ZebOS-XP®
Network Platform

Version 1.4
Extended Performance

Multi-Protocol Label Switching
Command Reference

December 2015

IP Infusion Inc.
3965 Freedom Circle, Suite 200
Santa Clara, CA 95054
+1 408-400-1900
http://www.ipinfusion.com/

For support, questions, or comments via E-mail, contact:
support@ipinfusion.com

Contents

Preface

This document describes the ZebOS-XP commands for Multi-Protocol Label Switching (MPLS).

Audience

This document is intended for network administrators and other engineering professionals who configure and manage MPLS.

Conventions

Table P-1 shows the conventions used in this guide.

Table P-1: Conventions

Convention	Description
Italics	Emphasized terms; titles of books
Note:	Special instructions, suggestions, or warnings
`monospaced type`	Code elements such as commands, functions, parameters, files, and directories

Contents

This document contains these chapters and appendices:

- Chapter 1, *Command Line Interface*
- Chapter 2, *MPLS Commands*
- Chapter 3, *Differentiated Services Commands*
- Chapter 4, *DiffServ-TE Commands*
- Chapter 5, *Virtual Private LAN Service Commands*
- Chapter 7, *MPLS-TP Commands*
- Chapter 8, *MPLS-TP OAM Commands*
- Chapter 9, *MPLS-TP LPS Commands*
- Chapter 10, *MPLS-TP RPS Commands*
- Chapter 11, *SAToP Commands*

Related Documents

Commands for Resource ReServation Protocol-Traffic Engineering (RSVP-TE) and Label Distribution Protocol (LDP) are not part of this document. Instead, see:

- *Resource ReServation Protocol Traffic Command Reference*
- *Resource ReServation Protocol Traffic Engineering Developer Guide*
- *Label Distribution Protocol Command Reference*
- *Label Distribution Protocol Developer Guide*

The following guides are also related to this document:

- *Multi-Protocol Label Switching Configuration Guide*
- *Multi-Protocol Label Switching Developer Guide*
- *Multi-Protocol Label Switching Software Forwarder Developer Guide*
- *Architecture Guide*
- *Installation Guide*
- *Network Services Module Command Reference*
- *Network Services Module Developer Guide*

Note: All ZebOS-XP technical manuals are available to licensed customers at http://www.ipinfusion.com/support/document_list.

Support

For support-related questions, contact support@ipinfusion.com.

Comments

If you have comments, or need to report a problem with the content, contact techpubs@ipinfusion.com.

CHAPTER 1 Command Line Interface

This chapter introduces the ZebOS-XP Command Line Interface (CLI) and how to use its features.

Overview

You use the CLI to configure, monitor, and maintain ZebOS-XP devices. The CLI is text-based and each command is usually associated with a specific task.

You can give the commands described in this manual locally from the console of a device running ZebOS-XP or remotely from a terminal emulator such as `putty` or `xterm`. You can also use the commands in scripts to automate configuration tasks.

Starting the Command Line Interface

You must start daemons as described in this section before you can use the CLI. The general steps are listed below. For details about the ZebOS-XP daemons, see the *Installation Guide.*

1. Start your terminal emulator and connect to the device or go to the console of the device running ZebOS-XP.
2. Connect to the directory where you installed the ZebOS-XP executables.
3. Start the Network Services Module (NSM).
   ```
   # ./nsm -d
   ```
4. Start the protocol module daemons that your organization uses, such as `mstpd`, `ospf6d`, or `ripd`.
   ```
   # ./mstpd -d
   ```
5. Start the Integrated Management Interface (IMI) daemon.
   ```
   # ./imi -d
   ```
6. Start the IMI shell.
   ```
   # ./imish
   ```
   Note: Your organization may use a ZebOS-XP build that does not include `imish`. If that is the case, you must connect to a port on which a protocol daemon is listening. For details, see the *Installation Guide.*

You can now begin using the CLI.

Command Line Interface Help

You access the CLI help by entering a full or partial command string and a question mark “?”. The CLI displays the command keywords or parameters along with a short description. For example, at the CLI command prompt, type:

```
> show ?
```

The CLI displays this keyword list with short descriptions for each keyword:

```
show ?
  application-priority            Application Priority
```

```
  arp                              Internet Protocol (IP)
  bfd                              Bidirectional Forwarding Detection (BFD)
  bgp                              Border Gateway Protocol (BGP)
  bi-lsp                           Bi-directional lsp status and configuration
  bridge                           Bridge group commands
  ce-vlan                          COS Preservation for Customer Edge VLAN
  class-map                        Class map entry
  cli                              Show CLI tree of current mode
  clns                             Connectionless-Mode Network Service (CLNS)
  control-adjacency                Control Adjacency status and configuration
  control-channel                  Control Channel status and configuration
  cspf                             CSPF Information
  customer                         Display Customer spanning-tree
  cvlan                            Display CVLAN information
  debugging                        Debugging functions (see also 'undebug')
  dot1x                            IEEE 802.1X Port-Based Access Control
  etherchannel                     LACP etherchannel
  ethernet                         Layer-2
...
```

If you type the ? in the middle of a keyword, the CLI displays help for that keyword only.

```
> show de?
debugging  Debugging functions (see also 'undebug')
```

If you type the ? in the middle of a keyword, but the incomplete keyword matches several other keywords, ZebOS-XP displays help for all matching keywords.

```
> show i? (CLI does not display the question mark).
interface  Interface status and configuration
ip         IP information
isis       ISIS information
```

Command Completion

The CLI can complete the spelling of a command or a parameter. Begin typing the command or parameter and then press the tab key. For example, at the CLI command prompt type `sh`:

```
> sh
```

Press the tab key. The CLI displays:

```
> show
```

If the spelling of a command or parameter is ambiguous, the CLI displays the choices that match the abbreviation. Type `show i` and press the tab key. The CLI displays:

```
> show i
  interface  ip         ipv6       isis
> show i
```

The CLI displays the `interface` and `ip` keywords. Type `n` to select `interface` and press the tab key. The CLI displays:

```
> show in
> show interface
```

Type ? and the CLI displays the list of parameters for the `show interface` command.

```
> show interface
  IFNAME  Interface name
  |       Output modifiers
```



```
>       Output redirection
<cr>
```

The CLI displays the only parameter associated with this command, the `IFNAME` parameter.

Command Abbreviations

The CLI accepts abbreviations that uniquely identify a keyword in commands. For example:

```
> sh in eth0
```

is an abbreviation for:

```
> show interface eth0
```

Command Line Errors

Any unknown spelling causes the CLI to display the error `Unrecognized command` in response to the ?. The CLI displays the command again as last entered.

```
> show dd?
% Unrecognized command
> show dd
```

When you press the Enter key after typing an invalid command, the CLI displays:

```
(config)#router ospf here
                           ^
% Invalid input detected at '^' marker.
```

where the ^ points to the first character in error in the command.

If a command is incomplete, the CLI displays the following message:

```
> show
% Incomplete command.
```

Some commands are too long for the display line and can wrap mid-parameter or mid-keyword, as shown below. This does *not* cause an error and the command performs as expected:

```
area 10.10.0.18 virtual-link 10.10.0.19 authent
ication-key 57393
```

Command Negation

Many commands have a `no` form that resets a feature to its default value or disables the feature. For example:

- The `ip address` command assigns an IPv4 address to an interface
- The `no ip address` command removes an IPv4 address from an interface

Syntax Conventions

Table 1-1 describes the conventions used to represent command syntax in this reference.

Table 1-1: Syntax conventions

Convention	Description	Example
`monospaced font`	Command strings entered on a command line	`show mpls`
`lowercase`	Keywords that you enter exactly as shown in the command syntax.	`show mpls`
`UPPERCASE`	See Variable Placeholders	`IFNAME`
`()`	Optional parameters, from which you must select one. Vertical bars delimit the selections. Do not enter the parentheses or vertical bars as part of the command.	`(A.B.C.D|<0-4294967295>)`
`()`	Optional parameters, from which you select one or none. Vertical bars delimit the selections. Do not enter the parentheses or vertical bars as part of the command.	`(A.B.C.D|<0-4294967295>|)`
`()`	Optional parameter which you can specify or omit. Do not enter the parentheses or vertical bar as part of the command.	`(IFNAME|)`
`{}`	Optional parameters, from which you must select one or more. Vertical bars delimit the selections. Do not enter the braces or vertical bars as part of the command.	`{intra-area <1-255>|inter-area <1-255>|external <1-255>}`
`[]`	Optional parameters, from which you select zero or more. Vertical bars delimit the selections. Do not enter the brackets or vertical bars as part of the command. A '?' before a parameter in square brackets limits that parameter to one occurrence in a command string.	`[<1-65535>|AA:NN|internet|local-AS|no-advertise|no-export]`
`.`	Repeatable parameter. The parameter that follows a period can be repeated more than once. Do not enter the period as part of the command.	`set as-path prepend .<1-65535>`

Variable Placeholders

Table 1-2 shows the tokens used in command syntax use to represent variables for which you supply a value.

Table 1-2: Variable placeholders

Token	Description
`WORD`	A contiguous text string (excluding spaces)
`LINE`	A text string, including spaces; no other parameters can follow this parameter
`IFNAME`	Interface name whose format varies depending on the platform; examples are: `eth0`, `Ethernet0`, `ethernet0`, `xe0`
`A.B.C.D`	IPv4 address
`A.B.C.D/M`	IPv4 address and mask/prefix
`X:X::X:X`	IPv6 address
`X:X::X:X/M`	IPv6 address and mask/prefix
`HH:MM:SS`	Time format
`AA:NN`	BGP community value
`XX:XX:XX:XX:XX:XX`	MAC address

`<1-5>`
`<1-65535>`
`<0-2147483647>`
`<0-4294967295>`
	Numeric range

Command Description Format

Table 1-3 explains the sections used to describe each command in this reference.

Table 1-3: Command descriptions

Section	Description
Command Name	The name of the command, followed by what the command does and when should it be used
Command Syntax	The syntax of the command
Parameters	Parameters and options for the command
Default	The state before the command is executed
Command Mode	The mode in which the command runs; see Command Modes
Example	An example of the command being executed

Keyboard Operations

Table 1-4 lists the operations you can perform from the keyboard.

Table 1-4: Keyboard operations

Key combination	Operation
Left arrow or Ctrl+b	Moves one character to the left. When a command extends beyond a single line, you can press left arrow or Ctrl+b repeatedly to scroll toward the beginning of the line, or you can press Ctrl+a to go directly to the beginning of the line.
Right arrow or Ctrl-f	Moves one character to the right. When a command extends beyond a single line, you can press right arrow or Ctrl+f repeatedly to scroll toward the end of the line, or you can press Ctrl+e to go directly to the end of the line.
Esc, b	Moves back one word
Esc, f	Moves forward one word
Ctrl+e	Moves to end of the line
Ctrl+a	Moves to the beginning of the line
Ctrl+u	Deletes the line
Ctrl+w	Deletes from the cursor to the previous whitespace
Alt+d	Deletes the current word
Ctrl+k	Deletes from the cursor to the end of line
Ctrl+y	Pastes text previously deleted with Ctrl+k, Alt+d, Ctrl+w, or Ctrl+u at the cursor

Table 1-4: Keyboard operations (Continued)

Key combination	Operation
Ctrl+t	Transposes the current character with the previous character
Ctrl+c	Ignores the current line and redisplays the command prompt
Ctrl+z	Ends configuration mode and returns to exec mode
Ctrl+l	Clears the screen
Up Arrow or Ctrl+p	Scroll backward through command history
Down Arrow or Ctrl+n	Scroll forward through command history

Show Command Modifiers

You can use two tokens to modify the output of a `show` command. Enter a question mark to display these tokens:

```
# show users ?
  | Output modifiers
  > Output redirection
```

You can type the | (vertical bar character) to use output modifiers. For example:

```
> show rsvp | ?
  begin     Begin with the line that matches
  exclude   Exclude lines that match
  include   Include lines that match
  redirect  Redirect output
```

Begin Modifier

The `begin` modifier displays the output beginning with the first line that contains the input string (everything typed after the `begin` keyword). For example:

```
# show run | begin eth1
...skipping
interface eth1
 ipv6 address fe80::204:75ff:fee6:5393/64
!
interface eth2
 ipv6 address fe80::20d:56ff:fe96:725a/64
!
line con 0
 login
!
end
```

You can specify a regular expression after the `begin` keyword, This example begins the output at a line with either “eth3” or “eth4”:

```
# show run | begin eth[3-4]

...skipping
interface eth3
```

```
 shutdown
!
interface eth4
 shutdown
!
interface svlan0.1
 no shutdown
!
route-map myroute permit 3
!
route-map mymap1 permit 10
!
route-map rmap1 permit 3
!
line con 0
 login
line vty 0 4
 login
!
end
```

Include Modifier

The `include` modifier includes only those lines of output that contain the input string. In the output below, all lines containing the word “input” are included:

```
# show interface eth1 | include input
    input packets 80434552, bytes 2147483647, dropped 0, multicast packets 0
    input errors 0, length 0, overrun 0, CRC 0, frame 0, fifo 1, missed 0
```

You can specify a regular expression after the `include` keyword. This examples includes all lines with “input” or “output”:

```
#show int eth0 | include (in|out)put
    input packets 597058, bytes 338081476, dropped 0, multicast packets 0
    input errors 0, length 0, overrun 0, CRC 0, frame 0, fifo 0, missed 0
    output packets 613147, bytes 126055987, dropped 0
    output errors 0, aborted 0, carrier 0, fifo 0, heartbeat 0, window 0
```

Exclude Modifier

The `exclude` modifier excludes all lines of output that contain the input string. In the following output example, all lines containing the word “input” are excluded:

```
# show interface eth1 | exclude input
Interface eth1
  Scope: both
  Hardware is Ethernet, address is 0004.75e6.5393
  index 3 metric 1 mtu 1500 <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Administrative Group(s): None
  DSTE Bandwidth Constraint Mode is MAM
  inet6 fe80::204:75ff:fee6:5393/64
    output packets 4438, bytes 394940, dropped 0
    output errors 0, aborted 0, carrier 0, fifo 0, heartbeat 0, window 0
    collisions 0
```

You can specify a regular expression after the `exclude` keyword. This example excludes lines with “output” or “input”:


```
# show interface eth0 | exclude (in|out)put
Interface eth0
  Scope: both
  Hardware is Ethernet  Current HW addr: 001b.2139.6c4a
  Physical:001b.2139.6c4a  Logical:(not set)
  index 2 metric 1 mtu 1500 duplex-full arp ageing timeout 3000
  <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Bandwidth 100m
  DHCP client is disabled.
  inet 10.1.2.173/24 broadcast 10.1.2.255
  VRRP Master of :  VRRP is not configured on this interface.
  inet6 fe80::21b:21ff:fe39:6c4a/64
    collisions 0
```

Redirect Modifier

The `redirect` modifier writes the output into a file. The output is not displayed.

```
# show history | redirect /var/frame.txt
```

The output redirection token (>) does the same thing:

```
# show history >/var/frame.txt
```

Command Modes

Commands are grouped into modes arranged in a hierarchy. Each mode has its own set of commands. Table 1-5 lists the command modes common to all protocols.

Table 1-5: Common command modes

Name	Description
Executive mode	Also called *view* mode, this is the first mode to appear after you start the CLI. It is a base mode from where you can perform basic commands such as `show`, `exit`, `quit`, `help`, `list`, and `enable`.
Privileged executive mode	Also called *enable* mode, in this mode you can run additional basic commands such as `debug`, `write`, and `show`.
Configure mode	Also called *configure terminal* mode, in this mode you can run configuration commands and go into other modes such as interface, router, route map, key chain, and address family.
Interface mode	In this mode you can configure protocol-specific settings for a particular interface. Any setting you configure in this mode overrides a setting configured in router mode.
Router mode	This mode is used to configure router-specific settings for a protocol such as RIP or OSPF.

Command Mode Tree

The diagram below shows the common command mode hierarchy.

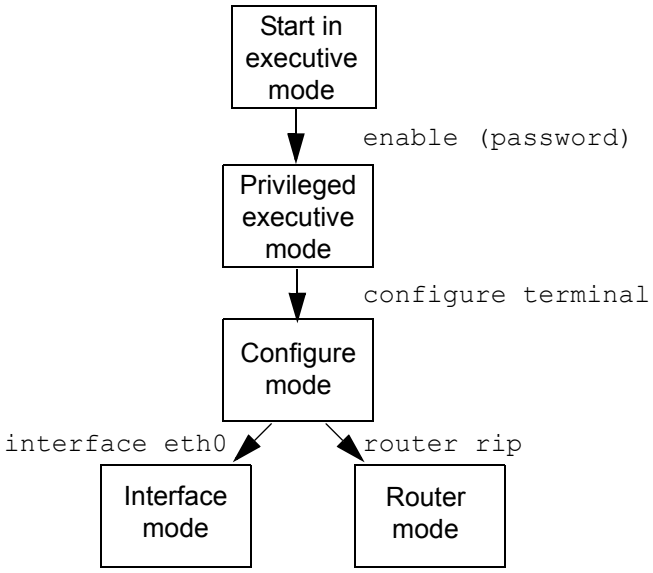

Figure 1-1: Common command modes

To change modes:

1. Enter privileged executive mode by entering `enable` in Executive mode.
2. Enter configure mode by entering `configure terminal` in Privileged Executive mode.

The example below shows starting `imish` and then moving from executive mode to privileged executive mode to configure mode and finally to router mode:

```
# ./imish
> enable mypassword
# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
(config)# router rip
(config-router)#
```

Note: Each protocol can have modes in addition to the common command modes. See the command reference for the respective protocol for details.

Debug Command

Whether the settings you make for a `debug` command persist between sessions depends on the mode where you make the settings:

- When you make settings for a `debug` command in executive mode, the configuration is valid for the current session only and is not saved in the `ZebOS.conf` file.
- When you make settings for a `debug` command in configuration mode, the configuration is retained and saved in `ZebOS.conf` and used even after the session restarts.

CHAPTER 2 MPLS Commands

This chapter provides an alphabetized reference of the Multi-Protocol Label Switching (MPLS) commands. It includes the following commands:

bandwidth

Use this command to specify the maximum bandwidth to be used for a band-class. The bandwidth value is in bits.

Note: Run this command in the Bandwidth-class mode (refer to mpls bandwidth-class).

Command Syntax

```
bandwidth BANDWIDTH setup-priority <0-7> class-type CLASS-TYPE
bandwidth BANDWIDTH setup-priority <0-7> hold-priority <0-7>
```

Parameter

`BANDWIDTH`	Bandwidth range <1-10000000000 bits> (usable units: k, m, g)
`setup-priority`	Indicate the `setup-priority` parameter
`<0-7>`	The actual setup priority value
`class-type`	Indicate the `class-type` parameter
`CLASS-TYPE`	Specify the actual name of DSTE class type

Command Mode

Bandwidth-class mode

Example

```
#configure terminal
(config)#mpls bandwidth-class new-BC
(config-mpls-bw)#bandwidth 100m setup-priority 1 class-type new
```

clear mpls statistics

Use this command to clear MPLS statistics.

Command Syntax

```
clear mpls statistics (top|ftn|ilm|)
```

Parameters

`top`	Clear top level statistics
`ftn`	Clear FTN statistics
`ilm`	Clear ILM statistics

Command Mode

Privileged Exec mode

Example

```
#clear mpls statistics top
```

label-switching

Use this command to either enable label-switching on an interface or to modify the label-space to which this interface is bound.

Use the `no` parameter and the interface is bound to the platform-wide (zero) label-space.

Command Syntax

```
label-switching
label-switching <0-60000>
no label-switching
no label-switching <0-65535>
```

Parameter

`<0-60000>`	Label space value in this range

Command Mode

Interface mode

Example

This example shows the enabling of label switching on the `eth0` interface.

```
#configure terminal
(config)#interface eth0
(config-if)#label-switching 654
```

mpls ac-group

Use this command to create a new access circuit group for MPLS.

Use the `no` parameter with this command to remove an access circuit group.

Command Syntax

```
mpls ac-group NAME <1-4294967295>
no mpls ac-group NAME
```

Parameter

`NAME`	The name of the access circuit group
`<1-4294967295>`	The identifier for the group; used in LDP

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#mpls ac-group new-ac 123

(config)#no mpls ac-group new-ac
```

mpls admin-groups

Use this command to create a name-to-value binding for an administrative group.

Note: Only 32 administrative groups can be configured at one time.

Use the `no` parameter with this command to remove a named administrative group.

Command Syntax

```
mpls admin-group NAME <0-31>
no mpls admin-group NAME <0-31>
```

Parameters

`NAME`	Name of administrative group
`<0-31>`	The value of the administrative group

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls admin-group mygroup 3
```

mpls bandwidth-class

Use this command to create a new bandwidth class name. Using this command changes the command mode to Bandwidth-class mode.

Use the `no` parameter with this command to remove a bandwidth class name.

Command Syntax

```
mpls bandwidth-class NAME
no mpls bandwidth-class NAME
```

Parameter

`NAME`	Name of the bandwidth class

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls bandwidth-class new-BC
(config-mpls-bw)#

(config)#no mpls bandwidth-class new-BC
```

mpls bfd

Use this command to configure a BFD session for MPLS based on the parameters defined below. Sessions can be configured for LDP, RSVP, and static LSPs.

Use the `no` parameter with this command to remove a configuration.

Command Syntax

```
mpls bfd ((ldp A.B.C.D/M)|(rsvp tunnel-name NAME)|(static A.B.C.D/M))(disable|{lsp-
  ping-intvl <1-4294967>|min-tx <50-4294967>|min-rx <50-4294967>|multiplier <1-
  255>|force-explicit-null}|)"
no mpls bfd ((ldp A.B.C.D/M)|(rsvp tunnel-name NAME)| (static A.B.C.D/M))
  (disable|)
no mpls bfd ((ldp A.B.C.D/M)|(rsvp tunnel-name NAME)| (static A.B.C.D/M)) ({lsp-
  ping-intvl <1-4294967>|min-tx <50-4294967>|min-rx <50-4294967>|multiplier <1-
  255>|force-explicit-null}|)
```

Parameters

`ldp`	Configure a BFD session for LDP
`A.B.C.D/M`	LDP FEC IPv4 address and mask
`rsvp`	Configure a BFD session for RSVP
`tunnel-name`	RSVP tunnel name
`NAME`	Name of the RSVP tunnel,
`static`	Configure BFD for a static LSP
`A.B.C.D/M`	Static IPv4 address and mask
`disable`	Disable BFD for the session
`lsp-ping-intvl`	LSP ping interval, in seconds
`<1-4294967>`	LSP ping interval value
`min-tx`	Minimum transmit interval, in milliseconds
`<50-4294967>`	Minimum transmit interval value
`min-rx`	Minimum reception interval, in milliseconds
`<50-4294967>`	Minimum reception interval value
`multiplier`	Set BFD detection multiplier
`<2-255>`	Detection multiplier value
`force-explicit-null`	Force Explicit NULL value

Defaults

The default LSP ping interval is 5 seconds.

The default minimum transit interval is 50 milliseconds.

The default minimum reception interval is 50 milliseconds.

The default multiplier value is 5.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls bfd ldp 1.1.1.1/2

(config)#no mpls bfd ldp 1.1.1.1/2
```

mpls bfd all

Use this command to configure BFD for all LDP, RSVP or static label switched paths.

Use the `no` parameter with this command to remove a BFD configuration.

Command Syntax

```
mpls bfd (ldp|rsvp|static) all ({lsp-ping-intvl <1-4294967>|min-tx <50-
  4294967>|min-rx <50-4294967>|multiplier <1-255>|force-explicit-null}|)
no mpls bfd (ldp|rsvp|static) all
no mpls bfd (ldp|rsvp|static) all ({lsp-ping-intvl <1-4294967>| min-tx <50-
  4294967>|min-rx <50-4294967>|multiplier <1-255>|force-explicit-null}|)
```

Parameters

`ldp`	Configure BFD for LDP
`rsvp`	Configure BFD for RSVP
`static`	Configure BFD for static LSPs
`lsp-ping-intvl`	LSP ping interval, in seconds
`<1-4294967>`	LSP ping interval value
`min-tx`	Minimum transmit interval, in milliseconds
`<50-4294967>`	Minimum transmit interval value
`min-rx`	Minimum reception interval, in milliseconds
`<50-4294967>`	Minimum reception interval
`multiplier`	Set BFD detection multiplier
`<2-255>`	Detection multiplier value
`force-explicit-null`	Force Explicit NULL value

Defaults

The default LSP ping interval is 5 seconds.

The default minimum transit interval is 50 milliseconds.

The default minimum reception interval is 50 milliseconds.

The default multiplier value is 5.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls bfd ldp lsp-ping-intvl 436521 all force-explicit null

(config)#no mpls bfd ldp all
```

mpls bfd-vccv

Use this command to configure MPLS with Bidirectional Forwarding Detection (BFD) for Pseudowire Virtual Circuit Connectivity Verification (VCCV).

Command Syntax

```
mpls bfd-vccv (start|stop) <1-1000000>
```

Parameters

`start`	Start BFD VCCV
`stop`	Stop BFD VCCV
`<1-1000000>`	The virtual circuit (VC) identifier

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls bfd-vccv start 123

(config)#mpls bfd-vccv stop 123
```

mpls cv

Use this command to configure MPLS with connectivity verification (CV).

Command Syntax

```
mpls cv ((start|stop) lsp-id <1-65535> (|ttl <1-255>|timeout <1-500>|sink-lsr src-
  lsr-ip A.B.C.D)|)
```

Parameters

`start`	Start connectivity verification
`stop`	Stop connectivity verification
`lsp-id`	LSP identifier
`<1-65535>`	The LSP ID
`ttl`	Time-t0-live
`<0-255>`	Time-to-live value
`timeout`	Timeout of OAM
`<1-500>`	Set timeout value
`sink-lsr`	Configure sink Link State Routing (LSR)
`src-lsr-ip`	Source LSR IP
`A.B.C.D`	Source LSR IPv4 address

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls cv start lsp-ip 123 ttl 456 timeout 78
```

mpls disable-all-interfaces

Use this command to disable all interfaces for MPLS. This command completely stops all signaling on the router. When issued, all signaling protocols are made aware of this change, which stops all MPLS-specific processing.

Command Syntax

```
mpls disable-all-interfaces
```

Parameters

None

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls disable-all-interfaces
```

mpls echo-request

Use this command to test MPLS echo requests.

Note: This is a test command for MPLS OAM.

Command Syntax

```
mpls echo-request (ldp|rsvp) A.B.C.D (send|recv) A.B.C.D
```

Parameter

`ldp`	Label Distribution Protocol FEC time-to-live
`rsvp`	Resource Reservation Protocol FEC time-to-live
`A.B.C.D`	Default source address
`send`	Send a request
`recv`	Receive an echo packet
`A.B.C.D`	Default source address

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls echo-request ldp 123.12.1.2 send 123.12.1.123
```

mpls egress-ttl

Use this command to set a custom Time to Live (TTL) value for LSPs for which this LSR is the egress.

Use the `no` parameter with this command to remove a custom TTL value.

Command Syntax

```
mpls egress-ttl <0-255>
no mpls egress-ttl <0-255>
```

Parameter

`<0-255>`	Set a TTL value to use

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls egress-ttl 45
```

mpls enable-all-interfaces

Use this command to enable all interfaces for MPLS. This command enables all interfaces on a router for label-switching, and is helpful when using a router with many interfaces.

Note: Executing this command does not enable any signaling protocol interaction via all the interfaces. Each protocol needs to be explicitly enabled per interface.

Command Syntax

```
mpls enable-all-interfaces
```

Parameters

None

Default

All interfaces are disabled by default.

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls enable-all-interfaces
```

mpls fdi

Use this command to configure MPLS with forward defect identifier (FDI).

Command Syntax

```
mpls fdi lsp-id <1-65535> ((ttl <1-255>|timeout <1-500>) level ((1 label-1
  LABEL)|(2 label-1 LABEL label-2 LABEL)| (3 label-1 LABEL label-2 LABEL label-3
  LABEL))|)
```

Parameters

`lsp-id`	Label switch path
`<1-65535>`	The LSP ID
`ttl`	Configure time-to-live
`<0-255>`	The TTL value to use
`timeout`	Timeout of OAM
`<1-500>`	Set a timeout value, in seconds
`1`	Level number 1
`label-1`	Immediate first tunnel label
`LABEL`	Either explicit-null or a label in the range of <16-1048575>
`2`	Level number 2
`label-2`	Middle tunnel label
`LABEL`	Either explicit-null or a label in the range of <16-1048575>
`3`	Level number 3
`label-3`	Final/last tunnel label
`LABEL`	Either explicit-null or a label in the range of <16-1048575>

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls fdi lsp-id 123 ttl 123 timeout 456 level 1 label-1 new-label
```

mpls ftn-entry tunnel-id <>

This command will be used to create a static tunnel.

In hardware, it creates a logical interface to which services can be mapped.

Command Syntax

```
mpls ftn-entry tunnel-id  <1-5000> A.B.C.D/M LABEL A.B.C.D IFNAME
(primary|secondary|)
mpls ftn-entry tunnel-id  <1-5000> A.B.C.D/M LABEL A.B.C.D IFNAME INDEX
(primary|secondary|)
mpls ftn-entry tunnel-id  <1-5000> A.B.C.D A.B.C.D LABEL A.B.C.D IFNAME
(primary|secondary|)
mpls ftn-entry tunnel-id  <1-5000> A.B.C.D A.B.C.D LABEL A.B.C.D IFNAME INDEX
(primary|secondary|)
no mpls ftn-entry tunnel-id  <1-5000> A.B.C.D/M WORD A.B.C.D IFNAME
(primary|secondary|)
no mpls ftn-entry tunnel-id  <1-5000> A.B.C.D A.B.C.D WORD A.B.C.D IFNAME
(primary|secondary|)
```

Parameters

`<1-5000>`	The tunnel ID value
`A.B.C.D/M`	Forwarding equivalence class with mask
`A.B.C.D`	Mask for forwarding equivalency class
`LABEL`	Outgoing label
`A.B.C.D`	Nexthop IPv4 address
`IFNAME`	Outgoing interface name
`INDEX`	FTN index for update

Note: When the INDEX parameter is passed, the FTN entry is updated. When INDEX is not used, a new FTN entry is created.

`primary`	The primary LSP; default is primary
`secondary`	The secondary LSP Command Mode

Command mode

Configure mode

Examples

```
ZebOS# configure terminal
ZebOS(config)#mpls ftn-entry tunnel-id 2  10.10.0.0/24 16 1.2.3.4 eth1
secondary
ZebOS(config)#no mpls ftn-entry tunnel-id 2  10.10.0.0/24 16 1.2.3.4 eth1
secondary
```

mpls ftn-entry

This command will be used to create a static LSP. In the hardware, it is used to create IP-route with outgoing MPLS parameters.

Command Syntax

```
mpls ftn-entry A.B.C.D/M LABEL A.B.C.D IFNAME (INDEX|)
no mpls ftn-entry A.B.C.D/M LABEL A.B.C.D IFNAME
```

Parameters

A.D.C.D/M	Forwarding Equivalence Class with Mask
LABEL	Outgoing label <16-1048575>
A.B.C.D	Nexthop IPv4 address
IFNAME	Outgoing interface name
INDEX	FTN index for update

Command Mode

Configure mode

Example

```
ZebOS# configure terminal
ZebOS (config)# mpls ftn-entry 2.2.2.2/32 111 20.0.0.2 eth1
ZebOS (config)# no mpls ftn-entry 2.2.2.2/32 111 20.0.0.2 eth1
```

mpls ilm-entry pop

Use this command to create an ILM entry in the ILM table to which a POP incoming interface is bound. Upon receipt of a labeled packet on an MPLS-enabled router, a lookup is done based on the incoming label in the ILM table. If a match is found, the packet may either be label-switched downstream, or popped and passed over IP. In a pop operation, an outgoing label is not needed as is either accepted or forwarded over IP. The nexthop option is also not mandatory because the FEC IP address could be a local IP address.

Use the `no` option with the command to delete an ILM entry. If there is no match, an error message displays.

Command Syntax

```
mpls ilm-entry LABEL IFNAME (pop)
no mpls ilm-entry LABEL IFNAME (pop)
```

Parameters

`LABEL`	Incoming label value
`IFNAME`	Incoming interface name
`pop`	Pop the incoming label

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls ilm-entry 100 eth0 pop
```

mpls ilm-entry swap

Use this command to create an ILM entry in the ILM table to which a swap incoming interface is bound. Upon receipt of a labeled packet on an MPLS-enabled router, a lookup is done based on the incoming label in the ILM table. If a match is found, the packet may either be label-switched downstream, or popped and passed over IP.

Use the `no` option with the command to delete an ILM entry. If there is no match, an error message displays.

Command Syntax

```
mpls ilm-entry LABEL IFNAME (swap) LABEL IFNAME A.B.C.D (A.B.C.D/M|A.B.C.D A.B.C.D)
  (<1-4294967295>|)
no mpls ilm-entry LABEL IFNAME (swap) LABEL IFNAME A.B.C.D (A.B.C.D/M|A.B.C.D
  A.B.C.D|) (<1-4294967295>|)
```

Parameters

`LABEL`	Incoming label value range <16-1048575>
`IFNAME`	Incoming interface name
`swap`	Specify swap for the incoming label
`LABEL`	Configure an outgoing label with a value from <16-1048575>

Note: A value of 2 indicates explicit NULL and a value of 3 indicates implicit NULL.

`IFNAME`	Outgoing interface name
`A.B.C.D`	Nexthop IPv4 address
`A.B.C.D`	The FEC for which this ILM entry is created
`A.B.C.D/M`	The FEC for which this ILM entry is created, plus mask
`A.B.C.D`	A mask for forwarding equivalence class mask
`<1-429496725>`	ILM index update

Note: When an ILM index value is passed, the ILM entry is updated. If the ILM index is not used, then a new ILM entry is created.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls ilm-entry 16 eth1 swap 17 eth2 1.1.1.1 1.1.1.1/3 1
```

mpls ilm-entry vpnpop

Use this command to create an ILM entry in the ILM table to which a VPN POP incoming interface is bound. Upon receipt of a labeled packet on an MPLS-enabled router, a lookup is done based on the incoming label in the ILM table. If a match is found, the packet may either be label-switched downstream, or popped and passed over IP.

Use the `no` option with the command to delete an ILM entry. If there is no match, an error message displays.

Note: This command is not supported for ZebIC releases.

Command Syntax

```
mpls ilm-entry LABEL IFNAME (vpnpop) LABEL IFNAME A.B.C.D (A.B.C.D/M|A.B.C.D
  A.B.C.D) (<1-4294967295>|)
no mpls ilm-entry LABEL IFNAME (vpnpop) LABEL IFNAME A.B.C.D (A.B.C.D/M|A.B.C.D
  A.B.C.D|) (<1-4294967295>|)
```

Parameters

`LABEL`	Incoming label value
`IFNAME`	Incoming interface name
`vpnpop`	Specify pop for the incoming label
`LABEL`	Configure an outgoing label with a value from <16-1048575>

Note: A value of 0 indicates explicit NULL and a value of 3 indicates implicit NULL.

`IFNAME`	Outgoing interface name
`A.B.C.D`	Nexthop IPv4 address
`A.B.C.D`	The FEC for which this ILM entry is created
`A.B.C.D/M`	The FEC for which this ILM entry is created, plus mask
`A.B.C.D`	A mask for forwarding equivalence class mask
`<1-429496725>`	ILM index update

Note: When an ILM index value is passed, the ILM entry is updated. If the ILM index is not used, then a new ILM entry is created.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls ilm-entry 100 eth0 vpnpop 200 eth1 1.2.3.4 10.10.0.0/24
```

mpls ingress-ttl

Use this command to set a Time to Live (TTL) value for LSPs for which this LSR is the ingress.

Use the `no` parameter with this command to unset the custom TTL value being used for LSPs for which this LSR is the ingress.

Command Syntax

```
mpls ingress-ttl <0-255>
no mpls ingress-ttl <0-255>
no mpls ingress-ttl
```

Parameter

`<0-255>`	Set the TTL value to use

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls ingress-ttl 3
```

mpls l2-circuit

Use this command to create an instance of an MPLS layer 2 virtual circuit, without specifying a group to which the VC belongs. Refer to mpls l2-circuit GROUPNAME for information on how to create an MPLS "with" a specific group. A Layer-2 MPLS Virtual Circuit instance may be bound to any interface on the router; however, only one interface may be bound to a Layer-2 circuit at a time.

Use the `no` parameter with this command to delete an instance of an MPLS Layer-2 Virtual Circuit.

Command Syntax

```
mpls l2-circuit NAME <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii NAME
  )  (control-word|) (tunnel-name NAME|tunnel-id <1-65535>) (manual|)

mpls l2-circuit NAME <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii NAME
  )  (control-word|) ((tunnel-id <1-65535> (forward|reverse|))|) (manual|)

mpls l2-circuit NAME <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii NAME
  )  (control-word|) ((tunnel-id <1-65535> (forward|reverse|))|) (manual|passive|)
  (vccv (cc-type (1|2|3)|) (bfd (bfd-cv-type (1|2|3|4)|)|)|)

mpls l2-circuit NAME <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii NAME
  )  (control-word|) ((tunnel-id <1-65535> (forward|reverse|))|) (manual|passive|)

mpls l2-circuit NAME ( <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii
  NAME ) (control-word|) ((tunnel-id <1-65535> (forward|reverse|))|)(manual (pw-
  status (<0-65535>|)|)|)

mpls l2-circuit NAME <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii NAME
  )  (control-word|) ((tunnel-id <1-65535> (forward|reverse|))|) (manual|) (vccv
  (cc-type (1|2|3)|) (bfd (bfd-cv-type (1|2|3|4)|)|)|)

no mpls l2-circuit NAME <1-4294967295>

no mpls l2-circuit NAME <1-4294967295> A.B.C.D
```

Parameters

`NAME`	String identifying the MPLS Layer-2 virtual circuit
`<1-4294967295>`	A 32-bit identifier to which the L2 circuit name should be mapped
`control-word`	Set the use of control-word
`A.B.C.D`	IPv4 address for the MPLS L2 virtual circuit end-point
`tunnel-name`	Configure a tunnel name
`NAME`	Name of MPLS LSP (or Layer 2 tunnel) to use for VC
`tunnel-id`	Configure a tunnel identifier
`<1-65535>`	Identifier of the MPLS (or Layer 2 tunnel) to use for this VC

Note: The tunnel identifier is obtained only after the tunnel is configured.

`forward`	Tunnel direction; forward tunnel identifier
`reverse`	Tunnel direction; reverse tunnel identifier
`manual`	When the `manual` parameter is passed, no signaling is used to set up the VC
`pw-status`	Pseudowire status
`REFRESH-TIME`	Refresh time

passive	TE is passive
vccv	CCV (Virtual Circuit Connectivity Verification) is required
cc-type	Specify CC type to signal or use as one of:
1	CC Type 1 - PWE3 control word with 0001b as first nibble
2	CC Type 2 - MPLS router alert label
3	CC Type 3 - MPLS PW label with TTL == 1
bfd	BFD VCCV is required
bfd-cv-type	Specific BFD CV type to signal or use, one of:
1	BFD IP/UDP-encapsulated, only for PW fault detection
2	BFD IP/UDP-encapsulated, for PW fault detection and AC/PW fault status signaling
3	BFD PW-ACH-encapsulated, only for PW fault detection
4	BFD PW-ACH-encapsulated, for PW fault detection and AC/PW fault status signaling
A.B.C.D	IPv4 Address for end-point for FEC129 MPLS Layer-2 Virtual Circuit
agi	Specify the value used for the AGI in FEC129 MPLS Layer-2 Virtual Circuit
NAME	AGI value for FEC129 MPLS Layer-2 Virtual Circuit
saii	Specify the value used for the SAII in FEC129 MPLS Layer-2 Virtual Circuit
NAME	SAII value for FEC129 MPLS Layer-2 Virtual Circuit
taii	Specify the value used for the TAII in FEC129 MPLS Layer-2 Virtual Circuit
NAME	TAII value for FEC129 MPLS Layer-2 Virtual Circuit

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls l2-circuit mycircuit 45678 1.2.3.4
```

mpls l2-circuit GROUPNAME

Use this command to create an instance of an MPLS Layer-2 Virtual Circuit. A Layer-2 MPLS Virtual Circuit instance may be bound to any interface on the router; however, only one interface may be bound to a Layer-2 circuit at a time.

Use the `no` parameter with this command to delete an instance of an MPLS Layer-2 Virtual Circuit.

Command Syntax

```
mpls l2-circuit NAME <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii NAME
  )  GROUPNAME (group-id <1-4294967295>|) (control-word|) ((tunnel-id <1-65535>
  (forward|reverse|))|) (manual|)

mpls l2-circuit NAME <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii NAME
  )  GROUPNAME (control-word|)((tunnel-id <1-65535> (forward|reverse|))|)
  (manual|passive|) (vccv (cc-type (1|2|3)|) (bfd (bfd-cv-type (1|2|3|4)|)|)|)

mpls l2-circuit NAME ( <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii
  NAME ) GROUPNAME (group-id <1-4294967295>|) (control-word|) ((tunnel-id <1-65535>
  (forward|reverse|))|) (manual(pw-status (<0-65535>|)|)|)

mpls l2-circuit NAME <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii NAME
  )  GROUPNAME (control-word|) ((tunnel-id <1-65535> (forward|reverse|))|)
  (manual|) (vccv (cc-type (1|2|3)|) (bfd (bfd-cv-type (1|2|3|4)|)|)|)

mpls l2-circuit NAME <1-4294967295> <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii
  NAME taii NAME )  <1-4294967295> GROUPNAME (group-id <1-4294967295>|) manual

mpls l2-circuit NAME <1-4294967295> (A.B.C.D | A.B.C.D agi NAME saii NAME taii NAME
  )  GROUPNAME (group-id <1-4294967295>|) (mode (raw | tagged svlan <2-4094> tpid
  (88a8|9100))|)(control-word|) ((tunnel-id <1-65535> (forward|reverse|))|)
  (manual|)

no mpls l2-circuit NAME <1-4294967295>

no mpls l2-circuit NAME <1-4294967295> A.B.C.D

no mpls l2-circuit NAME <1-4294967295> A.B.C.D GROUPNAME

no mpls l2-circuit NAME <1-4294967295> A.B.C.D GROUPNAME control-word
```

Parameters

`NAME`	A string that identifies the MPLS Layer 2 virtual circuit
`<1-4294967295>`	A32-bit identifier to which the L2 VC name should be mapped
`A.B.C.D`	The IPv4 address for the MPLS L2 virtual circuit end-point
`GROUPNAME`	The group name identifier
`group-id`	Identify a group identifier
`<1-4294967295>`	A value for group ID
`control-word`	Use control-word
`manual`	When this parameter is passed, no signaling is used to set up the VC
`passive`	Indicate that the T-PE is passive
`tunnel-id`	The ID of the MPLS LSP (or L2 tunnel) for this virtual circuit

<1-65535>	Tunnel identifier value
Note:	The tunnel ID is obtained only after the tunnel is configured.
forward	Tunnel direction; forward tunnel identifier
reverse	Tunnel direction; reverse tunnel identifier
vccv	VCCV (Virtual Circuit Connectivity Verification) is required
cc-type	Set CC type to signal or use, one of
1	CC Type 1 - PWE3 control word with 0001b as first nibble
2	CC Type 2 - MPLS router alert label
3	CC Type 3 - MPLS PW label with TTL == 1
bfd	BFD VCCV is required
bfd-cv-type	Set BFD CV type to signal or use, one of
1	BFD IP/UDP-encapsulated, only for PW fault detection
2	BFD IP/UDP-encapsulated, for PW fault detection and AC/PW fault status signaling
3	BFD PW-ACH-encapsulated, only for PW fault detection
4	BFD PW-ACH-encapsulated, for PW fault detection and AC/PW fault status signaling
A.B.C.D	IPv4 Address for end-point for FEC129 MPLS Layer-2 Virtual Circuit
agi	Specify the value used for the AGI in FEC129 MPLS Layer-2 Virtual Circuit
NAME	AGI value for FEC129 MPLS Layer-2 Virtual Circuit
saii	Specify the value used for the SAII in FEC129 MPLS Layer-2 Virtual Circuit
NAME	SAII value for FEC129 MPLS Layer-2 Virtual Circuit
taii	Specify the value used for the TAII in FEC129 MPLS Layer-2 Virtual Circuit
NAME	TAII value for FEC129 MPLS Layer-2 Virtual Circuit
raw	Configure the mode of operation as Raw
tagged	Configure the mode of operation as Tagged
svlan	Service VLAN
<2-4094>	VLAN identifier range
tpid	Tag protocol identifier
88a8	Set TPID value as 88a8
9100	Set TPID value as 9100

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls l2-circuit new 1 1 1.1.1.1 1 new group-id 123 manual
(config)#exit
```

mpls-l2-circuit NAME

Use this command in the Interface mode to bind an interface to a MPLS Layer-2 Virtual Circuit created in the configure mode.

Use the `no` parameter with this command to delete this instance.

Command Syntax

```
mpls-l2-circuit NAME ((ethernet|ppp|hdlc|tdm-T1|tdm-E1|tdm-T3|tdm-E3)
 (primary|secondary|)|)
mpls-l2-circuit NAME ((ethernet|ppp|hdlc|tdm-T1|tdm-E1|tdm-T3|tdm-E3|vlan <2-
 4094>|) ((inner-vlan <2-4094>|) ((tpid (88a8|9100)) (action (replace|remove|no-
 op))|)))(primary|secondary|)|)
no  mpls-l2-circuit NAME (ethernet|ppp|hdlc|tdm-T1|tdm-E1|tdm-T3|tdm-E3)
no  mpls-l2-circuit NAME (vlan <2-4094>|)
```

Parameters

`NAME`	A string identifying the MPLS Layer-2 Virtual Circuit
`ethernet`	Identify L2 circuit as Ethernet
`hdlc`	Identify L2 circuit as HDLC (High-Level Data Link Control)
`ppp`	Identify L2 circuit as point-to-point
`inner-vlan`	Service VLAN
`tpid`	Tag protocol identifier
`88a8`	Set TPID value as 88a8
`9100`	Set TPID value as 9100
`action`	Action
`replace`	Set action as replace
`remove`	Set action as remove
`no-op`	Set action as no operation
`primary`	Identify L2 circuit as the primary link
`secondary`	Identify L2 circuit as the secondary link; the secondary link is not activated unless the primary link fails
`tdm-T1`	TDM-T1 line
`tdm-E1`	TDM-E1 line
`tdm-T3`	TDM-T3 line
`tdm-E3`	TDM-E3 line
`vlan`	Identify L2 circuit as Ethernet VLAN
`<2-4094>`	VLAN identifier range
`<1-4294967295>`	Value for MPLS Layer-2 Virtual Circuit
`A.B.C.D`	IPv4 Address for end-point for MPLS Layer-2 Virtual Circuit

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)#mpls-l2-circuit VC1 vlan 10 inner-vlan 4 tpid 88a8 action replace
```

mpls l2-circuit-fib-entry

Use this command to add a static Layer-2 MPLS Virtual Circuit FIB entry.

Use the `no` parameter with this command to delete a Layer-2 MPLS Virtual Circuit FIB entry.

Command Syntax

```
mpls l2-circuit-fib-entry VC-ID
mpls l2-circuit-fib-entry VC-ID LABEL LABEL A.B.C.D IFNAME NAME
mpls l2-circuit-fib-entry VC-ID LABEL LABEL tp-tunnel TNLNAME NAME
no mpls l2-circuit-fib-entry VC-ID
no mpls l2-circuit-fib-entry VC-ID
```

Parameters

`VC-ID`	Virtual Circuit ID
`LABEL`	Incoming label in the range of <16-1048575>
`LABEL`	Outgoing label in the range of <16-1048585>
`A.B.C.D`	Nexthop IPv4 address
`IFNAME`	Provider-facing interface name
`NAME`	Access interface name or VC to be stitched to.
`TNLNAME`	MPLS-TP tunnel to map to

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls l2-circuit-fib-entry 10 100 200 10.10.10.10 eth1 eth2
ZebOS-XP#configure terminal
ZebOS-XP(config)#mpls l2-circuit-fib-entry 10  100 200 tp-tunnel  tp1 VC2
ZebOS-XP(config)#exit

ZebOS-XP#configure terminal
ZebOS-XP(config)#mpls l2-circuit-fib-entry 10  100 200 tp-tunnel  tp1 eth2
ZebOS-XP(config)#exit
```

mpls local-packet-handling

Use this command to enable the labeling of locally generated TCP packets. All other locally generated packets are not looked at by the MPLS Forwarder

Use the `no` parameter with this command to disable labeling of locally generated TCP packets.

Command Syntax

```
mpls local-packet-handling
```

```
no mpls local-packet-handling
```

Parameters

None

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls local-packet-handling
```

mpls log

Use this command to exercise logging control. This command interacts with the Linux kernel. When using the kernel logging utility - klogd - it needs to be enabled to a logging level that allows for the requested log messages to be printed.

Use the `no` parameter with this command to stop logging messages in the MPLS Forwarder.

Command Syntax

```
mpls log all
mpls log debug
mpls log error
mpls log notice
mpls log warning
no mpls log all
no mpls log debug
no mpls log error
no mpls log notice
no mpls log warning
```

Parameters

`all`	Log all messages in MPLS forwarder
`debug`	Log debug messages in MPLS forwarder
`error`	Log error messages in MPLS forwarder
`notice`	Log notice messages in MPLS forwarder
`warning`	Log warning messages in MPLS forwarder

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls log error
```

mpls lsp-model

Use this command to configure the MPLS LSP model as Pipe.

Use the `no` parameter with this command to configure the MPLS LSP model as uniform.

Command Syntax

```
mpls lsp-model pipe
no mpls lsp-model pipe
```

Parameter

None

Default

Uniform is the default model configuration.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls lsp-model pipe

#configure terminal
(config)#no mpls lsp-model pipe
```

mpls lsp-tunneling

Use this command to choose the transit LSP and a locally configured LSP tunnel for carrying the transit LSP.

Use the `no` parameter with this command to disable this configuration.

Command Syntax

```
mpls lsp-tunneling IFNAME <16-1048575> <16-1048575> A.B.C.D/M
no mpls lsp-tunneling IFNAME <16-1048575>
```

Parameters

`IFNAME`	Name of the incoming interface
`<16-1048575>`	Label used to identify incoming transit LSP traffic
`<16-1048575>`	Transit LSP Label distributed by tunnel LSP egress node to its upstream node

Note: Tunnel egress node should have a platform-wide label space configured.

`A.B.C.D/M`	Prefix used to identify tunnel LSP

Command Mode

Configure mode

Command Example

```
#configure terminal
(config)#mpls lsp-tunneling eth0 16 30 1.2.2.4/16
```

mpls map-route

Use this command to map a prefix to an FEC.

Use the `no` parameter with this command to disable this configuration.

Command Syntax

```
mpls map-route A.B.C.D/M A.B.C.D/M
mpls map-route A.B.C.D A.B.C.D A.B.C.D A.B.C.D
mpls map-route A.B.C.D/M (tp-tunnel NAME)
mpls map-route A.B.C.D A.B.C.D (tp-tunnel NAME)
no mpls map-route A.B.C.D/M A.B.C.D/M
no mpls map-route A.B.C.D A.B.C.D A.B.C.D A.B.C.D
no mpls map-route A.B.C.D/M (tp-tunnel NAME)
no mpls map-route A.B.C.D A.B.C.D (tp-tunnel NAME)
```

Parameters

`A.B.C.D`	IPv4 prefix to map
`A.B.C.D/M`	IPv4 prefix to map, plus mask
`A.B.C.D`	Mask for IPv4 prefix to map
`A.B.C.D/M`	Mask for IPv4 prefix to map, plus mask.
`A.B.C.D`	IPv4 forwarding equivalence class for route to map
`A.B.C.D`	Mask for IPv4 forwarding equivalence class
`tp-tunnel`	The TP (Transport Profile) tunnel to map to

Command Mode

Configure mode

Examples

In the following examples 5.6.7.8/32 is the FEC for an LSP, and 1.2.3.4 is the prefix to be mapped.

```
#configure terminal
(config)#mpls map-route 1.2.3.4/32 5.6.7.8/32

#configure terminal
(config)#mpls map-route 1.2.3.4 255.255.255.255 5.6.7.8 255.255.255.255
```

mpls max-label-value

Use this command to configure a maximum label value for a label space. Use module names (rsvp | ldp | bgp) to configure maximum label value for module in a label space, maximum label space value for a module should be within the range of label space being used. After setting a maximum label value for a label space, make sure to bind the label space to an interface.

Use the no parameter with this command to use the default maximum label value for all the label pools.

Note: The system allows label-space range (maximum and minimum label values) changes for interface-specific label spaces only. The platform-wide label-space range cannot be modified.

Command Syntax

```
mpls (rsvp|ldp|bgp|) max-label-value <16-1048575> (label-space <0-60000>|)
no mpls (rsvp|ldp|bgp|) max-label-value (<16-1048575>|) (label-space <0-60000>|)
```

Parameters

`rsvp`	Label range value for RSVP
`ldp`	Label range value for LDP
`bgp`	Label range value for BGP
`<16-1048575>`	Maximum size for all label pools
`label-space`	Label space for which the maximum value needs to be modified
`<0-60000>`	Range for label space

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls max-label-value 55 label-space 4456
```

mpls min-label-value

Use this command to configure a minimum label value for a label space. Use module names (rsvp | ldp | bgp) to configure minimum label value for module in a label space, minimum label space value for a module should be within the range of label space being used. After setting a minimum label value for a label space, make sure to bind the label space to an interface.

Use the no parameter with this command to use the default minimum label value for all the label pools.

Note: The system allows label-space range (maximum and minimum label values) changes for interface-specific label spaces only. The platform-wide label-space range cannot be modified.

Command Syntax

```
mpls (rsvp|ldp|bgp|) min-label-value <16-1048575> (label-space <0-60000>|)
no mpls (rsvp|ldp|bgp|) min-label-value (<16-1048575>|) (label-space <0-60000>|)
```

Parameters

`rsvp`	Label range value for RSVP
`ldp`	Label range value for LDP
`bgp`	Label range value for BGP
`<16-1048575>`	Maximum size for all label pools
`label-space`	Label space for which the minimum value needs to be modified
`<0-60000>`	Range for label space

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls min-label-value 556 label-space 2342
```

mpls ms-pw

Use this command to configure the PW Switching Point description string for every multi-segment pseudowire (MS-PW) of switching provider edge (S-PE) TLV.

Use the `no` parameter with this command to disable this type of configuration.

Command Syntax

```
mpls ms-pw MS-PW S-PE-DESCR
no mpls ms-pw MS-PW S-PE-DESCR
```

Parameters

`MS-PW`	String that identifies the multi-segment pseudowire object
`S-PE-DESCR`	String that describes the switching provider edge object

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls ms-pw new 123

(config)#no mpls ms-pw new 123
```

mpls ms-pw-stitch

Use this command to stitch two virtual circuits and MS-PW name only on S-PE. This command helps set up a control plane.

Use the `no` parameter with this command to disable this type of configuration.

Command Syntax

```
mpls ms-pw-stitch MS_PW_NAME VC1_NAME VC2_NAME (((mtu <68-9216>) (ethernet|(vlan
  <2-4096>)))|)
no mpls ms-pw-stitch MS_PW_NAME VC1_NAME VC2_NAME
```

Parameters

`MS-PW-NAME`	String identifying MS-PW stitch
`VC1-NAME VC2-NAME`	Identifies the virtual circuits to stitch
`mtu`	The MTU size of an interface, required when any one VC is not signaled
`<68-9216>`	An integer in this range that designates the MTU size
`ethernet`	Select the virtual circuit Ethernet option, required when a VC is not signaled
`vlan`	Select the virtual circuit Ethernet VLAN option, required when a VC is not signaled
`<2-4096>`	An integer in this range that identifies a VLAN

Command Mode

Configure mode

Examples

```
(config)#mpls ms-pw-stitch spe1 v1 v2 mtu 1500 ethernet
```

mpls propagate-ttl

Use this command to enable TTL propagation. Enabling TTL propagation causes the TTL value in the IP header to be copied onto the TTL field in the shim header, at the LSP ingress.

Use the `no` parameter with this command to disable TTL propagation.

Command Syntax

```
mpls propagate-ttl
no mpls propagate-ttl
```

Parameters

None

Default

TTL propagation is enabled by default.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls propagate-ttl

#configure terminal
(config)#no mpls propagate-ttl
```

mpls traffic-eng

Use this command to configure a routing command level for MPLS Traffic Engineering (MPLS-TP).

Use the `no` parameter with this command to remove this configuration.

Note: This command is not supported for ZebIC releases.

Command Syntax

```
mpls traffic-eng (level-1|level-2)
no mpls traffic-eng (level-1|level-2)
```

Parameters

`level-1`	Run MPLS-TE only at IS-IS level 1
`level-2`	Run MPLS-TE only at IS-IS level 2

Command Mode

IS-IS Router mode

Examples

```
#configure terminal
(config)#mpls traffic-eng level-1

(config-router)#no mpls traffic-eng level-1
```

mpls traffic-eng router-id

Use this command to configure a routing ID for MPLS Traffic Engineering (MPLS-TE).

Use the `no` parameter with this command to remove this configuration.

Command Syntax

```
mpls traffic-eng router-id A.B.C.D
no mpls traffic-eng router-id
```

Parameters

`A.B.C.D`	An IS-IS router ID in IPv4 address format

Command Mode

IS-IS Router mode

Examples

```
#configure terminal
(config)#router isis
(config-router)#mpls traffic-eng router-id 1.2.3.4

(config-router)#no mpls traffic-eng router-id
```

mpls vrf-entry

Use this command to add a VRF entry to the VRF table with the name `VRF-NAME`. To use this command, the VRF table must already exist.

Use the `no` parameter with this command to disable this configuration.

Note: This command is mainly for developers, and is available only when the `--enable-dev-test` option is used in the configure script.

Command Syntax

```
mpls vrf-entry VRF-NAME A.B.C.D/M LABEL A.B.C.D IFNAME (PUSH|DLVR_TO_IP)
mpls vrf-entry VRF-NAME A.B.C.D/M LABEL A.B.C.D IFNAME (PUSH|DLVR_TO_IP) INDEX
mpls vrf-entry VRF-NAME A.B.C.D A.B.C.D LABEL A.B.C.D IFNAME (PUSH|DLVR_TO_IP)
mpls vrf-entry VRF-NAME A.B.C.D A.B.C.D LABEL A.B.C.D IFNAME (PUSH|DLVR_TO_IP)
  INDEX
no mpls vrf-entry VRF-NAME A.B.C.D/M LABEL A.B.C.D IFNAME (PUSH|DLVR_TO_IP)
no mpls vrf-entry VRF-NAME A.B.C.D A.B.C.D LABEL A.B.C.D IFNAME (PUSH|DLVR_TO_IP)
no mpls vrf-entry VRF-ID A.B.C.D/M VRFINDEX
no mpls vrf-entry VRF-ID A.B.C.D A.B.C.D VRFINDEX
```

Parameters

`VRF-NAME`	The Virtual Routing Forwarding identifier
`A.B.C.D`	Forwarding Equivalence Class (FEC)
`A.B.C.D/M`	FEC, with mask
`A.B.C.D`	Mask for FEC
`A.B.C.D/M`	FEC, with mask
`LABEL`	Outgoing label in the range of <16-1046400>
`A.B.C.D`	Next hop IPv4 address
`IFNAME`	Name of the outgoing interface
`DLVR_TO_IP`	Forward over IP
`PUSH`	Only one label should be pushed

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls vrf-entry myVRF 10.10.0.0/24 100 1.2.3.4 eth1 PUSH
```

ping mpls

Use this command to start sending MPLS echo request packets using various parameters as defined below. Ping packets can be configured for LDP, RSVP, L2 circuit, VPLS, L3 VPN, or generic FEC types.

Command Syntax

```
ping mpls (ldp A.B.C.D/M|rsvp (tunnel-name NAME|egress A.B.C.D)|l2-circuit (vccv|)
 <1-4294967295> |vpls <1-10000> peer A.B.C.D/M|l3vpn VRFNAME A.B.C.D/M |ipv4
 A.B.C.D/M) ({reply-mode (1|2)|flags|destination A.B.C.D|source A.B.C.D|ttl <1-
 255>|timeout <1-500>|repeat <5-5000>|interval <2-20000>|force-explicit-
 null|detail}|)
ping mpls (ldp A.B.C.D/M|rsvp (tunnel-name NAME|egress A.B.C.D)|l2-circuit (vccv|)
 <1-4294967295> |vpls <1-10000> peer A.B.C.D/M|l3vpn VRFNAME A.B.C.D/M |ipv4
 A.B.C.D/M) ({reply-mode (1|2)|flags|destination A.B.C.D|source A.B.C.D|ttl <1-
 255>|timeout <1-500>|repeat <5-5000>|interval <2-20000>|force-explicit-
 null|detail}|)
```

Parameters

`ldp`	FEC type is LDP
`A.B.C.D/M`	LDP prefix address
`rsvp`	FEC type is RSVP
`tunnel-name`	RSVP tunnel name
`NAME`	Tunnel name string
`egress`	RSVP tunnel egress
`A.B.C.D`	RSVP tunnel egress address
`l2-circuit`	FEC type is L2 circuit
`vccv`	Virtual Circuit Connectivity Verification
`<1-4294967295>`	L2 circuit ID
`vpls`	FEC type is MPLS VPLS (L2-VPN)
`<1-10000>`	VPLS instance ID
`peer`	VPLS peer
`A.B.C.D/M`	VPLS peer address
`l3vpn`	FEC type is MPLS VPN (L3-VPN)
`VRFNAME`	VPN instance name
`A.B.C.D./M`	VPN prefix
`ipv4`	FEC type is generic; use for static/SNMP label switched paths
`A.B.C.D/M`	IPv4 prefix address
`reply-mode`	Reply mode, one of
`1`	Reply via UDP/IP packet (default)
`2`	Reply via IP packet with Router Alert
`flags`	Validate FEC stack

`destination`	Destination address
`A.B.C.D`	IPv4 address of the destination
`source`	Source address
`A.B.C.D`	IPv4 address of the source
`ttl`	Trace packet Time-to-live
`<1-255>`	Trace packet TTL value
`repeat`	Repeat sending of ping packets
`<5-5000>`	Number of pings to send
`interval`	Interval between ping packets, in milliseconds
`<2-20000>`	Interval value
`timeout`	Time to wait before rejecting the probe as a failure, in seconds
`<1-500>`	Timeout value
`force-explicit-null`	Force Explicit NULL label
`detail`	Print detailed output of the ping

Defaults

Default TTL value is 255.

Default timeout value is 60 seconds.

Command Mode

Privileged Exec mode

Example

```
#ping mpls ipv4 10.10.0.0/24 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 repeat 6 interval 3 detail force-explicit-null

#ping mpls l2-circuit 3 reply-mode 2 flags destination 127.1.3.4 source 10.10.0.1
ttl 226 timeout 65 repeat 6 interval 3 detail force-explicit-null

#ping mpls l3vpn vrfa 10.10.0.0/24 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 repeat 6 interval 3 detail force-explicit-null

#ping mpls ldp 10.10.0.0/24 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 repeat 6 interval 3 detail force-explicit-null

#ping mpls rsvp egress 1.2.3.5 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 repeat 6 interval 3 detail force-explicit-null

#ping mpls rsvp tunnel-name tun1 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 repeat 6 interval 3 detail force-explicit-null

#ping mpls vpls 2 peer 10.10.0.0 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 repeat 6 interval 3 detail force-explicit-null
```

show mpls

Use this command to display MPLS data.

Command Syntax

```
show mpls
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Examples

The following subsection displays a variety of `show mpls` commands.

```
#show mpls
Minimum label configured: 16
 Maximum label configured: 1048575
 Per label-space information:
   Label-space 0 is using minimum label: 16 and maximum label: 1048575
   Label-space 2342 is using minimum label: 556 and maximum label: 1048575
 Custom ingress TTL configured: none
 Custom egress TTL configured: none
 Log message detail: none
 Admin group detail: none
 Packets dropped IP:115167, dropped MPLS:0 sent to IP:490943, labeled:0,
switch
d:0

MPLS Differentiated Services Supported Classes data:
CLASS       DSCP_value
  be           000000

MPLS Differentiated Services CLASS to EXP mapping data:
CLASS    DSCP_value     EXP_value
  be      000000           0
#
```

show mpls admin-groups

Use this command to display all configured administrative groups.

Command Syntax

```
show mpls admin-groups
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Examples

The following sample shows the output of the `show mpls admin-group` command.

```
#show mpls admin-groups
 Admin group detail:
  Value of 0 associated with admin group 'a'
  Value of 1 associated with admin group 'b'
  Value of 2 associated with admin group 'c'
  Value of 4 associated with admin group 'd'
#
```

show mpls bandwidth-class

Use this command to view bandwidth class parameters: bandwidth class name; allocated bandwidth; setup hold priority

Command Syntax

```
show mpls bandwidth-class
```

Parameters

None

Command Mode

Exec mode

Examples

```
> show mpls bandwidth-class
Bandwidth-class: BW_1
Bandwidth:  6k        Setup-priority: 1  Class-type: 1
```

show mpls cross-connect-table

Use this command to display detailed information for all entries created in the MPLS cross-connect table.

Command Syntax

```
show mpls cross-connect-table
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Example

The following is a sample output of the show mpls cross-connect-table

```
#show mpls cross-connect-table
  Cross connect ix: 3, in intf: -, in label: 0, out-segment ix: 3
    Owner: RSVP, Persistent: No, Admin Status: Up, Oper Status: Up
   Out-segment with ix: 3, owner: RSVP, out intf: eth1, out label: 16
    Nexthop addr: 10.10.20.80, cross connect ix: 3, op code: Push

  Cross connect ix: 6, in intf: -, in label: 0, out-segment ix: 6
    Owner: RSVP, Persistent: No, Admin Status: Up, Oper Status: Up
   Out-segment with ix: 6, owner: RSVP, out intf: eth1, out label: 17
    Nexthop addr: 10.10.20.80, cross connect ix: 6, op code: Push
#
```

show mpls forwarding-table

Use this command to view forwarding table entries.

Command Syntax

```
show mpls forwarding-table (count|)
```

Parameters

count	Count of IPv4 FTNs.

Command Mode

Exec mode

Example

```
#show mpls forwarding-table

Codes: > - installed FTN, * - selected FTN, p - stale FTN,
       B - BGP FTN, K - CLI FTN,
       L - LDP FTN, R - RSVP-TE FTN, S - SNMP FTN, I - IGP-Shortcut,
       U - unknown FTN, O - SR-OSPF FTN, i - SR-ISIS FTN, k - SR-CLI FTN

Code    FEC                FTN-ID    Tunnel-id   Pri   LSP-Type        Out-
Label    Out-Intf       Nexthop
L>     16.16.16.0/24      1         0           Yes   LSP_DEFAULT     3
xe6            6.6.6.63
L>     63.63.63.63/32     2         0           Yes   LSP_DEFAULT     3
xe6            6.6.6.63
L>     65.65.65.65/32     3         0           Yes   LSP_DEFAULT     3
xe1            1.1.1.65

#show mpls forwarding-table count

--------------------------------------------
Num FTNs         : 3          [UP: 3, INSTALLED: 3]
  Primary FTNs   : 3          [UP: 3, INSTALLED: 3]
  Secondary FTNs : 0          [UP: 0, INSTALLED: 0]
--------------------------------------------
--------------------------------------------
Num IPV6 FTNs         : 0          [UP: 0]
  Primary IPV6 FTNs   : 0          [UP: 0]
  Secondary IPV6 FTNs : 0          [UP: 0]
--------------------------------------------
```

show mpls ftn-table

Use this command to display FTN (FEC-To-NHLF) table information.

Command Syntax

```
show mpls ftn-table
```

Parameters

None

Command Mode

Exec mode

Example

```
#show mpls ftn-table
Primary FTN entry with FEC: 5.5.5.5/32, id: 2, row status: Active
  Owner: LDP, Action-type: Redirect to Tunnel, Exp-bits: 0x0, Incoming DSCP:
none
  Tunnel id: 0,   Protected LSP id: 0, QoS Resource id: 0, Description: N/A
    Matched bytes:0, pkts:0, TX bytes:0, Pushed pkts:0
     Cross connect ix: 1, in intf: - in label: 0 out-segment ix: 1
      Owner: LDP, Persistent: No, Admin Status: Up, Oper Status: Up
       Out-segment with ix: 1, owner: LDP, out intf: p9p1, out label: 3
    Nexthop addr: 40.0.0.2        cross connect ix: 1, op code: Push
     Cross connect ix: 3, in intf: - in label: 0 out-segment ix: 3
      Owner: LDP, Persistent: No, Admin Status: Up, Oper Status: Up
       Out-segment with ix: 3, owner: LDP, out intf: p8p1, out label: 3
    Nexthop addr: 30.0.0.2        cross connect ix: 3, op code: Push

 Primary FTN entry with FEC: 50.0.0.0/24, id: 6, row status: Active
  Owner: LDP, Action-type: Redirect to Tunnel, Exp-bits: 0x0, Incoming DSCP:
none
  Tunnel id: 0,   Protected LSP id: 0, QoS Resource id: 0, Description: N/A
    Matched bytes:0, pkts:0, TX bytes:0, Pushed pkts:0
     Cross connect ix: 3, in intf: - in label: 0 out-segment ix: 3
      Owner: LDP, Persistent: No, Admin Status: Up, Oper Status: Up
       Out-segment with ix: 3, owner: LDP, out intf: p8p1, out label: 3
    Nexthop addr: 30.0.0.2        cross connect ix: 3, op code: Push
```

show mpls ilm-table

Use this command to view Incoming label mapping (ILM) table entries.

Command Syntax

```
show mpls ilm-table (count|)
```

Parameters

count	Count of entries in ILM table.

Command Mode

Exec mode

Example

```
#show mpls ilm-table
Codes: > - installed ILM, * - selected ILM, p - stale ILM
        K - CLI ILM,T - MPLS-TP

Code  FEC                ILM-ID      In-Label    Out-Label   In-Intf   Out-
Intf     Nexthop                     LSP-Type
  >   63.63.63.63/32     151187      53121       3          N/A      xe6
6.6.6.63                     LSP_DEFAULT
  >   16.16.16.0/24      151186      53120       3          N/A      xe6
6.6.6.63                     LSP_DEFAULT
 K>   N/A                151189      500         N/A        N/A      N/A
127.0.0.1                    LSP_DEFAULT
  >   65.65.65.65/32     151188      53122       3          N/A      xe1
1.1.1.65                     LSP_DEFAULT

#show mpls ilm-table count
-------------------------------------------
Num ILMs          : 4          [UP: 4, INSTALL: 4]
  Swap Entries    : 3          [UP: 3, INSTALL: 3]
  Pop Entries     : 1          [UP: 1, INSTALL: 1]
-------------------------------------------
```

show mpls in-segment-table

Use this command to display detailed information about all entries in the Incoming Label Map (also known as in-segment) table.

Command Syntax

```
show mpls in-segment-table
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Example

```
#show mpls in-segment-table
#
```

show mpls interface

Use this command to display all interfaces bound to an MPLS interface.

Command Syntax

```
show mpls interface
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Example

```
#show mpls interface
show mpls interface
Interface lo
  Label switching is disabled
Interface eth0
  Label switching is disabled
Interface eth1
  Label switching is disabled
Interface eth2
  Label switching is disabled
Interface eth3
  Label switching is disabled
Interface eth4
  Label switching is disabled
Interface svlan0.1
  Label switching is disabled

Non mpls interface statistics (in-labels used:platform wide label space)
  RX pkts:13702, dropped IP:2758, dropped MPLS:0, failed label lookup:0
  Sent to IP:10944, labeled:0, switched:0, in-labels used:0
  TX out fragments:0, out-labels used:0

Total number of mpls interface is 0
#
```

show mpls l2-circuit

Use this command to view MPLS-TP L2 circuit parameters.

Command Syntax

```
show mpls l2-circuit
show mpls l2-circuit NAME
```

Parameters

NAME	The name of the virtual circuit

Command Mode

Exec mode and Privileged Exec mode

Example

```
#show mpls l2-circuit HYD_BLR

MPLS Layer-2 Virtual Circuit: HYD_BLR, id: 500  PW-INDEX: 1
Endpoint-Type: MPLS-TP [GlobalID-NodeID]
Endpoint     : 2-2.2.2.2
Control Word: 0
MPLS Layer-2 Virtual Circuit Group: abc
Bound to interface: eth2
Virtual Circuit Type: Ethernet
Virtual Circuit is configured as Primary
Virtual Circuit is configured as Active
Virtual Circuit is active
```

show mpls ldp

Use this command to display MPLS LDP (Label Distribution Protocol) data.

Command Syntax

```
show mpls ldp discovery
show mpls ldp discovery IFNAME
show mpls ldp fec
show mpls ldp fec (prefix)
show mpls ldp fec (prefix|cr-lsp)
show mpls ldp graceful-restart
show mpls ldp neighbor
show mpls ldp neighbor detail
show mpls ldp parameter
show mpls ldp session
show mpls ldp session A.B.C.D
show mpls ldp session X:X::X:X
```

Parameters

`discovery`	Display the sources for locally generated LDP Discovery Hello PDUs
`IFNAME`	Display the interface name
`fec`	Display the forwarding equivalence class
`prefix`	Display the prefix FEC
`cr-lsp`	Display the LDP FEC CR-LSP (Constraint-Based Routing Label Switched Path) detail
`graceful-restart`	Display the graceful restart status
`neighbor`	Display the LDP neighbor information
`detail`	Display the detailed neighbor information
`parameter`	Display the LDP configuration parameters
`detail`	Display the detailed parameter information
`session`	Display the LDP session information
`A.B.C.D`	Display the session peer IPv4 address
`X:X::X:X`	Display the session peer IPv6 address

Command Mode

Exec mode and Privileged Exec mode

Example

```
#
#show mpls ldp session 1.1.1.1
#
```

show mpls log

Use this command to display MPLS logging information.

Command Syntax

```
show mpls log
```

Parameters

None

Command Mode

Exec mode

Example

```
#show mpls log
#
```

show mpls mapped-routes

Use this command to view MPLS mapped routes.

Use the `no` parameter with this command to reset this configuration.

Command Syntax

```
show mpls mapped-routes
```

Parameters

None

Command Mode

Exec mode

Example

```
#show mpls mapped-routes

Mapped-route       IPv4 FEC            MPLS-TP Tunnel
14.1.2.3/32        N/A                 NH4
```

show mpls ms-pw

Use this command to display multi-segment pseudowire (MS-PW) information.

Command Syntax

```
show mpls ms-pw ((NAME (vc-table|)|)|)
```

Parameters

NAME	Display the name of MS-PW
vc-table	Display the VC table details

Command Mode

Exec mode and Privileged Exec mode

Example

```
#show mpls ms-pw new vc-table
#
```

show mpls out-segment-table

Use this command to display detailed information of out-segment entries (also known as NHLFE) table.

Command Syntax

```
show mpls out-segment-table
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Example

```
#show mpls out-segment-table
#
```

show mpls qos-resource

Use this command to display detailed QoS resource information.

Command Syntax

```
show mpls qos-resource IFNAME
```

Parameters

IFNAME	Display the interface name for a QoS resource

Command Mode

Exec mode and Privileged Exec mode

Example

```
#show mpls qos-resource eth1
<*****************************************>
              QOS RESERVED TABLE
<*****************************************>
HOLD PRIORITY : 0

HOLD PRIORITY : 1

HOLD PRIORITY : 2

HOLD PRIORITY : 3

HOLD PRIORITY : 4

HOLD PRIORITY : 5

HOLD PRIORITY : 6

HOLD PRIORITY : 7
<*****************************************>
   QOS AWAITING TABLE (static resources)
<*****************************************>
HOLD PRIORITY : 0

HOLD PRIORITY : 1

HOLD PRIORITY : 2

HOLD PRIORITY : 3

HOLD PRIORITY : 4

HOLD PRIORITY : 5

HOLD PRIORITY : 6

HOLD PRIORITY : 7
TSUP-173>
```

show running-config interface mpls

Use this command to show the running system status and configuration for an MPLS interface.

Command Syntax

```
show running-config interface IFNAME mpls
```

Parameters

IFNAME	Display information for this interface name

Command Mode

Privileged Exec mode and Configure mode

Example

```
#show running-config interface eth1 mpls

#
```

show running-config mpls

Use this command to show any Multi-Protocol Label Switching (MPLS) related running configuration.

Command Syntax

```
show running-config mpls
```

Parameters

None

Command Mode

Privileged Exec mode

Example

```
>enable
#show running-config mpls
!
mpls propagate-ttl
!
!
!
#
```

show mpls vc-table

Use this command view configured virtual circuit (VC) components

Command Syntax

```
show mpls vc-table
```

Parameters

None

Command Mode

Exec mode

Examples

```
#show mpls vc-table

VC-ID Vlan-ID Inner-Vlan-ID Access-Intf Network-Intf Out Label  Tunnel-Label
Nexthop Status
500     N/A        N/A          eth2         eth1         544        57
N/A    Active
#
```

show mpls vrf

Use this command to display detailed information of all the configured VRF entries. Specify the name of the VRF to display information about a specific VRF entry.

Command Syntax

```
show mpls vrf-table
show mpls vrf-table VRFNAME
```

Parameters

VRFNAME	Display the MPLS VRF table by its configured name

Command Mode

Exec mode

Examples

```
#show mpls vrf new_vrf
#
```

show vccv statistics

Use this command to display VCCV messages received prior to advertising capability.

Command Syntax

```
show vccv statistics
```

Parameters

None

Command Mode

Privileged mode

Examples

The following is the sample output for `show vccv statistics` command.

```
#show vccv statistics
  CC Mismatch Discards - 10

#
```

trace mpls

Use this command to trace the route traversed by a specified echo request packet in an MPLS protocol. Trace requests can be configured for LDP, RSVP, L2 VC, VPLS, and L3 VPN label switched paths.

```
trace mpls (ldp A.B.C.D/M|rsvp (tunnel-name NAME|egress A.B.C.D)|l3vpn VRFNAME
  A.B.C.D/M|ipv4 A.B.C.D/M) ({reply-mode (1|2)|flags|destination A.B.C.D|source
  A.B.C.D|ttl <1-255>|timeout <1-500>|force-explicit-null|detail}|)
```

Parameters

`ldp`	FEC type is LDP
`A.B.C.D/M`	LDP prefix address
`rsvp`	FEC type is RSVP
`tunnel-name`	RSVP tunnel name
`NAME`	Tunnel name string
`egress`	RSVP tunnel egress
`A.B.C.D`	RSVP tunnel egress address
`l3vpn`	FEC type is MPLS VPN (L3-VPN)
`VRFNAME`	VPN instance name
`A.B.C.D./M`	VPN prefix
`ipv4`	FEC type generic; use for static/SNMP label switched paths
`A.B.C.D/M`	IPv4 prefix address
`reply-mode`	Reply mode, one of
`1`	Reply via UDP/IP packet (default)
`2`	Reply via IP packet with Router Alert
`flags`	Validate FEC stack
`destination`	Destination address
`A.B.C.D`	IPv4 address of the destination
`source`	Source address
`A.B.C.D`	IPv4 address of the source
`ttl`	Trace packet Time-to-live
`<1-255>`	Trace packet TTL value
`timeout`	Time to wait before rejecting the probe as a failure, in seconds
`<1-500>`	Timeout value
`force-explicit-null`	Force Explicit NULL label
`detail`	Print detailed output of the trace probe

Defaults

Default TTL value is 255.

Default timeout value is 60 seconds.

Command Mode

Privileged Exec mode

Examples

```
#trace mpls ipv4 10.10.0.0/24 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 detail force-explicit-null

#trace mpls l3vpn vrfa 10.10.0.0/24 reply-mode 2 flags destination 127.1.2.3
source 10.10.0.1 ttl 226 timeout 65 detail force-explicit-null

#trace mpls ldp 10.10.0.0/24 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 detail force-explicit-null

#trace mpls rsvp egress 1.2.3.5 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 detail force-explicit-null

#trace mpls rsvp tunnel-name tun1 reply-mode 2 flags destination 127.1.2.3 source
10.10.0.1 ttl 226 timeout 65 detail force-explicit-null
```

CHAPTER 3 Differentiated Services Commands

This chapter describes the Differentiated Services (DiffServ) commands.

mpls class-to-exp-bit

Use this command to configure node-level PHB-EXP mapping.

Use the `no` parameter with this command to remove a PHB-EXP mapping.

Command Syntax

```
mpls class-to-exp-bit CLASS <0-7>
no mpls class-to-exp-bit CLASS <0-7>
```

Parameters

`CLASS`	Diffserv class mapped to a PHB (per-hop behavior), for example, be, ef, af11, etc.
`<0-7>`	EXP bit mapped to the PHB

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls class-to-exp-bit ef 3
```

mpls support-diffserv-class

Use this command to configure a DiffServ class.

Use the `no` parameter with this command to remove a DiffServ class configuration.

Command Syntax

```
mpls support-diffserv-class CLASS
no mpls support-diffserv-class CLASS
```

Parameter

`CLASS`	DiffServ class mapped to a PHB, for example, be, ef, af11, etc.

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls support-diffserv-class af11
```

show mpls diffserv

Use this command to display Diffserv configuration information.

Command Syntax

```
show mpls diffserv
```

Parameters

None

Command Mode

Privileged Exec mode and Exec mode

Example

The DiffServ configuration information displayed by this command includes:

- All configurable Diffserv classes that can be used as PHB/PSC.
- PHB/PSC supported by this node.
- Node level PHB-EXP mapping.

Following is a sample output of the `show mpls diffserv` command showing DiffServ configuration information.

```
#show mpls diffserv
MPLS Differentiated Services Configurable Classes list:
DSCP Class:   be, value: 000000
DSCP Class:  cs1, value: 001000
DSCP Class: af11, value: 001010
DSCP Class: af12, value: 001100
DSCP Class: af13, value: 001110
DSCP Class:  cs2, value: 010000
DSCP Class: af21, value: 010010
DSCP Class: af22, value: 010100
DSCP Class: af23, value: 010110
DSCP Class:  cs3, value: 011000
DSCP Class: af31, value: 011010
DSCP Class: af32, value: 011100
DSCP Class: af33, value: 011110
DSCP Class:  cs4, value: 100000
DSCP Class: af41, value: 100010
DSCP Class: af42, value: 100100
DSCP Class: af43, value: 100110
DSCP Class:  cs5, value: 101000
DSCP Class:   ef, value: 101110

MPLS Differentiated Services Supported Classes data:
CLASS       DSCP_value
  be           000000

MPLS Differentiated Services CLASS to EXP mapping data:
CLASS    DSCP_value     EXP_value
  be      000000           0
#
```

show mpls diffserv class-to-exp

Use this command to display the node level PHB-EXP mapping.

Command Syntax

```
show mpls diffserv class-to-exp
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Example

Following is a sample output of the `show mpls diffserv class-to-exp` command showing PHB-EXP mapping at the node level.

```
#show mpls diffserv class-to-exp
MPLS Differentiated Services CLASS to EXP mapping data:
CLASS    DSCP_value     EXP_value
 be      000000         0
 be      000000         2
af12     001100         3
```

show mpls diffserv configurable-dscp

Use this command to display all configurable DSCP values which can be used as PHB/PSC by this node.

Command Syntax

```
show mpls diffserv configurable-dscp
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Example

Following is a sample output of the `show mpls diffserv configurable-dscp` command showing all configurable DiffServ DSCP values.

```
#show mpls diffserv configurable-dscp
MPLS Differentiated Services Configurable Classes list:
DSCP Class:  be, value: 000000
DSCP Class: cs1, value: 001000
DSCP Class: af11,value: 001010
DSCP Class: af12,value: 001100
DSCP Class: af13,value: 001110
DSCP Class: cs2, value: 010000
DSCP Class: af21,value: 010010
DSCP Class: af22,value: 010100
DSCP Class: af23,value: 010110
DSCP Class: cs3, value: 011000
DSCP Class: af31,value: 011010
DSCP Class: af32,value: 011100
DSCP Class: af33,value: 011110
DSCP Class: cs4, value: 100000
DSCP Class: af41,value: 100010
DSCP Class: af42,value: 100100
DSCP Class: af43,value: 100110
DSCP Class: cs5, value: 101000
DSCP Class:  ef, value: 101110
DSCP Class: cs6, value: 110000
DSCP Class: cs7, value: 111000
```

show mpls diffserv supported-dscp

Use this command to display supported DSCP values that can be used as PHB/PSC by this node.

Command Syntax

```
show mpls diffserv supported-dscp
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Example

Following is a sample output of the `show mpls diffserv supported-dscp` command showing the supported DiffServ DSCP value.

```
#show mpls diffserv supported-dscp
MPLS Differentiated Services Supported Classes data:
CLASS       DSCP_value
   be           000000
 af11           001010
 af12           001100
  cs5           101000
```

CHAPTER 4 DiffServ-TE Commands

This chapter provides an alphabetized reference for each of the DiffServ-Traffic Engineering (DS-TE) commands. It includes the following commands:

bandwidth-constraint

Use this command to configure the bandwidth constraint for a class type on the current interface.

Use the `no` parameter with this command to remove the bandwidth constraint of a class type on the current interface.

Command Syntax

```
bandwidth-constraint CT-NAME BANDWIDTH
no bandwidth-constraint CT-NAME
no bandwidth-constraint CT-NAME BANDWIDTH
```

Parameters

`CT-NAME`	DS-TE class type name associated with the bandwidth
`BANDWIDTH`	Bandwidth constraint in the range of <1-10000000000>; usable units include kilobit (k), megabit (m) or gigabits (g)

Defaults

The default bandwidth value is 0.

Command Mode

Interface mode

Example

```
#configure terminal
(config)#interface eth0
(config-if)#bandwidth-constraint a1 100m
```

bc-mode

Use this command to configure the bandwidth constraint mode for the current interface. There are two different modes available — MAM and RSDL.

Command Syntax

```
bc-mode MODE
```

Parameter

MODE	The bandwidth constraint mode, either MAM, or RSDL

Command Mode

Interface mode

Default

MAM mode

Example

```
#configure terminal
(config)#interface eth0
(config-if)#bc-mode mam
```

mpls class-type

Use this command to configure the name for a class type. Defining the class type name enables and configures the class type on a particular node.

Use the `no` parameter with this command to remove the class type configuration.

Command Syntax

```
mpls class-type CLASS-TYPE CLASS-TYPE-NAME
no mpls class-type CLASS-TYPE CLASS-TYPE-NAME
```

Parameters

`CLASS-TYPE`	Class type to configure in the range of <ct0-ct7>
`CLASS-TYPE-NAME`	Name to configure for the class type

Command Mode

Interface mode

Example

```
#configure terminal
(config)#mpls class-type ct1 a1
```

mpls te-class

Use this command to configure a TE class using the class type name and the preemption priority.

Use the `no` parameter with this command to remove the TE class configuration.

Command Syntax

```
mpls te-class TE-CLASS CLASS-TYPE-NAME <0-7>
no mpls te-class TE-CLASS CLASS-TYPE-NAME <0-7>
```

Parameters

`CLASS-TYPE-NAME`	
	Name to configure for the class type
`<0-7>`	Preemption priority

Command Mode

Configure mode

Example

```
#configure terminal
(configure)#mpls te-class te3 default 6
```

show mpls dste

Use this command to display the DS-TE configuration information on this node. It displays information about the configured class types and TE classes.

Command Syntax

```
show mpls dste
show mpls dste class-type
show mpls dste te-class
```

Parameters

`class-type`	Display the MPLS DSTE class type
`te-class`	Display the MPLS DSTE traffic engineering class

Command Mode

Exec mode and Privileged Exec mode

Example

The following is a sample output of the `show mpls dste` command that displays DSTE configuration information about TE classes and class types.

```
#show mpls dste
te0: {a1, 4}
te1: {a2, 5}
te3: {default, 6}
ct0: default
ct1: a1
ct2: a2
#
```

The following is a sample output of the `show mpls dste class-type` command that displays DSTE class types.

```
#show mpls dste class-type
ct0: default
ct1: a1
ct2: a2
#
```

The following is a sample output of the `show mpls dste te-class` command that displays DSTE TE classes.

```
#show mpls dste te-class
te0: {a1, 4}
te1: {a2, 5}
te3: {default, 6}
#
```


CHAPTER 5 Virtual Private LAN Service Commands

This chapter describes each VPLS (Virtual Private LAN Service) command.

clear mpls vpls

Use this command to clear VPLS data.

Command Syntax

```
clear mpls vpls NAME mac-addresses
```

Parameters

NAME	Clear data for the VPLS instance with name given
mac-addresses	Flush all MAC addresses for a VPLS instance

Command Mode

Exec mode and privileged exec mode

Example

```
#clear mpls vpls VPLS_123 mac-addresses
```

exit-signaling

Use this command to exit the VPLS signaling configuration mode, and start signaling. To configure signaling using BGP, see the signaling bgp command. To configure signaling with LDP, see the signaling ldp command. Other VPLS signaling configuration commands include rd (route distinguisher), route-target, ve-id, ve-range, and vpls-peer.

Note: It is *critical* to give this command after all VPLS signaling configurations are complete, otherwise signaling does not start.

Command Syntax

```
exit-signaling
```

Parameters

None

Command Mode

VPLS Signaling mode

Examples

```
# configure terminal
(config)#mpls vpls test 100
(config-vpls)#signaling bgp
(config-vpls-sig)#ve-id 2
(config-vpls-sig)#exit-signaling
```

mpls vpls

Use this command to create an instance of MPLS-based Virtual Private LAN Services (VPLS).

Use the `no` parameter with this command to delete an MPLS-based VPLS instance.

Command Syntax

```
mpls vpls NAME
mpls vpls NAME <1-4294967295>
no mpls vpls NAME
no mpls vpls NAME <1-4294967295>
```

Parameters

`NAME`	Enter a string to identify the VPLS instance
`<1-4294967295>`	VPLS instance identifier

Command Mode

Configuration mode

Example

```
#configure terminal
(config)#interface eth0
(config-if)#mpls-vpls t1 6489
(config-if)#exit
```

mpls-vpls

Use this command to bind an AC interface to a VPLS instance.

Use the no parameter with this command to unbind an AC interface from a VPLS instance

Command Syntax

```
mpls-vpls NAME
mpls-vpls NAME (vlan <2-4094>|)
no mpls-vpls NAME
no mpls-vpls NAME (vlan <2-4094>|)
```

Parameters

NAME	Enter a string to identify the VPLS instance
<2-4094>	VPLS instance identifier

Command Mode

Interface mode

Example

```
#configure terminal
(config)#interface eth0
(config-if)#mpls-vpls t1 128
(config-if)#exit
```

learning disable

Use this command to configure MAC address learning for a VPLS instance.

Use the no parameter with this command to disable the MAC address learning.

Command Syntax

```
learning disable
no learning disable
```

Parameters

None

Command Mode

VPLS Signaling mode

Example

```
# configure terminal
(config)#mpls vpls test 100
(config-vpls)#signaling bgp
(config-vpls-sig)#ve-id 2
(config-vpls-sig)#exit-signaling
```

rd (route distinguisher)

Use this command to create unique IP prefixes in different VPLS instances using either an Autonomous System Number (ASN) or an IP address as a unique identifier. This command is optional, because VPLS auto-discovery automatically generates an RD using a BGP.

Use the `no` parameter with this command to remove a route distinguisher.

Command Syntax

```
rd ASN:nn_or_IP-address:nn
no rd ASN:nn_or_IP-address:nn
```

Parameters

`ASN:nn_or_IP-address:nn`

Route distinguisher value, either an ASN plus an arbitrary number or an IP address plus an arbitrary number (`nn`)

Command Mode

VPLS Signaling mode

Examples

The following example is for configuring in `ASN:nn` format.

```
#configure terminal
(config)# mpls vpls test 100
(config-vpls)#signaling bgp
(config-vpls-sig)# rd 65432:1234
(config-vpls-sig)#exit
```

The following is example is for configuring in `IP-Addr:nn` format.

```
#configure terminal
(config)# mpls vpls test 100
(config-vpls)#signaling bgp
(config-vpls-sig)# rd 10.11.12.13:1234
(config-vpls-sig)#exit
```

route-target

Route targets can be exported or imported to indicate which nodes are part of a given VPLS instance. It uses autonomous-system number or an ip-address. This command is optional, as VPLS auto-discovery automatically generates a route target using lower 6 bytes of the RD and VPLS ID. This route-target command can be used to change the automatically generated value.

Use the `no` parameter with this command to remove a route target.

Command Syntax

```
route-target ASN:nn_or_IP-address:nn
no route-target ASN:nn_or_IP-address:nn
```

Parameters

`ASN:nn_or_IP-address:nn`

Route target value, either an ASN plus an arbitrary number (`nn`) or an IP address plus an arbitrary number

Command Mode

VPLS Signaling mode

Examples

```
#configure terminal
(config)# mpls vpls test 100
(config-vpls)#signaling bgp
(config-vpls-sig)# route-target 1.1.1.1:100
(config-vpls-sig)#exit
```

show mpls vpls

Use this command to display logging information configured for MPLS.

Command Syntax

```
show mpls vpls
show mpls vpls detail
show mpls vpls mesh
show mpls vpls NAME
show mpls vpls NAME mesh
show mpls vpls NAME spoke
show mpls vpls spoke
```

Parameters

`detail`	Display detailed VPLS information
`mesh`	Display MPLS VPLS Mesh Forwarding information. Use this parameter to display information about all core Virtual Circuit (VC) connections for all VPLS instances. Give the name of a VPLS instance to display information about that instance.
`NAME`	Display the identifying string for the VPLS domain
`spoke`	Display MPLS VPLS Spoke Forwarding information. Use this parameter to display information about all spoke VC connections for all VPLS instances. Give the name of a VPLS instance to display information about that instance.

Command Mode

Exec and Privileged Exec modes

Example

Examples

Using `show mpls vpls` command without parameters displays information about all VPLS instances.

The example below displays information about the VPLS instance `v1`, returned when using the `NAME` parameter.

```
#show mpls vpls t1
Virtual Private LAN Service Instance: t1, ID: 1
 Group ID: 0, VPLS Type: Ethernet VPLS, Configured MTU: 0
 Description: none
 Configured interfaces: none
 Mesh Peers: 192.168.0.80 (Up)
             192.168.0.90 (Up)
 Spoke Peers: t100 (Up)
#
```

The example below displays the name of the VPLS instance, its ID, they type of instance (Ethernet), the M and S peers, and the signaling protocol. For the first entry, the signaling protocol is BGP and for the second entry it is LDP.

```
#show mpls vpls
Name  VPLS-ID     Type            MPeers    SPeers    SIG-Protocol
v1    100         Ethernet        1         0         BGP
```

```
v3    300         Ethernet        1         0         LDP
```

The example below displays the output when using the `detail` parameter. It displays information for VPLS instance `v1`, including the signaling protocol.

```
#show mpls vpls detail
      Virtual Private LAN Service Instance: v1, ID: 100
      SIG-Protocol: BGP
      Group ID: 0, VPLS Type: Ethernet, Configured MTU: 1000
      Description: none
      Configured interfaces: none
         Mesh Peers:  2.2.2.2 (Dn)
```

The example below displays the output provided when using the `mesh` parameter without a specific VPLS name.

```
VPLS-ID  Peer Addr Tunnel-Label In-Label Network-Intf Out-Label Lkps/St PW-
INDEX    SIG-Protocol
100      2.2.2.2   N/A          52503    eth2          53258      0/Dn
2        BGP
300      2.2.2.2   N/A          none      N/A           none      0/Dn
1        LDP
```

The following is a sample output of the `show mpls vpls detail` command displaying detailed information about all configured VPLS instances.

```
#show mpls vpls detail
Virtual Private LAN Service Instance: t1, ID: 1
 Group ID: 0, VPLS Type: Ethernet VPLS, Configured MTU: 0
 Description: none
 Configured interfaces: none
 Mesh Peers: 192.168.0.80 (Up)
             192.168.0.90 (Up)
 Spoke Peers: t100 (Up)

Virtual Private LAN Service Instance: t2, ID: 2
 Group ID: 0, VPLS Type: Ethernet VPLS, Configured MTU: 0
 Description: none
 Configured interfaces: none
 Mesh Peers: 192.168.0.80 (Up)
             192.168.0.90 (Up)
#
```

The following is a sample output of the `show mpls vpls mesh` command displaying information about all the core VC connections for all VPLS instances.

```
#show mpls vpls mesh
VPLS-ID    Peer Addr        In-Intf    In-Label   Out-Intf   Out-Label Lkps/St
1          192.168.0.80     eth0       16         eth0       640        1/Up
1          192.168.0.90     eth1       18         eth1       642        1/Up
2          192.168.0.80     eth0       19         eth0       641        1/Up
2          192.168.0.90     eth1       17         eth1       643        1/Up
#
```

The following is a sample output of the `show mpls vpls spoke` displaying the spoke VC connection to the VPLS instance.

```
#show mpls vpls spoke
VPLS-ID    Virtual Circuit In-Intf    In-Label   Out-Intf   Out-Label Lkps/St
1          t100            eth2       20         eth2       640        1/Up
#
```


show vpls NAME mac-address

Use this command to display retrieved VPLS learning mac-addresses per VPLS-instance on MPLS enabled node.

Command Syntax

```
show vpls NAME mac-address
```

Parameters

NAME	Specify the name of the VPLS instance
mac-addresses	Specify the MAC-address

Command Mode

Exec modes

Examples

```
#show vpls v1 mac-address
MAC address Learned from Age-out
0000.002a.0104 1 300
0000.002a.0105 1 300
```

signaling bgp

Use this command to establish a pseudowire connection between Provider Edge (PE) routers. Use this command to use the Border Gateway Protocol (BGP) for signaling and to support VPLS auto-discovery between VPLS instances. Using this command triggers BGP to auto-discover VPLS peers and signal pseudowire between the VPLS peers in the same VPLS instance.

Note: Issuing this command puts the router into VPLS signaling (`config-vpls-sig`) mode.

Use the `no` parameter with this command to remove (tear down) pseudowires with other PE routers.

Command Syntax

```
signaling bgp
no signaling bgp
```

Parameters

None

Command Mode

VPLS mode

Examples

```
#configure terminal
(config)# mpls vpls test 100
(config-vpls)#signaling bgp
(config-vpls-sig)#exit
```

signaling ldp

Use this command to establish a pseudowire connection between Provider Edge (PE) routers. Use this command to use the Label Distribution Protocol (LDP) for signaling and to support VPLS auto-discovery between VPLS instances.Using this command triggers LDP to signal a pseudowire between the configured VPLS peers in the same VPLS instance. The `vpls-peer` command is used to identify the VPLS peers that are part of a VPLS instance

Note: Issuing this command puts the router into VPLS signaling (`config-vpls-sig`) mode.

Use the `no` parameter with this command to remove (tear down) pseudowires with other PE routers.

Command Syntax

```
signaling ldp
no signaling ldp
```

Parameters

None

Command Mode

VPLS mode

Examples

```
#configure terminal
(config)# mpls vpls test 100
(config-vpls)#signaling ldp
(config-vpls-sig)#vpls-peer 97.97.97.97
(config-vpls-sig)#exit
```

ve-id

Use this command to configure a VPLS Edge (VE) device. Each Provider Edge (PE) device participating in a VPLS must have at least one VE ID. When the PE is connected to several u-PEs (Layer 2 PE devices used to provide Layer 2 aggregation), there are unique VE IDs for each u-PE. The PE may also be assigned a VE ID, if it is to act as the VE for the VPLS.

Use the `no` parameter with this command to remove a VE ID.

Command Syntax

```
ve-id <1-65535>
no ve-id <1-65535>
```

Parameters

`<1-65535>`	Range of values for VE ID, which is defined as an unsigned 32-bit (2-octet) integer

Command Mode

VPLS Signaling mode

Examples

```
#configure terminal
(config)# mpls vpls test 100
(config-vpls)#signaling bgp
(config-vpls-sig)# ve-id 2
(config-vpls-sig)#exit
```

ve-range

Use this command to identify a range of VE IDs for a VPLS in an autonomous system (AS).

A label block, defined by a Label Base (LB) and a VE block size (VBS), is a contiguous set of labels {LB, LB+1, ..., LB+VBS-1}. The ve-range command sets the block size in multiples of eight.

Use the `no` parameter with this command to remove a VPLS VE range size.

Command Syntax

```
ve-range <8-128>
no ve-range <8-128>
```

Parameters

`<8-128>`	VE range size as a 2-octet integer

Note: Ranges assigned must be given in multiples of eight.

Command Mode

VPLS Signaling mode

Examples

```
#configure terminal
(config)# mpls vpls test 100
(config-vpls)#signaling bgp
(config-vpls-sig)# ve-range 32
(config-vpls-sig)#exit
```

vpls-ac-group

Use this command to assign an Attachment Circuit (AC) group to VPLS.

Use the `no` parameter with this command to remove an AC group.

Command Syntax

```
vpls-ac-group GROUPNAME
no vpls-ac-group
```

Parameter

`GROUPNAME`	Enter a name for the AC group

Command Mode

VPLS mode

Examples

```
#configure terminal
(config)#mpls vpls test 12
(config-vpls)#vpls-ac-group new-ac
(config-vpls)#no vpls-ac-group
```

vpls-description

Use this command to add a description line for a VPLS instance.

Use the `no` parameter with this command to remove a VPLS description.

Command Syntax

```
vpls-description LINE
no vpls-description (LINE|)
```

Parameter

`LINE`	Enter a text string for the VPLS instance

Command Mode

VPLS mode

Example

```
#configure terminal
(config)#mpls vpls test 34
(config-vpls)#vpls-description This is for testing
(config-vpls)#exit
```

vpls fib-entry

Use this command to create a static VPLS FIB entry. When a VPLS peer is configured manually, no signaling is done. Therefore, a VPLS static entry must be created for all manually created nodes.

Use the `no` option with this command to delete a static VPLS FIB entry.

Command Syntax

```
vpls fib-entry VPLS-ID (peer A.B.C.D| spoke-vc VC-NAME) IN-LABEL OUT-INTF OUT-LABEL
no vpls fib-entry VPLS-ID ((peer A.B.C.D)| (spoke-vc VC-NAME))
no vpls fib-entry VPLS-ID ((peer A.B.C.D)| (spoke-vc VC-NAME)) IN-LABEL OUT-INTF
  OUT-LABEL
```

Parameters

`VPLS-ID`	VPLS identifier
`peer`	Mesh peer address VPLS identifier
`A.B.C.D`	Peer IPv4 Address.
`spook-vc`	Spoke VC
`VC-NAME`	Virtual Circuit name
`IN-LABEL`	Incoming label value in the range of <16-1048575>
`OUT-INTF`	Provider-facing interface
`OUT-LABEL`	Outgoing label value in the range of <16-1048575>

Command Mode

Configure mode

Examples

The first example shows how to configure VPLS FIB entry `100` with mesh `peer 97.97.97.97` for incoming label `50426`, outgoing interface `eth2` with outgoing label `50426`:

```
#configure terminal
(config)#vpls fib-entry 100 peer 97.97.97.97 50426 eth2 50426
```

The second example shows how to configure VPLS FIB entry `100` with `spoke-vc t1` for incoming label `50426`, outgoing interface `eth2` with outgoing label `50426`:

```
#configure terminal
(config)#vpls fib-entry 100 spoke-vc t1 50426 eth2 50426
```

vpls-mtu

Use this command to set the Maximum Transmission Unit (MTU) size for a given VPLS instance. This size is signaled to peer VPLS routers.

Use the `no` parameter with this command to remove the MTU size setting.

Command Syntax

```
vpls-mtu <576-65535>
no vpls-mtu (<576-65535>|)
```

Parameter

`<576-65535>`	Range of MTU size allowed for a VPLS instance

Command Mode

VPLS mode

Example

```
#configure terminal
(config)#mpls vpls test 34
(config-vpls)#vpls-mtu 6506
(config-vpls)#exit
```

vpls-peer

Use this command to add a peer to a VPLS domain. This command triggers Label Distribution Protocol (LDP) signaling by default.

Use the `no` parameter to delete a VPLS virtual circuit for a specific peer.

Command Syntax

```
vpls-peer A.B.C.D ((agi NAME saii NAME taii NAME)|)   ((tunnel-id <1-65535>
  (forward|reverse|))|)
no vpls-peer A.B.C.D ((agi NAME saii NAME taii NAME)|)   ((tunnel-id <1-65535>
  (forward|reverse|))|)
```

Parameters

`A.B.C.D`	The address of a VPLS peer node to which a mesh virtual circuit is to be created
`tunnel-id`	The tunnel-identifier
`<1-65535>`	Tunnel ID within this range
`forward`	Tunnel direction - forward tunnel identifier (default setting)
`reverse`	Tunnel direction - reverse tunnel identifier
`A.B.C.D`	IPv4 Address for end-point for FEC129 MPLS Layer-2 Virtual Circuit
`agi`	Specify the value used for the AGI in FEC129 MPLS Layer-2 Virtual Circuit
`NAME`	AGI value for FEC129 MPLS Layer-2 Virtual Circuit
`saii`	Specify the value used for the SAII in FEC129 MPLS Layer-2 Virtual Circuit
`NAME`	SAII value for FEC129 MPLS Layer-2 Virtual Circuit
`taii`	Specify the value used for the TAII in FEC129 MPLS Layer-2 Virtual Circuit
`NAME`	TAII value for FEC129 MPLS Layer-2 Virtual Circuit

Command Mode

VPLS Signaling mode

Examples

```
#configure terminal
(config)#mpls vpls test 100
(config-vpls)#signaling ldp
(config-vpls-sig)#vpls-peer 97.97.97.97
(config-vpls-sig)#vpls-peer 97.97.97.97 tunnel-id 24
(config-vpls)#exit
(config)#exit
```

vpls-peer manual

Use this command to statically configure a VPLS peer. Because this command is not used in signaling mode, no signaling is used to set up the virtual circuit. At least one such peer configuration is required for every VPLS instance.

Use the `no` parameter with this command to remove a statically configured VPLS peer.

Command Syntax

For MPLS

```
vpls-peer A.B.C.D ((tunnel-id <1-65535> (forward|reverse|))|) manual
no vpls-peer A.B.C.D ((tunnel-id <1-65535> (forward|reverse|))|) manual
```

For MPLS-TP

```
vpls-peer A.B.C.D  global-id <1-4294967295> tunnel-name TNLNAME  manual
```

Parameters

`A.B.C.D`	The address of a VPLS peer node to which a mesh virtual circuit is to be created
`tunnel-id`	The tunnel-identifier
`<1-65535>`	Tunnel ID within this range
`forward`	Tunnel direction - forward tunnel identifier (default setting)
`reverse`	Tunnel direction - reverse tunnel identifier
`<1-4294967295>`	Specify the global-id
`TNLNAME`	Specify the MPLS-TP tunnel-name

Command Mode

VPLS mode

Examples

For MPLS

```
#configure terminal
(config)#mpls vpls test 100
(config-vpls)#vpls-peer 97.97.97.97 manual
(config-vpls)#vpls-peer 97.97.97.97 tunnel-id 24 manual
(config-vpls)#exit
(config)#exit
```

For MPLS-TP

```
#configure terminal
(config)#mpls vpls test 100
(config-vpls)#vpls-peer 3.3.3.3 global-id 300 tunnel-name tnl1 manual
(config-vpls)#exit
(config)#exit
```

vpls-type

Use this command to assign a type (either Ethernet or VLAN) for VPLS.

Use the no parameter with this command to remove the type assignment.

Command Syntax

```
vpls-type (ethernet|vlan)
no vpls-type ((ethernet|vlan)|)
```

Parameter

`ethernet`	Designate Ethernet as the VPLS type
`vlan`	Designate VLAN as the VPLS type

Command Mode

VPLS mode

Examples

```
#configure terminal
(config)#mpls vpls test 100
(config-vpls)#vpls-type ethernet
(config-vpls)#exit
(config)#exit

(config)#mpls vpls test 100
(config-vpls)#no vpls-type ethernet
(config-vpls)#exit
(config)#exit
```

vpls-vc

Use this command add a spoke virtual circuit to VPLS domain.

Use the `no` parameter to remove this configuration.

Command Syntax

For MPLS

```
vpls-vc NAME (ethernet|vlan|)
vpls-vc NAME (secondary NAME|) (ethernet|vlan|)
no vpls-vc NAME
```

For MPLS-TP

```
vpls-vc NAME (ethernet|vlan|) tunnel-name TNLNAME
no vpls-vc NAME
```

Parameter

`NAME`	Enter a string that identifies the MPLS VC to add to the VPLS domain
`secondary`	Set the secondary spoke name
`NAME`	Enter a string that identifies the secondary spoke
`ethernet`	Identify the spoke type as Ethernet (default)
`vlan`	Identify the spoke type as VLAN.
`TNLNAME`	Specify the MPLS-TP tunnel-name.

Command Mode

VPLS mode

Example

For MPLS

```
#configure terminal
(config)#mpls vpls test 34
(config-vpls)#vpls-vc VC1
(config-vpls)#exit
(config)#exit
```

For MPLS-TP

```
#configure terminal
(config)#mpls vpls test 34
(config-vpls)#vpls-vc vc1 ethernet tunnel-name tnl1
(config-vpls)#exit
(config)#exit
```

CHAPTER 6 Unified L2VPN commands

This chapter provides reference for Unified L2VPN commands.

Note: These commands are supported only for BGP L2VPN Auto-discovery feature as per RFC6074:

l2vpn-vpws

Use this command to create an instance of an MPLS layer 2 virtual circuit.

Command Syntax

```
l2vpn-vpws NAME
```

Parameters

`l2vpn-vpws`	Identifying string for a MPLS Layer-2 Virtual Circuit
`NAME`	Specifying string for MPLS Layer-2 Virtual Circuit name

Command Mode

Configuration mode

Example

```
(config)#l2vpn-vpws vpws1
```

protocol

Use this command to configure the signaling protocol for MPLS layer 2 virtual circuit or VPLS instance.

Command Syntax

```
protocol (none | ldp (autodiscovery-bgp |) | bgp)
```

Parameters

`ldp`	Specify signaling ldp for MPLS Layer-2 Virtual Circuit /VPLS
`autodiscovery-bgp`	Specify signaling LDP and auto-discovery BGP for MPLS Layer-2
`bgp`	Specify signaling bgp for MPLS Layer-2 Virtual Circuit /VPLS

Command Mode

VPWS mode and VPLS mode

Example

```
(config)#l2vpn-vpws vpws1
(config-vpws)#protocol ldp

(config)#l2vpn-vpls vpls1
(config)#vpn-id 20
(config-vpls)#protocol bgp

(config)#l2vpn-vpws vpws2
```

vc-id

Use this command to configure the VC Identifier for MPLS layer 2 virtual circuit.

Command Syntax

```
vc-id <1-4294967295>
```

Parameters

`<1-4294967295>` Specify VC ID for MPLS Layer-2 Virtual Circuit

Command Mode

VPWS mode

Example

```
(config)#l2vpn-vpws vpws1
(config-vpws)#protocol ldp
(config-vpws)#vc-id 10
```

control-word

Use this command to configure control word for MPLS layer 2 virtual circuit.

Command Syntax

```
control-word
```

Parameters

None

Command Mode

VPWS neighbor mode

Example

```
(config)#l2vpn-vpws vpws1
(config-vpws)#protocol ldp
(config-vpws)#vc-id 10
(config-vpws)#neighbor 2.2.2.2
(config-vpws-neighbor)#control-word
```

group-name

Use this command to configure group name for MPLS layer 2 virtual circuit.

Command Syntax

```
group-name GROUPNAME
```

Parameters

GROUPNAME	Specify value for group name

Command Mode

VPWS neighbor mode

Example

```
(config)#l2vpn-vpws vpws1
(config-vpws)#protocol ldp
(config-vpws)#vc-id 10
(config-vpws)#neighbor 2.2.2.2
(config-vpws-neighbor)#group-name vc-group1
```

tunnel-id

Use this command to configure tunnel identifier for MPLS layer 2 virtual circuit/VPLS instance.

Command Syntax

```
tunnel-id <1-65535> (forward|reverse|)
```

Parameters

<1-65535>	Specify the tunnel-id.

Command Mode

VPWS neighbor mode and VPLS neighbor mode

Example

```
(config)#l2vpn-vpws vpws1
(config-vpws)#protocol ldp
(config-vpws)#vc-id 10
(config-vpws)#neighbor 2.2.2.2
(config-vpws-neighbor)#tunnel-id 20

(config)#l2vpn-vpls vpls1
(config-vpls)# vpn-id 20
(config-vpls)# protocol ldp
(config-vpls)#neighbor 2.2.2.2
(config-vpls-neighbor)#tunnel-id 20
```

rd

Use this command to configure route distinguisher for MPLS layer 2 virtual circuit/VPLS instance.

Command Syntax

```
rd ASN:nn_or_IP-address:nn
```

Parameters

`ASN:nn_or_IP-address:nn`

Specify route distinguisher value.ASN:nn or IP-address:nn

Command Mode

VPWS mode and VPLS mode

Example

```
(config)#l2vpn-vpws vpws1
(config-vpws)#protocol ldp
(config-vpws)#vc-id 10
(config-vpws)#rd 100:10

(config)#l2vpn-vpls vpls1
(config-vpls)#vpn-id 2
(config-vpls)#protocol ldp autodiscovery-bgp
(config-vpls)#rd 100:10
```

route-target

Use this command to configure route target for MPLS layer 2 virtual circuit/VPLS instance.

Command Syntax

```
route-target ASN:nn_or_IP-address:nn
```

Parameters

ASN:nn_or_IP-address:nn

Specify route-target value

Command Mode

VPWS mode and VPLS mode

Example

```
(config)#l2vpn-vpws vpws1
(config-vpws)#protocol ldp
(config-vpws)#vc-id 10
(config-vpws)#route-target 100:20

(config)#l2vpn-vpls vpls1
(config-vpls)#vpn-id 2
(config-vpls)#protocol ldp autodiscovery-bgp
(config-vpls)#route-target 100:20
```

shutdown

Use this command to make MPLS layer 2 virtual circuit/VPLS instance administratively down.

Use no command to make MPLS layer 2 virtual circuit/VPLS instance administratively up.

Command Syntax

```
shutdown
no shutdown
```

Parameters

None

Command Mode

VPWS mode VPLS mode

Example

```
(config)#l2vpn-vpws vpws2
(config-vpws)#shutdown

(config)#l2vpn-vpls vpls2
(config-vpls)#shutdown
```

l2vpn-vpls

Use this command to create a VPLS instance.

Command Syntax

```
l2vpn-vpls NAME
```

Parameters

NAME	Specify string for VPLS instance name

Command Mode

configure mode

Example

```
(config)#l2vpn-vpls vpls2
(config-vpls)#vpn-id 20
```

vpn-id

Use this command to configure VPN identifier for a VPLS instance.

Command Syntax

```
vpn-id <1-4294967295>
```

Parameters

`<1-4294967295>` Specify value for VPLS

Command Mode

VPLS mode

Example

```
(config)#l2vpn-vpls vpls2
(config-vpls)#vpn-id 20
```

CHAPTER 7 MPLS-TP Commands

This chapter contains an alphabetized list of the commands used to initialize and configure MPLS Transport Profile. It includes the following commands:

ilm-entry pop

Use this command to configure an Incoming Label Map (ILM) pop entry. This type of configuration defines the behavior for handling labeled traffic received on a MPLS-TP edge node where the Tunnel is terminated. This command can be used at the edge node of any tunnel (unidirectional and bidirectional). For a co-routed bidirectional tunnel, the provider interface used in the ilm-entry configuration must be the same as the one used in the nhlfe-entry configuration.

Use the no parameter with this command to reset this configuration.

Note: For a unidirectional tunnel, removing the ilm-entry will not be allowed if the tunnel has been associated with another uni-directional tunnel so as to constitute an associated bidirectional path.

Command Syntax

For a unidirectional tunnel:

```
ilm-entry LABEL IFNAME pop
no ilm-entry LABEL IFNAME pop
```

For a bidirectional tunnel:

```
(forward-path|reverse-path) ilm-entry LABEL IFNAME pop
no (forward-path|reverse-path) ilm-entry LABEL IFNAME pop
```

Parameters

`LABEL`	Incoming label in the range of <16-1048575>
`IFNAME`	Incoming interface name; maximum 16 characters
`forward-path`	Forward path of a bidirectional LSP
`reverse-path`	Reverse path of a bidirectional LSP

Command Modes

Unidirectional and Bidirectional tunnel mode

Examples

The example below is for a unidirectional tunnel.

```
#configure terminal
(config)#mpls-tp tunnel 1 source 100 3.3.3.3 destination 100 1.1.1.1
(config-tnl)# tunnel-mode unidirectional

(config-unidir-tnl)#ilm-entry 2002 eth2 pop

(config-unidir-tnl)#no ilm-entry 2002 eth2 pop
```

The example below is for a bidirectional tunnel.

```
(config-tnl)#tunnel-mode bidirectional
(config-bidir-tnl)#forward-path ilm-entry 2002 eth2 pop
(config-bidir-tnl)#no forward-path ilm-entry 2002 eth2 pop
```


ilm-entry swap

Use this command to configure an ILM swap entry. This command can be used at the transit node of any tunnel (unidirectional/bidirectional).

Use the no parameter with this command to remove this configuration.

Note: For a unidirectional tunnel, removing the ilm-entry will not be allowed if the tunnel has been associated with another unidirectional tunnel so as to constitute an associated bidirectional path.

Command Syntax

For a unidirectional tunnel:

```
ilm-entry LABEL IFNAME swap LABEL IFNAME {mac MAC|bw-class NAME}
no ilm-entry LABEL IFNAME swap LABEL IFNAME
```

For a bidirectional tunnel:

```
(forward-path|reverse-path) ilm-entry LABEL IFNAME swap LABEL IFNAME
(forward-path|reverse-path) ilm-entry LABEL IFNAME swap LABEL IFNAME {mac MAC|bw-
  class NAME}
no (forward-path|reverse-path) ilm-entry LABEL IFNAME swap LABEL IFNAME
```

Parameters

LABEL	Incoming label in the range of <16-1048575>
IFNAME	Incoming interface name; maximum 16 characters
mac	Nexthop MAC address
MAC	The nexthop MAC address in xxxx:xxxx:xxxx format

Note: If no MAC address is identified specified, the default broadcast MAC address is used.

bw-class	Bandwidth class
NAME	Bandwidth class name, up to maximum 8 characters
LABEL	Swap label in the range of <16-1048575>
IFNAME	Swap interface name string; maximum 16 characters
forward-path	Forward path of a bidirectional LSP
reverse-path	Reverse path of a bidirectional LSP

Command Modes

Unidirectional and Bidirectional Tunnel mode

Examples

The example below is for a unidirectional tunnel.

```
#configure terminal
(config)#mpls-tp tunnel 1 source 100 3.3.3.3 destination 100 1.1.1.1
(config-tnl)#tunnel-mode unidirectional

(config-unidir-tnl)#ilm-entry 2002 eth2 swap 16 eth1
(config-unidir-tnl)#no ilm-entry 2002 eth2 swap 16 eth1
```

The example below is for a co-routed tunnel.

```
#configure terminal
(config)#mpls-tp tunnel 1 source 100 1.1.1.1 destination 100 3.3.3.3
(config-tnl)#tunnel-mode bidirectional

(config-bidir-tnl)#forward-path ilm-entry 1001 eth1 swap 1002 eth1
(config-bidir-tnl)#reverse-path ilm-entry 2001 eth2 swap 2002 eth2
```

Use this command to bind an interface to an MPLS-TP Layer 2 virtual circuit that was created in the Configure mode.

Use the `no` parameter with this command to delete this instance.

Command Syntax

```
 NAME (ethernet|vlan <2-4094>|)
 NAME (ethernet|)
no  NAME (ethernet|vlan <2-4094>|)
```

Parameters

`NAME`	Name of the Layer 2 circuit; maximum 16 characters
`ethernet`	Identify this object as Ethernet
`vlan`	Identify this object as a VLAN
`<2-4094>`	Enter a VLAN ID

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)# mycircuit ethernet
```

mpls-tp associate

Use this command associate two tunnels to form a composite associated bidirectional tunnel. The configuration requirements:

- Two unidirectional tunnels, one starting and one terminating at the node, must be configured on the east (ingress) and west (egress) nodes.
- End points (nodes) must be the same for both the unidirectional tunnels.

Use the `no` parameter with this command to remove an associated bidirectional tunnel configuration.

Command Syntax

```
mpls-tp associate fwd-tunnel NAME rev-tunnel NAME
no mpls-tp associate fwd-tunnel NAME rev-tunnel NAME
```

Parameters

`fwd-tunnel`	Configure a forward tunnel association
`NAME`	The forward tunnel name; maximum 16 characters
`rev-tunnel`	Configure a reverse-tunnel association
`NAME`	The reverse tunnel name; maximum 16 characters

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls-tp tunnel 1 source 100 1.1.1.1 destination 100 3.3.3.3
(config-tnl)#tunnel-name ASSOC-TNL-FWD
(config-tnl)#tunnel-mode unidirectional
(config-unidir-tnl)#nhfle-entry 1001 eth1

#configure terminal
(config)#mpls-tp tunnel 1 source 100 3.3.3.3 destination 100 1.1.1.1
(config-tnl)#tunnel-name ASSOC-TNL-REV
(config-tnl)#tunnel-mode unidirectional
(config-unidir-tnl)#ilm-entry 2002 eth1

(config)#mpls-tp associate fwd-tunnel ASSOC-TNL1-FWD rev-tunnel ASSOC-TNL1-REV

(config)#no mpls-tp associate fwd-tunnel ASSOC-TNL-FWD rev-tunnel ASSOC-TNL-
REV
```

mpls-tp global-id (IETF)

Use this command to set the IETF global identifier and node identifier.

Use the `no` form of this command to remove the global identifier and node identifier.

Command Syntax

```
mpls-tp global-id <1-4294967295> node-id A.B.C.D
no mpls-tp global-id <1-4294967295> node-id A.B.C.D
```

Parameters

`<1-4294967295>`	Global identifier.
`A.B.C.D`	Node identifier in 32-bit dot notation.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls-tp global-id 100 node-id 1.1.1.1

(config)#no mpls-tp global-id 100 node-id 1.1.1.1
```

mpls-tp itut

Use this command to set the ITU-T country code, carrier code, and node identifier.

Use the `no` form of this command to remove the country code, carrier code, and node identifier.

Command Syntax

```
mpls-tp itut cc NAME icc NAME node-id A.B.C.D
no mpls-tp itut cc NAME icc NAME node-id A.B.C.D
```

Parameters

`cc`	Country code.
`NAME`	Country code: two upper-case letters (A-Z).
`icc`	Carrier code.
`NAME`	Carrier code: 1-6 upper-case letters (A-Z) or digits (0-9).
`node-id`	Node identifier.
`A.B.C.D`	Node identifier in 32-bit dot notation.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls-tp itut cc US icc 12 node-id 1.1.1.1

(config)#no mpls-tp itut cc US icc 12 node-id 1.1.1.1
```

mpls-tp provider-interface

Use this command to configure an interface as a MPLS-TP provider interface; this allows MPLS-TP tunnels to be configured over the specified interface.

- Set up a data link in data-control mode
- Enable label switching (platform label space) on the physical interface

Use the `no` parameter with this command to remove a provider interface.

Note: Removing a provider interface requires that no MPLS-TP tunnels are set up over the affected interface.

Command Syntax

```
mpls-tp provider-interface A.B.C.D
no mpls-tp provider-interface
```

Parameters

`A.B.C.D`	Set local link identifier in IPv4 address format

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth1
(config-if)#mpls-tp provider-interface 20.1.1.1

(config-if)#no mpls-tp provider-interface
```

mpls-tp ring tunnel

Use this command to define an MPLS-TP ring tunnel.

- Use this command to change the command mode to Tunnel mode.
- Use the `no` parameter with this command to remove a configured MPLS-TP ring tunnel.

Note: The tunnel role can only be transit.

Command Syntax

```
mpls-tp ring-tunnel
```

Parameters

`<1.65535>`	Tunnel ID value.

Command Mode

Configure Mode

Examples

```
#configure terminal
(config)# mpls-tp ring-tunnel 1
(config)#

(config)#no mpls-tp ring-tunnel
```

mpls-tp tunnel (IETF)

Use this command to create an MPLS-TP tunnel with an ITEF identifier and enter tunnel mode.

Use the `no` form of this command to remove an MPLS-TP tunnel.

Command Syntax

```
mpls-tp tunnel <1-65535> source <1-4294967295> A.B.C.D destination <1-4294967295>
  A.B.C.D
no mpls-tp tunnel <1-65535> source <1-4294967295> A.B.C.D destination <1-
  4294967295> A.B.C.D
```

Parameters

`<0-65535>`	Tunnel identifier
`source`	Source of the tunnel.
`<1-4294967295>`	Global identifier.
`A.B.C.D`	Node identifier in 32-bit dot notation.
`destination`	Destination of the tunnel.
`<1-4294967295>`	Global identifier.
`A.B.C.D`	Node identifier in 32-bit dot notation.

Command Mode

Configure mode

Example

```
#configure terminal
(config)#mpls-tp tunnel 1 source 100 1.1.1.1 destination 100 3.3.3.3
(config-tnl)#

(config)#no mpls-tp tunnel 1 source 100 1.1.1.1 destination 100 3.3.3.3
```

mpls-tp tunnel (ITU-T)

Use this command to create an MPLS-TP tunnel with an ITU-T identifier and enter tunnel mode.

Use the `no` form of this command to remove an MPLS-TP tunnel.

Command Syntax

```
mpls-tp tunnel <1-65535> source CC-NAME ICC-NAME A.B.C.D destination CC-NAME ICC-
  NAME A.B.C.D
no mpls-tp tunnel <1-65535> source CC-NAME ICC-NAME A.B.C.D destination CC-NAME
  ICC-NAME A.B.C.D
```

Parameters

`<1-65535>`	Tunnel ID.
`source`	Source of the tunnel.
`CC-NAME`	Country code: two upper-case letters (A-Z).
`ICC-NAME`	Carrier code: 1-6 upper-case letters (A-Z) or digits (0-9).
`A.B.C.D`	Node identifier in 32-bit dot notation.
`destination`	Destination of the tunnel.
`CC-NAME`	Country code: two upper-case letters (A-Z).
`ICC-NAME`	Carrier code: 1-6 upper-case letters (A-Z) or digits (0-9).
`A.B.C.D`	Node identifier in 32-bit dot notation.

Command Mode

Configure mode

Example

```
#configure terminal
(config)mpls-tp tunnel 123 source CA 123 1.1.1.1 destination US 123 1.1.1.2
(config-tnl)#

(config)#no mpls-tp tunnel 123 source CA 123 1.1.1.1 destination US 123
1.1.1.2
```

nhlfe-entry

Use this command to configure an NHLFE entry, which defines the MPLS property for traffic that ingresses into the MPLS-TP cloud. This command can be used at the edge node of any tunnel (unidirectional/bidirectional).

For a co-routed bidirectional tunnel, the provider interface used in the nhlfe-entry configuration must be the same as the one used in the ilm-entry configuration.

Use the `no` parameter with this command to reset this configuration.

Note: For a unidirectional tunnel, removing the nhlfe-entry will not be allowed if the tunnel has been associated with another unidirectional tunnel so as to constitute an associated bidirectional path.

Command Syntax

For a unidirectional tunnel:

```
nhlfe-entry LABEL IFNAME {mac MAC|bw-class NAME}
no nhlfe-entry LABEL IFNAME
```

For a bidirectional tunnel:

```
(forward-path|reverse-path) nhlfe-entry LABEL IFNAME
(forward-path|reverse-path) nhlfe-entry LABEL IFNAME {mac MAC|bw-class NAME}
no (forward-path|reverse-path) nhlfe-entry LABEL IFNAME
```

Parameters

`LABEL`	Outgoing label value in the range of <16-1048575>
`IFNAME`	Outgoing interface name; maximum 16 characters
`mac`	Set a nexthop MAC address
`MAC`	The nexthop MAC address in xxxx:xxxx:xxxx format

Note: When no MAC address is identified, the default broadcast MAC address is used.

`bw-class`	Set the bandwidth class
`NAME`	Name of the bandwidth class; maximum 8 characters
`forward-path`	Forward path of a bidirectional LSP
`reverse-path`	Reverse path of a bidirectional LSP

Command Modes

Unidirectional and Bidirectional tunnel mode

Examples

The example below is for a unidirectional tunnel.

```
(config)#mpls-tp tunnel 1 source 100 1.1.1.1 destination 100 3.3.3.3
(config-tnl)#tunnel-mode unidirectional
(config-unidir-tnl)#nhlfe-entry 1001 eth1

(config-unidir-tnl)#no nhlfe-entry 1001 eth1
```

The example below is for a bidirectional tunnel.

```
(config)#mpls-tp tunnel 1 source 100 1.1.1.1 destination 100 3.3.3.3
(config-tnl)#tunnel-mode bidirectional

(config-bidir-tnl)#forward-path nhlfe-entry 1001 eth1

(config-bidir-tnl)#no forward-path nhlfe-entry 1001 eth1
```

show mpls-tp tunnel

Use this command to view the operational status of the Tunnel, its LSP and the LSP components (NHLFE or ILM).

Command Syntax

```
show mpls-tp tunnel
show mpls-tp tunnel NAME
```

Parameters

NAME	Identify the tunnel name with maximum 16 characters

Command Mode

Exec mode

Examples

```
#show mpls-tp tunnel Unidirect_tnl

<================================================================>
     Tunnel-id             : 44         Tunnel-Name   : Unidirect_tnl
     Source Global-Id      : 1          Source Node-Id      : 1.1.1.1
     Destination Global-Id : 2          Destination Node-Id : 2.2.2.2
     Mode  : UNIDIRECTIONAL
     Role  : Source
     State : UP

 ----------------------------------------------------------------
   LSP : 33       Type : Primary       Bidirectional : No
 ----------------------------------------------------------------
 Forward-Path : NHLFE   <OPCODE : Push>

 Outgoing-Label : 45            Outgoing-Interface : eth0
 NHLFE Index    : 1
 BW-class       : BW1           Qos Id : 2       BW : 6k
 Status : UP
```

tunnel-mode bidirectional

Use this command to configure a bidirectional MPLS-TP tunnel.

Command Syntax

```
tunnel-mode bidirectional
```

Parameters

None

Command Mode

Tunnel mode

Examples

```
#configure terminal
(config)#mpls-tp tunnel 1 source 100 1.1.1.1 destination 100 3.3.3.3
(config-tnl)#tunnel-mode bidirectional
```

tunnel-mode unidirectional

Use this command to configure a unidirectional MPLS-TP tunnel.

Command Syntax

```
tunnel-mode unidirectional
```

Parameters

None

Command Mode

Tunnel mode

Examples

```
#configure terminal
(config)#mpls-tp tunnel 1 source 100 1.1.1.1 destination 100 3.3.3.3
(config-tnl)#tunnel-mode unidirectional
```

tunnel-name

Use this command to assign a name to an MPLS-TP tunnel.

Before you can change a tunnel name, you must remove the following dependencies:

- Associated tunnel configuration
- VC or IPv4 FEC mapping to the tunnel
- ME configuration for the tunnel

Command Syntax

```
tunnel-name NAME
```

Parameters

NAME	The name of the tunnel, with maximum 16 characters

Command Mode

Tunnel mode

Examples

```
#configure terminal
(config)#mpls-tp tunnel 1 source 100 1.1.1.1 destination 100 3.3.3.3
(config-tnl)#tunnel-name BIDIR-TNL-1
```

CHAPTER 8 MPLS-TP OAM Commands

MPLS-TP Operation, Administration, and Maintenance (OAM) provides the ability to detect data plane failures that cannot be detected by protocols. This chapter contains commands used to manage OAM for MPLS-TP.

1dm

Use this command to enable one-way delay measurement for a Maintenance Entity Group End Point (MEP).

Use the `no` parameter with this command to disable one-way delay measurement.

Command Syntax

```
1dm ({interval <1-4> | test <0-4294967295>|data <1-1400>}|)
no 1dm
```

Parameters

`<1-4>`	Interval between delay measurement frames. The default is 1s.
`1`	1 second
`2`	10 seconds
`3`	1 minute
`4`	10 minutes
`<0-4294967295>`	Test identifier
`<1-1400>`	Number of characters to send.

Command Mode

ITUT MP configuration mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#1dm interval 1 data 123

(config-itut-mp)#no 1dm
```

2dm

Use this command to enable two-way delay measurement for a Maintenance Entity Group End Point (MEP).

Use the `no` parameter with this command to disable two-way delay measurement.

Command Syntax

```
2dm ({interval <1-4> | test <0-4294967295>|data <1-1400>}|)
no 2dm
```

Parameters

`<1-4>`	Interval between delay measurement frames. The default is 1s.
`1`	1 second
`2`	10 seconds
`3`	1 minute
`4`	10 minutes
`<0-4294967295>`	Test identifier
`<1-1400>`	Number of characters to send.

Command Mode

ITUT MP configuration mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#2dm interval 1 test 1234567890

(config-itut-mp)#no 2dm
```

alarm-indication

Use this command to enable the alarm-indication signal for a Maintenance Entity Group End Point (MEP).

Use the `no` parameter with this command to disable the alarm-indication signal.

Command Syntax

```
alarm-indication level <0-7> interval (1|60)
no alarm-indication
```

Parameters

`level`	Level at which AIS frames are sent.
`<0-7>`	Level value.
`interval`	Interval between AIS frames:
`1`	One frame per second.
`60`	One frame per minute.

Command Mode

ITUT MP configuration mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#alarm-indication level 2 interval 60

(config-itut-mp)#no alarm-indication
```

clear itut lb-globals

Use this command to clear ITUT loopback global variables.

Command Syntax

```
clear itut lb-globals meg NAME <1-8191>
```

Parameters

NAME	Maintenance Entity Group (MEG) name: 1-48 characters.
<1-8191>	Maintenance Entity Group End Point (MEP) identifier

Command Mode

Exec mode

Examples

```
#clear itut lb-globals meg ABC 3
```

continuity-check

Use this command to enable continuity checking (CC) for a Maintenance Entity Group (MEG) or Maintenance Entity Group End Point (MEP).

Use the `no` parameter with this command to disable continuity-checking (CC).

Command Syntax

```
continuity-check interval <1-7>
no continuity-check
```

Parameters

<1-7>	Interval between continuity checking packets:
1	3.33 milliseconds: default transmission period for protection-switching applications.
2	10 milliseconds
3	100 milliseconds: default transmission period for performance-monitoring applications.
4	1 second: default transmission period for fault-management applications.
5	10s
6	1 minute
7	10 minutes

Command Mode

ITUT MEG mode

ITUT MP mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#continuity-check interval 1

(config-itut-meg)#no continuity-check

#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#continuity-check interval 1

(config-itut-mp)#no continuity-check
```

debug mpls-tp itut-oam

Use this command to debug MPLS-TP OAM.

Use the `no` parameter with this command to stop debugging MPLS-TP OAM.

Command Syntax

```
debug mpls-tp itut-oam cc (fsm-event|fsm-state|pkt|all)
debug mpls-tp itut-oam lb
debug mpls-tp itut-oam test-signal
debug mpls-tp itut-oam ais
debug mpls-tp itut-oam lck
debug mpls-tp itut-oam lm
debug mpls-tp itut-oam 1dm
debug mpls-tp itut-oam 2dm
no debug mpls-tp itut-oam cc (fsm-event|fsm-state|pkt|all)
no debug mpls-tp itut-oam lb
no debug mpls-tp itut-oam test-signal
no debug mpls-tp itut-oam ais
no debug mpls-tp itut-oam lck
no debug mpls-tp itut-oam lm
no debug mpls-tp itut-oam 1dm
no debug mpls-tp itut-oam 2dm
```

Parameters

`cc`	Continuity checking
`fsm-event`	Finite-state machine events
`fsm-state`	Finite-state machine states
`pkt`	Packets
`all`	All of the above
`lb`	Loopback
`test-signal`	Test signal
`ais`	Alarm-indication signal
`lck`	Lock
`lm`	Loss measurement
`1dm`	One-way delay measurement
`2dm`	Two-way delay measurement

Command Mode

Exec mode

Examples

```
#debug mpls-tp itut-oam lck
```

delay-measurement

Use this command to enable delay-measurement in a Maintenance Entity (ME).

Use the `no` parameter with this command to disable delay-measurement in an ME.

Command Syntax

```
delay-measurement (interval <1-4>|)
no delay-measurement
```

Parameters

`<1-4>`	Delay measurement interval:
`1`	1 second
`2`	10 seconds
`3`	1 minute
`4`	10 minutes

Command Mode

IETF ME mode

Examples

```
(config)#ietf meg meg1
(config-ietf-meg)#me me1 tunnel
(config-ietf-me)#service tunnel tun1
(config-ietf-me)#delay-measurement interval 3
(config-ietf-me)#no delay-measurement
```

exit-me

Use this command to exit IETF ME mode and return to IETF MEG mode.

Command Syntax

```
exit-me
```

Parameters

None

Command Mode

IETF ME mode

Examples

```
(config)#ietf meg meg1
(config-ietf-meg)#me me1 tunnel
(config-ietf-me)#service tunnel tun1
(config-ietf-me)#exit-me
(config-ietf-meg)#
```

exit-mp

Use this command to exit ITUT MP mode and return to ITUT MEG mode.

Command Syntax

```
exit-mp
```

Parameters

None

Command Mode

ITUT MP mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mip-id 12
(config-itut-mp)#rmep-id 1 cc US icc 123456 umc new fwd
(config-itut-mp)#exit-mp
(config-itut-meg)#
```

fault management

Use this command to enable fault management in a Maintenance Entity. (ME)

Use the `no` parameter with this command to disable fault-management in an ME.

Command Syntax

```
fault-management (refresh-timer <1-20>|)
no fault-management
```

Parameters

`<1-20>`	Refresh timer in seconds

Defaults

The default refresh timer value is 20 seconds.

Command Mode

IETF ME mode

Examples

```
#configure terminal
(config)#ietf meg MEG
(config-ietf-meg)#me ME tunnel
(config-ietf-me)#service tunnel TUNNEL-NAME
(config-ietf-me)#fault-management refresh-timer 4
(config-ietf-me)#no fault-management
```

fault-alarm

Use this command to enable the fault-alarm feature for a Maintenance Entity Group End Point (MEP).

Use the `no` parameter with this command to disable this feature.

Command Syntax

```
fault-alarm (priority (5|4|3|2|1) alarm-time <1-10> reset-time <1-10>|)
no fault-alarm
```

Parameters

`priority`	Priority of a defect:
`5`	xCONCCM defect
`4`	errorCCm defect
`3`	someRMEPCCmdefect
`2`	someMACstatus defect
`1`	someRDI defect
`alarm-time`	Alarm time.
`<1-10>`	Alarm time value. The default is 2.5 seconds.
`reset-time`	Reset time.
`<1-10>`	Reset time value. The default is 10 seconds.

Command Mode

ITUT MP configuration mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#fault-alarm priority 1 alarm-time 1 reset-time 1

(config-itut-mp)#no fault-alarm
```

ietf meg

Use this command to configure an IETF Maintenance Entity Group (MEG) to monitor an MPLS-TP path by running OAM functions. This command changes to IETF MEG mode.

Use the `no` parameter with this command to remove a MEG.

Note: Once you have configured a MEG, you need to configure the service type. Refer to the service type command for more information.

Command Syntax

```
ietf meg NAME
```

```
no ietf meg NAME
```

Parameters

`NAME`	MEG name: 1-48 characters

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#ietf meg MEG
(config-ietf-meg)#

(config)#no ietf meg MEG
```

itut meg

Use this command to configure an ITUT Maintenance Entity Group (MEG) to monitor an MPLS-TP path by running OAM functions. This command changes to ITUT MEG mode.

Use the `no` parameter with this command to remove a MEG.

Command Syntax

```
itut meg UMC (level <0-7>|)
no itut meg UMC
```

Parameters

`UMC`	Unique MEG code: 1-5 characters, excluding a forward slash (/).
`<0-7>`	Level.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#

(config)#no itut meg new12
```

lm

Use this command to enable or disable loss measurement for a Maintenance Entity Group End Point (MEP).

Command Syntax

```
lm (enable|disable)
```

Parameters

`enable`	Enable loss measurement with continuity checking.
`disable`	Disable loss measurement with continuity checking.

Command Mode

ITUT MP configuration mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#lm enable

(config-itut-mp)#lm disable
```

lock

Use this command to configure the lock for a Maintenance Entity Group End Point (MEP).

To lock a bidirectional path on both sides of a MEP, the lock command must also be given on the peer MEP.

Command Syntax

```
lock interval (1|60) level <0-7>
no lock
```

Parameters

interval	Interval between lock frames:
1	1 frame per second.
60	1 frame per minute.
<0-7>	Level to which lock frames will be sent.

Command Mode

ITUT MP configuration mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#lock interval 1 level 1

(config-itut-mp)#no lock
```

lock-instruct

Use this command to lock a Maintenance Entity (ME).

Use the `no` parameter to release a lock on an ME.

Command Syntax

```
lock-instruct (refresh-timer <1-255|)
no lock-instruct
```

Parameters

`<1-255>`	Refresh timer in seconds. The default is 1 second.

Defaults

The default refresh-timer value is 1 second.

Command Mode

IETF ME mode

Examples

```
(config)#ietf meg meg1
(config-ietf-meg)#me me1 tunnel
(config-ietf-me)#service tunnel tun1
(config-ietf-me)#lock-instruct refresh-timer 35
(config-ietf-me)#no lock-instruct
```

loopback

Use this command to enable loopback for a Maintenance Entity (ME).

Use the no parameter with this command to disable loopback for an ME.

Command Syntax

```
loopback
no loopback
```

Parameters

None

Command Mode

IETF ME mode

Examples

```
(config)#ietf meg meg1
(config-ietf-meg)#me me1 tunnel
(config-ietf-me)#service tunnel tun1
(config-ietf-me)#loopback
(config-ietf-me)#no loopback
```

loss-measurement

Use this command to set the loss measurement interval for a Maintenance Entity (ME).

Use the `no` parameter with this command to disable loss measurement for an ME.

Command Syntax

```
loss-measurement (interval <1-5>|)
no loss-measurement
```

Parameters

`<1-5>`	Loss measurement interval:
`1`	10 milliseconds
`2`	100 milliseconds
`3`	1 second
`4`	10 seconds
`5`	1 minute

Command Mode

IETF ME mode

Examples

```
(config)#ietf meg meg1
(config-ietf-meg)#me me1 tunnel
(config-ietf-me)#service tunnel tun1
(config-ietf-me)#loss-measurement interval 3
(config-ietf-me)#no loss-measurement
```

me

Use this command to configure a IETF maintenance entity (ME). This command changes to IETF ME mode.

Use the `no` parameter with this command to remove an ME.

Command Syntax

```
me NAME (tunnel|vc|datalink)
no me NAME
```

Parameters

`NAME`	ME name: 1-48 characters
`vc`	Virtual circuit
`tunnel`	Tunnel
`datalink`	Data link

Command Mode

IETF ME mode

Examples

```
#configure terminal
(config)#ietf meg MEG
(config-ietf-meg)#type lsp mp-type mip
(config-ietf-meg)#me ME tunnel
(config-ietf-me)#

(config-ietf-meg)#no me ME
```

mep-id

Use this command to configure an ITUT Maintenance Entity Group End Point (MEP). This command changes to ITUT MP mode.

Use the `no` parameter with this command to remove an ITUT MEP.

Command Syntax

```
mep-id <1-8191>
no mep-id <1-8191>
```

Parameters

`<1-8191>`	MEP identifier.

Command Mode

ITUT MEG configuration mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#
```

mip-id

Use this command to configure an ITUT Maintenance Entity Group Intermediate Point (MIP). This command changes to ITUT MP mode.

Use the `no` parameter with this command to remove an ITUT MIP.

Command Syntax

```
mip-id <1-8191>
no mip-id <1-8191>
```

Parameters

`<1-8191>`	MIP identifier.

Command Mode

ITUT MP configuration mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mip-id 12
(config-itut-mp)#
```

mpls-tp (1dm | 2dm)

Use this command to start ITUT one-way or two-way delay measurement messages.

Command Syntax

```
mpls-tp (1dm | 2dm)(meg-name UMC mep-id <1-8191>) ({duration <5-60> | interval <1-
  4>| test <0-4294967295> | data <1-1400>}|)
```

Parameters

1dm	One-way delay measurement
2dm	Two-way delay measurement
UMC	Unique MEG code: 1-5 characters, excluding a forward slash (/).
<1-8191>	Maintenance Entity Group End Point (MEP) identifier
<5-60>	Duration of the session in seconds
<1-4>	Interval between delay measurement packets:
1	1 second
2	10 seconds
3	60 seconds
4	600 seconds
<0-4294967295>	Test identifier.
<1-1400>	Number of bytes to send.

Command Mode

Exec mode

Examples

```
#mpls-tp 1dm meg-name new mep-id 123 duration 5 interval 1 data 123 test
12345678
Initiating delay measurement on MEG: new, Duration 5 seconds
```

mpls-tp bfd

Use this command to configure a BFD session for an MPLS transport path. The Maintenance Entity Group (MEG) name and Maintenance Entity (ME) name correspond to an MPLS transport path which can be a label-switched path (LSP) or pseudowire (PW).

Use the `no` parameter with this command to remove a BFD session for an LSP or PW.

Command Syntax

```
mpls-tp bfd (meg-name NAME me-name NAME) ({min-tx (0 | <50-4294967>)|min-rx (0 |
  <50-4294967>)| multiplier <2-255>}|)
no mpls-tp bfd (meg-name NAME me-name NAME)
```

Parameters

`meg-name`	MEG
`NAME`	MEG name: 1-48 characters
`me-name`	ME
`NAME`	ME name: 1-48 characters
`min-tx`	Minimum transmit interval
`0`	No transmission
`<50-4294967>`	Minimum transmit interval in milliseconds
`min-rx`	Minimum reception interval
`0`	No reception
`<50-4294967>`	Minimum reception interval in milliseconds
`multiplier`	Multiplier
`<2-255>`	Multiplier value

Defaults

The default minimum transmit interval is 1 second.

The default minimum reception interval is 1 second.

The default multiplier value is 5.

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls-tp bfd meg-name new me-name ne min-rx 50 min-tx 100 multiplier 2

(config)#no mpls-tp bfd
```

mpls-tp delay-measurement

Use this command to start IETF delay measurement.

Command Syntax

```
mpls-tp delay-measurement (meg-name NAME me-name NAME)
  ({duration <5-60>|interval <1-4>}|)
```

Parameters

meg-name	Maintenance Entity Group (MEG)
NAME	MEG name: 1-48 characters
me-name	Maintenance Entity (ME)
NAME	ME name: 1-48 characters
<5-60>	Duration of the session in seconds
<1-4>	Interval between delay measurement packets:
1	1 second
2	10 seconds
3	60 seconds
4	600 seconds

Command Mode

Exec mode

Examples

```
#mpls-tp delay-measurement meg-name MEG2 me-name 1 interval 2
```

mpls-tp loss-measurement

Use this command start IETF loss measurement.

Command Syntax

```
mpls-tp loss-measurement(meg-name NAME me-name NAME)
  ({duration <5-60>|interval <1-5>}|)
```

Parameters

meg-name	Maintenance Entity Group (MEG)
NAME	MEG name: 1-48 characters
me-name	Maintenance Entity (ME)
NAME	ME name: 1-48 characters
<5-60>	Duration of the session in seconds
<1-5>	Interval between loss measurement packets:
1	10 millisecond
2	100 milliseconds
3	1 second
4	10 seconds
5	60 seconds

Command Mode

Exec mode

Examples

```
#mpls-tp loss-measurement meg-name MEG2 me-name 1 interval 3
```

mpls-tp lm

Use this command to start ITUT loss measurement.

Command Syntax

```
mpls-tp lm (meg-name UMC mep-id <1-8191>) ({duration <5-60> interval <1-5>})
```

Parameters

meg-name	Maintenance Entity Group (MEG)
UMC	Unique MEG code: 1-5 characters, excluding a forward slash (/).
<1-8191>	Maintenance Entity Group End Point (MEP) identifier
<5-60>	Duration of the session in seconds
<1-5>	Interval between loss measurement packets:
1	10 millisecond
2	100 milliseconds
3	1 second
4	10 seconds
5	60 seconds

Command Mode

Exec mode

Examples

```
#mpls-tp lm meg-name new mep-id 123 duration 5 interval 1
```

mpls-tp test

Use this command to send an ITUT test signal.

Command Syntax

```
mpls-tp test (meg-name NAME mep-id <1-8191> (in-service | out-of-service) test-
  pattern (1 | 2 | 3 | 4)) ({duration <5-60> | interval <1-5>}|)
```

Parameters

NAME	Maintenance entity group (MEG) name: 1-48 characters
<1-8191>	Maintenance Entity Group End Point (MEP) identifier
in-service	In-service testing.
out-of-service	Out-of-service testing
test-pattern	Test pattern to send:
1	Test pattern: abc.
2	Test pattern: 1234.
3	Test pattern: a1b2c.
4	Test pattern: 1a2b3c.
<5-60>	Duration of the session in seconds.
interval	Interval between packets
1	10 milliseconds
2	100 milliseconds
3	1 second
4	10 seconds
5	60 seconds

Command Mode

Exec mode

Examples

```
#mpls-tp test meg-name new mep-id 123 in-service test-pattern 1 duration 5
interval 1
```

ping mpls-tp (IETF)

Use this command to trigger the ping command for a Maintenance Entity Group End Point (MEP).

You cannot:

- Ping from an intermediate node
- Ping to an intermediate node on a virtual circuit path

Command Syntax

```
ping mpls-tp (meg-name NAME me-name NAME) ({mip (global-id <1-4294967295> node-id
  A.B.C.D (|interface-id <0-4294967295>)ttl <1-255>)|timeout <1-500>|repeat <5-
  5000>|interval <2-20000>|detail}|)
```

Parameters

`meg-name`	Maintenance entity group (MEG)
`NAME`	MEG name: 1-48 characters
`me-name`	Maintenance entity (ME)
`NAME`	ME name: 1-48 characters
`mip`	Maintenance Intermediate Point (MIP)
`global-id`	Global identifier
`<1-4294967295>`	Global identifier value
`node-id`	Node identifier
`A.B.C.D`	Node identifier in 32-bit dot notation
`interface-id`	Interface identifier
`<0-4294967295>`	Interface identifier value
`ttl`	Time-to-live
`<1-255>`	Time-to-live value
`timeout`	Timeout
`<1-500>`	Timeout in seconds
`repeat`	Number of pings to send
`<5-5000>`	Number of pings to send
`interval`	Interval between pings
`<2-20000>`	Interval in milliseconds
`detail`	Display detailed output

Command Mode

Privileged Exec mode

Examples

```
#ping mpls-tp meg-name 33 me-name m3-1
```

ping mpls-tp (ITUT)

Use this command to trigger the ping command for a Maintenance Entity Group End Point (MEP).

You cannot:

- Ping from an intermediate node
- Ping to an intermediate node on a virtual circuit path

Command Syntax

```
ping mpls-tp (meg-name NAME mep-id <1-8191>) ({(rmep <1-8191> NAME NAME NAME |
  mip (<1-8191> NAME NAME NAME ttl <1-255>) | ttl <1-255>)|
  tlv (data VAL | (test-pattern (1 | 2 | 3 | 4) (in-service | out-of-service)))
  |repeat <1-1024> |timeout <1-10> |detail }|)
```

Parameters

`meg-name`	Maintenance entity group (MEG)
`NAME`	MEG name: 1-48 characters
`mep-id`	MEP identifier
`<1-8191>`	MEP identifier
`rmep`	Target remote MEP
`<1-8191>`	Remote MEP identifier
`NAME`	Remote MEP country code: two upper-case letters (A-Z)
`NAME`	Remote MEP carrier code: 1-6 upper-case letters (A-Z) or digits (0-9)
`NAME`	Remote unique MEG code: 1-5 characters, excluding a forward slash (/)
`mip`	Target Maintenance Entity Group Intermediate Point (MIP)
`<1-8191>`	Target MIP identifier
`NAME`	Target MIP country code: two upper-case letters (A-Z)
`NAME`	Target MIP carrier code: 1-6 upper-case letters (A-Z) or digits (0-9)
`NAME`	Target unique MEG code: 1-5 characters, excluding a forward slash (/)
`ttl`	Target MIP time-to-live
`<1-255>`	Target MIP time-to-live value
`ttl`	Time-to-live
`<1-255>`	Time-to-live value
`tlv`	Test TLV
`data`	Bytes to pad
`VAL`	Number of bytes to pad, 1-1300
`test-pattern`	Test TLV to send:
`1`	Test Pattern: abc
`2`	Test Pattern: 1234
`3`	Test Pattern: a1b2c

4	Test Pattern: 1a2b3c
in-service	In-service testing
out-of-service	Out-of-service testing
repeat	Number of pings to send
<1-1024>	Number of pings to send
timeout	Timeout of ping
<1-10>	Timeout in seconds
detail	Display detailed output

Command Mode

Privileged Exec mode

Examples

```
#ping mpls-tp meg-name 33 mep-id 30 rmep 53
```

rmep-id

Use this command to configure a Remote Maintenance Entity Group End Point (RMEP).

Command Syntax

```
rmep-id <1-8191> cc CC-NAME icc ICC-NAME umc UMC (fwd|rev)
no rmep-id <1-8191> cc CC-NAME icc ICC-NAME umc UMC
```

Parameters

`<1-8191>`	RMEP identifier.
`CC-NAME`	Country code: two alphabetic characters, upper case (A-Z).
`ICC-NAME`	ITU carrier code: 1-6 characters, alphabetic (A-Z) or numeric (0-9).
`UMC`	Unique MEG code: 1-5 characters, excluding a forward slash (/).
`fwd`	Forward RMEP.
`rev`	Reverse RMEP.

Command Mode

ITUT MIP mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#rmep-id 1 cc US icc 123456 umc new fwd

(config-itut-mp)#no rmep-id 1 cc US icc 123456 umc new
```

service datalink

Use this command to configure the datalink service association for a Maintenance Entity Group End Point (MEP) or Intermediate Point (MIP).

Command Syntax

```
service datalink IFNAME
```

Parameters

IFNAME	Name of the datalink

Command Mode

ITUT MP mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#service datalink eth1
```

service type

Use this command to set the service type of the MEG as a tunnel, virtual circuit, or data link. This command is optional because the service type can also be set in an ME configuration implicitly.

Note: It is important to configure the service type immediately after configuring a MEG. Refer to the ietf meg command for more information.

Command Syntax

```
service type (tunnel|vc|datalink)
```

Parameters

`tunnel`	MPLS-TP tunnel
`vc`	Virtual circuit
`datalink`	Datalink

Command Mode

IETF MEG mode

Examples

```
#configure terminal
(config)#ietf meg MEG
(config-ietf-meg)#service type ?
  datalink  Data Link
  tunnel    MPLS-TP tunnel
  vc        Virtual Ciruit
(config-ietf-meg)#service type tunnel
```

service tunnel

Use this command to set the name of the tunnel for a Maintenance Entity Group End Point (MEP) or Intermediate Point (MIP).

Command Syntax

```
service tunnel NAME
```

Parameters

NAME	Name of the service tunnel: 1-16 characters

Command Mode

ITUT MP mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#service tunnel TUNNEL-123
```

service vc

Use this command to set the virtual circuit identifier for a Maintenance Entity Group End Point (MEP) or Intermediate Point (MIP).

Command Syntax

```
service vc <1-4294967295>
```

Parameters

<1-4294967295>

Virtual circuit identifier

Command Mode

ITUT MP mode

Examples

```
#configure terminal
(config)#itut meg new12 level 1
(config-itut-meg)#mep-id 12
(config-itut-mp)#service vc 1000
```

show debugging

Use this command to display ITUT debugging settings.

Command Syntax

```
show debugging mpls-tp itut-oam
```

Parameters

None

Command Mode

Exec mode

Examples

```
#show debugging mpls-tp itut-oam
CC FSM debugging event is on
CC FSM State debugging event is on
CC FSM Packet debugging event is on
Loopback FSM Packet debugging event is on
Test Packet Debugging event is on
AIS Packet Debugging event is on
Lock Packet Debugging event is on
LM Debugging event is on
1DM Debugging event is on
2DM Debugging event is on
```

show ietf meg

Use this command to display all configured MEG-ME information.

Command Syntax

```
show ietf meg (brief|summary)
```

Parameters

`brief`	Display brief MEG configuration information
`summary`	Display summary MEG configuration information

Command Mode

Exec mode

Examples

```
#show ietf meg brief
Total Number of MEGs configured : 1
================================================================================
Maintenance Entity Group: meg-1MEG Index: 1
Service Type: TunnelMP Location: Per-node
--------------------------------------------------------------------------------
Maintenance Entity: me-1ME Index: 1
Tunnel Name: tnl1MP Type: MEP
Oper Status: UP
--------------------------------------------------------------------------------
CC-CV: Disabled
Loopback: Disabled
Lock: Disabled
Fault-Management: Disabled
Loss-Measurement: Disabled
Delay-Measurement: Disabled


#show ietf meg summary
Total Number of MEGs configured : 1
--------------------------------------------------------------------------------
MEG-NameService-TypeME-NameMP TypeOper Status
--------------------------------------------------------------------------------
meg-1Tunnelme-1MEP
```

show ietf meg NAME

Use this command to display information for a Maintenance Entity Group (MEG).

Command Syntax

```
show ietf meg NAME (me NAME |)
```

Parameters

meg	MEG
NAME	MEG name: 1-48 characters
me	Maintenance Entity (ME)
NAME	ME name: 1-48 characters

Command Mode

Exec mode

Examples

```
#show ietf meg meg1
================================================================================
Maintenance Entity Group  : meg1                MEG Index    : 3
Service Type              : Tunnel              MP Location  : Per-node
--------------------------------------------------------------------------------
   Maintenance Entity     : me1                 ME Index     : 1
   Tunnel Name            : tun1                MP Type      : MEP
   Oper Status            : UP
 ------------------------------------------------------------------------------
      CC-CV               : Valid
```

show itut bm-list

Use this command to display the BFD master list.

Command Syntax

```
show itut bm-list
```

Parameters

None

Command Mode

Exec mode

Examples

```
#show itut bm-list
```

show itut lib-structures

Use this command to display library structures.

Command Syntax

```
show itut lib-structures
```

Parameters

None

Command Mode

Exec mode

Examples

```
#show itut lib-structures
```

show itut lb-globals

Use this command to display loopback global variables for a Maintenance Entity Group End Point (MEP).

Command Syntax

```
show itut lb-globals meg NAME <1-8191>
```

Parameters

NAME	Maintenance Entity Group (MEG) name.
<1-8191>	MEP identifier.

Command Mode

Exec mode and Privilege Exec mode

Examples

```
#show itut lb-globals meg new 123
================================
Next Seq No             : 1
In-Order Replies        : 0
Out-Of-Order Replies    : 0
LBR Sent Out            : 0
```

show itut meg

Use this command to display “brief” information on Maintenance Entity Group (MEG) configurations.

Command Syntax

```
show itut meg brief
```

Parameters

None

Command Mode

Exec mode and Privilege Exec mode

Examples

```
#show itut meg brief
================================================================================
Maintenance Entity Group  : US12/tem            MEG Index    : 3
Service Type              : Unknown             MEG Level    : 1
   ----------------------------------------------------------------------------
   MP-ID                  : 1
   Oper Status            : DOWN
   Reason                 : Path not associated
================================================================================
Maintenance Entity Group  : US12/new            MEG Index    : 1
Service Type              : Unknown             MEG Level    : 1
   ----------------------------------------------------------------------------
   MP-ID                  : 123
   Oper Status            : DOWN
   Reason                 : Path not associated
================================================================================
```

show itut test-globals

Use this command to display test-related global variables.

Command Syntax

```
show itut test-globals meg NAME <1-8191>
```

Parameters

NAME	Maintenance Entity Group (MEG) name.
<1-8191>	Maintenance Entity Group End Point (MEP) identifier.

Command Mode

Exec mode and Privilege Exec mode

Examples

```
#show itut test-globals meg 123 1
```

show itut trees

Use this command to display tree information.

Command Syntax

```
show itut trees (main-card|line-card)
```

Parameters

`main-card`	Main card trees.
`main-card`	Line card trees.

Command Mode

Exec mode

Examples

```
#show itut trees line-card
```

show mpls-tp cc meg

Use this command to display a continuity-check summary.

Command Syntax

```
show mpls-tp cc meg NAME (mp-id <1-8191>|)
```

Parameters

NAME	Maintenance Entity Group (MEG) name.
<1-8191>	Maintenance Entity Group End Point (MEP) identifier.

Command Mode

Exec mode and Privilege Exec mode

Examples

Output on x86 platform

```
#show mpls-tp cc meg NEW mp-id 123
MEG-Name                : INAIRTEL/meg
   MP-Id                  : 1
   Oper status            : Up
   CCM-Interval           : 4
   Lowest alarm priority  : 1
   FNG alarm time         : 2.5 seconds
   FNG reset time         : 10 seconds
   All RMEPs are dead     : True
   RDI present            : True
   Fault identified       : True
   Fault                  : DefRemoteCCM
   Diagnostic message     : Not receiving CCM PDUs from at least
                            one of the configured RMEPs.
   RMEP-Id                : 2
   RMEG-Name              : INAIRTEL/meg
   RMEP CCM defect        : True
   RMEP last RDI          : Not Applicable
```

Output on hardware

```
#show mpls-tp cc meg NEW mp-id 123
--------------------------------------------------------------------------------
Local MEG, MP-Id       Remote MEG,  MP-Id     Period   Oper status    Fault
--------------------------------------------------------------------------------
INAIRTEL/meg4, 0004   INAIRTEL/meg4, 0004      1 s        Up           Timeout
```

show mpls-tp cc summary

Use this command to display a continuity-check summary.

Command Syntax

```
show mpls-tp cc summary
```

Parameters

None

Command Mode

Exec mode and Privilege Exec mode

Examples

```
#show mpls-tp cc summary

Total number of CC sessions configured : 1

--------------------------------------------------------------------------------
MEG-Name              MP-Id           CCM-Interval         Oper status
--------------------------------------------------------------------------------
INAIRTEL/meg          1               4                    Up
```

show mpls-tp delay-measurement

Use this command to display the statistics of a IETF or ITUT delay measurement session.

Command Syntax

IETF form:

```
show mpls-tp delay-measurement (meg-name NAME me-name NAME)
```

ITUT forms:

```
show mpls-tp delay-measurement (meg-name NAME mep-id <1-8191>) 1dm
show mpls-tp delay-measurement (meg-name NAME mep-id <1-8191>) 2dm
```

Parameters

`meg-name`	Maintenance Entity Group (MEG)
`NAME`	MEG name: 1-48 characters
`me-name`	Maintenance Entity (ME)
`NAME`	ME name: 1-48 characters
`<1-8191>`	Maintenance Entity Group End Point (MEP) identifier
`1dm`	One-way delay measurement
`2dm`	Two-way delay measurement

Command Mode

Exec mode

Examples

```
#show mpls-tp delay-measurement MEG2 me-name ME1
```

show mpls-tp loss-measurement

Use this command to display the statistics of a IETF or ITUT loss measurement session.

Command Syntax

IETF form:

```
show mpls-tp loss-measurement (meg-name NAME me-name NAME)
```

ITUT form:

```
show mpls-tp loss-measurement (meg-name NAME mep-id <1-8191>)
```

Parameters

`meg-name`	Maintenance Entity Group (MEG)
`NAME`	MEG name: 1-48 characters
`me-name`	Maintenance Entity (ME)
`NAME`	ME name: 1-48 characters
`<1-8191>`	Maintenance Entity Group End Point (MEP) identifier

Command Mode

Exec mode

Examples

```
#show mpls-tp loss-measurement MEG2 me-name ME1
```

trace mpls-tp

Use this command to send an IETF trace.

You cannot:

- Trace from an intermediate node
- Trace on a virtual circuit path

Command Syntax

```
trace mpls-tp (meg-name NAME me-name NAME) ({detail | ttl <1-255>}|)
```

Parameters

`meg-name`	Maintenance Entity Group (MEG)
`NAME`	MEG name: 1-48 characters
`me-name`	Maintenance Entity (ME)
`NAME`	ME name: 1-48 characters
`detail`	Display detailed output
`<1-255>`	Maximum time-to-live value

Command Mode

Privileged Exec mode

Examples

```
#trace mpls-tp meg me1 me-name new detail
```

CHAPTER 9 MPLS-TP LPS Commands

The commands in this chapter configure Linear Protection Switching (LPS) for the MPLS Transport Profile.

backup meg

Use this command to configure a backup Maintenance Entity Group (MEG) for a protection group.

You can use this command to configure a backup entity with either an IETF or ITU-T identifier:

- Use the command form with the `me` parameter to configure a backup MEG with an IETF Maintenance Entity identifier
- Use the command form with the `mep-id` parameter to configure a backup MEG with an ITU-T Maintenance Entity End Group Point identifier

Use the `no` form of this command to remove a backup MEG.

Command Syntax

```
backup meg NAME me NAME
backup meg NAME mep-id <1-8191>
no backup meg NAME me NAME
no backup meg NAME mep-id <1-8191>
```

Parameters

`meg`	MEG name
`NAME`	MEG name; maximum 48 characters
`me`	IETF Maintenance Entity identifier
`NAME`	IETF Maintenance Entity identifier; maximum 48 characters
`mep-id`	ITU-T Maintenance Entity Group End Point identifier
`<1-8191>`	ITU-T Maintenance Entity Group End Point identifier

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#backup meg meg1 me me1
(config-pg)#backup meg meg1 mep-id 1

#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#no backup meg meg1 me me1
(config-pg)#no backup meg meg1 mep-id 1
```

continual tx-interval

Use this command to set a continual transmission interval.

Use the `no` form of this command to set the continual transmission interval to its default value.

Command Syntax

```
continual tx-interval <1-20>
no continual tx-interval
```

Parameters

`<1-20>`	Transmission interval in seconds

Default

The default value of the continual transmission interval is 5 seconds.

Command Mode

Protection group mode

Examples

```
 #configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#continual tx-interval 10

 #configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#no continual tx-interval
```

debug mpls-tp protection-switching

Use this command to turn on debugging options for MPLS-TP protection-switching events.

Use the `no` form of this command to turn off debugging options.

Command Syntax

```
debug mpls-tp protection-switching (fsm-event|lockout-event|signalfail-
  event|switchover-event|pkt-event|all)
no debug mpls-tp protection-switching (fsm-event|lockout-event|signalfail-
  event|switchover-event|pkt-event|all)
```

Parameters

`fsm-even`	Debug finite state machine events
`lockout-events`	Debug lockout events
`signalfail-event`	Debug signal-fail events
`switchover-event`	Debug switchover events
`pkt-event`	Debug packet events
`all`	Debug all events

Command Mode

Privileged Exec and Exec modes

Examples

```
#debug mpls-tp protection-switching fsm-event
#debug mpls-tp protection-switching lockout-event
#debug mpls-tp protection-switching pkt-event
#debug mpls-tp protection-switching signalfail-event
#debug mpls-tp protection-switching switchover-event
```

hold-off timer

Use this command to set a hold-off timer value used to filter intermittent link faults.

Use the `no` form of this command to set the hold-off timer to its default value.

Command Syntax

```
hold-off timer <0-10>
no hold-off timer
```

Parameters

`<0-10>`	Hold-off timer value in seconds

Default

The default value of the hold-off timer is 0.

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#hold-off timer 10

#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#no hold-off time
```

lockout

Use this command to manually prevent switching traffic to the protection path.

Use the `no` form of this command to remove the lockout setting.

Command Syntax

```
lockout
no lockout
```

Parameters

None

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#lockout

#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#no lockout
```

mpls-tp lsp protection-group

Use this command to configure an MPLS-TP protection group and enter protection group (PG) mode.

Use the `no` form of this command to remove a protection group.

Command Syntax

```
mpls-tp lps protection-group NAME
no mpls-tp lps protection-group NAME
```

Parameters

`NAME`	Name of the protection group; maximum 128 characters

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#

#configure terminal
(config)#no mpls-tp lps protection-group abc
```

primary meg

Use this command to configure a primary maintenance entity group (MEG) for a protection group.

You can use this command to configure a primary MEG with either an IETF or ITU-T identifier:

- Use the command form with the `me` parameter to configure a primary MEG with an IETF Maintenance Entity identifier
- Use the command form with the `mep-id` parameter to configure a primary MEG with an ITU-T Maintenance Entity End Point identifier

Use the `no` form of this command to remove a primary MEG.

Command Syntax

```
primary meg NAME me NAME
primary meg NAME mep-id <1-8191>
no primary meg NAME me NAME
no primary meg NAME mep-id <1-8191>
```

Parameters

`meg`	MEG name
`NAME`	MEG name; maximum 48 characters
`me`	IETF Maintenance Entity identifier
`NAME`	IETF Maintenance Entity identifier; maximum 48 characters
`mep-id`	ITU-T Maintenance Entity End Point identifier
`<1-8191>`	ITU-T Maintenance Entity End Point identifier

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#primary meg meg1 me me1
(config-pg)#primary meg meg1 me mep-id 1

#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#no primary meg meg1 me me1
(config-pg)#no primary meg meg1 mep-id 1
```

protection-scheme

Use this command to set the protection scheme for the switching path.

Use the `no` form of this command to remove the protection scheme.

Command Syntax

```
protection-scheme (unidirectional|bidirectional) (permanent|selector)
no protection-scheme
```

Parameters

`unidirectional`	Unidirectional protection scheme
	Note: Uni-directional 1:1 is not supported
`bidirectional`	Bidirectional protection scheme
`permanent`	Permanent 1+1 protection scheme
`selector`	Selector 1:1 protection scheme

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#protection-scheme unidirectional permanent

#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#no protection-scheme
```

rapid tx-interval

Use this command to set a rapid transmission interval.

Use the no form of this command to set the rapid transmission interval to its default value.

Command Syntax

```
rapid tx-interval <1-1000>
no rapid tx-interval
```

Parameters

<1-1000>	Rapid transmission interval value in milliseconds

Default

The default value of the rapid transmission interval is 3300 microseconds.

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#rapid tx-interval 100010

#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#no rapid tx-interval
```

reversion-mode

Use this command to configure the protection switching mode of operation.

Command Syntax

```
reversion-mode (revertive|non-revertive)
```

Parameters

`revertive`	Revertive mode of operation
`non-revertive`	Non-revertive mode of operation

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)# reversion-mode revertive
```

show debugging mpls-tp lps

Use this command to display the debugging options for MPLS-TP protection switching.

Command Syntax

```
show debugging mpls-tp lps
```

Parameters

None

Command Mode

Privileged Exec and Exec modes

Examples

```
 #show debugging mpls-tp lps
LPS FSM events debugging is on
LPS packet events debugging is on
LPS switchover events debugging is on
LPS lockout events debugging is on
LPS signal fail events debugging is on
```

show mpls-tp lps protection-group

Use this command to display information about MPLS-TP protection groups.

Command Syntax

```
show mpls-tp lps protection-group
```

Parameters

None

Command Mode

Privileged Exec and Exec modes

Examples

```
#show mpls-tp lps protection-group
<================================================================================>
Group Name          : abc                 Oper Status       : Up
Revertive mode      : Non-Revertive       Protection-scheme : Bidirectional(1:1)
WTR timer           : 5 sec               Hold-off timer    : 0 sec
Rapid tx freq       : 3300 usec           Continual tx freq : 5 sec
Primary meg         : meg2                Backup meg        : meg4
Primary me          : me2                 Backup me         : me4
--------------------------------------------------------------------------------
Current State       : Do Not Revert
Reason              : Do Not Revert
Current Event       : Local Clear Signal Fail on Working Path
--------------------------------------------------------------------------------
COUNTERS:
Pkt-Tx              : 921                 Pkt-Rx            : 916
Invalid pkt         : 0                   Scheme mismatch   : 0
Mode mismatch       : 0                   Start time        : 01:16:22
********************************************************************************
```

show mpls-tp lps protection-group NAME

Use this command to display information about a specific protection group.

Command Syntax

```
show mpls-tp lps protection-group NAME
```

Parameters

NAME	Name of the protection group; maximum of 48 characters

Command Mode

Privileged Exec and Exec modes

Examples

```
#show mpls-tp lps protection-group abc
<=============================================================================>
Group Name          : abc                Oper Status       : Up
Revertive mode      : Non-Revertive      Protection-scheme : Bidirectional(1:1)
WTR timer           : 5 sec              Hold-off timer    : 0 sec
Rapid tx freq       : 3300 usec          Continual tx freq : 5 sec
Primary meg         : meg2               Backup meg        : meg4
Primary me          : me2                Backup me         : me4
-----------------------------------------------------------------------------
Current State       : Do Not Revert
Reason              : Do Not Revert
Current Event       : Local Clear Signal Fail on Working Path
-----------------------------------------------------------------------------
COUNTERS:
Pkt-Tx              : 921                Pkt-Rx            : 916
Invalid pkt         : 0                  Scheme mismatch   : 0
Mode mismatch       : 0                  Start time        : 01:16:22
*****************************************************************************
```

show mpls-tp lps protection-group summary

Use this command to display summary information about an MPLS-TP protection group.

Command Syntax

```
show mpls-tp lps protection-group summary
```

Parameters

None

Command Mode

Exec mode

Examples

```
 #show mpls-tp lps protection-group summary
Total Number of PS groups configured : 2
--------------------------------------------------------------------------------
Group-Name Primary-MegName Primary-MeName Backup-MegName Backup-MeName Oper-Status
--------------------------------------------------------------------------------
abc        meg1            me1            meg3           me3           UP
def        meg2            me 2           meg4           me4           UP
```

switchover

Use this command to switch traffic to the backup path.

Use the `no` form of this command to remove the switchover configuration.

Command Syntax

```
switchover (force | manual)
no switchover (force | manual)
```

Parameters

`force`	Force switchover
`manual`	Manual switchover

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#switchover force

#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#no switchover force
```

wtr timer

Use this command to set the wait-to-restore timer used to verify that a signal failure is not intermittent.

Use the `no` form of this command to set the wait-to-restore timer to its default value.

Command Syntax

```
wtr timer <0-720>
no wtr timer
```

Parameters

`<0-720>`	Value of wait-to-restore timer in seconds

Default

The default value of the wait-to-restore timer is 300 seconds.

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#wtr timer 20

#configure terminal
(config)#mpls-tp lps protection-group abc
(config-pg)#no wtr-timer
```

CHAPTER 10 MPLS-TP RPS Commands

The commands in this chapter configure and manage Ring Protection Switching (RPS) for the MPLS Transport Profile.

backup meg

Use this command to configure a backup Maintenance Entity Group (MEG) for a protection group.

You can use this command to configure a backup entity with ITU-T identifier:

- Use the command form with the `mip-id` parameter to configure a backup MEG with an ITU-T Maintenance Entity group intermediate point identifier
- Use the `no` form of this command to remove a backup MEG.

Command Syntax

```
backup meg NAME mip-id <1-8191>
no backup meg NAME mip-id <1-8191>
```

Parameters

`NAME`	MEG name; maximum 48 characters
`<1-8191>`	ITU-T Maintenance Entity Group intermediate point identifier

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#backup meg meg1 mip-id 1

#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#no backup meg meg1 mip-id 1
```

clear wtr

Use this command to clear the signal fail condition immediately by stopping the running wait-to-restore timer.

Command Syntax

```
clear timer <0-720>
```

Parameters

<0-720>	Value of wait-to-restore timer in seconds

Default

The default value of the wait-to-restore timer is 300 seconds.

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#clear wtr
```

hold-off timer

Use this command to set a hold-off timer value used to filter intermittent link faults.

Use the `no` form of this command to set the hold-off timer to its default value.

Command Syntax

```
hold-off timer <0-10>
no hold-off timer
```

Parameters

`<0-10>`	Hold-off timer value in seconds

Default

The default value of the hold-off timer is 0.

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#hold-off timer 10

#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#no hold-off timer
```

mpls-tp rps protection-group

Use this command to configure an MPLS-TP RPS protection group and enter protection group (PG) mode.

Use the `no` form of this command to remove a protection group.

Command Syntax

```
mpls-tp rps protection-group NAME
no mpls-tp rps protection-group NAME
```

Parameters

`NAME`	Name of the protection group; maximum 128 characters

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#

#configure terminal
(config)#no mpls-tp rps protection-group abc
```

primary meg

Use this command to configure a primary maintenance entity group (MEG) for a protection group.

You can use this command to configure a primary MEG with either ITU-T identifier:

- Use the command form with the `me` parameter to configure a primary MEG with an ITU-T Maintenance Entity identifier
- Use the command form with the `mip-id` parameter to configure a primary MEG with an ITU-T Maintenance Entity intermediate point identifier

Use the `no` form of this command to remove a primary MEG.

Command Syntax

```
primary meg NAME mip-id <1-8191>
no primary meg NAME mip-id <1-8191>
```

Parameters

`meg`	MEG name
`NAME`	MEG name; maximum 48 characters
`mip-id`	ITU-T Maintenance Entity intermediate point identifier
`<1-8191>`	ITU-T Maintenance Entity intermediate point identifier

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#primary meg meg1 mip-id 1

#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#no primary meg meg1 mip-id 1
```

wtr timer

Use this command to set the wait-to-restore timer used to verify that a signal failure is not intermittent.

Use the `no` form of this command to set the wait-to-restore timer to its default value.

Command Syntax

```
wtr timer <0-720>
no wtr timer
```

Parameters

`<0-720>`	Value of wait-to-restore timer in seconds

Default

The default value of the wait-to-restore timer is 300 seconds.

Command Mode

Protection group mode

Examples

```
#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#wtr timer 20

#configure terminal
(config)#mpls-tp rps protection-group abc
(config-pg)#no wtr-timer
```

show mpls-tp rps protection-group

Use this command to display information about all the configured MPLS-TP RPS protection groups.

Command Syntax

```
show mpls-tp rps protection-group
```

Parameters

None

Command Mode

Privileged Exec and Exec modes

Examples

```
#show mpls-tp rps protection-group
<=================================================================
 Group Name         : abc              Oper Status       : Up
 Revertive mode     : Revertive
 WTR timer          : 300 sec          Hold-off timer    : 10 sec
 Primary meg        : meg1             Backup meg        : meg2
 Primary mip-id     : 1                Backup mip-id     : 2
 Group-Type         : ITUT
-----------------------------------------------------------------
 Current State      : Idle
 Current Event      : -
<=================================================================
<=================================================================
 Group Name         : def              Oper Status       : Up
 Revertive mode     : Revertive
 WTR timer          : 300 sec          Hold-off timer    : 10 sec
 Primary meg        : meg3             Backup meg        : meg4
 Primary mip-id     : 3                Backup mip-id     : 4
 Group-Type         : ITUT
-----------------------------------------------------------------
 Current State      : Idle
 Current Event      : -
<=================================================================
```

show mpls-tp rps protection-group NAME

Use this command to display information about a specific protection group.

Command Syntax

```
show mpls-tp rps protection-group NAME
```

Parameters

NAME	Name of the protection group; maximum of 48 characters

Command Mode

Privileged Exec and Exec modes

Examples

```
#show mpls-tp rps protection-group abc
<=============================================================================>
 Group Name         : abc             Oper Status       : Up
 Revertive mode     : Revertive
 WTR timer          : 300 sec         Hold-off timer    : 10 sec
 Primary meg        : meg1            Backup meg        : meg2
 Primary mip-id     : 1               Backup mip-id     : 2
 Group-Type         : ITUT
-------------------------------------------------------------------------------
 Current State      : Idle
 Current Event      : -
<=============================================================================>
```

show mpls-tp rps protection-group summary

Use this command to display summary information about all the configured MPLS-TP RPS protection groups.

Command Syntax

```
show mpls-tp rps protection-group summary
```

Parameters

None

Command Mode

Exec mode

Examples

```
#show mpls-tp rps protection-group summary

Total Number of PS groups configured : 1
-------------------------------------------------------------------------------
Group-Name Primary-Meg  Pri-Me Name/ID Backup-Meg   Bkp-Me Name/ID  Oper-
Status
-------------------------------------------------------------------------------
abc             meg1            1               meg2            2
UP
def             meg3            3               meg3            4
UP
```

CHAPTER 11 SAToP Commands

This chapter provides a reference for the SAToP (Structure-Agnostic Time Division Multiplexing over Packet) commands for pseudo wire encapsulation for Time Division Multiplexing (TDM) bit-streams (T1, E1, T3, E3). It includes the following commands:

interface tdm

Use this command to create a virtual interface of TDM type, which will help configure the TDM.

Use the no parameter to remove a virtual interface of TDM type.

Command Syntax

```
interface tdm <0-100>
no interface tdm <0-100>
```

Parameters

<0-100>	TDM interface number.

Command Mode

Configure mode

Example

```
#configure terminal
(config)#interface tdm 12
(config-if)#

(config)#no interface tdm 12
(config)#
```

jitter-buffer-size

Use this command to configures the jitter buffer size of the CE-bound (“depacketizer”) IWF (inter-working function).

Use the no parameter to remove a remove this configuration.

Command Syntax

```
jitter-buffer-size <1-500>
no jitter-buffer-size <1-500>
```

Parameters

<1-500>	Range for jitter buffer size in milliseconds (ms). Default value is 5 ms.

Command Mode

Interface TDM mode

Example

```
#configure terminal
(config)#interface tdm 12
(config-if)#jitter-buffer-size 123

(config)#interface tdm 12
(config-if)#no jitter-buffer-size
```

Use this command to bind an interface to an MPLS-TP Layer 2 virtual circuit that was created in the Configure mode.

Use the `no` parameter with this command to delete this instance.

Command Syntax

```
 NAME ((tdm-T1|tdm-E1|tdm-T3|tdm-E3) (primary|secondary|)|)
no  NAME ((tdm-T1|tdm-E1|tdm-T3|tdm-E3)
```

Parameters

`NAME`	Name of the Layer 2 circuit; maximum 16 characters.
`tdm-E1`	TDM - E1 line.
`tdm-E3`	TDM - E3 line.
`tdm-T1`	TDM - T1 line.
`tdm-T3`	TDM - T3 line.
`primary`	Primary link.
`secondary`	Secondary link. This will not be activated unless primary fails.

Command Mode

Interface mode

Examples

```
#configure terminal
(config)#interface eth0
(config-if)# new tdm-E1 primary
```

rtp-header

Use this command to configure RTP (Real-time Transport Protocol) header.

Use the no parameter to remove a remove this configuration.

Command Syntax

```
rtp-header
no rtp-header
```

Parameters

None

Command Mode

Interface TDM mode

Example

```
#configure terminal
(config)#interface tdm 12
(config-if)#rtp-header

(config)#interface tdm 12
(config-if)#no rtp-header
```

show tdm error-detection-timers

Use this command to display the error-set and error-clear timers.

Command Syntax

```
show tdm error-detection-timers interface IFNAME
```

Parameters

`interface`	Display the interface name.
`IFNAME`	Give the actual interface name.

Command Mode

Exec mode and Privileged Exec mode

Example

```
#show tdm error-detection-timers interface eth1
packet-loss_set_period                              = 2.5
stray-packets_set_period                           = 2.5
malformed-packets_set_period                 = 2.5
Excessive-packet-loss-rate_set_period     =2.5
Buffer-overrun_set_period                          = 2.5
Remote-packet-loss_set_period                = 2.5
packet-loss_clear_period                            = 10
stray-packets_ clear_period                        =10
malformed-packets_ clear_period              =10
Excessive-packet-loss-rate_ clear_period  =10
Buffer-overrun_ clear_period                       =10
Remote-packet-loss_ clear_period             =10

#
```

show tdm interface

Use this command to display TDM-related details.

Command Syntax

```
show tdm interface IFNAME
```

Parameters

IFNAME	Display the interface name.

Command Mode

Exec mode and Privileged Exec mode

Example

```
#show tdm interface tdm
tdm_name    status    type    bitrate    payload_bytes    PW_id     Control-
word   Buffer-size

tdm1             UP         E1     1.544m    256                  10
0x04544554      5 ms

#
```

show tdm satop-statistics

Use this command to displays statistics for both the CE-bound IWF and PSN-bound IWFs.

Command Syntax

```
show tdm satop-statistics (ce-bound|psn-bound) interface IFNAME
```

Parameters

`ce-bound`	Show packet details for CE-bound.
`psn-bound`	Show the packet details for PSN-bound.
`interface`	Display the interface name.
`IFNAME`	Give the actual interface name.

Command Mode

Exec mode and Privileged Exec mode

Example

```
#show tdm satop-statistics ce-bound interface tdm
interface tdm 2
--------------------------------------------------------------------------------
Forwarded packets                          = 0
fbp_drop_packets                                 = 0
out_of_window_packets                       = 0
buffer_overun_dropped_packets         = 0
window_switchover                              = 0
buffer_overun_events                         = 0
stray_packets; malformed_packets     = 0
cw_ais_drop_packets                         = 0
multiple_packets                                   = 0
mpls_drop_packets                                =0
denied_packets                                      =0
out_of_sequence_packets                     =0
out_of_band_cas_packets                     =0
rdi_dropped_packets                             =0
rai_packets                                                =0

#
```

tdm payload-bytes

Use this command to configures the payload size of SAToP packets. The default values are 256 for E1 and 192 for T1, 1024 for E3 and T3 lines.

Use the no parameter to remove a remove this configuration.

Command Syntax

```
tdm payload-bytes <0-32768>
```

```
no tdm payload-bytes
```

Parameters

<0-32768>	Set the payload in bytes.

Command Mode

Interface TDM mode

Example

```
#configure terminal
(config)#interface tdm 12
(config-if)#tdm payload-bytes 123

(config)#interface tdm 12
(config-if)#no tdm payload-bytes
```

timer error-clear

Use this command to configures the timer error-clear period.

Use the no parameter to remove a remove this configuration.

Command Syntax

```
timer error-clear (packet-loss|stray-packets|malformed-packets|excessive-packet-
  loss-rate|buffer-overrun|remote-packet-loss) <2000-10000>
no timer error-clear (packet-loss|stray-packets|malformed-packets|excessive-packet-
  loss-rate|buffer-overrun|remote-packet-loss)
```

Parameters

`buffer-overrun` Error-type - buffer-overrun.

`excessive-packet-loss-rate`
Error-type - excessive packet loss rate.

`malformed-packets`
Error-type - malformed-packets.

`packet-loss` Error-type - packet-loss.

`remote-packet-loss`
Error-type - remote packet loss.

`<2000-10000>`
Range for setting the error-set period in milliseconds.

`stray-packets` Error-type - stray-packets.

Command Mode

Interface TDM mode

Example

```
#configure terminal
(config)#interface tdm 12
(config-if)#timer error-clear remote-packet-loss 2123

(config)#interface tdm 12
(config-if)#no timer error-clear remote-packet-loss
```

timer error-set

Use this command to configures the timer error-set period.

Use the no parameter to remove a remove this configuration.

Command Syntax

```
timer error-set (packet-loss|stray-packets|malformed-packets|excessive-packet-
  loss-rate|buffer-overrun|remote-packet-loss) <2000-10000>
no timer error-set (packet-loss|stray-packets|malformed-packets|excessive-packet-
  loss-rate|buffer-overrun|remote-packet-loss)
```

Parameters

Parameters

`buffer-overrun` Error-type - buffer-overrun.

`excessive-packet-loss-rate`
Error-type - excessive packet loss rate.

`malformed-packets`
Error-type - malformed-packets.

`packet-loss` Error-type - packet-loss.

`remote-packet-loss`
Error-type - remote packet loss.

`<2000-10000>`
Range for setting the error-set period in milliseconds.

`stray-packets` Error-type - stray-packets.

Command Mode

Interface TDM mode

Example

```
#configure terminal
(config)#interface tdm 12
(config-if)#timer error-set remote-packet-loss 2123

(config)#interface tdm 12
(config-if)#no timer error-set remote-packet-loss
```

Index

M

N

P

R

S

T

V

W