



OcNOS®

Open Compute Network Operating System for Data Centers Version 7.0.0

Carrier Ethernet Guide

February 2026

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Preface

This guide describes how to configure OcNOS.

Audience

This guide is intended for network administrators and other engineering professionals who configure OcNOS.

Conventions

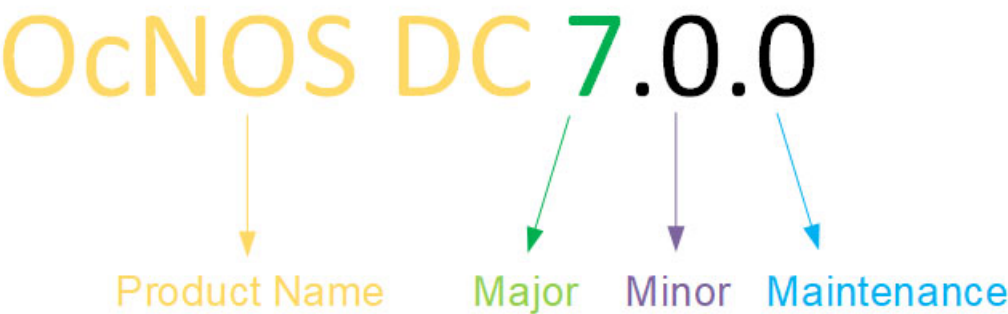
Table 1 on page 6 shows the conventions used in this guide.

Table 1: Conventions

Convention	Description
Italics	Emphasized terms or titles of books
Note:	Special instructions, suggestions, or warnings
<code>monospaced type</code>	Code elements such as commands, parameters, files, and directories

IP Infusion Product Release Version

Each integer in release number indicates Major, Minor, and Maintenance release versions. Build numbers that follow the release numbers are for internal tracking and verification of the software build process and are visible to customers as part of the software version number.



Product Name: IP Infusion Product Family

Major Version: New customer-facing functionality that represents a significant change to the code base; including, a significant marketing change or direction in the product.

Minor Version: Enhancements or extensions to existing features, changes to address external needs, or internal improvements might be motivated by improvements to satisfy new sales regions or marketing initiatives.

Maintenance Version: A collection of product bugs or hotfixes usually scheduled every 30 or 60 days, based on the number of hotfixes.

Related Documentation

For information about installing OcNOS, see the *Installation Guide* for your platform.

Feature Availability

Each OcNOS SKU contains a set of supported features. For a list of available features based on the SKU that you purchased. Refer to the *Feature Matrix*.

Migration Guide

Check the *Migration Guide* for necessary configuration changes before migrating from one version of OcNOS to another.

IP Maestro Support

Monitor devices running OcNOS Release 6.3.4-70 and above using IP Maestro software.

Technical Support

IP Infusion maintains an online technical support site that provides a variety of technical support programs for licensed OcNOS customers at the [Technical Assistance Center](#).

Customers and partners enjoy full access to the support website. The site allows customers and partners to open technical support calls, update open calls with new information, and review the status of open or closed calls. The password-protected site includes technical documentation, Release Notes, and descriptions of service offerings.

Technical Sales

Contact the IP Infusion sales representative for more information about the OcNOS solution.

Technical Documentation

For core commands and configuration procedures, visit: [Product Documentation](#).

For training videos, visit: [OcNOS Free Training Videos](#).

For a list of supported platforms and SKUs of OcNOS features, refer to the [OcNOS Feature Matrix](#).

Disclaimer

The global documentation site is evolving to provide an enhanced website user experience for select topics included in this release. Some guides are now available outside the existing documentation library and can be accessed directly from custom documentation landing pages. These guides offer robust in-built search functionality.

For the latest documentation, visit the product-specific documentation landing page and select the relevant guide.

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Command Line Interface

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

Overview

You use the CLI to configure, monitor, and maintain OcNOS 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 OcNOS or remotely from a terminal emulator such as `putty` or `xterm`. You can also use the commands in scripts to automate configuration tasks.

Chapter Organization

The chapters in command references are organized as described in [Command Description Format](#).

The chapters in configuration guides are organized into these major sections:

- An overview that explains a configuration in words
- Topology with a diagram that shows the devices and connections used in the configuration
- Configuration steps in a table for each device where the left-hand side shows the commands you enter and the right-hand side explains the actions that the commands perform
- Validation which shows commands and their output that verify the configuration

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

```

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

```

If you type the ? in the middle of a keyword, but the incomplete keyword matches several other keywords, OcNOS 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 int xe0

```

is an abbreviation for:

```

> show interface xe0

```

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 2](#) on page 11 describes the conventions used to represent command syntax in this reference.

Table 2: Syntax conventions

Convention	Description	Example
monospaced font	Command strings entered on a command line	<code>show ip ospf</code>
lowercase	Keywords that you enter exactly as shown in the command syntax.	<code>show ip ospf</code>
UPPERCASE	See Variable Placeholders	<code>IFNAME</code>
()	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.	<code>(A.B.C.D <0-4294967295>)</code>

Table 2: Syntax conventions (Continued)

Convention	Description	Example
()	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.	[<1-65535> AA:NN internet local-AS no-advertise no-export]
?	Nonrepeatable parameter. The parameter that follows a question mark can only appear once in a command string. Do not enter the question mark as part of the command.	?route-map WORD
.	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 3](#) on page 12 shows the tokens used in command syntax use to represent variables for which you supply a value.

Table 3: 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

Table 3: Variable placeholders

Token	Description
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 4](#) on page 13 explains the sections used to describe each command in this reference.

Table 4: 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
Applicability	The command introduced in a specific release version and modified or updated in subsequent versions.
Example	An example of the command being executed

Keyboard Operations

[Table 5](#) on page 13 lists the operations you can perform from the keyboard.

Table 5: 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.

Table 5: Keyboard operations (Continued)

Key combination	Operation
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
Ctrl+t	Transposes the current character with the previous character
Ctrl+c	Ignores the current line and redisplay 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

Note: The show command output included in the guides is for illustration purposes only. Based on the combination of features enabled and ongoing enhancements made to the commands, the output for these commands may vary. For instance, the actual command output may differ depending on the software version, configuration, and platform. Field names, values, and formats are subject to change.

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
last       Last few lines
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 running-config | begin xe1
...skipping
interface xe1
  ipv6 address fe80::204:75ff:fee6:5393/64
!
interface xe2
  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 “xe2” or “xe4”:

```
# show running-config | begin xe[2-4]

...skipping
interface xe2
  shutdown
!
interface xe4
  shutdown
!
interface svlan0.1
  no shutdown
!
route-map myroute permit 2
!
route-map mymap1 permit 10
!
route-map rmap1 permit 2
!
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 xe1 | 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 interface xe0 | 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 xe1 | exclude input
Interface xe1
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 xe0 | exclude (in|out)put
Interface xe0
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 cli history | redirect /var/frame.txt
```

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

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

Last Modifier

The `last` modifier displays the output of last few number of lines (As per the user input). The last number ranges from 1 to 9999.

For example:

```
#show running-config | last 10
```

String Parameters

The restrictions in [Table 6](#) on page 17 apply for all string parameters used in OcNOS commands, unless some other restrictions are noted for a particular command.

Table 6: String parameter restrictions

Restriction	Description
Input length	1965 characters or less
Restricted special characters	"?", ",", ">", " ", and "=" The " " character is allowed only for the <code>description</code> command in interface mode.

Command Modes

Commands are grouped into modes arranged in a hierarchy. Each mode has its own set of commands. [Table P-7](#) lists the command modes common to all protocols.

Table 7: Common command modes

Name	Description
Executive mode	Also called <i>view</i> 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 <code>show</code> , <code>exit</code> , <code>quit</code> , <code>help</code> , and <code>enable</code> .
Privileged executive mode	Also called <i>enable</i> mode, in this mode you can run additional basic commands such as <code>debug</code> , <code>write</code> , and <code>show</code> .
Configure mode	Also called <i>configure terminal</i> 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. Configure mode is single user. Only one user at a time can be in configure mode.
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 BGP or OSPF.

Command Mode Tree

The diagram below shows the common command mode hierarchy.

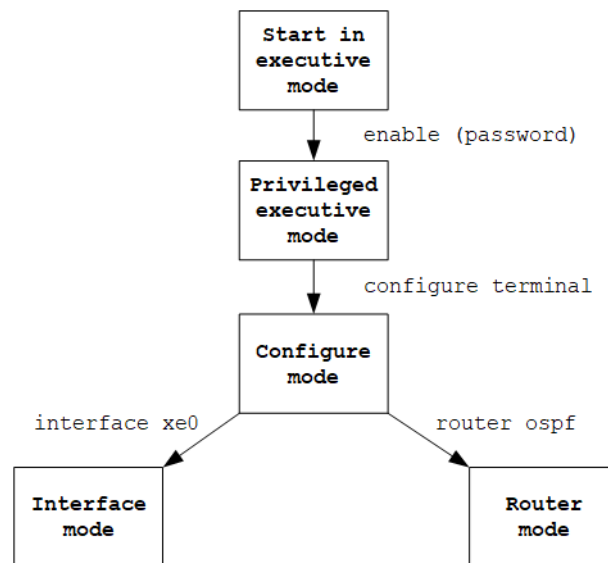


Figure 1: Common command modes

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 moving from executive mode to privileged executive mode to configure mode and finally to router mode:

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

Transaction-based Command-line Interface

The OcNOS command line interface is transaction based:

- Any changes done in configure mode are stored in a separate *candidate* configuration that you can view with the `show transaction current` command.
- When a configuration is complete, apply the candidate configuration to the running configuration with the `commit` command.
- If a `commit` fails, no configuration is applied as the entire transaction is considered failed. You can continue to change the candidate configuration and then retry the `commit`.
- Discard the candidate configuration with the `abort transaction` command.
- Check the last aborted transaction with the `show transaction last-aborted` command.
- Multiple configurations cannot be removed with a single `commit`. You must remove each configuration followed by a `commit`.

Note: All commands MUST be executed only in the default CML shell (`cmlsh`). If you log in as root and start `imish`, then the system configurations will go out of sync. The `imish` shell is not supported and should not be started manually.

Carrier Ethernet Configuration

CHAPTER 1 G.8032 ERPS Version 2

Overview

G.8032 Ethernet Ring Protection Switching (ERPS) Version 2 is an ITU-T standard that provides sub-50 ms protection switching for Ethernet traffic in ring topologies. ERPS Version 2 improves on the original G.8032 by supporting multiple interconnected rings and ladder topologies, enabling scalable and resilient Layer 2 networks.

In OcNOS, ERPS Version 2 ensures loop-free forwarding and rapid failover by designating a Ring Protection Link (RPL) and managing its state. When a fault occurs, ERPS Version 2 blocks or unblocks specific ring ports to maintain uninterrupted traffic flow.

Topology

Figure 1-1 displays a sample Ring Protection topology on which protection switching is configured with four bridges. The Ring Protection Link (RPL) owner is the link between Bridge 3 and Bridge 4 (xe16), on which one side of the link is defined explicitly as RPL owner (Bridge 4) and RPL neighbor (Bridge 3). The rest of the bridges are explicitly configured RPL non owner to enable ERPS in the ring.

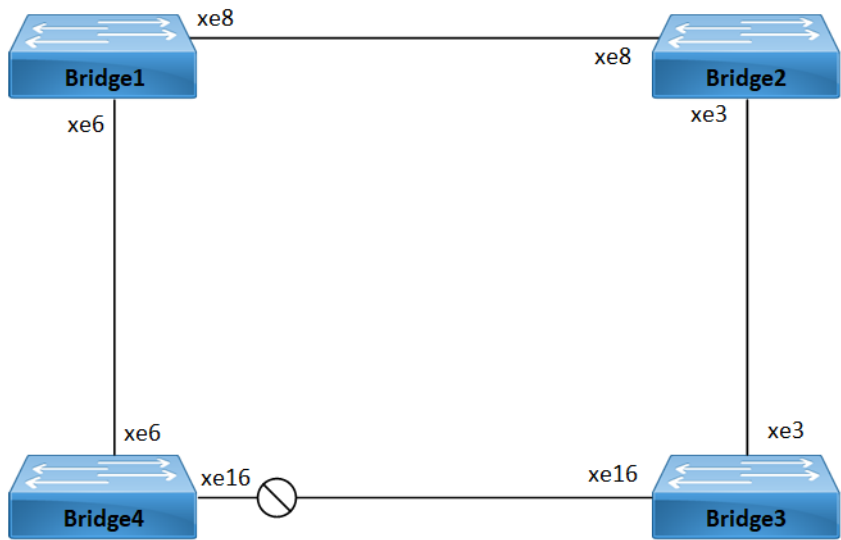


Figure 1-1: Major Ring Topology

Prerequisite

- A ring topology built with VLAN-enabled OcNOS interfaces
- Proper bridge-domain and VLAN assignments

Bridge 1

Bridge1#configure terminal	Enter configure mode
Bridge1(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.

<code>Bridgel((config)#vlan database</code>	Configure VLAN database
<code>Bridgel(config-vlan)#vlan 200-205 bridge 1 state enable</code>	Create VLAN 200-205 on bridge 1
<code>Bridgel(config-vlan)#interface xe6</code>	Configure interface xe6
<code>Bridgel(config-if)#switchport</code>	Configure xe6 as a layer 2 port
<code>Bridgel(config-if)#bridge-group 1</code>	Configure interface in bridge group 1
<code>Bridgel(config-if)#bridge-group 1 spanning-tree disable</code>	Disable spanning tree for bridge group 1 on that interface
<code>Bridgel(config-if)#switchport mode trunk</code>	Configure port as trunk port
<code>Bridgel(config-if)#switchport trunk allowed vlan add 200-205</code>	Allow vlan 200-205 on xe6 interface
<code>Bridgel(config-if)#interface xe8</code>	Configure interface xe8
<code>Bridgel(config-if)#switchport</code>	Configure xe8 as a layer 2 port
<code>Bridgel(config-if)#bridge-group 1</code>	Configure interface in bridge group 1
<code>Bridgel(config-if)#bridge-group 1 spanning-tree disable</code>	Disable spanning tree for bridge group 1 on that interface
<code>Bridgel(config-if)#switchport mode trunk</code>	Configure port as trunk port
<code>Bridgel(config-if)#switchport trunk allowed vlan add 200-205</code>	Allow vlan 200-205 on xe8 interface
<code>Bridgel(config-if)#ethernet cfm domain- type character-string domain-name nod12 level 7 mip-creation none</code>	Create cfm domain with type as character string with name nod12 and set mip creation criteria to default with level 7 on bridge 1
<code>Bridgel(config-ether-cfm)#service ma-type string ma-name 43982</code>	Create ma type as string with name 43982.
<code>Bridgel(config-ether-cfm-ma)# vlan 200 bridge 1</code>	Add vlan 200
<code>Bridgel(config-ether-cfm-ma)# mip-creation none</code>	Set mip-creation creation criteria to none
<code>Bridgel(config-ether-cfm-ma)#ethernet cfm mep down mpid 12 active true xe8</code>	Create down mep 12 for xe8 interface
<code>Bridgel(config-ether-cfm-ma-mep)#cc multicast state enable</code>	Enable cc multicast
<code>Bridgel(config-ether-cfm-ma-mep)#exit- ether-ma-mep-mode</code>	Exit ethernet cfm ma-mep mode
<code>Bridgel(config-ether-cfm-ma)#mep crosscheck mpid 21</code>	Configure crosscheck to remote MEP with value 21
<code>Bridgel(config-ether-cfm-ma)#cc interval 1s</code>	Enable cc interval with 1s.
<code>Bridgel(config-ether-cfm-ma)#exit-ether- ma-mode</code>	Exit Ethernet ma mode
<code>Bridgel(config-ether-cfm)#ethernet cfm domain-type character-string domain-name nod41 level 7 mip-creation none</code>	Create cfm domain with type as character string with name nod41 and set mip creation criteria to default with level 7 on bridge 1

Bridgel (config-ether-cfm) #service ma-type string ma-name 43982 vl	Create ma type as string with name 43982.
Bridgel (config-ether-cfm-ma) # vlan 200 bridge 1	Add vlan 200
Bridgel (config-ether-cfm-ma) # mip-creation none	Set mip-creation creation criteria to none
Bridgel (config-ether-cfm-ma) #ethernet cfm mep down mpid 14 active true xe6	Create down mep 14 for xe6 interface
Bridgel (config-ether-cfm-ma-mep) #cc multicast state enable	Enable cc multicast
Bridgel (config-ether-cfm-ma-mep) #exit- ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridgel (config-ether-cfm-ma) #mep crosscheck mpid 41	Configure crosscheck to remote MEP with value 41
Bridgel (config-ether-cfm-ma) #cc interval 1s	Enable cc interval with 1s.
Bridgel (config-ether-cfm-ma) #exit-ether- ma-mode	Exit Ethernet ma mode
Bridgel (config-ether-cfm) #g8032 ring RING1	Create a g8032 ring with name RING1
Bridgel (g8032-ring-config) #east-interface xe6	Associate xe6 interface as east-interface
Bridgel (g8032-ring-config) #west-interface xe8	Associate xe8 interface as west-interface
Bridgel (g8032-ring-config) #g8032 profile profile1	Create g8032 profile with profile name profile1
Bridgel (g8032-profile-config) #timer wait- to-restore 1	Configure wait to restore time as 1 min
Bridgel (g8032-profile-config) #timer hold- off 0	Configure hold-off timer value as 0
Bridgel (g8032-profile-config) #timer guard- time 10	Configure guard-time value as 10ms
Bridgel (g8032-profile-config) #switching mode revertive	Configure Switching mode as revertive Switching mode
Bridgel (g8032-profile-config) #g8032 erp- instance erp1	Create g8032 erp instance erp1
Bridgel (g8032-config-switch) #ring RING1	Associate Physical ring RING1 to erp1 instance
Bridgel (g8032-config-switch) #rpl role non- owner	Configure the node as non-owner node
Bridgel (g8032-config-switch) g8032-profile profile1	Associate Profile profile1 to erp1 instance
Bridgel (g8032-config-switch) #aps-channel level 7	Configure level as 7

Bridge1(g8032-config-switch)#aps-channel-vlan 200	Configure RAPS channel vlan as 200
Bridge1(g8032-config-switch)#data vlan 201-205	Configure traffic vlan from 201-205
Bridge1(g8032-config-switch)#ring-id 1	Configure ring-id as 1
Bridge1(g8032-config-switch)#g8032 ring lagsubring	Create g8032 ring with name lagsubring
Bridge1(g8032-ring-config)#east-interface po6	Associate po6 interface as east-interface
Bridge1(g8032-ring-config)#g8032 erp-instance erp2	Create g8032 erp instance erp2
Bridge1(g8032-config-switch)#ring-type sub-ring	Configure ring-type as sub-ring
Bridge1(g8032-config-switch)#ring lagsubring	Associate Physical ring lagsubring to erp2 instance
Bridge1(g8032-config-switch)#rpl role neighbor east-interface	Configure the node as neighbor node on east interface
Bridge1(g8032-config-switch)#g8032-profile profile1	Associate Profile profile1 to erp2 instance
Bridge1(g8032-config-switch)#aps-channel level 7	Configure level as 7
Bridge1(g8032-config-switch)#aps-channel-vlan 200	Configure RAPS channel vlan as 200
Bridge1(g8032-config-switch)#data vlan 201-205	Configure traffic vlan from 201-205
Bridge1(g8032-config-switch)#ring-id 2	Configure ring-id as 2
Bridge1(g8032-config-switch)#non-virtual-channel	Enable Non Virtual Channel
Bridge1(g8032-config-switch)# enable-tcn-propagation	Enable tcn propagation
Bridge1(g8032-config-switch)# tcn-to-instance erp1	Attach erp1 instance to erp2 instance to notify any changes in subring to major ring
Bridge1(g8032-config-switch)#commit	Commit the candidate configuration to the running configuration
Bridge1(g8032-config-switch)#end	Exit g8032 erp instance mode

Bridge 2

Bridge2#config terminal	Enter configure mode
Bridge2(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
Bridge2((config)#vlan database	Configure VLAN database
Bridge2(config-vlan)#vlan 200-205 bridge 1 state enable	Create VLAN 200-205 on bridge 1
Bridge2(config-vlan)#interface xe3	Configure interface xe3
Bridge2(config-if)#switchport	Configure xe3 as a layer 2 port
Bridge2(config-if)#bridge-group 1	Configure interface in bridge group 1

Bridge2(config-if)#bridge-group 1 spanning-tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge2(config-if)#switchport mode trunk	Configure port as trunk port
Bridge2(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on xe3 interface
Bridge2(config-if)#interface xe8	Configure interface xe8
Bridge2(config-if)#switchport	Configure xe8 as a layer 2 port
Bridge2(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge2(config-if)#bridge-group 1 spanning-tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge2(config-if)#switchport mode trunk	Configure port as trunk port
Bridge2(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on xe8 interface
Bridge2(config-if)#ethernet cfm domain- type character-string domain-name nod23 level 7 mip-creation none	Create cfm domain with type as character string with name nod23 and set mip creation criteria to default with level 7 on bridge 1
Bridge2(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982.
Bridge2(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge2(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge2(config-ether-cfm-ma)#ethernet cfm mep down mpid 23 active true xe3	Create down mep 23 for xe3 interface
Bridge2(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge2(config-ether-cfm-ma-mep)#exit- ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge2(config-ether-cfm-ma)#mep crosscheck mpid 32	Configure crosscheck to remote MEP with value 32
Bridge2(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge2(config-ether-cfm-ma)#exit-ether- ma-mode	Exit Ethernet ma mode
Bridge2(config-ether-cfm)#ethernet cfm domain-type character-string domain-name nod12 level 7 mip-creation none	Create cfm domain with type as character string with name nod12 and set mip creation criteria to default with level 7 on bridge 1
Bridge2(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982.
Bridge1(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge1(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge2(config-ether-cfm-ma)#ethernet cfm mep down mpid 21 active true xe8	Create down mep 21 for xe8 interface
Bridge2(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast

Bridge2 (config-ether-cfm-ma-mep) #exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge2 (config-ether-cfm-ma) #mep crosscheck mpid 12	Configure crosscheck to remote MEP with value 12
Bridge2 (config-ether-cfm-ma) #cc interval 1s	Enable cc interval with 1s.
Bridge2 (config-ether-cfm-ma) #exit-ether-ma-mode	Exit Ethernet ma modes
Bridge2 (config-ether-cfm) #g8032 ring RING1	Create g8032 ring with name RING1
Bridge2 (g8032-ring-config) #east-interface xe8	Associate xe8 interface as east-interface
Bridge2 (g8032-ring-config) #west-interface xe3	Associate xe3 interface as west-interface
Bridge2 (g8032-ring-config) #g8032 profile profile1	Create g8032 profile with profile name profile1
Bridge2 (g8032-profile-config) #timer wait-to-restore 1	Configure wait to restore time as 1 min
Bridge2 (g8032-profile-config) #timer hold-off 0	Configure hold-off timer value as 0
Bridge2 (g8032-profile-config) #timer guard-time 10	Configure guard-time value as 10ms
Bridge2 (g8032-profile-config) #switching mode revertive	Configure Switching mode as revertive Switching mode
Bridge2 (g8032-profile-config) #g8032 erp-instance erp1	Create g8032 erp instance erp1
Bridge2 (g8032-config-switch) #ring RING1	Associate Physical ring RING1 to erp1 instance
Bridge2 (g8032-config-switch) #rp1 role non-owner	Configure the node as non-owner node
Bridge2 (g8032-config-switch) #g8032-profile profile1	Associate Profile profile1 to erp1 instance
Bridge2 (g8032-config-switch) #aps-channel level 7	Configure level as 7
Bridge2 (g8032-config-switch) #aps-channel-vlan 200	Configure RAPS channel vlan as 200
Bridge2 (g8032-config-switch) #data vlan 201-205	Configure traffic vlan from 201-205
Bridge2 (g8032-config-switch) #ring-id 1	Configure ring-id as 1
Bridge2 (g8032-config-switch) #commit	Commit the candidate configuration to the running configuration
Bridge2 (g8032-config-switch) #end	Exit g8032 erp instance mode

Bridge 3

Bridge3#config terminal	Enter configure mode
Bridge3 (config) #bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
Bridge3 ((config) #vlan database	Configure VLAN database

Bridge3(config-vlan)#vlan 200-205 bridge 1 state enable	Create VLAN 200-205 on bridge 1
Bridge3(config-vlan)#interface xe3	Configure interface xe3
Bridge3(config-if)#switchport	Configure xe3 as a layer 2 port
Bridge3(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge3(config-if)#bridge-group 1 spanning-tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge3(config-if)#switchport mode trunk	Configure port as trunk port
Bridge3(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on xe3 interface
Bridge3(config-if)#interface xe16	Configure interface xe16
Bridge3(config-if)#switchport	Configure xe16 as a layer 2 port
Bridge3(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge3(config-if)#bridge-group 1 spanning-tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge3(config-if)#switchport mode trunk	Configure port as trunk port
Bridge3(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on xe16 interface
Bridge3(config-if)#ethernet cfm domain-type character-string domain-name nod23 level 7 mip-creation none	Create cfm domain with type as character string with name nod23 and set mip creation criteria to default with level 7 on bridge 1
Bridge3(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982.
Bridge3(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge3(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge3(config-ether-cfm-ma)#ethernet cfm mep down mpid 32 active true xe3	Create down mep 32 for xe3 interface.
Bridge3(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge3(config-ether-cfm-ma-mep)#exit- ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge3(config-ether-cfm-ma)#mep crosscheck mpid 23	Configure crosscheck to remote MEP with value 23
Bridge3(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge3(config-ether-cfm-ma)#exit-ether-ma- mode	Exit Ethernet ma mode
Bridge3(config-ether-cfm)#ethernet cfm domain-type character-string domain-name nod34 level 7 mip-creation none	Create cfm domain with type as character string with name nod34 and set mip creation criteria to default with level 7 on bridge 1
Bridge3(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982.
Bridge3(config-ether-cfm-ma)#ethernet cfm mep down mpid 34 active true xe16	Create down mep 34 for xe16 interface

Bridge3(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge3(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge3(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge3(config-ether-cfm-ma-mep)#exit- ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge3(config-ether-cfm-ma)#mep crosscheck mpid 43	Configure crosscheck to remote MEP with value 43
Bridge3(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge3(config-ether-cfm-ma)#exit-ether-ma- mode	Exit Ethernet ma mode
Bridge3(config-ether-cfm)#g8032 ring RING1	Create g8032 ring with name RING1
Bridge3(g8032-ring-config)#east-interface xe3	Associate xe3 interface as east-interface
Bridge3(g8032-ring-config)#west-interface xel6	Associate xe16 interface as west-interface
Bridge3(g8032-ring-config)#g8032 profile profile1	Create g8032 profile with profile name profile1
Bridge3(g8032-profile-config)#timer wait- to-restore 1	Configure wait to restore time as 1 min
Bridge3(g8032-profile-config)#timer hold- off 0	Configure hold-off timer value as 0
Bridge3(g8032-profile-config)#timer guard- time 10	Configure guard-time value as 10ms
Bridge3(g8032-profile-config)#switching mode revertive	Configure Switching mode as revertive Switching mode
Bridge3(g8032-profile-config)#g8032 erp- instance erp1	Create g8032 erp instance erp1
Bridge3(g8032-config-switch)#ring RING1	Associate Physical ring RING1 to erp1 instance
Bridge3(g8032-config-switch)#rpl role neighbor west-interface	Configure RPL node as neighbor node on west-interface
Bridge3(g8032-config-switch)g8032-profile profile1	Associate profile profile1 to erp1 instance
Bridge3(g8032-config-switch)#aps-channel level 7	Configure level as 7
Bridge3(g8032-config-switch)#aps-channel- vlan 200	Configure RAPS channel vlan as 200
Bridge3(g8032-config-switch)#data vlan 201- 205	Configure traffic vlan from 201-205
Bridge3(g8032-config-switch)#ring-id 1	Configure ring-id as 1
Bridge3(g8032-config-switch)#commit	Commit the candidate configuration to the running configuration
Bridge3(g8032-config-switch)#end	Exit g8032 erp instance mode

Bridge 4

Bridge4#config term	Enter configure mode
Bridge4(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
Bridge4((config)#vlan database	Configure VLAN database
Bridge4(config-vlan)#vlan 200-205 bridge 1 state enable	Create VLAN 200-205 on bridge 1
Bridge4(config-vlan)#interface xe6	Configure interface xe6
Bridge4(config-if)#switchport	Configure xe6 as a layer 2 port
Bridge4(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge4(config-if)#bridge-group 1 spanning- tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge4(config-if)#switchport mode trunk	Configure port as trunk port
Bridge4(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on xe6 interface
Bridge4(config-if)#interface xe16	Configure interface xe16
Bridge4(config-if)#switchport	Configure xe16 as a layer 2 port
Bridge4(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge4(config-if)#bridge-group 1 spanning- tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge4(config-if)#switchport mode trunk	Configure port as trunk port
Bridge4(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on xe16 interface
Bridge4(config-if)#ethernet cfm domain-type character-string domain-name nod34 level 7 mip-creation none	Create cfm domain with type as character string with name nod34 and set mip creation criteria to default with level 7 on bridge 1
Bridge4(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982.
Bridge4(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge4(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge4(config-ether-cfm-ma)#ethernet cfm mep down mpid 43 active true xe16	Create down mep 43 with local vid 200 for xe16 interface
Bridge4(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge4(config-ether-cfm-ma-mep)#exit- ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge4(config-ether-cfm-ma)#mep crosscheck mpid 34	Configure crosscheck to remote MEP with value 34
Bridge4(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge4(config-ether-cfm-ma)#exit-ether-ma- mode	Exit Ethernet ma mode

Bridge4(config-ether-cfm)#ethernet cfm domain-type character-string domain-name nod41 level 7 mip-creation none	Create cfm domain with type as character string with name nod41 and set mip creation criteria to default with level 7 on bridge 1
Bridge4(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982.
Bridge4(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge4(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge4(config-ether-cfm-ma)#ethernet cfm mep down mpid 41 active true xe6	Create down mep 41 for xe6 interface
Bridge4(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge4(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge4(config-ether-cfm-ma)#mep crosscheck mpid 14	Configure crosscheck to remote MEP with value 14
Bridge4(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge4(config-ether-cfm-ma)#exit-ether-ma-mode	Exit Ethernet ma mode
Bridge4(config-ether-cfm)#g8032 ring RING1	Create g8032 ring with name RING1
Bridge4(g8032-ring-config)#east-interface xe16	Associate xe16 interface as east-interface
Bridge4(g8032-ring-config)#west-interface xe6	Associate xe6 interface as west-interface
Bridge4(g8032-ring-config)#g8032 profile profile1	Create g8032 profile with profile name profile1
Bridge4(g8032-profile-config)#timer wait-to-restore 1	Configure wait to restore time as 1 min
Bridge4(g8032-profile-config)#timer hold-off 0	Configure hold-off timer value as 0
Bridge4(g8032-profile-config)#timer guard-time 10	Configure guard-timer value as 10ms
Bridge4(g8032-profile-config)#switching mode revertive	Configure Switching mode as revertive Switching mode
Bridge4(g8032-profile-config)#g8032 erp-instance erp1	Create g8032 erp instance erp1
Bridge4(g8032-config-switch)#ring RING1	Associate Physical ring RING1 to erp1 instance
Bridge4(g8032-config-switch)#rpl role owner east-interface	Configure the node as owner node on east-interface
Bridge4(g8032-config-switch)g8032-profile profile1	Associate Profile profile1 to erp1 instance
Bridge4(g8032-config-switch)#aps-channel level 7	Configure level as 7
Bridge4(g8032-config-switch)#aps-channel-vlan 200	Configure RAPS channel vlan as 200

Bridge4(g8032-config-switch)#data vlan 201-205	Configure traffic vlan from 201-205
Bridge4(g8032-config-switch)#ring-id 1	Configure ring-id as 1
Bridge4(g8032-config-switch)#commit	Commit the candidate configuration to the running configuration
Bridge4(g8032-config-switch)#end	Exit g8032 erp instance mode

Validation

Bridge1:

```
show g8032 aps-statistics erp1
```

```
Instance      : erp1
=====
Tx           : 3205
Rx           : 27
```

```
show g8032 physical-ring RING1
```

```
Ring          : RING1
=====
Description   :
East          : xe16
West         : xe6
ERP Inst      : erp1
```

```
show g8032 profile profile1
```

```
Profile : profile1
=====
Wait-To-Restore : 1 mins
Hold Off Timer  : 0.00 secs
Guard Timer     : 10 ms
Wait-To-Block   : 5010 ms
Protection Type : Revertive
```

Bridgel:

```
show g8032 erp-instance erp1
```

```
Inst Name      : erp1
Description    :
State          : G8032_ST_IDLE
Phy Ring       : RING1
Ring Type      : MAJOR-RING
Role           : NON-OWNER
Node ID        : 3c:2c:99:26:e6:80
```

```
-----
                        East Link          West Link
=====
Interface         : xe6                  xe8
State              : Unblocked            Unblocked
Remote NodeId      : 34:17:eb:e4:af:11    -
```



```

Remote BPR      : 1          -
Endpoint Info
-----
Domain Name     : nod41      nod12
MEP ID          : 14         12
MA Name         : 43982      43982
=====

```

```

-----
Channel         |
(LEVEL, VLAN, RING ID) |
=====
(7, 200, 1)    |
=====

```

```

DataTraffic vlan: 201-205
Profile : profile1

```

```

Bridge2:
show g8032 erp-instance erp1

```

```

Inst Name       : erp1
Description     :
State           : G8032_ST_IDLE
Phy Ring        : RING1
Ring Type       : MAJOR-RING
Role            : NON-OWNER
Node ID         : d8:9e:f3:5e:f8:29

```

```

-----
                        East Link          West Link
=====
Interface           : xe8                xe3
State                : Unblocked          Unblocked
Remote NodeId        : 34:17:eb:e4:af:11  -
Remote BPR           : 1                  -
Endpoint Info
-----
Domain Name         : nod12              nod23
MEP ID              : 21                  23
MA Name             : 43982              43982
=====

```

```

-----
Channel         |
(LEVEL, VLAN, RING ID) |
=====
(7, 200, 1)    |
=====

```

```

DataTraffic vlan: 201-205
Profile : profile1

```

```

sBridge3:
show g8032 erp-instance erp1
Inst Name       : erp1
Description     :
State           : G8032_ST_IDLE
Phy Ring        : RING1
Ring Type       : MAJOR-RING

```

Role : NEIGHBOR (WEST)
Node ID : 3c:2c:99:1a:da:7d

```

-----
                        East Link                West Link
=====
Interface      :  xe3                        xe16
State          :  Unblocked                  Blocked
Remote NodeId  :  34:17:eb:e4:af:11          34:17:eb:e4:af:11
Remote BPR     :  1                          1
Endpoint Info
-----
Domain Name    :  nod23                      nod34
MEP ID         :  32                         34
MA Name        :  43982                     43982
=====
-----
Channel        |
(LEVEL, VLAN, RING ID) |
=====
(7,      200,   1)   |
=====

```

DataTraffic vlan: 201-205
Profile : profile1

Bridge4:
show g8032 erp-instance erp1

Inst Name : erp1
Description :
State : G8032_ST_IDLE
Phy Ring : RING1
Ring Type : MAJOR-RING
Role : OWNER (EAST)
Node ID : 34:17:eb:e4:af:11

```

-----
                        East Link                West Link
=====
Interface      :  xe16                        xe6
State          :  Blocked                    Unblocked
Remote NodeId  :  -                          -
Remote BPR     :  -                          -
Endpoint Info
-----
Domain Name    :  nod34                      nod41
MEP ID         :  43                         41
MA Name        :  43982                     43982
=====
-----
Channel        |
(LEVEL, VLAN, RING ID) |
=====
(7,      200,   1)   |
=====

```

DataTraffic vlan: 201-205
Profile : profile1

Sub-ring without Virtual Channel on a LAG interface

Figure 3 displays a sample Ring Protection topology on which protection switching is configured with 5 bridges on lag interfaces. The topology contains one major ring and one subring with non-virtual channel. The Ring Protection Link (RPL) for major ring is the link between Bridge 4 (owner) and Bridge 3 (neighbor) on lag interface po3. The subring is configured with no virtual channel and it's RPL link is configured between bridge 1 (neighbor) and bridge 5 (owner) on lag interface po6. The rest of the bridges are explicitly configured RPL non owner to enable ERPS in the ring in both major and subring.

Topology

Figure 1-2 displays a sample Ethernet Ring Protection Switching topology.

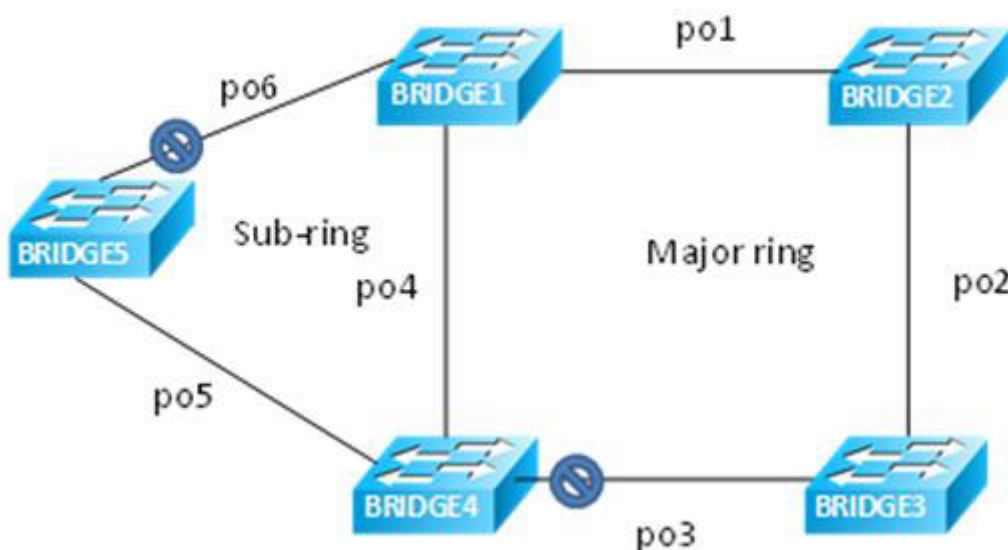


Figure 1-2: Major ring and sub-ring topology using LAG interface without a virtual channel

Bridge 1

Bridge1#config term	Enter configure mode
Bridge1(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
Bridge1((config)#vlan database	Configure VLAN database
Bridge1(config-vlan)#vlan 200-205 bridge 1 state enable	Create VLAN 200-205 on bridge 1
Bridge1(config-vlan)#interface po1	Configure lag interface po1
Bridge1(config-if)#switchport	Configure po1 as a layer 2 port
Bridge1(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge1(config-if)#bridge-group 1 spanning- tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge1(config-if)#switchport mode trunk	Configure port as trunk port

Bridgel(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po1 interface
Bridgel(config-if)#interface po4	Configure lag interface po4
Bridgel(config-if)#switchport	Configure po4 as a layer 2 port
Bridgel(config-if)#bridge-group 1 spanning- tree disable	Configure interface in bridge group 1
Bridgel(config-if)#switchport mode trunk	Disable spanning tree for bridge group 1 on that interface
Bridgel(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po4 interface
Bridgel(config-if)#interface po6	Configure lag interface po6
Bridgel(config-if)#switchport	Configure po6 as a layer 2 port
Bridgel(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridgel(config-if)#bridge-group 1 spanning- tree disable	Disable spanning tree for bridge group 1 on that interface
Bridgel(config-if)#switchport mode trunk	Configure port as trunk port
Bridgel(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po6 interface
Bridgel(config-if)#interface xe1	Configure interface xe1
Bridgel(config-if)#channel-group 6 mode active	Configure xe1 as part of po6
Bridgel(config-if)#interface xe2	Configure interface xe2
Bridgel(config-if)#channel-group 6 mode active	Configure xe2 as part of po6
Bridgel(config-if)#interface xe6	Configure interface xe6
Bridgel(config-if)#channel-group 4 mode active	Configure xe6 as part of po4
Bridgel(config-if)#interface xe7	Configure interface xe7
Bridgel(config-if)#channel-group 4 mode active	Configure xe7 as part of po4
Bridgel(config-if)#interface xe8	Configure interface xe8
Bridgel(config-if)#channel-group 1 mode active	Configure xe8 as part of po1
Bridgel(config-if)#interface xe9	Configure interface xe9
Bridgel(config-if)#channel-group 1 mode active	Configure xe9 as part of po1
Bridgel(config-if)#ethernet cfm domain-type character-string domain-name nod12 level 7 mip-creation none	Create cfm domain with type as character string with name nod12 and set mip creation criteria to default with level 7 on bridge 1
Bridgel(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982.
Bridgel(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridgel(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none

Bridgel(config-ether-cfm-ma)#ethernet cfm mep down mpid 12 active true po1	Create down mep 12 with local vid 200 for po1 interface
Bridgel(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridgel(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridgel(config-ether-cfm-ma)#mep crosscheck mpid 21	Configure crosscheck to remote MEP with value 21
Bridgel(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridgel(config-ether-cfm-ma)#exit-ether-ma-mode	Exit Ethernet ma mode
Bridgel(config-ether-cfm)#ethernet cfm domain-type character-string domain-name nod41 level 7 mip-creation none	Create cfm domain with type as character string with name nod41 and set mip creation criteria to default with level 7 on bridge 1
Bridgel(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982.
Bridgel(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridgel(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridgel(config-ether-cfm-ma)#ethernet cfm mep down mpid 14 active true po4	Create down mep 14 with local vid 200 for po4 interface
Bridgel(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridgel(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridgel(config-ether-cfm-ma)#mep crosscheck mpid 41	Configure crosscheck to remote MEP with value 41
Bridgel(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridgel(config-ether-cfm-ma)#exit-ether-ma-mode	Exit Ethernet ma mode
Bridgel(config-ether-cfm)#ethernet cfm domain-type character-string domain-name nod15 level 7 mip-creation none	Create cfm domain with type as character string with name nod15 and set mip creation criteria to default with level 7 on bridge 1
Bridgel(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982.
Bridgel(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridgel(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridgel(config-ether-cfm-ma)#ethernet cfm mep down mpid 51 active true po6	Create down mep 51 with local vid 200 for po6 interface
Bridgel(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridgel(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode

Bridgel (config-ether-cfm-ma) #mep crosscheck mpid 15	Configure crosscheck to remote MEP with value 15
Bridgel (config-ether-cfm-ma) #cc interval 1s	Enable cc interval with 1s.
Bridgel (config-ether-cfm-ma) #exit-ether-ma- mode	Exit Ethernet ma mode
Bridgel (config-ether-cfm) #g8032 ring lagring	Create g8032 ring with name lagring
Bridgel (g8032-ring-config) #east-interface po4	Associate po4 interface as east-interface
Bridgel (g8032-ring-config) #west-interface po1	Associate po1 interface as west-interface
Bridgel (g8032-ring-config) #g8032 profile profile1	Create g8032 profile with profile name profile1
Bridgel (g8032-profile-config) #timer wait- to-restore 1	Configure wait to restore time as 1 min
Bridgel (g8032-profile-config) #timer hold- off 0	Configure hold-off timer value as 0
Bridgel (g8032-profile-config) #timer guard- time 10	Configure guard-timer value as 10ms
Bridgel (g8032-profile-config) #switching mode revertive	Configure Switching mode as revertive Switching mode
Bridgel (g8032-profile-config) #g8032 erp- instance erp1	Create g8032 erp instance erp1
Bridgel (g8032-config-switch) #ring lagring	Associate Physical ring lagring to erp1 instance
Bridgel (g8032-config-switch) #rpl role non- owner	Configure the node as non-owner node
Bridgel (g8032-config-switch) g8032-profile profile1	Associate Profile profile1 to erp1 instance
Bridgel (g8032-config-switch) #aps-channel level 7	Configure level as 7
Bridgel (g8032-config-switch) #aps-channel- vlan 200	Configure RAPS channel vlan as 200
Bridgel (g8032-config-switch) #data vlan 201- 205	Configure traffic vlan from 201-205
Bridgel (g8032-config-switch) #ring-id 1	Configure ring-id as 1
Bridgel (g8032-config-switch) #g8032 ring lagsubring	Create g8032 ring with name lagsubring
Bridgel (g8032-ring-config) #east-interface po6	Associate po6 interface as east-interface
Bridgel (g8032-ring-config) #g8032 erp- instance erp2	Create g8032 erp instance erp2
Bridgel (g8032-config-switch) #ring-type sub- ring	Configure ring-type as sub-ring
Bridgel (g8032-config-switch) #ring lagsubring	Associate Physical ring lagsubring to erp2 instance
Bridgel (g8032-config-switch) #rpl role neighbor east-interface	Configure the node as neighbor node on east interface
Bridgel (g8032-config-switch) g8032-profile profile1	Associate Profile profile1 to erp2 instance

Bridge1(g8032-config-switch)#aps-channel level 7	Configure level as 7
Bridge1(g8032-config-switch)#aps-channel-vlan 200	Configure RAPS channel vlan as 200
Bridge1(g8032-config-switch)#data vlan 201-205	Configure traffic vlan from 201-205
Bridge1(g8032-config-switch)#ring-id 2	Configure ring-id as 2
Bridge1(g8032-config-switch)#non-virtual-channel	Enable Non Virtual Channel
Bridge1(g8032-config-switch)#enable-tcn-propagation	Enable tcn propagation
Bridge1(g8032-config-switch)# tcn-to-instance erp1	Attach erp1 instance to erp2 instance to notify any changes in subring to major ring
Bridge1(g8032-config-switch)#commit	Commit the candidate configuration to the running configuration
Bridge1(g8032-config-switch)#end	Exit g8032 erp instance mode

Bridge 2

Bridge2#config term	Enter configure mode
Bridge2(config)#bridge 1 protocol rstp vlan-bridge	Enable CFM domain name as string
Bridge2((config)#vlan database	Configure VLAN database
Bridge2(config-vlan)#vlan 200-205 bridge 1 state enable	Create VLAN 200-205 on bridge 1
Bridge2(config-vlan)#interface po1	Configure lag interface po1
Bridge2(config-if)#switchport	Configure po1 as a layer 2 port
Bridge2(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge2(config-if)#bridge-group 1 spanning-tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge2(config-if)#switchport mode trunk	Configure port as trunk port
Bridge2(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po1 interface
Bridge2(config-if)#interface po2	Configure lag interface po2
Bridge2(config-if)#switchport	Configure po2 as a layer 2 port
Bridge2(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge2(config-if)#bridge-group 1 spanning-tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge2(config-if)#switchport mode trunk	Configure port as trunk port
Bridge2(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po2 interface
Bridge2(config-if)#interface xe8	Configure interface xe8
Bridge2(config-if)#channel-group 1 mode active	Configure xe8 as part of po1
Bridge2(config-if)#interface xe9	Configure interface xe9

Bridge2(config-if)#channel-group 1 mode active	Configure xe9 as part of po1
Bridge2(config-if)#interface xe3	Configure interface xe3
Bridge2(config-if)#channel-group 2 mode active	Configure xe3 as part of po2
Bridge2(config-if)#interface xe4	Configure interface xe4
Bridge2(config-if)#channel-group 2 mode active	Configure xe4 as part of po2
Bridge2(config-if)#ethernet cfm domain-type character-string domain-name nod12 level 7 mip-creation none	Create cfm domain with type as character string with name nod12 and set mip creation criteria to default with level 7 on bridge 1
Bridge2(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982
Bridge2(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge2(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge2(config-ether-cfm-ma)#ethernet cfm mep down mpid 21 active true po1	Create down mep 21 with local vid 200 for po1 interface
Bridge2(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge2(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge2(config-ether-cfm-ma)#mep crosscheck mpid 12	Configure crosscheck to remote MEP with value 12
Bridge2(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s
Bridge2(config-ether-cfm-ma)#exit-ether-ma-mode	Exit1sEthernet ma mode
Bridge2(config-ether-cfm)#ethernet cfm domain-type character-string domain-name nod23 level 7 mip-creation none	Create cfm domain with type as character string with name nod23 and set mip creation criteria to default with level 7 on bridge 1
Bridge2(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982
Bridge2(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge2(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge2(config-ether-cfm-ma)#ethernet cfm mep down mpid 23 active true po2	Create down mep 23 with local vid 200 for po2 interface
Bridge2(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge2(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge2(config-ether-cfm-ma)#mep crosscheck mpid 32	Configure crosscheck to remote MEP with value 32

Bridge2(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge2(config-ether-cfm-ma)#exit-ether-ma-mode	Exit Ethernet ma mode
Bridge2(config-ether-cfm)#g8032 ring lagring	Create a g8032 ring with name lagring
Bridge2(g8032-ring-config)#east-interface po1	Associate po1 interface as east-interface
Bridge2(g8032-ring-config)#west-interface po2	Associate po2 interface as west-interface
Bridge2(g8032-ring-config)#g8032 profile profile1	Create g8032 profile with profile name profile1
Bridge2(g8032-profile-config)#timer wait-to-restore 1	Configure wait to restore time as 1 min
Bridge2(g8032-profile-config)#timer hold-off 0	Configure hold-off timer value as 0
Bridge2(g8032-profile-config)#timer guard-time 10	Configure guard-timer value as 10ms
Bridge2(g8032-profile-config)#switching mode revertive	Configure Switching mode as revertive Switching mode
Bridge2(g8032-profile-config)#g8032 erp-instance erp1	Create g8032 erp instance erp1
Bridge2(g8032-config-switch)#ring lagring	Associate Physical ring lagring to erp1 instance
Bridge2(g8032-config-switch)#rpl role non-owner	Configure the node as non-owner node
Bridge2(g8032-config-switch)g8032-profile profile1	Associate Profile profile1 to erp1 instance
Bridge2(g8032-config-switch)#aps-channel level 7	Configure level as 7
Bridge2(g8032-config-switch)#aps-channel-vlan 200	Configure RAPS channel vlan as 200
Bridge2(g8032-config-switch)#data vlan 201-205	Configure traffic vlan from 201-205
Bridge2(g8032-config-switch)#ring-id 1	Configure ring-id as 1
Bridge2(g8032-config-switch)#commit	Commit the candidate configuration to the running configuration
Bridge2(g8032-config-switch)#end	Exit g8032 erp instance mode

Bridge 3

Bridge3#config term	Enter configuration mode
Bridge3(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
Bridge3((config)#vlan database	Configure VLAN database
Bridge3(config-vlan)#vlan 200-205 bridge 1 state enable	Create VLAN 200-205 on bridge 1
Bridge3(config-vlan)#interface po2	Configure lag interface po2
Bridge3(config-if)#switchport	Configure po2 as a layer 2 port

Bridge3(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge3(config-if)#bridge-group 1 spanning-tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge3(config-if)#switchport mode trunk	Configure port as trunk port
Bridge3(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po2 interface
Bridge3(config-if)#interface po3	Configure lag interface po3
Bridge3(config-if)#switchport	Configure po3 as a layer 2 port
Bridge3(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge3(config-if)#bridge-group 1 spanning-tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge3(config-if)#switchport mode trunk	Configure port as trunk port
Bridge3(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po3 interface
Bridge3(config-if)#interface xe3	Configure interface xe3
Bridge3(config-if)#channel-group 2 mode active	Configure xe3 as part of po2
Bridge3(config-if)#interface xe4	Configure interface xe4
Bridge3(config-if)#channel-group 2 mode active	Configure xe4 as part of po2
Bridge3(config-if)#interface xe15	Configure interface xe3
Bridge3(config-if)#channel-group 3 mode active	Configure xe3 as part of po3
Bridge3(config-if)#interface xe16	Configure interface xe16
Bridge3(config-if)#channel-group 3 mode active	Configure xe16 as part of po3
Bridge3(config-if)#ethernet cfm domain-type character-string domain-name nod23 level 7 mip-creation none 1	Create cfm domain with type as character string with name nod23 and set mip creation criteria to default with level 7 on bridge 1
Bridge3(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982
Bridge3(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge3(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge3(config-ether-cfm-ma)#ethernet cfm mep down mpid 32 active true po2	Create down mep 32 with local vid 200 for po2 interface
Bridge3(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge3(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge3(config-ether-cfm-ma)#mep crosscheck mpid 23	Configure crosscheck to remote MEP with value 23
Bridge3(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge3(config-ether-cfm-ma)#exit-ether-ma-mode	Exit Ethernet ma mode

Bridge3(config-ether-cfm)#ethernet cfm domain-type character-string domain-name nod34 level 7 mip-creation none	Create cfm domain with type as character string with name nod34 and set mip creation criteria to default with level 7 on bridge 1
Bridge3(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982
Bridge3(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge3(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge3(config-ether-cfm-ma)#ethernet cfm mep down mpid 34 active true po3	Create down mep 34 with local vid 200 for po3 interface
Bridge3(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge3(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge3(config-ether-cfm-ma)#mep crosscheck mpid 43	Configure crosscheck to remote MEP with value 43
Bridge3(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge3(config-ether-cfm-ma)#exit-ether-ma-mode	Exit Ethernet ma mode
Bridge3(config-ether-cfm)#g8032 ring lagring	Create a g8032 ring with name lagring
Bridge3(g8032-ring-config)#east-interface po2	Associate po2 interface as east-interface
Bridge3(g8032-ring-config)#west-interface po3	Associate po3 interface as west-interface
Bridge3(g8032-ring-config)#g8032 profile profile1	Create g8032 profile with profile name profile1
Bridge3(g8032-profile-config)#timer wait-to-restore 1	Configure wait to restore time as 1 min
Bridge3(g8032-profile-config)#timer hold-off 0	Configure hold-off timer value as 0
Bridge3(g8032-profile-config)#timer guard-time 10	Configure guard-time value as 10ms
Bridge3(g8032-profile-config)#switching mode revertive	Configure Switching mode as revertive Switching mode
Bridge3(g8032-profile-config)#g8032 erp-instance erp1	Create g8032 erp instance erp1
Bridge3(g8032-config-switch)#ring lagring	Associate Physical ring lagring to erp1 instance
Bridge3(g8032-config-switch)#rpl role neighbor west-interface	Configure the node as neighbor node on west interface
Bridge3(g8032-config-switch)g8032-profile profile1	Associate Profile profile1 to erp1 instance
Bridge3(g8032-config-switch)#aps-channel level 7	Configure level as 7
Bridge3(g8032-config-switch)#aps-channel-vlan 200	Configure RAPS channel vlan as 200

Bridge3(g8032-config-switch)#data vlan 201-205	Configure traffic vlan from 201-205
Bridge3(g8032-config-switch)#ring-id 1	Configure ring-id as 1
Bridge3(g8032-config-switch)#commit	Commit the candidate configuration to the running configuration
Bridge3(g8032-config-switch)#end	Exit g8032 erp instance mode

Bridge 4

Bridge4#config term	Enter configure mode
Bridge4(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
Bridge4((config)#vlan database	Configure VLAN database
Bridge4(config-vlan)#vlan 200-205 bridge 1 state enable	Create VLAN 200-205 on bridge 1
Bridge4(config-vlan)#interface po3	Configure lag interface po3
Bridge4(config-if)#switchport	Configure po3 as a layer 2 port
Bridge4(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge4(config-if)#bridge-group 1 spanning- tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge4(config-if)#switchport mode trunk	Configure port as trunk port
Bridge4(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po3 interface
Bridge4(config-if)#interface po4	Configure lag interface po4
Bridge4(config-if)#switchport	Configure po4 as a layer 2 port
Bridge4(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge4(config-if)#bridge-group 1 spanning- tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge4(config-if)#switchport mode trunk	Configure port as trunk port
Bridge4(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po4 interface
Bridge4(config-if)#interface po5	Configure lag interface po5
Bridge4(config-if)#switchport	Configure po5 as a layer 2 port
Bridge4(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge4(config-if)#bridge-group 1 spanning- tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge4(config-if)#switchport mode trunk	Configure port as trunk port
Bridge4(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po5 interface
Bridge4(config-if)#interface xe6	Configure interface xe6
Bridge4(config-if)#channel-group 4 mode active	Configure xe6 as part of po4
Bridge4(config-if)#interface xe7	Configure interface xe7
Bridge4(config-if)#channel-group 4 mode active	Configure xe7 as part of po4

Bridge4 (config-if) #interface xe10	Configure interface xe10
Bridge4 (config-if) #channel-group 5 mode active	Configure xe10 as part of po5
Bridge4 (config-if) #interface xe11	Configure interface xe11
Bridge4 (config-if) #channel-group 5 mode active	Configure xe11 as part of po5
Bridge4 (config-if) #interface xe15	Configure interface xe15
Bridge4 (config-if) #channel-group 3 mode active	Configure xe15 as part of po3
Bridge4 (config-if) #interface xe16	Configure interface xe16
Bridge4 (config-if) #channel-group 3 mode active	Configure xe16 as part of po3
Bridge4 (config-if) #ethernet cfm domain-type character-string domain-name nod34 level 7 mip-creation none	Create cfm domain with type as character string with name nod34 and set mip creation criteria to default with level 7 on bridge 1
Bridge4 (config-ether-cfm) #service ma-type string ma-name 43982	Create ma type as string with name 43982
Bridge4 (config-ether-cfm-ma) # vlan 200 bridge 1	Add vlan 200
Bridge4 (config-ether-cfm-ma) # mip-creation none	Set mip-creation creation criteria to none
Bridge4 (config-ether-cfm-ma) #ethernet cfm mep down mpid 43 active true po3	Create down mep 43 with local vid 200 for po3 interface
Bridge4 (config-ether-cfm-ma-mep) #cc multicast state enable	Enable cc multicast
Bridge4 (config-ether-cfm-ma-mep) #exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge4 (config-ether-cfm-ma) #mep crosscheck mpid 34	Configure crosscheck to remote MEP with value 34
Bridge4 (config-ether-cfm-ma) #cc interval 1s	Enable cc interval with 1s.
Bridge4 (config-ether-cfm-ma) #exit-ether-ma-mode	Exit Ethernet ma mode
Bridge4 (config-ether-cfm) #ethernet cfm domain-type character-string domain-name nod41 level 7 mip-creation none	Create cfm domain with type as character string with name nod41 and set mip creation criteria to default with level 7 on bridge 1
Bridge4 (config-ether-cfm) #service ma-type string ma-name 43982	Create ma type as string with name 43982
Bridge4 (config-ether-cfm-ma) # vlan 200 bridge 1	Add vlan 200
Bridge4 (config-ether-cfm-ma) # mip-creation none	Set mip-creation creation criteria to none
Bridge4 (config-ether-cfm-ma) #ethernet cfm mep down mpid 41 active true po4	Create down mep 41 with local vid 200 for po4 interface
Bridge4 (config-ether-cfm-ma-mep) #cc multicast state enable	Enable cc multicast

Bridge4 (config-ether-cfm-ma-mep) #exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge4 (config-ether-cfm-ma) #mep crosscheck mpid 14	Configure crosscheck to remote MEP with value 14
Bridge4 (config-ether-cfm-ma) #cc interval 1s	Enable cc interval with 1s
Bridge4 (config-ether-cfm-ma) #exit-ether-ma-mode	Exit Ethernet ma mode
Bridge4 (config-ether-cfm) #ethernet cfm domain-type character-string domain-name nod45 level 7 mip-creation none	Create cfm domain with type as character string with name nod45 and set mip creation criteria to default with level 7 on bridge 1
Bridge4 (config-ether-cfm) #service ma-type string ma-name 43982	Create ma type as string with name 43982
Bridge4 (config-ether-cfm-ma) # vlan 200 bridge 1	Add vlan 200
Bridge4 (config-ether-cfm-ma) # mip-creation none	Set mip-creation creation criteria to none
Bridge4 (config-ether-cfm-ma) #ethernet cfm mep down mpid 54 active true po5	Create down mep 54 with local vid 200 for po5 interface
Bridge4 (config-ether-cfm-ma-mep) #cc multicast state enable	Enable cc multicast
Bridge4 (config-ether-cfm-ma-mep) #exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge4 (config-ether-cfm-ma) #mep crosscheck mpid 45	Configure crosscheck to remote MEP with value 45
Bridge4 (config-ether-cfm-ma) #cc interval 1s	Enable cc interval with 1s.
Bridge4 (config-ether-cfm-ma) #exit-ether-ma-mode	Exit Ethernet ma mode
Bridge4 (config-ether-cfm) #g8032 ring lagring	Create a g8032 ring with name lagring
Bridge4 (g8032-ring-config) #east-interface po3	Associate po3 interface as east-interface
Bridge4 (g8032-ring-config) #west-interface po4	Associate po4 interface as west-interface
Bridge4 (g8032-ring-config) #g8032 ring lagsubring	Create a g8032 ring with name lagsubring
Bridge4 (g8032-ring-config) #east-interface po5	Associate po5 interface as east-interface
Bridge4 (g8032-ring-config) #g8032 profile profile1	Create g8032 profile with profile name profile1
Bridge4 (g8032-profile-config) #timer wait-to-restore 1	Configure wait to restore time as 1 min
Bridge4 (g8032-profile-config) #timer hold-off 0	Configure hold-off timer value as 0
Bridge4 (g8032-profile-config) #timer guard-time 10	Configure guard-time value as 10ms
Bridge4 (g8032-profile-config) #switching mode revertive	Configure Switching mode as revertive Switching mode

Bridge4(g8032-profile-config)#g8032 erp-instance erp1	Create g8032 erp instance erp1
Bridge4(g8032-config-switch)#ring lagring	Associate Physical ring lagring to erp1 instance
Bridge4(g8032-config-switch)#rpl role owner east-interface	Configure the node as owner node on east interface
Bridge4(g8032-config-switch)g8032-profile profile1	Associate Profile profile1 to erp1 instance
Bridge4(g8032-config-switch)#aps-channel level 7	Configure level as 7
Bridge4(g8032-config-switch)#aps-channel-vlan 200	Configure RAPS channel vlan as 200
Bridge4(g8032-config-switch)#data vlan 201-205	Configure traffic vlan from 201-205
Bridge4(g8032-config-switch)#ring-id 1	Configure ring-id as 1
Bridge4(g8032-config-switch)#g8032 erp-instance erp2	Create g8032 erp instance erp2
Bridge4(g8032-config-switch)#ring-type sub-ring	Configure ring-type as sub-ring
Bridge4(g8032-config-switch)#ring lagsubring	Associate Physical ring lagsubring to erp2 instance
Bridge4(g8032-config-switch)#rpl role non-owner	Configure the node as neighbor node on east interface
Bridge4(g8032-config-switch)g8032-profile profile1	Associate Profile profile1 to erp2 instance
Bridge4(g8032-config-switch)#aps-channel level 7	Configure level as 7
Bridge4(g8032-config-switch)#aps-channel-vlan 200	Configure RAPS channel vlan as 200
Bridge4(g8032-config-switch)#data vlan 201-205	Configure traffic vlan from 201-205
Bridge4(g8032-config-switch)#ring-id 2	Configure ring-id as 2
Bridge4(g8032-config-switch)#non-virtual-channel	Enable Non Virtual Channel
Bridge4(g8032-config-switch)#enable-tcn-propagation	Enable tcn propagation
Bridge4(g8032-config-switch)# tcn-to-instance erp1	Attach erp1 instance to erp2 instance to notify any changes in subring to major ring
Bridge4(g8032-config-switch)#commit	Commit the candidate configuration to the running configuration
Bridge4(g8032-config-switch)#end	Exit g8032 erp instance mode

Bridge 5

Bridge5#config term	Enter config mode
Bridge5(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
Bridge5((config)#vlan database	Configure VLAN database

Bridge5(config-vlan)#vlan 200-205 bridge 1 state enable	Create VLAN 200-205 on bridge 1
Bridge5(config-vlan)#interface po5	Configure lag interface po5
Bridge5(config-if)#switchport	Configure po5 as a layer 2 port
Bridge5(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge5(config-if)#bridge-group 1 spanning- tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge5(config-if)#switchport mode trunk	Configure port as trunk port
Bridge5(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po3 interface
Bridge5(config-if)#interface po6	Configure lag interface po3
Bridge5(config-if)#switchport	Configure po3 as a layer 2 port
Bridge5(config-if)#bridge-group 1	Configure interface in bridge group 1
Bridge5(config-if)#bridge-group 1 spanning- tree disable	Disable spanning tree for bridge group 1 on that interface
Bridge5(config-if)#switchport mode trunk	Configure port as trunk port
Bridge5(config-if)#switchport trunk allowed vlan add 200-205	Allow vlan 200-205 on po3 interface
Bridge5(config-if)#interface xe1	Configure interface xe1
Bridge5(config-if)#channel-group 6 mode active	Configure xe1 as part of po6
Bridge5(config-if)#interface xe2	Configure interface xe2
Bridge5(config-if)#channel-group 6 mode active	Configure xe2 as part of po6
Bridge5(config-if)#interface xe10	Configure interface xe10
Bridge5(config-if)#channel-group 5 mode active	Configure xe10 as part of po5
Bridge5(config-if)#interface xe11	Configure interface xe11
Bridge5(config-if)#channel-group 5 mode active	Configure xe11 as part of po5
Bridge5(config-if)#ethernet cfm domain-type character-string domain-name nod15 level 7 mip-creation none	Create cfm domain with type as character string with name nod15 and set mip creation criteria to default with level 7 on bridge 1
Bridge5(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982
Bridge5(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge5(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge5(config-ether-cfm-ma)#ethernet cfm mep down mpid 15 active true po6	Create down mep 15 with local vid 200 for po6 interface
Bridge5(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge5(config-ether-cfm-ma-mep)#exit- ether-ma-mep-mode	Exit ethernet cfm ma-mep mode

Bridge5(config-ether-cfm-ma)#mep crosscheck mpid 51	Configure crosscheck to remote MEP with value 51
Bridge5(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge5(config-ether-cfm-ma)#exit-ether-ma-mode	Exit Ethernet ma mode
Bridge5(config-ether-cfm)#ethernet cfm domain-type character-string domain-name nod45 level 7 mip-creation none	Create cfm domain with type as character string with name nod45 and set mip creation criteria to default with level 7 on bridge 1
Bridge5(config-ether-cfm)#service ma-type string ma-name 43982	Create ma type as string with name 43982
Bridge5(config-ether-cfm-ma)# vlan 200 bridge 1	Add vlan 200
Bridge5(config-ether-cfm-ma)# mip-creation none	Set mip-creation creation criteria to none
Bridge5(config-ether-cfm-ma)#ethernet cfm mep down mpid 45 active true po5	Create down mep 45 with local vid 200 for po5 interface
Bridge5(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
Bridge5(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
Bridge5(config-ether-cfm-ma)#mep crosscheck mpid 54	Configure crosscheck to remote MEP with value 54
Bridge5(config-ether-cfm-ma)#cc interval 1s	Enable cc interval with 1s.
Bridge5(config-ether-cfm-ma)#exit-ether-ma-mode	Exit Ethernet ma mode
Bridge5(config-ether-cfm)#g8032 ring lagsubring	Create a g8032 ring with name lagsubring
Bridge5(g8032-ring-config)#east-interface po5	Associate po5 interface as east-interface
Bridge5(g8032-ring-config)#west-interface po6	Associate po6 interface as west-interface
Bridge5(g8032-ring-config)#g8032 profile profile1	Create g8032 profile with profile name profile1
Bridge5(g8032-profile-config)#timer wait-to-restore 1	Configure wait to restore time as 1 min
Bridge5(g8032-profile-config)#timer hold-off 0	Configure hold-off timer value as 0
Bridge5(g8032-profile-config)#timer guard-time 10	Configure guard-time value as 10ms
Bridge5(g8032-profile-config)#switching mode revertive	Configure Switching mode as revertive Switching mode
Bridge5(g8032-profile-config)#g8032 erp-instance erp2	Create g8032 erp instance erp2
Bridge5(g8032-config-switch)#ring lagsubring	Associate Physical ring lagsubring to erp2 instance
Bridge5(g8032-config-switch)#ring-type subring	Configure ring-type as subring

Bridge5(g8032-config-switch)#rpl role owner west-interface	Configure the node as owner node on west interface
Bridge5(g8032-config-switch)g8032-profile profile1	Associate Profile profile1 to erp2 instance
Bridge5(g8032-config-switch)#aps-channel level 7	Configure level as 7
Bridge5(g8032-config-switch)#aps-channel-vlan 200	Configure RAPS channel vlan as 200
Bridge5(g8032-config-switch)#data vlan 201-205	Configure traffic vlan from 201-205
Bridge5(g8032-config-switch)#ring-id 2	Configure ring-id as 2
Bridge5(g8032-config-switch)#commit	Commit the candidate configuration to the running configuration
Bridge5(g8032-config-switch)#end	Exit g8032 erp instance mode

Validation

```
Bridge1#show g8032 erp-instance erp2
```

```

Inst Name       : erp2
Description     :
State           : G8032_ST_IDLE
Phy Ring        : lagsubring
Ring Type       : SUB-RING (NON VIRTUAL)
Role            : NEIGHBOR (EAST)
Node ID         : 3c:2c:99:26:e6:7b

```

```

-----
                        East Link          West Link
=====
Interface         : po6                   -
State              : Blocked               -
Remote NodeId      : 6c:b9:c5:67:72:f6     -
Remote BPR         : 0                     -
Endpoint Info
-----
Domain Name        : nod15                 -
MEP ID             : 51                    -
MA Name            : 43982                 -
=====
TCN Propagation    : Enabled
TCN Propagation List: erp1,

      Channel          |
      (LEVEL, VLAN, RING ID) |
=====
      (7,      200,    2)      |
=====

```

```
Bridge1#show g8032 erp-instance erp1
```

```

Inst Name       : erp1
Description     :

```

```

State          : G8032_ST_IDLE
Phy Ring       : lagring
Ring Type      : MAJOR-RING
Role           : NON-OWNER
Node ID        : 3c:2c:99:26:e6:80

```

```

-----
                        East Link                West Link
=====
Interface       : po4                          po1
State           : Unblocked                    Unblocked
Remote NodeId   : 34:17:eb:e4:af:10            -
Remote BPR      : 1                            -
Endpoint Info
-----
Domain Name     : nod41                        nod12
MEP ID          : 14                          12
MA Name         : 43982                       43982
=====

```

```

-----
Channel         |
(LEVEL, VLAN, RING ID) |
=====
(7, 200, 1)    |
=====

```

```

DataTraffic vlan: 201-205
Profile : profile1

```

```

Bridge2#show g8032 erp-instance erp1

```

```

Inst Name      : erp1
Description    :
State         : G8032_ST_IDLE
Phy Ring      : lagring
Ring Type     : MAJOR-RING
Role          : NON-OWNER
Node ID       : d8:9e:f3:5e:f8:29

```

```

-----
                        East Link                West Link
=====
Interface       : po1                          po2
State           : Unblocked                    Unblocked
Remote NodeId   : 34:17:eb:e4:af:10            -
Remote BPR      : 1                            -
Endpoint Info
-----
Domain Name     : nod12                        nod23
MEP ID          : 21                          23
MA Name         : 43982                       43982
=====

```

```

-----
Channel         |
(LEVEL, VLAN, RING ID) |
=====
(7, 200, 1)    |
=====

```

DataTraffic vlan: 201-205
Profile : profile1

Bridge3#show g8032 erp-instance erp1

Inst Name : erp1
Description :
State : G8032_ST_IDLE
Phy Ring : lagring
Ring Type : MAJOR-RING
Role : NEIGHBOR (WEST)
Node ID : 3c:2c:99:1a:da:7d

```

-----
                        East Link                West Link
=====
Interface      : po2                          po3
State          : Unblocked                     Blocked
Remote NodeId  : 34:17:eb:e4:af:10             34:17:eb:e4:af:10
Remote BPR     : 1                             1
Endpoint Info
-----
Domain Name    : nod23                        nod34
MEP ID        : 32                            34
MA Name       : 43982                         43982
=====
-----
Channel        |
(LEVEL, VLAN, RING ID) |
=====
(7,      200,   1)   |
=====

```

DataTraffic vlan: 201-205
Profile : profile1

Bridge4#show g8032 erp-instance erp2

Inst Name : erp2
Description :
State : G8032_ST_IDLE
Phy Ring : lagsubring
Ring Type : SUB-RING (NON VIRTUAL)
Role : NON-OWNER
Node ID : 34:17:eb:e4:af:0b

```

-----
                        East Link                West Link
=====
Interface      : po5                          -
State          : Unblocked                     -
Remote NodeId  : 6c:b9:c5:67:72:f6             -
Remote BPR     : 0                             -
Endpoint Info
-----
Domain Name    : nod45                        -
MEP ID        : 54                            -
MA Name       : 43982                         -
=====

```

TCN Propagation : Enabled
 TCN Propagation List: erp1,

```

      Channel      |
    (LEVEL, VLAN, RING ID) |
=====
    (7,      200,   2)      |
=====

```

DataTraffic vlan: 201-205
 Profile : profile1

Bridge4#show g8032 erp-instance erp1

```

Inst Name      : erp1
Description    :
State          : G8032_ST_IDLE
Phy Ring       : lagring
Ring Type      : MAJOR-RING
Role           : OWNER (EAST)
Node ID        : 34:17:eb:e4:af:10

```

```

-----
                        East Link          West Link
=====
Interface      : po3                      po4
State          : Blocked                  Unblocked
Remote NodeId   : -                      -
Remote BPR      : -                      -
Endpoint Info
-----
Domain Name     : nod34                    nod41
MEP ID          : 43                      41
MA Name         : 43982                    43982
=====

```

```

      Channel      |
    (LEVEL, VLAN, RING ID) |
=====
    (7,      200,   1)      |
=====

```

DataTraffic vlan: 201-205
 Profile : profile1

Bridge5#show g8032 erp-instance erp2

```

Inst Name      : erp2
Description    :
State          : G8032_ST_IDLE
Phy Ring       : lagsubring
Ring Type      : SUB-RING
Role           : OWNER (WEST)
Node ID        : 6c:b9:c5:67:72:f6

```

```

-----
                        East Link          West Link
=====
Interface      : po5                      po6

```

```

State           :   Unblocked           Blocked
Remote NodeId   :   -                   -
Remote BPR      :   -                   -
Endpoint Info
-----

```

```

Domain Name     :   nod45               nod15
MEP ID          :   45                  15
MA Name         :   43982               43982
=====

```

```

-----
Channel         |
(LEVEL, VLAN, RING ID) |
=====
(7,      200,   2)   |
=====

```

```

DataTraffic vlan: 201-205
Profile : profile1

```

```

Bridge3#show g8032 erp-instance erp1

```

```

Inst Name       :   erp1
Description     :
State           :   G8032_ST_IDLE
Phy Ring        :   lagring
Ring Type       :   MAJOR-RING
Role            :   NEIGHBOR (WEST)
Node ID         :   3c:2c:99:1a:da:7d
-----

```

```

-----
East Link      West Link
=====
Interface      :   po2                po3
State          :   Unblocked          Blocked
Remote NodeId  :   34:17:eb:e4:af:10  34:17:eb:e4:af:10
Remote BPR     :   1                  1
Endpoint Info
-----
Domain Name    :   nod23              nod34
MEP ID         :   32                 34
MA Name        :   43982              43982
=====

```

```

-----
Channel         |
(LEVEL, VLAN, RING ID) |
=====
(7,      200,   1)   |
=====

```

```

DataTraffic vlan: 201-205
Profile : profile1

```

CHAPTER 2 Ethernet in the First Mile Configuration

This chapter contains a complete sample Ethernet 802.3ah (EFM) configuration.

EFM stands for Ethernet in the First Mile and it is an Ethernet link-layer OAM, which works over direct/with ethernet repeaters point-to-point ethernet links. OAM PDUs (Protocol Data Units) uses slow protocol destination MAC address 0180.c200.0002. These frames are single-hop and can not be forwarded beyond a single hop. The transmission rate is limited to a maximum of 10 frames per second to avoid impact on normal operations. Following are the OAM features supported by EFM.

- Discovery
- Link Monitoring
- Remote Fault Detection
- Remote Loopback

Note: Ethernet OAM is a layer 2 interface feature. So switchport configuration on interface is required. Configure the OAM Mode as Active or Passive. Both switch can be configured Active-Active or Active-Passive. But Passive-Passive on both switch won't work.

Note: Remote-loopback & link monitor supported is configured by default when ethernet oam is enabled.

Note: shut/no-shut should be performed to bring up the interface which becomes down after dying-gasp event.

Topology

Figure 2-3 displays a sample EFM topology.



Figure 2-3: EFM Topology

Configuration

All configuration commands in the table below should be followed for each switch.

#configure terminal	Enter configure mode.
(config)#interface xe3	Enter interface mode.
(config-if)#switchport	Set switching characteristics on the port.
(config-if)#ethernet oam enable	Configure EFM on interface
(config-if)#ethernet oam mode passive	Configure EFM mode Passive. Default is Active
(config-if)#ethernet oam mode active	Configure EFM mode Active
(config-if)# ethernet oam remote-loopback start	Configure remote-loopback start
(config-if)# ethernet oam remote-loopback stop	Configure remote-loopback stop
(config-if)#commit	Commit the configuration
(config-if)# exit	Exit from interface mode

Validation

1. Verify OAM discovery

show ethernet oam discovery interface xe3

Local client:

Administrative configurations:

Mode:	active
Unidirection:	not supported
Link monitor:	supported(on)
Remote Loopback:	supported
MIB retrieval:	not supported
MTU Size :	1518

Operational status:

Port status:	operational
Loopback status:	no loopback
PDU revision:	0

Remote client:

MAC address: 80a2.356c.21ff
Vendor(oui): 0 0 0

Administrative configurations:

Mode:	passive
Unidirection:	not supported
Link monitor:	supported
Remote Loopback:	supported
MIB retrieval:	not supported
MTU Size :	1518

2. Verify the Discovery State Machine Details

show ethernet oam xe3

Discovery State Machine Details:

EFM Discovery Machine State:	Send Any
Local Parser State:	Forward
Local Multiplexer State:	Forward
Remote Parser State:	Forward
Remote Multiplexer State:	Forward

Local Client:

Symbol Period Error:

Window:	100000000 Symbol(s)
Threshold:	1 Symbol(s)
Last Window Symbols Errors:	0 Symbol(s)

Total Symbols Errors: 0 Symbol(s)
Total Symbols Errors Events: 0 Events(s)
Relative Timestamp of the Event: 0 x 100 milliseconds

Frame Error:

Window: 100 x 10 milliseconds
Threshold: 1 Error Frame(s)
Last Window Frame Errors: 0 Frame(s)
Total Frame Errors: 0 Frames(s)
Total Frame Errors Events: 0 Events(s)
Relative Timestamp of the Event: 0 x 100 milliseconds

Frame Period Error:

Window: 10000000 Frames
Threshold: 1 Error Frame(s)
Last Window Frame Errors: 0 Frame(s)
Total Frame Errors: 0 Frames(s)
Total Frame Period Errors Events: 0 Events(s)
Relative Timestamp of the Event: 0 x 100 milliseconds

Frame Seconds Error:

Window: 1000 x 10 milliseconds
Threshold: 1 Error Second(s)
Last Window Frame Second Errors: 0 Frame(s)
Total Frame Second Errors: 0 Frames(s)
Total Frame Second Errors Events: 0 Events(s)
Relative Timestamp of the Event: 0 x 100 milliseconds

Remote Client:

Symbol Period Error:

Window: 0 Symbol(s)
Threshold: 0 Symbol(s)
Last Window Symbols Errors: 0 Symbol(s)
Total Symbols Errors: 0 Symbol(s)
Total Symbols Errors Events: 0 Events(s)
Relative Timestamp of the Event: 0 x 100 milliseconds

Frame Error:

Window: 0 x 100 milliseconds
Threshold: 0 Error Frame(s)
Last Window Frame Errors: 0 Frame(s)
Total Frame Errors: 0 Frames(s)
Total Frame Errors Events: 0 Events(s)
Relative Timestamp of the Event: 0 x 100 milliseconds

Frame Period Error:

Window: 0 Frames
Threshold: 0 Error Frame(s)

```

Last Window Frame Errors:      0 Frame(s)
Total Frame Errors:            0 Frames(s)
Total Frame Period Errors Events: 0 Events(s)
Relative Timestamp of the Event: 0 x 100 milliseconds

```

```

Frame Seconds Error:
Window:                        0 x 100 milliseconds
Threshold:                     0 Error Second(s)
Last Window Frame Second Errors: 0 Frame(s)
Total Frame Second Errors:      0 Frames(s)
Total Frame Second Errors Events: 0 Events(s)
Relative Timestamp of the Event: 0 x 100 milliseconds

```

3. Verify the oam statistics

```
show ethernet oam statistics interface xe3
```

Counters:

```

-----
Information OAMPDU Tx           : 331
Information OAMPDU Rx           : 323
Event Notification OAMPDU Tx    : 0
Event Notification OAMPDU Rx    : 0
Loopback Control OAMPDU Tx     : 0
Loopback Control OAMPDU Rx     : 0
Unsupported OAMPDU Rx           : 0

```

Local event logs:

```

-----
0 Errored Symbol Period records
0 Errored Frame records
0 Errored Frame Period records
0 Errored Frame Seconds records

```

Remote event logs:

```

-----
0 Errored Symbol Period records
0 Errored Frame records
0 Errored Frame Period records
0 Errored Frame Seconds records

```

4. Verify the oam status

```
show ethernet oam status interface xe3
```

General:

```

-----
Mode:                          active
PDU max rate:                   10 packets per second
PDU min rate:                   1 packet per 1 second

```

Link timeout: 5 seconds
High threshold action: no action

Link Monitoring:

Status: supported(on)

Event log size: 20 Entries

Symbol Period Error:

Window: 100 million symbols
Low threshold: 1 error symbol(s)
High threshold: none

Frame Error:

Window: 100 x 10 milliseconds
Low threshold: 1 error frame(s)
High threshold: none

Frame Period Error:

Window: 1000 x 100,000 frames
Low threshold: 1 error frame(s)
High threshold: none

Frame Seconds Error:

Window: 1000 x 10 milliseconds
Low threshold: 1 error second(s)
High threshold: none

CHAPTER 3 Ethernet CFM Configurations

This chapter contains examples of Ethernet Operations and Management (OAM) configurations using the Connectivity Fault Management (CFM) protocol.

Connectivity Fault Management detects, verifies, isolates and notifies connectivity failures on a Virtual Bridged LAN (B-VLAN) based on the protocol standard specified in IEEE 802.1ag 2007. It provides discovery and verification of paths through 802.1 bridges and LANs and is part of the Operation, Administration and Management (OAM) module. CFM is transparent to customer data being transported by a network and is capable of providing maximum fault management.

Note: CFM session flaps occur if the active LAG member transmitting and receiving CCM PDUs goes down and the LAG re-converges after hardware updates.

Continuity Check Message (CCM)

Topology

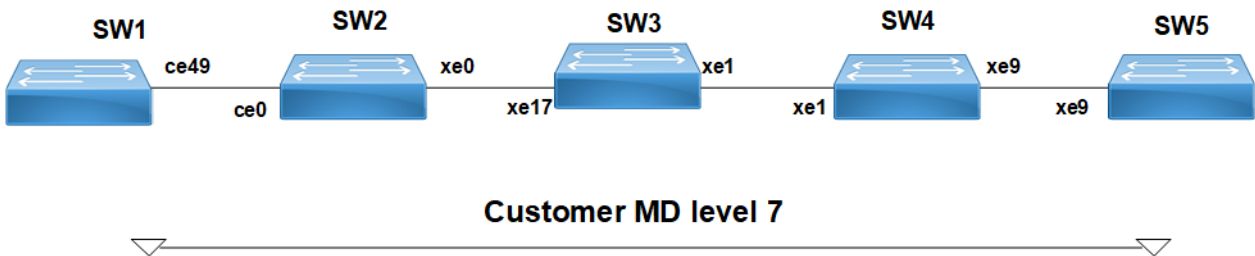


Figure 3-4: CFM Topology

Prerequisite

Configure below hardware-profile commands related to CFM in configuration mode and reboot the nodes.

```
hardware-profile statistics cfm-ccm enable
```

SW1

SW1#configure terminal	Enter configure mode.
SW1(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
SW1(config)#vlan database	Entering vlan database
SW1(config-vlan)#vlan 512 bridge 1 state enable	Create VLAN 512 on bridge 1.
SW1(config-vlan)#exit	Exit vlan database
SW1(config)#interface ce49	Configure interface ce49.
SW1(config-if)#switchport	Configure the interface as switch port.
SW1(config-if)#bridge-group 1	Configure interface in bridge group 1.

SW1(config-if)#switchport mode trunk	Configure interface mode as trunk.
SW1(config-if)#switchport trunk allowed vlan all	Allow all VLANs on interface ce49.
SW1(config-if)#exit	Exit config mode.
SW1(config)#ethernet cfm domain-type character-string domain-name mdnam level 7 mip-creation default	Create cfm domain with type as character string and set mip creation criteria to default.
SW1(config-ether-cfm)#service ma-type string ma-name testtm	Create ma type as string and configure the ma
SW1(config-ether-cfm-ma)#vlan 25 bridge 1	Configure vlan-id to associate the vlan to the MA
SW1(config-ether-cfm-ma)#mip-creation default	Set the mip creation criteria to default for the MA
SW1(config-ether-cfm-ma)#ethernet cfm mep down mpid 2 active true ce49	Create down mep on ce49.
SW1(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast.
SW1(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit CFM MEP configuration mode.
SW1(config-ether-cfm-ma)#mep crosscheck mpid 1	Configure crosscheck to remote MEP in VLAN 512.
SW1(config-ether-cfm-ma)#cc interval 10ms	Enable cc interval for 10 millisecond.
SW1(config-ether-cfm-ma)#exit-ether-ma-mode	Exit CFM MA configuration mode.
SW1(config-ether-cfm)#exit	Exit ethernet CFM mode.
SW1(config)#commit	Commit the configuration
SW1(config)#exit	Exit the configure terminal mode

SW2

SW2#configure terminal	Enter configure mode.
SW2(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
SW2(config)#vlan database	Entering vlan database
SW2(config-vlan)#vlan 512 bridge 1 state enable	Create VLAN 512 on bridge 1.
SW2(config-vlan)#exit	Exit vlan database
SW2(config)#interface ce0	Configure interface ce0.
SW2(config-if)#switchport	Configure the interface as switch port.
SW2(config-if)#bridge-group 1	Configure interface in bridge group 1.
SW2(config-if)#switchport mode trunk	Configure interface mode as trunk.
SW2(config-if)#switchport trunk allowed vlan all	Allow all VLANs on interface ce0.
SW2(config-if)#exit	Exit config mode.
SW2(config)#interface xe0	Configure interface xe0.
SW2(config-if)#switchport	Configure the interface as switch port.
SW2(config-if)#bridge-group 1	Configure interface in bridge group 1.
SW2(config-if)#switchport mode trunk	Configure interface mode as trunk.

SW2(config-if)#switchport trunk allowed vlan all	Allow all VLANs on interface xe1.
SW2(config-if)#exit	Exit the interface mode
SW2(config)#commit	Commit the configuration
SW2(config)#exit	Exit the configure terminal mode

SW3

SW3#configure terminal	Enter configure mode.
SW3(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
SW3(config)#vlan database	Entering vlan database
SW3(config-vlan)#vlan 512 bridge 1 state enable	Create VLAN 512 on bridge 1.
SW3(config-vlan)#exit	Exit vlan database
SW3(config)#interface xe17	Configure interface xe17
SW3(config-if)#switchport	Configure the interface as switch port.
SW3(config-if)#bridge-group 1	Configure interface in bridge group 1.
SW3(config-if)#switchport mode trunk	Configure interface mode as trunk.
SW3(config-if)#switchport trunk allowed vlan all	Allow all VLANs on interface xe17.
SW3(config-if)#exit	Exit config mode.
SW3(config)#interface xe1	Configure interface xe1.
SW3(config-if)#switchport	Configure the interface as switch port.
SW3(config-if)#bridge-group 1	Configure interface in bridge group 1.
SW3(config-if)#switchport mode trunk	Configure interface mode as trunk.
SW3(config-if)#switchport trunk allowed vlan all	Allow all VLANs on interface xe1.
SW3(config-if)#exit	Exit the interface mode
SW3(config)#commit	Commit the configuration
SW3(config)#exit	Exit the configure terminal mode

SW4

SW4#configure terminal	Enter configure mode.
SW4(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
SW4(config)#vlan database	Entering vlan database
SW4(config-vlan)#vlan 512 bridge 1 state enable	Create VLAN 512 on bridge 1.
SW4(config-vlan)#exit	Exit vlan database
SW4(config)#interface xe1	Configure interface xe1.
SW4(config-if)#switchport	Configure the interface as switch port.
SW4(config-if)#bridge-group 1	Configure interface in bridge group 1.

SW4(config-if)#switchport mode trunk	Configure interface mode as trunk.
SW4(config-if)#switchport trunk allowed vlan all	Allow all VLANs on interface xe1.
SW4(config-if)#exit	Exit config mode.
SW4(config)#interface xe9	Configure interface xe9.
SW4(config-if)#switchport	Configure the interface as switch port.
SW4(config-if)#bridge-group 1	Configure interface in bridge group 1.
SW4(config-if)#switchport mode trunk	Configure interface mode as trunk.
SW4(config-if)#switchport trunk allowed vlan all	Allow all VLANs on interface xe9.
SW4(config-if)#exit	Exit the interface mode
SW4(config)#commit	Commit the configuration
SW4(config)#exit	Exit the configure terminal mode

SW5

SW5#configure terminal	Enter configure mode.
SW5(config)#bridge 1 protocol rstp vlan-bridge	Create bridge 1 as an RSTP VLAN-aware bridge.
SW5(config)#vlan database	Entering vlan database
SW5(config-vlan)#vlan 512 bridge 1 state enable	Create VLAN 512 on bridge 1.
SW5(config-vlan)#exit	Exit vlan database
SW5(config)#interface xe9	Configure interface xe9.
SW5(config-if)#switchport	Configure the interface as switch port.
SW5(config-if)#bridge-group 1	Configure interface in bridge group 1.
SW5(config-if)#switchport mode trunk	Configure interface mode as trunk.
SW5(config-if)#switchport trunk allowed vlan all	Allow all VLANs on interface xe9.
SW5(config-if)#exit	Exit config mode.
SW5(config)#ethernet cfm domain-type character-string domain-name mdnam level 7 mip-creation default	Create cfm domain with type as character string and set mip creation criteria to default.
SW5(config-ether-cfm)#service ma-type string ma-name testtm	Create ma type as string and set mip creation criteria to default.
SW5(config-ether-cfm-ma)#vlan 25 bridge 1	Configure vlan-id to associate the vlan to the MA
SW5(config-ether-cfm-ma)#mip-creation default	Set the mip creation criteria to default for the MA
SW5(config-ether-cfm-ma)#ethernet cfm mep down mpid 1 active true xe9	Create down mep on xe9.
SW5(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast.
SW5(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit CFM MEP configuration mode
SW5(config-ether-cfm-ma)#mep crosscheck mpid 2	Configure crosscheck to remote MEP in VLAN 512.

SW5(config-ether-cfm-ma)#cc interval 10ms	Enable cc interval for 10 millisecond.
SW5(config-ether-cfm-ma)#exit-ether-ma-mode	Exit CFM MA configuration mode.
SW5(config-ether-cfm)#exit	Exit ethernet CFM mode.
SW5(config)#commit	Commit the configuration
SW5(config)#exit	Exit the configure terminal mode

Validation

```
SW1#ping ethernet mac 3c2c.9926.e683 unicast source 2 domain mdnam vlan 512 bridge 1
success rate is 100 (5/5)
```

```
SW1#traceroute ethernet 3c2c.9926.e683 mepid 2 domain mdnam
MP Mac Hops Relay-action Ingress/Egress Ingress/Egress action
3c2c.9926.e683 1 RlyHit Ingress IngOK
```

```
SW1#show ethernet cfm maintenance-points local mep domain mdnam ma-name testtm
MPID Dir Lvl VLAN CC-Stat HW-Status CC-Intvl MAC-Address Def Port MD Name
-----
--
2 Dn 7 512 Enable Installed 10 ms 6cb9.c567.721d F ce49
mdnam
```

```
SW1#show ethernet cfm maintenance-points remote domain mdnam ma-name testtm MEPID
RMEPID LEVEL VLAN Rx CCM RDI PEER-MAC TYPE
-----
-2 1 7 512 Yes False 3c2c.9926.e683 Configured
```

```
SW1#show ethernet cfm ma status domain mdnam ma testtm
MA NAME VLAN STATUS
-----
testtm 512 Active
```

Carrier Ethernet Command Reference

CHAPTER 1 CFM Commands

This chapter describes the commands used to manage the Connectivity Fault Management (CFM). CFM refers to the service OAM of Ethernet used to manage individual Layer 2 Ethernet services. The CFM protocol can discover and verify the path through 802.1 bridges and LANs. OcNOS adheres to the IEEE 802.1ag 2007 standard.

- [cc interval](#)
- [cc multicast](#)
- [cfm snmp restart](#)
- [clear ethernet cfm maintenance-point remote](#)
- [clear ethernet cfm statistics](#)
- [clear ethernet cfm traceroute-cache](#)
- [ethernet cfm debug](#)
- [ethernet cfm domain-type](#)
- [ethernet cfm mep](#)
- [ethernet cfm mip](#)
- [exit-ether-ma-mep-mode](#)
- [exit-ether-ma-mode](#)
- [link-level](#)
- [mep crosscheck](#)
- [mep lowest-priority-defect](#)
- [mip-creation](#)
- [ping ethernet mac](#)
- [service ma-type](#)
- [show debugging ethernet cfm](#)
- [show ethernet cfm errors](#)
- [show ethernet cfm ma status](#)
- [show ethernet cfm maintenance-points count](#)
- [show ethernet cfm maintenance-points local mep](#)
- [show ethernet cfm maintenance-points local mip](#)
- [show ethernet cfm maintenance-points remote](#)
- [show ethernet cfm traceroute-cache](#)
- [show ethernet cfm statistics](#)
- [show running-config cfm](#)
- [traceroute ethernet](#)
- [vlan](#)

cc interval

Use this command to set the continuity checking (CC) message interval.

Note: It is recommend to configure CC interval as equal-to or higher than 100ms. System can not be scaled when CC interval is configured less than 100ms.

Command Syntax

```
cc interval (10ms|100ms|1s|10s|1min|10min)
```

Parameters

10ms	10 milliseconds
100ms	100 milliseconds
1s	1 seconds
1min	1 minute
10s	10 seconds
10min	10 minutes

Command Mode

Ethernet CFM MA mode

Applicability

This command was introduced in OcNOS version 4.2.

Examples

```
(config)#ethernet cfm domain-type character-string domain-name 12345 level 7
(config-ether-cfm)#service ma-type string ma-name 43982
OcNOS(config-ether-cfm-ma)#vlan 10 bridge 1
(config-ether-cfm-ma)#ethernet cfm mep down mpid 2331 active true xe2
OcNOS(config-ether-cfm-ma-mep)cc interval 1s
OcNOS(config-ether-cfm-ma-mep)#cc multicast state enable
```

cc multicast

Use this command to start or stop multicast continuity checking messages (CCMs) on a MEP.

Command Syntax

```
cc multicast state (enable|disable)
```

Parameters

enable	Start sending CCMs
disable	Stop sending CCMs

Command Mode

Ethernet CFM MA MEP mode

Applicability

This command was introduced in OcNOS version 4.2.

Examples

```
OcNOS(config)#ethernet cfm domain-type character-string domain-name 12345 level 7
OcNOS(config-ether-cfm)#service ma-type string ma-name 43982
OcNOS(config-ether-cfm-ma)#vlan 10
(config-ether-cfm-ma)#ethernet cfm mep down mpid 2331 active true xe2
(config-ether-cfm-ma-mep)#cc multicast state enable
```

cfm snmp restart

Use this command to restart SNMP in CFM Protocol.

Command Syntax

```
cfm snmp restart
```

Parameters

None

Command Mode

Exec mode

Applicability

This command was introduced in OcNOS Version 5.1.

Examples

```
OcNOS#cfm snmp restart
```

clear ethernet cfm maintenance-point remote

Use this command to remove a dynamically learned RMEP.

The RMEP is relearned if [service ma-type](#) is enabled and a CCM (Continuity Checking Message) is received.

Command Syntax

```
clear ethernet cfm maintenance-points remote domain <DOMAIN-NAME>
```

Parameters

DOMAIN_NAME	Enter the name of the domain.
-------------	-------------------------------

Command Mode

Exec mode

Applicability

This command was introduced in OcNOS version 4.2.

Example

```
#clear ethernet cfm maintenance-points remote domain abcde
```

clear ethernet cfm statistics

Use this command to clear the CFM statistics.

Command Syntax

```
clear ethernet cfm statistics
```

```
clear ethernet cfm statistics mep <MEPID> domain <DOMAIN_NAME> ma <MA_NAME>
```

Parameters

MEPID	MEP identifier <1-8191>
DOMAIN_NAME	Enter the name of the domain. Name must be of 5 characters if type is character-string otherwise no_name if domain-type is no-name1
MA_NAME	Enter maintenance association name. If ma-type is character string then maximum length of ma-name is 6 else if it's integer then maximum is 2-octets.

Command Mode

Exec mode

Applicability

This command was introduced in OcNOS-SP version 1.0.

Example

```
OcNOS#clear ethernet cfm statistics
```

clear ethernet cfm traceroute-cache

Use this command to clear the CFM traceroute cache entry.

Command Syntax

```
clear ethernet cfm traceroute-cache
```

Parameters

None

Command Mode

Exec mode

Applicability

This command was introduced in OcNOS-SP version 1.0.

Example

```
#clear ethernet cfm traceroute-cache
```

ethernet cfm debug

Use this command to enable debug for ethernet cfm .

Use `no` from of this command to disable debug for ethernet cfm

Command Syntax

```
ethernet cfm debug (events|rx|tx|loopback|traceroute)
no ethernet cfm debug (events|rx|tx|loopback|traceroute)
```

Parameters

TIME	Wait-to-restore-timer <0-86400>
events	Enable event debugs
loopback	Enable loopback debugs
rx	Enable receive debugs
traceroute	Enable traceroute debugs
tx	Enable transmit debugs

Default

None

Command Mode

Configure mode

Applicability

This command was introduced in OcNOS Version 5.0

Examples

```
OcNOS(config)#ethernet cfm debug events
OcNOS(config)#ethernet cfm debug loopback
OcNOS(config)#ethernet cfm debug rx
OcNOS(config)#ethernet cfm debug tx
OcNOS(config)#ethernet cfm debug traceroute
OcNOS(config)#no ethernet cfm debug events
OcNOS(config)#no ethernet cfm debug loopback
OcNOS(config)#no ethernet cfm debug rx
OcNOS(config)#no ethernet cfm debug tx
OcNOS(config)#no ethernet cfm debug traceroute
```

ethernet cfm domain-type

Use this command to create a CFM Maintenance Domain (MD) in a bridge and enter Ethernet CFM mode.

Use the `no` form of this command to remove a domain.

Note: You can create up to 15 MDs in a bridge.

Only one domain can be created without any domain name in a bridge.

A domain name of type `character-string` can only be created only after the [mep crosscheck](#) command is executed.

Command Syntax

```
ethernet cfm domain-type (no-name|character-string) domain-name DOMAIN_NAME level
<0-7> mip-creation (none|default|explicit)
no ethernet cfm domain-name DOMAIN_NAME
```

Parameters

<code>domain-type</code>	Domain type (must match service ma-type setting)
<code>no-name</code>	No MD name. The <code>ma-type</code> must be integer or <code>itu-t</code> carrier code (ICC) format defined by Y.1731.
<code>character-string</code>	Character string name. The <code>ma-type</code> must be string.
<code>DOMAIN_NAME</code>	Enter the name of the domain.
<code><0-7></code>	MD level
<code>mip-creation</code>	Maintenance Intermediate Point (MIP) creation permission for this domain
<code>none</code>	No MIP can be created for this VLAN identifier
<code>default</code>	MIP can be created if no lower active level or MEP at next lower active level
<code>explicit</code>	Maintenance End Point (MEP) is needed at the next lower active level

Command Mode

Configure mode

Applicability

This command was introduced in OcNOS-SP version 1.0.

Examples

```
OcNOS(config)#
OcNOS(config)#ethernet cfm domain-type character-string domain-name 12347
level 7 mip-creation none
OcNOS(config-ether-cfm)#
```

ethernet cfm mep

Use this command to create a Maintenance End Point (MEP), make it active or inactive and enter Ethernet CFM MA MEP mode.

A MEP created with the `active false` option remains inactive and CFM functionality is suspended for such a MEP.

Note: VLAN parameters is supported only for sub-interface.

Use the `no` form of this command to delete a MEP.

Command Syntax

```
ethernet cfm mep (down|up) mpid <1-8191> active (false|true) (IFNAME ((vlan <1-4094> (inner-vlan <1-4094>)|)| evpn <1-16777215>))
no ethernet cfm mpid <1-8191>
```

Parameters

down	Down MEP
up	Up MEP
active	Administrative state of the MEP
true	Make the MEP active
false	Make the MEP inactive
IFNAME	Interface name
vlan	Outer vlan
inner-vlan	Inner vlan
evpn <ID>	EVPN instance ID

Command Mode

Ethernet CFM MA mode

Applicability

This command was introduced in OcNOS-SP version 1.0.

Example

Physical Interface:

```
OcNOS(config)#ethernet cfm domain-type character-string domain-name md001
level 7
OcNOS(config-ether-cfm)#service ma-type string ma-name ma001 vlan 11 bridge 1
OcNOS(config-ether-cfm-ma)#ethernet cfm mep down mpid 666 active true ge9
```

Sub-interface:

```
OcNOS(config)#ethernet cfm domain-type character-string domain-name md001
level 7
OcNOS(config-ether-cfm)#service ma-type string ma-name ma001
OcNOS(config-ether-cfm-ma)#ethernet cfm mep down mpid 111 active true ge9.1
vlan 100
```

ethernet cfm mip

Use this command to create a static MIP on an interface.

Use the `no` form of this command to remove a static MIP from an interface.

Command Syntax

```
ethernet cfm mip interface IFNAME
no ethernet cfm mip interface IFNAME
```

Parameters

IFNAME	Interface name of MIP
--------	-----------------------

Command Mode

Ethernet CFM MA mode

Applicability

This command was introduced in OcNOS version 4.2.

Example

```
OcNOS#con term
Enter configuration commands, one per line.  End with CNTL/Z.
OcNOS(config)#ethernet cfm domain-type character-string domain-name 12345
level 7
OcNOS(config-ether-cfm)# service ma-type string ma-name ma1
OcNOS(config-ether-cfm-ma)# vlan 25 bridge 1
OcNOS(config-ether-cfm-ma)# ethernet cfm mip interface ge5
OcNOS(config-ether-cfm-ma)#no ethernet cfm mip interface ge5
(config)#ethernet cfm domain-type character-string domain-name 12345 level 7
```

exit-ether-ma-mep-mode

Use this command to exit Ethernet CFM MA MEP mode and go back to Ethernet CFM MA mode.

Command Syntax

```
exit-ether-ma-mep-mode
```

Parameters

None

Command Mode

Ethernet CFM MA MEP mode

Applicability

This command was introduced in OcNOS version 4.2.

Examples

```
#configure terminal
(config)#ethernet cfm domain-type character-string domain-name 12345 level 7
(config-ether-cfm)#service ma-type string ma-name testtm
(config-ether-cfm-ma)#vlan 5 bridge 10
(config-ether-cfm-ma)#ethernet cfm mep down mpid 201 active true xe2
(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode
```

exit-ether-ma-mode

Use this command to exit Ethernet CFM MA mode and go back to Ethernet CFM mode.

Command Syntax

```
exit-ether-ma-mode
```

Parameters

None

Command Mode

Ethernet CFM MA mode

Applicability

This command was introduced in OcNOS version 4.2.

Examples

```
#configure terminal
(config)#ethernet cfm domain-type character-string domain-name 12345 level 7 mi
(config-ether-cfm)#service ma-type string ma-name testtm
(config-ether-cfm-ma)#vlan 5 bridge 10
(config-ether-cfm-ma)#exit-ether-ma-mode
```

link-level

Use this command to create a maintenance association for link-level MEPs (level 0) which do not listen on a VLAN.

Command Syntax

```
link-level (bridge <1-32>|)
```

Parameters

<1-32>	Bridge id
--------	-----------

Command Mode

Ethernet CFM MA mode

Applicability

This command was introduced in OcNOS-SP version 5.1.

Example

```
OcNOS#configure terminal
OcNOS(config)#ethernet cfm domain-type character-string domain-name 12345 level 0
OcNOS(config-ether-cfm)#service ma-type string ma-name ma1
OcNOS(config-ether-cfm-ma)#link-level bridge 1
OcNOS(config-ether-cfm-ma)#ethernet cfm mep down mpid 2331 active true xe2
```

mep crosscheck

Use this command to configure a remote MEP crosscheck.

Use the `no` form of this command to delete a crosscheck MEP.

Command Syntax

```
mep crosscheck mpid MEPID
no mep crosscheck mpid MEPID
```

Parameters

MEPID	Remote host MEP identifier <1-8191>
-------	-------------------------------------

Command Mode

Ethernet CFM MA or MEP mode.

Applicability

This command was introduced in OcNOS-SP version 1.0.

Example

Physical interface:

```
OcNOS#configure terminal
OcNOS(config)#ethernet cfm domain-type character-string domain-name 12345
level 7
OcNOS(config-ether-cfm)# service ma-type string ma-name testtm
OcNOS(config-ether-cfm-ma)#vlan 5 bridge 10
OcNOS(config-ether-cfm-ma)#mep crosscheck mpid 51
```

Sub-interface:

```
OcNOS#configure terminal
OcNOS(config)#ethernet cfm domain-type character-string domain-name md001
level 7
OcNOS(config-ether-cfm)# service ma-type string ma-name md001
OcNOS(config-ether-cfm-ma)# ethernet cfm mep down mpid 11 active true xe1.1
vlan 10 cc multicast state enable
OcNOS(config-ether-cfm-ma)#mep crosscheck mpid 2
```

mep lowest-priority-defect

Use this command to set the lowest-priority defect that can generate a fault alarm.

Use the `no` form of this command to set the lowest-priority defect to its default (`defMACstatus`).

Command Syntax

```
mep lowest-priority-defect
    (defRDICCM|defMACstatus|defRemoteCCM|defErrorCCM|defXconCCM)
no mep lowest-priority-defect
```

Parameters

<code>defRDICCM</code>	1 (lowest): At least one of the Remote MEP state machines is receiving valid CCMs from its remote MEP that has the Remote Defect Indication (RDI) bit set.
<code>defMACstatus</code>	2: One or more of the remote MEPs is reporting a failure in its Port Status Type-Length-Value (TLV) or Interface Status TLV: MEP Down.
<code>defRemoteCCM</code>	3: At least one of the remote MEP state machines is not receiving valid CCMs from its remote MEP.
<code>defErrorCCM</code>	4: One or more invalid CCMs has been received, and 3.5 times the CCMs' transmission interval has not yet expired.
<code>defXconCCM</code>	5: (highest): One or more cross-connect continuity check messages (CCMs) has been received, and 3.5 times at least one of those CCMs' transmission interval has not yet expired.

Default Value

`defMACstatus`

Command Mode

Ethernet CFM MA MEP mode

Applicability

This command was introduced in OcNOS version 4.2.

Example

```
#configure terminal
(config)#ethernet cfm domain-type character-string domain-name 12345 level 7
(config-ether-cfm)#service ma-type string ma-name testtm
(config-ether-cfm-ma)#vlan 5 bridge 10
(config-ether-cfm-ma)#ethernet cfm mep down mpid 201 active true xe7
(config-ether-cfm-ma-mep)#mep lowest-priority-defect defRemoteCCM
```

mip-creation

Use this command for Maintenance domain Intermediate Point (MIP) creation permission for this domain.

Note: CFM MIP is not supported on Provider Bridge.

Command Syntax

```
mip-creation (none|default|explicit|defer) |
```

Parameters

mip-creation	Maintenance domain Intermediate Point (MIP) creation permission for this domain
none	No MIP can be created for this VLAN identifier
default	MIP can be created if no lower active level or MEP at the next lower active level
explicit	MEP is needed at the next lower active level
defer	Use the MIP creation permissions of the MD to which this MA belongs

Command Mode

Ethernet CFM MA mode

Applicability

This command was introduced in OcNOS-SP version 5.1.

Example

```
OcNOS#configure terminal
OcNOS(config)#ethernet cfm domain-type character-string domain-name 12345 level 7
(config-ether-cfm)#service ma-type string ma-name testtm
OcNOS(config-ether-cfm-ma)#mip-creation none
OcnOS(config-ether-cfm-ma)#ethernet cfm mep down mpid 2331 active true xe22
```

ping ethernet mac

Use this command to send a loopback message for a MAC address to a remote MEP for fault verification. Use either the `domain` or the `level` parameter with the `vlan` or `bridge` parameter to target a specific device.

Command Syntax

```
ping ethernet mac MACADDRESS unicast source MEPID domain DOMAIN_NAME ma MA_NAME
```

Parameters

MACADDRESS	Destination MAC address in HHHH.HHHH.HHHH format
MEPID	Source host MEP ID <1-8191>
DOMAIN_NAME	Enter the name of the domain.
MA_NAME	Enter maintenance association name. If ma-type is character string then maximum length of ma-name is 6 else if it's integer then maximum is 2-octets.

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS-SP version 1.0.

Examples

```
#ping ethernet mac 0018.236e.5eb5 unicast source 201 domain 12345 ma 123
```

service ma-type

Use this command to create a service Maintenance Association (MA), and enter Ethernet CFM MA mode. This command allows creation of a maintenance association for link-level MEPs (level 0) which do not listen on a VLAN.

A VID can be associated with an MA after MA is created.

Use the `no` form of this command to remove an MA.

Command Syntax

Ethernet CFM mode

```
service ma-type (string|integer|itu-t) ma-name MA_NAME
no service ma-name MA_NAME
```

Command Mode

Ethernet CFM mode

Applicability

This command was introduced in OcNOS-SP version 1.0.

Example

OcNOS#con term

Enter configuration commands, one per line. End with CNTL/Z.

OcNOS(config)#ethernet cfm domain-type character-string domain-name mdnam level 7

OcNOS(config-ether-cfm)#service ma-type string ma-name testtm

show debugging ethernet cfm

Use this command to display CFM debugging options.

Command Syntax

```
show debugging ethernet cfm
```

Parameters

None

Command Mode

Privileged Exec Mode and Exec Mode

Applicability

This command was introduced in OcNOS version 6.0.

Examples

```
OcNOS#show debugging ethernet cfm
CFM debugging status:
CFM transmit debugging is on
CFM loopback debugging is on
CFM traceroute debugging is on
```

show ethernet cfm errors

Use this command to verify the defects present in a MEP.

Command Syntax

```
show ethernet cfm errors domain DOMAIN_NAME
```

Parameters

DOMAIN_NAME Enter the name of the domain.

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS version 4.2.

Example

```
#show ethernet cfm errors domain 12345
Domain Name      Level      Vlan      MEPID      Defects
-----
12345            7         10        100        .....
```

Table 1-1 explains the output fields

Table 1-1: show ethernet cfm errors

Field	Description
Domain Name	Maintenance Domain name
Level	MD Level
Vlan	Vlan identifier
MEPID	Maintenance End Point identifier
Defects	Defects in current MEP

show ethernet cfm ma status

Use this command to display the connectivity status of Maintenance Associations (MAs) in a domain.

Command Syntax

```
show ethernet cfm ma status domain DOMAIN_NAME (vlan <2-4094>|)
(mep <1-8191>| mep all|)
```

Parameters

DOMAIN_NAME	Enter the name of the domain.
<2-4094>	VLAN identifier
mep	Host MEP
<1-8191>	Host MEP identifier
all	All host MEPs

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS version 4.2.

Example

```
#show ethernet cfm ma status domain 12345 vlan 10
MA NAME          VLAN          STATUS
-----
43982            10             Active
```

Table 1-2 explains the output fields.

Table 1-2: show ethernet cfm ma status

Field	Description
MA NAME	Maintenance Association name
VLAN	VLAN identifier
STATUS	Active: All connected MEPs in MA are receiving the CCM with no defect or alarm present Partially Active: One or more connected MEPs in MA is not receiving CCM or it is receiving CCM with defect or alarm present Not Active: None of the connected MEPS in MA are receiving CCM or it is receiving CCM with defect or alarm present

show ethernet cfm maintenance-points count

Use this command to display information about the Total CFM sessions Count on a given interface.

Command Syntax

```
show ethernet cfm maintenance-points count IFNAME
```

Parameters

IFNAME	Interface name
--------	----------------

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS version 6.3.0.

Example

```
OcNOS#show ethernet cfm maintenance-points count xe6
```

```
-----  
Total No of MIPs                : 3  
Total No of MEPs                : 3  
Total No of UP MEPs             : 0  
Total No of Down MEPs           : 3  
Total No of Active CCM sessions : 3  
Total No of UP CCM sessions     : 2  
Total No of Active Test sessions : 0  
Total No of Active LM sessions  : 0  
Total No of Active DM sessions  : 0  
-----  
New: Total No of Active MEPs          : 6  
  
Old : Total No of Active CCM sessions : 6
```

show ethernet cfm maintenance-points local mep

Use this command to display information about the Maintenance End Points (MEPs) on a local interface.

Command Syntax

```
show ethernet cfm maintenance-points local (mep) (interface IFNAME|) (domain
DOMAIN_NAME) (ma-name MA_NAME)
```

Parameters

IFNAME	Interface name. This token can be used only for Down MEPs on L2 bridge.
DOMAIN_NAME	Enter the name of the domain.
MA_NAME	Maintenance association name.

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS version 4.2.

Example

```
#show ethernet cfm maintenance-point local mep xe2
MPID  Dir  Lvl  VLAN  CC-Stat  HW-Status  CC-Intvl  MAC-Address  Def  Port  MD Name
-----
100   Dn    7    10    Enable   Installed   100 ms    3c2c.99f0.b0c1  F    xe2   12345

#show ethernet cfm maintenance-points local mep domain 12345 ma-name
MPID  Dir  Lvl  VLAN  CC-Stat  HW-Status  CC-Intvl  MAC-Address  Def  Port  MD Name
-----
100   Dn    7    10    Enable   Installed   100 ms    3c2c.99f0.b0c1  F    xe2   12345
```

Table 1-3 explains the output fields.

Table 1-3: show ethernet cfm maintenance-points local mep

Field	Description
MPID	MEP identifier
Dir	Up MEP or Down MEP
Lvl	MD level
Vlan	VLAN identifier
CC-Stat	Whether continuity checking (CC) is enabled or disabled
HW-Status	Installed or pending to install in hardware
CC-Intvl	CCM Interval

Table 1-3: show ethernet cfm maintenance-points local mep

Field	Description
MAC-Address	MAC address
Def	Defect present
Port	CFM interface
MD Name	MD name

show ethernet cfm maintenance-points local mip

Use this command to display information about the Maintenance Intermediate Points (MIPs) on a local interface.

Command Syntax

```
show ethernet cfm maintenance-points local (mip) (interface IFNAME| (level <0-7>)
    (ma-name MA_NAME) | )
```

Parameters

IFNAME	Interface name.
<0-7>	Maintenance level.
MA_NAME	Maintenance association name. If ma-type is character string then maximum length of ma-name is 6 else if it's integer then maximum is 2-octets

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS version 4.2.

Example

```
#show ethernet cfm maintenance-points local mip level 7
Level  VID    Type  Port   MAC-Address
-----
7      10      MIP   xe3    0018.23ea.da36
7      10      MIP   xe5    0018.23ea.da38
```

[Table 1-4](#) explains the output fields.

Table 1-4: show ethernet cfm maintenance-points local mip

Field	Description
Level	MD level
VID	VLAN identifier
Type	MIP
Port	Interface name
MAC-Address	MAC address

show ethernet cfm maintenance-points remote

Use this command to display information about a remote MEP.

Command Syntax

```
show ethernet cfm maintenance-points remote (mpid MEP_ID|) (domain DOMAIN_NAME) (ma-  
name MA_NAME)
```

Parameters

MEP_ID	Remote MEP identifier <1-8191>
DOMAIN_NAME	Enter the name of the domain.
MA_NAME	Enter maintenance association name. If ma-type is character string then maximum length of ma-name is 6 else if it's integer then maximum is 2-octets.

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS-SP version 1.0.

Example

```
#show ethernet cfm maintenance-points remote domain 12345  
MEPIDRMEPIDLEVELVLANRx CCMRDIPEER-MACTYPE  
  
100 200 7 10 Yes Falsea82b.b579.fd2aConfigured
```

[Table 1-5](#) explains the output fields.

Table 1-5: show ethernet cfm maintenance-points remote

Field	Description
MEPID	MEP identifier
RMEPID	Remote MEP identifier
LEVEL	MD level
VLAN	VLAN identifier
Rx CCM	Yes if CCM receives, no if CCM doesn't receive.
RDI	Whether Remote Defect Indication (RDI) is on or off
PEER-MAC	Remote MEP mac address
TYPE	Configured or auto learned

show ethernet cfm traceroute-cache

Use this command to display the ethernet cfm traceroute cache

Command Syntax

```
show ethernet cfm traceroute-cache
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS version 4.2.

Example

```
OcNOS#show ethernet cfm traceroute-cache
MEPID      Dest mac          Hops      Relay-action
2          e8c5.7a91.f8c4        1         RlyHit
2          e8c5.7a91.f8c4        1         RlyHit
```

show ethernet cfm statistics

Use this command to display CFM statistics: CCM sent and received, LBM sent and LBR received, LTM sent and LTR received.

Command Syntax

```
show ethernet cfm statistics mep MEPID domain DOMAIN_NAME ma-name MA_NAME
```

Parameters

MEPID	Host MEP identifier <1-8191>
MA_NAME	Maintenance association name. If ma-type is character string then maximum length of ma-name is 6 else if it's integer then maximum is 2-octets
DOMAIN_NAME	Enter the name of the domain. Name must be of 5 characters if type is character-string otherwise no_name if domain-type is no-name1

Command Mode

Exec mode

Applicability

This command was introduced in OcNOS-SP version 1.0.

Example

```
#show ethernet cfm statistics
```

```
Continuity Check Messages
```

```
CCM Sent           : 168164
CCM Received       : 165460
```

```
Loop Back Messages
```

```
LBM Sent           : 5
LBR Received(Valid) : 5
LBR Received(Bad msdu) : 0
LBR Received(Out-of-Seq) : 0
```

```
Link Trace Messages
```

```
LTM Sent           : 1
LTR Sent           : 0
LTR Received(Valid) : 3
LTR Received(unexpected) : 0
```

```
Path Trace Messages
```

```
PTM Sent           : 0
PTM Received       : 0
PTM Received (bad) : 0
PTR Sent           : 0
PTR Received (Valid) : 0
PTR received (Unexpected) : 0
PTM Drop           : 0
```

Table 1-6 explains the output fields.

Table 1-6: show ethernet cfm statistics

Field	Description
Continuity Check Messages	
CCM Sent	Number of continuity check messages (CCMs) sent
CCM Received	Number of CCMs received
Loop Back Messages	
LBM Sent	Number of loopback messages (LBMs) sent
LBR Received(Valid)	Number of valid LBRs received
LBR Received(Bad msdu)	Number of LBRs received with bad MAC service data unit
LBR Received(Out-of-Seq)	Number of out-of-sequence LBRs received
Link Trace Messages	
LTM Sent	Number of link trace messages (LTMs) sent
LTR Received(Valid)	Number of link trace replies (LTRs) received
LTR Received(unexpected)	Number of unexpected LTRs received

show running-config cfm

Use this command to display CFM running configuration alone.

Command Syntax

```
show running-config cfm
```

Parameters

None

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS version 4.2.

Example

```
#show running-config cfm
ethernet cfm domain-type character-string domain-name 12347 level 2 mip-
creation none
service ma-type string ma-name 123
vlan 10 bridge 10
mip-creation default
ethernet cfm mep down mpid 14 active true xe4
    message level 2
    interval 1s
    frame priority 3
    exit-ether-ma-mep-lck-mode
ethernet cfm loss-measurement reply lmm
    exit-ether-ma-mep-mode
mep crosscheck mpid 41
exit-ether-ma-mode
!
```

traceroute ethernet

Use this command to start traceroute messages on a remote MEP.

Command Syntax

```
traceroute ethernet MAC mepid MEPID domain DOMAIN (ma MA_NAME)
```

Parameters

MAC	MAC address of the remote MEP or MIP in HHHH.HHHH.HHHH format.
MEPID	Host MEP identifier <1-8191>.
DOMAIN_NAME	Enter the name of the domain.
MA_NAME	Enter maintenance association name. If ma-type is character string then maximum length of ma-name is 6 else if it's integer then maximum is 2-octets.

Command Mode

Exec mode and Privileged Exec mode

Applicability

This command was introduced in OcNOS-SP version 1.0.

Example

```
#traceroute ethernet 0018.236e.5eb8 mepid 201 domain 12345 ma 123
MP Mac          Hops  Relay-action          Ingress/Egress  Ingress/Egress
action
0018.23ea.da36  1      RlyFDB                Ingress         IngOK
0018.23ea.da38  2      RlyFDB                Egress          EgrOK
0018.236e.5eb8  3      RlyHit                Ingress         IngOK

#traceroute ethernet 0018.236e.5eb8 mepid 201 domain 12345
MP Mac          Hops  Relay-action          Ingress/Egress  Ingress/Egress
action
0018.23ea.da36  1      RlyFDB                Ingress         IngOK
0018.23ea.da38  2      RlyFDB                Egress          EgrOK
0018.236e.5eb8  3      RlyHit                Ingress         IngOK
```

vlan

Use this command to create a service Maintenance Association (MA), with a VLAN.

Command Syntax

```
vlan VLAN_ID (bridge <1-32> | inner-vlan VLAN_ID|)
```

Parameters

<1-32>	Bridge id
VLAN_ID	Inner VLAN identifier <1-4094>

Command Mode

Ethernet CFM MA mode

Applicability

This command was introduced in OcNOS-SP version 5.1

Example

```
#configure terminal
OcNOS(config)#ethernet cfm domain-type character-string domain-name 12345 level 7
OcNOS(config-ether-cfm)#service ma-type string ma-name 43982
OcNOS(config-ether-cfm-ma)#vlan 10 bridge 10
OcNOS(config-ether-cfm-ma)#ethernet cfm mep down mpid 2331 active true xe2
```

CHAPTER 2 G.8032 ERPS Version 2 Commands

This chapter contains the G.8032 (2012) Ethernet Ring Protection Switching (ERPS) version 2 commands.

- `aps-channel level`
- `aps-channel vlan`
- `clear g8032 erp-instance`
- `data vlan`
- `debug g8032`
- `east-interface`
- `enable-tcn-propagation`
- `g8032 erp-instance`
- `g8032 erp-instance force-switch`
- `g8032 erp-instance manual-switch`
- `g8032 ring`
- `g8032-profile`
- `g8032 profile`
- `non-virtual-channel`
- `ring`
- `ring-id`
- `ring-type`
- `rpl role`
- `show g8032 all erp-instance`
- `show g8032 erp-instance`
- `show g8032 profile`
- `show g8032 ring`
- `switching mode`
- `tcn-to-instance`
- `timer`
- `virtual-channel`
- `west-interface`

aps-channel level

Use this command to set the maintenance entity group (MEG) level (MEL) to carry in R-APS messages.

Command Syntax

```
aps-channel level <0-7>
```

Parameters

<0-7> Level.

Command Mode

G.8032 configure switch mode

Examples

```
(g8032-config-switch)#aps-channel level 2
```

aps-channel vlan

Use this command to configure APS channel VLAN-ID for this ERP instance.

Command Syntax

```
aps-channel vlan <2-4094>
no aps-channel vlan
```

Parameters

<2-4094>	VLANID
----------	--------

Command Mode

G.8032 configure switch mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(g8032-config-switch)#aps-channel vlan 10
```

clear g8032 erp-instance

Use this command at the Ethernet ring node for the following operations:

1. Clearing an active local administrative command (forced switch or manual switch).
2. Triggering reversion before the wait to restore (WTR) or wait to block (WTB) timer expires in the case of revertive operation.
3. Triggering reversion in the case of non-revertive operation.

Command Syntax

```
#clear g8032 erp-instance INSTANCENAME
```

Parameters

`INSTANCENAME` Instance name (maximum 32 characters).

Command Mode

Exec mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
#clear g8032 erp-instance INST1
```

data vlan

Use this command to configure VLANs as data channels.

Use the `no` form of this command to remove the same.

Command Syntax

```
data vlan VLAN_RANGE
no data vlan VLAN_RANGE
```

Parameters

VLAN_RANGE	Enter VLAN ID 2-4094 or list of VLAN ID's separated by commas. Eg 2 or 2,4,5 or 50,51,52 etc.
------------	---

Command Mode

G.8032 configure switch mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(g8032-config-switch)#data vlan 201,202,203
```

debug g8032

Use this command to debug configuration.

Command Syntax

```
debug g8032 (all|tx|rx|fsm|timers|events|external|hal)
no debug g8032 (all|tx|rx|fsm|timers|events|external|hal)
```

Parameters

all	All debugging options.
events	Protocol event.
external	External CFM and NSM events.
fsm	Instance Finite State Machine updates.
hal	HAL events.
rx	Received PDUs.
timers	Protocol timer events.
tx	Transmitted PDUs.

Command Mode

Configure mode.

Exec mode.

Applicability

This command was introduced in OcNOS version 6.0.0.

Examples

```
(config)#debug g8032 tx
(config)#debug g8032 all
```

east-interface

Use this command to set the east port associated to the protection ring.

Command Syntax

```
east-interface IFNAME
no east-interface
```

Parameters

IFNAME	Interface name, such as xe1.
--------	------------------------------

Command Mode

G8032 ring config mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(config-if)#g8032 ring RING1
(g8032-ring-config)# east-interface ce1
```

enable-tcn-propagation

Use this command to enable or disable TCN (topology change notification) propagation for an interconnected ring.

Command Syntax

```
enable-tcn-propagation
no enable-tcn-propagation
```

Parameters

None.

Command Mode

G.8032 configure switch mode.

Applicability

This command was introduced in OcNOS version 6.0.0.

Examples

```
(g8032-config-switch) #enable-tcn-propagation
```

g8032 erp-instance

Use this command to create an ERP instance and change to G.8032 configure switch mode.

Use the `no` form of this command to delete an ERP instance.

Command Syntax

```
g8032 erp-instance INSTANCENAME
no g8032 erp-instance INSTANCENAME
```

Parameters

`INSTANCENAME` Instance name (maximum 32 characters).

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#g8032 erp-instance instance1
(g8032-config-switch)#
```

g8032 erp-instance force-switch

Use this command to configure administrative commands.

Command Syntax

```
g8032 erp-instance INSTANCE-NAME force-switch (east-interface | west-interface)
```

Parameters

INSTANCENAME	Instance name (maximum 32 characters).
east-interface	Apply command to east interface.
west-interface	Apply command to west interface.

Command Mode

Exec mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
#g8032 erp-instance example force-switch east-interface
```

g8032 erp-instance manual-switch

Use this command to configure administrative commands.

Command Syntax

```
g8032 erp-instance INSTANCE-NAME manual-switch (east-interface | west-interface)
```

Parameters

`INSTANCENAME` Instance name (maximum 32 characters).
`east-interface` Apply command to east interface.
`west-interface` Apply command to west interface.

Command Mode

Exec mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
#g8032 erp-instance example manual-switch west-interface
```

g8032 ring

Use this command to create a ring and associate east and west interfaces with it. All ERP instances on this ring have the same east and west interfaces,

Use the `no` form of this command to delete a ring.

Command Syntax

```
g8032 ring RINGNAME
no g8032 ring RINGNAME
```

Parameters

ring	Ring.
RINGNAME	Ring name (maximum 37 characters).

Command Mode

Configure mode

Examples

```
#configure terminal
(config)#g8032 ring ERPS123
(config)#no g8032 ring ERPS123
```

g8032-profile

Use this command to associate the ERP instance to a profile.

Command Syntax

```
g8032-profile PROFILENAME
```

Parameters

PROFILENAME Profile name.

Command Mode

G.8032 configure switch mode

Examples

```
(g8032-config-switch) g8032-profile prof_1
```

g8032 profile

Use this command to associate the ERPS profile to an instance.

Use the `no` form of this command to delete the ERPS profile from an instance.

Command Syntax

```
g8032 profile PROFILENAME
```

Parameters

PROFILENAME Profile name.

Command Mode

G.8032 configure switch mode

Examples

```
(g8032-config-switch) g8032-profile prof_1
```

non-virtual-channel

Use this command to make a sub-ring function without a virtual channel.

Use the `no` form of this command to delete a non-virtual channel.

Command Syntax

```
non-virtual-channel
no non-virtual-channel
```

Parameters

None.

Command Mode

G.8032 configure switch mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(g8032-config-switch) #non-virtual-channel
```

ring

Use this command to associate the ERP instance to a ring.

Command Syntax

```
ring RINGNAME
```

Parameters

RINGNAME	Ring name.
----------	------------

Command Mode

G.8032 configure switch mode

Examples

```
(g8032-config-switch)#ring ring1
```

ring-id

Use this command to set the ring identifier.

Command Syntax

```
ring-id <1-239>
```

Parameters

<1-239>	Ring identifier.
---------	------------------

Command Mode

G.8032 configure switch mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(g8032-config-switch)#ring-id 1
```

ring-type

Use this command to specify the type of the ethernet ring for this ERP instance.

Command Syntax

```
ring-type (major-ring | sub-ring | sub-ring-vc)
no ring-type
```

Parameters

major-ring	G.8032 major ring. In this type of rings nodes are connected in full circular topology
sub-ring	G.8032 sub-ring without virtual channel
sub-ring-vc	G.8032 sub-ring with virtual channel

Command Mode

G.8032 configure switch mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(g8032-config-switch)#ring-type major-ring
(g8032-config-switch)#ring-type sub-ring-vc
```

rpl role

Use this command to set the RPL (Ring Protection Link) role of the ring node.

Command Syntax

```
rpl role ((owner | neighbor | next-neighbor) (east-interface | west-interface) |
non-owner )
```

Parameters

owner	Ring node is the RPL owner.
neighbor	Ring node is neighbor to the RPL owner.
next-neighbor	Ring node is neighbor to the neighbor of the RPL owner.
east-interface	Role assigned to east interface.
west-interface	Role assigned to west interface.
non-owner	Ring node does not own the RPL.

Command Mode

G.8032 configure switch mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(g8032-config-switch)#rpl role owner east-interface
```

show g8032 all erp-instance

Use this command to display details about **all** ERP instances.

Command Syntax

```
show g8032 all erp-instance
```

Parameters

None

Command Mode

EXEC mode.

Applicability

This command was introduced in OcNOS version 6.0.0.

Example

```
(config)#show g8032 all erp-instance
```

```
Inst Name   : instance1
State       : G8032_ST_INIT
Phy Ring    : -
Role        : -
East Link   : -
West Link   : -
Attached    : -
Attached To : -
Virt Chan   : -
```

```
-----
```

Channel	Interface	Profile
(LEVL, VID, RID)	(east,ver), (west,ver)	
(7, 4065, 135)	(eth11,1), (eth2,2)	PROF1

```
=====
Data Traffic: 1,2,3,10,12...
```

show g8032 erp-instance

Use this command to display details about an ERP instance.

Command Syntax

```
show g8032 erp-instance INSTANCENAME
```

Parameters

INSTANCENAME Instance name.

Command Mode

Exec mode.

Applicability

This command was introduced before OcNOS version 5.0.

Example

```
(config)#show g8032 erp-instance instance1
Inst Name   : instance1
State       : G8032_ST_INIT
Phy Ring    : -
Role        : -
East Link   : -
West Link   : -
Attached    : -
Attached To : -
Virt Chan   : -
```

```
-----
      Channel      |      Interface      |  Profile
(LEVL, VID, RID)  | (east,ver), (west,ver) |
=====
(7, 4065, 135)    | (eth11,1), (eth2,2)   | PROF1
=====
Data Traffic: 1,2,3,10,12...
```

show g8032 profile

Use this command to display details about a profile.

Command Syntax

```
show g8032 profile PROFILENAME
```

Parameters

PROFILENAME Profile name.

Command Mode

Exec mode.

Applicability

This command was introduced before OcnOS version 5.0.

Examples

```
(config)#show g8032 profile profile1
Profile : profile1
=====
Wait-To-Restore : 5 mins
Hold Off Timer  : 0 secs
Guard Timer     : 500 ms
Wait-To-Block   : 5500 ms
Protection Type  : Revertive
```

show g8032 ring

Use this command to display details about a ring.

Command Syntax

```
show g8032 ring RINGNAME
```

Parameters

RINGNAME	Ring name.
----------	------------

Command Mode

Exec mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(config)#show g8032 ring ring1
Ring      : ring1
=====
East      : eth1
West      : eth2
ERP Inst  : inst1, inst2, inst3
```

switching mode

Use this command to set the revertive behavior of the ring node.

Command Syntax

```
switching mode (non-revertive | revertive)
```

Parameters

revertive	Represents revertive mode operation of a G.8032 ethernet ring.
non-revertive	Represents non-revertive mode operation of a G.8032 ethernet ring.

Command Mode

G.8032 profile configure mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(g8032-profile-config)# switching mode revertive
```

tcn-to-instance

Use this command to associate TCN instance (topology change notification) propagation for an interconnected ring when configured in non-virtual mode.

Command Syntax

```
tcn-to-instance INSTANCENAME
```

Parameters

INSTANCENAME Instance name.

Command Mode

G.8032 configure switch mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(config)#tcn-to-instance erp1
```

timer

Use this command to set timers.

Command Syntax

```
timer (wait-to-restore <1-12> | hold-off <0-10000> | guard-time <10-2000>)
```

Parameters

wait-to-restore

Wait-to-restore timer used to verify that a signal failure is not intermittent.

<1-12>

Timer value in minutes.

hold-off

Hold-off timer used to filter intermittent link faults.

<0-10000>

Timer value in a multiple of 100 milliseconds.

guard-time

Guard timer that blocks latent outdated messages from causing unnecessary state changes.

<1-20000>

Timer value in a multiple of 10 milliseconds.

Command Mode

G.8032 profile configure mode

Examples

```
(g8032-profile-config)#timer wait-to-restore 7
(g8032-profile-config)#timer hold-off 50
(g8032-profile-config)#timer guard-time 300
s(g8032-profile-config)#timer guard-time 30
```

virtual-channel

Use this command on a sub-ring to attach it to a major instance.

Use the `no` form of this command to delete a virtual channel.

Command Syntax

```
virtual-channel (<2-4094>|) attached-to-instance INSTANCENAME  
no virtual-channel
```

Parameters

<2-4094>	VLAN identifier.
INSTANCENAME	Major instance name.

Command Mode

G.8032 configure switch mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(g8032-config-switch)#virtual-channel 3 attached-to-instance inst1
```

west-interface

Use this command to set the west port associated to the protection ring.

Command Syntax

```
west-interface IFNAME
no west-interface
```

Parameters

IFNAME	Interface name
--------	----------------

Command Mode

G8032 ring config mode.

Applicability

This command was introduced before OcNOS version 5.0.

Examples

```
(config-if)#g8032 ring RING1
(g8032-ring-config)# west-interface cel
```

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