# XPEDITION

**NATIVE Command Line Interface
Reference Manual 8.2**

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# Contents

# About This Manual

This manual provides reference information for the commands in the Enterasys X-Pedition (XP) Command Line Interface (CLI). For product information not available in this manual, see the manuals listed in *Related Documentation* .

## What's New

The content of this manual is representative of the features and capabilities found in the 8.2 release. Changes to this manual include the addition of new and extended capabilities for the following:

# Who Should Read this Manual?

Read this manual if you are a network administrator responsible for configuring or managing the XP.

# How to Use this Manual

The CLI commands and facilities are organized alphabetically in this manual. To locate information about a command, go to the chapter for the command or for the facility that contains the command. For example, to find information about the **configure** command, go to *configure Command* on page 195. To find information about the **interface add** command, go to *interface Commands* on page 355, then locate the description of the **interface add** command within that chapter.

# Related Documentation

The XP documentation set includes the following items. Refer to these other documents to learn more about your product.

| For Information About... | See the... |
|---|---|
| Installing and setting up the XP | *Enterasys X-Pedition Getting Started Guide* |
| How to use CLI (Command Line Interface) commands to configure and manage the XP | *Enterasys X-Pedition User Reference Manual* |
| SYSLOG messages and SNMP traps | *Enterasys X-Pedition Error Reference Manual* |

# CLI Parameter Types

The following table describes all the parameter types you can use with the CLI.

| Data Type | Descripton | Example |
|---|---|---|
| conditional | A numerical conditional expression. Special symbols are used to describe a numerical condition: > (greater than), < (less than) and != (not equal to). | <1024 or >2048 or !=4096 |
| hexadecimal | A hexadecimal number | a7 or 0xa7 |
| hostname | Hostname of an IP host | gauguin or john-pc |
| hostname/IP | Hostname or IP address of a host | nagasaki or 10.43.1.4 |

| Data Type | Descripton | Example |
|---|---|---|
| keyword | A keyword described in the list of acceptable keywords in the online help | on or off |
| interface name or IP address | Name of an interface or its IP address | int1 or 10.1.4.33 |
| interface name list | A list of one or more interface names delimited by commas | int1 or int1,int2,int3 |
| IP address | An IP address of the form x.x.x.x. Some commands may explicitly require a unicast or multicast address. | *10.1.2.3* |
| IP address/mask | A pair of IP address and mask values. Depending on the command, the mask may be a network mask or filtering mask. The mask can be described using the traditional IP address syntax (255.0.0.0) or a CIDR syntax (/8). | 10.1.4.0/255.255.255.0 or 10.1.4.0/24 |
| IP address list | A list of IP addresses separated by spaces but enclosed in quotes. | *"10.1.4.4 10.1.5.5 10.1.6.6"* |
| IPX network address | An IPX network address in hexadecimal | |
| IPX network**.**node address | An IPX network and node address of the form <netaddr>.<macaddr> where <netaddr> is the network address of a host and <macaddr> is the node or MAC address of the IPX host. For some commands, if the node address is not given, the node address is assumed to be a wildcard. | a1b2c3d4.0820a1:f3:38:11 or aa89f383 |
| IPX SAP server name | An alphanumeric string representing a valid IPX SAP server name where the following characters are illegal: "*./:;<=>?[]\| | server1 |
| MAC address | A MAC address specified in one of two forms: xx:xx:xx:xx:xx:xx or xxxxxx:xxxxxx | 08:00:50:1a:2b:c3 or 080050:1a2bc3 |
| number | An integer number | *100* |
| numerical range | A number or a range of numbers | 5 or 7-10 |
| port | A single port | et.1.4, gi.2.1, hs.3.1.100, or se.4.2.200 |

| Data Type | Descripton | Example |
|---|---|---|
| port list | A list of one or more ports. To specify a range of ports within a module, describe the range in parenthesis. You can also specify non-consecutive ports by using commas to separate them. The wildcard character (*) can also be used to specify all modules or all ports within a module | et.1.(3-8) or et.1.(1,3,5), hs.(1-2).1.100, or se.4.(1-3).200, gi.2.* |
| slot number | A list of one or more occupied slots in the XP | 1 or 7 |
| string | A character string. To include spaces in a string, specify the entire string in double quotes (“). | abc or “abc def” |
| URL | A Uniform Resource Locator. The type of URL depends on the command where the URL is used. Currently, two URLs are supported:<br><br>TFTP: *tftp://host/pathname*<br><br>RCP: *rcp://username@host/pathname* | tftp://10.1.4.5/test/abc.txt<br><br>rcp://dave@rtr/test/abc.txt |

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| | |
|---|---|
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• Your Enterasys Networks service contract number

- A description of the failure

- A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)

- The serial and revision numbers of all involved Enterasys Networks products in the network

- A description of your network environment (layout, cable type, etc.)

- Network load and frame size at the time of trouble (if known)

# Chapter 1

# acl Commands

The **acl** commands allow you to create ACLs (Access Control Lists) and apply them to IP and IPX interfaces on the XP. An ACL permits or denies switching of packets based on criteria such as the packet's source address and destination address, TCP or UDP port number, and so on. When you apply an ACL to an interface, you can specify whether the ACL affects incoming traffic or outgoing traffic. You also can enable a log of the ACL's use.

**Note:** Using ACLs for packet filtering directly impacts NetFlow performance. Specific performance will vary based on the number and complexity of the ACLs.

## Command Summary

Table 1 lists the **acl** commands. The sections following the table describe the command syntax.

**Table 1. acl commands**

| |
|---|
| **acl** *<name>* **apply interface** *<InterfaceName>* **input\|output** **[logging on\|off\|deny-only\|permit-only\|on-syslog\|deny-syslog\|permit-syslog] [policy local\|external]** |
| **acl** *<name>* **apply interface-are** *<InterfaceName>* **input\|output** |
| **acl** *<name>* **apply port** *<port list>* **input\|output [logging on\|off\|on-syslog\|deny-syslog\|permit-syslog] [policy local\| external]** |
| **acl** *<name>* **apply service** *<ServiceName>* **[logging on\|off\|on-syslog\|deny-syslog\|permit-syslog]** |
| **acl** *<name>* **clearCounters aclname\| all\| interface\| service\| port** |
| **acl logging set syslog-only** |
| **acl** *<name>* **permit\|deny appletalk [nbp-brrq] [nbp-fwdrq] [nbp-lookup] [nbp-object** *<ObjectName>*] **[nbp-type** *<TypeName>*] **[nbp-zone** *<ZoneName>*] |

**Table 1.  acl commands (Continued)**

| |
|---|
| **acl** *\<name\>* **permit\|deny appletalk cable-range** *\<range\>* |
| **acl** *\<name\>* **permit\|deny appletalk zone** *\<ZoneName\>* |
| **acl** *\<name\>* **permit\|deny icmp** *\<SrcAddr/Mask\>* *\<DstAddr/Mask\>* **[log]** |
| **acl** *\<name\>* **permit\|deny igmp** *\<SrcAddr/Mask\>* *\<DstIP/mask\>* **[log]** |
| **acl** *\<name\>* **permit\|deny ip** *\<SrcAddr/Mask\>* *\<DstAddr/Mask\>* *\<SrcPort\>* *\<DstPort\>* *\<tos\>* [**accounting 5-minutes\|15-minutes\|hourly**] **[log]** |
| **acl** *\<name\>* **permit\|deny ip-protocol** *\<proto-num\>* *\<SrcAddr/Mask\>* *\<DstAddr/Mask\>* *\<tos\>* **[log]** |
| **acl** *\<name\>* **permit\|deny ipx** *\<SrcAddr\>* *\<SrcSocket\>* *\<DstAddr\>* *\<DstSocket\>* *\<SrcNetMask\>* *\<DstNetMask\>* |
| **acl** *\<name\>* **permit\|deny ipxgns** *\<ServerAddr\>* *\<ServiceType\>* *\<ServiceName\>* |
| **acl** *\<name\>* **permit\|deny ipxrip** *\<FromNetwork\>* *\<ToNetwork\>* |
| **acl** *\<name\>* **permit\|deny ipxsap** *\<ServerAddr\>* *\<ServiceType\>* *\<ServiceName\>* |
| **acl** *\<name\>* **permit\|deny ipxtype20** |
| **acl** *\<name\>* **permit\|deny tcp** *\<SrcAddr/Mask\>* *\<DstAddr/Mask\>* *\<SrcPort\>* *\<DstPort\>* *\<tos\>* *\<tos-mask\>* [**accounting 5-minutes\|15-minutes\|hourly**] [**established**] **[log]** |
| **acl** *\<name\>* **permit\|deny udp** *\<SrcAddr/Mask\>* *\<DstAddr/Mask\>* *\<SrcPort\>* *\<DstPort\>* *\<tos\>* *\<tos-mask\>* [**accounting 5-minutes\|15-minutes\|hourly**] **[log]** |
| **acl-policy enable external\| policy-routing-external** |
| **acl show [aclname** *\<string\>*/**all] \| [interface** *\<string\>*/**all-ip] \| [service] \| [port** *\<port list\>*/**all-ports] \| [all]** |

# acl apply interface

## Purpose

Apply an ACL to an interface.

## Format

**acl** *<name>* **apply interface** *<InterfaceName>* **input|output**
**[logging on|off|deny-only|permit-only|on-syslog|deny-syslog|permit-syslog] [policy**
**local|external]**

## Mode

Configure

## Description

The **acl apply interface** command applies a previously defined ACL to an interface. When you apply an ACL to an interface, you implicitly enable access control on that interface. You can apply an ACL to filter out inbound traffic, outbound traffic, or both inbound and outbound traffic. Inbound traffic is packets coming into the interface while outbound traffic is packets going out of that interface.

When you apply an ACL, you also can enable ACL Logging by using the **logging** keyword. When you enable ACL Logging on an interface, the XP displays ACL Logging messages on the console. The ACL log provides information such as the interface name, the ACL name, whether the packet is forwarded or not, and the internal details of the packet.

You can also specify if the ACL is allowed to be modified or removed from the interface by an external agent (such as a policy manager application) by using the **policy** keyword. If you do not specify the **policy** keyword, an external agent is allowed to modify or remove the applied ACL. Note that the **acl-policy enable external** command must be in the configuration before an external agent can modify or remove an applied ACL.

## Parameters

| | |
|---|---|
| *<name>* | Name of the ACL. The ACL must already be defined. To define an ACL, use one of the commands described in other sections in this chapter. |
| *<InterfaceName>* | Name of the interface to which you are applying the ACL. |
| **input** | Applies the ACL to filter out inbound traffic. |
| **output** | Applies the ACL to filter out outbound traffic. |

**logging on|off|deny-only|permit-only**

Enables or disables ACL logging for this interface. You can specify one of the following keywords:

| | |
|---|---|
| **off** | Disables all logging. |
| **on** | Enables logging of packets that are dropped or forwarded because of ACL. If logging is turned on when you apply the ACL to an interface, you will override the rule-based logging values. In order to enable rule-based logging, the log option must remain off. |
| **deny-only** | Enables logging of dropped packets only. |
| **permit-only** | Enables logging of forwarded packets only. |
| **on-syslog** | Enables logging of packets that are dropped or forwarded. Sends logging messages only to SYSLOG server. |
| **deny-syslog** | Enables logging of dropped packets only. Sends logging messages only to SYSLOG server. |
| **permit-syslog** | Enables logging of forwarded packets only. Sends logging messages only to SYSLOG server. |

**policy local|external**

Allows or prevents an external agent from modifying or removing the applied ACL. You can specify one of the following keywords:

| | |
|---|---|
| **local** | External agent cannot modify or remove the applied ACL. |
| **external** | External agent can modify or remove the applied ACL. This is the default. |

## Restrictions

You can apply only one ACL at a time (IP or IPX) to inbound or outbound traffic on an interface. For example, if you define two ACLs, "ipacl1" and "ipacl2", you cannot apply them both to inbound traffic. However, if you define one ACL for *inbound* traffic and one for *outbound* traffic, you can apply both ACLs. This does not limit the number of rules you may apply, it means only that you must include all rules in a single ACL.

**Note:**   You can apply IP ACLs to IP interfaces only and IPX ACLs to IPX interfaces only.

## Examples

To apply ACL "100" to interface *int4* to filter out inbound traffic:

```
xp(config)# acl 100 apply interface int4 input
```

To apply ACL "nonfs" to interface *int16* to filter out outbound traffic and enable logging:

xp(config)# **acl nonfs apply interface int16 output logging on**

To apply ACL "100" to interface *int10* to filter out inbound traffic and enable logging to the SYSLOG server:

xp(config)# **acl 100 apply interface int10 input logging on-syslog**

# acl apply interface-are

## Purpose

Applies an Appletalk/ARE (Advanced Routing Engine) ACL to an interface.

## Format

**acl** *<name>* **apply interface-are** *<InterfaceName>* **input|output**

## Mode

ARE-Configure

## Description

The **acl apply interface-are command** works very similarly to the **acl apply interface** command, with the following exceptions:

–   If an Appletalk/ARE ACL contains Names Binding Protocol (NBP) rules (such as nbp-brrq, nbp-fwdrq, nbp-lookup, nbp-object, nbp-type, or nbp-zone), you may only apply it to the *input* of an interface.

–   Like other ACLs for the XP, each direction (input and output) on an interface must have only one Appletalk/ARE ACL applied to it at a time. For example, although you can define two ARE ACLs, "areacl1" and "areacl2", you cannot apply them both to the same interface. Unlike other ACLs, however, a single ARE ACL may be applied to *both* directions on one interface. In addition, a single ARE ACL may be applied to multiple interfaces.

–   After applying an ARE ACL containing zone or cable-range rules, it may be necessary to reboot all network XPs in order to see the new ACL. Alternatively, you may disable or disconnect the Routing Maintenance Protocol (RTMP) until all routes have been removed from each network XP routing table.

**Note:**   No special action is required for ACLs containing only NBP rules.

–   There are no logging options available for ARE ACLs at this time.

## Parameters

| | |
|---|---|
| *<name>* | Name of the ACL. The ACL must already be defined. To define an ACL, use one of the commands described in other sections in this chapter. |
| *<InterfaceName>* | Name of the interface to which you are applying the ACL. |
| **input** | Applies the ACL to filter out inbound traffic. |
| **output** | Applies the ACL to filter out outbound traffic. |

## Restrictions

You may only use this command in ARE-Configure mode. For more about this mode, please see Chapter 6, *are Commands*.

You may apply only one ARE ACL to an interface at a time.

## Examples

To apply ACL "ar10" to interface *int4* to filter out inbound traffic:

xp(are-config)# **acl ar10 apply interface-are int4 input**

To apply ACL "ar12" to interface *int16* to filter out outbound traffic:

xp(are-config)# **acl ar12 apply interface-are int16 output**

# acl apply port

## Purpose

Apply an ACL to one or more ports operating in Layer 4 bridging mode.

## Format

**acl** *<name>* **apply port** *<port list>* **input|output [logging on|off|on-syslog|deny-syslog|permit-syslog] [policy local| external]**

## Mode

Configure

## Description

The **acl apply port** applies a previously defined ACL to one or more ports. This command only applies to ports operating in Layer 4 bridging mode. The ACLs that are applied to a Layer 4 bridging port are only used with bridged traffic. Routed traffic is still subject to the ACLs that are attached to the interface.

## Parameters

| | |
|---|---|
| *<name>* | Name of the ACL. The ACL must already be defined. To define an ACL, use one of the commands described in other sections in this chapter. |
| *<port list>* | Specifies the port(s) in the Layer-4 bridging VLAN to which you are applying the ACL. |
| **input** | Applies the ACL to filter out inbound traffic. |
| **output** | Applies the ACL to filter out outbound traffic. |
| **logging on|off** | Enables or disables ACL logging for this port. You can specify one of the following keywords: |

| | | |
|---|---|---|
| | **on** | Enables logging of packets that are dropped or forwarded because of ACL. |
| | **off** | Disables all logging. |
| | **on-syslog** | Enables logging of packets that are dropped or forwarded. Sends logging messages only to SYSLOG server. |
| | **deny-syslog** | Enables logging of dropped packets only. Sends logging messages only to SYSLOG server. |

| | |
|---|---|
| **permit-syslog** | Enables logging of forwarded packets only. Sends logging messages only to SYSLOG server. |

**policy local|external**

Allows or prevents an external agent from modifying or removing the applied ACL. You can specify one of the following keywords:

| | |
|---|---|
| **local** | External agent cannot modify or remove the applied ACL. |
| **external** | External agent can modify or remove the applied ACL. This is the default. |

## Restrictions

The line cards that contain the specified ports must support Layer 4 bridging. The XP software checks the line card(s) and displays an error message if new line card(s) are necessary.

## Examples

To apply ACL "l4" to slot 1, gigabit port 3 and slot 3, 10/100 port 6 for inbound traffic:

```
xp(config)# acl l4 apply port gi.1.2 et.3.6 input
```

To apply ACL "l4out" to slot 5, all ports for outbound traffic and enable logging:

```
xp(config)# acl l4out apply port et.5.* output logging on
```

To apply ACL "l4" to slot 3, all ports for outbound traffic and enable logging to the SYSLOG server:

```
xp(config)# acl 14 apply port et.3.* output logging on-syslog
```

# acl apply service

## Purpose

Apply an ACL to a service on the XP.

## Format

**acl** *<name>* **apply service** *<ServiceName>* **[logging on|off|on-syslog|deny-syslog|permit-syslog]**

## Mode

Configure

## Description

The **acl apply service** command applies a previously defined ACL to a service provided by the XP. A service is typically a server or agent running on the XP, for example, a Telnet server or SNMP agent. By applying an ACL to a service, you can control which host can access individual services on the XP. This type of ACL is known as a Service ACL. It does not control packets going *through* the XP. It only controls packets that are *destined* for the XP, specifically, one of the services provided by the XP. As a result, a Service ACL, by definition, is applied only to check for inbound traffic to the XP. The destination host of a Service ACL is by definition the XP. The destination port is the well-known port of the service.

When you apply an ACL, you also can enable ACL Logging by using the **logging** keyword. When you enable ACL Logging on an interface, the XP displays ACL Logging messages on the console. The ACL log provides information such as the interface name, the ACL name, whether the packet is forwarded or not, and the internal details of the packet.

In addition, you may apply an ACL to a service on a per-interface basis, based on the destination address defined by the ACL.

## Parameters

| | |
|---|---|
| *<name>* | Name of the Service ACL. The ACL must already be defined. To define an ACL, use one of the commands described in other sections in this chapter. |
| *<ServiceName>* | Name of the service on the XP to which you are applying the ACL. Currently, the following services are supported: |

      **http**     HTTP web server

      **snmp**    SNMP agent

      **telnet**   Telnet server

**[logging [on|off]]**    Enables or disables ACL logging for this interface. You can specify one of the following keywords:

        **off**    Disables logging.

        **on**    Enables logging.

        **on-syslog**
            Enables logging of packets that are dropped or forwarded. Sends logging messages only to SYSLOG server.

        **deny-syslog**
            Enables logging of dropped packets only. Sends logging messages only to SYSLOG server.

        **permit-syslog**
            Enables logging of forwarded packets only. Sends logging messages only to SYSLOG server.

## Restrictions

You can apply only one ACL of each type (IP or IPX) to a service at one time. For example, although you can define two ACLs, "ipacl1" and "ipacl2", you cannot apply them both to the same service.

## Examples

To permit access to the SNMP agent only from the host 10.4.3.33 (presumably an SNMP management station):

```
xp(config)# acl 100 permit udp 10.4.3.33
xp(config)# acl 100 apply service snmp
```

The following commands permit access to the Telnet server from hosts on the subnet 10.4.7.0/24 with a privileged source port. In addition, with logging enabled, all incoming Telnet accesses are logged to the console.

```
xp(config)# acl 120 permit tcp 10.4.7.0/24 <1024
xp(config)# acl 120 apply service telnet logging on
```

The following commands permit access to the HTTP web server from subnet 10.12.4.0/24. Notice that even though the destination address and port are specified for this ACL (*10.12.7.44* and *any* port), they are ignored. This service ACL will match only packets destined for the XP itself and the well-known port of the service (port 80 for HTTP).

```
xp(config)# acl 140 permit ip 10.12.4.0/24 any 10.12.7.44 any
xp(config)# acl 120 apply service http
```

# acl clearCounters

## Purpose

Clears one or all ACL counters.

## Format

**acl clearCounters aclname** *<string>* **| all| interface| service| port**

## Mode

Enable

## Description

The **acl clearCounters** commands allows the user to clear ACL counters. With ACL logging enabled, the router prints out a message about whether a packet is forwarded or dropped and counters keep track of these statistics. With this command, the user can clear these ACL counters.

## Parameters

| | |
|---|---|
| **aclname** *<string>* | Clears the counter based on the name of the ACL. Specify **all** to clear all ACLs. |
| **all** | Clears all ACL counters. |
| **interface** *<string>* | Clears ACL counters attached to specific interfaces. Specify **all-ip** to clear all counters with IP interfaces. |
| **service** | Clears ACL counters that are applied to services. |
| **port** *<port list>* | Clears ACL counters on specific ports. Specify **all-ports** to clear counters on all ports. |

## Restrictions

None

## Examples

To clear the ACL counters for ACL 'engacl':

```
xp# acl clearCounters aclname engacl
```

# acl logging set syslog-only

## Purpose

Directs all acl reports only to the SYSLOG server.

## Format

**acl logging set syslog-only**

## Mode

Configure

## Description

The **acl logging set syslog-only** commands allows the user to globally direct acl reporting to the SYSLOG server only (if defined). In order to view messages at the SYSLOG server, the SYSLOG level should be set to accept Informational Messages.

## Restrictions

None.

# acl permit|deny appletalk nbp

## Purpose

Creates an Appletalk/ARE (Advanced Routing Engine) ACL with Name Binding Protocol (NBP) rules.

## Format

**acl** *<name>* **permit|deny appletalk [nbp-brrq] [nbp-fwdrq] [nbp-lookup] [nbp-object** *<ObjectName>*] **[nbp-type** *<TypeName>*] **[nbp-zone** *<ZoneName>*]

## Mode

ARE-Configure

## Description

The **acl permit appletalk** and **acl deny appletalk** commands creates and defines an ACL to allow or block specific types Appletalk/ARE traffic from entering or leaving the XP. In this case, you use the commands to define Name Binding Protocol (NBP) rules. As with other ACLs for the XP, you may use both deny and permit commands within the same NBP-ruled ACL.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You may use a string of characters or a number. |
| **nbp-prrq** | Name Binding Protocol Broadcast Request. Permit or deny all broadcast request packets. |
| **nbp-fwdrq** | Name Binding Protocol Forward Request. Permit or deny all forward request packets. |
| **nbp-lookup** | Name Binding Protocol Lookup Request. Permit or deny all lookup request packets. |

**nbp-object** *<ObjectName>*
> Permit or deny a specific machine. Specify the name of the machine (up to 32 characters). A single "~" can be used to request a match for 0 or more characters. If no machine is specified, the default "**any**" will be applied.

**nbp-type** *<TypeName>*
> Permit or deny a specific type of machine. Specify the name of the machine (up to 32 characters). A single "~" can be used to request a match for 0 or more characters. If no machine type is specified, the default "**any**" will be applied.

**nbp-zone** *<ZoneName>*

Permit or deny requests from a specific zone. Specify the name of the zone. If no zone is specified, the default "**any**" will be applied.

## Restrictions

You may only use this command in ARE-Configure mode. For more about this mode, please see Chapter 6, *are Commands*.

When you apply an Appletalk/ARE ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies ***all*** traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

A single ACL can contain rules for NBP, zone, or cable-range, due to the fact that these three Appletalk/ARE ACL rules act independently of one another. In effect, a single ACL containing all three types of rule will act as if it were three different ACLs.

## Examples

To permit all broadcast requests for ACL ar310:

```
xp(are-config)# acl ar310 permit appletalk nbp-brrq
```

The *implicit deny rule* will automatically cause all forward requests to be dropped.

To permit both broadcast and forward requests:

```
xp(are-config)# acl ar310 permit appletalk nbp-brrq nbp-fwdrq
```

To deny recognition of all laser printers on any zone:

```
xp(are-config)# acl ar310 deny appletalk nbp-object ~ nbp-type laserprinter
xp(are-config)# acl ar310 permit nbp-brrq nbp-fwdrq
```

To deny recognition of laser printer "printer 1":

```
xp(are-config)# acl ar310 deny appletalk nbp-object printer1 nbp-type laserprinter
xp(are-config)# acl ar310 permit nbp-brrq nbp-fwdrq
```

# acl permit|deny appletalk cable-range

## Purpose

Creates an Appletalk/ARE (Advanced Routing Engine) ACL containing cable range rules.

## Format

**acl** *<name>* **permit|deny appletalk cable-range** *<range>*

## Mode

ARE-Configure

## Description

The **acl permit appletalk cable-range** and **acl deny appletalk cable-range** commands create and define an ACL to allow or block specific types Appletalk/ARE traffic from entering or leaving the XP. In this case, you use the commands to define cable range rules. Unlike with other ACLs for the XP, all cable range rules within an ACL must either permit or deny traffic; you may not mix the two commands.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You may use a string of characters or a number. |
| *<range>* | Cable range for which to apply rule. Specify values between 1 and 65279, inclusive. |

## Restrictions

You may only use this command in ARE-Configure mode. For more about this mode, please see Chapter 6, *are Commands*.

All cable range rules within a single ACL must either permit or deny traffic. For example, if you create a rule, "acl appleacl deny appletalk cable-range 1-100", any additional cable range rules for ACL "appleacl" must also be of the type "deny."

When you apply an Appletalk/ARE ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies **all** traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic. Thusly, if you define an ACL to "deny" cable range access, any cable range not listed within the ACL will be permitted. If you define an ACL to "permit" cable range access, any cable range not listed within the ACL will be blocked.

A single ACL can contain rules for cable-range, NBP, and zone due to the fact that these three Appletalk/ARE ACL rules act independently of one another. In effect, a single ACL containing all three types of rule will act as if it were three different ACLs.

# acl permit|deny appletalk zone

## Purpose

Creates an Appletalk/ARE (Advanced Routing Engine) ACL containing zone rules.

## Format

**acl** *<name>* **permit|deny appletalk zone** *<ZoneName>*

## Mode

ARE-Configure

## Description

The **acl permit appletalk zone** and **acl deny appletalk zone** commands create and define an ACL to allow or block specific types Appletalk/ARE traffic from entering or leaving the XP. In this case, you use the commands to define zone rules. Unlike with other ACLs for the XP, all zone rules within an ACL must either permit or deny traffic; you may not mix the two commands.

**Note:** The XP acts as either a *seed* or a *no-seed* router. If you set as a seed router, the XP will assign zone information to the networks to which it is attached.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You may use a string of characters or a number. |
| *<ZoneName>* | The name of the zone for which to apply rule. Zone names may use a string of characters or numbers. (A *zone* refers a logical grouping of appletalk networks on a LAN or WAN.) |

## Restrictions

You may use this command only in ARE-Configure mode. For more about this mode, please see Chapter 6, *are Commands*.

All zone rules within a single ACL must either permit or deny traffic. For example, if you create a rule, "acl zacl deny appletalk zone myzone," any additional zone rules for ACL "zacl" must also be of the type "deny."

When you apply an Appletalk/ARE ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies **all** traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic. Thusly, if you define an ACL to "deny" zone access, any zone not listed within the ACL will be permitted. If you define an ACL to "permit" zone access, any zone not listed within the ACL will be blocked.

A single ACL can contain rules for zone, NBP, and cable-range, due to the fact that these three Appletalk/ARE ACL rules act independently of one another. In effect, a single ACL containing all three types of rule will act as if it were three different ACLs.

## Examples

If you wish to permit only those packets that emanate from zoneA (i.e., all other packets are ignored), enter the following:

**acl 243 permit appletalk zone zoneA**

If you wish to deny all packets from zoneB (i.e., all other packets are welcome), enter the following:

**acl 245 deny appletalk zone zoneB**

# acl permit|deny icmp

## Purpose

Create an ICMP ACL.

## Format

**acl** *<name>* **permit|deny icmp** *<SrcAddr/Mask>* *<DstAddr/Mask>* *<tos>*

## Mode

Configure

## Description

The **acl permit icmp** and **acl deny icmp** commands define an ACL to allow or block ICMP traffic from entering or leaving the XP. For each of the values describing a flow, you can use the keyword **any** to specify a *wildcard* ("don't care") condition. If you do not specify a value for a field, the XP applies a wildcard condition to the field, giving the same effect as if you specify the **any** keyword.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You can use a string of characters or a number. |
| *<SrcAddr/Mask>* | The source address and the filtering mask of this flow. If the source address is a network or subnet address, you must supply the filtering mask. Generally, the filtering mask is the network mask of this network or subnet. If the source address is that of a host then no mask is required. By default, if a mask is not supplied, the source address is treated as that of a host. You can specify the mask using the traditional IP address format ("255.255.0.0") or the CIDR format ("/16"). |
| *<DstAddr/Mask>* | The destination address and the filtering mask of this flow. The same requirements and restrictions for *<SrcAddr/Mask>* apply to *<DstAddr/Mask>*. |
| *<tos>* | IP TOS (Type of Service) value. You can specify a TOS value from 0 – 255. |
| **log** | This optional parameter allows you to enable ACL logging for this specific ACL rule. If logging is turned on when you apply the ACL to an interface (e.g., with the *acl apply interface* on page 3), you will override the rule-based logging values. In order to enable rule-based logging, the log option must remain off. |

## Restrictions

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies **all** traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

To deny ICMP traffic from the subnet 10.24.5.0 (with a 24 bit netmask) to any destination:

xp(config)# **acl 310 deny icmp 10.24.5.0/24 any**

To create an ACL to permit ICMP traffic from the host 10.12.28.44 to subnet 10.43.21.0:

xp(config)# **acl 312 permit icmp 10.12.28.44 10.43.21.0/24**

# acl permit|deny igmp

## Purpose

Create an IGMP ACL.

## Format

**acl** *<name>* **permit|deny igmp** *<SrcAddr/Mask> <DstAddr/Mask> <tos>*

## Mode

Configure

## Description

The **acl permit igmp** and **acl deny igmp** commands define an ACL to allow or block IGMP traffic from entering or leaving the XP. For each of the values describing a flow, you can use the keyword **any** to specify a wildcard ("don't care") condition. If you do not specify a value for a field, the XP applies a wildcard condition to the field, giving the same effect as if you specify the **any** keyword.

| | |
|---|---|
| *<name>* | Name of this ACL. You can use a string of characters or a number. |
| *<SrcAddr/Mask>* | The source address and the filtering mask of this flow. If the source address is a network or subnet address, you must supply the filtering mask. Generally, the filtering mask is the network mask of this network or subnet. If the source address is that of a host then no mask is required. By default, if a mask is not supplied, the source address is treated as that of a host. You can specify the mask using the traditional IP address format ("255.255.0.0") or the CIDR format ("/16"). |
| *<DstAddr/Mask>* | The destination address and the filtering mask of this flow. The same requirements and restrictions for *<SrcAddr/Mask>* apply to *<DstAddr/Mask>*. |
| *<tos>* | IP TOS (Type of Service) value. You can specify a TOS value from 0 – 255. |
| **log** | This optional parameter allows you to enable ACL logging for this specific ACL rule. |

## Restrictions

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies *all* traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

To create an ACL to deny IGMP traffic from the subnet 10.1.5.0 (with a 24 bit netmask) to any destination:

```
xp(config)# acl 410 deny igmp 10.1.5.0/24 any
```

To create an ACL to permit IGMP traffic from the host 10.33.34.44 to subnet 10.11.21.0:

```
xp(config)# acl 714 permit igmp 10.33.34.44 10.11.21.0/24
```

# acl permit|deny ip

## Purpose

Create an IP ACL.

## Format

**acl <***name***> permit|deny ip** *<SrcAddr/Mask> <DstAddr/Mask> <SrcPort> <DstPort> <tos>*
*<tos-mask>* **any** [**accounting 5-minutes|15-minutes|hourly**] [**log**]

## Mode

Configure

## Description

The **acl permit ip** and **acl deny ip** commands define an Access Control List to allow or block IP
traffic from entering or leaving the router. Unlike the more specific variants of the acl commands
for **tcp** and **udp**, the IP version of the command includes IP-based protocols such as **tcp**, **udp**, **icmp**
and **igmp**. For each of the values describing a flow, you can use the keyword **any** to specify a
*wildcard* ("don't care") condition. If you do not specify a value for a field, the XP assumes that the
value is a wildcard (as if you had specified the **any** keyword). The two exceptions to this rule are
the optional parameters *<tos>* (type of service) and **accounting**. *<tos>* is a value from 0 to 15. The
**accounting** keyword is only valid for the **permit** command, and can be placed anywhere on the
command line.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You can use a string of characters or a number. The string must be less than 100 characters. |
| *<SrcAddr/Mask>* | The source address and the filtering mask of this flow. If the source address is a network or subnet address, you must supply the filtering mask. Generally, the filtering mask is the network mask of this network or subnet. If the source address is that of a host then no mask is required. By default, if a mask is not supplied, the source address is treated as that of a host. You can specify the mask using the traditional IP address format ("255.255.0.0") or the CIDR format ("/16"). |
| *<DstAddr/Mask>* | The destination address and the filtering mask of this flow. The same requirements and restrictions for *<SrcAddr/Mask>* apply to *<DstAddr/Mask>*. |
| *<SrcPort>* | For TCP or UDP, the number of the source TCP or UDP port. This field applies only to TCP or UDP traffic. If the incoming packet is ICMP or another non-TCP or non-UDP packet and you specified a source or destination port, the XP |

does not check the port value. The XP checks only the source and destination IP addresses in the packet.

You can specify a range of port numbers using operator symbols; for example, 10-20 (between 10 and 20 inclusive), >1024 (greater than 1024), <1024 (less than 1024), !=1024 (not equal to 1024). The port numbers of some popular services are already defined as keywords. For example, for Telnet, you can enter the port number 23 as well as the keyword **telnet**.

| | |
|---|---|
| *<DstPort>* | For TCP or UDP, the number of the destination TCP or UDP port. This field applies only to incoming TCP or UDP traffic. The same requirements and restrictions for *<SrcPort>* apply to *<DstPort>*. |
| *<tos>* | IP TOS (Type of Service) value. You can specify a TOS value from 0 – 255. |
| *<tos-mask>* | Mask value used for the TOS byte. You can specify a mask value from 0– 255. Default is **30**. Specify **any** for any TOS value. |
| **log** | This optional parameter allows you to enable ACL logging for this specific ACL rule. |

## Restrictions

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies ***all*** traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

To create an ACL to permit IP traffic from the subnet 10.1.0.0 (with a 16 bit netmask) to any destination:

```
xp(config)# acl 100 permit ip 10.1.0.0/16 any
```

The following command creates an ACL to deny any incoming TCP or UDP traffic coming from a privileged port (less than 1024). If the incoming traffic is not TCP or UDP, then the XP check only the source and destination addresses, not the port number. Therefore, this ACL will deny all non-TCP and non-UDP traffic.

```
xp(config)# acl 120 deny ip any any 1-1024 any
```

To create an ACL to permit Telnet traffic (port 23) from the host 10.23.4.8 to the subnet 10.2.3.0:

```
xp(config)# acl 130 permit ip 10.23.4.8 10.2.3.0/24
```

The following command creates an ACL to permit all IP traffic. Since none of the ACL fields are specified, they are all assumed to be wildcards.

```
xp(config)# acl allip permit ip
```

The above command is equivalent to the following:

```
xp(config)# acl allip permit ip any any any any any
```

# acl permit|deny ip-protocol

## Purpose

Create an ACL for any IP protocol type.

## Format

**acl** *<name>* **permit|deny ip-protocol** *<proto-num> <SrcAddr/Mask> <DstAddr/Mask> <tos>*
[**log**]

## Mode

Configure

## Description

The **acl permit ip-protocol** and **acl deny ip-protocol** commands define an Access Control List to
allow or block IP traffic from entering or leaving the router for any protocol type. Unlike the more
specific variants of the acl commands such as **ip**, **tcp** and **udp**, the **ip-protocol** version of the
command allows the user to specify any valid IP protocol type. This command allows the user to
specify an IP protocol other than the ones available with other **acl permit|deny** commands. For
example, to specify an ACL for IP encapsulation in IP, one can use the IPinIP protocol type, 4, in
the ACL. For each of the values describing a flow, you can use the keyword **any** to specify a
*wildcard* ("don't care") condition. If you do not specify a value for a field, the XP assumes that the
value is a wildcard (as if you had specified the **any** keyword).

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You can use a string of characters or a number. |
| *<proto-num>* | IP protocol number of this flow. |
| *<SrcAddr/Mask>* | The source address and the filtering mask of this flow. If the source address is a network or subnet address, you must supply the filtering mask. Generally, the filtering mask is the network mask of this network or subnet. If the source address is that of a host then no mask is required. By default, if a mask is not supplied, the source address is treated as that of a host. You can specify the mask using the traditional IP address format ("255.255.0.0") or the CIDR format ("/16"). |
| *<DstAddr/Mask>* | The destination address and the filtering mask of this flow. The same requirements and restrictions for *<SrcAddr/Mask>* apply to *<DstAddr/Mask>*. |
| *<tos>* | IP TOS (Type of Service) value. You can specify a TOS from 0 – 255. |
| **log** | This optional parameter allows you to enable ACL logging for this specific ACL rule. |

## Restrictions

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies ***all*** traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

To create an ACL to permit VRRP traffic (IP protocol type 112) from the subnet 10.14.0.0 (with a 16 bit netmask) to any destination:

```
xp(config)# acl 100 permit ip-protocol 112 10.14.0.0/16 any
```

The following command has the same function as **acl 120 deny igmp** since the protocol type for IGMP is 2.

```
xp(config)# acl 120 deny ip-protocol 2
```

# acl permit|deny ipx

## Purpose

Create an IPX ACL.

## Format

**acl** *<name>* **permit|deny ipx** *<SrcAddr> <SrcSocket> <DstAddr> <DstSocket> <SrcNetMask>*
*<DstNetMask>*

## Mode

Configure

## Description

The **acl permit ipx** and **acl deny ipx** commands define an ACL to allow or block IPX traffic from
entering or leaving the XP.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You can use a string of characters or a number. |
| *<SrcAddr>* | The source IPX address in *<network>*.*<node>* format, where *<network> is the network address and <node>* is the MAC address. The XP will interpret this number in hexadecimal format. You do not need to use a "0x" prefix. You can use the keyword **any** to specify a wildcard ("don't care") condition. |
| | To specify any network, enter **FFFFFFFF**.*<node>*; to specify any node, enter *<network>*.**FF:FF:FF:FF:FF:FF**. |
| *<SrcSocket>* | Source IPX socket. The XP will interpret this number in hexadecimal format. You do not need to use a "0x" prefix. You can use the keyword **any** to specify a wildcard ("don't care") condition. |
| *<DstAddr>* | The destination IPX address in *<network>*.*<node>* format. The syntax for the destination address is the same as the syntax for the source address *<SrcAddr>*. The XP will interpret this number in hexadecimal format. You do not need to use a "0x" prefix. You can use the keyword **any** to specify a wildcard ("don't care") condition. |
| *<DstSocket>* | Destination IPX socket. The XP will interpret this number in hexadecimal format. You do not need to use a "0x" prefix. You can use the keyword **any** to specify a wildcard ("don't care") condition. |
| *<SrcNetmask>* | Source network mask. This field specifies a group of networks for which the ACL applies. This mask field is ANDed with the network portion of |

<SrcAddr> and the source network of the incoming packets to determine a hit. The XP will interpret this number in hexadecimal format. You do not need to use a "0x" prefix.

This is an optional argument and if you omit the argument, the XP uses the hexadecimal value FFFFFFFF.

| | |
|---|---|
| *<DstNetmask>* | Destination network mask. This field specifies a group of networks for which the ACL applies. This mask field is ANDed with the network portion of *<DstAddr>* and the destination network of the incoming packets to determine a hit. The XP will interpret this number in hexadecimal format. You do not need to use a "0x" prefix. |

This is an optional argument and if you omit the argument, the XP uses the hexadecimal value FFFFFFFF.

## Restrictions

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies **all** traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

The following command creates an ACL to permit IPX traffic from the host with IPX address AAAAAAAA.01:20:0A:F3:24:6D, any socket, to any other IPX address (network.node), any socket.

```
xp(config)# acl 100 permit ipx AAAAAAAA.01:20:0A:F3:24:6D any any any
```

The following command creates an ACL to deny IPX traffic from the host with IPX address F6D5E4.01:20:0A:F3:24:6D, with socket address 451, to any other IPX address (network.node), any socket.

```
xp(config)# acl 200 deny ipx F6D5E4.01:20:0A:F3:24:6D 451 any any
```

# acl permit|deny ipxgns

## Purpose

Create an IPX GNS (Get Nearest Server) ACL.

## Format

**acl** *<name>* **permit|deny ipxgns** *<ServerAddr> <ServiceType> <ServiceName>*

## Mode

Configure

## Description

The **acl permit ipxgns** and **acl deny ipxgns** commands define an ACL to allow or block replying to GNS requests.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You can use a string of characters or a number. |
| *<ServerAddr>* | The SAP server's IPX address in *<network>.<node>* format, where *<network> is the network address and <node>* is the MAC address. You can use the keyword **any** to specify a wildcard ("don't care") condition. |
| *<ServiceType>* | The SAP service type. Express the service type in hexadecimal. You do not need to use a "0x" prefix. You can use the keyword **any** to specify a wildcard ("don't care") condition. |
| *<ServiceName>* | The SAP service name. This is an optional argument and if you omit the argument, the XP applies a wildcard condition to the field. |

## Restrictions

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies *all* traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic. You can only apply the **acl permit ipxgns** and **acl deny ipxgns** commands to output.

## Examples

To create a GNS ACL to permit the XP to reply with the server "FILESERVER", whose IPX address is F6D5E4.01:20:0A:F3:24:5D, to get nearest server requests:

```
xp(config)# acl 100 permit ipxgns F6D5E4.01:20:0A:F3:24:5D 0004 FILESERVER
```

To create a GNS ACL to prevent the XP from replying with the server "ARCHIVESERVER", whose IPX address is F6D5E4.01:20:0A:F3:24:5C, to a get nearest server request:

```
xp(config)# acl 200 deny ipxgns F6D5E4.01:20:0A:F3:24:5C 0009 ARCHIVESERVER
```

# acl permit|deny ipxrip

## Purpose

Create an IPX RIP (Route Information Protocol) ACL.

## Format

**acl** *<name>* **permit|deny ipxrip** *<FromNetwork>* *<ToNetwork>*

## Mode

Configure

## Description

The **acl permit ipxrip** and **acl deny ipxrip** commands define an ACL which allows or blocks IPX RIP traffic from entering or leaving the XP.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You can use a string of characters or a number. |
| *<FromNetwork>* | The "from" IPX network address. You can use the **any** keyword to specify a wildcard condition. If you use **any**, the XP uses the value 0 for *<FromNetwork> and FFFFFFFE for <ToNetwork>*. |
| *<ToNetwork>* | The "to" IPX network address. This is an optional parameter. If you omit this parameter, the value that the XP assumes depends on whether you specified **any** for *<FromNetwork>*. |

–If you omit the *<ToNetwork>* value and you used the value **any** for *<FromNetwork>*, the XP sets the *<ToNetwork>* to FFFFFFFE.

–If you omit the *<ToNetwork>* value but do not use the value **any** for *<FromNetwork>*, the XP sets *<ToNetwork>* to the same value you specified for *<FromNetwork>*.

## Restrictions

Please note that the rules within an ACL must belong to the same protocol family.

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies ***all*** traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

To create an ACL to permit IPX RIP traffic from networks AA000001 to AAFFFFFF:

xp(config)# **acl 100 permit ipxrip AA000001 AAFFFFFF**

# acl permit|deny ipxsap

## Purpose

Create an IPX SAP (Service Advertisement Protocol) ACL.

## Format

**acl** *<name>* **permit|deny ipxsap** *<ServerAddr>* *<ServiceType>* *<ServiceName>*

## Mode

Configure

## Description

The **acl permit ipxsap** and **acl deny ipxsap** commands define an ACL to allow or block IPX SAP traffic from entering or leaving the XP.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You can use a string of characters or a number. |
| *<ServerAddr>* | The SAP server's IPX address in *<network>*.*<node>* format, where *<network>* *is the network address and <node>* is the MAC address. You can use the keyword **any** to specify a wildcard ("don't care") condition. |
| | To specify any network, enter **FFFFFFFF**.*<node>*; to specify any node, enter *<network>*.**FF:FF:FF:FF:FF:FF**. |
| *<ServiceType>* | The SAP service type. Express the service type in hexadecimal. You do not need to use a "0x" prefix. You can use the keyword **any** to specify a wildcard ("don't care") condition. |
| *<ServiceName>* | The SAP service name. This is an optional argument and if you omit the argument, the XP applies a wildcard condition to the field. |

## Restrictions

Please note that the rules within an ACL must belong to the same protocol family.

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies *all* traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

To create a SAP ACL to permit SAP information related to the server "FILESERVER" whose IPX address is F6D5E4.01:20:0A:F3:24:5D:

```
xp(config)# acl 100 permit ipxsap F6D5E4.01:20:0A:F3:24:5D 0004 FILESERVER
```

To create a SAP ACL to deny SAP information related to the server "ARCHIVESERVER" whose IPX address is F6D5E4.01:20:0A:F3:24:5C:

```
xp(config)# acl 200 deny ipxsap F6D5E4.01:20:0A:F3:24:5C 0009 ARCHIVESERVER
```

# acl permit|deny ipxtype20

## Purpose

Create an IPX type 20 ACL.

## Format

**acl** *<name>* **permit|deny ipxtype20**

## Mode

Configure

## Description

The **acl permit ipxtype20** and **acl deny ipxtype20** commands define an ACL to allow or block IPX type 20 packets from entering or leaving the XP.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You may use a string of characters or a number. |

## Restrictions

Please note that the rules within an ACL must belong to the same protocol family.

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies *all* traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

To create an ACL to deny IPX type 20 packets:

```
xp(config)# acl 100 deny ipxtype20
```

# acl permit|deny tcp

## Purpose

Create a TCP ACL.

## Format

**acl** *<name>* **permit|deny tcp** *<SrcAddr/Mask>* *<DstAddr/Mask>* *<SrcPort>* *<DstPort>* *<tos>*
*<tos-mask>* [**accounting 5-minutes|15-minutes|hourly**] [**established**][**log**]

## Mode

Configure

## Description

The **acl permit tcp** and **acl deny tcp** commands define an ACL to allow or block TCP traffic from
entering or leaving the XP. For each of the values describing a flow, you can use the keyword **any**
to specify a *wildcard* ("don't care") condition. If you do not specify a value for a field, the XP
applies a wildcard condition to the field, giving the same effect as if you specify the **any** keyword.
The two exceptions to this rule are the optional parameters *<tos>* (type of service) and **accounting**.
*<tos>* is a value from 0 to 15. The **accounting** keyword is only valid for the **permit** command, and
can be placed anywhere on the command line.

## Parameters

| | |
|---|---|
| *<name>* | Is the name of this ACL. You can use a string of characters or a number. |
| *<SrcAddr/Mask>* | Is the source address and the filtering mask of this flow. If the source address is a network or subnet address, you must supply the filtering mask. Generally, the filtering mask is the network mask of this network or subnet. If the source address is that of a host then no mask is required. By default, if a mask is not supplied, the source address is treated as that of a host. You can specify the mask using the traditional IP address format ("255.255.0.0") or the CIDR format ("/16"). |
| *<DstAddr/Mask>* | Is the destination address and the filtering mask of this flow. The same requirements and restrictions for *<SrcAddr/Mask>* apply to *<DstAddr/Mask>*. |
| *<SrcPort>* | For TCP or UDP, is the number of the source TCP or UDP port. *This field applies only to incoming TCP or UDP traffic.* You can specify a range of port numbers using operator symbols; for example, 10-20 (between 10 and 20 inclusive), >1024 (greater than 1024), <1024 (less than 1024), !=1024 (not equal to 1024). The port numbers of some popular services are already defined as keywords. For example, for Telnet, you can enter the port number 23 as well as the keyword **telnet**. |

| | |
|---|---|
| *<DstPort>* | For TCP or UDP, is the number of the destination TCP or UDP port. *This field applies only to incoming TCP or UDP traffic.* The same requirements and restrictions for *<SrcPort>* apply to *<DstPort>*. |
| *<tos>* | Is the IP TOS (Type of Service) value. You can specify a TOS value from 0 – 255. |
| *<tos-mask>* | Mask value used for the TOS byte. You can specify a mask value from 0– 255. Default is **30**. Specify **any** for any TOS value. |
| **established** | Allows TCP responses from external hosts, provided the connection was established internally. |
| **log** | This optional parameter allows you to enable ACL logging for this specific ACL rule. |

## Restrictions

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies **all** traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

To create an ACL to permit TCP traffic from the subnet 10.21.33.0 (with a 24 bit netmask) to any destination:

```
xp(config)# acl 100 permit tcp 10.21.33.0/255.255.255.0 any
```

To create an ACL to deny any incoming HTTP traffic:

```
xp(config)# acl noweb deny tcp any any http any
```

To create an ACL to permit FTP traffic (both command and data ports) from subnet 10.31.34.0 to 10.31.60.0:

```
xp(config)# acl ftp100 permit tcp 10.31.34.0/24 10.31.60.0/24 20-21 any
```

# acl permit|deny udp

## Purpose

Create a UDP ACL.

## Format

**acl** *<name>* **permit|deny udp** *<SrcAddr/Mask> <DstAddr/Mask> <SrcPort> <DstPort> <tos>*
*<tos-mask>* [**accounting 5-minutes|15-minutes|hourly**] [**log**]

## Mode

Configure

## Description

The **acl permit udp** and **acl deny udp** commands define an ACL to allow or block UDP traffic
from entering or leaving the XP. For each of the values describing a flow, you can use the keyword
**any** to specify a *wildcard* ("don't care") condition. If you do not specify a value for a field, the XP
applies a wildcard condition to the field, giving the same effect as if you specify the **any** keyword.
The two exceptions to this rule are the optional parameters *<tos>* (type of service) and **accounting**.
*<tos>* is a value from 0 to 15. The **accounting** keyword is only valid for the **permit** command, and
can be placed anywhere on the command line.

## Parameters

| | |
|---|---|
| *<name>* | Name of this ACL. You can use a string of characters or a number. |
| *<SrcAddr/Mask>* | The source address and the filtering mask of this flow. If the source address is a network or subnet address, you must supply the filtering mask. Generally, the filtering mask is the network mask of this network or subnet. If the source address is that of a host then no mask is required. By default, if a mask is not supplied, the source address is treated as that of a host. You can specify the mask using the traditional IP address format ("255.255.0.0") or the CIDR format ("/16"). |
| *<DstAddr/Mask>* | The destination address and the filtering mask of this flow. The same requirements and restrictions for *<SrcAddr/Mask>* apply to *<DstAddr/Mask>*. |
| *<SrcPort>* | For TCP or UDP, the number of the source TCP or UDP port. *This field applies only to incoming TCP or UDP traffic.* You can specify a range of port numbers using operator symbols; for example, 10-20 (between 10 and 20 inclusive), >1024 (greater than 1024), <1024 (less than 1024), !=1024 (not equal to 1024). The port numbers of some popular services are already defined as keywords. For example, for Telnet, you can enter the port number 23 as well as the keyword **telnet**. |

| | |
|---|---|
| *<DstPort>* | For TCP or UDP, the number of the destination TCP or UDP port. *This field applies only to incoming TCP or UDP traffic.* The same requirements and restrictions for *<SrcPort>* apply to *<DstPort>*. |
| *<tos>* | IP TOS (Type of Service) value. You can specify a TOS value from 0 – 255. |
| *<tos-mask>* | Mask value used for the TOS byte. You can specify a mask value from 0– 255. Default is **30**. Specify **any** for any TOS value. |
| **log** | This optional parameter allows you to enable ACL logging for this specific ACL rule. |

## Restrictions

When you apply an ACL to an interface, the XP appends an *implicit deny rule* to that ACL. The implicit deny rule denies *all* traffic. If you intend to allow all traffic that doesn't match your specified ACL rules to go through, you must *explicitly* define a rule to permit all traffic.

## Examples

Here are some examples of ACL commands for permitting and denying UDP traffic flows.

```
xp(config)# acl 100 permit udp 10.1.3.0/24 any
```

Creates an ACL to permit UDP traffic from the subnet 10.1.3.0 (with a 24 bit netmask) to any destination.

```
xp(config)# acl notftp deny udp any any tftp any
```

Creates an ACL to deny any incoming TFTP traffic.

```
xp(config)# acl udpnfs permit udp 10.12.0.0/16 10.7.0.0/16 any nfs
```

Creates an ACL to permit UDP based NFS traffic from subnet 10.12.0.0 to subnet 10.7.0.0.

# acl-policy enable external

## Purpose

Allow an external server to create and delete ACLs.

## Format

**acl-policy enable external| policy-routing-external**

## Mode

Configure

## Description

The **acl-policy enable** command allows ACLs to be configured by an external agent, such as the Policy Manager. If this command is in the active configuration, an external server can create, modify, and delete ACLs on the XP. If this command is not in the active configuration, then ACLs can only be created, modified, and deleted using the CLI.

## Parameters

**external**          Enables ACLs to be configured by an external agent such as the Policy Manager.

**policy-routing-external**

Enables policy routing to be configured by an external agent such as the Policy Manager.

## Restrictions

The only action allowed by the **acl-policy enable external** command is to allow an external server to create, modify, and delete ACLs. Once entered, this command must be negated in order to prohibit an external server from creating, altering, or deleting ACLs. An external server can only modify ACLs that it created, or ACLs that were created using the CLI with the "external" flag. It cannot modify an ACL that was created using the CLI with the "local" flag.

# acl show

## Purpose

Displays one or more ACLs.

## Format

**acl show [aclname** *<string>*/**all] | [interface** *<string>*/**all-ip] | [service] | [port** *<port list>*/**all-ports] | [all]**

## Mode

Enable

## Description

The **acl show** command allows you to display the ACLs currently configured. Using the parameters associated with this command allows you to sort and display the ACLs by the name, interface, port, or service type.

You may also use the **acl show** command to display rules for Appletalk/ARE ACLs. Under this command, the Appletalk ACL is displayed in three separate sections. Each section provides information on configured zone, cable-range, and NBP rules, respectively. An *implicit deny* or *permit* rule is appended to the end of the ACL in all three sections. The third section, displaying Name Binding Protocol (NBP) rules, contains six fields:

1. **Forward**: Displays all permit and deny traffic.

2. **Count**: The number of times the ACL has been used to permit or deny traffic.

3. **Object**, **Type**, and **Zone**: The requested object, type, and zone names to be filtered. These parameters display as **object: type@zone**.

4. **Packet Type**: The type of NBP packet currently being filtered (broadcast request or forward request).

## Parameters

| | |
|---|---|
| **aclname** | Use this parameter to display ACLs by name. |
| *<string>* | The name of the ACL. |
| **all** | Specify **all** to display all ACLs. |
| **interface** | Use this parameter to display ACLs attached to a specific interface. |

| | |
|---|---|
| *<string>* | The name of the interface. |
| **all-ip** | Specify **all** to display ACLs attached to all IP interfaces. |
| **service** | Use this parameter to display ACLs applied to services. |
| **port** | Use this parameter to display ACLs applied to a specified port(s). |
| *<port list>* | The list of port(s) or SmartTRUNK(s). |
| **all-ports** | Specify **all** to display ACLs applied to all ports. |
| **all** | Use this parameter to display all ACLs. |

## Restrictions

You may sort Appletalk/ARE ACLs by **aclname** and **interface** only.

# Chapter 2

# acl-edit Commands

The **acl-edit** command activates the ACL Editor mode. The ACL Editor provides a user-friendly interface for maintaining and manipulating rules in an ACL. Using the editor, you can add, delete or re-order ACL rules. In addition, if the modified ACL is currently applied to an interface, the ACL is automatically "re-applied" to the interface and takes effect immediately. To edit an ACL, you enter the **acl-edit** command in Configure mode. The command must also specify the name of the ACL you want to edit. Only one ACL can be edited at one time.

> **Note:** You may also use the ACL Editor to maintain and manipulate Appletalk/ARE (Advanced Routing Engine) ACL rules. In order to do this, however, you must be in **ARE-Configure** mode. For more information on this mode, please see Chapter 6, *are Commands*.

## Command Summary

Table 2 lists the commands available with the ACL Editor. The sections following the table describe the command syntax.

**Table 2. acl-edit commands**

| |
|---|
| **acl-edit** *<aclname>* |
| **acl permit\|deny** |
| **delete** *<rule#>* |
| **exit** |
| **move** *<rule#>* **after** *<rule#>* |
| **save** |
| **show** |

# acl-edit

## Purpose

Enter ACL Editor to edit the specified ACL.

## Format

**acl-edit** *<aclname>*

## Mode

Configure

## Description

The **acl-edit** command enters the ACL Editor to edit an ACL specified by the user. Once inside the ACL editor, the user can then add, delete or re-order ACL rules for that ACL. If the ACL happens to be applied to an interface, changes made to that ACL will automatically take effect when the changes are committed to the running system.

## Parameters

*<aclname>*   Name of the ACL to edit.

## Restrictions

Inside the ACL Editor, you can only add rules for the ACL you specified in the acl-edit command. You cannot add rules for other ACLs. Basically, each ACL editing session works only on one ACL at a time. For example, if you start with *acl-edit 110*, you cannot add rules for ACL *121*.

# Example

To edit ACL 111:

```
xp(config)# acl-edit 111
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2003-2005 any

xp(acl-edit)> ?
acl             - Configure L3 Access Control List
delete           - Delete an ACL rule
exit            - Exit current mode
move              - Move an ACL rule
save             - Save changes made to this ACL
show              - Show contents of this ACL
```

# acl permit|deny

## Purpose

Create an ACL rule to permit or deny traffic.

## Format

**acl** *<name>* **permit|deny**

## Mode

ACL Editor

## Description

The **acl permit|deny** commands are equivalent to the same commands in the Configuration mode. You can use these commands to create rules for the ACL that you are editing. Just like the acl commands in Configuration mode, new rules are appended to the end of the rules. You can use the move command to re-order the rules.

## Restrictions

You can only add rules for the ACL you specified in the acl-edit command. You cannot add rules for other ACLs. For example, if you start with *acl-edit 110*, you cannot add rules for ACL *121*.

## Example

To add a new rule (deny all UDP traffic) to ACL 111:

```
xp(config)# acl-edit 111
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2003-2005 any

xp(acl-edit)> acl 111 deny udp
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2003-2005 any
3*: acl 111 deny udp
```

# delete

## Purpose

Deletes a rule from an ACL.

## Format

**delete** *<rule#>*

## Mode

ACL Editor

## Description

The **delete** commands allows the administrator to delete a specific rule from an ACL. When in the ACL Editor, each rule is displayed with its rule number. One can delete a specific rule from an ACL by specifying its rule number with the delete command.

## Parameters

*<rule#>*     Number of the ACL rule to delete.

## Restrictions

None

## Example

To delete ACL rule number 2 from the ACL:

```
xp(config)# acl-edit 111
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2003-2005 any
3*: acl 111 deny udp

xp(acl-edit)> delete 2
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 deny udp
```

# exit

## Purpose

Exit ACL Editor.

## Format

**exit**

## Mode

ACL Editor

## Description

The **exit** command allows the user to exit the ACL Editor. Before exiting, if changes are made to this ACL, the system will prompt the user to see if the changes should be committed to the running system or discarded. If the user commits the changes then changes made to this ACL will take effect immediately. If the ACL is applied to an interface, the ACL is automatically re-applied to the interface. Packets going through this interface will be matched against the new rules in this ACL. If the user chooses not to commit the changes, the changes will be discarded. The next time the user edits this ACL, changes from the previous edit session will be lost.

## Parameters

None

## Restrictions

None

## Example

To create an ACL to deny IGMP traffic from the subnet 10.1.5.0 (with a 24 bit netmask) to any destination:

```
xp(config)# acl-edit 111
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2003-2005 any
3*: acl 111 deny udp

xp(acl-edit)> delete 2
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 deny udp

xp(acl-edit)> exit

xp(config)# acl 410 deny igmp 10.1.5.0/24 any
```

# move

## Purpose

Re-order ACL rules by moving a rule to another position.

## Format

**move** *<src-rule#>* **after** *<dst-rule#>*

## Mode

ACL Editor

## Description

The **move** command provides the user with the ability to re-order rules within an ACL. When new rules are entered in the ACL Editor, they are appended to the end of the rules. One can move these rules to the desired location by using the move command. The move command can also be used on existing ACL rules created in Configuration mode instead of the ACL Editor.

## Parameters

*<src-rule#>*   Rule number of the rule you want to move.

*<dst-rule#>*   Rule number of the rule after which you want the source rule to move to.

## Restrictions

None

## Examples

To move rule #2 to the end of the list:

```
xp(config)# acl-edit 111
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2003-2005 any
3*: acl 111 permit udp 10.1.17.0/24 10.1.22.0/24 2000-2002 any
4*: acl 111 permit udp 10.1.18.0/24 10.1.34.0/24 2003-2005 any

xp(acl-edit)> move 2 after 4
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 permit udp 10.1.17.0/24 10.1.22.0/24 2000-2002 any
3*: acl 111 permit udp 10.1.18.0/24 10.1.34.0/24 2003-2005 any
4*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2003-2005 any
```

# save

## Purpose

Save any changes made by the ACL Editor.

## Format

**save**

## Mode

ACL Editor

## Description

The **save** command saves any non-committed changes made by the ACL Editor. If changes are made to this ACL, the changes will be saved and will take effect immediately. If the ACL is applied to an interface, the ACL is automatically re-applied to the interface. Packets going through this interface will be matched against the new rules in this ACL. The **save** command also contains an implicit exit command. Regardless of whether changes were made by the ACL Editor or not, upon completion of the **save** command, the user exits the ACL Editor and returns to Configuration mode. Consequently, one should issue the **save** command after all the changes are made.

## Parameters

None

## Restrictions

None

## Examples

To save and commit the changes made by the ACL Editor.

```
xp(config)# acl-edit 111
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2003-2005 any
3*: acl 111 deny udp

xp(acl-edit)> delete 2
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 deny udp

xp(acl-edit)> save
```

# show

## Purpose

Displays the contents of the ACL in the current editing session.

## Format

**show**

## Mode

ACL Editor

## Description

The **show** command displays the contents of the ACL currently being edited.

## Parameters

*None*

## Restrictions

None

## Examples

To display the contents of the ACL currently being edited:

```
xp(acl-edit)# show
1*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2000-2002 any
2*: acl 111 permit tcp 10.1.15.0/24 10.1.11.0/24 2003-2005 any
```

# Chapter 3

# aging Commands

The **aging** commands control aging of learned MAC address entries in the XP's Layer-2 lookup tables or Layer-3 and Layer-4 flows. Using the **aging** commands, you can show Layer-2 or Layer-3 and Layer-4 aging information, set or disable Layer-2 aging on specific ports, set or disable aging of Layer-3 and Layer-4 flows, or set or disable NAT or LSNAT flows.

**Note:**     Interfaces configured with PVCs do not support LSNAT.

## Command Summary

Table 3 lists the **l2** and **l3** aging commands. The sections following the table describe the command syntax.

**Table 3.  aging commands**

| |
|---|
| **aging l2 disable** *<port-list>*\|**all-ports** |
| **aging l2 set aging-timeout** *<seconds>* **port** *<port-list>*\|**all-ports** |
| **aging l2 show status** |
| **aging l3 set timeout** *<seconds>*\|**disable** |
| **aging l3 set nat-flow-timeout** *<minutes>*\|**disable** |
| **aging l3 show status** |

# aging l2 disable

## Purpose

Disable aging of MAC addresses.

## Format

**aging l2 disable** *<port-list>*|**all-ports**

## Mode

Configure

## Description

By default, the XP ages learned MAC addresses in the Layer-2 lookup tables. Each port has its own Layer-2 lookup table. When a learned entry ages out, the XP removes the aged out entry. You can disable this behavior by disabling aging on all ports or on specific ports.

## Parameters

*<port-list>*|**all-ports**

The port(s) on which you want to disable aging. You can specify a single port or a comma-separated list of ports. If you use the **all-ports** keyword, aging is disabled on all ports.

## Restrictions

Unknown.

## Examples

To disable aging on slot 1, port 3:

```
xp(config)# aging l2 disable et.1.3
```

To disable aging on slot 4, port 2, and slots 1 through 3, ports 4, 6, 7, and 8:

```
xp(config)# aging l2 disable et.4.2,et.(1-3).(4,6-8)
```

To disable aging on all ports:

xp(config)# **aging l2 disable all-ports**

# aging l2 set aging-timeout

## Purpose

Set the aging time for learned MAC entries.

## Format

**aging l2 set** *<port-list>*|**all-ports aging-timeout** *<seconds>*

## Mode

Configure

## Description

The **aging l2 set aging-timeout** command sets the aging time for learned MAC entries. When the aging time expires for a MAC address, the XP removes the MAC address from the specified port(s). The aging time is specified in seconds.

## Parameters

*<port-list>*|**all-ports**

> The port(s) on which you want to set the aging time. You can specify a single port or a comma-separated list of ports. If you use the **all-ports** keyword, the aging time is set on all ports.

*<seconds>*   The number of seconds the XP allows a learned MAC address to remain in the L2 lookup table (for the specified port). You can specify from 15 to 1000000 seconds. The default is 300 seconds.

## Restrictions

None.

## Example

To set the aging time to 15 seconds on all ports:

```
xp(config)# aging l2 set all-ports aging-timeout 15
```

# aging l2 show status

## Purpose

Show the L2 aging status for XP ports.

## Format

**aging l2 show status**

## Mode

User

## Description

The **aging l2 show status** command shows whether L2 aging is enabled or disabled on XP ports. For ports on which L2 aging is enabled, this command also shows the aging time.

## Parameters

None.

## Restrictions

None.

# aging l3 set timeout

## Purpose

Set the aging time for a Layer-3 or Layer-4 flow.

## Format

**aging l3 set timeout** *<seconds>*|**disable**

## Mode

Configure

## Description

The **aging l3 set timeout** command sets the aging time for a Layer-3 or Layer-4 flow. The aging time is specified in seconds.

## Parameters

*<seconds>*   The number of seconds the XP allows for a Layer-3 or Layer-4 flow. You can specify a value from 4 to 3600 seconds. For example, in an ISP environment (where thousands of flows are possible), you could change this value to 180-300 (3-5 minutes) to help in keeping with longer-term flows. The default is 30 seconds.

**disable**   Disables Layer-3 and Layer-4 aging.

## Restrictions

None.

## Example

To set the Layer-3 or Layer-4 flow aging time to 300 seconds (5 minutes):

```
xp(config)# aging l3 set timeout 60
```

# aging l3 set nat-flow-timeout

## Purpose

Set the aging time for NAT and LSNAT flows.

## Format

**aging l3 set nat-flow-timeout** *<minutes>*|**disable**

## Mode

Configure

## Description

The **aging l3 set nat-flow-timeout** command sets the aging time for Network Address Translation (NAT) and Load Sharing NAT flows. The aging time is specified in minutes.

## Parameters

*<minutes>*   The number of minutes the XP allows for NAT and LSNAT flows. You can specify from 2 to 1440 minutes. The default is 2 minutes.

**disable**   Disables NAT and LSNAT flow aging.

## Restrictions

Interfaces configured with PVCs do not support LSNAT.

## Example

To set the NAT aging time to 5 minutes:

```
xp(config)# aging l3 set nat-flow-timeout 5
```

# aging l3 show status

## Purpose

Show the L3 aging status for XP ports.

## Format

**aging l3 show status**

## Mode

User

## Description

The **aging l3 show status** command shows whether Layer-3 or Layer-4 aging is enabled or disabled on XP ports. For ports on which Layer-3 or Layer-4 aging is enabled, this command also shows the aging time.

## Parameters

None.

## Restrictions

None.

## Example

To show whether Layer-3 or Layer-4 aging is enabled and display the aging time for enabled ports:

```
xp# aging l3 show status
L3 Aging: Timeout 30 seconds
```

# Chapter 4

# appletalk Commands

The **appletalk** commands allow the user to manipulate the AppleTalk Protocol for an Advanced Routing Engine (ARE) module. Before using any of the commands in this chapter, you must first execute the command **are enable protocol appletalk module** *<module-number>* from the Configuration mode. For more information on the **are enable protocol appletalk** command, please see Chapter 6, *are Commands*.

## Command Summary

Table 4 lists the **appletalk** commands. The sections following the table describe the command syntax.

**Table 4.  appletalk commands**

| |
|---|
| **appletalk aarp clear address** *<Net.Node>*\|**all** |
| **appletalk aarp show address** *<Net.Node>*\|**all** |
| **appletalk ping** *<address>* **[packets** *<num>*] **[size** *<packet-size>*] **[wait** *<seconds>*] |
| **appletalk show aarp-globals** |
| **appletalk show interfaces** *<InterfaceName>*\|**all** |
| **appletalk show routes interface** *<InterfaceName>*\|**all** |
| **appletalk show rtmp-jitter\|-status\|-update-interval\|-valid-interval** |
| **appletalk show zip-query-interval** |
| **appletalk show zone interface** *<InterfaceName>*\|**all** |
| **appletalk show zone network** *<range>*\|**all** |

# appletalk aarp clear

## Purpose

Removes the specified AppleTalk Address Resolution Protocol (AARP) entries.

## Format

**appletalk aarp clear address** *<Net.Node>*|**all**

## Mode

Enable

## Description

The **appletalk aarp clear** command allows the user to remove specific AppleTalk AARP entries from the AppleTalk AARP tables. This command will not remove permanent AARP entries (such as those created with the **appletalk add aarp** command).

## Parameters

**address** *<Net.Node>*    Specifies AppleTalk AARP entry to remove. Specifying **all** will remove all AppleTalk AARP entries.

## Restrictions

None.

## Example

To remove AppleTalk AARP entry 1.2:

xp# **appletalk aarp clear address 1.2**

# appletalk aarp show

## Purpose

Displays the specified AppleTalk Address Resolution Protocol (AARP) entries.

## Format

**appletalk aarp show address** *<Net.Node>*|**all**

## Mode

Enable

## Parameters

**address** *<Net.Node>*    Specifies AppleTalk AARP entry to display. Specifying **all** will display all AppleTalk AARP entries.

## Restrictions

None.

# appletalk ping

## Purpose

Tests connection for the specified AppleTalk address.

## Format

**appletalk ping** *<address>* **[packets** *<num>*] **[size** *<packet-size>*] **[wait** *<seconds>*]

## Mode

Enable

## Description

The **appletalk ping** command allows the user to test the connection between the router and a specific AppleTalk address.

## Parameters

| | |
|---|---|
| *<address>* | Specifies AppleTalk address you want to ping. |
| **packets** *<num>* | Specifies total number of packets to send. The default is 1. |
| **size** *<packet-size>* | Specifies the size of each packet. This number must lie between 0 and 585. The default size is 20. |
| **wait** *<seconds>* | Specifies the number of seconds to wait for all ping responses to arrive. The default is 1. |

## Restrictions

None.

## Examples

To ping AppleTalk address 1.2:

```
xp# appletalk ping 1.2
```

To ping the same AppleTalk address 5 times with packets 100 bytes in length, with a wait time of 3 seconds before displaying the ping response:

xp# **appletalk ping 1.2 packets 5 size 100 wait 3**

# appletalk show aarp-globals

## Purpose

Displays all AppleTalk AARP settings.

## Format

**appletalk show aarp-globals**

## Mode

Enable

## Parameters

None.

## Restrictions

None.

# appletalk show interfaces

## Purpose

Displays AppleTalk interfaces defined on the system.

## Format

**appletalk show interfaces** *<InterfaceName>*|**all**

## Mode

Enable

## Parameters

*<InterfaceName>*|**all**    Specifies an interface to display. Entering **all** will display all interfaces on the system.

## Restrictions

None.

# appletalk show routes

## Purpose

Displays AppleTalk routing table for system interface(s).

## Format

**appletalk show routes interface** *<InterfaceName>*|**all**

## Mode

Enable

## Description

The **appletalk show routes** command shows the user the AppleTalk routing table for all interfaces, or a specified interface. If you choose the **all** parameter, the entire routing table will be shown. If you choose to display a specific interface, the commands will show the entire routing table *minus* any routes filtered for that interface.

## Parameters

**interface** *<InterfaceName>*|**all**
Specifies an interface for which to display routing table. If a specific interface is entered, the routing table will not include routes which are filtered for that interface.

## Restrictions

None.

## Example

To display the routing table for interface "app3":

xp# **appletalk show routes interface app3**

# appletalk show rtmp

## Purpose

Displays various Routing Table Maintenance Protocol (RTMP) statistics.

## Format

**appletalk show rtmp-jitter|-status|-update-interval|-valid-interval**

## Mode

Enable

## Description

The **appletalk show rtmp** command shows the user statistics for the RTMP, including functions defined by the **appletalk rtmp** command.

## Parameters

| | |
|---|---|
| **jitter** | Displays RTMP jitter statistics. |
| **status** | Displays the RTMP status for each interface. This status shows whether RTMP and split-horizon are enabled or disabled. |
| **update-interval** | Displays, in seconds, the currently set interval between the sending of RTMP updates. |
| **valid-interval** | Displays, in seconds, the currently set interval during which an RTMP route is considered valid. |

## Restrictions

None.

# appletalk show zip-query-interval

## Purpose

Displays the currently set number of seconds between Zone Information Protocol (ZIP) queries.

## Format

**appletalk show zip-query-interval**

## Mode

Enable

## Description

The **appletalk show zip-query-interval** command shows the user the currently set interval between ZIP queries, as defined by the **appletalk zip query-interval** command.

## Parameters

None.

## Restrictions

None.

# appletalk show zone interface

## Purpose

Displays all zones for specified interface(s).

## Format

**appletalk show zone interface** *<InterfaceName>*|**all**

## Mode

Enable

## Description

The **appletalk show zone interface** command shows the user all zones for specified interfaces on the router. Zones derived from other routers on the network will not be displayed.

## Parameters

*<InterfaceName>*|**all**     Specifies the interface for which you would like to see zone statistics. Specifying **all** will display zones for all interfaces on the router.

## Restrictions

None.

## Examples

To display zones for interface "app7":

```
xp# appletalk show zone interface app7
```

To display zones for all interfaces:

```
xp# appletalk show zones interface all
```

# appletalk show zone network

## Purpose

Displays all zones for specified cable range(s).

## Format

**appletalk show zone network** *<range>*|**all**

## Mode

Enable

## Description

The **appletalk show zone network** command shows the user all zones for specified cable ranges on the router. If the keyword **all** is specified, command will display all known zones on the entire network.

## Parameters

*<range>*|**all**          Specifies the cable range for which you would like to see zone statistics. Valid numbers include 1 to 65279. Specifying **all** will display zones from the entire network.

## Restrictions

None.

## Examples

To display zones for range 10-100:

```
xp# appletalk show zone network 10-100
```

To display zones from the entire network:

```
xp# appletalk show zones network all
```

# Chapter 5

# appletalk Configuration Commands

The **appletalk** configuration commands allow the user to configure the AppleTalk Protocol for an Advanced Routing Engine (ARE) module. Before using any of the commands in this chapter, you must first execute the command **are enable protocol appletalk module** *<module-number>* from the Configuration mode.Then you must enter the ARE-Configuration mode. These commands can be used *only* from the ARE-Configuration mode. For more information on the **are enable protocol appletalk** command and ARE-Configuration mode, please see Chapter 6, *are Commands*.

## Command Summary

Table 5 lists the **appletalk** configuration commands. The sections following the table describe the command syntax.

**Table 5. appletalk configuration commands**

| |
|---|
| **appletalk add aarp exit-port** *<port>* **address** *<Net.Node>* **macaddr** *<MACaddr>* |
| **appletalk add route interface** *<InterfaceName>* **cable-range** *<range>* **gateway** *<Net.Node>* **distance** *<hops>* |
| **appletalk aarp interval** *<seconds>* |
| **appletalk aarp timeout** *<seconds>* |
| **appletalk checksun disable** |
| **appletalk rtmp jitter** *<percent>* |
| **appletalk rtmp update-disable interface** *<InterfaceName>*|**all** |
| **appletalk rtmp update-interval** *<seconds>* |

**Table 5. appletalk configuration commands (Continued)**

| |
|---|
| **appletalk rtmp valid-interval** *<seconds>* |
| **appletalk split-horizon disable** |
| **appletalk zip query-interval** *<seconds>* |

# appletalk add aarp

## Purpose

Creates a permanent AppleTalk Address Resolution Protocol (AARP) entry.

## Format

**appletalk add aarp exit port** *<port>* **address** *<Net.Node>* **macaddr** *<MACaddr>*

## Mode

ARE-Configure

## Description

The **appletalk add aarp** command allows the user to create a permanent AppleTalk AARP entry.

## Parameters

**exit-port** *<port>*
Specifies port for which to send any packet destined for the following address.

**address** *<Net.Node>*
Specifies AppleTalk address to associate with the following MAC address.

**macaddr** *<MACaddr>*
Specifies MAC address to associate with the previous AppleTalk address. MAC address should be entered in the following format: xx:xx:xx:xx:xx:xx.

## Restrictions

You must be in ARE-Configure mode before using this command.

# appletalk add route

## Purpose

Adds a static route to the routing table.

## Format

**appletalk add route interface** *<InterfaceName>* **cable-range** *<range>* **gateway**
  *<Net.Node>* **distance** *<hops>*

## Mode

ARE-Configure

## Description

The **appletalk add route** command allows the user to add a static route to the routing
table.

## Parameters

**interface** *<InterfaceName>*
  Specifies interface through which packets will be routed.

**cable-range** *<range>*
  Specifies range of network numbers which can be reached through this route.
  Valid numbers include 1 to 65279.

**gateway** *<Net.Node>*
  Specifies the address of the next router a packet destined for the cable range will
  encounter.

**distance** *<hops>*
  Specifies how many routers a packet must encounter before reaching its final
  destination.

## Restrictions

You must be in ARE-Configure mode before using this command.

# Example

To add a route on interface "if1":

xp(are-config)# **appletalk add route interface if1 cable-range 3-4 gateway 5.6 distance 2**

This command determines that an AppleTalk packet destined for network "3-4" will exit through this interface. The AppleTalk address for the next router to be encountered is "5.6," and there are "2" hops (routers) between this router and the destination.

# appletalk aarp interval

## Purpose

Sets the interval between AppleTalk AARP requests.

## Format

**appletalk aarp interval** *<seconds>*

## Mode

ARE-Configure

## Description

The **appletalk aarp interval** command creates an interval between AARP requests while the system is attempting to determine a hardware address.

## Parameters

*<seconds>*      Specifies number of seconds at which you want to set the interval.

## Restrictions

You must be in ARE-Configure mode before using this command.

# appletalk aarp timeout

## Purpose

Determines the age-out time of the AppleTalk AARP table.

## Format

**appletalk aarp timeout** *<seconds>*

## Mode

ARE-Configure

## Parameters

*<seconds>*     Specifies number of seconds at which you want to set the age-out time.

## Restrictions

You must be in ARE-Configure mode before using this command.

# appletalk checksum disable

## Purpose

Disables checksum calculation for out-going packets.

## Format

**appletalk checksum disable**

## Mode

ARE-Configure

## Parameters

None.

## Restrictions

You must be in ARE-Configure mode before using this command.

# appletalk rtmp jitter

## Purpose

Staggers Routing Table Maintenance Protocol (RTMP) routing updates.

## Format

**appletalk rtmp jitter** *<percent>*

## Mode

ARE-Configure

## Description

The **appletalk rtmp jitter** command staggers routing updates by altering the RTMP update interval in order to avoid syncing with other routers on the same link.

## Parameters

*<percent>*   Specifies the percentage to alter the RTMP update interval. For example, if the current RTMP update interval is 10, and you set the "jitter" to 10%, the update interval will be altered to occur between 9 and 11 seconds.

## Restrictions

You must be in ARE-Configure mode before using this command.

## Example

To alter the RTMP update interval by 15%:

```
xp(are-config)# appletalk rtmp jitter 15
```

# appletalk rtmp update-disable

## Purpose

Disables RTMP updates.

## Format

**appletalk rtmp update-disable interface** *<InterfaceName>*|**all**

## Mode

ARE-Configure

## Description

The **appletalk rtmp update-disable** command prevents RTMP updates from being sent out on the indicated interface(s).

## Parameters

**interface** *<InterfaceName>*|**all**
> Specifies interface for which you want to disable RTMP updates. You may specify **all** to disable updates on all available interfaces.

## Restrictions

You must be in ARE-Configure mode before using this command.

## Example

To disable RTMP updates on interface "app5":

```
xp(are-config)# appletalk rtmp update-disable interface app5
```

# appletalk rtmp update-interval

## Purpose

Determines the number of seconds between RTMP updates.

## Format

**appletalk rtmp update-interval** *<seconds>*

## Mode

ARE-Configure

## Description

The **appletalk rtmp update-interval** command sets the number of seconds between RTMP updates on an interface.

## Parameters

*<seconds>*    Specifies number of seconds at which to set RTMP update interval. The default is 10.

## Restrictions

You must be in ARE-Configure mode before using this command.

# appletalk rtmp valid-interval

## Purpose

Determines number of seconds a route is considered valid.

## Format

**appletalk rtmp valid-interval** *<seconds>*

## Mode

ARE-Configure

## Description

The **appletalk rtmp valid-interval** command sets the number of seconds for which a route is considered valid. A route is considered invalid after the valid-interval expires twice. A route is deleted after the valid-interval expires three times. The valid timer is reset every time an RTMP packet is received which validates the route.

## Parameters

*<seconds>*  Specifies number of seconds for which you want to set the valid-interval timer. The default is 20.

## Restrictions

You must be in ARE-Configure mode before using this command.

# appletalk split-horizon disable

## Purpose

Disables RTMP from using split-horizon methodology.

## Format

**appletalk split-horizon disable**

## Mode

ARE-Configure

## Description

The **appletalk split-horizon disable** command prevents the Route Maintenance Protocol (RTMP) from using the split-horizon methodology. This methodology is enabled by default.

## Parameters

None.

## Restrictions

You must be in ARE-Configure mode before using this command.

# appletalk zip query-interval

## Purpose

Determines interval between Zone Information Protocol (ZIP) queries.

## Format

**appletalk zip query-interval** *<seconds>*

## Mode

ARE-Configure

## Description

The **appletalk zip query-interval** command sets the interval between zip queries. These queries occur when the router discovers a routing table entry without an associated zone. It sends a zip query to collect appropriate zones for the entry.

## Parameters

*<seconds>*     Specifies number of seconds for which you want to set the query interval timer. The default is 10.

## Restrictions

You must be in ARE-Configure mode before using this command.

# Chapter 6

# are Commands

The **are** commands allow you to manipulate the Advanced Routing Engine (ARE) module, the full-featured AppleTalk Phase II router available for the XP. These commands apply to the ARE module globally, and will function regardless of protocol designation.

## Command Summary

Table 6 lists the **are** commands. The sections following the table describe the command syntax.

**Table 6.  are commands**

| |
|---|
| **are enable protocol appletalk module** *<module-number>* |
| **are-config** *<module-number>* |
| **system are-promimage upgrade** *<module-number> <tftp-server> <filename>* |

# are enable protocol appletalk

## Purpose

Enables AppleTalk protocol on an ARE module.

## Format

**are enable protocol appletalk module** *<module-number>*

## Mode

Configure

## Description

The **are enable protocol appletalk** command allows the user to enable AppleTalk protocol on a specified ARE module. This command is required before the user attempts to configure any protocol-specific commands on a module.

## Parameters

**module** *<module-number>*    Specifies ARE module for which to enable the protocol.

## Restrictions

None.

## Example

To enable AppleTalk protocol on module 5:

xp(config)# **are enable protocol appletalk module 5**

# are-config

## Purpose

Places CLI session in ARE-Configure mode.

## Format

**are config** *<module-number>*

## Mode

Configure

## Description

The **are configure** command places the CLI session in ARE-Configure mode. All configuration settings for a specific ARE module or modules must be made from this mode.

**Note:** When you negate an interface configured with an ARP command, the XP automatically reassigns the command to a non-existing interface in the same configuration.

## Parameters

*<module-number>*    Specifies ARE module for which to enter ARE-Configure mode. If no module is specified, interface will return a list of all active modules available for configuration.

## Restrictions

User must be in Configure mode.

## Example

To enter ARE-Configure mode on module 5:

xp(config)# **are config 5**

# system are-promimage upgrade

## Purpose

Upgrades boot PROM image on a specified ARE module.

## Format

**system are-promimage upgrade** *<module-number> <tftp-server> <filename>*

## Mode

Enable

## Description

The **system are-promimage upgrade** command allows you to upgrade a specific ARE module's boot PROM image with the image located on the tftp server.

**Note:**    In order to take advantage of this upgrade, you must reboot the ARE module.

## Parameters

| | |
|---|---|
| *<module-number>* | Specifies ARE module for which to upgrade Boot PROM image. |
| <tftp-server> | Specifies tftp server on which the image is located. |
| <filename> | Specifies image file name. |

## Restrictions

None.

## Example

To upgrade the PROM for ARE module 5 with the file "prom_image_file":

xp(config)# **system are-promimage upgrade 5 tftp://host1/public/prom_image_file**

# Chapter 7

# arp Commands

The **arp** commands enable you to add, display, and clear ARP entries on the XP.

## Command Summary

Table 7 lists the arp commands. The sections following the table describe the command syntax.

**Table 7. arp commands**

| |
|---|
| **arp add** *<host>* **mac-addr** *<MAC-addr>* **exit-port** *<port>* **keep-time** *<seconds>* |
| **arp clear** *<host>*|**all [interface** *<string>*| **unresolved | all] [port <***port>*]** |
| **arp set drop-unresolved disabled| enabled** |
| **arp set interface** *<name>*|**all keep-time** *<number>* |
| **arp set unresolve-threshold** *<num>* |
| **apr set unresolve-timer** *<num>* |
| **arp show** *<IPaddr>*|**all [undecoded] [unresolved] [interface** *<string>*| **all] [port <***port>*]** |
| **statistics show arp** |

# arp add

## Purpose

Add an ARP entry.

## Format

**arp add** *<host>* **mac-addr** *<MAC-addr>* **exit-port** *<port>* **keep-time** *<seconds>*

## Mode

Enable and Configure

## Description

The **arp add** command lets you manually add ARP entries to the ARP table. Typically, the XP creates ARP entries dynamically. Using the **arp add** command, you can create an ARP entry to last a specific amount of time or as a permanent ARP entry. This command exists in both Enable and Configure mode with a slight variation. The **keep-time** option is valid only in Enable mode. The **keep-time** option allows you to create an ARP entry to last a specific amount of time. The Configure mode version of the **arp add** command does not use the **keep-time** option. ARP entries created in the Configure mode are permanent ARP entries and they do not have an expiration time. If the exit port is not specified, then packets to the IP address for which the ARP entry is created are transmitted on all ports of the interface. If an ARP request is received from the host for which the ARP entry was created, then the exit port is updated with the port on which the ARP request was received, so that subsequent packets are transmitted on one port only.

## Parameters

| | |
|---|---|
| *<host>* | Hostname or IP address of this ARP entry. |
| **mac-addr** *<MAC-addr>* | MAC address of the host. |
| **exit-port** *<port>* | The port for which you are adding the entry. Specify the port to which the host is connected. |
| **keep-time** *<seconds>* | The number of seconds this ARP entry should remain in the ARP table. A value of 0 means this is a permanent ARP entry.<br><br>**Note:** This option is valid only for the Enable mode **arp add** command. |

## Restrictions

If you enter the **arp add** command while in the Configure mode, you can add only permanent ARP entries.

## Examples

To create an ARP entry for the IP address 10.8.1.2 at port et.4.7 for 15 seconds:

> xp# **arp add 10.8.1.2 mac-addr 08:00:20:a2:f3:49 exit-port et.4.7 keep-time 15**

To create a permanent ARP entry for the host *nfs2* at port et.3.1:

> xp(config)# **arp add nfs2 mac-addr 080020:13a09f exit-port et.3.1**

# arp clear

## Purpose

Remove an ARP entry from the ARP table.

## Format

**arp clear** *<host>***|all [interface** *<string>***| all] [port <***port***>] unresolved**

## Mode

Enable

## Description

The **arp clear** command lets you manually remove entries from the ARP table. The command can remove both dynamic and permanent entries.

## Parameters

| | |
|---|---|
| *<host>* | Hostname or IP address of the ARP entry to remove. |
| **all** | Remove all ARP entries, thus clearing the entire ARP table. |
| **interface** | Specify this optional parameter to clear only entries in the ARP table that corresponds to a specific interface. |
| *<string>* | Specifies the interface name. |
| **all** | Specifies all interfaces. |
| **port** | Specify this optional parameter to clear only entries in the ARP table that corresponds to a specific exit port. |
| *<port>* | Specifies the exit port. |
| **unresolved** | Specify this optional parameter to clear only currently unresolved entries. |

## Examples

To remove the ARP entry for the host 10.8.1.2 from the ARP table:.

xp# **arp clear 10.8.1.2**

To clear the entire ARP table.

> xp# **arp clear all**

If the Startup configuration file contains **arp add** commands, the Control Module re-adds the ARP entries even if you have cleared them using the **arp clear** command. To permanently remove an ARP entry, use the **negate** command or **no** command to remove the entry. Here is an example of the **no** command:

> xp# **no arp add nfs2 macaddr 080020:13a09f exit-port et.3.1**

This command removes the ARP entry for "nfs2".

# arp set drop-unresolved

## Purpose

Decides how to handle unresolved traffic.

## Format

**arp set drop-unresolved disabled| enabled**

## Mode

Configure.

## Description

The **arp set drop-unresolved** command lets you specify how to deal with traffic that is unresolved by address resolution protocol. This command specifies that the router will drop all traffic to unresolved IP addresses in hardware until the nexthop MAC address is resolved. Sixth and subsequent packets are dropped.

## Parameters

| | |
|---|---|
| **disabled** | Specifies that all unresolved ARP traffic will be handled by the software. This is the **default**. |
| **enabled** | Specifies that all unresolved ARP traffic will be dropped into the hardware. The route then tries to resolve the nexthop MAC address by sending ARP requests. |

## Examples

To enable the drops of unresolved ARP traffic:

```
xp# arp set drop-unresolved enabled
```

# arp set interface

## Purpose

Set the lifetime of ARP entries in seconds.

## Format

**arp set interface** *<name>*|**all keep-time** *<number>*

## Mode

Configure

## Description

The **arp set interface... keep-time** command lets you specify the **lifespan** (**inseconds**) for any or all ARP interface entries.

## Parameters

| | |
|---|---|
| **interface** *<name>*|**all** | Name of the interface(s) for which you will define the lifespan. |
| **keep-time** *<number>* | Number of seconds determining lifespan of ARP interfaces. The default value is 1200 seconds (20 minutes). |

# arp set unresolve-threshold

## Purpose

Specifies the maximum number of ARP requests to send.

## Format

**arp set max-unresolved** *<num>*

## Mode

Configure.

## Description

The **arp set max-unresolved** command lets you specify the number of ARP requests to send out to resolve the nexthop MAC address. This command sets the maximum number of ARP entries that the CPU will try to resolve in each attempt when ARP entries have traffic stopped in hardware.

## Parameters

*<num>*    Specifies that maximum number of ARP requests are sent out. Specify any number greater than or equal to 1. The default is 50.

## Examples

To configure the CPU to send out 100 ARP requests:

xp# **arp set unresolve-threshold 100**

# arp set unresolve-timer

## Purpose

Specifies how often to send ARP requests to resolve the nexthop MAC address for unresolved ARP traffic.

## Format

**arp set unresolve-timer** *<num>*

## Mode

Configure.

## Description

The **arp set unresolve-timer** command lets you specify the frequency in which to send out ARP requests to resolve the nexthop MAC address. This command configures the timer which controls the interval after which the CPU sends ARP requests and try to resolve those ARP entries which have traffic stopped in hardware.

## Parameters

*<num>*        Specifies that interval for which ARP requests are sent out. Specify any number greater than or equal to 20. This parameter is in seconds. The default is 30 seconds.

## Examples

To configure the CPU to send out ARP requests every 10 seconds:

```
xp# arp set unresolve-timer 10
```

# arp show

## Purpose

Display the ARP table.

## Format

**arp show** *<IPaddr>*|**all [undecoded] [unresolved] [interface** *<string>*| **all] [port <***port***>]**

## Mode

Enable

## Description

The **arp show** command displays the entire ARP table.

## Parameters

| | |
|---|---|
| *<IPaddr>* | Shows the ARP entry for the specified IP address. |
| **all** | Shows all entries in the ARP table. |
| **undecoded** | Specify this optional parameter to show MAC addresses in hexadecimal format. |
| **unresolved** | Specify this optional parameter to show only MAC addresses in the ARP table that have yet to be mapped to an network layer address. |
| **interface** | Specify this optional parameter to show only addresses in the ARP table that is associated with the specific interface. |
| *<string>* | Specifies the interface name. |
| **all** | Specifies all interfaces. |
| **port** | Specify this optional parameter to show only addresses in the ARP table that corresponds to a specific exit port. |
| *<port>* | Specifies the exit port. |

# statistics show arp

## Purpose

Display ARP statistics.

## Format

**statistics show arp** *<Interface Name>*|**all**

## Mode

Enable

## Description

The **arp show statistics** command displays ARP statistics, such as the total number of ARP requests and replies.

## Parameters

*<Interface Name>*  Displays ARP statistics for the specified interface.

**all**  Displays ARP statistics for all router interfaces.

# Chapter 8

# atm Commands

## Command Summary

Table 8 lists the **atm** commands. The sections following Table 8 describe the command syntax for each command.

**Note:** Interfaces configured with PVCs do not support LSNAT or VRRP.

**Table 8.  atm commands**

| |
|---|
| **atm apply service** *<string>* **port** *<port list>* |
| **atm create vcl port** *<port list>* |
| **atm define service** *<string>* **[srv-cat ubr\| cbr\| rt-vbr\| nrt-vbr] [pcr] \| [pcr-kbits] [scr] \| [scr-kbits] [mbs] [encaps llc-mux\| vc-mux] [oam on\| off] [oam-f5-type current-segment \| end-to-end]** |
| **atm set peer-addr port** *<port>* **ip-address** *<ipaddr>*\|**ipx-address** *<netaddr>*.*<macaddr>* |
| **atm set port** *<port list>* **cell-mapping direct\| plcp** |
| **atm set port** *<port list>* **pdh-cell-scramble on\| off** |
| **atm set port** *<port list>* **vpi-bits** *<num>* |
| **atm set vcl port** *<port>* **forced-bridged traffic-stats-enable** |
| **atm show [vpl port** *<port list>*\| **all [summary]] \| [vcl port** *<port list>*\| **all [summary]] [service** *<string>*\| **all] \| [port-settings** *<port list>*/ **all-ports] \| [stats port** *<port list>*]** |

# atm apply service

## Purpose

Apply a service profile.

## Format

**atm apply service** *<string>* **port** *<port list>*

## Mode

Configure

## Description

The **atm apply service** command applies a service profile to a virtual channel (VC), virtual path (VP), and/or atm port. Service profiles define certain preset values for traffic and QoS parameters. Each service profile has its own unique set of traffic and QoS guarantees in handling transmission of ATM cells.

An important concept when applying service profile definitions is the concept of inheritance. Since a service profile definition can be applied to a virtual channel, virtual path, or on a port; the actual connection can inherit the service profile definition from any one of the three. The virtual channel will inherit the service profile definition that is directly applied on it. If no service profile was applied to the virtual channel, the connection will inherit the service profile applied to the virtual path. If no service profile definition was applied to the virtual path, then the connection will inherit the service profile applied to the ATM port. If no service profile was applied to the port, then the default service profile UBR is applied.

The following service classes are supported: CBR (constant bit rate), rt-VBR (real-time variable bit rate), nrt-VBR (non real-time variable bit rate), and UBR (unspecified bit rate). ABR (available bit rate) is not currently supported.

## Parameters

*<string>*   Is the character string of a previously-defined service. You define a service using the **atm define service** command (see ).

*<port list>*   Is the port name, in the format: **media.slot.port.vpi.vci**

    **media**   Is the media type. This is **at** for an ATM port.
    **slot**   Is the slot number where the module is installed.
    **port**   Is the number of the port through which data is passing.
    **vpi**   Is the Virtual Path Identifier. This parameter is optional.
    **vci**   Is the Virtual Channel Identifier. This parameter is optional.

## Examples

To apply the pre-defined service profile 'CBR1' to virtual channel at.5.1.1.100:

xp(config)# **atm apply service CBR1 port at.5.1.1.100**

To apply the pre-defined service profile 'CBR1' to virtual path at.5.1.1:

xp(config)# **atm apply service CBR1 port at.5.1.1**

To apply the pre-defined service profile 'CBR1' to port at.5.1:

xp(config)# **atm apply service CBR1 port at.5.1**

# atm create vcl

## Purpose

Create a virtual channel.

## Format

**atm create vcl port** *<port list>*

## Mode

Configure

## Description

The **atm create vcl** command creates a virtual channel on an ATM port. Virtual channels are point to point cell-switched connections used for ATM cell traffic. Virtual channels are defined by specifying a VCI (Virtual Channel Identifier) and VPI (Virtual Path Identifier) pair.

The range of available VCI and VPI are set by the **atm set port vpi-bits** command later in this chapter.

**Note:** Be careful when specifying VCI numbers 0 through 31. Those VPI/VCI pairs are used by some protocols for signaling purposes.

## Parameters

*<port list>*    Is the port name, in the format: **media.slot.port.vpi.vci**

> **media**    Is the media type. This is **at** for an ATM port.
>
> **slot**    Is the slot number where the module is installed.
>
> **port**    Is the number of the port through which data is passing.
>
> **vpi**    Is the Virtual Path Identifier.
>
> **vci**    Is the Virtual Channel Identifier.

## Restrictions

None.

## Examples

To create a virtual channel on slot 5, port 1, VPI 1, and VCI 100:

```
xp(config)# atm create vcl port at.5.1.1.100
```

To create many virtual channels simultaneously:

```
xp(config)# atm create vcl port at.5.1.(1,3-5,7).(100,555-600,700)
```

The following commands create an ATM virtual channel on an ATM port and associate the port with an IPX interface. This allows IPX routing between two IPX interfaces. As with any IPX interface, IPX routing using RIP (the default) will begin when you configure an IPX interface.

```
xp(config)# atm create vcl port at.3.1.1.100
xp(config)# interface create ipx finance address 01234567 peer-address 01234567.00:00:1d:a9:8c:a1
port at.3.1.1.100
xp(config)# interface create ipx marketing address 01234569 port et.1.1
```

# atm define service

## Purpose

Define a service profile.

## Format

**atm define service** *<string>* **[srv-cat ubr| cbr| rt-vbr| nrt-vbr] [pcr] | [pcr-kbits] [scr] | [scr-kbits] [mbs] [encaps llc-mux| vc-mux] [oam on| off] [oam-f5-type current-segment | end-to-end]**

## Mode

Configure

## Description

The **atm define** command defines a set of traffic parameters. You can then apply this set of traffic parameters to a virtual channel. Quality of Service (QoS) parameters define the delays, dependability, and peak limits for a virtual channel. Class of Service defines the bandwidth guarantees. When a virtual channel is established, a service profile definition created by this command can then be applied to the connection.

## Parameters

*<string>*    Is a character string. The maximum length is 32 bytes.

**srv-cat**    Is the service category (UBR is the default):

    **cbr**    Constant Bit Rate. This service category provides a guaranteed constant bandwidth specified by the Peak Cell Rate (PCR). This service requires only the PCR value. The Sustainable Cell Rate (SCR) and Maximum Burst Size (MBS) values are ignored. This service category is intended for applications that require constant cell rate guarantees such as uncompressed voice or video transmission.

    **ubr**    Unspecified Bit Rate. This service category is strictly best effort and runs at the available bandwidth. Users may limit the bandwidth by specifying a PCR value. The SCR and MBS are ignored. This service class is intended for applications that do not require specific traffic guarantees. UBR is the **default**.

    **nrt-vbr** Non Real-Time Variable Bit Rate. This service category provides a guaranteed constant bandwidth (specified by the SCR), but also provides for peak bandwidth requirements (specified by the PCR). This service category

requires the PCR, SCR, and MBS options and is intended for applications that can accommodate bursty traffic with no need for real-time guarantees.

**rt-vbr**   Real-Time Variable Bit Rate. This service category provides a guaranteed constant bandwidth (specified by the SCR), but also provides for peak bandwidth requirements (specified by the PCR). This service category requires the PCR, SCR, and MBS options and is intended for applications that can accommodate bursty real-time traffic such as compressed voice or video.

**pcr**   Peak Cell Rate. This rate specifies the maximum cell transmission rate, expressed in cells/sec. The **default** is 353207 cells/sec for ATM OC-3. This parameter is valid for CBR, rtVBR, nrtVBR, and UBR service categories. This parameter is optional for UBR.

**pcr-kbits**   Is the Peak Cell Rate, and specifies the maximum cell transmission rate, expressed in kbits/sec. The **default** is 149759 kbits/sec (353207 cells/sec) for ATM OC-3. This is the same as PCR, but is expressed in kbits/sec, and therefore may be a more convenient form. However, since the natural unit for ATM is cells/sec, there may be a difference in the actual rate because the kbit/sec value may not be an integral number of cells. This parameter is valid for CBR, rtVBR, nrtVBR, and UBR service categories.

**scr**   Sustainable Cell Rate. This rate specifies the average cell rate, expressed in cells/sec. The **default** is 0 cells/sec. This parameter is valid only for rtVBR and nrtVBR service categories.

**scr-kbits**   Sustainable Cell Rate expressed in kbits/sec. The **default** is 0 kbits/sec. This is the same as SCR, but is expressed in kbits/sec, and therefore may be a more convenient form. However, since the natural unit for ATM is cells/sec, there may be a difference in the actual rate because the kbit/sec value may not be an integral number of cells. This parameter is valid only for rtVBR and nrtVBR service categories.

**mbs**   Is the Maximum Burst Size in cells. **MBS** specifies how many cells (2 to 255) can be transmitted at the Peak Cell Rate. The **default** is 0 cells. This parameter is valid only for rtVBR and nrtVBR service categories.

**encaps**   Is the encapsulation scheme to transport multi protocol data over the AAL5 layer. Either **llc-mux** (logical link control based on multiplexing) or **vc-mux** (virtual channel-based multiplexing). The default is **llc-mux**.

**oam**   OAM (Operation, Administration, and Management) loopback cells are used to provide loopback capabilities and confirm whether a VC connection is up. Only F5 OAM segments and end-to-end are supported, which provides loopback capabilities on a VC connection level. This parameter turns OAM ON or OFF on the PVC. The default is **off**. OAM OFF means that the XP responds to F5 OAM requests, but will not generate F5 OAM responses.

**oam-f5-type**

Used to specify the path of the OAM cells. Select either current-segment or end-to-end. The **default** is current-segment.

## Restrictions

**scr** can not exceed **pcr**. No parameters may exceed the link rate for the type of **phy**.

## Examples

To define a 10Mbps service:

> xp(config)# **atm define service CBR-example srv-cat cbr pcr_kbits 10000**

# atm set peer-addr

## Purpose

Maps peer address to virtual channels.

## Format

**atm set peer-addr port** *<port>* **ip-address** *<ipaddr>*|**ipx-address** *<netaddr>.<macaddr>*

## Mode

Configure

## Description

The **atm set peer-addr** command allows you to map a peer address for an ATM port to a specific virtual channel. This allows you to associate a specific virtual channel and its interface to a specific peer address.

## Parameters

**port** *<port>*    Specifies a single port, including virtual channel, in the format: **media.slot.port.vpi.vci**.

          **media**    Is the media type. This is always **at** for an ATM port.

          **slot**    Is the slot number where the module is installed.

          **port**    Is the number of the port through which data is passing.

          **vpi**    Is the Virtual Path Identifier.

          **vci**    Is the Virtual Channel Identifier.

**ip-address** *<ipaddr>*

    Specifies an IP address for the peer. Specify a unicast IP address and netmask value in the following format: **a.b.c.d/**e. This IP address will be mapped to the VC.

**ipx-address** *<netaddr>.<macaddr>*

    Specifies an IPX address for the peer. Specify an IPX network and node address in the following format: **a1b2c3d4.aa:bb:cc:dd:ee:ff**. If a *<macaddr>* is not specified, then a wildcard address is used. This IPX address will be mapped to the VC.

## Restrictions

None.

## Example

To map the peer address 10.0.0.100/24 to the virtual channel at.4.1.0.100:

xp (config)# **atm set peer-addr ports at.4.1.0.100 ip-address 10.0.0.100/24**

# atm set port cell-mapping

## Purpose

Sets the format used to map ATM cells.

## Format

**atm set port** *<port list>* **cell-mapping direct| plcp**

## Mode

Configure

## Description

The **atm set port cell-mapping** command specifies the format for mapping ATM cells into PDH (plesiochronous digital hierarchy) T3 and E3 frames. The ATM cells that each frame carries does not fit exactly into the PDH frame, therefore mapping of the data is necessary to ensure efficient transmission.

## Parameters

| | |
|---|---|
| *<port list>* | Specifies the ATM port(s). Specify **all-ports** to select all ports. |
| **direct** | Specifies ATM direct mapping. Default. |
| **plcp** | Specifies physical layer convergence protocol mapping. |

## Restrictions

Cell mapping is valid only for T3 and E3 PHY interfaces.

## Example

To set cell-mapping to plcp for ATM port at.9.1:

```
xp(config)# atm set port at.9.1 cell-mapping plcp
```

# atm set port pdh-cell-scramble

## Purpose

Enables cell scrambling for ATM ports.

## Format

**atm set port** *<port list>* **pdh-cell-scramble on| off**

## Mode

Configure

## Description

The **atm set port pdh-cell-scramble** command allows you to enable payload scrambling for PDH (plesiochronous digital hierarchy) PHY interfaces for the ATM line card, such as T1, T3, E1, and E3. Scrambling a payload is important in optimizing the transmission density of the data stream. Since all transmission use the same source clock for timing, scrambling the payload using a random number generator converts the data stream to a more random sequence. This ensures optimal transmission density of the data stream.

## Parameters

**port** *<port list>*  Specifies the port, in the format: **media.slot.port**. Specify **all-ports** to enable cell scrambling on all ports.

    **media**  Specifies the media type. This is **at** for ATM ports**.**

    **slot**  Specifies the slot number where the module is installed.

    **port**  Specifies the port number.

**on**  Enables cell scrambling.

**off**  Disables cell scrambling.

## Restrictions

This command is valid only for PDH PHY interfaces. SONET frames are scrambled using the SONET commands.

## Example

To enable cell scrambling for ATM port at.9.1:

xp(config)# **atm set port pdh-cell-scramble on**

# atm set port vpi-bits

## Purpose

Sets the bit allocation for VPI on an ATM port.

## Format

**atm set port** *<port list>* **vpi-bits** *<num>*

## Mode

Configure

## Description

The **atm set port vpi-bits** command allows you to set the number of bits allocated for VPI on an ATM port. There are 12 bits available for each VPI/VCI pair. The number of bits allocated define the amount of VPI and VCI values available. The following equations define the number of virtual paths and virtual channels:

# of virtual paths $= 2^n$; where *n* is the number of bits allocated for VPI and *n* is a value from 1 to 4

# of virtual channels $= 2^{12-n}$; where *n* is the number of bits allocated for VCI

Since there are only 12 bits available for each VPI/VCI pair, the more bits you allocate for VPI, the less bits remain for VCI. This is a shared number of bits. With the bit allocation command, you set the number of bits allocated for VPI. In turn, this sets the remaining number of bits as the number of bits allocated for VCI. The maximum value for *n* is 4.

**Note:** Be careful when specifying VCI numbers 0 through 31. Those VPI/VCI pairs are used by some protocols for signaling purposes.

**Note:** The maximum value for *n* is 4.

## Parameters

**port** *<port list>*  This parameter identifies the ATM port. Specify this parameter in the format: **media.slot.port**. Specify **all-ports** to set bit allocation on all ports.

    **media**  Specifies the media type. This is **at** for ATM ports**.**

    **slot**  Specifies the slot number where the module is installed.

    **port**  Specifies the port number.

**vpi-bits** *<num>*

This parameter sets the number of bits for VPI. Specify any number between 1 and 4 (the **default** is 1).

## Restrictions

None.

## Example

To allocate 3 bits for VPI on port at.9.1:

```
xp(config)# atm set port at.9.1 vpi-bits 3
```

# atm set vcl

## Purpose

Sets the VCL operation mode.

## Format

**atm set vcl port** *<port>* **forced-bridged traffic-stats-enable**

## Mode

Configure

## Description

The **atm set vcl** command enables forced bridging and traffic statistics logging on a per-VC basis. Forced-bridging forces the VC to encapsulate all ingress/egress traffic into a Layer-2 frame. This formats all traffic on a VC as bridged traffic, better suited for inter operability with other routers. Traffic-stats-enable enables gathering and logging of traffic statistics on a VC.

## Parameters

| | | |
|---|---|---|
| *<port>* | Specifies a single port, including the virtual channel, in the format: **media.slot.port.vpi.vci** | |
| | **media** | The media type. This is always **at** for an ATM port. |
| | **slot** | The slot number where the module is installed. |
| | **port** | The number of the port through which data is passing. |
| | **vpi** | The Virtual Path Identifier. |
| | **vci** | The Virtual Channel Identifier. |
| **forced-bridged** | Enables encapsulation of all traffic as Layer-2 bridged traffic. This parameter can be used for inter-operability between the Enterasys X-Pedition and other vendor products. | |
| **traffic-stats-enable** | Enables gathering of traffic statistics on a VC. You can display traffic statistics using the **atm show stats** command. | |

## Restrictions

None.

# Example

To encapsulate all traffic as bridged traffic on at.4.1.0.100:

xp (config)# **atm set vcl port at.4.1.0.100 forced-bridged**

# atm show

## Purpose

Display information specific to an ATM port.

## Format

**atm show [vpl port** *<port list>***| all [summary]] | [vcl port** *<port list>***| all [summary]] [service** *<string>***| all] | [port-settings** *<port list>*/ **all-ports] | [stats port** *<port list>***]**

## Mode

Enable

## Parameters

**vpl port** *<port list>***| all [summary]**

>    Shows VPL configurations on a port.

>    Specify **at.slot.port** to display all VPL configurations on the port.

>    Specify **at.slot.port.vpl** to display only the specified VPL configuration on the port.

>    Specify **all** to display verbose VPL configurations on all ports.

>    Specify **summary** to display summarized VPL configuration in tabular form.

**vcl port** *<port list>***| all [summary]**

>    Shows VCL configurations on a port.

>    Specify **at.slot.port** to display all VCLs configurations on the port.

>    Specify **at.slot.port.vpl** to display all VCL configurations for a specified VPL.

>    Specify **at.slot.port.vpl.vcl** to display only the specified VCL configuration on the port.

>    Specify **all** to display verbose VCL configurations on all ports.

>    Specify **summary** to display summarized VCL configuration in tabular form.

**service** *<string>***| all**

>    Shows the profile for a defined service. Specify **all** to show all ATM service profiles.

**port-settings** *<port list>***| all-ports**

>    Shows the characteristics of an ATM port that were set by the **port set** command.

Specify the port using the following format: **at.slot.por**t. Specify **all-ports** to show characteristics of all ATM ports.

**stats port** *<port list>*

Shows the traffic statistics of a virtual channel. Traffic statistics must first be enabled using the **atm set vcl traffic-stats-enable** command.

Specify **at.slot.port.vpl** to display traffic statistics for all VCL within a specified VPL.

Specify **at.slot.port.vpl.vcl** to display traffic statistics only for the specified VCL.

# Restrictions

None.

# Examples

To display information about the VPL configurations on ATM port 1:

```
xp(atm-show)# vpl port at.9.1

VPL Table Contents for Slot 9, Port 1:
    Virtual Path Identifier:      1
    Administrative Status:        Up
    Operational Status:           Up
    Last State Change:            1581
    Service Definition:           default-OC3
       Service Class:             UBR
       Peak Bit Rate:             Best Effort
       Sustained Bit Rate:        0 Kbits/sec (0 cps)
       Maximum Burst Size:        0 cells
       Encapsulation Type:        LLC Multiplexing
       F5-OAM:                    Responses Only
       F5-OAM-Type:               Current Segment
```

- Virtual Path IdentifierIdentifies a particular VP.

- Administrative StatusShows whether the VP is a viable network element.
  **Up** indicates a viable network element.
  **Down** indicates a non-viable network element.

- Operational StatusShows whether the VP is passing traffic.
  **Up** indicates traffic.
  **Down** indicates no traffic.

- Last State ChangeShows the last time the VP went up or down. Time is in seconds relative to system bootup.

- Service DefinitionShows the name of the defined service and its traffic parameters

To display information about all the defined service profiles for UBR:

```
xp# atm show service all

default-OC3
   Service Class:        UBR
   Peak Bit Rate:         Best Effort
   Sustained Bit Rate:    0 Kbits/sec (0 cps)
   Maximum Burst Size:   0 cells
   Encapsulation Type:   LLC Multiplexing
   F5-OAM:                Responses Only
   F5-OAM-Type:          Current Segment
```

- Service Class

  Shows the type of service class.
  **UBR** indicates Unspecified Bit Rate
  **CBR** indicates Constant Bit Rate
  **RT-VBR** indicates Real-time Variable Bit Rate
  **NRT-VBR** indicates Non Real-time Variable Bit Rate

- Peak Bit Rate

  Shows the maximum bit transmission rate.

- Sustained Bit Rate

  Shows the average bit transmission rate (in Kilobits per second).

- Maximum Burst Size

  Shows how many cells can be transmitted at the Peak Bit Rate.

- Encapsulation Type

  Shows the encapsulation scheme to transport multi protocol data over the AAL5 layer.
  **LLC Multiplexing** indicates logical link control encapsulation (**default**).
  **VC Multiplexing** indicates VC-based multiplexing encapsulation.

- F5-OAM

  Shows how OAM (Operation, Administration, and Management) loopback cells provide loopback capabilities and confirm whether a VC connection is up. F5 OAM segments and end-to-end are supported, which provides loopback capabilities on a VC connection level.
  **Responses Only** indicates that the port will respond but doesn't generate OAM cells.
  **Requests & Responses** indicates that the port will respond and generate OAM cells.

- F5-OAM-Type

  Shows F5-OAM-Type setting.

To display port-setting information about ATM port 1:

```
xp(atm-show)# port-settings at.9.1
Port information for Slot 9, Port 1:
    Port Type:              T3 ATM coaxial cable
    Xmt Clock Source:       Local
    Scramble Mode:          Payload
    Line Coding:            B3ZS
    Cell Mapping:           Direct
    Framing                 Cbit-Parity
    VC Mode:                 1 bit of VPI, 11 bits of VCI
    Service Definition:     default-OC3
       Service Class:       UBR
       Peak Bit Rate:       Best Effort
       Sustained Bit Rate:  0 Kbits/sec (0 cps)
       Maximum Burst Size:  0 cells
       Encapsulation Type:  LLC Multiplexing
       F5-OAM:               Requests & Responses
       F5-OAM-Type:         Current Segment
```

- Port Type                Shows the type of PHY interface for the port.

- Xmt Clock Source          Shows the timing source for the port.
                            **Local** indicates the on board clock oscillator as the timing source.
                            **Loop** indicates the receiver input as the timing source.

- Scramble Mode             Shows the scramble/descramble mode for the port.
                            **None** indicates no scrambling.
                            **Payload** indicates scrambling of the payload only.
                            **Frame** indicates scrambling of the stream only.
                            **Both** indicates scrambling of payload and stream.

- Line Coding               Shows the particular DS1/T1 and DS3/T3 coding convention.

- Cell Mapping              Shows the format used to map ATM cells.
                            **Direct** indicates direct cell mapping.
                            **Plcp** indicates physical layer convergence protocol mapping.

- Framing                   Shows the type of framing scheme.
                            **cbit-parity** is used for T3 framing.
                            **m23** is used for T3 framing.
                            **esf** indicates extended super frame and is used for T1 framing.
                            **g832** is used for E3 framing.
                            **g751** is used for E3 framing.

- VC Mode                   Shows the bit allocation for VPI and VCI.

- Service Definition        Shows the name of the defined service on the port and its traffic parameters.

# Chapter 9

# bgp Commands

The **bgp** commands let you display and set parameters for the Border Gateway Protocol (BGP).

**Note:**    BGP management traps are not supported in this release.

## Command Summary

Table 9 lists the **bgp** commands. The sections following the table describe the command syntax.

**Table 9.  bgp commands**

| |
|---|
| **bgp add network** *<ipaddr-mask>*|**all group** *<number-or-string>* |
| **bgp add peer-host** *<ipaddr>* **group** *<number-or-string>* |
| **bgp clear peer-host** *<ipaddr>* |
| **bgp create peer-group** *<number-or-string>* |
| **bgp set DampenFlap** *<option>* |
| **bgp set default-metric** *<num>* |
| **bgp set cluster-id** *<ipaddr>* |
| **bgp set multipath off** |
| **bgp set peer-group** *<number-or-string>* |
| **bgp set peer-host** *<ipaddr>* |
| **bgp set preference** *<num>* |
| **bgp show cidr-only** *<ip-addr-mask>*|**default**|**all** [**to-terminal**|**to-file**] |

**Table 9.  bgp commands (Continued)**

| |
|---|
| **bgp show community community-id** *<number>* **autonomous-system** *<number>*| **well-known-community [no-export|no-advertise|no-export-subconfed]| reserved-community** *<number>*] [**to-terminal|to-file**] |
| **bgp show peer-as** *<number>* [**to-terminal|to-file**] |
| **bgp show peer-group-type external|internal|routing [to-terminal|to-file]** |
| **bgp show peer-host** *<ipaddr>* **received-routes|all-received-routes|advertised-routes [to-terminal|to-file]** |
| **bgp show regexp to-terminal|to-file** |
| **bgp show routes** *<ip-addr-mask>*|**default|all [to-terminal|to-file]** |
| **bgp show summary [to-terminal|to-file]** |
| **bgp show sync-tree** |
| **bgp start|stop** |
| **bgp trace** *<option>* |

# bgp add network

## Purpose

Adds a network to a BGP peer group.

## Format

**bgp add network** *<ip-addr-mask>*|**all group** *<number-or-string>*

## Mode

Configure

## Description

The **bgp add network** command lets you add a BGP peer network, thus allowing peer connections from any addresses in the specified range of network and mask pairs.

## Parameters

**network** *<ip-addr-mask>*|**all**
> Specifies a network from which peer connections are allowed. Specify an IP address and Mask value. Example: 1.2.3.4/255.255.0.0 or 1.2.3.4/16. Specify **all** to add all networks.

**group** *<number-or-string>*
> Specifies the group ID associated with this network range.

## Restrictions

None.

# bgp add peer-host

## Purpose

Add a BGP peer by adding a peer host.

## Format

**bgp add peer-host** *<ipaddr>* **group** *<number-or-string>*

## Mode

Configure

## Description

The **bgp add peer-host** command adds a peer-host to a BGP group.

## Parameters

**peer-host** *<ipaddr>*
> Specifies the peer host's IP address.

**group** *<number-or-string>*
> Specifies the group ID of the group to which the peer host belongs.

## Restrictions

None.

# bgp clear peer-host

## Purpose

Disconnect and re-establish a peer connection.

## Format

**bgp clear peer-host** *<ipaddr>*

## Mode

Enable.

## Description

The **bgp clear peer-host** command sends a notification packet to the selected peer host, causing the peer session to close and re-establish.

## Parameters

**peer-host** *<ipaddr>*
   Specifies the peer host's IP address.

## Restrictions

None.

# bgp create peer-group

## Purpose

Create a BGP group based on a type and autonomous system number. You may create any number of groups, but each group must have a unique combination of type and autonomous system.

## Format

**bgp create peer-group** *<number-or-string>* **type external|internal|routing**
**[autonomous-system** *<number>*]
**[proto any|rip|ospf|static]**
**[interface** *<interface-name-or-ipaddr>* |**all]**

## Mode

Configure

## Description

The **bgp create peer-group** command creates an entity with which peers may be associated. Peers are added to the group with the commands **bgp add peer-host** or **bgp add network**. Once a group is created, group-wide parameters may be applied with the **bgp set peer-group** command.

## Parameters

**peer-group** *<number-or-string>*
> Is a group ID, which can be a number or a character string.

**type** Specifies the type of BGP group you are adding. Specify one of the following:

> **external** Use for external BGP peers. Full policy checking is applied to all incoming and outgoing advertisements. All peers in this group must be directly reachable through a local interface—they must be L2 adjacent.

> **internal** Use for internal BGP peers where there is no IGP being used. This group expects all peers to be L2 adjacent so that next hops received in updates can be used directly for forwarding.

> **routing** An internal group which uses the routes of an interior protocol to resolve forwarding addresses. Type routing groups will determine the immediate next hops for routes by using the next hop received with a route from a peer as a forwarding address, and using this to look up an immediate next hop in an IGP's routes. Such groups support distant peers, but need to be informed of the IGP whose routes they are using to determine immediate next hops. This implementation comes closest to the IBGP implementation of other router vendors.

**autonomous-system**

Specifies the autonomous system of the peer group. Specify a number from 1 – 65534.

**proto**  Specifies the interior protocol to be used to resolve BGP next hops. Specify one of the following:

**any**  Use any IGP to resolve BGP next hops.

**rip**  Use RIP to resolve BGP next hops.

**ospf**  Use OSPF to resolve BGP next hops.

**static**  Use static to resolve BGP next hops.

**interface** *<interface-name-or-IPaddr>*

Interfaces whose routes are carried via the IGP for which third-party next hops may be used instead. Use only with parameter type ROUTING. Specify the interface or use **all** to use all interfaces.

# Restrictions

None.

# bgp set cluster-id

## Purpose

Specifies the route reflection cluster ID for BGP.

## Format

**bgp set cluster-id** *<ipaddr>*

## Mode

Configure

## Description

The **bgp set cluster-id** command specifies the route reflection cluster ID for BGP. The cluster ID defaults to the same as the router-id. If a router is to be a route reflector, then a single cluster ID should be selected and configured on all route reflectors in the cluster. If there is only one route reflector in the cluster, the cluster ID setting may be omitted, as the default will suffice.

## Parameters

**cluster-id** *<ipaddr>*
    Is the cluster ID.

## Restrictions

The only constraints on the choice of cluster ID are (a) IDs of clusters within an AS must be unique within that AS, and (b) the cluster ID must not be 0.0.0.0. Choosing the cluster ID to be the router ID of one router in the cluster will always fulfill these criteria.

# bgp set DampenFlap

## Purpose

Configures parameters for Weighted Route Dampening.

## Format

**bgp set dampenflap [state enable|disable]|[suppress-above** *<num>*]|
[**reuse-below** *<num>*]|[**max-flap** *<num>*]|[**unreach-decay** *<num>*]|
[**reach-decay** *<num>*]|[**keep-history** *<num>*]

## Mode

Configure

## Description

The **bgp set dampenflap** command configures the state of Weighted Route Dampening.

## Parameters

**state enable|disable**
> Causes the Route Instability History to be maintained (**enable** option) or not (**disable** option).

**suppress-above** *<num>*
> Is the value of the instability metric at which route suppression will take place. A route will not be installed in the FIB or announced even if it is reachable during the period that it is suppressed. The default is 3.0.

**reuse-below** *<num>*
> Is the value of the instability metric at which a suppressed route will become unsuppressed, if it is reachable but currently suppressed. The value must be less than that for the suppress-above option. The default is 2.0.

**max-flap** *<num>*
> Is the upper limit of the instability metric. This value must be greater than the larger of 1 and that for suppress-above. The default is 16.0.

**unreach-decay** *<num>*
> Specifies the time in seconds for the instability metric value to reach one-half of its current value when the route is *unreachable*. This half-life value determines the rate at which the metric value is decayed. The default is 900.

**reach-decay** *<num>*
> Specifies the time in seconds for the instability metric value to reach one half of its current value when the route is *reachable*. This half-life value determines the rate at which the

metric value is decayed. A smaller half-life value will make a suppressed route reusable sooner than a larger value. The default is 300.

**keep-history** *<num>*
Specifies the period in seconds over which the route flapping history is to maintained for a given route. The size of the configuration arrays is directly affected by this value. The default is 1800.

## Restrictions

None.

# bgp set default-metric

## Purpose

Set the metric used when advertising routes through BGP.

## Format

**bgp set default-metric** *<num>*

## Mode

Configure

## Description

The **bgp set default-metric** command lets you set the default metric BGP uses when it advertises routes. If this command is not specified, no metric is propagated. This metric may be overridden by a metric specified on the neighbor or group statements or in an export policy.

## Parameters

*<num>*    Specifies the default cost. Specify a number from 0 - 65535.

## Restrictions

None.

# bgp set multipath

## Purpose

Disables multipath route calculation for BGP routes.

## Format

**bgp set multipath off**

## Mode

Configure

## Description

The **bgp set multipath** command disables multipath route calculation for BGP routes. No multipath forwarding occurs as a result of this command.

## Parameters

**off**

Disables multipath route calculation for BGP routes.

## Restrictions

If you negate this command from the configuration file, the XP will not automatically recreate multipath routes. To recreate multipath routes, stop and restart bgp.

# bgp set peer-group

## Purpose

Set parameters for the specified BGP Peer Group.

## Format

**bgp set peer-group** *<number-or-string>*
**[**
**med|reflector-client|no-client-reflect|[metric-out** *<num>*]**|[set-pref** *<num>*]
**[local-pref** *<num>*] **[local-as** *<num>*]**|ignore-first-as-hop|**
**[generate-default enabled|disabled]|[gateway** *<ipaddr>*]**|next-hop-self|**
**[preference** *<num>*]**[preference2** *<num>*]**[local-address** *<ipaddr>*]**|**
**[hold-time** *<num>*]**|[version 2|3|4]|passive|[send-buffer** *<num>*]**|**
**[recv-buffer** *<num>*]**|[in-delay** *<num>*]**|[out-delay** *<num>*]**|[keep all|none]|**
**show-warnings|no-aggregator-id|keep-alives-always|v3-asloop-okay|no-v4-asloop|**
**[as-count** *<num>*]**|log-up-down|[ttl** *<num>*]**|**
**[optional-attributes-list** *<number-or-string>*]
**]**

## Mode

Configure

## Description

The **bgp set peer-group** command sets parameters for the specified BGP group.

## Parameters

**group** *<number-or-string>*
   Specifies the group.

**med**
   Forces med to be used for route selection process. By default, any metric (Multi_Exit_Disc, or
   MED) received on a BGP connection is ignored. If it is desired to use MEDs in route
   selections, the **med** option must be specified in this (**create peer-group**) command. By default,
   MEDs are not sent on external connections. To send MEDs, use the **metric** option of the **ip-router policy create bgp-export-destination** statement or the **metric-out** option of the **bgp
   set peer-group** or **bgp set peer-host** commands.

**reflector-client**
   The **reflector-client** option specifies that GateD will act as a route reflector for this group. All
   routes received from any group member will be sent to all other internal neighbors, and all
   routes received from any other internal neighbors will be sent to the reflector clients. Since the

route reflector forwards routes in this way, the reflector-client group need not be fully meshed. Use only for *internal* and *routing* groups.

**no-client-reflect**

If the no-client-reflect option is specified, routes received from reflector clients will only be sent to internal neighbors which are not in the same group as the sending reflector client. In this case the reflector-client group should be fully meshed. In all cases, routes received from normal internal peers will be sent to all reflector clients.

Note that it is necessary to export routes from the local AS into the local AS when acting as a route reflector. The reflector-client option specifies that GateD will act as a route reflector for this group. All routes received from any group member will be sent to all other internal neighbors, and all routes received from any other internal neighbors will be sent to the reflector clients. Since the route reflector forwards routes in this way, the reflector-client group need not be fully meshed.

**metric-out** *<num>*

Specifies the primary metric used on all routes sent to the specified peer group. Specify a number from 0 - 65535.

**set-pref** *<num>*

Routes propagated by IBGP must include a Local_Pref attribute. By default, BGP sends the Local_Pref path attribute as 100, and ignores it on receipt. GateD BGP does not use Local_Pref as a route-preference decision maker unless the setpref option has been set. For Routing- or Internal-type groups, the setpref option allows GateD's global protocol preference to be exported into Local_Pref and allows Local_Pref to be used for GateD's route selection preference. Note that the setpref option is the only way for GateD to send a route with a given local_pref. The local_pref is never set directly, but rather as a function of the GateD preference and setpref metrics. Allows BGP's LOCAL_PREF attribute to be used to set the GateD preference on reception, and allows the GateD preference to set the LOCAL_PREF on transmission. The set-pref metric works as a lower limit, below which the imported LOCAL_PREF may not set the GateD preference. Use only for *internal* and *routing* groups. Specify a number from 0 - 255.

**local-pref** *<num>*

Sets the BGP LOCAL_PREF attribute. Use for *internal* and *routing* groups only. Specify a number from 1 - 65535.

**local-as** *<num>*

Identifies the autonomous system which the router is representing to this group of peers. The default is the one configured by the **set autonomous_system** command. Specify a number from 1 - 65534.

**ignore-first-as-hop**

Some routers, known as Route Servers, are capable of propagating routes without appending their own AS to the AS path. By default, GateD will drop such routes. Specifying ignore-first-as-hop here or on either the **create peer-group** or **set peer-host** CLI commands disables this feature. This option should only be used if it is positively known that the peer is a route server and not a normal router.

**generate-default enabled|disabled**

Specifies whether the router should generate a default route when BGP receives a valid update from its peer. If this option is not specified, then the generation of default route is enabled.

**gateway** *<ipaddr>*

If a network is not shared with a peer, this option specifies a router on an attached network to be used as the next hop router for routes received from this neighbor. This field is used for EBGP Multihop. **The IP address must be a host address on a locally attached network**.

**next-hop-self**

This option causes the next hop in route advertisements set to this peer or group of peers to be set to our own router's address even if it would normally be possible to send a third-party next hop. Use of this option may cause efficient routes to be followed, but it may be needed in some cases to deal with broken bridged interconnect media (in cases where the routers on the shared medium do not really have full connectivity to each other) or broken political situations. Use only for EXTERNAL groups.

**preference** *<num>*

Specifies the preference used for routes learned from these peers. Specify a number from 0 - 255.

**preference2** *<num>*

In case of a preference tie, this option (the second preference), may be used to break the tie. The default value is 0. Specify a number from 0 - 255.

**local-address** *<ipaddr>*

Specifies the address to be used on the local end of the TCP connection with the peer or with the peer's gateway when the gateway option is used. A session with an external peer will only be opened when an interface with the appropriate local address (through which the peer or gateway address is directly reachable). In either case incoming connections will only be recognized as matching a configured peer if they are addressed to the configured local address. Use for *internal* and *routing* groups only. **It should be one of the interface addresses.**

**hold-time** *<num>*

Specifies the hold time value to use when negotiating the connection with this peer, in seconds. If BGP does not receive a keepalive, update, or notification message from a peer within the period specified in the Hold Time field of the BGP Open message, then the BGP connection will be closed. The value must be either 0 (no keepalives will be sent) or at least 6.

**version 2|3|4**

Specifies the version of the BGP protocol to use with this peer. If not specified, only the specified version will be offered. Specify 2, 3, or 4.

**passive**

Specifies that active OPENs to this peer should not be attempted. BGP would wait for the peer to issue an OPEN. By default, all explicitly configured peers are active, they periodically send OPEN messages until the peer responds. Note that if it is applied to both sides of a peering session, it will prevent the session from ever being established.

**send-buffer** *<num>*

Controls the amount of send buffer acquired from the memory subsystem. The maximum supported is 65535 bytes. By default, BGP acquires the maximum supported. Specify a number from 4096 – 65535.

**recv-buffer** *<num>*

Controls the amount of receive buffer acquired from the memory subsystem. The maximum

supported is 65535 bytes. By default, BGP acquires the maximum supported. Specify a number from 4096 – 65535.

**in-delay** *<num>*

Used to dampen route fluctuations. In delay specifies the amount of time in seconds a route learned from a BGP peer must be stable before it is accepted into the routing database. Specify a number equal to or greater than 0. The default value is 0, meaning that this feature is disabled.

**out-delay** *<num>*

Used to dampen route fluctuations. Out delay is the amount of time in seconds a route must be present in the routing table before it is exported to BGP. Specify a number equal to or greater than 0. The default value is 0, meaning that this feature is disabled.

**keep all|none**

Used to retain routes learned from a peer even if the routes' AS paths contain one of our exported AS numbers.

**show-warnings**

This option causes GateD to issue warning messages when receiving questionable BGP updates such as duplicate routes and/or deletions of non-existing routes. Normally these events are silently ignored.

**no-aggregator-id**

This option causes GateD to specify the router ID in the aggregator attribute as zero (instead of its router ID) in order to prevent different routers in an AS from creating aggregate routes with different AS paths.

**keep-alives-always**

This option causes GateD to always send keepalives, even when an update could have correctly substituted for one. This allows inter operability with routers that do not completely obey the protocol specifications on this point.

**v3-asloop-okay**

By default GateD will not advertise routes whose AS path is looped (i.e. with an AS appearing more than once in the path) to version 3 external peers. Setting this flag removes this constraint. Ignored when set on internal groups or peers.

**no-v4-asloop**

Prevents routes with looped AS paths from being advertised to version 4 external peers. This can be useful to avoid advertising such routes to peer which would incorrectly forward the routes on to version 3 neighbors.

**as-count** *<num>*

This option determines how many times the XP will insert its own AS number when we send the AS path to an external neighbor.

Specify a number between 1 and 25. The default is 1. Higher values typically are used to bias upstream neighbors' route selection. (All else being equal, most routers will prefer to use routes with shorter AS Paths. Using **ascount**, the AS Path the XP sends can be artificially lengthened.)

Note that ascount supersedes the **no-v4-asloop** option–regardless of whether **no-v4-asloop** is set, we will still send multiple copies of our own AS if the **as-count** option is set to something greater than one. Also, note that if the value of ascount is changed and GateD is reconfigured,

routes will not be sent to reflect the new setting. If this is desired, it will be necessary to restart the peer session.

**log-up-down**

This option causes a message to be logged via the SYSLOG mechanism whenever a BGP peer enters or leaves the ESTABLISHED state.

**ttl** *<num>*

By default, BGP sets the IP TTL for local peers to ONE and the TTL for non-local peers to 255. This option is provided when attempting to communicate with improperly functioning routers that ignore packets sent with a TTL of ONE. Specify a number between 1 and 255.

**optional-attributes-list** *<number-or-string>*

Specifies the ID of the optional-attributes-list to be associated with this peer-group.

# Restrictions

None.

# bgp set peer-host

## Purpose

Set parameters for a BGP peer host.

## Format

**bgp set peer-host** *<ipaddr>* **[group** *<number-or-string>*/**[metric-out** *<num>*]|
**[set-pref** *<num>*]**[local-as** *<num>*]|**ignore-first-as-hop**|
**[generate-default enabled|disabled]|[gateway** *<ipaddr>*]|**next-hop-self**|
**[preference** *<num>*]**[preference2** *<num>*]**[local-address** *<ipaddr>*]|
**[hold-time** *<num>*]|**[version 2|3|4]|passive|[send-buffer** *<num>*]|
**[recv-buffer** *<num>*]|**[in-delay** *<num>*]|**[out-delay** *<num>*]|**[keep all|none]|
show-warnings|no-aggregator-id|keep-alives-always|v3-asloop-okay|
no-v4-asloop|[as-count** *<num>*]|**[ttl** *<num>*]|
**[optional-attributes-list** *<number-or-string>*]]

## Mode

Configure

## Description

The **bgp set peer-host** command lets you set various parameters for the specified BGP peer hosts.

## Parameters

**group** *<number-or-string>*
Specifies the group ID

**metric-out** *<num>*
Specifies the primary metric used on all routes sent to the specified peer group. The metric hierarchy is as follows, starting from the most preferred: 1)The metric specified by export policy. 2) Peer-level metricout. 3) Group-level metricout 4) Default metric. For *internal* and *routing* peers use the **group** command to set the metric-out. Specify a number from 0 - 65535.

**set-pref** *<num>*
Allows BGP's LOCAL_PREF attribute to be used to set the GateD preference on reception, and allows the GateD preference to set the LOCAL_PREF on transmission. The set-pref metric works as a lower limit, below which the imported LOCAL_PREF may not set the GateD preference. For *internal* and *routing* peers, use the **group** command to set the metric-out. Specify a number from 0 - 255. **This parameter applies to *internal* and *routing* peers only.**

**local-as** *<num>*
Identifies the autonomous system which the router is representing to this group of peers. The

default is the one configured using the **ip-router global set autonomous-system** command. Specify a number from 1 - 65534.

**ignore-first-as-hop**

Some routers, known as Route Servers, are capable of propagating routes without appending their own AS to the AS path. By default, GateD will drop such routes. Specifying ignore-first-as-hop here or on either the **create peer-group** or **set peer-host** CLI commands disables this feature. This option should only be used if it is positively known that the peer is a route server and not a normal router.

**generate-default enabled|disabled**

Specifies whether the router should generate a default route when BGP receives a valid update from its peer. If this option is not specified, then the generation of default route is enabled.

**gateway** *<IPaddr>*

if a network is not shared with a peer, this option specifies a router on an attached network to be used as the next hop router for routes received from this neighbor. This is used for **EBGP multihop**. **The IP address must be a host address on a locally attached network.**

**next-hop-self**

This option causes the next hop in route advertisements set to this peer or group of peers to be set to our own router's address, even if it would normally be possible to send a third-party next hop. Use of this option may cause inefficient routes to be followed, but it may be needed in some cases to deal with broken bridged interconnect media (in cases where the routers in the shared medium do not really have full connectivity to each other) or broken political situations. **Use only for external peer hosts.**

**preference** *<num>*

Specifies the preference used for routes learned from these peers. This can differ from the default BGP preference set in the bgp set preference statement, so that GateD can prefer routes from one peer, or group of peer, over others. This preference may be explicitly overridden by import policy. Specify a number from 0 - 255.

**preference2** *<num>*

In case of preference tie, this option (the second preference), may be used to break the tie. The default value is 0. Specify a number from 0 - 255.

**local-address** *<IPaddr>*

Specifies the address to be used on the local end of the TCP connection with the peer or with the peer's gateway when the gateway option is used. A session with an external peer will be opened only when an interface with the appropriate local address (through which the peer or gateway address is directly reachable) is operating. For other types of peers, a peer session will be maintained when any interface with the specified local address is operating. In either case incoming connections will only be recognized as matching a configured peer if they are addressed to the configured local address. For *internal* and *routing* peers, use the **group** command to set the local-address—**the address should be one of the interface addresses.**

**hold-time** *<num>*

Specifies the hold time value to use when negotiating the connection with this peer, in seconds. If BGP does not receive a keepalive, update, or notification message from a peer within the period specified in the Hold Time field of the BGP Open message, then the BGP connection will be closed. The value must be either 0 (no keepalives will be sent) or at least 6.

**Note:**  Setting the hold-time to 0 is not negotiated. If the remote peer attempts to negotiate any value other than 0, the higher value will be used. If you want to prevent keepalives from being exchanged, configure both peers to use a hold-time of 0.

**version 2|3|4**

Specifies the version of the BGP protocol to use with this peer. If not specified, only the specified version will be offered. Specify 2, 3, or 4.

**passive**

Specifies that active OPENs to this peer should not be attempted. BGP would wait for the peer to issue an OPEN. By default, all explicitly configured peers are active, they periodically send OPEN messages until the peer responds. Note that if it is applied to both sides of a peering session, it will prevent the session from ever being established.

**send-buffer** *<num>*

Controls the amount of send buffer acquired from the memory subsystem. The maximum supported is 65535 bytes. By default, BGP acquires the maximum supported. Specify a number from 4096 - 65535.

**recv-buffer** *<num>*

Controls the amount of receive buffer acquired from the memory subsystem. The maximum supported is 65535 bytes. By default, BGP acquires the maximum supported. Specify a number from 4096 – 65535.

**in-delay** *<num>*

Used to dampen route fluctuations. In delay specifies the amount of time in seconds a route learned from a BGP peer must be stable before it is accepted into the routing database. The default value is 0, meaning that this feature is disabled. Specify a number equal to or greater than 0.

**out-delay** *<num>*

Used to dampen route fluctuations. Out delay is the amount of time in seconds a route must be present in the routing table before it is exported to BGP. The default value is 0, meaning that this feature is disabled. Specify a number equal to or greater than 0.

**keep all|none**

Used to retain routes learned from a peer even if the routes' AS paths contain one of our exported AS numbers.

**show-warnings**

This option causes GateD to issue warning messages when receiving questionable BGP updates such as duplicate routes and/or deletions of non-existing routes. Normally these events are silently ignored.

**no-aggregator-id**

This option causes GateD to specify the router ID in the aggregator attribute as zero (instead of its router ID) in order to prevent different routers in an AS from creating aggregate routes with different AS paths.

**keep-alives-always**

This option causes GateD to always send keepalives, even when an update could have correctly substituted for one. This allows inter operability with routers that do not completely obey the protocol specifications on this point.

**v3-asloop-okay**

By default GateD will not advertise routes whose AS path is looped (i.e. with an AS appearing more than once in the path) to version 3 external peers. Setting this flag removes this constraint. Ignored when set on internal groups or peers.

**no-v4-asloop**

Prevents routes with looped AS paths from being advertised to version 4 external peers. This can be useful to avoid advertising such routes to peer which would incorrectly forward the routes on to version 3 neighbors.

**as-count** *<num>*

This option determines how many times we will insert our own AS number when we send the AS path to an external neighbor. Specify a number equal to or greater than 0. The default is 1. Higher values are typically used to bias upstream neighbors' route
selection. (All things being equal most routers will prefer to use routes with shorter AS Paths.

Using **ascount**, the AS Path the XP sends can be artificially lengthened.) Note that ascount supersedes the **no-v4-asloop** option--regardless of whether **no-v4-asloop** is set, the XP will still send multiple copies its own AS if the **as-count** option is set to something greater than one.

Also, note that if the value of **ascount** is changed and GateD is reconfigured, routes will not be sent to reflect the new setting. If this is desired, it will be necessary to restart the peer session. Use only for external peer_hosts. Specify a number from 1-25.

**log-up-down**

Causes a message to be logged via the SYSLOG mechanism whenever a BGP peer enters or leaves the ESTABLISHED state.

**ttl** *<num>*

By default, BGP sets the IP TTL for local peers to ONE and the TTL for non-local peers to 255. This option is provided when attempting to communicate with improperly functioning routers that ignore packets sent with a TTL of ONE. Specify a number from 1-255.

**optional-attributes-list** *<num-or-string>*

Specifies the ID of the optional-attributes-list to be associated with this peer-group.

# Restrictions

None.

# bgp set preference

## Purpose

Set BGP preference.

## Format

**bgp set preference** *<num>*

## Mode

Configure

## Description

The **bgp set preference** command lets you set the BGP preference for the XP.

## Parameters

*<num>*    Specifies the preference of routes learned from BGP. Specify a number from 0 -255.
           The default preference is 170.

## Restrictions

None.

# bgp show aspaths

## Purpose

Displays BGP AS path information

## Format

**bgp show aspaths** *<aspath>*|**all** [**to-terminal**|**to-file**]

## Mode

Enable

## Description

The **bgp show aspaths** command displays information about a specified AS path or all AS paths. The AS path is listed along with the number of routes that use it.

## Parameters

| | |
|---|---|
| *<aspath>* | Displays information about the specified AS path. |
| **all** | Displays information about all AS paths. |
| **to-terminal** | Causes output to be displayed on the terminal. This is the default. |
| **to-file** | Causes output to be saved in the file **/gatedtrc/gated.dmp**. |

## Restrictions

None.

## Example

To display information about all AS paths:

```
xp# bgp show aspaths all
Hash  Ref   Path
0     5     IGP (Id 1)
2     1     (64900) 64901 64902 IGP (Id 3)
7     4     (64900) 64901 IGP (Id 2)
```

# bgp show cidr-only

## Purpose

Display routes in the BGP routing table with CIDR network masks

## Format

**bgp show cidr-only** *<ip-addr-mask>*|**all** [**to-terminal**|**to-file**]

## Mode

Enable

## Description

The **bgp show cidr-only** command displays the same type of route information as the bgp show routes command. The difference is that the **bgp show cidr-only** command limits the display to CIDR routes only.

## Parameters

*<ip-addr-mask>* Displays information about the specified CIDR route.

**all**　　　　　　Displays information about all CIDR routes.

**to-terminal**　　Causes output to be displayed on the terminal.

**to-file**　　　　Causes output to be saved in the file **/gatedtrc/gated.dmp**.

## Restrictions

None.

## Example

To display information all CIDR routes in the XP's BGP route table:

```
xp# bgp show cidr-only all
Proto    Route/Mask NextHop       ASPath
BGP       12.2.19/25 207.135.89.65   (64800) 64753 64752 64751 6379 3561 11277 IGP (Id 13805)
BGP      12.5.172/22 207.135.89.65   (64800) 64753 64752 64751 6379 3561 1 IGP (Id 173)
BGP      12.5.252/23 207.135.89.65   (64800) 64753 64752 64751 6379 5646 1 7018 6301 IGP (Id 926)
BGP       12.6.42/23 207.135.89.65   (64800) 64753 64752 64751 6379 5646 1 7018 11090 IGP (Id 979)
BGP      12.6.134/23 207.135.89.65   (64800) 64753 64752 64751 6379 5646 1 701 7314 10562 IGP (Id 388)
BGP      12.7.214/23 207.135.89.65   (64800) 64753 64752 64751 6379 5646 7018 4129 IGP (Id 31004)
```

# bgp show community

## Purpose

Displays routes that belong to a specified community.

## Format

**bgp show community community-id** *<number>* **autonomous-system** *<number>*| **well-known-community [no-export|no-advertise|no-export-subconfed]| reserved-community** *<number>*] [**to-terminal|to-file**]

## Mode

Enable

## Description

The **bgp show community** command displays routes that belong to a specified community in a specified autonomous system.

## Parameters

**community-id** *<number>*
   Is the community identifier portion of a community split. This is combined with the autonomous-system value entered to create a value for the community attribute.

**autonomous-system** *<number>* Is an autonomous system number.

**well-known-community**
   Is one of the well-known communities. Specify one of the following:

   **no-export**
      Is a special community that indicates the routes associated with this attribute must not be advertised outside a BGP confederation boundary. Since the XP's implementation does not support confederations, this boundary is an AS boundary.

   **no-advertise**
      is a special community indicating that the routes associated with this attribute must not be advertised to other BGP peers.

   **no-export-subconfed**
      Is a special community indicating the routes associated with this attribute must not be advertised to external BGP peers. (This includes peers in other members' autonomous systems inside a BGP confederation.)

**reserved-community** *<number>*
   This option specifies one of the reserved communities that is not well-known. A reserved

community is one that is in one of the following ranges (0x0000000 - 0x0000FFFF) or (0xFFFF0000 - 0xFFFFFFFF).

**to-terminal**
Causes output to be displayed on the terminal. This is the default.

**to-file**
Causes output to be saved in the file **/gatedtrc/gated.dmp**.

## Restrictions

None.

## Example

To display routes that belong to community 160 in AS 64900:

```
xp# bgp show community community-id 160 autonomous-system 64900
BGP table : Local router ID is 192.68.11.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal
Origin codes: i - IGP, e - EGP, ? - incomplete

  Network         Next Hop      Metric LocPrf Path
*> 192.68.20/24     172.16.20.2            64901 i
*> 192.68.222/24    172.16.20.2             64901 64902 i
```

# bgp show peer-as

## Purpose

Displays information about TCP and BGP connections to an autonomous system.

## Format

**bgp show peer-as** <*number*> **[to-terminal|to-file]**

## Mode

Enable

## Description

The **bgp show peer-as** command displays information about routers in a specified autonomous system that are peered with the XP.

## Parameters

**peer-as** <*number*>  Is the AS number of a peer autonomous system.

**to-terminal**   Causes output to be displayed on the terminal. This is the default.

**to-file**   Causes output to be saved in the file **/gatedtrc/gated.dmp**.

## Restrictions

None.

## Example

To display information about TCP and BGP connections to autonomous system 64901:

```
xp# bgp show peer-as 64901
group type External AS 64901 local 64900 flags <>
 peer 172.16.20.2 version 4 lcladdr (null) gateway (null)
  flags 0x20
  state 0x6 <Established>
  options 0x0 <>
  metric_out -1  preference 170  preference2 0
  recv buffer size 0  send buffer size 0
  messages in 10039 (updates 5, not updates 10034) 190863 octets
  messages out 10037 (updates 1, not updates 10036) 190743 octets
```

# bgp show peer-group-type

## Purpose

Displays status information about BGP peers by group.

## Format

**bgp show peer-group-type external|internal|routing [to-terminal|to-file]**

## Mode

Enable

## Description

The **bgp show peer-group-type** command displays status information about BGP peers according to their group.

## Parameters

| | |
|---|---|
| **external** | Displays status information about external peers. |
| **internal** | Displays status information about internal peers. |
| **routing** | Displays status information about routing peers. |
| **to-terminal** | Causes output to be displayed on the terminal. This is the default. |
| **to-file** | Causes output to be saved in the file **/gatedtrc/gated.dmp**. |

## Restrictions

None.

## Example

To display status information about external peers:

```
xp# bgp show peer-group-type external
Group    Neighbor      V    AS MsgRcvd MsgSent State
external 172.16.20.2    4 64901   10045   10044 Established
BGP summary, 1 peers in group type "external"
```

# bgp show peer-host

## Purpose

Displays status information about BGP peer hosts.

## Format

**bgp show peer-host** *<ipaddr>* **received-routes|all-received-routes|advertised-routes [to-terminal|to-file]**

## Mode

Enable

## Description

The **bgp show peer-host** command displays information related to a specified BGP peer host. Three types of information can be displayed: routes received and accepted from a BGP peer host, all BGP routes (both accepted and rejected) from a peer host, and all routes the XP has advertised to a peer host.

## Parameters

| | |
|---|---|
| *<ipaddr>* | Is the IP address of a BGP peer host |
| **received-routes** | Displays all valid BGP routes received and accepted from the specified peer host. |
| **all-received-routes** | Displays all BGP routes (both accepted and rejected) from the specified peer host. |
| **advertised-routes** | Displays all routes the **XP** has advertised to the specified peer host. |
| **to-terminal** | Causes output to be displayed on the terminal. This is the default. |
| **to-file** | Causes output to be saved in the file **/gatedtrc/gated.dmp**. |

## Restrictions

None.

## Examples

To display all valid BGP routes received and accepted from peer host 172.16.20.2:

```
xp# bgp show peer-host 172.16.20.2 received-routes
BGP table : Local router ID is 192.68.11.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal
Origin codes: i - IGP, e - EGP, ? - incomplete

  Network         Next Hop       Metric LocPrf Path
*> 172.16.70/24      172.16.20.2            64901 i
*> 172.16.220/24     172.16.20.2             64901 i
*> 192.68.20/24      172.16.20.2            64901 i
*> 192.68.222/24     172.16.20.2             64901 64902 i
```

To display all BGP routes (both accepted and rejected) from peer host 172.16.20.2:

```
xp# bgp show peer-host 172.16.20.2 all-received-routes
BGP table : Local router ID is 192.68.11.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal
Origin codes: i - IGP, e - EGP, ? - incomplete

  Network         Next Hop       Metric LocPrf Path
  172.16.20/24      172.16.20.2            64901 i
*> 172.16.70/24      172.16.20.2            64901 i
*> 172.16.220/24     172.16.20.2             64901 i
*> 192.68.20/24      172.16.20.2            64901 i
*> 192.68.222/24     172.16.20.2             64901 64902 i
```

Displays all routes the XP has advertised to peer host 172.16.20.2:

```
xp# bgp show peer-host 172.16.20.2 advertised-routes
BGP table : Local router ID is 192.68.11.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal
Origin codes: i - IGP, e - EGP, ? - incomplete

  Network         Next Hop       Metric LocPrf Path
*> 172.16.20/24      172.16.20.1            i
*> 192.68.11/24      192.68.11.1            i
```

# bgp show regexp

## Purpose

Displays the BGP routes matching the AS path regular expression.

## Format

**bgp show regexp** *<string>* **to-terminal|to-file**

## Mode

Enable

## Description

The **bgp show regexp** command searches through all BGP routes that contain specified keywords belonging to an AS path. These specified keywords are the AS path regular expression upon which the search is executed. The character string can be a combination of AS numbers or names.

Some BGP character string shorthand conventions:

| | |
|---|---|
| **.** | Matches any AS number |
| * | Zero or more repetitions |
| + | One or more repetitions |
| **?** | Zero or one repetition |
| \| | Alternation |
| ( ) | Parentheses group sub expressions |

## Parameters

| | |
|---|---|
| *<string>* | A character string that specifies the regular expression. Specify an As. |
| **to-terminal** | Causes output to be displayed on the terminal. This is the default. |
| **to-file** | Causes output to be saved in the file **/gatedtrc/gated.dmp**. |

## Restrictions

None.

# Example

To display the BGP routes starting with "64751":

```
xp# bgp show regexp "64751 .*" to-terminal
Network          Next Hop       Metric LocPrf Path
*> 193.226.64/22 134.141.178.33          64751 6379 1 1239 11331 8338 i
```

# bgp show routes

## Purpose

Displays entries in the BGP routing table.

## Format

**bgp show routes** *<ip-addr-mask>*|**all [to-terminal|to-file]**

## Mode

Enable

## Description

The **bgp show routes** command displays the IP address/netmask, next hop, and AS path for each BGP route.

## Parameters

| | |
|---|---|
| *<ip-addr-mask>* | Displays information about the specified route. |
| **all** | Displays information about all routes. |
| **to-terminal** | Causes output to be displayed on the terminal. This is the default. |
| **to-file** | Causes output to be saved in the file **/gatedtrc/gated.dmp**. |

## Restrictions

None.

## Example

To display the BGP routing table:

```
xp# bgp show routes all
Proto     Route/Mask NextHop        ASPath
BGP       172.16.70/24 172.16.20.2    (64900) 64901 IGP (Id 2)
BGP       172.16.220/24 172.16.20.2    (64900) 64901 IGP (Id 2)
BGP       192.68.20/24 172.16.20.2    (64900) 64901 IGP (Id 2)
BGP       192.68.222/24 172.16.20.2    (64900) 64901 64902 IGP (Id 3)
```

# bgp show summary

## Purpose

Displays the status of all BGP connections.

## Format

**bgp show summary [to-terminal|to-file]**

## Mode

Enable

## Description

The **bgp show summary** command displays the status of all BGP peers of the XP.

## Parameters

**to-terminal**     Causes output to be displayed on the terminal. This is the default.

**to-file**     Causes output to be saved in the file **/gatedtrc/gated.dmp**.

## Restrictions

None.

## Example

To display the status of all BGP connections:

```
xp# bgp show summary
Neighbor      V    AS MsgRcvd MsgSent    Up/Down State
172.16.20.2    4 64901   10033   10031   6d23h8m1s Established
BGP summary, 1 groups, 1 peers
```

# bgp show sync-tree

## Purpose

Displays the BGP synchronization tree.

## Format

**bgp show sync-tree**

## Mode

Enable

## Description

The **bgp show sync-tree** command displays the BGP synchronization tree. The synchronization tree is used by IBGP peers to resolve the next hop (forwarding address). It gives information about routes that are orphaned because the next hop could not be resolved.

## Parameters

None.

## Restrictions

None.

# Examples

The following example shows the next hops for some of the routes that are not resolved (by showing orphaned routes):

```
xp# bgp show sync tree
Task BGP_Sync_64805:
    IGP Protocol: Any      BGP Group: group type Routing AS 64805

    Sync Tree (* == active, + == active with alternate, - ==
inactive with alternate:
    Orphaned routes
        Forwarding address 172.23.1.18
            3/255 peer 172.23.1.26 preference 170
            128.36/255.255 peer 172.23.1.26 preference 170
            128.152/255.255 peer 172.23.1.26 preference 170
            129.200/255.255 peer 172.23.1.26 preference 170
            129.253/255.255 peer 172.23.1.26 preference 170
            130.44/255.255 peer 172.23.1.26 preference 170
            130.50/255.255 peer 172.23.1.26 preference 170
            130.132/255.255 peer 172.23.1.26 preference 170
            134.54/255.255 peer 172.23.1.26 preference 170
            134.120/255.255 peer 172.23.1.26 preference 170
            134.173/255.255 peer 172.23.1.26 preference 170
            134.217/255.255 peer 172.23.1.26 preference 170
            134.244/255.255 peer 172.23.1.26 preference 170
            136.1/255.255 peer 172.23.1.26 preference 170
            137.49/255.255 peer 172.23.1.26 preference 170
            137.159/255.255 peer 172.23.1.26 preference 170
            138.239/255.255 peer 172.23.1.26 preference 170
```

The following example shows the next hop for all the routes that are resolved.:

```
xp# bgp show sync-tree
Task BGP_Sync_64805:
    IGP Protocol: Any      BGP Group: group type Routing AS 64805

    Sync Tree (* == active, + == active with alternate, - ==
inactive with alternate:
    Node 3/8388608 route 3/255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 4/8388608 route 4/255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 6/8388608 route 6/255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 9.2/32768 route 9.2/255.255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 9.20/16384 route 9.20/255.255.128 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 10.12.1/2 route 10.12.1/255.255.255.252 metric 0 interface
    Node 10.12.1.4/2 route 10.12.1.4/255.255.255.252 metric 2 next hop 172.23.1.22
    Node 10.200.12/128 route 10.200.12/255.255.255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 10.203.12/128 route 10.203.12/255.255.255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 10.204.12/128 route 10.204.12/255.255.255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 12/8388608 route 12/255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 12.2.19/64 route 12.2.19/255.255.255.128 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 12.2.97/128 route 12.2.97/255.255.255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 12.3.123/128 route 12.3.123/255.255.255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 12.4.5/128 route 12.4.5/255.255.255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 12.4.164/128 route 12.4.164/255.255.255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 12.5.164/128 route 12.5.164/255.255.255 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 12.5.172/512 route 12.5.172/255.255.252 metric -1 next hops 172.23.1.6 172.23.1.22
    Node 12.5.252/256 route 12.5.252/255.255.254 metric -1 next hops 172.23.1.6 172.23.1.22
```

# bgp start|stop

## Purpose

Start or stop Border Gateway Protocol (BGP).

## Format

**bgp start|stop**

## Mode

Configure

## Description

The **bgp** start command starts BGP on the XP.

## Parameters

**start**        Starts BGP.

**stop**         Stops BGP.

## Restrictions

None.

# bgp trace

## Purpose

Set BGP trace options.

## Format

**bgp trace [packets|open|update|keep-alive [detail|send|receive|[group** *<number>* **[peer-host** *<ipaddr>***]]] [aspath] [local-options all|general|state|normal|policy|task|timer|route]**

## Mode

Configure

## Description

The **bgp trace** command lets you set BGP trace options for the XP.

## Parameters

| | |
|---|---|
| **packets** | Traces all BGP packets. |
| **open** | Traces BGP OPEN packets, which are used to establish a peer relationship. |
| **update** | Traces BGP update packets, which are used to pass network reachability information. |
| **keep-alive** | Traces BGP KEEPALIVE packets, which are used to verify reachability. |
| **detail** | Shows detailed information about the specified packets. |
| **send** | Shows the specified packets sent by the router. |
| **receive** | Shows the specified packets received by the router. |
| **local-options** | Sets trace options for this protocol only. You can specify the following: |

| | | |
|---|---|---|
| | **aspath** | Traces aspath related events. |
| | **all** | Traces all additions, changes, and deletions to the GateD routing table. |
| | **general** | Activates normal and route tracing. |
| | **state** | Traces state machine transitions in the protocol |
| | **normal** | Traces normal protocol occurrences. (Abnormal protocol occurrences are always traced.) |

| | |
|---|---|
| **policy** | Traces the application of protocol and user-specified policies to routes being imported and exported |
| **task** | Traces system interface and processing associated with this protocol or peer |
| **timer** | Traces timer usage by this with this protocol or peer |
| **route** | Traces routing table changes for routes installed by this protocol or peer |
| **group** | Is the group ID of the group for which tracing needs to be enabled. |
| **peer-host** | peer-host ip address for which tracing needs to be enabled.The peer-host has to be qualified by the group to which it belongs |

If neither the group nor peer-host is specified then tracing is enabled for all groups and peers. If the group is specified and the peer-host is not specified then the tracing is enabled for that group. If both the peer-host and group are specified than the tracing is enabled for that peer-host in the specified group

## Restrictions

None.

# Chapter 10

# cdp Commands

## Command Summary

Table 10 lists the **cdp** commands. The sections following the table describe the command syntax.

**Table 10.  cdp commands**

| |
|---|
| **cdp set global-status auto-enabled \|enabled \|disabled** |
| **cdp set hold-time** *<number>* |
| **cdp set transmit-frequency** *<number>* |
| **cdp set authentication-code** *<string>* |
| **cdp set port-status port** *<port-list>* **\|all-ports autoenabled\| enabled \|disabled** |
| **cdp show neighbors [detail]** |
| **cdp show global-info** |
| **cdp show stats** |
| **cdp show port-status port** *<port-list>* **\|all-ports** |

# cdp set global-status

## Purpose

Set the global-status of all ports.

## Format

**cdp set global-status auto-enabled |enabled |disabled**

## Mode

Configure.

## Description

The **cdp set global-status** command allows you to set the global status of all ports to auto-enabled, enabled, or disabled. The default **global-status** is **auto-enabled**, indicating that if a port receives a CDP packet, the XP will begin transmitting CDP hello packets from that port. This setting applies to all ports on the system. You can set individual ports differently by using *cdp set port-status* on page 174. The port-status takes precedence over the global-status.

## Parameters

None.

## Restrictions

The port-status takes precedence over the global-status.

## Example

Set the global-status to enabled:

> **xp(config)(cdp-set)# global-status enabled**

# cdp set hold-time

## Purpose

Set hold time.

## Format

**cdp set hold-time** *<number>*

## Mode

Configure.

## Description

The **cdp set hold-time** command specifies the amount of time (in seconds) to retain a neighbor entry since receiving the last hello packet.

## Parameters

*<number>*        Enter a hold time of 30-300 seconds.

## Restrictions

None.

## Example

Set the hold time to 60 seconds:

```
xp(config)(cdp-set)# hold-time 60
```

# cdp set transmit-frequency

## Purpose

Set CDP hello packet transmission frequency.

## Format

**cdp set transmit-frequency** *<number>*

## Mode

Configure.

## Description

The **cdp set transmit-frequency** command specifies the amount of time (in seconds) between successive CDP hello packet transmissions.

## Parameters

*<number>*                Enter a transmit frequency of 5-300 (inclusive).

## Restrictions

None.

## Example

Set the CDP hello packet transmission frequency to 50 seconds:

```
xp(config)(cdp-set)# transmit-frequency 50
```

# cdp set authentication-code

## Purpose

Sets authentication code for transmitted CDP packets.

## Format

**cdp set authentication-code** *<string>*

## Mode

Configure.

## Description

The **cdp set authentication-code** command allows you to set the authentication code for transmitted CDP packets. The authentication code (a string) has a maximum length of 16 bytes.

## Parameters

**authentication-code** *<string>*    A character string whose maximum length is 16 bytes.

## Restrictions

None.

## Example

Assign an authentication code for transmitted packets:

    xp(config)(cdp-set)# authentication-code enterasys

# cdp set port-status

## Purpose

Set port status for an individual port.

## Format

**cdp set port-status autoenabled| enabled |disabled port** *<port-list>* **|all-ports**

## Mode

Configure.

## Description

The **cdp set port-status** command allows you to set the status of an individual port to auto-enabled, enabled, or disabled. The default status is **autoenabled**, indicating that if a port receives a CDP packet, the XP will begin transmitting CDP hello packets from that port. This applies to all ports on the system set to **autoenabled**. The **cdp set port-status** command allows you to override the global status set for the port. (See *cdp set global-status* on page 170.)

## Parameters

**port** *<port-list>*    The port(s) you wish to autoenable, enable, or disable. You may use the keyword **all-ports** to set the status of all ports.

## Restrictions

None.

## Example

```
xp(config)(cdp-set)# port-status enable port all-ports
```

# cdp show neighbors

## Purpose

Show CDP neighbors.

## Format

**cdp show neighbors [detail]**

## Mode

Enable.

## Description

The **cdp show neighbors** command displays the neighbor table which outlines which port the neighbor is seen on, information about the MAC address, IP address, neighbor's port that connects to your port, neighbor type, and capabilities. The **detail** optional will display more verbose information about the neighbor.

## Parameters

**[detail]**          Display more verbose information about the neighbor.

## Restrictions

None.

# Example

```
xp(cdp-show)# neighbors

Following are the CDP neighbors:

Type: SF7  Network Switch running Secure Fast version 1.7 or lower
      SF8  Network Switch running Secure Fast version 1.8 or greater
      ROU  Router                        BRG  Bridge
      VLM  Cabletron VLAN Manager        NSR  Network Server(NT)
      NWS  Network Workstation(NT)       W95  Windows95
      W98  Windows98                     USR  UNIX Server
      UWS  UNIX Workstation              RWA  Roamabout wireless acc pnt

 Capabilities:
    IG   IGMP enabled on sending port
    RP   Uses RIP for routing           BG   Uses BGP for routing
    OS   Uses OSPF for routing          DV   Supports DVMRP
    1Q   Has 802.1Q support             GV   Supports GVRP
    GM   Supports GMRP                  IS   Supports IGMP snooping
    SB   Performs source route bridging
    TB   Performs transparent bridging
    L1   Performs Level 1 functionality

Local Port      Neighbor MAC        Neighbor IP        Neighbor Port N   Type    Capabilities
-------------   -------------------- ----------------   ---------------------- ------   ------------
et.2.4          00:E0:63:68:5F:F1    10.136.136.104     et.3.1                 ROU     OS DV L1
et.7.15         00:01:F4:09:F2:7B    0.0.0.0            et.1.1                 ROU     OS DV L1
et.13.24        00:E0:63:A2:38:6F    10.136.136.204     et.1.1                 ROU     OS DV L1
gi.12.8         00:E0:63:68:12:F1    10.136.136.202     gi.5.1                 ROU     OS DV L1
```

# cdp show global-info

## Purpose

Show CDP global information.

## Format

**cdp show global-info**

## Mode

Enable.

## Description

The **cdp show global-info** command displays the current global settings for transmit frequency, holdtime, CDP status (auto-enabled, enabled, disabled), and authentication code.

## Restrictions

None.

## Example

```
xp(cdp-show)# global-info

CDP Global Information:
   Transmit frequency is 60 seconds
   Holdtime is 180 seconds
   CDP status is Auto Enabled
   Authentication code is Default
```

# cdp show stats

## Purpose

Show CDP traffic.

## Format

**cdp show stats**

## Mode

Enable.

## Description

The **cdp show stats** command displays the total number of CDP packets sent and received. Also displayed are error statistics for packets received with an unsupported version of CDP, the number of packets that could not be parsed, packet transmission errors, number of memory errors, and number of packets received with invalid authentication code.

## Restrictions

None.

## Example

```
xp(cdp-show)# stats
CDP statistics:
  Total number of CDP Packets sent              : 0
  Total number of valid CDP Packets received    : 0
  Packets received with unsupported CDP Version  : 0
  Number of CDP packets that could not be parsed : 0
  Packet transmission errors                    : 0
  Number of memory errors                       : 0
  Number of packets received with invalid auth code : 0
```

# cdp show port-status

## Purpose

Show status of selected ports.

## Format

**cdp show port-status port** *<port-list>* **|all-ports**

## Mode

Enable.

## Description

The **cdp show port-status** command displays the current status of a specific port(s) including packets sent and received, errors, current link state, and CDP status of port (auto-enabled, enabled, or disabled).

## Parameters

| | |
|---|---|
| **port** *<port-list>* | The port(s) for which you will display the current status. You may enter a series of ports (et.1.3,et.(1,2).(4,6-8)) or enter the keyword **all-ports** to display the status of all ports. |

## Restrictions

None.

# Example

```
xp(cdp-show)# port-status port et.1.3,et.(1,2).(4,6-8)

Port    Port Status   Pkts Sent   Pkts Received  Errors    Link State
----    ------------  -----------  ---------     ------    ----------
et.1.3   Auto Enabled  0            0             0         Down
et.1.4   Auto Enabled  0            0             0         Down
et.1.6   Auto Enabled  0            0             0         Down
et.1.7   Auto Enabled  0            0             0         Down
et.1.8   Auto Enabled  0            0             0         Down
et.2.4   Auto Enabled  0            0             0         Down
et.2.6   Auto Enabled  0            0             0         Down
et.2.7   Auto Enabled  0            0             0         Down
et.2.8   Auto Enabled  0            0             0         Down
```

# Chapter 11

# cli Commands

The **cli** commands allow you to change the behavior of the CLI in terms of command completion and command history recall.

## Command Summary

Table 11 lists the **cli** commands. The sections following the table describe the command syntax.

**Table 11.  cli commands**

| |
|---|
| **cli set command completion on\|off** |
| **cli set history size** *<num>*\|**default\|maxsize** |
| **cli set terminal rows** *<num>* **columns** *<num>* |
| **cli show history** |
| **cli show terminal** |
| **cli terminal monitor on\|off** |
| **cli set common** |

# cli set command completion

## Purpose

Turn on or off command completion support.

## Format

**cli set command completion on|off**

## Mode

User and Configure

## Description

The **cli set command completion** command lets you enable or disable command completion support. This command works in both User and Configure mode. When executed in Configure mode, it turns on or off command completion support for the entire system. When executed in User mode, the command affects only the current login session of the user issuing that command.

## Parameters

**on**     Turn on command completion.

**off**    Turn off command completion.

## Restrictions

None.

# cli set history

## Purpose

Modify command history recall characteristics.

## Format

**cli set history size** *<num>*|**default**|**maxsize**

## Mode

User and Configure

## Description

The **cli set history** command lets you to set the size of the command history buffer. Each command stored in this buffer can be recalled without having the user type in the same, complete command again. By setting the size of this history buffer, one tells the router how many of the most recently executed commands should be stored. When the buffer is full, the oldest command is pushed out to make space for the newest command. The **cli set history** command works in both User and Configure mode. When executed in Configure mode, it sets the history size of the entire system. When executed in User mode, the command affects only the current login session of the user issuing that command.

## Parameters

**size**   A number specifying how many of the most recently executed commands should be kept. To disable history support, specify a size of 0. The **size** option can also take the following two keywords:

    **default**   Sets the history size to the system default.

    **maxsize**   Sets the history size to the system maximum.

## Restrictions

None.

## Examples

To set the history buffer size to 100 commands:

```
xp# cli set history size 100
```

# cli set terminal

## Purpose

Modify current session's terminal settings.

## Format

**cli set terminal [columns** *<num>*] **[rows** *<num>*]

## Mode

User

## Description

The **cli set terminal** command lets you modify the terminal screen size of the current session. Specifying the number of rows available on your terminal causes the system to automatically pause when screen output fills the entire screen.

## Parameters

**columns**     Number of columns for your terminal. Minimum acceptable value is 20.

**rows**        Number of rows for your terminal. The default row size is 25. To prevent output from pausing after one screen full, set the value to 0.

## Restrictions

None.

## Examples

To set the number of rows to 50 lines:

```
xp# cli set terminal rows 50
```

# cli show history

## Purpose

Display the command history from the current CLI session.

## Format

**cli show history**

## Mode

User

## Description

The **cli show history** command shows the commands you have issued during the current CLI session. A number is associated with each command. A command's number is useful for re-entering, modifying, or negating the command.

**Note:** You also can perform a command history recall by entering **!*** at any command prompt.

## Parameters

None.

## Restrictions

None.

# cli show terminal

## Purpose

Display information about the current terminal settings.

## Format

**cli show terminal**

## Mode

User

## Description

The **cli show terminal** command shows information about the terminal settings. The terminal settings affect the display characteristics of your CLI session.

## Parameters

None.

## Restrictions

None.

# cli terminal monitor

## Purpose

Allows the current CLI session to receive or not receive console output.

## Format

**cli terminal monitor on|off**

## Mode

Enable

## Description

Some system messages are normally only sent to the management console. The **cli terminal monitor** command allows the current CLI session to also receive those messages. This command is useful only if you have a current Telnet CLI session and you want the debugging output that is normally sent to the management console to also be displayed on the Telnet session.

## Parameters

**on**    Turn on receipt of console output.

**off**    Turn off receipt of console output.

## Restrictions

None.

# cli set common

## Purpose

Switch to the Common CLI mode.

## Format

**cli set common**

## Mode

Enable

## Description

The **cli set common** command changes the CLI environment from the Native to the Common CLI. When executed in Enable mode, this command configures the system's CLI to use the Common CLI commands and attributes. All users currently logged in and all subsequent users will switch to the Common CLI.

## Parameters

None.

## Restrictions

None.

# Chapter 12

# comment Commands

The **comment** commands allow you to add user defined comment lines into the active configuration file. These commands are useful for recording informative records of active configuration changes and additions.

## Command Summary

Table 12 lists the **comment** commands. The sections following the table describe the command syntax.

**Table 12.  comment commands**

| |
|---|
| **comment out <num>** |
| **comment in** *<num>* |
| **comment line** *<num> <string>* |
| **comment move** *<num>* |

# comment out

## Purpose

Negates a command in the active configuration file, leaving the command as a comment.

## Format

**comment out** *<num>*

## Mode

Configure

## Description

The **comment out** command allows you to negate a command or set of commands in the active configuration file. This is done by specifying the line number of the command or commands that you wish to negate from active configuration. The command will then be left in the active configuration file as a comment.

## Parameters

*<num>*    Specifies the line number or numbers from the active configuration file that corresponds to the command you wish to negate.

## Restrictions

None.

## Example

To negate command #10 in the active configuration file:

xp# **comment out 10**

# comment in

## Purpose

Reactivates a command in the active configuration file.

## Format

**comment in** *<num>*

## Mode

Configure

## Description

The **comment in** command allows you to reactivate a command that you previously negated using the **comment out** command. This is done by specifying the line number for the negated command or commands in the active configuration file.

## Parameters

*<num>*     Specifies the line number or numbers from the active configuration file that corresponds to the command you wish to reactivate.

## Restrictions

You may only reactivate a previously negated command.

## Example

To reactivate line 10 in the active configuration file:

```
xp# comment in 10
```

# comment line

## Purpose

Adds a comment line to the active configuration file.

## Format

**comment line** *<num> <string>*

## Mode

Configure

## Description

The **comment line** command allows you to add a comment line to the active configuration file. This comment line will be added directly above the command(s) that is currently occupying the line number(s). Comment lines are denoted with a "C" following the line number, and a "!!" directly before the actual line of comments.

## Parameters

*<num>*       Specifies the line number or numbers to which you wish to add a comment line.

*<string>*    Specifies the comment line character string. Enclose the character string in quotation marks.

## Restrictions

The character string must be enclosed in quotation marks.

## Example

To specify a comment line "this is an ethernet port" to line 10:

xp# **comment line 10 "this is an ethernet port"**

# comment move

## Purpose

Moves a comment line from one line number to another line number in the active configuration file.

## Format

**comment move** *<num>*

## Mode

Configure

## Description

The **comment move** command allows you to move a comment line or range of comment lines from one line number to another line number within the active configuration file.

## Parameters

*<num>*  Specify the current line number(s) before the comma, and specify the new line number(s) after the comma.

The format is as follows: *<current line number(s), new line number(s)>*

## Restrictions

Do not attempt to move actual commands. When moving a range of comment lines, the line number ranges must be the same size.

## Example

To move the comments in lines 1-2 to lines 7-8:

```
xp# comment move 1-2,7-8
```

# Chapter 13

# configure Command

The **configure** command exits Enable mode and places the CLI session in Configure mode. Configure mode allows you to set and change XP parameters.

## Purpose

Enters the CLI's Configure mode.

## Format

**configure**

## Mode

Enable

## Description

Configure mode provides the capabilities to configure all features and functions on the XP. These include router configuration, access control lists and spanning tree. To enter Configure mode, enter the command **config** from Enable mode.

**Note:** As mentioned previously, up to four Telnet sessions can be run simultaneously on the XP. All four sessions can be in Configure mode at the same time, so you should consider limiting access to the XP to authorized users.

The Configure mode command prompt consists of the XP name followed by **(config)** and a pound sign (#):

```
xp(config)#
```

To exit Configure mode and return to Enable mode, either type **exit** and press Return, or press Ctrl+Z.

## Parameters

None.

## Restrictions

To enter Configure mode, you must already be in Enable mode.

# Chapter 14

# copy Command

The **copy** command allows the user to copy a file.

## Format

**copy active|scratchpad|tftp-server|rcp-server|startup|**<*filename*>|<*url*> **to**
**backup-CM|active|scratchpad|tftp-server|rcp-server|startup|**<*filename*>|<*url*>

## Mode

Enable

## Description

The **copy** command is primarily for transferring configuration information. You can copy configuration information between the XP and external hosts using protocols such as TFTP or RCP. Within the XP, you can copy configuration information between the XP file system, the scratchpad (configuration database), the active (running) configuration, or the Startup configuration. You also can use the **copy** command to make backup copies of a configuration file.

If the XP has two Control Modules, you can copy the startup configuration of the primary Control Module to the secondary Control Module.

## Parameters

**active**      Specifies information from the active configuration database (the running system configuration).

**scratchpad**  Specifies configuration changes from the scratchpad.

**tftp-server** Downloads or uploads a file on a TFTP server.

**rcp-server**  Downloads or uploads a file on an RCP server.

**startup**        Copies the Startup configuration information stored in the Control Module's NVRAM.

*<filename>*       Specifies the name of a file on the XP's local file system (NVRAM or PCMCIA Flash Module).

**Note:**    The XP supports PCMCIA Flash Modules obtained from Enterasys Networks only. For information regarding the PCMCIA Virtual File systems VFS1 and VFS2, see the *Enterasys X-Pedition User Reference Manual*.

*<url>*            Specifies a URL. You can specify one of the following types of URLs:

      **tftp**        For example, **tftp://**<hostname>/<path>

      **Attention Solaris Users:**
      In order to specify a tftp URL, you must first create the file on the tftp-server under the same filename you wish to use for the copy command. You must also make certain that all permissions for both the file and any directories within its path are world writable.

      **rcp**        For example, **rcp://**<username>@<hostname>/<path>

      **Note:**    Because it refers to an absolute path, you must include a backslash within the path name for both the **tftp** and **rcp** URLs, as well as between the hostname and path.

**backup-CM**  Specifies that the startup configuration be copied to the secondary Control Module. You can specify the **backup-CM** parameter only as the destination and only with **startup** as the source. When **startup** is the destination, information is copied to the secondary Control Module as well.

## Restrictions

The XP does not allow some combinations of source and destination pair. Typically, you cannot have the same location for both source and destination; for example, you cannot copy from one TFTP server directly to another TFTP server or copy from scratchpad to scratchpad.

In addition, you cannot copy directly into the active configuration from anywhere except the scratchpad. All changes to the running system must come through the scratchpad.

## Examples

To copy configuration information from the scratchpad to the active database, enter the following command. This command activates all the uncommitted changes, thus immediately placing the changes into effect.

```
xp# copy scratchpad to active
```

To copy the file config.john to config.debi:.

```
xp# copy config.john to config.debi
```

To copy the Startup configuration to a TFTP server for backup purposes, enter the following command. The CLI prompts for the TFTP server's IP address or hostname and the filename:

```
xp# copy startup to tftp-server
```

To copy a previously saved configuration from a TFTP server to the Startup configuration, enter the following command. Note the use of an URL to specify the TFTP server and the filename.

```
xp# copy tftp://10.1.2.3/backup/config.org to startup
```

To copy the active configuration to a remote server using RCP, enter the following command. Notice that in this example a URL specifies the RCP user name, server, and filename.

```
xp# copy active to rcp://john@server1/config/config.dec25
```

To copy the startup configuration of the primary Control Module to the secondary Control Module:

```
xp# copy startup to backup-CM
```

# Chapter 15

# dhcp Commands

The **dhcp** commands allow you to configure *scopes* (sets of IP address pools and network parameters) that are to be used by Dynamic Host Configuration Protocol (DHCP) clients and apply them to interfaces on the XP.

## Command Summary

Table 13 lists the **dhcp** commands. The sections following the table describe the command syntax.

**Table 13.  dhcp commands**

| |
|---|
| **dhcp** *<scope>* **attach superscope** *<superscope>* |
| **dhcp** *<scope>* **define parameters** *<parameter> <value>* |
| **dhcp** *<scope>* **define pool** *<ip-range>* |
| **dhcp** *<scope>* **define static-ip** *<ipaddr>* **mac-address** *<macaddr>* [*<parameter> <value>*] |
| **dhcp flush** |
| **dhcp global set commit-interval** *<hours>* |
| **dhcp global set lease-database** *<url>* |
| **dhcp show binding** [**active|expired|static**|*<ipaddr>*] |
| **dhcp show num-clients** |
| **dhcp global set ping-timeout** *<num>* |

# dhcp attach superscope

## Purpose

Creates a group of scopes that share a common interface.

## Format

**dhcp** *<scope>* **attach superscope** *<superscope>*

## Mode

Configure

## Description

The **dhcp attach superscope** command allows you to create a "superscope," a group of scopes that share a common physical interface. For example, you can define and group together scopes for different subnets that are accessed through a single port or VLAN.

## Parameters

| | |
|---|---|
| *<scope>* | The name of a scope that was previously configured with the **dhcp define** commands. |
| *<superscope>* | The name of the group to which the specified scope is being attached. |

## Restrictions

None.

## Examples

Consider the following example where the scopes 'client1' and 'client2' exist on the same interface. To group scopes 'client1' and 'client2' into the superscope 'allclients':

```
xp(config)# dhcp client1 attach superscope allclients
xp(config)# dhcp client2 attach superscope allclients
```

# dhcp define parameters

## Purpose

Define parameters to be used by DHCP clients.

## Format

**dhcp** *<scope>* **define parameters** *<parameter>* *<value>*...

## Mode

Configure

## Description

The **dhcp define parameters** command allows you to define a set of parameters that are to be used by clients when DHCP is enabled. The client uses these parameters to configure its network environment, for example, the default gateway and DNS domain name. The DHCP server on the XP supports parameters used by Windows 95/98/NT and MacOS clients.

## Parameters

*<scope>*
 The name that refers to this set of client parameters.

*<parameter>* *<value>*
 You can specify one or more of the following client parameters and values:

| | |
|---|---|
| **address-mask** | (Required) Specifies the address and netmask of the scope's subnet. |

**Note:** The **address-mask** parameter is *required* and must be defined *before* any other client parameters are specified.

| | |
|---|---|
| **broadcast** | Specify the broadcast address. |
| **bootfile** | Specify the client's boot filename. |
| **dns-domain** | Specify the DNS domain name. |
| **dns-server** | Specify the IP address of the DNS server. |
| **gateway** | Specify the IP address of the default gateway. |
| **lease-time** | Specify how long, in hours, the lease is valid. (A lease is the amount of time that an assigned IP address is valid for a client system.) |
| **netbios-name-server** | Specify the IP address of the NetBIOS name server or WINS server. |

| | |
|---|---|
| **netbios-node-type** | Specify the NetBIOS node type of the client. |
| **netbios-scope** | Specify the NetBIOS scope of the client. |

## Restrictions

None.

## Examples

The following command configures a group of network parameters for the scope 'finance':

xp(config)# **dhcp finance define parameters address-netmask 10.33.0.0/16 dns-server 10.3.2.1 dns-domain acme.com gateway 10.33.1.1 netbios-node-type b-node lease-time 90 netbios-name-server 10.33.44.55 netbios-scope acme-finance**

# dhcp define pool

## Purpose

Define a pool of IP addresses to be used by DHCP clients.

## Format

**dhcp** *<scope>* **define pool** *<ip-range>*

## Mode

Configure

## Description

The **dhcp define pool** command allows you to define a pool of IP addresses that can be used by DHCP clients. An IP address pool, along with a set of parameters defined with the **dhcp define parameters** command, make up a DHCP "scope".

## Parameters

*<scope>*      A name that refers to the specified pool of addresses.

*<ip-range>*   The range of IP addresses to be used by the clients. Use a hyphen (-) to designate the range. If you have more than one pool of IP addresses to specify or if the addresses are not contiguous, specify additional addresses using multiple **dhcp define pool** commands.

## Restrictions

None.

## Examples

To specify the addresses between 10.1.1.1 to 10.1.1.20 as the pool of IP addresses for the scope 'clients':

```
xp(config)# dhcp clients define pool 10.1.1.1-10.1.1.20
```

To specify two separate pools of IP addresses for the scope 'clients':

```
xp(config)# dhcp clients define pool 10.1.1.1-10.1.1.20
xp(config)# dhcp clients define pool 10.1.1.30-10.1.1.40
```

# dhcp define static-ip

## Purpose

Define a static IP address for a specific MAC address.

## Format

**dhcp** *<scope>* **define static-ip** *<ipaddr>* **mac-address** *<macaddr>* [*<parameter>* *<value>*...]

## Mode

Configure

## Description

The **dhcp define static-ip** command allows you to configure a static IP address for a specific MAC address. For example, you can define a static IP address for a printer's MAC address to ensure that the printer always receives the same IP address from the DHCP server. Static IP addresses can be used for BOOTP clients as well as DHCP clients.

If you want a single MAC address to have different static IP addresses, depending upon which subnet or interface the machine is on, you can configure different scopes with different IP addresses that map to the same MAC address.

A client configured for a static IP address inherits the client parameters that are configured for the scope. If you want to configure a specific group of parameters for a static IP address, specify those parameters with the **dhcp define static-ip** command.

## Parameters

*<scope>*        A name that refers to the specified static IP address.

*<ipaddr>*        The static IP address.

*<macaddr>*        The MAC address to which the specified static IP address is to be mapped.

*<parameter>* *<value>*
     Specifies the client parameters and values for this static IP address. You can specify one or more of the following client parameters and values:

| | |
|---|---|
| **broadcast** | Specify the broadcast address. |
| **bootfile** | Specify the client's boot filename. |
| **dns-domain** | Specify the DNS domain name. |
| **dns-server** | Specify the IP address of the DNS server. |

| | |
|---|---|
| **gateway** | Specify the IP address of the default gateway. |
| **lease-time** | Specify how long, in minutes, the lease is valid. (A lease is the amount of time that an assigned IP address is valid for a client system.) |
| **netbios-name-server** | Specify the IP address of the NetBIOS name server or WINS server. |
| **netbios-node-type** | Specify the NetBIOS node type of the client. |
| **netbios-scope** | Specify the NetBIOS scope of the client. |

## Restrictions

None.

## Examples

To specify a static IP address 10.1.44.55 to the MAC address 08:00:20:12:34:56 for the scope 'servers':

```
xp(config)# dhcp servers define static-ip 10.1.44.55 mac-address 08:00:20:12:34:56
```

To specify a static IP address 10.1.44.55 to the MAC address 08:00:20:12:34:56 for the scope 'servers' and give it a specific default gateway address:

```
xp(config)# dhcp servers define static-ip 10.1.44.55 mac-address 08:00:20:12:34:56 gateway 10.1.1.2
```

To define two different scopes ('public' and 'private') with two different static IP addresses (10.1.44.55 and 10.2.10.23) that map to the MAC address 08:00:20:12:34:56:

```
xp(config)# dhcp public define static-ip 10.1.44.55 mac-address 08:00:20:12:34:56
xp(config)# dhcp private define static-ip 10.2.10.23 mac-address 08:00:20:12:34:56
```

# dhcp flush

## Purpose

Forces the DHCP server to update its lease database.

## Format

**dhcp flush**

## Mode

Enable

## Description

The DHCP server normally updates its lease database at the intervals specified with the **dhcp global set commit-interval** command. While the DHCP server is running, you can force the server to immediately update its lease database by using the **dhcp flush** command.

## Parameters

None.

## Restrictions

None.

# dhcp global set commit-interval

## Purpose

Configure the intervals at which the DHCP server updates the lease database.

## Format

**dhcp global set commit-interval** *<minutes>*

## Mode

Configure

## Description

After each client transaction, the DHCP server does not immediately update the information in the lease database. Lease update information is stored in flash memory and flushed to the database at certain intervals. You can use the **dhcp global set commit-interval** command to specify this interval.

**Note:** Writing to flash memory can be time-consuming if there are many clients on the network.

## Parameters

**commit-interval** *<hours>*
  The interval, in hours, that the DHCP server updates the lease database. The default value is 1 hour. You can specify a value between 1-48.

## Restrictions

None.

## Examples

To configure the DHCP server to update the lease database once every 2 hours:

```
xp(config)# dhcp global set commit-interval 2
```

# dhcp global set lease-database

## Purpose

Specify a TFTP or RCP server where the lease database is backed up.

## Format

**dhcp global set lease-database** *<url>*

## Mode

Configure

## Description

By default, the XP stores the clients' lease information (the lease database) in its flash memory. You can use the **dhcp global set lease-database** command to specify a TFTP or RCP server where the lease database is to be periodically backed up.

## Parameters

**lease-database** *<url>*
    The TFTP or RCP server where the lease-database is to be backed up.

## Restrictions

None.

## Examples

To configure the lease database to be on a TFTP server (10.50.89.88) with the file name 'lease-db':

```
xp(config)# dhcp global set lease-database tftp://10.50.89.88/lease-db
```

To configure the lease database to be on an RCP server (10.50.89.89) with the user name 'john' and the file name 'lease-db':

```
xp(config)# dhcp global set lease-database rcp://john@10.50.89.89/lease-db
```

# dhcp show binding

## Purpose

Display information from the lease database.

## Format

**dhcp show binding [active|expired|static|<*ipaddr*>]**

## Mode

Enable

## Description

The **dhcp show** command displays information from the lease database. If you do not specify any parameters, the DHCP server displays the entire lease database.

## Parameters

**active**     Displays currently active leases only.

**expired**     Displays expired leases only.

**static**     Displays leases with static IP address assignments only.

<*ipaddr*>     IP address. Will display only the binding for the specified IP address.

## Restrictions

None.

## Examples

To display information from the lease database:

```
xp# dhcp show binding
IP address Hardware Address Lease Expiration     Type
--------- --------------- ---------------    ----
10.20.1.22 00:40:05:41:f1:2d 2001-05-24 17:45:06 dynamic
10.20.1.23 00:00:b4:b1:29:9c 2001-05-24 17:45:04 dynamic
10.20.1.21 00:00:b4:b0:f4:83 2001-05-24 17:45:01 dynamic
10.20.1.20 00:80:c8:e1:20:8a 2001-05-24 09:24:30 dynamic
10.30.7.9  08:00:20:11:22:33 ---            static
10.30.7.44 08:00:20:44:55:66 ---             static
```

# dhcp show num-clients

## Purpose

Display the number of allocated bindings for the DHCP server and the maximum number allowed.

## Format

**dhcp show num-clients**

## Mode

Enable

## Description

The **dhcp show** command displays the number of allocated bindings for the DHCP server and the maximum number allowed.

## Parameters

**None.**

## Restrictions

None.

## Examples

To display information:

```
xp# dhcp show num-clients
15 current clients (253 maximum)
```

# dhcp global set ping-timeout

## Purpose

Specify a ping timeout for address probing.

## Format

**dhcp global set ping-timeout** *<num>*

## Mode

Configure.

## Description

The **dhcp global set ping-timeout** command changes the time interval between pings when DHCP is trying to reclaim unused IP addresses.

## Parameters

*<num>*　　The time interval between pings.

## Restrictions

None.

# Chapter 16

# diff Command

The **diff** command compares the active configuration with the specified configuration file.

## Format

**diff** *<filename>*|**startup**

## Mode

Configure

## Description

The **diff configuration** command compares the active configuration with the specified configuration file.

## Parameters

*<filename>*     Name of a configuration file.

**startup**     The Startup configuration file.

## Restrictions

None.

# Example

To compare the active configuration with the Startup configuration file:

xp# **diff startup**

# Chapter 17

# dvmrp Commands

The **dvmrp** commands let you configure and display information about Distance Vector Multicast Routing Protocol (DVMRP) interfaces.

## Command Summary

Table 14 lists the **dvmrp** commands. The sections following the table describe the command syntax.

**Table 14.  dvmrp commands**

| |
|---|
| **dvmrp accept\|noaccept route** *<IPaddr/mask>* **[exact] [interface** *<IPaddr>* **[router** *<IPaddr>***]]** |
| **dvmrp advertise\|noadvertise route** *<IPaddr/mask>* **[exact] [interface** *<IPaddr>***]** |
| **dvmrp create tunnel** *<name>* **local** *<IPaddr>* **remote** *<IPaddr>* |
| **dvmrp enable no-pruning** |
| **dvmrp enable interface** *<IPaddr>*\|*<interface-name>*\|*<tunnel-name>* |
| **dvmrp set interface** *<IPaddr>*\|*<hostname>* **[metric** *<num>*] **[neighbor-timeout** *<seconds>*] **[prunetime** *<seconds>*] **[rate** *<num>*] **[scope** *<IPaddr/mask>*] **[threshold** *<num>*] |
| **dvmrp show interface [***<IPaddr>***]** |
| **dvmrp show routes host** *<IPaddr>*\|**interface** *<IPaddr>*\|**net** *<netaddr>*\|**router** *<IPaddr>* |
| **dvmrp show rules** |
| **dvmrp start** |

# dvmrp accept route

## Purpose

Specifies routes to be accepted from DVMRP neighbor routers.

## Format

**dvmrp accept|noaccept route** *<IPaddr/mask>* **[exact] [interface** *<IPaddr>* **[router** *<IPaddr>*]]

## Mode

Configure

## Description

The **dvmrp accept route** command allows you to specify particular routes that can be learned from DVMRP neighbors.

A route is always accepted from a DVMRP neighbor unless you use the **dvmrp noaccept route** to prevent it from being accepted. You can use the **dvmrp accept route** command along with the **dvmrp noaccept route** command to filter the routes accepted from DVMRP neighbor routers.

## Parameters

**accept**
Allows the specified route to be accepted from DVMRP neighbor routers.

**noaccept**
Prevents the specified route from being accepted from DVMRP neighbor routers.

**route** *<IPaddr/mask>*
Is the IP address and mask of the route prefix to be accepted.

**exact**
Causes only routes exactly matching the prefix to be accepted.

**interface** *<ipAddr>*
Is the IP address of the interface to which you are applying this filter.

**router** *<IPaddr>*
Is the IP address of a DVMRP neighbor router.

## Restrictions

None.

## Examples

To cause the XP to accept only prefix 20.30.40.0/24, and filter out all other routes:

```
xp(config)# dvmrp noaccept route 0/0 interface customer1
xp(config)# dvmrp accept route 20.30.40.0/24 interface customer1
```

If interface customer1 breaks subnet 20.30.40.0/24 into smaller subnets, you can filter out routes from these subnets with the following commands:

```
xp(config)# dvmrp noaccept route 0/0 interface customer1
xp(config)# dvmrp accept route 20.30.40.0/24 interface customer1 exact
```

# dvmrp advertise route

## Purpose

Specifies routes to be advertised to DVMRP neighbor routers.

## Format

**dvmrp advertise|noadvertise route** *<IPaddr/mask>* **[exact] [interface** *<IPaddr>***]**

## Mode

Configure

## Description

The **dvmrp advertise route** command allows you to specify particular routes that can be advertised to DVMRP neighbors. A route is always advertised to a DVMRP neighbor unless you use the **dvmrp noadvertise route** command to prevent it from being advertised. You can use the **dvmrp advertise route** command along with **dvmrp noadvertise route** to filter the routes advertised to DVMRP neighbor routers.

## Parameters

**advertise**
Allows the specified route to be advertised to DVMRP neighbor routers.

**noadvertise**
Prevents the specified route from being advertised to DVMRP neighbor routers.

**route** *<IPaddr/mask>*
Is the IP address and mask of the route prefix to be advertised.

**exact**
Causes only routes exactly matching the prefix to be advertised.

**interface** *<ipAddr>*
Is the IP address of the interface to which you are applying this filter.

## Restrictions

None.

## Examples

To prevent route 10.0.0.0/8 from being advertised on interface mbone (all other routes are advertised):

> xp(config)# **dvmrp noadvertise route 10/8 interface mbone**

To advertise only route 20.20.20.0/24 to its neighbors on interface mbone:

> xp(config)# **dvmrp noadvertise route 0/0 interface mbone**
> xp(config)# **dvmrp advertise route 20.20.20.0/24 interface mbone**

# dvmrp create tunnel

## Purpose

Creates a DVMRP tunnel.

## Format

**dvmrp create tunnel** *<name>* **local** *<ipAddr>* **remote** *<ipAddr>*

## Mode

Configure

## Description

The **dvmrp create tunnel** command creates a tunnel used to pass multicast traffic through a unicast network that resides between DVMRP clouds. As multicast frames exit the DVMRP *source* cloud, they are *encapsulated* in a unicast packet. When frames enter the *destination* cloud, the unicast packets are *un-encapsulated* and returned to the native multicast format. The XP control module encapsulates and un-encapsulates each packet—not the hardware ASICs (this can degrade overall performance and drop frames from the stream).

If the sum of the traffic crossing a DVMRP tunnel exceeds approximately 8 mbps, packet loss may occur. CPU-bound traffic such as learning flows, ARPs, and routing updates will lower system performance. This does not apply to packets routed by an XP within a DVMRP cloud.

## Parameters

| | |
|---|---|
| *<name>* | Name of this DVMRP tunnel. |
| **local** *<ipAddr>* | IP address of the local end point of this tunnel. |
| | **Note:**  The local IP address must already be configured on the XP. |
| **remote** *<ipAddr>* | IP address of the remote end point of this tunnel. |

## Restrictions

- Tunnels use unicast routing principles. Make sure a route exists between the tunnel source and destination (**local** *<ipAddr>* and **remote** *<ipAddr>*) you specify.

- An IP interface has to exist before a tunnel can be created from it.

  **Note:**  A good way to confirm that a tunnel exists is to ping the other end of the tunnel.

- Tunnels cannot be created between two endpoints (i.e., on the same subnet).

- A maximum of eight tunnels are allowed.

Caution is advised when creating DVMRP tunnels with the **dvmrp create tunnel** command.

## Example

To create a DVMRP tunnel called *tun12* between 10.3.4.15 (the local end of the tunnel) and 10.5.3.78 (the remote end of the tunnel):

xp(config)# **dvmrp create tunnel tun12 local 10.3.4.15 remote 10.5.3.78**

# dvmrp enable no-pruning

## Purpose

Disables DVMRP pruning.

**Note:** Pruning is enabled by default. The current DVMRP specification requires pruning capability. Unless you have a good reason for disabling pruning, Enterasys Networks recommends that you leave it enabled.

## Format

**dvmrp enable no-pruning**

## Mode

Configure

## Description

Disable DVMRP pruning.

## Parameters

None.

## Restrictions

None.

# dvmrp enable interface

## Purpose

Enables DVMRP on an interface.

## Format

**dvmrp enable interface** *<ipAddr/name>|<tunnel-name>*

## Mode

Configure

## Description

The **dvmrp enable interface** command enables DVMRP on the specified interface.

## Parameters

*<ipAddr/name>|<tunnel-name>*
IP address or tunnel name of the interface on which you are enabling DVMRP.

•If you are enabling DVMRP on an interface that does not have a tunnel, specify its name or IP address.

•If you are enabling DVMRP on an interface that has a tunnel, specify the tunnel name.

## Restrictions

**Note:** The Control Module's en0 interface is never used for multicast traffic.

DVMRP does not run on multiple IP subnets if created on an interface. Currently, the XP automatically picks up the first subnet to run DVMRP on it. However any one particular subnet can be picked up by enabling it. But before doing that, no subnet should already be enabled on that interface. The XP supports a maximum of 64 DVMRP and IGMP interfaces.

**Note:** The **igmp enable interface** command has a similar restriction of using only one subnet.

## Examples

To enable DVMRP on the IP interface with IP address 10.50.78.2:

xp(config)# **dvmrp enable interface 10.50.78.2**

To enable tunnel tun12:

xp(config)# **dvmrp enable interface tun12**

# dvmrp set interface

## Purpose

Configures various DVMRP parameters on an interface.

## Format

**dvmrp set interface** *<IPaddr/name>* **[metric** *<num>*] **[neighbor-timeout** *<seconds>*]
**[prunetime** *<seconds>*] **[rate** *<num>*] **[scope** *<IPaddr/mask>*] **[threshold** *<num>*]

## Mode

Configure

## Description

The **dvmrp set interface** command sets DVMRP parameters on an IP interface.

## Parameters

*<ipAddr/name.*
IP address or name of the interface on which you are configuring DVMRP parameters.

**metric** *<num>*
The metric (cost) of this interface. Specify a number in the range 1 – 16. The default is 1.
Normally you should not change this setting unless the network topology requires it.

**neighbor-timeout** *<num>*
The number of seconds after which the XP will consider the neighbor to be down. Specify a
number in the range 40 – 400. The default is 35.

**Note:** If you have old routers, this value should be increased to accommodate them; older
routers do not send probes or route updates at 40-second intervals.

**prunetime** *<seconds>*
The multicast prunetime of this interface. Specify a number in the range 300 – 7200. The
default is 3600 seconds (one hour).

**rate** *<num>*
The multicast rate of this interface in kbps. Specify a number in the range 1 – 10000. The
default is 500.

**Note:** The option applies only to tunnels.

**scope** *<IPaddr/mask>*
The multicast scope of this interface. The purpose of this option is to disallow the groups
specified by a scope from being forwarded across an interface. This option therefore is a

filtering mechanism. The threshold and the scope are two common mechanisms for implementing local simple filtering of a multicasting data.

Specify an IP address and network mask. Example: 239.0.0.0/8.

**threshold** *<num>*
The multicast threshold of this interface. The purpose of this option is to allow forwarding of a packet on a multicast interface only if the packet's threshold is at least the configured value. The threshold and the scope are two common mechanisms for implementing local simple filtering of a multicasting data.

Specify a number in the range 1 – 255. The default is 1.

## Restrictions

None.

## Examples

To configure the interface 10.50.89.90 to have a metric of 5 and a threshold of 16:

xp(config)# **dvmrp set interface 10.50.89.90 metric 5 threshold 16**

# dvmrp show interface

## Purpose

Displays DVMRP interfaces.

## Format

dvmrp show interface [<*IPaddr*>]

## Mode

Enable

## Description

The **dvmrp show interface** command displays the state of an interface running DVMRP, along with other neighbor-related information. Neighbors are displayed with their DVMRP version and capability flags and Generation IDs; this information can help in debugging. If rules are in effect for an interface, they are indicated by ExportPol or the ImportPol flags.

## Parameters

<*IPaddr*>    Displays DVMRP information for the specified interface.

## Restrictions

None.

## Examples

Here is an example of the **dvmrp show interface** command.

```
xp# dvmrp show interface
Address: 10.50.1.1         Subnet: 10.50.1/24       Met: 1  Thr: 1
Name   : pc               State: Dn  Igmp  Dvmrp

Address: 207.135.89.10      Subnet: 207.135.89.0/27  Met: 1  Thr: 1
Name   : corp             State: Up  Igmp  Dvmrp Querier  ExportPol
Peer   : 207.135.89.1     Version: 3.255       Flags:0xe  GID: 0x31a

Address: 10.55.89.101       Subnet: 10.55.89/24      Met: 1  Thr: 1
Name   : lab              State: Up  Dvmrp
Peer   : 10.55.89.100     Version: 3.255       Flags:0xe  GID: 0x179

Address: 207.135.89.10      Remote: 207.137.137.1   Met: 1  Thr: 1  Rate: 1000
Name   : mbone            State: Tunnel  Up  Dvmrp ExportPol
Peer   : 207.137.137.1    Version: 3.8         Flags:0xe  GID: 0x6c19d135
```

# dvmrp show routes

## Purpose

Displays DVMRP unicast routing table.

## Format

**dvmrp show routes host** *<IPaddr>*|**interface** *<IPaddr>*|**net** *<netaddr>*|**router** *<IPaddr>*
**subordinates|permission**

## Mode

Enable

## Description

The **dvmrp show routes** command displays the contents of DVMRP unicast routing table.

DVMRP routes show the topology information for the internet multicasting sites. It is independent of IP unicast routing table or protocol. In this table, the information is presented about a address prefix (in form of network-address/network-mask length), the interface and the uplink (parent) router through which this subnet can be reached. This table also shows information about any routers/interfaces which consider this router as their uplink (that is, those routers which depend on this router if traffic were to originate from this subnet). These routers/interfaces are shown as children of the parent router.

**Note:** The **dvmrp show routes** command can search on the basis of subnet and on the basis of those routes whose parent is a particular interface and/or a particular router.

**Note:** This command only shows DVMRP routes and not information about current multicast sessions. For information about current multicast sessions, use the **multicast show mroutes** command.

## Parameters

| | |
|---|---|
| **host** *<IPaddr>* | Displays the route to the specified uplink host address. |
| **interface** *<IPaddr>* | Displays the interface address of the specified uplink interface. |
| **net** *<netaddr>* | Displays the route to the specified prefix (or subnets falling within the prefix). |
| **router** *<IPaddr>* | Displays the route to the specified router. |
| **subordinates** | Displays the downstream routers list. |
| **permissions** | Indicates whether a route is affected by any rules. Routes marked NoAdv are not advertised. |

## Restrictions

None.

## Examples

To display DVMRP routes offered by the next-hop router 207.137.137.1:

```
xp# dvmrp show routes router 207.137.137.1
DVMRP Routing Table (4232 routes,  8 hold-down-routes)
Net: 128.119.3.16/29     Gateway: 207.137.137.1   Met: 9   Age: 35
Parent: mbone            Children: corp
                         lab

Net: 128.119.3.8/29      Gateway: 207.137.137.1   Met: 9   Age: 35
Parent: mbone            Children: corp
                         lab

Net: 209.12.162.16/28    Gateway: 207.137.137.1   Met: 26   Age: 35
Parent: mbone            Children: corp
                         lab

Net: 208.197.171.112/28   Gateway: 207.137.137.1   Met: 7   Age: 35
Parent: mbone            Children: corp
                         lab

Net: 208.151.215.240/28   Gateway: 207.137.137.1   Met: 7   Age: 35
Parent: mbone            Children: corp
                         lab

Net: 208.151.215.192/28   Gateway: 207.137.137.1   Met: 7   Age: 35
Parent: mbone            Children: corp
                         lab

Net: 208.151.215.96/28   Gateway: 207.137.137.1   Met: 7   Age: 35
Parent: mbone            Children: corp
```

To show non-advertised routes on interface lab:

```
xp# dvmrp show routes interface lab permission
DVMRP Routing Table (4232 routes,  5 hold-down-routes)
Net: 100.100.100/24       Gateway: 10.55.89.100     Met: 2  Age: 25
Parent: lab          Children: corp
                        mbone        leaf NoAdv


Net: 20.20.20/24          Gateway: 10.55.89.100    Met: 2  Age: 25
Parent: lab          Children: corp
                        mbone        leaf NoAdv


Net: 10.55.89/24          Gateway: ----        Met: 1   Age: --
Parent: lab          Children: corp        leaf NoAdv
                        mbone        leaf NoAdv

Total Routes Printed: 3
```

# dvmrp show rules

## Purpose

Displays the rules in effect for filtering routes from DVMRP neighbor routers.

## Format

**dvmrp show rules**

## Mode

Enable

## Description

The **dvmrp show rules** command displays the filtering rules in effect for DVMRP routes. Once you have set rules with the **dvmrp accept** and **dvmrp advertise** commands, you can display the active rules by entering the **dvmrp show rules** command.

## Parameters

None.

## Restrictions

None.

## Example

In this example, the following rules are in effect:

```
dvmrp advertise route 207.135.89.0/24 interface mbone
dvmrp noadvertise route 0/0 interface mbone
dvmrp advertise route 207.135.88.0/24 interface mbone
dvmrp noadvertise route 10/8 interface corp
```

To display information about these rules:

```
# dvmrp show rules
NoAdvertise: 10.0.0.0/8          IF: corp
Advertise  : 207.135.89.0/24      IF: mbone
Advertise  : 207.135.88.0/24      IF: mbone
NoAdvertise: default             IF: mbone
```

These rules would affect the routing table as follows:

---

**# dvmrp show route net 10/8 permissions**

Net: 10.55.89/24       Gateway: ----      Met: 1  Age: --
Parent: lab          Children: corp     leaf NoAdv
                    mbone     leaf NoAdv

---

These rules prevent a directly connected route on this router from being visible to interface corp and mbone. The leaf flag indicates there is no downstream neighbor on the interface.

# dvmrp start

## Purpose

Starts DVMRP multicast routing.

## Format

**dvmrp start**

## Mode

Configure

## Description

The **dvmrp start** command starts DVMRP multicast routing on the configured multicast-enabled interfaces and tunnels.

**Note:** Because DVMRP is the only multicasting protocol on the XP, IGMP starts and stops along with DVMRP. If you want to start IGMP on local interfaces, you still must use this command.

DVMRP is by default not running. DVMRP does not interact with any unicast protocol. However if you need to run a tunnel, make sure that the tunnel is reachable by a unicast routing mechanism.

## Parameters

None.

## Restrictions

None.

# Chapter 18

# enable Command

The **enable** command switches the CLI session from User mode to Enable mode.

## Format

**enable**

## Mode

User

## Description

Enable mode provides more facilities than User mode. You can display critical features within Enable mode including router configuration, access control lists, and SNMP statistics. To enter Enable mode from the User mode, enter the command **enable** (or **en**), then supply the password when prompted. If no password is configured, a warning message advising you to configure a password is displayed. If a password is configured and you do not know your password or pressing Return does not work, see the administrator for the XP.

The Enable mode command prompt consists of the XP name followed by the pound sign(#):

```
xp#
```

To exit Enable mode and return to User mode, type **exit** and press Return, or press Ctrl+Z. To proceed from the Enable mode into the Configure mode, use the **configure** command.

## Parameters

None.

## Restrictions

None.

# Chapter 19

# erase Command

The **erase** command erases the contents of the scratchpad or Startup configuration files.

## Format

**erase scratchpad|startup**

## Mode

Configure

## Description

The **erase scratchpad** command erases the contents of the XP's command scratchpad. The **erase startup** command erases the Startup configuration from the Control Module's NVRAM.

## Parameters

**scratchpad**    Erases the contents of the scratchpad. The scratchpad contains configuration commands that you have issued but have not yet activated.

**startup**    Erases the contents of the Startup configuration. The Startup configuration is the configuration the XP uses to configure itself when you reboot it. When you erase the Startup configuration, then reboot immediately, the XP restarts without any configuration information.

## Restrictions

The erase commands do not delete other types of files. To delete a file, use the **file del** command.

# Chapter 20

# exit Command

The **exit** command exits the current CLI mode to the previous mode. For example, if you are in the Enable mode, **exit** returns you to the User mode. If you are in Configure mode, **exit** returns you to Enable mode. If you are in User mode, **exit** closes your CLI session and logs you off the XP.

## Format

exit

## Mode

All modes.

## Parameters

None.

## Restrictions

None.

*Enterasys X-Pedition Native Command Line Interface Reference Manual*

# Chapter 21

# file Commands

The **file** commands enable you to display a directory of the files on a storage device, display the contents of a file on the console, and delete a file.

## Command Summary

Table 15 lists the **file** commands. The sections following the table describe the command syntax.

**Table 15.  file commands**

| |
|---|
| **file delete** *<file-name>* |
| **file dir** *<device-name>* |
| **file type** *<file-name>* |

# file delete

## Purpose

Delete a file.

## Format

**file delete** *<file-name>*

## Mode

Enable

## Description

The **file delete** command deletes the specified file. The filename can include a device name. By default, if a device name is not specified, it is assumed to be the **bootflash:** device which is where all configuration files are stored.

## Parameters

*<file-name>*    Name of the file to delete. The filename can include a device-name using this format: *<device-name>***:***<file-name>*. By default, if a device-name is not specified, it is assumed to be the **bootflash:** device. The **bootflash:** device is the default device for storing configuration files.

*<device-name>*    Device name. You can specify one of the following:

**Note:**    Device names end with a colon.

> **bootflash:**    The Control Module's NVRAM.
>
> **slot0:**    The PCMCIA Flash Module in slot 0 (the upper slot).
>
> **slot1:**    The PCMCIA Flash Module in slot 1(the lower slot).

**Note:**    The XP supports PCMCIA Flash Modules obtained from Enterasys Networks only. For information regarding the PCMCIA Virtual File systems VFS1 and VFS2, see the *Enterasys X-Pedition User Reference Manual*.

## Restrictions

None.

## Examples

To delete the file config.old:

xp# **file delete config.old**

# file dir

## Purpose

Display contents of a file system.

## Format

**file dir** *<device-name>*

## Mode

User.

## Description

Displays a directory of the files on the specified storage device.

## Parameters

*<device-name>*      Device name. You can specify one of the following:

**Note:**    Device names end with a colon.

> **bootflash:**    The Control Module's NVRAM.
>
> **slot0:**        The PCMCIA Flash Module in slot 0 (the upper slot).
>
> **slot1:**        The PCMCIA Flash Module in slot 1(the lower slot).

**Note:**    The XP supports PCMCIA Flash Modules obtained from Enterasys Networks only. For information regarding the PCMCIA Virtual File systems VFS1 and VFS2, see the *Enterasys X-Pedition User Reference Manual*.

## Restrictions

None.

## Examples

To display the contents of the **bootflash** device:

```
xp# file dir bootflash:
```

# file type

## Purpose

Display contents of a file.

## Format

**file type** *<file-name>*

## Mode

Enable.

## Description

Displays the contents of a file.

## Parameters

*<file-name>*    Name of the file to display. The filename can include a device-name using this format: *<device-name>***:***<file-name>*. By default, if a device-name is not specified, it is assumed to be the **bootflash:** device. The **bootflash:** device is the default device for storing configuration files.

*<device-name>*    Device name. You can specify one of the following:

**Note:**    Device names end with a colon.

> **bootflash:**    The Control Module's NVRAM.
>
> **slot0:**    The PCMCIA Flash Module in slot 0 (the upper slot).
>
> **slot1:**    The PCMCIA Flash Module in slot 1(the lower slot).

**Note:**    The XP supports PCMCIA Flash Modules obtained from Enterasys Networks only. For information regarding the PCMCIA Virtual File systems VFS1 and VFS2, see the *Enterasys X-Pedition User Reference Manual*.

## Restrictions

None.

## Examples

To display the contents of the file startup (the startup configuration file):

xp# **file type startup**

# Chapter 22

# filters Commands

The **filters** commands let you create and apply the following types of security filters:

- **Address filters.** Address filters block traffic based on a frame's source MAC address, destination MAC address, or both. Address filters are always configured and applied on the input port.

- **Static entry filters.** Static entry filters allow or force traffic to go to a set of destination ports based on a frame's source MAC address, destination MAC address, or both. Static entry filters are always configured and applied on the input port. You can configure source static entry filters, destination static entry filters, and flow static entry filters. Source static entry filters allow or disallow frames based on their source MAC address; destination static entry filters allow or disallow frames based on their destination MAC address. Flow static entries allow or disallow traffic based on their source *and* destination MAC addresses.

- **Port-to-address locks.** Port-to-address lock filters "lock" a user to a port or set of ports, disallowing them access to other ports.

- **Secure ports.** Secure port filters shut down Layer 2 access to the XP from a specific port or drop all Layer 2 packets received by a port. Used by themselves, secure ports secure unused XP ports. When used in conjunction with static entry filters, secure ports drop all received or sent traffic (depending on the static entry filter) except traffic forced to or from the port by the static entry filter.

# Command Summary

Table 16 lists the **filters** commands. The sections following the table describe the command syntax.

**Table 16.  filters commands**

| |
|---|
| **filters add address-filter name** *<name>* **source-mac** *<MACaddr>* **source-mac-mask** *<MACaddr>* **dest-mac** *<MACaddr>* **dest-mac-mask** *<MACaddr>* **vlan** *<VLAN-num>* **in-port-list** *<port-list>* |
| **filters add port-address-lock name** *<name>* **source-mac** *<MACaddr>* **vlan** *<VLAN-num>* **in-port-list** *<port-list>* |
| **filters add secure-port name** *<name>* **direction source\|destination vlan** *<VLAN-num>* **in-port-list** *<port-list>* |
| **filters add static-entry name** *<name>* **restriction allow\|disallow\|force source-mac** *<MACaddr>* **source-mac-mask** *<MACaddr>* **dest-mac** *<MACaddr>* **dest-mac-mask** *<MACaddr>* **vlan** *<VLAN-num>* **in-port-list** *<port-list>* **out-port-list** *<port-list>* |
| **filters show address-filter [all-source\|all-destination\|all-flow]** **[source-mac** *<MACaddr>* **dest-mac** *<MACaddr>*] **[ports** *<port-list>*] **[vlan** *<VLAN-num>*] |
| **filters show port-address-lock ports [ports** *<port-list>*] **[vlan** *<VLAN-num>*] **[source-mac** *<MACaddr>*] |
| **filters show secure-port** |
| **filters show static-entry [all-source\|all-destination\|all-flow]** **ports** *<port-list>* **vlan** *<VLAN-num>* **[source-mac** *<MACaddr>* **dest-mac** *<MACaddr>*] |

# filters add address-filter

## Purpose

Applies an address filter.

## Format

**filters add address-filter name** *<name>* **source-mac** *<MACaddr>* **source-mac-mask**
   *<MACaddr>* **dest-mac** *<MACaddr>* **dest-mac-mask** *<MACaddr>* **vlan** *<VLAN-num>* **in-port-list** *<port-list>*

## Mode

Configure

## Description

The **filters add address-filter** command blocks traffic based on a frame's source MAC address
(**source-mac**), destination MAC address (**dest-mac**), or a flow (specified using both a source MAC
address and a destination MAC address).

## Parameters

| | |
|---|---|
| **name** *<name>* | Specifies the name of the filter. This parameter must be less than 25 characters. |
| **source-mac** *<MACaddr>* | Specifies the source MAC address. Use this option for source or flow address filters. |
| **source-mac-mask** *<MACaddr>* | Specifies the source MAC Mask address. Use this option for source or flow address filters. |
| **dest-mac** *<MACaddr>* | Specifies the destination MAC address. Use this option for destination or flow address filters. |
| **dest-mac-mask** *<MACaddr>* | Specifies the destination MAC Mask address. Use this option for destination or flow static entries. |
| **vlan** *<VLAN-num>* | Specifies the VLAN. |
| **in-port-list** *<port-list>* | Specifies the ports to which you want to apply the filter. |

## Restrictions

You should apply flow filters (specified using both a source MAC address and a destination MAC
address) only to ports that are using flow-based bridging.

# filters add port-address-lock

## Purpose

Applies a port address lock.

## Format

**filters add port-address-lock name** *<name>* **source-mac** *<MACaddr>* **vlan** *<VLAN-num>* **in-port-list** *<port-list>*

## Mode

Configure

## Description

The **filters add port-address-lock** command locks a user (identified by the user's MAC address) to a specific port or set of ports. The source MAC address will be allowed to reach only those stations and other ports that are connected to a port specified by **in-port-list**.

## Parameters

| | |
|---|---|
| **name** *<name>* | Specifies the name of the lock filter. This parameter must be less than 25 characters. |
| **source-mac** *<MACaddr>* | Specifies the source MAC address. |
| **vlan** *<VLAN-num>* | Specifies the VLAN. |
| **in-port-list** *<port-list>* | Specifies the ports to which you want to apply the lock. |

## Restrictions

None.

# filters add secure-port

## Purpose

Applies a port security filter.

## Format

**filters add secure-port name** *<name>* **direction source|destination vlan** *<VLAN-num>*
**in-port-list** *<port-list>*

## Mode

Configure

## Description

The **filters add secure-port** command shuts down Layer 2 access to the XP from the ports
specified by **in-port-list**. The XP drops all traffic received from these ports.

**Note:** You can use port-to-address lock filters to force traffic to a port secured by the **filters add
secure-port** command.

## Parameters

**name** *<name>*
Specifies the name of the filter. This parameter must be less than 25 characters.

**direction source|destination**
Specifies whether the filter is to secure a source port or a destination port.

**vlan** *<VLAN-num>*
Specifies the VLAN.

**in-port-list** *<port-list>*
Specifies the ports to which you want to apply the filter.

## Restrictions

None.

# filters add static-entry

## Purpose

Applies a static entry.

## Format

**filters add static-entry name** *<name>* **restriction allow|disallow|force source-mac**
  *<MACaddr>* **source-mac-mask** *<MACaddr>* **dest-mac** *<MACaddr>* **dest-mac-mask**
  *<MACaddr>* **vlan** *<VLAN-num>* **in-port-list** *<port-list>* **out-port-list** *<port-list>*

## Mode

Configure

## Description

The **filters add static-entry** command allows, disallows, or forces traffic to go to a set of
destination ports based on a frame's source MAC address (**source-mac**), destination MAC address
(**dest-mac**), or a flow (specified using both a source MAC address and a destination MAC address).

## Parameters

**name** *<name>*
  Specifies the name of the static-entry filter. This parameter must be less than 25 characters.

**restriction allow|disallow|force**
  Specifies the forwarding behavior of the static entry, which can be one of the following
  keywords:

  **allow**    Allows packets to go to the set of ports specified by out-port-list.

  **disallow** Prohibits packets from going to the set of ports specified by out-port-list.

  **force**    Forces packets to go to the set of ports specified by out-port-list, despite any port
               locks in effect on the ports.

**source-mac** *<MACaddr>*
  Specifies the source MAC address. Use this option for source or flow static entries.

**source-mac-mask** *<MACaddr>*
  Specifies the source MAC address. Use this option for source or flow static entries.

**dest-mac** *<MACaddr>*
  Specifies the destination MAC address. Use this option for destination or flow static entries.

**dest-mac-mask** *<MACaddr>*
  Specifies the destination MAC address. Use this option for destination or flow static entries.

**in-port-list** *<port-list>*
Specifies the ports to which you want to apply the static entry.

**out-port-list** *<port-list>*
Specifies the ports to which you are allowing, disallowing, or forcing packets.

## Restrictions

You should apply flow filters (specified using both a source MAC address and a destination MAC address) only to ports that are using flow-based bridging.

# filters show address-filter

## Purpose

Displays the address filters.

## Format

**filters show address-filter**
**[all-source|all-destination|all-flow]**
**[source-mac** *<MACaddr>* **dest-mac** *<MACaddr>*] **[ports** *<port-list>*]
**[vlan** *<VLAN-num>*]

## Mode

Enable

## Description

The **filters show address-filter** command displays the address filters currently configured on the XP.

## Parameters

**all-source|all-destination|all-flow**
Specifies the types of filters you want to display.

**source-mac** *<MACaddr>*
Restricts the display to only those address filters that have been applied to this source MAC address.

**dest-mac** *<MACaddr>*
Restricts the display to only those address filters that have been applied to this destination MAC address.

**ports** *<port-list>*
Restricts the display to only those address filters that have been applied to the specified ports.

**vlan** *<VLAN-num>*
Restricts the display to only those address filters that have been applied to the specified VLANs.

## Restrictions

None.

# filters show port-address-lock

## Purpose

Display the port address locks.

## Format

**filters show port-address-lock [ports** *<port-list>*]
[**vlan** *<VLAN-num>*] [**source-mac** *<MACaddr>*]

## Mode

Enable

## Description

The **filters show port-address-lock** command displays the port-address-lock filters currently configured on the XP.

## Parameters

**ports** *<port-list>*
Restricts the display to only those port address locks that have been applied to the specified ports.

**vlan** *<VLAN-num>*
Restricts the display to only those port address locks that have been applied to the specified VLANs.

**source-mac** *<MACaddr>*
Restricts the display to only those port address locks that have been applied to this source MAC address.

## Restrictions

None.

# filters show secure-port

## Purpose

Display the port security filters.

## Format

filters show secure-port

## Mode

Enable

## Description

The **filters show secure-port** command displays the secure-port filters currently configured on the XP.

## Parameters

None.

## Restrictions

None.

# filters show static-entry

## Purpose

Displays the static entry filters.

## Format

**filters show static-entry [all-source|all-destination|all-flow]**
**ports** *<port-list>* **vlan** *<VLAN-num>*
**[source-mac** *<MACaddr>* **dest-mac** *<MACaddr>*]

## Mode

Configure

## Description

The **filters show static-entry** command displays the static-entry filters currently configured on the XP.

## Parameters

**all-source|all-destination|all-flow**
Specifies the types of static entries you want to display.

**ports** *<port-list>*
Restricts the display to only those static entries that have been applied to the specified ports.

**vlan** *<VLAN-num>*
Restricts the display to only those static entries that have been applied to the specified VLANs.

**source-mac** *<MACaddr>*
Restricts the display to only those static entries that have been applied to this source MAC address.

**dest-mac** *<MACaddr>*
Restricts the display to only those static entries that have been applied to this destination MAC address.

## Restrictions

None.

# Chapter 23

# fddi Commands

## Command Summary

The **fddi** commands allow you to define and display parameters for the FDDI modules on the XP. Table 17 lists the fddi commands. The sections following the table describe the command syntax.

**Table 17.  fddi commands**

| |
|---|
| **fddi reset** *<port>* |
| **fddi set fddi-mode** *<port>* **[sac-mode\|das-mode]** |
| **fddi set fddi-fdx-mode** *<port>* |
| **fddi set mac-group** *<port>* **treq** *<number>* **ma-unit-data-enable [true\|false]** |
| **fddi set mac-restricted-token** *<port>* *<value>* |
| **fddi set path-group** *<port>* **tvx-lower-bound** *<number>* **tmax-lower-bound** *<number>* **treq-max** *<number>* |
| **fddi set port-group** *<port>* **ler-cutoff** *<value>* **ler-alarm** *<value>* **connection** *<a\|b>* |
| **fddi set ring-purger** *<port>* |
| **fddi set smt-group** *<port>* **userdata** *<string or number>* **connection-policy** *<number>* **tnotify** *<number>* **stat-rpt-policy [on\|off] trace-max-expiration** *<value>* |
| **fddi set translation [fddi_ipx_snap\|fddi_appletalk_arp]** to **[enet_II \| 802.3_raw_ipx \| 802.3_snap] port** *<port>* |
| **fddi show fddi-mode** *<port-list>***\|all ports** |
| **fddi show fddi-status** *<port-list>***\|all ports** |
| **fddi show fddi-fdx-mode** *<port-list>***\|all ports** |

**Table 17.  fddi commands (Continued)**

| |
|---|
| **fddi show mac-group** *<port-list>*\|**all ports** |
| **fddi show mac-restricted-token** *<port-list>*\|**all ports** |
| **fddi show media-type** *<port-list>*\|**all-ports** |
| **fddi show path-group** *<port-list>*\|**all ports** |
| **fddi show port-group** *<port-list>*\|**all ports** |
| **fddi show ring-purger** *<port-list>*\|**all ports** |
| **fddi show smt-config** *<port-list>*\|**all ports** |
| **fddi show smt-group** *<port-list>*\|**all ports** |
| **fddi show translation** *<port-list>*\|**all ports** |
| **fddi show version** *<port-list>*\|**all ports** |

# fddi reset

## Purpose

Resets a specific FDDI port

## Format

**fddi reset** *<port>*

## Mode

Enable

## Description

The **fddi reset** command allows you to restore a port without disrupting operations on the other port.

## Parameters

*<port>*          Specifies the FDDI port. To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

## Restrictions

None

## Example

To reset port fi.5.1:

```
xp# fddi reset fi.5.1
```

# fddi set fddi-mode

## Purpose

Sets the FDDI operating mode for the specified FDDI port(s).

## Format

**fddi set fddi-mode** *<port>* **[sac-mode|das-mode]**

## Mode

Configure

## Description

The **fddi set fddi-mode** allows you to configure the ports as single attachment concentrators (SAC) or dual attachment stations (DAS). SACs attach to the primary ring only. They are used primarily to attach routers to a ring through concentrators. In SAC mode, port A becomes an M port, and port B becomes an S port. The M port in a SAC is used to extend the primary ring, and connects to an A, B, or S (slave) port. The S port in a SAC connects to a single ring only and typically connects to an M port.

A DAS connects to both the primary and secondary FDDI rings. Thus, in case of a device failure, it is capable of wrapping the ring.

## Parameters

| | |
|---|---|
| *<port>* | Specifies the FDDI port. To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1. |
| **sac-mode** | Sets the operating mode to single attachment concentrator (SAC). |
| **das-mode** | Sets the operating mode to dual attachment station (DAS). |

## Restrictions

DAS mode is not available for UTP.

## Example

To set the operating mode of port fi.5.1 to DAS:

xp# **fddi set fddi-mode fi.5.1 das-mode**

# fddi set fddi-fdx-mode

## Purpose

Sets the specified FDDI port to full-duplex mode.

## Format

**fddi set fddi-fdx-mode** *<port>*

## Mode

Configure

## Description

The **fddi set fddi-fdx-mode** command sets a specific FDDI port to full-duplex mode. When you set the FDDI port to full-duplex mode, it executes a protocol that detects if there is another device on the FDDI ring that is also attempting to run full duplex. If it does detect another device in full-duplex mode and it is the only other device on the ring, the ports will operate in full-duplex mode. But if the port detects that there is more than one other device on the ring, it will cease to operate in full-duplex mode.

## Parameters

*<port>*          Specifies the FDDI port. To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

## Restrictions

None

## Example

To set port fi.5.2 to full-duplex mode:

xp# **fddi set fddi-fdx-mode fi.5.2**

# fddi set mac-group

## Purpose

Sets the MAC configuration parameters for the specified FDDI port

## Format

**fddi set mac-group** *<port>* **treq** *<number>* **ma-unit-data-enable [true|false]**

## Mode

Configure

## Description

The **fddi set mac-group** command sets a station's MAC parameters. During the claim process, each station "bids" on the right to initialize the ring. The station's bid is its token rotation time (**treq** value). The station with the fastest rotation time wins the claim as it can support the rotation time of all the other stations.

## Parameters

| | |
|---|---|
| *<port>* | Specifies the FDDI port. To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1. |
| **treq** *<number>* | Specifies the station's desired token rotation time in milliseconds. This value should be less than or equal to the **treq-max** value specified in the **fddi set path-group** command. Enter a value between 4 and 173.01504. Note that because of unit conversions, treq may be rounded slightly down from the value specified. |

**ma-unit-data-enable [true|false]**

Sets the MA_UNITDATA_ENABLE flag to true or false.
**Note:** This parameter is included to be consistent with the MIB only. Setting this parameter on the XP has no affect on the operation of the network.

## Restrictions

None.

## Example

To set the MAC configuration parameters for port fi.4.2:

xp# **fddi set mac group fi.4.2 treq 15 ma-unit-data-enable true**

# fddi set mac-restricted-token

## Purpose

Sets the MAC restricted token time out for the specified FDDI port.

## Format

**fddi set mac-restricted-token** *<port> <value>*

## Mode

Configure

## Description

The **fddi set mac-restricted-token** command specifies how long a station can hold a restricted token. A station that holds the restricted token can use the entire network bandwidth for an extended period. Upon completion of its transmission, the station with the restricted token converts the token to non-restricted, re-issues it to the ring and normal operations continue.

## Parameters

*<port>*       Specifies an FDDI port. To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

*<value>*      Specifies the MAC restricted token time out in milliseconds. Specify a value between 0 and 10000.

## Restrictions

None.

# Example

To set the restricted token time out for port fi.4.2:

```
xp# fddi set mac-restricted-token fi.4.2 25
```

# fddi set path-group

## Purpose

Sets the PATH configuration parameters for the specified FDDI port.

## Format

**fddi set path-group** *<port>* **tvx-lower-bound** *<number>* **tmax-lower-bound** *<number>* **treq-max** *<number>*

## Mode

Configure

## Description

The **fddi set path-group** command sets thresholds for the timers used by any MAC configured in the primary path. The valid transmission timer (tvx) clocks the period between valid transmissions. When the station receives a valid transmission, the tvx resets. If no valid frame, including a token, is received and the tvx expires, the station begins ring initialization.

The **tmax** value is the minimum target rotation time (TTRT) supported by a MAC. The **treq-max** value is the maximum rotation time used by a MAC.

## Parameters

*<port>*  
Specifies an FDDI port. To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**tvx-lower-bound** *<number>*  
Specifies the minimum TVX value (in milliseconds) that shall be used by any MAC configured in this path. This value should be lower than the **treq-max**. Enter a value between 0 and 5.20192.

**tmax-lower-bound** *<number>*

Specifies the minimum TMAX value (in milliseconds) supported by any MAC configured in this path. This value should be greater than or equal to the **treq-max**. Enter a value between 10 and 1331.69152.

**treq-max** *<number>*Specifies the maximum TREQ value (in milliseconds) that shall be used by any MAC configured in this path. This value must be greater than the **tvx-lower-bound** and equal to or less than the **tmax-lower-bound**.

**Note:** Due to unit conversions, the **tvx-lower-bound, tmax-lower-bound, and treq-max** values may be rounded down slightly from the values specified.

## Restrictions

None.

## Example

To set the path configuration parameters for port fi.4.2:

xp# **fddi set path-group fi.4.2 tvx-lower-bound 5 tmax-lower-bound 18 treq-max 18**

# fddi set port-group

## Purpose

Sets parameters for the specified FDDI port.

## Format

**fddi set port-group** *<port>* **ler-cutoff** *<value>* **ler-alarm** *<value>* **connection** *<***a**/**b***>*

## Mode

Configure

## Description

The **fddi set port-group** command allows you to specify link error monitoring (LEM) thresholds for an FDDI port. If the link error rate exceeds the **ler-alarm** value, an alarm is generated. If more errors are detected after the alarm, and the **ler-cutoff** is exceeded, the link is declared faulty and the connection is broken.

## Parameters

| | |
|---|---|
| *<port>* | Specifies an FDDI port. To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1. |
| **ler-cutoff** *<value>* | Specifies the desired link error rate cutoff. If exceeded, the link connection will be broken. |
| **ler-alarm** *<value>* | Specifies the desired link error rate alarm limit. If exceeded, the link connection will generate an alarm. |
| **connection** *<***a**/**b***>* | Specifies the actual or physical port being configured. Specify **a** to set parameters for the port on the left side of the PHY. Specify **b** to set parameters for the port on the right side of the PHY. |

## Restrictions

None.

## Example

To set the PORT configuration parameters for port fi.4.2:

```
xp# fddi set port-group fi.4.2 ler-cutoff 17 ler-alarm 20 connection b
```

# fddi set ring-purger

## Purpose

Turns on the ring purger mode for the specified FDDI port.

## Format

**fddi set ring-purger** *<port>*

## Mode

Configure

## Description

The **fddi set ring-purger** command allows the FDDI port to participate in ring purger election. The station "elected" as the ring purger strips the ring of obsolete or stray frames and packets. This prevents old packets from continually circling the ring.

## Parameters

*<port>*　　　　Specifies an FDDI port. To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

## Restrictions

None.

## Example

To enable ring purger mode for port fi.4.2:

```
xp# fddi set ring-purger fi.4.2
```

# fddi set smt-group

## Purpose

Sets the station management (SMT) parameters for the specified FDDI port.

## Format

**fddi set smt-group** *<port>* **userdata** *<string or number>*|**connection-policy** *<number>*|**tnotify** *<number>*|**stat-rpt-policy [on|off]|trace-max-expiration** *<value>*

## Mode

Configure

## Description

The **fddi set smt-group** command allows you to set various station management parameters. There parameters include the following:

• The connection policy specifies which type of connection the station will reject. In the policy statement, the first value represents the local port and the second value represents the port of the adjacent station. The Bit # specifies the binary bit position. To specify a connection policy, determine which connections will be rejected, calculate the decimal value of the bit ($2^{\wedge}$ Bit #) for each connection rejected, and add these values together.

| Policy | Bit # |
|---|---|
| Reject A-A | 0 |
| Reject A-B | 1 |
| Reject A-S | 2 |
| Reject A-M | 3 |
| Reject B-A | 4 |
| Reject B-B | 5 |
| Reject B-S | 6 |
| Reject B-M | 7 |
| Reject S-A | 8 |

                Reject S-B   9

                Reject S-S   10

                Reject S-M  11

                Reject M-A 12

                Reject M-B 13

                Reject M-S  14

                Reject M-M 15

- Each station on an FDDI ring announces its address to its downstream neighbor by transmitting neighborhood information frames (NIF). Specify the time period between the transmission of NIFs.

- When there is an unexpected network or node change, a station can generate status reporting frames (SRF) which notify the network of the unexpected event or condition (such as a ring wrap). You can turn this feature on or off for a particular port.

## Parameters

*<port>*               Specifies an FDDI port. To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**userdata** *<string or number>*

               Specifies a text string or numbers. May be up to 7 characters.

**connection-policy** *<value>*

               Specifies a value representing the connection policies in effect in a node. This value is a sum of the decimal values calculated for each connection policy. Note that Bit 15, (rejectM-M), is always set and cannot be cleared.
               Example: Reject A-A, S-M and M-M = $(2^0 + 2^{11} + 2^{15})$

t**notify** *<value>*     Specifies the amount of time between the transmission of neighborhood information frames (nifs).

**stat-rpt-policy [on|off]**

               Specifies whether the station will generate status reporting frames for unexpected events and conditions.

**trace-max-expiration** *<value>*

               Specifies the amount of time before a trace expires. Enter a value between 6002 and 100000.

# Restrictions

None.

# fddi set translation

## Purpose

Sets the IPX/Appletalk ARP frame translation settings for the specified FDDI port.

## Format

**fddi set translation [fddi_ipx_snap| fddi_appletalk_arp] to [enet_II|802.3_raw_ipx| 802.3_snap] port** *<port>*

## Mode

Configure

## Description

The **fddi set translation** command allows you to specify how FDDI IPX Snap frames or FDDI Appletalk ARP frames are translated to Ethernet. FDDI IPX Snap frames are translated to Ethernet II frames, by default. Alternatively, you can specify that they be translated to 802.3 Raw IPX frames. FDDI Appletalk ARP frames are translated to 802.3 Snap frames by default. Alternatively, you can specify that they be translated to Ethernet II frames.

## Parameters

**fddi_ipx_snap**        Specifies that the frames to be translated are IPX Snap frames.

**fddi_appletalk_arp**   Specifies that the frames to be translated are FDDI Appletalk ARP frames.

**enet_II**              Specifies that the frames will be translated as Ethernet II frames.

**802.3_raw_ipx**        Specifies that the frames will be translated as 802.3 Raw IPX frames.

**802.3_snap**           Specifies that the frames will be translated as 802.3 Snap frames.

<port>                    Specifies an FDDI port. To specify an FDDI port, use the prefix: fi.
                          For example, to specify an FDDI port in slot 5, use fi.5.1.

## Restrictions

- IPX Snap frames cannot be translated to 802.3 Snap frames.

- Appletalk ARP frames cannot be translated to 802.3 Raw IPX frames.

## Example

To specify the translation settings for port fi.4.2:

```
xp# fddi set translation fddi_ipx_snap to enet_II fi.4.2
```

# fddi show fddi-mode

## Purpose

Displays the operating FDDI mode for the specified port(s).

## Format

**fddi show fddi-mode** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show fddi-mode** command displays the operating mode for a specified port. This allows you to determine whether the specified port is operating as a Single Attachment Concentrator (SAC) or Dual Attachment Station (DAS).

## Parameters

*<port-list>*     Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**     Specifies all FDDI ports.

## Restrictions

None.

# Example

To display the operating mode of port fi.5.1:

xp# **fddi show fddi-mode fi.5.1**

# fddi show fddi-status

## Purpose

Displays the FDDI status for the specified FDDI port(s).

## Format

**fddi show fddi-status** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show fddi-status** command displays FDDI status information for the specified ports. This includes station ID, upstream and downstream neighbors, and station state.

## Parameters

*<port-list>*        Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**          Specifies all FDDI ports.

## Restrictions

None.

## Example

To display the fddi status of ports fi.5.1 and fi.5.2:

```
xp# fddi show fddi-status fi.5.(1-2)
```

# fddi show fddi-fdx-mode

## Purpose

Displays the FDDI full duplex value for the specified FDDI port(s).

## Format

**fddi show fddi-fdx-mode** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show fddi-fdx-mode** command displays the full duplex value for a specific FDDI port or ports. This allows you to determine whether or not the specified port is active and running in full-duplex mode. Note that the FDDI port will operate in full-duplex mode only if there is one other station on the ring that is running full-duplex. It will cease running in full-duplex if there are multiple stations on the ring.

## Parameters

| | |
|---|---|
| *<port-list>* | Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1. |
| **all-ports** | Specifies all FDDI ports. |

## Restrictions

None.

# Example

To display the full-duplex status of port fi.5.2:

xp# **fddi show fddi-fdx-mode fi.5.2**

# fddi show mac-group

## Purpose

Displays the MAC configuration parameters for the specified FDDI port(s).

## Format

**fddi show mac-group** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show mac-group** command allows you to display the requested rotation time (treq value) and MAC Unit Data Enable flag of the specified port(s).

## Parameters

*<port-list>*     Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**      Specifies all FDDI ports.

## Restrictions

None.

## Example

To display the MAC parameters of port fi.3.2:

xp# **fddi show mac-group fi.3.2**

# fddi show mac-restricted token

## Purpose

Displays the MAC restricted token time for the specified FDDI port(s).

## Format

**fddi show mac-restricted-token** *&lt;port-list&gt;*|**all ports**

## Mode

Enable

## Description

The **fddi show mac-restricted-token** command allows you to display the restricted token time for the specified port(s). A station that holds the restricted token can use the entire network bandwidth until the restricted token time expires.

## Parameters

*&lt;port-list&gt;*  Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**  Specifies all FDDI ports.

## Restrictions

None.

# Example

To display the restricted token time for port fi.4.1:

xp# **fddi show mac-restricted-token fi.4.1**

# fddi show media-type

## Purpose

Displays the media type for the specified FDDI port(s).

## Format

**fddi show media-type** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show media-type** command allows you to display the media type and PHY states of the specified FDDI port(s). The media types are Single-Mode Fiber, Multi-Mode Fiber (MMF), and Unshielded Twisted Pair (UTP).

## Parameters

| | |
|---|---|
| *<port-list>* | Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1. |
| **all-ports** | Specifies all FDDI ports. |

## Restrictions

None.

# Example

To display the media type of ports fi.4.1 and fi.4.2:

xp# **fddi show media-type fi.4.(1-2)**

# fddi show path-group

## Purpose

Displays the PATH configuration parameters for the specified port(s).

## Format

**fddi show path-group** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show path-group** command allows you to display the various thresholds for the timers used by the MACs in the primary path. These include the minimum valid transmission time (tvx), which is the period between valid transmissions; the minimum tmax value, which is the lowest target token rotation time supported by a MAC; and the maximum **treq** value, which is the maximum target rotation time that may be requested by a station in the primary path.

## Parameters

*<port-list>*    Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**    Specifies all FDDI ports.

## Restrictions

None.

# Example

To display the PATH parameters for port fi.3.2:

xp# **fddi show media-type fi.3.2**

# fddi show port-group

## Purpose

Displays the PORT configuration parameters for the specified FDDI port(s).

## Format

**fddi show port-group** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show port-group** command allows you to display PORT configuration parameters for the specified FDDI port(s). These include the port connections; the link error rate alarm (ler-alarm) value, which is the number of link errors detected before an alarm is generated; and the link error rate cutoff (ler-cutoff) value, which is the number of link errors detected before the link is declared faulty and the connection is broken.

## Parameters

*<port-list>*   Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**    Specifies all FDDI ports.

## Restrictions

None.

# Example

To display the PORT parameters for port fi.4.2:

xp# **fddi show port-group fi.4.2**

# fddi show ring-purger

## Purpose

Displays the ring purger value for the specified port(s).

## Format

**fddi show ring-purger** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show ring-purger** command allows you to display the ring purger status of the specified port(s). When this feature is turned on, the FDDI port participates in ring purger election.

## Parameters

| | |
|---|---|
| *<port-list>* | Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1. |
| **all-ports** | Specifies all FDDI ports. |

## Restrictions

None.

## Example

To display the ring purger status of port fi.4.1:

```
xp# fddi show ring-purger fi.4.1
```

# fddi show smt-config

## Purpose

Displays the current SMT configurations for the specified FDDI port(s).

## Format

**fddi show smt-config** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show smt-config** command allows you to display station management (SMT) information for the specified FDDI port(s). These include the SMT version; the treq value, which is the station's requested token rotation time; the tneg value, which is the token rotation time negotiated by the station during the claim process; and the tnotify value, which is the period between the generation of neighborhood information frames.

## Parameters

*<port-list>*      Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**       Specifies all FDDI ports.

## Restrictions

None.

# Example

To display SMT information for port fi.4.2:

xp# **fddi show smt-config fi.4.2**

# fddi show smt-group

## Purpose

Displays the SMT configuration parameters for the specified FDDI port(s).

## Format

**fddi show smt-group** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show smt-group** command allows you to display Station Management (SMT) parameters that were set for the specified port(s). These include the user data; connection policy, which specifies the type of connections rejected by the port(s); the status report policy, which specifies whether a station generates Status Reporting Frames (SRF) when unexpected events or conditions occur; the time period between the generation of Neighborhood Information Frames (NIF); and the trace max expiration time.

## Parameters

*<port-list>*     Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**      Specifies all FDDI ports.

## Restrictions

None.

# Example

To display SMT parameters configured for port fi.4.1:

xp# **fddi show smt-group fi.4.1**

# fddi show translation

## Purpose

Displays the frame translation settings for the specified port(s).

## Format

**fddi show translation** *<port-list>* | **all-ports**

## Mode

Enable

## Description

The **fddi show translation** command allows you to display the IPX/Appletalk ARP frame translation settings.

## Parameters

*<port-list>*     Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**      Specifies all FDDI ports.

## Restrictions

None.

## Example

To display the translation settings configured for port fi.4.1:

xp# **fddi show translation fi.4.1**

# fddi show version

## Purpose

Displays the firmware version of the specified FDDI port(s).

## Format

**fddi show version** *<port-list>*|**all ports**

## Mode

Enable

## Description

The **fddi show version** command allows you to display the firmware version of the specified port(s).

## Parameters

*<port-list>*    Specifies the FDDI port(s). To specify an FDDI port, use the prefix: fi. For example, to specify an FDDI port in slot 5, use fi.5.1.

**all-ports**    Specifies all FDDI ports.

## Restrictions

None.

## Example

To display the firmware version of port fi.4.1:

```
xp# fddi show version fi.4.1
```

# Chapter 24

# frame-relay Commands

The **frame-relay** commands allow you to define frame relay service profiles, and specify and monitor frame relay High-Speed Serial Interface (HSSI) and standard serial ports.

## Command Summary

Table 18 lists the **frame-relay** commands. The sections following the table describe the command syntax.

**Table 18.  frame relay commands**

| |
|---|
| **frame-relay apply service** *<service name>* **ports** *<port list>* |
| **frame-relay clear stats-counter [frame-drop-qdepth-counter] [max-frame-enqued-counter] [frame-drop-red-counter] [rmon] ports** *<port list>* |
| **frame-relay create vc** *<port>* |
| **frame-relay define service** *<service name>* **[Bc** *<number>*] **[Be** *<number>*] **[becn-adaptive-shaping** *<number>*] **[cir** *<number>*] **[high-priority-queue-depth** *<number>*] **[low-priority-queue-depth** *<number>*] **[med-priority-queue-depth** *<number>*] **[red on|off] [red-maxTh-high-prio-traffic** *<number>*] **[red-maxTh-low-prio-traffic** *<number>*] **[red-maxTh-med-prio-traffic** *<number>*] **[red-minTh-high-prio-traffic** *<number>*] **[red-minTh-low-prio-traffic** *<number>*] **[red-minTh-med-prio-traffic** *<number>*] **[de-mark on|off]** |
| **frame-relay set fr-encaps-bgd ports** *<port list>* |
| **frame-relay set lmi [error-threshold** *<number>*] **[full-enquiry-interval** *<number>*] **[monitored-events** *<number>*] **[polling-interval** *<number>*] **[state enable|disable] [type ansi617d-1994|q933a|rev1] ports** *<port list>* |
| **frame-relay set payload-compress [type frf9_mode1_stac] ports** *<port list>* |

**Table 18.  frame relay commands (Continued)**

| |
|---|
| **frame-relay set peer-addr [ip-address** *<IP address>*] **[ipx-address** *<ipx address>*] **[ports** *<port list>*] |
| **frame-relay show service** *<service name>*\|**all** |
| **frame-relay show stats ports** *<port name>* **[last-error] [lmi] [mibII]** |
| **frame-relay show stats ports** *<port name>* **summary** |

# frame-relay apply service ports

## Purpose

Apply a pre-defined service profile to a frame relay virtual circuit (VC).

## Format

**frame-relay apply service** *<service name>* **ports** *<port list>*

## Mode

Configure

## Description

Issuing the **frame-relay apply service** command allows you to apply a previously defined service profile to a given frame relay VC.

## Parameters

*<service name>*   The name of the previously defined service profile you wish to apply to the given port(s) or interfaces.

*<port list>*   The port(s) to which you wish to apply the pre-defined service profile. You can specify a single VC or a comma-separated list of VCs.

## Restrictions

Usage is restricted to frame relay VCs only.

## Example

To apply the service "s1" to slot 2, VC 100 on serial ports 1 and 2:

```
xp(config)# frame-relay apply service s1 ports se.2.1.100,se.2.2.100
```

# frame-relay clear stats-counter

## Purpose

Clears the specified statistics counter.

## Format

**frame-relay clear stats-counter [frame-drop-qdepth-counter] [max-frame-enqued-counter] [frame-drop-red-counter] [rmon] ports** *<port list>*

## Mode

Enable

## Description

The **frame-relay clear stats-counter** command allows you to specify a particular statistic counter and have those statistics reset to zero. There are statistic counters on each WAN port, and you can use the **frame-relay clear stats-counter** to clear the counter for an individual WAN port or for a group of ports.

## Parameters

| | |
|---|---|
| **frame-drop-qdepth-counter** | Specify this optional parameter to reset the frame drop counter to zero. |
| **max-frame-enqued-counter** | Specify this optional parameter to reset the max enquedframes counter to zero. |
| **frame-drop-red-counter** | Specify this optional parameter to reset the packet drop counter to zero. |
| **rmon** | Specify this optional parameter to reset the rmon counter to zero. |
| *<port list>* | The WAN port(s) that you wish to clear the counter. |

## Restrictions

Usage is restricted to WAN ports only.

# Example

To clear the frame drop counter to zero on WAN port hs.3.1:

xp# **frame-relay clear stats-counter frame-drop-qdepth-counter port hs.3.1**

# frame-relay create vc

## Purpose

Create frame relay virtual circuits (VCs).

## Format

**frame-relay create vc** *<port>*

## Mode

Configure

## Description

The **frame-relay create vc** command allows you to create a frame-relay virtual circuit on a slot and port location specified in the command line.

## Parameters

*<port>*  The port on which you wish to create a frame relay virtual circuit. Specify the port in the following format: **media.slot.port.dlci**.

  **media**  Is the media type.

  **slot**  Is the slot number where the module is installed.

  **port**  Is the port number.

  **dlci**  Is the Data Link Connection Identifier. Specify any number between 16-1007.

## Restrictions

Usage is restricted to frame relay ports only.

## Example

To create a frame relay virtual circuit with a DLCI of 100 on serial port 1 of slot 3:

```
xp(config)# frame-relay create vc port se.3.1.100
```

# frame-relay define service

## Purpose

Configure service profiles for frame relay ports.

## Format

**frame-relay define service** *<service name>* **[Bc** *<number>*] **[Be** *<number>*]
**[becn-adaptive-shaping** *<number>*] **[cir** *<number>*] **[high-priority-queue-depth** *<number>*]
**[low-priority-queue-depth** *<number>*] **[med-priority-queue-depth** *<number>*] **[red on|off]**
**[red-maxTh-high-prio-traffic** *<number>*] **[red-maxTh-low-prio-traffic** *<number>*] **[red-maxTh-med-prio-traffic** *<number>*]
**[red-minTh-high-prio-traffic** *<number>*] **[red-minTh-low-prio-traffic** *<number>*]
**[red-minTh-med-prio-traffic** *<number>*] **[de-mark on|off]**

## Mode

Configure

## Description

The **frame-relay define service** command allows you to specify the following attributes for a
newly created service profile:

• Number of bits per second contained in a committed burst for frame relay virtual circuits.

• Number of bits per second contained in an excessive burst for frame relay virtual circuits.

• Whether or not to simultaneously enable and specify the threshold at which adaptive shaping
will activate when receiving BECN frames

• The committed information rate (in bits per second) for frame relay virtual circuits.

• The allowable queue depth for high-, low-, and medium-priority frames on frame relay VCs.

• Activation or deactivation of Random Early Discard (RED) for frame relay circuits.

• The maximum and minimum threshold values for RED high-, low-, and medium-priority traffic.

In general, Enterasys recommends that the maximum threshold values be less than or equal to
the respective high-, low-, or medium-priority queue depth. The minimum threshold values
should be one-third of the respective maximum threshold.

## Parameters

*<service name>*
    The name you wish to assign to the newly created service profile.

**Bc** *<number>*

The number of bits per second contained in a committed burst for a frame relay virtual circuit. You can specify a number between 1 and 2,147,483,646 bits per second.

**Be** *<number>*

The number of bits per second contained in an excessive burst for a frame relay virtual circuit. You can specify a number between 1 and 2,147,483,646 bits per second.

**becn-adaptive-shaping** *<number>*

The threshold (number of frames) at which adaptive shaping will activate when receiving BECN frames. You can specify a number between 1 and 100,000 frames.

**cir** *<number>*

The committed information rate (in bits per second) for frame relay virtual circuits. You can specify a number between 1 and 2,147,483,646 bits.

**high-priority-queue-depth** *<number>*

The number of high-priority frames allowed in the frame relay queue. You can specify a number between 1 and 65,535. Enterasys recommends a value within the 5 - 100 item range. The default value is 20.

**low-priority-queue-depth** *<number>*

The number of low-priority frames allowed in the frame relay queue. You can specify a number between 1 and 65,535. Enterasys recommends a value within the 5 - 100 item range. The default value is 20.

**med-priority-queue-depth** *<number>*

The number of medium-priority frames allowed in the frame relay queue. You can specify a number between 1 and 65,535. Enterasys recommends a value within the 5 - 100 item range. The default value is 20.

**red on|off**

Specifying the **on** keyword enables RED for frame relay ports. Specifying the **off** keyword disables RED for frame relay ports.

**red-maxTh-high-prio-traffic** *<number>*

The maximum allowable number of frames for high-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 12.

**red-maxTh-low-prio-traffic** *<number>*

The maximum allowable number of frames for low-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 12.

**red-maxTh-med-prio-traffic** *<number>*

The maximum allowable number of frames for medium-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 12.

**red-minTh-high-prio-traffic** *<number>*

The minimum allowable number of frames for high-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 4.

**red-minTh-low-prio-traffic** *<number>*

The minimum allowable number of frames for low-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 4.

**red-minTh-med-prio-traffic** *<number>*

The minimum allowable number of frames for medium-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 4.

**de-mark on|off**

Specifying the **on** keyword enables DE marking for best traffic. Specifying the **off** keyword disables DE marking for best traffic. Default is **off**.

# Restrictions

When defining a value for **Bc**, you *must* also be sure to define an appropriate value for **cir**, and vice-versa.

# Examples

Suppose you wish to specify a frame relay virtual circuit with the following attributes:

*   Committed burst value of 35 million and excessive burst value of 30 million

*   BECN active shaping at 65 thousand frames

*   Committed information rate (CIR) of 120 million bits per second

*   Leave high-, low-, and medium-priority queue depths set to factory defaults

*   Random Early Discard (RED) disabled

The command line necessary to set up a service profile with the above attributes would be as follows:

xp(config)# **frame-relay define service profile1 Bc 35000000 Be 30000000 becn-adaptive-shaping
65000 cir 120000000 red off**

# frame-relay set fr-encaps-bgd

## Purpose

Force the ingress packets to be encapsulated in bridged format.

## Format

**frame-relay set fr-encaps-bgd ports** *<port list>*

## Mode

Configure

## Description

Issuing the **frame-relay set fr-encaps-bgd** command allows you to use bridged format encapsulation on a given frame relay VC.

## Parameters

*<port list>*   The port(s) to which you wish to use bridged encapsulation. You can specify a single VC or a comma-separated list of VCs.

## Restrictions

Usage is restricted to frame relay VCs only.

## Example

To force the bridged encapsulation to slot 2, VC 100 on serial ports 1 and 2:

```
xp(config)# frame-relay set fr-encaps-bgd ports se.2.1.100,se.2.2.100
```

# frame-relay set lmi

## Purpose

Set frame relay Local Management Interface (LMI) parameters.

## Format

**frame-relay set lmi [error-threshold** *<number>*] **[full-enquiry-interval** *<number>*]
**[monitored-events** *<number>*] **[polling-interval** *<number>*] **[state enabled|disabled] [type
ansi617d-1994|q933a|rev1] ports** *<port list>*

## Mode

Configure

## Description

The **frame-relay set lmi** command allows you to specify the following attributes:

- The number of times the router will attempt to poll an LMI interface before declaring it down. You can define a value between 1 and 10, inclusive.

- The number of status enquiries that will be sent before a full status enquiry is requested. You can define a value between 1 and 255, inclusive.

- The number of status enquiries over which various pieces of LMI information can be collected and tabulated. For example, you can tabulate the number of times an interface was declared down/lost due to a lack of proper responses to status enquiries. You can define a value between 1 and 10, inclusive.

- The number of seconds that pass between successive status enquiry messages. You can define a value between 5 and 30, inclusive.

- Whether or not LMI messages are sent. LMI messages are not sent by default.

- The LMI type for frame relay WAN ports.

## Parameters

**error-threshold** *<number>*
   The number of unanswered status enquiries that the router will make before declaring an interface to be down.

**full-enquiry-interval** *<number>*
   The number of status enquiries that will be sent before a full report on status is compiled and transmitted.

**monitored-events** *<number>*

The number of status enquiries over which collection and tabulation of various pieces of LMI information will take place.

**polling-interval** *<number>*

The amount of time (in seconds) that will pass before a subsequent status enquiry takes place.

**state enabled|disabled**

Enables the sending and receiving of LMI messages. If LMI messages are enabled, the operational status of each VC is determined by the LMI messages. If LMI messages are disabled, each VC is assumed to be operationally "up". LMI messages are disabled by default.

**type ansi617d-1994|q933a|rev1**

The LMI type for frame relay WAN ports. You can only specify the **ansi617d-1994**, **q933a**, or **rev1** keywords to define as the LMI type for WAN ports.

**ports** *<port list>*

The port or ports that will assume the LMI service profile behavior.

# Restrictions

None.

# Examples

To set the number of status enquiries that will be sent before compilation and transmission of a full status report for serial port 2 of slot 2 to 75 enquiries:

xp(config)# **frame-relay set lmi full-enquiry-interval 75 ports se.2.2**

# frame-relay set payload-compress

## Purpose

Enable packet compression for frame-relay ports.

## Format

**frame-relay set payload-compress [type frf9_mode1_stac] ports**<*port list*>

## Mode

Configure

## Description

The **frame-relay set payload-compress** command allows you to enable packet compression according to Mode 1 of FRF 9. If this command is not configured, packet compression is not enabled.

## Parameters

**type frf9_mode1_stac**
Specifies the Stacker FRF 9, Mode 1 compression algorithm. This is the default value.

*<port list>*
The port(s) on which you wish to enable the packet compression. You can specify a single VC or a comma-separated list of VCs.

## Restrictions

Usage is restricted to frame relay VCs only.

## Example

To enable Stacker FRF 9, Mode 1 packet compression on slot 3, VC 300 on serial port 1:

```
xp(config)# frame-relay set payload-compress ports se.3.1.300
```

# frame-relay set peer-addr

## Purpose

Set the peer address in case that InArp is not supported on the remote device.

## Format

**frame-relay set peer-addr [ip-address** *<IP address>*] **[ipx-address** *<IPX address>*] **[ports** *<port list>*]

## Mode

Configure

## Description

Issuing the **frame-relay set peer-addr** command allows you to set the peer address if it can't be resolved by InArp.

## Parameters

*<IP address>*   The IP address you wish to use.

*<IPX address>* The IPX address you wish to use.

*<port list>*   The location of the port to which you wish to assign the address.

## Restrictions

Usage is restricted to frame relay VCs only.

## Example

To assign an IP address 10.1.1.1/16 to slot 2, VC 100 on serial port 1:

xp(config)# **frame-relay set peer-addr ip-address 10.1.1.1/16 ports se.2.1.100**

# frame-relay show service

## Purpose

Displays frame relay service profiles.

## Format

**frame-relay show service** *<service name>*/**all**

## Mode

Enable

## Description

The **frame-relay show service** command allows you to display the available frame relay service profiles.

## Parameters

*<service name>*  The name of a particular pre-defined service profile.

**all**  Displays all of the available frame relay service profiles.

## Restrictions

None.

## Example

To display the available frame relay service profiles named "prof1":

xp# **frame-relay show service prof1**

# frame-relay show stats

## Purpose

Displays frame relay statistics.

## Format

**frame-relay show stats ports** *<port name>* **[last-error] [lmi] [mibII]**

## Mode

Enable

## Description

The **frame-relay show stats** command allows you to display the following frame relay port statistics for the given port:

- The last reported frame relay error.

- The active frame relay LMI parameters.

- The MIBII statistics for frame relay WAN ports.

## Parameters

**ports** *<port name>*
The port or ports for which you want to display statistics.

**last-error**
Specifying the **last-error** keyword allows you to display the last reported frame relay error for the given port.

**lmi**
Specifying the **lmi** keyword allows you to displays the active frame relay LMI parameters.

**mibII**
Specifying the **mibII** keyword allows you to displays the MIBII statistics for frame relay WAN ports.

## Restrictions

The **last-error**, **mibII**, and **lmi** commands are for ports only (no VC designators allowed). Otherwise, the port name may have the "VC" designator.

## Examples

To display the last recorded error and MIB II statistics and for serial port 1 of slot 3:

xp# **frame-relay show stats ports se.3.1 last-error mibII**

To display the VC statistics for serial port 1, slot 3, VCs 1-10:

xp# **frame-relay show stats ports se.3.1.1-10**

# frame-relay show stats summary

## Purpose

Displays a summary of all VC statistics.

## Format

**frame-relay show stats summary ports** *<port name>*

## Mode

Enable

## Description

The **frame-relay show stats summary** command allows you to display all of the summary information for VC statistics.

## Parameters

*<port name>*    The port or ports for which you wish to display summary statistics.

## Restrictions

None.

## Example

To display summary statistics for serial port 1 of slot 4, VC 100:

```
xp# frame-relay show stats summary ports se.4.1.100
```

# Chapter 25

# garp Commands

The following commands allow you to....

## Command Summary

Table 19 lists the **garp** commands. The sections following the table describe the command syntax.

**Table 19.  garp commands**

| |
|---|
| **garp show timers** *<port-list>*\| **all-ports** |
| **garp set timers** *<port-list>* **join** *<num>*\| **leave** *<num>*\| **leaveall** *<num>* |

# garp show timers

## Purpose

Display values of GARP timers.

## Format

**garp show timers** *<port-list>* **| all-ports**

## Mode

Enable

## Description

The **garp show timers** command allows display of the values of the GARP join timer, leave timer, and leaveall timer for specified port(s).

## Parameters

*<port-list>* **| all-ports**    Specifies port(s) for which to display GARP timer values. Entering **all-ports** will display timer values for every port.

## Restrictions

None.

## Example

To display values of GARP timers for port et.1.1:

```
er# garp show timers et.1.1
```

# garp set timers

## Purpose

Sets the values of GARP timers.

## Format

**garp set timers** *<port-list>* **join** *<num>* / **leave** *<num>* / **leaveall** *<num>*

## Mode

Configure

## Description

The **garp set timers** command allows setting of GARP join, leave, and leaveall timers for specified port(s).

## Parameters

| | |
|---|---|
| **port** *<port-list>* | Specifies ports for which to display GARP timer values. |
| **join** *<num>* | Sets join timer to value specified. Value must fall between 20 and 1000 cs. |
| **leave** *<num>* | Sets leave timer to value specified. Value must fall between 60 and 3000 cs. |
| **leaveall** *<num>* | Sets leave all timer to value specified. Value must fall between 1000 and 18000 cs. |

## Restrictions

Timers should satisfy the following relationship: **Leave >= Join*3**, and **LeaveAll > Leave**.

## Examples

To set GARP timers for port et.1.1:

```
xp# garp set timers et.1.1 join 1000 leave 2500 leaveall 18000
```

# Chapter 26

# gvrp Commands

The following commands allow you to display and alter GVRP parameters on the XP.

## Command Summary

Table 20 lists the **gvrp** commands. The sections following the table describe the command syntax.

**Table 20. gvrp commands**

| |
|---|
| **gvrp show statistics** *<port-list>* **\| all ports** |
| **gvrp show status** |
| **gvrp show registration-mode** *<port-list>* **\| all-ports** |
| **gvrp show applicant-status** *<port-list>* **\| all-ports** |
| **gvrp clear statistics** *<port-list>* **\| all-ports** |
| **gvrp enable dynamic-vlan-creation** |
| **gvrp enable ports** *<port-list>* |
| **gvrp set registration-mode forbidden ports** *<port-list>* **\| all-ports** |
| **gvrp set applicant status non-participant ports** *<port-list>* **\| all-ports** |
| **gvrp start** |

# gvrp show statistics

## Purpose

Displays various GVRP statistics for ports.

## Format

**gvrp show statistics** *<port-list>* **| all ports**

## Mode

Enable

## Description

The **gvrp show statistics** command displays statistics for the specified port(s).

## Parameters

None.

## Restrictions

None.

## Example

```
gvrp show statistics et.1.1-2
```

# gvrp show status

## Purpose

Shows status of GVRP.

## Format

**gvrp show status**

## Mode

Enable

## Description

The **gvrp show status** command displays current status of GVRP.

## Parameters

None.

## Restrictions

None.

## Example

```
gvrp show status
```

# gvrp show registration-mode

## Purpose

Shows GVRP registration-mode for specified port(s).

## Format

**gvrp show registration-mode ports** *<port-list>* **| all-ports**

## Mode

Enable

## Description

The **gvrp show registration-mode** command displays the GVRP registration-mode of specified port(s).

## Parameters

| | |
|---|---|
| *<port-list>* | Specifies port(s) for which information will display. |
| **all-ports** | Displays information for all XP ports. |

## Restrictions

None.

## Example

```
gvrp show registration-mode ports et.1.1-2
```

# gvrp show applicant-status

## Purpose

Shows GVRP applicant-status for specified port(s).

## Format

**gvrp show registration-mode ports** *<port-list>* | **all-ports**

## Mode

Enable

## Description

The **gvrp show applicant-status** command displays the GVRP applicant-status of specified port(s).

## Parameters

| | |
|---|---|
| *<port-list>* | Specifies port(s) for which information will display. |
| **all-ports** | Displays information for all XP ports. |

## Restrictions

None.

## Example

```
gvrp show registration-mode ports et.1.1-2
```

# gvrp clear statistics

## Purpose

Clears GVRP statistics for specified port(s).

## Format

**gvrp clear statistics** *<port-list>* | **all-ports**

## Mode

Enable

## Description

The **gvrp clear statistics** command clears GVRP statistics for specified port(s).

## Parameters

| | |
|---|---|
| *<port-list>* | Specifies port(s) for which statistics will be cleared. |
| **all-ports** | Clears statistics on all XP ports. |

## Restrictions

None.

## Example

```
gvrp clear statistics et.1.1-2
```

# gvrp enable dynamic-vlan-creation

## Purpose

Allows GVRP to dynamically create vlans.

## Format

**gvrp enable dynamic-vlan-creation**

## Mode

Configure

## Description

The **gvrp enable dynamic-vlan-creation** command allows GVRP to dynamically create vlans on the XP. If not enabled, GVRP will continue to propagate vlans to other network devices; however, vlans will not be created dynamically.

## Parameters

None.

## Restrictions

None.

## Example

To enable dynamic vlan creation:

xp(config)# **gvrp enable dynamic-vlan-creation**

# gvrp enable ports

## Purpose

Enables GVRP on specified port(s).

## Format

**gvrp enable ports** *<port-list>*

## Mode

Configure

## Description

The **gvrp enable ports** command enables GVRP on specified port(s).

## Parameters

*<port-list>*        Specifies port(s) upon which GVRP will be enabled.

## Restrictions

None.

## Example

To enable GVRP on ports et.1.1 and et.1.2:

xp(config)# **gvrp enable ports et.1.1 and et.1.2**

# gvrp set registration-mode forbidden

## Purpose

Sets GVRP registration-mode for specified port(s).

## Format

**gvrp set registration-mode forbidden ports** *<port-list>* **| all-ports**

## Mode

Configure

## Description

The **gvrp set registration-mode forbidden** command enables the user to disallow vlan registration on specified port(s).

**Note:** The system default allows vlan registration.

## Parameters

| | |
|---|---|
| *<port-list>* | Specifies port(s) on which vlan registration will be forbidden. |
| **all-ports** | Forbids vlan registration on all **XP** ports |

## Restrictions

None.

## Example

To forbid registration on port et.1.1:

```
xp(config)# gvrp registration-mode forbidden ports et.1.1
```

# gvrp set applicant-status non-participant

## Purpose

Sets GVRP applicant-status for specified port(s).

## Format

**gvrp set applicant-status non-participant ports** *<port-list>* **| all-ports**

## Mode

Configure

## Description

The **gvrp set applicant-status non-participant** command stops GVRP from propagating vlan information on specified port(s). These port(s) may still create vlans from other network devices if so configured.

## Parameters

| | |
|---|---|
| *<port-list>* | Specifies port(s) on which to halt vlan propagation. |
| **all-ports** | Halts vlan propagation on all **XP** ports |

## Restrictions

None.

## Example

To set port et.1.1 to a non-participant:

```
xp(config)# gvrp applicant-status non-participant ports et.1.1
```

# gvrp start

## Purpose

Starts GVRP on the XP.

## Format

**gvrp start**

## Mode

Configure

## Description

The **gvrp start** command enables GVRP.

## Parameters

None.

## Restrictions

None.

## Example

To enable GVRP:

xp(config)# **gvrp start**

# Chapter 27

# igmp Commands

The **igmp** commands let you display and set IGMP parameters.

## Command Summary

Table 21 lists the **igmp** commands. The sections following the table describe the command syntax.

**Table 21.  igmp commands**

| |
|---|
| **igmp enable interface** *<name/ipAddr>* |
| **igmp enable vlan** *<vlan-name>* |
| **igmp set interface** *<name/ipAddr>* **[allowed-groups** *<group-list>*|**not-allowed-groups** *<group-list>*] **[use-all-ports]** |
| **igmp join group** *<ipAddr>* **interface** *<name/ipAddr>* |
| **igmp set queryinterval** *<num>* |
| **igmp set responsetime** *<num>* |
| **igmp set vlan** *<vlan-name>* [**host-timeout** *<num>*] [**querier-timeout** *<num>*] [**router-timeout** *<num>* **leave-timeout** *<num>*] |
| **igmp show interfaces [group** *<ipAddr>*|**interface** *<name/ipAddr>*] |
| **igmp show memberships [group** *<ipAddr>*|*port* *<num>*] |
| **igmp show timers** |
| **igmp show vlans** |
| **igmp start-snooping** |

# igmp enable interface

## Purpose

Enables IGMP on an interface.

## Format

**igmp enable interface** *<name/ipAddr>*

## Mode

Configure

## Description

The **igmp enable interface** command enables IGMP on the specified interface.

## Parameters

*<name/ipAddr>*   Name or IP address of the interface on which you are enabling
                  IGMP.

## Restrictions

IGMP is not enabled on tunnels.

## Example

To enable IGMP on interface 10.50.1.2:

```
xp(config)# igmp enable interface 10.50.1.2
```

# igmp enable vlan

## Purpose

Enables IGMP snooping on a VLAN.

## Format

**igmp enable vlan** *<vlan-name>*

## Mode

Configure

## Description

The **igmp enable vlan** command enables IGMP snooping on a specified VLAN. By default, IGMP snooping is disabled on all VLANs.

**Note:** The **igmp start-snooping** command must be present for the **igmp enable vlan** command to function properly. See *igmp start-snooping* .

## Parameters

*<vlan-name>*
   Is the name of the VLAN where IGMP snooping is to be enabled.

## Restrictions

Layer 3 multicasting and layer-2 snooping cannot be run simultaneously on the same VLAN.

## Example

To enable igmp snooping on VLAN blue:

```
xp(config)# igmp enable vlan blue
```

# igmp set interface

## Purpose

Configures IGMP parameters.

## Format

**igmp set interface** *<name/ipAddr>*
**[allowed-groups** *<group-list>***|not-allowed-groups** *<group-list>***] [use-all-ports]**

## Mode

Configure

## Description

Sets IGMP parameters on a per-interface basis to control group restrictions and optimization.

## Parameters

**allowed-groups** *<group-list>*
　　Restricts the groups to only those specified.

**not-allowed-groups** *<group-list>*
　　Allows any groups besides those specified.

**Note:**　Specify only one of the above options, as they are mutually exclusive.

**use-all-ports**
　　Disables per-port IGMP control. By default, per-port IGMP control is enabled.

**Note:**　If the traffic is being supplied by a dvmrp tunnel, which uses CPU-based switching, then for efficiency reasons, port based optimization is not used by this traffic.

## Restrictions

None.

## Examples

The following is an example of the **igmp set interface** command:

```
xp(config)# igmp set interface 200.1.1.1 allowed-groups 225.2.0.0/16
```

The above command will allow only memberships to groups falling in the specified range. Outside this range, all groups are implicitly ignored.

# igmp join group

## Purpose

Allows you to configure a static igmp group onto an interface.

## Format

**igmp set join group** *<ipAddr>* **interface** *<name/ipAddr>*

## Mode

Configure

## Description

The **igmp set join group** command allows an interface to join an igmp group statically. Most interfaces join igmp groups dynamically, outside the control of the user. This command allows the user to configure an igmp group onto an interface statically.

## Parameters

**group** *<ipAddr>*
    Specifies the multicast address.

**interface** *<name/ipAddr>*
    Specifies the interface name or IP address.

## Restrictions

None.

## Examples

To configure the igmp group '255.2.0.0' on interface 200.1.1.1:

```
xp(config)# igmp set join group 255.2.0.0 interface 200.1.1.1
```

# igmp set queryinterval

## Purpose

Configures IGMP Host Membership Query interval.

## Format

**igmp set queryinterval** *<num>*

## Mode

Configure

## Description

Sets the IGMP Host Membership Query time interval. The interval you set applies to all ports on the XP.

## Parameters

*<num>* A value from 20 – 3600 seconds. The default is 125 seconds.

## Restrictions

None.

## Example

To set the query interval to 30 seconds:

```
xp(config)# igmp set queryinterval 30
```

# igmp set responsetime

## Purpose

Configures IGMP Host Membership response wait time.

## Format

**igmp set responsetime** *<num>*

## Mode

Configure

## Description

Sets the wait time for IGMP Host Membership responses. The wait time you set applies to all ports on the XP.

## Parameters

*<num>*  Response wait time in seconds. Specify a number from 10 – 3599. The default is 10.

## Restrictions

None.

## Examples

To set the Host Membership response wait time to 20 seconds:

```
xp(config)# igmp set responsetime 20
```

# igmp set vlan

## Purpose

Sets parameters for IGMP snooping on a VLAN.

## Format

**igmp set vlan** *<vlan-name>* [**host-timeout** *<num>*] [**querier-timeout** *<num>*] [**router-timeout**
*<num>* **leave-timeout** *<num>*] [**filter-ports** *<port-list>*] [**permanent-ports** *<port-list>*]

## Mode

Configure

## Description

The **igmp set vlan** command allows you to set parameters for VLAN-based IGMP snooping.

## Parameters

**host-timeout** *<num>*
Allows adjusting to long host timeout values that may have been set up for the IGMP querier.
The default value is 250 seconds.

**querier-timeout** *<num>*
Allows adjusting to long timeout values that may have been set up for the IGMP querier. The
default value is 260 seconds.

**router-timeout** *<num>*
Allows adjusting to long timeout values that may have been set up for the routers. Different
versions of DVMRP can have different time outs. The default value is 140 seconds.

**leave-timeout** *<num>*
Allows quicker timeout if IGMP v2 leave messages are used. The value is nominally 10
seconds.

**filter-ports** *<port-list>*
Allows forced filtering of certain ports from multicast data. Setting ports as filter ports ensures
that no host there will join any memberships. A port can optionally be either a permanent port
or a filter port, but not both.

**permanent-ports** *<port-list>*
Allows forcing of mulicast data if present on certain ports. A port can optionally be either a
permanent port or a filter port, but not both.

## Restrictions

None.

## Example

To set parameters for IGMP snooping on the VLAN blue:

xp(config)# **igmp set vlan blue host-timeout 125 querier-timeout 130 router-timeout 70**

# igmp show interfaces

## Purpose

Shows the interfaces running IGMP.

## Format

**igmp show interfaces [group** *<ipAddr>*|**interface** *<name/ipAddr>*]

## Mode

Enable

## Description

The **igmp show interfaces** command shows memberships on a specified interface or for a multicast group address. When you use the command to show interfaces by group, all interfaces containing the group membership are shown.

**Note:** This command is similar to **igmp show memberships**, except where the **igmp show interfaces** command shows interface details, the **igmp show memberships** command shows ports.

## Parameters

**group** *<ipAddr>*            Address of a multicast group.

**interface** *<name/ipAddr>*Name or address of a interface.

## Restrictions

None.

# Example

To show information about the interfaces running IGMP:

```
xp# igmp show interfaces

Address: 172.1.1.10 Subnet: 172.1.1/24 Met: 1 Thr: 1
Name : mls15 State: Up Querier Leaf Igmp Dvmrp

Address: 207.135.89.64 Subnet: 207.135.89.0/25 Met: 1 Thr: 1
Name : company State: Up Querier Leaf Igmp Dvmrp
Groups : 224.0.1.12
224.1.127.255
224.0.1.24
224.2.127.253
224.2.127.254

Address: 10.135.89.10 Subnet: 10.135.89.0/25 Met: 1 Thr: 1
Name : test State: Up Querier Igmp Dvmrp

Address: 207.135.122.11 Subnet: 207.135.122.8/29 Met: 1 Thr: 1
Name : mbone State: Up Igmp Dvmrp
Groups : 224.0.1.11
224.0.1.12
224.2.127.254
239.255.255.255
224.2.127.253
```

# igmp show memberships

## Purpose

Displays IGMP host memberships.

## Format

**igmp show memberships [group** *<ipAddr>|port <num>***]**

## Mode

Enable

## Description

The **igmp show memberships** command displays IGMP host members on a specific interface and/or for a particular multicast group.

## Parameters

**group** *<ipAddr>*    Address of the multicast group for which to display host memberships.

*port <num>*    Port numbers on which the members reside.

## Restrictions

None.

## Examples

To display host members for multicast group 225.0.1.20:

```
xp(config)# igmp show memberships group 225.0.1.20
```

To display host members for multicast group 225.0.1.20 on port et.1.1:

```
xp(config)# igmp show memberships group 225.0.1.20 port et.1.1
```

The following is a fuller example.

```
xp(config)# igmp show memberships

Group : 224.0.1.11 Ports: et.1.1
Group : 224.0.1.12 Ports: et.1.1
et.5.1
Group : 224.0.1.24 Ports: et.5.1
Group : 224.1.127.255 Ports: et.5.1
Group : 224.2.127.253 Ports: et.1.1
et.5.1
Group : 224.2.127.254 Ports: et.1.1
et.5.1
Group : 239.255.255.255 Ports: et.1.1
```

# igmp show timers

## Purpose

Displays IGMP timers.

## Format

**igmp show timers**

## Mode

Enable

## Description

The **igmp show timers** command displays IGMP timers.

## Parameters

None.

## Restrictions

None.

# igmp show vlans

## Purpose

Displays IGMP VLANs.

## Format

**igmp show vlans [detail] [name *<name>*] [timers]**

## Mode

Enable

## Description

The **igmp show vlans** command displays IGMP VLANs.

## Parameters

| | |
|---|---|
| **detail** | Shows all IGMP membership information |
| **name** *<name>* | Shows IGMP membership information for the specified VLAN |
| **timers** | Shows all IGMP L2 snooping related timers |

## Restrictions

None.

# igmp start-snooping

## Purpose

Starts passive IGMP snooping on enabled VLANs.

## Format

**igmp start-snooping**

## Mode

Configure

## Description

The **igmp start-snooping** command starts IGMP snooping on enabled VLANs. This task is independent of L3 multicasting.

**Note:** The **igmp start-snooping** command must be present for the **igmp enable vlan** command to function properly. See *igmp enable vlan* on page 339.

## Parameters

None.

## Restrictions

None.

# Chapter 28

# interface Commands

The **interface** commands allow the user to create AppleTalk, IP, and IPX interfaces. They also allow the addition of network mask and broadcast address information to existing IP interfaces, and they display configuration information for AppleTalk, IP, and IPX interfaces.

## Command Summary

Table 22 lists the **interface** commands. The sections following the table describe the command syntax.

**Table 22. interface commands**

| |
|---|
| **interface add appletalk** *<InterfaceName>* **zone** *<ZoneName>* **[default]** |
| **interface add ip** *<InterfaceName>* **address-netmask** *<IPaddr-mask>* **peer-address** **[***<IPaddr>***] [broadcast** *<IPaddr>***]** |
| **interface add ipx** *<InterfaceName>* **address** *<IPXaddr>* **[peer-address** *<IPXaddr>***] [output-mac-encapsulation** *<MACencap>***]** |
| **interface create appletalk** *<InterfaceName>* **vlan** *<name>***\|port** *<port>* **cable-range** *<range>* **[zone** *<ZoneName>***] [address** *<Net.Node>***] [up\|down]** |
| **interface create appletalk** *<InterfaceName>* **vlan** *<name>***\|port** *<port>* **noseed [up\|down]** |
| **interface create ip** *<InterfaceName>* **address-netmask** *<IPaddr-mask>* **[broadcast** *<IPaddr>***] [peer-address** *<IPaddr>***] vlan** *<name>***\|port** *<port>* **mtu** *<num>* **[output-mac-encapsulation** *<MACencap>***] [up\|down] [mac-addr** *<MACaddr-spec>***]** |
| **interface create ipx** *<InterfaceName>* **address** *<IPXaddr>* **peer-address [***<IPXaddr>***] vlan** *<name>* **\| port** *<port>* **[output-mac-encapsulation** *<MACencap>***] [up\|down] [mac-addr** *<MACaddr-spec>***] [mtu** *<num>***]** |

**Table 22. interface commands (Continued)**

| |
|---|
| **interface show appletalk** *<InterfaceName>*\|**all [brief]** |
| **interface show ip** *<InterfaceName>*\|**all [brief]** |
| **interface show ipx** *<InterfaceName>*\|**all [brief]** |

# interface add appletalk

## Purpose

Adds zones to an existing AppleTalk interface.

## Format

**interface add appletalk** *<InterfaceName>* **zone** *<ZoneName>* **[default]**

## Mode

ARE-Configure

## Description

The **interface add appletalk** command configures additional zones for an existing interface.

**Note:** The interface must already exist. To create an interface, enter the **interface create appletalk** command.

## Parameters

| | |
|---|---|
| *<InterfaceName>* | Name of the IP interface; for example, int4. |
| *<ZoneName>* | Name of the additional zone; for example, "myzone." Up to 253 zones may be assigned to an interface. |
| **default** | Changes the default zone for the local network attached to the interface. Specified zone name will become the new default zone. If this parameter is not used, the default zone will not change. |

## Restrictions

You must be in ARE-Configure mode before using this command. To learn more about this mode, please see Chapter 6, *are Commands*.

You can use this command only on an interface that has already been created using the **interface create appletalk** command.

## Example

To configure an additional zone with the name myzone, and to make it the new default:

```
xp(are-config)# interface add appletalk int4 zone myzone default
```

# interface add ip

## Purpose

Configure secondary addresses for an existing interface.

## Format

**interface add ip** *<InterfaceName>* **address-netmask** *<IPaddr-mask>* **peer-address** [*<IPaddr>*]
  [**broadcast** *<IPaddr>*]

## Mode

Configure

## Description

The **interface add ip** command configures secondary addresses for an existing IP interface. Use
this command to configure a secondary IP address and netmask, a secondary peer-address, and a
secondary broadcast address.

**Note:** The interface must already exist. To create an interface, enter the **interface create ip**
command.

## Parameters

| | |
|---|---|
| *<InterfaceName>* | Name of the IP interface; for example, int4. |
| **address-netmask** | Secondary IP address and netmask of this interface. You can specify the address and mask information using the traditional format (example: 10.1.2.3/255.255.0.0) or the CIDR format (example: 10.1.2.3/16). If you specify an address without mask information, the XP uses the natural mask for the address (/8 for Class A, /16 for Class B or /24 for Class C). |
| **peer-address** | Secondary IP address of the peer for this port. Primarily used for setting up connection with another WAN port or setting up a VC with another ATM port.<br>For WAN and ATM ports only. |

**broadcast** *<IPaddr>* Secondary broadcast address of this interface.

## Restrictions

You can use this command only on an interface that has already been created using the **interface
create ip** command.

# Example

To configure a secondary address of 10.23.4.36 with a 24-bit netmask (255.255.255.0) on the IP interface int4:

xp(config)# **interface add ip int4 address-mask 10.23.4.36/24**

# interface add ipx

## Purpose

Configure secondary addresses for an existing IPX interface.

## Format

**interface add ipx** *<InterfaceName>* **address** *<IPXaddr>* [**peer-address** *<IPXaddr>*] [**output-mac-encapsulation** *<MACencap>*]

## Mode

Configure

## Description

The **interface add ipx** command configures secondary addresses for an existing IPX interface.

**Note:** The interface must already exist. To create an interface, enter the **interface create ipx** command.

## Parameters

| | |
|---|---|
| *<InterfaceName>* | Name of the IP interface; for example, int4. |
| **address** | Secondary IPX network address of this interface, specified in a hexadecimal number. |
| **peer-address** | Secondary IPX address of the peer for this port. Primarily used for setting up connection with another WAN port. The **peer-address** contains the network address, a period (**.**), then the mac address. This can be illustrated as follows: **a1b2c3d4.aa:bb:cc:dd:ee:ff** For WAN ports only. |

**output-mac-encapsulation**

The output MAC encapsulation associated with this interface. You can specify one of the following:

–**ethernet_ii** (the default)

–**ethernet 802.3**

–**ethernet_snap**

–**ethernet_802.2_ipx**

## Restrictions

- You can use this command only on an interface that has already been created using the **interface create ipx** command.

- IPX is not supported in partially meshed WAN networks unless each node has a unique network address.

## Example

To configure a secondary address of 10 (hexadecimal) on the IPX interface int4 with an 802.3 output encapsulation scheme:

xp(config)# **interface add ipx int4 address 10 output-mac-encapsulation ethernet_802.3**

# interface create appletalk

## Purpose

Creates an AppleTalk interface.

## Format

**interface create appletalk** *<InterfaceName>* **vlan** *<name>*|**port** *<port>* **cable-range** *<range>*
  **[zone** *<ZoneName>*] **[address** *<Net.Node>*] **[up|down]**

## Mode

ARE-Configure

## Description

The **interface create appletalk** command creates and configures an AppleTalk/ARE interface. Configuration of an AppleTalk interface can include creating an interface in a disabled (**down**) state instead of the default enabled (**up**) state. In using this command, you *must* specify a cable range. Otherwise, you should use the **interface create appletalk noseed** command.

Interfaces on the XP are logical interfaces. Therefore, you can associate an interface with a single port or with multiple ports.

• To associate an interface with a single port, use the **port** option with the
  **interface create appletalk** command.

• To associate an interface with multiple ports, first create a VLAN and add ports to it, then use
  the **vlan** option with the **interface create appletalk** command.

**Note:** You must use either the **port** option or the **vlan** option with the **interface create appletalk** command.

## Parameters

*<InterfaceName>*
    Name of the AppleTalk interface; for example, int4.

**vlan** *<name>*
    Name of the VLAN associated with this interface.

**port** *<port>*
    The port associated with this interface.

**cable-range** *<range>*
    Sets the range of network numbers assigned to this interface. Valid numbers include 1 to 65279. Cable ranges cannot overlap across interfaces that are part of the same network. For

example, if one interface has the cable range 1-100 assigned to it, no other interface on the network may have any cable range that includes any number between 1 and 100. A cable range must also be continuous. For example, a cable range of 1-50, 60-100 is invalid.

**zone** <*ZoneName*>

Sets the default zone (up to 32 characters) for the local network connected to the interface. This default zone can be changed using the **interface add appletalk zone** command. If no zone is specified, a default zone will automatically be assigned to the interface.

**address** <*Net.Node*>

Assigns the network and node number to this interface. Valid network numbers range from 1 to 65279. Valid node numbers range from 1 to 253. If no address is specified, a random valid address will automatically be assigned to the interface.

**Note:** The network number must lie within the previously specified **cable-range**. For example, if you set the cable range value at 1-2, then an appropriate network number would be 1 (i.e. 1.121). The address 3.121 would be considered inappropriate.

**up**

Sets the state of the interface to up. The interface will activate and attempt to pass traffic. (This is the default state.)

**down**

Sets the state of the interface to down. The interface will be created, however it will pass no traffic.

## Restrictions

You must be in ARE-Configure mode before using this command. To learn more about this mode, please see Chapter 6, *are Commands*.

## Examples

To create an interface called "app7" with the cable range 100-1100 and address 1050.88, enter the following command. The interface is associated with port et.1.3.

```
xp(are-config)# interface create appletalk app7 port et.1.3 cable-range 100-1100 address 1050.88
```

To create an interface called "app1" associated with the VLAN called "marketing" and a cable range of 10-200, enter the following command. The interface is created in the down (disabled) state.

```
xp(are-config)# interface create appletalk app1 vlan marketing cable-range 10-200 down
```

# interface create appletalk noseed

## Purpose

Creates a seeded AppleTalk interface.

## Format

**interface create appletalk** *<InterfaceName>* **vlan** *<name>*|**port** *<port>* **noseed [up|down]**

## Mode

ARE-Configure

## Description

The **interface create appletalk noseed** command creates and configures a seeded AppleTalk interface. This means that, upon creation, the interface will attempt to "seed" itself on the network. It will take its cable range and default zone from another network router. This command should be used when ever two routers are connected. One router will act as the "seed," giving a cable range and default zone to the secondary, "non-seeded" router.

Configuration of a seeded AppleTalk interface can also include creating an interface in a disabled (**down**) state instead of the default enabled (**up**) state.

Interfaces on the XP are logical interfaces. Therefore, you can associate an interface with a single port or with multiple ports.

- To associate an interface with a single port, use the **port** option with the **interface create appletalk noseed** command.

- To associate an interface with multiple ports, first create a VLAN and add ports to it, then use the **vlan** option with the **interface create appletalk noseed** command.

**Note:** You must use either the **port** option or the **vlan** option with the **interface create appletalk noseed** command.

## Parameters

*<InterfaceName>*
    Name of the AppleTalk interface; for example, int4.

**vlan** *<name>*
    Name of the VLAN associated with this interface.

**port** *<port>*
    The port associated with this interface.

**noseed**

Prompts the interface to attempt to "seed" itself on the network. This parameter should be used in place of the **cable-range** and **zone** parameters, since the interface will attempt to gain a cable range and zone from another router on the network.

**up**

Sets the state of the interface to up. The interface will activate and attempt to pass traffic. (This is the default state.)

**down**

Sets the state of the interface to down. The interface will be created, however it will pass no traffic.

# Restrictions

You may only use this command in ARE-Configure mode. For more about this mode, please see Chapter 6, *are Commands*.

# Examples

To create an interface called "aps8" which will attempt to seed itself on the network, enter the following command. The interface is associated with port et.1.5.

xp(are-config)# **interface create appletalk aps8 port et.1.5 noseed**

# interface create ip

## Purpose

Create an IP interface.

## Format

**interface create ip** *<InterfaceName>* **address-netmask** *<IPaddr-mask>* **[broadcast** *<IPaddr>*]
   **[peer-address** *<IPaddr>*] **vlan** *<name>*|**port** *<port>* **mtu** *<num>*
   **[output-mac-encapsulation** *<MACencap>*] **[up|down] [mac-addr** *<MACaddr-spec>*]
   **[type broadcast|point-to-point]**

## Mode

Configure

## Description

The **interface create ip** command allows you to create and configure an IP interface name, IP
address, netmask, broadcast address, and the (subnet) mask to use when you create the interface.

**Note:**   When you create an IP interface, the **interface create ip** command requires a logical name
         for each interface. If you use an IP interface name that begins with **en** or **lo**, the XP will
         disable the proxy ARP on the interface.

If you define a class C address and do not specify a mask, the router will assign the 24-bit
(255.255.255.0) class C mask and the broadcast address will set all 8 host bits to 1. The XP also
allows you the flexibility to use variable-length subnet masking in your network. If you specify a
27-bit (255.255.255.224) mask to have 6 subnets, the router broadcast will set all 5 host bits to 1.
Traditional routers use this same functionality.

Router interface address:

```
172.16.1.129/27
172.16.1.129/255.255.255.224
```

Broadcast address with traditional routing:

```
172.16.1.159
```

Host interface address:

```
172.16.1.140/24
172.16.1.159/255.255.255.0
```

Broadcast address with traditional routing:

```
172.16.1.255
```

If the hosts on this network use the class C mask, they will recognize the traditional router broadcast as another host address (the hosts would use the traditional 172.16.1.255 for broadcasts). In this situation, you could configure the router broadcast to 172.16.1.255—then the hosts on the network would recognize the broadcast address. Do not specify the broadcast address if all devices on the subnet are using the same mask.

The XP is pre-allocated a pool of 64 MAC addresses. By default, the XP configures each new IP interface with the *base* MAC address—the lowest MAC address in the pool. However, you can use the **mac-addr** option to assign a different MAC address to an interface. Interfaces on the XP are logical interfaces; therefore, you can associate an interface with a single port or with multiple ports. You can also create an interface in a *disabled* (**down**) state instead of the default *enabled* (**up**) state.

- To associate an interface with a single port, use the **port** option with the **interface create** command.

- To associate an interface with multiple ports, first create an IP VLAN and add ports to it, then use the vlan option with the **interface create** command.

**Note:** You must use either the **port** option or the **vlan** option with the **interface create** command.

## Parameters

*<InterfaceName>*
    Name of the IP interface; for example, int4.

**address-netmask**
    IP address and netmask of this interface. You can specify the address and mask information using the traditional format (example: 10.1.2.3/255.255.0.0) or the CIDR format (example: 10.1.2.3/16). If you specify an address without mask information, the XP uses the natural mask for the address ( /8 for Class A, /16 for Class B or /24 for Class C).

**broadcast**
    IP address and netmask of this interface. You can specify the address and mask information using the traditional format (example: 10.1.2.3/255.255.0.0) or the CIDR format (example: 10.1.2.3/16). If you specify an address without mask information, the XP uses the natural mask for the address ( /8 for Class A, /16 for Class B or /24 for Class C).

**peer-address**
    IP address of the peer for this port. Primarily used for setting up connection with another WAN port or setting up a VC with another ATM port.
    For WAN and ATM ports only.

**vlan** *<name>*
    Name of the VLAN associated with this interface.

**port** *<port>*
    Port associated with this interface.

**mtu** *<num>*
> Sets the Maximum Transmission Unit (MTU) for this interface.

**up**
> Sets the state of the interface to up. (This is the default state.)

**down**
> Sets the state of the interface to down.

**output-mac-encapsulation**
> The output MAC encapsulation associated with this interface. You can specify one of the following:

> – **ethernet_ii** (the default)

> – **ethernet_snap**

**mac-addr** *<MACaddr-spec>*
> Sets the MAC address for this interface. You can specify one of the following:

> – A specific MAC address – specify the entire MAC address as follows: xx:xx:xx:xx:xx:xx

> – An offset from the base MAC address in the pool – specify the offset. For example, to specify an offset of 10 from the base MAC address, enter "10". For example, if the base MAC address is 00:E0:63:02:00:00 and you specify an offset of 10, the XP assigns MAC address 00:E0:63:02:00:0A to the interface.

> – The base MAC address – specify the **basemac** keyword. This is the default.

**type broadcast| point-to-point**
> Sets the type of interface. Specify one of the following:

> – **broadcast** (the default)

> – **point-to-point** (the default for PPP)

**Note:** If you connect the ATM interface to a router that uses a firmware version older than 8.2.0.0, you will need to set the interface type to point-to-point.

## Restrictions

You must enter the peer address to set the ATM interface type to point-to-point.

## Examples

To create a VLAN called IP3, add ports et.3.1 through et.3.4 to the VLAN, then create an IP interface on the VLAN:

```
xp(config)# vlan create IP3 ip
xp(config)# vlan add ports et.3.1-4 to IP3
xp(config)# interface create ip int3 address-mask 10.20.3.42/24 vlan IP3
```

To create an interface called "int7" with the address 10.50.89.88 and a 16-bit subnet mask, enter the following command. The interface is associated with port et.1.3.

xp(config)# **interface create ip int7 address-mask 10.50.89.88/16 port et.1.3**

To create an interface called "int1" with a broadcast address of 10.10.42.255, enter the following command. The interface is associated with the VLAN called "marketing". The interface is created in the *down* (disabled) state.

xp(config)# **interface create ip int1 address-mask 10.10.42.17/255.255.255.0 broadcast 10.10.42.255 vlan marketing down**

# interface create ipx

## Purpose

Create an IPX interface.

## Format

**interface create ipx** *<InterfaceName>* **address** *<IPXaddr>* **peer-address [** *<IPXaddr>*] **vlan**
   *<name>* **| port** *<port>* **[output-mac-encapsulation** *<MACencap>*] **[up|down]**
   **[mac-addr** *<MACaddr-spec>*] **[mtu** *<num>*]

## Mode

Configure

## Description

The **interface create ipx** command creates and configures an IPX interface. Configuration of an
IPX interface can include information such as the interface's name, IPX address, VLAN, port, and
output MAC encapsulation. You can also create an interface in the disabled (**down**) state instead of
the default enabled (**up**) state.

The XP is pre-allocated a pool of 64 MAC addresses (the maximum). By default, each new IPX
interface is automatically configured with the lowest MAC address in the pool (the "base" MAC
address). However, you can assign an interface a different MAC address by using the **mac-addr**
option.

## Parameters

*<InterfaceName>*
   Name of the IPX interface; for example, int9.

**address** *<ipxAddr>*
   IPX address of this interface.

**peer-address**
   IPX address of the peer for this port. Primarily used for setting up connection with another
   WAN port. The **peer-address** contains the network address, a period (**.**), then the mac address.
   This can be illustrated as follows: **a1b2c3d4.aa:bb:cc:dd:ee:ff**
   For WAN ports only.

**vlan** *<name>*
   Name of the VLAN associated with this interface.

**port** *<port>*
   Port associated with this interface.

**up**

Sets the state of the interface to up. (This is the default state.)

**down**

Sets the state of the interface to down.

**output-mac-encapsulation**

The output MAC encapsulation associated with this interface. You can specify one of the following:

– **ethernet_ii** (the default)

– **ethernet_snap**

– **ethernet_802.2_ipx**

**mac-addr** *<MACaddr-spec>*

Sets the MAC address for this interface. You can specify one of the following:

– A specific MAC address – specify the entire MAC address as follows: xx:xx:xx:xx:xx:xx or xxxxxx:xxxxxx

– An offset from the IPX base MAC address (base+2) in the pool – specify the offset. For example, to specify an offset of 10 from the IPX base MAC address, enter "10". If, for example, the IPX base MAC address is 00:E0:63:02:00:00 and you specify an offset of 10, the XP assigns IPX MAC address 00:E0:63:02:00:0A to the interface. You may enter any number between 1 and 61.

> **Note:** The XP has a pool of 64 MAC addresses (base to base+63); by default, IPX uses (base+2). If you would like to use another of the available MAC addresses, enter a number between 1 and 61; the interface MAC will then become ((IPXbaseMAC) + *<number>*).

– The IPX base MAC address – specify the **basemac** keyword. This is the default, therefore you need only enter the keyword in order to make the selection explicit.

**mtu**

Sets the maximum transmission units in bytes. You may specify any value between 72 and 65535.

## Restrictions

IPX is not supported in partially meshed WAN networks unless each node has a unique network address.

## Examples

The following commands create a VLAN called IPX10, add all the ports on the line card in slot 1 to the VLAN, and create an IPX interface called "int10" with the IPX address a98d7c6f, associated with VLAN IPX10.

```
xp(config)# vlan create IPX10 ipx
xp(config)# vlan add ports et.1.* to IPX10
xp(config)# interface create ipx int10 address a98d7c6f vlan IPX10
```

The following command creates an interface called "int5" with the IPX address 82af3d57 for port et.1.3. The interface is added in the down (disabled) state.

```
xp(config)# interface create ipx int5 address 82af3d57 port et.1.3 down
```

To create an interface called "int6" with the MAC address 00:01:02:03:04:05 and IPX address 82af3d58 for port et.1.4.

```
xp(config)# interface create ipx int6 address 82af3d58 port et.1.4
    mac-addr 00:01:02:03:04:05
```

To create an interface called "int7" for a VLAN called "IPX-VLAN" on port et.1.4 with the MAC address at the base of the XP's MAC address pool:

```
xp(config)# interface create ipx int7 address 82af3d59 vlan IPX-VLAN et.1.4 mac-addr basemac
```

The following command creates an interface called "int7" for a VLAN called "IPX-VLAN" on port et.1.4 with a MAC address offset by 10 from the base of the XP's MAC address pool. If the base MAC address in the XP's MAC address pool is 00:E0:63:02:00:00, the offset of 10 gives the interface the MAC address 00:E0:63:02:00:0A.

```
xp(config)# interface create ipx int7 address 82af3d59 vlan IPX-VLAN et.1.4 mac-addr 10
```

The following commands create an ATM virtual channel on an ATM port and associate the port with an IPX interface. This allows IPX routing between two IPX interfaces. As with any IPX interface, IPX routing using RIP (the default) will begin when you configure an IPX interface.

```
xp(config)# atm create vcl port at.3.1.1.100
xp(config)# interface create ipx finance address 01234567 peer-address 01234567.00:00:1d:a9:8c:a1
port at.3.1.1.100
xp(config)# interface create ipx marketing address 01234569 port et.1.1
```

# interface show appletalk

## Purpose

Displays configuration of all AppleTalk interfaces.

## Format

**interface show appletalk** *<InterfaceName>* **| all [brief]**

## Mode

Enable

## Description

The **interface show appletalk** command displays configuration information for all AppleTalk/ARE interfaces defined on the system.

## Parameters

*<InterfaceName>* **| all**
  Name of the AppleTalk interface; for example, app4. Specify **all** to show configuration information about all AppleTalk interfaces on the XP.

**brief**
  Display a brief summary of the interface in tabular form.

## Restrictions

None.

## Examples

To display configuration information for the AppleTalk interface called "app7":

```
xp# interface show appletalk app7
```

.To display configuration information for all AppleTalk interfaces:

```
xp# interface show appletalk all
```

# interface show ip

## Purpose

Display configuration of an IP interface.

## Format

**interface show ip** *<InterfaceName>* **| all [brief]**

## Mode

Enable

## Description

The **interface show ip** command displays configuration information for an IP interface.

**Note:** You can display exactly the same information from within the ip facility using the **ip show interfaces** command.

## Parameters

*<InterfaceName>* **| all**
> Name of the IP interface; for example, int4. Specify **all** to show configuration information about all the IP interfaces on the XP.

**brief**
> Displays a brief summary of the interface in tabular form.

## Restrictions

None.

## Examples

To display configuration information for the IP interface called "int7":

xp# **interface show ip int7**

.To display configuration information for all IP interfaces:

xp# **interface show ip all**

# interface show ipx

## Purpose

Display configuration of an IPX interface.

## Format

**interface show ipx** *<InterfaceName>* **| all [brief]**

## Mode

Enable

## Description

The **interface show ipx** command displays configuration information for an IPX interface.

**Note:** You can display exactly the same information from within the ip facility using the **ipx show interfaces** command.

## Parameters

*<InterfaceName>* **| all**
Name of the IPX interface; for example, int9. Specify **all** to show configuration information about all the IPX interfaces on the XP.

**brief** Shows a brief summary of the interface in tabular form.

## Restrictions

None.

## Examples

To display configuration information for the IPX interface called "int8":

xp# **interface show ipx int8**

To display configuration information for all IPX interfaces:

xp# **interface show ipx all**

# Chapter 29

# ip Commands

The **ip** commands let you display route table entries and various IP related tables.

## Command Summary

Table 23 lists the **ip** commands. The sections following the table describe the command syntax.

**Table 23. ip commands**

| |
|---|
| **ip add route** *<ipAddr-mask>*\|**default gateway** *<hostname-or-IPaddr>* **[host]** **[interface** *<hostname-or-IPaddr>*] **[intf-list** *<IPaddr-list>*] **[preference** *<num>*] **[retain]** **[reject] [no-install] [blackhole] [gate-list** *<gateway list>*] |
| **ip clear reverse-flows** |
| **ip disable dns-lookup\|fast-icmp\|forwarding\|** **icmp-redirect {interface** *<name>*\|**all} \|proxy-arp {interface** *<name>*\|**all} \|source-routing\|icmp-message {echo-reply timestamp-reply time-exceeded destination-unreachables} \|default-route-check** |
| **ip dos disable port-attack-protection\|directed-broadcast-protection** |
| **ip enable directed-broadcast interface** *<interface-name>*\|**reverse-flow {all\|policy\|NAT\|load-balance\|normal}** |
| **ip helper-address interface** *<interface-name> <helper-address>* \|**all-interfaces** [*<udp-port#>*] |
| **ip l3-hash module** *<num>*\|**all variant** *<num>* |
| **ip set data-receive-size\|control-receive-size** *<num>* |
| **ip set port** *<port-list>* **forwarding-mode [destination-based\| host-flow-based]** |
| **ip show connections [no-lookup]** |

**Table 23.  ip commands (Continued)**

| |
|---|
| **ip show hash-variant** *<num>*\|**all** |
| **ip show helper-address** |
| **ip show interfaces [**<*interface-name*>**] [brief]** |
| **ip show reverse-flows** |
| **ip show routes [show-protocol direct\|default\|ospf\|ospf-ase\|rip\|bgp\|static] [show-arps] [show-multicast] [show-summary] [verbose]** |
| **ip show stack-queues** |

# ip add route

## Purpose

Configure a static route.

## Format

**ip add route** *<ipAddr-mask>*|**default gateway** *<hostname-or-IPaddr>* **[host] [interface**
*<hostname-or-IPaddr>*] **[intf-list** *<IPaddr-list>*] **[preference** *<num>*] **[retain] [reject] [no-
install] [blackhole] [gate-list** *<gateway list>*]

## Mode

Configure

## Description

The **ip add route** command creates a static route entry in the route table. The static route can be a
default route, a route to a network, or a route to a specific host.

## Parameters

*<ipAddr-mask>*  IP address and netmask of the destination. You can specify the address and mask
information using the traditional format (example: 10.1.2.3/255.255.0.0) or the
CIDR format (example: 10.1.2.3/16). If you specify an address without mask
information, the XP uses the natural mask for the address ( /8 for Class A, /16 for
Class B or /24 for Class C).

**gateway** *<hostname-or-IPaddr>*
IP address or hostname of the next hop router for this route.

**host**  Specifies that this route is a route to a host.

**interface**  The next hop interface associated with this route. When this option is specified,
gateways are only considered valid when they are on one of these interfaces.

*<IPaddr-list>*  The next hop interfaces associated with this route. When you specify this option,
the only gateways considered valid are those identified on the list of interfaces.

**preference**  The preference of this static route. The preference controls how this route
competes with routes from other protocols. The parameter takes a value between
0-255. The default preference is 60.

**retain**  If specified, this option prevents this static route from being removed from the
forwarding table when the routing service (GateD) is gracefully shutdown.
Normally gated removes all routes except interface routes during a graceful

shutdown. The retain option can be used to insure that some routing is available even when GateD is not running.

**reject**        If specified, install this route as a reject route. Instead of forwarding a packet like a normal route, reject routes cause packets to be dropped and unreachable messages to be sent to the originator of the packet.

**no-install**    If specified, the route will not be installed in the forwarding table when it is active but will be eligible for exporting to other protocols.

**blackhole**     This option is the same as the reject option with the exception that unreachable messages are not sent.

**gate-list** *<gateway list>*
                  Allows you to specify up to four gateways for a particular destination host or network.

## Restrictions

None

## Examples

To configure the router 10.4.1.1 as the default gateway for this XP:

    xp(config)# **ip add route default gateway 10.4.1.1**

To configure the gateway 10.4.78.11 as the gateway for any packet destined for the subnet 10.4.14.0/24:

    xp(config)# **ip add route 10.4.14.0/24 gateway 10.4.78.11**

To configure the gateway 10.4.78.11 as the gateway for any packet destined for the subnet 10.4.14.0/24:

    xp(config)# **ip add route 10.4.14.0/24 gateway 10.4.78.11**

To configure the gateway 10.4.16.99 as the gateway to the host 10.4.15.2:

    xp(config)# **ip add route 10.4.15.2 host gateway 10.4.16.99**

To configure a reject route entry for packets destined for the subnet 10.14.3.0/24:

    xp(config)# **ip add route 10.14.3.0/24 gateway 10.1.16.99 reject**

# ip clear reverse-flows

## Purpose

Clears reverse flow statistics.

## Format

**ip clear reverse-flows**

## Mode

Enable

## Description

The **ip clear reverse-flows** command deletes all reverse flow statistics. Reverse flows are IP traffic flows in the opposite direction, where source information becomes destination information and vice versa.

## Parameters

None

## Restrictions

None

## Example

To clear the reverse flow statistics:

```
xp# ip clear reverse-flows
```

# ip disable

## Purpose

Disables IP options on the XP.

## Format

**ip disable dns-lookup|fast-icmp|forwarding|**
    **icmp-redirect {interface** *<name>*|**all} |proxy-arp {interface** *<name>*|**all} |source-routing**
    **|icmp-message {echo-reply timestamp-reply time-exceeded destination-unreachables}**
    **|default-route-check**

## Mode

Configure

## Description

The **ip disable** command allows you to disable features that are enabled by default on the XP.

## Parameters

**dns-lookup**
> Disables DNS name lookup for all commands. Sometimes a DNS server is too slow to respond and this can cause a command that displays information about many hosts to take a long time to finish. Disabling DNS lookup displays all host addresses as IP addresses instead of host names.

**fast-icmp**
> Disables the fast ICMP feature on the XP. By default, the XP installs ICMP flows to be switched along the fast path in hardware if the ICMP flow is meant to be routed. ICMP echo requests are installed as control priority for packets destined for the XP. When this feature is disabled, all ICMP packets are handled via the slow path in software.

**forwarding**
> Disables the router's ability to forward IP packets. No IP packets will be forwarded to any IP interface if this command is used.

**icmp-redirect {interface** *<interface name>*|**all}**
> Disables ICMP redirection on the specified IP interface. If you specify the all keyword, ICMP redirection is disabled for all network interfaces.

**proxy-arp {interface** *<name>*|**all}**
> Disables the proxy ARP feature on the specified IP interface. By default, the **XP** acts as a proxy for ARP requests with destination addresses of hosts to which the **XP** can route traffic.

Unless you actually require the use of proxy ARP, it is advisable to disable it on the **XP**. If you specify the all keyword, the proxy ARP feature is disabled for all network interfaces.

**source-routing**
Causes the **XP** to drop packets that have the SOURCE_ROUTE option set in the IP header. By default, packets that have the SOURCE_ROUTE option set are forwarded using the next-hop address in the IP packet.

**icmp-message {echo-reply timestamp-reply time-exceeded destination-unreachables}**
Disables the ability to send out ICMP messages. ICMP messages are used to communicate errors in packet traffic to other **XP**s. You can disable the following ICMP response messages: **echo-reply**, **timestamp-reply**, **time-exceeded**, and **destination-unreachables**.

**default-route-check**
Allows a default route to be set through the management (en0) interface.

# Restrictions

None

# Examples

To disable ICMP redirection on the "int4" network interface:

```
xp(config)# ip disable icmp-redirect int4
```

To disable DNS name lookup for all commands:

```
xp(config)# ip disable icmp-redirect dns-lookup
```

To prevent the XP from acting as a proxy for ARP requests with destination addresses of hosts to which the XP can route traffic:

```
xp(config)# ip disable proxy-arp interface all
```

# ip dos disable

## Purpose

Disables denial of service (DOS) features on the XP.

## Format

**ip dos disable directed-broadcast-protection|port-attack-protection**

## Mode

Configure

## Description

By default, the XP installs flows in the hardware so that packets sent as directed broadcasts are dropped in hardware if directed broadcast is not enabled on the interface where the packet is received. You can disable this behavior with the **ip dos disable directed-broadcast-protection** command.

Similarly, the XP installs flows to drop packets destined for the XP for which service is not provided by the XP. This prevents packets for unknown services from slowing the CPU. You can disable this behavior with the **ip dos disable port-attack-protection** command, causing these packets to be processed by the CPU.

## Parameters

**directed-broadcast-protection**
Disables the directed-broadcast-protection feature of the XP. By default the XP drops packets sent as directed broadcasts if directed broadcast is not enabled on the interface where the packet is received. This command causes directed broadcast packets to be processed on the XP even if directed broadcast is not enabled on the interface receiving the packet.

**port-attack-protection**
Disables the port-attack-protection feature of the XP. By default, packets that are destined for the XP, but do not have a service defined for them on the XP, are dropped. This prevents packets for unknown services from slowing the XP's CPU. This command disables this behavior, allowing packets destined for the XP that do not have a service defined for them on the XP to be processed by the XP's CPU.

## Restrictions

None

## Examples

To cause directed broadcast packets to be processed on the XP, even if directed broadcast is not enabled on the interface receiving the packet:

xp(config)# **ip dos disable directed-broadcast-protection**

To allow packets destined for the XP, but do not have a service defined for them on the XP, to be processed by the XP's CPU:

xp(config)# **ip dos disable port-attack-protection**

# ip enable

## Purpose

Disables IP options on the XP.

## Format

**ip enable directed-broadcast interface** *<interface name>*|**reverse-flow {all|policy|NAT|load-balance|normal}**

## Mode

Configure

## Description

The **ip enable** command allows you to configure the router to forward directed broadcast packets received on an interface, and to set up reverse flows.

Directed broadcast packets are network or subnet broadcast packets which are sent to a router to be forwarded as broadcast packets. They can be misused to create Denial Of Service attacks. The XP protects against this possibility by *not* forwarding directed broadcasts, by default. To enable the forwarding of directed broadcasts, use the **ip enable directed-broadcast** command.

Reverse flows in this case are Layer-3 flows heading in the opposite direction to the corresponding IP flows. IP flows are defined by the source and destination IP addresses, source and destination TCP/UDP port, Type of Service and transport protocol.

## Parameters

**directed-broadcast interface** *<interface name>*|**all**
> This is the name of the specified IP interface. If you specify the **all** keyword, directed broadcast forwarding is enabled for all network interfaces.

**reverse-flow all|policy|NAT|load-balance|normal**
> Enables the ability to set up reverse flows. Specify **all** to disable any type of reverse flow to be set up. Specify **policy** to disable setting up reverse flows for policy routed packets. Specify **NAT** to disable setting up reverse flows for NAT packets. Specify **load-balance** to disable setting up reverse flows for load balance packets. Specify **normal** to disable setting up reverse flows for normally routed packets.

## Restrictions

None

## Examples

To enable directed broadcast forwarding on the "int4" network interface:

```
xp(config)# ip enable directed-broadcast interface int4
```

To enable directed broadcast forwarding for all network interfaces:

```
xp(config)# ip enable directed-broadcast interface all
```

To enable reverse flows for policy routed packets:

```
xp(config)# ip enable reverse-flow policy
```

# ip helper-address

## Purpose

Configure the router to forward specific UDP broadcast packets across interfaces.

## Format

**ip helper-address interface** *<interface-name> <helper-address>*/**all-interfaces** [*<udp-port#>*]

## Mode

Configure

## Description

The **ip helper-address** command allows the user to forward specific UDP broadcast from one interface to another. Typically, broadcast packets from one interface are not forwarded (routed) to another interface. However, some applications use UDP broadcast to detect the availability of a service. Other services, for example BOOTP/DHCP require broadcast packets to be routed so that they can provide services to clients on another subnet. An IP helper can be configured on each interface to have UDP broadcast packets forwarded to a specific host for a specific service or forwarded to all other interfaces.

The **ip helper-address** command allows the user to specify a UDP port number for which UDP broadcast packets with that destination port number will be forwarded. By default, if no UDP port number is specified, the XP will forward UDP broadcast packets for the following six services:

- BOOTP/DHCP (port 67 and 68)

- DNS (port 37)

- NetBIOS Name Server (port 137)

- NetBIOS Datagram Server (port 138)

- TACACS Server (port 49)

- Time Service (port 37)

## Parameters

*<interface-name>*   Name of the IP interface where UDP broadcast is to be forwarded to the helper address.

*<helper-address>*/**all-interfaces**
                     Address of the host where UDP broadcast packets should be forwarded. If **all-interfaces** is specified, UDP broadcast packets are forwarded to all interfaces except the interface on which the broadcast packet was received.

| | |
|---|---|
| *<udp-port>* | Destination UDP port number of the broadcast packets to forward. If not specified, packets for the six default services will be forwarded to the helper address. |

## Restrictions

If you specify an interface name, the name must belong to an existing IP interface.

## Examples

To forward UDP broadcast packets received on interface int1 to the host 10.1.4.5 for the six default UDP services:

```
xp(config)# ip helper-address interface int1 10.1.4.5
```

To forward UDP broadcast packets received on interface int2 to the host 10.2.48.8 for packets with the destination port 111 (port mapper):

```
xp(config)# ip helper-address interface int2 10.2.48.8 111
```

To forward UDP broadcast packets received on interface int3 to all other interfaces:

```
xp(config)# ip helper-address interface int3 all-interfaces
```

# ip l3-hash

## Purpose

Changes the hashing algorithm used for the L3 lookup table.

## Format

**ip l3-hash module** *<num>*|**all variant** *<num>*

## Mode

Configure

## Description

The XP's L3 Lookup table is organized as a hash table. The hash function reduces the destination and source MAC addresses to 16-bit quantities each. The hashing algorithm generates a uniform distribution within the MAC address space. However, given a particular set of addresses, the distribution may cause addresses to clump together in the table. To minimize the risk of thrashing in the tables, three variations to the basic hashing algorithm are defined. Only one variation is in effect on a line card at any given time. You can use the ip **l3-hash** command to set which variation is in effect for a line card.

Swizzling shifts the hash value by a certain amount of bits, producing more random distribution across the L3 lookup table.

Auto-hashing periodically queries the L2 or L3 tables for hash bucket overflow on a port. If there are more overflows than a certain threshold level, auto-hashing will automatically change the hash mode for that port. Eventually a 'best' hash mode for the particular traffic will be found, which will provide a more even distribution across the L2 or L3 lookup table.

To see the effect changing the hashing algorithm has on the hash bucket, use the **statistics show l3-stat** command in the XP's Diagnostic mode.

## Parameters

**module** *<num>*|**all**
　　Is a slot number on the XP. Specify any number between 1 and 16. The hashing algorithm change affects all ports on the line card in the slot. The **all** option causes the hashing algorithm to change on all ports on all slits.

**variant** *<num>*
　　Causes a variation to the basic hashing algorithm to be made. Valid variant numbers are: 0-3, 4-7 (swizzled), and 8 (auto-hashed). If you specify 0, the default hashing algorithm is used.

## Restrictions

None.

## Example

To change the default hashing algorithm used for the L3 lookup table on all ports on slot 7:

xp(config)# **ip l3-hash module 7 variant 1**

# ip set data-receive-size | control-receive-size

## Purpose

Sets the size of the stack data and control receive queues.

## Format

**ip set data-receive-size|control-receive-size** *<num>*

## Mode

Configure

## Description

The **ip set data-receive-size|control-receive-size** command allows you to tune the size of the data and control pipes that reside between the IP stack and internal drivers on the Control Module.

## Parameters

**data-receive-size** *<num>*
Sets the size of the stack data receive queue. Specify a value from 256-1024 bytes. The default is 512 bytes.

**control-receive-size** *<num>*
Sets the size of the stack control receive queue. Specify a value from 256-1024 bytes. The default is 512 bytes.

## Restrictions

None.

## Example

To set the size of the stack data receive queue to 1024 bytes:

```
xp(config)# ip set data-receive-size 1024
```

# ip set port forwarding-mode

## Purpose

Causes the XP, when processing an IP packet, to extract only certain fields from a layer-4 flow, rather than the entire flow.

## Format

**ip set port** *<port-list>* **forwarding-mode <destination-based|host-flow-based>**

## Mode

Configure

## Description

The XP's flow identifying logic normally extracts the complete application (layer-4) flow from an IP packet. The **ip set port forwarding-mode** command causes the XP to extract only certain flow-related fields from the packet's L3 header, rather than the full layer-4 flow. This allows ports to route packets based on destination address alone, or on destination and source address only. As a result, in environments that do not have any filtering or RSVP requirements, the flow table can be used much more efficiently.

## Parameters

**port** *<port-list>*
Modifies the flow extraction behavior on the specified ports. All ports must have an IP interface configured for them.

**destination-based**
If the packet is a unicast packet, causes the *destination IP address*, *TOS* and *L4 protocol* fields to be the only fields extracted from the IP packet. These fields and the *port of entry* field are set into the flow block being constructed. All of the other fields are set to zero.

For L3 multicast packets, the *destination IP address*, *source IP address, TOS* and *L4 protocol* fields are the only fields extracted from the IP packet. These along with the *port of entry* are the only fields set in the flow block. The remaining fields are set to zero. The flow lookup then proceeds as normal.

**host-flow-based**

For both unicast and multicast packets, the *destination IP address*, *source IP address, TOS* and the *L4 protocol* are the only fields extracted from the IP packet. These along with the *port of entry* are set in the flow block. The remaining flow block fields are set to zero. The flow lookup then proceeds as normal.

## Restrictions

None

## Example

To cause the XP to extract only the *destination IP address*, *TOS*, and *L4 protocol* fields from a layer-4 flow when processing an IP packet on port et.1.1:

```
xp(config)# ip set port et.1.1 forwarding-mode destination-based
```

To cause the XP to extract only the *destination IP address*, *source IP address, TOS,* and *L4 protocol* type from a layer-4 flow when processing an IP packet on port et.1.1:

```
xp(config)# ip set port et.1.1 forwarding-mode host-flow-based
```

# ip show connections

## Purpose

Show all TCP/UDP connections and services.

## Format

**ip show connections [no-lookup]**

## Mode

Enable

## Description

The **ip show connections** command displays all existing TCP and UDP connections to the XP as well as TCP/UDP services available on the XP.

## Parameters

**no-lookup**    By default, when displaying an IP address, this command attempts to do a reverse DNS lookup to look for the hostname associated with the IP address and display the hostname instead. If you do not want the reverse DNS lookup to occur, specify the **no-lookup** option.

## Restrictions

None.

# Example

The following example displays all established connections and services of the XP.

```
xp# ip show connections
Active Internet connections (including servers)
Proto Recv-Q Send-Q  Local Address        Foreign Address      (state)
tcp    0    0  *:gated-gii      *:*            LISTEN
tcp    0    0  *:http           *:*            LISTEN
tcp    0    0  *:telnet         *:*            LISTEN
udp    0    0  127.0.0.1:1025       127.0.0.1:162
udp    0    0  *:snmp           *:*
udp    0    0  *:snmp-trap        *:*
udp    0    0  *:bootp-relay       *:*
udp    0    0  *:route          *:*
udp    0    0  *:*            *:*
```

# ip show hash-variant

## Purpose

Display IP hash variant per module.

## Format

**ip show hash-variant** *<num>*|**all**

## Mode

Enable

## Description

The **ip show hash-variant** command displays hash variant information. There are a total of 16 modules using the hash variant feature (1-16).

Enabling hash variant causes a variation to the basic hashing algorithm. This variation will prevent clustering of hash values and will provide a more even distribution across the L3 lookup table. Valid variant numbers are: 0-3, 4-7 (swizzled), and 8 (auto-hashed). The default hashing algorithm is 0.

Swizzling shifts the hash value by a certain amount of bits, causing a more random distribution across the L3 lookup table. Auto-hashing allows the XP to auto-select a hashing algorithm optimized for 'best case' L3 table distribution.

## Parameters

*<num>*|**all**    Specifies the module. Specify any number between 1-16. Specify **all** to display hash variant information for all modules.

## Restrictions

None.

# Example

To display IP hash variant information on all 16 modules:

```
xp# ip show hash-variant all
IP Module          Hash Variant
-------------------------------------------------
Module 2            variant-0
Module 3            variant-0
Module 4            variant-0
Module 5            variant-1
Module 6            variant-0
Module 7            variant-0
Module 8            variant-2
Module 9            variant-0
Module 10           variant-7
Module 11           variant-0
Module 12           variant-6
Module 13           variant-0
Module 14           variant-0
Module 15           variant-0
```

# ip show helper-address

## Purpose

Display the configuration of IP helper addresses.

## Format

**ip show helper-address [**<*interface-name*>**]**

## Mode

Enable

## Description

The **ip show helper-address** command displays the configuration of IP helper addresses configured on the system. One can specify the optional parameter, *interface-name*, to show only the IP helper addresses configured for that interface. If the command is executed without specifying an interface name then the IP helper address configuration of all interfaces are shown.

## Parameters

<*interface-name*>   Name of the IP interface to display any configured IP helper addresses.

## Restrictions

If you specify an interface name, the name must belong to an existing IP interface.

## Example

The following example shows that interface int4 has one helper address configured while interface int3 has one helper address configured for the port mapper service (port 111).

```
xp# ip show helper-address
Interface    IP address    Helper Address
---------    ----------    --------------
int6         10.1.17.1     none
int5         10.1.16.1     none
int4         10.1.15.1     10.4.1.45
int1         10.1.12.1     none
int0         10.1.11.1     none
int3         10.1.14.1     10.5.78.122(111)
```

# ip show interfaces

## Purpose

Display the configuration of IP interfaces.

## Format

**ip show interfaces [**<*interface-name*>**] [brief] | all**

## Mode

Enable

## Description

The **ip show interfaces** command displays the configuration of an IP interface. If you issue the command without specifying an interface name then the configuration of all IP interfaces is displayed. This command displays the same information as the **interface show ip** command.

## Parameters

<*interface-name*>  Name of the IP interface; for example, xp4. If you do not specify an interface name, the XP displays all the IP interfaces.

**brief**  Shows a brief summary of the interface in tabular form.

## Restrictions

If you specify an interface name, the name must belong to an existing IP interface.

## Example

To display the configuration of the IP interface "int1":

```
xp# ip show interfaces int1
int1: flags=9862<BROADCAST,NOTRAILERS,RUNNING,SIMPLEX,LINK0,MULTICAST>
    VLAN: IP2
    Ports:
    inet 10.1.12.1/24 broadcast 10.1.12.255
```

# ip show reverse-flows

## Purpose

Display reverse flow statistics.

## Format

**ip show reverse-flows**

## Mode

Enable

## Description

The **ip show reverse-flows** command displays the reverse flow statistics. Reverse flows are IP traffic flows in the opposite direction, where source information becomes destination information and vice versa. This command shows the number of reverse flow packets.

## Parameters

None

## Restrictions

None

## Example

To display the reverse flow statistics:

```
xp# ip show reverse-flows
IP Reverse Flow Statistics :
Total reverse-flow packets              : 0
Successful reverse-flow packets         : 0
Unsuccessful reverse-flow packets        : 0
Arphold packets                         : 0
Find Flow entry success packets         : 0
Sum of arp hold and flow entry success packets : 0
```

# ip show routes

## Purpose

Display the IP routing table.

## Format

**ip show routes [show-protocol direct|default|ospf|ospf-ase|rip|bgp|static] [show-arps] [show-multicast] [show-summary] [verbose]**

## Mode

Enable

## Description

The **ip show routes** command displays the IP routing table. Different command options can be used to show different aspects of the routing table.

## Parameters

**show-protocol**    Shows only the IP routes that belong to one of these specified protocols:

        **direct**        Shows all direct routes.

        **default**        Shows all default routes.

        **ospf**        Shows all OSPF (Open Shortest Path First) routes.

        **ospf-ase**        Shows all OSPF (Open Shortest Path First) Autonomous System-External routes.

        **rip**        Shows all RIP (Routing Information Protocol) routes.

        **bgp**        Shows all BGP (Border Gateway Protocol) routes.

        **static**        Shows all manually defined routes.

        **show-arps**        By default, ARP entries are not shown. To show ARP entries (if any are present), specify the **show-arps** option.

**show-multicast**    By default, routes to multicast destinations are not shown. To show routes to multicast destinations, specify the **show-multicast** option.

**show-summary**    Shows a summary of all route entries.

**verbose**    Show the routing table in verbose mode (the additional information is useful for debugging). A list of definitions for the verbose command follows.

| | |
|---|---|
| **U: Up** | Interface is up. |
| **G: Gateway** | This is a route to another network through the gateway specified. |
| **H: Host** | This is a route to a host through the gateway specified. |
| **R: Reject** | The router will return a "host unreachable" message upon receipt of a packet destined for this network and drop the packet. |
| **D: Dynamic** | The router received an ICMP redirect message for this route and installed it. |
| **M: Modified** | The router has changed an existing route because of an ICMP redirect. |
| **C: Cloning** | A directly connected interface route that may have more specific routes generated from it (e.g., ARP entries). Cloned routes may not be on point-to-point interfaces. |
| **S: Static** | This is a manually configured route. |
| **W: Cloned** | A route was "cloned" from another route that was "C" or "c". |
| **c: Pr Cloning** | A route learned from a routing protocol may be "cloned." Cloned routes may not be on point-to-point interfaces. |
| **B: Blackhole** | The router will drop—quietly—any packets received on this interface destined for this network. A "host unreachable" message will—not—be sent. |

## Restrictions

None.

# Example

The following example displays the contents of the routing table. It shows that some of the route entries are for locally connected interfaces ("directly connected"), while some of the other routes are learned from RIP.

```
xp# ip show routes
Destination          Gateway             Owner    Netif
-----------          -------             -----    -----
10.1.0.0/16          50.1.1.2            RIP      to-linux2
10.2.0.0/16          50.1.1.2            RIP      to-linux2
10.3.0.0/16          50.1.1.2            RIP      to-linux2
10.4.0.0/16          50.1.1.2            RIP      to-linux2
14.3.2.1             61.1.4.32           Static   int61
21.0.0.0/8           50.1.1.2            RIP      to-linux2
30.1.0.0/16          directly connected  -        to-goya
50.1.0.0/16          directly connected  -        to-linux2
61.1.0.0/16          directly connected  -        int61
62.1.0.0/16          50.1.1.2            RIP      to-linux2
68.1.0.0/16          directly connected  -        int68
69.1.0.0/16          50.1.1.2            RIP      to-linux2
127.0.0.0/8          127.0.0.1           Static   lo
127.0.0.1            127.0.0.1           -        lo
210.11.99.0/24       directly connected  -        int41
```

# ip show stack-queues

## Purpose

Display the IP stack queues.

## Format

**ip show stack-queues**

## Mode

Enable

## Description

The **ip show stack-queues** command displays the IP stack queues drop and size information.

## Parameters

None

## Restrictions

None

# Chapter 30

# ip-policy Commands

The **ip-policy** commands let you set up policies that cause the XP to forward packets to a specified IP address based on information in a packet's L3/L4 IP header fields.

## Command Summary

Table 24 lists the **ip-policy** commands. The sections following the table describe the command syntax.

**Table 24.  ip-policy commands**

| |
|---|
| **ip-policy** *<name>* **apply local\|interface** *<name>*\|**all** |
| **ip-policy clear all\|policy-name** *<name>*\|**all** |
| **ip-policy** *<name>* **deny acl** *<aclname>*\|**everything-else** [**sequence** *<num>*] |
| **ip-policy** *<name>* **permit acl** *<aclname>*\|**everything-else** [**sequence** *<num>*] **next-hop-list** *<ip-addr-list>* **action policy-first\|policy-last\|policy-only** |
| **ip-policy** *<name>* **set** [**pinger on**] [**load-policy round-robin**\| **ip-hash sip\|dip\|both**] |
| **ip-policy show** [**all**] [**policy-name** *<name>*\|**all**] [**interface** *<name>*\|**all**] |

# ip-policy apply

## Purpose

Applies an IP policy to an interface.

## Format

**ip-policy** *<name>* **apply local|interface** *<InterfaceName>*|**all**

## Mode

Configure

## Description

Once you have defined an IP policy, you use the **ip-policy apply** command to apply the IP policy to an interface. Once the IP policy is applied to the interface, packets start being forwarded using the policy.

## Parameters

| | |
|---|---|
| *<name>* | Is the name of a previously defined IP policy. |
| *<InterfaceName>* | Is the name of the inbound interface to which you are applying the IP policy. The interface name must be less than 32 characters. |
| **local** | Causes packets generated by the XP to be forwarded according to the IP policy. |
| **all** | Causes the IP policy to be applied to all IP interfaces. |

## Restrictions

IP policies can be applied to IP interfaces only.

## Examples

To apply IP policy p1 to interface int4:

```
xp(config)# ip-policy p1 apply interface int4
```

To apply IP policy p2 to all IP packets generated on the XP:

```
xp(config)# ip-policy p2 apply local
```

# ip-policy clear

## Purpose

Clears IP policy statistics.

## Format

**ip-policy clear all|policy-name** *<name>*|**all**

## Mode

Enable

## Description

The **ip-policy clear** command is used in conjunction with the **ip-policy show** command, which gathers statistics about IP policies. The **ip-policy clear** command lets you reset IP policy statistics to zero.

## Parameters

*<name>*    Is the name of an active IP policy.

**all**      Causes statistics to be cleared for all IP policies.

## Restrictions

None.

## Examples

To clear statistics for IP policy p1:

```
xp# ip-policy clear policy-name p1
```

To clear statistics for all IP policies:

```
xp(config)# ip-policy clear all
```

# ip-policy deny

## Purpose

Specifies which packets cannot be subject to policy-based routing.

## Format

**ip-policy** *<name>* **deny acl** *<aclname>*|**everything-else** [**sequence** *<num>*]

## Mode

Configure

## Description

The **ip-policy deny** command allows you to specifically prevent packets matching a profile from being forwarded with an IP policy. These packets are routed using dynamic routes instead.

**Note:** Since there is an implicit deny rule at the end of all IP policies, all packets that do not match any policy are forwarded using dynamic routes.

## Parameters

*<name>*
  Is the name of an IP policy.

**acl** *<aclname>*
  Is the name of the ACL profile of the packets to be excluded from IP policy-based forwarding. Profiles are defined with the **acl** command. The ACL may contain either **permit** or **deny** keywords. The **ip-policy deny** command only looks at the following ACL rule parameter values: protocol, source IP address, destination IP address, source port, destination port, and TOS.

**everything-else**
  Keyword that specifies an action to be performed for packets that do not match any of the previously-defined ACLs. Specifies that packets that are not *specifically* permitted to use policy-based routing are forwarded using dynamic routes.

**sequence** *<num>*
  If an IP policy is composed of more than one **ip-policy** statement, specifies the order in which the statement is evaluated. Possible values are 1-65535. The **ip-policy** statement with the lowest sequence number is evaluated first.

## Restrictions

ACLs for non -IP protocols cannot be used for IP policy routing.

## Examples

To create a profile called "prof1" for telnet packets from 9.1.1.5 to 15.1.1.2:

> xp(config)# **acl prof1 permit ip 9.1.1.5 15.1.1.2 any any telnet 0**

**Note:** See *acl permit/deny ip* on page 24 for more information on creating profiles for IP policy routing.

To create an IP policy called "p3" that prevents packets matching prof1 (that is, telnet packets from 9.1.1.5 to 15.1.1.2) from being forwarded using an IP policy:

> xp(config)# **ip-policy p3 deny acl prof1**

To create a policy called "p4" that prevents all packets that have not been specifically permitted to use policy-based routing (using the **ip-policy permit** command) from being forwarded using an IP policy:

> xp(config)# **ip-policy p4 deny acl everything-else**

# ip-policy permit

## Purpose

Specifies gateways and actions for IP policies

## Format

**ip-policy** *<name>* **permit acl** *<aclname>*|**everything-else** [**sequence** *<num>*]
[**next-hop-list** *<ip-addr-list>*|**null**] [**action policy-first**|**policy-last**|**policy-only**]

## Mode

Configure

## Description

The **ip-policy permit** command allows you to specify the next-hop gateway where packets matching a given profile should be forwarded. You can specify up to four next-hop gateways for an IP policy. Packets matching a profile you defined with an **acl** command are forwarded to the next-hop gateway.

You can specify when to apply the IP policy route with respect to dynamic or statically configured routes. You can cause packets to use the IP policy route first, then the dynamic route if the next-hop gateway is unavailable; use the dynamic route first, then the IP policy route; or drop the packets if the next-hop gateway is unavailable.

## Parameters

*<name>*
Is the name of an IP policy.

**acl** *<aclname>*
Is the name of the ACL profile of the packets to be forwarded using an IP policy. Profiles are created with the **acl** command. The ACL may contain either **permit** or **deny** keywords. The **ip-policy permit** command only looks at the following ACL rule parameter values: protocol, source IP address, destination IP address, source port, destination port, and TOS.

**everything-else**
Specifies that all packets not *specified* using policy-based routing (i.e., with the **ip-policy deny** command) are forwarded to the next-hop gateway.

**sequence** *<num>*
If an IP policy is composed of more than one **ip-policy** statement, specifies the order in which the statement is evaluated. Possible values are 1-65536. The **ip-policy** statement with the lowest sequence number is evaluated first.

**next-hop-list** *<ip-addr-list>*|**null**

Is the IP address of one or more next-hop gateways. Packets matching the profile specified in *<aclname>* are forwarded to one of the gateways specified here. You can specify up to four gateways for each profile. If you specify more than one gateway, enclose the list of IP addresses in quotes. You can define how the packet load is distributed among multiple gateways with the **ip-policy set load-policy** command.

To drop packets that match the profile, use the **null** keyword.

**action policy-first|policy-last|policy-only**

Specifies how IP policies are applied with respect to dynamic or statically configured routes. The following options are available:

**policy-first**   Causes packets matching the specified profile to use the IP policy route first. If the next-hop gateway specified in the IP policy is not reachable, the dynamic route is used instead.

**policy-last**   Causes packets matching the specified profile to be routed using dynamic routes first. If a dynamic route is not available, then all packets matching the profile are routed using the IP policy gateway.

**policy-only**   Causes packets matching the specified profile to use the IP policy route. If the next-hop gateway specified in the IP policy is not reachable, then the packets are dropped.

## Restrictions

ACLs for non IP protocols cannot be used for IP policy routing.

## Examples

To create a profile called "prof1" for telnet packets from 9.1.1.5 to 15.1.1.2:

```
xp(config)# acl prof1 permit ip 9.1.1.5 15.1.1.2 any any telnet 0
```

**Note:**   See *acl permit/deny ip* for more information on creating profiles for IP policy routing.

To cause packets matching prof1 (that is, telnet packets from 9.1.1.5 to 15.1.1.2) to be forwarded to 10.10.10.10:

```
xp(config)# ip-policy p5 permit acl prof1 next-hop-list 10.10.10.10
```

To cause all packets that have not been specified using policy-based routing (using the **ip-policy deny** command) to be forwarded to 10.10.10.10:

```
xp(config)# ip-policy p5 permit acl everything-else next-hop-list 10.10.10.10
```

To cause packets matching prof1 to use dynamic routes if 10.10.10.10 is not available:

xp(config)# **ip-policy p5 permit acl prof1 next-hop-list 10.10.10.10 action policy-first**

To cause packets matching prof1 to be dropped if 10.10.10.10 is not available:

xp(config)# **ip-policy p5 permit acl prof1 next-hop-list 10.10.10.10 action policy-only**

# ip-policy set

## Purpose

Controls how packets are distributed among the next hop gateways in an IP policy and queries the availability of next-hop gateways.

## Format

**ip-policy** *<name>* **set [pinger on] [load-policy round-robin|**
**ip-hash sip|dip|both]**

## Mode

Configure

## Description

If you specify more than one next-hop gateway in an IP policy, you can use the **ip-policy set** command to control how the load is distributed among the next-hop gateways. You can cause each new flow to use the first available next-hop gateway in the **ip-policy permit** statement, or you can cause flows to use all the next-hop gateways in the **ip-policy permit** statement sequentially. You can also control which information in the IP packet to use to determine the next-hop gateway.

In addition, you can use the **ip-policy set** command to have the XP query the availability of the next-hop gateways specified in an IP policy. When this option is active, the XP periodically queries the next-hop gateways via ICMP_ECHO_REQUESTS. Only gateways that respond to these requests are used for forwarding packets.

## Parameters

*<name>*
Is the name of an IP policy.

**pinger on**
Causes the XP to check the availability of next-hop gateways by querying them with ICMP_ECHO_REQUESTS. Only gateways that respond to these requests are used for forwarding packets.

**Note:** Some hosts may have disabled responding to ICMP_ECHO packets. Make sure each next-hop gateway can respond to ICMP_ECHO packets before using this option.

**load-policy round-robin**
If an IP policy has more than one next-hop gateway, specifies how the packets are distributed among the gateways. Two options are available:

**round-robin** Uses a sequential order to pick the next gateway in the list for each new flow.

| **ip-hash** | Uses the following information in the IP packet to determine the next hop gateway. |
|---|---|
| **sip** | Uses the source IP based selection. |
| **dip** | Uses the destination IP based selection. |
| **both** | Uses both source IP and destination IP for selection. |

## Restrictions

None.

## Examples

To set up 10.10.10.10 and 10.10.10.5 as next-hop gateways for IP policy p6:

```
xp(config)# ip-policy p6 permit profile prof1 next-hop-list '10.10.10.10 10.10.10.5'
```

To distribute flows among these two next-hop gateways in a sequential manner:

```
xp(config)# ip-policy p6 set load-policy round-robin
```

# ip-policy show

## Purpose

Displays information about active IP policies.

## Format

**ip-policy show [all] [policy-name** *<name>***|all] [interface** *<name>***|all]**

## Mode

Enable

## Description

The **ip-policy show** command displays information about active IP policies, including profile definitions, policy configuration settings, and next-hop gateways. The command also displays statistics about packets that have matched an IP policy statement as well as the number of packets that have been forwarded to each next-hop gateway.

## Parameters

**policy-name** *<name>***|all**
    Is the name of an IP policy. Use the **all** keyword to display all active policies.

    **Note:**    The **ip-policy show all** command works identically to the **ip-policy show policy-name all** command

**interface** *<name>***|all**
    Displays information about IP policies applied to a specified interface. When you use the **all** keyword, the command displays information about IP policies applied to all interfaces (i.e., an IP policy used by all interfaces). If no IP policy is shared by all interfaces, the following error message will appear:

    %PBR-I-NOALL, No policy applied to all IP interfaces

## Restrictions

None.

# Example

To display information about IP policy p1:

```
xp# ip-policy show policy-name p1

--------------------------------------------------------------------------------
IP Policy name    : p1 ❶
Applied Interfaces : int1 ❷
Load Policy       : first available ❸

❹            ❺            ❻          ❼      ❽      ❾ ❿
ACL         Source IP/Mask   Dest. IP/Mask    SrcPort   DstPort   TOS Prot
---         -------------    -------------    --------- --------- --- ----
prof1       9.1.1.5/32       15.1.1.2         any       any       0 IP
prof2       2.2.2.2/32       anywhere         any       any       0 IP
everything  anywhere         anywhere         any       any       0 IP

                             Next Hop Information
                             --------------------
⓫    ⓬    ⓭      ⓮    ⓯                ⓰          ⓱   ⓲
Seq   Rule   ACL      Cnt Action           Next Hop      Cnt Last
---   ----   -------- --- -----------      --------      --- ----
10    permit prof1    0   Policy Only          11.1.1.2      0   Dwn
20    permit prof2    0   Policy Last          1.1.1.1       0   Dwn
                                              2.2.2.2       0   Dwn
                                              3.3.3.3       0   Dwn
999   permit everything 0 Policy Only           drop        N/A N/A
65536 deny   deny     0   N/A              normal fwd    N/A N/A
㉑
```

**Legend:**

1.  The name of the IP policy.

2.  The interface where the IP policy was applied.

3.  The load distribution setting for IP-policy statements that have more than one next-hop gateway; either first available (the default) or round-robin.

4.  The names of the profiles (created with an **acl** statement) associated with this IP policy.

5.  The source address and filtering mask of this flow.

6.  The destination address and filtering mask of this flow.

7.  For TCP or UDP, the number of the source TCP or UDP port.

8.  For TCP or UDP, the number of the destination TCP or UDP port.

9.  The TOS value in the packet.

10. IP protocol (ICMP, TCP UDP).

11. The sequence in which the statement is evaluated. IP policy statements are listed in the order they are evaluated (lowest sequence number to highest).

12. The rule to apply to the packets matching the profile: either permit or deny

13. The name of the profile (ACL) of the packets to be forwarded using an IP policy.

14. The number of packets that have matched the profile since the IP policy was applied (or since the **ip-policy clear** command was last used)

15. The method by which IP policies are applied with respect to dynamic or statically configured routes; possible values are Policy First, Policy Only, or Policy Last.

16. The list of next-hop gateways in effect for the policy statement.

17. The number of packets that have been forwarded to this next-hop gateway.

18. The state of the link the last time an attempt was made to forward a packet; possible values are up, dwn, or N/A.

19. Implicit deny rule that is always evaluated last, causing all packets that do not match one of the profiles to be forwarded normally (with dynamic routes).

# Chapter 31

# ip-redundancy (vrrp) Commands

The **ip-redundancy** commands let you display and configure the Virtual Router Redundancy Protocol (VRRP) on the XP. VRRP is defined in RFC 2338.

**Note:** Interfaces configured with PVCs do not support VRRP.

## Command Summary

Table 25 lists the **ip-redundancy** commands. The sections following the table describe the command syntax.

**Table 25.  ip-redundancy commands**

| |
|---|
| **ip-redundancy associate vrrp** *<vrid>* **interface** *<interface>* **id** *<vrid>* **address** *<ip address/mask>* |
| **ip-redundancy clear vrrp-stats interface** *<interface>* **id** *<vrid>* |
| **ip-redundancy create vrrp** *<vrid>* **interface** *<interface>* |
| **ip-redundancy set vrrp** *<vrid>* **interface** *<interface>* **[priority** *<num>*] **[adv-interval** *<num>*] **[preempt-mode enabled\|disabled\|owner-disabled] [auth-type none\|text] [auth-key** *<key>*] **[warmup-period** *<num>*] |
| **ip-redundancy show vrrp interface** *<interface>* **[id***<vrid>*] **[verbose] [summary]** |
| **ip-redundancy start vrrp** *<vrid>* **interface** *<interface>* |
| **ip-redundancy trace vrrp [events** *<enabled \| disabled>*] **[state-transitions** *<enabled \| disabled>*] **[packet-errors** *<enabled \| disabled>*] **[all** *<enabled \| disabled>*] *<option>* |

# ip-redundancy associate

## Purpose

Associates an IP address with a virtual router.

## Format

**ip-redundancy associate vrrp** *<vrid>* **interface** *<interface>* **address** *<ipaddr/mask>*

## Mode

Configure

## Description

The **ip-redundancy associate** command adds an IP address to the list of IP addresses associated with a virtual router.

## Parameters

| | |
|---|---|
| *<vrid>* | Is the identifier of a virtual router. Specify a number between 1-255 |
| *<interface>* | Is the name of the interface where the virtual router resides. |
| *<ipaddr/mask>* | Is the IP address and subnet mask to be associated with the virtual router. |

## Restrictions

Interfaces configured with PVCs do not support VRRP.

## Example

To add IP address/mask 1.2.3.4/16 to the list of IP addresses associated with virtual router 1 on interface int1:

```
xp(config)# ip-redundancy associate vrrp 1 interface int1 address 1.2.3.4/16
```

# ip-redundancy clear vrrp-stats

## Purpose

Clears statistics gathered for VRRP.

## Format

**ip-redundancy clear vrrp-stats interface** *<interface>* **[id** *<vrid>***]**

## Mode

Enable

## Description

The **ip-redundancy clear vrrp-stats** command is used in conjunction with the **ip-redundancy show vrrp** command, which displays information about the virtual routers associated with an interface. When you specify the **verbose** option with the **ip-redundancy show vrrp** command, additional statistics are shown, including the number of times a Backup router became the Master, the number of VRRP advertisements received, and counts of VRRP packets that contain errors. When you run the **ip-redundancy clear vrrp-stats** command, these statistics are reset to zero.

## Parameters

*<interface>*   Causes VRRP statistics to be cleared for all virtual routers on the specified interface.

*<vrid>*   Causes VRRP statistics to be cleared for the virtual router with the specified VRID. Enter a number between 1-255.

## Restrictions

Interfaces configured with PVCs do not support VRRP.

## Example

To clear statistics for virtual router 1 on interface int1:

xp# **ip-redundancy clear vrrp-stats interface int1 id 1**

# ip-redundancy create

## Purpose

Creates a virtual router.

## Format

**ip-redundancy create vrrp** *<vrid>* **interface** *<interface>*

## Mode

Configure

## Description

The **ip-redundancy create** command creates a virtual router on a specified interface.

## Parameters

*<vrid>*        Is the identifier of the virtual router to create. Specify a number between 1-255.

*<interface>*Is the interface on which to create the virtual router.

## Restrictions

Interfaces configured with PVCs do not support VRRP.

## Example

To create a virtual router with an identifier (VRID) of 1 on interface int1:

xp(config)# **ip-redundancy create vrrp 1 interface int1**

# ip-redundancy set

## Purpose

Sets parameters for a virtual router.

## Format

**ip-redundancy set vrrp** *<vrid>* **interface** *<interface>* **[priority** *<num>*]
**[adv-interval** *<num>*] **[preempt-mode enabled|disabled|owner-disabled] [auth-type none|text]**
**[auth-key** *<key>*] **[warmup-period** *<num>*]

## Mode

Configure

## Description

The **ip-redundancy set** command lets you specify parameters for a virtual router, including backup priority, advertisement interval, whether the router can preempt a Master router that has a lower priority, the type of authentication used, and warm up time.

## Parameters

| | |
|---|---|
| *<vrid>* | Is the identifier of a virtual router. Specify a number between 1-255. |
| *<interface>* | Is the name of the interface where the virtual router resides. |
| **priority** *<num>* | Specifies the backup priority to be used by this virtual router. This number must be between 1-254. The default is 100. The priority number applies only if the virtual router is not the IP address owner. The priority of the IP address owner is always 255 and cannot be changed. |
| **adv-interval** *<num>* | Is the interval between VRRP advertisements in seconds. The default is 1 second. |
| **preempt-mode** | Specifies whether a backup router can preempt a Master router with a lower priority. Use one of the following keywords: |

| | | |
|---|---|---|
| | **enabled** | Preempt mode is enabled. A backup router can pre-empt a lower-priority Master router. |
| | **disabled** | Pre-empt mode is disabled. A backup router cannot pre-empt a lower-priority Master router. |
| | **owner-disabled** | |
| | | Pre-empt mode is disabled. A backup router cannot pre- |

empt a lower-priority Master router, even if it is the Owner.

**auth-type**  Specifies the type of authentication used for VRRP exchanges between routers. Use one of the following keywords:

**none**  VRRP exchanges are not authenticated (the default).

**text**  VRRP exchanges are authenticated with a clear-text password.

**auth-key** *<key>*  Is the clear-text password used to authenticate VRRP exchanges. If you specify the **text** keyword, you must also specify the **auth-key** parameter.

**warmup-period** *<num>*  Specifies the amount of delay (in seconds) before this virtual router is initialized, following a system reboot. Specify any number between 0 and 180. This delay is used to prevent a virtual router from preempting an existing Master before having received all of the routing updates from neighboring routers. (Default delay is 30 seconds).

## Restrictions

Interfaces configured with PVCs do not support VRRP.

## Examples

To specify 200 as the priority used by virtual router 1 on interface int1:

```
xp(config)# ip-redundancy set vrrp 1 interface int1 priority 200
```

To set the advertisement interval to 3 seconds:

```
xp(config)# ip-redundancy set vrrp 1 interface int1 adv-interval 3
```

To prevent a Backup router from taking over as Master from a Master router that has a lower priority:

```
xp(config)# ip-redundancy set vrrp 1 interface int1 preempt-mode disabled
```

To authenticate VRRP exchanges on virtual router 1 on interface int1 with a password of 'yago':

```
xp(config)# ip-redundancy set vrrp 1 interface int1 auth-type text auth-key yago
```

# ip-redundancy show

## Purpose

Shows information about virtual routers.

## Format

**ip-redundancy show vrrp interface** *<interface>* **[id** *<vrid>***] [verbose] [summary]**

## Mode

Enable

## Description

The **ip-redundancy show vrrp** command displays configuration information about virtual routers on an interface. You can display information for one virtual router or for all the virtual routers on an interface. If you specify the verbose option, additional statistics are shown, including the number of times a Backup router became the Master, the number of VRRP advertisements received, and counts of VRRP packets that contain errors. These statistics are gathered from the time you start the virtual router, or from the time you last ran the **ip-redundancy clear vrrp-stats** command.

## Parameters

| | |
|---|---|
| *<interface>* | Is the name of the interface where the virtual router resides. If you do not specify the *<vrid>* parameter, information about all virtual routers on the interface is displayed. |
| *<vrid>* | Is the identifier of a virtual router. Specify a number between 1-255. |
| **verbose** | Causes VRRP statistics to be displayed for each virtual router |

## Restrictions

Interfaces configured with PVCs do not support VRRP.

## Examples

To display information about all virtual routers on interface int1:

```
xp# ip-redundancy show vrrp interface int1

VRRP Virtual Router 100 - Interface int1
-----------------------------------------
Uptime            0 days, 0 hours, 0 minutes, 17 seconds.
State          Backup
Priority         100 (default value)
Virtual MAC address    00005E:000164
Advertise Interval     1 sec(s) (default value)
Preempt Mode        Enabled (default value)
Authentication       None (default value)
Primary Address      10.8.0.2
Associated Addresses   10.8.0.1
              100.0.0.1


VRRP Virtual Router 200 - Interface int1
-----------------------------------------
Uptime            0 days, 0 hours, 0 minutes, 17 seconds.
State          Master
Priority         255 (default value)
Virtual MAC address    00005E:0001C8
Advertise Interval     1 sec(s) (default value)
Preempt Mode        Enabled (default value)
Authentication       None (default value)
Primary Address      10.8.0.2
Associated Addresses   10.8.0.2
```

To display VRRP statistics for virtual router 100 on interface int1:

```
xp# ip-redundancy show vrrp 1 interface int1 verbose

VRRP Virtual Router 100 - Interface int1
-----------------------------------------
Uptime            0 days, 0 hours, 0 minutes, 17 seconds.
State          Backup
Priority          100 (default value)
Virtual MAC address    00005E:000164
Advertise Interval     1 sec(s) (default value)
Preempt Mode        Enabled (default value)
Authentication      None (default value)
Primary Address       10.8.0.2
Associated Addresses   10.8.0.1
              100.0.0.1

Stats:
  Number of transitions to master state        2
  VRRP advertisements rcvd               0
  VRRP packets sent with 0 priority          1
  VRRP packets rcvd with 0 priority          0
  VRRP packets rcvd with IP-address list mismatch  0
  VRRP packets rcvd with auth-type mismatch      0
  VRRP packets rcvd with checksum error        0
  VRRP packets rcvd with invalid version       0
  VRRP packets rcvd with invalid VR-Id         0
  VRRP packets rcvd with invalid adv-interval    0
  VRRP packets rcvd with invalid TTL         0
  VRRP packets rcvd with invalid 'type' field    0
  VRRP packets rcvd with invalid auth-type       0
  VRRP packets rcvd with invalid auth-key        0
```

# ip-redundancy start vrrp

## Purpose

Starts a virtual router.

## Format

**ip-redundancy start vrrp** *<vrid>* **interface** *<interface>*

## Mode

Configure

## Description

The **ip-redundancy start vrrp** command starts a virtual router on the specified interface.

## Parameters

*<vrid>*        Is the identifier of a virtual router. Specify a number between 1-255.

*<interface>*   Is the name of the interface where the virtual router resides.

## Restrictions

Interfaces configured with PVCs do not support VRRP.

## Example

To start virtual router 1 on interface int1:

```
xp# ip-redundancy start vrrp 1 interface int1
```

# ip-redundancy trace

## Purpose

Traces VRRP events.

## Format

**ip-redundancy trace vrrp [events** *<enabled | disabled>*] **[state-transitions** *<enabled | disabled>*] **[packet-errors** *<enabled | disabled>*] **[all** *<enabled | disabled>*] *<option>*

## Mode

Configure

## Description

The **ip-redundancy trace vrrp** command displays messages when certain VRRP events take place on the XP. Use this command to display messages when a virtual router changes from one state to another (i.e., from Backup to Master), a VRRP packet error is detected, or when any VRRP event occurs.

## Parameters

| | |
|---|---|
| **events** | Displays a message when VRRP receives any type of event. This option is disabled by default. |
| **state-transitions** | Displays a message when a VRRP router changes from one state to another. This option is enabled by default. |
| **packet-errors** | Displays a message when a VRRP packet error is detected. This option is enabled by default. |
| **all enabled\|disabled** | Enables or disables all VRRP tracing. |

## Restrictions

Interfaces configured with PVCs do not support VRRP.

# Chapter 32

# ip-router Commands

The **ip-router** commands let you configure and monitor features and functions that work across the various routing protocols.

## Command Summary

Table 26 lists the **ip-router** commands. The sections following the table describe the command syntax.

**Table 26.  ip-router commands**

| |
|---|
| **ip-router authentication add key-chain** *<option-list>* |
| **ip-router authentication create key-chain** *<option-list>* |
| **ip-router find route** *<ip-addr>* [**ignore-state**] |
| **ip-router global add** *<option-list>* |
| **ip-router global set** *<option-list>* |
| **ip-router global set trace-options** *<option-list>* |
| **ip-router global set trace-state on\|off** |
| **ip-router global use provided_config** |
| **ip-router kernel trace** *<option-list>* **detail\|send\|receive** |
| **ip-router policy add filter** *<option-list>* |
| **ip-router policy add optional-attributes-list** *<option-list>* |
| **ip-router policy aggr-gen destination** *<name>* *<option-list>* |
| **ip-router policy create aggregate-export-source** *<option-list>* |

**Table 26.  ip-router commands (Continued)**

| |
|---|
| **ip-router policy create aggr-gen-dest** *<option-list>* |
| **ip-router policy create aggr-gen-source** *<option-list>* |
| **ip-router policy create aspath-export-source** *<number-or-string>* *<option-list>* |
| **ip-router policy create bgp-export-destination** *<number-or-string>* *<option-list>* |
| **ip-router policy create bgp-export-source** *<number-or-string>* *<option-list>* |
| **ip-router policy create bgp-import-source** *<number-or-string>* *<option-list>* |
| **ip-router policy create direct-export-source** *<option-list>* |
| **ip-router policy create filter** *<option-list>* |
| **ip-router policy create optional-attributes-list** *<option-list>* |
| **ip-router policy create ospf-export-destination** *<number-or-string>* *<option-list>* |
| **ip-router policy create ospf-export-source** *<number-or-string>* *<option-list>* |
| **ip-router policy create ospf-import-source** *<number-or-string>* *<option-list>* |
| **ip-router policy create rip-export-destination** *<number-or-string>* *<option-list>* |
| **ip-router policy create rip-export-source** *<number-or-string>* *<option-list>* |
| **ip-router policy create rip-import-source** *<number-or-string>* *<option-list>* |
| **ip-router policy create static-export-source** *<option-list>* |
| **ip-router policy create tag-export-source** *<number-or-string>* *<option-list>* |
| **ip-router policy export destination** *<option-list>* |
| **ip-router policy import source** *<option-list>* |
| **ip-router policy redistribute from-proto** *<protocol>* *<option-list>* <br>     **to-proto rip\|ospf\|bgp** |
| **ip-router show configuration-file active\|permanent** |
| **ip-router show rib [detail]** |
| **ip-router show route [ip-addr-mask\|default] [detail]** |
| **ip-router show state [all] [memory] [timers] [to-file] [to-terminal] [task *<string>*\|all\|gii \|icmp\|inet\|interface\|krt \|route]** |

# ip-router authentication add key-chain

## Purpose

Add a key to an existing key-chain.

## Format

**ip-router authentication add key-chain** *<option-list>*

## Mode

Configure

## Parameters

*<option-list>*
Specifies the options you are adding. Specify one of the following:

**key** *<string>*
Adds a new key to an existing key-chain. The key can be up to 16 characters long.

**type primary|secondary**
Specifies whether the key is a primary key or a secondary key within the key chain.

## Restrictions

None.

# ip-router authentication create key-chain

## Purpose

Create a key-chain and associate an identifier with it.

## Format

**ip-router authentication create key-chain** *<option-list>*

## Mode

Configure.

## Parameters

*<option-list>*
Specifies the options you are adding. Specify one of the following:

**key** *<string>*
Specifies a key to be included in this key chain. The key can be up to 16 characters long.

**type primary|secondary**
Specifies whether the key is a primary key or a secondary key within the key chain.

**id**
Specifies an integer between 1 and 255. This option is only necessary for MD5 authentication method.

## Restrictions

None.

# ip-router find route

## Purpose

Find the active route in the RIB which the packet will use.

## Format

ip-router find route ***<ip-addr>*** [**ignore-state**]

## Mode

Enable.

## Parameters

*<ip-addr>*
　　Specifies the destination of the packet.

**ignore-state**
　　This optional parameter allows inactive routes to be considered in route determination.

## Restrictions

None.

# ip-router global add

## Purpose

Add an interface or martian. Martians are invalid addresses that are rejected by the routing software.

## Format

**ip-router global add interface** *<name-or-IPaddr>*

**ip-router global add martian** *<ipAddr/mask>***|default [host] [allow]**

## Mode

Configure

## Parameters

**interface** *<name-or-IPaddr>*
   Makes an interface known to the IP router.

**martian** *<ipAddr/mask>***|default [host] [allow]**
   Adds a martian. Specify the following options:

   *<ipAddr/mask>*   The IP address and netmask for the martian.

   **default**       Adds default martian.

   **host**          Specifies that this martian is a host address.

   **allow**         Allows a subset of a range that was disallowed.

## Restrictions

None.

# ip-router global set

## Purpose

Set various global parameters required by various protocols.

## Format

**ip-router global set** *<option-list>*

## Mode

Configure

## Parameters

*<option-list>*
    Specify one of the following:

    **autonomous-system** *<num1>* **loops** *<num2>*
        The autonomous system number. *<num1>* sets the as number for the router. It is only required if the router is going to run BGP. Specify a number from 1 – 65534.
        *<num2>* controls the number of times the as may appear in the as-path. Default is 1. It is only required if the router is going to run protocols that support as-path, such as BGP.

    **router-id** *<hostname-or-IPaddr>*
        The router ID for use by BGP and OSPF. The most preferred address is any address other than 127.0.0.1 on the loopback interface. If there are no secondary addresses on the loopback interface, then the default router ID is set to the address of the first interface which is in the up state that the XP encounters (except the interface en0, which is the Control Module's interface). The address of a non point-to-point interface is preferred over the local address of a point-to-point interface.

    **interface** *<interface-name>*|**all preference** *<num>* **down-preference** *<num>* **passive autonomous-system** *<num>*

    Specify the following:

        *<interface-name>*|**all**
            Specify an interface that was added using the *ip-router global add interface* command, or **all** for all interfaces.

        **preference** *<num>*
            Sets the preference for routes to this interface when it is up and functioning. Specify a number from 0 – 255. Default value is 0.

        **down-preference** *<num>*
            Sets the preference for routes to this interface when it is down. Specify a number from 0 – 255. Default value is 255.

**passive**

Prevents changing of route preference to this interface if it is down.

**autonomous-system** *<num>*

The AS that will be used to create as-path associated with the route created from the definition of this interface.

# Restrictions

None.

# ip-router global set trace-options

## Purpose

Set various trace options.

## Format

**ip-router global set trace-options** *<option-list>*

## Mode

Configure

## Parameters

*<option-list>*
Specifies the trace options you are setting. Specify one or more of the following:

| | |
|---|---|
| **startup** | Trace startup events. |
| **parse** | Trace lexical analyzer and parser of gate-d config files. |
| **ydebug** | Trace lexical analyzer and parser in detail. |
| **adv** | Trace allocation and freeing of policy blocks. |
| **symbols** | Trace symbols read from kernel at startup. |
| **if-list** | Trace the reading of the kernel interface list. |
| **all** | Tun on all tracing. |
| **general** | Turn on normal and route tracing |
| **state** | Trace state machine transitions in protocols. |
| **normal** | Trace normal protocol occurrences. Abnormal occurrences are always traced. |
| **policy** | Traces the application of policy to routes being exported and imported. |
| **task** | Traces system interfaces and task processing associated with this protocol or peer. |
| **timer** | Traces timer usage by this protocol or peer |
| **route** | Traces routing table changes for routes installed by this protocol or peer. |
| **none** | Specifies that all tracing should be turned off for this protocol or peer. |

## Restrictions

None.

# ip-router global set trace-state

## Purpose

Enable or disable tracing.

## Format

**ip-router global set trace-state on|off**

## Mode

Configure

## Parameters

**on|off**     Specifies whether you are enabling or disabling tracing. Specify **on** to enable tracing or specify **off** to disable tracing. The default is **off**.

## Restrictions

None.

# ip-router global use provided_config

## Purpose

Causes the XP to use the configuration file stored in the Control Module's NVRAM.

## Format

**ip-router global use provided_config**

## Mode

Configure

## Parameters

None.

**Note:** This command requires that you first copy the GateD configuration into the Control Module's NVRAM.

To do this, enter the following command in Enable mode:

```
xp# copy tftp-server to gated.conf
TFTP server [10.50.89.88]? 10.50.89.88
Source filename [tmp/gated.conf]?
########
%TFTP-I-XFERRATE, Received 5910 bytes in 0.1 seconds
```

## Restrictions

None.

# ip-router kernel trace

## Purpose

Provides trace capabilities between the Routing Information Base and the Forwarding Information Base.

## Format

**ip-router kernel trace** *<option-list>* **detail|send|receive**

## Mode

Configure

## Parameters

*<option-list>*
Specifies the kernel trace options. Specify one or more of the following:

| | |
|---|---|
| **packets** | Packets exchanged with the kernel. |
| **routes** | Routes exchanged with the kernel. |
| **redirect** | Redirect messages received from the kernel. |
| **interface** | Interface messages received from the kernel. |
| **other** | All other messages received from the kernel. |
| **remnants** | Routes read from the kernel when the XP routing process starts. |
| **request** | The XP routing process requests to Add/Delete/Change routes in the kernel forwarding table. |
| **info** | Informational messages received from the routing socket, such as TCP loss, routing lookup failure, and route resolution request. |

## Restrictions

None.

# ip-router policy add filter

## Purpose

Adds a route filter. Routes are specified by a set of filters that will match a certain set of routes by destination, or by destination and mask.

## Format

**ip-router policy add filter** *<number-or-string>* **network**
*<ipAddr/mask>* **[exact|refines|between** *<low-high>***][host-net]**

## Mode

Configure

## Parameters

**filter** *<number-or-string>*
Specifies the identifier of the route filter.

**network** *<IP-address>*
Specifies networks that are to be filtered. Matching usually requires both an address and a mask, although the mask can be implied. If no additional options qualifying the networks to be filtered are specified, then any destination that falls in the range implied by this network-specification is matched, so the mask of the destination is ignored. If a natural network is specified, the network, any subnets, and any hosts will be matched. If you specify the **exact**, **refines**, or **between** parameters, the mask of the destination is also considered.

**exact**
Specifies that the mask of the routes to be filtered must match the supplied mask exactly. This is used to match a network, but not subnets or hosts of that network

**refines**
Specifies that the mask of the routes to be filtered must be more specific (i.e. longer) than the supplied mask. This is used to match subnets.

**between** *<low-high>*
Specifies that the mask of the destination must be as or more specific (i.e., as long as longer) than the lower limit (the first number parameter) and no more specific (i.e. as long as or shorter) than the upper limit (the second parameter).

**host-net**
This option qualifies that the specified network is a host. To match, the address must exactly match the specified and the network mask must be a host mask (i.e. all ones). This is equivalent to a network specification of host/255.255.255.255 along with the exact option.

## Restrictions

None.

# ip-router policy add optional-attributes-list

## Purpose

Expands a previously created optional-attributes-list.

## Format

**ip-router policy add optional-attributes-list** *<option-list>*

## Mode

Configure

## Parameters

*<option-list>*
Specifies the options. Specify one or more of the following:

**optional-attributes-list** *<number-or-string>*
Specifies the identifier for the optional attributes list you are expanding.

**community-id** *<number>*
Specifies a community identifier portion of a community split. This is combined with the autonomous system value entered to create a value for the community attribute.

**autonomous-system** *<number>*
Specifies the autonomous system portion of a community split. This would be combined with the community id value entered to create a value for the community attribute. Specify a number from 1 – 65534.

**no-export**
Specifies that all routes received with this attribute value *will not* be advertised outside a BGP confederation boundary.

**well-known-community**
Specifies one of the well-known communities.

**no-advertise**
Specifies that all routes received with this attribute value *will not* be advertised to other BGP peers.

**no-export-subconfed**
Specifies that all routes received with this attribute value *will not* be advertised to external BGP peers (this includes peers in other members autonomous systems inside a BGP confederation).

**reserved-community** *<number>*
Specifies one of the reserved communities which is not well-known. A reserved

community is one which is in one of the following ranges (0x0000000 - 0x0000FFFF) or (0xFFFF0000 - 0xFFFFFFFF).

## Restrictions

None.

# ip-router policy aggr-gen destination

## Purpose

Creates an aggregate or generate route.

## Format

**ip-router policy aggr-gen destination** *<number-or-string>* **[source** *<number-or-string>* **[filter** *<number-or-string>*|**[network** *<ipAddr/mask>* **[exact|refines|between** *<low-high>*] **[preference** *<number>*|**restrict]]]]**

## Mode

Configure

## Parameters

**destination** *<number-or-string>*
Is the identifier of the aggregate-destination that specifies the aggregate/summarized route.

**source** *<number-or-string>*
Is the identifier of the aggregate-source that contributes to an aggregate route.

**filter** *<number-or-string>*
Specifies the filter for an aggregate/generate.

**network** *<ipAddr/mask>*
This option specifies networks which are to be aggregated. Matching usually requires both an address and a mask, although the mask can be implied. If no additional options qualifying the networks to be aggregated are specified, then any destination that falls in the range implied by this network-specification is matched, so the mask of the destination is ignored. If a natural network is specified, the network, any subnets, and any hosts will be matched. If you specify the **exact**, **refines**, or **between** parameters, the mask of the destination is also considered.

**exact**
This option specifies that the mask of the routes to be aggregated must match the supplied mask exactly. This is used to match a network, but not subnets or hosts of that network

**refines**
This option specifies that the mask of the routes to be aggregated must be more specific (i.e. longer) than the supplied mask. This is used to match subnets.

**between** *<low-high>*
Specifies that the mask of the destination must be as or more specific (i.e., as long as longer) than the lower limit (the first number parameter) and no more specific (i.e. as long as or shorter) than the upper limit (the second parameter).

**preference** *<number>*
   This option specifies the preference to be assigned to the resulting aggregate route.

## Restrictions

None.

# ip-router policy create aggregate-export-source

## Purpose

Creates a source for exporting aggregate routes into other protocols.

## Format

**ip-router policy create aggregate-export-source**
*<number-or-string>* **[metric** *<number>*|**restrict]**

## Mode

Configure

## Parameters

| | |
|---|---|
| *<number-or-string>* | Specifies the identifier of the aggregate export source. |
| **metric** *<number>* | Specifies the metric to be associated with the exported routes. |
| **restrict** | Specifies that nothing is exported from the specified source. |

## Restrictions

None.

# ip-router policy create aggr-gen-dest

## Purpose

Creates an aggregate-generation destination. An aggregate-generation destination is one of the building blocks needed to create an aggregate/generate route.

## Format

**ip-router policy create aggr-gen-dest** *<number-or-string>*
**network** *<ipAddr/mask>*|**default [type aggregate|generation] [preference** *<number>*]**[brief]**

## Mode

Configure

## Parameters

*<number-or-string>*
     Specifies the identifier of an aggregate-generation destination.

**network** *<ipAddr/mask>*|**default**
     Specifies the aggregate or generated route.

**type aggregate**
     Specifies that the destination is an aggregate.

**type generation**
     Specifies that the destination is a generate.

**preference** *<num>*
     Specifies the preference to be assigned to the resulting aggregate route. The default preference is 130.

**brief**
     Used to specify that the AS path should be truncated to the longest common AS path. The default is to build an AS patch consisting of SETs and SEQUENCES of all contributing AS paths.

## Restrictions

None.

# ip-router policy create aggr-gen-source

## Purpose

Creates a source for the routes contributing to a aggregate/generate route.

## Format

**ip-router policy create aggr-gen-source** *<number-or-string>*
**protocol all|static|direct|aggregate|rip|ospf|bgp [autonomous-system** *<number>*]**[aspath-regular-expression** *<string>*]**[tag** *<number>*]**[preference** *<number>*/**restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
    Specifies the identifier of an aggregate-generation source.

**protocol** *<string>*
    Specifies the protocol of the contributing aggregate source. Specify one of the following:

    •**all**

    •**static**

    •**direct**

    •**aggregate**

    •**rip**

    •**ospf**

    •**bgp**

**autonomous-system** *<number>*
    Restricts selection of routes to those learned from the specified autonomous system. This selection may also be carried out by using route filters to explicitly list the set of routes to be accepted. Specify a number from 1 – 65534.

**aspath-regular-expression** *<string>*
    Restricts selection of routes to those specified by the aspath.

**tag** *<number>*
    Restricts selection of routes to those identified by a tag.

**preference** *<number>*
    Specifies the preference to assign to the contributing routes.

**restrict**
Indicates that these routes cannot contribute to the aggregate.

# Restrictions

None.

# ip-router policy create aspath-export-source

## Purpose

Create an export source where routes to be exported are identified by the autonomous system path associated with them. This command applies only if you are using BGP.

## Format

**ip-router policy create aspath-export-source** *<number-or-string> <option-list>*

## Mode

Configure

## Parameters

*<number-or-string>*
    Specifies a name or number for the Autonomous System path export source.

*<option-list>*
    Specifies the Autonomous System path source options you are setting. Specify one of the following:

    **protocol** *<name>*
        Specifies the protocol by which the routes to be exported were learned. Specify one of the following:

        •all

        •**static**

        •**direct**

        •**aggregate**

        •**rip**

        •**ospf**

        •**bgp**

    **aspath-regular-expression** *<string>*
        Specifies an aspath regular expression which should be satisfied for the route to be exported.

    **origin** *<string>*
        Specifies whether the origin of the routes to be exported was an interior gateway protocol or an exterior gateway protocol. Specify one of the following:

        **–any**

**–igp**

**–egp**

**–incomplete**

**metric** *<num>*
Specifies metric associated with the exported routes.

**restrict**
Specifies that nothing is exported from the specified source.

**Note:** You can specify **metric** or **restrict** even if you specified **protocol**, **aspath-regular-expression**, or **origin**.

# Restrictions

None.

# ip-router policy create bgp-export-destination

## Purpose

Create an export destination for BGP routes.

## Format

**ip-router policy create bgp-export-destination**
*<number-or-string> <option-list>*

## Mode

Configure

## Parameters

*<number-or-string>*
　Creates a BGP export destination and associates an identifier (tag) with it.

*<option-list>*
　Specifies the BGP export destination options you are setting. Specify the following:

　**autonomous-system** *<num>*
　　Specifies the autonomous system of the peer-group to which we would be exporting.
　　Specify a number from 1 – 65535.

　**optional-attribute-list** *<num-or-string>*
　　Specifies the identifier of the optional-attribute-list which contains the optional attributes
　　which are to be sent along with these exported routes. This option may be used to send the
　　BGP community attribute. Any communities specified in the optional-attributes-list are
　　sent in addition to any received with the route or those specified with the 'set peer-group'
　　or 'set peer-host' commands.

　**metric** *<num>*
　　Specifies the metric to be associated with the BGP exported routes.

　**restrict**
　　Restricts the export of BGP routes to the specified destination.

　**sequence-number** *<num>*
　　Specifies the relative position of this export-destination in a list of bgp export-destinations.

## Restrictions

None.

# ip-router policy create bgp-export-source

## Purpose

Create a source for exporting bgp routes into other protocols.

## Format

**ip-router policy create bgp-export-source** *<number-or-string> <option-list>*

## Mode

Configure

## Parameters

*<number-or-string>*
    Creates a BGP export source and associates an identifier (tag) with it.

*<option-list>*
    Specifies the BGP export source options you are setting. Specify the following:

    **autonomous-system** *<num>*
        Specifies the autonomous system of the peer-group from which we would be exporting. A route filter could alternatively be used to explicitly list a set of routes to be accepted. Specify a number from 1 – 65534.

    **metric** *<num>*
        Specifies the metric to be associated with the BGP exported routes.

    **restrict**
        Restricts the export of BGP routes from the specified source.

## Restrictions

None.

# ip-router policy create bgp-import-source

## Purpose

Create a source for importing BGP routes.

## Format

**ip-router policy create bgp-import-source** *<number-or-string> <option-list>*

## Mode

Configure

## Parameters

*<number-or-string>*
  Creates a BGP import source and associates an identifier (tag) with it.

*<option-list>*
  Specifies the BGP import source options you are setting. Specify the following:

  **autonomous-system** *<num>*
    Specifies the autonomous system of the peer-group from which we would be exporting. A
    route filter could alternatively be used to explicitly list a set of routes to be accepted.
    Specify a number from 1 – 65534.

  **aspath-regular-expression** *<string>*
    Specifies the as path regular expression that must be satisfied for the route to be exported.
    A route filter could alternatively be used to explicitly list a set of routes to be announced.

  **origin** *<value>*
    Specifies the origin attribute. Specify one of the following:

    **any**          Specifies that the origin attribute can be any one of **igp**, **egp** and **incomplete**.

    **igp**          Specifies that the origin attribute of the imported routes is IGP.

    **egp**          Specifies that the origin attribute of the imported routes is EGP.

    **incomplete**   Specifies that the origin attribute of the imported routes is incomplete.

  **optional-attribute-list** *<num-or-string>*
    Specifies the identifier of the optional-attribute-list. This option allows the specification of
    import policy based on the path attributes found in the BGP update. If multiple
    communities are specified in the aspath-opt option, only updates carrying all of the
    specified communities will be matched. If none is specified, only updates lacking the
    community attribute will be matched.

**preference** *<num>*

Specifies the preference to be associated with the BGP imported routes.

**restrict**

Specifies that nothing is exported from the specified source.

**sequence number** *<num>*

Indicates the position this bgp import source will have in a list of BGP import sources.

# Restrictions

None.

# ip-router policy create direct-export-source

## Purpose

Creates an export source for interface routes.

## Format

**ip-router policy create direct-export-source** *<number-or-string>* **[interface** *<name-or-IPaddr>*]**[metric** *<num>*/**restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
  Creates a source for exporting **interface** (**direct**) routes and associates an identifier with it.

**interface**
  This option qualifies that the direct routes should be associated with the specific interface.

**metric** *<num>*
  Specifies the metric to be associated with the exported routes.

**restrict**
  Restricts the export of routes from the specified source.

## Restrictions

None.

# ip-router policy create filter

## Purpose

Creates a route filter. Routes are filtered by specifying a set of filters that will match a certain set of routes by destination, or by destination and mask.

## Format

**ip-router policy create filter** *<number-or-string>* **network**
*<ipAddr/mask>* **[exact|refines|between** *<low-high>***][host-net]**

## Mode

Configure

## Parameters

**filter** *<number-or-string>*
  Specifies the identifier of the route filter.

**network** *<IP-address>*
  This option specifies networks which are to be filtered. Matching usually requires both an address and a mask, although the mask can be implied. If no additional options qualifying the networks to be filtered are specified, then any destination that falls in the range implied by this network-specification is matched, so the mask of the destination is ignored. If a natural network is specified, the network, any subnets, and any hosts will be matched. If you specify the **exact**, **refines**, or **between** parameters, the mask of the destination is also considered.

**exact**
  This option specifies that the mask of the routes to be filtered must match the supplied mask exactly. This is used to match a network, but not subnets or hosts of that network

**refines**
  This option specifies that the mask of the routes to be filtered must be more specific (i.e. longer) than the supplied mask. This is used to match subnets.

**between** *<low-high>*
  Specifies that the mask of the destination must be as or more specific (i.e., as long as longer) than the lower limit (the first number parameter) and no more specific (i.e. as long as or shorter) than the upper limit (the second parameter).

**host-net**
  This option qualifies that the specified network is a host. To match, the address must exactly match the specified and the network mask must be a host mask (i.e. all ones). This is equivalent to a network specification of host/255.255.255.255 along with the exact option.

## Restrictions

None.

# ip-router policy create optional-attributes-list

## Purpose

Creates an optional-attributes-list for BGP.

## Format

**ip-router policy create optional-attributes-list** *<option-list>*

## Mode

Configure

## Parameters

*<option-list>*
Specifies the options you are setting. Specify the following:

*<number-or-string>*
Specifies the identifier for the attributes list.

**community-id** *<number>*
Specifies a community identifier portion of a community split. This is combined with the autonomous system value entered to create a value for the community attribute.

**autonomous-system** *<number>*
Specifies the autonomous system portion of a community split. This would be combined with the community id value entered to create a value for the community attribute. Specify a number from 1 – 65534.

**no-export**
Specifies that all routes received with this attribute value *will not* be advertised outside a BGP confederation boundary.

**well-known-community**
Specifies one of the well-known communities.

**no-advertise**
Specifies that all routes received with this attribute value *will not* be advertised to other BGP peers.

**no-export-subconfed**
Specifies that all routes received with this attribute value *will not* be advertised to external BGP peers (this includes peers in other members autonomous systems inside a BGP confederation).

**reserved-community** *<number>*
Specifies one of the reserved communities which is not well-known. A reserved

community is one which is in one of the following ranges (0x0000000 - 0x0000FFFF) or (0xFFFF0000 - 0xFFFFFFFF).

## Restrictions

None.

# ip-router policy create ospf-export-destination

## Purpose

Create a destination for exporting routes into OSPF.

## Format

**ip-router policy create ospf-export-destination**
*<number-or-string>* **[tag** *<num>***][type 1|2][metric** *<num>***|restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
　　Creates an OSPF export destination and associates an identifier with it.

**tag** *<num>*
　　Tag to be associated with exported OSPF routes.

**type 1|2**
　　Specifies that OSPF routes to be exported are type 1 or type 2 ASE routes. Specify 1 or 2.

**metric** *<num>*
　　Specifies the metric to be associated with the exported routes.

**restrict**
　　Restricts the export of the specified routes.

## Restrictions

It is not possible to create OSPF intra- or inter-area routes by exporting routes from the routing table into OSPF. You can only export from the routing table into OSPF ASE routes.

# ip-router policy create ospf-export-source

## Purpose

Create a source for exporting OSPF routes into other protocols.

## Format

**ip-router policy create ospf-export-source**
*<number-or-string>* **[type ospf|ospf-ase][metric** *<num>*|**restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
　　Creates an OSPF export source and associates an identifier with it.

**type ospf**
　　Exported routes are OSPF routes.

**type ospf-ase**
　　Exported routes are OSPF ASE routes.

**metric** *<num>*
　　Specifies the metric to be associated with the exported routes.

**restrict**
　　Specifies that nothing is to be exported from this source.

## Restrictions

None.

# ip-router policy create ospf-import-source

## Purpose

Create a source for importing OSPF routes.

## Format

**ip-router policy create ospf-import-source** *<number-or-string>* **[tag** *<num>***][preference** *<num>*|**restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
  Creates an OSPF import source and associates an identifier with it.

**tag** *<num>*
  Tag to be associated with the imported routes.

**preference** *<num>*
  Preference associated with the imported OSPF routes.

**restrict**
  Specifies that matching **ospf-ase** routes are not imported.

## Restrictions

None.

# ip-router policy create rip-export-destination

## Purpose

Create a destination for exporting routes into RIP.

## Format

**ip-router policy create rip-export-destination** *<number-or-string>*
**[interface** *<name-or-IPaddr>*|**gateway** *<name-or-IPaddr>*] **[metric** *<num>*|**restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
  Specifies an identifier for the RIP export destination:

**interface** *<name-or-IPaddr>*|**all**
  Specifies router interfaces over which to export routes. Specify **all** to export routes to all interfaces.

**gateway** *<name-or-IPaddr>*
  Specifies the gateway that will receive the exported routes.

**metric** *<num>*
  Specifies the metric to be associated with the exported routes. Specify a number from 1 – 16.

**restrict**
  Restricts the export of routes to the specified destination.

## Restrictions

None.

# ip-router policy create rip-export-source

## Purpose

Create a source for exporting RIP routes into other protocols

## Format

**ip-router policy create rip-export-source**
*<number-or-string>* **[interface** *<name-or-IPaddr>*|**gateway** *<name-or-IPaddr>*][**metric**
*<num>*/**restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
    Specifies an identifier for the RIP export source:

**interface** *<name-or-IPaddr>*
    Indicates that only routes learned over specified interfaces are exported.

**gateway** *<name-or-IPaddr>*
    Indicates that only routes learned over specified gateways are exported.

**metric** *<num>*
    Specifies the metric to be associated with the exported routes.

**restrict**
    Indicates that nothing is exported from the specified source.

## Restrictions

None.

# ip-router policy create rip-import-source

## Purpose

Create a source for importing RIP routes.

## Format

**ip-router policy create rip-import-source** *<number-or-string>*
**[interface** *<name-or-IPaddr>***|gateway** *<name-or-IPaddr>***][preference** *<num>***/restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
    Specifies an identifier for the RIP import source:

**interface** *<name-or-IPaddr>*
    Indicates that only routes learned over specified interfaces are imported.

**gateway** *<name-or-IPaddr>*
    Indicates that only routes learned over specified gateways are imported.

**preference** *<num>*
    Specifies the preference to be associated with the imported routes.

**restrict**
    Indicates that nothing is imported from the specified source.

## Restrictions

None.

# ip-router policy create static-export-source

## Purpose

Creates a source for exporting static routes into other protocols.

## Format

**ip-router policy create static-export-source** *<number-or-string>*
**[interface** *<name-or-IPaddr>*]**[metric** *<num>*/**restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
    Creates a source for exporting **static** routes and associates an identifier with it.

**interface**
    This option qualifies that the **static** routes should be associated with the specific interface.

**metric** *<num>*
    Specifies the metric to be associated with the exported routes.

**restrict**
    Restricts the export of routes from the specified source.

## Restrictions

None.

# ip-router policy create tag-export-source

## Purpose

Create an export source where routes to be exported are identified by the tag associated with them.

## Format

**ip-router policy create tag-export-source** *<number-or-string>*
**protocol all|static|direct|aggregate|rip|ospf|bgp**
**[tag** *<number>*]**[metric** *<number>*/**restrict]**

## Mode

Configure

## Parameters

*<number-or-string>*
　　Specifies the identifier of an tag-export source.

**protocol** *<string>*
　　Specifies the protocol of the contributing source. Specify one of the following:

　　**•all**

　　**•static**

　　**•direct**

　　**•aggregate**

　　**•rip**

　　**•ospf**

　　**•bgp**

**tag** *<number>*
　　Restricts selection of routes to those identified by a tag.

**metric** *<number>*
　　Specifies the metric to assign to the exported routes.

**restrict**
　　Indicates that the matching routes are not exported.

## Restrictions

None.

# ip-router policy export destination

## Purpose

Creates an export policy from the various building blocks.

## Format

**ip-router policy export destination** *<exp-dest-id>*
[**source** *<exp-src-id>* [**filter** *<filter-id>*|[**network** *<ipAddr/mask>* [**exact**|**refines**|**between** *<low-high>*] [**metric** *<number>*|**restrict**]]]]

## Mode

Configure

## Parameters

*<exp-dest-id>*
> Is the identifier of the export-destination which determines where the routes are to be exported. If no routes to a particular destination are to be exported, then no additional parameters are required.

*<exp-src-id>*
> If specified, is the identifier of the export-source which determines the source of the exported routes. If a export-policy for a given export-destination has more than one export-source, then the *ip-router policy export destination <exp-dest-id>* command should be repeated for each *<exp-src-id>*.

*<filter-id>*
> If specified, is the identifier of the route-filter associated with this export-policy. If there is more than one route-filter for any export-destination and export-source combination, then the *ip-router policy export destination <exp-dest-id> source <exp-src-id>* command should be repeated for each *<filter-id>*.

**network** *<ipAddr/mask>*
> Specifies networks which are to be exported. Matching usually requires both an address and a mask, although the mask can be implied. If no additional options qualifying the networks to be exported are specified, then any destination that falls in the range implied by this network-specification is matched, so the mask of the destination is ignored. If a natural network is specified, the network, any subnets, and any hosts will be matched. If you specify the **exact**, **refines**, or **between** parameters, the mask of the destination is also considered.

**exact**
> This option specifies that the mask of the routes to be exported must match the supplied mask exactly. This is used to match a network, but not subnets or hosts of that network

**refines**

This option specifies that the mask of the routes to be exported must be more specific (i.e. longer) than the supplied mask. This is used to match subnets.

**between** *<low-high>*

Specifies that the mask of the destination must be as or more specific (i.e., as long as longer) than the lower limit (the first number parameter) and no more specific (i.e. as long as or shorter) than the upper limit (the second parameter).

**restrict**

Specifies that routes matching the filter are not to be exported.

**metric** *<number>*

Specifies the metric to be associated with the routes that match the specified filter.

# Restrictions

None.

# ip-router policy import source

## Purpose

Creates an import policy.

## Format

**ip-router policy import source** *<imp-src-id>* **[filter** *<filter-id>*|**[network** *<ipAddr/mask>*
**[exact|refines|between** *<low-high>*] **[preference** *<number>*|**restrict]]]**

## Mode

Configure

## Parameters

*<imp-src-id>*
Is the identifier of the import-source that determines the source of the imported routes. If no routes from a particular source are to be imported, then no additional parameters are required.

*<filter-id>*
If specified, is the identifier of the route-filter associated with this import-policy. If there is more than one route-filter for any import-source, then the *ip-router policy import source <imp-src-id>* command should be repeated for each *<filter-id>*.

**network** *<ipAddr/mask>*
Specifies networks which are to be imported. Matching usually requires both an address and a mask, although the mask can be implied. If no additional options qualifying the networks to be imported are specified, then any destination that falls in the range implied by this network-specification is matched, so the mask of the destination is ignored. If a natural network is specified, the network, any subnets, and any hosts will be matched. If you specify the **exact**, **refines**, or **between** parameters, the mask of the destination is also considered.

**exact**
This option specifies that the mask of the routes to be imported must match the supplied mask exactly. This is used to match a network, but not subnets or hosts of that network

**refines**
This option specifies that the mask of the routes to be imported must be more specific (i.e. longer) than the supplied mask. This is used to match subnets.

**between** *<low-high>*
Specifies that the mask of the destination must be as or more specific (i.e., as long as longer) than the lower limit (the first number parameter) and no more specific (i.e. as long as or shorter) than the upper limit (the second parameter).

**restrict**
Specifies that routes matching the filter are not to be imported.

**preference** *<number>*
> Specifies the preference with which the imported routes that match the specified filter should be installed.

# Restrictions

None.

# ip-router policy redistribute

## Purpose

Creates a simple route redistribution policy

## Format

**ip-router policy redistribute from-proto** *<protocol>* **to-proto** *<protocol>* **[network**
*<ipAddr/mask>* **[exact|refines|between** *<low-high>*]] **[metric** *<number>*|**restrict] [source-as**
*<number>*] **[target-as** *<number>*] **[tag] [ase-type]**

## Mode

Configure

## Parameters

**from-proto** *<protocol>*
    Specifies the protocol of the source routes. The values for the from-proto parameter are **rip**,
    **ospf**, **bgp**, **direct**, **static**, **aggregate**, or **ospf-ase**.

**to-proto** *<protocol>*
    Specifies the destination protocol where the routes are to be exported. The values for the to-
    proto parameter are **rip**, **ospf**, or **bgp**.

**network** *<ipAddr/mask>*
    Provides a means to define a filter for the routes to be distributed. The network parameter
    defines a filter that is made up of an IP address and a mask. Routes that match the filter are
    considered as eligible for redistribution.

    Matching usually requires both an address and a mask, although the mask can be implied. If no
    additional options qualifying the networks to be redistributed are specified, then any destination
    that falls in the range implied by this network-specification is matched, so the mask of the
    destination is ignored. If a natural network is specified, the network, any subnets, and any hosts
    will be matched. If you specify the **exact**, **refines**, or **between** parameters, the mask of the
    destination is also considered.

**exact**
    This option specifies that the mask of the routes to be redistributed must match the supplied
    mask exactly. This is used to match a network, but not subnets or hosts of that network.

**refines**
    This option specifies that the mask of the routes to be redistributed must be more specific (i.e.
    longer) than the supplied mask. This is used to match subnets.

**between** *<low-high>*
    Specifies that the mask of the destination must be as or more specific (i.e., as long as longer)

than the lower limit (the first number parameter) and no more specific (i.e. as long as or shorter) than the upper limit (the second parameter).

**restrict**

Specifies that routes matching the filter are not to be redistributed.

**metric**

Indicates the metric to be associated with the redistributed routes.

tag

Tag to be associated with the exported OSPF routes.

ase-type

Routes exported from the GateD routing table into OSPF default to becoming type 1 ASEs. This default may be explicitly overridden here. Thus, this option should be used to specify if the routes are to be exported as OSPF Type 1 or Type 2 ASE routes.

**Note:** Each protocol (RIP, OSPF, and BGP) has a configurable parameter that specifies the default-metric associated with routes exported to that protocol. If a metric is not explicitly specified with the redistribute command, then it is inherited from the default-metric associated with the protocol to which the routes are being exported.

# Restrictions

None.

# ip-router show configuration file

## Purpose

Display the active or startup configuration file in GateD format.

## Format

**ip-router show configuration-file active|permanent**

## Mode

Enable

## Parameters

**active**      Shows the active GateD configuration file in RAM; this is the default.

**permanent**   Shows the permanent GateD configuration file in NVRAM, if available.

## Restrictions

None.

# ip-router show rib

## Purpose

Display routing information base.

## Format

**ip-router show rib [detail]**

## Mode

Enable

## Description

The **ip-router show rib** command shows the route-manager's routing information base (RIB). For any given network, the routing daemon could have multiple routes. The active route to any network is shown with a plus (+) sign next to it. The last active route is shown with a minus (-) next to it. If a route has been the last active route and is also the current active route, then it is shown with a asterisk (*) sign next to it. The legend is as follows:

- "+" Active Route

- "-" Last Active

- "*" Both

If the detail option is used, then additional information is displayed about these routes. The announcements bits for the active route are shown which shows the protocol into which this route is advertised.

## Parameters

**detail**  Allows you to view additional information about the routes in the RIB.

## Restrictions

None.

# Examples:

A sample output of the **ip-router show rib** command is shown below:

```
xp# ip-router show rib
Routing Tables:
Generate Default: no
Destinations: 63776   Routes: 63776
Holddown: 0   Delete: 53811   Hidden: 1
Codes: Network - Destination Network Address
    S - Status + = Best Route, - = Last Active, * = Both
    Src - Source of the route :
    Ag - Aggregate, B - BGP derived, C - Connected
    R - RIP derived, St - Static, O - OSPF derived
    OE - OSPF ASE derived, D - Default
    Next hop - Gateway for the route; Next hops in use: 4
    Netif - Next hop interface
    Prf1 - Preference of the route, Prf2 - Second Preference of the route
    Metrc1 - Metric1 of the route, Metrc2 - Metric2 of the route
    Age - Age of the route
Network/Mask     S Src Next hop        Netif Prf1 Metrc1 Metrc2    Age
------------     - --- --------        ----- ---- ------ ------    ---
3/8           *  B 134.141.178.33    mls0 170          70:34:28
4/8           *  B 134.141.178.33    mls0 170          70:34:28
4.17.106/24     *  B 134.141.178.33    mls0 170          70:34:28
4.17.115/24     *  B 134.141.178.33    mls0 170          70:34:28
4.24.148.128/25   *  B 134.141.178.33     mls0 170          70:34:28
6/8           *  B 134.141.178.33    mls0 170          70:34:28
6.80.137/24     *  B 134.141.178.33    mls0 170          70:34:28
9.2/16         *  B 134.141.178.33    mls0 170          70:34:28
9.20/17        *  B 134.141.178.33    mls0 170          70:34:28
10.50/16        *  C 10.50.90.1       en   0    0     0 113:31:09
10.60.90/24     *  C 10.60.90.1       mls2 0    0     0 113:31:09
12/8          *  B 134.141.178.33    mls0 170          70:34:28
12.1.248/24     *  B 134.141.178.33    mls0 170          70:34:28
12.2.19/25     *  B 134.141.178.33    mls0 170          12:47:48
12.2.76/24     *  B 134.141.178.33    mls0 170          31:03:36
12.2.97/24     *  B 134.141.178.33    mls0 170          1:41:30
12.2.109/24     *  B 134.141.178.33    mls0 170          87:55:47
12.2.169/24     *  B 134.141.178.33    mls0 170          113:31:01
12.3.63/24     *  B 134.141.178.33    mls0 170          70:34:28
12.4.5/24      *  B 134.141.178.33    mls0 170          70:34:28
12.4.126/24     *  B 134.141.178.33    mls0 170          70:34:28
12.4.164/24     *  B 134.141.178.33    mls0 170          70:34:28
12.4.175/24     *  B 134.141.178.33    mls0 170          95:47:57
12.4.196/22     *  B 134.141.178.33    mls0 170          70:34:28
12.5.48/21     *  B 134.141.178.33    mls0 170          70:34:28
12.5.164/24     *  B 134.141.178.33    mls0 170          113:31:01
12.5.252/23     *  B 134.141.178.33    mls0 170          70:34:28
12.6.42/23     *  B 134.141.178.33    mls0 170          70:34:28
12.6.97/24     *  B 134.141.178.33    mls0 170          70:34:28
```

ITo see a specific route, use the **ip-router show route** command.

# ip-router show route

## Purpose

Displays the state of GateD.

## Format

**ip-router show route [ip-addr-mask|default] [detail]**

## Mode

Enable

## Description

This command shows a specific route in the route-manager's routing information base (RIB). For any given network, the routing daemon could have multiple routes. The active route to any network is shown with a plus (+) sign next to it. The last active route is shown with a minus (-) next to it. If a route has been the last active route and is also the current active route, then it is shown with a asterisk (*) sign next to it. The legend is as follows:

- "+" Active Route

- "-" Last Active

- "*" Both

If the detail option is used, then additional information is displayed about this routes. The announcements bits for the active route are shown which shows the protocol into which this route is advertised.

## Parameters

*<ipAddr/mask>*|**default**
   Allows you to specify a particular IP address mask for the RIB route in question, or refer to the default address mask.

**detail**
   Allows you to view additional information about the routes in the RIB.

## Restrictions

None.

## Examples

A sample output of the **ip-router show route detail** command is shown below.

```
xp# ip-router show route 10.12.1.0/255.255.255.252 detail
10.12.1        mask 255.255.255.252
entries 2   announce 1
TSI:
RIP 150.1.255.255mc  <> metric 1
RIP 222.1.1.255mc  <> metric 1
BGP_Sync_64805 dest 10.12.1/2 metric 0
BGP group type Routing AS 64805 no metrics
Instability Histories:

*Direct   Preference:  0
*NextHop: 10.12.1.2        Interface: 10.12.1.2(to-c4500)
State: <Int Active Retain>
Age: 5:12:10   Metric: 0   Metric2: 0   Tag: 0
Task: IF
Announcement bits(5):
2-KRT 4-RIP.0.0.0.0+520 5-RIP.0.0.0.0+520
6-BGP_Sync_64805
7-BGP_Group_64805
AS Path: IGP (Id 1)

OSPF   Preference: -10
*NextHop: 10.12.1.1        Interface: 10.12.1.2(to-c4500)
State: <NotInstall NoAdvise Int Hidden Gateway>
Local AS: 64805
Age: 1:20:05   Metric: 1   Metric2: -1   Tag: 0
Task: OSPF
AS Path: (64805) IGP (Id 9551)
Cost: 1   Area: 0.0.0.0   Type: Net   AdvRouter:
172.23.1.14
```

In this case there two routes to network 10.12.1.0/255.255.255.252 One of them is a direct route and other route is learned through OSPF. The direct route has a better preference (lower preference is considered better preference), and is thus the active route. The direct route has been installed since 5 hours, 12 minutes and 10 seconds. This direct route is being announced to the Forwarding Information Base (FIB) which is indicated by KRT, over two RIP interfaces (which is indicated by 4-RIP.0.0.0.0+520, 5-RIP.0.0.0.0+520) and also to the BGP internal peer-group for autonomous system 64805.

To see all the routes in the RIB, use the **ip-router show rib** command.

# ip-router show state

## Purpose

Displays the state of GateD.

## Format

**ip-router show state [all] [memory] [timers] [to-file] [to-terminal]**
**[task *<string>*|all|gii |icmp|inet|interface|krt |route]**

## Mode

Enable

## Parameters

| | |
|---|---|
| **all** | Shows all output. |
| **memory** | Shows memory allocations. |
| **timers** | Shows various GateD timers. |
| **to-file** | Saves the routing-process state in the gated.dmp file. |
| **to-terminal** | Displays the routing-process state on the console. |
| **task** | Shows task-specific information. The default is to show information for all tasks. You can specify a task using the **following options:** |

| | | |
|---|---|---|
| | *<string>* | Displays information for the task specified. |
| | **all** | Shows information for all tasks. |
| | **gii** | Shows GII information. |
| | **icmp** | Shows information for the ICMP task. |
| | **inet** | Shows information for the INET task. |
| | **interface** | Shows information for the Interface task. |
| | **krt** | Shows information for the KRT task. |
| | **route** | Shows information for the route task. |

## Restrictions

None.

# Chapter 33

# ipx Commands

The **ipx** commands let you add entries to the IPX SAP table for SAP servers and display the IPX forwarding database, RIP table, and SAP table.

## Command Summary

Table 27 lists the **ipx** commands. The sections following the table describe the command syntax.

**Table 27. ipx commands**

| |
|---|
| **ipx add route** *<networkaddr>* *<nextroutnextnode>* *<metric>* *<ticks>* |
| **ipx add sap** *<type>* *<SrvcName>* *<node>* *<socket>* *<metric>* *<interface-network>* |
| **ipx find rip** *<address>* |
| **ipx find sap** *<type>*|**all** *<SrvcName>*|**all** *<network>*|**all** *<entrytype>* |
| **ipx l3-hash module** *<num>*|**all variant** *<num>* |
| **ipx set interface ifname** *<string>*| **ipg** *<num>* | **ripintvl** *<num>* | **sapintvl** *<num>* |
| **ipx set rip buffers** *<buffer-size>*| **packets-per-iteration** *<num>* |
| **ipx set ripreq buffers** *<buffer-size>*| **packets-per-iteration** *<num>* |
| **ipx set sap buffers** *<buffer-size>*| **packets-per-iteration** *<num>*|**topn** |**delay** *<num>* |
| **ipx set sapgns buffers** *<buffer-size>* |**round-robin** |**packets-per-iteration** *<num>* |
| **ipx set type20 propagation on** |
| **ipx set port forwarding-mode destination-based** |
| **ipx show buffers** |

**Table 27.  ipx commands (Continued)**

| |
|---|
| **ipx show hash-variant** *\<num\>*\|**all** |
| **ipx show interfaces** *\<interface\>* \|**all [brief]** |
| **ipx show rib destination** |
| **ipx show servers hops\|net\|name\|type** |
| **ipx show summary** |
| **ips show routes** |
| **ipx show packets-per-iteration** |
| **ipx show stack-queues** |

# ipx add route

## Purpose

Add an IPX RIP route entry to the routing table.

## Format

**ipx add route** *<networkaddr> <nextroutnextnode> <metric> <ticks>*

## Mode

Configure

## Description

The **ipx add route** command adds a route into the IPX RIP routing table.

## Parameters

| | |
|---|---|
| *<networkaddr>* | Destination network address. |
| *<nextroutnextnode>* | Next router's Network.Node address. |
| *<metric>* | The number of hops to this route. You can specify a number from 0 – 14. |
| *<ticks>* | Ticks associated with this route. |

## Restrictions

- Route entries that you add using the **ipx add route** command override dynamically learned entries, regardless of hop count.

- IPX is not supported in partially meshed WAN networks unless each node has a unique network address.

## Example

To add an IPX route to IPX network A1B2C3F5 via router A1B2C3D4.00:E0:63:11:11:11 with a metric of 1 and a tick of 100:

```
xp(config)# ipx add route A1B2C3F5 A1B2C3D4.00:E0:63:11:11:11 1 100
```

# ipx add sap

## Purpose

Add an IPX SAP entry to the routing table.

## Format

**ipx add sap** *<type> <SrvcName> <node> <socket> <metric> <interface-network>*

## Mode

Configure

## Description

The **ipx add sap** command adds an entry for an IPX server to the IPX SAP table.

## Parameters

| | |
|---|---|
| *<type>* | The type of service. Specify the service type using its hexadecimal value. |
| *<SrvcName>* | Name of the IPX server. You can use any characters in the name except the following: " * . / : ; < = > ? [ ] \ \| |
| | **Note:**Lowercase characters are changed to uppercase characters. |
| *<node>* | *The* IPX network and node address. Specify the address in the following format: *<netaddr>.<macaddr>*. Example: a1b2c3d4.aa:bb:cc:dd:ee:ff. |
| *<socket>* | The socket number for this SAP entry. You can specify a Hexadecimal number from 0x0 – 0xFFFF. |
| *<metric>* | The number of hops to the server. You can specify a number from 1 – 14. |
| *<interface-network>* | The interface network associated with this SAP entry. |

## Restrictions

SAP entries that you add using the **ipx add sap** command override dynamically learned entries, regardless of hop count. Moreover, if a dynamic route entry that is associated with the static SAP entry ages out or is deleted, the XP does not advertise the corresponding static SAP entries for the service until it relearns the route.

# ipx find rip

## Purpose

Find an IPX address in the routing table.

## Format

**ipx find rip** *<address>*

## Mode

Enable

## Description

The **ipx find rip** command searches for an IPX address in the routing table.

## Parameter

*<address>*   The IPX network address of this interface. Specify the IPX address using its hexadecimal value.

## Restrictions

None.

## Example

To find an IPX network in the route table:

```
xp(config)# ipx find rip A1B2C3F5
```

# ipx find sap

## Purpose

Find a SAP entry in the routing table.

## Format

**ipx find sap** *<type>*|**all** *<SrvcName>*|**all** *<network>*|**all** *<entrytype>*

## Mode

Enable

## Description

The **ipx find sap** command searches for a SAP entry in the routing table.

## Parameters

*<type>*|**all**     The types of service. Specify the service type using its hexadecimal value. Specify **all** for all types of service.

*<SrvcName>*|**all**

Name of the IPX service. You can use any characters in the name except the following: " * . / : ; < = > ? [ ] \ |

> **Note:**   Lowercase characters are changed to uppercase characters.

> Specify **all** for all IPX services.

*<network>*|**all**

Network on which the service resides. Specify an IPX network address in the following format: *<netaddr.>* Example: a1b2c3d4. Specify **all** for all networks.

*<entrytype>*   The types of entry you want to find. Specify one of the following:

> **all**        Finds static and dynamic SAP entries.

> **dynamic**  Finds only the dynamic SAP entries.

> **static**     Finds only the static SAP entries.

## Restrictions

None.

## Example

To find a SAP entry in the route table:

xp(config)# **ipx find sap 4 FILESERVER a2b2c3d4 dynamic**

# ipx l3-hash

## Purpose

Changes the hashing algorithm used for the L3 IPX lookup table.

## Format

**ipx l3-hash module** *<num>*|**all variant** *<num>*

## Mode

Configure

## Description

The XP's L3 Lookup table is organized as a hash table. The hash function reduces the destination and source MAC addresses to 16-bit quantities each. The hashing algorithm generates a uniform distribution within the MAC address space. However, given a particular set of addresses, the distribution may cause addresses to clump together in the table. To minimize the risk of thrashing in the tables, three variations to the basic hashing algorithm are defined. Only one variation is in effect on a line card at any given time. You can use the ipx **l3-hash** command to set which variation is in effect for a line card.

Swizzling shifts the hash value by a certain amount of bits, producing more random distribution across the L3 lookup table.

Auto-hashing periodically queries the L2 or L3 tables for hash bucket overflow on a port. If there are more overflows than a certain threshold level, auto-hashing will automatically change the hash mode for that port. Eventually a 'best' hash mode for the particular traffic will be found, which will provide a more even distribution across the L2 or L3 lookup table.

## Parameters

**module** *<num>*|**all**
Is a slot number on the XP. Specify any number between 1 and 16. The hashing algorithm change affects all ports on the line card in the slot. The **all** option causes the hashing algorithm to change on all ports on all slits.

**variant** *<num>*
Causes a variation to the basic hashing algorithm to be made. Valid variant numbers are: 0-3, 4-7 (swizzled), and 8 (auto-hashed). If you specify 0, the default hashing algorithm is used.

## Restrictions

None.

## Example

To change the default hashing algorithm used for the L3 lookup table on all ports on slot 7:

xp(config)# **ipx l3-hash module 7 variant 1**

# ipx set interface

## Purpose

Sets the IPX interface parameters.

## Format

**ipx set interface ifname** *<string>*| **ipg** *<num>* | **ripintvl** *<num>* | **sapintvl** *<num>*

## Mode

Configure

## Description

The **ipx set interface** command sets the IPX interface parameters such as interface name, inter-packet gap, broadcast interval for RIP, and broadcast interval for SAP.

## Parameter

| | |
|---|---|
| **ifname** *<string>* | Specify the interface name. |
| **ipg** *<num>* | Specify the Inter Packet Gap (in milliseconds). Specify any number between 30 and 180. |
| **ripintvl** *<num>* | Specify the broadcast interval for RIP (in seconds). Specify any number between 60 and 300. |
| **sapintvl** *<num>* | Specify the broadcast interval for SAP (in seconds). Specify any number between 60 and 300. |

## Restrictions

None.

# ipx set rip

## Purpose

Sets the RIP socket buffer size in bytes or the number of packets per iteration.

## Format

**ipx set rip buffers** *<buffer-size>* | **packets-per-iteration** *<num>*

## Mode

Configure

## Description

The **ipx set rip buffers** command sets the RIP socket buffer size or the number of rip packets processed per iteration.

## Parameters

**buffers** *<buffer-size>*          Specify the socket buffer size in bytes.

**packets-per-iteration** *<num>*    Specify the number of rip packets to be processed per iteration.

## Restrictions

None.

# ipx set ripreq

## Purpose

Sets the buffer size or number of packets per iteration for rip requests.

## Format

**ipx set ripreq buffers** *<buffer-size>* **|packets-per-iteration** *<num>*

## Mode

Configure

## Description

The **ipx set ripreq** command sets the rip buffer size or the number of packets per iteration.

## Parameters

| | |
|---|---|
| **buffers** *<buffer-size>* | Size of the buffer in bytes. |
| **packets-per-iteration** *<num>* | The number of rip request packets processed per iteration. |

## Restrictions

None.

# ipx set sap

## Purpose

Sets various SAP socket parameters.

## Format

**ipx set sap buffers** *<buffer-size>* **|packets-per-iteration** *<num>* **|topn |delay** *<num>*

## Mode

Configure

## Description

The **ipx set sap** command sets various SAP socket parameters.

## Parameter

| | |
|---|---|
| **buffers** *<buffer-size>* | Specify the buffer size in bytes. |
| **packets-per-iteration** *<num>* | The number of SAP packets processed per iteration. |
| **topn** | Send only the nearest N services for a general reply. |
| **delay** *<num>* | Delay multiple to be used for general SAP requests. |

## Restrictions

None.

# ipx set sapgns

## Purpose

Sets parameters for sap get nearest server packets.

## Format

**ipx set sapgns buffers** *<buffer-size>***|round-robin |packets-per-iteration** *<num>*

## Mode

Configure

## Description

The **ipx set sapgns** command sets the following parameters for get nearest server packets:

• sets buffer size

• sets a round-robin scheme for finding servers

## Parameter

| | |
|---|---|
| **buffers** *<buffer-size>* | Specify the buffer size in bytes. |
| **round-robin** | Sets a round-robin scheme for finding the nearest server. |
| **packets-per-iteration** *<num>* | The number of SAP Get Nearest Server packets processed per iteration. |

## Restrictions

None.

# ipx set type20 propagation

## Purpose

Controls the propagation of type 20 packets.

## Format

**ipx set type20 propagation on**

## Mode

Configure

## Description

The **ipx set type20 propagation** command controls the propagation of type 20 packets.

## Parameter

None.

## Restrictions

None.

# ipx set port

## Purpose

Configures an IPX port for forwarding mode.

## Format

**ipx set port forwarding-mode destination-based**

## Mode

Configure

## Description

The **ipx set port forwarding-mode destination-based** command sets up an IPX port to forward traffic based on the packet destination network, node, and socket.

## Parameter

None.

## Restrictions

None.

# ipx show buffers

## Purpose

Display the RIP and SAP socket buffer sizes.

## Format

**ipx show buffers**

## Mode

Enable

## Description

The **ipx show buffers** command displays the RIP and SAP socket buffer sizes.

## Parameters

## Restrictions

None.

# ipx show hash-variant

## Purpose

Display IPX hash variant per module.

## Format

**ipx show hash-variant** *<num>*|**all**

## Mode

Enable

## Description

The **ipx show hash-variant** command displays hash variant information. There are a total of 16 modules using the hash variant feature (1-16).

Enabling hash variant causes a variation to the basic hashing algorithm. This variation will prevent clustering of hash values and will provide a more even distribution across the L3 lookup table. Valid variant numbers are: 0-3, 4-7 (swizzled), and 8 (auto-hashed). The default hashing algorithm is 0.

Swizzling shifts the hash value by a certain amount of bits, causing a more random distribution across the L3 lookup table. Auto-hashing allows the XP to auto-select a hashing algorithm optimized for 'best case' L3 table distribution.

## Parameters

| | |
|---|---|
| *<num>*\|**all** | Specifies the module. Specify any number between 1-16. Specify **all** to display hash variant information for all modules. |

## Restrictions

None.

# Example

To display IPX hash variant information on all 16 modules:

```
xp# ipx show hash-variant all
IPX Module              Hash Variant
-------------------------------------------------
Module 2                variant-3
Module 3                variant-0
Module 4                variant-0
Module 5                variant-0
Module 6                variant-5
Module 7                variant-0
Module 8                variant-0
Module 9                variant-0
Module 10               variant-0
Module 11               variant-2
Module 12               variant-2
Module 13               variant-0
Module 14               variant-0
Module 15               variant-1
```

# ipx show interfaces

## Purpose

Display the configuration of IPX interfaces.

## Format

**ipx show interfaces** *<interface>*|**all [brief]**

## Mode

Enable

## Description

The **ipx show interfaces** command displays the configuration of an IPX interface. If you issue the command without specifying an interface name then the configuration of all IPX interfaces is displayed.

## Parameters

*<interface>*|**all** Name of the IPX interface (for example, xp14) or all interfaces.

**brief**　　　　Shows a brief summary of the interface in tabular form.

## Restrictions

If you specify an interface name, the name must belong to an existing IPX interface.

## Example

To display the configuration of all IPX interfaces:

```
xp# ipx show interfaces all
xp12: flags=9863<UP,BROADCAST,NOTRAILERS,RUNNING,SIMPLEX,LINK0,MULTICAST>
     VLAN: _VLAN-1
     Ports: et.1.7
     IPX: A1B2C3D4.00:E0:63:11:11:11
xp14: flags=9863<UP,BROADCAST,NOTRAILERS,RUNNING,SIMPLEX,LINK0,MULTICAST>
     VLAN: _VLAN-2
     Ports: et.1.2
     IPX: ABCD1234.00:E0:63:11:11:11
```

# ipx show rib destination

## Purpose

Show IPX RIP table output sorted by destination.

## Format

**ipx show rib destination**

## Mode

User

## Description

The **ipx show rib destination** command displays IPX RIP table output sorted by destination.

## Parameters

None.

## Restrictions

None.

# ipx show servers

## Purpose

Show IPX server information.

## Format

**ipx show servers hops|net|name|type**

## Mode

User

## Description

The **ipx show servers** command displays IPX server information sorted by any or all of the optional arguments. Sorting is done based on the order of optional arguments given.

## Parameters

| | |
|---|---|
| **hops** | Shows the number of hops that the service is away. |
| **name** | Shows the Sap service name. |
| **net** | Shows the interface type over which the service arrived. |
| **type** | Shows the Sap service type. |

## Restrictions

None.

# ipx show summary

## Purpose

Displays summary of the IPX RIP/SAP tables.

## Format

**ipx show summary**

## Mode

User

## Description

The **ipx show summary** command displays a summary of the IPX RIP/SAP tables.

## Parameters

None.

## Restrictions

None.

# ipx show routes

## Purpose

Displays information for IPX routes.

## Format

**ipx show routes**

## Mode

User

## Description

The **ipx show routes** command displays information for all IPX routes.

## Parameters

None.

## Restrictions

None.

# ipx show packets-per-iteration

## Purpose

Display the number of IPX control packets processed per iteration.

## Format

**ipx show packets-per-iteration**

## Mode

User

## Description

The **ipx show packets-per-user** command displays the number of IPX control packets processed per iteration for rip, rip request, SAP, and SAP GNS.

## Parameters

None.

## Restrictions

None.

# ipx show stack-queues

## Purpose

Displays information for IPX stack queues.

## Format

**ipx show stack-queues**

## Mode

User

## Description

The **ipx show stack-queues** command displays size and drop information for the IPX stack queues.

## Parameters

None.

## Restrictions

None.

# Chapter 34

# l2-tables Commands

The **l2-tables** commands let you display various L2 tables related to MAC addresses.

## Command Summary

Table 28 lists the **l2-tables** commands. The sections following the table describe the command syntax.

**Table 28. l2-tables commands**

| |
|---|
| **l2-tables show all-flows [vlan** *<VLAN-num>* **[source-mac** *<MACaddr>***]] [undecoded]** |
| **l2-tables show all-macs [verbose [undecoded]]**<br>      **[vlan** *<VLAN-num>***] [source] [destination] [multicast]** |
| **l2-tables show bridge-management** |
| **l2-tables show igmp-mcast-registrations [vlan** *<VLAN-num>***]** |
| **l2-tables show mac** *<MACaddr>* **vlan** *<VLAN-num>* |
| **l2-tables show mac-table-stats** |
| **l2-tables show port-macs port** *<port-list>***\|all-ports**<br>      **[[vlan** *<VLAN-num>***] [source] [destination] [multicast] [undecoded] [no-stats]**<br>      **[verbose] [decode-smarttrunks]]** |
| **l2-tables show vlan-igmp-status vlan** *<VLAN-num>* |
| **l2-tables show system-macs** |

# l2-tables show all-flows

## Purpose

Show all L2 flows (for ports in flow-bridging mode).

## Format

**l2-tables show all-flows [vlan** *<VLAN-num>* **[source-mac** *<MACaddr>***]] [undecoded]**

## Mode

User or Enable

## Description

The **l2-tables show all-flows** command shows all the L2 flows learned by the XP. The XP learns flows on ports that are operating in flow-bridging mode.

## Parameters

**vlan** *<VLAN-num>*
    The VLAN number associated with the flows. The VLAN number can be from 1 – 4095.

**source-mac** *<MACaddr>*
    The source MAC address of the flows. Specify the MAC address in either of the following formats:

    xx:xx:xx:xx:xx:xx
    xxxxxx:xxxxxx

**undecoded**
    Prevents the **XP** from displaying the vendor names with the MAC addresses. Instead, the OUI of each MAC address is displayed "as is," in hexadecimal format. If you do not use this option, the **XP** decodes the OUI and displays the vendor name.

## Restrictions

None.

# l2-tables show all-macs

## Purpose

Show all MAC addresses currently in the L2 tables.

## Format

**l2-tables show all-macs [verbose [undecoded]]**
**[vlan** *<VLAN-num>***] [source] [destination] [multicast]**

## Mode

User or Enable

## Description

The **l2-tables show all-macs** command shows how many MAC addresses the XP has in its L2 tables. You can format the displayed information based on VLAN, source MAC address, destination MAC address or multicast. If you enter the verbose option, the command also shows the individual MAC addresses.

## Parameters

| | |
|---|---|
| **vlan** *<VLAN-num>* | Displays only MAC addresses in the specified VLAN. |
| **source** | Displays only source addresses. |
| **destination** | Displays only destination addresses. |
| **multicast** | Displays only multicast and broadcast addresses. |
| **verbose** | Shows detailed information for each MAC address entry. |
| **undecoded** | Prevents the XP from displaying the vendor names with the MAC addresses. Instead, the OUI of each MAC address is displayed "as is," in hexadecimal format. If you do not use this option, the XP decodes the OUI and displays the vendor name. |

## Restrictions

None.

# l2-tables show bridge-management

## Purpose

Show information about all MAC addresses registered by the system.

## Format

**l2-tables show bridge-management**

## Mode

User or Enable

## Description

The **l2-tables show bridge-management** command shows MAC addresses that have been inserted into the L2 tables for management purposes. Generally, these entries are configured so that a port forwards a frame to the Control Module if the management MAC matches the frame's destination MAC.

An example of a bridge-management MAC is Spanning Tree's bridge group address (0180C2:000000), which is registered in the L2 tables of XP ports on which the Spanning Tree Protocol (STP) is enabled.

## Parameters

None.

## Restrictions

None.

# l2-tables show igmp-mcast-registrations

## Purpose

Show information about multicast MAC addresses registered by IGMP.

## Format

**l2-tables show igmp-mcast-registrations [vlan** *<VLAN-num>***]**

## Mode

User or Enable

## Description

The **l2-tables show igmp-mcast-registrations** command shows the multicast MAC addresses that IGMP has registered with the L2 tables. The XP forwards the multicast MAC addresses only to the ports that IGMP specifies.

## Parameters

**vlan** *<VLAN-num>*    Displays only the multicast MAC addresses registered for the specified VLAN.

## Restrictions

None.

# l2-tables show mac

## Purpose

Show information about a particular MAC address.

## Format

**l2-tables show mac** *<MACaddr>* **vlan** *<VLAN-num>*

## Mode

User or Enable

## Description

The **l2-tables show mac** command shows the port number on which the specified MAC address resides.

## Parameters

*<MACaddr>*        Is a MAC address. You can specify the address in either of the following formats:

xx:xx:xx:xx:xx:xx
xxxxxx:xxxxxx

**vlan** *<VLAN-num>* Displays the MAC address for this VLAN.

## Restrictions

None.

# l2-tables show mac-table-stats

## Purpose

Show statistics for the MAC addresses in the MAC address tables.

## Format

**l2-tables show mac-table-stats**

## Mode

User or Enable

## Description

The **l2-tables show mac-table-stats** command shows statistics for the master MAC address table in the Control Module and the MAC address tables on the individual ports.

## Parameters

None.

## Restrictions

None.

# l2-tables show port-macs

## Purpose

Show information about MACs residing in a port's L2 table.

## Format

**l2-tables show port-macs port** *<port-list>*|**all-ports**
[[**vlan** *<VLAN-num>*] [**source**] [**destination**] [**multicast**] [**undecoded**] [**no-stats**] [**verbose**]
[**decode-smarttrunks**]]

## Mode

User or Enable

## Description

The **l2-tables show port-macs** command shows the information about the learned MAC addresses
in individual L2 MAC address tables. Each port has its own MAC address table. The information
includes the number of source MAc addresses and the number of destination MAC addresses in the
table. If you enter the **verbose** option, the MAC addresses also are displayed.

## Parameters

**port** *<port-list>*|**all-ports**
    Specifies the port(s) for which you want to display MAC address information. You can specify
    a single port or a comma-separated list of ports. If you use the **all-ports** keyword, MAC
    address information is displayed for all ports.

**vlan** *<VLAN-num>*
    Specifies the type of MAC address for which you want to show statistics.

**source**
    Displays statistics for only source addresses.

**destination**
    Displays statistics for only destination addresses.

**multicast**
    Displays statistics for only multicast and broadcast addresses.

**undecoded**
    Displays the MAC addresses in hexadecimal format rather than undecoded format. Undecoded
    format does not show the vendor name in place of the first three hexadecimal digits (example:
    Enterasys:33:44:55). The default is undecoded (example: 00:11:22:33:44:55).

**no-stats**
>    Lists the MAC addresses without displaying any statistics.

**verbose**
>    Shows detailed statistics for each MAC address entry.

**decode-smarttrunks**
>    Shows l2 table information for SmartTRUNK ports.

# Restrictions

None.

# Example

---

xp(**l2-tables-show**)# **port-macs port et.1.2 decode-smarttrunks**


L2 table information for port et.1.2

-----------------------------------------

Number of source MAC addresses: 0

Number of destination MAC addresses: 0

Number of management-configured MAC addresses: 3

Port table capacity: 5888

Port table demand deletion upper & lower thresholds: 95% - 85%

Number of times table usage has reached upper threshold: 0

Number of times buckets have become full: 0

Number of duplicate learning frames: 0

Number of times LG port got out-of-sync: 0

Number of requests to learn a frame on an invalid VLAN: 0

Number of frames received from this switch (possible loop): 0

Aging is enabled

Addresses will be aged-out after 300 seconds

---

# l2-tables show vlan-igmp-status

## Purpose

Show whether IGMP is on or off on a VLAN.

## Format

**l2-tables show vlan-igmp-status vlan** *<VLAN-num>*

## Mode

Enable

## Description

The **l2-tables show vlan-igmp-status** command shows the multicast MAC addresses that IGMP has registered with the L2 tables. This command also shows the ports to which the multicast MAC addresses are forwarded.

**Note:** For IGMP forwarding to occur for a multicast MAC address, IGMP must be enabled on the VLAN with which the MAC address is associated.

## Parameters

**vlan** *<VLAN-num>*    The VLAN number. The VLAN number can be from 1 – 4095.

## Restrictions

None.

# l2-tables show system-macs

## Purpose

To display information about specific MACs registered by the system.

## Format

**l2-tables show system-macs**

## Mode

Enable

## Description

The **l2-tables show system-macs** command displays information about MACs auto-registered by the system (e.g., VRRP MAC addresses).

## Parameters

None.

## Restrictions

None.

## Example

```
xp(l2-tables-show)# system-macs

Name:             VRRP Virtual-MAC
-------           ------------------------
Direction:        Source
Restriction:      force-to-go
VLAN:             30
Source MAC:       00005E:000102
In-List ports:    et.1.(1-2)
```

# Chapter 35

# load-balance Commands

The **load-balance** commands allow you to distribute session load across a pool of servers. These commands provide a way to load balance network traffic to multiple servers.

## Command Summary

Table 29 lists the **load-balance** commands. The sections following the table describe the command syntax.

**Table 29. load-balance commands**

| |
|---|
| **load-balance add host-to-group** *<ipaddr/range>* **group-name** *<group name>* **port** *<port number>* [**weight** *<weight>*] |
| **load-balance add host-to-vip-range** *<range>* **vip-range-name** *<range name>* **port** *<port number>* [**weight** *<weight>*] |
| **load-balance allow access-to-servers client-ip** *<ipaddr/range>* **group-name** *<group name>* |
| **load-balance create group-name** *<group name>* **virtual-ip** *<ipaddr>* **virtual-port** *<port number>* **protocol tcp\|udp** [**persistence-level vpn\| tcp\|ssl\| sticky**] |
| **load-balance create vip-range-name** *<range name>* **vip-range** *<range>* **virtual-port** *<port number>* **protocol tcp\|udp** [**persistence-level vpn\| tcp\|ssl\| sticky**] |
| **load-balance set aging-for-src-maps** *<string>* **aging-time** *<num>* |
| **load-balance set client-proxy-subnet** *<group name>* **subnet** *<num>* |
| **load-balance set ftp-control-port** *<port number>* |
| **load-balance set group-options** *<string>* [**ping-int** *<num>*] [**ping-tries** *<num>*] [**app-int** *<num>*] [**app-tries** *<num>*] [**acv-command** *<string>* **acv-reply** *<string>*] [**acv-quit** *<string>*] [**read-till-index** *<num>*] [**check-port** *<port number>*] |

**Table 29.  load-balance commands (Continued)**

| |
|---|
| **load-balance set group-conn-thresh** *<string>* **limit** *<num>* |
| **load-balance set hash-variant** *<value>* |
| **load-balance set policy-for-group** *<group name>* **policy** *<policy>* |
| **load-balance set server-status server-ip** *<ipaddr/range>* **server-port** *<port number>* **group-name** *<group name>* **status up\|down** |
| **load-balance set server-options** *<ipaddr>* **[port** *<num>*] **[ping-int** *<num>*] **[ping-tries** *<num>*] **[app-int** *<num>*] **[app-tries** *<num>*] **[acv-command** *<string>* **acv-reply** *<string>*] **[acv-quit** *<string>*] **[read-till-index** *<num>*] **[check-port** *<port number>*] |
| **load-balance set vpn-dest-port** *<num>* |
| **load-balance show acv-options [group-name** *<string>*] **[destination-host-ip** *<ipaddr>*] **[destination-host-port** *<num>*] |
| **load-balance show hash-stats** |
| **load-balance show source-mappings client-ip** *<ipaddr>* **virtual-ip** *<ipaddr>* **virtual-port** *<port number>* **destination-host-ip** *<ipaddr>* |
| **load-balance show statistics group-name** *<group name>* **virtual-ip** *<ipaddr>* **virtual-port** *<port number>* |
| **load-balance show virtual-hosts group-name** *<group name>* **virtual-ip** *<ipaddr>* **virtual-port** *<port number>* |

# load-balance add host-to-group

## Purpose

Adds a server to a previously-created group of load balancing servers.

## Format

**load-balance add host-to-group** *<ipaddr/range>* **group-name** *<group name>* **port** *<port number>* [**weight** *<weight>*]

## Mode

Configure

## Description

The **load-balance add host-to-group** command lets you add a server to a server group that was previously-created with the **load-balance create group-name** command.

## Parameters

**host-to-group** *<ipaddr/range>*
> The IP address of the server being added to the group, in the form a.b.c.d or a range of IP addresses in the form 10.10.1.1-10.10.1.3.

**group-name** *<group name>*
> The name of the group of load balancing servers.

**port** *<port number>*
> The port number to be used for load balancing communications for the server being added. Specify a number between 1 and 65535.

**weight** *<weight>*
> This parameter is only valid if you specify the weighted round robin policy for this group of load balancing servers. (The **load-balance set policy-for-group** command specifies the policy for distributing workload to the servers.) The weight determines how many sessions are assigned to this server during its turn in the weighted round robin selection. Specify a number between 1 and 65535. The default value is 1.

## Restrictions

None.

## **Examples**

To add a server 10.10.13.2 to the server group 'service2':

```
xp(config)# load-balance add host-to-group 10.10.13.2 group-name service2 port 80
```

To add servers 10.10.13.3, 10.10.13.4, and 10.10.13.5 to the server group 'service2':

```
xp(config)# load-balance add host-to-group 10.10.13.3-10.10.13.5 group-name service2 port 80
```

The following is an example of specifying the weighted round robin policy for distributing the workload on the server group 'service2.' To add servers 10.10.13.3, 10.10.13.4, and 10.10.13.5 to the server group 'service2,' a weight must be assigned to each server in the group:

```
xp(config)# load-balance set policy-for-group service2 policy weighted-round-robin
xp(config)# load-balance add host-to-group 10.10.13.3 group-name service2 port 80 weight 10
xp(config)# load-balance add host-to-group 10.10.13.4 group-name service2 port 80 weight 100
xp(config)# load-balance add host-to-group 10.10.13.5 group-name service2 port 80 weight 1000
```

# load-balance add host-to-vip-range

## Purpose

Adds a range of servers to a range of virtual IP addresses that were created with the **load-balance create vip-range-name** command.

## Format

**load-balance add host-to-vip-range** *<range>* **vip-range-name** *<range name>* **port** *<port number>* [**weight** *<weight>*]

## Mode

Configure

## Description

The **load-balance add host-to-vip-range** command lets you add a range of servers to a range of virtual IP addresses that were previously created with the **load-balance create vip-range-name** command. This command adds the first server address in the range to the first virtual IP address, the second server address to the second virtual IP address, and so on. Therefore, the number of servers in the specified range must *equal* the number of virtual IP addresses; if you specified 15 virtual IP addresses with the l**oad-balance create vip-range-name** command, then you must specify a range of 15 IP addresses in the **load-balance add host-to-vip-range** command.

## Parameters

**host-to-vip-range** *<range>*
>   The IP range of the servers being added to the range, in the form 10.10.1.1-10.10.1.3. The number of servers in the range must be the same as the number of virtual IP addresses that were previously-created.

**vip-range-name** *<range name>*
>   The name of the range of load balancing servers.

**port** *<port number>*
>   The port number to be used for load balancing communications for the server being added. Specify a number between 1 and 65535.

**weight** *<weight>*
>   This parameter is only valid if you specify the weighted round robin policy for this group of load balancing servers. (The **load-balance set policy-for-group** command specifies the policy for distributing workload to the servers.) The weight determines how many sessions are assigned to this server during its turn in the weighted round robin selection. Specify a number between 1 and 65535. The default value is 1.

## Restrictions

None.

## Examples

The following command creates the server groups 'service1' through 'service15' with virtual IP addresses 207.135.89.1 through 207.135.89.15:

> xp(config)# load-balance create vip-range-name service vip-range 207.135.89.1-207.135.89.15 virtual-port 80 protocol tcp

To add servers 10.10.13.1-10.10.13.15 to the server groups 'service1' through 'service15':

> xp(config)# load-balance add host-to-vip-range 10.10.13.1-10.10.13.15 vip-range-name service port 80

# load-balance allow access-to-servers

## Purpose

Allows specified hosts to access the load balancing servers without address translation.

## Format

**load-balance allow access-to-servers client-ip** *<ipaddr/range>* **group-name** *<group name>*

## Mode

Configure

## Description

Load balancing causes both source and destination addresses to be translated on the XP. It may be undesirable in some cases for a source address to be translated; for example, when data is to be updated on each individual server. The **load-balance allow access-to-servers** command lets you specify the hosts which are allowed to access a group of load balancing servers without address translation.

Note that a host that is allowed to access a group of load balancing servers without address translation *cannot* use the virtual IP address and port to access servers in the group.

## Parameters

**client-ip** *<ipaddr/range>*
> The IP address of the host that is to be granted direct access, in the form a.b.c.d or a range of IP addresses in the form 10.10.1.1-10.10.1.3.

**group-name** *<group name>*
> The name of the group of load balancing servers.

## Restrictions

None.

## Examples

To allow the host 10.23.4.8 to directly access the server group 'service2':

```
xp(config)# load-balance allow access-to-servers client-ip 10.23.4.8 group-name service2
```

# load-balance create group-name

## Purpose

Creates a server group for load balancing.

## Format

**load-balance create group-name** *<group name>* **virtual-ip** *<ipaddr>* **virtual-port** *<port number>* **protocol tcp|udp [persistence-level vpn|tcp|ssl| sticky]**

## Mode

Configure

## Description

The **load-balance create group-name** command lets you create a load balancing server group and specify a unique "virtual" IP address and port number that is used by a client to access any server in the group. You must also specify the protocol (for example, TCP for HTTP and FTP sessions) to be used by the load balancing servers. After you create the group with this command, use the **load-balance add host** command to add specific server systems to the group.

**Note:** If you want to create many groups, each with a virtual IP address, use the **load-balance create vip-range-name** command.

## Parameters

**group-name** *<group name>*

The name of this group of load balancing servers.

**virtual-ip** *<ipaddr>*

The address in the form a.b.c.d that will be used as the IP address for this group.

**virtual-port** *<port number>*

The port number to be used for this group. Specify a number between 1 and 65535.

**Note:** You cannot specify port number 20, as it is the FTP data port. If you create a group on the FTP control port for FTP, an implicit group will be created on port number 20.

**protocol tcp|udp**

The protocol used by this group of load balancing servers.

**persistence-level vpn|tcp|ssl|sticky**

The level of persistence to use for the bindings or connections, either **vpn**, **tcp** (TCP), **ssl** (secure socket layer), or **sticky**. **tcp** is the default if the **persistence-level** parameter is not specified. **Sticky** connections allow a client to connect to the same real server as in previous connections.

## Restrictions

None.

## Examples

To configure the server group 'service2':

```
xp(config)# load-balance create group-name service2 virtual-ip 10.10.100.100 virtual-port 80 protocol tcp
```

# load-balance create vip-range-name

## Purpose

Creates a group of servers for load balancing.

## Format

**load-balance create vip-range-name** *<range name>* **vip-range** *<range>* **virtual-port** *<port number>* **protocol tcp|udp [persistence-level vpn|tcp|ssl| sticky]**

## Mode

Configure

## Description

The **load-balance create vip-range-name** command lets you specify a range of "virtual" IP addresses and a port number that is used by a client to access a server in the virtual IP address range. You must also specify the protocol (for example, TCP for HTTP and FTP sessions) to be used by the load balancing servers.

This command *implicitly* creates separate server groups for each virtual IP address in the specified range. The *<range name>* you specify becomes the base group name. Thus, the command **load-balance create vip-range-name myrange vip-range 207.135.89.1-207.135.89.15 virtual-port 80 protocol tcp** creates the groups 'myrange1' with virtual IP address 207.135.89.1, 'myrange2' with virtual IP address 207.135.89.2, etc. This command allows you to create *multiple* server groups, each with unique virtual IP addresses, whereas the **load-balance create group-name** command allows you to only create a *single* group with a *single* virtual IP address.

After you create groups with this command, you can use the **load-balance add host-to-group** command to identify specific server systems in each group. Or, you can use the **load-balance add host-to-vip-range** command to add a range of server IP addresses to each group.

## Parameters

**vip-range-name** *<range name>*

The base group name for this range of load balancing servers.

**vip-range** *<range>*

The range of virtual IP addresses to be created.

**virtual-port** *<port number>*

The port number to be used for this virtual IP range. Specify a number between 1 and 65535.

**Note:** You cannot specify port number 20, as it is the FTP data port.

**protocol tcp|udp**

The protocol used by this virtual IP range.

**persistence-level vpn|tcp|ssl|sticky**

The level of persistence to use for the bindings, either vpn, **tcp** (TCP), or **ssl** (secure socket layer). **tcp** is the default if the **persistence-level** parameter is not specified. **Sticky** connections allow a client to connect to the same real server as in previous connections.

# Restrictions

None.

# Examples

To configure the server groups 'service1' through 'service15':

```
xp(config)# load-balance create vip-range-name service vip-range 207.135.89.1-207.135.89.15 virtual-port
80 protocol tcp
```

# load-balance set aging-for-src-maps

## Purpose

Set the aging time for the mappings of a group.

## Format

**load-balance set aging-for-src-maps** *<string>* **aging-time** *<num>*

## Mode

Configure

## Description

The **load-balance set aging-for-src-maps** command sets the aging time for server group mapping. Once the aging time has expired, mapping from a client to a selected server within the group is cleared. This allows the user to better configure timeout values to specific server groups instead of using a general timeout value for all groups.

## Parameters

**aging-for-src-maps** *<string>*
Specifies the name of the server group.

**aging-time** *<num>*
Specifies the aging time in minutes. Specify a number between 1 and 4320. The default values depend on which persistence level is selected for a group. Persistence levels vpn and tcp has a default value of 3 minutes. Persistence levels ssl and sticky has a default value of 120 minutes.

## Restrictions

None.

## Example

To set the aging time to 120 minutes for the server group 'group1':

xp(config)# **load-balance set aging-for-src-maps group1 aging-time 120**

# load-balance set client-proxy-subnet

## Purpose

Set the subnet for client address range mapping.

## Format

**load-balance set client-proxy-subnet** *<group name>* **subnet** *<num>*

## Mode

Configure

## Description

The **load-balance set client-proxy-subnet** command sets the subnet used for mapping clients to a specific server group.

## Parameters

**client-proxy-subnet** *<group name>*
    Specifies the name of the server group.

**subnet** *<num>*
    Specifies the subnet. Specify a number between 1 and 31.

## Restrictions

None.

## Example

To set the subnet number to 10 for the server group 'group1':

---

xp(config)# **load-balance set client-proxy-subnet group1 subnet 10**

---

# load-balance set ftp-control-port

## Purpose

Specifies the port for FTP control.

## Format

**load-balance set ftp-control-port** *<port number>*

## Mode

Configure

## Description

File Transfer Protocol (FTP) packets require special handling with load balancing, because IP address information is contained within the FTP packet data. You can use the **load-balance set ftp-control-port** command to specify the port number that is used for FTP control. The default is port 21.

## Parameters

**ftp-control-port** *<port number>*
  Specifies the port number used for FTP control. Specify a value between 1 and 65535.

## Restrictions

None.

## Example

To set the FTP control port to 5000:

```
xp(config)# load-balance set ftp-control-port 5000
```

# load-balance set group-options

## Purpose

Sets options for a virtual group.

## Format

**load-balance set group-options** *<string>* **[ping-int** *<num>*] **[ping-tries** *<num>*] **[app-int** *<num>*] **[app-tries** *<num>*] **[acv-command** *<string>* **acv-reply** *<string>*] **[acv-quit** *<string>*] **[read-till-index** *<num>*] **[check-port** *<port number>*]

## Mode

Configure

## Description

The **load-balance set group-options** command allows you to set various parameters for checking server content of a load balancing server group. This group must already be created with the **load-balance create group-name** command.

## Parameters

**group-options** *<string>*
   The name of the group of load balancing servers.

**ping-int**
   Use this parameter to set the ping interval (seconds) for servers in this group. Specify any value between 5 and 3600. The default value is 5.

**ping-tries**
   Use this parameter to set the number of ping retries before marking the server down. Specify any value between 4 and 255. The default value is 4.

**app-int**
   Use this parameter to set the interval (seconds) between application checks. Specify any value between 5 and 3600. The default value is 15.

**app-tries**
   Use this parameter to set the number of retries before marking the application down. Specify any value between 4 and 255. The default value is 4.

**acv-command**
   Use this parameter to set the application content verification command.

**acv-reply**
   Use this parameter to set the application content verification reply.

**acv-quit**

Use this parameter to set the application content verification command to be sent before closing connection.

**read-till-index**

Specify this parameter to instruct checking till this index for start of 'acv-reply'. Specify a number between 2 and 255.

**check-port**

Use this parameter to set an alternate port for application checks. Specify a number between 1 and 65535.

# Restrictions

None.

# Example

To set the load-balancing group-options for the server group 'service2' to ping every 5 seconds:

xp(config)# **load-balance set group-options service2 ping-int 5**

# load-balance set group-conn-thresh

## Purpose

Sets the connection threshold for each server in this group.

## Format

**load-balance set group-conn-thresh** *<string>* **limit** *<num>*

## Mode

Configure

## Description

The **load-balance set group-options** command allows you to set a limit on how many connections will be supported for a load balancing server group. This number will be the maximum number of connections allowed for each server in the group. This group must already be created with the **load-balance create group-name** command.

## Parameters

**group-conn-thresh** *<string>*
  The name of the group of load balancing servers.

**limit** *<num>*
  Specifies the number of connections that are supported by the server group. Specify any number between 1 and 65535.

## Restrictions

None.

## Example

To set the maximum number of connections to 50000 connections for server group 'service2':

```
xp(config)# load-balance set group-conn-thresh service2 limit 50000
```

# load-balance set hash-variant

## Purpose

Sets the hash variant for calculating the load-balancing mappings index.

## Format

**load-balance set hash-variant** *<value>*

## Mode

Configure

## Description

The **load-balance set hash-variant** command sets the hash variant that is used to calculate the load-balancing mappings index. You will only need to set this variant if the **load-balance show hash-stats** command output shows extremely uneven distribution of hash table entries.

## Parameters

**hash-variant** *<value>*
Specifies the hash variant. Specify 0, 1, or 2. The default value is 0.

## Restrictions

None.

## Example

To set the hash variant to 1:

```
xp(config)# load-balance set hash-variant 1
```

# load-balance set mappings-age-timer

## Purpose

Specifies the timeout for sessions between hosts and load-balancing servers.

## Format

**load-balance set mappings-age-timer** *<timer>*

## Mode

Configure

## Description

A mapping between a host (source) and a load-balancing server (destination) times out after a period of non-use. The **load-balance set mappings-age-timer** command allows you to set the timeout for the mappings. The default is 3 minutes.

## Parameters

**mappings-age-timer** <timer>
   The number of minutes before a source-destination mapping times out. Specify a value between 3-4320.

## Restrictions

None.

## Example

To set the timeout for load-balancing mappings to 720 minutes (12 hours):

```
xp(config)# load-balance set mappings-age-timer 720
```

# load-balance set policy-for-group

## Purpose

Specifies the policy for distributing workload on load-balancing servers.

## Format

**load-balance set policy-for-group** *<group name>* **policy** *<policy>*

## Mode

Configure

## Description

The **load-balance set policy-for-group** command allows you to specify how the XP selects the server that will service a new session. The default policy for distributing workload among the load balancing servers is "round-robin," where the XP selects the server on a rotating basis.

## Parameters

**policy-for-group** *<group name>*
   The name of this group of load balancing servers.

**policy** *<policy>*
   One of the following keywords:

   **round-robin**
      The servers are selected sequentially (round-robin), without regard to the load on individual servers. This is the default policy.

   **weighted-round-robin**
      This policy is a variation of the round-robin policy. The XP still selects servers in turn, but during its turn, each server takes on a number of session connections according to its assigned weight. For example, if 'server1' is assigned a weight of 1000 and 'server2' is assigned a weight of 10, then server1 will be assigned 1000 sessions during its turn and server2 will be assigned 10 sessions during its turn. If you specify this policy, then you should assign different weights to each server in the group with the **load-balance add host-to-group** or the **load-balance add host-to-vip-range** command.

   **least-loaded**
      The server with the fewest number of sessions bound to it is selected to service the new session.

## Restrictions

None.

## Example

To set the load-balancing policy for the server group 'service2' to 'weighted round robin':

xp(config)# **load-balance set policy-for-group service2 policy weighted-round-robin**

# load-balance set server-status

## Purpose

Sets the status of a load balancing server.

## Format

**load-balance set server-status server-ip** *<ipaddr/range>* **server-port** *<port number>*
**group-name** *<group name>* **status up|down**

## Mode

Enable

## Description

The **load-balance set server-status** command allows you to set the status of a load balancing
server. When the status of a server is set to "down," no *new* sessions are directed to that server.
Current sessions on the server are not affected. This command can be used when server content
needs to be updated or to bring one or more backup servers online during peak usage times.

## Parameters

**server-ip** *<ipaddr/range>*
    IP address of the server whose status is to be set.

**server-port** *<port number>*
    Port number of the server whose status is to be set.

**group-name** *<group name>*
    Group name to which this server belongs.

**status up|down**
    Sets the server status to up or down. Setting a server's status to down will cause new sessions
    *not* to be directed to the server.

## Restrictions

None.

# Example

To set the status for the server 10.10.1.2 to 'down':

> xp# **load-balance set server-status server-ip 10.10.1.2 server-port 80 group-name service2 status down**

# load-balance set server-options

## Purpose

Sets options for a destination server.

## Format

**load-balance set server-options** *<string>* [**port** *<num>*] [**ping-int** *<num>*] [**ping-tries** *<num>*]
[**app-int** *<num>*] [**app-tries** *<num>*] [**acv-command** *<string>* **acv-reply** *<string>*] [**acv-quit**
*<string>*] [**read-till-index** *<num>*] [**check-port** *<port number>*]

## Mode

Configure

## Description

The **load-balance set server-options** command allows you to set various parameters for a load
balancing destination server.

## Parameters

**server-options** *<string>*
  The name of the destination server.

**port** *<num>*
  Use this parameter to select the port running the application on the destination server.

**ping-int** *<num>*
  Use this parameter to set the ping interval (seconds) for servers in this group. Specify any
  value between 5 and 3600. The default value is 5.

**ping-tries** *<num>*
  Use this parameter to set the number of ping retries before marking the server down. Specify
  any value between 4 and 255. The default value is 4.

**app-int** *<num>*
  Use this parameter to set the interval (seconds) between application checks. Specify any value
  between 5 and 3600. The default value is 15.

**app-tries** *<num>*
  Use this parameter to set the number of retries before marking the application down. Specify
  any value between 4 and 255. The default value is 4.

**acv-command** *<string>*
  Use this parameter to set the application content verification command.

**acv-reply** *<string>*

Use this parameter to set the application content verification reply.

**acv-quit** *<string>*

Use this parameter to set the application content verification command to be sent before closing connection.

**read-till-index**

Specify this parameter to instruct checking till this index for start of 'acv-reply'. Specify a number between 2 and 255.

**check-port** *<port number>*

Use this parameter to set an alternate port for application checks. Specify a number between 1 and 65535.

## Restrictions

None.

## Example

To set the load-balancing server-options for the destination server 'server2' to ping every 5 seconds:

```
xp(config)# load-balance set server-options server2 ping-int 5
```

# load-balance set vpn-dest-port

## Purpose

Sets the destination port for VPNs.

## Format

**load-balance set vpn-dest-port** *<num>*

## Mode

Configure

## Description

The **load-balance set vpn-dest-port** command allows you to set the destination port number for load balanced VPNs.

## Parameters

**vpn-dest-port** *<num>*
Specifies the destination port number. Specify any number between 1 and 65535. Default is 500.

## Restrictions

Do not specify port 20, since this is the number designated for the FTP data port.

## Example

To set the destination port to port 5000:

```
xp(config)# load-balance set vpn-dest-port 5000
```

# load-balance show acv-options

## Purpose

Displays load balance application content verification (acv) options.

## Format

**load-balance show acv-options [group-name** *<string>*] **[destination-host-ip** *<ipaddr>*]
**[destination-host-port** *<num>*]

## Mode

Enable

## Description

The **load-balance show acv-options** command allows you to display load balancing acv options.

## Parameters

**group-name** *<string>*
   Use this parameter to show acv-options of the servers belonging to this group.

**destination-host-ip** *<ipaddr>*
   Use this parameter to show acv-options of the servers that are a part of the group with this
   Virtual IP.

**destination-host-port** *<num>*
   Use this parameter to show acv-options of servers that are a part of the group with this Virtual
   port. Specify any number between 1 and 65535.

## Restrictions

None.

# load-balance show hash-stats

## Purpose

Displays load balancing hashing statistics.

## Format

**load-balance show hash-stats**

## Mode

Enable

## Description

The **load-balance show hash-stats** command allows you to display load balancing hash statistics.

## Parameters

None.

## Restrictions

None.

## Example

To display hash statistics:

```
xp# load-balance show hash-stats
Total Mappings: 4502

Top 10 Hash Depths:


+---------+---------------+-----------------------+
| Index  |  Hash Depth  | Hash Depth Occurrence |
+---------+---------------+-----------------------+
|1       |0             |11882           |
|2       |1             |4226            |
|3       |2             |138             |
+---------+---------------+-----------------------+

Top 10 Hash Depth Occurrences:


+---------+-----------------------+---------------+
| Index  | Hash Depth Occurrence |  Hash Depth  |
+---------+-----------------------+---------------+
|1       |11882            |0         |
|2       |4226             |1         |
|3       |138              |2         |
+---------+-----------------------+---------------+
```

# load-balance show source-mappings

## Purpose

Displays load balancing source-destination bindings.

## Format

**load-balance show source-mappings client-ip** *<ipaddr>* **virtual-ip** *<ipaddr>* **virtual-port**
*<port number>* **destination-host-ip** *<ipaddr>*

## Mode

Enable

## Description

The **load-balance show source-mappings** command allows you to display load balancing source-
destination bindings.

## Parameters

**client-ip** *<ipaddr>*
    IP address of client whose mappings are to be shown.

**virtual-ip** *<ipaddr>*
    Virtual IP address whose mappings are to be shown.

**virtual-port** *<port number>*
    Virtual port number whose mappings are to be shown.

**destination-host-ip** *<ipaddr>*
    IP address of the destination server whose mappings are to be shown.

## Restrictions

None.

# Example

To display source-destination bindings:

```
xp# load-balance show source-mappings

Current Mappings:

FC: Flow Count
AC: Age Count
SPort: Source Port
VPort: Virtual Port
DPort: Destination Port


+----------------+-----+----------------+-----+----------------+-----+----+----+
| Source Address |Sport| Virtual IP |VPort| Dst. Address |DPort| FC | AC |
+----------------+-----+----------------+-----+----------------+-----+----+----+
|70.1.0.71 |1024 |50.1.1.18 |80 |52.1.1.73 |80 |2 |0 |
|70.1.0.71 |1025 |50.1.1.17 |80 |52.1.1.71 |80 |2 |0 |
|70.1.0.72 |1026 |50.1.1.17 |80 |52.1.1.72 |80 |2 |0 |
|70.1.0.72 |1027 |50.1.1.18 |80 |52.1.1.74 |80 |2 |0 |

4 source mapping(s) displayed.
```

# load-balance show statistics

## Purpose

Displays load balancing statistics.

## Format

**load-balance show statistics group-name** *<group name>* **virtual-ip** *<ipaddr>* **virtual-port** *<port number>*

## Mode

Enable

## Description

The **load-balance show statistics** command allows you to display load balancing statistics.

## Parameters

**group-name** *<group name>*
　　Name of the group whose statistics are to be shown.

**virtual-ip** *<ipaddr>*
　　Virtual IP address whose statistics are to be shown.

**virtual-port** *<port number>*
　　Virtual port number whose statistics are to be shown.

## Restrictions

None.

# Example

To display load balance statistics:

```
xp# load-balance show statistics

Load Balancing Packets Dropped:
      No Such Virtual-IP Packet drop count: 73
      TTL expired Packet drop count: 0

Load Balance Group Statistics:

      Group Name: telnet Virtual-IP: 50.1.1.17 Virtual-Port: 23
            No destination selected Packet drop count          : 0
            Memory Allocation error Packet drop count            : 0
            No forward route found Packet drop count            : 0
            Number of Packets forwarded                   : 23437
            Channel not Load Balancing compliant Packet drop count : 0
            No hosts in group Packet drop count               : 0
            Client in Access List Packet drop count            : 2

      Group Name: http Virtual-IP: 50.1.1.17 Virtual-Port: 80
            No destination selected Packet drop count          : 2
            Memory Allocation error Packet drop count            : 0
            No forward route found Packet drop count            : 0
            Number of Packets forwarded                   : 34429
            Channel not Load Balancing compliant Packet drop count : 0
            No hosts in group Packet drop count               : 0
            Client in Access List Packet drop count            : 1

Statistics of 2 groups shown.
```

# load-balance show virtual-hosts

## Purpose

Displays hosts in a load balancing group.

## Format

**load-balance show virtual-hosts group-name** *<group name>* **virtual-ip** *<ipaddr>* **virtual-port** *<port number>*

## Mode

Enable

## Description

The **load-balance show virtual-hosts** command allows you to display the hosts in a load balancing group.

## Parameters

**group-name** *<group name>*
    The load balancing group that is to be shown.

**virtual-ip** *<ipaddr>*
    IP address of the group that is to be shown.

**virtual-port** *<port number>*
    Port number of the group that is to be shown.

## Restrictions

None.

## Example

To display load balance groups:

```
xp# load-balance show virtual-hosts

Load Balanced Groups:

Flow Mode Count: 0

OS: Operational state of server
AS: Admin state of server


+---------------+---------------+------+-------------+---------+------------+
|  Group Name   |   Virtual IP  | Port | Hosts Added | Hosts Up | Next Index |
+---------------+---------------+------+-------------+---------+------------+
|telnet         |50.1.1.17      |23    |2            |2        |0           |
+---------------+---------------+------+-------------+---------+------------+
+-------+--------------+------+----------------+----+----+-----------+
| Index |   Host IP    | Port |  Client Count  | OS | AS | Load Count |
+-------+--------------+------+----------------+----+----+-----------+
|0      |52.1.1.73     |23    |0               |Up  |Up  |0          |
|1      |52.1.1.74     |23    |0               |Up  |Up  |0          |
+-------+--------------+------+----------------+----+----+-----------+



+---------------+---------------+------+-------------+---------+------------+
|  Group Name   |   Virtual IP  | Port | Hosts Added | Hosts Up | Next Index |
+---------------+---------------+------+-------------+---------+------------+
|http           |50.1.1.17      |80    |2            |2        |0           |
+---------------+---------------+------+-------------+---------+------------+
+-------+--------------+------+----------------+----+----+-----------+
| Index |   Host IP    | Port |  Client Count  | OS | AS | Load Count |
+-------+--------------+------+----------------+----+----+-----------+
|0      |52.1.1.71     |80    |0               |Up  |Up  |0          |
|1      |52.1.1.72     |80    |0               |Up  |Up  |0          |
+-------+--------------+------+----------------+----+----+-----------+
```

# Chapter 36

# logout Command

The **logout** command ends the CLI session.

## Format

**logout**

## Mode

All modes

## Description

The **logout** command ends your CLI session. If you have uncommitted changes in the scratchpad, a message warns you that the changes are not saved and gives you an opportunity to cancel the logout and save the changes.

## Parameters

None.

## Restrictions

None.

# Chapter 37

# mtrace Command

## Purpose

Trace multicast path between a source and a receiver

## Format

**mtrace** *<source>* [**destination** *<IPaddr>*] [**group** *<IPaddr>*] [**max-hops** *<number>*]

## Mode

User

## Description

The **mtrace** command tracks the multicast path from a source to a receiver. A trace probe is sent in a reverse path from the receiver back to the source. As the probe passes from hop to hop, it collects information such as interface address and packet counts from each router. If the **mtrace** command is executed with only the source parameter then a multicast path is calculated from the *source* to the XP. One can examine the multicast path between two external hosts by specifying a receiver instead of using the XP as the default receiver.

## Parameters

| | |
|---|---|
| *<source>* | IP address of the source. |
| **destination** *<IPaddr>* | Destination IP address. |
| **group** *<IPaddr>* | Multicast destination group address. |
| **max-hops** *<number>* | Maximum number of hops to trace (default: 0, range: 0-32) |

## Restrictions

None.

## Examples

To display the multicast path from IP address 2.2.2.2 to the XP:

```
xp# mtrace 2.2.2.2
```

To display the multicast path from 1.1.1.1 to x.y.z.w for the group 239.1.1.1:

```
xp# mtrace 1.1.1.1 destination x.y.z.w group 239.1.1.1
```

# Chapter 38

# multicast Commands

The **multicast** commands let you display information about IP multicast interfaces.

## Command Summary

Table 30 lists the **multicast** commands. The sections following the table describe the command syntax.

**Table 30.  multicast commands**

| |
|---|
| **multicast show interface [***<ipAddr>|<hostname>***]** |
| **multicast show mroutes [child** *<IPaddr>***] [group** *<IPaddr>***] [parent** *<IPaddr>***]** |

# multicast show interface

## Purpose

Display information about IP multicast interfaces.

## Format

**multicast show interface [**<*ipAddr*>|<*hostname*>**]**

## Mode

Enable

## Description

The **multicast show interface** command displays interfaces that are running IGMP or DVMRP.

**Note:** This command is a superset of the **dvmrp show interface** and **igmp show interface** commands.

## Parameters

<*ipAddr*>|<*hostname*>  IP address or hostname of the interface.

## Restrictions

None.

## Examples

To display IP multicast information about interface 10.50.89.90:

xp# **multicast show interface 10.50.89.90**

The following example shows a larger listing.

---

xp# **multicast show interface**

Address: 172.1.1.10 Subnet: 172.1.1/24 Met: 1 Thr: 1
Name: mls15 State: Up Querier Leaf Igmp Dvmrp

Address: 207.135.89.64 Subnet: 207.135.89.0/25 Met: 1 Thr: 1
Name: company State: Up Querier Leaf Igmp Dvmrp
Groups: 224.0.1.12
224.1.127.255
224.0.1.24
224.2.127.253
224.2.127.254

Address: 10.135.89.10 Subnet: 10.135.89.0/25 Met: 1 Thr: 1
Name: test State: Up Querier Igmp Dvmrp
Peer: 10.135.89.67 Flags: 0xe Version: 3.255

Address: 190.1.0.1 Subnet: 190.1/16 Met: 1 Thr: 1
Name: rip State: Dis

Address: 207.135.122.11 Subnet: 207.135.122.8/29 Met: 1 Thr: 1
Name: mbone State: Up Igmp Dvmrp
Peer: 207.135.122.10 Flags: 0xe Version: 3.255
Groups: 224.0.1.11
224.0.1.12
224.2.127.254
239.255.255.255
224.2.127.253

Address: 10.40.1.10 Subnet: 10.40.1/24 Met: 1 Thr: 1
Name: downstream State: Up Dvmrp
Peer: 10.40.1.1 Flags: 0xf Version: 3.255

Address: 10.100.1.1 Subnet: 10.100.1/24 Met: 1 Thr: 1
Name: dan State: Dn Dvmrp

---

# multicast show mroutes

## Purpose

Display the IP multicast routing table.

## Format

**multicast show mroutes [child** *<IPaddr>*] **[group** *<ipaddr>*] **[parent** *<IPaddr>*]

## Mode

Enable

## Description

The **multicast show mroutes** command displays the IP multicast routing table entry for the specified multicast group address.

This command lists all the multicast distribution trees, showing the parent interface (from where the traffic is coming), and the children distribution interfaces (to which the traffic is being forwarded). It would also show any cache information available either in hardware forwarding mechanism or in the main processor (for software based forwarding).

**Note:**    The cache information can be timed out when not enough traffic is present, but multicast routes can still be present. Cache information is presented in number of flows (Layer 4 sessions). Multicast routes stay at least for 5 minutes, while the hardware forwarding mechanism can time out a flow faster.
Any pruning information if present is also shown.

The search can always be narrowed by looking at a particular group, and/or looking at a particular parent interface, and/or looking at a particular child interface.
Multicast routes are not the same as DVMRP routes.

## Parameters

**child** *<ipaddr>*    Address of a child interface.

**group** *<ipaddr>*    Address of a multicast group.

**parent** *<ipaddr>*    Address of a parent interface.

## Restrictions

None.

## Examples

To display the IP multicast route entry for the group 225.0.0.10:

xp# **multicast show mroutes group 225.0.0.10**

Here is a fuller example of the output from this command.

xp# **multicast show mroutes**
Network: 130.207.8/24 Group: 224.2.1.1 Age: 99s
Parent: mbone Child: test
downstream
Source: 130.207.8.82 Pkts: 383 Flows: 1

Network: 131.120.63/24 Group: 224.2.1.1 Age: 63s
Parent: mbone Pruned Child: test Pruned
downstream Pruned
Source: 131.120.63.33 Pkts: 0 Flows: 0

Network: 147.6.65.0/25 Group: 224.2.2.1 Age: 48s
Parent: mbone Pruned Child: test Pruned
downstream Pruned
Source: 147.6.65.38 Pkts: 0 Flows: 0

# Chapter 39

# nat Commands

The **nat** commands allow you to define Network Address Translation (NAT) bindings for local (inside) and global (outside) network addresses.

## Command Summary

Table 31 lists the **nat** commands. The sections following the table describe the command syntax.

**Table 31. nat commands**

| |
|---|
| **nat clear-err-stats out-of-globals\| port-mode** |
| **nat create dynamic local-acl-pool** *<local-acl>* **global-pool** *<ip-addr/ip-addr-range/ip-addr-list>* **[matches-interface** *<interface>*] **[enable-ip-overload]** |
| **nat create static protocol ip\|tcp\|udp local-ip** *<local-ip-addr/address range>* **global-ip** *<global-ip-addr/address range>* **[local-port** *<tcp/udp-local-port>*\|**any] [global-port** *<tcp/udp-global-port>*\|**any]** |
| **nat flush-dynamic-binding all\| pool-specified [local-acl-pool** *<local-acl>*] **[global-pool** *<ip-addr/ip-addr-range>*]\| **type-specified\| owner-specified [dns\| ftp-control\| ftp-data]** |
| **nat set dns-session-timeout** *<num>* |
| **nat set dynamic-binding-timeout** *<minutes>*\|**disable** |
| **nat set ftp-control-port** *<port number>* |
| **nat set ftp-session-timeout** *<minutes>* |
| **nat set interface** *<name>* **inside\|outside** |
| **nat set secure-plus on\| off** |
| **nat show [translations] [timeouts] [statistics]** |

# nat clear-err-stats

## Purpose

Clears NAT error statistics.

## Format

**nat clear-err-stats out-of-globals| port-mode**

## Mode

Enable

## Description

The **nat clear-err-stats** command allows you to clear specific NAT error statistics such as out-of-globals messages in the case of dynamic bindings and port misconfiguration.

## Parameters

**out-of-globals**    Clears error statistics during dynamic binding in the case where there are no more global IP addresses in the global address pool.

**port-mode**    Clears error statistics that occur because of port misconfigurations. Such cases are where the port is set to either destination-based forwarding or host-flow based forwarding.

## Restrictions

None

## Example

To clear all out-of-global error statistics:

```
xp(config)# nat clear-err-stats out-of-globals
```

# nat create dynamic

## Purpose

Defines local and global IP address pools for dynamic address binding.

## Format

**nat create dynamic local-acl-pool** *<local-acl>* **global-pool** *<ip-addr/ip-addr-range/ip-addr-list>*
**[matches-interface** *<interface>*] **[enable-ip-overload]**

## Mode

Configure

## Description

The **nat create dynamic** command lets you specify the local-acl pool and global IP address pool that are to be used for dynamic address binding. With dynamic address translation, IP address bindings last only until the data flow ages out or the dynamic binding is manually deleted. Global IP addresses defined for dynamic translation are reassigned whenever they become free. The local address pool for dynamic bindings are defined via an ACL profile, while the global address pool must be specified as a single IP address, an address range, an IP address and mask, or an IP list. You can also specify multiple global pools for the same local-acl pool, if you have more than one connection to the Internet on different interfaces.

## Parameters

**local-acl-pool** *<local-acl>*

> The ACL that corresponds to the local IP address pool. The ACL may contain either
> **permit** or **deny** keywords. Note that only the source IP address information in the ACL is
> used; other ACL parameters are ignored. Used in the case of address translation from an
> inside private to an outside public network.

**global-pool** *<ip-addr/ip-addr-range/ip-addr-list>*

> The global address pool, defined in one of the following ways:

>> A single IP address in the form a.b.c.d

>> An IP address range in the form 10.10.1.1-10.10.1.50

>> IP address and mask in the form 1.2.0.0/255.255.0.0 or 1.2.3.0/16

>> A list of IP addresses, separated by spaces and enclosed in quotation marks.

> Used in the case of address translation from an inside private to an outside public network.

**Note:** Do not specify more than 64K global addresses.

**matches-interface** *<interface>*

> Specifies the interface to use for multiple global pools. Used in the case of address translation from an inside private to an outside public network.

**enable-ip-overload**

> Enables Port Address Translation (PAT) if no global addresses are available from the pool. This allows many local addresses to be bound to a single global address using port numbers 1024 through 4999 (port numbers are not configurable). With PAT, multiple IP addresses can map to a single IP address with multiple numbers. Used in the case of address translation from an inside private to an outside public network.

**Note:** Protocols like ICMP do not work with the **enable-ip-overload** option. Thus, the **ping** command will not work if this option is used.

# Restrictions

None.

# Examples

To configure address pools for dynamic address bindings, first configure the ACL that corresponds to the local IP address pool. In the following example, the ACL 'lcl' corresponds to IP addresses from 10.1.1.1 to 10.1.1.254:

```
xp(config)# acl lcl permit ip 10.1.1.0/24
```

Then, specify this ACL for the local IP address pool for dynamic address bindings with global addresses 136.1.1.1 to 136.1.1.254:

```
xp(config)# nat create dynamic local-acl-pool lcl global-pool 136.1.1.0/24
```

The following examples show the use of Port Address Translation, where the global pool consists of only two specified IP addresses. In the following example, the ACL 'lcl' corresponds to IP addresses from 10.1.1.1 to 10.1.1.254:

```
xp(config)# acl lcl permit ip 10.1.1.0/24
```

Then, specify this ACL for the local IP address pool for dynamic address bindings with global addresses 136.1.1.1 and 136.1.1.2 with Port Address Translation enabled:

```
xp(config)# nat create dynamic local-acl-pool lcl global-pool 136.1.1.1-136.1.1.2 enable-ip-overload
```

Port numbers 1024 through 4999 can be used for global addresses 136.1.1.1 and 136.1.1.2, so you can have a maximum of about 4000 bindings per global address.

# nat create static

## Purpose

Defines one-to-one binding between a local address and global address.

## Format

**nat create static protocol ip|tcp|udp local-ip** *<local-ip-addr/address range>* **global-ip** *<global-ip-addr/address range>* **[local-port** *<tcp/udp-local-port>*|**any] [global-port** *<tcp/udp-global-port>*|**any]**

## Mode

Configure

## Description

The **nat create static** command lets you define fixed address translation from the local network to the global network. The binding of the local to the global address does not expire until this command is negated. If the protocol used is TCP or UDP, you can also specify port address translation (PAT).

## Parameters

**ip|tcp|udp**
Specifies either only IP address translation, IP and TCP port address translation, or IP and UDP port address translation.

**local-ip** *<local-ip-addr/address range>*

Either a single IP address, in the form a.b.c.d, or an address range, in the form 10.10.1.1-10.10.1.50.

**global-ip** *<global-ip-addr/address range>*

Either a single IP address, in the form a.b.c.d, or an address range, in the form 10.10.1.1-10.10.1.50.

**local-port** *<tcp/udp-local-port>*|**any**

The local TCP or UDP port number. Specify a number between 1-65535, or **any** for no port translation. This parameter is only valid if you specified **tcp** or **udp**.

**Note:** The number of IP addresses in the local range should be equal to the number of IP addresses in the global range.

**global-port** *<tcp/udp-global-port>*|**any**

> The global TCP or UDP port number. Specify a number between 1-65535, or **any** for no port translation. This parameter is only valid if you specified **tcp** or udp.

## Restrictions

None.

## Examples

To configure a static binding of a local and a global IP address:

```
xp(config)# nat create static protocol ip local-ip 10.1.1.13 global-ip 136.1.1.13
```

To configure a static binding of local and global IP address ranges:

```
xp(config)# nat create static protocol ip local-ip 10.1.1.1-10.1.1.50 global-ip 136.1.1.1-136.1.1.50
```

To configure a static binding of local and global IP and UDP port addresses:

```
xp(config)# nat create static local-ip 10.1.1.13 global-ip 136.1.1.13 local-port 18 global-port 36
protocol udp
```

# nat flush-dynamic-binding

## Purpose

Deletes dynamic NAT bindings.

## Format

**nat flush-dynamic-binding all| pool-specified** [**local-acl-pool** *<local-acl>*] [**global-pool** *<ip-addr/ip-addr-range/ ip-addr-list>*]| **type-specified| owner-specified [dns| ftp-control| ftp-data]**

## Mode

Enable

## Description

The **nat flush-dynamic-binding** command deletes dynamic address bindings. You can delete the dynamic address bindings for specific address pools or delete all dynamic bindings.

## Parameters

**all**
Deletes all NAT dynamic bindings.

**pool-specified**
Deletes NAT dynamic bindings based on local and global acl pools.

  **local-acl-pool** *<local-acl>*
  The ACL that corresponds to the local IP address pool.

  **global-pool** *<ip-addr/ip-addr-range>*
  The global address pool, defined in one of the following ways:

      A single IP address in the form a.b.c.d

      An IP address range in the form 10.10.1.1-10.10.1.50

      IP address and mask in the form 1.2.0.0/255.255.0.0 or 1.2.3.0/16

**type-specified**
Deletes NAT dynamic bindings based on the type of dynamic binding.

**owner-specified**
Deletes NAT dynamic bindings based on the type of application utilizing the bindings.

  **dns**
  Deletes NAT dynamic bindings created by DNS (domain name server).

**ftp-control**
Deletes NAT dynamic bindings created by FTP control connection.

**ftp-data**
Deletes NAT dynamic bindings created by FTP data connection.

# Restrictions

None.

# Examples

To delete dynamic address bindings for the local address pool that corresponds to the ACL 'lcl' and the global address pool that corresponds to 136.1.1.1-136.1.1.254:

```
xp# nat flush-dynamic-binding pool-specified local-acl-pool lcl global-pool 136.1.1.0/24
```

To delete all dynamic address bindings:

```
xp# nat flush-dynamic-binding all
```

# nat set dns-session-timeout

## Purpose

Specifies the timeout for the DNS session.

## Format

**nat set dns-session-timeout** *<num>*

## Mode

Configure

## Description

The **nat set dns-session-timeout** command sets the timeout for DNS application-specific sessions.

The default DNS session timeout is **30** minutes.

## Parameters

*<num>*      The timeout for the DNS session, in minutes. Specify a value between 3-2880. Default is 30 minutes.

## Restrictions

None.

## Example

To set the DNS session timeout to 60 minutes:

```
xp(config)# nat set dns-session-timeout 60
```

# nat set dynamic-binding-timeout

## Purpose

Sets the timeout for dynamic NAT binding.

## Format

**nat set dynamic-binding-timeout** *<minutes>*|**disable**

## Mode

Configure

## Description

Dynamic address bindings time out after a period of non-use. The **nat set dynamic-binding-timeout** command lets you set the timeout for dynamic address bindings. The default is 1440 minutes (24 hours).

## Parameters

*<minutes>*  The number of minutes before an dynamic address binding times out. Specify a value between 3-2880.

**disable**  Disables timeout of dynamic address bindings.

## Restrictions

None

## Example

To set the timeout for dynamic address bindings to 3 minutes:

```
xp(config)# nat set dynamic-binding-timeout 3
```

To disable timeout of dynamic address bindings:

```
xp(config)# nat set dynamic-binding-timeout disable
```

# nat set ftp-control-port

## Purpose

Specifies the port for FTP control.

## Format

**nat set ftp-control-port** *<port number>*

## Mode

Configure

## Description

File Transfer Protocol (FTP) packets require special handling with NAT, because IP address information is contained within the FTP packet data. You can use the **nat set ftp-control-port** command to specify the port number that is used for FTP control.

The default port for FTP control is port **21**.

## Parameters

*<port number>*
    Specifies the port number used for FTP control. Specify a value between 1 and 65535.

## Restrictions

None.

## Example

To set the FTP control port to 100:

```
xp(config)# nat set ftp-control-port 100
```

# nat set ftp-session-timeout

## Purpose

Specifies the timeout for the FTP session.

## Format

**nat set ftp-session-timeout** *<minutes>*

## Mode

Configure

## Description

The **nat set ftp-session-timeout** command sets the timeout for the FTP session.

The default FTP session timeout is **30** minutes.

## Parameters

*<minutes>*    The timeout for the FTP session. Specify a value between 3-2880.

## Restrictions

None.

## Example

To set the FTP session timeout to 60 minutes:

```
xp(config)# nat set ftp-session-timeout 60
```

# nat set interface

## Purpose

Defines an interface as inside or outside for NAT address translation.

## Format

**nat set interface** *<name>* **inside|outside**

## Mode

Configure

## Description

The **nat set interface** command allows you to define an interface as inside or outside. When NAT is enabled using the **nat create static** or **nat create dynamic** command, address translation is applied only to packets that arrive on these interfaces.

## Parameters

*<name>*
   Is the name of the interface to which address translation will apply.

**inside|outside**
   Specifies the interface(s) as inside or outside.

## Restrictions

None.

## Examples

To create the interface '10-net' and define it as an inside interface for NAT:

```
xp(config)# interface create ip 10-net address-netmask 10.1.1.1/24 port et.2.1
xp(config)# nat set interface 10-net inside
```

To create the interface '192-net' and define it as an outside interface for NAT:

```
xp(config)# interface create ip 192-net address-netmask 192.50.20.1/24 port et.2.2
xp(config)# nat set interface 192-net outside
```

# nat set secure-plus

## Purpose

Block IP addresses defined as *inside* addresses from ever appearing on an *outside* interface.

## Format

**nat set secure-plus on|off**

## Mode

Configure

## Description

The **nat set secure-plus** command forces all flows from the *inside* network or the *outside* network to go through network address translation. Packets that would otherwise bypass NAT and transmit untranslated are dropped.

## Parameters

**on|off**
Specify on to enable secure-plus feature. Specify off to disable secure-plus feature.

## Restrictions

None.

# nat show

## Purpose

Displays NAT information.

## Format

**nat show [translations** *<type>***] [timeouts] [statistics]**

## Mode

Enable

## Description

The **nat show** command allows you to display NAT address translations, timeouts, and statistics.

## Parameters

**translations** *<type>*
Displays NAT translations. Specify one of the following keywords:

**all**
Shows all translations.

**type static|dynamic|overloaded-dynamic**
Shows static, dynamic, or IP overloaded dynamic translations.

**owner dns|ftp-control|ftp-data**
Shows dynamic translation created by dns, overloaded dynamic ftp control connection translations, or overloaded dynamic ftp data connection translations.

**local-filter-in** *<local-ip-addr>*
Shows translations of the specified local IP address. The IP address must be in the form a.b.c.d.

**global-filter-in** *<global-ip-addr>*
Shows translations of the specified global IP address. The IP address must be in the form a.b.c.d.

**timeouts**
Displays the current set of timeouts.

**statistics**
Displays NAT statistics.

**verbose**
Displays NAT translations in greater detail.

## Restrictions

None.

## Examples

To display active NAT translations:

```
xp# nat show translations all

Proto Local/Inside       Global/Outside IP    Type        No. of flows
----- -------------------- -------------------- --------------- ------------
TCP   15.15.15.15:1896     100.1.1.1:1026       Dyn. ovr.    2
TCP   15.15.15.15:1897     100.1.1.1:1028       Dyn. ovr.    0
TCP   15.15.15.15:1894     100.1.1.1:1024       Dyn. ovr.    2
TCP   15.15.15.15:1895     100.1.1.1:1025       Dyn. ovr.    2
TCP   15.15.15.15:1892     100.1.1.1:1027       Dyn. ovr.    0
IP    10.10.10.10:*        200.1.1.1:*          Dynamic      20
IP    4.4.4.4:*            202.1.1.1:*          Static       789
```

If there are many active NAT translations, you can filter the display by specifying **local-filter-in**, **global-filter-in**, or **type** parameters for the **nat show translations** command.

To display NAT timeouts:

```
xp# nat show timeouts

All values in minutes
Flow    FTP Sess.  DNS Sess.  Dyn. Sess.
------  ---------  ---------  ----------
2       30         30         1440
```

To display NAT statistics:

```
NAT current status
------------------
active

NAT secure-plus status
----------------------
inactive

Interface Information
---------------------
No. of Interfaces: 1
Interface: 20net, configured as nat: outside

STATIC Binding Information
--------------------------
No. of Static Bindings: 1

DYNAMIC Binding Information
--------------------------
No. of Dynamic Bindings: None

Local Acl pool  Max. globals  Globals used  Max. ports  Ports Used  Out of globals/ports
-------------- ------------ ------------ ---------- ---------- ----
local           1          0        3975      0      0
```

# Chapter 40

# negate Command

The **negate** command negates a command in the scratchpad or the active configuration.

## Format

**negate** *<cmd-number>* **[scratchpad|active-config]**

## Mode

Configure

## Description

The **negate** command allows you to negate one or more commands by specifying the command number of the commands you want to negate. The command number for each command can be found using the Configure mode **show** command. You can negate commands from the active running system or non-committed commands from the scratchpad. By default, if you do not specify **active-config** or **scratchpad**, the command to negate is assumed to be in the **active-config**.

## Parameters

*<cmd-number>*    The number of the command(s) you want to negate. Use the **show** command to display the command numbers.

**active-config**    Negate the specified command from the active running system.

**scratchpad**    Negate the specified non-committed command from the scratchpad.

## Restrictions

The specified command number must represent a command that exists.

## Examples

To negate command 23 from the active configuration:

```
xp# negate 23
```

To negate commands 3, 5, 6 and 7 from the scratchpad:

```
xp# negate 3,5-7 scratchpad
```

# Chapter 41

# netflow Commands

NetFlow data characterizes the movement of IP traffic on a network. NetFlow allows you to collect information about packets sent through the network and to use this data for detailed traffic analysis, network planning, network monitoring, usage-based billing, and for use by third party mediation vendors, network management tools, and billing companies. Combined with a network data analyzer, the NetFlow data you collect can help enterprise engineers, capacity planners, marketing groups, and network management better understand network traffic patterns and isolate areas in need of improvement. NetFlow traffic describes source and destination addresses, autonomous system numbers, port addresses, time of day, number of packets, total bytes, and type of service.

**Note:** In order to run NetFlow, you must *enable* SNMP.

**Note:** **Do not** run NetFlow and RMON Professional simultaneously.

## Command Summary

Table 32 lists the **NetFlow** commands. The sections following the table describe the command syntax.

**Table 32. NetFlow commands**

| |
|---|
| **netflow clear statistics** |
| **netflow enable** |
| **netflow set deadtime** *<val>* |
| **netflow set flow-destination-port** *<port-number>* |
| **netflow set interval** *<minutes>* |
| **netflow set memory** *<size>* |
| **netflow set ports** *<port list>* \| **all-ports** |
| **netflow set priority** *<number>* \|**low** \|**medium** \|**high** |
| **netflow set retries** *<number>* |

| |
|---|
| **netflow set server** *<server_IPaddr>* **[timeout** *<number>***][retries** *<number>***]** **[deadtime** *<number>***][flow-destination-port** *<number>***]** |
| **netflow set timeout** *<number>* |
| **netflow show configuration| server| statistics| status| all** |

# netflow clear statistics

## Purpose

Clear many of the NetFlow statistics kept by the XP. *Optional*.

## Format

**netflow clear statistics**

## Mode

Enable.

## Description

The **netflow clear statistics** command will clear the NetFlow session statistics kept by the XP (available through *netflow show* on page 605). Clearing statistics will not affect the netflow process or the data packets sent from the XP to the server.

## Parameters

None.

## Restrictions

NetFlow cannot monitor traffic exits in a multicast environment. If you want to collect statistics on traffic moving through your system, you must monitor the input port(s).

.

# netflow enable

## Purpose

Enable NetFlow agent. *Required*.

## Format

**netflow enable**

## Mode

Configure.

## Description

The netflow enable command starts the NetFlow agent.

## Parameters

None.

## Restrictions

- You must configure at least one NetFlow server before you can execute this command successfully. See *netflow set server* on page 602.

- You must configure **netflow set ports** before you can monitor any ports.

- **Do not** run NetFlow and RMON simultaneously.

- In order to run NetFlow, you must *enable* SNMP.

# netflow set deadtime

## Purpose

Changes the default deadtime parameter for NetFlow. *Optional*.

## Format

**netflow set deadtime** *<number>*

## Mode

Configure.

## Description

The **netflow set deadtime** command causes the XP to mark as "dead" any NetFlow server that fails to respond to a detection request, thus avoiding the wait for the request to timeout before trying the next configured server. Additional requests for a NetFlow server marked as "dead" will skip the server for the duration of minutes specified. If all servers are marked "dead," NetFlow will not send information to any server.

## Parameters

*<number>*
> The length of time (in minutes) for transaction requests to skip over a NetFlow server—up to a maximum of 1440 minutes (24 hours).

**Note:** The parameter above is used for data collector *detection* only—it does not indicate collector activity (i.e., this parameter determines whether or not a collector exists).

**Note:** If the server you used does not receive all of the packets you sent, the server may have stopped working during packet transmission.

## Restrictions

None.

# netflow set flow-destination-port

## Purpose

Sets the IP address of the default flow destination port of a specific NetFlow server. *Optional*.

## Format

**netflow set flow-destination-port** *<port-number>*

## Mode

Configure.

## Description

The **netflow set flow-destination-port** command sets the default flow destination port through which the XP will send its data. The default netflow flow-destination port number is 2055.

**Note:** If you change the default value for the flow-destination port, the new value must correspond with the port ID on the collector you will use.

## Parameters

*<port-number>*
   The port through which to send the NetFlow packets.

## Restrictions

None.

# netflow set interval

## Purpose

Changes the default interval parameter for NetFlow. *Optional*.

## Format

**netflow set interval** *<minutes>*

## Mode

Configure.

## Description

The **netflow set interval** command allows you to set the time interval at which all currently monitored flows will report updated information to the collector. NetFlow staggers the packet reporting throughout the entire period of the interval to reduce congestion and prevent packet loss. As flows *expire*, they will report to the collector regardless of the time interval specified.

## Parameters

**Interval** *<minutes>*
The time in minutes (1-1440) for an interval. The default interval is 30 minutes.

## Restrictions

None.

# netflow set memory

## Purpose

Changes the default memory settings for NetFlow. *Optional*.

## Format

**netflow set memory** *<size>*

## Mode

Configure.

## Description

The **netflow set memory** command allows you to set the maximum amount of memory used by the NetFlow agent. This limits the maximum number of flows and buffered datagrams supported by the NetFlow agent.

## Parameters

**memory** *<size>*
Set the amount of memory in kilobytes (100–hardware limit) you will use. The default value is 450.

## Restrictions

None.

# netflow set ports

## Purpose

Configure the ports that will participate in the NetFlow accounting. *Required.*

## Format

**netflow set ports** *<port list>*/**all-ports**

## Mode

Configure.

## Description

The **netflow set ports** command is used to identify which ports the NetFlow agent will monitor.

## Parameters

**ports** *<port list>*
    Specifies the ports participating in the NetFlow feature.

**all-ports**
    Enables all ports.

## Restrictions

None.

## Example

```
xp# netflow set ports et.3.1-4
```

# netflow set priority

## Purpose

Changes the default priority levels of NetFlow tasks. *Optional*.

## Format

**netflow set priority** *<number>* | **low** | **medium** | **high**

## Mode

Configure.

## Description

The **netflow set priority** command allows you to set the operational priority of NetFlow tasks. A higher priority indicates that the NetFlow tasks will have a chance to run more often. If you specify a numerical value, the lower the value of the number, the higher its task priority. Negate this command to set the NetFlow tasks priorities to their default values (between low and medium). This command is not commonly used.

## Parameters

**Priority** *<number>*
    Specify this parameter to set the task priority to a numerical value (from 50 to 250). The lower the value, the higher its priority.

**low**
    Set the task priority to low.

**medium**
    Set the task priority to medium.

**high**
    Set the task priority to high.

## Restrictions

None.

# netflow set retries

## Purpose

Changes the default retry Parameter for NetFlow. *Optional*.

## Format

**netflow set retries** *<number>*

## Mode

Configure.

## Description

The **netflow set retries** command allows you to set the default number of times to attempt to connect to a NetFlow server before moving on to the next configured server.

## Parameters

**retries** *<number>*
    The number of times (1-10) to try contacting a particular NetFlow server.

**Note:**    The parameter above is used for data collector *detection* only—it does not indicate collector activity (i.e., this parameter determines whether or not a collector exists).

## Restrictions

None.

# netflow set server

## Purpose

Sets the IP address of a NetFlow server and allows you to configure NetFlow-related parameters for the server. *Required.*

## Format

**netflow set server** *<server_IPaddr>* **[timeout** *<number>*]**[retries** *<number>*]
**[deadtime** *<number>*]**[flow-destination-port** *<number>*]

## Mode

Configure.

## Description

The **netflow set server** command allows you to set NetFlow-related parameters—even override the default settings—on a *server-by-server* basis only (by using the IP address of a specific NetFlow server). If a server is unavailable, the XP will try another server defined on the list. You may define up to 3 servers for the XP at one time.

## Parameters

**server** *<server_IPaddr>*
    The IP address of a specific NetFlow server. Although you can define up to three NetFlow servers, you may enter only one server per **netflow set server** command.

**timeout** *<number>*
    The maximum time in seconds (1-9) to wait for a NetFlow server to reply. The default is 3 seconds.

**retries** *<number>*
    The number of times (1-10) to try contacting a NetFlow server. The default is 3 retries.

**deadtime** *<number>*
    The length of time for transaction requests to skip over a NetFlow server—up to a maximum of 1440 minutes (24 hours). The default dead time is 1. This command causes the XP to mark as "dead" any NetFlow server that fails to respond to authentication requests, thus avoiding the wait for the request to timeout before trying the next configured server. Additional requests for a NetFlow server marked as "dead" will skip the server for the duration of minutes specified. If all servers are marked "dead," NetFlow will not send information to any server.

**Note:** The *timeout*, *retries*, and *deadtime* parameters are used for data collector *detection* only—they do not indicate collector activity (i.e., these parameters determine whether or not a collector exists). See also *netflow set timeout* .

**flow-destination-port** *<number>*
> The destination port number. The default NetFlow destination port number is 2055.

**Note:** If you change the default value for the flow-destination port, the new value must correspond with the port ID on the collector you will use.

## Restrictions

None.

# netflow set timeout

## Purpose

Changes the default timeout parameters for NetFlow. *Optional*.

## Format

**netflow set timeout** *<number>*

## Mode

Configure.

## Description

The **netflow set timeout** command allows you to set the default time that the XP waits for a reply from an available NetFlow server. This command helps *detect* the collector only, it does not monitor collector activity. See also *netflow set server*

## Parameters

**timeout** *<number>*
   The maximum time (in seconds) to wait for a NetFlow server to reply. The default is 3 seconds.

**Note:**   NetFlow uses the parameter above for data collector *detection* only—it does not indicate collector activity (i.e., this parameter determines whether or not a collector exists).

## Restrictions

None.

# netflow show

## Purpose

Displays all pertinent NetFlow agent data including configuration, server, statistics, and status.

## Format

**netflow show configuration| server| statistics| status| all**

## Mode

Enable.

## Description

The **netflow show** command allows you to show the configuration, server, statistics, and status, of the NetFlow agent.

## Parameters

| | |
|---|---|
| **configuration** | Show configured values:<br>Whole flow table interval<br>Ports included in NetFlow<br>Maximum memory |
| **server** | Show server information:<br>IP Address<br>UDP port number |
| **statistics** | Show NetFlow statistics:<br>Current flow count<br>Number of reported flow updates<br>Number of sent PDUs<br>Memory consumed dropped PDUs |

**Note:** NetFlow cannot monitor traffic exits in a multicast environment. If you want to collect statistics on traffic moving through your system, you must monitor the input port(s).

| | |
|---|---|
| **status** | Show NetFlow status:<br>Current NetFlow sequence number<br>State of the NetFlow agent (on/off)<br>Agent start time |
| **all** | Show all of the above. |

## Restrictions

None.

## Examples

```
xp# netflow show all
NetFlow Status:
NetFlow is ENABLED

Netflow Default Configuration:
    Default Server Timeout      : 3
    Default Deadtime            : 0
    Default Retries             : 3
    Default Port                : 2054
    Netflow task priority       : 230

Netflow Statistics:
    Last Expired Interval        : 2001-05-29 06:56:13
    Reporting Interval           : 2
    Next reporting interval is at : 2001-05-29 07:01:51

    Maximum memory bytes         : 01000000
    Current memory bytes         : 00040564
    Historical memory bytes      : 00071428
    # reported records           : 00014062
    Total # reported packets     : 00000511
    discarded flows              : 00000000
    Next flow sequence           : 00014063
    # of sends to collector      : 00000511

    Current flow count           : 00000013
    Pending deleted flow count   : 00000000
    Netflow Create Flows         : 00003640
    Netflow Delete Flows         : 00002895
    Netflow update Flows         : 00011167

xp Flow Statistics
    Current Allocated Flows    : 00003960  TTL Allocated Flows     : 00003960
    Current de-allocated Flows : 00003214  TTL de-allocated Flows  : 00003214
    Current current flows      : 00000746  TTL xp current flows    : 00000746

Ports enabled for Netflow:
    ifIndex    Name     In Flows    Out Flow    Monitored
    ------------------------------------------------------------------------
     0001     et.1.1    00000000    00000000    on
     0002     et.1.2    00000000    00000000    on
     0003     et.1.3    00003090    00000256    on
     0004     et.1.4    00000256    00003090    on
     0009     et.3.1    00000038    00000256    on
     0010     et.3.2    00000256    00000038    on
     0011     et.3.3    00000000    00000000    on
     0012     et.3.4    00000000    00000000    on
     0018     gi.7.2    00000000    00000000    on
    ------------------------------------------------------------------------
Number of ports being monitored: 9

NETFLOW servers listed in order of priority:

Server:          134.141.135.153
Accounting Port:    <Default>
Timeout (seconds):  <Default>
Retries:            <Default>
Deadtime (minutes): <Default>
Server Timeouts:    0
```

# Chapter 42

# no Command

The **no** command removes a configuration command from the active configuration of the running system.

## Format

**no** *<command-to-negate>*

## Mode

Configure

## Description

The **no** command allows you to negate a previously executed command. Following the keyword **no**, one can specify the command to negate in its entirety or use the wildcard character (**\***) to negate a group of commands. In addition to the **no** command, one can also use the **negate** command to negate a group of commands using the command number.

## Parameters

*<command>*    The CLI command you want to negate. You do not have to enter the entire command. You can use the wildcard character, *, to negate matching commands. For example, if you specify "no acl 100 *" then all commands starting with the words "acl 100" will be negated.

## Restrictions

The command to negate must already be in the active configuration. You cannot negate a command that hasn't been entered.

## Examples

To negate the specified **arp add** command, enter the following. By negating this command, the system removes the ARP entry for *nfs2* from the ARP table.

```
xp# no arp add nfs2 macaddr 080020:13a09f exit-port et.3.1
```

To negate all commands starting with the word "acl":

```
xp# no acl *
```

# Chapter 43

# ntp Commands

The **ntp** commands configure and display the characteristics of the NTP (Network Time Protocol) client.

## Command Summary

Table 33 lists the **ntp** commands. The sections following the table describe the command syntax.

**Table 33.  ntp commands**

| |
|---|
| **ntp set server** *\<host>* **[interval** *\<minutes>*] **[source** *\<ipaddr>*] **[version** *\<num>*] |
| **ntp show all** |
| **ntp synchronize server** *\<host>* |

# ntp set server

## Purpose

Specifies the NTP server against which the XP is to synchronize its clock.

## Format

**ntp set server** *<host>* **[interval** *<minutes>***] [source** *<ipaddr>***] [version** *<num>***]**

## Mode

Configure

## Description

The **ntp set server** command instructs the XP's NTP client to periodically synchronize its clock. By default, the XP specifies an NTPv3 client that sends a synchronization packet to the server every 60 minutes. This means the XP will attempt to set its own clock against the server once every hour. The synchronization interval as well as the NTP version number can be changed.

**Note:** To ensure that NTP has the correct time, you need to specify the time zone, as well. You can set the time zone by using the **system set timezone** command. When specifying daylight saving time, you'll need to use the **system set daylight-saving** command.

## Parameters

| | |
|---|---|
| **server** *<host>* | Specifies the hostname or the IP address of the NTP server. |
| **interval** *<minutes>* | Specifies how often (in minutes) the XP should synchronize with the server. The default synchronization interval is 60 minutes. Valid interval is between 1 minute to 10080 minutes (7 days). |
| **source** *<ipaddr>* | Specifies the source IP address to be used by the XP for sending the NTP packet. The IP address must belong to one of the interfaces on the XP. |
| **version** *<num>* | Specifies the NTP version number of the packet. The default version number is 3 (NTPv3). Valid value is 1-3. |

## Restrictions

None.

## Examples

To send NTP packets to the NTP server 10.13.1.1 with default parameters:

xp(config)# **ntp set server 10.13.1.1**

To synchronize with a NTP server every 15 minutes with a specific source IP address:

xp(config)# **ntp set server 10.13.1.1 interval 15 source 10.15.3.3**

# ntp show all

## Purpose

Display NTP information about the XP.

## Format

**ntp show all**

## Mode

Enable

## Description

The **ntp show all** command displays various NTP information about the XP, for example, the last time a successful synchronization was made, synchronization interval, NTP version number, etc.

## Parameters

None.

## Restrictions

None.

## Example

```
xp# ntp show all
NTP status:
        Synchronization interval: 60 mins
        Version: NTPv3
        Last successful contact: Mon Jan 22 23:08:15 2001
```

# ntp synchronize server

## Purpose

Manually force the XP to immediately synchronize with a NTP server.

## Format

**ntp synchronize server** *<host>*

## Mode

Enable

## Description

The **ntp synchronize server** command forces the XP to immediately synchronize its clock with the NTP server. Unlike the Configuration mode **ntp set server** command, this Enable mode command does not send periodic synchronization packets to the server. Instead, each time this command is executed, the XP synchronizes itself with the server. To have the XP synchronizes itself periodically, use the **ntp set server** command.

## Parameters

*<host>*                    Specifies the hostname or the IP address of the NTP server.

## Restrictions

None.

## Examples

To synchronize the XP against the NTP server 10.13.1.1:

```
xp(config)# ntp synchronize server 10.13.1.1
%NTP-I-TIMESYNC, Time synchronized to Mon Jan 22 23:11:28 2001
```

# Chapter 44

# ospf Commands

The **ospf** commands let you display and set parameters for the Open Shortest Path First (OSPF) routing protocol.

## Command Summary

Table 34 lists the **ospf** commands. The sections following the table describe the command syntax.

**Table 34.  ospf commands**

| |
|---|
| **ospf add interface** *<interfacename-or-IPaddr>* **to-area** *<area-addr>*\|**backbone** **[type broadcast\|non-broadcast\|point-to-multipoint]** |
| **ospf add nbma-neighbor** *<hostname-or-IPaddr>* **to-interface** *<hostname-or-IPaddr>* **[eligible]** |
| **ospf add stub-host to-area** *<area-addr>*\|**backbone cost** *<num>* |
| **ospf add network \| summary-range** *<IPaddr/mask>* **to-area** *<area-addr>* **[restrict]** **[host-net]** |
| **ospf add pmp-neighbor** *<IPaddr>* **to-interface** *<hostname-or-IPaddr>* |
| **ospf add virtual-link** *<number-or-string>* **neighbor** *<IPaddr>* **transit-area** *<area-num>* |
| **ospf create area** *<area-num>* **[backbone]** |
| **ospf create-monitor destination** *<hostname-or-IPaddr>* |
| **ospf monitor** *<option-list>* |
| **ospf set area** *<area-num>* **[stub] [stub-cost** *<num>*] **[authentication-method none\|simple\|md5] [no-summary]** |

**Table 34.  ospf commands (Continued)**

| |
|---|
| **ospf set ase-defaults {[preference** *<num>*] **|[cost** *<num>*] **|**<br>    **[type** *<num>*]**| [inherit-metric]}** |
| **ospf set export-interval** *<num>* |
| **ospf set export-limit** *<num>* |
| **ospf set interface** *<interfacename-or-IPaddr>***|all**<br>    **[state disable|enable] [cost** *<num>*] **[no-multicast] [retransmit-interval** *<num>*]<br>    **[transit-delay** *<num>*] **[priority** *<num>*] **[hello-interval** *<num>*]<br>    **[router-dead-interval** *<num>*] **[poll-interval** *<num>*]**[key-chain** *<num-or-string>*] |
| **ospf set monitor-auth-method none|simple|md5** |
| **ospf set trace-options [lsa-build] [spf] [lsa-transmit] [lsa-receive] [state] [hello] [dd]**<br>    **[request] [lsu] [ack]** |
| **ospf set virtual-link** *<number-or-string>* **[state disable|enable] [cost** *<num>*]<br>    **[no-multicast] [retransmit-interval** *<num>*] **[transit-delay** *<num>*] **[priority** *<num>*]<br>    **[hello-interval** *<num>*] **[router-dead-interval** *<num>*] **[poll-interval** *<num>*] |
| **ospf show** *<option-list>* |
| **ospf start|stop** |

# ospf add interface

## Purpose

Associates an interface with an OSPF area.

## Format

**ospf add interface** *<interfacename-or-IPaddr>* **to-area** *<area-addr>*|**backbone**
**[type broadcast|non-broadcast|point-to-multipoint]**

## Mode

Configure

## Parameters

*<interfacename-or-IPaddr>*
    An interface name or an IP address.

**to-area** *<area-addr>*|**backbone**
    OSPF Area with which this interface is to be associated.

**type**
    Specifies whether the interface is broadcast, non-broadcast, or point-to-multipoint. Specify one
    of the following:

    •**broadcast** (default)

    •**non-broadcast**

    •**point-to-multipoint**

## Restrictions

None.

# ospf add nbma-neighbor

## Purpose

Specifies an OSPF NBMA Neighbor.

## Format

**ospf add nbma-neighbor** *<hostname-or-IPaddr>* **to-interface** *<interfacename-or-IPaddr>*
**[eligible]**

## Mode

Configure

## Parameters

**to-interface** *<interfacename-or-IPaddr>*
Adds the neighbor to the specified OSPF interface.

**eligible**
Specifies whether an OSPF NBMA Neighbor is eligible for becoming a designated router.

## Restrictions

None.

# ospf add network | summary-range

**Note:** Because the **OSPF add network** command is misinterpreted with commands having similar syntax from other vendors, this command will eventually be dropped from the XP's host of CLI commands. The new command is **ospf add summary-range**. At this time, however, both are acceptable CLI commands, hence both are dealt with in this section.

## Purpose

Configures summary-ranges on Area Border Routers (ABRs). This allows you to reduce the amount of routing information propagated between areas.

On the XP, summary-ranges are created using the **ospf add summary-range** command – the networks specified using this command describe the scope of an area. Intra-area Link State Advertisements (LSAs) that fall within the specified ranges are not advertised into other areas as inter-area routes. Instead, the specified ranges/networks are advertised as summary network LSAs. If you specify the **restrict** option, the summary network LSAs are not advertised. Each intra-area LSA that does not fall into any range is advertised as an OSPF Type-3 or 4 LSA.

## Format

**ospf add network | summary-range** *<IPaddr/mask>* **to-area** *<area-addr>* **[restrict]**
  **[host-net]**

## Mode

Configure

## Parameters

*<IPaddr/mask>*
  IP Address and network mask value representing the summary-range. Example:
  16.122.0.0/255.255.0.0 or 16.122.0.0/16.

**to-area** *<area-addr>*
  OSPF Area with which this summary-range is to be associated.

**restrict**
  If the restrict option is specified for a network/summary-range, then that network is not advertised in Summary network LSAs.

**host-net**
  Specifies that the network is an OSPF Host Network.

## Restrictions

None.

## Example

In the following example, two summary ranges are created:

```
ospf add summary-range 207.135.16.0/24 to-area 207.135.0.0
ospf add summary-range 207.135.17.0/24 to-area 207.135.0.0 restrict
```

Intra-area Link State Advertisements (LSAs) that fall within the range 207.135.16.0/24 are not advertised into other areas as inter-area routes. Instead, the specified range 207.135.16.0/24 is advertised as summary network LSA.

Because the summary range 207.135.17.0/24 has the restrict option associated with it, intra-area link state advertisements (LSAs) that fall within it are not advertised as summary network LSA. Using this mechanism, one can have "hidden networks" within an area, which are not advertised to other areas.

# ospf add pmp-neighbor

## Purpose

Specifies an OSPF Point-to-Multipoint Neighbor.

## Format

**ospf add pmp-neighbor** *<IPaddr>* **to-interface** *<hostname-or-IPaddr>*

## Mode

Configure

## Description

The **ospf add pmp-neighbor** configures a Point-to-Multipoint neighbor router on an interface. A Point-to-Multipoint connectivity is used when the network does not provide full connectivity to all routers in the network. As in the case of NBMA (non-broadcast multiple access) networks, a list of neighboring routers reachable over a PMP network should be configured so that the router can discover its neighbors.

## Parameters

**pmp-neighbor** *<IPaddr>*
    Specifies the point-to-multipoint neighbor.

**to-interface** *<interfacename-or-IPaddr>*
    Adds the neighbor to the specified OSPF interface.

## Restrictions

None.

## Example

To add a point-to-multipoint neighbor with IP address 134.141.179.141 to the OSPF interface 134.141.179.152:

xp(config)# **ospf add pmp-neighbor 134.141.179.141 to-interface 134.141.179.152**

# ospf add stub-host

## Purpose

Adds a stub-host to an OSPF area.

## Format

**ospf add stub-host to-area** *<area-addr>*|**backbone cost** *<num>*

## Mode

Configure

## Parameters

**to-area** *<area-addr>*|**backbone**
OSPF Area to which you are adding a stub host.

**cost** *<num>*
The cost that should be advertised for this directly attached stub host. Specify a number from 0 – 65535.

## Restrictions

None.

# ospf add virtual-link

## Purpose

Creates an OSPF Virtual Link.

## Format

**ospf add virtual-link** *<number-or-string>* **neighbor** *<IPaddr>*
　　**transit-area** *<area-num>*

## Mode

Configure

## Parameters

*<number-or-string>*
　　A number or character string identifying the virtual link.

**neighbor** *<IPaddr>*
　　The IP address of an OSPF virtual link neighbor.

**transit-area** *<area-num>*
　　The Area ID of the transit area.

## Restrictions

None.

# ospf create area

## Purpose

Create an OSPF area.

## Format

**ospf create area** *<area-num>*|**backbone**

## Mode

Configure

## Parameters

| | |
|---|---|
| *<area-num>* | The Area ID. Normally, Area IDs are formatted like IP addresses: *<num>.<num>.<num>.<num>*. |
| **backbone** | Specifies that the Area you are adding is the backbone area. |

## Restrictions

None.

# ospf create-monitor

## Purpose

Create an OSPF monitor destination.

## Format

**ospf create-monitor destination** *<hostname-or-IPaddr>*

## Mode

Enable

## Parameters

**destination** *<hostname-or-IPaddr>*
  Specifies the destination whose OSPF activity is to be monitored.

## Restrictions

None.

# ospf monitor

## Purpose

Monitor OSPF.

## Format

**ospf monitor statistics|errors|next-hop-list|interfaces|neighbors**
**[destination** *<hostname-or-IPaddr>*] **[auth-key** *<string>*]

**ospf monitor lsdb [display-retransmit-list] [destination** *<hostname-or-IPaddr>*]
**[auth-key** *<string>*] **[area** *<IPaddr>*]

**ospf monitor routes [type all|asbrs-in-area|area-border-routers|**
**asbrs-other-areas|networks-in-area|networks-other-areas |as-routes]**
**[destination** *<hostname-or-IPaddr>*] **[auth-key** *<string>*]

**ospf monitor lsa area-id** *<IPaddr>* **type router-links|network-links|**
**summary-networks|summary-asbr|as-external ls-id** *<IPaddr>* **adv-rtr** *<IPaddr>* **[destination**
*<hostname-or-IPaddr>*] **[auth-key** *<string>*]

**ospf monitor as-external-db [display-retransmit-list destination** *<IPaddr>*] **[auth-key**
*<string>*]

## Mode

Enable

## Parameters

**destination** *<hostname-or-IPaddr>*
Monitors the specified OSPF destination. Default is the router on which the command is
executed.

**auth-key** *<string>*
Specifies the authorization key for the OSPF destination. This option is not needed if the OSPF
destination does not require a key or if an authorization was specified using the **ospf monitor**
**create-destination** command.

**statistics**
Shows input/output statistics for monitor request, hello, data base description, link-state
request, link-state update, and link-state ack packets. Area statistics are provided, which
describe the total number of routing neighbors and number of active OSPF interfaces. Routing
table statistics are summarized and reported as the number of intra-area routes, inter-area
routes, and AS external data base entries.

**errors**

Shows the various error conditions which can occur between OSPF routing neighbors and the number of occurrences for each.

**next-hop-list**

Shows information about all valid next hops mostly derived from the SPF calculation.

**interfaces**

Shows information about all interfaces configured for OSPF. Information reported includes the area, interface IP address, interface type, interface state, cost, priority, and the IP address of the Designated Router and Backup Designated Router for the network.

**neighbors**

Shows information about all OSPF routing neighbors. Information reported includes the area, local interface address, router ID, neighbor IP address, state, and mode.

**lsdb**

Displays the link-state database (except for ASEs). This table describes the routers and networks making up the AS. If the display-retransmit-list option is specified, the retransmit list of neighbors held by this lsdb structure will also be printed.

**display-retransmit-list** – Displays the retransmit list from the link state database.

**area** – Displays the area for which lsdb is to be displayed.

**routes**

Displays the OSPF routing table. This table reports the AS border routes, area border routes, summary AS border routes, networks, summary networks and AS external networks currently managed via OSPF.

**type all**

Shows all OSPF routes.

**type asbrs-in-area**

Shows routes to AS boundary routers in this area.

**type area-border-routers**

Shows routes to area border routers for this area.

**type asbrs-other-areas**

Shows summary routes to AS boundary routers in other areas.

**type networks-in-area**

Shows routes to networks in this area.

**type networks-other-areas**

Shows routes to networks in other areas.

**type as-routes**

Shows AS routes to non-OSPF networks.

**lsa**

Displays the link state advertisement. Area_Id is the OSPF area for which the query is directed. Adv_Rtr is the router -id of the router which originated this link state advertisement. Type specifies the type of advertisement to request:

**area-id** *<IPaddr>*
> Specifies the OSPF area.

**type router-links**
> Requests router link advertisements that describe the collected states of the router interfaces. ls-id is set to the originating router's router-id.

**type network-links**
> Requests network link advertisements that describe the set of routers attached to the network. ls-id is set to the IP interface address of the designated router for the network.

**type summary-networks**
> Request summary-link advertisements describing routes to networks. ls-id is set to the IP address of the destination network.

**type summary-asbr**
> Requests summary-link advertisements describing routes to AS boundary routers. ls-id is set to the AS boundary router's router-id.

**type as-external**
> Requests AS external link state advertisements. ls-id is set to the IP address of the destination network.

**ls-id** *<IPaddr>*
> Species the ls-id for the type of link-state advertisement requested

**adv-rtr** *<IPaddr>*
> Requests the router ID of the originating router.

**as-external-db**
> Display the AS external data base entries. This table reports the advertising router, forwarding address, age, length, sequence number, type, and metric for each AS external route. If the display-retransmit-list option is specified, the retransmit list of neighbors held by this lsdb structure will also be printed.

# Restrictions

None.

# Examples

The following are examples of **ospf monitor** commands.

```
xp# ospf monitor statistics

IO stats
Input  Output  Type
8      0 Monitor request
1322   1314 Hello
716    721 DB Description
39     728 Link-State Req
3037   3355 Link-State Update
1317    354 Link-State Ack
```

```
ASE: 1903 checksum sum 3BB0F22

LSAs originated: 1915   received: 17
Router: 5  ASE: 1910

Area 0.0.0.0:
Neighbors: 3    Interfaces: 3
Spf: 3  Checksum sum 6CB41
DB: rtr: 5 net: 5 sumasb: 0 sumnet: 2

Routing Table:
Intra Area: 5   Inter Area: 4   ASE: 1
```

```
xp# ospf monitor errors

Packets Received:
10: Monitor request              1342: Hello
716: DB Description                39: Link-State Req
3212: Link-State Update          1536: Link-State Ack

Packets Sent:
0: Monitor response             1335: Hello
721: DB Description              728: Link-State Req
3907: Link-State Update          359: Link-State Ack

Errors:
0: IP: bad destination          0: IP: bad protocol
0: IP: received my own packet        0: OSPF: bad packet type
0: OSPF: bad version             0: OSPF: bad checksum
0: OSPF: bad area id             0: OSPF: area mismatch
0: OSPF: bad virtual link        0: OSPF: bad authentication type
0: OSPF: bad authentication key       0: OSPF: packet too small
0: OSPF: packet size > ip length    1: OSPF: transmit error
0: OSPF: interface down          0: OSPF: unknown neighbor
0: HELLO: netmask mismatch          0: HELLO: hello timer mismatch
0: HELLO: dead timer mismatch       0: HELLO: extern option mismatch
0: HELLO: router id confusion        0: HELLO: virtual neighbor
unknown
0: HELLO: NBMA neighbor unknown      0: DD: neighbor state low
0: DD: router id confusion       0: DD: extern option mismatch
0: DD: unknown LSA type          1: LS ACK: neighbor state low
0: LS ACK: bad ack             1140: LS ACK: duplicate ack
0: LS ACK: Unknown LSA type          0: LS REQ: neighbor state low
0: LS REQ: empty request          0: LS REQ: bad request
8: LS UPD: neighbor state low       0: LS UPD: newer self-gen LSA
0: LS UPD: LSA checksum bad           131: LS UPD: received less recent
LSA
0: LS UPD: unknown LSA type           2: Interface: Not configured for
OSPF
0: Interface: Invalid type        0: Interface: Mcast disabled.
0: Interface: Invalid state       0: Interface: Address not found
1: No vlinks and src is non local
```

```
xp# ospf monitor next-hop-list

Next hops:

Address        Type      Refcount  Interface
-------------------------------------------------------------
10.12.1.1      Neighbor      6  10.12.1.2     to-c4500
10.12.1.2      Direct        1  10.12.1.2     to-c4500
150.1.0.1      Direct        1  150.1.0.1     to-aval-eth5
172.23.1.5     Direct        3  172.23.1.5    to-XP6
172.23.1.6     Neighbor      5  172.23.1.5    to-XP6
172.23.1.21    Direct        3  172.23.1.21   to-XP1
172.23.1.22    Neighbor     19  172.23.1.21   to-XP1
172.23.1.25    Direct        3  172.23.1.25   lo
222.1.1.1      Direct        1  222.1.1.1     to-linux1
```

```
xp# ospf monitor interfaces
>sent to 127.0.0.1

Source <<127.0.0.1     >>

Area: 0.0.0.0
IP Address     Type State    Cost Pri DR          BDR
---------------------------------------------------------------------
172.23.1.5     Bcast BackupDR 2    2  172.23.1.6    172.23.1.5
10.12.1.2      Bcast BackupDR 1    2  10.12.1.1     10.12.1.2
172.23.1.21    Bcast BackupDR 1    2  172.23.1.22   172.23.1.21
done
```

```
xp# ospf monitor neighbors
> sent to 127.0.0.1

Source <<127.0.0.1     >>

Interface: 172.23.1.5    Area: 0.0.0.0
Router Id     Nbr IP Addr    State    Mode  Prio
--------------------------------------------------------
0.0.0.6       172.23.1.6     Full     Slave  1

Interface: 10.12.1.2     Area: 0.0.0.0
Router Id     Nbr IP Addr    State    Mode  Prio
--------------------------------------------------------
172.23.1.14   10.12.1.1      Full     Slave  1

Interface: 172.23.1.21    Area: 0.0.0.0
Router Id     Nbr IP Addr    State    Mode  Prio
--------------------------------------------------------
0.0.0.1       172.23.1.22    Full     Master 1
```

```
done
```

```
xp# ospf monitor routes
> sent to 127.0.0.1

Source <<127.0.0.1      >>
AS Border Routes:
Router      Cost AdvRouter      NextHop(s)
---------------------------------------------------
Area 0.0.0.0:
0.0.0.6        2 0.0.0.6        172.23.1.6
172.23.1.22
0.0.0.4        0 0.0.0.4
0.0.0.1        1 0.0.0.1        172.23.1.22

Total AS Border routes: 3

Area Border Routes:
Router      Cost AdvRouter      NextHop(s)
---------------------------------------------------
Area 0.0.0.0:
0.0.0.3        2 0.0.0.3        172.23.1.22
0.0.0.1        1 0.0.0.1        172.23.1.22

Total Area Border Routes: 2

Summary AS Border Routes:
Router      Cost AdvRouter      NextHop(s)
---------------------------------------------------

Networks:
Destination      Area        Cost Type NextHop        AdvRouter
-----------------------------------------------------------------------------

172.23.1.4/30    0.0.0.0        2 Net  172.23.1.5    0.0.0.6
10.12.1.0/30     0.0.0.0        1 Net  10.12.1.1     172.23.1.14
172.23.1.20/30   0.0.0.0        1 Net  172.23.1.21    0.0.0.1
172.23.1.25      0.0.0.0        0 Stub 172.23.1.25    0.0.0.4
172.23.1.8/30    0.0.0.0        2 Net  172.23.1.22    0.0.0.1
10.12.1.4/30     0.0.0.0        2 Net  172.23.1.22   172.23.1.14
172.23.1.14      0.0.0.0        2 Stub 10.12.1.1      172.23.1.14
172.23.1.26      0.0.0.0        3 Stub 172.23.1.6    0.0.0.6
172.23.1.22
16               0.0.0.0        2 SNet 172.23.1.22    0.0.0.1
ASEs:
Destination      Cost E    Tag NextHop        AdvRouter
-----------------------------------------------------------------------------
15.1             1   1 c0000000 172.23.1.22    0.0.0.1
Total nets: 9
Intra Area: 5  Inter Area: 4   ASE: 1
done
```

```
xp# ospf monitor lsdb

LS Data Base:
Area: 0.0.0.0
Type LinkState ID    AdvRouter      Age Len Sequence Metric Where
---------------------------------------------------------------------
Stub 172.23.1.25    0.0.0.4        341 24 0         0 SpfTree
Stub 172.23.1.14    172.23.1.14    352 24 0         0 SpfTree
Stub 172.23.1.26    0.0.0.6        343 24 0         0 SpfTree
Rtr  0.0.0.1        0.0.0.1        309 72 800009b0    0 SpfTree
Rtr  0.0.0.3        0.0.0.3       1223 36 80000011    0 SpfTree
Rtr  0.0.0.4        0.0.0.4        341 72 80000084    0 SpfTree
Rtr  172.23.1.14    172.23.1.14     74 60 80000bf6    0 Clist
Rtr  0.0.0.6        0.0.0.6        227 60 80000a0d    0 SpfTree
Net  172.23.1.10    0.0.0.1        309 32 80000005    0 SpfTree
Net  172.23.1.22    0.0.0.1        309 32 80000003    0 SpfTree
Net  10.12.1.1      172.23.1.14     74 32 80000002    0 SpfTree
Net  10.12.1.6      172.23.1.14     74 32 8000003d    0 SpfTree
Net  172.23.1.6     0.0.0.6        227 32 80000003    0 SpfTree
SNet 16.255.255.255 0.0.0.3       1129 28 8000000c    1 Uninitialized
SNet 16.255.255.255 0.0.0.1        215 28 80000003    1 Uninitialized
done
```

```
xp# ospf monitor as-external-db

AS External Data Base:
Destination    AdvRouter    Forward Addr    Age Len Sequence T Metric
-----------------------------------------------------------------------------
130.58.225     0.0.0.4      0.0.0.0         201 36 80000001 21
130.58.174     0.0.0.4      0.0.0.0         201 36 80000001 21
130.56.235     0.0.0.4      0.0.0.0         236 36 80000001 21
130.56.184     0.0.0.4      0.0.0.0         236 36 80000001 21
130.54.245     0.0.0.4      0.0.0.0         238 36 80000001 21
130.54.194     0.0.0.4      0.0.0.0         239 36 80000001 21
130.52.255     0.0.0.4      0.0.0.0         241 36 80000001 21
130.52.204     0.0.0.4      0.0.0.0         241 36 80000001 21
130.51.9       0.0.0.4      0.0.0.0         211 36 80000001 21
130.50.214     0.0.0.4      0.0.0.0         211 36 80000001 21
130.49.19      0.0.0.4      0.0.0.0         213 36 80000001 21
130.48.224     0.0.0.4      0.0.0.0         214 36 80000001 21
130.47.29      0.0.0.4      0.0.0.0         216 36 80000001 21
130.46.234     0.0.0.4      0.0.0.0         248 36 80000001 21
130.45.39      0.0.0.4      0.0.0.0         251 36 80000001 21
130.44.244     0.0.0.4      0.0.0.0         251 36 80000001 21
130.43.49      0.0.0.4      0.0.0.0         253 36 80000001 21
130.42.254     0.0.0.4      0.0.0.0         221 36 80000001 21
130.41.59      0.0.0.4      0.0.0.0         256 36 80000001 21
130.41.8       0.0.0.4      0.0.0.0         256 36 80000001 21
130.39.69      0.0.0.4      0.0.0.0         258 36 80000001 21
130.39.18      0.0.0.4      0.0.0.0         258 36 80000001 21
130.37.79      0.0.0.4      0.0.0.0         261 36 80000001 21
130.37.28      0.0.0.4      0.0.0.0         261 36 80000001 21
130.35.89      0.0.0.4      0.0.0.0         263 36 80000001 21
```

```
130.35.38      0.0.0.4      0.0.0.0        263 36  80000001 21
130.33.99      0.0.0.4      0.0.0.0        267 36  80000001 21
130.33.48      0.0.0.4      0.0.0.0        267 36  80000001 21
130.31.109     0.0.0.4      0.0.0.0         272 36  80000001 21
130.31.58      0.0.0.4      0.0.0.0        272 36  80000001 21
130.29.119     0.0.0.4      0.0.0.0         277 36  80000001 21
130.29.68      0.0.0.4      0.0.0.0        277 36  80000001 21
130.27.129     0.0.0.4      0.0.0.0         282 36  80000001 21
130.27.78      0.0.0.4      0.0.0.0        282 36  80000001 21
130.25.139     0.0.0.4      0.0.0.0         287 36  80000001 21
130.25.88      0.0.0.4      0.0.0.0        287 36  80000001 21
130.23.149     0.0.0.4      0.0.0.0         292 36  80000001 21
130.23.98      0.0.0.4      0.0.0.0        292 36  80000001 21
130.21.159     0.0.0.4      0.0.0.0         297 36  80000001 21
```

# ospf set area

## Purpose

Sets the parameters for an OSPF area.

## Format

**ospf set area** *<area-num>* **[stub] [stub-cost** *<num>***] [authentication-method none|simple|md5] [no-summary]**

## Mode

Configure

## Parameters

*<area-num>*
  The Area ID.

**stub**
  Makes this Area a stub area.

**stub-cost** *<num>*
  Specifies the cost to be used to inject a default route into the area. Specify a number from 0 – 65535.

**authentication-method none|simple|md5**
  Specifies the authentication method used within the area. Specify one of the following:

  **none**   Does not use authentication.

  **simple**   Uses a simple string (password) up to 8 characters in length for authentication. If you chose this authentication method, then you should also specify a key-chain identifier using the key-chain option.

  **md5**   Uses the MD5 algorithm to create a crypto-checksum of an OSPF packet and an authentication key of up to 16 characters.

**no-summary**
  Specifies that this is a fully stub area.

## Restrictions

None.

# ospf set ase-defaults

## Purpose

Sets the defaults used when importing OSPF ASE routes into the routing table and exporting routes from the routing table into OSPF ASEs.

## Format

**ospf set ase-defaults {[preference** *<num>*] |**[cost** *<num>*] |
    **[type** *<num>*]| **[inherit-metric]}**

## Mode

Configure

## Parameters

**preference** *<num>*
    Specifies the preference of OSPF ASE routes. Specify a number between 0 and 255.

**cost** *<num>*
    Specifies the cost used when exporting non-OSPF route into OSPF as an ASE. Specify a number from 0 – 65535.

**type** *<num>*
    Specifies the ASE type. Routes exported from the routing table into OSPF default to becoming type 1 ASEs. You can change the default using the **type** option. You also can override the type in OSPF export policies. Specify either 1 or 2.

**inherit-metric**
    Allows an OSPF ASE route to inherit the metric of the external route when no metric is specified on the export. A metric specified with the export command takes precedence. The cost specified in the default is used if you do not specify **inherit-metric**.

## Restrictions

None.

# ospf set export-interval

## Purpose

Specifies the interval at which ASE LSAs will be generated and flooded into OSPF. The default is once per second.

## Format

**ospf set export-interval** *<num>*

## Mode

Configure

## Parameters

*<num>*   The interval in seconds. Specify a number equal to or greater than 1. The default is 1 (once per second).

## Restrictions

None.

# ospf set export-limit

## Purpose

Specifies how many ASEs will be generated and flooded in each batch.

## Format

**ospf set export-limit** *<num>*

## Mode

Configure

## Parameters

*<num>*   The export limit. Specify a number equal to or greater than 1. The default is 100.

## Restrictions

None.

# ospf set interface

## Purpose

Sets parameters for an OSPF interface.

## Format

**ospf set interface** *<name-or-IPaddr>*|**all**
**[state disable|enable] [cost** *<num>*] **[no-multicast]**
**[retransmit-interval** *<num>*] **[transit-delay** *<num>*]
**[priority** *<num>*] **[hello-interval** *<num>*]
**[router-dead-interval** *<num>*] **[poll-interval** *<num>*]
**[key-chain** *<num-or-string>*]

## Mode

Configure

## Parameters

*<name-or-IPaddr>*|**all**
    The OSPF interface for which you are setting OSPF parameters.

**state disable|enable**
    Enables or disables OSPF on the interface.

**cost** *<num>*
    The cost associated with this interface. Specify a number from 0 – 65535.

    The total cost to get to a destination is calculated by adding up the cost of all interfaces that a packet must cross to reach a destination.

    The default cost of an OSPF interface is calculated using its bandwidth. A VLAN that is attached to an interface could have several ports of differing speeds. The bandwidth of an interface is represented by the highest bandwidth port that is part of the associated VLAN. The cost of an OSPF interface is inversely proportional to this bandwidth. The cost is calculated using the following formula:

    *Cost* = 2000000000 / *speed (in bps)*

The following is a table of the port types and the OSPF default cost associated with each type:

| Port Media Type | Speed | OSPF Default Cost |
|-----------------|-------|-------------------|
| Ethernet 1000 | 1000 Mbps | 2 |
| Ethernet 10/100 | 100 Mbps | 20 |
| Ethernet 10/100 | 10 Mbps | 200 |
| WAN (T1) | 1.5 Mbps | 1333 |
| WAN (T3) | 45 Mbps | 44 |

**no-multicast**
Instructs the XP not to send multicast packets to neighbors on point-to-point interfaces.

**retransmit-interval** *<num>*
The number of seconds between link state advertisement retransmissions for adjacencies belonging to this interface. Specify a number equal to or greater than 1. The default is 5.

**transit-delay** *<num>*
The estimated number of seconds required to transmit a link state update over this interface. Transit delay takes into account transmission and propagation delays and must be greater than 0. Specify a number equal to or greater than 1. The default is 1.

**priority** *<num>*
A number between 0 and 255 specifying the priority for becoming the designated router on this interface. When two routers attached to a network both attempt to become the designated router, the one with the higher priority wins. A router whose router priority is set to 0 is ineligible to become designated router. Specify a number from 0 – 255. The default is 1.

**hello-interval** *<num>*
The length of time, in seconds, between hello packets that the router sends on this interface. Specify a number from 0 – 255. The default is 10 for broadcast interfaces and 30 for point-to-point and other non-broadcast interfaces.

**router-dead-interval** *<num>*
The number of seconds not hearing a router's Hello packets before the router's neighbors will declare it down. Specify a number from 0 – 255. The default is 4 times the value of the hello interval.

**poll-interval** *<num>*
Before adjacency is established with a neighbor, OSPF packets are sent periodically at the specified poll interval. Specify a number equal to or greater than 1. The default value for this option is 120 seconds.

**key-chain** *<num-or-string>*
The identifier of the key-chain containing the authentication keys.

## Restrictions

None.

# ospf set monitor-auth-method

## Purpose

You can query the OSPF state using the OSPF-Monitor utility. This utility sends non-standard OSPF packets that generate a text response from OSPF. By default these requests are not authenticated. If you specify an authentication key, the incoming requests must match the specified authentication key.

## Format

**ospf set monitor-auth-method none|simple|md5**

## Mode

Configure

## Description

This section contains a fuller description of what the command does.

## Parameters

**authentication-method none|simple|md5**
The authentication method used within the area. Specify one of the following:

| | |
|---|---|
| **none** | Does not use authentication. |
| **simple** | Uses a simple string (password) up to 16 characters in length for authentication. If you chose this authentication method, then you should also specify a key-chain identifier using the key-chain option. |
| **md5** | Uses the MD5 algorithm to create a crypto-checksum of an OSPF packet and an authentication key of up to 16 characters. |

## Restrictions

None.

# ospf set trace-options

## Purpose

Sets various OSPF trace options.

## Format

**ospf set trace-options lsa-build|spf|lsa-transmit|lsa-receive**

**ospf set trace-options hello|dd|request|lsu|ack [detail] [send] [receive]**

## Mode

Configure

## Parameters

| | |
|---|---|
| **lsa-build** | Traces Link State Advertisement Creation. |
| **spf** | Traces Shortest Path First (SPF) calculations. |
| **lsa-transmit** | Traces Link State Advertisement (LSA) transmission. |
| **lsa-receive** | Traces Link State Advertisement (LSA) reception. |
| **hello** | Traces OSPF hello packets that are used to determine neighbor reachability. |
| **dd** | Traces OSPF Database Description packets that are used in synchronizing OSPF databases. |
| **request** | Traces OSPF Link State Request packets which are used in synchronizing OSPF databases. |
| **lsu** | Traces OSPF Link State Update packets which are used in synchronizing OSPF databases. |
| **ack** | Traces OSPF Link State Ack packets which are used in synchronizing OSPF databases. |
| **detail** | Shows detailed information about OSPF packets. |
| **send** | Shows OSPF packets sent by the router. |
| **receive** | Shows OSPF packets received by the router. |

## Restrictions

None.

# ospf set virtual-link

## Purpose

Sets the parameters for an OSPF virtual link.

## Format

**ospf set virtual-link** *<number-or-string>*
**[state disable|enable] [cost** *<num>*] **[no-multicast] [retransmit-interval** *<num>*]
**[transit-delay** *<num>*] **[priority** *<num>*] **[hello-interval** *<num>*]
**[router-dead-interval** *<num>*] **[poll-interval** *<num>*]

## Mode

Configure

## Parameters

*<number-or-string>*
    The identifier for this virtual link.

**state disable|enable**
    Enables or disables the virtual link.

**cost** *<num>*
    The cost associated with this virtual link. The cost of all interfaces that a packet must cross to
    reach a destination are added to get the cost to that destination. The default cost of the OSPF
    interface is 1, but another non-zero value may be specified. Specify a number from 0 – 65535.

**no-multicast**
    Instructs the XP to not send multicast packets to neighbors on point-to-point virtual links.

**retransmit-interval** *<num>*
    The number of seconds between link state advertisement retransmissions for adjacencies
    belonging to this virtual link. Specify a number equal to or greater than 1.

**transit-delay** *<num>*
    The estimated number of seconds required to transmit a link state update over this virtual link.
    Transit delay takes into account transmission and propagation delays and must be greater than
    0. Specify a number equal to or greater than 1.

**priority** *<num>*
    A number between 0 and 255 specifying the priority for becoming the designated router on this
    virtual link. When two routers attached to a network both attempt to become the designated
    router, the one with the higher priority wins. A router whose router priority is set to 0 is
    ineligible to become designated router. Specify a number from 0 – 255.

**hello-interval** *<num>*

The length of time, in seconds, between hello packets that the router sends on this virtual link. Specify a number from 0 – 255. The default is 60 seconds.

**router-dead-interval** *<num>*

The number of seconds not hearing a router's Hello packets before the router's neighbors will declare it down. Specify a number from 0 – 255. The default value for this parameter is 4 times the value of the **hello-interval** parameter

**poll-interval** *<num>*

Before adjacency is established with a neighbor, OSPF packets are sent periodically at the specified poll interval. Specify a number from 0 – 255. The default is 120 seconds.

# Restrictions

None.

# ospf show

## Purpose

Show OSPF information.

## Format

**ospf show** *<option-list>*

## Mode

Enable

## Parameters

*<option-list>*
Specifies the OSPF information you want to display. Specify one or more of the following:

**all**                    Displays all OSPF tables.

**globals**                Displays OSPF globals.

**timers**                 Displays OSPF timers.

**areas**                  Displays OSPF areas.

**interfaces**             Displays OSPF interfaces.

**next-hop-list**          Displays valid next hop entries.

**import-policies**        Displays OSPF import policies.

**export-policies**        Displays OSPF export policies.

**statistics**             Displays OSPF statistics. Specify the following:

> **Interface** Enter the interface address for the statistics you want to display. If you do not enter a specific interface address, the XP will collect statistics for all interfaces.

> **To-terminal** Outputs the information to the terminal—the default.

> **To-file** Saves output to the file **/cfg/gated.dmp**.

**Note:** The statistics for the ports specified will reinitialize if you add a previously removed interface to OSPF, add a previously removed area to OSPF (this reinitializes the statistics for that area's interfaces), create a previously removed interface, add a previously removed "ospf start" command, remove a previously added "ospf stop" command, or if you change the port status from "down" to "up." To reset *all* port statistics, restart OSPF.

|                   |                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------|
| **errors**        | Displays OSPF errors. Specify the following:                                                |

      **Interface** Enter an interface address for which errors are displayed. If you do not enter a specific interface address, the XP will collect errors for all interfaces.

      **To-terminal** Outputs the information to the terminal—the default.

      **To-file** Saves output to the file **/cfg/gated.dmp**.

**Note:** The statistics for the ports specified will reinitialize if you add a previously removed interface to OSPF, add a previously removed area to OSPF (this reinitializes the statistics for that area's interfaces), create a previously removed interface, add a previously removed "ospf start" command, remove a previously added "ospf stop" command, or if you change the port status from "down" to "up." To reset *all* port statistics, restart OSPF.

|                    |                                                                   |
|--------------------|-------------------------------------------------------------------|
| **virtual-links**  | Displays OSPF virtual links.                                      |
| **summary-asb**    | Displays OSPF border routes.                                     |
| **as-external-ldsb** | Displays OSPF Autonomous System external link states.          |
| **exported-routes** | Displays routes redistributed into OSPF.                        |
| **lsa**            | Displays the Link State Advertisement. This option requires all of the following:<br>**Area-ID** The OSPF area for which the query is directed.<br>**ls-id**  The ID of the LSA.<br>**Type**  Specifies the type of advertisement to request: |

      **Router-links** Request the router links advertisement. They describe the collected states of the router's interfaces. For this type of request, the ls_id should be set to the originating router's Router ID.

      **Network-links** Request the network links advertisement. They describe the set of routers attached to the network. For this type of request, the ls_id field should be set to the IP interface address of the network's designated router.

      **Summary-networks** Request the summary link advertisements describing routes to networks. They describe inter-area routes, and enable the condensing of routing information at area borders. For this type of request, the ls_id field should be set to the destination network's IP address.

      **Summary-asbr** Request the summary link advertisements describing routes to AS boundary routers. They describe inter-area routes, and enable the condensing of routing information at area borders. For this type of request, the ls_id field should be set to the Router ID of the described AS boundary router.

      **As-external** Request the AS external link advertisements. They describe routes to destinations external to the Autonomous System.

For this type of request, the ls_id field should be set to the destination network's IP address.

**Adv-Rtr** is the router-id of the router which originated this link state advertisement.

Note: The **areas**, **virtual-links**, **summary-asb**, **as-external-ldsb**, and **exported-routes** options can be used with the following display options:

**to-file** *<ipaddr>*   Saves output in the file **/gatedtrc/gated.dmp**.

**backbone**   Backbone area.

**all**   All areas.

# ospf start|stop

## Purpose

Start or stop the OSPF protocol. OSPF is disabled by default on the XP.

## Format

**ospf start|stop**

## Mode

Configure

## Parameters

**start**  Starts OSPF.

**stop**  Stops OSPF.

## Restrictions

None.

# Chapter 45

# ping Command

The **ping** command tests connection between the XP and an IP host.

## Format

**ping** *<hostname-or-IPaddr>* **packets** *<num>* **size** *<num>* **wait** *<num>* **[flood] [dontroute]**

## Mode

User or Enable

## Description

The **ping** command test connection between the XP and an IP host. The ping command sends ICMP echo packets to the host you specify.

*   If the packets reach the host, the host sends a ping response to the XP and the CLI displays messages stating that the host can be reached.

*   If the host does not respond, the XP assumes the host cannot be reached from the XP and the CLI display messages stating that the host did not reply.

## Parameters

*<hostname-or-IPaddr>*
> The host name or IP address you want to ping.

**packets** *<num>*
> The number of ping packets you want to send. The default is 1.

**size** *<num>*
> The packet size. For Ethernet, specify a number from 0 – 1364.

**wait** *<num>*

> The number of seconds the XP will wait for a positive response from the host before assuming that the host has not responded. The default is 1.

**flood**

> Causes the XP to send a new ping request as soon as a ping reply is received. If you do not specify the **flood** option, the XP waits to send a new request. The amount of time the XP waits is specified by the **wait** option.

**dontroute**

> Restricts the ping to locally attached hosts.

## Restrictions

If you enter this command from the User mode, the only parameter you can use is *<hostname-or-IPaddr>*. To use any of the other parameters, you must be in Enable mode.

# Chapter 46

# port Commands

The **port** commands set and display the following parameters:

- Port state (enabled or disabled)

- Bridging status (flow-based or address-based)

- Port operating mode (half duplex or full duplex)

- Port speed for the 10/100 ports (10-Mbps or 100-Mbps)

- Port mirroring (used for analyzing network traffic)

- Port shut down if broadcast threshold is reached

## Command Summary

Table 35 lists the **port** commands. The sections following the table describe the command syntax.

**Table 35.  port commands**

| |
|---|
| **port auto-negotiate enable** *<port-list>*\|**disable** *<port-list>*\|**restart** *<port-list>* |
| **port bmon** *<port-list>* [**redirect**\| **unlimited-redirect**] [**rate** *<number>*] [**duration** *<number>*] [**shutdown** *<number>*] [**packets-limited all**\|**broadcast**] |
| **port description** *<port-list> <desc>* |
| **port disable** *<port-list>* |
| **port enable 8021p port** *<port-list>* |
| **port flow-bridging** *<port-list>*\|**all-ports** |
| **port enable forced-return-flows port** *<port-list>* \|**all-ports** |

**Table 35. port commands (Continued)**

| |
|---|
| **port set [**<*port-list*>**\|all-ports] [duplex full\|half]** <br> **[speed 10Mbps\|100Mbps\|**<*number*>**] [auto-negotiation on\|off] [auto-negotiation-speed** <br> **10Mbps\|100Mbps\|10_100Mbps] [auto-negotiation-duplex half\|full\|both] [auto-negotiation-** <br> **flowctl off\|asymmetric\|symmetric\|both]** <br> **[hash-mode m0\|m1\|m2\|m3\|m-auto] [wan-encapsulation frame-relay\|ppp] [ifg** <*number*>**]** <br> **[input-encapsulation forced-ethernet_ii] [link-timer** <*number*>**] [clock** <*clock-source*>**]** <br> **[transmit-clock-source local\|loop] [framing cbit-parity\|m23\|esf\|g832\|g751] [mtu** <br> <*number*>**] [mc-vlan-encap** <*number*>**]** |
| **port show 8021p** <*port-list*>**\|all-ports** |
| **port show autonegotiation** <*port-list*>**\|all-ports** |
| **port show autonegotiation-capabilities** <*port-list*>**\|all-ports** |
| **port show bmon [config][detail][port** <*port list*>**][stats]** |
| **port show bridging-status** <*port-list*>**\|all-ports** |
| **port show description** <*port-list*>**\|all-ports** |
| **port show MAU** <*port-list*>**\|all-ports** |
| **port show MAU-statistics** <*port-list*>**\|all-ports** |
| **port show port-status** <*port-list*>**\|all-ports\| all-smarttrunks** |
| **port show stp-info** <*port-list*>**\|all-ports [rstp]** |
| **port show pvst-info** <*port-list*>**\|all-ports spanning-tree** <*string*> **[rstp]** |
| **port show vlan-info** <*port-list*>**\|all-ports** |
| **port show mirroring-status** <*slot*>**\|all-slots** |
| **port show hash-mode** <*port-list*> **\|all-ports** |
| **port show mc-vlan-encap** <*port-list*> **\|all-ports** |
| **port show serial-link-info** <*port-list*> **\|all-ports** |

# port auto-negotiate

## Purpose

Enables, disables, and/or restarts auto-negotiation on a port.

## Format

**port auto-negotiate enable** *<port-list>*|**disable** *<port-list>*|**restart** *<port-list>*

## Mode

Enable

## Description

The **port auto-negotiate** command allows you to enable auto-negotiation on a port, disable auto-negotiation on a port, and/or restart auto-negotiation on a port. Auto-negotiation is a process whereby both ports on a connection resolve the best line speed, duplex mode and flow control scheme to communicate with each other.

## Parameters

**enable** *<port-list>*
  Enables auto-negotiation on the port or set of ports.

**disable** *<port-list>*
  Disables auto-negotiation on the port or set of ports.

**restart** *<port-list>*
  Restarts auto-negotiation on the port or set of ports.

## Restrictions

None.

## Example

To enable auto-negotiation on port et.2.1:

```
xp# port auto-negotiate enable et.2.1
```

# port bmon

## Purpose

Monitor broadcast traffic on a port. This command is useful in cases where excess broadcast traffic heading toward the control module may degrade performance and you need to temporarily shut down the port.

## Format

**port bmon** *<port-list>* [**rate** *<number>*] [**duration** *<number>*] [**shutdown** *<number>*] [**packet-limited all|broadcast**] [**redirect** *<port>*] [**unlimited-redirect** *<port>*]

## Mode

Configure

## Description

The **port bmon** command allows you to monitor the broadcast traffic on one or more ports and shut down a port if its broadcast traffic reaches and sustains a certain rate limit for a specific length of time. The **port bmon** command can also *redirect* the traffic from a channel with a monitored port to another port instead of shutting the monitored port down. The unlearned traffic for the monitor port's channel (all ports on that line card) is redirected to the target port and learned traffic flows continue to forward as they were learned. When configuring **port bmon**, you must specify a port to which you will redirect traffic if you are using the redirection feature—otherwise, the command will shut down the port by default.

With the **port bmon** command, you can define monitoring thresholds on a port or set of ports. If those thresholds are met or exceeded, the port(s) will shut down for a user-specified period. This will reduce the risk that the control module may become overloaded by traffic and crash.

## Parameters

**port** *<port-list>*
> Specifies the ports that you are monitoring for broadcasts.

**rate** *<number>*
> The rate limit, in Kpkts per second, which will trigger a port shut down if the rate is sustained for the specified duration. Values can be from 1-1000. The default value is 10.

**duration** *<number>*

> The number of seconds that the specified rate limit is sustained, after which the port will be shut down. Values can be from 1-3600. The default value is 1.

**shutdown** *<number>*

> The number of seconds that the port will be shut down if the rate threshold is reached. Values can be from 60-36000. The default value is 300.

**packets-limited all| broadcast**

> Specifies the type of packets to monitor for shutdown. Specify **all** to monitor all packets. Specify **broadcast** to only monitor broadcast packets. The default value is **all**.

**redirect** *<port>*

> Specifies the port to which you will redirect traffic. The redirect option routes all unlearned traffic through another port after the current port reaches capacity. Redirect sends traffic for the number of seconds defined as the *shutdown* value, but waits the number of seconds defined as the *duration* before redirecting traffic. This option cannot be used with the unlimited-redirect option.

**unlimited-redirect** *<port>*

> Specifies the port to which you will redirect traffic. The unlimited-redirect option routes all unlearned traffic through another port after the current port reaches capacity. Unlimited-redirect sends traffic *indefinitely*, but waits the number of seconds defined as the *duration* before redirecting traffic. This option cannot be used with the redirect or shutdown options.

## Restrictions

None.

## Examples

To monitor traffic on port et.1.3 and shut it down for 5 minutes if the rate of 10,000 packets per second is sustained for 1 second:

```
xp(config)# port bmon et.1.3 packets-limited all
```

To monitor traffic on port et.1.3 and shut it down for 3 minutes if the rate of 25,000 packets per second is sustained for 5 seconds:

```
xp(config)# port bmon et.1.3 rate 25 duration 5 shutdown 180 packets-limited all
```

To configure a 360-second shutdown on port et1.3 whenever a rate of 100,000 broadcast packets per second is sustained for 1 second:

```
xp(config)# port bmon et.1.3 rate 100 shutdown 360 packets-limited broadcast
```

**How to use redirection:**

This will redirect all unlearned traffic on port et.3.2's channel to port et.4.3 for 60 seconds, one second after the 1kPkts/sec traffic limit is reached:

xp(config)# **port bmon et.3.2 redirect et.4.3 rate 1 shutdown 60 packets-limited all**

This will redirect all unlearned traffic on port et.2.2's channel to port et.3.1 indefinitely, one second after the 5kPkt/sec broadcast traffic limit is reached:

xp(config)# **port bmon et2.2 unlimited-redirect et.3.1 rate 5**

This will redirect all unlearned traffic on port et.1.3's channel to port et.2.3 for 100 seconds, five seconds after the 2kPkt/sec limit has been reached:

xp(config)# **port bmon et.1.3 redirect et.2.3 shutdown 100 rate 2 duration 5**

# port description

## Purpose

Defines a user description for a port.

## Format

**port description** *<port-list> <desc>*

## Mode

Configure

## Description

The **port description** command allows you to define a character string description for a port. This is useful for management purposes.

## Parameters

**description** *<port-list>*
Specifies the port(s). Valid for Ethernet and WAN ports only.

**description** *<desc>*
Specifies the character string used for the description of the port. This must be 125 characters or less.

## Restrictions

This command is valid for Ethernet and WAN only.

## Example

To set port et.2.1 with the description 'vlan1-2':

```
xp(config)# port description et.2.1 vlan1-2
```

# port disable

## Purpose

Disable a port.

## Format

**port disable** *<port-list>*

## Mode

Configure

## Description

The **port disable** command disables the specified ports. Disabled ports do not send or receive any traffic. You might want to disable unused ports to prevent network users from inadvertently or unscrupulously connecting to unoccupied but enabled ports on the XP.

## Parameters

**port** *<port-list>* Specifies the ports you are disabling.

## Restrictions

None.

## Examples

To disable port et.1.3 on the XP:

```
xp(config)# port disable et.1.3
```

To disable ports 1 through 5 on the Ethernet line card in slot 3 of the XP chassis:

```
xp(config)# port disable et.3.1-5
```

# port enable 8021p

## Purpose

Enables 802.1p encapsulation.

## Format

**port enable 8021p port** *<port-list>*|**all-ports**

## Mode

Configure

## Description

The **port enable 8021p** command enables 802.1p encapsulation on the specified ports. The 802.1p standard provides the ability to classify traffic into eight priority categories or class of services. This classification scheme is based upon MAC frame information and is used for QoS (Quality of Service) for VLANs.

## Parameters

**port** *<port-list>*|**all-ports**       Specifies the port(s) you are enabling. Specify **all-ports** to enable 802.1p encapsulation on all relevant ports

## Restrictions

None.

## Example

To enable 802.1p encapsulation on port et.1.3:

```
xp(config)# port enable 8021p port et.1.3
```

# port flow-bridging

## Purpose

Set ports to use flow-based bridging.

## Format

**port flow-bridging** *<port-list>*|**all-ports**

## Mode

Configure

## Description

The **port flow-bridging** command changes the specified ports from using address-based bridging to using flow-based bridging. A port can use only one type of bridging at a time.

Each port has an L2 lookup table where MAC address or flows are stored.

- If the port is configured for address-based bridging (default), each L2 table entry consists of a MAC address and a VLAN ID.

- If the port is configured for flow-based bridging, each L2 table entry consists of a source MAC address, a destination MAC address, and a VLAN ID.

Suppose that a port on the XP is connected to a hub that is connected to three workstations, A, B, and C. If each workstation is talking to one another and sending broadcast traffic, the L2 table on the XP's port would contain the following entries for the workstations. Assume that the VLAN ID is "1" for all entries.

If the ports are configured for address-based bridging:

- MAC address A

- MAC address B

- MAC address C

- MAC broadcast address

If the ports are configured for flow-based bridging:

- MAC addresses A->B

- MAC addresses B->A

- MAC addresses B->C

- MAC addresses A->C

- MAC addresses C->A

- MAC addresses C->B

- MAC addresses A->broadcast

- MAC addresses B->broadcast

- MAC addresses C->broadcast

## Parameters

*\<port-list>* **| all-ports**     Specifies the ports you are changing to flow-based bridging. The keyword **all-ports** changes all the ports on the XP to flow-based bridging.

## Restrictions

None.

## Examples

To configure Ethernet port et.3.7 for flow-based bridging:

xp(config)# **port flow-bridging et.3.7**

# port enabled forced-return-flows

## Purpose

Enable the forced-return-flows to function on a port or list of ports.

## Format

**port enable forced-return-flows port** *<port-list>*|**all-ports**

## Mode

Configure

## Description

The **port enable forced-return-flows** command allows you to perform routing without the use of a layer 3 protocol such as RIP or OSPF—these setups may involve VRRP and static gateways. In the case of VRRPs and static gateways, when a remote gateway goes down it does not notify routers more than one hop away. This can cause existing flows to restrict the flow of traffic. With forced-return-flows enabled, each new flow checks the exit port for a "reverse flow" (the source/destination IP addresses are the reverse of this new flow). If the "reverse flow" has an exit port that differs from the new flow's entry port, the exit port of the "reverse flow" changes to the new flow's entry port.

## Parameters

*<port-list>* | **all-ports**    Enable forced return flows to a specific port on the port list. Use the keyword **all-ports** to specify all ports.

## Restrictions

None.

## Examples

xp(config)# **port enable forced-return-flows port et.4.6**

# port set

## Purpose

Set port operating mode and port speed.

## Format

**port set [**<*port-list*>**|all-ports] [duplex full|half] [speed 10Mbps|100Mbps|**<*number*>**]**
**[auto-negotiation on|off] [auto-negotiation-speed 10Mbps|100Mbps|10_100Mbps]**
**[auto-negotiation-duplex half|full|both] [auto-negotiation-flowctl off|asymmetric|**
**symmetric|both] [hash-mode m0|m1|m2|m3|m-auto] [wan-encapsulation frame-relay|ppp]**
**[ifg** <*number*>**] [input-encapsulation forced-ethernet_ii] [link-timer** <*number*>**]**
**[clock** <*clock-source*>**] [transmit-clock-source local|loop]**
**[framing cbit-parity|m23|esf|g832|g751] [mtu** <*number*>**] [mc-vlan-encap** <*number*>**]**

## Mode

Configure

## Description

Depending on the media type of a port, the **port set** command lets you set various parameters of
each port.

For 10/100-Mbps Ethernet, you can set the following:

- Operating mode (half-duplex or full-duplex).

- Port speed (10-Mbps or 100-Mbps). This parameter applies only to ports on the 10/100 line
  cards.

- Hash mode

**Note:** By default, all ports use autosensing to detect the operating mode and speed of the
network segment to which they are connected. If you use this command to set a port
parameter, the setting disables autosensing for that parameter on the port. For example, if
you set the speed of a segment to 10-Mbps, that segment no longer uses autosensing for
the port speed and will always attempt to operate at 10-Mbps.

For Gigabit Ethernet, you can set the following:

- Auto-negotiation

- Hash mode

For WAN ports, you can set the following:

• Wan-encapsulation (either frame-relay or ppp) and clock source (HSSI ports only)

• Speed (in Megabits per second)

**Note:** "Duplex", "autonegotiation", and "hash mode" are not applicable parameters for WAN interfaces.

# Parameters

*<port-list>*|**all-ports**
Specifies the ports. The **all-ports** keyword applies the settings you select to all the XP ports.

**duplex full|half**
Sets the operating mode to half duplex or full duplex. This option is valid for 10/100 Mbps Ethernet only.

**speed 10Mbps|100Mbps**
Sets the port speed to 10-Mbps or 100-Mbps. This option is valid for 10/100 Mbps Ethernet only and with auto-negotiation turned off.

**auto-negotiation on|off**
Turns on or off auto-negotiation for Gigabit Ethernet ports. Auto-negotiation is a process whereby both ports on a connection resolve the best line speed, duplex mode and flow control scheme to communicate with each other.

**auto-negotiation-speed 10Mbps|100Mbps|10_100Mbps**
Sets the auto-negotiation speed on a Fast Ethernet port.

– **10Mbps** – Sets the auto-negotiation line speed capability advertised to 10Mbits/sec

– **100Mbps** – Sets the auto-negotiation line speed capability advertised to 100Mbits/sec

– **10_100Mbps** – Sets the auto-negotiation line speed capability advertised to 10Mbits/sec and 100Mbits/sec

**auto-negotiation-duplex half|full|both**
Sets the auto-negotiation duplex mode on a Fast Ethernet port.

– **half** – Sets the auto-negotiation duplex mode advertised to half-duplex.

– **full** – Sets the auto-negotiation duplex mode advertised to full-duplex.

– **both** – Sets the auto-negotiation duplex mode advertised to half-duplex and full-duplex.

**auto-negotiation-flowctl off|asymmetric|symmetric|both**
Sets the flow-control on a full-duplex Gigabit Ethernet port.

– **off** – Clears the flow-control capability advertised by the port.

– **asymmetric** – Sets the flow-control capability advertised to asymmetric pause.

– **symmetric** – Sets the flow-control capability advertised to symmetric pause.

– **both** – Sets the flow-control capability advertised to asymmetric pause and symmetric pause.

**hash-mode m0|m1|m2|m3|m-auto**

Sets the Layer-2 hash mode for this port. This hash mode defines the algorithm scheme that will be used to calculate the hash value used for the Layer-2 and Layer-3 lookup table.

The 48-bit MAC address is hashed into 8-bit groupings, represented by either B5, B4, B3, B2, B1, or B0. Assuming a MAC address of the value B5B4:B3B2:B1B0, the following describes the various hash mode and the resulting MAC address format:

– **m0** – B5B4:B3B2:B1B0

– **m1** – B5B4:B3B2:B0B1

– **m2** – B5B4:B2B3:B1B0 (default hash mode)

– **m3** – B4B5:B3B2:B1B0

– **m-auto** – auto hashing
   Auto-hashing periodically queries the L2 or L3 tables for hash bucket overflow on a port. If the number of overflows exceed a certain threshold level, auto-hashing will automatically change the hash mode for that port. Eventually a 'best' hash mode for the particular traffic will be found, which will provide optimal distribution across the L2 or L3 lookup table.

The 16 bit hash index is calculated by the performing the following calculation:

(B5B4) XOR (B3B2) XOR (B1B0)

**wan-encapsulation frame-relay|ppp**

Sets the encapsulation for the WAN port to either frame-relay or ppp.

**ifg** *<number>*

Changes the inter-frame gap (IFG) for the port by the amount specified by *<number>*. The *<number>* is a delta value in 40-nanosecond units for the IFG. Possible values for *<number>* are -12 through 64.

**input-encapsulation forced-ethernet_ii**

Changes the interpretation of the input MAC encapsulation to Ethernet II.

**link-timer** *<number>*

Sets the auto-negotiation link timer to the number of milliseconds specified by *<number>*. The *<number>* is a value between 0 and 20. This option is valid for Gigabit ports only.

**clock** *<clock-source>*

Sets the clock source. This parameter is applicable only when the **wan-encapsulation** parameter is specified for a HSSI port that will be connected back-to-back with a HSSI port on another router. The *<clock-source>* is one of the following values:

| | |
|---|---|
| **external-clock** | External transmit clock (DCE provided) |
| **internal-clock-51mh** | Internal transmit clock at 51.84 Mhz |
| **internal-clock-25mh** | Internal transmit clock at 25.92 Mhz |

| | | |
|---|---|---|
| | **external-rx-clock** | External receive clock for transmit clocking |

**Note:** For WAN cards without an internal clock, an external CSU/DSU is required.

**transmit-clock-source local|loop**
> Sets the ATM port transmit clock source. The expected value is one of the following timing sources:

| | | |
|---|---|---|
| | **local** | Selects the on board crystal oscillator as the clock source<br>**local** is the default value |
| | **loop** | Selects the receiver inputs as the clock source |

**Note:** Do not set both ports in the same connection with a loop clock source. At least one port must be set to local clock source.

**framing cbit-parity|m23|esf|g832|g751**
> Specifies the type of framing used by the ATM port. The expected value is one of the following framing types:

| | | |
|---|---|---|
| | **cbit-parity** | Valid for T3 only |
| | **m23** | Valid for T3 only |
| | **esf** | Valid for T1 only |
| | **g832** | Valid for E3 only |
| | **g751** | Valid for E3 only |

**Mtu** *<number>*
> Changes the MTU on SONET ports. You may enter a value between 64 and 65535.

**mc-vlan-encap** *<number>*
> The XP can forward multicast packets to only one vlan on an 802.1Q trunk. To resolve this problem, all outgoing multicast traffic on a Q trunk port is redirected to **vlan** *<number>*. On the other end of the Q trunk link, a SmartSwitch 2000/6000 is used and configured with vlan classification. This allows multicast traffic to forward successfully.

## Restrictions

For 10/100 Mbps Ethernet, you must set both the operating mode and the speed. You cannot set one without setting the other. For Gigabit Ethernet, you can only turn on or off auto-negotiation. You cannot set the speed or duplex for Gigabit modules.

## Examples

To configure port et.1.5 to be 10 Mbps and half duplex:

```
xp(config)# port set et.1.5 speed 10mbps duplex half
```

To turn off auto-negotiation for the Gigabit port gi.4.2:

> xp(config)# **port set gi.4.2 auto-negotiation off**

To set the Layer 2 hash mode for all ports to the m0 hash algorithm:

> xp(config)# **port set all-ports hash-mode m0**

To set the speed for a HSSI ppp WAN port located on port 1 of slot 3:

> xp(config)# **port set hs.3.1 wan-encapsulation ppp speed 45000000**

To set an internal clock source (25.92 Mhz) for a HSSI ppp WAN port located on port 1 of slot 3:

> xp(config)# **port set hs.3.1 wan-encapsulation ppp speed 45000000 clock internal-clock-25mh**

To set the speed for a serial frame relay WAN port located at port 4 of slot 2, VC 100:

> xp(config)# **port set se.2.4.100 wan-encapsulation frame-relay speed 1500000**

To increase the inter-frame gap for port et.1.1 by 400 nanoseconds (10 * 40ns):

> xp(config)# **port set ifg et.1.1 ifg 10**

# port show 8021p

## Purpose

Displays 802.1p encapsulation status.

## Format

**port show 8021p** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show 8021p** command displays whether 802.1p encapsulation is enabled or disabled on a port or list of ports. The 802.1p standard provides the ability to classify traffic into eight priority categories or class of services. This classification scheme is based upon MAC frame information and is used for QoS (Quality of Service) for VLANs.

## Parameters

*<port-list>*|**all-ports**    Specifies the ports for which you want to display the description. The **all-ports** keyword displays the description for all the XP ports.

## Restrictions

None.

## Example

To display 802.1p encapsulation status for port et.2.1:

```
xp# port show 8021p et.2.1

Port      802.1p Status
 ----      -------------
 et.2.1      Disabled
```

# port show autonegotiation

## Purpose

Displays auto-negotiation information.

## Format

**port show autonegotiation** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show autonegotiation** command displays auto-negotiation information. This command displays port number, administration status, current status, remote signaling, fault advertised, and fault received. Auto-negotiation is a process whereby both ports on a connection resolve the best line speed, duplex mode and flow control scheme to communicate with each other.

## Parameters

*<port-list>*|**all-ports**    Specifies the ports for which you want to display the description. The **all-ports** keyword displays the description for all the XP ports.

## Restrictions

None.

## Example

To display auto-negotiation information for port et.2.1:

```
xp# port show autonegotiation et.2.1

          Admin    Current      Remote      Fault       Fault
Port   Status   Status       Signalling  Advertised   Received
------ -------- ------------- ----------- ------------- ---------
et.2.1  disabled  other        not detected  n/a        n/a
```

# port show autonegotiation-capabilities

## Purpose

Displays auto-negotiation capabilities.

## Format

**port show autonegotiation-capabilities** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show autonegotiation-capabilities** command displays auto-negotiation capabilities. This command displays a list of port capabilities, advertised capabilities, and any received capabilities from another port. Auto-negotiation is a process whereby both ports on a connection resolve the best line speed, duplex mode and flow control scheme to communicate with each other.

## Parameters

*<port-list>*|**all-ports**     Specifies the ports for which you want to display the description. The **all-ports** keyword displays the description for all the XP ports.

## Restrictions

None.

# Example

To display auto-negotiation capabilities for port et.2.1:

```
xp# port show autonegotiation-capabilities et.2.1

Port    Capability    Advertised    Received
------  ------------- ------------- -------------
et.2.1  other         other
        10 baseT      10 baseT
        10 baseT FD   10 baseT FD
        100 baseT4    100 baseT4
        100 baseTX    100 baseTX
        100 baseTX FD 100 baseTX FD
        100 baseT2    100 baseT2
        100 baseT2 FD 100 baseT2 FD
        Pause         Pause
        Asymetric Pause  Asymetric Pause
        Symmetric Pause  Symmetric Pause
        Asym-Sym Pause   Asym-Sym Pause
        1000 baseX    1000 baseX
        1000 baseX FD 1000 baseX FD
        1000 baseT    1000 baseT
        1000 baseT FD 1000 baseT FD
```

# port show bmon

## Purpose

Display broadcast monitoring information for XP ports.

## Format

**port show bmon [config][detail][port** *<port list>***][stats]**

## Mode

Enable

## Description

The **port show bmon** command lets you display broadcast monitoring information for XP ports.

## Parameters

If no parameters are specified, the current states of all ports are displayed.

| | |
|---|---|
| **config** | Displays configuration information for broadcast monitoring. |
| **detail** | Displays all information for broadcast monitoring. |
| **port** *<port-list>* | Specifies the ports for which you want to display information. |
| **stats** | Displays statistics information for broadcast monitoring. |

## Restrictions

None.

# Example

To display the state of ports with broadcast monitoring:

```
xp# port show bmon
Port: et.1.1 State: On

Port: et.6.8 State: ShutDn Expire: 39 (sec)

Port: et.7.8 State: On
```

The above example shows three ports, with the port et.6.8 shut down for 39 seconds.

To display broadcast monitoring configuration values set for the ports:

```
xp# port show bmon config
Port: et.1.1 Rate (Kpps): 10 Burst (sec): 1 Shutdown (sec):300

Port: et.6.8 Rate (Kpps): 10 Burst (sec): 5 Shutdown (sec):60

Port: et.7.8 Rate (Kpps): 2 Burst (sec): 2 Shutdown (sec):60
```

In the above example, port et.1.1 has been configured with default values.

To display broadcast monitoring statistics for the ports:

```
xp# port show bmon stats
Port: et.1.1 Current Broadcast Rate (Kpps): 0.000

Port: et.6.8 Burst at port shutdown (Kpps): 10.032
ShutDn Count: 2

Port: et.7.8 Current Broadcast Rate (Kpps): 0.000
```

In the above example, the current broadcast traffic on et.1.1 and et.7.8 is zero. The port et.6.8 is currently shut down and it shows a burst of 10.032K packets per second at its shut down. This port has been shut down twice because of excessive broadcast traffic.

To show broadcast monitoring details for the ports:

```
xp# port show bmon detail
Port: et.1.1 Rate (Kpps): 10 Burst (sec): 1 Shutdown (sec):300
State: On
Current Broadcast Rate (Kpps): 0.000

Port: et.6.8 Rate (Kpps): 10 Burst (sec): 5 Shutdown (sec):60
State: ShutDn Expire: 39 (sec)
Burst at port shutdown (Kpps): 10.032
ShutDn Count: 2

Port: et.7.8 Rate (Kpps): 2 Burst (sec): 2 Shutdown (sec):60
State: On
Current Broadcast Rate (Kpps): 0.000
```

The above example shows configuration, state, and statistics information.

# port show bridging-status

## Purpose

Display the bridging status of XP ports.

## Format

**port show bridging-status** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show bridging-status** command lets you display bridging-status information for XP ports.

## Parameters

*<port-list>*|**all-ports**    Specifies the ports for which you want to display information. The **all-ports** keyword displays the selected information for all the XP ports.

## Restrictions

None.

## Example

To display the bridging status for all available ports:

```
xp# port show bridging-status all-ports
Port     Mgmt Status  phy-state    link-state Bridging Mode
----     -----------  ---------    ---------- -------------
et.4.1   No Action    Disabled     Link Down  Address
et.4.2   No Action    Disabled     Link Down  Address
et.4.3   No Action    Forwarding   Link Up    Address
et.4.4   No Action    Disabled     Link Down  Address
et.4.5   No Action    Disabled     Link Down  Address
et.4.6   No Action    Forwarding   Link Up    Address
et.4.7   No Action    Disabled     Link Down  Address
et.4.8   No Action    Disabled     Link Down  Address
```

# port show description

## Purpose

Display the user defined descriptions of XP ports.

## Format

**port show description** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show description** command lets you display the user defined description for XP ports.
The description is defined using the **port description** command.

## Parameters

*<port-list>*|**all-ports**    Specifies the ports for which you want to display the description. The **all-ports** keyword displays the description for all the XP ports.

## Restrictions

This command is valid for Ethernet and WAN only.

## Example

To display the bridging status for all available ports:

```
xp# port show description et.2.1

Port Name   Description
---------   -----------
et.2.1      vlan1-2
```

# port show MAU

## Purpose

Displays Media Access Control information.

## Format

**port show MAU** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show MAU** command displays Media Access Control (MAC) information. This command displays port number, media type, default media type, jack type, operational status, and support level.

## Parameters

*<port-list>*|**all-ports**    Specifies the ports for which you want to display the description. The **all-ports** keyword displays the description for all the XP ports.

## Restrictions

None.

## Example

To display MAC information for port et.2.1:

```
xp# port show MAU et.2.1

Port    MUA Type        Default Type    Jack Type  Status Supported
------  --------------  --------------  ---------  -----------  ---
et.2.1  100 BaseFX HD   100 BaseFX HD   fiber SC   operational  no
```

# port show MAU-statistics

## Purpose

Displays Media Access Control statistics.

## Format

**port show MAU-statistics** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show MAU-statistics** command displays Media Access Control (MAC) statistics. This command displays port number, media availability, media availability state exits totals, jabber (excessively long frames) state, jabbering state enters totals, and false carriers totals.

## Parameters

*<port-list>*|**all-ports**    Specifies the ports for which you want to display the description. The **all-ports** keyword displays the description for all the XP ports.

## Restrictions

None.

## Example

To display MAC statistics for port et.2.1:

```
xp# port show MAU-statistics et.2.1

                             Media Avail.  Jabber    Jabbering    False
Port   Media Avail.     State Exits   State    State Enters Carriers
------ ---------------- ------------ --------- ------------ ----
et.2.1  not available    0            other    0            0
```

# port show port-status

## Purpose

Display various information about specified ports.

## Format

**port show port-status** *<port-list/SmartTRUNK-list>*|**all-ports**|**all-smarttrunks**

## Mode

Enable

## Description

The **port show port-status command** lets you display port-status information for XP ports or SmartTRUNKs.

## Parameters

*<port-list/SmartTRUNK-list>*|**all-ports**|**all-smarttrunks**
Specifies the LAN/WAN ports or SmartTRUNKs for which you want to display status information. The **all-ports** keyword displays information for all the XP ports. The **all-smarttrunks** keyword displays information for all SmartTRUNKs.

## Restrictions

This command does not show Virtual Circuit (VC) information. To see the state of sub-interfaces, you need to use the appropriate facility command, such as the **frame-relay show stats** command.

# Example

To display the port status for all ports on Ethernet module 1 (et.1):

```
xp# port show port-status et.1.*

Flags: M - Mirroring enabled  S - SmartTRUNK port

                                Link  Admin
Port    Port Type           Duplex Speed    Negotiation State State Flags
----    ---------           ------ -----    ----------- ----- ----- -----
et.1.1  10/100-Mbit Ethernet  Half   10 Mbits  Manual      Up    Up
et.1.2  10/100-Mbit Ethernet  Half   10 Mbits  Manual      Up    Up
et.1.3  10/100-Mbit Ethernet  Half   10 Mbits  Manual      Up    Up
et.1.4  10/100-Mbit Ethernet  Half   10 Mbits  Manual      Up    Up
et.1.5  10/100-Mbit Ethernet  Half   10 Mbits  Manual      Up    Up
et.1.6  10/100-Mbit Ethernet  Half   10 Mbits  Manual      Up    Up
et.1.7  10/100-Mbit Ethernet  Half   10 Mbits  Manual      Up    Up
et.1.8  10/100-Mbit Ethernet  Half   10 Mbits  Manual      Up    Up
```

# port show stp-info

## Purpose

Display Spanning Tree (STP) information for XP ports.

## Format

**port show stp-info** *<port-list>*|**all-ports [rstp]**

## Mode

Enable

## Description

The **port show stp-info** command lets you display Spanning-Tree information for XP ports.

## Parameters

| | |
|---|---|
| *<port-list>*\|**all-ports** | Specifies the ports for which you want to display information. The **all-ports** keyword displays the selected information for all the XP ports. |
| **rstp** | Display RSTP-related information. |

## Restrictions

None.

# Example

To display the spanning tree information for all available ports:

```
xp# port show stp-info all-ports
                                                    Designated
Port    Priority  Cost   STP       State     Designated-Bridge   Port
----    --------  ----   ---       -----     ----------------    ----------
et.2.1   008      00001  Enabled   Forwarding  0064:00e06336b60e  8 011
et.2.2   000      00000  Disabled  Disabled    0000:000000000000  0 000
et.2.3   000      00000  Disabled  Disabled    0000:000000000000  0 000
et.2.4   000      00000  Disabled  Disabled    0000:000000000000  0 000
et.2.5   000      00000  Disabled  Disabled    0000:000000000000  0 000
et.2.6   008      00010  Enabled   Forwarding  07d0:00e0633680ce  8 026
et.2.7   008      00010  Enabled   Forwarding  07d0:00e0633680ce  8 027
et.2.8   008      00010  Enabled   Forwarding  07d0:00e0633680ce  8 028
gi.3.1   008      00001  Enabled   Blocking    03e8:00e06334eb4e  8 035
gi.3.2   008      00001  Enabled   Blocking    03e8:00e06334eb4e  8 035
```

```
xp# port show stp-info all-ports rstp
                   Point To Point Status   Edge Port Status
Port    Port Role     (Admin/Oper)          (Admin/Oper)     Sends RSTP?
----    ---------  --------------------   ----------------  ----------
et.2.1  Root       Auto/True              False/False       Yes
et.2.2  Disabled   Auto/False             False/False       Yes
et.2.3  Disabled   Auto/False             False/False       Yes
et.2.4  Disabled   Auto/False             False/False       Yes
et.2.5  Disabled   Auto/False             False/False       Yes
et.2.6  Designated Auto/True              True/True         Yes
et.2.7  Designated Auto/True              True/True         Yes
et.2.8  Designated Auto/True              True/True         Yes
gi.3.1  Alternate  Auto/True              False/False       Yes
gi.3.2  Alternate  Auto/True              False/False       Yes
```

# port show pvst-info

## Purpose

Display Spanning Tree (STP) information for a particular spanning tree.

## Format

**port show pvst-info** *<port-list>*|**all-ports spanning-tree** *<string>* **[rstp]**

## Mode

Enable

## Description

The **port show pvst-info** command lets you display Spanning-Tree information for a particular spanning tree.

## Parameters

| | |
|---|---|
| *<port-list>*\|**all-ports** | Specifies the ports for which you want to display information. The **all-ports** keyword displays the selected information for all the XP ports. |
| *<string>* | Specifies the name of the spanning tree for which you want to display information. |
| **rstp** | Display RSTP-related information. |

## Restrictions

None.

## Example

To display the spanning tree information for spanning tree on all ports:

```
xp# port show pvst-info all-ports spanning-tree red
                                                       Designated
Port      Priority   Cost    STP      State      Designated-Bridge      Port
----      --------   ----    ---      -----      -----------------      ----------
et.7.1    008        00010   Enabled  Forwarding   8000:00001d17ed21    8 071
et.7.2    000        00000   Enabled  Disabled     0000:000000000000    0 000
et.7.3    008        00010   Enabled  Blocking     8000:00e0630457c0    8 005
et.7.4    008        00010   Enabled  Blocking     8000:00e0630457c0    8 006
```

```
xp# port show pvst-info all ports spanning-tree red rstp

                  Point To Point Status    Edge Port Status
Port    Port Role    (Admin/Oper)            (Admin/Oper)      Sends RSTP?
----    ---------    --------------------    ----------------  ----------
et.7.1  Root         Auto/True               False/False       Yes
et.7.2  Disabled     Auto/False              False/False       Yes
et.7.3  Alternate    Auto/True               False/False       Yes
et.7.4  Alternate    Auto/True               False/False       Yes
```

# port show vlan-info

## Purpose

Display VLAN information for XP ports.

## Format

**port show vlan-info** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show vlan-info** command lets you display VLAN information about XP ports.

## Parameters

*<port-list>*|**all-ports**    Specifies the ports for which you want to display information. The **all-ports** keyword displays the selected information for all the XP ports.

## Restrictions

None

## Example

To display the VLAN information for all available ports:

```
xp# port show vlan-info all-ports
Port    Access Type    IP VLANs    IPX VLANs    Bridging VLANs
------  ---------    ---------  --------  --------------
et.4.1    access      DEFAULT     DEFAULT     DEFAULT
et.4.2    access      DEFAULT     DEFAULT     DEFAULT
et.4.3    access      DEFAULT     DEFAULT     DEFAULT
et.4.4    access      DEFAULT     DEFAULT     DEFAULT
et.4.5    access      DEFAULT     DEFAULT     DEFAULT
et.4.6    access      DEFAULT     DEFAULT     DEFAULT
et.4.7    access      DEFAULT     DEFAULT     DEFAULT
et.4.8    access      DEFAULT     DEFAULT     DEFAULT
```

# port show mirroring-status

## Purpose

Show the port mirroring status for slots in the XP chassis.

## Format

**port show mirroring-status** *<slot>*|**all-slots**

## Mode

Enable

## Description

The **port show mirroring-status** command shows the following port mirroring status information for the specified chassis slots:

- Whether port mirroring is enabled

- The ports or slots that are being mirrored

- The mirroring mode (input port, output slot, or both)

## Parameters

*<slot>*|**all-slots**    Specifies the chassis slots for which you want to display port mirroring status. The **all-slots** keyword displays port mirroring status for all the slots in the chassis.

## Restrictions

None.

## Examples

To display the port mirroring status for slot 5:

```
xp(config)# port show mirroring-status 5
```

# port show hash-mode

## Purpose

Displays the Layer 2 hash mode for a particular port(s).

## Format

**port show hash-mode** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show hash-mode** command displays the Layer 2 hash mode used by a particular port(s). An example is displayed to show the resulting MAC address format by using this hash mode. See *port set* on page 663 for a description of all hash modes.

## Parameters

*<port-list>*|**all-ports**   Specifies the ports for which you will display the description. Use the **all-ports** keyword to display all XP ports.

## Restrictions

None.

## Examples

To display the hash mode for port et.2.1:

```
xp# port show hash-mode et.2.1

L2 Port Hash Mode (assume a MAC address = 0011:2233:4455

-------------------------
Port et.2.1          Mode-2          0011_3322_4455
```

# port show mc-vlan-encap

## Purpose

Displays the vlan ID where an outbound multicast packet on an 802.1q trunk port will be redirected.

## Format

**port show mc-vlan-encap** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show mc-vlan-encap** command displays which vlan(s) to redirect the outbound multicast traffic to on a port or a list of ports. The XP can forward multicast packets to only one vlan on an 802.1Q trunk. To resolve this problem, all outgoing multicast traffic on a Q trunk port is redirected to **vlan** *<number>*. On the other end of the Q trunk link, a SmartSwitch 2000/6000 is used and configured with vlan classification. This allows multicast traffic to forward successfully.

## Parameters

*<port-list>*|**all-ports**   Specifies the ports for which you will display the description. Use the **all-ports** keyword to display all XP ports.

## Restrictions

This command applies only to Q-trunk ports.

## Examples

To display the hash mode for port et.2.1:

```
xp# port show mc-vlan-encap et.4.6
Port et.4.6          MC Encapsulation Vlan: 10
```

# port show serial-link-info

## Purpose

Displays the serial link information for XP ports.

## Format

**port show serial-link-info** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **port show serial-link-info** command lets you display the status of the DTE-DCE control signals for a particular port(s).

## Parameters

*<port-list>*|**all-ports**  Specifies the port(s) for which you will display all serial-port information. Use the **all-ports** keyword to display all XP ports.

## Restrictions

This command applies only to WAN ports.

## Examples

```
xp# port show serial-link-info all-ports

Port    Port Type      CD   CTS   RTS/DTR      DSR    LL    LINK
----    -------------  --   ---   ------------ ----   ---   -----
se.5.1  V.35           on   on    on           on     off   on
se.5.2  V.35           on   on    on           on     off   on
se.5.3  WAN Serial     off  off   off          off    off   off
se.5.4  WAN Serial     off  off   off          off    off   off
```

**CD**  Carrier Detected
**CTS**  Clear To Send
**RTS/DTR**  Request To Send/Data Terminal Ready
**DSR**  Data Set Ready
**LL**  Local Loopback

# Chapter 47

# port mirroring Command

## Purpose

Apply port mirroring to a target port on an XP or to traffic specified by an ACL profile.

## Format

**port mirroring dst-ports** *<port_list>* **[src-ports** *<port_list>*|**src-acl** *<acl name>***]**

## Mode

Configure

## Description

The **port mirroring** command can be used to duplicate traffic from a single port to another single port, a single port to multiple ports, multiple ports to a single port, or multiple ports to multiple ports. You may also use the Port Mirroring facility in conjunction with an ACL. When you set up a mirror for traffic coming into the XP that matches a specific ACL, the XP mirrors the traffic out to one or more ports.

## Parameters

**dst-ports** *<port_list>*
      The port(s) you will use to monitor activity. This is the port or port list to which you will want to connect the traffic sniffer.

**src-ports** *<port_list>*

> The port(s) for which you want to monitor activity. You can specify any ports. Traffic will be mirrored from these ports to the monitor port.

**src-acl** *<acl name>*

> The name of the ACL that specifies the profile of the traffic that you want to monitor. The ACL must be a previously created IP ACL. The ACL may contain either **permit** or **deny** keywords. The **port mirroring** command only looks at the following ACL rule parameter values: protocol, source IP address, destination IP address, source port, destination port, and TOS.

## Restrictions

Also, Enterasys recommends that you monitor Gigabit ports through other Gigabit ports—you would almost certainly experience speed-inconsistency-related problems monitoring a Gigabit port through a 10Base-T or 100Base-TX port.

**Known Restrictions**

- ACLs and ports cannot be mirrored simultaneously.

- You may define up to 10 port mirrors and 128 ACL mirrors, but the actual limit will depend on the resources available.

- Packets that are lost due to CRC and BUFFER_OVERFLOW errors are not mirrored to the monitor-port.

- In the example below, routed packets from source A to destination B on link 2 are seen as leaving src mac of XP when port 1.2 is being monitored.
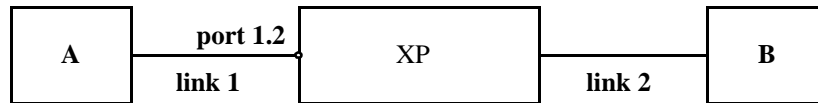


## Examples

To mirror traffic on ethernet ports et.2.2 to port et1.2:

```
xp(config)# port mirroring dst-ports et.1.2 src-ports et.2.2
```

After configuring et.1.2 as a monitor-port, et.1.2 is unusable for any other function in the system. This is indicated by a A LINK_DOWN message. However, et.1.2 is capable of transmitting TX packets and its LED will be lit while in operation.

To mirror traffic that is specified by the profile in the ACL "101" to port et1.2:

```
xp(config)# port mirroring dst-ports et.1.2 src-acl 101
```

# Chapter 48

# ppp Commands

The **ppp** commands allow you to define Point-to-Point Protocol (PPP) service profiles, and specify and monitor PPP High-Speed Serial Interface (HSSI) and standard serial ports.

## Command Summary

Table 36 lists the **ppp** commands. The sections following the table describe the command syntax.

**Table 36. ppp commands**

| |
|---|
| **ppp add-to-mlp** *<mlp>* **ports** *<port list>* |
| **ppp apply service** *<service name>* **ports** *<port list>* |
| **ppp clear stats-counter [frame-drop-qdepth-counter] [max-frame-enqued-counter] [frame-drop-red-counter] [rmon] ports** *<port list>* |
| **ppp create-mlp** *<mlp list>* **slot** *<number>* |
| **ppp define service** *<service name>* **[bridging enable\|disable] [high-priority-queue-depth** *<number>*] **[ip enable\|disable] [ipx enable\|disable] [lcp-echo on\|off] [lcp-magic on\|off] [low-priority-queue-depth** *<number>*] **[max-configure** *<number>*] **[max-failure** *<number>*] **[max-terminate** *<number>*] **[med-priority-queue-depth** *<number>*] **[red on\|off] [red-maxTh-high-prio-traffic** *<number>*] **[red-maxTh-low-prio-traffic** *<number>*] **[red-maxTh-med-prio-traffic** *<number>*] **[red-minTh-high-prio-traffic** *<number>*] **[red-minTh-low-prio-traffic** *<number>*] **[red-minTh-med-prio-traffic** *<number>*] **[retry-interval** *<number>*] |
| **ppp restart lcp-ncp ports** *<port list>* |
| **ppp set mlp-encaps-format ports** *<port list>* **[format short-format]** |
| **ppp set mlp-frag-size ports** *<port list>* **[size** *<size>*] |
| **ppp set mlp-fragq-depth ports** *<port list>* **qdepth** *<number-of-packets>* |

**Table 36. ppp commands (Continued)**

| |
|---|
| **ppp set mlp-orderq-depth ports** *<port list >* **qdepth** *<number-of-packets>* |
| **ppp set payload-compress [max-histories 0\|1] [type stac] ports** *<port list>* |
| **ppp set payload-encrypt [type des-bis] transmit-key** *<key>* **receive-key** *<key>* **ports** *<port list>* |
| **ppp set peer-addr [ip-address** *<IP address>*] **[ipx-address** *<IPX address>*] **[ports** *<port list>*] |
| **ppp set ppp-encaps-bgd ports** *<port list>* |
| **ppp show mlp** *<mlp list>*\|**all-ports** |
| **ppp show service** *<service name>*\|**all** |
| **ppp show stats ports** *<port>* **[bridge-ncp] [ip-ncp] [link-status] [summary]** |

# ppp add-to-mlp

## Purpose

Add PPP ports to an MLP bundle.

## Format

**ppp add-to-mlp** *<mlp>* **port** *<port list>*

## Mode

Configure

## Description

The **ppp add-to-mlp** command allows you to add one or more PPP ports to a previously defined MLP bundle.

## Parameters

| | |
|---|---|
| *<mlp>* | The name of the previously defined MLP bundle. |
| *<port list>* | The WAN port(s) you want to add to the MLP bundle. |

## Restrictions

Usage is restricted to PPP WAN ports only.

## Example

To add the port "hs.3.1" to the MLP bundle "mp.1":

```
xp(config)# ppp add-to-mlp mp.1 port hs.3.1
```

# ppp apply service

## Purpose

Apply a pre-defined service profile to an interface.

## Format

**ppp apply service** *<service name>* **ports** *<port list>*

## Mode

Configure

## Description

Issuing the **ppp apply service ports** command allows you to apply a previously defined service profile to a given PPP WAN port.

## Parameters

*<service name>*   The name of the previously defined service you wish to apply to the given port(s) or interfaces.

*<port list>*   The port(s) to which you wish to apply the pre-defined service profile. You can specify a single port or a comma-separated list of ports.

## Restrictions

Usage is restricted to PPP WAN ports only.

## Example

To apply the service "s1" to slot 2, serial ports 1 and 2:

```
xp(config)# ppp apply service s1 ports se.2.1,se.2.2
```

# ppp clear stats-counter

## Purpose

Clears the specified statistics counter.

## Format

**ppp clear stats-counter [frame-drop-qdepth-counter] [max-frame-enqued-counter] [frame-drop-red-counter] [rmon] ports** *<port list>*

## Mode

Enable

## Description

The **ppp clear stats-counter** command allows you to specify a particular statistic counter and have the statistics reset to zero. There are statistic counters on each PPP WAN port, and you can use the **ppp clear stats-counter** to clear the counter for an individual WAN port or for a group of ports.

## Parameters

| | |
|---|---|
| **frame-drop-qdepth-counter** | Specify this optional parameter to reset the frame drop counter to zero. |
| **max-frame-enqued-counter** | Specify this optional parameter to reset the max enqued frames counter to zero. |
| **frame-drop-red-counter** | Specify this optional parameter to reset the packet drop counter to zero. |
| **rmon** | Specify this optional parameter to reset the rmon counter to zero. |
| *<port list>* | The WAN port(s) that you wish to clear the counter. |

## Restrictions

Usage is restricted to PPP WAN ports only.

## Example

To clear the frame drop counter to zero on WAN port hs.3.1:

xp# **ppp clear stats-counter frame-drop-qdepth-counter ports hs.3.1**

# ppp create-mlp

## Purpose

Create MLP bundles.

## Format

**ppp create-mlp** *<mlp list>* **slot** *<number>*

## Mode

Configure

## Description

The **ppp create-mlp** command allows you to create one or more MLP bundles.

## Parameters

| | |
|---|---|
| *<mlp list>* | The name(s) of the MLP bundles you want to create. You can specify a single bundle or a comma-separated list of MLP bundles. |
| *<slot>* | The slot number for the MLP bundle(s). |

## Restrictions

Usage is restricted to PPP WAN ports only.

## Example

To create the MLP bundle "mp.1" for slot 1:

```
xp(config)# ppp create-mlp mp.1 slot 1
```

# ppp define service

## Purpose

Define a service profile for WAN ports.

## Format

**ppp define service** *<service name>* **[bridging enable|disable] [high-priority-queue-depth** *<number>*] **[ip enable|disable] [ipx enable|disable] [lcp-echo on|off] [lcp-magic on|off] [low-priority-queue-depth** *<number>*] **[max-configure** *<number>*] **[max-failure** *<number>*] **[max-terminate** *<number>*] **[med-priority-queue-depth** *<number>*] **[red on|off] [red-maxTh-high-prio-traffic** *<number>*] **[red-maxTh-low-prio-traffic** *<number>*] **[red-maxTh-med-prio-traffic** *<number>*] **[red-minTh-high-prio-traffic** *<number>*] **[red-minTh-low-prio-traffic** *<number>*] **[red-minTh-med-prio-traffic** *<number>*] **[retry-interval** *<number>*]

## Mode

Configure

## Description

The **ppp define service** command allows you to specify the following attributes for a newly created service profile:

- Activate and deactivate bridging, IP, and/or IPX for PPP WAN ports. If you do not specify any bridging, IP, or IPX protocols for PPP WAN ports, they are all activated by default. If you specify a bridging, IP, or IPX protocol, you *must* also explicitly define the behavior of the other two (i.e., **enabled** or **disabled**).

- The allowable PPP queue depth for high-, low-, and medium-priority items.

- Enable and disable the sending of LCP Echo Request messages. LCP Echo Requests and their corresponding LCP Echo Responses determine if a link to a peer is down.

- Enable and disable the use of LCP magic numbers. Magic numbers are used to help detect loopback conditions.

- The maximum allowable number of unanswered/improperly answered configuration requests before determining that the connection to the peer is lost.

- The maximum allowable number of negative-acknowledgment responses for a given interface before declaring an inability to converge.

- The maximum allowable unacknowledged terminate requests before determining that the peer is unable to respond.

- Activate or deactivate Random Early Discard (RED) for PPP ports.

- The maximum and minimum threshold values for RED high-, low-, and medium-priority traffic.

  In general, Enterasys recommends that the maximum threshold values be less than or equal to the respective high-, low-, or medium-priority queue depth. The minimum threshold values should be one-third of the respective maximum threshold.

- The number of seconds that will pass before a subsequent "resending" of the configuration request will be transmitted.

## Parameters

*<service name>*
　　The name you wish to assign to the newly created service profile.

**bridging enable|disable**
　　Specifying the **enable** keyword activates bridging for PPP WAN ports. Specifying the **disable** keyword deactivates bridging for PPP WAN ports.

**high-priority-queue-depth** *<number>*
　　The number of items allowed in the PPP queue. You can specify a number between 1 and 65,535. Enterasys recommends a value within the 5 - 100 item range. The default value is 20.

**ip enable|disable**
　　Specifying the **enable** keyword activates IP for PPP WAN ports. Specifying the **disable** keyword deactivates IP for PPP WAN ports.

**ipx enable|disable**
　　Specifying the **enable** keyword activates IPX for PPP WAN ports. Specifying the **disable** keyword deactivates IPX for PPP WAN ports.

**lcp-echo on|off**
　　Specifying the **on** keyword enables the sending of LCP Echo Request messages. Specifying the **off** keyword disables the sending of LCP Echo Request messages. The sending of LCP Echo Requests is enabled by default.

**lcp-magic on|off**
　　Specifying the **on** keyword enables the use of LCP magic numbers. Specifying the **off** keyword disables the use of LCP magic numbers. The use of LCP magic numbers is enabled by default.

**low-priority-queue-depth** *<number>*
　　The number of items allowed in the PPP queue. You can specify a number between 1 and 65,535. Enterasys recommends a value within the 5 - 100 item range. The default value is 20.

**max-configure** *<number>*
　　The maximum allowable number of unanswered requests. You can specify any number greater than or equal to 1. The default value is 10.

**max-failure** *<number>*
　　The maximum allowable number of negative-acknowledgment transmissions. You can specify any number greater than or equal to 1. The default value is 5.

**max-terminate** *<number>*

The maximum allowable number of unanswered/improperly answered connection-termination requests before declaring the link to a peer lost. You can specify any number greater than or equal to 1. The default value is 2.

**med-priority-queue-depth** *<number>*

The number of items allowed in the PPP queue. You can specify a number between 1 and 65,535. Enterasys recommends a value within the 5 - 100 item range. The default value is 20.

**red on|off**

Specifying the **on** keyword enables RED for PPP WAN ports. Specifying the **off** keyword disables RED for PPP WAN ports.

**red-maxTh-high-prio-traffic** *<number>*

The maximum allowable threshold for high-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 12.

**red-maxTh-low-prio-traffic** *<number>*

The maximum allowable threshold for low-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 12.

**red-maxTh-med-prio-traffic** *<number>*

The maximum allowable threshold for medium-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 12.

**red-minTh-high-prio-traffic** *<number>*

The minimum allowable threshold for high-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 4.

**red-minTh-low-prio-traffic** *<number>*

The minimum allowable threshold for low-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 4.

**red-minTh-med-prio-traffic** *<number>*

The minimum allowable threshold for medium-priority RED traffic. You can specify a number between 1 and 65,535. The default value is 4.

**retry-interval** *<number>*

The number of seconds between subsequent configuration request transmissions (the interval). You can specify any number greater than or equal to 1. The default value is 30.

## Restrictions

Usage is restricted to PPP WAN ports only.

## Example

To create a service profile named "pppserv4" with the following attributes:

• Bridging enabled

• IP and IPX enabled

- LCP Echo Requests disabled

- LCP magic numbers disabled

- RED disabled

- A retry interval of 20 seconds

Enter the following command line in Configure mode:

---

xp(config)# **ppp define service pppserv4 bridging enable ip enable ipx enable lcp-echo off lcp-magic off red off retry-interval 20**

---

# ppp restart lcp-ncp

## Purpose

Restart PPP LCP/NCP negotiation.

## Format

**ppp restart lcp-ncp ports** *<port list>*

## Mode

Enable

## Description

The **ppp restart lcp-ncp** command allows you to reset and restart the LCP/NCP negotiation process for PPP WAN ports.

## Parameters

*<port list>*   The ports for which you would like to re-establish LCP/NCP negotiation.

## Restrictions

This command line is available only for PPP WAN ports.

## Example

To restart LCP/NCP negotiation on serial ports 1 and 2 of slot 4:

```
xp# ppp restart lcp-ncp ports se.4.1,se.4.2
```

# ppp set mlp-encaps-format

## Purpose

Set MLP encapsulation format.

## Format

**ppp set mlp-encaps-format ports** *<port list>* **[format short-format]**

## Mode

Configure

## Description

The **ppp set mlp-encaps-format** command allows you to specify the encapsulation format for MLP bundles. If this command is not configured, long format encapsulation is used for MLP bundles.

## Parameters

*<port list>*
> The MLP port(s) to which you want to apply the encapsulation format

**format short-format**
> Specifies the use of short format for MLP encapsulation.

## Restrictions

Usage is restricted to PPP WAN ports only.

## Example

To specify short format encapsulation for the MLP bundles "mp.1" and "mp.4-7":

```
xp(config)# ppp set mlp-encaps-format ports mp.1,mp.4-7 format short-format
```

# ppp set mlp-frag-size

## Purpose

Set the frame size under which no MLP fragmentation is needed.

## Format

**ppp set mlp-frag-size ports** *<port list >* **[size** *<size>***]**

## Mode

Configure

## Description

The **ppp set mlp-frag-size** command allows you to set the frame size under which no fragmentation is needed for transmission on the MLP bundle. The default size is 1500 bytes. Any frames that are less than the value set by the **ppp set mlp-frag-size** command are not fragmented. Any frames that are over the value are fragmented for transmission on the MLP bundle.

## Parameters

| | |
|---|---|
| *<port list>* | The MLP port(s) to which the frame size applies. |
| *<size>* | The size of the frame, in bytes, that are fragmented by MLP. The value can be between 64 and 1500, inclusive. The default value is 1500. |

## Restrictions

Usage is restricted to PPP WAN ports only.

## Example

To specify that frames of 200 bytes or more are fragmented on the MLP bundles "mp.1" and "mp.4-7":

```
xp(config)# ppp set mlp-frag-size ports mp.1,mp.4-7 size 200
```

# ppp set mlp-fragq-depth

## Purpose

Set the depth of the MLP fragment queue.

## Format

**ppp set mlp-fragq-depth ports** *<port list>* **qdepth** *<number-of-packets>*

## Mode

Configure

## Description

The **ppp set mlp-fragq-depth** command allows you to set the depth of the queue used by MLP to hold packet fragments for reassembly.

## Parameters

*<port list>*        The MLP port(s) to which the queue depth applies.

*<number-of-packets>*

> The depth of the queue, in packets, to hold unassembled packet fragments. The value can be between 100 and 4000, inclusive. The default value is 1000.

## Restrictions

Usage is restricted to MLP WAN ports only.

## Example

To specify a queue depth of 2500 packets to hold fragments for reassembly on the MLP bundles "mp.1":

```
xp(config)# ppp set mlp-fragq-depth ports mp.1 size 2500
```

# ppp set mlp-orderq-depth

## Purpose

Set the depth of the MLP packet order queue.

## Format

**ppp set mlp-orderq-depth ports** *<port list>* **qdepth** *<number-of-packets>*

## Mode

Configure

## Description

The **ppp set mlp-orderq-depth** command allows you to set the depth of the queue used by MLP to hold MLP packets for preserving the packet order.

## Parameters

*<port list>*          The MLP port(s) to which the queue depth applies.

*<number-of-packets>*
                       The depth of the queue, in packets, to hold MLP packets. The value can be between 100 and 4000, inclusive. The default value is 1000.

## Restrictions

Usage is restricted to MLP WAN ports only.

## Example

To specify a queue depth of 2500 packets to hold packets for reordering on the MLP bundles "mp.1":

xp(config)# **ppp set mlp-orderq-depth ports mp.1 size 2500**

# ppp set payload-compress

## Purpose

Enables packet compression for PPP ports.

## Format

**ppp set payload-compress [max-histories** *<number>*] **[type stac] ports** *<port list>*

## Mode

Configure

## Description

The **ppp set payload-compress** command allows you to enable the Stacker payload compression. You can enable compression on a single port, an entire multilink PPP (MLP) bundle, or on individual ports that are members of a multilink PPP bundle. If this command is not configured, payload compression is not enabled.

## Parameters

*<number>*
Specifies the maximum number of compression history buffers to be kept. You can specify either 0 or 1. Specifying 0 disables the keeping of any histories and each packet is individually compressed. Specifying 1 allows a history buffer to be kept, which may result in better compression. The default value is 1.

**type stac**
Specifies the Stacker (STAC LZS) compression algorithm. This is the default.

*<port list>*
The port(s) on which you want to enable payload compression. You can specify a single port or a comma-separated list of ports.

## Restrictions

Usage is restricted to PPP WAN ports only.

## Example

To enable LZS Stac payload compression on slot 4, on serial port 2:

```
xp(config)# ppp set payload-compress ports se.4.2
```

# ppp set payload-encrypt

## Purpose

Enables packet encryption for PPP ports.

## Format

**ppp set payload-encrypt [type des-bis] transmit-key** *<key>* **receive-key** *<key>* **ports** *<port list>*

## Mode

Configure

## Description

The **ppp set payload-encrypt** command allows you to enable the encryption of packets using the DES-bis algorithm. You can enable encryption on a single port, an entire multilink PPP (MLP) bundle, or on individual ports that are members of an MLP bundle. If this command is not configured, payload encryption is not enabled.

## Parameters

**type des-bis**
Specifies the DES-bis encryption algorithm. This is the default.

*<key>*
Specifies a 16-digit hexadecimal number for the encoding and decoding of the packets. The keys are themselves encrypted and stored in the active and startup configurations.

*<port list>*
The port(s) on which you want to enable payload encryption. You can specify a single port or a comma-separated list of ports.

## Restrictions

Usage is restricted to PPP WAN ports only.

## Example

To enable DES-bis payload encryption on slot 4, on serial port 2:

```
xp(config)# ppp set payload-encrypt transmit-key 0x123456789abcdefO receive-key
0xfedcba9876543210 ports se.4.2
```

# ppp set peer-addr

## Purpose

Set the peer address in case that IPCP/IPXCP can't resolve the address.

## Format

**ppp set peer-addr [ip-address** *<IP address>*] **[ipx-address** *<IPX address>*] **[ports** *<port list>*]

## Mode

Configure

## Description

Issuing the **ppp set peer-addr** command allows you to set the peer address if it can't be resolved by IPCP or IPXCP.

## Parameters

| | |
|---|---|
| *<address>* | The IP or IPX address you wish to use. |
| *<port>* | The port to which you wish to assign the address. |

## Restrictions

Usage is restricted to PPP port only.

## Example

To assign an ip address 10.1.1.1/16 to slot 2, serial port 1:

```
xp(config)# ppp set peer-addr ip-address 10.1.1.1/16 ports se.2.1
```

# ppp set ppp-encaps-bgd

## Purpose

Force the ingress packets to be encapsulated in bridged format.

## Format

**ppp set ppp-encaps-bgd ports** *<port list>*

## Mode

Configure

## Description

Issuing the **ppp set ppp-encaps-bgd** command allows you to use bridged format encapsulation on a given ppp port.

## Parameters

*<port list>*   The port(s) to which you wish to use bridged encapsulation. You can specify a single port or a comma-separated list of ports.

## Restrictions

Usage is restricted to ppp port only.

## Example

To force the bridged encapsulation to slot 2, serial ports 1 and 2:

xp(config)# **ppp set ppp-encaps-bgd ports se.2.1,se.2.2**

# ppp show mlp

## Purpose

Displays the PPP ports that have been added into an MLP bundle.

## Format

**ppp show mlp** *<mlp list>*|**all-ports**

## Mode

Enable

## Description

The **ppp show mlp** command allows you to display information about one or more MLP bundles.

## Parameters

| | |
|---|---|
| *<mlp list>* | The name(s) of the MLP bundles on which you want information. You can specify a single bundle or a comma-separated list of MLP bundles. |
| **all-ports** | Displays information on all MLP ports. |

## Restrictions

None.

## Example

To display the PPP ports for mp.1:

```
xp# ppp show mlp mp.1
mp.1:
 Slot: 4
 PPP ports: se.4.1,se.4.3
```

# ppp show service

## Purpose

Displays PPP service profiles.

## Format

**ppp show service** *<service name>*|**all**

## Mode

Enable

## Description

The **ppp show service** command allows you to display one or all of the available PPP service profiles.

## Parameters

*<service name>*   The service profile you wish to display.

**all**   Displays all of the available PPP service profiles.

## Restrictions

None.

## Example

To display the available PPP service profiles named profile_4:

```
xp# ppp show service profile_4
```

# ppp show stats

## Purpose

Displays bridge NCP, IP NCP, and link-status parameters.

## Format

**ppp show stats ports** *<port>* **[bridge-ncp] [ip-ncp] [link-status] [summary]**

## Mode

Enable

## Description

The **ppp show stats** command allows you to display parameters for bridge NCP, IP NCP, and link-status on PPP WAN ports. You can specify one, two, or three of the available parameter types.

## Parameters

| | |
|---|---|
| *<port>* | The PPP WAN port for which you wish to view bridge NCP, IP NCP, and/or link-status parameters. |
| **bridge-ncp** | Specifies that you wish to view bridging NCP parameters for the given port. |
| **ip-ncp** | Specifies that you wish to view IP NCP parameters for the given port. |
| **link-status** | Specifies that you wish to view link-status parameters for the given port. |
| **summary** | Specifies that you wish to view summarized display. |

## Restrictions

None.

## Example

To display the available link-status and IP NCP parameters for the PPP WAN interface located at slot 4, port 1:

```
xp# ppp show stats ports se.4.1 ip-ncp link-status
```

# Chapter 49

# pvst Commands

The **pvst** commands let you display and change settings for a VLAN spanning tree.

## Command Summary

Table 37 lists the **pvst** commands. The sections following the table describe the command syntax.

**Table 37. stp commands**

| |
|---|
| **pvst create spanningtree vlan-name** *<string>* |
| **pvst enable port** *<port-list>* **spanning-tree** *<string>* |
| **pvst set bridging** [**forward-delay** *<num>*] [**hello-time** *<num>*] [**max-age** *<num>*] <br> [**priority** *<num>*] **spanning-tree** *<string>* |
| **pvst set port** *<port-list>* **priority** *<num>* **port-cost** *<num>* **spanning-tree** *<string>* <br> **point-to-point [ForceTrue\|ForceFalse\|Auto] edge-port [True\|False]** |
| **pvst show bridging-info spanning-tree** *<string>* |
| **pvst reset-rstp port** *<port-list>* **spanning-tree** *<string>* |
| **pvst set protocol-version rstp spanning-tree** *<string>* |
| **pvst set no-special-encap** |

# pvst create spanningtree

## Purpose

Create an instance of spanning tree for a particular VLAN.

## Format

**pvst create spanningtree vlan-name** *<string>*

## Mode

Configure

## Description

The **pvst create spanningtree** command creates a spanning tree instance for a particular VLAN.

## Parameters

**vlan-name** *<string>*

The name of the VLAN for which a new instance of spanning tree is to be created.

## Restrictions

None.

# pvst enable port spanning-tree

## Purpose

Enable PVST on one or more ports on a particular spanning tree.

## Format

**pvst enable port** *<port-list>* **spanning-tree** *<string>*

## Mode

Configure

## Description

The **pvst enable port** command enables STP on the specified port for the specified spanning tree.

## Parameters

*<port-list>*   The ports on which you are enabling STP. You can specify a single port or a comma-separated list of ports. Example: et.1.3,et.(1-3).(4,6-8).

*<string>*   The name of the spanning-tree instance. This name is the same as the VLAN name.

**Note:**   For default VLAN, use **stp** commands.

## Restrictions

For PVST, the spanning tree instance must have previously been created.

# pvst set bridging spanning-tree

## Purpose

Set STP bridging parameters for a particular VLAN.

## Format

**pvst set bridging** [**forward-delay** *<num>*] [**hello-time** *<num>*] [**max-age** *<num>*]
[**priority** *<num>*] **spanning-tree** *<string>*

## Mode

Configure

## Description

The **pvst set bridging spanning-tree** command lets you configure the following STP parameters
for a particular VLAN:

- Bridging priority

- Hello time

- Maximum age

- Forward delay

## Parameters

**forward-delay** *<num>*
Sets the STP forward delay for the XP. The forward delay is measured in seconds. Specify a
number from 4– 30. The default is 15.

**hello-time** *<num>*
Sets the STP hello time for the XP. The hello time is measured in seconds. Specify a number
from 1– 10. The default is 2.

**max-age** *<num>*
Sets the STP maximum age for the XP. Specify a number from 6–40. The default is 20.

**priority** *<num>*
Sets the STP bridging priority for the XP. Specify a number from 0 – 65535. The default is
32768

**spanning-tree** *<string>*
The name of the spanning-tree instance. This name is the same as the VLAN name.

**Note:** For default VLAN, use **stp** commands.

## Restrictions

For PVST, the spanning tree instance must have previously been created.

## Examples

To set the bridging priority of Spanning Tree for VLAN ip1 to 1:

xp(config)# **pvst set bridging priority 1 spanning-tree ip1**

# pvst set port spanning-tree

## Purpose

Set PVST port priority and port cost for ports for a particular VLAN.

## Format

**pvst set port** *<port-list>* **priority** *<num>* **port-cost** *<num>* **spanning-tree** *<string>*
**point-to-point [forcetrue|forcefalse|auto] edge-port [true|false]**

## Mode

Configure

## Description

The **pvst set port** command sets the STP priority and port cost for individual ports for a particular VLAN.

## Parameters

**port** *<port-list>*
   The port(s) for which you are setting STP parameters. You can specify a single port or a comma-separated list of ports. Example: et.1.3,et.(1-3).(4,6-8).

**priority** *<num>*
   The priority you are assigning to the port(s). Specify a number from 0– 16 inclusive. The default is 8.

**port-cost** *<num>*
   The STP cost you are assigning to the port(s). Specify a number from 1– 65535. The default depends on the port speed: 1 for Gigabit (100-Mbps) ports, 10 for 100-Mbps ports, and 100 for 10-Mbps ports.

**spanning-tree** *<string>*
   The name of the spanning-tree instance. This name is the same as the VLAN name.

**point-to-point [ForceTrue|ForceFalse|Auto]**
   Specify a point-to-point or a non-point-to-point link administratively. The default is 'Auto.'

**edge-port [True|False]**
   Specify whether the port(s) should be initialized as an edge port or a non-edge port. The default is 'False.'

**Note:**   For default VLAN, use **stp** commands.

## Restrictions

For PVST, the spanning tree instance must have previously been created.

# pvst show bridging-info spanning-tree

## Purpose

Display STP bridging information for a particular VLAN.

## Format

**pvst show bridging-info spanning-tree** *<string>*

## Mode

Enable

## Description

The **pvst show bridging-info** command displays STP bridging information for a particular VLAN.

## Parameters

**spanning-tree** *<string>*
　　The name of the spanning-tree instance. This name is the same as the VLAN name.

**Note:**　For default VLAN, use **stp** commands.

## Restrictions

For PVST, the spanning tree instance must have previously been created.

# pvst reset-rstp spanning-tree

## Purpose

Reset RSTP.

## Format

**pvst reset-rstp port** *<port list>* **spanning-tree** *<string>*

## Mode

Enable

## Description

The **pvst reset-rstp spanning-tree** command resets the point-to-point and edge port parameters to user-specified values and forces the specified ports to send RSTP BPDUs until a version 0 STP BPDU is received.

## Parameters

**port** *<port-list>*
   The port(s) for which you are setting the STP parameters. You can specify a single port or a comma-separated list of ports. For example: et.1.3, et.(1-3).(4,6-8).

**spanning-tree** *<string>*
   The name of the spanning-tree instance. This name is the same as the VLAN name.

**Note:**    As a default, use the STP commands.

## Restrictions

For PVST, the spanning tree instance must have previously been created.

# pvst set protocol-version rstp spanning-tree

## Purpose

Set PVST version to 2 (IEEE 802.1w).

## Format

**stp set protocol-version rstp spanning-tree** *<string>*

## Mode

Configure

## Description

The **stp set protocol-version** command changes the STP version from *STP compatible* (version 0) to *Rapid Spanning Tree Protocol* (version2).

## Parameters

**spanning-tree** *<string>*
    The name of the spanning-tree instance. This name is the same as the VLAN name.

## Restrictions

For PVST, the spanning tree instance must have previously been created.

# pvst set no-special-encap

## Purpose

To disable PVST encapsulation on all port-based VLANs.

## Format

**pvst set no-special-encap**

## Mode

Configure

## Description

The stp **set no-special-encap** command forces the XP's port-based VLAN to send and receive IEEE standard BPDU's. Issue this command if PVST needs to be compatible with STP.

## Parameters

**None**

## Restrictions

None.

# Chapter 50

# qos Commands

The **qos** commands define and display Quality of Service (QoS) parameters. Use the command to classify Layer 2, Layer 3, and Layer 4 traffic into the following priorities:

- control

- high

- medium

- low

By assigning priorities to network traffic, you can ensure that critical traffic will reach its destination even if the exit ports for the traffic are experiencing greater than maximum utilization. Use the **qos set l2**, **qos set ip**, and **qos set ipx** commands to assign priorities for Layer-2, IP, and IPX traffic respectively.

## Flows

For Layer 3 (IP and IPX) traffic, you can define "flows", blueprints or templates of IP and IPX packet headers.

- The IP fields are source IP address, destination IP address, UDP/TCP source port, UDP/TCP destination port, TOS (Type of Service), transport protocol (TCP or UDP) and a list of incoming interfaces.

- The IPX fields are source network, source node, destination network, destination node, source port, destination port, and a list of incoming interfaces.

The flows specify the contents of these fields. If you do not enter a value for a field, a wildcard value (all values acceptable) is assumed for the field.

## Precedence

A precedence from 1 – 7 is associated with each field in a flow. The XP uses the precedence value associated with the fields to break ties if packets match more than one flow. The highest precedence is 1 and the lowest is 7. Here are the default precedences of the fields:

- **IP** – destination port (1), destination address (2), source port (3), source IP address (4), TOS (5), interface (6), protocol (7).

- **IPX** – destination network (1), source network (2), destination node (3), source node (4), destination port (5), source port (6), interface (7).

Use the **qos precedence ip** and **qos precedence ipx** commands to change the default precedences.

## Queuing Policies

You can use one of two queuing policies on the XP:

- **strict priority** – assures the higher priorities of throughput but at the expense of lower priorities. For example, during heavy loads, low-priority traffic can be dropped to preserve throughout of control-priority traffic, and so on.

- **weighted fair queuing** – distributes priority throughput among the four priorities (control, high, medium, and low) based on percentages.

The XP can use only one queuing policy at a time. The policy is used on the entire XP. The default queuing policy is strict priority.

# Command Summary

Table 38 lists the **qos** commands. The sections following the table describe the command syntax.

**Table 38.  qos commands**

| |
|---|
| **qos apply priority-map** *<string>* **ports** *<port list>* |
| **qos create priority-map** *<string>* *<num>* **control**\| **low**\| **med**\| **high** |
| **qos precedence ip [sip** *<num>*] **[dip** *<num>*] **[srcport** *<num>*] **[destport** *<num>*] **[tos** *<num>*] **[protocol** *<num>*] **[intf** *<num>*] |
| **qos precedence ipx [srcnet** *<num>*] **[srcnode** *<num>*] **[srcport** *<num>*] **[dstnet** *<num>*] **[dstnode** *<num>*] **[dstport** *<num>*] **[intf** *<num>*] |
| **qos priority-map off** |
| **qos wred input [port** *<port list>*\|**all-ports] [queue control\|high\|medium\|low] [exponential-weighting-constant** *<num>*] **[min-queue-threshold** *<num>*] **[max-queue-threshold** *<num>*] **[mark-prob-denominator** *<num>*] |

**Table 38.  qos commands (Continued)**

| |
|---|
| **qos set ip** *<name>* *<priority>*\|**low** \|**medium** \|**high** \|**control** \|**num** *<srcaddr/mask>*\|**any** *<dstaddr/mask>*\|**any** *<srcport>*\|**any** *<dstport>*\|**any** *<tos>*\|*<interface-list>*\|**any** *<protocol>* |
| **qos set ipx** *<name>* *<priority>*\|**low** \|**medium** \|**high** \|**control** \|**num** *<srcnet>*\|**any** *<srcmask>*\|**any** *<srcport>*\|**any** *<dstnet>*\|**any** *<dstmask>*\|**any** *<dstport>*\|*<interface-list>*\|**any** |
| **qos set l2 name** *<name>* **source-mac** *<MACaddr>* **source-mac-mask dest-mac** *<MACaddr>* **dest-mac-mask [vlan** *<vlanID>*\|**any] in-port-list** *<port-list>* **priority control\|high\|medium\|low\|***<num>* |
| **qos set queuing-policy weighted-fair port** *<port list>*\|**all-ports** |
| **qos set weighted-fair control** *<percentage>* **high** *<percentage>* **medium** *<percentage>* **low** *<percentage>* **port** *<port list>*\|**all-ports** |
| **qos show ip** |
| **qos show ipx** |
| **qos show l2 all-destination all-flow ports** *<port-list>* **vlan** *<vlanID>* **source-mac** *<MACaddr>* **dest-mac** *<MACaddr>* |
| **qos show precedence ip\| ipx** |
| **qos show priority-map** *<string>*\| **all** |
| **qos show wred [input port** *<port list>* \|**all-ports] [port** *<port list>* \|**all-ports]** |
| **qos show wfq port** *<port list>* \|**all-ports** |

# qos apply priority-map

## Purpose

Applies a pre-defined priority map to a port(s).

## Format

**qos apply priority-map** *<string>* **ports** *<port list>*

## Mode

Configure

## Description

The **qos apply priority-map** command allows you apply a previously defined priority map to a port or multiple ports. A priority map associates certain 802.1p tag values inside the frame to a certain internal priority queue. Use the **qos create priority-map** command to first create a priority map.

By default, the XP maps the number to the four internal priorities as follows: 1 or 2 = low; 0 or 3 = medium; 4 or 5 = high; 6 or 7 = control.

## Parameters

**priority-map** *<string>*
    Specifies the name of the map. Specify a string less than 25 characters.

**port** *<port list>*
    Specifies the port(s) on which you want to apply the priority map.

## Restrictions

None.

## Example

The following command applies the priority map 'map1' to port so.2.1:

```
xp(config)# qos apply priority-map 'map1' port so.2.1
```

# qos create priority-map

## Purpose

Creates a priority map to an 802.1p tag.

## Format

**qos create priority-map** *<string>* *<num>* **control| low| med| high**

## Mode

Configure

## Description

The **qos create priority-map** command lets you map 802.1p tags from a frame to one of the four internal priority queue classes: **control**, **low**, **medium**, and **high**. Internal priority queue classes are used in to prioritize flows during traffic congestion situations. The flows with the higher priority is given precedence over lower priorities. The internal priority class **control** receives the highest precedence, while **low** receives the lowest precedence.

The 802.1p standard provides a way of tagging frames to a certain internal priority. With this command, you can set a particular 802.1p priority tag to map to a specific internal priority queue.

By default, the XP maps the number to the four internal priorities as follows: 1 or 2 = low; 0 or 3 = medium; 4 or 5 = high; 6 or 7 = control.

## Parameters

**priority-map** *<string>*
    Specifies the name of the map. Specify a string less than 25 characters.

*<num>*
    Specifies the 802.1p priority tag that you want to map. Specify a number between 0 and 7.

**queue control|high|medium|low**
    Specifies the internal priority queue. Specify either the **control, high, medium, or low** queue.

## Restrictions

None.

## Example

The following command creates a priority map 'map1' that maps the 802.1p tags 0 and 1 to low, 2 and 3 to medium, 4 and 5 to high, and 6 and 7 to control queue:

xp(config)# **qos create priority-map 'map1' 0 low 1 low 2 medium 3 medium 4 high 5 high 6 control 7 control**

# qos precedence ip

## Purpose

Set the precedence of the IP flow fields.

## Format

**qos precedence ip [sip** *<num>*] **[dip** *<num>*] **[srcport** *<num>*] **[destport** *<num>*]
**[tos** *<num>*] **[protocol** *<num>*] **[intf** *<num>*]

## Mode

Configure

## Description

The **qos precedence ip** command lets you set the QoS precedence for various flow fields in IP traffic. You can set a precedence from 1 – 7 for the following IP fields:

- IP source address

- IP destination address

- Source TCP or UDP port

- Destination TCP or UDP port

- Type of Service (TOS) for the packet

- Protocol (TCP or UDP)

- Incoming interface

The precedence 1 is the highest priority. IP interfaces or flow fields within IP packets that have a precedence of 1 are given first priority. The default priorities are as follows:

- destination port (1)

- destination address (2)

- source port (3)

- source IP address (4)

- TOS (5)

- interface (6)

- protocol (7).

## Parameters

**sip** *<num>*

Specifies the precedence of the source address field in IP flows. Specify a precedence from 1 – 7.

**dip** *<num>*

Specifies the precedence of the destination address field in IP flows. Specify a precedence from 1 – 7.

**srcport** *<num>*

Specifies the precedence of the source port field in IP flows. Specify a precedence from 1 – 7.

**dstport** *<num>*

Specifies the precedence of the destination port field in IP flows. Specify a precedence from 1 – 7.

**tos** *<num>*

Specifies the precedence of the TOS field in IP flows. Specify a precedence from 1 – 7.

**protocol** *<num>*

Specifies the precedence of the transport layer protocol name field in IP flows. Specify a precedence from 1 – 7.

**intf** *<num>*

Specifies the precedence of the IP interface based on the interface's name. Specify a precedence from 1 – 7.

## Restrictions

None.

## Examples

To change the precedence for fields within IP flows from the default precedences listed above:

```
xp(config)# qos precedence ip sip 3 dip 1 srcport 2 destport 4 tos 5
    protocol 6 intf 7
```

# qos precedence ipx

## Purpose

Set the precedence of the IPX flow fields.

## Format

qos precedence ipx [srcnet *<num>*] **[srcnode** *<num>*] **[srcport** *<num>*] **[dstnet** *<num>*]
**[dstnode** *<num>*] **[dstport** *<num>*] **[intf** *<num>*]

## Mode

Configure

## Description

The **qos precedence ipx** command lets you set the precedence of the following fields in IPX flows.

- Source network

- Source port

- Source node

- Destination network

- Destination node

- Destination port

- Incoming interface

You can set the precedence of the following fields from 1 – 7. The precedence 1 has the highest priority and 7 has the lowest. The default priorities are as follows:

- destination network (1)

- source network (2)

- destination node (3)

- source node (4)

- destination port (5)

- source port (6)

- interface (7).

## Parameters

**srcnet** *<num>*
> Specifies the precedence of the source network field in IPX flows. Specify a precedence from 1 – 7.

**srcport** *<num>*
> Specifies the precedence of the source port field in IPX flows. Specify a precedence from 1 – 7.

**srcnode** *<num>*
> Specifies the precedence of the source node field in IPX flows. Specify a precedence from 1 – 7.

**dstnet** *<num>*
> Specifies the precedence of the destination network field in IPX flows. Specify a precedence from 1 – 7.

**dstnode** *<num>*
> Specifies the precedence of the destination node field in IPX flows. Specify a precedence from 1 – 7.

**dstport** *<num>*
> Specifies the precedence of the destination port field in IPX flows. Specify a precedence from 1 – 7.

**intf** *<num>*
> Specifies the precedence of the IPX interface based on the interface's name. Specify a precedence from 1 – 7.

## Restrictions

None.

## Examples

To change the precedence for fields within IPX flows from the default precedences listed above:

```
xp(config)# qos precedence ipx srcnet 1 srcnode 2 srcport
    dstnet 3 srcport 4 dstnode 5 dstport 6 intf 7
```

# qos priority-map off

## Purpose

Turns off priority mapping on a port(s).

## Format

**qos priority-map off**

## Mode

Configure

## Description

The **qos priority-map off** command allows you disable any priority maps applied on a port using the **qos apply priority-map** command and reverts back to the default priority mapping.

By default, the XP maps the number to the four internal priorities as follows: 1 or 2 = low; 0 or 3 = medium; 4 or 5 = high; 6 or 7 = control.

## Parameters

None**.**

## Restrictions

None.

## Example

The following command disables all priority mapping:

```
xp(config)# qos priority-map off
```

# qos wred input

## Purpose

Enable WRED on input queues of specific ports.

## Format

**qos wred input [port** *<port list>*|**all-ports] [queue control|high|medium|low] [exponential-weighting-constant** *<num>*] **[min-queue-threshold** *<num>*] **[max-queue-threshold** *<num>*] **[mark-prob-denominator** *<num>*]

## Mode

Configure

## Description

The **qos** w**red input** command lets you set the parameters for Weighted Random Early Detection algorithm and allow you to apply them to input queues of specific ports.

Weighted Random Early Detection alleviates traffic congestion issues by selectively dropping packets before the queue becomes completely flooded. WRED parameters allow you to set conditions and limits for dropping packets in the queue.

## Parameters

**port** *<port list>*|**all-ports**
   Specifies the port on which the WRED algorithm will be applied. Specify **all-ports** to apply WRED algorithm to all ports.

**queue control|high|medium|low**
   Allows you to specify which queue to apply the WRED algorithm. Specify either the **control, high, medium, or low** queue.

**exponential-weighting-constant** *<num>*
   Sets the queue weight. Specify a number from 7-10. The default is 8.

**min-queue-threshold** *<num>*
   Sets the minimum queue length. When the queue length rises above this threshold, packets begin to drop. Specify any number between 1 and 32000.

**max-queue-threshold** *<num>*
   Sets the maximum queue length. When the queue length reaches this threshold, packets are dropped according to the mark probability denominator. Specify any number between 1 and 32000.

**mark-prob-denominator** *<num>*

Specifies the fraction of the packets to be dropped when the queue length reaches the maximum threshold. Specify a number from 10-100. The default is 50.

## Restrictions

WRED should only be applied for TCP/IP traffic.

## Examples

The following command sets WRED on port et.2.1 for the input high queue, sets the queue weight at 8, minimum queue length at 10, maximum queue length at 100, and the fraction of packets dropped to be 50:

```
xp(config)# qos wred input port et.2.1 queue high exponential-weighting-constant 8 min-queue-
     threshold 10 max-queue-threshold 100 mark-prob-denominator 50
```

# qos set ip

## Purpose

Set a priority for an IP flow.

## Format

**qos set ip** *<name>* *<priority>* **[***<srcaddr/mask>***|any]**
**[***<dstaddr/mask>***|any] [***<srcport>***|any] [***<dstport>***|any] [***<tos>***|any] [***<port list>***|***<interface-list>***|any] [***<protocol>***/any] [***<tos-mask>***|any] [***<tos-precedence-rewrite>***|any] [***<tos-rewrite>***|any]**

## Mode

Configure

## Description

The **qos set ip** command sets the priority for an IP flow based on the following fields in the flow:

*   Flow name

*   Source IP address and network mask

*   Destination IP address and network mask

*   Source port

*   Destination port

*   TOS

*   Layer 4 bridging port list or interface list

*   Transport layer protocol (TCP or UDP)

You can set the priority of each field to control, low, medium, or high. The default is low.

## Parameters

*<name>*
   Specifies the IP flow name.

*<priority>*
   Specifies the priority you are assigning to the flow parameters you specified from the list above. You can specify one of the following priorities:

   **control**   Assigns control priority to the IP flow parameters you have specified. This is the highest priority.

**high**      Assigns high priority to the IP flow parameters you have specified.

**medium**   Assigns medium priority to the IP flow parameters you have specified.

**low**       Assigns low priority to the IP flow parameters you have specified. This is the default.

*<srcaddr/mask>*|**any**

Specifies the source IP address and network mask for which you are assigning a priority. You can specify the mask using the traditional IP address format ("255.255.0.0") or the CIDR format ("/16").

If you specify **any** instead of a network mask, the XP assumes a wildcard "don't care" condition. If you do not specify a mask, then the XP assumes a mask of 255.255.255.255. You cannot substitute the mask with the **any** keyword. The keyword **any** is for the entire *<srcaddr/mask>* pair.

*<dstaddr/mask>*|**any**

Specifies the destination IP address and network mask for which you are assigning a priority. The same requirements and restrictions for *<srcaddr/mask>* **apply to** *<dstaddr/mask>*.

If you specify **any** instead of a network mask, the XP assumes a wildcard "don't care" condition. If you do not specify a mask, then the XP assumes a mask of 255.255.255.255. You cannot substitute the mask with the **any** keyword. The keyword **any** is for the entire *<dstaddr/mask>* pair.

*<srcport>*|**any**

Specifies the source TCP or UDP port for which you are assigning a priority. Specify a port number from 1 – 65535 or **any** to allow any value. You may also specify a range of port numbers using operator symbols; for example, 10-20 (between 10 and 20 inclusive), >1024 (greater than 1024), <1024 (less than 1024), !=1024 (not equal to 1024).

*<dstport>*|**any**

Specifies the destination TCP or UDP port for which you are assigning a priority. Specify a port number from 1 – 65535 or **any** to allow any value. You may also specify a range of port numbers using operator symbols; for example, 10-20 (between 10 and 20 inclusive), >1024 (greater than 1024), <1024 (less than 1024), !=1024 (not equal to 1024).

*<tos>*|**any**

Specifies the TOS for which you are assigning a priority. Specify a number from 0– 255 or **any** to allow any value.

*<port list>*|*<interface-list>*|**any**

Specifies one or more Layer 4 bridging ports or one or more IP interface names for which you are assigning priority. If you specify a list, delimit the interface names with commas. Specify **any** to allow any IP interface name.

*<protocol>*/**any**

Specifies the transport layer protocol for which you are assigning priority. You can specify one of the following values:

**tcp**    Assigns the priority parameters to the TCP protocol.

**udp**   Assigns the priority parameters to the UDP protocol.

**any**  Assigns the priority parameters to both the TCP and UDP protocols.

*<tos-mask>*
Specifies the mask that is used for the TOS byte. Specify a number from 1-255 or **any** to specify any TOS value. The default is 30.

*<tos-precedence-rewrite>*
Rewrites the precedence portion of the TOS field with a new value. Specify a number from 0-7 or **any** to specify any TOS value.

*<tos-rewrite>*
Rewrites the entire TOS field with a new value. Specify a number from 0-31 or **any** to specify any TOS value.

**Note:**  If you set **any** for the TOS precedence rewrite and specify a value for *<tos-rewrite>,* then the precedence portion of the TOS field remains the same as in the packet, but the rest of the TOS field is rewritten. If you specify values for both *<tos-precedence-rewrite>* and *<tos-rewrite>*, then the precedence portion of the TOS field is rewritten to the new *<tos-precedence-rewrite>* number and the rest of the TOS field is rewritten to the new *<tos-rewrite>* number.

## Restrictions

None.

## Examples

The following command creates a flow called "flow1". This flow provides a template for an IP packet with the IP address 1.1.1.1, network mask 255.255.0.0, destination address 2.2.2.2 (and implied destination mask 255.255.255.255). The flow includes source TCP/UDP port 3010, destination port 3000, a TOS of 15, the interfaces mls1 and mls2, and the TCP protocol as transport layer. This very explicit flow has the highest priority—control.

```
xp(config)# qos set ip flow1 control 1.1.1.1/255.255.0.0 2.2.2.2 3010 3000 15 mls1,mls2 tcp
```

# qos set ipx

## Purpose

Set a priority for an IPX flow.

## Format

**qos set ipx** *<name>* *<priority>* [*<srcnet>*|**any**] [*<srcmask>*|**any**] [*<srcport>*|**any**]
[*<dstnet>*|**any**] [*<dstmask>*|**any**] [*<dstport>*|**any**] [*<port list>*|*<interface-list>*|**any**]

## Mode

Configure

## Description

The **qos set ipx** command lets you set the priority for an IPX flow based on the following fields in
the flow:

- Flow name

- Source network

- Source network mask

- Source port

- Destination network

- Destination network mask

- Destination port

- Layer 4 bridging port list or interface list

You can set the priority of each field to control, low, medium, or high. The default is low.

## Parameters

*<name>*
Specifies the IPX flow name.

*<priority>*
Specifies the priority you are assigning to the flow parameters you specified from the list
above. You can specify one of the following priorities:

**control**    Assigns control priority to the IPX flow parameters you have specified. This is the
highest priority.

**high**      Assigns high priority to the IPX flow parameters you have specified.

**medium**   Assigns medium priority to the IPX flow parameters you have specified.

**low**       Assigns low priority to the IPX flow parameters you have specified. This is the default.

*<srcnet>*|**any**

Specifies the IPX source network and node address. Specify them in the following format: *<netaddr>***.***<macaddr>*; for example: a1b2c3d4.aa:bb:cc:dd:ee:ff.

If you specify **any** instead of a **.***<macaddr>*, the XP assumes a wildcard value. All MAC addresses are then valid.

*<srcmask>*|**any**

Specifies the IPX source network mask. Specify the mask in hexadecimal digits. If you do not specify a mask value and instead use the value **any**, the XP internally sets the mask to FFFFFFFF.

*<srcport>*|**any**

Specifies a port number from 1 – 65535 or any to allow any value. You may also specify a range of port numbers using operator symbols; for example, 10-20 (between 10 and 20 inclusive), >1024 (greater than 1024), <1024 (less than 1024), !=1024 (not equal to 1024).

*<dstnet>*|**any**

Specifies the IPX destination network and node address. The same requirements and restrictions for *<dstaddr> apply to <srcaddr>*.

*<dstmask>*|**any**

Specifies the IPX destination network mask. Specify the mask in hexadecimal digits or **any** to allow any value.

*<dstport>*|**any**

Specifies a port number from 1 – 65535 or **any** to allow any value. You may also specify a range of port numbers using operator symbols; for example, 10-20 (between 10 and 20 inclusive), >1024 (greater than 1024), <1024 (less than 1024), !=1024 (not equal to 1024).

*<port list>*|*<interface-list>*|**any**

Specifies one or more Layer 4 bridging ports or one or more IPX interface names for which you are assigning priority. If you specify a list, delimit the interface names with commas. Specify **any** to allow any IPX interface name.

## Restrictions

None.

## Examples

The following command creates an IPX flow called "abc". This flow gives a high priority to IPX traffic on interface mls1 from network 12345678.00:01:00:00:00:00, mask 0000ff00, port 55 to network 22222222.02:00:00:00:00:00, mask 0000ff00, port 65.

xp(config)# **qos set ipx abc high 12345678.00:01:00:00:00:00 0000ff00 55 22222222.02:00:00:00:00:00 0000ff00 65 mls1**

# qos set l2

## Purpose

Configure priority for a Layer 2 flow.

## Format

**qos set l2 name** *<name>* **source-mac** *<MACaddr>* **dest-mac** *<MACaddr>* **[vlan** *<vlanID>* **any]**
**in-port-list** *<port-list>* **priority control | high | medium | low |** *<trunk-priority>*

## Mode

Configure

## Description

The **qos set l2** command lets you set a QoS priority for a Layer 2 flow. You can set a priority for a
flow based on the following fields in the flow:

- L2 flow name

- Source MAC address

- Destination MAC address

- VLAN ID

- Incoming port(s)

You can set the priority in one of the following ways:

- The flow is assigned a priority within the XP. In this case you specify a priority of control, low,
  medium, or high. The default is low.

- The flow is assigned a priority within the XP, but in addition, if the exit ports are VLAN trunk
  ports, the flow is assigned an 802.1Q priority. In this case you specify a number from 0 – 7. The
  XP maps the number to the four internal priorities as follows: 1 or 2 = low; 0 or 3 = medium; 4
  or 5 = high; 6 or 7 = control.

## Parameters

**name** *<name>*
　　Specifies the L2 flow name.

**source-mac** *<MACaddr>*
　　Specifies the L2 source MAC address. *Specify the MAC address in either of the following*
　　*formats:*

xx:xx:xx:xx:xx:xx
xxxxxx:xxxxxx

**dest-mac** *<MACaddr>*
Specifies the L2 destination MAC address.

**vlan** *<vlanID>*
Specifies the name of a VLAN.

**in-port-list** *<port-list>*
Specifies the XP ports for which you are setting priority for this flow. The priority applies when the L2 packet enters the XP on one of the specified ports. The priority does not apply to exit ports.

**priority control|high|medium|low|***<trunk-priority>*
Specifies the priority you are assigning to the flow parameters you specified from the list above. You can specify one of the following priorities:

| | |
|---|---|
| **control** | Assigns control priority to the IP flow parameters you have specified. This is the highest priority. |
| **high** | Assigns high priority to the IP flow parameters you have specified. |
| **medium** | Assigns medium priority to the IP flow parameters you have specified. |
| **low** | Assigns low priority to the IP flow parameters you have specified. This is the default. |
| *<trunk-priority>* | Assigns n 802.1Q VLAN trunk priority when the exit port is a VLAN trunk port. The XP maps the number to the four internal priorities as follows: 0 = low; 1, 2, or 3 = medium; 4, 5,or 6 = high; 7 = control. |

## Restrictions

None.

# qos set queuing-policy

## Purpose

Change the queueing policy from strict priority to weighted fair.

## Format

**qos set queuing-policy weighted-fair port** *<port list>*|**all-ports**

## Mode

Configure

## Description

The **qos set queuing-policy** command lets you override the default queuing policy (strict priority) in favor of weighted fair queuing on specific ports or on all ports. Only one type of queuing policy can be active at a time.

To set the queuing policy back to strict priority, enter the following command:

xp(config)# **no qos set queuing-policy weighted-fair port** *<port list>*

## Parameters

**weighted-fair**
    Sets the queuing policy to weighted fair.

**port** *<port list>*|**all-ports**
    Specifies the Ethernet ports or WAN modules and ports on which weighted fair queuing apply.
    Specify **all-ports** to apply weighted fair queuing to all ports.

## Restrictions

None.

# qos set weighted-fair

## Purpose

Set percentages for weighted-fair queuing.

## Format

**qos set weighted-fair control** *<percentage>* **high** *<percentage>* **medium** *<percentage>* **low** *<percentage>* **port** *<port list>*|**all-ports**

## Mode

Configure

## Description

The **qos set weighted-fair** command lets you set the percentage of XP bandwidth allocated to the control, high, medium, and low priorities. The percentages apply to specific ports or to all ports. Make sure the total percentages for all four priorities equals 100.

## Parameters

**control** *<percentage>*
Specifies the percentage of XP bandwidth allocated to the control priority. Specify a number from 1 – 100. The default is 25.

**high** *<percentage>*
Specifies the percentage of XP bandwidth allocated to the high priority. Specify a number from 1 – 100. The default is 25.

**medium** *<percentage>*
Specifies the percentage of XP bandwidth allocated to the medium priority. Specify a number from 1 – 100. The default is 25.

**low** *<percentage>*
Specifies the percentage of XP bandwidth allocated to the low priority. Specify a number from 1 – 100. The default is 25.

**port** *<port list>*|**all-ports**
Specifies the Ethernet ports or WAN modules and ports on which the defined percentages apply. Specify **all-ports** to apply the percentages to all ports.

## Restrictions

The total percentages for all four QoS levels must equal 100%.

# qos show ip

## Purpose

Show QoS information for IP flows.

## Format

**qos show ip**

## Mode

Enable

## Description

The **qos show ip** command lets you display QoS information for IP flows.

## Parameters

None.

## Restrictions

None.

# qos show ipx

## Purpose

Show QoS information for IPX flows.

## Format

**qos show ipx**

## Mode

Enable

## Description

The **qos show ipx** command lets you display QoS information for IPX flows.

## Parameters

None.

## Restrictions

None.

# qos show l2

## Purpose

Show QoS information for L2 flows.

## Format

**qos show l2 all-destination all-flow ports** *<port-list>* **vlan** *<vlanID>* **source-mac** *<MACaddr>* **dest-mac** *<MACaddr>*

## Mode

Enable

## Description

The **qos show l2** command lets you display QoS information for L2 flows. You can filter the display according to the following:

• Destinations

• Flows

• Ports

• VLANs

• Source MAC addresses

• Destination MAC addresses

• Priority

## Parameters

**all-destination**
Filters the display to show all the L2 destination priorities.

**all-flow**
Filters the display to show all the L2 flow priorities.

**ports** *<port-list>*
Filters the display to show L2 priority information for specific ports.

**vlan** *<vlanID>*
Filters the display to show L2 priority information for specific VLANs.

**source-mac** *<MACaddr>* Filters the display to show L2 priority information for specific source MAC addresses.

**dest-mac** *<MACaddr>*
　　Filters the display to show L2 priority information for specific destination MAC addresses.

## Restrictions

　　None.

# qos show precedence

## Purpose

Shows IP or IPX precedence values.

## Format

**qos show precedence ip| ipx**

## Mode

Enable

## Description

The **qos show precedence** command lets you display the precedence values for all fields in a flow.

IP flows consist of the following fields: destination port, destination address, source port, source IP address, TOS, interface, protocol.

IPX flows consist of the following fields: destination network, source network, destination node, source node, destination port, source port, interface.

## Parameters

**ip**
Displays the precedence values for IP flows.

**ipx**
Displays the precedence values for IPX flows.

## Restrictions

None.

# qos show priority-map

## Purpose

Shows the priority mapping and the ports that it is applied.

## Format

**qos show priority-map** *<string>*| **all**

## Mode

Enable

## Description

The **qos show priority-map** command lets you display the priority mapping that is configured on a port. The command shows how each 802.1p tag values are mapped to a specific internal priority queue.

## Parameters

*<string>*
    Specifies the name of the priority map.

**all**
    Displays all priority maps.

## Restrictions

None.

# qos show wred

## Purpose

Shows WRED parameters for each port.

## Format

**qos show wred [input port** *<port list>* **|all-ports] [port** *<port list>* **|all-ports]**

## Mode

Enable

## Description

The **qos show wred** command lets you display WRED information for a certain port or all ports. You can display WRED parameter information according to the following:

- Input ports

- All Ports

## Parameters

**input port** *<port list>* **|all-ports**
   Displays input port WRED parameters. Specify **all-ports** to display parameters for all ports.

**port** *<port list>* **|all-ports**
   Displays WRED parameters for each port. Specify **all-ports** to display parameters for all ports.

## Restrictions

None.

# qos show wfq

## Purpose

Shows bandwidth allocated for each port.

## Format

**qos show wfq [port** *<port list>* **|all-ports] [input** *<slot num>* **|all-modules]**

## Mode

Enable

## Description

The **qos show wfq** command lets you display the bandwidth for each port allocated with weighted-fair queuing.

## Parameters

**port** *<port list>* **|all-ports**
Displays bandwidth allocated for each port. Specify a list of ethernet or wan ports. Specify **all-ports** to display bandwidth for all ports.

**input** *<slot num>* **|all-modules**
Displays bandwidth allocated for each slot. Specify a list of occupied slots. Specify **all-modules** to display bandwidth for all modules.

## Restrictions

None.

# Chapter 51

# radius Commands

The **radius** commands let you secure access to the XP using the Remote Authentication Dial-In User Service (RADIUS) protocol. When users log in to the XP or try to access Enable mode, they are prompted for a password. If RADIUS authentication is enabled on the XP, it will contact a RADIUS server to verify the user. If the user is verified, he or she is granted access to the XP.

## Command Summary

Table 39 lists the **radius** commands. The sections following the table describe the command syntax.

**Table 39.  radius commands**

| |
|---|
| **radius accounting command level** *<level>* |
| **radius accounting shell start \|stop \|all** |
| **radius accounting snmp active \|startup** |
| **radius accounting system fatal \|error \|warning \|info** |
| **radius authentication login \|enable** |
| **radius enable** |
| **radius set server** *<IPaddr>* **[acct-port** *<number>*] **[auth-port** *<number>*] **[timeout** *<number>*] **[retries** *<number>*] **[deadtime** *<number>*] **[key** *<string>*] **[source** *<IFname_IPaddr>*] |
| **radius set [timeout** *<number>*] **[retries** *<number>*] **[deadtime** *<number>*] **[key** *<string>*] **[source** *<IFname_IPaddr>*] **last-resort password \|succeed \|deny** |
| **radius show stats\|all** |

# radius accounting command level

## Purpose

Causes the specified types of commands to be logged to the RADIUS server.

## Format

**radius accounting command level** *<level>*

## Mode

Configure

## Description

The **radius accounting command level** command allows you specify the types of commands that are logged to the RADIUS server. The user ID and timestamp are also logged.

## Parameters

*<level>*    Specifies the type(s) of commands that are logged to the RADIUS server. Enter one of the following values:

5        Log Configure commands.

10      Log all Configure and Enable commands.

15      Log all Configure, Enable, and User commands.

## Restrictions

None.

## Example

To cause Configure, Enable, and User mode commands to be logged on the RADIUS server:

```
xp(config)# radius accounting command level 15
```

# radius accounting shell

## Purpose

Causes an entry to be logged on the RADIUS server when a shell is stopped or started on the XP.

## Format

**radius accounting shell start|stop|all**

## Mode

Configure

## Description

The **radius accounting shell** command allows you to track shell usage on the XP. It causes an entry to be logged on the RADIUS server when a shell is started or stopped. You can specify that an entry be logged when a shell is started, when a shell is stopped, or when a shell is either started or stopped.

## Parameters

**start**    Logs an entry when a shell is started.

**stop**    Logs an entry when a shell is stopped

**all**    Logs an entry when a shell is either started or stopped

## Restrictions

None.

## Example

To cause an entry to be logged on the RADIUS server when a shell is either started or stopped on the XP:

**radius accounting shell all**

# radius accounting snmp

## Purpose

Logs to the RADIUS server any changes made to the startup or active configuration via SNMP.

## Format

**radius accounting snmp active|startup**

## Mode

Configure

## Description

The **radius accounting snmp** command allows you to track changes made to the active or startup configuration through SNMP. It causes an entry to be logged on the RADIUS server whenever a change is made to the ACL configuration. You can specify that an entry be logged to the active or startup configuration.

## Parameters

**active**    Logs an entry when a change is made to the active configuration.

**startup**  Logs an entry when a change is made to the startup configuration.

## Restrictions

None.

## Example

To cause an entry to be logged on the RADIUS server whenever an ACL configuration change is made via SNMP to the active configuration:

```
xp(config)# radius accounting snmp active
```

# radius accounting system

## Purpose

Specifies the type(s) of messages to be logged on the RADIUS server.

## Format

**radius accounting system fatal|error|warning|info**

## Mode

Configure

## Description

The **radius accounting system** command allows you to specify the types of messages that are logged on the RADIUS server.

## Parameters

**fatal**
Logs only fatal messages.

**error**
Logs fatal messages and error messages.

**warning**
Logs fatal messages, error messages, and warning messages.

**info**
Logs all messages, including informational messages.

## Restrictions

None.

## Example

To log only fatal and error messages on the RADIUS server:

xp(config)# **radius accounting system error**

# radius authentication

## Purpose

Causes RADIUS authentication to be performed at either the XP login prompt or when the user tries to access Enable mode.

## Format

**radius authentication login|enable**

## Mode

Configure

## Description

The **radius authentication** command allows you to specify when RADIUS authentication is performed: either when a user logs in to the XP, or tries to access Enable mode.

## Parameters

**login**        Authenticates users at the XP login prompt.

**enable**       Authenticates users when they try to access Enable mode.

## Restrictions

None.

## Example

To perform RADIUS authentication at the XP login prompt:

---

**radius authentication login**

---

# radius enable

## Purpose

Enables RADIUS authentication on the XP. RADIUS authentication is disabled by default on the XP.

## Format

**radius enable**

## Mode

Configure

## Description

The **radius enable** command causes RADIUS authentication to be activated on the XP. You set RADIUS-related parameters with the **radius set**, **radius accounting shell**, and **radius authorization** commands, then use the **radius enable** command to activate RADIUS authentication.

## Parameters

None.

## Restrictions

None.

## Example

The following commands set RADIUS-related parameters on the XP. The commands are then activated with the **radius enable** command:

```
radius set server 207.135.89.15
radius set timeout 30
radius authentication login
radius accounting shell all
radius enable
```

# radius set

## Purpose

Sets parameters for authenticating the XP through a RADIUS server.

## Format

**radius set [timeout** *<number>*] **[retries** *<number>*] **[deadtime** *<number>*] **[key** *<string>*]
**[source** *<IFname_IPaddr>*] **last-resort password |succeed |deny**

## Mode

Configure

## Description

The **radius set** command allows you to set default RADIUS-related parameters on the XP, how long to wait for the RADIUS server to authenticate the user, an encryption key, and what to do if the RADIUS server does not reply by a given time.

## Parameters

| | |
|---|---|
| **timeout** *<number>* | Is the maximum time (in seconds) to wait for a RADIUS server to reply. The default is 3 seconds. |
| **retries** *<number>* | The number of times (1-10) to try contacting this RADIUS server. |
| **deadtime** *<number>* | The length of time for transaction requests to skip over a RADIUS server—up to a maximum of 1440 minutes (24 hours). This command causes the XP to mark as "dead" any RADIUS server that fails to respond to authentication requests, thus avoiding the wait for the request to timeout before trying the next configured server. Additional requests for a RADIUS server marked as "dead" will skip the server for the duration of minutes specified (unless all servers are marked "dead"). |
| **key** *<string>* | Is an encryption key to be shared with the RADIUS server. |
| **source** *<IFname_IPaddr>* | Sets the source interface name or IP address for RADIUS messages. |
| **last-resort** | Is the action to take if a RADIUS server does not reply within the time specified by the **timeout** parameter. If this parameter is *not* specified, user authentication will always fail if the RADIUS server does not reply within the specified timeout period. |
| | Specify one of the following keywords: |

| | |
|---|---|
| **password** | The user is prompted for the password set with **system set password** command. This keyword is *recommended* for optimal security, however, note that you must set a password with the **system set password** command. |
| **succeed** | Access to the XP is granted. |
| **deny** | Unable to connect to RADIUS server, access to the XP is denied. |

## Restrictions

None.

## Example

The following commands specify that hosts 137.72.5.9 and 137.72.5.41 are RADIUS servers, and the XP should wait no more than 30 seconds for a response from one of these servers. If a response from a RADIUS server doesn't arrive in 30 seconds, the user is prompted for the password that was set with the XP **system set password** command.

```
radius set server 137.72.5.9
radius set server 137.72.5.41
radius set timeout 30
radius set last-resort password
```

# radius set server

## Purpose

Sets parameters for authenticating the XP through a specific RADIUS server.

## Format

**radius set server** *<IPaddr>* **[acct-port** *<number>*] **[auth-port** *<number>*] **[timeout** *<number>*]
**[retries** *<number>*] **[deadtime** *<number>*] **[key** *<string>*] **[source** *<IFname_IPaddr>*]

## Mode

Configure

## Description

The **radius set server** command allows you to set RADIUS-related parameters on the XP,
including the IP address of a specific RADIUS server, how long to wait for the RADIUS server to
authenticate the user, an encryption key, and what to do if the RADIUS server does not reply by a
given time.

## Parameters

| | |
|---|---|
| **server** *<IPaddr>* | Is the IP address of a specific RADIUS server. You can enter up to five RADIUS servers. Enter one server per **radius set server** command. |
| **acct-port** *<number>* | Enter the accounting port number. The default **Acct-port** number is 1813. |
| **auth-port** *<number>* | Enter the authentication port number. The default **Auth-port** number is 1812. |
| **timeout** *<number>* | Is the maximum time (in seconds) to wait for a RADIUS server to reply. The default is 3 seconds. |
| **retries** *<number>* | The number of times (1-10) to try contacting this RADIUS server. |
| **deadtime** *<number>* | The length of time for transaction requests to skip over a RADIUS server—up to a maximum of 1440 minutes (24 hours). This command causes the XP to mark as "dead" any RADIUS server that fails to respond to authentication requests, thus avoiding the wait for the request to timeout before trying the next configured server. Additional requests for a RADIUS server marked as "dead" will skip the server for the duration of minutes specified (unless all servers are marked "dead"). |
| **key** *<string>* | Is an encryption key to be shared with the RADIUS server. |

**source** *<IFname_IPaddr>* Sets the source interface name or IP address for RADIUS messages.

## Restrictions

None.

## Example

The following commands specify that hosts 137.72.5.9 and 137.72.5.41 are RADIUS servers, and the XP should wait no more than 30 seconds for a response from one of these servers. If a response from a RADIUS server doesn't arrive in 30 seconds, the user is prompted for the password that was set with the XP **system set password** command.

```
radius set server 137.72.5.9
radius set server 137.72.5.41
radius set timeout 30
radius set last-resort password
```

# radius show

## Purpose

Displays information about RADIUS configuration on the XP.

## Format

**radius show stats|all**

## Mode

Enable

## Description

The **radius show** command displays statistics and configuration parameters related to RADIUS configuration on the XP. The statistics displayed include:

accepts   Number of times each server responded and validated the user successfully.

rejects   Number of times each server responded and denied the user access, either because the user wasn't known, or the wrong password was supplied.

timeouts   Number of times each server did not respond.

## Parameters

**stats**      Displays the accepts, rejects, and timeouts for each RADIUS server.

**all**       Displays the configuration parameters set with the **radius set** command, in addition to the accepts, rejects, and timeouts for each RADIUS server.

## Restrictions

None.

# Example

To display configuration parameters and RADIUS server statistics:

```
radius show all
RADIUS status:                      ACTIVE
RADIUS last resort:                 Succeed when server fails
Command Level Logging:               15 - Log Configure, Enable and User Commands
Default RADIUS timeout (seconds):   3
Default RADIUS retries:             3
Default RADIUS deadtime (minutes):  0
Default RADIUS key:                 net
Default RADIUS source IP address:   Let system decide


RADIUS servers listed in order of priority:


Server:            10.136.16.102
Port:              49
Timeout (seconds):   <Default>
Retries:             <Default>
Deadtime (minutes):   3
Key:               net
Source IP:           <Default>
Server is dead. Will be made tested again in 2 minutes


Server:            10.136.15.100
Port:              49
Timeout (seconds):   <Default>
Retries:             <Default>
Deadtime (minutes):  <Default>
Key:
Source IP:           <Default>


Server:            10.136.15.101
Port:              49
Timeout (seconds):   <Default>
Retries:             <Default>
Deadtime (minutes):  <Default>
Key:               net
Source IP:           <Default>


RADIUS server host statistics:


Host           Accepts  Rejects  Timeouts
10.136.16.102    0        0        3
10.136.15.100    1        0        0        * Sever being used
10.136.15.101    0        0        0
```

# Chapter 52

# rarpd Commands

The **rarpd** commands let you configure and display information about Reverse Address Resolution Protocol (RARP) on the XP.

## Command Summary

Table 40 lists the **rarpd** commands. The sections following the table describe the command syntax.

**Table 40.  rarpd commands**

| |
|---|
| **rarpd add hardware-address** *<mac-address>* **ip-address** *<IPaddr>* |
| **rarpd set interface** *<name>*\|**all server-ip <***IPaddr***>** |
| **rarpd show interface\|mappings** |

# rarpd add

## Purpose

Maps a MAC address to an IP address.

## Format

**rarp add hardware-address** *<mac-address>* **ip-address** *<IPaddr>*

## Mode

Configure

## Description

The **rarpd add** command allows you to map a MAC address to an IP address for use with RARP. When a host makes a RARP request on the XP, and its MAC address has been mapped to an IP address with the **rarp add** command, the RARP server on the XP responds with the IP address that corresponds to the host's MAC address.

## Parameters

**hardware-address** *<mac-address>*
    Is a MAC address in the form *xx:xx:xx:xx:xx:xx* or *xxxxxx:xxxxxx*.

**ip-address** *<IPaddr>*
    Is the IP address to be mapped to the MAC address.

## Restrictions

None

## Example

To map MAC address 00:C0:4F:65:18:E0 to IP address 10.10.10.10:

xp(config)# **rarpd add hardware-address 00:C0:4F:65:18:E0 ip-address 10.10.10.10**

# rarpd set interface

## Purpose

Specifies the interface(s) to which the XP's RARP server responds.

## Format

**rarpd set interface** *<name>*|**all**

## Mode

Configure

## Description

The **rarpd set interface** command allows you to specify which interfaces the XP's RARP server responds to when sent RARP requests. You can specify individual interfaces or all interfaces.

## Parameters

| | |
|---|---|
| *<name>* | Is the name of an interface. |
| **all** | Causes the RARP server to respond to RARP requests from all interfaces. |
| **server-ip** | The server IP address to use in replies. |

## Restrictions

None.

## Example

To cause the XP's RARP server to respond to RARP requests from interface int1:

```
xp(config)# rarpd set interface int1
```

# rarpd show

## Purpose

Displays information about the XP's RARP configuration.

## Format

**rarpd show interface|mappings**

## Mode

Enable

## Description

The **rarpd show** command displays information about the configuration of the XP's RARP server. You can list the MAC-to-IP address mappings or the interfaces to which the XP responds to RARP requests.

## Parameters

**interface**    Lists the interfaces to which the XP responds to RARP requests.

**mappings**    Displays the list of MAC-to-IP address mappings that was set with the **rarp add command**.

## Restrictions

None.

## Example

To display the RARP server's list of MAC-to-IP address mappings:

```
xp# rarpd show mappings
```

# Chapter 53

# rate-limit Command

The **rate-limit** commands allow you to define rate limits and apply them to IP interfaces. There are several types of rate limiting supported:

- Flow rate limiting Œ rate limiting for individual flows

- Flow-aggregate rate limiting Œ software-based rate limiting for an aggregation of flows

- Aggregate rate limiting Œ rate limiting for an aggregation of flows enabled on a per-line card basis

- Port level rate limiting Œ rate limiting for individual ports

- VLAN rate limiting: rate limiting per VLAN

**Note:** For a complete list of hardware and the features they support, consult the Release Notes on the Enterasys Networks web site: **www.enterasys.com**

## Command Summary

Table 41 lists the **rate-limit** commands. The sections following the table describe the command syntax.

**Table 41.  rate-limit commands**

| |
|---|
| **rate-limit** *<name>* **aggregate acl** *<acl list>* **rate [drop-packets\| no-action\| lower-priority\| lower-priority-except-control\| tos-precedence-rewrite** *<num>*\| **tos-precedence-rewrite-lower-priority** *<num>*] **[allocate-resources-during-apply\| allocate-resources-during-traffic]** |
| **rate-limit** *<name>* **apply interface** *<interface>* |
| **rate-limit** *<name>* **flow-aggregate acl** *<acl list>* **rate** *<rate>* **exceed-action** *<action>* **[sequence** *<number>*] \| **min-bandwidth** *<min-bw>* \| **distribute-among** *<number-of-flows>*] |

**Table 41. rate-limit commands (Continued)**

| |
|---|
| **rate-limit** *&lt;name&gt;* **input acl** *&lt;acl list&gt;* **rate** *&lt;number&gt;* **exceed-action** *&lt;action&gt;* [**sequence** *&lt;number&gt;*] |
| **rate-limit** *&lt;name&gt;* **port-level input port** *&lt;port list&gt;* **rate** *&lt;num&gt;* [**drop-packets**\| **no-action**\| **lower-priority**\| **lower-priority-except-control**\| **tos-precedence-rewrite** *&lt;num&gt;*\| **tos-precedence-rewrite-lower-priority** *&lt;num&gt;*] |
| **rate-limit** *&lt;name&gt;* **port-level slot** *&lt;num&gt;* **ignore-control-priority** |
| **rate-limit** *&lt;name&gt;* **port-level output port** *&lt;port list&gt;* **rate** *&lt;num&gt;* **drop-packets** |
| **rate-limit show** [**all**] \|[**policy-type flow-policies**\| **flow-aggregate-policies**\| **aggregate-policies**\| **portlevel-policies**\|**all**]\|[**policy-name** *&lt;name&gt;*]\|[**interface** *&lt;interface&gt;*]\|[**port-level port** *&lt;port list&gt;* \|**all-port**] \| [**port-level policy-name** *&lt;name&gt;*]\|[**rate-limiting-mode**] |
| **rate-limit** *&lt;name&gt;* **vlan** *&lt;name&gt;* **port** *&lt;port-list&gt;*\| **all-ports destport** *&lt;port-list&gt;*\| **all-ports rate** *&lt;num&gt;* **exceed-action** *&lt;action&gt;* |

# rate-limit aggregate acl

## Purpose

Defines an aggregate rate-limiting policy.

## Format

**rate-limit** *<name>* **aggregate acl** *<acl list>* **rate [drop-packets| no-action| lower-priority| lower-priority-except-control| tos-precedence-rewrite** *<num>*| **tos-precedence-rewrite-lower-priority** *<num>*] [**allocate-resources-during-apply**| **allocate-resources-during-traffic**]

## Mode

Configure

## Description

The **rate-limit aggregate acl** command allows you to specify the rate limiting policy for an aggregation of flows. An aggregation of flows is all the flows with the same ACLs. The rate limiting policy affects the whole aggregation and not an individual flow. Example of this type of policy is rate limiting traffic from one subnet to another.

## Parameters

<name>
> The name of the rate limit.

**acl** *<acl list>*|**all-ports**
> Specifies the ACL which will identify the flows to aggregate and rate limit. The keyword **all** specifies all ACLs.

**rate** *<num>*
> Specifies the rate limit, in bps, for the flow. This value can be between 1000 and 1000000000.

**drop-packets**
> This optional parameter specifies that if the rate-limit is exceeded, then packets will be dropped.

**no-action**
> This optional parameter specifies that if the rate-limit is exceeded, then no action will be taken.

**lower-priority**
> This optional parameter specifies that if the rate-limit is exceeded, then the packets priority is lowered.

**lower-priority-except-control**
> This optional parameter specifies that if the rate-limit is exceeded, then the packets priority is lowered, except control packets.

**tos-precedence-rewrite** *<num>*
> This optional parameter specifies that if the rate-limit is exceeded, then the tos precedence in the IP packet header will be rewritten to a specified value. This value can be between 0 and 7.

**tos-precedence-rewrite-lower-priority** *<num>*
> This optional parameter specifies that if the rate-limit is exceeded, then the tos precedence in the IP packet header will be rewritten to a specified value and the packet priority will be lowered. This value can be between 0 and 7.

**allocate-resources during-apply**
> This optional parameter allocates resources to the policy when its applied to an interface.

**allocate-resources during-traffic**
> This optional parameter allocates resources to the policy when actual traffic flow is present.

# Restrictions

Ports associated with the IP interface must reside on a single T-series line card. You cannot apply an aggregate rate limiting policy to an interface that spans ports on more than one line card.

# Example

To define an aggregate rate limiting policy based on the ACL 'engacl':

> xp(config)# **rate-limit eng aggregate acl engacl rate 10000000 drop-packets allocate-resources during-apply**

# rate-limit apply

## Purpose

Applies a rate limiting policy to an interface.

## Format

**rate-limit** *<name>* **apply interface** *<interface>*

## Mode

Configure

## Description

The **rate-limit apply** command allows you to apply a previously-defined rate limiting policy to an interface.

## Parameters

*<name>*
    The name of the rate limiting policy.

**interface** *<interface>*/**all**
    The name of the IP interface. The keyword **all** applies the policy to all IP interfaces.

## Restrictions

None.

## Example

To apply the rate limiting policy 'engacl' to the interface 'ip16':

```
xp(config)# rate-limit engacl apply interface ip16
```

# rate-limit flow-aggregate

## Purpose

Used to specify a profile for software-based aggregate rate limiting.

**Note:** You cannot use Flow-Aggregate Rate Limiting on line cards that support Aggregate Rate Limiting. Flow-Aggregate Rate Limiting allows you to rate limit the aggregation of flows where the hardware does not support aggregate rate limiting.

## Format

**rate-limit** *<name>* **flow-aggregate acl** *<acl list>* **rate** *<rate>* **exceed-action** *<action>*
**[sequence** *<number>*] | **min-bandwidth** *<min-bw>* | **distribute-among** *<number-of-flows>*]

## Mode

Configure.

## Description

The **rate-limit flow-aggregate** command is used to specify a profile for software-based aggregate rate limiting. Use the rate-limit apply command to apply the profile to an IP interface.

**rate-limit** *<name>*
    The name of the rate limiting policy. The maximum length for this name is 30 bytes.

**acl** *<acl list>*    The ACL(s) that define a rate limiting policy. The rate-limit flow-aggregate command disregards the permit/deny keywords in the ACL rule definition. However, it does look at all parameters in the ACL rule.

**rate** *<rate>*    The rate limit, in bps, for the aggregation of flows. The range for <rate> is 3000 to 1000000000.

**exceed-action** *<action>*
    The action taken if the rate limit is exceeded.
    drop-packets              Drop the packets.
    set-priority-low          Set packet priority to low.
    set-priority-medium       Set packet priority to medium.
    set-priority-high         Set packet priority to high.

**sequence** *<number>*
    The sequence number for this policy. The range for <number> is 1 to 65535.

**min-bandwidth** *<min-bw>*
    The minimum bandwidth for each flow. The range for <min-bw> is 3000 to 1000000000.

**distribute-among** *<number-of-flows>*

The number of flows among which freed bandwidth is distributed. The range for <number-of-flows> is 1 to 10. The default is 1.

## Restrictions

None.

## Example

The following example defines a rate limit profile client1 for traffic from the 10.10.10.0 network. Packets will be dropped if the rate limit of 10 million bps is exceeded, and each flow will have a minimum bandwidth of 10,000 bps.

---

xp(config)# acl 100 permit ip 10.10.10.0/24 any

xp(config)# rate-limit client1 flow-aggregate acl 100 rate

10000000 exceed-action drop-packets min-bandwidth

xp(config)# rate-limit apply client1 interface in1

---

# rate-limit input acl

## Purpose

Defines a policy to enable per flow rate limit.

## Format

**rate-limit** *<name>* **input acl** *<acl list>* **rate** *<number>* **exceed-action** *<action>* [**sequence** *<number>*]

## Mode

Configure

## Description

The **rate-limit input** command allows you to specify the profile for per flow rate limiting by specifying IP ACLs, the rate limit, and the action to be performed if the rate limit is reached. You then use the **rate-limit apply** command to apply the rate limit to an IP interface.

## Parameters

<name>
> The name of the rate limiting policy. The maximum length for this name is 30 bytes or less.

**input acl** *<acl list>*
> The ACL(s) that define a per flow rate limiting policy. The **rate-limit input** command disregards the **permit/deny** keywords in the ACL rule definition, however, it does look at all parameters in the ACL rule.

**rate** *<number>*
> The rate limit, in bps, for the flow. This value can be between 1000 and 1000000000.

**exceed-action** *<action>*
> The action to be taken if the rate limit is exceeded. Specify one of the following keywords:

> | | |
> |---|---|
> | **drop-packets** | Drop the packets. |
> | **set-priority-low** | Set the priority to low. |
> | **set-priority-medium** | Set the priority to medium. |
> | **set-priority-high** | Set the priority to high. |

**sequence** *<number>*
> The sequence number for this policy. This value can be between 1 and 65535.

## Restrictions

None.

## Example

To define a rate limit profile 'client1' for the ACL '100' that causes packets to be dropped if the rate limit of 10 million bps is exceeded:

xp(config)# **rate-limit client1 input acl 100 rate-limit 10000000 exceed-action drop-packets**

# rate-limit port-level input

## Purpose

Defines a rate limiting policy on a per-port basis for incoming traffic.

## Format

**rate-limit** *<name>* **port-level input port** *<port list>* **rate** *<num>* **[drop-packets| no-action| lower-priority| lower-priority-except-control| tos-precedence-rewrite** *<num>*| **tos-precedence-rewrite-lower-priority** *<num>***]**

## Mode

Configure

## Description

The **rate-limit port-level input** command allows you to specify the profile for a rate limiting policy on a per-port basis. This policy only affects incoming traffic to the port. The defined policy will only apply to that specific port and not an aggregation of flows.

## Parameters

<name>
    The name of the rate limit.

**port** *<port list>*|**all-ports**
    Specifies which ports to apply the rate-limiting policy. Specify **all-ports** to enable rate-limiting on all the ports.

**rate** *<num>*
    Specifies the rate limit, in bps, for the flow. This value can be between 1000 and 1000000000.

**drop-packets**
    This optional parameter specifies that if the rate-limit is exceeded, then packets will be dropped.

**no-action**
    This optional parameter specifies that if the rate-limit is exceeded, then no action will be taken.

**lower-priority**
    This optional parameter specifies that if the rate-limit is exceeded, then the packets priority is lowered.

**lower-priority-except-control**

> This optional parameter specifies that if the rate-limit is exceeded, then the packets priority is lowered, except for control packets.

**tos-precedence-rewrite** *<num>*

> This optional parameter specifies that if the rate-limit is exceeded, then the tos precedence in the IP packet header will be rewritten to a specified value. This value can be between 0 and 7.

**tos-precedence-rewrite-lower-priority** *<num>*

> This optional parameter specifies that if the rate-limit is exceeded, then the tos precedence in the IP packet header will be rewritten to a specified value and the packet priority will be lowered. This value can be between 0 and 7.

# Restrictions

None.

# Example

To define the port level rate limiting policy 'department' for the input port et.2.1 that causes packets to be dropped if the rate limit of 10 million bps is exceeded:

xp(config)# **rate-limit department port-level input port et.2.1 rate 10000000 drop-packets**

# rate-limit port-level slot

## Purpose

Sets rate limiting options for a module.

## Format

**rate-limit** *<name>* **port-level slot** *<num>* **ignore-control-priority**

## Mode

Configure

## Description

The **rate-limit port-level slot** command allows you to set the output port level rate limiting policy to ignore the control priority traffic. This means that there will be no rate limiting for control priority traffic. Note that this policy does not actually try and rate limit the traffic.

## Parameters

<name>
> The name of the rate limiting policy.

**slot** *<num>*|**all**
> Specifies the module or slot. This value can be between 0 and 32. Specify **all** to enable rate-limiting on all modules or slots.

**ignore-control-priority**
> This optional parameter specifies that if the rate-limit is exceeded, then the control priority packets will not be dropped.

## Restrictions

None.

## Example

To define a rate limiting policy 'dontdrop' for all module or slots to prevent control priority packets from being dropped if the rate limit of 10 million bps is exceeded:

```
xp(config)# rate-limit dontdrop port-level slot all ignore-control-priority
```

# rate-limit port-level output

## Purpose

Defines a rate limiting policy on a per-port basis for outgoing traffic.

## Format

**rate-limit** *<name>* **port-level output port** *<port list>* **rate** *<num>* **drop-packets**

## Mode

Configure

## Description

The **rate-limit port-level output** command allows you to specify the profile for a rate limiting policy on a per-port basis. This policy only affects outgoing traffic to the port, and the only exceed action available is dropping packets. The defined policy will only apply to that specific port and not an aggregation of flows.

## Parameters

<name>
> The name of the rate limit.

**port** *<port list>*|**all-ports**
> Specifies which ports to apply the rate-limiting policy. Specify **all-ports** to enable rate-limiting on all the ports.

**rate** *<number>*
> The rate limit, in bps, for the flow. This value can be between 1000 and 1000000000.

**drop-packets**
> This optional parameter specifies that if the rate-limit is exceeded, then packets will be dropped.

## Restrictions

None.

## Example

To define a rate limit policy 'department' for the output port et.2.1 that causes packets to be dropped if the rate limit of 10 million bps is exceeded:

> xp(config)# **rate-limit department port-level output port et.2.1 rate 10000000 drop-packets**

# rate-limit show

## Purpose

Displays rate limiting policies.

## Format

**rate-limit show [all] |[policy-type flow-policies| flow-aggregate-policies| aggregate-policies| portlevel-policies|all]|[policy-name** *<name>*]|[**interface** *<interface>*]|[**port-level port** *<port list>* |**all-port] | [port-level policy-name** *<name>*]|[**rate-limiting-mode]**

## Mode

Enable

## Description

The **rate-limit show** command shows information about rate limiting policies.

## Parameters

**all**
Displays information on all rate limit policies configured on the XP.

**policy-type**
The type of the rate limit policy. The keyword **all** shows all rate limit types. You can specify the following types of policies:

| | |
|---|---|
| **flow-policies** | All flow policies |
| **flow-aggregate-policies** | All software-based flow-aggregate policies |
| **aggregate-policies** | All aggregate policies |
| **portlevel-policies** | All port level policies |
| **all** | All policies |

**policy-name** *<name>* | **all**
The name of the rate limiting policy. The keyword **all** shows all rate limit policies.

**interface** *<interface>* | **all**
The name of the IP interface. The keyword **all** shows rate limiting policies for all IP interfaces.

**port-level port** *<port list>* | **all-ports**
The name of the port. The keyword **all-ports** shows rate limiting policies for all ports.

**port-level policy-name** *<name>*
> The name of the rate limiting policy name.

**rate-limiting-mode**
> Shows the current rate limiting mode, whether per-flow rate limiting or aggregate rate limiting.

# Restrictions

None.

# Example

To show all configured rate limit policies:

```
xp# rate-limit show all

-------------------------------------------------------------------------
Rate Limit Policy name : rlpol ❶
Applied Interfaces : if0 ❷


 ❸        ❹          ❺           ❻        ❼      ❽    ❾
ACL     Source IP/Mask   Dest. IP/Mask   SrcPort  DstPort  TOS  Prot
---     --------------   -------------   -------- -------- ---- ---
100     10.212.10.11/32  anywhere        any      any      any  IP
200     10.212.10.12/32  anywhere        any      any      any  IP
300     10.212.10.13/32  anywhere        any      any      any  IP
400     10.212.10.14/32  anywhere        any      any      any  IP
500     10.212.10.10/32  anywhere        any      any      any  IP


 ❿ ⓫        ⓬          ⓭
Seq ACL    Rate Limit Exceed Action
--- ----   -------- -------------
10  100    26000    Low
10  200    26000    Low
10  300    26000    Low
10  400    26000    Low
10  500    26000    Low
```

**Legend:**

1. The name of the rate limit.

2. The IP interface to which the rate limit is applied.

3. The name of the ACL(s) that define the rate limit.

4. The source address and filtering mask specified by the ACL.

5. The destination address and filtering mask specified by the ACL.

6.  The number of the TCP or UDP source port.

7.  The number of the TCP or UDP destination port.

8.  The Type of Service value.

9.  The protocol for the ACL.

10. The sequence number for this policy.

11. The name of the ACL.

12. The rate limit for the flow.

13. The action to be taken if the rate limit is reached: packets can be dropped or the priority set to low, medium, or high.

# rate-limit vlan port

## Purpose

Defines a rate limit policy on a per-vlan basis for *incoming* or per-port *outgoing* traffic.

## Format

**rate-limit** *<name>* **vlan** *<name>* **port** *<port-list>*| **all-ports destport** *<port-list>*| **all-ports rate** *<num>* **exceed-action** *<action>*

## Mode

Configure

## Description

The rate-limit vlan port command allows you to specify the rate limiting policy for incoming traffic on a particular vlan, or outgoing traffic on a port belonging to a specific vlan. Like Port rate limiting policies, you do not specify an ACL when defining this type of policy. Vlan rate limiting policies do not need to be applied to an interface and take affect when they are created.

**Note:** When you use the vlan rate limiting policy to limit outgoing traffic on a port belonging to a specified vlan, multicast and broadcast traffic will not be rate limited.

## Parameters

| | |
|---|---|
| *<name>* | The name of the rate limit. |
| **vlan** *<name>* | The name of the vlan. |
| **port** *<port-list>*|**all-ports** | Specifies which ports to apply the rate-limiting policy. Specify all-ports to enable rate-limiting on all the ports belonging to the specified vlan. |
| **destport** *<port-list>*|**all-ports** | Specifies which exit ports to apply the rate-limiting policy. Specify all-ports to enable rate-limiting on all the exit ports belonging to the specified vlan. |
| **rate** *<num>* | Specifies the rate limit, in bps, for the vlan or vlan port. This value can be between 1000 and 1000000000. |
| **exceed-action** *<action>* | The action to be taken if the rate limit is exceeded. Specify one of the following keywords: |
| | drop-packets Drop the packets |
| | set-priority-low Set the priority to low |

set-priority-medium Set the priority to medium
set-priority-high Set the priority to high

## Restrictions

When using the vlan rate limiting policy to limit outgoing traffic on a port belonging to a specified vlan, multicast and broadcast traffic will not be rate limited.

## Example

To define a rate limit policy "client1" for the vlan "red" that causes packets to be dropped if the rate limit of 10 million bps is exceeded.

```
XP(config)# rate-limit client1 vlan red port all-ports rate 10000000 exceed-action drop-packets
```

# Chapter 54

# rdisc Commands

The **rdisc** commands allow you to configure router advertisement on the XP.

## Command Summary

Table 42 lists the **rdisc** commands. The sections following the table describe the command syntax.

**Table 42. rdisc commands**

| |
|---|
| **rdisc add address** *<hostname-or-ipaddr>* |
| **rdisc add interface all** |
| **rdisc set address** *<ipaddr>* **type multicast\|broadcast advertise enable\|disable preference** *<number>* **\|ineligible** |
| **rdisc set interface all min-adv-interval** *<number>* **max-adv-interval** *<number>* **lifetime** *<number>* |
| **rdisc show all** |
| **rdisc start** |
| **rdisc stop** |

# rdisc add address

## Purpose

Defines the IP address(es) that are to be included in router advertisements sent by the XP.

## Format

**rdisc add address** *<hostname-or-ipaddr>*

## Mode

Configure

## Description

The **rdisc add address** command lets you define addresses to be included in router advertisements. If you configure this command, only the specified hostname(s) or IP address(es) are included in the router advertisements.

## Parameters

*<hostname-or-ipaddr>*    Defines the hostname or IP address(es) to be included in the router advertisements.

## Restrictions

None.

## Example

To define an address to be included in router advertisements:

```
xp(config)# rdisc add address 10.10.5.254
```

# rdisc add interface

## Purpose

Enables router advertisement on all interfaces.

## Format

**rdisc add interface all**

## Mode

Configure

## Description

The **rdisc add interface** command lets you enable router advertisement on all interfaces. By default, all addresses on the interface are included in router advertisements sent by the XP. If you want to have only specific addresses included in router advertisements, use the **rdisc add address** command to specify those addresses.

## Parameters

**all**  Enables router advertisement on all interfaces. By default, router advertisement is disabled on all interfaces.

## Restrictions

None.

## Example

To enable router advertisement on all interfaces:

```
xp(config)# rdisc add interface all
```

# rdisc set address

## Purpose

Configures router advertisement parameters that apply to a specific address.

## Format

**rdisc set address** *<ipaddr>* **type multicast|broadcast advertise enable|disable preference** *<number>* **|ineligible**

## Mode

Configure

## Description

The **rdisc set address** command lets you specify the type of router advertisement in which the address is included and the preference of the address for use as a default route.

## Parameters

*<ipaddr>*   Specifies the IP address.

**type multicast|broadcast**
Specifies the type of router advertisement in which the IP address is to be included:

 **multicast** Specifies that the IP address should only be included in a multicast router advertisement. This is the default.

 **broadcast** Specifies that the IP address should only be included in a broadcast router advertisement, even if IP multicast is available.

**advertise enable|disable**
Specifies whether the IP address is included in the router advertisements:

 **enable**  Include the IP address in router advertisements. This is the default.

 **disable**  Do not include the IP address in router advertisements.

**preference** *<number>*/**ineligible**
Specifies the degree of preference of the IP address as a default route. The higher the value, the more preference. If the IP address is ineligible to be a default route, specify **ineligible**. The default value is 0.

## Restrictions

None

## Examples

To specify that an address be included only in broadcast router advertisements and that the address is ineligible to be a default route:

xp(config)# **rdisc set address 10.20.36.0 type broadcast preference ineligible**

# rdisc set interface

## Purpose

Configures router advertisement parameters applying to all interfaces.

## Format

**rdisc set interface all min-adv-interval** *<number>* **max-adv-interval** *<number>* **lifetime** *<number>*

## Mode

Configure

## Description

The **rdisc set interface** command lets you specify the intervals between the sending of router advertisements and the lifetime of addresses sent in a router advertisement.

## Parameters

**all**     Applies parameters to all interfaces.

**min-adv-interval** *<number>*
> Specifies the minimum time, in seconds, allowed between the sending of unsolicited broadcast or multicast router advertisements. This value can be between 3-1800. The default is 0.75 times the **max-adv-interval** value.

**max-adv-interval** *<number>*
> Specifies the maximum time, in seconds, allowed between the sending of unsolicited broadcast or multicast router advertisements. This value can be between 4-1800. The default value is 600 seconds.

**lifetime** *<number>*
> Specifies the lifetime, in seconds, of addresses in a router advertisement. This value can be between 4-9000. The default is 3 times the **max-adv-interval** value.

## Restrictions

None

## Examples

To specify the maximum time between the sending of router advertisements on all interfaces:

xp(config)# **rdisc set interface all max-adv-interval 1200**

Note that since the **min-adv-interval** and **lifetime** parameters were not specified, the default values for those parameters become 900 seconds and 3600 seconds, respectively.

# rdisc show

## Purpose

Shows the state of router discovery on the XP.

## Format

**rdisc show all**

## Mode

Enable

## Description

The **rdisc show** command shows the state of router discovery on the XP.

## Parameters

**all**
Displays all router discovery information.

## Restrictions

None.

# Examples

To display router discovery information:

---

xp# **rdisc show all**

Task State: <Foreground NoResolv NoDetach> ❶

  Send buffer size 2048 at 812C68F8
  Recv buffer size 2048 at 812C60D0

Timers:

  RouterDiscoveryServer Priority 30

    RouterDiscoveryServer_XP2_XP3_IP <OneShot>
      last: 10:17:21 next: 10:25:05 ❷

Task RouterDiscoveryServer:
  Interfaces:
    Interface XP2_XP3_IP: ❸
      Group 224.0.0.1: ❹
        minadvint 7:30 maxadvint 10:00 lifetime 30:00 ❺

        Address 10.10.5.254: Preference: 0 ❻

  Interface policy:
    Interface XP2_XP3_IP* MaxAdvInt 10:00 ❼

---

**Legend:**

1.  Information about the RDISC task.

2.  Shows when the last router advertisement was sent and when the next advertisement will be sent.

3.  The interface on which router advertisement is enabled.

4.  Multicast address.

5.  Current values for the intervals between the sending of router advertisements and the lifetime of addresses sent in a router advertisement.

6.  IP address that is included in router advertisement. The preference of this address as a default route is 0, the default value.

7.  Shows configured values for the specified interface.

# rdisc start

## Purpose

Starts router discovery on the XP.

## Format

**rdisc start**

## Mode

Configure

## Description

The **rdisc start** command lets you start router discovery on the XP. When router discovery is started, the XP multicasts or broadcasts periodic router advertisements on each configured interface. The router advertisements contain a list of addresses on a given interface and the preference of each address for use as the default route on the interface. By default, router discovery is disabled.

## Parameters

None.

## Restrictions

None

# rdisc stop

## Purpose

Stops router discovery.

## Format

**rdisc stop**

## Mode

Configure

## Description

The **rdisc stop** command stops router discovery on the XP, thereby stopping router advertisements from being sent out.

## Parameters

None.

## Restrictions

None

# Chapter 55

# reboot Command

The **reboot** command reboots the XP.

## Format

**reboot**

## Mode

Enable.

## Parameters

None.

## Restrictions

None.

# Chapter 56

# rip Commands

The Routing Information Protocol, Version 1 and Version 2 (RIPv1 and RIPv2), is the most commonly used interior gateway protocol. RIP selects the route with the lowest metric as the best route. The metric is a hop count representing the number of gateways through which data must pass in order to reach its destination. The longest path that RIP accepts is 15 hops. If the metric is greater than 15, a destination is considered unreachable and the XP discards the route. RIP assumes that the best route is the one that uses the fewest gateways, that is, the shortest path. RIPv1 is described in RFC 1058 and RIPv2 is described in RFC 1723.

## Command Summary

Table 43 lists the **rip** commands. The sections following the table describe the command syntax.

**Table 43. rip commands**

| |
|---|
| **rip add interface | source-gateways | trusted-gateways** *<hostname-or-IPaddr>* |
| **rip set auto-summary disable | enable** |
| **rip set broadcast-state always | choose | never** |
| **rip set check-zero disable | enable** |
| **rip set check-zero-metric disable | enable** |
| **rip set default-metric** *<num>* |
| **rip set interface** *<interfacename-or-IPaddr>* **| all [receive-rip enable | disable] [send-rip enable | disable] [metric-in** *<num>*] **[metric-out** *<num>*] **[version 1|version 2 [type broadcast|multicast]] authentication-method [none|(simple|md5 key-chain** *<num-or-string>*)] |
| **rip set max-routes** *<num>* |
| **rip set multipath off** |

**Table 43.  rip commands (Continued)**

| |
|---|
| **rip set poison-reverse disable | enable** |
| **rip set preference** *<num>* |
| **rip show** *<option-list>* |
| **rip start** |
| **rip stop** |
| **rip trace [packets|request|response|local-options] [detail] [send|receive]** |

# rip add

## Purpose

Adds RIP entities.

**Note:** By default, RIP is disabled on all XP interfaces. To enable RIP on an interface, you must use the **rip add interface** command.

## Format

**rip add interface** *<interfacename-or-IPaddr>*

**rip add source-gateways|trusted-gateways** *<hostname-or-IPaddr>*

## Mode

Configure

## Description

The **rip add** command lets you add the following RIP entities:

- Interfaces that will run RIP

- Routers that send RIP updates directly, rather than through broadcast or multicast

- Trusted gateways, from which the XP will accept RIP updates. when you add trusted gateways, the XP does not accept RIP updates from sources other than those trusted gateways.

## Parameters

**interface**
Informs the RIP process about the specified interfaces. You can specify a list of interface names or IP addresses or use the **all** keyword to specify all interfaces.

**source-gateways**
Adds a router that sends RIP updates directly, rather than using broadcasts or multicasts. You can specify a single interface name or IP address.

**Note:** Updates to source gateways are not affected by the RIP packet transmission state of the interface.

**trusted-gateway**
Adds a trusted source for RIP updates. When you add trusted gateways, the XP will not accept RIP updates from any sources except the trusted gateways. You can specify a single interface name or IP address.

*<interfacename-or-IPaddr>*
> The interface name or IP address of the interface, router, or gateway. You can specify a list or use the keyword **all** to specify all XP interfaces.

*<hostname-or-IPaddr>*
> The hostname or IP address of the source or trusted gateway.

## Restrictions

None.

# rip set auto-summary

## Purpose

Enables automatic summarization and redistribution of RIP routes.

## Format

**rip set auto-summary disable | enable**

## Mode

Configure

## Description

The **rip set auto-summary** command specifies that routes to subnets should be automatically summarized by the classful network boundary and redistributed into RIP.

## Parameters

**disable | enable**
   Enables or disables automatic summarization and redistribution of RIP routes.

## Restrictions

None.

# rip set broadcast-state

## Purpose

Determines if RIP packets will be broadcast regardless of the number of interfaces present. This is useful when propagating static routes or routes learned from another protocol into RIP. In some cases, the use of broadcast when only one network interface is present can cause data packets to traverse a single network twice.

## Format

**rip set broadcast-state always | choose | never**

## Mode

Configure

## Description

The **rip set broadcast-state** command specifies whether the XP broadcasts RIP packets regardless of the number of interfaces present.

## Parameters

**always | choose | never**
Specifies whether the XP broadcasts RIP packets regardless of the number of interfaces present. Specify one of the following:

**always**   Always sends RIP broadcasts regardless of the number of interfaces present.

**choose**   Sends RIP broadcasts only if more than one interface is configured on the XP. This is the default state.

**never**    Never sends RIP broadcasts on attached interfaces.

## Restrictions

None.

# rip set check-zero

## Purpose

Specifies whether RIP should make sure that reserved fields in incoming RIP V1 packets are zero. Normally, RIP will reject packets where the reserved fields are non-zero.

## Format

**rip set check-zero disable | enable**

## Mode

Configure

## Description

The **rip set check-zero** command specifies whether RIP should make sure that reserved fields in incoming RIP V1 packets are zero. RIP will reject packets where the reserved fields are non-zero.

- If you use the **disable** keyword, RIP does not check the reserved field.

- If you use the **enable** keyword, RIP on the XP checks to ensure that the reserved fields in incoming RIP packets are zero. If the reserved field in a RIP packet is not zero, the XP discards the packet. This is the default state.

## Parameters

**disable | enable**
Enables or disables checking of the reserved field.

## Restrictions

None.

# rip set check-zero-metric

## Purpose

Specifies whether RIP should accept routes with a metric of zero. Normally, RIP will reject routes with a metric of zero.

## Format

**rip set check-zero-metric disable | enable**

## Mode

Configure

## Description

The **rip set check-zero-metric** command specifies whether RIP should accept routes with a metric of zero. This may be necessary for interoperability with other RIP implementations that send routes with a metric of zero.

- If you use the **disable** keyword, RIP accepts routes that have a metric of zero and treats them as though they were received with a metric of 1.

- If you use the **enable** keyword, RIP rejects routes that have a metric of zero. This is the default state.

## Parameters

**disable | enable**
Enables or disables acceptance of RIP routes that have a metric of zero.

## Restrictions

None.

# rip set default-metric

## Purpose

Defines the metric used when advertising routes via RIP that were learned from other protocols. If not specified, the default value is 16 (unreachable). This choice of values requires you to explicitly specify a metric in order to export routes from other protocols into RIP. This metric may be overridden by a metric specified in the export command.

**Note:** The metric 16 is equivalent in RIP to "infinite" and makes a route unreachable. You must set the default metric to a value other than 16 in order to allow the XP to export routes from other protocols such as OSPF and BGP-4 into RIP.

## Format

**rip set default-metric** *<num>*

## Mode

Configure

## Description

The **rip set default metric** command defines the metric used when advertising routes via RIP that were learned from other protocols.

## Parameters

*<num>*  Specifies the metric. Specify a number from 1 – 16. The default is 16.

## Restrictions

None.

# rip set interface

## Purpose

Set the RIP state, version, type of update messages, metric and authentication scheme used for each interface running RIP.

## Format

**rip set interface** *<interfacename-or-IPaddr>* | **all**

**[advertise-classfull enable | disable]**

**[receive-rip enable | disable]**

**[send-rip enable | disable]**

**[metric-in** *<num>*]

**[metric-out** *<num>*]

**[version 1|version 2 [type broadcast|multicast]]**

**[authentication-method none|(simple|md5
key-chain** *<num-or-string>*)]

## Mode

Configure

## Description

The **rip set interface** command lets you set the following parameters for RIP interfaces:

- Whether the interface will accept RIP updates

- Whether the interface will send RIP updates

- The RIP version (RIP V1 or RIP V2)

- The packet type used for RIP V2 updates (broadcast or multicast)

- The metric added to incoming RIP updates

- The metric added to outgoing RIP updates

- The key-chain for RIP update authentication

- The authentication method used for RIP updates (none, simple, or MD5)

## Parameters

*<interfacename-or-IPaddr>*|**all**
> The interface names or IP addresses of the interfaces for which you are setting RIP parameters. Specify the **all** keyword if you want to set RIP parameters for all IP interfaces on the XP.

**advertise-classfull enable | disable**
> This command is used to announce a classfull network onto a subnetted RIP Version 1 interface having the same classfull network.

**receive-rip enable|disable**
> Specifies whether the interface(s) can receive RIP updates. Specify **enable** if you want to receive RIP updates on the interface. Otherwise, select **disable**.
>
> The default is **enable**.
>
> **Note:** This option affects RIP updates sent from trusted gateways. If you specify **disable**, the XP will not receive any RIP updates, including those sent from trusted gateways. If you specify **enable** *and* you have set up trusted gateways, the XP will accept updates only from those trusted gateways.

**send-rip enable|disable**
> Specifies whether the interface(s) can send RIP updates. Specify **enable** if you want to send RIP updates from this interface. Otherwise, specify **disable**.
>
> The default is **enable**.
>
> **Note:** This option does not affect the sending of updates to source gateways.

**metric-in** *<num>*
> Specifies a metric that the interface adds to incoming RIP routes before adding them to the interface table. Specify a metric from 1 – 16. Use this option to make the XP prefer RIP routes learned from the specified interfaces less than RIP routes from other interfaces. The default is 1.

**metric-out** *<num>*
> Specifies a metric that the interface adds to outgoing RIP routes sent through the specified interfaces. The default is 0. Use this option to make other routers prefer other sources of RIP routes over this router.

**version 1|version 2 [type broadcast|multicast]**
> Specifies the RIP version used on the interface(s).

**broadcast**
> Causes RIP V2 packets that are RIP V1-compatible to be broadcast on this interface.

**multicast**
> Causes RIP V2 packets to be multicasted on this interface; this is the default.

**authentication-method none|(simple|md5 key-chain** *<num-or-string>*)
> The authentication method the interface uses to authenticate RIP updates. Specify one of the following:

> **none**
>> The interface does not use any authentication.

**simple**
> The interface uses a simple password in which an authentication key of up to 8 characters is included in the packet.

**md5**
> The interface uses MD5 authentication. This method uses the MD5 algorithm to create a crypto-checksum of a RIP packet and an authentication key of up to 16 characters.

**Note:** If you choose the simple or md5 authentication method, you must also specify a key-chain identifier using the key-chain option.

**key-chain** *<num-or-string>*
> The identifier of the key-chain containing the authentication keys. This parameter applies only if you specified simple or md5 for the authentication type.

## Restrictions

None.
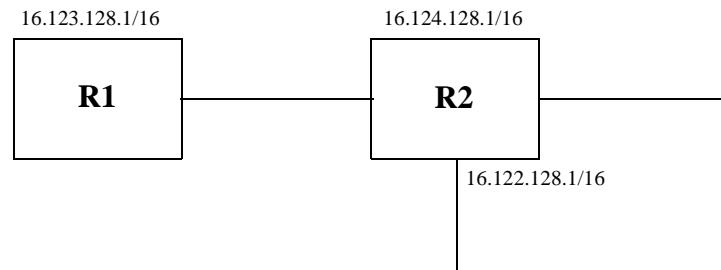
## Example



In this example, router R1 has the following three interfaces:

1. It is connected to router R2 over interface 16.123.128.1/16. It is running RIP version 1 on this interface.

2. It has two other interfaces with the following addresses (16.124.128.1/16, 16.122.128.1/16).

3. Router R1 the entire class A network (16.0.0.0/8) behind it.

By default, router R1 would not announce a classful network (16.0.0.0/8) over a subnet (16.123.128.1/16). If that is something which is desired, then the below given command should be entered.

```
rip set interface 16.123.128.1 advertise-classfull enable | disable
```

Typically, a user would enable automatic summarization for RIP. This would create an implicit aggregate 16.0.0.0/8. If it is desired, that this classfull network is announced over a subnetted RIP Version 1 interface, then the above command should be entered.

# rip set max-routes

## Purpose

Defines the maximum number of RIP routes.

## Format

**rip set default-metric** *<num>*

## Mode

Configure

## Description

The **rip set max-routes** command defines the maximum number of RIP routes that can be maintained by the Routing Information Base (RIB).

## Parameters

*<num>*  Specifies the maximum number of routes. Specify a number from 1 – 4. The default is 4.

## Restrictions

None.

# rip set multipath

## Purpose

Disables multipath route calculation for RIP routes.

## Format

**rip set multipath off**

## Mode

Configure

## Description

The **rip set multipath** command disables multipath route calculation for RIP routes. No multipath forwarding occurs when this command is used.

## Parameters

**off**      Disables multipath route calculation.

## Restrictions

If you negate this command from the configuration file, the XP will not automatically recreate multipath routes. To recreate multipath routes, stop and restart rip.

# rip set poison-reverse

## Purpose

Enables poison reverse on all XP interfaces.

## Format

**rip set poison-reverse disable | enable**

## Mode

Configure

## Description

The **rip set poison-reverse** command allows you to enable or disable poison reverse on all XP interfaces. The XP supports poison reverse as specified by RFC 1058.

**Note:** Turning on poison reverse will approximately double the amount of RIP updates.

## Parameters

**disable | enable**
Enables or disables poison reverse on the XP.

## Restrictions

None.

# rip set preference

## Purpose

Sets the preference of routes learned from RIP. The default preference is 100. This preference may be overridden by a preference specified in the import command.

## Format

**rip set preference** *<num>*

## Mode

Configure

## Description

The **rip set preference** command sets the preference for destinations learned through RIP. The preference you specify applies to all IP interfaces for which RIP is enabled on the XP. The default preference is 100. You can override this preference by specifying a different preference in an import policy.

## Parameters

*<num>*  Specifies the preference. Specify a number from 0 – 255. The default is 100. Lower numbers have higher preference.

## Restrictions

None.

# rip show

## Purpose

Display RIP information.

## Format

**rip show** *<option-list>*

## Mode

Enable

## Description

The **rip show** command displays RIP information.

## Parameters

*<option-list>*
    Specifies the RIP dump information you want to display. Specify one or more of the following:

    **all**
        Displays all RIP tables.

    **globals**
        Displays RIP globals.

    **timers**
        Displays RIP timers.

        **RIP Responses**  The network sends and receives RIP responses each time it encounters a change to the network (e.g., a new interface) until it updates the routing table to reflect the change(s). If you have an unstable network, you may be inundated with RIP response packets that indicate a network change. In such a case, you will want to use a Flash Timer.

        **Flash Timer**  A Flash Timer consolidates the list of RIP response packets and sends all of them randomly every 1-5 seconds instead of as they appear. Once the routing table update is complete, the timer remains inactive until the next routing table change or until 30 seconds passes and the Update Timer solicits the network status.

        **Update Timer**  Every 30 seconds, regardless of whether or not your routing table changed, the update timer returns the network status.

        **Age Timer**  In many cases, a route or series of routes will expire after a specific time period. The Age Timer is an automated process used to delete any expired routes. The Age

Timer will fire every 3 minutes unless a route will expire within the 3-minute period—in this case, the timer will change to coincide with the route expiration.

**Show Command** The show command lists the status of each timer. The examples below depict the status changes over time:

```
xp(enable)# rip show timers

Timers:
-----------

Timer                 State     Last      Next      Intvl   Jitter   Flags
-------------------------------------------------------------------------------------------
RIP.0.0.0.0+520_Flash    Inactive  -         -         -       -        Inactive
RIP.0.0.0.0+520_Update   Active    15:40:35  15:41:05  30      -
RIP.0.0.0.0+520_Age      Active    15:39:00  15:42:00  -       -        OneShot
```

```
xp(enable)# rip show timers

Timers:
-----------

Timer                 State     Last      Next      Intvl   Jitter   Flags
-------------------------------------------------------------------------------------------
RIP.0.0.0.0+520_Flash    Active    15:41:05  15:41:09  4       -
RIP.0.0.0.0+520_Update   Active    15:41:05  15:41:35  30      -
RIP.0.0.0.0+520_Age      Active    15:39:00  15:42:00  -       -        OneShot
```

```
xp(enable)# rip show timers

Timers:
-----------

Timer                 State     Last      Next      Intvl   Jitter   Flags
-------------------------------------------------------------------------------------------
RIP.0.0.0.0+520_Flash    Inactive  -         -         -       -        Inactive
RIP.0.0.0.0+520_Update   Active    15:41:05  15:41:35  30      -
RIP.0.0.0.0+520_Age      Active    15:39:00  15:42:00  -       -        OneShot
```

**State (active or inactive)** The state of the timer—scheduled timers are inactive.

**Last and Next** A timestamp of the last and next time the timer was and will be used.

**Interval** The time (in seconds) between timer activities that are periodic as opposed to OneShot. The Age Timer is considered a OneShot because the interval may not be consistent.

**Jitter** To prevent peak volumes of network activity associated with timers, the network uses a *Jitter*. Jitter is displayed when the next expiration will occur at the

predetermined interval plus or minus a few microseconds. This helps reduce network congestion. The example below depicts a jitter:

*Predetermined Expiration Interval*

*Timer Expiration*

*Jitter*

*Jitter*
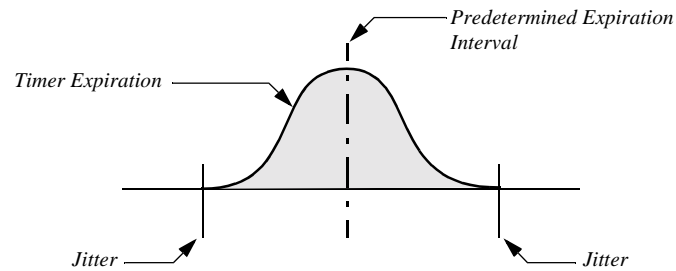
**Flags**  Indicate whether a timer is inactive or a OneShot.

**interface**
Displays RIP interfaces.

**active-gateways**
Displays active gateways running RIP.

**interface-policies**
Displays RIP interface policies.

**import-policies**
Displays RIP import policies.

**export-policies**
Displays RIP export policies.

## Restrictions

None.

# rip start

## Purpose

Start RIP on the XP.

**Note:**    RIP is disabled by default.

## Format

**rip start**

## Mode

Configure

## Description

The **rip start** command starts RIP on all IP interfaces on the XP for which RIP is enabled.

## Parameters

None.

## Restrictions

None.

# rip stop

## Purpose

Stop RIP on the XP.

## Format

**rip stop**

## Mode

Configure

## Description

The **rip stop** command stops RIP on all IP interfaces on the XP for which RIP is enabled.

## Parameters

None.

## Restrictions

None.

# rip trace

## Purpose

Trace RIP packets.

## Format

**rip trace [packets|request|response|local-options] [detail | send|receive]**

## Mode

Configure

## Description

The **rip trace** command traces the following sets of RIP packets:

* RIP request packets sent or received by the XP

* RIP response packets sent or received by the XP

Depending on the options you specify, you can trace all packets, request packets only, or receive packets only. In addition, you can select to trace the request packets, receive packets, or both that are sent by the XP, received by the XP, or all packets (both sent packets and received packets).

## Parameters

**packets**    Traces all RIP packets, both request packets and response packets. This is the default.

**request**    Traces only request packets, such as REQUEST, POLL and POLLENTRY packets.

**response**    Traces only response packets.

For the **packets**, **request**, and **response** parameters, you can optionally specify one of the following:

**detail**    Shows detailed information about the traced packets.

**receive**    Shows information about traced RIP packets received by the XP.

**send**    Shows information about traced RIP packets sent by the XP.

**Note:**    **The default is to show both send and receive packets.**

**local-options**    Sets trace options for this protocol only. These trace options are inherited from those set by the **ip-router global set trace options** command, or you can override them here. Specify one or more of the following:

        **all**    Turns on all tracing.

| | | |
|---|---|---|
| **general** | Turns on normal and route tracing. | |
| **state** | Traces state machine transitions in the protocols. | |
| **normal** | Traces normal protocol occurrences. | |

**Note:** Abnormal protocol occurrences are always traced.

| | |
|---|---|
| **policy** | Traces application of protocol and user-specified policies to routes being imported and exported. |
| **task** | Traces system processing associated with this protocol or peer. |
| **timer** | Traces timer usage by this protocol or peer. |
| **route** | Traces routing table changes for routes installed by this protocol or peer. |

## Restrictions

None.

# Chapter 57

# rmon Commands

The **rmon** commands let you display and set parameters for RMON statistics on a per-port basis. RMON1 (RFC1757) accounts for bridged traffic in host and matrix statistics, but **not** routed traffic. RMON2 (RFC2021) accounts for routed traffic in host, matrix, and protocol distribution statistics, but **not** bridged traffic. This is a hardware limitation.

**Note:** **Do not** run NetFlow and RMON simultaneously.

## Command Summary

Table 44 lists the **rmon** commands. The sections following the table describe the command syntax.

**Table 44.  rmon commands**

| |
|---|
| **rmon address-map index** *<index-number>* {**port** *<port>* [**owner** *<string>*] [**status enable|disable**]} |**max-number** *<number>* |
| **rmon al-matrix-top-n index** *<index-number>* **matrix-index** *<number>* **ratebase terminal-packets|terminal-octets|all-packets|all-octets duration** *<number>* **size** *<number>* [**owner** *<string>*] [**status enable|disable**] |
| **rmon alarm index** *<index-number>* **variable** *<string>* [**interval** *<seconds>*] [**falling-event-index** *<num>*] [**falling-threshold** *<num>*] [**owner** *<string>*] [**rising-event-index** *<num>*] [**rising-threshold** *<num>*] [**startup rising|falling|both**] [**status enable|disable**] [**type absolute-value|delta-value**] |
| **rmon apply cli-filters** *<filter id>* |
| **rmon capture index** *<index-number>* **channel-index** *<number>* [**full-action lock|wrap**] [**slice-size** *<number>*] [**download-slice-size** *<number>*] [**download-offset** *<number>*] [**max-octets** *<number>*] [**owner** *<string>*] [**status enable|disable**] |

**Table 44. rmon commands**

| |
|---|
| **rmon channel index** <*index-number*> **port** <*port*> [**accept-type matched\|failed**] [**data-control on\|off**] [**turn-on-event-index** <*number*>] [**turn-off-event-index** <*number*>] [**event-index** <*number*>] [**channel-status ready\|always-ready**] [**description** <*string*>] [**owner** <*string*>] [**status enable\|disable**] |
| **rmon clear cli-filter** |
| **rmon enable** |
| **rmon etherstats index** <*index-number*> **port** <*port*> [**owner** <*string*>] [**status enable\|disable**] |
| **rmon event index** <*index-number*> **type none\|log\|trap\|both** [**community** <*string*>] [**description** <*string*>] [**owner** <*string*>] [**status enable\|disable**] |
| **rmon filter index** <*index-number*> **channel-index** <*number*> [**data-offset** <*number*>] [**data** <*string*>] [**data-mask** <*string*>] [**data-not-mask** <*string*>] [**pkt-status** <*number*>] [**status-mask** <*number*>] [**status-not-mask** <*number*>] [**owner** <*string*>] [**status enable\|disable**] |
| **rmon history index** <*index-number*> **port** <*port*> [**interval** <*seconds*>] [**owner** <*string*>] [**samples** <*num*>] [**status enable\|disable**] |
| **rmon hl-host index** <*index-number*> **port** <*port*> **nl-max-entries** <*number*> **al-max-entries** <*number*> [**owner** <*string*>] [**status enable\|disable**] |
| **rmon hl-matrix index** <*index-number*> **port** <*port*> **nl-max-entries** <*number*> **al-max-entries** <*number*> [**owner** <*string*>] [**status enable\|disable**] |
| **rmon host index** <*index-number*> **port** <*port*> [**owner** <*string*>] [**status enable\|disable**] |
| **rmon host-top-n index** <*index-number*> **host-index** <*number*> [**base** <*statistics*>] [**duration** <*time*>] [**size** <*size*>] [**owner** <*string*>] [**status enable\|disable**] |
| **rmon matrix index** <*index-number*> [**port** <*port*>] [**owner** <*string*>] [**status enable\|disable**] |
| **rmon nl-matrix-top-n index** <*index-number*> **matrix-index** <*number*> **ratebase terminal-packets\|terminal-octets\|all-packets\|all-octets duration** <*number*> **size** <*number*> [**owner** <*string*>] [**status enable\|disable**] |
| **rmon protocol-distribution index** <*index-number*> **port** <*port*> [**owner** <*string*>] [**status enable\|disable**] |
| **rmon set lite\|standard\|professional default-tables yes\|no** |
| **rmon set cli-filter** <*filter-id*> <*parameter*> |
| **rmon set memory** <*number*> |
| **rmon set ports** <*port list*>\|**all-ports** |
| **rmon set protocol-directory** <*protocol*>\|**all-protocols** [**address-map on\|off\|na**] [**host on\|off\|na**] [**matrix on\|off\|na**] |
| **rmon show address-map-control** <*port-list* >\|**all-ports** |

**Table 44. rmon commands**

| |
|---|
| **rmon show address-map-logs** *<port-list >*\|**all-ports** |
| **rmon show al-host** *<port-list>* \|**all-ports [summary]** |
| **rmon show al-matrix** *<port-list>* \|**all-ports [order-by srcdst \|dstsrc] [summary]** |
| **rmon show al-matrix-top-n** |
| **rmon show alarms** |
| **rmon show channels** |
| **rmon show cli-filters** |
| **rmon show etherstats** *<port-list>* \|**all-ports** |
| **rmon show events** |
| **rmon show filters** |
| **rmon show history** *<port-list>* \|**all-ports** |
| **rmon show host-top-n** |
| **rmon show hosts** *<port-list>* \|**all-ports [summary]** |
| **rmon show matrix** *<port-list>* \|**all-ports [summary] [order-by srcdst\| dstsrc]** |
| **rmon show nl-host** *<port-list>* \|**all-ports [summary]** |
| **rmon show nl-matrix** *<port-list>* \|**all-ports [order-by srcdst \|dstsrc] [summary]** |
| **rmon show nl-matrix-top-n rmon show** |
| **rmon show packet-capture control-table [captured-packets** *<control-index>*] |
| **rmon show probe-config [basic] [net-config] [trap-dest]** |
| **rmon show protocol-directory** *<protocol>* \|**all-protocols** |
| **rmon show protocol-distribution** *<port-list>* \|**all-ports** |
| **rmon show status** |
| **rmon** *<string>* **show user-history [all-indexes]** |
| **rmon user-history-apply** *<groupname>* **to** *<user-history-index>* [**status enable \|disable**] |
| **rmon user-history-control index** *<index-number>* **objects** *<number>* **samples** *<number>* **interval** *<number>* [**owner** *<string>*] [**status enable\|disable**] |
| **rmon user-history-objects** *<groupname>* **variable** *<oid>* **type absolute-value \|delta-value** [**status enable\|disable**] |

# rmon address-map

## Purpose

Configures the RMON 2 Address Map group.

## Format

**rmon address-map index** *<index-number>* {**port** *<port>* [**owner** *<string>*] [**status enable|disable**]} |**max-number** *<number>*

## Mode

Configure

## Description

The Address Map group maps MAC addresses to network address bindings that are discovered by the XP on a per-port basis. The **rmon address-map** command sets various parameters of the RMON 2 Address Map table. If the default tables are turned on for the Professional group, an entry in the Address Map control table is created for each available port. Use the **rmon show address-map** command to display the address map.

## Parameters

*<index-number>*
   Is a number between 1 and 65535 that uniquely identifies a row in the Address Map table.

*<port>*
   Specifies the port from which to collect data.

**owner** *<string>*
   Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
   Enables or disables this matrix. The default is enable.

**max-number** *<number>*
The maximum number of entries (1 to 2147483647) to allow in address-map tables. This is helpful for controlling memory used by the RMON task.

## Restrictions

None.

# Example

To create an entry in the Address Map table for port et.1.3:

xp(config)# **rmon address-map index 20 port et.1.3**

# rmon al-matrix-top-n

## Purpose

Gathers the top *n* Application Layer Matrix entries.

## Format

**rmon al-matrix-top-n index** *<index-number>* **matrix-index** *<number>* **ratebase terminal-packets|terminal-octets|all-packets|all-octets duration** *<number>* **size** *<number>* [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The **rmon al-matrix-top-n** command gathers the top *n* Application Layer Matrix entries sorted by a specified statistic. To do this, you must first configure the Application Layer/Network Layer Matrix table using the **rmon hl-matrix** command.

Use the **rmon show al-matrix-top-n** command to display the top *n* Application Layer Matrix entries.

## Parameters

*<index-number>*
Is a number between 1 and 65535 that uniquely identifies a row in the application layer matrix table.

**matrix-index** *<number>*
Specifies the index into the hl-matrix table. The default is 0.

**ratebase terminal-packets|terminal-octets|all-packets|all-octets**
Specifies the sorting method:

| | |
|---|---|
| **terminal-packets** | Sort by terminal packets. |
| **terminal-octets** | Sort by terminal octets. |
| **all-packets** | Sort by all packets. |
| **all-octets** | Sort by all octets. |

**duration** *<number>*
Specifies the duration, in seconds, between reports. If the duration is 0 (the default), this implies that no reports have been requested for this entry. The default is 0.

**size** *<number>*
    Specifies the maximum number of matrix entries to include in the report. The default is 150.

**owner** *<string>*
    Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
    Enables or disables this matrix. The default is enable.

# Restrictions

None.

# Example

To monitor the top *n* entries in the Application Layer Matrix, you should first configure the Application Layer/Network Layer Matrix table using the **rmon hl-matrix** command. Then, to gather the top 100 Application Layer Matrix entries sorted by all packets, use the following command:

xp(config)# **rmon al-matrix-top-n index 25 matrix-index 50 ratebase all-packets duration 60 size 100**

# rmon alarm

## Purpose

Configures the RMON 1 Alarm group.

## Format

**rmon alarm index** *<index-number>* **variable** *<string>* [**interval** *<seconds>*] [**falling-event-index** *<num>*] [**falling-threshold** *<num>*] [**owner** *<string>*] [**rising-event-index** *<num>*] [**rising-threshold** *<num>*] [**startup rising|falling|both**] [**status enable|disable**] [**type absolute-value|delta-value**]

## Mode

Configure

## Description

The Alarm group takes periodic statistical samples and compares them with previously-configured thresholds. If a monitored variable crosses a threshold, an alarm is generated. The **rmon alarm** command sets various parameters of the RMON 1 Alarm control table.

Use the **rmon show alarm** command to display the alarm data.

## Parameters

**index** *<index-number>*
　Is a number that uniquely identifies an entry in the alarm table. The value must be between 1 and 65535, inclusive.

**interval** *<seconds>*
　Specifies the sampling interval in seconds when statistical samples of variables are collected and compared to the rising and falling thresholds. The value must be between 1 and 2147483647, inclusive.

**falling-event-index** *<num>*
　Is the action to be taken as defined by the row with this index in the event table when a falling threshold is crossed. The value must be between 1 and 65535, inclusive.

**falling-threshold** *<num>*
　Specifies that the sample's value must be less than or equal to the threshold to trigger an alarm. When the sample's value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single event is generated. The value must be between 1 and 2147483647, inclusive.

**owner** *<string>*

Specifies the owner of the alarm resource; for example, an IP address, machine name or person's name.

**rising-event-index** *<num>*

Is the action to be taken as defined by the row with this index in the event table when a rising threshold is crossed. The value must be between 1 and 65535, inclusive.

**rising-threshold** *<num>*

Specifies that the sample's value must be greater than or equal to the threshold to trigger an alarm. When the sample's value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single event is generated. The value must be between 1 and 2147483647, inclusive.

**startup** *<keyword>*

Specifies the condition for which the alarm is to be generated. The condition can be one of the following:

| | |
|---|---|
| **rising** | Causes an alarm to be generated if the sampled variable is greater than or equal to the rising threshold. |
| **falling** | Causes an alarm to be generated if the sampled variable is less than or equal to the falling threshold. |
| **both** | Causes an alarm to be generated if the sampled variable is greater than or equal to the rising threshold or less than or equal to the falling threshold. |

**status enable|disable**

Enables or disables this alarm.

**type** *<keyword>*

Specifies the method of sampling the selected variable and calculating the value to be compared against the thresholds. The sampling method can be one of the following:

| | |
|---|---|
| **absolute-value** | Monitor the absolute value over the sample interval of the variable against the threshold value. |
| **delta-value** | Monitor the change in value over the sample interval of the variable against the threshold value. |

**variable** *<string>*

Specifies the object identifier of the variable to be sampled. Only variables that resolve to an ASN.1 primitive type of INTEGER may be sampled.

## Restrictions

None.

## Examples

To cause an alarm event if the variable defined in alarm 10 crosses the rising threshold:

xp(config)# **rmon alarm index 10 startup rising interval 30 variable 1.3.6.1.2.1.5.14.0 rising-threshold 40 rising-event-index 1**

To monitor the absolute value of the variable against a threshold value:

xp(config)# **rmon alarm index 10 type absolute-value startup rising interval 30 variable 1.3.6.1.2.1.5.14.0 rising-threshold 40 rising-event-index 1**

To specify Mike as the owner of alarm 10:

xp(config)# **rmon alarm index 10 owner Mike type absolute-value startup rising interval 30 variable 1.3.6.1.2.1.5.14.0 rising-threshold 40 rising-event-index 1**

To specify a 5-second interval on alarm 10:

xp(config)# **rmon alarm index 10 interval 5 type absolute-value startup rising interval 30 variable 1.3.6.1.2.1.5.14.0 rising-threshold 40 rising-event-index 1**

To specify the rising threshold at 10 on alarm 10:

xp(config)# **rmon alarm index 10 rising-threshold 10 type delta-value startup rising interval 30 variable 1.3.6.1.2.1.5.14.0 rising-event-index 1**

# rmon apply cli-filters

## Purpose

Apply a specific CLI RMON filter.

## Format

**rmon apply cli-filters** *<filter id>*

## Mode

Enable

## Description

The **rmon apply cli-filters** command applies a specific CLI RMON filter to the current Telnet or Console session. This enables different users to select the different CLI filters which you should define using the **rmon set cli-filter** command.

Use the **rmon show cli-filters** command to see the RMON CLI filters that have been defined on the XP. Use the **rmon clear cli-filter** command to clear the applied filter.

## Parameter

*<filter id>*        Is a number between 1 and 65535 that identifies the filter ID to apply.

## Restrictions

None.

## Example

To apply filter ID 2:

```
xp> rmon apply cli-filters 2
```

To see a list of CLI RMON filters:

```
xp> rmon show cli-filters
RMON CLI Filters
Id   Filter
--   ------
 1   (inpkts >= 0)
 2   (inpkts >= 0 and outoctets >= 0)
 3   srcmac 222222222222 and (outoctets >= 0)
You have selected a filter: (inpkts >= 0)
```

# rmon capture

## Purpose

Configures the RMON 1 Packet Capture group.

## Format

**rmon capture index** *<index-number>* **channel-index** *<number>* [**full-action lock|wrap**] [**slice-size** *<number>*] [**download-slice-size** *<number>*] [**download-offset** *<number>*] [**max-octets** *<number>*] [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The Packet Capture group allows packets to be captured after they have flowed through a channel. The **rmon capture** command sets various parameters of the RMON 1 Packet Capture table.

Use the **rmon show packet-capture** command to display the Packet Capture table.

## Parameters

**index** *<index-number>*
Is a number between 1 and 65535 that uniquely identifies a row in the Packet Capture table.

**channel-index** *<number>*
Is a number between 1 and 65535 that identifies the channel that is the source of packets. The default is 0.

**full-action lock|wrap**
Specifies the action of the buffer when it reaches the full status:

**lock**     Stop capturing packets when the buffer reaches the full status.

**wrap**     Wrap around when the buffer reaches the full status.

**slice-size** *<number>*
Is a number between 0 and 2147483647 that is the maximum number of octets that will be saved in this capture buffer. The default is 100.

**download-slice-size** *<number>*
Is a number between 0 and 2147483647 that is the maximum number of octets that will be returned in an SNMP retrieval. The default is 100.

**download-offset** *<number>*

The offset of the first octet number (between 0 and 2147483647) of each packet that will be returned in an SNMP retrieval. The default is 0.

**max-octets** *<number>*

The maximum number of octets (between 0 and 2147483647) to use to hold captured packets and their control information. The default is 1.

**Note:** The **max-octets** default value allows packet capture to continue indefinitely until all available RMON memory resources are exhausted. If these resources exhaust, RMON features will be disabled.

**owner** *<string>*

Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**

Enables or disables this channel. The default is enable.

## Restrictions

Packet capture using RMON uses considerable CPU cycles. For best results, enable packet capture when the CPU is not busy running other important tasks and CPU utilization is low.

## Example

To create an entry in the Packet Capture table:

```
xp(config)# rmon capture index 20 channel-index 1 full-action wrap
```

# rmon channel

## Purpose

Configures the RMON 1 Filter Channel group.

## Format

**rmon channel index** *<index-number>* **port** *<port>* [**accept-type matched|failed**] [**data-control on|off**] [**turn-on-event-index** *<number>*] [**turn-off-event-index** *<number>*] [**event-index** *<number>*] [**channel-status ready|always-ready**] [**description** *<string>*] [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The Filter Channel group must be configured in order to configure the Filter group. The **rmon channel** command sets various parameters of the RMON 1 Filter Channel table. After a channel row has been created, a filter must be defined with the **rmon filter** command.

Use the **rmon show channels** command to display all the channels configured on the XP.

## Parameters

**index** *<index-number>*
   Is a number between 1 and 65535 that uniquely identifies a row in the Filter Channel table.

**port** *<port>*
   Identifies the port from which data is collected.

**accept-type matched|failed**
   Specifies the action of the filters associated with this channel:

   **matched**    Packets will be accepted if they are accepted by both the packet data and packet status matches of an associated filter.

   **failed**       Packets will be accepted only if they fail either the packet data match or the packet status match of each of the associated filters.

**data-control on|off**
   Specifies the flow control of the data:

   **on**            Implies data, status, and events flow through this channel.

   **off**           Implies data, status, and events will not flow through this channel.

**turn-on-event-index** *<number>*

    Is a number between 0 and 65535 that identifies the event configured to turn the associated data control from off to on.

**turn-off-event-index** *<number>*

    Is a number between 0 and 65535 that identifies the event configured to turn the associated data control from on to off.

**event-index** *<number>*

    Is a number between 0 and 65535 that identifies the event configured to be generated when the associated data control is on and a packet is matched.

**channel-status ready|always-ready**

    Specifies the status:

    **ready**          A single event is generated.

    **always-ready**    Allows events to be generated at will.

**description** *<string>*

    Describes this channel in a maximum of 127 bytes.

**owner** *<string>*

    Specifies the owner of packet capture; for example, an IP address, machine name or person's name.

**status enable|disable**

    Enables or disables this channel. The default is enable.

## Restrictions

None.

## Example

To create an entry in the Filter Channel table:

```
xp(config)# rmon channel index 25 port et.1.3 accept-type matched data-control on turn-on-event-
index 30 turn-off-event-index 55 event-index 60 channel-status ready
```

# rmon clear cli-filter

## Purpose

Clear the currently-selected CLI RMON filter.

## Format

**rmon clear cli-filter**

## Mode

Enable

## Description

The **rmon clear cli-filter** command clears the CLI RMON filter that was applied with the **rmon apply cli-filters** command.

## Parameters

None.

## Restrictions

None.

# rmon enable

## Purpose

Enables RMON.

## Format

**rmon enable**

## Mode

Configure

## Description

When the XP is booted, RMON is off by default. The **rmon enable** command turns RMON on. At least one of the Lite, Standard, or Professional RMON groups must be configured first before you can turn on RMON. Use the **rmon set** command to configure the Lite, Standard, or Professional RMON groups.

To disable RMON, the **rmon enable** command must be negated. This frees up all resources associated with RMON, including any memory allocated to RMON.

## Parameters

None.

## Restrictions

If the SNMP agent is disabled, RMON cannot be enabled. If RMON is enabled and the SNMP agent is disabled, then RMON will be turned off.

# rmon etherstats

## Purpose

Configures the RMON 1 Ethernet Statistics (Etherstats) group.

## Format

**rmon etherstats index** *<index-number>* **port** *<port>* [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The Etherstats group contains statistics for XP ports. The **rmon etherstats** command sets various parameters of the RMON 1 Etherstats control table. If default tables were turned on for the Lite group, a entry is created in the Etherstats control table for each available port.

Use the **rmon show etherstats** command to display the Etherstats data.

## Parameters

**index** *<index-number>*
   Is a number between 1 and 65535 that uniquely identifies a row in the Etherstats control table.

**port** *<port>*
   Specifies the physical port from which to collect data.

**owner** *<string>*
   Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
   Enables or disables this Etherstat. The default is enable.

## Restrictions

The RMON agent reports only traffic *received* on a port.

## Example

To create an entry in the Etherstats control table:

```
xp(config)# rmon etherstats index 10 port et.1.3
```

# rmon event

## Purpose

Configures the RMON 1 Event group.

## Format

**rmon event index** *<index-number>* **type none|log|trap|both** [**community** *<string>*] [**description** *<string>*] [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The Event group controls the generation and notification of events. The **rmon event** command sets various parameters of the RMON 1 Event control table.

Use the **rmon show event** command to display the event data.

## Parameters

**index** *<index-number>*
  Is a number between 1 and 65535 that uniquely identifies an entry in the Event table.

**community** *<string>*
  Specifies the SNMP community string to be sent with the trap. If an SNMP trap is to be sent, it will go to the SNMP community specified in this string.

**description** *<string>*
  Specifies a comment describing this event.

**owner** *<string>*
  Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
  Enables or disables this event. The default is enable.

**type none|log|trap|both**
  Specifies what action to be taken when the event occurs. The action can be one of the following:

  **none**   Causes no notification to be sent for the event.

  **log**   Causes an entry for the event to be made in the log table for each event.

  **trap**   Causes an SNMP trap to be sent to one or more management stations for the event.

**both** Causes both an entry to be made in the log table and an SNMP trap to be sent to one or more management stations.

## Restrictions

None.

## Examples

To set the event community string to public:

```
xp(config)# rmon event index 10 community public
```

To add the description "num-pkts" to event 10:

```
xp(config)# rmon event index 10 description num-pkts
```

To specify Ed as the owner of event 10:

```
xp(config)# rmon event index 10 owner Ed
```

To send an SNMP trap when event 10 is triggered:

```
xp(config)# rmon event index 10 type trap
```

# rmon filter

## Purpose

Configures the RMON 1 Filter group.

## Format

**rmon filter index** *<index-number>* **channel-index** *<number>* [**data-offset** *<number>*] [**data** *<string>*] [**data-mask** *<string>*] [**data-not-mask** *<string>*] [**pkt-status** *<number>*] [**status-mask** *<number>*] [**status-not-mask** *<number>*] [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The Filter group allows packets to be matched on certain criteria. The **rmon filter** command sets various parameters of the RMON 1 Filter table. To configure the Filter group, the Filter Channel group must first be configured with the **rmon channel** command.

Use the **rmon show filters** command to display the filters defined on the XP.

## Parameters

**index** *<index-number>*
  Is a number between 1 and 65535 that uniquely identifies a row in the Filter table.

**channel-index** *<number>*
  Is a number between 1 and 65535 that identifies the channel of which this filter is a part.

**data-offset** *<number>*
  Is a number between 0 and 2147483647 that is the offset from the beginning of each packet where a match of packet data will be attempted.

**data** *<string>*
  Is a string of up to 512 characters that is the data that is to be matched with the input packet.

**data-mask** *<string>*
  Is a string of up to 512 characters that is the mask that is applied to the match process.

**data-not-mask** *<string>*
  Is a string of up to 512 characters that is the inversion mask that is applied to the match process.

**pkt-status** *<number>*
> Is a number between 0 and 2147483647 that is the status that is to be matched with the input packet.

**status-mask** *<number>*
> Is a number between 0 and 2147483647 that is the mask that is applied to the status match process.

**status-not-mask** *<number>*
> Is a number between 0 and 2147483647 that is the inversion mask that is applied to the status match process.

**owner** *<string>*
> Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
> Enables or disables this channel. The default is enable.

## Restrictions

None.

## Example

To create an entry in the Filter table:

```
xp(config)# rmon filter index 25 channel-index 35 data kgreen
```

# rmon history

## Purpose

Configures the RMON 1 History group.

## Format

**rmon history index** *<index-number>* **port** *<port>* [**interval** *<seconds>*] [**owner** *<string>*]
[**samples** *<num>*] [**status enable|disable**]

## Mode

Configure

## Description

The RMON History group periodically records samples of variables and stores them for later
retrieval. You use the r**mon history** command to specify the XP port to collect data from, the
number of samples, the sampling interval, and the owner. If default tables were turned on for the
Lite group, an entry is created in the History control table for each available port.

Use the **rmon show history** command to display the history data.

## Parameters

**index** *<index-number>*
Is a number between 1 and 65535 that uniquely identifies an entry in the History table.

**interval** *<seconds>*
Specifies the sampling interval in seconds. This value must be between 1 and 3600, inclusive.
The default value is 1800.

**owner** *<string>*
Specifies the owner of the history resource; for example, an IP address, machine name or
person's name.

**port** *<port>*
Specifies the port from which to collect data.

**samples** *<num>*
Specifies the number of samples to be collected before wrapping counters. This value must be
between 1 and 65535, inclusive. The default value is 50.

**status enable|disable**
Enables or disables this history control row.

## Restrictions

None.

## Example

To specify that port et.3.1 collect 60 samples at an interval of 30 seconds:

xp(config)# **rmon history index 10 port et.3.1 samples 60 interval 30**

# rmon hl-host

## Purpose

Configures the RMON 2 Application Layer and Network Layer Host groups.

## Format

**rmon hl-host index** *<index-number>* **port** *<port>* **nl-max-entries** *<number>* **al-max-entries** *<number>* [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The **rmon hl-host** command sets various parameters of the RMON 2 Application Layer and Network Layer Host groups. The Application Layer Host group monitors traffic from the network layer up to the application layer for any protocol communication defined in the protocol directory. The Network Layer Host group monitors traffic at the network layer for any protocol defined in the protocol directory.

Configuration of the Application Layer/Network Layer Host table involves configuring only one control row in the Application Layer Host control table. This table, when configured, captures both application layer and network layer host data. If the default tables were turned on for the Professional group, an entry is created in the Application Layer Host control table for each available port.

Use the **rmon show al-host** command to display the Application Layer Host table. Use the **rmon show nl-host** command to display the Network Layer Host table.

## Parameters

**index** *<index-number>*
    Is a number between 1 and 65535 that uniquely identifies a row in the application layer host control table.

*<port>*
    Specifies the port from which to collect data.

**nl-max-entries**
    Specifies the maximum number of network layer entries. The default is 1.

**al-max-entries**
    Specifies the maximum number of application layer entries. The default is 1.

**owner** *<string>*
　　Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
　　Enables or disables this matrix. The default is enable.

## Restrictions

None.

## Example

To create an entry in the Application Layer Host control table:

```
xp(config)# rmon hl-host index 20 port et.1.3
```

# rmon hl-matrix

## Purpose

Configures the RMON 2 Application Layer Matrix and Network Layer Matrix groups.

## Format

**rmon hl-matrix index** *<index-number>* **port** *<port>* **nl-max-entries** *<number>* **al-max-entries** *<number>* [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The **rmon hl-matrix** command sets various parameters of the RMON 2 Application Layer Matrix and Network Layer Matrix groups. The Application Layer Matrix group monitors traffic from the network layer up to the application layer for any protocol communication defined in the protocol directory. The Network Layer Matrix group monitors traffic at the network layer for any protocol defined in the protocol directory.

Configuration of the Application Layer/Network Layer Matrix table involves configuring only one control row in the Application Layer Matrix control table. When configured, this table captures both application layer and network layer matrix data. If the default tables were turned on for the Professional group, an entry is created in the Application Layer Matrix control table for each available port.

Use the **rmon show al-matrix** command to display the Application Layer Matrix table. Use the **rmon show nl-matrix** command to display the Network Layer Matrix table.

## Parameters

**index** *<index-number>*
> Is a number between 1 and 65535 that uniquely identifies a row in the application layer matrix control table.

**port** *<port>*
> Specifies the port from which to collect data.

**nl-max-entries** *<number>*
> Specifies the maximum number of network layer entries. The default is 1.

**al-max-entries** *<number>*
> Specifies the maximum number of application layer entries. The default is 1.

**owner** *<string>*
     Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
     Enables or disables this matrix. The default is enable.

# Restrictions

None.

# Example

To create an entry in the Application Layer Matrix control table:

xp(config)# **rmon hl-matrix index 20 port et.1.3**

# rmon host

## Purpose

Configures the RMON 1 Host group.

## Format

**rmon host index** *<index-number>* **port** *<port>* [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The RMON 1 Host group captures L2 information from hosts coming in on a particular port. The **rmon host** command sets various parameters of the Host group. If default tables were turned on for the standard group, an entry is created in the Host control table for each available port.

Use the **rmon show hosts** command to display the host data and logs.

## Parameters

**index** *<index-number>*
Is a number between 1 and 65535 that uniquely identifies a row in the Host table.

**port** *<port>*
Specifies the physical port from which to collect data.

**owner** *<string>*
Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
Enables or disables this host. The default is enable.

## Restrictions

None.

## Example

To create an entry in the Host control table:

```
xp(config)# rmon hosts index 20 port et.1.3
```

# rmon host-top-n

## Purpose

Configures the RMON 1 HostTopN group.

## Format

**rmon host-top-n index** *<index-number>* **host-index** *<number>* [**base** *<statistics>*] [**duration** *<time>*] [**size** *<size>*] [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The HostTopN group displays the top n number of hosts, sorted by a specified statistic. The **rmon host-top-n** command sets various parameters of the RMON 1 HostTopN control table. The HostTopN group depends upon the Host group and the host-index specified in the HostTopN control table must correspond to a pre-defined host index in the Host control table.

Use the r**mon show host-top-n** command to display the control table row.

Note that Host Top N report runs once. To run the reports again via the CLI, the control row must be disabled and then enabled. If the report has already been run, the Time Remaining field is set to zero. Otherwise, the Time Remaining field will be decremented until the report is run.

## Parameters

**index** *<index-number>*
    Is a number between 1 and 65535 that uniquely identifies a row in the Host Top N table.

*<number>*
    Is a number between 1 and 65535 that is the index into the host table identified by hostIndex.

*<statistics>*
    Specifies the type of statistic from which to collect data. Specify one of the following keywords:

    **in-packets**    Gather top statistics according to In-Packets.

    **out-packets**
                Gather top statistics according to Out-Packets.

    **in-octets**    Gather top statistics according to In-Octets.

    **out-octets**    Gather top statistics according to Out-Octets.

**out-errors**    Gather top statistics according to Out-Errors.

**out-broadcastPkts**

>    Gather top statistics according to Out-BroadcastPkts.

**out-multicastPkts**

>    Gather top statistics according to Out-MulticastPkts.

*<time>*

>    Is a number between 1 and 2147483647 that is the duration, in seconds, between reports. The default is 0.

<size>

>    Is a number between 1 and 2147483647 that is the maximum number of hosts to include in the table. The default is 10.

**owner** *<string>*

>    Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**

>    Enables or disables this hostTopN. The default is enable.

# Restrictions

None.

# Example

To create an entry in the HostTopN control table:

```
xp(config)# rmon host-top-n index 25 host-index 55 base in-packets duration 60 size 24
```

# rmon matrix

## Purpose

Configures the RMON 1 Matrix group.

## Format

**rmon matrix index** *<index-number>* [**port** *<port>*] [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The Matrix group captures L2 traffic on a particular port between two hosts (a source MAC and destination MAC address). The **rmon matrix** command sets various parameters of the RMON 1 Matrix control table. If default tables were turned on for the Standard group, an entry is created in the Matrix control table for each available port.

**Note:** By default, ports on the XP operate in address-bridging mode. The port must be enabled in *flow-bridging* mode in order for layer 2 matrix information to be captured.

Use the **rmon show matrix** command to display the matrix group and logs.

## Parameters

**index** *<index-number>*
Is a number between 1 and 65535 that uniquely identifies a row in the Matrix table.

**port** *<port>*
Specifies the port from which to collect data.

**owner** *<string>*
Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
Enables or disables this matrix. The default is enable.

## Restrictions

None.

## Example

To create an entry in the Matrix control table:

xp(config)# **rmon matrix index 25 port et.1.3**

# rmon nl-matrix-top-n

## Purpose

Gathers the top n Network Layer Matrix entries.

## Format

**rmon nl-matrix-top-n index** *<index-number>* **matrix-index** *<number>* **ratebase packets |octets duration** *<number>* **size** *<number>* [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The **rmon nl-matrix-top-n** command gathers the top n Network Layer Matrix entries.Before you do this, you should first configure the Application Layer/Network Layer Matrix table using the **rmon hl-matrix** command.

Use the **rmon show nl-matrix-top-n** command to display the top n Network Layer Matrix entries.

## Parameters

**index** *<index-number>*
Is a number between 1 and 65535 that uniquely identifies a row in the network layer matrix table.

**matrix-index** *<number>*
Specifies the index into the hl-matrix table. The default is 0.

**ratebase packets|octets**
Specifies the sorting method:

| | |
|---|---|
| **packets** | Sort by packets. |
| **octets** | Sort by octets. |

**duration** *<number>*
Specifies the duration, in seconds, between reports. The default is 0.

**size** *<number>*
Specifies the maximum number of matrix entries to include in the report. The default is 150.

**owner** *<string>*
Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
> Enables or disables this matrix. The default is enable.

# Restrictions

None.

# Example

To gather the top n Network Layer Matrix entries:

> xp(config)# **rmon nl-matrix-top-n index 2 matrix-index 25 ratebase all-packets duration 60 size 100**

# rmon protocol-distribution

## Purpose

Configures the RMON 2 Protocol Distribution group.

## Format

**rmon protocol-distribution index** *<index-number>* **port** *<port>* [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The Protocol Distribution group displays the packets and octets on a protocol and port basis. The **rmon protocol-distribution** command sets various parameters of the RMON 2 Protocol Distribution control table. If default tables were turned on for the Professional group, an entry is created in the Protocol Distribution control table for each available port.

Use the **rmon show protocol-distribution** command to display the protocol distribution.

## Parameters

**index** *<index-number>*
Is a number between 1 and 65535 that uniquely identifies a row in the Protocol Distribution table.

**port** *<port>*
Specifies the port from which to collect data.

**owner** *<string>*
Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
Enables or disables this matrix. The default is enable.

## Restrictions

None.

## Example

To create an entry in the Protocol Distribution control table:

xp(config)# **rmon protocol-distribution index 25 port et.1.3**

# rmon set

## Purpose

Configures the Lite, Standard, or Professional RMON groups.

## Format

**rmon set lite|standard|professional default-tables yes|no**

## Mode

Configure

## Description

You can enable various levels of support (Lite, Standard, or Professional) for RMON groups on a specified set of ports.

Lite adds support for the following RMON 1 groups:

- Ethernet statistics (Etherstats)

- History

- Alarm

- Event

Standard adds support for the following RMON 1 groups:

- Host

- HostTopN

- Matrix

- Filter

- Packet Capture

**Note:** Packet capture using RMON uses considerable CPU cycles. For best results, enable packet capture when the CPU is not busy running other important tasks and CPU utilization is low.

Professional adds support for the following RMON 2 groups:

- Protocol Directory

- Protocol Distribution

- Address Map

- Network Layer Host

- Network Layer Matrix

- Application Layer Host

- Application Layer Matrix

- User History

- Probe Configuration

A group can consist of a control table and a data table. A control table specifies the statistics to be collected. Each row in the control table specifies the entities for which data is collected, for example, physical ports. The data tables contain the statistics that are collected based on the control table information.

## Parameters

**lite|standard|professional**
Specifies the Lite, Standard, or Professional RMON groups.

**default-tables yes**
Creates control tables for the following Lite, Standard, or Professional RMON groups:

| | |
|---|---|
| Lite groups: | Etherstats |
| | History |
| Standard groups: | Host |
| | Matrix |
| Professional groups: | Protocol Distribution |
| | Address Map |
| | Application Layer/Network Layer Host |
| | Application Layer/Network Layer Matrix |

A row in each control table is created for each port on the XP, with the default owner "monitor."

**default-tables no**
Removes all control table rows with the owner "monitor". If you wish to save a particular control table row, you must change the owner to a value other than "monitor".

## Restrictions

None.

## Example

To configure the RMON Lite groups and create default control tables:

```
xp(config)# rmon set lite default-tables yes
```

# rmon set cli-filter

## Purpose

Defines filters that can be applied to certain RMON groups during a CLI session.

## Format

**rmon set cli-filter** *<filter-id> <parameter>*

## Mode

Configure

## Description

You can define filters that CLI users can apply to certain RMON groups. The filters you define are visible to all users that have a Telnet or Console session on the XP. Each user has the choice of whether or not to apply a particular filter using the **rmon apply cli-filters command**.

RMON CLI filters only affect the output of the following RMON groups:

- Host

- Matrix

- Network Layer Host

- Application Layer Host

- Network Layer Matrix

- Application Layer Matrix

- Protocol Distribution

The **rmon show cli-filters** command displays the RMON CLI filters that have been defined on the XP.

## Parameters

*<filter-id>*
   Is a number between 1 and 65535 that uniquely identifies a CLI filter.

*<parameter>*
   Specifies the parameter on which the filter is set:

   **src-mac**     Source MAC Address

   **dst-mac**     Destination MAC Address

| | |
|---|---|
| **inpkts** | In Packets |
| **inoctets** | In Octets |
| **outpkts** | out packets |
| **outoctets** | out Octets |
| **multicast** | Multicast packets |
| **broadcast** | Broadcast packets |
| **errors** | Errors |

The following operands can also be used:

| | |
|---|---|
| **and** | AND |
| **or** | Or |
| = | Equal to |
| < | Less than |
| <= | Less than or equal to |
| > | Greater than |
| >= | Greater than or equal to |
| **!=** | Not equal to |
| ( | Left bracket |
| ) | Right Bracket |

**src-mac** and **dst-mac** can be specified once and the other parameters can be specified multiple times.

## Restrictions

None.

## Example

To configure an RMON CLI filter on a source MAC address of 123456:123456 and on input packets greater than 1000 and error packets greater than 10 or out packets less than 10000, use the following command:

```
xp(config)# rmon set cli-filter 3 src-mac 123456:123456 and ((inpkts > 1000 and errors > 10)
or (outpkts < 10000))
```

# rmon set memory

## Purpose

Increases the amount of memory allocated to RMON.

## Format

**rmon set memory** *<number>*

## Mode

Enable

## Description

RMON allocates memory depending on the number of ports enabled for RMON, the groups that have been configured (Lite, Standard, or Professional) and whether or not default tables have been turned on or off. You can dynamically allocate additional memory to RMON, if needed.

Later, if this additional memory is no longer required, you can reduce the allocation; this change will not take effect until RMON is restarted. This is because memory cannot be freed while RMON is still using it. If the amount of memory specified is less than what RMON has currently allocated, a warning message is displayed and the action is ignored.

Use the **rmon show status** command to display the amount of memory currently allocated to RMON.

## Parameters

*<number>*
Specifies the total amount of memory, in Mbytes, to be allocated to RMON. The value can be between 2 and 96.

**Note:** The number specified is the total number of Mbytes of memory to be allocated; it is not an increment of memory.

## Restrictions

None.

## Example

To show the amount of memory allocated to RMON:

xp# **rmon show status**

To increase the amount of memory allocated to RMON:

xp# **rmon set memory 32**

# rmon set ports

## Purpose

Enables RMON on one or more ports.

## Format

**rmon set ports** *<port list>*|**allports**

## Mode

Configure

## Description

Since RMON uses many system resources, RMON can be enabled on a set of ports. Ports can be dynamically added and removed from the port list. For example, if default tables are turned on for the Lite group and port et.2.1 is then added to the port list, an entry for port et.2.1 is automatically created in the Etherstats and History control tables.

## Parameters

*<port list>*
    Specifies the port(s) on which RMON is enabled. Specify **allports** to enable RMON for all ports on the XP.

## Restrictions

None.

## Example

To enable RMON on all ports on the XP:

```
xp(config)# rmon set ports allports
```

# rmon set protocol-directory

## Purpose

Specifies the protocol encapsulations that are managed with the Protocol Directory group.

## Format

**rmon set protocol-directory** *<protocol>*|**all-protocols [address-map on|off|na] [host on|off|na] [matrix on|off|na]**

## Mode

Configure

## Description

The **rmon set protocol-directory** command defines the protocols that are managed with RMON on the XP.

## Parameters

*<protocol>*

Specifies the protocol encapsulations that are managed with the Protocol Directory group on the XP. (See Appendix A for a list of protocols supported on the XP.) Specify **all-protocols** to manage all protocols that are supported on the XP.

**address-map on|off|na**

Configures support for the Address Map group for the specified protocol(s).

**host on|off|na**

Configures support for the Host group for the specified protocol(s).

**matrix on|off|na**

Configures support for the Matrix group for the specified protocol(s).

## Restrictions

The Protocol Directory group is part of the RMON Professional group. To use the **rmon set protocol-directory** command you must enable the RMON Professional group with the **rmon set professional** command.

# Example

To configure a protocol encapsulation for the Protocol Directory group:

xp(config)# **rmon set protocol-directory all-protocols address-map on host on matrix on**

# rmon show address-map-logs

## Purpose

Displays MAC address to network address bindings for each protocol.

## Format

**rmon show address-map-logs** *<port-list >*/**all-ports**

## Mode

Enable

## Description

The **rmon show address-map-logs** command displays entries in the RMON 2 Address Map log table. Entries in this table are created automatically when default tables are turned on for the Professional group. You can show address bindings for specific ports or for all ports.

## Parameters

*<port-list >*/**all-ports**
   The port(s) for which you want to display MAC-network address information. Use the keyword **all-ports** to show information for all ports.

## Restrictions

This command is only available if you have configured the Professional group and Address Map control table entries exist for the specified port.

# Example

To display the address map log table for all ports:

```
xp# rmon show address-map-logs all-ports
RMON II Address Map Control Table

❶        ❷        ❸           ❹
Port     macAdd     nlAdd        Protocol
----     ------     -----        --------
et.5.1   00001D:CBA3FD 192.100.81.1    ether2.ip-v4
et.5.1   00001D:CBA3FD 192.100.81.1    *ether2.ip-v4
et.5.1   00001D:CBA3FD 10.60.89.88     ether2.ip-v4
et.5.1   00001D:CBA3FD 10.60.89.88     *ether2.ip-v4
et.5.5   00001D:CBA3FD 192.100.81.3    ether2.ip-v4
et.5.5   00001D:CBA3FD 192.100.81.3    *ether2.ip-v4
et.5.5   080020:835CAA 10.60.89.88     ether2.ip-v4
et.5.5   080020:835CAA 10.60.89.88     *ether2.ip-v4
et.5.1   0080C8:C172A6 192.100.81.3    ether2.ip-v4
et.5.1   0080C8:C172A6 192.100.81.3    *ether2.ip-v4
```

**Legend:**

1. The port on which the MAC address-network address binding was discovered.

2. The MAC address for the binding.

3. The network layer address for the binding.

4. The protocol, as specified in the RMON Protocol Directory for the XP.

# rmon show address-map-control

## Purpose

Displays the address map control table.

## Format

**rmon show address-map-control**

## Mode

Enable

## Description

The **rmon show address-map-control** command displays the collection of network layer addresses to physical addresses to interface mappings.

**Note:** This is not like the typical RMON controlTable and dataTable in which each entry creates its own datatable. Each entry in this table enables the discovery of addresses on a new interface and the placement of address mappings into the central addressMapTable.

Implementations are encouraged to add an entry per monitored interface upon initialization so that a default collection of address mappings is available.

## Parameters

None.

## Restrictions

None.

# rmon show al-host

## Purpose

Shows application layer traffic.

## Format

**rmon show al-host** *<port-list>*|**all-ports** [**summary**]

## Mode

Enable

## Description

The **rmon show al-host** command shows entries in the RMON 2 Application Layer Host table for one or more ports. Entries in this table are created automatically when default tables are turned on for the Professional group.

If CLI filters have been applied, they will take effect when the Application Layer Host table is displayed. This command shows control rows and their corresponding logs only if there are logs. A control row with no data will not appear in the report.

The Application Layer host group is configured with the **rmon hl-host** command.

## Parameters

*<port-list>*|**all-ports**

> The port(s) for which you want to display application layer traffic information. Use the keyword **all-ports** to show traffic information for all the ports.

[**summary**]

> Use the keyword **summary** to display control row summary information only.

## Restrictions

This command is only available if you have configured the Professional group and control table entries exist for the specified port.

# Example

To show Application Layer Host tables on all ports:

```
xp# rmon show al-host all-ports
RMON II Application Layer Host Table

Index: 500, Port: et.5.1, Inserts: 9, Deletes: 0, Owner: monitor ❶

❷            ❸    ❹      ❺      ❻      ❼
Address       InPkts InOctets  OutPkts OutOctets Protocol
-------       ------ --------  ------- --------- --------
10.60.89.88    1080   879418      2       164  *ether2.ip-v4
10.60.89.88    1080   879418      2       164  *ether2.ip-v4.tcp
10.60.89.88    1080   879418      2       164  *ether2.ip-v4.tcp.telnet
192.100.81.1      1      100      1       100  *ether2.ip-v4
192.100.81.1      1      100      1       100  *ether2.ip-v4.icmp
192.100.81.3      3      264   1081    879518  *ether2.ip-v4
192.100.81.3      1      100      1       100  *ether2.ip-v4.icmp
192.100.81.3      2      164   1080    879418  *ether2.ip-v4.tcp
192.100.81.3      2      164   1080    879418  *ether2.ip-v4.tcp.telnet


Index: 504, Port: et.5.5, Inserts: 6, Deletes: 0, Owner: monitor
Address       InPkts InOctets  OutPkts OutOctets Protocol
-------       ------ --------  ------- --------- --------
10.60.89.88       3      246   1141     92563  *ether2.ip-v4
10.60.89.88       3      246   1141     92563  *ether2.ip-v4.tcp
10.60.89.88       3      246   1141     92563  *ether2.ip-v4.tcp.telnet
192.100.81.3   1141    92563      3       246  *ether2.ip-v4
192.100.81.3   1141    92563      3       246  *ether2.ip-v4.tcp
192.100.81.3   1141    92563      3       246  *ether2.ip-v4.tcp.telnet
```

**Legend:**

1. The control table entry for this port:

   Index: uniquely identifies the entry in the control table.
   Port: port name.
   Inserts: number of Application Layer Host table entries for this port.
   Deletes: number of Application Layer Host table entries deleted for this port.
   Owner: default owner "monitor."

2. Network address discovered on the port.

3. Number of packets transmitted without errors to the network address for the protocol.

4. Number of octets transmitted without errors to the network address for the protocol.

5. Number of packets transmitted without errors from the network address for the protocol.

6. Number of octets transmitted without errors from the network address for the protocol.

7. The protocol, as specified in the RMON Protocol Directory for the XP. Note that this shows the destination socket, as well as application/protocol information.

# rmon show al-matrix

## Purpose

Shows application layer traffic between source and destination addresses.

## Format

**rmon show al-matrix** *<port-list>*|**all-ports [order-by srcdst|dstsrc] [summary]**

## Mode

Enable

## Description

The **rmon show al-matrix** command shows entries in the RMON 2 Application Layer Matrix table for one or more ports. Entries in this table are created automatically when default tables are turned on for the Professional group.

If CLI filters have been applied, they will take effect when this table is displayed. The control rows and their corresponding logs are displayed only if there are logs. A control row with no data will not appear in the report.

## Parameters

*<port-list>*|**all-ports**
  The port(s) for which you want to display application layer traffic information. Use the keyword **all-ports** to show traffic information for all the ports.

**srcdst**
  Orders the logs by source address, then destination address (default).

**dstsrc**
  Orders the logs by destination address, then source address.

**summary**
  Displays control row summary information only.

## Restrictions

This command is only available if you have configured the Professional group and control table entries exist for the specified port.

# Example

To show the Application Layer Matrix table for all ports:.

```
xp# rmon show al-matrix all-ports
RMON II Application Layer Host Table

Index: 500, Port: et.5.1, Inserts: 10, Deletes: 0, Owner: monitor ❶


❷          ❸          ❹      ❺    ❻
SrcAddr     DstAddr       Packets   Octets  Protocol
-------     -------       -------   ------  --------
10.60.89.88   192.100.81.3     2      164  *ether2.ip-v4
10.60.89.88   192.100.81.3     2      164  *ether2.ip-v4.tcp
10.60.89.88   192.100.81.3     2      164  *ether2.ip-v4.tcp.telnet
192.100.81.1  192.100.81.3     1      100  *ether2.ip-v4
192.100.81.1  192.100.81.3     1      100  *ether2.ip-v4.icmp
192.100.81.3  10.60.89.88    1181    972211  *ether2.ip-v4
192.100.81.3  10.60.89.88    1181    972211  *ether2.ip-v4.tcp
192.100.81.3  10.60.89.88    1181    972211  *ether2.ip-v4.tcp.telnet
192.100.81.3  192.100.81.1     1      100  *ether2.ip-v4
192.100.81.3  192.100.81.1     1      100  *ether2.ip-v4.icmp


Index: 504, Port: et.5.5, Inserts: 6, Deletes: 0, Owner: monitor
SrcAddr     DstAddr       Packets   Octets  Protocol
-------     -------       -------   ------  --------
10.60.89.88   192.100.81.3    1242    100744  *ether2.ip-v4
10.60.89.88   192.100.81.3    1242    100744  *ether2.ip-v4.tcp
10.60.89.88   192.100.81.3    1242    100744  *ether2.ip-v4.tcp.telnet
192.100.81.3  10.60.89.88     3      246  *ether2.ip-v4
192.100.81.3  10.60.89.88     3      246  *ether2.ip-v4.tcp
192.100.81.3  10.60.89.88     3      246  *ether2.ip-v4.tcp.telnet
```

**Legend:**

1.  The control table entry for this port:

    Index: uniquely identifies the entry in the control table.
    Port: port name.
    Inserts: number of application layer host table entries for this port.
    Deletes: number of application layer host table entries deleted for this port.
    Owner: default owner "monitor."

2.  Source address.

3.  Destination address.

4.  Number of link layer packets transmitted from the source to the destination without errors for the protocol.

5.  Number of octets transmitted from the source to the destination without errors for the protocol.

6.  The protocol, as specified in the RMON Protocol Directory for the XP.

# rmon show al-matrix-top-n

## Purpose

Reports the top *n* Application Layer Matrix entries, sorted by a specific metric.

## Format

**rmon show al-matrix-top-n**

## Mode

Enable

## Description

The **rmon show al-matrix-top-n** command shows entries in the RMON 2 Application Layer Matrix Top N table.

## Parameters

None.

## Restrictions

This command is only available if you have enabled the Professional RMON group and entries exist in the Application Layer Matrix Top N table.

## Example

Consider the following command to gather the top n Application Layer Matrix entries:

```
xp(config)# rmon al-matrix-top-n index 1 matrix-index 500 ratebase all-packets duration 20 size 5
```

To show the top n entries in the Application Layer Matrix table, as specified by the previous command:

```
xp# rmon show al-matrix-top-n
RMON II Al Matrix Table

❶   ❷   ❸      ❹   ❺   ❻ ❼          ❽   ❾
Index M-Index RateBase    TimeRem Duration Size StartTime      Reports Owner
  1    500 All-Packets     14     20    5 00D 00H 50M 25S      1 Usama

❿         ⓫         ⓬       ⓭        ⓮        ⓯        ⓰
SrcAddr      DstAddr     PktRate  R-PktRate OctetRate R-OctetRate Protocol
-------      -------     ------- --------- --------- ----------- --------
192.100.81.3  10.60.89.88    21      0    19836       0 *ether2.ip-v4.tcp.telnet
192.100.81.3  10.60.89.88    21      0    19836       0 *ether2.ip-v4.tcp
192.100.81.3  10.60.89.88    21      0    19836       0 *ether2.ip-v4
192.100.81.1  192.100.81.3    0      0      0         0 *ether2.ip-v4
192.100.81.3  192.100.81.1    0      0      0         0 *ether2.ip-v4
```

**Legend:**

1. Index number that identifies this entry in the Application Layer Matrix Top N control table.

2. The Application Layer Matrix table for which the top N report is shown.

3. The parameter on which the entries are sorted.

4. Number of seconds left in the report currently being collected.

5. Number of seconds that this report has collected during the last sampling interval.

6. Maximum number of matrix entries in this report.

7. The time when this report was last started.

8. The number of reports generated by this entry.

9. The entity that configured this entry.

10. Network address of the source host.

11. Network address of the destination host.

12. Number of packets from the source to the destination during the sampling interval.

13. Number of packets from the destination to the source during the sampling interval.

14. Number of octets from the source to the destination during the sampling interval.

15. Number of octets from the destination to the source during the sampling interval.

16. The protocol, as defined in the RMON Protocol Directory group on the XP.

# rmon show alarms

## Purpose

Displays configured alarms.

## Format

**rmon show alarms**

## Mode

Enable

## Description

The **rmon show alarms** command displays the RMON Alarm table.

## Parameters

None.

## Restrictions

This command is only available if you have configured the Lite group.

## Example

To show configured RMON alarms:

```
xp# rmon show alarm
```

# rmon show channels

## Purpose

Shows the contents of the Filter Channel table.

## Format

**rmon show channels**

## Mode

Enable

## Description

The **rmon show channels** command displays the contents of the Filter Channel table.

## Parameters

None.

## Restrictions

This command is only available if you have configured the Standard group.

## Example

To show the contents of the Filter Channel table:

```
xp# rmon show channels
RMON 1 Channel Table
    No channels defined
```

# rmon show cli-filters

## Purpose

Displays previously-configured RMON CLI filters.

## Format

**rmon show cli-filters**

## Mode

User and Enable.

## Description

The **rmon show cli-filters** command displays the RMON CLI filters that have been defined for use on the XP. Use the **rmon apply cli-filters** command to apply a filter to your current Telnet or Console session.

## Parameters

None.

## Restrictions

None.

## Example

To show RMON CLI filters that are defined on the XP:

```
xp> rmon show cli-filters
RMON CLI Filters

❶   ❷
Id  Filter
--  ------
 1  (inpkts >= 0)
 2  (inpkts >= 0 and outoctets >= 0)
 3  srcmac 222222222222 and (outoctets >= 0)
You have selected a filter: (inpkts >= 0) ❸
```

**Legend:**

1. The filter ID. You use this value to apply a filter with the **rmon apply cli-filters** command.

2. The filter parameters that were specified with the **rmon set cli-filter** command.

3. This shows the parameters of the filter that is currently applied to your Telnet or Console session.

# rmon show etherstats

## Purpose

Displays Ethernet statistics for one or more ports.

## Format

**rmon show etherstats** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **rmon show etherstats** command displays entries in the Ethernet table for one or more ports. Entries in this table are created automatically when default tables are turned on for the Lite group.

## Parameters

*<port-list>*|**all-ports**
> The port(s) for which you want Ethernet statistics displayed. Use the keyword **all-ports** to show Ethernet statistics on all ports.

## Restrictions

The RMON agent reports only traffic *received* on a port. This command is available only if you have configured the Lite group.

# Example

To display Ethernet statistics on a specified port:

```
xp# rmon show etherstats et.5.1
RMON I Ethernet Statistics Table
Index: 502, Port: et.5.1, Owner: monitor ❶
-----
RMON EtherStats          Total
---------------          -----
Octets              83616016 ❷
Unicast Frames          86185 ❸
Broadcast Frames            0 ❹
Multicast Frames            0 ❺
Collisions                  0 ❻
64 Byte Frames            292 ❼
65-127 Byte Frames      16625
128-255 Byte Frames      6145
256-511 Byte Frames      4520
512-1023 Byte Frames     7992
1024-1518 Byte Frames   50511
```

Legend:

1.  The EtherStats control table entry for this port:

    Index: uniquely identifies this entry.
    Port: port et.5.1.
    Owner: default owner "monitor."

2.  Number of octets of data received on the network.

3.  Number of good frames received that were directed to a Unicast address.

4.  Number of good frames received that were directed to a broadcast address.

5.  Number of good frames received that were directed to a multicast address.

6.  Number of collisions on this Ethernet segment.

7.  Number of good and bad frames received, for various frame size ranges.

# rmon show events

## Purpose

Displays configured events and logs of triggered events.

## Format

**rmon show events**

## Mode

Enable

## Description

The **rmon show events** command displays configured events and the logs, if any, of triggered events.

## Parameters

None.

## Restrictions

This command is only available if you have configured the Lite group.

## Example

To show RMON events and logs:

```
xp# rmon show events
RMON I Event table

❶  ❷  ❸        ❹                ❺
Index Type Community    Description        Owner
  1 log  public      Log Only        Usama
No event logs found ❻
Index Type Community    Description        Owner
  2 both private     Log & Trap        Usama
No event logs found
```

Legend:

1. Index number that identifies this entry in the Event table.

2.  Type of event: log, trap, or both log and trap.

3.  Community string used for this event.

4.  User-defined description of this event.

5.  Owner of this event entry.

# rmon show filters

## Purpose

Shows the contents of the Filters table.

## Format

**rmon show filters**

## Mode

Enable

## Description

The **rmon show filters** command displays the contents of the Filter table.

## Parameters

None.

## Restrictions

This command is only available if you have configured the Standard group.

## Example

To show the contents of the Filter table:

```
xp# rmon show filters
RMON 1 Filter Table
    No filters defined
```

# rmon show history

## Purpose

Shows statistics over a period of time.

## Format

**rmon show history** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **rmon show history** command displays statistical samples that are stored in the RMON History group. Entries in this table are created automatically when default tables are turned on for the Lite group.

## Parameters

*<port-list>*|**all-ports**
> The port(s) for which the history is to be displayed. Use the keyword **all-ports** to show history information on all the ports.

## Restrictions

This command is only available if you have configured the Lite group.

## Example

To display history information for a specific port:

```
xp# rmon show history et.5.1
RMON I History Table

❶   ❷      ❸         ❹    ❺
Index Port     Interval(secs) Buckets Owner
 502 et.5.1          300  50/50  monitor


❻   ❼           ❽   ❾    ❿    ⓫    ⓬    ⓭
 Index SysUpTime       Octets Packets  Bcst  Mcst  Colls %Util Other
 213 00D 17H 45M 47S   318114   336    0    0    0    0    0
 214 00D 17H 50M 47S   323928   341    0    0    0    0    0
 215 00D 17H 55M 48S   323586   335    0    0    0    0    0
 216 00D 18H 00M 49S   317186   320    0    0    0    0    0
 217 00D 18H 05M 49S   323470   333    0    0    0    0    0
                         .
                         .
                         .
 258 00D 21H 31M 03S   322264   312    0    0    0    0    0
 259 00D 21H 36M 03S   327944   315    0    0    0    0    0
 260 00D 21H 41M 04S   333138   309    0    0    0    0    0
 261 00D 21H 46M 06S   327782   312    0    0    0    0    0
 262 00D 21H 51M 07S   332268   294    0    0    0    0    0
```

**Legend:**

1. Index number that identifies the entry for this port in the History control table.

2. Port name.

3. Interval (in seconds) for data samples for each data bucket.

4. The actual number of buckets/the requested number of buckets.

5. Owner of this entry "monitor" (default).

6. Index number for this data bucket.

7. Time at which the sample was measured.

8. Total number of octets received on the network.

9. Number of packets received during the sampling period.

10. Number of good packets received during the sampling interval that were directed to a broadcast address.

11. Number of good packets received during the sampling interval that were directed to a multicast.

12. The number of collisions on this Ethernet segment during the sampling interval (best estimate).

13. The percentage of the network being utilized (best estimate).

# rmon show host-top-n

## Purpose

Displays the top *n* hosts.

## Format

**rmon show host-top-n**

## Mode

Enable

## Description

The **rmon show host-top-n** command displays a report of the top hosts for a specified statistic. Note that the Host Top N report runs once. To run the reports again via the CLI, the control row must be disabled and then enabled. If the report has already been run, the Time Remaining field is set to zero. Otherwise, the Time Remaining field will be decremented until the report is run.

## Restrictions

This command is only available if you have configured the Standard group and Host Top N control table entries exist.

## Example

Consider the following command to gather the top n Host entries:

```
xp(config)# rmon host-top-n index 1 host-index 500 base out-octets duration 20 size 5
```

To display the Host Top N report, as specified by the previous command:

```
xp# rmon show host-top-n
RMON I HostTopN Table

 ❶    ❷    ❸        ❹    ❺    ❻    ❼          ❽
Index HostIndex RateBase    TimeRem Duration Buckets StartTime     Owner
1     500    Out-Octets   0       20   5/5  00D 00H 39M 29S  Usama

 ❾              ❿
Address         Rate
-------         ----
0080C8:C172A6       19911
00001D:CBA3FD        0
```

**Legend:**

1.  Index number that identifies this entry in the Host Top N control table.

2.  Index number that identifies the Host control table entry.

3.  The parameter used to order the list of top "n" entries.

4.  Number of seconds left in the report currently being collected.

5.  Number of seconds that this report has collected during the last (or current) sampling interval.

6.  Maximum number of hosts requested for the Top N table/maximum number of hosts in the Top N table.

7.  The time of the sampling.

8.  The owner of this entry.

9.  The host address.

10. The value of the statistic for the host address.

# rmon show hosts

## Purpose

Shows statistics about the hosts discovered on the network.

## Format

**rmon show hosts** *<port-list>*|**all-ports** [**summary**]

## Mode

Enable

## Description

The **rmon show hosts** command displays entries in the Hosts table for one or more ports. Entries in this table are created automatically when default tables are turned on for the Standard group.

If CLI filters have been applied, they will take effect when the Host table is displayed. This command will display control rows and their corresponding logs only if there are logs. A control row that has no data is not displayed.

## Parameters

*<port-list>*|**all-ports**
   The port(s) for which host information is to be shown. Use the keyword **all-ports** to show host information on all the ports.

**summary**
   Use the keyword **summary** to show a summary of all control table rows with the number of logs in each row.

## Restrictions

This command is only available if you have configured the Standard group and control table entries exist for the specified port.

# Example

To show host information for a specific port:

```
xp# rmon show hosts et.5.1
RMON I Host Table
Index: 502, Port: et.5.1, Owner: monitor ❶


❷           ❸      ❹       ❺      ❻        ❼     ❽
Address      InPkts  InOctets  OutPkts  OutOctets   Bcst  Mcst
-------      ------  --------  -------  ---------   ----  ----
00001D:CBA3FD    88917  88436760    62132  5 095029    0     0
0080C8:C172A6    62132  5095029    88920  88437062    0     0
```

**Legend:**

1.  Host control table information for this port:

    Index: number that identifies the entry for this port in the table.
    Port: port name.
    Owner: the default owner "monitor."

2.  MAC address of the discovered host.

3.  Number of good packets transmitted to this address.

4.  Number of good octets transmitted to this address.

5.  Number of good packets transmitted from this address.

6.  Number of good octets transmitted from this address.

7.  Number of good packets transmitted by this address that were directed to a broadcast address.

8.  Number of good packets transmitted by this address that were directed to a multicast address.

To show a summary of host information:

```
xp# rmon show all-ports summary
RMON I Host Table Summary


❶     ❷      ❸      ❹      ❺      ❻
Index Data Rows Port    Status Mode    Owner
----- --------- ----   ------ ----    -----
 500      1 et.5.1  Up     Address monitor
 501      1 et.5.2  Up     Address monitor
 502      0 et.5.3  Down   Flow    monitor
 503     17 et.5.4  Up     Flow    monitor
 504      0 et.5.5  Down   Flow    monitor
 505      0 et.5.6  Down   Flow    monitor
 506      0 et.5.7  Down   Flow    monitor
 507      0 et.5.8  Down   Flow    monitor
```

**Legend:**

1. Index number that identifies this entry in the Host control table.

2. Number of data rows associated with this index number.

3. Port.

4. Current state of the port.

5. Source of the data for this entry.

6. Owner of this entry.

# rmon show matrix

## Purpose

Shows statistics for source-destination address pairs.

## Format

**rmon show matrix** *<port-list>*|**all-ports [summary] [order-by srcdst|dstsrc]**

## Mode

Enable

## Description

The **rmon show matrix** command displays entries in the Matrix table. Entries in this table are automatically created when default tables are turned on for the Standard group.

If CLI filters have been applied, they will take effect when the Matrix table is displayed. This command will display control rows and their corresponding logs only if there are logs. A control row that has no data is not displayed.

## Parameters

*<port-list>*|**all-ports**
   The port(s) for which you want to display information. Use the keyword **all-ports** to show matrix information on all the ports.

**summary|order by**
Use the keyword **summary** to display the control rows only. Use the keyword **order-by** to display entries by source/destination or by destination/source.

**srcdst|dstsrc**
   Use the keyword **srcdst** to display the entries by source/destination. Use the keyword **dstsrc** to display entries by destination/source.

## Restrictions

This command is only available if you have configured the Standard group.

# Example

To show statistics for source-destination address pairs:

```
xp# rmon show matrix all-ports
RMON I Matrix Table

Port: et.5.1, Index: 500, Owner: monitor ❶


❷              ❸              ❹        ❺
SrcAddr         DstAddr         Packets   Octets
-------         -------         -------   ------
00001D:CBA3FD       0080C8:C172A6      3       264
0080C8:C172A6       00001D:CBA3FD      4       346

Port: et.5.5, Index: 504, Owner: monitor
SrcAddr         DstAddr         Packets   Octets
-------         -------         -------   ------
00001D:CBA3FD       080020:835CAA      3       246
080020:835CAA       00001D:CBA3FD      2       164
```

**Legend:**

1.  The Matrix control table entry for this port:

    Port: the name of the port.
    Index: the index number for this port in the Matrix table.
    Owner: default "monitor."

2.  Source MAC address.

3.  Destination MAC address.

4.  Number of packets transmitted from the source to the destination address, including bad packets.

5.  Number of octets transmitted from the source to the destination address.

To show control row summary statistics:

```
xp# rmon show matrix all-ports summary
RMON I Matrix Table Summary
 Index  Data Rows  Port   Status  Mode  Owner
-----  ---------  ----  ------  ----  ----
500     0     et.1.1  Up    Address monitor
501     0     et.1.2  Down  Address monitor
502     0     et.1.3  Down  Address monitor
503     0     et.1.4  Up    Address monitor
504     0     et.1.5  Down  Address monitor
505     0     et.1.6  Down  Address monitor
506     0     et.1.7  Down  Address monitor
507     0     et.1.8  Up    Address monitor
508     0     gi.4.1  Up    Address monitor
509     0     gi.4.2  Up    Address monitor
510     0     et.7.1  Up    Address monitor
511     0     et.7.2  Down  Address monitor
512     0     et.7.3  Down  Address monitor
513     0     et.7.4  Down  Address monitor
514     0     et.7.5  Down  Address monitor
515     0     et.7.6  Down  Address monitor
516     0     et.7.7  Down  Address monitor
517     0     et.7.8  Down  Address monitor
25      0     et.1.3  Down  Address
```

# rmon show nl-host

## Purpose

Shows the amount of traffic to and from each network address.

## Format

**rmon show nl-host** *<port-list>*|**all-ports** [**summary**]

## Mode

Enable

## Description

The **rmon show nl-host** command shows entries in the RMON 2 Network Layer Host table for one or more ports. Entries in this table are created automatically when default tables are turned on for the Professional group.

If CLI filters have been applied, they will take effect when the Network Layer host table is displayed. This command shows control rows and their corresponding logs only if there are logs. A control row with no data will not appear in the report.

## Parameters

*<port-list>*|**all-ports**
   The port(s) for which you want to display traffic information. Use the keyword **all-ports** to show information on all the ports.

**summary**
   Use the keyword **summary** to display control row summary information only.

## Restrictions

This command is only available if you have configured the Professional RMON group and control table entries exist for the specified port.

# Example

To display the network layer host table for all ports:

```
xp# rmon show nl-host all-ports

RMON II Network Layer Host Table

Index: 500, Port: et.5.1, Inserts: 3, Deletes: 0, Owner: monitor ❶


❷            ❸      ❹        ❺       ❻       ❼
Address      InPkts InOctets OutPkts OutOctets Protocol
-------      ------ -------- ------- --------- --------
10.60.89.88    1159   952300       2       164 *ether2.ip-v4
192.100.81.1      1      100       1       100 *ether2.ip-v4
192.100.81.3      3      264    1160    952400 *ether2.ip-v4

Index: 504, Port: et.5.5, Inserts: 2, Deletes: 0, Owner: monitor
Address      InPkts InOctets OutPkts OutOctets Protocol
-------      ------ -------- ------- --------- --------
10.60.89.88       3      246    1220     98962 *ether2.ip-v4
192.100.81.3   1220    98962       3       246 *ether2.ip-v4
```

**Legend:**

1.  The control table entry for this port:

    Index: index number that identifies this entry in the hl host control table.
    Port: name of port.
    Inserts: number of inserts in the network layer host table for this entry.
    Deletes: number of deletions in the network layer host table for this entry.
    Owner: the entity that configured this entry.

2.  The network address.

3.  Number of packets received by this network address.

4.  Number of octets received by this network address.

5.  Number of packets sent by this network address.

6.  Number of octets sent by this network address.

7.  The protocol, as defined in the RMON Protocol Directory for the XP. Note that this shows the network layer protocol encapsulations only. If you want to see application/protocol information, such as the destination socket, use the **rmon show al-host** command.

# rmon show nl-matrix

## Purpose

Shows information about the traffic between network address pairs.

## Format

**rmon show nl-matrix** *<port-list>***|all-ports [order-by srcdst|dstsrc] [summary]**

## Mode

Enable

## Description

The **rmon show nl-matrix** command shows entries in the Network Layer Matrix table for one or more ports. Entries in this table are created automatically when default tables are turned on for the Professional group**.**

If CLI filters have been applied, they will take effect when this table is displayed. The control rows and their corresponding logs are displayed only if there are logs. A control row with no data will not appear in the report.

## Parameters

*<port-list>***|all-ports**
   The port(s) for which you want to display network layer traffic information. Use the keyword **all-ports** to show information for all ports.

**order-by srcdst**
   Orders the logs by source address, then destination address (default).

**order-by dstsrc**
   Orders the logs by destination address, then source address.

**summary**
   Use the keyword **summary** to display control row summary information only.

## Restrictions

This command is only available if you have configured the Professional group and control table entries exist for the specified port.

# Example

To show the Network Layer Matrix table for all ports:

```
xp# rmon show nl-matrix all-ports
RMON II Network Layer Matrix Table

Index: 500, Port: et.5.1, Inserts: 4, Deletes: 0, Owner: monitor ❶


❷           ❸              ❹        ❺     ❻
SrcAddr      DstAddr         Packets   Octets  Protocol
-------      -------         -------   ------ --------
10.60.89.88   192.100.81.3        2       164  *ether2.ip-v4
192.100.81.1  192.100.81.3        1       100  *ether2.ip-v4
192.100.81.3  10.60.89.88      1241   1025436  *ether2.ip-v4
192.100.81.3  192.100.81.1        1       100  *ether2.ip-v4


Index: 504, Port: et.5.5, Inserts: 2, Deletes: 0, Owner: monitor
SrcAddr      DstAddr         Packets   Octets  Protocol
-------      -------         -------   ------ --------
10.60.89.88   192.100.81.3     1302    105604  *ether2.ip-v4
192.100.81.3  10.60.89.88         3       246  *ether2.ip-v4
```

**Legend:**

1. The control table entry for this port:

   Index: index number that identifies this entry in the control table.
   Port: name of port.
   Inserts: number of inserts in the Network Layer Matrix table for this entry.
   Deletes: number of deletions in the Network Layer Matrix table for this entry.
   Owner: the entity that configured this entry.

2. Source network address.

3. Destination network address.

4. Number of packets transmitted without error from the source to the destination.

5. Number of octets transmitted without error from the source to the destination.

6. The protocol, as specified in the RMON Protocol Directory for the XP.

# rmon show nl-matrix-top-n

## Purpose

Reports the top *n* Network Layer Matrix entries, sorted by a specific metric.

## Format

**rmon show nl-matrix-top-n**

## Mode

Enable

## Description

The rmon show nl-matrix-top-n command shows entries in the RMON 2 Network Layer Matrix Top N table.

## Parameters

None.

## Restrictions

This command is only available if you have configured the Professional group and entries exist in the Network Layer Matrix Top N table.

## Example

Consider the following command to gather the top n Network Layer Matrix entries:

```
xp(config)# rmon nl-matrix-top-n index 1 matrix-index 500 ratebase all-octets duration 20 size 5
```

To show the top n entries in the Network Layer Matrix table, as specified by the previous command:

```
xp# rmon show nl-matrix-top-n
RMON II Nl Matrix Table

❶    ❷    ❸      ❹    ❺    ❻ ❼        ❽    ❾
Index M-Index RateBase   TimeRem Duration Size StartTime      Reports Owner
  1    500 Octets       20    20   5 00D 00H 51M 37S     1 Usama

❿          ⓫          ⓬      ⓭       ⓮       ⓯        ⓰
SrcAddr      DstAddr       PktRate  R-PktRate OctetRate R-OctetRate Protocol
-------      -------       ------- --------- --------- ----------- --------
192.100.81.3  10.60.89.88      23    0   19986      0 *ether2.ip-v4
192.100.81.1  192.100.81.3      0    0    0      0 *ether2.ip-v4
192.100.81.3  192.100.81.1      0    0    0      0 *ether2.ip-v4
10.60.89.88   192.100.81.3      0   23    0   19986 *ether2.ip-v4
```

**Legend:**

1. Index number that identifies this entry in the network layer Matrix Top N control table.

2. The Network Layer Matrix table for which the top N report is shown.

3. The parameter on which the entries are sorted.

4. Number of seconds left in the report currently being collected.

5. Number of seconds that this report has collected during the last sampling interval.

6. Maximum number of matrix entries in this report.

7. The time when this report was last started.

8. The number of reports generated by this entry.

9. The entity that configured this entry.

10. Network address of the source host.

11. Network address of the destination host.

12. Number of packets from the source to the destination during the sampling interval.

13. Number of packets from the destination to the source during the sampling interval.

14. Number of octets from the source to the destination during the sampling interval.

15. Number of octets from the destination to the source during the sampling interval.

16. The protocol, as defined in the RMON Protocol Directory for the XP.

# rmon show packet-capture

## Purpose

Shows packets captured after flowing through a channel.

## Format

**rmon show packet-capture control-table [captured-packets** *<control-index>***]**

## Mode

Enable

## Description

The **rmon show packet-capture** command shows the buffer table for captured packets. Before you use this command, first configure the Filter Channel group using the **rmon channel index** command. Then use the **rmon capture** command to configure the Packet Capture group which allows packets to be captured after they have flowed through a channel.

## Parameters

**control-table**

Displays RMON packet capture filter information. Each packet captured belongs to one entry of the control-table.

**captured-packets** *<control-index>*

Displays all of the packets captured for RMON. If you supply the optional *control-index*, you will display only packets captured for the specified control index; otherwise, you will display all captured packets. To determine the *control-index*, use the command "**rmon show packet-capture control-table**."

## Restrictions

• This command is available only if you have enabled the Standard RMON groups.

• Packet capture using RMON uses considerable CPU cycles. For best results, enable packet capture when the CPU is not busy running other important tasks and CPU utilization is low.

# rmon show probe-config

## Purpose

Shows the configuration of the XP for interaction with other RMON devices.

## Format

**rmon show probe-config [basic] [net-config] [trap-dest]**

## Mode

Enable

## Description

The **rmon show probe-config** command shows entries in the RMON 2 Probe Configuration table.

## Parameters

| | |
|---|---|
| **basic** | Shows basic probe configuration information. |
| **net-config** | Shows network configuration table. |
| **trap-dest** | Shows trap destination table. |

## Restrictions

This command is only available if you have configured the Professional group.

# rmon show protocol-directory

## Purpose

Displays the protocols that the XP can monitor with RMON.

## Format

**rmon show protocol-directory** *<protocol>*|**all-protocols**

## Mode

Enable

## Description

The **rmon show protocol-directory** command displays the protocol encapsulations that are defined in the RMON 2 Protocol Directory group for the XP.

## Parameters

*<protocol>*|**all-protocols**
> The specific protocol encapsulation that is managed with the RMON 2 Protocol Directory group. (See Appendix A for protocol encapsulations that are supported on the XP.) Use the keyword **all-protocols** to display all protocol encapsulations that are managed with the Protocol Directory group.

## Restrictions

This command is only available if you have configured the Professional group.

## Example

To show all protocol encapsulations that are managed with the Protocol Directory group:

:

```
xp# rmon show protocol-directory all-protocols
RMON II Protocol Directory Table

Last Change: 00D 00H 00M 00S
Index AddrMap Host Matrix Status Protocol
1    Off   Off  Off   Active ether2
2    NA    Off  Off   Active idp
3    NA    Off  Off   Active ip-v4
4    NA    Off  Off   Active chaosnet
5    NA    Off  Off   Active arp
6    NA    Off  Off   Active rarp
7    NA    Off  Off   Active vip
8    NA    Off  Off   Active vloop
9    NA    Off  Off   Active vloop2
10   NA    Off  Off   Active vecho
11   NA    Off  Off   Active vecho2
12   NA    Off  Off   Active ipx
13   NA    Off  Off   Active netbios-3com
14   NA    Off  Off   Active atalk
15   NA    Off  Off   Active aarp

...
```

**NOTE:** The example above shows a partial listing only.

# rmon show protocol-distribution

## Purpose

Shows the octets and packets detected for different protocols on a network segment.

## Format

**rmon show protocol-distribution** *<port-list>*|**all-ports**

## Mode

Enable

## Description

The **rmon show protocol-distribution** command displays the RMON 2 Protocol Distribution table. This table contains a list of protocols, defined in the RMON 2 Protocol Directory, that are discovered by the XP. Entries in this table are created automatically when default tables are turned on for the Professional group. If you delete an entry in the Protocol Directory, then entries in this table associated with the deleted protocol are also deleted.

If CLI filters have been applied, they will take effect when the Protocol Distribution table is displayed.

## Parameters

*<port-list>*|**all-ports**
> The port(s) for which you want to show protocol distribution. Use the keyword **all-ports** to show protocol distribution information on all the ports.

## Restrictions

This command is only available if you have configured the Professional group.

## Example

To show the RMON 2 Protocol Distribution table:

:

```
xp(config)# rmon show protocol-distribution all-ports
RMON II Protocol Distribution Table

Index: 508, Port: gi.4.1, Owner: monitor
Pkts Octets Protocol
---- ------ --------
3312 304550 ether2
3312 304550 ip-v4
2459 234564 icmp
 853  69986 tcp
 853  69986 telnet
```

# rmon show status

## Purpose

Displays RMON status, groups, enabled ports, and memory utilization.

## Format

**rmon show status**

## Mode

Enable

## Description

The **rmon show status** command shows whether RMON is enabled, the RMON groups that are configured, the ports on which RMON is enabled, and the memory allocated and used by RMON.

## Parameters

None.

## Example

To show RMON status:

```
xp# rmon show status
RMON Status
-----------
* RMON is ENABLED ❶
* RMON initialization successful.


+-------------------------+
| RMON Group Status       | ❷
+-------+--------+---------+
| Group | Status | Default |
+-------+--------+---------+
| Lite  |   On  |   Yes |
+-------+--------+---------+
| Std   |   On  |   Yes |
+-------+--------+---------+
| Pro   |   On  |   Yes |
+-------+--------+---------+

RMON is enabled on: et.5.1, et.5.2, et.5.3, et.5.4, et.5.5, et.5.6, et.5.7, et.5.8 ❸

RMON Memory Utilization ❹
-----------------------
     Total Bytes Available:  48530436

Total Bytes Allocated to RMON:  4000000
        Total Bytes Used:   2637872
        Total Bytes Free:   1362128
```

**Legend:**

1.  When the XP is booted, RMON is off by default. RMON is enabled with the **rmon enable** command.

2.  Shows which RMON group (Lite, Standard, or Professional) is configured and whether default control tables are turned on.

3.  Shows the ports on which RMON is enabled.

4.  Shows RMON memory utilization. You can adjust the amount of memory allocated to RMON with the **rmon set memory** command.

# rmon show user-history

## Purpose

Shows user-defined collection of historical information from MIB objects on the XP.

## Format

**rmon** *<string>* **show user-history [all-indexes]**

## Mode

Enable

## Description

The **rmon show user-history** command shows the User History table.

## Parameters

*<string>*     Specifies a particular rmon.

**all-indexes**    This optional parameter displays all indexes.

## Restrictions

This command is only available if you have configured the Professional group.

# rmon user-history-apply

## Purpose

Applies a specified group to the User History control table.

## Format

**rmon user-history-apply** *&lt;groupname&gt;* **to** *&lt;user-history-index&gt;* [**status enable|disable**]

## Mode

Configure

## Description

The **rmon user-history-apply** command applies all objects in the group created with the **rmon user-history-objects** command to the row in the User History control table. If the number of objects specified in the control row is greater than those in the group, the remaining OIDs are set to 0.0. If the number of objects specified in the control row is less than those in the group, the remaining are discarded.

## Parameters

*&lt;groupname&gt;*
  Is the name of a group of objects that has been created with the **rmon-user-history-objects** command.

*&lt;user-history-index&gt;*
  Specifies the row in the User History control table.

## Restrictions

None.

# rmon user-history-control

## Purpose

Monitors a group of objects (OIDs) over a period of time.

## Format

**rmon user-history-control index** *<index-number>* **objects** *<number>* **samples** *<number>*
**interval** *<number>* [**owner** *<string>*] [**status enable|disable**]

## Mode

Configure

## Description

The **rmon user-history-control** command monitors the group of objects that are defined with the
**rmon user-history-objects** command. This command creates an entry in the User History control
table.

Use the **rmon show user-history** command to display the User History table.

## Parameters

*<index-number>*
   Is a number between 1 and 65535 that uniquely identifies a row in the user history control
   table.

**objects** *<number>*
   Specifies the number of MIB objects to be collected.

**samples** *<number>*
   Specifies the number of discrete time intervals over which data is to be saved.

**interval** *<number>*
   Specifies the interval, in seconds, between samples.

**owner** *<string>*
   Specifies the owner of the event; for example, an IP address, machine name or person's name.

**status enable|disable**
   Enables or disables this matrix. The default is enable.

## Restrictions

None.

# rmon user-history-objects

## Purpose

Defines a group of objects (OIDs).

## Format

**rmon user-history-objects** *<groupname>* **variable** *<oid>* **type absolute-value|delta-value**
[**status enable|disable**]

## Mode

Configure

## Description

The **rmon user-history-objects** command defines the group of objects that can be monitored with
the **rmon user-history-control** command. This command creates a group with a single OID as a
member of the group. To add several objects to the group, you need to issue multiple **user-history-
objects** commands. Each object appears as a separate row in the User History control table.

## Parameters

*<groupname>*
    Is the name of the group of objects.

**variable** *<oid>*
    Specifies the object identifier to be monitored.

**type absolute-value|delta-value**
    Specifies the method of sampling for the selected variable.

**interval** *<number>*
    Specifies the interval, in seconds, between samples.

**status enable|disable**
    Enables or disables this matrix. The default is enable.

## Restrictions

None.

# Chapter 58

# save Command

The **save** command saves the configuration changes you have entered during the current CLI session. You can save the configuration commands in the scratchpad to the active configuration, thus activating changes. You then can save the active changes to the Startup configuration.

## Format

**save active|startup**

## Mode

Configure

**Note:** If you are in Enable mode, you still can save the active configuration changes to the Startup configuration file by entering the **copy active to startup** command.

## Description

Saves configuration changes.

*   If you use the **active** keyword, uncommitted changes in the scratchpad are activated. The XP accumulates configuration commands in the scratchpad until you activate them or clear them (or reboot). When you activate the changes, the XP runs the commands.

*   If you use the **startup** keyword, the configuration of the running system is saved in the Startup configuration file and re-instated by the server the next time you reboot.

## Parameters

**active | startup**     Specifies the destination for the configuration commands you are saving.

## Restrictions

None.

# Chapter 59

# show Command

## Purpose

The **show** command displays the configuration of your running system.

## Format

**show active| scratchpad| startup| failed**

## Mode

Configure

## Description

The **show** command displays the configuration of your running system as well as any non-committed changes in the scratchpad. Each CLI command is preceded with a number. This number can be used with the **negate** command to negate one or more commands. If you see the character **E** (for Error) immediately following the command number, it means the command did not execute successfully due of an earlier error condition. To get rid of the command in error, you can either negate it or fix the original error condition.

There are three modes for the **show** command: **active**, **scratchpad**, and **startup**. Specifying **active** shows you the configuration that are currently active on the router. Specifying **scratchpad** shows you the configuration currently in the scratchpad but have yet to be applied as active. Specifying **startup** shows the configuration that will be applied to the next bootup. You must specify one of these three modes as a parameter for the show command.

When viewing the active configuration file, the CLI displays the configuration file command lines with the following possible annotations:

*   Commands without errors are displayed without any annotation.

*   Commands with errors are annotated with an "E".

- If a particular command has been applied such that it can be expanded on additional interfaces/modules, then it is annotated with a "P". For example, if you enable STP on all ports in the current system, but the XP contains only one module, then that particular command will be extended to all modules when they have been added to the XP.

  A command like **stp enable et.\*.\*** would be displayed as follows:

  ```
  P: stp enable et.*.*
  ```

  indicating that it is only partially applied. If you add more modules to the XP at a later date and then update the configuration file to encompass all of the available modules in the XP, then the "P:" portion of the above command line would disappear when displaying this configuration file.

  If a potentially partial command, which was originally configured to encompass all of the available modules on the XP, becomes only partially activated (after a hotswap or some such chassis reconfiguration), then the status of that command line will automatically change to indicate a partial completion status, complete with "P:".

  **Note:** Commands with no annotation or annotated with a "P:" are not in error.

## Parameters

| | |
|---|---|
| **active** | Specify this parameter to show the configuration that are currently active on the router. |
| **scratchpad** | Specify this parameter to show the configuration currently in the scratchpad but have yet to be applied as active. |
| **startup** | Specify this parameter to show the configuration that will be applied to the next bootup. |
| **failed** | This parameter shows all active configuration lines on the router that are in partial or total error. |

## Restrictions

None.

## Examples

The following command shows the active configuration:

```
xp(config)# show active
Running system configuration:
   !
   ! Last modified from Console on 2000-02-09 13:00:46
   !
1E: atm create vcl port at.9.1.1.200
   !
2E: interface create ip pos11 address-netmask 20.11.11.20/24 peer-address 20.11
.11.21 type point-to-point port so.13.1
3E: interface create ip atm1 address-netmask 12.1.1.1/24 port at.9.1.1.200
4 : interface add ip en0 address-netmask 134.141.179.147/27
   !
5 : ip add route 134.141.173.0/24 gateway 134.141.179.129
6 : ip add route 134.141.176.0/24 gateway 134.141.179.129
7 : ip add route 134.141.172.0/24 gateway 134.141.179.129
   !
8 : system set idle-timeout telnet 0
9 : system set idle-timeout serial 0
```

The following command shows the configuration currently in the scratchpad:

```
xp(config)# show scratchpad

******** Non-committed changes in Scratchpad ********
1*: atm define service service1 srv-cat cbr pcr 100000
   !
2*: vlan create vlan1 ip id 5
   !
3*: ip add route default host gateway 100.0.0.1
```

The following command shows the configuration saved for startup at next bootup:

```
xp(config)# show startup
!
! Startup configuration for the next system reboot
!
! Last modified from Console on 2001-12-28 16:51:19
!
version 3.1
atm create vcl port at.9.1.1.200
interface create ip pos11 address-netmask 20.11.11.20/24 peer-address 20.11.11.2
1 type point-to-point port so.13.1
interface create ip atm1 address-netmask 12.1.1.1/24 port at.9.1.1.200
interface add ip en0 address-netmask 134.141.179.147/27
ip add route 134.141.173.0/24 gateway 134.141.179.129
ip add route 134.141.176.0/24 gateway 134.141.179.129
ip add route 134.141.172.0/24 gateway 134.141.179.129
system set idle-timeout telnet 0
system set idle-timeout serial 0
pos set so.13.1 working protecting so.13.2
```

# Chapter 60

# smarttrunk Commands

The **smarttrunk** commands let you display and set parameters for SmartTRUNK ports. SmartTRUNK ports are groups of ports that have been logically combined to increase throughput and provide link redundancy.

## Command Summary

Table 45 lists the **smarttrunk** commands. The sections following the table describe the command syntax.

**Table 45.  smarttrunk commands**

| |
|---|
| **smarttrunk add ports** *\<port list\>* **to** *\<smarttrunk\>* |
| **smarttrunk clear load-distribution** *\<smarttrunk\>* |
| **smarttrunk create** *\<smarttrunk\>* **protocol huntgroup \|no-protocol \|lacp [no-llap-ack]** |
| **smarttrunk set actor-parameters port** *\<port-list\>* **[system-priority** *\<number\>* **port-key** *\<number\>* **port-priority** *\<number\>* **activity active\| passive aggregation aggregatable\| individual timeout long\| short lacp enable\| disable]** |
| **smarttrunk set load-policy on** *\<smarttrunk\>* *\<load-policy\>* |
| **smarttrunk show** *\<option\>* |

# smarttrunk add ports

## Purpose

Adds physical ports to a SmartTRUNK.

## Format

**smarttrunk add ports** *<port list>* **to** *<smarttrunk>*

## Mode

Configure

## Description

The **smarttrunk add ports** command allows you to add the ports specified in *<port list>* to a SmartTRUNK. The SmartTRUNK must already have been created with the **smarttrunk create** command. The ports in the SmartTRUNK must be set to full duplex.

## Parameters

| | |
|---|---|
| *<port list>* | Is one or more ports to be added to an existing SmartTRUNK. All the ports in the SmartTRUNK must be connected to the same destination. |
| *<**smarttrunk**>* | Is the name of an existing SmartTRUNK. |

## Restrictions

Ports added to a SmartTRUNK must:

- Be set to full duplex

- Be in the same VLAN

- Have the same properties (L2 aging, STP state, and so on)

## Example

To add ports et.1.1, et.1.2, and et.1.3 to SmartTRUNK st.1:

```
xp(config)# smarttrunk add ports et.1.(1-3) to st.1
```

# smarttrunk clear load-distribution

## Purpose

Clears load distribution statistics for ports in a SmartTRUNK.

## Format

**smarttrunk clear load-distribution** <**smarttrunk** *list*> / **all-smarttrunks**

## Mode

Enable

## Description

The **smarttrunk clear load-distribution** command is used in conjunction with the **smarttrunk show distribution** command, which gathers statistics for the transmitted bytes per second flowing through the SmartTRUNK and each port in it. The **smarttrunk clear load-distribution** command lets you reset load distribution statistics to zero.

## Parameters

<**smarttrunk** *list* >   Is the name of one or more existing SmartTRUNKs.

**all-smarttrunks**   Causes load distribution information to be cleared for all SmartTRUNKs.

## Restrictions

None.

## Example

To clear load distribution information from SmartTRUNK st.1:

xp# **smarttrunk clear load-distribution st.1**

# smarttrunk create

## Purpose

Creates a SmartTRUNK and specifies a control protocol for it.

## Format

**smarttrunk create** *<smarttrunk>* **protocol huntgroup |no-protocol |lacp [no-llap-ack]**

## Mode

Configure

## Description

The **smarttrunk create** command allows you to create a SmartTRUNK logical port. Once you have created a SmartTRUNK port, you add physical ports to it with the **smarttrunk add ports** command.

SmartTRUNKs on the XP are compatible with the DEC Hunt Groups control protocol. If you are connecting the SmartTRUNK to another XP, Enterasys switch, or Digital GIGAswitch/Router, you can specify that the SmartTRUNK use this control protocol. SmartTRUNKing and Hunt Groups are comprised of two protocols:

* Logical Link Aging Protocol (LLAP) – Assists in learning and aging

* Physical Link Affinity Protocol (PLAP) – Monitors and maintains the trunking states

SmartTRUNKs are also compatible with devices that do not support the Hunt Groups control protocol, such as those that support Cisco's EtherChannel technology. If you are connecting a SmartTRUNK to devices that do not support Hunt Groups, no control protocol is used. You must specify the **no-protocol** keyword in the **smarttrunk create** command.

## Parameters

| | |
|---|---|
| *<smarttrunk>* | Is the name of the SmartTRUNK to create. The name of the SmartTRUNK must be in the form st.*x*; for example, st.1. |
| **huntgroup** | Specifies that the DEC Hunt Group control protocol be used. Use this keyword if you are connecting the SmartTRUNK to another XP, Enterasys switch, or Digital GIGAswitch/Router. |
| **no-protocol** | Specifies that no control protocol be used. Use this keyword if the SmartTRUNK is connected to a device that does not support the DEC Hunt Group control protocol. |
| **lacp** | 802.3 Link Aggregation Control Protocol. |

**no-llap-ack**     By default, the XP sends out extra LLAP ack packets for backward compatibility with some Cabletron products. Set this to stop these extra packets.

## Restrictions

None.

## Example

The following command creates a SmartTRUNK named st.1, using the DEC Hunt Group control protocol.

```
xp(config)# smarttrunk create st.1 protocol huntgroup
```

# smarttrunk set actor-parameters

## Purpose

Set actor parameters for running link aggregation.

## Format

**smarttrunk set actor-parameters port** *<port-list>* **[system-priority** *<number>*
**port-key** *<number>* **port-priority** *<number>* **activity active|passive**
**aggregation aggregatable|individual timeout long|short lacp enable|disable]**

## Mode

Configure

## Description

The **smarttrunk set actor-parameters** command allows you to set the actor parameters for
running link aggregation with the 802.3ad protocol (lacp).

**Specify Actor Parameters for LACP (Link Aggregation Control Protocol)**

To set the actor parameters, enter the following:

| | |
|---|---|
| Set actor's administrative parameters. | **smarttrunk set actor-parameters** |
| The port number for which to set the parameters. | **smarttrunk set actor-parameters port** *<port list>* |
| Set the priority of the system. | **smarttrunk set actor-parameters port** *<port list>* **system-priority** *<num>* |
| Set the administrative key for the port. | **smarttrunk set actor-parameters port** *<port list>* **port-key** *<num>* |
| Set the administrative priority for the port. | **smarttrunk set actor-parameters port** *<port list>* **port-priority** *<num>* |
| Set the administrative LACP activity for the port. | **smarttrunk set actor-parameters port** *<port list>* **activity** *<active/passive>* |
| Set the administrative aggregation for the port. | **smarttrunk set actor-parameters port** *<port list>* **aggregation** *<aggregatable/individual>* |

| Set the administrative LACP Timeout for the port. | **smarttrunk set actor-parameters port <port list> timeout <long/short>** |
|---|---|
| Set the LACP enable/disable flag. | **smarttrunk set actor-parameters port <port list> lacp <enable/disable>** |

## Parameters

**port** *<port-list>*  
The port number for which to set the parameters.

**system-priority** *<number>*  
Sets the priority of the system (1-65536). The default priority is **1**.

**port-key** *<number>*  
Sets the admin key for the port (1-65536). The default port-key is **1**.

**port-priority** *<number>*  
Sets the admin priority for the port (1-65536). The default priority is **1**.

**activity active|passive**  
Sets the admin LACP activity for the port. By default, the port is **active**.

**aggregation aggregate|individual**  
Sets the admin aggregation for the port. By default, the port setting is **aggregate**.

**timeout long|short**  
Defines the admin LACP timeout for the port. By default, the timeout is **short**.

**lacp enable|disable**  
Enable or disable the LACP. By default, the LACP is **enable**d.

**Note**: Any parameter for which you do not specify a value will use its default setting.

## Restrictions

None.

# smarttrunk set load-policy

## Purpose

Specifies how traffic is distributed across the ports in a SmartTRUNK.

## Format

**smarttrunk set load-policy round-robin |link-utilization on** *<smarttrunk-list>* **|all-smarttrunks**

## Mode

Configure

## Description

The **smarttrunk set load-policy** command lets you specify how a SmartTRUNK distributes traffic among its ports.

## Parameters

| | |
|---|---|
| **round-robin** | Round-robin (the default) means that flows are assigned to ports on a sequential basis. The first flow goes to the first port in the SmartTRUNK, the second flow to the second port, and so on. Traffic is distributed evenly across all ports. |
| **link-utilization** | Specifies that packets should be sent to the least-used port in the SmartTRUNK. |
| *<smarttrunk-list >* | Is the name of one or more SmartTRUNKs. |
| **all-smarttrunks** | Specifies that the command be applied to all SmartTRUNKs. |

## Restrictions

None.

## Example

To specify that SmartTRUNK st.1 distribute flows sequentially among its component ports:

```
xp(config)# smarttrunk set load-policy on st.1 round-robin
```

# smarttrunk show

## Purpose

Displays information about SmartTRUNKs on the XP

## Format

**smarttrunk show trunks**

**smarttrunk show distribution|protocol-state|connections** <**smarttrunk** *list*>|**all-smarttrunks**

## Mode

Enable

## Description

The **smarttrunkshow** command shows statistics about SmartTRUNKs on the XP.

## Parameters

| | |
|---|---|
| **trunks** | Shows information about all SmartTRUNKs, including active and inactive ports, and the control protocol used. |
| **distribution** | Provides statistics on how traffic is distributed across the ports in a SmartTRUNK. |
| **protocol-state** | Shows information about the control protocol on a SmartTRUNK. |
| **connections** | Shows information about the SmartTRUNK connection, including the MAC address of the remote switch, and the module number and port number of each remote port. Connection information is reported only if the Hunt Group protocol is enabled for the SmartTRUNK. |
| <**smarttrunk** *list* > | Is the name of one or more SmartTRUNKs. |
| **all-smarttrunks** | Specifies that the command be applied to all SmartTRUNKs. |

## Restrictions

None.

# Examples

To display information about all SmartTRUNKs on the XP:

```
xp# smarttrunk show trunks

Flags: D - Disabled  I - Inactive

SmartTRUNK Active Ports      Inactive Ports    Primary Port Protocol Load-Policy  Flags
---------- ------------      --------------    ------------ -------- -----------  -----
st.1                et.3.(7-8)      None      None    RR
```

To show how traffic is distributed across the ports on all SmartTRUNKs:

```
xp# smarttrunk show distribution all-smarttrunks

SmartTRUNK   Member   %TX Util.    %RX Util.    Link Status   Grp Status
----------------   -----------   -------------   -------------   ----------   -----------
st.1          et.2.4     0.00         0.00        Forwarding    Up
st.1          et.2.5     0.00         0.00        Forwarding    Up
st.1          et.2.6     0.00         0.00        Forwarding    Up
```

To show information about the control protocol for SmartTRUNK st.1:

```
xp# smarttrunk show protocol-state st.1

SmartTRUNK  Protocol      State   Port   Port State
---------- --------      -----   ----   ----------
st.1     HuntGroup     Down    et.3.1 Negotiate
                               et.3.2 Negotiate
```

To show connection information for all SmartTRUNKs:

```
xp# smarttrunk show connections all-smarttrunks
SmartTRUNK Local Port Remote Switch       Remote Module  Remote Port  State
---------- ---------- -------------       -------------  -----------  -----
st.1     et.2.1    Enterasys A9:6E:57  3         1        Up
st.1     et.2.2    Enterasys A9:6E:57  3         2        Up
st.1     et.2.3    Enterasys A9:6E:57  3         3        Up
st.1     gi.3.1    Enterasys A9:6E:57  4         5        Up
st.2     et.2.4    --           --        --       Up
st.2     et.2.5    --           --        --       Up
st.2     et.2.6    --           --        --       Up
```

**Note:**   In the example above, SmartTRUNK st.2 has no control protocol enabled, so no connection information is reported.

# Chapter 61

# snmp Commands

The **snmp** commands let you set and show SNMP parameters including SNMP community names and IP host targets for SNMP traps.

**Note:** In order to run NetFlow, you must enable SNMP.

## Command Summary

lists the **snmp** commands. The sections following the table describe the command syntax.

**Table 46. snmp Commands**

| |
|---|
| **snmp disable trap authentication\|link-up-down** |
| **snmp disable port-trap** *<port list>* |
| **snmp set chassis-id** *<chassis-name>* |
| **snmp set community** *<community-name>* **privilege read\|read-write** |
| **snmp set mib name** *<mib-name>* **status enable\| disable** |
| **snmp set target** *<IP-addr>* **community** *<community-name>* **[status enable\|disable]** |
| **snmp show access\|all\|chassis-id\|community\|statistics\|trap\|mibs** |
| **snmp stop** |
| **snmp test trap type ps-failure\| ps-recover \| vrrpNewMaster** |

# snmp disable trap

## Purpose

Disable specific SNMP trap types.

## Format

**snmp disable trap authentication |link-up-down |frame-relay |ospf |spanning-tree |bgp |vrrp |environmentals**

## Mode

Configure

## Description

The **snmp disable trap** command controls the types of traps the XP emits based trap type. You can disable the following trap types:

- Authentication – use the **authentication** keyword to prevent the XP from sending a trap each time it receives an invalid community string.

- Link-state change – use the **link-up-down** keyword to prevent the XP from sending a trap each time a port changes operational state.

## Parameters

| | |
|---|---|
| **authentication** | Disables authentication traps, which the XP sends when it receives an invalid SNMP community string. |
| **link-up-down** | Disables link-state change traps, which the XP sends when a port's operational state changes. |
| **frame-relay** | DLCI up/down trap. |
| **ospf** | Sixteen different OSPF traps. |
| **spanning-tree** | NewRoot and topologyChange traps. |
| **bgp** | BGPEstablished and bgpBackwardTransistion traps |
| **vrrp** | NewMaster and authFailure traps. |
| **environmentals** | Temperature, fan, and power supply traps |

## Restrictions

None.

# snmp disable port-trap

## Purpose

Disable specific SNMP trap types for a specific port.

## Format

**snmp disable port-trap** *<port list>*

## Mode

Configure

## Description

The **snmp disable port-trap** command controls the types of traps the XP emits based trap type on specific ports. You can disable the following trap types on a per-port basis:

*   Link-state change – use the **link-up-down** keyword to prevent the XP from sending a trap each time a port changes operational state.

## Parameters

*<port list>*          Specifies the port(s) on which you wish to disable traps.

## Restrictions

None.

# snmp set chassis-id

## Purpose

Set the XP's chassis ID using SNMP.

## Format

**snmp set chassis-id** *<chassis-name>*

## Mode

Configure

## Description

The **snmp set chassis-id** command lets you set a string to give the XP an SNMP identity.

## Parameters

*<chassis-name>*  Is a string describing the XP.

## Restrictions

None.

# snmp set community

## Purpose

Set an SNMP community string and specify the access privileges for that string.

## Format

**snmp set community** *<community-name>* **privilege read|read-write**

## Mode

Configure

## Description

The **snmp set community** command sets a community string for SNMP access to the XP. SNMP management stations that want to access the XP must supply a community string that is set on the switch. This command also sets the level of access to the XP to read-only or read-write. Communities that are read-only allow SNMP *GETs* but not SNMP *SETs*. Communities that have read-write access allow both SNMP GETs and SNMP SETs.

## Parameters

**community** *<community-name>*
   Character string for the community string.

**privilege read|read-write**
   Access level. Specify one of the following:

| | |
|---|---|
| **read** | Allows SNMP GETs but not SNMP SETs. |
| **read-write** | Allows SNMP GETs and SNMP SETs. This option allows you to view, edit, and create table entries using standard SNMP methods for the ipNetToMedia table (IP-MIB, RFC-2011). The following restrictions apply: |

   - You cannot set the ipNetToMediaIfIndex and ipNetToMediaNetAddress objects.

   - Setting "static" ipNetToMediaType entries to "invalid" or "dynamic" works only for ARP entries associated with an **arp add** configuration command or those created via the ipNetToMedia table.

   - To create a new row, set ipNetToMediaPhysAddress with a unique index. By default, the type for this entry is "static."

## Restrictions

None.

## Example

To set the SNMP community string to "public," which has read-only access:

xp(config)# **snmp set community public privilege read**

# snmp set mib

## Purpose

Enables or disables a given MIB module in the SNMP agent.

## Format

**snmp set mib name** *<mib-name>* **status enable| disable**

## Mode

Configure

## Description

The **snmp set mib** command allows you to enable or disable a particular MIB module in the SNMP agent.

## Parameters

*<mib-name>*
Character string for the MIB module you wish to enable or disable. The following MIB modules are supported by the SNMP agent:

| | |
|---|---|
| **LAG-MIB** | IEEE 802.3ad LACP |
| **SNMPv2-MIB** | System and snmp group objects |
| **EtherLike-MIB** | IEEE 802.3 detailed ethernet statistics |
| **IF-MIB** | Interfaces group: ifTable, ifXTable, ifStackTable |
| **IP-MIB** | IP group containing global IP statistics |
| **IP-FORWARD-MIB** | IP CIDR Route Table |
| **UDP-MIB** | UDP statistics group |
| **TCP-MIB** | TCP Statistics group |
| **BGP4-MIB** | Border Gateway Protocol Version 4 mib |
| **OSPF-MIB** | OSPF Version 2 mib |
| **RIPv2-MIB** | RIP Version 2 mib |
| **BRIDGE-MIB** | Transparent layer 2 bridging protocol mib |
| **FRAME-RELAY-DTE-MIB** | Frame Relay mib |

| | |
|---|---|
| **PPP-LCP-MIB** | Point to Point Link Control Protocol mib |
| **PPP-SEC-MIB** | Point to Point Security mib |
| **PPP-IP-NCP-MIB** | Point to Point IP Network Control Protocol |
| **PPP-BRIDGE-NCP-MIB** | Point to Point Bridge Control Protocol |
| **DS1-MIB** | Transmission statistics for DS1 serial line protocol |
| **DS3-MIB** | Transmission statistics for DS3 serial line protocol |
| **SONET-MIB** | Transmission statistics for SONET |
| **ATM-MIB** | Transmission statistics for ATM |
| **RADIUS-AUTH-CLIENT-MIB** | Radius client protocol statistics |
| **RMON-MIB** | Remote Monitoring for Layer 2 traffic |
| **RMON2-MIB** | Remote Monitoring for Layer 3/4 traffic |
| **VRRP-MIB** | Virtual Router Redundancy Protocol |
| **DVMRP-MIB** | Distance Vector Multicast Routing Protocol |
| **IGMP-MIB** | Internet Group Membership Protocol MIB, Multicast |
| **MAU-MIB** | IEE 802.3 Medium Attachment Units (MIB) |
| **APPLETALK-MIB** | AppleTalk MIB II |
| **FDDI-MIB** | FDDI MIB |
| **DEC-ELAN-EXT-MIB** | DEC FDDI Extensions MIB |
| **NOVELL-RIPSAP-MB** | Novell RIPSAP MIB |
| **NOVELL-IPX-MIB** | Novell IPX MIB |
| **CDP-MIB** | Cabletron Discovery Protocol |
| **POLICY-MIB** | Policy Configuration MIB |
| **CONFIG-MIB** | Configuration control mib |
| **HARDWARE-MIB** | Chassis, environmental and inventory statistics |
| **SERVICE-STATUS-MIB** | Operational protocol statistics |
| **CAPACITY-MIB** | Device capacity usage statistics |
| **CTRON-MIB2-MIB** | Cabletron extension to MIB-II |
| **CTRON-CONTAINER-MIB** | Cabletron container MIB |
| **CTRON-CHASSIS-MIB** | Cabletron chassis MIB (6SSRM-02 only) |
| **CT-DOWNLOAD-MIB** | Cabletron download MIB |

**status**
Specifies whether to enable or disable the MIB module:

**enable**          Enables the MIB module

**disable**         Disables the MIB module

## Restrictions

None.

## Example

To enable the RMON2-MIB in the SNMP agent:

```
xp(config)# snmp set mib rmon2-mib status enable
```

# snmp set target

## Purpose

Sets the target IP address and community string for SNMP traps.

## Format

**snmp set target** *<IP-addr>* **community** *<community-name>* **[status enable|disable]**

## Mode

Configure

## Description

The **snmp set target** command specifies the IP address of the target server(s) to which you want the XP to send SNMP traps. You may configure multiple targets with the same IP address and different community strings, but traps will not be sent to a target if the community string specified on the target is not configured. Trap targets are enabled by default but you can use the status argument to disable or re-enable a target.

**Note:**   In general, community strings sent with traps should not have read-write privileges.

## Parameters

*<IP-addr>*
   Is the IP address of the management station from which you want to be able to access the traps.

**Note:**   The target IP address should be locally attached to the XP. Cold start traps might not reach their destination if the target requires dynamic route table entries to be forwarded correctly. The XP will retry every minute up to four minutes on the cold-start trap.

*<community-name>*
   Is the name of the SNMP community for which you are setting the trap target.

*<port >*
   The UDP port to which to send the trap. The default port is udp/162.

*<owner>*
   The administrative owner of the trap destination—monitor by default.

**status enable|disable**
   Re-enables or disables the target.

## Restrictions

None.

# snmp show

## Purpose

Shows SNMP information.

## Format

**snmp show access|all|chassis-id|community|statistics|tftp|trap|mibs**

## Mode

Enable

## Description

The **snmp show** command shows the following SNMP information:

- Community strings set on the XP

- SNMP Statistics

- IP address of SNMP trap target server

## Parameters

| | |
|---|---|
| **access** | Displays the last five SNMP clients to access the XP. |
| **all** | Displays all SNMP information (equivalent to specifying all the other keywords). |
| **chassis-id** | Displays the XP's SNMP name. |
| **community** | Displays the XP's community string. |
| **statistics** | Displays SNMP statistics. |
| **tftp** | Show tftp SNMP status. |
| **trap** | Displays the IP address of the trap target server. |
| **mibs** | Displays the SNMP MIB registry. |

## Restrictions

None.

## Examples

The following command displays a log of SNMP access to the XP. The host that accessed the XP and the XP system time when the access occurred are listed.

```
xp(config)# snmp show access
SNMP Last 5 Clients:
        10.15.1.2              Wed Feb 7 18:42:59 2001
        10.15.1.2              Wed Feb 7 18:42:55 2001
        10.15.1.2              Wed Feb 7 18:42:56 2001
        10.15.1.2              Wed Feb 7 18:42:57 2001
        10.15.1.2              Wed Feb 7 18:42:58 2001
```

To display the SNMP identity of the XP:

```
xp(config)# snmp show chassis-id

SNMP Chassis Identity:
s/n 123456
```

To display the IP address of the trap target server:

```
xp(config)# snmp show trap

Trap Table:
Index   Trap    Target   Addr    Community String     Status
1.              10.15.1.2        public               enabled
2.              1.2.3.4          public123            disabled
3.              5.6.7.8          public20             disabled
```

# snmp stop

## Purpose

Stop SNMP access to the device.

## Format

**snmp stop**

## Mode

Configure

## Description

The **snmp stop** command stops SNMP access to the XP. The XP will still finish all active requests but will then disregard future requests. When you issue this command, UDP port 161 is closed.

## Parameters

None.

## Restrictions

None.

# snmp test trap

## Purpose

Tests SNMPv1 notifications to currently configured managers.

## Format

**snmp test trap type ps-failure| ps-recover| vrrpNewMaster| coldStart| linkDown |linkUp**

## Mode

Enable

## Description

The **snmp test trap** command allows you to test the SNMPv1 notifications to the managers currently configured. You can test the following notification types:

- PS-failure

- PS-recover

## Parameters

| | |
|---|---|
| **ps-failure** | Tests the power supply failure trap notification. |
| **ps-recover** | Tests the power supply recover trap notification. |
| **vrrpNewMaster** | Tests the Virtual Router Redundancy New Master Trap. |
| **coldStart** | Send coldStart trap to manager. |
| **linkDown** | Send link down for ifIndex 1 to manager. |
| **linkUp** | Send link up for ifIndex 1 to manager. |

## Restrictions

None.

# Chapter 62

# sonet Commands

The **sonet** commands allows you to configure and display various parameters for Synchronous Optical Network (SONET) encapsulation. These commands allows you to accommodate Packet-over-SONET (POS) and ATM (asynchronous transfer mode) transmission using the XP.

Packet-over-SONET technology provides the ability to transmit IP packets and ATM cells over a SONET backbone by encapsulating them into a SONET frame. In reference to the OSI Layer model, the SONET layer rests right beneath the IP layer or the ATM layer. Based on the transmission mechanism of SONET frames, the result is larger traffic bandwidth and faster line speed (OC-3), accommodating QoS guarantees as well as the ability to deliver voice/video data over an internetwork.

SONET frames carry a large amount of data stored as overhead. This overhead information provide the information for OAM&P (operation, administration, management, and provisioning) capabilities, such as performance monitoring, automatic protection switching, and path tracing.

Enterasys SONET technology features Automatic Protection Switching, performance monitoring capabilities, as well as commercial circuit identification.

# Command Summary

Table 47 lists the **sonet** commands. The sections following the table describe the command syntax.

**Table 47. sonet commands**

| |
|---|
| **sonet set** *<SONET ports>* **C2** *<num>* |
| **sonet set** *<SONET ports>* **circuit-id** *<string>* |
| **sonet set** *<SONET ports>* **fcs-16-bit** |
| **sonet set** *<SONET ports>* **framing sonet\| sdh** |
| **sonet set** *<SONET ports>* **J0** *<num>* |
| **sonet set** *<SONET ports>* **loopback none\| line-facility\| serial-terminal\| parallel** |
| **sonet set** *<SONET ports>* **path-trace** *<string>* |
| **sonet set** *<SONET ports>* **payload-scramble on\| off** |
| **sonet set** *<SONET ports>* **protected-by** *<SONET port>* |
| **sonet set** *<SONET ports>* **protection 1+1** |
| **sonet set** *<SONET ports>* **protection-switch lockoutprot\| forced\| manual** |
| **sonet set** *<SONET ports>* **reverting nonrevertive\| revertive** |
| **sonet set** *<SONET ports>* **S1S0** *<num>* |
| **sonet set** *<SONET ports>* **sd-ber** *<num>* |
| **sonet set** *<SONET ports>* **sf-ber** *<num>* |
| **sonet set** *<SONET ports>* **sts-stream-scramble on\|off** |
| **sonet set** *<SONET ports>* **WTR-timer** *<num>* |
| **sonet show aps** *<SONET ports>* |
| **sonet show loopback** *<SONET ports>* |
| **sonet show medium** *<SONET ports>* |
| **sonet show pathtrace** *<SONET ports>* |

# sonet set C2

## Purpose

Sets a value for the C2 flag.

## Format

**sonet set** *<SONET ports>* **C2** *<num>*

## Mode

Configure

## Description

The **sonet set C2** command allows you to specify a value for the C2 flag. SONET frames carry overhead for path, section and line for easier multiplexing and better OAM&P (operation, administration, management, and provisioning) capabilities.

The SONET frame overhead information is stored in separate bytes, or flags.

There are nine bytes allocated for section overhead labeled A1, A2, B1, D1, D2, D3, E1, F1, J0/Z0.

There are 18 bytes allocated for line overhead labeled H1, H2, H3, B2, K1, K2, D4, D5, D6, D7, D8, D9, D10, D11, D12, S1/Z1, M0/M1, and E2.

There are nine bytes allocated for path overhead labeled J1, B3, C2, H4, G1, P2, Z3, Z4, and Z5.

The **sonet set C2** command set the C2 flag. The C2 flag is the path signal label byte used to indicate the contents of the synchronous payload envelope.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| *<num>* | Specifies the value of the C2 flag. Specify any number between 0 and 255. |

## Restrictions

None.

## Example

To set the C2 flag to 16 on port so.2.1:

xp(config)# **sonet set so.2.1 C2 16**

# sonet set circuit-id

## Purpose

Sets a circuit identifier.

## Format

**sonet set** *<SONET ports>* **circuit-id** *<string>*

## Mode

Configure

## Description

The **sonet set circuit-id** command allows you to set a circuit identifier on a specified SONET port. This command is for administrative purposes, used to identify this line and associate it with a certain customer circuit. Primarily used for service level management.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| *<string>* | Specifies the circuit identifier. The maximum length must be 64 bytes or less. |

## Restrictions

None.

## Example

To identify the circuit line on port so.2.1 to as 'customer1':

```
xp(config)# sonet set so.2.1 circuit-id customer1
```

# sonet set fcs-16-bit

## Purpose

Sets the frame check sequence to 16 bits.

## Format

**sonet set** *<SONET ports>* **fcs-16-bit**

## Mode

Configure

## Description

The **sonet set fcs-16-bit** command allows you to set the frame check sequence (FCS) field length of the SONET frame to 16 bits. By default, this field length is set to 32 bits (4 octets). Using this command, you can set the frame check sequence field length to 16 bits (2 octets) instead.

The FCS field is used as an error check mechanism during frame transmission. An FCS value is calculated before transmission based on destination address, source address, and other data inside the frame. The FCS field inside the SONET frame carries this value. After the frame arrives to the destination, the FCS value is calculated again and compared with the value in the FCS field. This is done to ensure that there was no errors during transmission.

## Parameters

*<SONET ports>*          Specifies the SONET port name(s).

## Restrictions

None.

## Example

To set the frame check sequence on port so.2.1 to 16 bits:

```
xp(config)# sonet set so.2.1 fcs-16-bit
```

# sonet set framing

## Purpose

Sets optical framing for SONET or SDH.

## Format

**sonet set** *<SONET ports>* **framing sonet| sdh**

## Mode

Configure

## Description

The **sonet set framing** command allows you to specify the SONET frame type for mapping the data. The two options are SONET (Synchronous Optical Network) which is an ANSI standard, or SDH (Synchronous Digital Hierarchy) which is an ITU standard.

There are minor differences between the two standards. One such difference is that SONET has a basic transmission rate of OC-1 (51.84 Mbps), whereas SDH has a basic transmission rate of OC-3 (155.52 Mbps).

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| **sonet** | Sets the optical framing standard to SONET. |
| **sdh** | Sets the optical framing standard to SDH. |

## Restrictions

None.

## Example

To set optical framing on port so.2.1 to SONET:

```
xp(config)# sonet set so.2.1 framing sonet
```

# sonet set J0

## Purpose

Sets a value for the J0 flag.

## Format

**sonet set** *<SONET ports>* **J0***<num>*

## Mode

Configure

## Description

The **sonet set J0** command allows you to specify a value for the J0 flag. SONET frames carry overhead for path, section and line for easier multiplexing and better OAM&P (operation, administration, management, and provisioning) capabilities.

The SONET frame overhead information is stored in separate bytes, or flags.

There are nine bytes allocated for section overhead labeled A1, A2, B1, D1, D2, D3, E1, F1, J0/Z0.

There are 18 bytes allocated for line overhead labeled H1, H2, H3, B2, K1, K2, D4, D5, D6, D7, D8, D9, D10, D11, D12, S1/Z1, M0/M1, and E2.

There are nine bytes allocated for path overhead labeled J1, B3, C2, H4, G1, P2, Z3, Z4, and Z5.

The **sonet set J0** command set the J0 flag. The J0 flag is the section trace byte.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| *<num>* | Specifies the value of the J0 flag. Specify any number between 0 and 255. |

## Restrictions

None.

# Example

To set the J0 flag to 16 on port so.2.1:

xp(config)# **sonet set so.2.1 J0 16**

# sonet set loopback

## Purpose

Exercises loopback functionality.

## Format

**sonet set** *<SONET ports>* **loopback none| line-facility| serial-terminal| parallel**

## Mode

Configure

## Description

The **sonet set loopback** command allows you to exercise loopback functionality on a specified SONET port. Loopback is used to verify connectivity between two devices.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| **none** | Disables loopback functionality. Loopback is disabled by default. |
| **line-facility** | Line or facility loopback connects high speed receive data to high speed transmit data. |
| **serial-terminal** | Serial or terminal loopback connects high speed transmit to high speed receive data. |
| **parallel** | Parallel loopback connects byte wide transmit to receive processor. |

## Restrictions

None.

## Example

To connect high speed receive data to high speed transmit on port so.2.1:

```
xp(config)# sonet set so.2.1 loopback line-facility
```

# sonet set path-trace

## Purpose

Sets a path trace message.

## Format

**sonet set** *<SONET ports>* **path-trace** *<string>*

## Mode

Configure

## Description

The **sonet set path-trace** command allows you to set a message in a buffer to be sent as a path-trace message.

The path trace message is part of the path overhead of the transport overhead in every SONET frame. This path trace byte is a 64 byte (or less) message string that is used by the destination and source to notify each other that they are connected within a path.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| *<string>* | Specifies a character string. The maximum length must be 64 bytes or less. |

## Restrictions

None.

## Example

To send the path trace message 'tracer' on port so.2.1:

```
xp(config)# sonet set so.2.1 path-trace tracer
```

# sonet set payload-scramble

## Purpose

Enables scrambling and descrambling of the STS (synchronous transfer signal) payload.

## Format

**sonet set** *<SONET ports>* **payload-scramble on| off**

## Mode

Configure

## Description

The **sonet set payload-scramble** command allows you to enable scrambling or descrambling of the payload encapsulated in the STS frame. Scrambling the STS payload is important in optimizing the transmission density of the data stream. Since all SONET transmission use the same source clock for timing, scrambling the payload using a random number generator converts the data stream to a more random sequence. This ensures optimal transmission density of the data stream.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| **on** | Enables scrambling and descrambling of the STS payload. |
| **off** | Disables scrambling and descrambling of the STS payload. |

## Restrictions

None.

## Example

To enable scrambling on port so.2.1:

```
xp(config)# sonet set so.2.1 payload-scramble on
```

# sonet set protected-by

## Purpose

Configures an APS protecting port.

## Format

**sonet set** *<SONET ports>* **protected-by** *<SONET port>*

## Mode

Configure

## Description

The **sonet set protecting** command allows you to specify a protecting port for Automatic Protection Switching (APS). APS is used to provide redundancy for transmission between two SONET devices. This ensures that if a link goes down, traffic can be automatically switched to a secondary backup link and the connection remains operational.

With APS, there is a **working** (primary) port and a **protecting** (backup) port. APS automatically switches all traffic over from the **working** to the **protecting** port in case of signal degradation or failure in receive on the working port.

This command is used in conjunction with the **sonet set protection** command.

## Parameters

*<SONET ports>*        Specifies the SONET port name(s).

**protected-by** *<SONET port>*
                        Specifies the APS protecting port. This must be a single port. Only valid for Packet-over-SONET ports.

## Restrictions

None.

## Example

To set so.1.1 as the APS protecting port for so.2.1:

```
xp(config)# sonet set so.2.1 protection 1+1 protected by so.1.1
```

# sonet set protection

## Purpose

Configures an APS working port.

## Format

**sonet set** *<SONET ports>* **protection 1+1**

## Mode

Configure

## Description

The **sonet set protection 1+1** command allows you to configure a working port for Automatic Protection Switching (APS). This working port will be protected by the protecting port. APS is used to provide redundancy for transmission between two SONET devices. This ensures that if a link goes down, traffic can be automatically switched to a secondary backup link and the connection remains operational.

With APS, there is a **working** (primary) port and a **protecting** (backup) port. APS automatically switches all traffic over from the **working** to the **protecting** port in case of signal degradation or failure in receive on the working port.

This command is used in conjunction with the sonet set **protected-by** option.

Negate this command to disable APS on the SONET port.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| **1+1** | Specifies the 1+1 APS scheme, where one working port is matched with one protecting port. |

## Restrictions

None.

# Example

To configure so.2.1 as an APS working port protected by so.1.1:

xp(config)# **sonet set so.2.1 protection 1+1 protected-by so.1.1**

# sonet set protection-switch

## Purpose

Configures protection switching parameters.

## Format

**sonet set** *<SONET ports>* **protection-switch lockoutprot| forced| manual**

## Mode

Configure

## Description

The **sonet set protection-switch** command allows you to configure SONET Automatic Protection Switching (APS) on a SONET port. With APS, there is a **working** (primary) port and a **protecting** (backup) port. APS automatically switches all traffic over from the **working** to the **protecting** port in case of signal degradation or failure in receive on the working port.

Use this command to configure the APS switching characteristics for a SONET port.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| **lockoutprot** | Prevents APS switching from a **working** port to a **protecting** port in the case of signal failure or signal degrade. This command is configured only on the protecting port. |
| **forced** | Allows protection switching to occur. Switches service from this port to the other port, even when there are errors on the other port. |
| **manual** | Allows you to manually switch service from a port to the other APS port. This is provided that there are no errors on the protecting port. This command can be configured on either the working port or the protecting port. |

## Restrictions

None.

# Example

To configure APS switching for the working port so.2.1:

xp(config)# sonet **set so.2.1 protection-switch forced**

# sonet set reverting

## Purpose

Sets SONET protection switching to revertive or nonrevertive mode.

## Format

**sonet set** *<SONET ports>* **reverting nonrevertive| revertive**

## Mode

Configure

## Description

The **sonet set reverting** command allows you to select whether traffic will be switched back to the working port from the protecting port after the signal degrade or failure condition has been corrected. Once the condition has been corrected, APS waits for a specified time period (WTR-timer) before switching back to the working port.

With APS, there is a **working** (primary) port and a **protecting** (backup) port. APS automatically switches all traffic over from the **working** to the **protecting** port in case of signal degradation or failure in receive on the working port.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| **nonrevertive** | Prevents automatic switch back to the **working** port from the **protecting** port after the signal degrade or failure condition has been corrected. |
| **revertive** | Allows traffic to switch back from the **protecting** port to the **working** port after the signal degrade or failure condition has been corrected and after the Wait-to-Restore timer has expired. |

## Restrictions

None.

# Example

To set APS switching to revertive mode for the protecting port so.2.1:

xp(config)# sonet **set so.2.1 reverting revertive**

# sonet set S1S0

## Purpose

Sets a value for the S1/S0 flag.

## Format

**sonet set** *<SONET ports>* **S1S0** *<num>*

## Mode

Configure

## Description

The **sonet set S1S0** command allows you to specify a value for the S1/S0 flag. SONET frames carry overhead for path, section and line for easier multiplexing and better OAM&P (operation, administration, management, and provisioning) capabilities.

The SONET frame overhead information is stored in separate bytes, or flags.

There are nine bytes allocated for section overhead labeled A1, A2, B1, D1, D2, D3, E1, F1, J0/Z0.

There are 18 bytes allocated for line overhead labeled H1, H2, H3, B2, K1, K2, D4, D5, D6, D7, D8, D9, D10, D11, D12, S1/Z1, M0/M1, and E2.

There are nine bytes allocated for path overhead labeled J1, B3, C2, H4, G1, P2, Z3, Z4, and Z5.

The **sonet set S1S0** command set the S1/S0 flag. The S1/S0 flag is the line synchronization status byte used to indicate synchronization state of the line terminating devices.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| *<num>* | Specifies the value of the S1/S0 flag. Specify any number between 0 and 3. |

## Restrictions

None.

## Example

To set the S1/S0 flag to 1 on port so.2.1:

xp(config)# **sonet set so.2.1 S1S0 1**

# sonet set sd-ber

## Purpose

Sets the Bit Error Rate (BER) signal degrade threshold level.

## Format

**sonet set** *<SONET ports>* **sd-ber** *<num>*

## Mode

Configure

## Description

The **sonet set sd-ber** command allows you to specify a signal degrade threshold level. There are two threshold levels based on the Bit Error Rate: signal degrade and signal failure. These two threshold levels act as a two stage alarm system, where the signal degrade threshold is always met first before the signal failure threshold.

Once the BER reaches the signal degrade threshold level, then a signal degrade alarm occurs and the receive is considered to be in signal degrade condition. Based upon the APS configuration, all traffic is switched from the working port to the protecting port.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| *<num>* | Specifies the Bit Error Rate signal degrade threshold level in $10^{-n}$. Specify any number for n between 5 to 9. The default is 6, indicating a threshold level of $10^{-6}$. This means that a signal degrade alarm occurs if the Bit Error Rate rises past the 1/1000000 level. |

## Restrictions

None.

## Example

To set the BER signal degrade threshold level to $10^{-6}$ or 1/1000000:

```
xp(config)# sonet set so.2.1 sd-ber 6
```

# sonet set sf-ber

## Purpose

Sets the Bit Error Rate (BER) signal failure threshold level.

## Format

**sonet set** *<SONET ports>* **sf-ber** *<num>*

## Mode

Configure

## Description

The **sonet set sf-ber** command allows you to specify a signal failure threshold level. There are two threshold levels based on the Bit Error Rate: signal degrade and signal failure. These two threshold levels act as a two-stage alarm system, whereby the signal degrade threshold is always met first before the signal failure threshold.

Once the BER reaches the signal failure threshold level, then a signal failure alarm occurs and the receive is considered to be in signal failure condition. Based upon the APS configurations, all traffic is switched from the working port to the protecting port.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| *<num>* | Specifies the Bit Error Rate signal failure threshold level in $10^{-n}$. Specify any number for n between 3 to 5. The default is 3, indicating a threshold level of $10^{-3}$. This means that a signal failure alarm occurs if the Bit Error Rate rises past the 1/1000 level. |

## Restrictions

None.

## Example

To set the BER signal failure threshold level to $10^{-3}$ or 1/1000:

```
xp(config)# sonet set so.2.1 sf-ber 3
```

# sonet set sts-stream-scramble

## Purpose

Enables scrambling or descrambling of the STS (synchronous transfer signal) stream.

## Format

**sonet set** *<SONET ports>* **sts-stream-scramble on| off**

## Mode

Configure

## Description

The **sonet set sts-stream-scramble** command allows you to enable scrambling and descrambling of the STS stream. Scrambling the STS stream is important in optimizing the transmission density of the data stream. Since all STS transmission use the same source clock for timing. Scrambling the payload using a random number generator converts the data stream to a more random sequence. This ensures optimal transmission density of the data stream.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| **on** | Enables scrambling and descrambling of the STS stream. |
| **off** | Disables scrambling and descrambling of the STS stream. |

## Restrictions

None.

## Example

To enable scrambling on port so.2.1:

```
xp(config)# sonet set so.2.1 sts-stream-scramble on
```

# sonet set WTR-timer

## Purpose

Sets the Wait-to-Restore timer.

## Format

**sonet set** *<SONET ports>* **WTR-timer** *<num>*

## Mode

Configure

## Description

The **sonet set WTR-timer** command allows you to set the Wait-to-Restore timer. The WTR-timer specifies a time period that must expire before traffic is switched back to the working port from the protecting port. Once the signal degrade or failure condition has been corrected, APS waits until the WTR-timer expires before switching back to the working port.

## Parameters

| | |
|---|---|
| *<SONET ports>* | Specifies the SONET port name(s). |
| *<num>* | Specifies the WTR timer (in minutes). Specify any number between 5 and 12 minutes. The **default** is 5 minutes. |

## Restrictions

None.

## Example

To set the WTR-timer to 6 minutes on port so.2.1:

```
xp(config)# sonet set so.2.1 WTR-timer 6
```

# sonet show aps

## Purpose

Displays APS status.

## Format

**sonet show aps** *<SONET ports>*

## Mode

Enable

## Description

The **sonet show aps** command allows you to display APS (automatic protection switching) status. This command allows you to display such APS parameters as protection level, working or protecting port, directionality, and switch status.

## Parameters

*<SONET ports>*          Specifies the SONET port name(s).

## Restrictions

None.

## Example

To display the APS status for port so.2.1:

```
xp# sonet show aps so.2.1
```

# sonet show loopback

## Purpose

Displays loopback status.

## Format

**sonet show loopback** *<SONET ports>*

## Mode

Enable

## Description

The **sonet show loopback** command allows you to display loopback status for a specified SONET port. Loopback is used to verify connectivity between two devices.

## Parameters

*<SONET ports>*          Specifies the SONET port name(s).

## Restrictions

None.

## Example

To display the loopback status for port so.2.1:

xp# **sonet show loopback so.2.1**

# sonet show medium

## Purpose

Displays SONET optical line values.

## Format

**sonet show medium** *<SONET ports>*

## Mode

Enable

## Description

The **sonet show medium** command allows you to display the various SONET optical line values associated with a SONET port. This command will allow you to display values such as framing status, line type, and administrator-specified circuit identifier.

## Parameters

*<SONET ports>*          Specifies the SONET port name(s).

## Restrictions

None.

## Example

To display optical line values for port so.2.1:

```
xp# sonet show medium so.2.1
```

# sonet show pathtrace

## Purpose

Displays received path trace messages.

## Format

**sonet show pathtrace** *<SONET ports>*

## Mode

Enable

## Description

The **sonet show pathtrace** command allows you to display path trace messages received on a specified SONET port.

## Parameters

*<SONET ports>*          Specifies the SONET port name(s).

## Restrictions

None.

## Example

To display the path trace messages for port so.2.1:

xp# **sonet show pathtrace so.2.1**

# Chapter 63

# statistics Commands

The **statistics** commands allow the user to display statistics for various XP features. You also can clear some statistics.

## Command Summary

Table 48 lists the statistics commands. The sections following the table describe the command syntax.

**Table 48.  statistics commands**

| |
|---|
| **statistics clear** *<statistic-type>* *<port-list>*\|**all-ports** |
| **statistics clear appletalk** |
| **statistics show appletalk-atp\|-ddp\|-echo\|-interface\|-nbp\|-routing\|-zip** |
| **statistics show arp** *<string>*\|**all** |
| **statistics show icmp** |
| **statistics show ip** |
| **statistics show ip-interface** *<string>*\|**all [packets] [bytes] [errors] [input] [output]\|verbose** |
| **statistics show ip-routing** |
| **statistics show ipx** |
| **statistics show ipx-interface** *<string>*\|**all packets bytes errors input output verbose** |
| **statistics show ipx-routing** |
| **statistics show multicast** |
| **statistics show framer** *<port-list>* |

**Table 48. statistics commands (Continued)**

| |
|---|
| **statistics show port-errors** *<port/*SmartTRUNK-*list>*\|**all-ports** |
| **statistics show port-packets** *<port-list>*\|**all-ports** |
| **statistics show port-stats** *<port/*SmartTRUNK-*list>*\|**all-ports** |
| **statistics show rarp** *<string>*\|**all** |
| **statistics show summary-stats** |
| **statistics show tcp** |
| **statistics show udp** |
| **statistics show most-active** |
| **statistics show vlan all**\|*<string>* |
| **statistics clear vlan all**\|*<string>* |

# statistics clear

## Purpose

Clear statistics.

## Format

**statistics clear** *<statistic-type> <port-list>*|**all-ports**

## Mode

Enable

## Description

The **statistics clear** command clears port statistics, error statistics, or RMON statistics. When you clear statistics, the XP sets the counters for the cleared statistics to 0, then begins accumulating the statistics again.

## Parameters

*<statistic-type>*
> Type of statistics you want to clear. Specify one of the following:

| | |
|---|---|
| **port-errors** | Clears all error statistics for the specified port. Specify **all-ports** to clear error statistics for all ports. |
| **port-packets** | Clears all packet statistics for the specified port. Specify **all-ports** to clear packet statistics for all ports. |
| **port-stats** | Clears all normal (non-error) statistics for the specified port. Specify **all-ports** to clear port statistics for all ports. |
| **rmon** | Clears all RMON statistics for the specified port. Specify **all-ports** to clear rmon statistics for all ports. |
| **ip** | Clears all IP statistics. Specify **all-ports** to clear ip statistics for all ports. |
| **ipx** | Clears all IPX statistics. Specify **all-ports** to clear ipx statistics for all ports. |
| **appletalk** | Clears all AppleTalk statistics. When you clear statistics, the XP sets the counters for the cleared statistics to 0, then begins accumulating the statistics again. |
| **icmp** | Clears all ICMP statistics. |

*<port-list>*

The ports for which you are clearing statistics. You can specify a single port or a comma-separated list of ports. Example: et.1.3,et.(1-3).(4,6-8). Specify **all-ports** to clear statistics for all the XP ports.

## Restrictions

None.

# statistics show appletalk

## Purpose

Displays various AppleTalk statistics.

## Format

**statistics show appletalk-atp|-ddp|-echo|-interface|-nbp|-routing|-zip**

## Mode

Enable

## Parameters

| | |
|---|---|
| **atp** | Displays statistics for the AppleTalk Transaction Protocol. |
| **ddp** | Displays statistics for the Datagram Delivery Protocol |
| **echo** | Displays statistics for the Echo Protocol. |
| **interface** | Displays interface statistics. |
| **nbp** | Displays statistics for the Name Binding Protocol (NBP). |
| **routing** | Displays statistics for the Routing Table Maintenance Protocol (RTMP). |
| **zip** | Displays statistics for the Zone Information Protocol (ZIP). |

## Restrictions

None.

# statistics show arp

## Purpose

Display address resolution protocol (ARP) statistics.

## Format

**statistics show arp** *<string>*|**all**

## Mode

Enable

## Parameters

*<string>*|**all**
   Specifies the name of an interface. Specify **all** to display ARP statistics for all interfaces.

## Restrictions

None.

## Example

To display ARP statistics on interface 'en0':

```
xp# statistics show arp en0

Interface en0:
     1 requests sent
     19 replies sent
     0 proxy replies sent
     Last 5 Requests Sent
     ----- no arp requests sent -----
     Last 5 Replies Sent
     134.141.179.129 | Yago    16:BF:21     |2000-04-17 13:12:49
     134.141.179.129 | Yago    16:BF:21     |2000-04-17 13:50:15
     134.141.179.129 | Yago    16:BF:21     |2000-04-17 15:32:32
     134.141.179.129 | Yago    16:BF:21     |2000-04-17 16:17:19
     134.141.179.129 | Yago    16:BF:21     |2000-04-17 11:12:44

     Last 5 ARP packets received on wrong interface
     ----- no arp packets received on wrong interface -----
```

- requests sent    Displays how many ARP requests have been sent out to an ARP server for address resolution.

- replies sent    Displays how many ARP replies have been sent out to an ARP client in response to request packets.

- proxy replies sent    Displays how many proxy ARP replies have been sent out in response to request packets. A proxy router serving as a gateway to a subnet would respond with a proxy reply.

- Last 5 Requests sent    Displays the last five ARP requests sent, including the following information: target MAC address, date and time sent.

- Last 5 Replies sent    Displays the last five ARP replies sent, including the following information: target IP address, date and time sent.

- Last 5 ARP packets received on wrong interface
     Displays the last five ARP packets that has been received on the wrong interface.

# statistics show icmp

## Purpose

Display internet control message protocol (ICMP) statistics.

## Format

**statistics show icmp**

## Mode

Enable

## Parameters

None.

## Restrictions

None.

## Example

To display ICMP statistics:

```
xp# statistics show icmp
icmp:
     0 messages with bad code fields
     0 messages smaller than minimum length
     0 bad checksums
     0 messages with bad length
     0 message responses generated
```

| | |
|---|---|
| • messages with bad code fields | Displays the number of ICMP messages processed by the router with a bad code field. The code field within the ICMP header uses a number to specify the message content of the ICMP message. An invalid number within the code field would show in this statistic parameter. |
| • messages smaller than minimum length | Displays the number of ICMP messages processed by the router that didn't meet a minimum length requirement. |

| | | |
|---|---|---|
| • | bad checksums | Displays the number of ICMP messages processed by the router with bad checksums. The checksum field within the ICMP header is used to verify that the message was transmitted error-free. A bad checksum indicates an ICMP message with errors. |
| • | messages with bad length | Displays the number of ICMP messages processed by the router with bad or invalid length. |
| • | message responses generated | Displays the number of ICMP responses that have been generated by the router in response to ICMP messages. |

# statistics show ip

## Purpose

Display Internet Protocol (IP) statistics.

## Format

**statistics show ip**

## Mode

Enable

## Parameters

None.

## Restrictions

If you configure multiple protocol types (e.g., IP and IPX) on the same port(s), interface statistics collected for the port(s) will not be accurate—both protocols will gather port statistics.

# Example

To display IP statistics:

```
xp# statistics show ip
ip:
     78564 total packets received
     0 bad header checksums
     0 packets with size smaller than minimum
     0 packets with data size < data length
     0 packets with header length < data size
     0 packets with data length < header length
     0 packets with bad options
     0 packets with incorrect version number
     0 fragments received
     0 fragments dropped (dup or out of space)
     0 fragments dropped after timeout
     0 packets reassembled ok
     2984 packets for this host
     0 packets for unknown/unsupported protocol
     0 packets forwarded
     75580 packets not forwardable
     0 redirects sent
     2120 packets sent from this host
     0 packets sent with fabricated ip header
     0 output packets dropped due to no bufs, etc.
     0 output packets discarded due to no route
     0 output datagrams fragmented
     0 fragments created
     0 datagrams that can't be fragmented
```

| | | |
|---|---|---|
| • | total packets received | Displays the total number of IP packets received by the router, including all forwarded and dropped packets. |
| • | bad header checksums | Displays the number of IP packets received by the router with bad checksums. The checksum field within the IP header is used to verify that the packet was transmitted error-free. A bad checksum indicates an IP packet with errors. |
| • | packets w/size smaller than minimum | Displays the number of IP packets received by the router that didn't meet a minimum length requirement. |
| • | packets w/data size < data length | Displays the number of IP packets received by the router containing a data size smaller than the specified data length. The data length field in the IP header specifies the data length contained within the packet. |

| | | |
|---|---|---|
| • | packets w/header length < data size | Displays the number of IP packets received by the router containing a IP header length smaller than the data size within the packet. |
| • | packets w/data length < header length | Displays the number of IP packets received by the router containing a data length smaller than the IP header length. |
| • | packets w/incorrect version number | Displays the number of IP packets received by the router with an incorrect IP version number. The IP version number field in the IP header is used to specify whether the packet is formatted for IPv4 or IPv6. |
| • | fragments received | Displays the number of datagram fragments received by the router. A datagram that does not fit into an IP packet must be fragmented into two or more packets. |
| • | fragments dropped | Displays the number of datagram fragments dropped by the router. A datagram that does not fit into an IP packet must be fragmented into two or more packets. |
| • | fragments dropped after timeout | Displays the number of datagram fragments dropped by the router after a certain time period. A datagram that does not fit into an IP packet must be fragmented into two or more packets. |
| • | packets reassembled ok | Displays the number of IP packets containing fragmented datagrams that were reassembled successfully at the destination. |
| • | packets for this host | Displays the total number of IP packets received that were intended for the router as the destination. |
| • | packets for unknown protocol | Displays the number of IP packets received by the router that is of an unknown or unsupported routed protocol. |
| • | packets forwarded | Displays the number of IP packets received by the router that were forwarded onto another host. |
| • | packets not forwardable | Displays the total number of IP packets received by the router that could not be forwarded onto another host. |
| • | redirects sent | Displays the number of redirects sent by the router. |
| • | packets sent from this host | Displays the total number of IP packets sent out by the router. |

- packets sent w/fabricated ip header

  Displays the total number of IP packets sent out by the router after attaching an IP header onto the packet.

- output packets dropped due to no bufs

  Displays the total number of IP packets dropped before being sent out by the router because of lack of output buffer space.

- output packets discarded due to no route

  Displays the total number of IP packets dropped before being sent out by the router because of no IP routing information.

- output datagrams fragmented

  Displays the total number of datagrams that were fragmented into two or more IP packets before being sent out by the router.

- fragments created

  Displays the total number of datagram fragments created.

- datagrams that can't be fragmented

  Displays the total number of datagrams that was not successfully fragmented into two or more IP packets.

# statistics show ip-interface

## Purpose

Display IP interface statistics.

## Format

**statistics show ip-interface** *<string>*|**all [packets] [bytes] [errors] [input] [output]|verbose**

## Mode

Enable

## Parameters

*<string>*|**all**
Specifies the name of an interface. Specify **all** to display IP statistics for all interfaces.

**packets**
Specify this optional parameter to display the number of packets that have passed through the interface.

**bytes**
Specify this optional parameter to display the number of bytes that have passed through the interface.

**errors**
Specify this optional parameter to display the number of packets with errors detected through the interface.

**input**
Specify this optional parameter to display interface statistics for the input side.

**output**
Specify this optional parameter to display interface statistics for the output side.

**verbose**
Specify this optional parameter to display statistics on the number of packets, bytes, and errors on both the input and output sides of the interface.

## Restrictions

None.

# Example

To display interface statistics on interface 'en0':

```
xp# statistics show ip-interface en0 verbose

Name In-frames Out-frames  In-bytes  Out-bytes  In-errors Out-errors
en0 0        0        0        0        0        0
```

- In-frames                          Displays the number of packets that have entered the interface.

- Out-frames                         Displays the number of packets that have exited the interface.

- In-bytes                           Displays the number of bytes that have entered the interface.

- Out-bytes                          Displays the number of bytes that have exited the interface.

- In-errors                          Displays the number of packets with errors detected entering the interface.

- Out-errors                         Displays the number of packets with errors detected exiting the interface.

# statistics show ip-routing

## Purpose

Display unicast IP routing statistics.

## Format

**statistics show ip-routing**

## Mode

Enable

## Parameters

None.

## Restrictions

None.

## Example

To display routing statistics:

```
xp# statistics show ip-routing
routing:
    0 bad routing redirects
    0 dynamically created routes
    0 new gateways due to redirects
    1141 destinations found unreachable
    0 uses of a wildcard route
```

| | | |
|---|---|---|
| • | bad routing redirects | Displays the number of bad redirects have occurred. A redirect occurs in the case where the destination interface is the same as the source interface. |
| • | dynamically created routes | Displays the number of IP routes have been created using a routing protocol, as opposed to static routes which are user-defined. |
| • | new gateways due to redirects | Displays the number of new gateways have been added into the routing table due to redirects. |

- destinations found unreachable

  Displays the number of destination addresses that have been found to be unreachable in the routing table. A destination may be unreachable due to the route being expired or being unavailable due to network changes.

- uses of a wildcard route

  Displays the number of times that a wildcard route has been used to forward a packet onto the next-hop destination.

# statistics show ipx

## Purpose

Display internetwork packet exchange (IPX) statistics.

## Format

**statistics show ipx**

## Mode

Enable

## Parameters

None.

## Restrictions

If you configure multiple protocol types (e.g., IP and IPX) on the same port(s), interface statistics collected for the port(s) will not be accurate—both protocols will gather port statistics.

# Example

To display IPX statistics:

```
xp# statistics show ipx
ipx:
      0 total packets received
      0 packets with bad checksums
      0 packets smaller than advertised
      0 packets smaller than a header
      0 packets forwarded
      0 packets not forwardable
      0 packets for this host
      0 packets sent from this host
      0 packets dropped due to no bufs, etc.
      0 packets discarded due to no route
      0 packets too big
      0 packets with too many hops
      0 packets of type 20
      0 packets discarded due to infiltering
      0 packets discarded due to outfiltering
      0 packets with misc protocol errors
      0 rip packets discarded due to socket buffer full
      0 sap packets discarded due to socket buffer full
      0 rip req packets discarded due to socket buffer full
      0 sap gns packets discarded due to socket buffer full
      0 packets discarded due to port of entry zero
      0 packets discarded due to sourced by us
```

- total packets received
  Displays the total number of IPX packets received by the router, including all forwarded and dropped packets.

- bad header checksums
  Displays the number of IPX packets received by the router with bad checksums. The checksum field within the IPX header is used to verify that the packet was transmitted error-free. A bad checksum indicates an IPX packet with errors.

- packets smaller than advertised
  Displays the number of IPX packets received by the router that are smaller than what the header indicates as the size.

- packets smaller than a header
  Displays the number of IPX packets received by the router that are smaller than the IPX header.

- packets forwarded
  Displays the number of IPX packets received by the router that have been forwarded onto the next-hop destination.

- packets not forwardable
  Displays the total number of IPX packets received by the router that could not be forwarded onto another host.

|   |   |   |
|---|---|---|
| • | packets for this host | Displays the total number of IPX packets received that were intended for the router as the destination. |
| • | packets sent from this host | Displays the total number of IPX packets sent out by the router. |
| • | packets dropped due to no bufs | Displays the total number of IPX packets dropped before being sent out by the router because of lack of buffer space. |
| • | packets discarded due to no route | Displays the total number of IPX packets dropped before being sent out by the router because of no IPX routing information. |
| • | packets too big | Displays the total number of IPX packets that exceed a size threshold. |
| • | packets with too many hops | Displays the total number of IPX packets that exceed a number of hops threshold. |
| • | packets of type 20 | Displays the total number of NetBIOS packets. |
| • | packets discarded due to infiltering | Displays the total number of incoming IPX packets that have been discarded due to filtering. Filtering is based upon various access control lists (ACL) such as IPX ACL, SAP ACL, and RIP ACL. |
| • | packets discarded due to outfiltering | Displays the total number of outgoing IPX packets that have been discarded due to filtering. Filtering is based upon various access control lists (ACL) such as IPX ACL, SAP ACL, and RIP ACL. |
| • | packets with misc protocol errors | Displays the total number of IPX packets containing routing protocol errors. |
| • | rip packets discarded | Displays the total number of Routing Information Protocol (RIP) packets that have been discarded due to the socket buffer being full. |
| • | sap packets discarded | Displays the total number of Server Advertisement Protocol (SAP) packets that have been discarded due to the socket buffer being full. |
| • | rip req packets discarded | Displays the total number of Routing Information Protocol (RIP) request packets that have been discarded due to the socket buffer being full. |
| • | sap gns packets discarded | Displays the total number of Service Advertisement Protocol (SAP) Get Nearest Server (GNS) packets that have been discarded due to the socket buffer being full. |

# statistics show ipx-interface

## Purpose

Display IPX interface statistics.

## Format

**statistics show ipx-interface** *<string>*|**all [packets] [bytes] [errors] [input] [output]|verbose**

## Mode

Enable

## Parameters

*<string>*|**all**
Specifies the name of an interface. Specify **all** to display IPX statistics for all interfaces.

**packets**
Specify this optional parameter to display the number of packets that have passed through the interface.

**bytes**
Specify this optional parameter to display the number of bytes that have passed through the interface.

**errors**
Specify this optional parameter to display the number of packets with errors detected through the interface.

**input**
Specify this optional parameter to display interface statistics for the input side.

**output**
Specify this optional parameter to display interface statistics for the output side.

**verbose**
Specify this optional parameter to display statistics on the number of packets, bytes, and errors on both the input and output sides of the interface.

## Restrictions

None.

# Example

To display interface statistics on interface 'en0':

```
xp# statistics show ipx-interface en0 verbose

Name In-frames Out-frames  In-bytes  Out-bytes  In-errors Out-errors
en0 0        0        0        0        0        0
```

- In-frames                    Displays the number of packets that have entered the interface.

- Out-frames                   Displays the number of packets that have exited the interface.

- In-bytes                     Displays the number of bytes that have entered the interface.

- Out-bytes                    Displays the number of bytes that have exited the interface.

- In-errors                    Displays the number of packets with errors detected entering the interface.

- Out-errors                   Displays the number of packets with errors detected exiting the interface.

# statistics show ipx-routing

## Purpose

Display IPX routing statistics.

## Format

**statistics show ipx-routing**

## Mode

Enable

## Parameters

None.

## Restrictions

None.

## Example

To display routing statistics:

```
xp# statistics show ipx-routing
routing:
      0 bad routing redirects
      0 dynamically created routes
      0 new gateways due to redirects
      1141 destinations found unreachable
      0 uses of a wildcard route
```

| | |
|---|---|
| • bad routing redirects | Displays the number of bad redirects have occurred. A redirect occurs in the case where the destination interface is the same as the source interface. |
| • dynamically created routes | Displays the number of IPX routes have been created using a routing protocol, as opposed to static routes which are user-defined. |
| • new gateways due to redirects | Displays the number of new gateways have been added into the routing table due to redirects. |

| | | |
|---|---|---|
| • | destinations found unreachable | Displays the number of destination addresses that have been found to be unreachable in the routing table. A destination may be unreachable due to the route being expired or being unavailable due to network changes. |
| • | uses of a wildcard route | Displays the number of times that a wildcard route has been used to forward a packet onto the next-hop destination. |

# statistics show multicast

## Purpose

Display multicast statistics.

## Format

**statistics show multicast**

## Mode

Enable

## Parameters

None.

## Restrictions

None.

## Example

To display multicast statistics:

```
xp# statistics show multicast
multicast forwarding:
        0 multicast forwarding cache lookups
        0 multicast forwarding cache misses
        0 upcalls to mrouted
        0 upcall queue overflows
        0 upcalls dropped due to full socket buffer
        0 cache cleanups
        0 datagrams with no route for origin
        0 datagrams arrived with bad tunneling
        0 datagrams could not be tunneled
        0 datagrams arrived on wrong interface
        0 datagrams selectively dropped
        0 datagrams dropped due to queue overflow
        0 datagrams dropped for being too large
```

# statistics show framer

## Purpose

Display framer statistics.

## Format

**statistics show framer** *<port list>*

## Mode

Enable

## Parameters

*<port list>*
Specifies the port or group of ports.

## Restrictions

None.

# statistics show port-errors

## Purpose

Display port error statistics.

## Format

**statistics show port-errors** *<port/*SmartTRUNK-*list>***|all-ports**

## Mode

Enable

## Parameters

*<port/*SmartTRUNK-*list>***|all-ports**
   Specifies the port. Specify **all-ports** to display port error statistics for all physical and logical ports.

## Restrictions

None.

## Example

To display port error statistics on port et.2.1:

```
xp# statistics show port-errors et.2.1

Port: et.2.1
----
Error Stats                    Error Stats

-----------                    -----------

CRC errors            0        Carrier sense errors    0

Single collision (tx OK)  0        Many collisions (tx OK)   0

Many collisions (drop)    0        Late collisions        0

Long frames  >1518 bytes  0        Invalid long frames      0

Short frames <64 bytes    0        Alignment errors        0

Deferred transmissions    0        Transmit underruns      0

IP - bad version        0        IP - bad checksum        0

IP - bad header        0        IP - small datagram      0

IP - expand TTL ring      0        IPX - bad header        0

Non-IP/IPX protocol      0        Invalid MAC encap.      0

Internal frame tx error   0        Internal frame rx error   0

Input buffer overflow      0        Packet request overflow   0

Out buffer (low) ovflow    0        Out buffer (med) ovflow    0

Out buffer (high) ovflow   0        Out buffer (ctrl) ovflow   0

Input VLAN drop frame      0
Error stats cleared   * Never Cleared *
```

# statistics show port-packets

## Purpose

Display port packet statistics.

## Format

**statistics show port-packets** *<port-list>*|**all-ports**

## Mode

Enable

## Parameters

*<port-list>*|**all-ports**
Specifies the port. Specify **all-ports** to display port packet statistics for all physical and logical ports.

## Restrictions

None.

## Example

To display port packet statistics on port et.2.1:

```
xp# statistics show port-packets et.2.1

Port: et.2.1
----
RMON Stats           Received          Transmitted

----------          --------          -----------

Unicast frames          0                 0

Multicast frames        0                 0

Broadcast frames        0                 0

64 byte frames          0                 0

65-127 byte frames      0                 0

128-255 byte frames     0                 0

256-511 byte frames     0                 0

512-1023 byte frames    0                 0

1024-1518 byte frames   0                 0

RMON stats cleared   * Never Cleared *
```

# statistics show port-stats

## Purpose

Display normal (non-error) port statistics.

## Format

**statistics show port-stats** <*port/*SmartTRUNK-*list*>|**all-ports**

## Mode

Enable

## Parameters

<*port/*SmartTRUNK-*list*>|**all-ports**
   Specifies the port. Specify **all-ports** to display port statistics for all physical and logical ports.

## Restrictions

None.

# Example

To display port statistics on port et.2.1:

```
xp# statistics show port-stats et.2.1

Port: et.2.1
-------------
Port Stats              Received            Transmitted


----------              --------            -----------

Frames/Packets           0                   0

. Switched frames (bridging)  0                  0

. Local frames (bridging)   0               N/A
. Routed packets         0                  0

  . Switched (data)       0               N/A
  . Consumed by CPU       0                  N/A
Bytes                0                  0

. Bridged bytes           0                   0

. Routed bytes            0                   0

L2 table misses           0               N/A
IP table misses          0               N/A
IPX table misses          0               N/A
IP TTL expirations        0               N/A
IPX TC expirations        0               N/A
1 minute traffic rates
. Average bits/sec         0                   0

. Packet discards         0                   0

. Packet errors           0                   0

. Unicast packets         0                   0

. Multicast packets        0                   0

. Broadcast packets        0                   0

Port stats cleared  * Never Cleared *
```

- **Frames/Packets**

- **Switched frames**Shows the number of frames that have been bridged or forwarded.

- **Local frames**Shows the number of local frames (frames destined for a port that is the same as the port of entry) that was dropped.

- **Routed packets**

- **Switched (data)**Shows the number of packets that was forwarded by the hardware.

- **Consumed by CPU**Shows the number of packets that was sent to the control module to be forwarded.

- **Bytes**

- **Bridged bytes**Shows the number of total bytes that has been bridged.

- **Routed bytes**Shows the number of total bytes that has been routed.

- **L2 table misses**                           Shows the number of times that a Layer-2 frame could not be resolved by the L2 Table.

- **IP table misses**                             Shows the number of times that an IP packet could not be resolved by the IP Routing Table.

- **IPX table misses**                          Shows the number of times that an IPX packet could not be resolved by the IPX Routing Table.

- **IP TTL expirations**                      Shows the number of IP packets that have been received by the port with a Time-to-Live (TTL) header with a value of 1. The IP packet will then be expired at this point.

- **IPX TC expirations**                     Shows the number of IPX packets that have been received by the port with a TC header with a value of 1. The IPX packet will then be expired at this point.

- **1 minute traffic rates**

- **Average bits/sec**Shows an average traffic rate in bits/second for a one-minute time period for a port.

- **Packet discards**Shows the number of packets discarded by a port within a one-minute time period.

- **Packet errors**Shows the number of packets containing errors that was seen by the port within a one-minute time period.

- **Unicast packets**Shows the number of unicast packets that was seen by the port within a one-minute time period.

- **Multicast packets**Shows the number of multicast packets that was seen by the port within a one-minute time period.

- **Broadcast packets**Shows the number of broadcast packets that was seen by the port within a one-minute time period.

- **Port stats Cleared**                     Shows the date and time when the port stats were last cleared.

# statistics show rarp

## Purpose

Display reverse ARP statistics.

## Format

**statistics show rarp** *<string>*

## Mode

Enable

## Parameters

*<string>*|**all**
   Specifies the interface name. Specify **all** to display reverse ARP statistics for all interfaces.

## Restrictions

None.

## Example

To display reverse ARP statistics on interface 'en0':

```
xp# statistics show rarp en0

Interface en0:
     0 requests received
     0 replies sent
     0 requests received on interface with rarpd disabled
     0 requests received that failed sanity check
     0 requests received that did not result in a match
     Last 5 Requests Received
     ----- no rarp requests received -----
     Last 5 Replies Sent
     ----- no rarp replies sent -----
```

# statistics show summary-stats

## Purpose

Display recent traffic summary statistics.

## Format

**statistics show summary-stats**

## Mode

Enable

## Parameters

None.

## Restrictions

None.

# statistics show tcp

## Purpose

Display Transmission Control Protocol (TCP) statistics.

## Format

**statistics show tcp**

## Mode

Enable

## Parameters

None.

## Restrictions

None.

# Example

To display TCP statistics:

```
xp# statistics show tcp
tcp:
     235 packets sent
            232 data packets (22777 bytes)
            1 data packet (494 bytes) retransmitted
            0 resends initiated by MTU discovery
            2 ack-only packets (5 packets delayed)
            0 URG only packets
            0 window probe packets
            0 window update packets
            0 control packets
     320 packets received
            227 acks (for 22776 bytes)
            3 duplicate acks
            0 acks for unsent data
            158 packets (185 bytes) received in-sequence
            0 completely duplicate packets (0 bytes)
            0 old duplicate packets
            0 packets with some dup. data (0 bytes duped)
            0 out-of-order packets (0 bytes)
            0 packets (0 bytes) of data after window
            0 window probes
            0 window update packets
            0 packets received after close
            0 discarded for bad checksums
            0 discarded for bad header offset fields
            0 discarded because packets too short
     0 connection requests
     1 connection accept
     1 bad connection attempt
     0 listen queue overflows
     1 connection established (including accepts)
     0 connections closed (including 0 drops)
            0 connections updated cached RTT on close
            0 connections updated cached RTT variance on close
            0 connections updated cached ssthresh on close
     0 embryonic connections dropped
     226 segments updated rtt (of 228 attempts)
     0 retransmit timeouts
            0 connections dropped by rexmit timeout
     0 persist timeouts
            0 connections dropped by persist timeout
     0 keepalive timeouts
            0 keepalive probes sent
            0 connections dropped by keepalive
     0 correct ACK header predictions
     88 correct data packet header predictions
```

# statistics show udp

## Purpose

Display User Datagram Protocol (UDP) statistics.

## Format

**statistics show udp**

## Mode

Enable

## Parameters

None.

## Restrictions

None.

## Example

To display UDP statistics:

```
xp# statistics show udp
udp:
      0 datagrams received
      0 datagrams with incomplete header
      0 datagrams with bad data length field
      0 datagrams with bad checksum
      0 datagrams dropped due to no socket
      0 broadcast/multicast datagrams dropped due to no socket
      0 datagrams dropped due to full socket buffers
      0 datagrams not for hashed pcb
      0 delivered
      0 datagrams output
```

# statistics show most-active

## Purpose

Display active tasks.

## Format

**statistics show most-active**

## Mode

Enable

## Parameters

None.

## Restrictions

None.

# Example

To display active tasks:

```
xp# statistics show most-active

Timestamp: 2000-04-25 17:56:32
CPU Idle : 98%   (since system startup 441751425.0 sec ago)
NAME          USAGE %     RELATIVE %
--------      -------     ----------
STP_T         0.2         47.65
PHY_POLL      0.0         17.57
L2_AGE_T      0.0         7.90
L3_AGE_T      0.0         7.10
IPC           0.0          4.60
CONS_T        0.0          4.25
STATS_T       0.0         3.96
TNTASK        0.0         2.41
SYSTEM H      0.0         0.88
HBT_T         0.0         0.82
SNMP          0.0         0.67
GATED         0.0         0.58
IPXROUTE      0.0         0.48
CONS2T        0.0          0.33
LOWEST        0.0         0.25
PPP_TASK      0.0         0.24
PINGER_T      0.0          0.11
L2_LRN_T      0.0         0.07
CDP_T         0.0         0.02
LGRP_T        0.0         0.00
MPS           0.0         0.00
TNETD         0.0         0.00
ETHH          0.0          0.00
NI H          0.0          0.00
ARP_T         0.0         0.00
HSWAP         0.0         0.00
IPRED_T       0.0         0.00
SYS_TK        0.0         0.00
SNMP_CF       0.0         0.00
WAN_TOD_      0.0         0.00
DHCP          0.0          0.00
BOUNCE        0.0          0.00
IP_T          0.0         0.00
IPX_T         0.0         0.00
PHX_T         0.0         0.00
NTP           0.0         0.00
ERROR_LO      0.0          0.00
L3_ACL_T      0.0         0.00
MCAST         0.0         0.00
PROFILE       0.0          0.00
PRI_L3MD      0.0         0.00
L3_RL_T       0.0         0.00
```

# statistics show vlan

## Purpose

Display the per-VLAN-packet statistics for IP-unicast traffic.

## Format

**statistics show vlan all|**<*string*>

## Mode

Enable

## Description

The **statistics show vlan** command shows IP-unicast packet statistics for all VLANs in the router or for a specific VLAN.

## Parameters

**all**
    Display statistics for all VLANs.

*<string>*
    Display statistics for a specific VLAN.

## Restrictions

L4-bridging and RMON Pro must be enabled on the VLAN and the VLAN ports in order to collect per-VLAN-statistics. "N/A" will appear if the VLAN does not satisfy these restrictions.

## Example

To display UDP statistics:

```
xp# statistics show vlan

 VID    VLAN Name    Total Packets    Total Bytes
 ---    ---------    -------------    -----------
 1      DEFAULT      N/A              N/A
 5      red          1007114          81576234
 6      blue         1004947          81400
```

# statistics clear vlan

## Purpose

Clear per VLAN packet statistics for IP-unicast traffic.

## Format

**statistics clear vlan all|***<string>*

## Mode

Enable

## Description

The **statistics clear vlan** command resets all counters used for per VLAN packet accounting or those used for a specific VLAN.

## Parameters

None

## Restrictions

None

# Chapter 64

# stp Commands

The **stp** commands let you display and change settings for the default Spanning Tree.

## Command Summary

Table 49 lists the **stp** commands. The sections following the table describe the command syntax.

**Table 49. stp commands**

| |
|---|
| **stp enable port** *&lt;port-list&gt;* |
| **stp set bridging** [**forward-delay** *&lt;num&gt;*] [**hello-time** *&lt;num&gt;*] [**max-age** *&lt;num&gt;*] [**priority** *&lt;num&gt;*] |
| **stp set port** *&lt;port-list&gt;* **priority** *&lt;num&gt;* **port-cost** *&lt;num&gt;* <br> **point-to-point [ForceTrue\| ForceFalse\| Auto] edge-port [True\| False]** |
| **stp set vlan-disable** |
| **stp show bridging-info** |
| **stp reset-rstp port** *&lt;port-list&gt;* \|**all-ports** |
| **stp set protocol-version rstp** |
| **stp filter-bpdu** *&lt;port-list&gt;* \|**all-ports** |

# stp enable port

## Purpose

Enable STP on one or more ports.

## Format

**stp enable port** *<port-list>*

## Mode

Configure

## Description

The **stp enable port** command enables STP on the specified ports.

## Parameters

*<port-list>*   The ports on which you are enabling STP. You can specify a single port or a comma-separated list of ports. Example: et.1.3,et.(1-3).(4,6-8).

## Restrictions

None

# stp set bridging

## Purpose

Set STP bridging parameters.

## Format

**stp set bridging** [**forward-delay** *<num>*] [**hello-time** *<num>*] [**max-age** *<num>*]
[**priority** *<num>*]

## Mode

Configure

## Description

The **stp set bridging** command lets you configure the following STP parameters:

* Bridging priority

* Hello time

* Maximum age

* Forward delay

## Parameters

**forward-delay** *<num>*
　Sets the STP forward delay for the XP. The forward delay is measured in seconds. Specify a
　number from 4–30. The default is 15.

**hello-time** *<num>*
　Sets the STP hello time for the XP. The hello time is measured in seconds. Specify a number
　from 1–10. The default is 2.

**max-age** *<num>*
　Sets the STP maximum age for the XP. Specify a number from 6–40. The default is 20.

**priority** *<num>*
　Sets the STP bridging priority for the XP. Specify a number from 0–65535. The default is
　32768.

## Restrictions

None.

## Examples

To set the bridging priority of Spanning Tree for the entire XP to 1:

xp(config)# **stp set bridging priority 1**

# stp set port

## Purpose

Set STP port priority and port cost for ports.

## Format

**stp set port** *<port-list>* **priority** *<num>* **port-cost** *<num>*
**point-to-point [ForceTrue| ForceFalse| Auto] edge-port [True| False]**

## Mode

Configure

## Description

The **stp set port** command sets the STP priority and port cost for individual ports.

## Parameters

**port** *<port-list>*
   The port(s) for which you are setting STP parameters. You can specify a single port or a comma-separated list of ports. Example: et.1.3,et.(1-3).(4,6-8).

**priority** *<num>*
   The priority you are assigning to the port(s). Specify a number from 0– 16 inclusive. The default is 8.

**port-cost** *<num>*
   The STP cost you are assigning to the port(s). Specify a number from 1– 65535. The default depends on the port speed: 1 for Gigabit (100-Mbps) ports, 10 for 100-Mbps ports, and 100 for 10-Mbps ports.

**point-to-point [ForceTrue|ForceFalse|Auto]**
   Specify a point-to-point or a non-point-to-point link administratively. The default setting is 'Auto.'

**edge-port [True|False]**
   Specify whether the port(s) should be initialized as a edge port or a non-edge port. The default is 'False.'

## Restrictions

None.

# stp set vlan-disable

## Purpose

Blocks VLAN traffic if the port is not a member of that VLAN.

## Format

**stp set vlan-disable**

## Mode

Configure

## Description

The **stp set vlan-disable** command specifies that if the port does not belong to a certain VLAN, then the port should block all traffic coming from that VLAN.

## Parameters

None.

## Restrictions

None

# stp show bridging-info

## Purpose

Display STP bridging information.

## Format

**stp show bridging-info**

## Mode

Enable

## Description

The **stp show bridging-info** command displays STP bridging information for the XP.

## Parameters

None.

## Restrictions

None.

# stp reset-rstp

## Purpose

Reset RSTP.

## Format

**stp reset-rstp port** *<port_list>* **|all ports**

## Mode

Enable

## Description

The **stp reset-rstp** command resets the point-to-point and edge port parameters to the user-specified values and forces the specified ports to send RSTP BPDU's until a version 0 STP BPDU is received.

## Parameters

| | |
|---|---|
| *<port_list>* | Specifies the ports for which you want to reset RSTP. |
| **all-ports** | The all-ports keyword resets RSTP for all the XP ports. |

## Restrictions

None.

# stp set protocol-version rstp

## Purpose

Enable rapid reconfiguration on default spanning tree.

## Format

**stp set protocol-version rstp**

## Mode

Configure.

## Description

The **stp set protocol-version** command changes the STP version from "STP compatible" (version 0) to "Rapid Configuration" (version 2).

## Restrictions

STP cannot be enabled on any non-LAN ports when running RSTP.

# stp filter-bpdu

## Purpose

Filter out BPDU on a port when STP is disabled.

## Format

**stp filter-bpdu** *<port-list>* **|all-ports**

## Mode

Configure.

## Description

The **stp filter-bpdu** command sets up a filter on the specified port for BPDU's when STP is disabled.

## Parameters

| | |
|---|---|
| *<port-list>* | List of ports to which you will apply the filter. |
| **all-ports** | All ports. |

## Restrictions

Can be used only when STP is disabled.

# Chapter 65

# system Commands

The **system** commands let you display and change system parameters.

## Command Summary

Table 50 lists the **system** commands. The sections following the table describe the command syntax.

**Table 50.  system commands**

| |
|---|
| **system enable aggregate-rate-limiting slot** *<number>* |
| **system failover master-cm** |
| **system hotswap out\|in slot** *<number>* |
| **system image add** *<IPaddr-or-hostname>* *<filename>* |
| **system image choose** *<filename>* **primary-cm\| backup-cm\| none** |
| **system image list primary-cm\| backup-cm\| all** |
| **system image delete** *<filename>* **primary-cm\| backup-cm** |
| **system kill telnet-session** *<session-id>* |
| **system l3-deep-buckets module** *<num>* **set on** |
| **system promimage upgrade** *<hostname-or-IPaddr>* *<filename>* |
| **system set bootprom netaddr** *<IPaddr>* **netmask** *<IPnetmask>* **tftp-server** *<IPaddr>* **[tftp-gateway** *<IPaddr>***]** |
| **system set console level fatal\|error\|warning\|info** |
| **system set contact** *<system-contact>* |

**Table 50. system commands (Continued)**

| |
|---|
| **system set date year** *<year>* **month** *<month>* **day** *<day>* **hour** *<hour>* **min** *<min>* **second** *<sec>* |
| **system set dns** server *<IPaddr>*[**,***<IPaddr>*[**,***<IPaddr>*]] domain *<name>* |
| **system set dst-changing [s-wk** *<num>*] **[s-dow** *<num>*] **[s-mo** *<num>*] **[s-hr** *<num>*] **[s-min** *<num>*] **[e-wk** *<num>*] **[e-dow** *<num>*] **[e-mo** *<num>*] **[e-hr** *<num>*] **[e-min** *<num>*]**\|dst-fixed [s-mo** *<num>*] **[s-day** *<num>*] **[s-hr** *<num>*] **[s-min** *<num>*] **[e-mo** *<num>*] **[e-day** *<num>*] **[e-hr** *<num>*] **[e-min** *<num>*]**\|dst-manual** |
| **system set dst-fixed [s-mo** *<num>*] **[s-day** *<num>*] **[s-hr** *<num>*] **[s-min** *<num>*] **[e-mo** *<num>*] **[e-day** *<num>*] **[e-hr** *<num>*] **[e-min** *<num>*]**\|dst-manual** |
| **system set dst-manual** |
| **system set idle-timeout serial\|telnet** *<num>* |
| **system set location** *<location>* |
| **system set login-banner** *<string>***\|none\|file-name** *<string>* |
| **system set name** *<system-name>* |
| **system set password** *<mode>* *<string>*\|none |
| **system set poweron-selftest** [on\|quick] |
| **system set show-config alphabetical** |
| **system set syslog** [**server** *<hostname-or-IPaddr>*] **[level** *<level-type>*] **[facility** *<facility-type>*] **[buffer-size** *<size>*] **[source <***source-IPaddr***>]** |
| **system set terminal baud** *<baud-rate>***\|columns** *<num>***\|rows** *<num>* |
| **system set timezone** *<timezone>*\|*<minutes>* |
| **system show** *<system-parm>* |
| **system set backup-cm-timeout seconds** *<seconds>* |
| **system set max-packets-per-interrupt** *<number>* |
| **system set max-pkts-in-recv-ctrl-only** *<number>* |
| **system set data-pkts-threshold** *<number>* |
| **system set cntrl-pkts-threshold** *<number>* |
| **system set stp-pkts-threshold** *<number>* |
| **system set lgrp-pkts-threshold** *<number>* |
| **system set ifqlen-to-xmit-pkts** *<number>* |
| **system set ip-wakeup-intvl** *<seconds>* |

**Table 50. system commands (Continued)**

| |
|---|
| **system set ipx-wakeup-intvl** *&lt;seconds&gt;* |
| **system set low-priority-pad** *&lt;number&gt;* |
| **system set med-priority-pad** *&lt;number&gt;* |
| **system set high-priority-pad** *&lt;number&gt;* |
| **system set ni-driver-debug** |
| **system set cntrl-only-mode-count-per-min** *&lt;number&gt;* |
| **system set buffs-in-normal-mode low** *&lt;number&gt;* **medium** *&lt;number&gt;* **high** *&lt;number&gt;* |
| **system set buffs-in-recv-ctrl-mode low** *&lt;number&gt;* **medium** *&lt;number&gt;* **high** *&lt;number&gt;* **dynamic** |
| **system set malloc** |
| **system set extended-debug** |
| **system disable inputportlevel-rate-limiting slot** *&lt;numbers&gt;* |
| **system are-promimage upgrade module** *&lt;number&gt;* |
| **system set trap-source** *&lt;IPaddr&gt;* |
| **system set retro-mib-ifspeed** |

# system enable aggregate-rate-limiting

## Purpose

Enables Input Port Level and Aggregate Rate Limiting.

## Format

**system enable aggregate-rate-limiting slot** *<numbers>*

## Mode

Configure

## Description

The **system enable aggregate-rate-limiting** command enables port level and aggregate rate limiting features on the router. There are two modes of operation for rate limiting available on the XP: per-flow rate limiting and aggregate rate limiting. By default, the per-flow rate limiting mode is enabled.

By using this command, you are disabling per-flow rate limiting and enabling aggregate rate limiting and port level rate limiting.

To revert back to per-flow rate limiting, negate this command.

## Parameters

**slot** *<numbers>*        The slot numbers you wish to disable.

## Restrictions

None.

## Example

To enable aggregate rate limiting:

```
xp# system enable aggregate-rate-limiting slot 1
```

# system failover master-cm

## Purpose

Force a failover from the master to backup Control Module.

## Format

**system failover master-cm**

## Mode

Enable

## Description

The system failover master-cm command allows you to force a failover from the master CM to the backup CM.

## Parameters

None

## Restrictions

None

# system hotswap

## Purpose

Activates or deactivates a line card.

## Format

**system hotswap out|in slot** *<number>*

## Mode

Enable

## Description

The **system hotswap out** command deactivates a line card in a specified slot on the XP, causing it to go offline. The command performs the same function as if you had pressed the Hot Swap button on the line card.

The **system hotswap in** command causes a line card that was deactivated with the **system hotswap out** command to go online again. The command performs the same function as if you had removed the card from its slot and inserted it again.

See the *Enterasys X-Pedition User Reference Manual* for more information on hot swapping line cards.

## Parameters

**out**

Causes the line card in the specified slot to be deactivated.

**in**

Causes an inactive line card in the specified slot to be reactivated.

> **Note:**The **system hotswap in** command works only on a line card that was deactivated with the **system hotswap out** command.

**slot** *<number>*

Is the slot where the line card resides. Specify any number between 1-16.

## Restrictions

None.

# Example

To deactivate the line card in slot 7 on the XP:

xp# **system hotswap out slot 7**

# system image add

## Purpose

Copy a system software image to the XP.

## Format

**system image add** *<IPaddr-or-hostname> <filename>* **[primary-cm] [backup-cm]**

## Mode

Enable

## Description

The **system image add** command copies a system software image from a TFTP server into the PCMCIA Flash Module on the Control Module. By default, if the XP has two Control Modules, the system software image is copied to both Control Modules.

**Note:** The XP supports PCMCIA Flash Modules obtained from Enterasys Networks only. For information regarding the PCMCIA Virtual File systems VFS1 and VFS2, see the *Enterasys X-Pedition User Reference Manual*.

## Parameters

*<IPaddr-or-hostname>*
    Is the IP address or host name of the TFTP server or a TFTP URL.

*<filename>*
    Is the name of the system software image file.

**primary-cm**
    Copies the system software image only to the primary Control Module.

**backup-cm**
    Copies the system software image only to the secondary Control Module.

## Restrictions

None.

# Example

To download the software image file named img.tar.gz from the TFTP server 10.1.2.3:

xp# **system image add tftp://10.1.2.3/images/img.tar.gz**

# system image choose

## Purpose

Select a system software image file.

## Format

**system image choose** *<filename>* **primary-cm| backup-cm| none**

## Mode

Enable

## Description

The **system image choose** command specifies the system software image file on the PCMCIA Flash Module that you want the XP to use the next time you reboot the system.

**Note:** The XP supports PCMCIA Flash Modules obtained from Enterasys Networks only. For information regarding the PCMCIA Virtual File systems VFS1 and VFS2, see the *Enterasys X-Pedition User Reference Manual*.

## Parameters

| | |
|---|---|
| *<filename>* | The name of the system software image file. |
| **primary-cm** | This parameter specifies that the image file is chosen for the primary control module. |
| **backup-cm** | This parameter specifies that the image file is chosen for the backup control module. |
| **none** | This parameter specifies that no image file is chosen for the next bootup. |

## Restrictions

None.

# system image delete

## Purpose

Deletes a system software image file from the PCMCIA Flash Module.

## Format

**system image delete** *<filename>* **primary-cm|backup-cm**

## Mode

Enable

## Description

The **system image delete** command deletes a system software image file from the PCMCIA Flash Module on the Control Module.

**Note:** The XP supports PCMCIA Flash Modules obtained from Enterasys Networks only. For information regarding the PCMCIA Virtual File systems VFS1 and VFS2, see the *Enterasys X-Pedition User Reference Manual*.

## Parameters

*<filename>*  The name of the system software image file you want to delete.

**primary-cm**  This parameter deletes the image file from the primary control module.

**backup-cm**  This parameter deletes the image file from the backup control module.

## Restrictions

None.

# system image list

## Purpose

Lists the system software image files on the PCMCIA Flash Module.

## Format

**system image list primary-cm| backup-cm| all**

## Mode

Enable

## Description

The **system image list** command lists the system software image files contained on the PCMCIA Flash Module on the Control Module.

**Note:**  The XP supports PCMCIA Flash Modules obtained from Enterasys Networks only. For information regarding the PCMCIA Virtual File systems VFS1 and VFS2, see the *Enterasys X-Pedition User Reference Manual*.

## Parameters

**primary-cm**   This parameter lists the image files on the primary control module.

**backup-cm**   This parameter lists the image files on the backup control module.

**all**   This parameter lists the image files on both the primary and backup control module.

## Restrictions

None.

# system kill telnet-session

## Purpose

Kills a specified Telnet session.

## Format

**system kill telnet-session** *<session-id>*

## Mode

Enable

## Description

The **system kill telnet-session** command kills the Telnet session specified by the session ID. Use the **system show users** command to display the list of current Telnet users and session IDs.

## Parameters

*<session-id>*
> The Telnet connection slot number, which can be 0, 1, 2, or 3. The **system show users** command displays the session ID number in the first column. You can only specify one session ID per **system kill telnet-session** command.

## Restrictions

None.

## Example

To show the active Telnet sessions.

```
xp# system show users
Current Terminal User List:
# Login ID    Mode        From          Login Timestamp
- --------    ----        ----          --------------
             enabled     console        Thu Feb 22 13:07:412001
0            enabled     10.9.0.1       Thu Feb 22 13:07:592001
2            login-prompt 10.9.0.1
3            login-prompt 10.9.0.1
```

Then, to kill Telnet session 2:

```
xp# system kill telnet-session 2
Telnet session 2 (from 10.9.0.1) killed
```

# system l3-deep-hashing

## Purpose

Enables deep hashing on a specified module.

## Format

**system l3-deep-buckets module** *<num>* **set on**

## Mode

Configure

## Description

Use the **system l3-deep-buckets** command to enable deep hashing on a specified module.

Deep hashing allows for more than four hash buckets (levels within a particular entry for a hash value) within an entry in the L3 lookup table. Although hashing should provide an even distribution across the lookup table, there is still a possibility that more than four flows may end up at a particular entry in the lookup table.

Allowing for more than four entries through deep hashing will prevent thrashing, but may cause less-than-wirespeed performance due to the extra amount of entries. This is because thrashing will reduce performance to a greater extent than deep hashing. But although deep hashing may result in less-than-wirespeed performance, it still performs much better than if it were thrashing.

## Parameters

**module** *<num>*|**all**
Is a slot number on the XP. Specify any number between 1 and 16. The hashing algorithm change affects all ports on the line card in the slot. Specify **all** to enable deep hashing on all slots.

**on**
Enables deep hashing on the module. Negate this command from active configuration to disable l3 deep hashing

## Restrictions

None.

# Example

To enable deep hashing on slot 7:

xp(config)# **system l3-deep-buckets module 7 set on**

# system promimage upgrade

## Purpose

Upgrades the boot PROM software on the Control Module.

## Format

**system promimage upgrade** *<IPaddr-or-hostname> <filename>*

## Mode

Enable

## Description

The **system promimage upgrade** command copies and installs a boot PROM software image from a TFTP server onto the internal memory on the Control Module. The boot PROM software image is loaded when you power on the XP and in turn loads the system software image file.

## Parameters

*<IPaddr-or-hostname>*
  The IP address or host name of the TFTP server or a TFTP URL.

*<filename>*
  The name of the boot PROM software image file.

## Restrictions

None.

# Example

The command in the following example downloads a boot PROM image file from the TFTP server 10.50.89.88.

```
xp# system promimage upgrade tftp://10.50.89.88/qa/prom-upgrade
Downloading image 'qa/prom-upgrade' from host '10.50.89.88'
tftp complete
checksum valid. Ready to program.
flash found at 0xbfc00000
erasing...
programming...
verifying...
programming successful.
Programming complete.
```

# system set bootprom

## Purpose

Sets parameters for the boot PROM.

## Format

**system set bootprom netaddr** *<IPaddr>* **netmask** *<IPnetmask>*
**tftp-server** *<IPaddr>* [**tftp-gateway** *<Ipaddr>*]

## Mode

Configure

## Description

The **system set bootprom** command sets parameters to aid in booting the XP's system software image remotely over the network. You can use this command to set the XP's IP address, subnet mask, TFTP boot server address, and gateway address.

**Note:**    These parameters apply only to the Control Module's en0 Ethernet interface.

## Parameters

**netaddr** *<IPaddr>*
    The IP address the XP uses during the boot exchange with the TFTP boot server.

**netmask** *<IPnetmask>*
    The subnet mask the XP uses during the boot exchange.

**tftp-server** *<IPaddr>*
    The TFTP boot server's IP address.

**tftp-gateway** *<Ipaddr>*
    The gateway that connects the XP to the TFTP boot server.

## Restrictions

None.

# Example

The command in the following example configures the XP to use IP address 10.50.88.2 to boot over the network from TFTP boot server 10.50.89.88.

xp(config)# s**ystem set bootprom netaddr 10.50.88.2 netmask 255.255.0.0 tftp-server 10.50.89.88**

# system set console level

## Purpose

Set the minimum console display level.

## Format

**system set console level fatal|error|warning|info**

## Mode

Configure

## Description

The **system set console level** command sets the type of messages you wish to display on the console terminal.

## Parameters

| | |
|---|---|
| **fatal** | Displays fatal messages only. |
| **error** | Displays fatal and error messages only. |
| **warning** | Displays fatal, error, and warning messages only. |
| **info** | Displays all messages. |

## Restrictions

None.

# system set contact

## Purpose

Set the contact name and information for this XP.

## Format

**system set contact** *<system-contact>*

## Mode

Configure

## Description

The **system set contact** command sets the name and contact information for the network administrator responsible for this XP.

## Parameters

*<system-contact>*
> A string listing the name and contact information for the network administrator responsible for this XP. If the string contains blanks or commas, you must use the quotation marks around the string. (Example: **"Jane Doe, janed@corp.com, 408-555-5555 ext. 555"**.)

## Restrictions

None.

# system set date

## Purpose

Set the system time and date.

## Format

**system set date year** *<year>* **month** *<month>* **day** *<day>*
**hour** *<hour>* **min** *<min>* **second** *<sec>*

## Mode

Enable

## Description

The **system set date** command sets the system time and date for the XP. The XP keeps the time in a battery-backed realtime clock. To display the time and date, enter the **system show date** command.

## Parameters

**year** *<number>*
    Four-digit number for the year. (Example: **2001**)

**month** *<month-name>*
    Name of the month. You must spell out the month name. (Example: **March**)

**day** *<day>*
    Number from 1 – 31 for the day.

**hour** *<hour>*
    Number from 0 – 23 for the hour. (The number **0** means midnight.)

**minute** *<minute>*
    Number from 0 – 59 for the hour.

**second** *<second>*
    Number from 0 – 59 for the second.

## Restrictions

None.

# system set dns

## Purpose

Configure the XP to reach up to three DNS servers.

## Format

**system set dns server** ["]*<IPaddr>* [*<IPaddr>*] [*<IPaddr>*]["] **domain** *<name>*

## Mode

Configure

## Description

The **system set dns** command configures the XP to reach up to three DNS servers. You also can specify the domain name to use for each DNS query by XP.

## Parameters

["]*<IPaddr>* [*<IPaddr>*] [*<IPaddr>*]["]
  IP address of the DNS server. Specify the address in dotted-decimal notation. You can specify up to three DNS servers separated by single spaces in the command line.

  **Note:** If you specify more than one IP address, you must surround the IP address specification with a set of quotes.

*<domain-name>*
  Domain name for which the server is an authority.

## Restrictions

None.

## Examples

To configure a single DNS server and configure the XP's DNS domain name to "mrb.com":

```
xp(config)# system set dns server 10.1.2.3 domain mrb.com
```

To configure three DNS servers and configure the XP's DNS domain name to "mrb.com":

```
xp(config)# system set dns server "10.1.2.3 10.2.10.12 10.3.4.5" domain mrb.com
```

# system set dst-changing

## Purpose

Sets Daylight Saving Time according to specific days.

## Format

**system set dst-changing [s-wk** *<num>*] **[s-dow** *<num>*] **[s-mo** *<num>*] **[s-hr** *<num>*]
**[s-min** *<num>*] **[e-wk** *<num>*] **[e-dow** *<num>*] **[e-mo** *<num>*] **[e-hr** *<num>*] **[e-min** *<num>*]

## Mode

Configure

## Description

If Daylight Saving Time is in effect in your local time zone, use one of the **system set dst-**
commands to enable it on the XP (see *system set dst-fixed* on page 1071 and *system set dst-manual*
on page 1073). When you enable automatic DST settings, the settings do not affect the system until
the time change arrives. When Daylight Saving Time starts (s-mo, s-hr, etc.), the system time will
automatically advance one hour. At the end of Daylight Saving Time (e-mo, e-hr,etc.), the system
clock will subtract one hour is. To disable Daylight Saving Time settings on the XP, negate this
command. (The UCT offset stays the same during all of this.)

## Parameters

**s-wk** *<num>*    This optional parameter specifies the starting week of the month. Specify a
number between 1 and 5. The following is a description of the values: 1-first
week, 2-second week, 3-third week, 4-fourth week, 5-last week. The default
value is 1.

**s-dow** *<num>*    This optional parameter specifies the starting day of the week. Specify a
number between 1 and 7. The following is a description of the values: 1-
Sunday, 2-Monday, 3-Tuesday, 4-Wednesday, 5-Thursday, 6-Friday, 7-
Saturday. The default value is 1.

**s-mo** *<num>*    This optional parameter specifies the starting month of the year. Specify a
number between 1 and 12. The following is a description of the values: 1-
January, 2-February, 3-March, 4-April, 5-May, 6-June, 7-July, 8-August, 9-
September, 10-October, 11-November, 12-December. The default value is 1.

**s-hr** *<num>*    This optional parameter specifies the starting hour of the day. Specify a
number between 0 and 23. This is based upon a 24-hour day, where 0-
beginning of the first hour and 23-beginning of the last hour for that day. The
default value is 0.

**s-min** *<num>*    This optional parameter specifies the starting minute of the hour. Specify a number between 0 and 59. This is based upon a 60-minute hour, where 0-beginning of the first minute and 59-beginning of the last minute for that hour. The default value is 0.

**e-wk** *<num>*    This optional parameter specifies the ending week of the month. Specify a number between 1 and 5. The following is a description of the values: 1-first week, 2-second week, 3-third week, 4-fourth week, 5-last week. The default value is 1.

**e-dow** *<num>*    This optional parameter specifies the ending day of the week. Specify a number between 1 and 7. The following is a description of the values: 1-Sunday, 2-Monday, 3-Tuesday, 4-Wednesday, 5-Thursday, 6-Friday, 7-Saturday. The default value is 1.

**e-mo** *<num>*    This optional parameter specifies the ending month of the year. Specify a number between 1 and 12. The following is a description of the values: 1-January, 2-February, 3-March, 4-April, 5-May, 6-June, 7-July, 8-August, 9-September, 10-October, 11-November, 12-December. The default value is 1.

**e-hr** *<num>*    This optional parameter specifies the ending hour of the day. Specify a number between 0 and 23. This is based upon a 24-hour day, where 0-beginning of the first hour and 23-beginning of the last hour for that day. The default value is 0.

**e-min** *<num>*    This optional parameter specifies the ending minute of the hour. Specify a number between 0 and 59. This is based upon a 60-minute hour, where 0-beginning of the first minute and 59-beginning of the last minute for that hour. The default value is 0.

## Restrictions

None.

## Examples

To set Daylight Saving Time to start at midnight on the last Sunday of March and end at 2:00 A.M. on the first Saturday of October every year:

```
xp(config)# system set dst-changing s-wk 5 s-dow 1 s-mo 3 e-wk 1 e-dow 7 e-mo 10 e-hr 2
```

# system set dst-fixed

## Purpose

Sets Daylight Saving Time automatically according to specific dates.

## Format

**system set dst-fixed [s-mo** *<num>*] **[s-day** *<num>*] **[s-hr** *<num>*] **[s-min** *<num>*] **[e-mo** *<num>*] **[e-day** *<num>*] **[e-hr** *<num>*] **[e-min** *<num>*]

## Mode

Configure

## Description

If Daylight Saving Time is in effect in your local time zone, use one of the **system set dst-** commands to enable it on the XP (see *system set dst-changing* on page 1069 and *system set dst-manual* on page 1073). When you enable automatic DST settings, the settings do not affect the system until the time change arrives. When Daylight Saving Time starts (s-mo, s-hr, etc.), the system time will automatically advance one hour. At the end of Daylight Saving Time (e-mo, e-hr, etc.), the system clock will subtract one hour is. To disable Daylight Saving Time settings on the XP, negate this command. (The UCT offset stays the same during all of this.)

## Parameters

**s-mo** *<num>*     This optional parameter specifies the starting month of the year. Specify a number between 1 and 12. The following is a description of the values: 1-January, 2-February, 3-March, 4-April, 5-May, 6-June, 7-July, 8-August, 9-September, 10-October, 11-November, 12-December. The default value is 1.

**s-day** *<num>*     This optional parameter specifies the starting day of the month. Specify a number between 1 and 31. This is based upon a 31-day month, where 1-first day and 31-thirty first day for that month. The default value is 1.

**s-hr** *<num>*     This optional parameter specifies the starting hour of the day. Specify a number between 0 and 23. This is based upon a 24-hour day, where 0-beginning of the first hour and 23-beginning of the last hour for that day. The default value is 0.

**s-min** *<num>*     This optional parameter specifies the starting minute of the hour. Specify a number between 0 and 59. This is based upon a 60-minute hour, where 0-beginning of the first minute and 59-beginning of the last minute for that hour. The default value is 0.

| | |
|---|---|
| **e-mo** *<num>* | This optional parameter specifies the ending month of the year. Specify a number between 1 and 12. The following is a description of the values: 1-January, 2-February, 3-March, 4-April, 5-May, 6-June, 7-July, 8-August, 9-September, 10-October, 11-November, 12-December. The default value is 1. |
| **e-day** *<num>* | This optional parameter specifies the ending day of the month. Specify a number between 1 and 31. This is based upon a 31-day month, where 1-first day and 31-thirty first day for that month. The default value is 1. |
| **e-hr** *<num>* | This optional parameter specifies the ending hour of the day. Specify a number between 0 and 23. This is based upon a 24-hour day, where 0-beginning of the first hour and 23-beginning of the last hour for that day. The default value is 0. |
| **e-min** *<num>* | This optional parameter specifies the ending minute of the hour. Specify a number between 0 and 59. This is based upon a 60-minute hour, where 0-beginning of the first minute and 59-beginning of the last minute for that hour. The default value is 0. |

## Restrictions

None.

## Examples

To set Daylight Saving Time to start at 3:00 a.m. on April 1st and end at midnight on the 15th of September every year:

```
xp(config)# system set dst-fixed s-mo 4 s-day 1 s-hr 3 e-mo 9 e-day 15
```

# system set dst-manual

## Purpose

Allows you to set the system time forward by one hour after you save the command into active configuration. Negating this command will set the system time back one hour.

## Format

**system set dst-manual**

## Mode

Configure

## Description

If Daylight Saving Time is in effect in your local time zone, use one of the **system set dst-** commands to enable it on the XP (see *system set dst-changing* on page 1069, and *system set dst-fixed* on page 1071). When you enable automatic DST settings, the settings do not affect the system until the time change arrives. When Daylight Saving Time starts (s-mo, s-hr, etc.), the system time will automatically advance one hour. At the end of Daylight Saving Time (e-mo, e-hr,etc.), the system clock will subtract one hour is. To disable Daylight Saving Time settings on the XP, negate this command. (The UCT offset stays the same during all of this.)

## Parameters

None.

## Restrictions

None.

# system set idle-timeout

## Purpose

Set the console idle timeout value.

## Format

**system set idle-timeout serial|telnet** *<num>*

## Mode

Configure

## Description

The **system set idle-timeout** command sets the time (in minutes) that the console can remain idle before the communication session is terminated by the control module.

## Parameters

**serial**
Use this parameter to set the timeout value for a serial console connection.

**telnet**
Use this parameter to set the timeout value for a telnet console connection.

*<num>*
Use this parameter to set the idle-timeout value in minutes. You can specify any value between 0 and 60.

## Restrictions

None.

# system set location

## Purpose

Set the system location.

## Format

**system set location** *<location>*

## Mode

Configure

## Description

The **system set location** command adds a string describing the location of the XP. The system name and location can be accessed by SNMP managers.

## Parameters

*<location>*   A string describing the location of the XP. If the string contains blanks or commas, you must use quotation marks around the string.
(Example: **"Bldg C, network control room"**.)

## Restrictions

None.

# system set login-banner

## Purpose

Set the system login banner.

## Format

**system set login-banner** *<string>*/**none|file-name name** *<string>*

## Mode

Configure

## Description

The **system set login-banner** command configures the initial login banner that one sees when logging into the XP. The banner may span multiple lines by adding line-feed characters in the string, "**\n**".

## Parameters

*<string>*    Is the text of the login banner for the XP. The banner may span multiple lines by having line-feed characters in the string, "**\n**".

**none**    Specifies that no login-banner be used on the XP.

**name** *<string>*
    Specifies the name of the file containing the login banner.

## Restrictions

None.

## Example

The following example configures a multi-line login banner:

xp(config)# **system set login-banner "Server network** XP**\nUnauthorized Access Prohibited"**

The next person to log into the XP would see the following:

```
Server network XP
Unauthorized Access Prohibited

Press RETURN to activate console...
```

If you do not want any login-banner at all, enter the following:

```
xp(config)# system set login-banner none
```

# system set name

## Purpose

Set the system name.

## Format

**system set name** *<system-name>*

## Mode

Configure

## Description

The **system set name** command configures the name of the XP. The XP name will use the name as part of the command prompt.

## Parameters

*<system-name>*   The hostname of the XP. If the string contains blanks or commas, you must use quotation marks around the string. (Example: **"Mega-Corp** XP **#27"**.)

## Restrictions

None.

# system set password

## Purpose

Set passwords for various CLI access modes.

## Format

**system set password** *<mode>* *<string>*|**none**

## Mode

Configure

## Description

The **system set password** command sets or changes the passwords for the Login and Enable access modes.

**Note:** If a password is configured for the Enable mode, the XP prompts for the password when you enter the **enable** command. Otherwise, the XP displays a message advising you to configure an Enable password, then enters the Enable mode. From the Enable mode, you can access the Configure mode to make configuration changes.

## Parameters

*<mode>*
    The access mode for which you are setting a password. Specify one of the following:

**login**    The password required to start a CLI session. The XP prompts for this password when the system finishes booting.

**enable**    The password for entering the Enable mode.

*<string>*|**none**
    The password. If you specify **none**, no password is required.

**Note:** You cannot use the string "none" as a password.

## Restrictions

The XP stores passwords in the Startup configuration file. If you copy a configuration file from one XP to another, the passwords in the file also are copied and will be required on the new XP.

When you activate a new password by copying the password set command to the active configuration, the XP replaces the command with a **system set hashed-password** command, which

hides the password text in the configuration file so that the password is not visible to others if they examine the configuration file.

To remove a password, enter the following command while in Configure mode:

xp(config)# **system set password *<mode>* none**

# system set poweron-selftest

## Purpose

Specify the type of Power-On-Self-Test (POST) to perform during system bootup.

## Format

**system set poweron-selftest [on|quick]**

## Mode

Configure

## Description

The **system set poweron-selftest** command configures the type of Power-On-Self-Test (POST) the XP should perform during the next system bootup. By default, no POST is performed during system bootup. To perform POST, you must use this command to specify which type of test to run, **quick** or **full**. Once POST enabled, to turn off POST, you simply negate this command (using the **negate** command).

## Parameters

**on**      The XP will perform a **full** test during the next system bootup.

**quick**   The XP will perform a **quick** test during the next system bootup.

## Restrictions

None.

# system set show-config

## Purpose

Specify how configuration commands should be displayed.

## Format

**system set show-config alphabetical**

## Mode

Configure

## Description

The **show** and **system show active-config** commands normally display the configuration commands in the order that they are executed. The **system set show-config** command changes the way the configuration commands are shown.

## Parameters

**alphabetical**          Shows the configuration commands in alphabetical order.

## Restrictions

None.

## Example

To display the configuration commands in alphabetical order:

```
xp(config)# system set show-config alphabetical
```

# system set syslog

## Purpose

Identify a Syslog server to which the XP can send Syslog messages

## Format

**system set syslog** [**server** *<hostname-or-IPaddr>*]
[**level** *<level-type>*] [**facility** *<facility-type>*]
[**source** *<source-IPaddr>*] [**buffer-size** *<size>*]

## Mode

Configure

## Description

The **system set syslog** command identifies the Syslog server to which the XP should send system messages. You can control the type of messages to send as well as the facility under which the message is sent. The type of messages to send is based on the severity of the message (controlled by the option **level**). Messages can also be sent under a specific facility. There are 11 facilities supported by the XP. On the Syslog server, you can decide what to do with these messages based on the level as well as the facility. For example, you might choose to discard the messages, write them to a file or send them out to the console. You can further identify the source of the system messages sent to the Syslog server by specifying a source IP address for the Syslog on the XP.

The XP keeps the last *<n>* messages in a local circular buffer. By default, this buffer keeps the last 10 Syslog messages. You can change the buffer size to hold anywhere from 10 – 50 messages. To view the current buffer size, enter the **system show syslog buffer** command.

## Parameters

*<hostname-or-IP-addr>*
    Hostname or IP address of the SYSLOG server.

*<level-type>*
    Level of messages you want the XP to log. Specify one of the following:

**fatal**    Logs only fatal messages.

**error**    Logs fatal messages and error messages.

**warning**    Logs fatal messages, error messages, and warning messages. This is the default.

**info**    Logs all messages, including informational messages.

*<facility-type>*
Type of facility under which you want messages to be sent. By default, unless specified
otherwise, messages are sent under facility *local7*. The facility-type can be one of the
following:

| | |
|---|---|
| **kern** | kernel messages |
| **user** | user messages |
| **daemon** | daemon messages |
| **local0** | Reserved for local use |
| **local1** | Reserved for local use |
| **local2** | Reserved for local use |
| **local3** | Reserved for local use |
| **local4** | Reserved for local use |
| **local5** | Reserved for local use |
| **local6** | Reserved for local use |
| **local7** | Reserved for local use |

*<source-IPaddr>*
Source IP address of the messages sent to the Syslog server. You must specify a Unicast IP
address in the form a.b.c.d.

*<size>*
The Syslog message buffer size. The size specifies how many messages the Syslog buffer can
hold. You can specify a number from 10 – 50, giving the buffer a capacity to hold from 10– 50
Syslog messages. The default is 10.

## Restrictions

None.

## Example

To log only fatal and error level messages to the syslog server on 10.1.43.77:

```
xp(config)# system set syslog server 10.1.43.77 level error
```

# system set terminal

## Purpose

Sets global terminal parameters.

## Format

**system set terminal baud** *<baud-rate>*|**columns** *<num>*|**rows** *<num>*

## Mode

Configure

## Description

The **system set terminal** command globally sets parameters for a serial console's baud rate, output columns, and output rows.

## Parameters

**baud** *<baud-rate>*
    Sets the baud rate. You can specify one of the following:

    **•300**

    **•600**

    **•1200**

    **•2400**

    **•4800**

    **•9600**

    **•19200**

    **•38400**

**columns** *<num>*
    Sets the number of columns displayed at one time.

**rows** *<num>*
    Sets the number of rows displayed at one time.

## Restrictions

None.

# Example

The command in the following example sets the baud rate, number of columns, and number of rows for the management terminal connected to the System Control module.

```
xp(config)# system set terminal baud 38400 columns 132 rows 50
```

# system set timezone

## Purpose

Sets time zone information or time offset.

## Format

**system set timezone** *<timezone>|<minutes>*

## Mode

Configure

## Description

The **system set timezone** command sets the local time zone for the XP. You can use one of the time zone keywords to specify the local time zone or specify the time offset in minutes. You must configure the time zone in order to use NTP (Network Time Protocol) to synchronize the XP's real time clock.

## Parameters

*<timezone>*

Sets the time zone using one of the following keywrods:

| | |
|---|---|
| **est** | Eastern Standard Time (UCT -05:00) |
| **cst** | Central Standard Time (UCT -06:00) |
| **mst** | Mountain Standard Time (UCT -07:00) |
| **pst** | Pacific Standard Time (UCT -08:00) |
| **uct-12** | Eniwetok, Kawajalein (UCT -12:00) |
| **uct-11** | Midway Island, Samoa (UCT -11:00) |
| **uct-10** | Hawaii (UCT -10:00) |
| **uct-9** | Alasaka (UCT -09:00) |
| **uct-8** | Pacific Standard Time (UCT -08:00) |
| **uct-7** | Mountain Standard Time (UCT -07:00) |
| **uct-6** | Central Standard Time (UCT -06:00) |
| **uct-5** | Eastern Standard Time (UCT -05:00) |

| | |
|---|---|
| **uct-4** | Caracas, La Paz (UCT -04:00) |
| **uct-3** | Buenos Aires, Georgetown (UCT -03:00) |
| **uct-2** | Mid-Atlantic (UCT -02:00) |
| **uct-1** | Azores, Cape Verde Island (UCT -01:00) |
| **uct** | Greenwich, London, Dublin (UCT) |
| **uct+1** | Berlin, Madrid, Middle European Time, Paris (UCT +01:00) |
| **uct+2** | Athens, Helsinki, Istanbul, Cairo (UCT +02:00) |
| **uct+3** | Moscow, Nairobi, Riyadh (UCT +03:00) |
| **uct+4** | Abu Dhabi, Kabul(UCT +05:00) |
| **uct+5** | Pakistan (UCT +05:00) |
| **uct+5:30** | India (UCT +05:30) |
| **uct+6** | Bangladesh (UCT +06:00) |
| **uct+7** | Bangkok, Jakarta (UCT +07:00) |
| **uct+8** | Beijing, Hong Kong, Singapore(UCT +08:00) |
| **uct+9** | Japan, Korea (UCT +09:00) |
| **uct+10** | Sydney, Guam (UCT +10:00) |
| **uct+11** | Solomon Is. (UCT +11:00) |
| **uct+12** | Fiji, Marshall Is. Auckland (UCT +12:00) |

*<minutes>*

Specify the time zone offset in minutes. Valid values are between -720 minutes to + 720 minutes.

## Restrictions

None.

## Example

To set the local time zone to Pacific Standard Time (UCT -8:00).

```
xp(config)# system set timezone pst
```

# system show

## Purpose

Show system information.

## Format

**system show** *<system-parm>*

## Mode

Enable

## Description

The **system show command** shows the active settings for the following system parameters:

- Active configuration (CLI configuration of the running system)

- Size of the Syslog message buffer

- Contact information for the XP administrator (if you set one using the **system set contact** command)

- Current system time and date (if you set them using **system set date** command)

- Time that has elapsed since the XP was rebooted and the system time and date when the last reboot occurred

- IP address(es) and domain name of DNS servers the XP can use (if you set them using **system set dns** command)

- Hardware information

- Location of the XP (if you set one using the **system set location** command)

- System name of the XP (if you set one using the **system set name** command)

- IP address or hostname of SYSLOG server and the message level (if you set these parameters using the **system set syslog** command)

- Configuration changes in the scratchpad that are waiting for activation

- Software version running on the Control Module

- Last five Telnet connections to the XP

- Current Telnet sessions on the XP

- CPU and other resource usage

# Parameters

*<system-parm>*

System parameter you want to display. Specify one of the following:

**6000-backplane-status** (Advanced Router Module only)

Shows backplane status of the Advanced Router Module for the SmartSwitch 6000 (6SSRM-02 5SSRM-02).

**active-config**

Shows the active configuration of the system.

**bootlog**

Shows the contents of the boot log file, which contains all the system messages generated during bootup.

**bootprom**

Shows boot PROM parameters for TFTP downloading of the system image. This information is useful only if you have configured the system to download the system image via TFTP.

**capacity all|chassis|task|cpu|memory**

Shows usage information about various resources on the **XP**.

**contact**

Shows the contact information (administrator name, phone number, and so on).

**cpu-utilization**

Shows the percentage of the CPU that is currently being used.

**date**

Shows the system time and date.

**dns**

Shows the IP addresses and domain names for the DNS servers the XP can use.

**environmental-info**

Shows environmental information, such as temperature and power supply status.

**hardware**

Shows hardware information.

**idle-timeout serial|telnet**

Shows the timeout value (in minutes). If the communication interface remains idle past **idle-timeout** value, the communication session will be closed by the system. You can specify a timeout value for a serial connection or a telnet connection. A value of 0 means that the **idle-timeout** feature is disabled.

**location**

Shows the XP's location.

**login-banner**

Shows the XP's login banner. The login banner can be configured using the **system set login-banner** command.

**name**

Shows the XP's name.

**poweron-selftest-mode**

Shows the type of Power-On Self Test (POST) that should be performed, if any.

**scratchpad**

Shows the configuration changes in the scratchpad. These changes have not yet been activated.

**startup-config**

Shows the contents of the Startup configuration file.

**switching-fabric**

Shows the status of switching fabric cards.

**syslog**

Shows the IP address of the SYSLOG server and the level of messages the XP sends to the server.

**syslog buffer**

Shows how many SYSLOG messages the XP's SYSLOG message buffer can hold.

**telnet-access**

Lists the last five Telnet connections to the XP.

**terminal**

Shows the default terminal settings (number of rows, number of columns, and baud rate).

**timezone**

Shows the time zone offset from UCT in minutes.

**uptime**

Shows how much time has elapsed since the most recent reboot.

**users**

Shows the current Telnet connections to the XP.

**version**

Shows the software version running on the XP.

# Restrictions

None.

# system set backup-cm-timeout

## Purpose

Set backup-CM timeout value.

## Format

**system set backup-cm-timeout seconds** *<seconds>*

## Mode

Configure (diagnostic mode)

## Description

The **system set backup-cm-timeout** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

*<seconds>*          The CM timeout value.

## Restrictions

None.

# system set max-packets-per-interrupt

## Purpose

Set maximum number of packets per interrupt.

## Format

**system set max-packets-per-interrupt** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set max-package-per-interrupt** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

*<number>*        The maximum number of packets.

## Restrictions

None.

# system set max-pkts-in-recv-ctrl-only

## Purpose

Set maximum number of packets for control in receive-control-only mode.

## Format

**system set max-pkts-in-recv-ctrl-only** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set max-pkts-in-recv-ctrl-only** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

| | |
|---|---|
| *<number>* | The maximum number of packets. |

## Restrictions

None.

# system set data-pkts-threshold

## Purpose

Set maximum number of data packets processed before relinquishing the CPU.

## Format

**system set data-pkts-threshold** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set data-pkts-threshold** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

| | |
|---|---|
| *<number>* | The maximum number of data packets. |

## Restrictions

None.

# system set cntrl-pkts-threshold

## Purpose

Set maximum number of cntrl packets processed before relinquishing the CPU.

## Format

**system set cntrl-pkts-threshold** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set cntrl-pkts-threshold** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

*<number>*          The maximum number of cntrl packets.

## Restrictions

None.

# system set stp-pkts-threshold

## Purpose

Set maximum number of spanning tree packets processed before entering receive-control-only mode.

## Format

**system set stp-pkts-threshold** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set stp-pkts-threshold** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

*<number>*          The maximum number of spanning tree packets.

## Restrictions

None.

# system set lgrp-pkts-threshold

## Purpose

Set maximum number of packets processed for a port that is part of a link group before entering receive-control-only mode.

## Format

**system set lgrp-pkts-threshold** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set lgrp-pkts-threshold** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

| | |
|---|---|
| *<number>* | The maximum number of packets processed. |

## Restrictions

None.

# system set ifqlen-to-xmit-pkts

## Purpose

Sets the length of the interface transmit packet queue.

## Format

**system set ifqlen-to-xmit-pkts** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set ifqlen-to-xmit-pkts** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

| | |
|---|---|
| *<number>* | The interface transmit packet queue length. |

## Restrictions

None.

# system set ip-wakeup-intvl

## Purpose

Sets wake-up interval for the IP task.

## Format

**system set ip-wakeup-intvl** *<seconds>*

## Mode

Configure (diagnostic mode)

## Description

The **system set ip-wakeup-intvl** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

*<seconds>*          The duration of the wake-up interval.

## Restrictions

None.

# system set ipx-wakeup-intvl

## Purpose

Sets wake-up interval for the IPX task.

## Format

**system set ipx-wakeup-intvl** *<seconds>*

## Mode

Configure (diagnostic mode)

## Description

The **system set ipx-wakeup-intvl** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

*<seconds>*          The duration of the wake-up interval.

## Restrictions

None.

# system set low-priority-pad

## Purpose

Sets the nia receive queue threshold padding for low priority packets.

## Format

**system set low-priority-pad** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set low-priority-pad** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

*<number>*          The receive queue threshold padding.

## Restrictions

None.

# system set med-priority-pad

## Purpose

Sets the nia receive queue threshold padding for medium priority packets.

## Format

**system set med-priority-pad** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set med-priority-pad** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

| | |
|---|---|
| *<number>* | The receive queue threshold padding. |

## Restrictions

None.

# system set high-priority-pad

## Purpose

Sets the nia receive queue threshold padding for high priority packets.

## Format

**system set high-priority-pad** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set high-priority-pad** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

| | |
|---|---|
| *<number>* | The receive queue threshold padding. |

## Restrictions

None.

# system set ni-driver-debug

## Purpose

Sets the nia driver debugging mode.

## Format

**system set ni-driver-debug**

## Mode

Configure (diagnostic mode)

## Description

The **system set ni-driver-debug** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

None.

## Restrictions

None.

# system set cntrl-only-mode-count-per-min

## Purpose

Sets a threshold for readjusting the buffer thresholds, based on the number of control priority switches per minute.

## Format

**system set cntrl-only-mode-count-per-min** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set cntrl-only-mode-count-per-min** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

*<number>*          The number of control priority switches per minute.

## Restrictions

None.

# system set buffs-in-normal-mode

## Purpose

Set the percentage distribution in normal mode.

## Format

**system set buffs-in-normal-mode low** *<number>* **medium** *<number>* **high** *<number>*

## Mode

Configure (diagnostic mode)

## Description

The **system set buffs-in-normal-mode** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

| | |
|---|---|
| **low** *<number>* | Percentage of low buffers. |
| **medium** *<number>* | Percentage of medium buffers. |
| **high** *<number>* | Percentage of high buffers. |

## Restrictions

None.

# system set buffs-in-recv-ctrl-mode

## Purpose

Set the percentage distribution in control receive mode.

## Format

**system set buffs-in-recv-ctrl-mode low** *<number>* **medium** *<number>* **high** *<number>*
**dynamic**

## Mode

Configure (diagnostic mode)

## Description

The **system set buffs-in-recv-ctrl-mode** command is a system tuning command used only under
the direction of Enterasys support personnel.

## Parameters

| | |
|---|---|
| **low** *<number>* | The percentage of low buffers. |
| **medium** *<number>* | The percentage of medium buffers. |
| **high** *<number>* | The percentage of high buffers |
| **dynamic** | Set the thresholds dynamically. |

## Restrictions

None.

# system set malloc

## Purpose

Sets the caller trace for the system malloc functionality.

## Format

**system set malloc debug**

## Mode

Configure (diagnostic mode)

## Description

The **system set malloc** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

None.

## Restrictions

None.

# system set extended-debug

## Purpose

Sets various runtime debug extensions.

## Format

**system set extended-debug**

## Mode

Configure (diagnostic mode)

## Description

The **system set extended-debug** command is a system tuning command used only under the direction of Enterasys support personnel.

## Parameters

None.

## Restrictions

None.

# system disable inputportlevel-rate-limiting

## Purpose

Disables Input Port Level Rate Limiting on a specific slot(s).

## Format

**system disable inputportlevel-rate-limiting slot** *<numbers>*

## Mode

Configure

## Description

The **system disable inputportlevel-rate-limiting** command disables Input Port Level Rate Limiting on a specific slot(s).

## Parameters

**slot** *<numbers>*      The occupied slot or list of slots.

## Restrictions

None.

# system are-promimage upgrade

## Purpose

Upgrade the boot prom on the specified ARE module.

## Format

**system are-promimage upgrade module** *<number>*

## Mode

Enable

## Description

The **system set data-pkts-threshold** command allows you to upgrade the boot prom on a specific ARE module.

## Parameters

**module** *<number>*   The module number of the ARE module to upgrade.

## Restrictions

None.

# snmp set trap-source

## Purpose

Sets the source interface IP address reported in traps sent by the SNMP Agent.

## Format

**snmp set trap-source** *<IPaddr>*

## Mode

Configure

## Description

The **snmp set trap-source** command configures the IP address reported in traps sent by the SNMP Agent.

## Parameters

| | |
|---|---|
| *<IPaddr>* | The IP address. |

## Restrictions

None.

# snmp set retro-mib-ifspeed

## Purpose

Causes the ifSpeed for IP Interface rows to return speed of the first operational port. The default reported value is zero. This allows the ifSpeed to behave as it would in earlier versions of the MIB.

## Format

**snmp set retro-mib-ifspeed**

## Mode

Configure

## Description

The **snmp set retro-mib-ifspeed** command causes the ifSpeed for IP Interface rows to return the speed of the first operational port.

## Parameters

None.

## Restrictions

None.

# Chapter 66

# tacacs Commands

The **tacacs** commands let you secure access to the XP using the Terminal Access Controller Access Control System (TACACS) protocol. When TACACS authentication is activated on the XP, users are prompted for a password when they try to access Enable mode. The XP queries a TACACS server to see if the password is valid. If the password is valid, the user is granted access to Enable mode.

## Command Summary

Table 51 lists the **tacacs** commands. The sections following the table describe the command syntax.

**Table 51. tacacs commands**

| |
|---|
| **tacacs enable** |
| **tacacs set host** *<IPaddr>* |
| **tacacs set [timeout** *<number>*] **[last-resort password| succeed| deny]** |
| **tacacs show stats|all** |

# tacacs enable

## Purpose

Enables TACACS authentication on the XP. TACACS authentication is disabled by default on the XP.

## Format

**tacacs enable**

## Mode

Configure

## Description

The **tacacs enable** command starts TACACS authentication on the XP. When you issue this command, the TACACS-related parameters set with **tacacs set** commands become active.

## Parameters

None.

## Restrictions

None.

## Example

The following commands set TACACS-related parameters on the XP. The commands are then activated with the **tacacs enable** command:

```
tacacs set host 207.135.89.15
tacacs set timeout 30
tacacs enable
```

# tacacs set

## Purpose

Sets parameters for authenticating the XP through a TACACS server.

## Format

**tacacs set host** *<IPaddr>*

**tacacs set [timeout** *<number>*] **[last-resort password| succeed| deny]**

## Mode

Configure

## Description

The **tacacs set** command allows you to set TACACS-related parameters on the XP, including the IP addresses of up to five TACACS servers, how long to wait for the TACACS server to authenticate the user, and what to do if the TACACS server does not reply by a given time.

## Parameters

| | |
|---|---|
| **host** *<IPaddr>* | Is the IP address of a TACACS server. You can enter up to five TACACS servers. Enter one server per **tacacs set host** command. |
| **timeout** *<number>* | Is the maximum time (in seconds) to wait for a TACACS server to reply. The default is 3 seconds. |
| **last-resort** | Is the action to take if a TACACS server does not reply within the time specified by the **timeout** parameter. Specify one of the following: |

| | |
|---|---|
| **password** | The user is prompted for the Enable mode password set with **system set password** command (if one exists). |
| **succeed** | Access to the XP is granted. |
| **deny** | Unable to connect to TACACS server, access to the XP is denied. |

## Restrictions

None.

## Example

The following commands specify that hosts 137.72.5.9 and 137.72.5.41 are TACACS servers, and the XP should wait no more than 30 seconds for a response from one of these servers. If a response from a TACACS server doesn't arrive in 30 seconds, the user is prompted for the password that was set with the XP **system set password** command.

```
tacacs set host 137.72.5.9
tacacs set host 137.72.5.41
tacacs set timeout 30
tacacs set last-resort password
```

# tacacs show

## Purpose

Displays information about TACACS configuration on the XP.

## Format

**tacacs show stats|all**

## Mode

Enable

## Description

The **tacacs show** command displays statistics and configuration parameters related to TACACS configuration on the XP. The statistics displayed include:

accepts    Number of times each server responded and validated the user successfully.

rejects    Number of times each server responded and denied the user access, either because the user wasn't known, or the wrong password was supplied.

timeouts   Number of times each server did not respond.

## Parameters

**stats**    Displays the number of accepts, rejects, and timeouts for each TACACS server.

**all**    Displays the configuration parameters set with the **tacacs set** command, in addition to the number of accepts, rejects, and timeouts for each TACACS server.

## Restrictions

None.

## Example

To display configuration parameters and TACACS server statistics:

**tacacs show all**

# Chapter 67

# tacacs-plus Commands

The **tacacs-plus** commands let you secure access to the XP using the TACACS Plus protocol. When users log in to the XP or try to access Enable mode, they are prompted for a password. If TACACS Plus authentication is enabled on the XP, it will contact a TACACS Plus server to verify the user. If the user is verified, he or she is granted access to the XP.

**Note:** The XP currently supports the Password Authentication Protocol (PAP) method of authentication but not the Challenge Handshake Authentication Protocol (CHAP) method.

## Command Summary

Table 52 lists the **tacacs-plus** commands. The sections following the table describe the command syntax.

**Table 52. tacacs-plus commands**

| |
|---|
| **tacacs-plus accounting command level** *<level>* |
| **tacacs-plus accounting shell start\|stop\|all** |
| **tacacs-plus accounting snmp active\|startup** |
| **tacacs-plus accounting system fatal\|error\|warning\|info** |
| **tacacs-plus authentication login\|enable\|system** |
| **tacacs-plus enable** |
| **tacacs-plus set server** *<IPaddr>* **[port** *<number>*] **[timeout** *<number>*] **[retries** *<number>*] **[deadtime** *<number>*] **[key** *<string>*] **[source** *<IFname_IPaddr>*] |
| **tacacs-plus set [timeout** *<number>*] **[retries** *<number>*] **[deadtime** *<number>*] **[key** *<string>*] **[source** *<IFname_IPaddr>*] **[last-resort password\|succeed\|deny]** |
| **tacacs-plus show stats\|all** |

# tacacs-plus accounting command level

## Purpose

Causes the specified types of commands to be logged to the TACACS Plus server.

## Format

**tacacs-plus accounting command level** *<level>*

## Mode

Configure

## Description

The **tacacs-plus accounting command level** command allows you specify the types of commands that are logged to the TACACS Plus server. The user ID and timestamp are also logged.

## Parameters

*<level>*    Specifies the type(s) of commands that are logged to the TACACS Plus server. Enter one of the following values:

5        Log Configure commands.

10       Log all Configure and Enable commands.

15       Log all Configure, Enable, and User commands.

## Restrictions

None.

## Example

To cause Configure, Enable, and User mode commands to be logged on the TACACS Plus server:

xp(config)# **tacacs-plus accounting command level 15**

# tacacs-plus accounting shell

## Purpose

Causes an entry to be logged on the TACACS Plus server when a shell is stopped or started on the XP.

## Format

**tacacs-plus accounting shell start|stop|all**

## Mode

Configure

## Description

The **tacacs-plus accounting shell** command allows you to track shell usage on the XP. It causes an entry to be logged on the TACACS Plus server when a shell is started or stopped. You can specify that an entry be logged when a shell is started, when a shell is stopped, or when a shell is either started or stopped.

## Parameters

**start**    Logs an entry when a shell is started.

**stop**    Logs an entry when a shell is stopped

**all**    Logs an entry when a shell is either started or stopped

## Restrictions

None.

## Example

To cause an entry to be logged on the TACACS Plus server when a shell is either started or stopped on the XP:

```
xp(config)# tacacs-plus accounting shell all
```

# tacacs-plus accounting snmp

## Purpose

Logs to the TACACS Plus server any changes made to the startup or active configuration via SNMP.

## Format

**tacacs-plus accounting snmp active|startup**

## Mode

Configure

## Description

The **tacacs-plus accounting snmp** command allows you to track changes made to the active or startup configuration through SNMP. It causes an entry to be logged on the TACACS Plus server whenever a change is made to the ACL configuration. You can specify that an entry be logged to the active or startup configuration.

## Parameters

**active**   Logs an entry when a change is made to the active configuration.

**startup**  Logs an entry when a change is made to the startup configuration.

## Restrictions

None.

## Example

To cause an entry to be logged on the TACACS Plus server whenever an ACL configuration change is made via SNMP to the active configuration:

```
xp(config)# tacacs-plus accounting snmp active
```

# tacacs-plus accounting system

## Purpose

Specifies the type(s) of messages to be logged on the TACACS Plus server.

## Format

**tacacs-plus accounting system fatal|error|warning|info**

## Mode

Configure

## Description

The **tacacs-plus accounting system** command allows you to specify the types of messages that are logged on the TACACS Plus server.

## Parameters

**fatal**
 Logs only fatal messages.

**error**
 Logs fatal messages and error messages.

**warning**
 Logs fatal messages, error messages, and warning messages.

**info**
 Logs all messages, including informational messages.

## Restrictions

None.

## Example

To log only fatal and error messages on the TACACS Plus server:

xp(config)# **tacacs-plus accounting system error**

# tacacs-plus authentication

## Purpose

Causes TACACS Plus authentication to be performed at either the XP login prompt or when the user tries to access Enable mode.

## Format

**tacacs-plus authentication login|enable|system**

## Mode

Configure

## Description

The **tacacs-plus authentication** command allows you to specify when TACACS Plus authentication is performed: either when a user logs in to the XP, or tries to access Enable mode.

## Parameters

| | |
|---|---|
| **login** | Authenticates users at the XP login prompt. |
| **enable** | Authenticates users when they try to access Enable mode. |
| **system** | Authenticates $enab<n>$user when they try to access Enable or Login mode. |

## Restrictions

None.

## Example

To perform TACACS Plus authentication at the XP login prompt:

```
xp(config)# tacacs-plus authentication login
```

# tacacs-plus enable

## Purpose

Enables TACACS Plus authentication on the XP. TACACS Plus authentication is disabled by default on the XP.

## Format

**tacacs-plus enable**

## Mode

Configure

## Description

The **tacacs-plus enable** command causes TACACS Plus authentication to be activated on the XP. You set TACACS Plus-related parameters with the **tacacs-plus set**, **tacacs-plus accounting shell**, and **tacacs-plus authorization** commands, then use the **tacacs-plus enable** command to activate TACACS Plus authentication.

## Parameters

None.

## Restrictions

None.

## Example

The following commands set TACACS Plus-related parameters on the XP. The commands are then activated with the **tacacs-plus enable** command:

```
xp(config)# tacacs-plus set server 207.135.89.15
xp(config)# tacacs-plus set timeout 30
xp(config)# tacacs-plus authentication login
xp(config)# tacacs-plus accounting shell all
xp(config)# tacacs-plus enable
```

# tacacs-plus set

## Purpose

Sets default parameters for authenticating the XP through a TACACS-Plus server.

## Format

**tacacs-plus set [timeout** *<number>*] [**retries** *<number>*] [**deadtime** *<number>*] [**key** *<string>*]
[**source** *<IFname_IPaddr>*] [**last-resort password|succeed|deny**]

## Mode

Configure

## Description

The **tacacs-plus set** command allows you to set TACACS-Plus-related parameters on the XP, how long to wait for the TACACS-Plus server to authenticate the user, an encryption key, and what to do if the TACACS-Plus server does not reply by a given time.

## Parameters

| | |
|---|---|
| **timeout** *<number>* | Is the maximum time (1-30) in seconds to wait for a TACACS-Plus server to reply. The default is 3 seconds. |
| **retries** *<number>* | The default number of times (1-10) to attempt to contact a server. |
| **deadtime** *<number>* | The length of time for transaction requests to skip over a TACACS server—up to a maximum of 1440 minutes (24 hours). This command causes the XP to mark as "dead" any TACACS server that fails to respond to authentication requests, thus avoiding the wait for the request to timeout before trying the next configured server. Additional requests for a TACACS server marked as "dead" will skip the server for the duration of minutes specified (unless all servers are marked "dead"). |
| **key** *<string>* | Is an encryption key to be shared with the TACACS-Plus server. The maximum length of this string is 128 bytes. |
| **source** *<IFname_IPaddr>* | Sets the source interface name or IP address for TACACS-Plus messages. |
| **last-resort** | Is the action to take if a TACACS-Plus server does not reply within the time specified by the **timeout** parameter. Specify one of the following: |

| | |
|---|---|
| **password** | The user is prompted for the password set with **system set password** command (if one has been set). |
| **succeed** | Access to the XP is granted. |
| **deny** | Unable to connect to TACACS server, access to the XP is denied. |

## Restrictions

None.

## Example

The following commands specify that hosts 137.72.5.9 and 137.72.5.41 are TACACS Plus servers, and the XP should wait no more than 30 seconds for a response from one of these servers. If a response from a TACACS-Plus server doesn't arrive in 30 seconds, the user is prompted for the password that was set with the XP **system set password** command.

```
xp(config)# tacacs-plus set server 137.72.5.9
xp(config)# tacacs-plus set server 137.72.5.41
xp(config)# tacacs-plus set timeout 30
xp(config)# tacacs-plus set last-resort password
```

# tacacs-plus set server

## Purpose

Sets parameters for authenticating the XP through a specific TACACS-Plus server.

## Format

**tacacs-plus set server** *<IPaddr>* **[port** *<number>*] **[timeout** *<number>*] **[retries** *<number>*]
**[deadtime** *<number>*] **[key** *<string>*] **[source** *<IFname_IPaddr>*]

## Mode

Configure

## Description

The **tacacs-plus set server** command allows you to set TACACS-Plus-related parameters on the
XP, including the IP address of a specific TACACS-Plus server, how long to wait for the TACACS-
Plus server to authenticate the user, an encryption key, and what to do if the TACACS-Plus server
does not reply by a given time.

## Parameters

| | |
|---|---|
| **server** *<IPaddr>* | Is the IP address of a TACACS-Plus server. You can enter up to five TACACS Plus servers. Enter one server per **tacacs-plus set server** command. |
| **port** *<number>* | The TACACS-Plus TCP port you will use (1-65535). The default port is 49. |
| **timeout** *<number>* | Is the maximum time (1-30) in seconds to wait for a TACACS Plus server to reply. The default is 3 seconds. |
| **retries** *<number>* | The default number of times (1-10) to attempt to contact this TACACS server. |
| **deadtime** *<number>* | The length of time for transaction requests to skip over a TACACS server—up to a maximum of 1440 minutes (24 hours). This command causes the XP to mark as "dead" any TACACS server that fails to respond to authentication requests, thus avoiding the wait for the request to timeout before trying the next configured server. Additional requests for a TACACS server marked as "dead" will skip the server for the duration of minutes specified (unless all servers are marked "dead"). |
| **key** *<string>* | Is an encryption key to be shared with the TACACS-Plus server. The maximum length of this string is 128 bytes. |

source *<IFname_IPaddr>* Sets the source interface name or IP address for TACACS-Plus
messages.

## Restrictions

None.

## Example

The following commands specify that hosts 137.72.5.9 and 137.72.5.41 are TACACS-Plus servers,
and the XP should wait no more than 30 seconds for a response from one of these servers. If a
response from a TACACS Plus server doesn't arrive in 30 seconds, the user is prompted for the
password that was set with the XP **system set password** command.

```
xp(config)# tacacs-plus set server 137.72.5.9
xp(config)# tacacs-plus set server 137.72.5.41
xp(config)# tacacs-plus set timeout 30
xp(config)# tacacs-plus set last-resort password
```

# tacacs-plus show

## Purpose

Displays information about TACACS Plus configuration on the XP.

## Format

**tacacs-plus show stats|all**

## Mode

Enable

## Description

The **tacacs-plus show** command displays statistics and configuration parameters related to TACACS Plus configuration on the XP. The statistics displayed include:

**accepts**   Number of times each server responded and validated the user successfully.

**rejects**   Number of times each server responded and denied the user access, either because the user wasn't known, or the wrong password was supplied.

**timeouts**  Number of times each server did not respond.

## Parameters

**stats**        Displays the accepts, rejects, and timeouts for each TACACS Plus server.

**all**            Displays the configuration parameters set with the **tacacs-plus set** command, in addition to the accepts, rejects, and timeouts for each TACACS Plus server.

## Restrictions

None.

# Example

To display configuration parameters and TACACS Plus server statistics:

```
xp# tacacs-plus show all
TACACS+ status:             ACTIVE
TACACS+ last resort:          Succeed when server fails
Command Level Logging:         15 - Log Configure, Enable and User Commands
Default TACACS+ timeout (seconds): 3
Default TACACS+ retries:       3
Default TACACS+ deadtime (minutes):0
Default TACACS+ key:          net
Default TACACS+ source IP address: Let system decide

TACACS+ servers listed in order of priority:

Server:        10.136.16.102
Port:          49
Timeout (seconds):   <Default>
Retries:         <Default>
Deadtime (minutes):  3
Key:          net
Source IP:        <Default>
Server is dead. Will be made tested again in 2 minutes

Server:        10.136.15.100
Port:          49
Timeout (seconds):   <Default>
Retries:         <Default>
Deadtime (minutes):  <Default>
Key:
Source IP:        <Default>

Server:        10.136.15.101
Port:          49
Timeout (seconds):   <Default>
Retries:         <Default>
Deadtime (minutes):  <Default>
Key:          net
Source IP:        <Default>

TACACS+ server host statistics:

Host         Accepts  Rejects  Timeouts
10.136.16.102    0     0     3
10.136.15.100    1     0     0       * Sever being used
10.136.15.101    0     0     0
```

# Chapter 68

# telnet Command

The **telnet** command opens a Telnet session to the specified host.

## Format

**telnet** *<hostname-or-IPaddr>* [**socket** *<socket-number>*]

## Mode

User or Enable

## Description

The **telnet** command allows you to open a Telnet session to the specified host.

## Parameters

*<hostname-or-IPaddr>*
   The host name or IP address of the remote computer that you want to access.

**socket** *<socket-number>*
   The TCP port through which the Telnet session will be opened. If this parameter is not
   specified, the Telnet port (socket number 23) is assumed. This parameter can be used to test
   other ports; for example, socket number 21 is the port for FTP.

## Restrictions

None.

# Example

To open a Telnet session on the host "xp4":

xp# **telnet** xp**4**

# Chapter 69

# traceroute Command

The **traceroute** command traces the path a packet takes to reach a remote host.

## Format

**traceroute** *<host>* [**max-ttl** *<num>*] [**probes** *<num>*] [**size** *<num>*] [**source** *<host>*] [**tos** *<num>*] [**wait-time** *<secs>*] [**verbose**] [**noroute**]

## Mode

User

## Description

The **traceroute** command traces the route taken by a packet to reach a remote IP host. The **traceroute** command examines the route taken by a packet traveling from a source to a destination. By default, the source of the packet is the XP. However, one can specify a different source and track the route between it and a destination. The route is calculated by initially sending a probe (packet) from the source to the destination with a TTL of 1. Each intermediate router that is not able to reach the final destination directly will send back an ICMP Time Exceeded message. Subsequent probes from the source will increase the TTL value by 1. As each Time Exceeded message is received, the program keeps track of the address of each intermediate gateway. The probing stops when the packet reaches the destination or the TTL exceeds the **max-ttl** value.

## Parameters

*<host>*
    Hostname or IP address of the destination

**max-ttl** *<num>*
    Maximum number of gateways ("hops") to trace

**probes** *<num>*
     Number of probes to send

**size** *<num>*
     Packet size of each probe

**source** *<host>*
     Hostname or IP address of the source

**tos** *<num>*
     Type of Service value in the probe packet

**wait-time** *<secs>*
     Maximum time to wait for a response

**verbose**
     Displays results in verbose mode

**noroute**
     Ignores the routing table and sends a probe to a host on a directly attached network. If the
     destination is not on the local network, an error is returned.

## Restrictions

None.

## Example

To display the route from the XP to the host *othello* in verbose mode:

xp# **traceroute othello verbose**

# Chapter 70

# vlan Commands

The **vlan** commands allow the user to perform the following tasks:

*   Create VLANs

*   List VLANs

*   Add ports to VLANs

*   Deny the addition of new ports to VLANs

*   Change the port membership of VLANs

*   Make a VLAN port either a trunk port or an access port

## Command Summary

Table 53 lists the **vlan** commands. The sections following the table describe the command syntax.

**Table 53. vlan commands**

| |
|---|
| **vlan add ports** *<port-list>* **to** *<vlan-name>* |
| **vlan create** *<vlan-name>* *<type>* **id** *<num>* |
| **vlan enable l4-bridging on** *<vlan-name>* |
| **vlan forbid ports** *<port-list>* **from** *<string>* |
| **vlan make** *<port-type>* *<port-list>* |
| **vlan multi-add ports** *<port-list>* **to** *<basename>* **id** *<num>* **through** *<num>* |
| **vlan multi-create** *<basename>* *<type>* **id** *<num>* **through** *<num>* |
| **vlan show** |

# vlan add ports

## Purpose

Adds ports to a VLAN.

## Format

**vlan add ports** *<port-list>* **to** *<vlan-name>*

## Mode

Configure

## Description

The **vlan add ports** command adds ports and trunk ports to an existing VLAN. You do not need to specify the VLAN type when you add ports (you specify the VLAN type when you create the VLAN). For information about creating VLANs, see *vlan create* .

## Parameters

*<port-list>*
> The ports you are adding to the VLAN. You can specify a single port or a comma-separated list of ports. Example: et.1.3,et.(1-3).(4,6-8).

*<vlan-name>*
> Name of the VLAN to which you are adding ports.

## Restrictions

The VLAN to which you add ports must already exist. To create a VLAN, use the **vlan create** command. An access port can be added to only one IP VLAN, one IPX VLAN, and one bridged-protocols VLAN.

# vlan create

## Purpose

Creates a VLAN based on ports or protocol.

## Format

**vlan create** *<vlan-name>* *<type>* **id** *<num>*

## Mode

Configure

## Description

The **vlan create** command creates a VLAN definition. You can create a port-based VLAN or a protocol-based VLAN. For information about adding ports and trunk ports to a VLAN, see *vlan add ports* .

## Parameters

*<vlan-name>*   Name of the VLAN. The VLAN name is a string up to 32 characters long.

**Note:**   The VLAN name cannot begin with an underscore ( _ ) or the word "SYS_". The names "control," "default," "blackhole," "reserved," and "learning" cannot be used.

*<type>*   The type of VLAN you are adding. The VLAN type determines the types of traffic the XP will forward on the VLAN. Specify any combination of the first seven types that follow *or* specify **port-based**:

    **ip**
        Create this VLAN for IP traffic

    **ipx**
        Create this VLAN for IPX traffic

    **appletalk**
        Create this VLAN for AppleTalk traffic

    **dec**
        Create this VLAN for DECnet traffic

    **sna**
        Create this VLAN for SNA traffic

    **ipv6**
        Create this VLAN for IPv6 traffic

**bridged-protocols**

Create this VLAN for extended VLAN types (DEC, SNA, Appletalk, IPv6), and non-IP and non-IPX protocols

**Note:** You can specify a combination of **ip**, **ipx**, **appletalk**, **dec**, **sna**, **ipv6**, and **bridged-protocols**. If you specify *any* of the extended VLAN types (**sna**, **dec**, **appletalk**, **ipv6**) with the **bridged-protocols** option, then all the other extended VLAN types are removed from the VLAN. See the following table:

| Configuration Command | Protocols Included in VLAN | Protocols Excluded from VLAN |
|---|---|---|
| vlan create *<vlan-name>* ip | **IP** | **IPX, SNA, IPv6, DECnet, Appletalk, Other** |
| vlan create *<vlan-name>* ip bridged-protocols | **IP, SNA, DECnet, IPv6, Appletalk, Other** | **IPX** |
| vlan create *<vlan-name>* ip bridged-protocols sna | **IP, SNA, Other** | **IPX, IPv6, DECnet, Appletalk** |
| vlan create *<vlan-name>* ip bridged-protocols sna ipv6 | **IP, SNA, IPv6, Other** | **IPX, DECnet, Appletalk** |

**port-based**

Create this VLAN for all traffic types listed above (port-based VLAN)

**Note:** You can specify a combination of **ip**, **ipx**, **appletalk**, **dec**, **sna**, **ipv6**, and **bridged-protocols** *or* you can specify **port-based**; you cannot specify **port-based** with any of the other options.

**id** *<num>*    ID of this VLAN. The ID must be unique. You can specify a number from 2 – 4094. If more than one XP will be configured with the same VLAN, you must specify the same VLAN ID on each XP.

## Restrictions

The following *cannot* be used for VLAN names:

- control

- default

- blackhole

- reserved

- learning

- names starting with an underscore (_) or "sys_"

**Note:** Specify both SNA and bridged-protocol to successfully create an SNA based VLAN. The SNA-protocol-based VLAN (implemented in version 3.0 and later) needs to be configured with the following command:
**vlan create sna bridged-protocols id <id#>**
in order to forward all SNA protocol types. Refer to the following Technical Bulletin for more detail: TB0973-1

## Examples

The following command creates a VLAN 'blue' for IP, SNA, non-IPX, non-DECnet, non-Appletalk, non-IPv6 protocols:

xp(config)# **vlan create blue ip bridged-protocols sna**

The following command creates a VLAN 'red' for IP, non-IPX, and extended VLAN types SNA, DECnet, Appletalk, and IPv6:

xp(config)# **vlan create red ip bridged-protocols**

# vlan enable

## Purpose

Enable VLAN specific features.

## Format

**vlan enable l4-bridging on** *<vlan-name>*

## Mode

Configure

## Description

The **vlan enable** command allows you to enable VLAN features.

## Parameters

| | |
|---|---|
| *<vlan-name>* | The name of the VLAN. |
| **l4-bridging on** | This optional parameter enables Layer-4 bridging. |

## Restrictions

None.

# vlan forbid ports

## Purpose

Forbids ports from being added to an existing VLAN.

## Format

**vlan forbid ports** *<port-list>* **from** *<string>*

## Mode

Configure

## Description

The **vlan forbid ports** command prevents the addition of new ports to a VLAN.

## Parameters

| | |
|---|---|
| *<port-list>* | Specifies forbidden ports. You can specify a single port or use commas to specify a list of ports. For example: et.1.3, et.(1-3), (4,6-8). |
| *<string>* | Specifies name of a valid VLAN. |

## Restrictions

None.

## Example

The following command forbids ports et.1.1 and et.1.2 from VLAN red:

```
xp(config)# vlan forbid ports et.1.(1-2) from red
```

# vlan make

## Purpose

Configures the specified ports into either trunk or access ports.

## Format

**vlan make** *<port-type>* *<port-list>*

## Mode

Configure

## Description

The **vlan make** command turns a port into a VLAN trunk or VLAN access port. A VLAN trunk port can forward traffic for multiple VLANs. Use trunk ports when you want to connect XP switches together and send traffic for multiple VLANs on a single network segment connecting the switches. When you create a trunk port, you must use the **vlan add ports** command to add the trunk port to a VLAN.

**Note:** When you create a VLAN trunk, make sure the port you use is not already assigned to an existing VLAN (other than the default). After you define the trunk, you must convert it to 802.1Q in order to add it to an existing non-default VLAN.

## Parameters

*<port-type>*
> The port type. You can specify one of the following types:

> **trunk-port**
>> The port will forward traffic for multiple VLANs. The XP will encapsulate all traffic in IEEE 802.1Q tag headers.

> **access-port**
>> The port will forward traffic only for the VLANs to which you have added the ports and the traffic will be untagged. This is the default.

*<port-list>*
> The ports you are configuring. You can specify a single port or a comma-separated list of ports. Example: et.1.3,et.(1-3).(4,6-8).

## Restrictions

None.

# vlan multi-add

## Purpose

Adds ports to multiple VLANS. Used with the vlan multi-create command.

## Format

**vlan multi-add ports** *<port-list>* **to** *<basename>* **id** *<num>* **through** *<num>*

## Mode

Configure

## Description

The vlan multi-add ports command adds ports to existing VLANS created with the vlan multi-create command.

## Parameters

| | |
|---|---|
| *<port-list>* | The ports you are adding to the VLANS. You can specify a single port or a comma-separated list of ports. Example: et.1.3,et.(1-3).(4,6-8). |
| *<basename>* | The basename of the VLANS to add ports to. |
| **id** *<num>* | The starting ID of the VLANS to add ports to. |
| *through <num>* | The ending ID of the VLANS to add ports to. |

## Restrictions

The VLANS to which you add ports must already exist. To create multiple VLANS, use the vlan multi-create command. Ports must be trunk ports to be used with this command.

## Example

The following command adds ports to VLANS RED2, RED3, RED4, and RED5.

```
vlan multi-add ports gi.1.1-2 to RED id 2 through 5
```

# vlan multi-create

## Purpose

Creates multiple VLANS based on ports or protocol.

## Format

**vlan multi-create** *<basename>* *<type>* **id** *<num>* **through** *<num>*

## Mode

Configure

## Description

The vlan multi-create command creates multiple VLANS. The name of the VLAN will be the basename appended with the VLAN ID.

## Parameters

*<basename>*    The basename of the VLAN. VLAN IDS will be appended to the basename for the VLAN name.

*<type>*    The type of VLAN you are adding. The VLAN type determines the types of traffic the XP will forward on the VLAN. Specify any combination of the first seven types that follow *or* specify **port-based**:

**ip**
   Create this VLAN for IP traffic

**ipx**
   Create this VLAN for IPX traffic

**appletalk**
   Create this VLAN for AppleTalk traffic

**dec**
   Create this VLAN for DECnet traffic

**sna**
   Create this VLAN for SNA traffic

**ipv6**
   Create this VLAN for IPv6 traffic

**bridged-protocols**
   Create this VLAN for extended VLAN types (DEC, SNA, Appletalk, IPv6), and non-IP and non-IPX protocols

**Note:** You can specify a combination of **ip**, **ipx**, **appletalk**, **dec**, **sna**, **ipv6**, and **bridged-protocols**. If you specify *any* of the extended VLAN types (**sna**, **dec**, **appletalk**, **ipv6**) with the **bridged-protocols** option, then all the other extended VLAN types are removed from the VLAN. See the following table:

| Configuration Command | Protocols Included in VLAN | Protocols Excluded from VLAN |
|---|---|---|
| vlan create *<vlan-name>* ip | **IP** | **IPX, SNA, IPv6, DECnet, Appletalk, Other** |
| vlan create *<vlan-name>* ip bridged-protocols | **IP, SNA, DECnet, IPv6, Appletalk, Other** | **IPX** |
| vlan create *<vlan-name>* ip bridged-protocols sna | **IP, SNA, Other** | **IPX, IPv6, DECnet, Appletalk** |
| vlan create *<vlan-name>* ip bridged-protocols sna ipv6 | **IP, SNA, IPv6, Other** | **IPX, DECnet, Appletalk** |

> **port-based**
> Create this VLAN for all traffic types listed above (port-based VLAN)

**Note:** You can specify a combination of **ip**, **ipx**, **appletalk**, **dec**, **sna**, **ipv6**, and **bridged-protocols** *or* you can specify **port-based**; you cannot specify **port-based** with any of the other options.

**id** *<num>*     The starting ID of the VLANS to be created. This ID must be smaller than the end ID.

**through** *<num>*     The ending ID of the VLANS to be created.

## Restrictions

The following *cannot* be used for VLAN names:

- control

- default

- blackhole

- reserved

- learning

- names starting with an underscore (_) or "sys_"

**Note:** Specify both SNA and bridged-protocol to successfully create an SNA based VLAN. The SNA-protocol-based VLAN (implemented in version 3.0 and later) needs to be configured with the following command:

**vlan multi-create** *<basename>* **sna bridged-protocols id** *<num>* **through** *<num>*

in order to forward all SNA protocol types. Refer to the following Technical Bulletin for more detail: TB0973-1

## Example:

The following command creates VLANS RED2, RED3, RED4, and RED5.

```
vlan multi-create RED id 2 through 5
```

# vlan show

## Purpose

Displays a list of all active VLANs on the XP.

## Format

**vlan show**

## Mode

User or Enable

## Description

The **vlan show** command lists all the VLANs that have been configured on the XP.

## Parameters

None.

## Restrictions

None.

# Chapter 71

# web-cache Commands

The **web-cache** commands allow you to transparently redirect HTTP requests to a group of local cache servers. This feature can provide faster user responses and reduce demands for WAN bandwidth.

## Command Summary

Table 54 lists the **web-cache** commands. The sections following the table describe the command syntax.

**Table 54. web-cache commands**

| |
|---|
| **web-cache** *<cache-name>* **apply interface** *<interface-name>* |
| **web-cache clear all\|cache-name** *<cache-name>* |
| **web-cache** *<cache-name>* **create bypass-list range** *<ipaddr-range>*\|**list** *<ipaddr-list>*/**acl** *<acl-name>* |
| **web-cache** *<cache-name>* **create server-list** *<server-list-name>* **range** *<ipaddr-range>*\|**list** *<ipaddr-list>* |
| **web-cache** *<cache-name>* **permit\|deny hosts range** *<ipaddr-range>*\|**list** *<ipaddr-list>*/**acl** *<acl-name>* |
| **web-cache** *<cache-name>* **set http-port** *<port number>* |
| **web-cache** *<cache-name>* **set round-robin range** *<ipaddr-range>*\|**list** *<ipaddr-list>* |
| **web-cache show [all] [cache-name** *<cache-name>*\|**all] [servers cache** *<cache-name>*\|**all]** |

# web-cache apply interface

## Purpose

Applies a caching policy to an interface.

## Format

**web-cache** *<cache-name>* **apply interface** *<interface-name>*

## Mode

Configure

## Description

The **web-cache apply** command lets you apply a configured cache policy to an outbound interface to start the redirection. The interface to which the cache policy is applied is typically the interface that connects to the Internet. This command redirects outbound HTTP traffic to the cache servers.

## Parameters

*<cache-name>*
> The name of a cache policy configured with the **web-cache create server-list** command.

*<interface-name>*
> The name of the outbound interface that connects to the actual Web server. Typically, this is the interface that connects to the Internet.

## Restrictions

None.

## Example

To apply the caching policy 'websrv1' to the interface 'inet2':

```
xp(config)# web-cache websrv1 apply interface inet2
```

# web-cache clear

## Purpose

Clears statistics for the specified caching policy.

## Format

**web-cache clear all|cache-name** *<cache-name>*

## Mode

Enable

## Description

The **web-cache clear** command lets you clear statistics for all caching policies or for specified policies.

## Parameters

**all**
Clears statistics for all caching policies.

**cache-name** *<cache-name>*

Clears statistics for the specified caching policy.

## Restrictions

None.

## Examples

To clear statistics for the caching policy 'websrv1':

xp# **web-cache clear cache-name websrv1**

# web-cache create bypass-list

## Purpose

Defines the destination sites for which HTTP requests are not redirected to the cache servers, but sent direct.

## Format

**web-cache** *<cache-name>* **create bypass-list range** *<ipaddr-range>*|**list** *<ipaddr-list>*/**acl** *<acl-name>*

## Mode

Configure

## Description

Certain web sites require authentication of source IP addresses for user access. Requests to these sites cannot be sent to the cache servers. The **web-cache create bypass-list** command allows you to define the destinations to which HTTP requests must be sent directly without redirection to a cache server. You can specify a range of IP addresses, a list of up to four IP addresses, or an ACL that qualifies these hosts.

## Parameters

*<cache-name>*
The name of the caching policy for which the specified hosts will not apply.

**range** *<ipaddr-range>*
A range of host IP addresses in the form "176.89.10.10 176.89.10.50". This adds the hosts 176.89.10.10, 176.89.10.11, etc., through 176.89.10.50 to the bypass list.

**list** *<ipaddr-list>*
A list of up to four destination IP addresses in the form "176.89.10.10 176.89.10.11 176.89.10.12".

**acl** *<acl-name>*
Name of the ACL profile that defines the packet profile to bypass. The ACL may contain either **permit** or **deny** keywords. The **web-cache create bypass-list** command only looks at the following ACL rule parameter values: protocol, source IP address, destination IP address, source port, destination port, and TOS.

## Restrictions

None.

## Examples

To specify the hosts 176.89.10.10 and 176.89.10.11 for the bypass list for the caching policy 'websrv1':

xp(config)# web-cache websrv1 create bypass-list list "176.89.10.10 176.89.10.11"

To specify the hosts defined in the ACL 'nocache' for the bypass list for the caching policy 'websrv1':

xp(config)# web-cache websrv1 create bypass-list acl nocache

# web-cache create server-list

## Purpose

Defines the list of servers to be used for caching.

## Format

**web-cache** *<cache-name>* **create server-list** *<server-list-name>* **range** *<ipaddr-range>*|**list** *<ipaddr-list>*

## Mode

Configure

## Description

The **web-cache create server-list** command allows you to create a group of servers that are used for the specified caching policy. If there are multiple cache servers, load balancing is done based on the destination IP address. If any cache server fails, traffic is redirected to other active servers. You can specify either a range of IP addresses or a list of up to four IP addresses. Note that traffic that is sent from a server in the server list is not redirected.

## Parameters

*<cache-name>*
    The name of the caching policy.

*<server-list-name>*
    The name of this list of servers.

**range** *<ipaddr-range>*
    A range of host IP addresses in the form "176.89.10.10 176.89.10.50". This adds the hosts 176.89.10.10, 176.89.10.11, etc., through 176.89.10.50 to the server list.

**list** *<ipaddr-list>*
    A list of up to four host IP addresses in the form "176.89.10.10 176.89.10.11 176.89.10.12".

## Restrictions

None.

## Examples

To specify the server list 'servers1' for the caching policy 'websrv1':

xp(config)# web-cache websrv1 create server-list servers1 range "10.10.10.10 10.10.10.50"

# web-cache permit|deny hosts

## Purpose

Specifies the hosts whose HTTP requests are redirected to the cache servers.

## Format

**web-cache** *<cache-name>* **permit|deny hosts range** *<ipaddr-range>*|**list** *<ipaddr-list>*|**acl** *<acl-name>*

## Mode

Configure

## Description

The **web-cache permit** command lets you specify the hosts (users) whose HTTP requests are redirected to the cache servers, while the **web-cache deny** command lets you specify the hosts whose HTTP requests are not redirected to the cache servers. If no **permit** command is specified, all HTTP requests are redirected to the cache servers. You can specify a range of IP addresses, a list of up to four IP addresses, or an ACL that qualifies these hosts.

## Parameters

*<cache-name>*
    The name of the cache.

**range** *<ipaddr-range>*
    A range of host IP addresses in the form "176.89.10.10 176.89.10.50".

**list** *<ipaddr-list>*
    A list of up to four host IP addresses in the form "176.89.10.10 176.89.10.11 176.89.10.12".

**acl** *<acl-name>*
    Name of the ACL profile to be used. This defines the profile of the packets to be permitted or denied. The **web-cache permit/deny** command only looks at the following ACL rule parameter values: protocol, source IP address, destination IP address, source port, destination port, and TOS.

## Restrictions

None.

## Examples

To allow the HTTP requests of certain hosts to be redirected to the cache servers:

xp(config)# **web-cache websrv1 permit hosts range "10.10.20.10 10.10.20.50"**

To specify that the HTTP requests of certain hosts not be redirected to the cache servers:

xp(config)# **web-cache websrv1 deny hosts list "10.10.20.61 10.10.20.75"**

# web-cache set http-port

## Purpose

Specifies the HTTP port used by a proxy server.

## Format

**web-cache** *<cache-name>* **set http-port** *<port number>*

## Mode

Configure

## Description

Some networks use proxy servers that listen for HTTP requests on a non-standard port number. The XP can be configured to redirect HTTP requests on a non-standard HTTP port. The **web-cache set http-port** command lets you specify the port number that is used by the proxy server for HTTP requests. The default is port 80.

## Parameters

*<cache-name>*
    The name of the cache.

*<port number>*
    Specifies the port number used by the proxy server for HTTP requests. Specify a value between 1 and 65535.

## Restrictions

None.

## Example

To set the port number for HTTP requests:

xp(config)# **web-cache websvr1 set http-port 100**

# web-cache set round-robin

## Purpose

Specifies a list of destination IP addresses to be distributed across cache servers.

## Format

**web-cache** *<cache-name>* **set round-robin range** *<ipaddr-range>*|**list** *<ipaddr-list>*

## Mode

Configure

## Description

The XP determines the cache server to redirect an HTTP request, based on the destination IP address of the request. If a certain web site is accessed very frequently, the cache server that services HTTP requests to this web site can become overloaded with user requests. The **web-cache set round-robin** command allows you to distribute destination IP addresses for HTTP requests across cache servers in a round-robin manner. If a cache server fails, the address range associated with that server is redistributed among the remaining servers.

## Parameters

*<cache-name>*
　The name of the caching policy.

**range** *<ipaddr-range>*
　A range of host IP addresses in the form "176.89.10.10 176.89.10.50".

**list** *<ipaddr-list>*
　A list of up to four destination IP addresses in the form "176.89.10.10 176.89.10.11 176.89.10.12".

## Restrictions

None.

## Example

To specify destination IP addresses to be distributed across the caching policy 'websvr1' servers:

```
xp(config)# web-cache set round-robin list "176.20.20.10 176.20.50.60"
```

# web-cache show

## Purpose

Displays information about caching policies.

## Format

**web-cache show [all] [cache-name** *<cache-name>***|all] [servers cache** *<cache-name>***|all]**

## Mode

Enable

## Description

The **web-cache show** command allows you to display web caching information for specific caching policies or server lists.

## Parameters

**all**
 Displays all web cache information for all caching policies and all server lists.

**cache-name** *<cache-name>*/**all**
 Displays web cache information for the specified caching policy. **all** displays all caching policies.

**servers cache** *<cache-name>*/**all**
 Displays information for the servers configured for the specified caching policy. **all** displays all configured cache servers.

## Restrictions

None.

# Examples

To display web cache information for a specific caching policy:

```
xp# web-cache show cache-name cache1
Cache Name : cache1 ❶
Applied Interfaces : ip1 ❷
Bypass list : none ❸
HTTP Port : 80 ❹

    ❺           ❻           ❼           ❽        ❾   ❿ ⓫
ACL      Source IP/Mask  Dest. IP/Mask  SrcPort  DstPort  TOS Port
---      --------------  -------------  --------- --------- --- ----
deny207 172.89.1.1/32   207.135.0.0/16  any      http     0   IP

    ⓬         ⓭         ⓮
Server   Max con  IP address
---- --   ------- ----------
s1       2000     176.89.10.50 - 176.89.10.60

Access Users ⓯
------ -----
Permit All Users
Deny   profile deny207
```

**Legend:**

1. The name of the cache policy.

2. The outbound interface where the cache policy was applied, typically an interface that connects to the Internet.

3. Destination sites for which HTTP requests are *not* redirected to cache servers and are sent direct.

4. The HTTP port used by a proxy server. A port number other than 80 can be specified with the **web-cache set http-port** command.

5. The names of the profiles (created with an **acl** statement) associated with this cache policy.

6. The source address and filtering mask.

7. The destination address and filtering mask.

8. The source port.

9. The destination port.

10. The TOS value in the packet.

11. The protocol.

12. The server list name.

13. The maximum number of connections that can be handled by each server in the server list.

14. The list or range of IP addresses of the servers in the server list.

15. The hosts (users) whose HTTP requests *are* redirected to the cache servers and the hosts whose HTTP requests are *not* redirected to the cache servers. If no **permit** command is specified, all HTTP requests are redirected to the cache servers.

To display information for all configured web cache servers:

```
xp# web-cache show servers cache cache1
Cache name : cache1 ❶

      ❷        ❸        ❹        ❺        ❻
Block IP address    Max Conn  Used Cnt  Status
----- ----------   --------  --------  ------
s1    176.89.10.50 2000      0         Down
s1    176.89.10.51 2000      0         Down
s1    176.89.10.52 2000      0         Down
s1    176.89.10.53 2000      0         Down
s1    176.89.10.54 2000      0         Down
s1    176.89.10.55 2000      0         Down
s1    176.89.10.56 2000      0         Down
s1    176.89.10.57 2000      0         Down
s1    176.89.10.58 2000      0         Down
s1    176.89.10.59 2000      0         Down
s1    176.89.10.60 2000      0         Down
```

**Legend:**

1. The name of the cache policy.

2. The server list name.

3. The IP address of a server in the server list.

4. The maximum number of connections that can be handled by the server.

5. The number of connections currently being handled by the server.

6. The current status of the server.

# Appendix A

# RMON 2 Protocol Directory

This appendix lists the protocol encapsulations that can be managed with the RMON 2 Protocol Directory group on the XP. You can specify protocol encapsulations with the **rmon set protocol-directory** or **rmon show protocol-directory** commands. For example, ether2.ipx specifies IPX over Ethernet II, while *ether2.ipx specifies IPX over any link layer protocol. The protocol object IDs are defined in RFC 2074.

The protocols are listed in the following order:

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| **Ethernet Applications** | |
| ether2.idp | 8.0.0.0.1.0.0.6.0.2.0.0 |
| ether2.ip-v4 | 8.0.0.0.1.0.0.8.0.2.0.0 |
| ether2.chaosnet | 8.0.0.0.1.0.0.8.4.2.0.0 |
| ether2.arp | 8.0.0.0.1.0.0.8.6.2.0.0 |
| ether2.vip | 8.0.0.0.1.0.0.11.173.2.0.0 |
| ether2.vloop | 8.0.0.0.1.0.0.11.174.2.0.0 |
| ether2.vecho | 8.0.0.0.1.0.0.11.175.2.0.0 |
| ether2.netbios-3com | 8.0.0.0.1.0.0.60.0.2.0.0 |
| ether2.dec | 8.0.0.0.1.0.0.96.0.2.0.0 |
| ether2.mop | 8.0.0.0.1.0.0.96.1.2.0.0 |
| ether2.mop2 | 8.0.0.0.1.0.0.96.2.2.0.0 |
| ether2.drp | 8.0.0.0.1.0.0.96.3.2.0.0 |
| ether2.lat | 8.0.0.0.1.0.0.96.4.2.0.0 |
| ether2.dec-diag | 8.0.0.0.1.0.0.96.5.2.0.0 |
| ether2.lavc | 8.0.0.0.1.0.0.96.7.2.0.0 |
| ether2.rarp | 8.0.0.0.1.0.0.128.53.2.0.0 |
| ether2.atalk | 8.0.0.0.1.0.0.128.155.2.0.0 |
| ether2.vloop2 | 8.0.0.0.1.0.0.128.196.2.0.0 |
| ether2.vecho2 | 8.0.0.0.1.0.0.128.197.2.0.0 |
| ether2.sna-th | 8.0.0.0.1.0.0.128.213.2.0.0 |
| ether2.aarp | 8.0.0.0.1.0.0.128.243.2.0.0 |
| ether2.ipx | 8.0.0.0.1.0.0.129.55.2.0.0 |
| ether2.snmp | 8.0.0.0.1.0.0.129.76.2.0.0 |
| ether2.ip-v6 | 8.0.0.0.1.0.0.134.221.2.0.0 |
| ether2.loopback | 8.0.0.0.1.0.0.144.0.2.0.0 |
| *ether2.ip-v4 | 8.1.0.0.1.0.0.8.0.2.0.1 |
| *ether2.ipx | 8.1.0.0.1.0.0.129.55.2.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| **IP (version 4) Applications** | |
| *ether2.ip-v4.icmp | 12.1.0.0.1.0.0.8.0.0.0.0.1.3.0.1.0 |
| *ether2.ip-v4.igmp | 12.1.0.0.1.0.0.8.0.0.0.0.2.3.0.1.0 |
| *ether2.ip-v4.ggp | 12.1.0.0.1.0.0.8.0.0.0.0.3.3.0.1.0 |
| *ether2.ip-v4.ipip4 | 12.1.0.0.1.0.0.8.0.0.0.0.4.3.0.1.0 |
| *ether2.ip-v4.st | 12.1.0.0.1.0.0.8.0.0.0.0.5.3.0.1.0 |
| *ether2.ip-v4.tcp | 12.1.0.0.1.0.0.8.0.0.0.0.6.3.0.1.0 |
| *ether2.ip-v4.ucl | 12.1.0.0.1.0.0.8.0.0.0.0.7.3.0.1.0 |
| *ether2.ip-v4.egp | 12.1.0.0.1.0.0.8.0.0.0.0.8.3.0.1.0 |
| *ether2.ip-v4.igp | 12.1.0.0.1.0.0.8.0.0.0.0.9.3.0.1.0 |
| *ether2.ip-v4.bbn-rcc-mon | 12.1.0.0.1.0.0.8.0.0.0.0.10.3.0.1.0 |
| *ether2.ip-v4.nvp2 | 12.1.0.0.1.0.0.8.0.0.0.0.11.3.0.1.0 |
| *ether2.ip-v4.pup | 12.1.0.0.1.0.0.8.0.0.0.0.12.3.0.1.0 |
| *ether2.ip-v4.argus | 12.1.0.0.1.0.0.8.0.0.0.0.13.3.0.1.0 |
| *ether2.ip-v4.emcon | 12.1.0.0.1.0.0.8.0.0.0.0.14.3.0.1.0 |
| *ether2.ip-v4.xnet | 12.1.0.0.1.0.0.8.0.0.0.0.15.3.0.1.0 |
| *ether2.ip-v4.chaos | 12.1.0.0.1.0.0.8.0.0.0.0.16.3.0.1.0 |
| *ether2.ip-v4.udp | 12.1.0.0.1.0.0.8.0.0.0.0.17.3.0.1.0 |
| *ether2.ip-v4.mux | 12.1.0.0.1.0.0.8.0.0.0.0.18.3.0.1.0 |
| *ether2.ip-v4.dcn-meas | 12.1.0.0.1.0.0.8.0.0.0.0.19.3.0.1.0 |
| *ether2.ip-v4.hmp | 12.1.0.0.1.0.0.8.0.0.0.0.20.3.0.1.0 |
| *ether2.ip-v4.prm | 12.1.0.0.1.0.0.8.0.0.0.0.21.3.0.1.0 |
| *ether2.ip-v4.xns-idp | 12.1.0.0.1.0.0.8.0.0.0.0.22.3.0.1.0 |
| *ether2.ip-v4.trunk-1 | 12.1.0.0.1.0.0.8.0.0.0.0.23.3.0.1.0 |
| *ether2.ip-v4.trunk-2 | 12.1.0.0.1.0.0.8.0.0.0.0.24.3.0.1.0 |
| *ether2.ip-v4.leaf-1 | 12.1.0.0.1.0.0.8.0.0.0.0.25.3.0.1.0 |
| *ether2.ip-v4.leaf-2 | 12.1.0.0.1.0.0.8.0.0.0.0.26.3.0.1.0 |
| *ether2.ip-v4.rdp | 12.1.0.0.1.0.0.8.0.0.0.0.27.3.0.1.0 |
| *ether2.ip-v4.irtp | 12.1.0.0.1.0.0.8.0.0.0.0.28.3.0.1.0 |
| *ether2.ip-v4.iso-tp4 | 12.1.0.0.1.0.0.8.0.0.0.0.29.3.0.1.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.netbit | 12.1.0.0.1.0.0.8.0.0.0.0.30.3.0.1.0 |
| *ether2.ip-v4.mfe-nsp | 12.1.0.0.1.0.0.8.0.0.0.0.31.3.0.1.0 |
| *ether2.ip-v4.merit-inp | 12.1.0.0.1.0.0.8.0.0.0.0.32.3.0.1.0 |
| *ether2.ip-v4.sep | 12.1.0.0.1.0.0.8.0.0.0.0.33.3.0.1.0 |
| *ether2.ip-v4.third-pc | 12.1.0.0.1.0.0.8.0.0.0.0.34.3.0.1.0 |
| *ether2.ip-v4.idpr | 12.1.0.0.1.0.0.8.0.0.0.0.35.3.0.1.0 |
| *ether2.ip-v4.xtp | 12.1.0.0.1.0.0.8.0.0.0.0.36.3.0.1.0 |
| *ether2.ip-v4.ddp | 12.1.0.0.1.0.0.8.0.0.0.0.37.3.0.1.0 |
| *ether2.ip-v4.idpr-cmtp | 12.1.0.0.1.0.0.8.0.0.0.0.38.3.0.1.0 |
| *ether2.ip-v4.tp-plus-plus | 12.1.0.0.1.0.0.8.0.0.0.0.39.3.0.1.0 |
| *ether2.ip-v4.il | 12.1.0.0.1.0.0.8.0.0.0.0.40.3.0.1.0 |
| *ether2.ip-v4.sip | 12.1.0.0.1.0.0.8.0.0.0.0.41.3.0.1.0 |
| *ether2.ip-v4.sdrp | 12.1.0.0.1.0.0.8.0.0.0.0.42.3.0.1.0 |
| *ether2.ip-v4.sip-sr | 12.1.0.0.1.0.0.8.0.0.0.0.43.3.0.1.0 |
| *ether2.ip-v4.sip-frag | 12.1.0.0.1.0.0.8.0.0.0.0.44.3.0.1.0 |
| *ether2.ip-v4.idrp | 12.1.0.0.1.0.0.8.0.0.0.0.45.3.0.1.0 |
| *ether2.ip-v4.rsvp | 12.1.0.0.1.0.0.8.0.0.0.0.46.3.0.1.0 |
| *ether2.ip-v4.gre | 12.1.0.0.1.0.0.8.0.0.0.0.47.3.0.1.0 |
| *ether2.ip-v4.mhrp | 12.1.0.0.1.0.0.8.0.0.0.0.48.3.0.1.0 |
| *ether2.ip-v4.bna | 12.1.0.0.1.0.0.8.0.0.0.0.49.3.0.1.0 |
| *ether2.ip-v4.sipp-esp | 12.1.0.0.1.0.0.8.0.0.0.0.50.3.0.1.0 |
| *ether2.ip-v4.sipp-ah | 12.1.0.0.1.0.0.8.0.0.0.0.51.3.0.1.0 |
| *ether2.ip-v4.i-nlsp | 12.1.0.0.1.0.0.8.0.0.0.0.52.3.0.1.0 |
| *ether2.ip-v4.swipe | 12.1.0.0.1.0.0.8.0.0.0.0.53.3.0.1.0 |
| *ether2.ip-v4.nhrp | 12.1.0.0.1.0.0.8.0.0.0.0.54.3.0.1.0 |
| *ether2.ip-v4.priv-host | 12.1.0.0.1.0.0.8.0.0.0.0.61.3.0.1.0 |
| *ether2.ip-v4.cftp | 12.1.0.0.1.0.0.8.0.0.0.0.62.3.0.1.0 |
| *ether2.ip-v4.priv-net | 12.1.0.0.1.0.0.8.0.0.0.0.63.3.0.1.0 |
| *ether2.ip-v4.sat-expak | 12.1.0.0.1.0.0.8.0.0.0.0.64.3.0.1.0 |
| *ether2.ip-v4.kryptolan | 12.1.0.0.1.0.0.8.0.0.0.0.65.3.0.1.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.rvd | 12.1.0.0.1.0.0.8.0.0.0.0.66.3.0.1.0 |
| *ether2.ip-v4.ippc | 12.1.0.0.1.0.0.8.0.0.0.0.67.3.0.1.0 |
| *ether2.ip-v4.priv-distfile | 12.1.0.0.1.0.0.8.0.0.0.0.68.3.0.1.0 |
| *ether2.ip-v4.sat-mon | 12.1.0.0.1.0.0.8.0.0.0.0.69.3.0.1.0 |
| *ether2.ip-v4.visa | 12.1.0.0.1.0.0.8.0.0.0.0.70.3.0.1.0 |
| *ether2.ip-v4.ipcv | 12.1.0.0.1.0.0.8.0.0.0.0.71.3.0.1.0 |
| *ether2.ip-v4.cpnx | 12.1.0.0.1.0.0.8.0.0.0.0.72.3.0.1.0 |
| *ether2.ip-v4.cphb | 12.1.0.0.1.0.0.8.0.0.0.0.73.3.0.1.0 |
| *ether2.ip-v4.wsn | 12.1.0.0.1.0.0.8.0.0.0.0.74.3.0.1.0 |
| *ether2.ip-v4.pvp | 12.1.0.0.1.0.0.8.0.0.0.0.75.3.0.1.0 |
| *ether2.ip-v4.br-sat-mon | 12.1.0.0.1.0.0.8.0.0.0.0.76.3.0.1.0 |
| *ether2.ip-v4.sun-nd | 12.1.0.0.1.0.0.8.0.0.0.0.77.3.0.1.0 |
| *ether2.ip-v4.wb-mon | 12.1.0.0.1.0.0.8.0.0.0.0.78.3.0.1.0 |
| *ether2.ip-v4.wb-expak | 12.1.0.0.1.0.0.8.0.0.0.0.79.3.0.1.0 |
| *ether2.ip-v4.iso-ip | 12.1.0.0.1.0.0.8.0.0.0.0.80.3.0.1.0 |
| *ether2.ip-v4.vmtp | 12.1.0.0.1.0.0.8.0.0.0.0.81.3.0.1.0 |
| *ether2.ip-v4.secure-mvtp | 12.1.0.0.1.0.0.8.0.0.0.0.82.3.0.1.0 |
| *ether2.ip-v4.vines | 12.1.0.0.1.0.0.8.0.0.0.0.83.3.0.1.0 |
| *ether2.ip-v4.ttp | 12.1.0.0.1.0.0.8.0.0.0.0.84.3.0.1.0 |
| *ether2.ip-v4.nfsnet-igp | 12.1.0.0.1.0.0.8.0.0.0.0.85.3.0.1.0 |
| *ether2.ip-v4.dgp | 12.1.0.0.1.0.0.8.0.0.0.0.86.3.0.1.0 |
| *ether2.ip-v4.tcf | 12.1.0.0.1.0.0.8.0.0.0.0.87.3.0.1.0 |
| *ether2.ip-v4.igrp | 12.1.0.0.1.0.0.8.0.0.0.0.88.3.0.1.0 |
| *ether2.ip-v4.ospf | 12.1.0.0.1.0.0.8.0.0.0.0.89.3.0.1.0 |
| *ether2.ip-v4.sprite-rpc | 12.1.0.0.1.0.0.8.0.0.0.0.90.3.0.1.0 |
| *ether2.ip-v4.larp | 12.1.0.0.1.0.0.8.0.0.0.0.91.3.0.1.0 |
| *ether2.ip-v4.mtp | 12.1.0.0.1.0.0.8.0.0.0.0.92.3.0.1.0 |
| *ether2.ip-v4.ax-25 | 12.1.0.0.1.0.0.8.0.0.0.0.93.3.0.1.0 |
| *ether2.ip-v4.ipip | 12.1.0.0.1.0.0.8.0.0.0.0.94.3.0.1.0 |
| *ether2.ip-v4.micp | 12.1.0.0.1.0.0.8.0.0.0.0.95.3.0.1.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.scc-sp | 12.1.0.0.1.0.0.8.0.0.0.0.96.3.0.1.0 |
| *ether2.ip-v4.etherip | 12.1.0.0.1.0.0.8.0.0.0.0.97.3.0.1.0 |
| *ether2.ip-v4.encap | 12.1.0.0.1.0.0.8.0.0.0.0.98.3.0.1.0 |
| *ether2.ip-v4.priv-encript | 12.1.0.0.1.0.0.8.0.0.0.0.99.3.0.1.0 |
| *ether2.ip-v4.gmtp | 12.1.0.0.1.0.0.8.0.0.0.0.100.3.0.1.0 |
| **IPX Applications** | |
| *ether2.ipx.nov-pep | 12.1.0.0.1.0.0.129.55.0.0.0.0.3.0.0.0 |
| *ether2.ipx.nov-pep.ncp | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.4.81.4.0.0.0.0 |
| *ether2.ipx.nov-pep.nov-sap | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.4.82.4.0.0.0.0 |
| *ether2.ipx.nov-pep.nov-rip | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.4.83.4.0.0.0.0 |
| *ether2.ipx.nov-pep.nov-netbios | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.4.85.4.0.0.0.0 |
| *ether2.ipx.nov-pep.nov-diag | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.4.86.4.0.0.0.0 |
| *ether2.ipx.nov-pep.nov-sec | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.4.87.4.0.0.0.0 |
| *ether2.ipx.nov-pep.smb | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.5.80.4.0.0.0.0 |
| *ether2.ipx.nov-pep.smb2 | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.5.82.4.0.0.0.0 |
| *ether2.ipx.nov-pep.burst | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.13.5.4.0.0.0.0 |
| *ether2.ipx.nov-pep.nov-watchdog | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.64.4.4.0.0.0.0 |
| *ether2.ipx.nov-pep.nov-bcast | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.64.5.4.0.0.0.0 |
| *ether2.ipx.nov-pep.nlsp | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.144.1.4.0.0.0.0 |
| *ether2.ipx.nov-pep.snmp | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.144.15.4.0.0.0.0 |
| *ether2.ipx.nov-pep.snmptrap | 16.1.0.0.1.0.0.129.55.0.0.0.0.0.0.144.16.4.0.0.0.0 |
| *ether2.ipx.nov-rip | 12.1.0.0.1.0.0.129.55.0.0.0.1.3.0.0.0 |
| *ether2.ipx.nov-echo | 12.1.0.0.1.0.0.129.55.0.0.0.2.3.0.0.0 |
| *ether2.ipx.nov-error | 12.1.0.0.1.0.0.129.55.0.0.0.3.3.0.0.0 |
| *ether2.ipx.nov-pep2 | 12.1.0.0.1.0.0.129.55.0.0.0.4.3.0.0.0 |
| *ether2.ipx.nov-spx | 12.1.0.0.1.0.0.129.55.0.0.0.5.3.0.0.0 |
| *ether2.ipx.nov-pep3 | 12.1.0.0.1.0.0.129.55.0.0.0.17.3.0.0.0 |
| *ether2.ipx.nov-netbios | 12.1.0.0.1.0.0.129.55.0.0.0.20.3.0.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| **TCP Applications** | |
| *ether2.ip-v4.tcp.tcpmux | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.1.4.0.1.0.0 |
| *ether2.ip-v4.tcp.compressnet-mgmt | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.2.4.0.1.0.0 |
| *ether2.ip-v4.tcp.compressnet | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.3.4.0.1.0.0 |
| *ether2.ip-v4.tcp.rje | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.5.4.0.1.0.0 |
| *ether2.ip-v4.tcp.echo | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.7.4.0.1.0.0 |
| *ether2.ip-v4.tcp.discard | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.9.4.0.1.0.0 |
| *ether2.ip-v4.tcp.systat | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.11.4.0.1.0.0 |
| *ether2.ip-v4.tcp.daytime | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.13.4.0.1.0.0 |
| *ether2.ip-v4.tcp.qotd | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.17.4.0.1.0.0 |
| *ether2.ip-v4.tcp.msp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.18.4.0.1.0.0 |
| *ether2.ip-v4.tcp.chargen | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.19.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ftp-data | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.20.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ftp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.21.4.0.1.0.0 |
| *ether2.ip-v4.tcp.telnet | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.23.4.0.1.0.0 |
| *ether2.ip-v4.tcp.priv-mail | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.24.4.0.1.0.0 |
| *ether2.ip-v4.tcp.smtp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.25.4.0.1.0.0 |
| *ether2.ip-v4.tcp.nsw-fe | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.27.4.0.1.0.0 |
| *ether2.ip-v4.tcp.msg-icp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.29.4.0.1.0.0 |
| *ether2.ip-v4.tcp.msg-auth | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.31.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dsp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.33.4.0.1.0.0 |
| *ether2.ip-v4.tcp.priv-print | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.35.4.0.1.0.0 |
| *ether2.ip-v4.tcp.time | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.37.4.0.1.0.0 |
| *ether2.ip-v4.tcp.rap | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.38.4.0.1.0.0 |
| *ether2.ip-v4.tcp.graphics | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.41.4.0.1.0.0 |
| *ether2.ip-v4.tcp.nicname | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.43.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mpm-flags | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.44.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mpm | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.45.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mpm-send | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.46.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ni-ftp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.47.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.tcp.auditd | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.48.4.0.1.0.0 |
| *ether2.ip-v4.tcp.tacacs | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.49.4.0.1.0.0 |
| *ether2.ip-v4.tcp.xns-time | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.52.4.0.1.0.0 |
| *ether2.ip-v4.tcp.domain | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.53.4.0.1.0.0 |
| *ether2.ip-v4.tcp.xns-ch | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.54.4.0.1.0.0 |
| *ether2.ip-v4.tcp.isi-gl | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.55.4.0.1.0.0 |
| *ether2.ip-v4.tcp.xns-auth | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.56.4.0.1.0.0 |
| *ether2.ip-v4.tcp.priv-term | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.57.4.0.1.0.0 |
| *ether2.ip-v4.tcp.xns-mail | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.58.4.0.1.0.0 |
| *ether2.ip-v4.tcp.priv-file | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.59.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ni-mail | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.61.4.0.1.0.0 |
| *ether2.ip-v4.tcp.acas | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.62.4.0.1.0.0 |
| *ether2.ip-v4.tcp.covia | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.64.4.0.1.0.0 |
| *ether2.ip-v4.tcp.tacacs-ds | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.65.4.0.1.0.0 |
| *ether2.ip-v4.tcp.sql*net | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.66.4.0.1.0.0 |
| *ether2.ip-v4.tcp.gopher | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.70.4.0.1.0.0 |
| *ether2.ip-v4.tcp.netrjs-1 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.71.4.0.1.0.0 |
| *ether2.ip-v4.tcp.netrjs-2 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.72.4.0.1.0.0 |
| *ether2.ip-v4.tcp.netrjs-3 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.73.4.0.1.0.0 |
| *ether2.ip-v4.tcp.netrjs-4 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.74.4.0.1.0.0 |
| *ether2.ip-v4.tcp.priv-dialout | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.75.4.0.1.0.0 |
| *ether2.ip-v4.tcp.deos | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.76.4.0.1.0.0 |
| *ether2.ip-v4.tcp.priv-rje | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.77.4.0.1.0.0 |
| *ether2.ip-v4.tcp.vettcp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.78.4.0.1.0.0 |
| *ether2.ip-v4.tcp.finger | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.79.4.0.1.0.0 |
| *ether2.ip-v4.tcp.www-http | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.80.4.0.1.0.0 |
| *ether2.ip-v4.tcp.hosts2-ns | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.81.4.0.1.0.0 |
| *ether2.ip-v4.tcp.xfer | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.82.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mit-ml-dev | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.83.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ctf | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.84.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
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| *ether2.ip-v4.tcp.mit-ml-dev | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.85.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mfcobol | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.86.4.0.1.0.0 |
| *ether2.ip-v4.tcp.priv-termlink | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.87.4.0.1.0.0 |
| *ether2.ip-v4.tcp.kerberos | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.88.4.0.1.0.0 |
| *ether2.ip-v4.tcp.su-mit-tg | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.89.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dnsix | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.90.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mit-dov | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.91.4.0.1.0.0 |
| *ether2.ip-v4.tcp.npp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.92.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dcp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.93.4.0.1.0.0 |
| *ether2.ip-v4.tcp.objcall | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.94.4.0.1.0.0 |
| *ether2.ip-v4.tcp.supdup | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.95.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dixie | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.96.4.0.1.0.0 |
| *ether2.ip-v4.tcp.swift-rvf | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.97.4.0.1.0.0 |
| *ether2.ip-v4.tcp.tacnews | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.98.4.0.1.0.0 |
| *ether2.ip-v4.tcp.metagram | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.99.4.0.1.0.0 |
| *ether2.ip-v4.tcp.newacct | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.100.4.0.1.0.0 |
| *ether2.ip-v4.tcp.hostname | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.101.4.0.1.0.0 |
| *ether2.ip-v4.tcp.iso-tsap | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.102.4.0.1.0.0 |
| *ether2.ip-v4.tcp.gppitnp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.103.4.0.1.0.0 |
| *ether2.ip-v4.tcp.acr-nema | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.104.4.0.1.0.0 |
| *ether2.ip-v4.tcp.csnet-ns | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.105.4.0.1.0.0 |
| *ether2.ip-v4.tcp.3com-tsmux | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.106.4.0.1.0.0 |
| *ether2.ip-v4.tcp.rtelnet | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.107.4.0.1.0.0 |
| *ether2.ip-v4.tcp.snagas | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.108.4.0.1.0.0 |
| *ether2.ip-v4.tcp.pop2 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.109.4.0.1.0.0 |
| *ether2.ip-v4.tcp.pop3 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.110.4.0.1.0.0 |
| *ether2.ip-v4.tcp.sunrpc | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.111.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mcidas | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.112.4.0.1.0.0 |
| *ether2.ip-v4.tcp.auth | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.113.4.0.1.0.0 |
| *ether2.ip-v4.tcp.audionews | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.114.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.tcp.sftp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.115.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ansanotify | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.116.4.0.1.0.0 |
| *ether2.ip-v4.tcp.uucp-path | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.117.4.0.1.0.0 |
| *ether2.ip-v4.tcp.sqlserv | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.118.4.0.1.0.0 |
| *ether2.ip-v4.tcp.nntp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.119.4.0.1.0.0 |
| *ether2.ip-v4.tcp.erpc | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.121.4.0.1.0.0 |
| *ether2.ip-v4.tcp.smakynet | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.122.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ansatrader | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.124.4.0.1.0.0 |
| *ether2.ip-v4.tcp.locus-map | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.125.4.0.1.0.0 |
| *ether2.ip-v4.tcp.unitary | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.126.4.0.1.0.0 |
| *ether2.ip-v4.tcp.locus-con | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.127.4.0.1.0.0 |
| *ether2.ip-v4.tcp.gss-xlicen | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.128.4.0.1.0.0 |
| *ether2.ip-v4.tcp.pwdgen | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.129.4.0.1.0.0 |
| *ether2.ip-v4.tcp.cisco-fna | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.130.4.0.1.0.0 |
| *ether2.ip-v4.tcp.cisco-tna | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.131.4.0.1.0.0 |
| *ether2.ip-v4.tcp.cisco-sys | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.132.4.0.1.0.0 |
| *ether2.ip-v4.tcp.statsrv | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.133.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ingres-net | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.134.4.0.1.0.0 |
| *ether2.ip-v4.tcp.loc-srv | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.135.4.0.1.0.0 |
| *ether2.ip-v4.tcp.profile | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.136.4.0.1.0.0 |
| *ether2.ip-v4.tcp.netbios-ns | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.137.4.0.1.0.0 |
| *ether2.ip-v4.tcp.netbios-dgm | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.138.4.0.1.0.0 |
| *ether2.ip-v4.tcp.netbios-ssn | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.139.4.0.1.0.0 |
| *ether2.ip-v4.tcp.emfis-data | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.140.4.0.1.0.0 |
| *ether2.ip-v4.tcp.emfis-cntl | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.141.4.0.1.0.0 |
| *ether2.ip-v4.tcp.bl-idm | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.142.4.0.1.0.0 |
| *ether2.ip-v4.tcp.imap2 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.143.4.0.1.0.0 |
| *ether2.ip-v4.tcp.news | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.144.4.0.1.0.0 |
| *ether2.ip-v4.tcp.uaac | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.145.4.0.1.0.0 |
| *ether2.ip-v4.tcp.iso-tp0 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.146.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.tcp.iso-ip | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.147.4.0.1.0.0 |
| *ether2.ip-v4.tcp.cronus | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.148.4.0.1.0.0 |
| *ether2.ip-v4.tcp.aed-512 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.149.4.0.1.0.0 |
| *ether2.ip-v4.tcp.sql-net | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.150.4.0.1.0.0 |
| *ether2.ip-v4.tcp.hems | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.151.4.0.1.0.0 |
| *ether2.ip-v4.tcp.bftp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.152.4.0.1.0.0 |
| *ether2.ip-v4.tcp.netsc-prod | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.154.4.0.1.0.0 |
| *ether2.ip-v4.tcp.netsc-dev | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.155.4.0.1.0.0 |
| *ether2.ip-v4.tcp.sqlsrv | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.156.4.0.1.0.0 |
| *ether2.ip-v4.tcp.knet-cmp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.157.4.0.1.0.0 |
| *ether2.ip-v4.tcp.pcmail-srv | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.158.4.0.1.0.0 |
| *ether2.ip-v4.tcp.nss-routing | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.159.4.0.1.0.0 |
| *ether2.ip-v4.tcp.snmp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.161.4.0.1.0.0 |
| *ether2.ip-v4.tcp.snmptrap | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.162.4.0.1.0.0 |
| *ether2.ip-v4.tcp.cmip-man | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.163.4.0.1.0.0 |
| *ether2.ip-v4.tcp.cmip-agent | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.164.4.0.1.0.0 |
| *ether2.ip-v4.tcp.xns-courier | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.165.4.0.1.0.0 |
| *ether2.ip-v4.tcp.s-net | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.166.4.0.1.0.0 |
| *ether2.ip-v4.tcp.namp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.167.4.0.1.0.0 |
| *ether2.ip-v4.tcp.rsvd | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.168.4.0.1.0.0 |
| *ether2.ip-v4.tcp.send | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.169.4.0.1.0.0 |
| *ether2.ip-v4.tcp.print-srv | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.170.4.0.1.0.0 |
| *ether2.ip-v4.tcp.multiplex | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.171.4.0.1.0.0 |
| *ether2.ip-v4.tcp.cl-1 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.172.4.0.1.0.0 |
| *ether2.ip-v4.tcp.xyplex-mux | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.173.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mailq | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.174.4.0.1.0.0 |
| *ether2.ip-v4.tcp.vmnet | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.175.4.0.1.0.0 |
| *ether2.ip-v4.tcp.genrad-mux | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.176.4.0.1.0.0 |
| *ether2.ip-v4.tcp.nextstep | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.178.4.0.1.0.0 |
| *ether2.ip-v4.tcp.bgp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.179.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.tcp.ris | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.180.4.0.1.0.0 |
| *ether2.ip-v4.tcp.unify | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.181.4.0.1.0.0 |
| *ether2.ip-v4.tcp.audit | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.182.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ocbinder | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.183.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ocserver | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.184.4.0.1.0.0 |
| *ether2.ip-v4.tcp.remote-kis | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.185.4.0.1.0.0 |
| *ether2.ip-v4.tcp.kis | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.186.4.0.1.0.0 |
| *ether2.ip-v4.tcp.aci | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.187.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mumps | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.188.4.0.1.0.0 |
| *ether2.ip-v4.tcp.qft | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.189.4.0.1.0.0 |
| *ether2.ip-v4.tcp.gacp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.190.4.0.1.0.0 |
| *ether2.ip-v4.tcp.prospero | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.191.4.0.1.0.0 |
| *ether2.ip-v4.tcp.osu-nms | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.192.4.0.1.0.0 |
| *ether2.ip-v4.tcp.srmp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.193.4.0.1.0.0 |
| *ether2.ip-v4.tcp.irc | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.194.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dn6-nlm-aud | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.195.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dn6-smm-red | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.196.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dls | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.197.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dls-mon | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.198.4.0.1.0.0 |
| *ether2.ip-v4.tcp.smux | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.199.4.0.1.0.0 |
| *ether2.ip-v4.tcp.src | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.200.4.0.1.0.0 |
| *ether2.ip-v4.tcp.at-rtmp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.201.4.0.1.0.0 |
| *ether2.ip-v4.tcp.at-nbp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.202.4.0.1.0.0 |
| *ether2.ip-v4.tcp.at-3 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.203.4.0.1.0.0 |
| *ether2.ip-v4.tcp.at-echo | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.204.4.0.1.0.0 |
| *ether2.ip-v4.tcp.at-5 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.205.4.0.1.0.0 |
| *ether2.ip-v4.tcp.at-zis | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.206.4.0.1.0.0 |
| *ether2.ip-v4.tcp.at-7 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.207.4.0.1.0.0 |
| *ether2.ip-v4.tcp.at-8 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.208.4.0.1.0.0 |
| *ether2.ip-v4.tcp.tam | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.209.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.tcp.z39-50 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.210.4.0.1.0.0 |
| *ether2.ip-v4.tcp.914c-g | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.211.4.0.1.0.0 |
| *ether2.ip-v4.tcp.anet | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.212.4.0.1.0.0 |
| *ether2.ip-v4.tcp.vmpwscs | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.214.4.0.1.0.0 |
| *ether2.ip-v4.tcp.softpc | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.215.4.0.1.0.0 |
| *ether2.ip-v4.tcp.atls | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.216.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dbase | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.217.4.0.1.0.0 |
| *ether2.ip-v4.tcp.mpp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.218.4.0.1.0.0 |
| *ether2.ip-v4.tcp.uarps | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.219.4.0.1.0.0 |
| *ether2.ip-v4.tcp.imap3 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.220.4.0.1.0.0 |
| *ether2.ip-v4.tcp.fln-spx | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.221.4.0.1.0.0 |
| *ether2.ip-v4.tcp.rsh-spx | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.222.4.0.1.0.0 |
| *ether2.ip-v4.tcp.cdc | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.223.4.0.1.0.0 |
| *ether2.ip-v4.tcp.sur-meas | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.243.4.0.1.0.0 |
| *ether2.ip-v4.tcp.link | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.245.4.0.1.0.0 |
| *ether2.ip-v4.tcp.dsp3270 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.0.246.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ldap | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.1.133.4.0.1.0.0 |
| *ether2.ip-v4.tcp.https | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.1.187.4.0.1.0.0 |
| *ether2.ip-v4.tcp.exec | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.2.0.4.0.1.0.0 |
| *ether2.ip-v4.tcp.login | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.2.1.4.0.1.0.0 |
| *ether2.ip-v4.tcp.cmd | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.2.2.4.0.1.0.0 |
| *ether2.ip-v4.tcp.printer | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.2.3.4.0.1.0.0 |
| *ether2.ip-v4.tcp.uucp | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.2.28.4.0.1.0.0 |
| *ether2.ip-v4.tcp.banyan-vip | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.2.61.4.0.1.0.0 |
| *ether2.ip-v4.tcp.doom | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.2.154.4.0.1.0.0 |
| *ether2.ip-v4.tcp.notes | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.5.72.4.0.1.0.0 |
| *ether2.ip-v4.tcp.oracl-srv | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.5.245.4.0.1.0.0 |
| *ether2.ip-v4.tcp.oracl-tns | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.5.246.4.0.1.0.0 |
| *ether2.ip-v4.tcp.oracl-tns-srv | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.5.247.4.0.1.0.0 |
| *ether2.ip-v4.tcp.oracl-coauthor | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.5.249.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.tcp.oracl-remdb | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.6.35.4.0.1.0.0 |
| *ether2.ip-v4.tcp.oracl-names | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.6.39.4.0.1.0.0 |
| *ether2.ip-v4.tcp.oracl-em1 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.6.212.4.0.1.0.0 |
| *ether2.ip-v4.tcp.oracl-em2 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.6.218.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ms-streaming | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.6.219.4.0.1.0.0 |
| *ether2.ip-v4.tcp.oracl-vp2 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.7.16.4.0.1.0.0 |
| *ether2.ip-v4.tcp.oracl-vp1 | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.7.17.4.0.1.0.0 |
| *ether2.ip-v4.tcp.ccmail | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.12.192.4.0.1.0.0 |
| *ether2.ip-v4.tcp.xwin | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.23.112.4.0.1.0.0 |
| *ether2.ip-v4.tcp.quake | 16.1.0.0.1.0.0.8.0.0.0.0.6.0.0.101.144.4.0.1.0.0 |
| **UDP Applications** | |
| *ether2.ip-v4.udp.echo | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.7.4.0.1.0.0 |
| *ether2.ip-v4.udp.discard | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.9.4.0.1.0.0 |
| *ether2.ip-v4.udp.systat | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.11.4.0.1.0.0 |
| *ether2.ip-v4.udp.daytime | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.13.4.0.1.0.0 |
| *ether2.ip-v4.udp.qotd | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.17.4.0.1.0.0 |
| *ether2.ip-v4.udp.msp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.18.4.0.1.0.0 |
| *ether2.ip-v4.udp.chargen | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.19.4.0.1.0.0 |
| *ether2.ip-v4.udp.priv-mail | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.24.4.0.1.0.0 |
| *ether2.ip-v4.udp.nsw-fe | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.27.4.0.1.0.0 |
| *ether2.ip-v4.udp.msg-icp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.29.4.0.1.0.0 |
| *ether2.ip-v4.udp.msg-auth | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.31.4.0.1.0.0 |
| *ether2.ip-v4.udp.dsp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.33.4.0.1.0.0 |
| *ether2.ip-v4.udp.priv-print | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.35.4.0.1.0.0 |
| *ether2.ip-v4.udp.time | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.37.4.0.1.0.0 |
| *ether2.ip-v4.udp.rlp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.39.4.0.1.0.0 |
| *ether2.ip-v4.udp.graphics | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.41.4.0.1.0.0 |
| *ether2.ip-v4.udp.nameserver | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.42.4.0.1.0.0 |
| *ether2.ip-v4.udp.auditd | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.48.4.0.1.0.0 |
| *ether2.ip-v4.udp.re-mail-ck | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.50.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.udp.la-maint | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.51.4.0.1.0.0 |
| *ether2.ip-v4.udp.xns-time | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.52.4.0.1.0.0 |
| *ether2.ip-v4.udp.domain | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.53.4.0.1.0.0 |
| *ether2.ip-v4.udp.xns-ch | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.54.4.0.1.0.0 |
| *ether2.ip-v4.udp.isi-gl | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.55.4.0.1.0.0 |
| *ether2.ip-v4.udp.xns-auth | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.56.4.0.1.0.0 |
| *ether2.ip-v4.udp.priv-term | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.57.4.0.1.0.0 |
| *ether2.ip-v4.udp.xns-mail | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.58.4.0.1.0.0 |
| *ether2.ip-v4.udp.priv-file | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.59.4.0.1.0.0 |
| *ether2.ip-v4.udp.ni-mail | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.61.4.0.1.0.0 |
| *ether2.ip-v4.udp.bootps | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.67.4.0.1.0.0 |
| *ether2.ip-v4.udp.bootpc | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.68.4.0.1.0.0 |
| *ether2.ip-v4.udp.tftp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.69.4.0.1.0.0 |
| *ether2.ip-v4.udp.priv-dialout | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.75.4.0.1.0.0 |
| *ether2.ip-v4.udp.deos | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.76.4.0.1.0.0 |
| *ether2.ip-v4.udp.priv-rje | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.77.4.0.1.0.0 |
| *ether2.ip-v4.udp.vettcp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.78.4.0.1.0.0 |
| *ether2.ip-v4.udp.hosts2-ns | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.81.4.0.1.0.0 |
| *ether2.ip-v4.udp.xfer | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.82.4.0.1.0.0 |
| *ether2.ip-v4.udp.mit-ml-dev | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.83.4.0.1.0.0 |
| *ether2.ip-v4.udp.ctf | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.84.4.0.1.0.0 |
| *ether2.ip-v4.udp.mit-ml-dev | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.85.4.0.1.0.0 |
| *ether2.ip-v4.udp.kerberos | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.88.4.0.1.0.0 |
| *ether2.ip-v4.udp.npp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.92.4.0.1.0.0 |
| *ether2.ip-v4.udp.dcp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.93.4.0.1.0.0 |
| *ether2.ip-v4.udp.dixie | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.96.4.0.1.0.0 |
| *ether2.ip-v4.udp.swift-rvf | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.97.4.0.1.0.0 |
| *ether2.ip-v4.udp.tacnews | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.98.4.0.1.0.0 |
| *ether2.ip-v4.udp.metagram | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.99.4.0.1.0.0 |
| *ether2.ip-v4.udp.iso-tsap | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.102.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
| --- | --- |
| *ether2.ip-v4.udp.gppitnp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.103.4.0.1.0.0 |
| *ether2.ip-v4.udp.csnet-ns | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.105.4.0.1.0.0 |
| *ether2.ip-v4.udp.3com-tsmux | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.106.4.0.1.0.0 |
| *ether2.ip-v4.udp.pop3 | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.110.4.0.1.0.0 |
| *ether2.ip-v4.udp.sunrpc | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.111.4.0.1.0.0 |
| *ether2.ip-v4.udp.audionews | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.114.4.0.1.0.0 |
| *ether2.ip-v4.udp.ansanotify | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.116.4.0.1.0.0 |
| *ether2.ip-v4.udp.sqlserv | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.118.4.0.1.0.0 |
| *ether2.ip-v4.udp.cfdptkt | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.120.4.0.1.0.0 |
| *ether2.ip-v4.udp.erpc | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.121.4.0.1.0.0 |
| *ether2.ip-v4.udp.smakynet | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.122.4.0.1.0.0 |
| *ether2.ip-v4.udp.ntp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.123.4.0.1.0.0 |
| *ether2.ip-v4.udp.ansatrader | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.124.4.0.1.0.0 |
| *ether2.ip-v4.udp.unitary | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.126.4.0.1.0.0 |
| *ether2.ip-v4.udp.gss-xlicen | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.128.4.0.1.0.0 |
| *ether2.ip-v4.udp.pwdgen | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.129.4.0.1.0.0 |
| *ether2.ip-v4.udp.cisco-fna | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.130.4.0.1.0.0 |
| *ether2.ip-v4.udp.cisco-tna | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.131.4.0.1.0.0 |
| *ether2.ip-v4.udp.cisco-sys | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.132.4.0.1.0.0 |
| *ether2.ip-v4.udp.statsrv | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.133.4.0.1.0.0 |
| *ether2.ip-v4.udp.loc-srv | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.135.4.0.1.0.0 |
| *ether2.ip-v4.udp.netbios-ns | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.137.4.0.1.0.0 |
| *ether2.ip-v4.udp.netbios-dgm | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.138.4.0.1.0.0 |
| *ether2.ip-v4.udp.netbios-ssn | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.139.4.0.1.0.0 |
| *ether2.ip-v4.udp.emfis-data | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.140.4.0.1.0.0 |
| *ether2.ip-v4.udp.emfis-cntl | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.141.4.0.1.0.0 |
| *ether2.ip-v4.udp.bl-idm | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.142.4.0.1.0.0 |
| *ether2.ip-v4.udp.news | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.144.4.0.1.0.0 |
| *ether2.ip-v4.udp.uaac | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.145.4.0.1.0.0 |
| *ether2.ip-v4.udp.iso-tp0 | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.146.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.udp.iso-ip | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.147.4.0.1.0.0 |
| *ether2.ip-v4.udp.cronus | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.148.4.0.1.0.0 |
| *ether2.ip-v4.udp.aed-512 | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.149.4.0.1.0.0 |
| *ether2.ip-v4.udp.sql-net | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.150.4.0.1.0.0 |
| *ether2.ip-v4.udp.sgmp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.153.4.0.1.0.0 |
| *ether2.ip-v4.udp.netsc-prod | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.154.4.0.1.0.0 |
| *ether2.ip-v4.udp.netsc-dev | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.155.4.0.1.0.0 |
| *ether2.ip-v4.udp.nss-routing | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.159.4.0.1.0.0 |
| *ether2.ip-v4.udp.sgmp-traps | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.160.4.0.1.0.0 |
| *ether2.ip-v4.udp.snmp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.161.4.0.1.0.0 |
| *ether2.ip-v4.udp.snmptrap | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.162.4.0.1.0.0 |
| *ether2.ip-v4.udp.cmip-man | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.163.4.0.1.0.0 |
| *ether2.ip-v4.udp.cmip-agent | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.164.4.0.1.0.0 |
| *ether2.ip-v4.udp.xns-courier | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.165.4.0.1.0.0 |
| *ether2.ip-v4.udp.s-net | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.166.4.0.1.0.0 |
| *ether2.ip-v4.udp.namp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.167.4.0.1.0.0 |
| *ether2.ip-v4.udp.rsvd | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.168.4.0.1.0.0 |
| *ether2.ip-v4.udp.send | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.169.4.0.1.0.0 |
| *ether2.ip-v4.udp.print-srv | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.170.4.0.1.0.0 |
| *ether2.ip-v4.udp.multiplex | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.171.4.0.1.0.0 |
| *ether2.ip-v4.udp.cl-1 | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.172.4.0.1.0.0 |
| *ether2.ip-v4.udp.xyplex-mux | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.173.4.0.1.0.0 |
| *ether2.ip-v4.udp.mailq | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.174.4.0.1.0.0 |
| *ether2.ip-v4.udp.vmnet | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.175.4.0.1.0.0 |
| *ether2.ip-v4.udp.genrad-mux | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.176.4.0.1.0.0 |
| *ether2.ip-v4.udp.xdmcp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.177.4.0.1.0.0 |
| *ether2.ip-v4.udp.nextstep | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.178.4.0.1.0.0 |
| *ether2.ip-v4.udp.ris | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.180.4.0.1.0.0 |
| *ether2.ip-v4.udp.unify | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.181.4.0.1.0.0 |
| *ether2.ip-v4.udp.audit | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.182.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.udp.ocbinder | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.183.4.0.1.0.0 |
| *ether2.ip-v4.udp.ocserver | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.184.4.0.1.0.0 |
| *ether2.ip-v4.udp.remote-kis | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.185.4.0.1.0.0 |
| *ether2.ip-v4.udp.kis | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.186.4.0.1.0.0 |
| *ether2.ip-v4.udp.aci | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.187.4.0.1.0.0 |
| *ether2.ip-v4.udp.mumps | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.188.4.0.1.0.0 |
| *ether2.ip-v4.udp.osu-nms | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.192.4.0.1.0.0 |
| *ether2.ip-v4.udp.srmp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.193.4.0.1.0.0 |
| *ether2.ip-v4.udp.irc | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.194.4.0.1.0.0 |
| *ether2.ip-v4.udp.dls | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.197.4.0.1.0.0 |
| *ether2.ip-v4.udp.dls-mon | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.198.4.0.1.0.0 |
| *ether2.ip-v4.udp.src | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.200.4.0.1.0.0 |
| *ether2.ip-v4.udp.at-rtmp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.201.4.0.1.0.0 |
| *ether2.ip-v4.udp.at-nbp | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.202.4.0.1.0.0 |
| *ether2.ip-v4.udp.at-3 | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.203.4.0.1.0.0 |
| *ether2.ip-v4.udp.at-echo | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.204.4.0.1.0.0 |
| *ether2.ip-v4.udp.at-5 | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.205.4.0.1.0.0 |
| *ether2.ip-v4.udp.at-zis | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.206.4.0.1.0.0 |
| *ether2.ip-v4.udp.at-7 | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.207.4.0.1.0.0 |
| *ether2.ip-v4.udp.at-8 | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.208.4.0.1.0.0 |
| *ether2.ip-v4.udp.tam | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.209.4.0.1.0.0 |
| *ether2.ip-v4.udp.914c-g | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.211.4.0.1.0.0 |
| *ether2.ip-v4.udp.anet | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.212.4.0.1.0.0 |
| *ether2.ip-v4.udp.ipx-tunnel | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.213.4.0.1.0.0 |
| *ether2.ip-v4.udp.vmpwscs | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.214.4.0.1.0.0 |
| *ether2.ip-v4.udp.softpc | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.215.4.0.1.0.0 |
| *ether2.ip-v4.udp.atls | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.216.4.0.1.0.0 |
| *ether2.ip-v4.udp.dbase | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.217.4.0.1.0.0 |
| *ether2.ip-v4.udp.uarps | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.219.4.0.1.0.0 |
| *ether2.ip-v4.udp.fln-spx | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.221.4.0.1.0.0 |

| Protocol Encapsulation | Protocol Identifier (Object ID) |
|---|---|
| *ether2.ip-v4.udp.rsh-spx | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.222.4.0.1.0.0 |
| *ether2.ip-v4.udp.cdc | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.223.4.0.1.0.0 |
| *ether2.ip-v4.udp.sur-meas | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.243.4.0.1.0.0 |
| *ether2.ip-v4.udp.link | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.245.4.0.1.0.0 |
| *ether2.ip-v4.udp.dsp3270 | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.0.246.4.0.1.0.0 |
| *ether2.ip-v4.udp.ldap | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.1.133.4.0.1.0.0 |
| *ether2.ip-v4.udp.biff | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.2.0.4.0.1.0.0 |
| *ether2.ip-v4.udp.who | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.2.1.4.0.1.0.0 |
| *ether2.ip-v4.udp.syslog | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.2.2.4.0.1.0.0 |
| *ether2.ip-v4.udp.ip-xns-rip | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.2.8.4.0.1.0.0 |
| *ether2.ip-v4.udp.banyan-vip | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.2.61.4.0.1.0.0 |
| *ether2.ip-v4.udp.notes | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.5.72.4.0.1.0.0 |
| *ether2.ip-v4.udp.ccmail | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.12.192.4.0.1.0.0 |
| *ether2.ip-v4.udp.quake | 16.1.0.0.1.0.0.8.0.0.0.0.17.0.0.101.144.4.0.1.0.0 |