



**OcNOS®**  
**Open Compute**  
**Network Operating System**  
**for Data Center**  
**Version 6.4.2**

**Layer 1 Guide**  
December 2023

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# Contents

<b>Preface</b> .....	<b>v</b>
Audience .....	v
Conventions .....	v
Chapter Organization .....	v
Related Documentation .....	v
Migration Guide .....	v
Feature Availability .....	vi
Support .....	vi
Comments .....	vi
<b>Command Line Interface</b> .....	<b>7</b>
Overview .....	7
Command Line Interface Help .....	7
Command Completion .....	8
Command Abbreviations .....	8
Command Line Errors .....	8
Command Negation .....	9
Syntax Conventions .....	9
Variable Placeholders .....	10
Command Description Format .....	11
Keyboard Operations .....	11
Show Command Modifiers .....	12
String Parameters .....	15
Command Modes .....	15
Transaction-based Command-line Interface .....	17
<b>Layer 1 Configuration Guide</b> .....	<b>19</b>
CHAPTER 1 Cross-Connect (XC) .....	21
Topology .....	21
Configuration using Topology-1 .....	22
Validation .....	24
Configuration using Topology-2 .....	30
Validation .....	32
Configuring Cross connect using Static lag interfaces: .....	34
Validation .....	36
CHAPTER 2 Cross-Connect (XC) Resiliency .....	39
CHAPTER 3 CFM over xConnect Configuration .....	49
Topology .....	49
Configuration .....	49
Validation .....	54
<b>Layer 1 Command Reference</b> .....	<b>57</b>

CHAPTER 1	Port Based xConnect Commands	59
	backup	60
	cross-connect	61
	cross-connect switchover type revertive	62
	disable	63
	ep1 ep2	64
	link-fault-pass-through enable	65
	show cross-connect	66
<b>Index</b>		<b>69</b>

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# Preface

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This guide describes how to configure OcNOS.

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## Audience

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

---

## Conventions

[Table P-1](#) shows the conventions used in this guide.

**Table P-1: Conventions**

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

---

## 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

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## Related Documentation

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

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## Migration Guide

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

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## Feature Availability

The features described in this document that are available depend upon the OcNOS SKU that you purchased. See the *Feature Matrix* for a description of the OcNOS SKUs.

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## Support

For support-related questions, contact [support@ipinfusion.com](mailto:support@ipinfusion.com).

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## Comments

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# Command Line Interface

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

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## 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.

---

## Command Line Interface Help

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

```
> show ?
```

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

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

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

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

If you type the ? in the middle of a keyword, but the incomplete keyword matches several other keywords, 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 P-2](#) describes the conventions used to represent command syntax in this reference.

**Table P-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 <a href="#">Variable Placeholders</a>	<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 &lt;0-4294967295&gt;)</code>
( )	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.	<code>(A.B.C.D &lt;0-4294967295&gt; )</code>
( )	Optional parameter which you can specify or omit. Do not enter the parentheses or vertical bar as part of the command.	<code>(IFNAME )</code>
{ }	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.	<code>{intra-area &lt;1-255&gt; inter-area &lt;1-255&gt; external &lt;1-255&gt;}</code>

**Table P-2: Syntax conventions (Continued)**

Convention	Description	Example
[ ]	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 P-3 shows the tokens used in command syntax use to represent variables for which you supply a value.

**Table P-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
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 P-4 explains the sections used to describe each command in this reference.

**Table P-4: Command descriptions**

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

---

## Keyboard Operations

Table P-5 lists the operations you can perform from the keyboard.

**Table P-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.
Esc, b	Moves back one word
Esc, f	Moves forward one word
Ctrl+e	Moves to end of the line
Ctrl+a	Moves to the beginning of the line
Ctrl+u	Deletes the line
Ctrl+w	Deletes from the cursor to the previous whitespace
Alt+d	Deletes the current word
Ctrl+k	Deletes from the cursor to the end of line
Ctrl+y	Pastes text previously deleted with Ctrl+k, Alt+d, Ctrl+w, or Ctrl+u at the cursor

**Table P-5: Keyboard operations (Continued)**

Key combination	Operation
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

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[3-4]
...skipping
```

```

interface xe3
 shutdown
!
interface xe4
 shutdown
!
interface svlan0.1
 no shutdown
!
route-map myroute permit 3
!
route-map mymap1 permit 10
!
route-map rmap1 permit 3
!
line con 0
 login
line vty 0 4
 login
!
end

```

---

## Include Modifier

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

```

# show interface 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 P-6](#) apply for all string parameters used in OcnOS commands, unless some other restrictions are noted for a particular command.

**Table P-6: String parameter restrictions**

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

---

## Command Modes

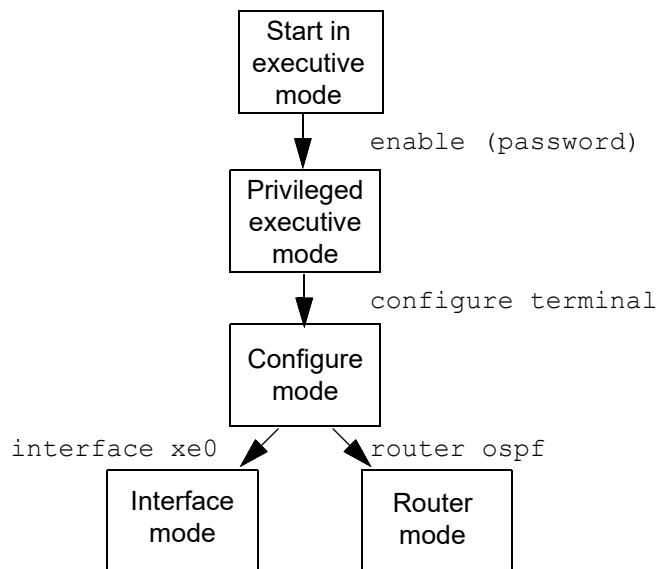
Commands are grouped into modes arranged in a hierarchy. Each mode has its own set of commands. [Table P-7](#) lists the command modes common to all protocols.

**Table P-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 P-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.



# Layer 1 Configuration Guide



## CHAPTER 1 Cross-Connect (XC)

This chapter contains the cross-connect configuration examples to connect the two cross connection ports.

The cross connect is bi-directional. The traffic which is received on the first interface is transmitted out to the second interface and the traffic which is received on the second interface is transmitted out to the first interface.

It is point-to-point and same end points (EP) cannot be used for another cross connect.

The following are the types of end points supported by this port based on cross connect.

1. Native Ethernet interface
2. LAG interface

### Topology

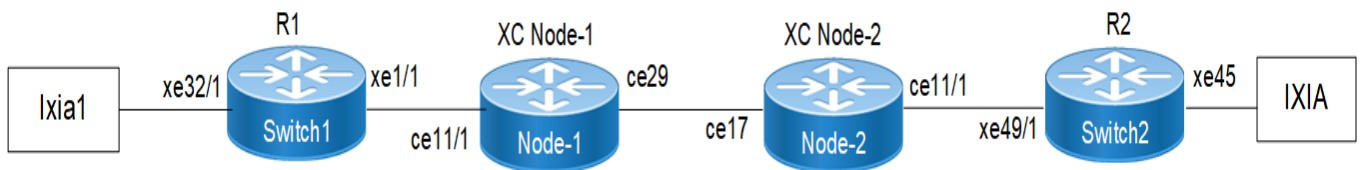


Figure 1-1: Cross-connect Topology-1

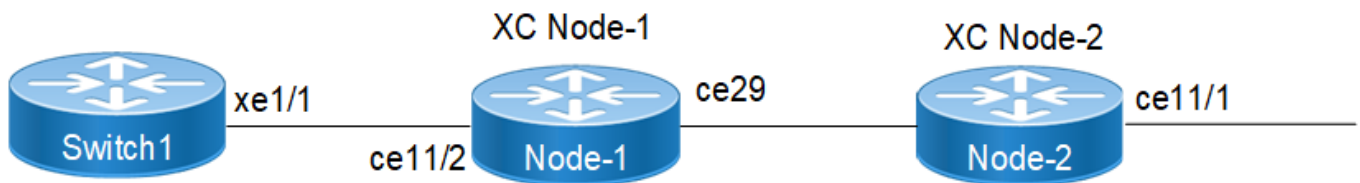


Figure 1-2: Cross-connect Topology-2

---

## Configuration using Topology-1

The following configuration example will illustrate OSPF, BFD and BGP session establishments via Cross-connect:

### R1

OcNOS#configure terminal	Enter into configure terminal
OcNOS(config)#hostname R1	Configure the host name
R1(config)#in xe1/1	Enter into interface level
R1(config-if)#ip address 10.10.10.1/24	Configure ip address to the interface
R1(config-if)#exit	Exiting from interface level
R1(config)#in xe32/1	Enter into interface mode
R1(config-if)#ip address 20.20.20.1/24	Configure ip address to the interface
R1(config-if)#exit	Exiting from interface level
R1(config)#interface lo	Enter into loop-back interface
R1(config-if)#ip address 1.1.1.1/24 secondary	Configuring secondary ip address
R1(config-if)#	Exiting the loop-back interface level
R1(config)#bfd interval 3 minrx 3 multiplier 3	Configuring bfd options
R1(config)#router ospf 10	Configuring OSPF process
R1(config-router)#router-id 1.1.1.1	Configuring router-id
R1(config-router)#network 10.10.10.0 0.0.0.255 area 0	Configuring Network id and Area id
R1(config-router)#redistribute connected	Configuring redistribute connected
R1(config-router)#bfd all-interfaces	Configuring bfd on all-interfaces
R1(config-router)#exit	Exiting the OSPF process
R1(config)#router bgp 100	Configuring bgp process
R1(config-router)#neighbor 10.10.10.2 remote-as 200	Configuring neighbor details
R1(config-router)#end	Exiting from the bgp process

**XC Node-1**

OcNOS#configure terminal	Entering into the configure terminal mode
OcNOS (config)#hostname Xc Node-1	Configuring the hostname
Xc Node-1(config)#interface ce29	Entering into interface level
Xc Node-1(config-if)#switchport	Configuring switchport
Xc Node-1(config-if)#exit	Exiting the interface level
Xc Node-1(config)#in ce11/1	Entering the interface level
Xc Node-1(config-if)#switchport	Configuring the switchport
Xc Node-1(config-if)#exit	Exiting the interface level
Xc Node-1(config)#cross-connect OSPF_BFD_BGP	Configuring the Cross-connect
Xc Node-1(config-XC)#ep1 ce11/1 ep2 ce29	Creating endpoints
Xc Node-1(config-XC)#end	Exiting cross-connect mode

**Xc Node-2**

OcNOS#configure terminal	Entering into the configure terminal mode
OcNOS (config)#hostname Xc Node-2	Configuring the hostname
Xc Node-2(config)#interface ce17	Entering into interface level
Xc Node-2(config-if)#switchport	Configuring switchport
Xc Node-2(config-if)#exit	Exiting the interface level
Xc Node-2(config)#interface ce11/1	Entering the interface level
Xc Node-2(config-if)#switchport	Configuring the switchport
Xc Node-2(config-if)#exit	Exiting the interface level
Xc Node-2(config)#cross-connect OSPF_BFD_BGP-1	Configuring the Cross-connect
Xc Node-2(config-XC)#ep1 ce17 ep2 ce11/1	Creating endpoints
Xc Node-2(config-XC)#end	Exiting cross-connect mode

**R2**

OcNOS#conf terminal	Enter into configure terminal
OcNOS (config)#hostname R2	Configure the host name
R2 (config)#in xe49/1	Enter into interface level
R2 (config-if)#ip address 10.10.10.2/24	Configure ip address to the interface
R2 (config-if)#exit	Exiting from interface level
R2 (config)#int xe45	Enter into interface mode
R2 (config-if)#ip address 30.30.30.1/24	Configure ip address to the interface
R2 (config-if)#exit	Exiting from interface level
R2 (config)#interface lo	Enter into loop-back interface
R2 (config-if)#ip address 2.2.2.2/24 secondary	Configuring secondary ip address
R2 (config-if)#exit	Exiting the loop-back interface level
R2 (config)#bfd interval 3 minrx 3 multiplier 3	Configuring bfd options
R2 (config)#router ospf 10	Configuring OSPF process
R2 (config-router)#router-id 2.2.2.2	Configuring router-id
R2 (config-router)#network 10.10.10.0 0.0.0.255 area 0	Configuring Network id and Area id
R2 (config-router)#redistribute connected	Configuring redistribute connected
R2 (config-router)#bfd all-interfaces	Configuring bfd on all-interfaces
R2 (config-router)#exit	Exiting the OSPF process
R2 (config)#router bgp 200	Configuring bgp process
R2 (config-router)#neighbor 10.10.10.1 remote-as 100	Configuring neighbor details
R2 (config-router)#end	Exiting from the bgp process

**Validation**

**Cross-connect Validation:**

```
Xc Node-1#sh cross-connect
cross-connect status
XC name          o-vlan i-vlan Ep1          Ep2          Admin-Status
-----+-----+-----+-----+-----+-----
OSPF_BFD_BGP    -      -      ce11/1      ce29         UP
-----+-----+-----+-----+-----+-----
cross-connect summary
Total : 1
Up    : 1
Down  : 0
Xc Node-1#
```

```
Xc Node-1#show running-config cross-connect
cross-connect OSPF_BFD_BGP
```



```
ep1 ce11/1 ep2 ce29
```

```
Xc Node-2#sh cross-connect
```

```
cross-connect status
```

XC name	o-vlan	i-vlan	Ep1	Ep2	Admin-Status
OSPF_BFD_BGP-1	-	-	ce17	ce11/1	UP

```
cross-connect summary
```

```
Total : 1
```

```
Up      : 1
```

```
Down   : 0
```

```
Xc Node-2#
```

```
Xc Node-2#show running-config cross-connect
```

```
cross-connect OSPF_BFD_BGP-1
```

```
ep1 ce17 ep2 ce11/1
```

### OSPF Validation:

```
R1#show ip ospf neighbor
```

```
Total number of full neighbors: 1
```

```
OSPF process 10 VRF(default):
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
2.2.2.2	1	Full/Backup	00:00:37	10.10.10.2	xe1/1

```
R1#
```

```
R2#show ip ospf neighbor
```

```
Total number of full neighbors: 1
```

```
OSPF process 10 VRF(default):
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
1.1.1.1	1	Full/Backup	00:00:38	10.10.10.1	xe49/1

```
R2#
```

### BFD Validation:

```
R1#show bfd interface xe1/1
```

```
Interface: xe1/1 ifindex: 10001 state: UP
```

```
Interface level configuration: NO ECHO, NO SLOW TMR
```

```
Min Tx: 3 Min Rx: 3 Multiplier: 3
```

```
R1#
```

```
R1#show bfd session
```

## Cross-Connect (XC)

---

BFD process for VRF: (DEFAULT VRF)

```
=====
=====
Sess-Idx  Remote-Disc  Lower-Layer  Sess-Type  Sess-State  UP-Time  Interface
          Down-Reason  Remote-Addr
1          1          IPv4         Single-Hop  Up          00:02:54  xe1/1
          NA          10.10.10.2/32
Number of Sessions: 1
```

R1#show bfd session

BFD process for VRF: (DEFAULT VRF)

```
=====
=====
Sess-Idx  Remote-Disc  Lower-Layer  Sess-Type  Sess-State  UP-Time  Interface
          Down-Reason  Remote-Addr
1          1          IPv4         Single-Hop  Up          00:02:54  xe1/1
          NA          10.10.10.2/32
Number of Sessions: 1
```

R1#show bfd session detail

BFD process for VRF: (DEFAULT VRF)

```
=====
=====
Session Interface Index : 10001          Interface name :xe1/1
Session Index : 1
Lower Layer : IPv4                      Version : 1
Session Type : Single Hop                Session State : Up
Local Discriminator : 1                  Local Address : 10.10.10.1/32
Remote Discriminator : 1                 Remote Address : 10.10.10.2/32
Local Port : 49152                       Remote Port : 3784
Options :
```

Diagnostics : None

Timers in Milliseconds :

```
Min Tx: 3          Min Rx: 3          Multiplier: 3
Neg Tx: 3          Neg Rx: 3          Neg detect mult: 3
Min echo Tx: 1000  Min echo Rx: 1000  Neg echo intrvl: 0
```

Storage type : 2

Sess down time : 00:00:00

Sess Down Reason : NA

Bfd GTSM Disabled

Bfd Authentication Disabled

Counters values:

```
Pkt In : 000000000000000117138          Pkt Out : 000000000000000117172
Pkts Drop : 00000000000000000000          Auth Pkts Drop : 00000000000000000000
```

```
Echo Out : 0000000000000000000000000000
IPv6 Pkt In : 0000000000000000000000000000
UP Count : 1
IPv6 Echo Out : 0000000000000000000000000000
IPv6 Pkt Out : 0000000000000000000000000000
UPTIME : 00:05:42
```

Protocol Client Info:

```
OSPF-> Client ID: 4      Flags: 4
```

```
-----
Number of Sessions:    1
```

R1#

R2#show bfd interface xe49/1

```
Interface:      xe49/1  ifindex: 10049 state:   UP
Interface level configuration: NO ECHO, NO SLOW TMR
Min Tx: 3  Min Rx: 3  Multiplier: 3
```

R2#show bfd session

BFD process for VRF: (DEFAULT VRF)

```
=====
=====
Sess-Idx  Remote-Disc  Lower-Layer  Sess-Type  Sess-State  UP-Time  Interface
          Down-Reason  Remote-Addr
1         1             IPv4         Single-Hop  Up           00:04:12  xe49/1
          NA             10.10.10.1/32
Number of Sessions:    1
```

R2#sh bfd session detail

BFD process for VRF: (DEFAULT VRF)

```
=====
=====
Session Interface Index : 10049      Interface name :xe49/1
Session Index : 1
Lower Layer : IPv4                  Version : 1
Session Type : Single Hop           Session State : Up
Local Discriminator : 1              Local Address : 10.10.10.2/32
Remote Discriminator : 1             Remote Address : 10.10.10.1/32
Local Port : 49152                   Remote Port : 3784
Options :
```

Diagnostics : None

Timers in Milliseconds :

```
Min Tx: 3          Min Rx: 3          Multiplier: 3
Neg Tx: 3          Neg Rx: 3          Neg detect mult: 3
```

## Cross-Connect (XC)

---

Min echo Tx: 1000                    Min echo Rx: 1000                    Neg echo intrvl: 0  
Storage type : 2  
Sess down time : 00:00:00  
Sess Down Reason : NA  
Bfd GTSM Disabled  
Bfd Authentication Disabled

### Counters values:

Pkt In : 00000000000000044905	Pkt Out : 00000000000000044905
Pkts Drop : 00000000000000000000	Auth Pkts Drop : 00000000000000000000
Echo Out : 00000000000000000000	IPv6 Echo Out : 00000000000000000000
IPv6 Pkt In : 00000000000000000000	IPv6 Pkt Out : 00000000000000000000
UP Count : 1	UPTIME : 00:02:11

### Protocol Client Info:

OSPF-> Client ID: 4                    Flags: 4

-----  
Number of Sessions:                    1

## BGP Validation:

R1#sh bgp neighbors

BGP neighbor is 10.10.10.2, remote AS 200, local AS 100, external link  
  BGP version 4, local router ID 10.10.10.1, remote router ID 2.2.2.2  
  BGP state = Established, up for 00:04:00  
  Last read 00:00:08, hold time is 90, keepalive interval is 30 seconds  
  Neighbor capabilities:  
    Route refresh: advertised and received (old and new)  
    Address family IPv4 Unicast: advertised and received  
  Received 11 messages, 0 notifications, 0 in queue  
  Sent 12 messages, 0 notifications, 0 in queue  
  Route refresh request: received 0, sent 0  
  Minimum time between advertisement runs is 30 seconds  
For address family: IPv4 Unicast  
  BGP table version 1, neighbor version 1  
  Index 1, Offset 0, Mask 0x2  
  Community attribute sent to this neighbor (both)  
  0 accepted prefixes  
  0 announced prefixes

  Connections established 1; dropped 0  
  Local host: 10.10.10.1, Local port: 179  
  Foreign host: 10.10.10.2, Foreign port: 58033  
  Next hop: 10.10.10.1  
  Next hop global: ::  
  Next hop local: ::  
  BGP connection: non shared network

R2#sh ip bgp neighbors

BGP neighbor is 10.10.10.1, remote AS 100, local AS 200, external link

```

BGP version 4, local router ID 2.2.2.2, remote router ID 10.10.10.1
BGP state = Established, up for 00:00:03
Last read 00:00:03, hold time is 90, keepalive interval is 30 seconds
Neighbor capabilities:
  Route refresh: advertised and received (old and new)
  Address family IPv4 Unicast: advertised and received
Received 2 messages, 0 notifications, 0 in queue
Sent 2 messages, 0 notifications, 0 in queue
Route refresh request: received 0, sent 0
Minimum time between advertisement runs is 30 seconds
For address family: IPv4 Unicast
  BGP table version 1, neighbor version 1
  Index 1, Offset 0, Mask 0x2
  Community attribute sent to this neighbor (both)
  0 accepted prefixes
  0 announced prefixes

Connections established 1; dropped 0
Local host: 10.10.10.2, Local port: 58033
Foreign host: 10.10.10.1, Foreign port: 179
Nexthop: 10.10.10.2
Nexthop global: ::
Nexthop local: ::
BGP connection: non shared network
R2#

```

**Show interface counters:**

```
R1#sh interface counters rate gbps
```

Interface	Rx gbps	Rx pps	Tx gbps	Tx pps
xe1/1	6.91	13082945	6.91	13082949
xe32/1	6.91	13082325	6.91	13082325

```
R1#
```

```
Xc Node-1#sh interface counters rate gbps
```

Interface	Rx gbps	Rx pps	Tx gbps	Tx pps
ce11/1	6.91	13082437	6.91	13082437
ce29	6.91	13082457	6.91	13082458

```
Xc Node-1#
```

```
Xc Node-1# sh cross-connect
```

```
cross-connect status
```

XC name	o-vlan	i-vlan	Ep1	Ep2	Admin-Status
OSPF_BFD_BGP	-	-	ce11/1	ce29	UP

## Cross-Connect (XC)

---

cross-connect summary

Total : 1

Up : 1

Down : 0

Xc Node-1#

Xc Node-2#sh interface counters rate gbps

Interface	Rx gbps	Rx pps	Tx gbps	Tx pps
cel1/1	6.91	13082428	6.91	13082429
cel17	6.91	13082381	6.91	13082378

Xc Node-2#sh cross-connect

cross-connect status

XC name	o-vlan	i-vlan	Ep1	Ep2	Admin-Status
OSPF_BFD_BGP-1	-	-	cel17	cel1/1	UP

cross-connect summary

Total : 1

Up : 1

Down : 0

Xc Node-2#

R2#sh interface counters rate gbps

Interface	Rx gbps	Rx pps	Tx gbps	Tx pps
xe45	6.91	13081988	6.91	13081988
xe49/1	6.91	13082339	6.91	13082339

R2#

---

## Configuration using Topology-2

The following configuration example illustrates configuration of cross-connect using LAG interfaces on Xc Node:

**Configuration on R1 Node:**

R1# configure terminal	Enter configure mode
R1(config)#interface po100	Creating port channel interface
R1(config-if)#exit	Exit the interface level
R1(config)#interface xe1/1	Enter interface level
R1(config-if)# channel-group 100 mode active	Adding member port to the port channel interface
R1(config-if)#exit	Exit the interface level
R1(config)#interface xe1/2	Enter interface level
R1(config-if)# channel-group 100 mode active	Adding member port to the port channel interface
R1(config-if)#exit	Exit the interface level

**Configuring Cross connect using dynamic lag interfaces on XC\_node1:**

XC_node1# configure terminal	Enter configure mode
XC_node1(config)#interface po100	Creating port channel interface
XC_node1(config-if)#switchport	Configuring Switchport to the interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface po200	Creating port channel interface
XC_node1(config-if)#switchport	Configuring Switchport to the interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface ce11/1	Enter interface level
XC_node1(config-if)# channel-group 100 mode active	Adding member port to the port channel interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface ce11/2	Enter interface level
XC_node1(config-if)# channel-group 100 mode active	Adding member port to the port channel interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface ce29	Enter interface level
XC_node1(config-if)# channel-group 200 mode active	Adding member port to the port channel interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface ce30	Enter interface level
XC_node1(config-if)# channel-group 200 mode active	Adding member port to the port channel interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#cross-connect lag	Create cross-connect by providing the name
XC_node1(config-XC)#ep1 po100 ep2 po200	Adding end-points ep1 and ep2 as lag interfaces
XC_node1(config-XC)#exit	Exit Cross-connect mode
XC_node1(config)#exit	Exit Configure terminal mode

**Configuring Cross connect using dynamic lag interfaces on XC\_node2:**

XC_node2# configure terminal	Enter configure mode
XC_node2(config)#interface po200	Creating port channel interface
XC_node2(config-if)#switchport	Configuring Switchport to the interface
XC_node2(config-if)#exit	Exit the interface level
XC_node2(config)#interface ce29	Enter interface level
XC_node2(config-if)# channel-group 200 mode active	Adding member port to the port channel interface
XC_node2(config-if)#exit	Exit the interface level
XC_node2(config)#interface ce30	Enter interface level
XC_node2(config-if)# channel-group 200 mode active	Adding member port to the port channel interface
XC_node2(config-if)#exit	Exit the interface level
XC_node2(config)#interface ce11/1	Enter interface level
XC_node2(config-if)#Switchport	Configure switchport to the interface
XC_node2(config-if)#exit	Exit the interface level
XC_node2(config)#cross-connect lag	Create cross-connect by providing the name
XC_node2(config-XC)#ep1 po100 ep2 ce11/1	Adding end-points ep1 and ep2 as lag interfaces
XC_node2(config-XC)#exit	Exit Cross-connect mode
XC_node2(config)#exit	Exit Configure terminal mode

**Validation**

**Cross-connect using Dynamic lag on XC\_node1:**

```
XC_node1#sh cross-connect
cross-connect status
XC name          o-vlan i-vlan Ep1          Ep2          Admin-Status
-----+-----+-----+-----+-----+-----
lag              -      -      po100       po200       UP
-----+-----+-----+-----+-----+-----
cross-connect summary
Total : 1
Up    : 1
Down  : 0

XC_node1#sh running-config cross-connect
!
cross-connect lag
 ep1 po100 ep2 po200
!
XC_node1#sh etherchannel summary
 Aggregator po100 100100
 Aggregator Type: Layer2
 Admin Key: 0100 - Oper Key 0100
```



```

Link: ce11/1 (5073) sync: 1
Link: ce11/2 (5074) sync: 1

```

```

-----
Aggregator po200 100200
Aggregator Type: Layer2
Admin Key: 0200 - Oper Key 0200
  Link: ce30 (5005) sync: 1
  Link: ce29 (5006) sync: 1

```

### Cross-connect using Dynamic lag on XC\_node2:

```
XC_node2#sh cross-connect
```

```
cross-connect status
```

XC name	o-vlan	i-vlan	Ep1	Ep2	Admin-Status
lag	-	-	po200	ce11/1	UP

```
cross-connect summary
```

```

Total : 1
Up    : 1
Down  : 0

```

```
XC Node-2#show running-config cross-connect
```

```
!
```

```
cross-connect lag
```

```
  ep1 po200 ep2 ce11/1
```

```
XC Node-2#sh etherchannel summary
```

```

Aggregator po200 100200
Aggregator Type: Layer2
Admin Key: 0200 - Oper Key 0200
  Link: ce18 (5009) sync: 1
  Link: ce17 (5010) sync: 1

```

---

## Configuring Cross connect using Static lag interfaces:

### Configuration on R1 Node:

R1# configure terminal	Enter configure mode
R1(config)#interface sa100	Creating Static lag interface
R1(config-if)#exit	Exit the interface level
R1(config)#interface xe1/1	Enter interface level
R1(config-if)# static-channel-group 100	Adding member port to the static lag interface
R1(config-if)#exit	Exit the interface level
R1(config)#interface xe1/2	Enter interface level
R1(config-if)# static-channel-group 100	Adding member port to the static lag interface
R1(config-if)#exit	Exit the interface level

**Configuring Cross connect using static lag interfaces on XC\_node1:**

XC_node1# configure terminal	Enter configure mode
XC_node1(config)#interface sa100	Creating static lag interface
XC_node1(config-if)#switchport	Configuring Switchport to the interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface sa200	Creating static lag interface
XC_node1(config-if)#switchport	Configuring Switchport to the interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface ce11/1	Enter interface level
XC_node1(config-if)# static-channel-group 100	Adding member port to the static lag interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface ce11/2	Enter interface level
XC_node1(config-if)# static-channel-group 100	Adding member port to the static interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface ce29	Enter interface level
XC_node1(config-if)# static-channel-group 200	Adding member port to the static lag interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#interface ce30	Enter interface level
XC_node1(config-if)# static-channel-group 200	Adding member port to the static lag interface
XC_node1(config-if)#exit	Exit the interface level
XC_node1(config)#cross-connect static-lag	Create cross-connect by providing the name
XC_node1(config-XC)#ep1 sa100 ep2 sa200	Adding end-points ep1 and ep2 as lag interfaces
XC_node1(config-XC)#exit	Exit Cross-connect mode
XC_node1(config)#exit	Exit Configure terminal mode

**Configuring Cross connect using static lag interfaces on XC\_node2:**

XC_node2# configure terminal	Enter configure mode
XC_node2(config)#interface sa200	Creating static lag interface
XC_node2(config-if)#switchport	Configuring Switchport to the interface
XC_node2(config-if)#exit	Exit the interface level
XC_node2(config)#interface ce29	Enter interface level
XC_node2(config-if)# static-channel-group 200	Adding member port to the static lag interface
XC_node2(config-if)#exit	Exit the interface level
XC_node2(config)#interface ce30	Enter interface level
XC_node2(config-if)# static-channel-group 200	Adding member port to the static lag interface
XC_node2(config-if)#exit	Exit the interface level
XC_node2(config)#interface ce11/1	Enter interface level
XC_node2(config-if)#Switchport	Configure switchport to the interface
XC_node2(config-if)#exit	Exit the interface level
XC_node2(config)#cross-connect static-lag	Create cross-connect by providing the name
XC_node2(config-XC)#ep1 po200 ep2 ce11/1	Adding end-points ep1 and ep2 interfaces
XC_node2(config-XC)#exit	Exit Cross-connect mode
XC_node2(config)#exit	Exit Configure terminal mode

**Validation**

**Cross-connect using Static Lag on XC\_node1:**

```
XC_node1#sh cross-connect
cross-connect status
XC name          o-vlan i-vlan Ep1          Ep2          Admin-Status
-----+-----+-----+-----+-----+-----+
static-lag      -      -      sa100        sa200        UP
-----+-----+-----+-----+-----+
cross-connect summary
Total : 1
Up    : 1
Down  : 0
```

**Cross-connect using Static Lag on XC\_node2:**

```
XC_node2#sh cross-connect
cross-connect status
XC name          o-vlan i-vlan Ep1          Ep2          Admin-Status
-----+-----+-----+-----+-----+
static-lag      -      -      sa200        ce11/1       UP
-----+-----+-----+-----+-----+
```

---

```
cross-connect summary
```

```
Total : 1
```

```
Up    : 1
```

```
Down  : 0
```

### Disable the Cross-connect on XC node1:

Xc Node-1# configure terminal	Enter configure mode
Xc Node-1(config)#cross-connect lag	Enter into cross-connect mode
Xc Node-1(config-XC)#disable	Disabling the cross-connect
Xc Node-1(config-XC)# exit	Exit the cross-connect

### Validation:

#### Disable the cross-connect on XC node1:

```
Xc Node-1#sh cross-connect
```

```
cross-connect status
```

XC name	o-vlan	i-vlan	Ep1	Ep2	Admin-Status
lag	-	-	po100	po200	DOWN

```
cross-connect summary
```

```
Total : 1
```

```
Up    : 0
```

```
Down  : 1
```

### Enable the Cross-connect XC\_node1:

Xc Node-1# configure terminal	Enter configure mode
Xc Node-1(config)#cross-connect lag	Enter into cross-connect mode
Xc Node-1(config-XC)#no disable	Enable the cross-connect
Xc Node-1(config-XC)#exit	Exit the cross-connect

### Validation:

#### Cross-connect after enable on XC\_node1:

```
Xc Node-1#sh cross-connect
```

```
cross-connect status
```

XC name	o-vlan	i-vlan	Ep1	Ep2	Admin-Status
lag	-	-	po100	po200	UP

```
cross-connect summary
```

```
Total : 1
```

```
Up    : 1
```

```
Down  : 0
```



## CHAPTER 2 Cross-Connect (XC) Resiliency

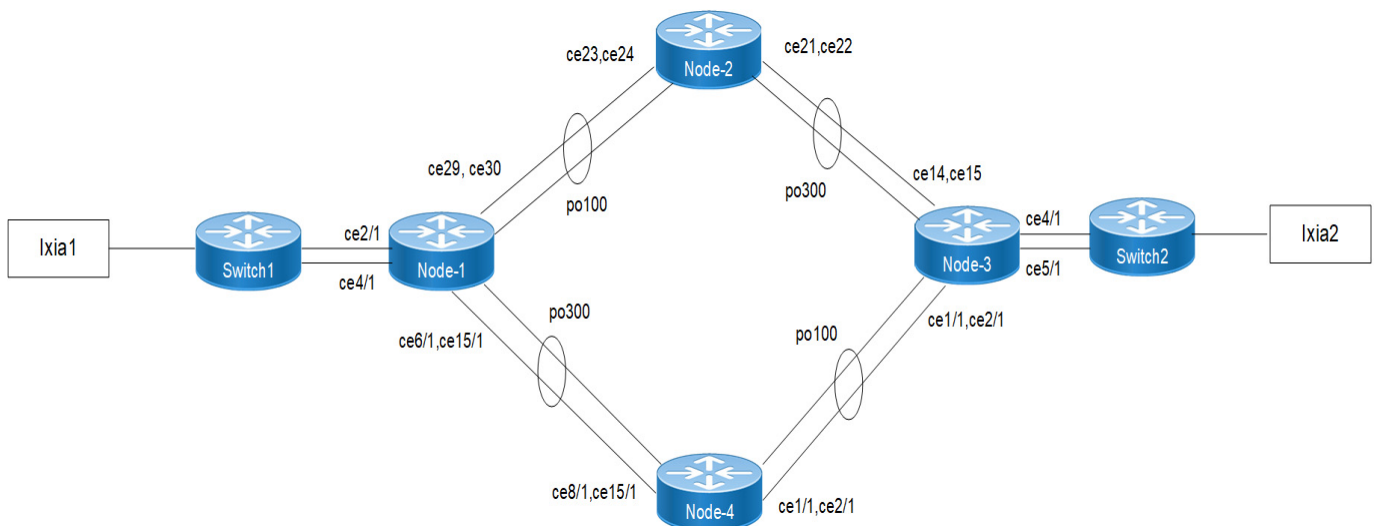
This Chapter contains the cross-connect resiliency configuration example.

This feature provides resiliency support for port level cross connect when primary link goes down. Whenever, any of the endpoint (EP) of cross-connect goes down, pre-configured backup EP will be chosen and cross-connect will be up with backup EP. Same backup EP cannot be used in another cross-connect link.

The following are the types of EPs supported as backup EPs.

1. Native Ethernet interface
2. LAG interface

### Topology



**Figure 2-3: Cross-connect Resiliency Topology**

### LFPT (Link-Fault-Pass-Through)

If one endpoint goes down, other endpoint of the link is notified and port status is shown as DOWN.

**Example:** If po100 interface of Node-1 goes down, then Node-2 will inform to Node-3 via LFPT to down the po300 interface.

### Revertive

When primary EP comes up, then traffic need to switch from backup EP to Primary EP.

**Example:** Suppose po100 is down on Node-1, the traffic flow is send to backup EP po300. Whenever the po100 comes up on Node-1 then the traffic flow is switched from backup EP po300 to primary EP po100.

**Node-1**

#configure terminal	Enter configure mode
(config)#hostname Node-1	Configure the hostname
(config)#interface po100	Create port channel interface
(config-if)#switchport	Configure switchport on LAG port
(config-if)#exit	Exit the interface level
(config)#interface ce29	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce30	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface po300	Create port channel interface
(config-if)#switchport	Configure switchport on LAG interface
(config-if)#exit	Exit the interface level
(config)#interface ce6/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce15/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce2/1	Enter interface level
(config-if)#switchport	Configure switchport
(config)#interface ce4/1	Enter interface level
(config-if)#switchport	Configure switchport
(config-if)#exit	Exit the interface level
(config)#cross-connect sample	Create cross-connect by providing the name
(config-XC)#ep1 po100 ep2 ce2/1	Add end-points end-point1 and end-point2
(config-XC)#backup ep1 po300	Add backup end-point1
(config-XC)#backup ep2 ce4/1	Add backup end-point2
(config-XC)#cross-connect switchover type revertive	Configure revertive mode
(config-XC)#link-fault-pass-through enable	Configure LFPT



**Node-2**

#configure terminal	Enter configure mode
(config)#hostname Node-2	Configure the hostname
(config)#interface po100	Create port channel interface
(config-if)#switchport	Configure switchport on LAG port
(config-if)#exit	Exit the interface level
(config)#interface ce23	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce24	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface po300	Create port channel interface
(config-if)#switchport	Configure switchport on LAG interface
(config-if)#exit	Exit the interface level
(config)#interface ce21	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce22	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#cross-connect sample2	Create cross-connect by providing the name
(config-XC)#ep1 po100 ep2 po300	Add end-points end-point1 and end-point2
(config-XC)#link-fault-pass-through enable	Configure LFPT

**Node-3**

#configure terminal	Enter configure mode
(config)#hostname Node-3	Configure the hostname
(config)#interface po300	Create port channel interface
(config-if)#switchport	Configure switchport on LAG port
(config-if)#exit	Exit the interface level
(config)#interface ce13	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level

## Cross-Connect (XC) Resiliency

(config)#interface ce14	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface po100	Create port channel interface
(config-if)#switchport	Configure switchport on LAG interface
(config-if)#exit	Exit the interface level
(config)#interface ce1/1	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce2/1	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce4/1	Enter interface level
(config-if)#switchport	Configure switchport
(config)#interface ce5/1	Enter interface level
(config-if)#switchport	Configure switchport
(config-if)#exit	Exit the interface level
(config)#cross-connect sample3	Create cross-connect by providing the name
(config-XC)#ep1 po300 ep2 ce4/1	Add end-points end-point1 and end-point2
(config-XC)#backup ep1 po100	Add backup end-point1
(config-XC)#backup ep2 ce5/1	Add backup end-point2
(config-XC)#cross-connect switchover type revertive	Configure revertive mode
(config-XC)#link-fault-pass-through enable	Configure LFPT

## Node-4

#configure terminal	Enter configure mode
(config)#hostname Node-4	Configure the hostname
(config)#interface po100	Create port channel interface
(config-if)#switchport	Configure switchport on LAG port
(config-if)#exit	Exit the interface level
(config)#interface ce1/1	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce2/1	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short

(config-if)#exit	Exit the interface level
(config)#interface po300	Create port channel interface
(config-if)#switchport	Configure switchport on LAG interface
(config-if)#exit	Exit the interface level
(config)#interface ce8/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce15/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#cross-connect sample4	Create cross-connect by providing the name
(config-XC)#ep1 po300 ep2 po100	Add end-points end-point1 and end-point2
(config-XC)#link-fault-pass-through enable	Configure LFPT

## Validation

### Cross-connect using Dynamic LAG on Node-1

```

Node-1#sh etherchannel summary
  Aggregator po100 100100
  Aggregator Type: LayeNode-2
  Admin Key: 0100 - Oper Key 0100
    Link: ce29 (5073) sync: 1
    Link: ce30 (5074) sync: 1
-----
  Aggregator po300 100300
  Aggregator Type: LayeNode-2
  Admin Key: 0300 - Oper Key 0300
    Link: ce6/1 (5005) sync: 1
    Link: ce15/1 (5006) sync: 1

Node-1#sh running-config cross-connect
!
cross-connect sample
ep1 po100 ep2 ce2/1
cross-connect switchover type revertive
link-fault-pass-through enable
backup ep1 po300
backup ep2 ce4/1
!

Node-1#sh cross-connect
Codes: EP - Endpoint, Bkp_EP - Backup endpoint
      * - Active Endpoint, none - not configured
Cross-connect name : sample

```

## Cross-Connect (XC) Resiliency

```
EP1:po100      EP2:ce2/1      Revertive:Yes      Bkp_EP1:po300      Bkp_EP2:ce4/1
Admin Status:UP      Oper Status:UP
```

```
=====
=====+
| EP      | OVID    | IVID    | Rx packets  | Rx bytes    | Tx packets  | Tx bytes
|Interface Status|
=====+
=====+
| EP1*   | -      | -      | 0           | 0           | 5974137342
|764688374912 |UP      |
| EP2*   | -      | -      | 5973605019 | 764619747456 | 0           | 0
|UP      |
| bkp_EP1 | -      | -      | 5973879754 | 764654827904 | 0           | 0
|UP      |
| bkp_EP2 | -      | -      | 0           | 0           | 0           | 0
|UP      |
=====+
=====+
```

### cross-connect summary

```
Total XC      : 1
Admin Up       : 1
Admin Down     : 0
Total Rules    : 1
```

## Cross-connect using Dynamic LAG on Node-2

```
Node-2#sh etherchannel summary
```

```
Aggregator po100 100100
Aggregator Type: LayeNode-2
Admin Key: 0100 - Oper Key 0100
  Link: ce23 (5067) sync: 1
  Link: ce24 (5068) sync: 1
```

```
-----
Aggregator po300 100300
Aggregator Type: LayeNode-2
Admin Key: 0300 - Oper Key 0300
  Link: ce21 (5063) sync: 1
  Link: ce22 (5064) sync: 1
```

```
Node-2#show running-config cross-connect
```

```
!
cross-connect sample2
!
cross-connect sample2
  ep1 po100 ep2 po300
  link-fault-pass-through enable
!
```

```
Node-2#sh cross-connect
```

```
Codes: EP - Endpoint, Bkp_EP - Backup endpoint
      * - Active Endpoint, none - not configured
Cross-connect name : sample2
```

```

EP1:po100      EP2:po300      Revertive:No      Bkp_EP1:None      Bkp_EP2:None
Admin Status:UP      Oper Status:UP
=====+
| EP      | OVID    | IVID    | Rx packets  | Rx bytes   | Tx packets  | Tx bytes
|Interface Status|
=====+
| EP1*   | -      | -      | 3710       | 470780    | 723        | 90626
|UP      |        |        |            |           |           |
| EP2*   | -      | -      | 72         | 6468      | 14         | 1548
|UP      |        |        |            |           |           |
=====+
=====+

```

## cross-connect summary

```

Total XC      : 1
Admin Up      : 1
Admin Down    : 0
Total Rules   : 1

```

**Cross-connect using Dynamic LAG on Node-3**

```

Node-3#sh etherchannel summary
  Aggregator po100 100100
  Aggregator Type: LayeNode-2
  Admin Key: 0100 - Oper Key 0100
    Link: ce1/1 (5005) sync: 1
    Link: ce2/1 (5006) sync: 1
-----

```

```

  Aggregator po300 100300
  Aggregator Type: LayeNode-2
  Admin Key: 0300 - Oper Key 0300
    Link: ce13 (5011) sync: 1
    Link: ce14 (5012) sync: 1

```

```

Node-3#sh running-config cross-connect

```

```

!
cross-connect sample3
  ep1 po300 ep2 ce4/1
  cross-connect switchover type revertive
  link-fault-pass-through enable
  backup ep1 po100
  backup ep2 ce5/1
!

```

```

Node-3#sh cross-connect

```

```

Codes: EP - Endpoint, Bkp_EP - Backup endpoint
      * - Active Endpoint, none - not configured
Cross-connect name : sample3
EP1:po300      EP2:ce4/1      Revertive:Yes      Bkp_EP1:po100      Bkp_EP2:ce5/1
Admin Status:UP      Oper Status:UP

```

## Cross-Connect (XC) Resiliency

```
=====+
=====+
| EP      | OVID    | IVID    | Rx packets | Rx bytes  | Tx packets | Tx bytes
|Interface Status|
=====+
=====+
| EP1*    | -      | -      | 201        | 13536     | 83318167485
|10664725404928 |UP      |
| EP2*    | -      | -      | 93501105144 | 11968141426060 | 2          | 128
|UP       |
| bkp_EP1 | -      | -      | 0          | 0         | 10171776397
|1301987373312 |UP      |
| bkp_EP2 | -      | -      | 93501187674 | 11968152089344 | 0          | 0
|UP       |
=====+
=====+
```

### cross-connect summary

```
Total XC      : 1
Admin Up      : 1
Admin Down    : 0
Total Rules   : 1
```

## Cross-connect using Dynamic LAG on Node-4

Node-4#sh etherchannel summary

```
Aggregator po100 100100
Aggregator Type: LayeNode-2
Admin Key: 0100 - Oper Key 0100
  Link: ce1/1 (5005) sync: 1
  Link: ce2/1 (5006) sync: 1
```

```
-----
Aggregator po300 100300
Aggregator Type: LayeNode-2
Admin Key: 0300 - Oper Key 0300
  Link: ce8/1 (5009) sync: 1
  Link: ce15/1 (5012) sync: 1
```

Node-4#sh running-config cross-connect

```
!
cross-connect sample4
ep1 po300 ep2 po100
link-fault-pass-through enable
!
```

## Disable the Cross-connect on Node-1

```
=====+
#configure terminal                               Enter configure mode
(config)#cross-connect sample                     Enter into cross-connect mode
(config-XC)#disable                               Disabling the cross-connect
(config-XC)#exit                                 Exit the cross-connect
=====+
```

**Validation****Disable the cross-connect on Node-1**

```

Node-1#sh cross-connect
Codes: EP - Endpoint, Bkp_EP - Backup endpoint
      * - Active Endpoint, none - not configured
Cross-connect name : sample
EP1:po100      EP2:ce2/1      Revertive:Yes      Bkp_EP1:po300      Bkp_EP2:ce4/1
Admin Status:DOWN      Oper Status:DOWN
=====
+=====+
| EP      | OVID    | IVID    | Rx packets  | Rx bytes    | Tx packets  | Tx bytes
|Interface Status|
+=====+
=====+
| EP1*   | -      | -      | 0           | 0           | 5974137342
|764688374912 |UP
| EP2*   | -      | -      | 5973605019  | 764619747456 | 0           | 0
|UP
| bkp_EP1 | -      | -      | 5973879754  | 764654827904 | 0           | 0
|UP
| bkp_EP2 | -      | -      | 0           | 0           | 0           | 0
|UP
+=====+
=====+

```

```
cross-connect summary
```

```

Total XC      : 1
Admin Up      : 0
Admin Down    : 1
Total Rules   : 0

```

**Enable the Cross-connect Node-1**

#configure terminal	Enter configure mode
(config)#cross-connect sample	Enter into cross-connect mode
(config-XC)#no disable	Enable the cross-connect
(config-XC)#exit	Exit the cross-connect

**Validation****Cross-connect after enable on Node-1**

```

Node-1#sh cross-connect
Codes: EP - Endpoint, Bkp_EP - Backup endpoint
      * - Active Endpoint, none - not configured
Cross-connect name : sample
EP1:po100      EP2:ce2/1      Revertive:Yes      Bkp_EP1:po300      Bkp_EP2:ce4/1
Admin Status:UP      Oper Status:UP
=====
+=====+
| EP      | OVID    | IVID    | Rx packets  | Rx bytes    | Tx packets  | Tx bytes
|Interface Status|
+=====+

```

## Cross-Connect (XC) Resiliency

```
=====+
=====+
| EP1*      |      -      |      -      | 0          | 0          | 5974137342
|764688374912 |UP          |              |              |              |
| EP2*      |      -      |      -      | 5973605019 | 764619747456 | 0          | 0
|UP          |              |              |              |              |
| bkp_EP1   |      -      |      -      | 5973879754 | 764654827904 | 0          | 0
|UP          |              |              |              |              |
| bkp_EP2   |      -      |      -      | 0          | 0          | 0          | 0
|UP          |              |              |              |              |
=====+
=====+
```

### cross-connect summary

```
Total XC      : 1
Admin Up      : 1
Admin Down    : 0
Total Rules   : 1
```



## CHAPTER 3 CFM over xConnect Configuration

This chapter contains a complete example of CFM over xConnect configuration.

The main objective of this feature is to achieve L2 resiliency using CFM over xConnect where the traffic is switched to the next available link within xConnect when CFM detects errors or link failure on the monitored link in DC platforms.

### Topology

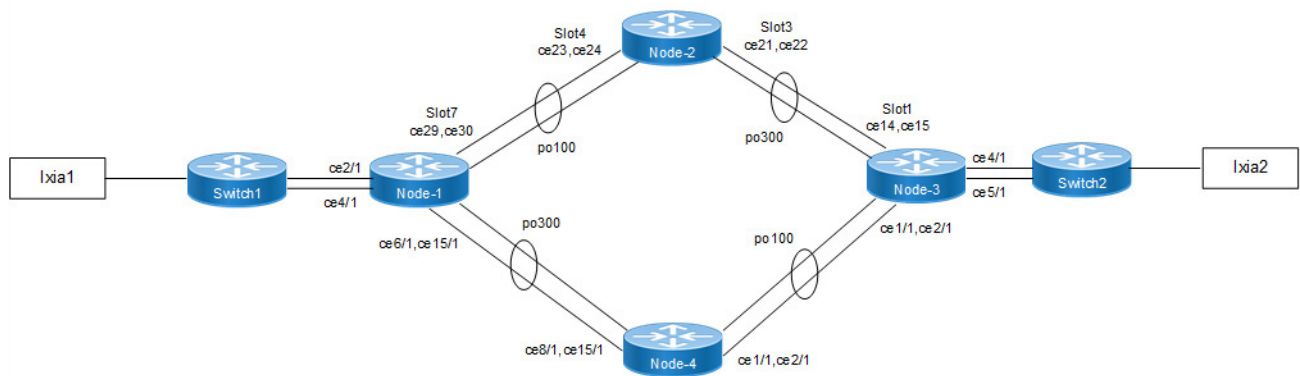


Figure 3-4: CFM over xConnect Topology

### Configuration

#### Node-1

#configure terminal	Enter configure mode
(config)# hostname Node-1	Configure the hostname.
(config)#interface po100	Create port channel interface.
(config-if)#switchport	Configure switchport on LAG port
(config-if)#exit	Exit the interface level
(config)#interface ce29	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface.
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce30	Enter interface level

## CFM over xConnect Configuration

(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface po300	Create port channel interface
(config-if)#switchport	Configure switchport on LAG interface
(config-if)#exit	Exit the interface level
(config)#interface ce6/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce15/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce2/1	Enter interface level
(config-if)#switchport	Configure switchport
(config)#interface ce4/1	Enter interface level
(config-if)#switchport	Configure switchport
(config-if)#exit	Exit the interface level
(config)#cross-connect xc1	Create cross-connect by providing the name
(config-XC)#ep1 po100 ep2 ce2/1	Add end-points end-point1 and end-point2
(config-XC)#backup ep1 po300	Add backup end-point1
(config-XC)#backup ep2 ce4/1	Add backup end-point2
(config-XC)#exit	Exit XC mode
(config)#ethernet cfm domain-type character-string domain-name mdnam1 level 0 mip-creation none	Create CFM domain with type as character string with level 0 and set MIP creation criteria to none.
(config-ether-cfm)#service ma-type string ma-name test1	Create ma type as string
(config-ether-cfm-ma)#link-level-ma	Configure link-level-ma
(config-ether-cfm-ma)#ethernet cfm mep down mpid 1 active true po100	Create down MEP for local-VID on po100
(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
(config-ether-cfm-ma)#mep crosscheck mpid 2	Configure crosscheck to remote MEP
(config-ether-cfm-ma)#cc interval 10ms	Enable cc interval for 10 millisecond
(config-ether-cfm-ma)#exit-ether-ma-mode	Exit ethernet ma mode
(config-ether-cfm)#exit	Exit ethernet CFM mode
(config)#ethernet cfm domain-type character-string domain-name mdnam2 level 0 mip-creation none	Create CFM domain with type as character string with level 0 and set MIP creation criteria to none.

(config-ether-cfm)#service ma-type string ma-name test2	Create MA type as string
(config-ether-cfm-ma)#link-level-ma	Configure link-level-ma
(config-ether-cfm-ma)#ethernet cfm mep down mpid 3 active true po300	Create down MEP for local-VID on po300
(config-ether-cfm-ma-mep)#cc multicast state enable	Enable CC multicast
(config-ether-cfm-ma-mep)#exit-ether-ma- mep-mode	Exit ethernet CFM MA-MEP mode
(config-ether-cfm-ma)#mep crosscheck mpid 4	Configure crosscheck to remote MEP
(config-ether-cfm-ma)#cc interval 10ms	Enable CC interval for 10 millisecond
(config-ether-cfm-ma)#exit-ether-ma-mode	Exit ethernet MA mode
(config-ether-cfm)#exit	Exit ethernet CFM mode

## Node-2

#configure terminal	Enter configure mode
(config)#hostname Node-2	Configure the hostname
(config)#interface po100	Create port channel interface
(config-if)#switchport	Configure switchport on LAG port
(config-if)#exit	Exit the interface level
(config)#interface ce23	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level.
(config)#interface ce24	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface po300	Create port channel interface
(config-if)#switchport	Configure switchport on LAG interface
(config-if)#exit	Exit the interface level
(config)#interface ce21	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce22	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#cross-connect xc1	Create cross-connect by providing the name
(config-XC)#ep1 po100 ep2 po300	Add end-points end-point1 and end-point2

**Node-3**

#configure terminal	Enter configure mode
(config)#hostname Node-3	Configure the hostname
(config)#interface po300	Create port channel interface
(config-if)#switchport	Configure switchport on LAG port
(config-if)#exit	Exit the interface level
(config)#interface ce13	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level.
(config)#interface ce14	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface po100	Create port channel interface
(config-if)#switchport	Configure switchport on LAG interface
(config-if)#exit	Exit the interface level
(config)#interface ce1/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce2/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce4/1	Enter interface level
(config-if)#switchport	Configure switchport
(config)#interface ce5/1	Enter interface level
(config-if)#switchport	Configure switchport
(config-if)#exit	Exit the interface level
(config)#cross-connect xc1	Create cross-connect by providing the name
(config-XC)#ep1 po300 ep2 ce4/1	Add end-points end-point1 and end-point2
(config-XC)#backup ep1 po100	Add backup end-point1
(config-XC)#backup ep2 ce5/1	Add backup end-point2
(config-XC)#exit	Exit XC mode
(config)#ethernet cfm domain-type character-string domain-name mdnam1 level 0 mip-creation none	Create cfm domain with type as character string with level 0 and set mip creation criteria to none.
(config-ether-cfm)#service ma-type string ma-name test1	Create ma type as string
(config-ether-cfm-ma)#link-level-ma	Configure link-level-ma

(config-ether-cfm-ma)#ethernet cfm mep down mpid 2 active true po300	Create down mep for local-vid on po100
(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
(config-ether-cfm-ma)#mep crosscheck mpid 1	Configure crosscheck to remote MEP
(config-ether-cfm-ma)#cc interval 10ms	Enable cc interval for 10 millisecond
(config-ether-cfm-ma)#exit-ether-ma-mode	Exit ethernet ma mode
(config-ether-cfm)#exit	Exit ethernet CFM mode
(config)#ethernet cfm domain-type character-string domain-name mdnam2 level 0 mip-creation none	Create cfm domain with type as character string with level 0 and set mip creation criteria to none.
(config-ether-cfm)#service ma-type string ma-name test2	Create ma type as string
(config-ether-cfm-ma)#link-level-ma	Configure link-level-ma
(config-ether-cfm-ma)#ethernet cfm mep down mpid 4 active true po100	Create down mep for local-vid on po300
(config-ether-cfm-ma-mep)#cc multicast state enable	Enable cc multicast
(config-ether-cfm-ma-mep)#exit-ether-ma-mep-mode	Exit ethernet cfm ma-mep mode
(config-ether-cfm-ma)#mep crosscheck mpid 3	Configure crosscheck to remote MEP
(config-ether-cfm-ma)#cc interval 10ms	Enable cc interval for 10 millisecond
(config-ether-cfm-ma)#exit-ether-ma-mode	Exit ethernet ma mode
(config-ether-cfm)#exit	Exit ethernet CFM mode

#### Node-4

#configure terminal	Enter configure mode
(config)#hostname Node-4	Configure the hostname
(config)#interface po100	Create port channel interface
(config-if)#switchport	Configure switchport on LAG port
(config-if)#exit	Exit the interface level
(config)#interface ce1/1	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level.
(config)#interface ce2/1	Enter interface level
(config-if)#channel-group 100 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface po300	Create port channel interface
(config-if)#switchport	Configure switchport on LAG interface
(config-if)#exit	Exit the interface level

---

(config)#interface ce8/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#interface ce15/1	Enter interface level
(config-if)#channel-group 300 mode active	Add member port to the port channel interface
(config-if)#lacp timeout short	Configure LACP timeout as short
(config-if)#exit	Exit the interface level
(config)#cross-connect xc1	Create cross-connect by providing the name
(config-XC)#ep1 po300 ep2 po100	Add end-points end-point1 and end-point2

---

## Validation

### Node-1

```
#sh ethernet cfm maintenance-points local mep domain mdnam2 ma-name test2
```

```
MPID Dir Lvl VLAN CC-Stat CC-Intvl MAC-Address Def Port MD Name
```

```
-----
3 Dn 0 0 Enable 10 ms 34ef.b689.e05a T po300 mdnam2
```

```
#sh ethernet cfm maintenance-points local mep domain mdnam1 ma-name test1
```

```
MPID Dir Lvl VLAN CC-Stat CC-Intvl MAC-Address Def Port MD Name
```

```
-----
1 Dn 0 0 Enable 10 ms 34ef.b689.e020 F po100 mdnam1
```

```
#sh ethernet cfm maintenance-points remote mpid 3 domain mdnam2
```

```
MEPID RMEPID LEVEL VLAN Rx CCM RDI PEER-MAC TYPE
```

```
-----
3 4 0 0 Yes False 5cff.35b7.54b3 Configured
```

```
#sh ethernet cfm maintenance-points remote mpid 1 domain mdnam1
```

```
MEPID RMEPID LEVEL VLAN Rx CCM RDI PEER-MAC TYPE
```

```
-----
1 2 0 0 Yes False 5cff.35b7.54bb Configured
```

```
#sh ethernet cfm errors domain mdnam1
```

```
Domain Name Level Vlan MEPID Defects
```

```
-----
mdnam1 0 0 1 .....
```

```
1. defRDICCM 2. defMACstatus 3. defRemoteCCM
```

```
4. defErrorCCM 5. defXconCCM
```

```
#sh ethernet cfm errors domain mdnam2
```

```
Domain Name Level Vlan MEPID Defects
```

```
-----
mdnam2 0 0 3 .....
```

---

```
1. defRDICCM      2. defMACstatus  3. defRemoteCCM
4. defErrorCCM   5. defXconCCM
```

### Node-3

```
#sh ethernet cfm maintenance-points local mep domain mdnam1 ma-name test1
```

```
MPID Dir Lvl VLAN CC-Stat  CC-Intvl MAC-Address  Def Port  MD Name
```

```
-----
2     Dn  0   0   Enable  10 ms   5cff.35b7.54bb F   po300 mdnam1
```

```
#sh ethernet cfm maintenance-points local mep domain mdnam2 ma-name test2
```

```
MPID Dir Lvl VLAN CC-Stat  CC-Intvl MAC-Address  Def Port  MD Name
```

```
-----
4     Dn  0   0   Enable  10 ms   5cff.35b7.54b3 F   po100 mdnam2
```

```
#sh ethernet cfm maintenance-points remote mpid 4 domain mdnam2
```

```
MEPID      RMEPID      LEVEL      VLAN      Rx CCM      RDI      PEER-MAC      TYPE
```

```
-----
4           3           0           0           Yes         False    34ef.b689.e05a Configured
```

```
#sh ethernet cfm maintenance-points remote mpid 2 domain mdnam1
```

```
MEPID      RMEPID      LEVEL      VLAN      Rx CCM      RDI      PEER-MAC      TYPE
```

```
-----
2           1           0           0           Yes         False    34ef.b689.e020 Configured
```

```
#sh ethernet cfm errors domain mdnam1
```

```
Domain Name      Level      Vlan      MEPID      Defects
```

```
-----
mdnam1           0           0           2           .....
```

```
1. defRDICCM      2. defMACstatus  3. defRemoteCCM
4. defErrorCCM   5. defXconCCM
```

```
#sh ethernet cfm errors domain mdnam2
```

```
Domain Name      Level      Vlan      MEPID      Defects
```

```
-----
mdnam2           0           0           4           .....
```

```
1. defRDICCM      2. defMACstatus  3. defRemoteCCM
4. defErrorCCM   5. defXconCCM
```





# Layer 1 Command Reference



## CHAPTER 1 Port Based xConnect Commands

---

This chapter contains the port based xConnect commands.

- [backup](#)
- [cross-connect](#)
- [cross-connect switchover type revertive](#)
- [disable](#)
- [ep1 ep2](#)
- [link-fault-pass-through enable](#)
- [show cross-connect](#)

---

## backup

Use this command to configure backup for primary endpoints.

Use `no` form of this command to unconfigure backup for primary endpoint.

### Command Syntax

```
backup (ep1|ep2) IFNAME
no backup (ep1|ep2)
```

### Parameters

IFNAME	Interface name for backup endpoint
--------	------------------------------------

### Default

None

### Command Mode

Configure-XC mode

### Applicability

This command was introduced in OcNOS-DC version 2.0.

### Example

```
#configure terminal
(config)#cross-connect temp
(config-XC)#backup ep1 xe35

(config-XC)#no backup ep1
```

---

## cross-connect

Use this command to provide name for a xConnect. This command will change mode from config to cross-connect mode.

### Command Syntax

```
cross-connect <xc-name>
```

### Parameters

<code>xc-name</code>	Cross-connect name
----------------------	--------------------

### Default

None

### Command Mode

Configure mode

### Applicability

This command was introduced in OcNOS-DC version 2.0

### Example

```
#configure terminal
(config)#cross-connect temp
(config-XC)#
```

---

## cross-connect switchover type revertive

Use this command to configure revertive mode for cross-connect.

Use the no form of this command to make it non-revertive mode for cross-connect.

### Command Syntax

```
cross-connect switchover type revertive
no cross-connect switchover type revertive
```

### Parameters

None

### Default

Non-revertive by default.

### Command Mode

Configure-XC mode

### Applicability

This command was introduced in OcNOS-DC version 2.0.

### Example

```
#configure terminal
(config)#cross-connect temp
(config-XC)#cross-connect switchover type revertive
(config-XC)#no cross-connect switchover type revertive
```

## disable

Use this command to do admin shutdown on a cross-connect.

Use the `no` form of this command to enable cross-connect.

### Command Syntax

```
disable
no disable
```

### Parameters

None

### Default

By default, the cross-connect will be enabled.

### Command Mode

Configure-XC mode

### Applicability

This command was introduced in OcNOS-DC version 2.0

### Example

```
#configure terminal
(config)#cross-connect temp
(config-XC)#disable
(config-XC)#no disable
```

---

## ep1 ep2

Use this command to configure xConnect between two endpoints.

### Command Syntax

```
ep1 IFNAME1 ep2 IFNAME2
```

### Parameters

IFNAME1	Interface name for ep1
IFNAME2	Interface name for ep2

### Default

None

### Command Mode

Configure-XC mode

### Applicability

This command was introduced in OcNOS-DC version 2.0.

### Example

```
#configure terminal
(config)#cross-connect temp
(config-XC)#ep1 xe33 ep2 xe34
```



---

## link-fault-pass-through enable

Use this command to enable LFPT in the cross-connect.

Use the `no` form of this command to disable LFPT.

### Command Syntax

```
link-fault-pass-through enable
no link-fault-pass-through enable
```

### Parameters

None

### Default

LFPT is disabled by default.

### Command Mode

Configure-XC mode

### Applicability

This command was introduced in OcNOS-DC version 2.0.

### Example

```
#configure terminal
(config)#cross-connect temp
(config-XC)#link-fault-pass-through enable
(config-XC)#no link-fault-pass-through enable
```

## show cross-connect

Use this command to show cross-connect entry.

### Command Syntax

```
show cross-connect (name WORD| count|)
```

### Parameters

WORD	Cross-connect name
count	Cross-connect count

### Default

None

### Command Mode

Exec mode

### Applicability

This command was introduced in OcNOS-DC version 2.0.

### Example

```
OcNOS#sh cross-connect
```

```
Cross-connect name : temp
EP1:ce13/1      EP2:ce4/1      Revertive:No      Bkp_EP1:ce14/1      Bkp_EP2:ce15/1
Admin Status:UP      Oper Status:UP
```

```

=====
=====+
| EP      | OVID    | IVID    | Rx packets  | Rx bytes   | Tx packets  | Tx bytes
|Interface Status|
=====+
| EP1*   | -      | -      | 177629      | 12078772   | 0           | 0
|UP      |        |        |              |             |             |
| EP2*   | -      | -      | 0           | 0          | 177633      | 12079044
|UP      |        |        |              |             |             |
| bkp_EP1 | -      | -      | 0           | 0          | 0           | 0
|UP      |        |        |              |             |             |
| bkp_EP2 | -      | -      | 0           | 0          | 0           | 0
|UP      |        |        |              |             |             |
=====
=====+

```

```
cross-connect summary
```

```
Total XC      : 1
Admin Up      : 1
Admin Down    : 0
Total Rules   : 1
```

OcNOS#sh cross-connect temp

Cross-connect name : temp

EP1:ce13/1      EP2:ce4/1      Revertive:No      Bkp\_EP1:ce14/1      Bkp\_EP2:ce15/1  
 Admin Status:UP      Oper Status:UP

```

=====+
=====+
| EP      | OVID    | IVID    | Rx packets | Rx bytes  | Tx packets | Tx bytes
|Interface Status|
=====+
=====+
| EP1*   | -      | -      | 177629     | 12078772  | 0          | 0
|UP      |        |        |            |           |           |
| EP2*   | -      | -      | 0          | 0         | 177633    | 12079044
|UP      |        |        |            |           |           |
| bkp_EP1 | -      | -      | 0          | 0         | 0          | 0
|UP      |        |        |            |           |           |
| bkp_EP2 | -      | -      | 0          | 0         | 0          | 0
|UP      |        |        |            |           |           |
=====+
=====+
    
```

cross-connect summary

Total XC : 1  
 Admin Up : 1  
 Admin Down : 0  
 Total Rules : 1

OcNOS#sh cross-connect count

cross-connect summary

Total XC : 1  
 Admin Up : 1  
 Admin Down : 0  
 Total Rules : 1



# Index

## B

begin modifier 12  
 BGP community value  
   command syntax 10  
 braces  
   command syntax 9

## C

command abbreviations 8  
 command completion 8  
 command line  
   errors 8  
   help 7  
   keyboard operations 11  
 command modes 15  
   configure 15  
   exec 15  
   interface 15  
   privileged exec 15  
   router 15  
 command negation 9  
 command syntax  
   ? 10  
   . 10  
   () 9  
   {} 9  
   | 9  
   A.B.C.D/M 10  
   AA:NN 10  
   BGP community value 10  
   braces 9  
   conventions 9  
   curly brackets 9  
   HH:MM:SS 10  
   IFNAME 10  
   interface name 10  
   IPv4 address 10  
   IPv6 address 10  
   LINE 10  
   lowercase 9  
   MAC address 10  
   monospaced font 9  
   numeric range 10  
   parentheses 9  
   parenteses 9  
   period 10  
   question mark 10  
   square brackets 10  
   time 10  
   uppercase 9  
   variable placeholders 10  
   vertical bars 9  
   WORD 10

X::X:X 10  
 X::X:X/M 10  
 XX:XX:XX:XX:XX:XX 10  
 configure mode 15  
 curly brackets  
   command syntax 9

## E

exec command mode 15

## I

IFNAME 10  
 interface mode 15  
 IPv4 address  
   command syntax 10  
 IPv6 address  
   command syntax 10

## L

LINE 10

## M

MAC address  
   command syntax 10

## P

parentheses  
   command syntax 9  
 parenteses  
   command syntax 9  
 period  
   command syntax 10  
 privileged exec mode 15

## Q

question mark  
   command syntax 10

## R

router mode 15

## S

show commands 12  
   exclude modifier 13  
   include modifier 13  
   redirect modifier 14  
 square brackets  
   command syntax 10

**T**

command syntax 9

time

command syntax 10

**W**

WORD 10

**V**

vertical bars