Virtual Private Network Command Reference for Cisco NCS 6000 Series Routers

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CONTENTS

Preface

The preface contains these sections:

Changes to This Document

This table lists the changes made to this document since it was first printed.

Table 1: Changes to This Document

Date	Change Summary
September 2017	Republished with documentation updates for Cisco IOS XR Release 6.3.1 features.
July 2017	Republished with documentation updates for Cisco IOS XR Release 6.2.2 features.
March 2017	Republished with documentation updates for Cisco IOS XR Release 6.2.1 features.
November 2016	Republished with documentation updates for Cisco IOS XR Release 6.1.2 features.
May 2015	Republished with documentation updates for Cisco IOS XR Release 5.2.3 features.
May 2015	Initial release of this document for Cisco IOS XR Release 5.2.1.

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Ethernet Interfaces Commands

This module describes the Cisco IOS XR software commands used to configure the Ethernet interfaces on the Cisco NCS 6000 Series Router.

Note This module does not include the commands for Management Ethernet interfaces and Ethernet OAM. To configure a Management Ethernet interface for routing or modify the configuration of a Management Ethernet interface or to configure Ethernet OAM, use the commands described in the *Interface and Hardware Component Configuration Guide for Cisco NCS 6000 Series Routers*

Refer to the *Interface and Hardware Component Command Reference for the Cisco NCS 6000 Series Routers* for more information on the Ethernet Interfaces and Ethernet OAM commands.

- encapsulation dot1ad dot1q, on page 2
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- l2transport (Ethernet), on page 5
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encapsulation dot1ad dot1q

To define the matching criteria to be used in order to map single-tagged 802.1ad frames ingress on an interface to the appropriate service instance, use the **encapsulation dot1ad dot1q** command in subinterface configuration mode. To delete the matching criteria to map single-tagged 802.1ad frames ingress on an interface to the appropriate service instance, use the **no** form of this command.

encapsulation dot1ad *vlan-id* **dot1q** {*vlan-id*}
no encapsulation dot1ad *vlan-id* **dot1q** {*vlan-id*}

Syntax Description

dot1ad	Indicates that the IEEE 802.1ad provider bridges encapsulation type is used for the outer tag.
dot1q	Indicates that the IEEE 802.1q standard encapsulation type is used for the inner tag.
vlan-id	VLAN ID, integer in the range 1 to 4094.

Command Default

No matching criteria are defined.

Command Modes

Subinterface configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The outer VLAN tag is an 802.1ad VLAN tag, instead of an 802.1Q tag. An 802.1ad tag has an ethertype value of 0x88A8, instead of 0x8100 that 802.1Q uses.

Some of the fields in the 802.1ad VLAN header are interpreted differently per 802.1ad standard. A **tunneling ethertype** command applied to the main interface does not apply to an 802.1ad subinterface.

An interface with encapsulation dot1ad causes the router to categorize the interface as an 802.1ad interface. This causes special processing for certain protocols and other features:

- MSTP uses the IEEE 802.1ad MAC STP address instead of the STP MAC address.
- Certain QoS functions may use the Drop Eligibility (DE) bit of the IEEE 802.1ad tag.

Examples

The following example shows how to map single-tagged 802.1ad ingress frames to a service instance:

```
RP/0/RP0/CPU0:router(config-subif)# encapsulation dot1ad 100 dot1q 20
```

Related Commands

Command	Description
encapsulation dot1q, on page 3	Defines the matching criteria to map 802.1Q frames ingress on an interface to the appropriate service instance.

encapsulation dot1q

To define the matching criteria to map 802.1Q frames ingress on an interface to the appropriate service instance, use the **encapsulation dot1q** command in the subinterface configuration mode. To delete the matching criteria to map 802.1Q frames ingress on an interface to the appropriate service instance, use the **no** form of this command.

encapsulation dot1q *vlan-id*
no encapsulation

Syntax Description

vlan-id	VLAN ID, integer in the range 1 to 4094.

Command Default

No matching criteria are defined.

Command Modes

Subinterface configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Only one encapsulation statement can be applied to a subinterface. Encapsulation statements cannot be applied to main interfaces.

A single encapsulation dot1q statement specifies matching for frames with a single VLAN ID.

Examples

The following example shows how to map 802.1Q frames ingress on an l2transport subinterface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/1/0/3.10 l2transport
RP/0/RP0/CPU0:router(config-subif)# encapsulation dot1q 10
```

Related Commands

Command	Description
encapsulation dot1ad dot1q, on page 2	Defines the matching criteria to be used in order to map single-tagged 802.1ad frames ingress on an interface to the appropriate service instance.
encapsulation dot1q second-dot1q, on page 4	Defines the matching criteria to map Q-in-Q ingress frames on an interface to the appropriate service instance.

encapsulation dot1q second-dot1q

To define the matching criteria to map Q-in-Q ingress frames on an interface to the appropriate service instance, use the **encapsulation dot1q second-dot1q** command in the subinterface configuration mode. To delete the matching criteria to map Q-in-Q ingress frames on an interface to the appropriate service instance, use the **no** form of this command.

encapsulation dot1q { *vlan-id* **second-dot1q** {*vlan-id* } }
no encapsulation dot1q { *vlan-id* **second-dot1q** {*vlan-id* } }

Syntax Description

vlan-id	VLAN ID, integer in the range 1 to 4094.
	A maximum of nine ranges or individual values may be specified. The values must not overlap.
second-dot1q	(Optional) Specifies IEEE 802.1Q VLAN tagged packets.

Command Default

No matching criteria are defined.

Command Modes

Subinterface configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The criteria for this command are: the outer tag must be unique and the inner tag may be a single VLAN.

QinQ service instance, allows single, multiple or range on second-dot1q.

Only one encapsulation command must be configured per service instance.

Examples

The following example shows how to map ingress frames to a service instance:

Related Commands

Command	Description
encapsulation dot1ad dot1q, on page 2	Defines the matching criteria to be used in order to map single-tagged 802.1ad frames ingress on an interface to the appropriate service instance.
encapsulation dot1q, on page 3	Defines the matching criteria to map 802.1Q frames ingress on an interface to the appropriate service instance.

l2transport (Ethernet)

To enable Layer 2 transport port mode on an Ethernet interface and enter Layer 2 transport configuration mode, use the **l2transport** command in interface or subinterface configuration mode for an Ethernet interface. To disable Layer 2 transport port mode on an Ethernet interface, use the **no** form of this command.

l2transport
no l2transport

This command has no keywords or arguments.

Command Default	None

Command Modes	Interface or Subinterface configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read, write

Examples The following example shows how to use the l2transport command on an Ethernet subinterface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/1/0/3.10 l2transport
RP/0/RP0/CPU0:router(config-subif)# encapsulation dot1q 10
```

Related Commands

Command	Description
show interfaces	Displays statistics for all interfaces configured on the router or for a specific node.
show l2vpn xconnect	Displays brief information on configured xconnects.

rewrite ingress tag

To specify the encapsulation adjustment that is to be performed on the frame ingress to the service instance, use the **rewrite ingress tag** command in the subinterface configuration mode. To delete the encapsulation adjustment that is to be performed on the frame ingress to the service instance, use the **no** form of this command.

rewrite ingress tag {**push** {**dot1q** *vlan-id*|**dot1q** *vlan-id* **second-dot1q** *vlan-id*|**dot1ad** *vlan-id* **dot1q** *vlan-id*}|**pop** {**1**|**2**}|**translate** {**1to1** {**dot1q** *vlan-id*|**dot1ad** *vlan-id*}|**2-to-1 dot1q** *vlan-id*|**dot1ad** *vlan-id*}|**1-to-2** {**dot1q** *vlan-id* **second-dot1q** *vlan-id*|**dot1ad** *vlan-id* **dot1q** *vlan-id*}|**2-to-2** {**dot1q** *vlan-id* **second-dot1q** *vlan-id*|**dot1ad** *vlan-id* **dot1q** *vlan-id*}} [**symmetric**]
no rewrite tag [**symmetric**]

Syntax Description		
vlan-id	VLAN ID, integer in the range 1 to 4094.
push dot1q *vlan-id*	Pushes one 802.1Q tag with *vlan-id*.
push dot1q *vlan-id* **second-dot1q** *vlan-id*	Pushes a pair of 802.1Q tags in the order first, second.
**pop {1	2}**	One or two tags are removed from the packet. This command can be combined with a push (pop N and subsequent push *vlan-id*).
translate 1-to-1 dot1q *vlan-id*	Replaces the incoming tag (defined in the encapsulation command) into a different 802.1Q tag at the ingress service instance.
translate 2-to-1 dot1q *vlan-id*	Replaces a pair of tags defined in the **encapsulation** command by vlan-id.
translate 1-to-2 dot1q *vlan-id* **second-dot1q** *vlan-id*	Replaces the incoming tag defined by the encapsulation command by a pair of 802.1Q tags.
translate 2-to-2 dot1q *vlan-id* **second-dot1q** *vlan-id*	Replaces the pair of tags defined by the encapsulation command by a pair of VLANs defined by this rewrite.
symmetric	(Optional) A rewrite operation is applied on both ingress and egress. The operation on egress is the inverse operation as ingress.

Command Default   The frame is left intact on ingress.

Command Modes   Subinterface configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **symmetric** keyword is accepted only when a single VLAN is configured in encapsulation. If a list of VLANs or a range VLAN is configured in encapsulation, the **symmetric** keyword is accepted only for push rewrite operations; all other rewrite operations are rejected.

The **pop** command assumes the elements being popped are defined by the encapsulation type. The exception case should be drop the packet.

The **rewrite ingress tag translate**command assume the tags being translated from are defined by the encapsulation type. In the 2-to-1 option, the "2" means "2 tags of a type defined by the **encapsulation** command. The translation operation requires at least "from" tag in the original packet. If the original packet contains more tags than the ones defined in the "from", then the operation should be done beginning on the outer tag. Exception cases should be dropped.

Examples

The following example shows how to specify the encapsulation adjustment that is to be performed on the frame ingress to the service instance:

```
RP/0/RP0/CPU0:router(config-subif)# rewrite ingress push dot1q 200
```

Related Commands

Command	Description
encapsulation dot1ad dot1q, on page 2	Defines the matching criteria to be used in order to map single-tagged 802.1ad frames ingress on an interface to the appropriate service instance.
encapsulation dot1q, on page 3	Defines the matching criteria to map 802.1Q frames ingress on an interface to the appropriate service instance.
encapsulation dot1q second-dot1q, on page 4	Defines the matching criteria to map Q-in-Q ingress frames on an interface to the appropriate service instance.

Virtual Private Network Commands

For detailed information about virtual private network concepts, configuration tasks, and examples, refer to the *Virtual Private Network Configuration Guide for the Cisco NCS 6000 Series Router*

clear l2vpn collaborators

To clear the state change counters for L2VPN collaborators, use the **clear l2vpn collaborators** command in EXEC mode.

clear l2vpn collaborators

Syntax Description

This command has no arguments or keywords.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows how to clear change counters for L2VPN collaborators:

```
RP/0/RP0/CPU0:router# clear l2vpn collaborators
```

Related Commands

Command	Description
show l2vpn collaborators, on page 28	Displays information about the state of the interprocess communications connections between l2vpn_mgr and other processes.

clear l2vpn forwarding counters

To clear L2VPN forwarding counters, use the **clear l2vpn forwarding counters** command in EXEC mode.

clear l2vpn forwarding counters

Syntax Description   This command has no arguments or keywords.

Command Default   None

Command Modes   EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read, write

Examples   The following example shows how to clear L2VPN forwarding counters:

```
RP/0/RP0/CPU0:router# clear l2vpn forwarding counters
```

Related Commands

Command	Description
show l2vpn forwarding, on page 30	Displays forwarding information from the layer2_fib manager on the line card.

clear l2vpn forwarding message counters

To clear L2VPN forwarding message counters, use the **clear l2vpn forwarding message counters** command in EXEC mode.

clear l2vpn forwarding message counters location *node-id*

Syntax Description	**location** *node-id*	Clears L2VPN forwarding message counters for the specified location.

Command Default   None

Command Modes   EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read, write

Examples   The following example shows how to clear L2VPN forwarding message counters on a specified node:

```
RP/0/RP0/CPU0:router# clear l2vpn forwarding message counters location 0/6/CPU0
```

Related Commands

Command	Description
show l2vpn forwarding, on page 30	Displays forwarding information from the layer2_fib manager on the line card.

clear l2vpn forwarding table

To clear an L2VPN forwarding table at a specified location, use the **clear l2vpn forwarding table** command in EXEC mode.

clear l2vpn forwarding table location *node-id*

Syntax Description	**location** *node-id*	Clears L2VPN forwarding tables for the specified location.

Command Default   None

Command Modes   EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read, write

Examples   The following example shows how to clear an L2VPN forwarding table from a specified location:

```
RP/0/RP0/CPU0:router# clear l2vpn forwarding table location 1/2/3/5
```

Related Commands

Command	Description
show l2vpn forwarding, on page 30	Displays forwarding information from the layer2_fib manager on the line card.

interface (p2p)

To configure an attachment circuit, use the **interface** command in p2p configuration submode. To return to the default behavior, use the **no** form of this command.

interface *type* *interface-path-id*
no **interface** *type* *interface-path-id*

Syntax Description		
type	Interface type. For more information, use the question mark (?) online help function.	
interface-path-id	Physical interface or a virtual interface.	
	Note	Use the **show interfaces** command to see a list of all possible interfaces currently configured on the router.
	For more information about the syntax for the router, use the question mark (?) online help function.	

Command Default None

Command Modes p2p configuration submode

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read, write

Examples The following example shows how to configure an attachment circuit on a TenGigE interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)# xconnect group gr1
RP/0/RP0/CPU0:router(config-l2vpn-xc)# p2p p001
RP/0/RP0/CPU0:router(config-l2vpn-xc-p2p)# interface TenGigE 1/1/1/1
```

Related Commands

Command	Description
p2p, on page 27	Enters p2p configuration submode to configure point-to-point cross-connects.

l2transport

To configure a physical interface to operate in Layer 2 transport mode, use the **l2transport** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

l2transport
no l2transport

This command has no arguments or keywords.

Command Default	None
Command Modes	Interface configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The l2transport command and these configuration items are mutually exclusive:

- IPv4 address and feature (for example, ACL) configuration
- IPv4 enable, address and feature (for example, ACL) configuration
- Bundle-enabling configuration
- L3 subinterfaces
- Layer 3 QoS Policy

Note

After an interface or connection is set to Layer 2 switched, commands such as **ipv4 address** are not usable. If you configure routing commands on the interface, **l2transport** is rejected.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows how to configure an interface or connection as Layer 2 switched under several different modes:

Ethernet Port Mode:

```
RP/0/RP0/CPU0:router# configure
```

```
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/0/0/0
RP/0/RP0/CPU0:router(config-if)# l2transport
```

Ethernet VLAN Mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/0/0/0.900 l2transport
RP/0/RP0/CPU0:router(config-if)# encapsulation dot1q 100do1q vlan 999
```

Ethernet VLAN Mode (QinQ):

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/0/0/0.900 l2transport
RP/0/RP0/CPU0:router(config-if)# encapsulation dot1q 20 second-dot1q 10vlan 999 888
```

Ethernet VLAN Mode (QinAny):

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/0/0/0.900 l2transport
RP/0/RP0/CPU0:router(config-if)# encapsulation dot1q 30 second-dot1q do1q vlan 999 any
```

Related Commands	Command	Description
	show l2vpn forwarding, on page 30	Displays forwarding information from the layer2_fib manager on the line card.

l2vpn

To enter L2VPN configuration mode, use the **l2vpn** command in global configuration mode. To return to the default behavior, use the **no** form of this command.

l2vpn
no l2vpn

Syntax Description	This command has no arguments or keywords.
Command Default	None
Command Modes	Global configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Note   All L2VPN configuration can be deleted using the **no l2vpn** command.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows how to enter L2VPN configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)#
```

Related Commands

Command	Description
show l2vpn forwarding, on page 30	Displays forwarding information from the layer2_fib manager on the line card.

logging (l2vpn)

To enable cross-connect logging, use the **logging** command in L2VPN configuration submode. To return to the default behavior, use the **no** form of this command.

logging pseudowire status
no logging pseudowire status

Syntax Description	
	pseudowire status Enables pseudowire state change logging.

Command Default   None

Command Modes   L2VPN configuration submode

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Note   All L2VPN configuration can be deleted using the **no l2vpn** command.

Task ID

Task ID	Operations
l2vpn	read, write

Examples   The following example shows how to enable cross-connect logging:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)# logging pseudowire status
```

Related Commands

Command	Description
l2vpn, on page 17	Enters L2VPN configuration mode.

monitor-session (l2vpn)

To attach a traffic monitoring session as one of the segments for a cross connect, use the **monitor-session** command in point-to-point cross connect configuration mode. To remove the association between a traffic mirroring session and a cross connect, use the **no** form of this command.

monitor-session *session-name*
no monitor-session *session-name*

Syntax Description		
	session-name	Name of the monitor session to configure.

Command Default

No default behavior or values

Command Modes

Point-to-point cross connect configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 5.2.1	This command was introduced.

Usage Guidelines

Before you can attach a traffic mirroring session to a cross connect, you must define it using the **monitor-session** global configuration command. Once the traffic mirroring session is defined, use the **monitor-session** point-to-point cross connect configuration command to attach this session as one of the segments for the cross connect. Once attached, all traffic replicated from the monitored interfaces (in other words, interfaces that are associated with the monitor-session) is replicated to the pseudowire that is attached to the other segment of the cross-connect.

The *session-name* argument should be different than any interface names currently used in the system.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

This example shows how to attach a traffic mirroring session as segment for the xconnect:

```
RP/0/RSP0/CPU0:router(config)# l2vpn
RP/0/RSP0/CPU0:router(config-l2vpn)# xconnect group g1
RP/0/RSP0/CPU0:router(config-l2vpn-xc)# p2p xcon1
RP/0/RSP0/CPU0:router(config-l2vpn-xc-p2p)# monitor-session mon1
```

Related Commands

Command	Description
See the **monitor session** command in the *Interface and Hardware Component Command Reference for the Cisco NCS 6000 Series Routers*.	

mpls static label (L2VPN)

To configure static labels for MPLS L2VPN, use the **mpls static label** command in L2VPN cross-connect P2P pseudowire configuration mode. To have MPLS assign a label dynamically, use the **no** form of this command.

mpls static label local *label* **remote** *value*
no mpls static label local *label* **remote** *value*

Syntax Description

local *label*	Configures a local pseudowire label. Range is 16 to 15999.
remote *value*	Configures a remote pseudowire label. Range is 16 to 15999.

Command Default

The default behavior is a dynamic label assignment.

Command Modes

L2VPN cross-connect P2P pseudowire configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows how to configure static labels for MPLS L2VPN:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn xconnect group l2vpn
RP/0/RP0/CPU0:router(config-l2vpn-xc)# p2p rtrA_to_rtrB
RP/0/RP0/CPU0:router(config-xc-p2p)# neighbor 10.1.1.2 pw-id 1000
RP/0/RP0/CPU0:router(config-l2vpn-xc-p2p-pw)# mpls static label local 800 remote 500
```

Related Commands

Command	Description
l2vpn, on page 17	Enters L2VPN configuration mode.
neighbor (L2VPN), on page 22	Configures a pseudowire for a cross-connect.
p2p, on page 27	Enters p2p configuration submode to configure point-to-point cross-connects.

Command	Description
xconnect group, on page 57	Configures cross-connect groups.

neighbor (L2VPN)

To configure a pseudowire for a cross-connect, use the **neighbor** command in p2p configuration submode. To return to the default behavior, use the **no** form of this command.

neighbor *A.B.C.D* **pw-id** *value* [{**backup**|**mpls** ||**pw-class** }]
no neighbor *A.B.C.D* **pw-id** *value* [{**backup**|**mpls** ||**pw-class** }]

Syntax Description		
	A.B.C.D	IP address of the cross-connect peer.
	pw-id *value*	Configures the pseudowire ID and ID value. Range is 1 to 4294967295.

Command Default None

Command Modes p2p configuration submode

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

A cross-connect may have two segments:

1. An Attachment Circuit (AC)
2. An second AC or a pseudowire

> **Note** The pseudowire is identified by two keys: neighbor and pseudowire ID. There may be multiple pseudowires going to the same neighbor. It is not possible to configure only a neighbor.

All L2VPN configurations can be deleted using the **no l2vpn** command.

Task ID

Task ID	Operations
l2vpn	read, write

Examples This example shows a point-to-point cross-connect configuration (including pseudowire configuration):

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn xconnect group l2vpn
```

```
RP/0/RP0/CPU0:router(config-l2vpn-xc)# p2p rtrA_to_rtrB
RP/0/RP0/CPU0:router(config-xc-p2p)# neighbor 10.1.1.2 pw-id 1000 pw-class class12
RP/0/RP0/CPU0:router(config-xc-p2p)# neighbor 10.1.1.3 pw-id 1001 pw-class class13
RP/0/RP0/CPU0:router(config-xc)# p2p rtrC_to_rtrD
RP/0/RP0/CPU0:router(config-xc-p2p)# neighbor 10.2.2.3 pw-id 200 pw-class class23
RP/0/RP0/CPU0:router(config-xc-p2p)# neighbor 10.2.2.4 pw-id 201 pw-class class24
```

This example shows a point-to-point cross-connect configuration (including pseudowire configuration):

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn xconnect group l2vpn
RP/0/RP0/CPU0:router(config-l2vpn-xc)# p2p rtrA_to_rtrB
RP/0/RP0/CPU0:router(config-xc-p2p)# neighbor 10.1.1.2 pw-id 1000 pw-class foo
RP/0/RP0/CPU0:router(config-xc)# p2p rtrC_to_rtrD
RP/0/RP0/CPU0:router(config-xc-p2p)# neighbor 20.2.2.3 pw-id 200 pw-class bar1
```

Related Commands	**Command**	**Description**
	l2vpn, on page 17	Enters L2VPN configuration mode.
	p2p, on page 27	Enters p2p configuration submode to configure point-to-point cross-connects.
	pw-class (L2VPN), on page 24	Enters pseudowire class submode to define a pseudowire class template.
	xconnect group, on page 57	Configures cross-connect groups.

pw-class (L2VPN)

To enter pseudowire class submode to define a pseudowire class template, use the **pw-class** command in L2VPN configuration submode. To delete the pseudowire class, use the **no** form of this command.

pw-class *class-name*
no pw-class *class-name*

Syntax Description	*class-name* Pseudowire class name.

Command Default	None

Command Modes	L2VPN configuration submode

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

> **Note** All L2VPN configurations can be deleted using the **no l2vpn** command.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows how to define a simple pseudowire class template:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)# xconnect group l1vpn
RP/0/RP0/CPU0:router(config-l2vpn-xc)# p2p rtrA_to_rtrB
RP/0/RP0/CPU0:router(config-l2vpn-xc-p2p)# neighbor 10.1.1.2 pw-id 1000
RP/0/RP0/CPU0:router(config-l2vpn-xc-p2p-pw)# pw-class kanata01
```

Related Commands

Command	Description
p2p, on page 27	Enters p2p configuration submode to configure point-to-point cross-connects.

pw-class encapsulation mpls

To configure MPLS pseudowire encapsulation, use the **pw-class encapsulation mpls** command in L2VPN pseudowire class configuration mode. To undo the configuration, use the **no** form of this command.

pw-class *class-name* **encapsulation mpls** {**control word|ipv4|load-balancing|preferred-path|protocol ldp|sequencing|tag-rewrite|transport-mode|vccv verification-type none**}
no pw-class *class-name* **encapsulation mpls** {**control word|ipv4|load-balancing|preferred-path|protocol ldp|sequencing|tag-rewrite|transport-mode|vccv verification-type none**}

Syntax Description		
	class-name	Encapsulation class name.
	control word	Disables control word for MPLS encapsulation. Disabled by default.
	ipv4	Sets the local source IPv4 address.
	load-balancing	Sets flow label-based load balancing.
	preferred-path	Configures the preferred path tunnel settings.
	protocol ldp	Configures LDP as the signaling protocol for this pseudowire class.
	sequencing	Configures sequencing on receive or transmit.
	tag-rewrite	Configures VLAN tag rewrite.
	transport-mode	Configures transport mode to be either Ethernet or VLAN.
	vccv none	Enables or disables the VCCV verification type.

Command Default   None

Command Modes   L2VPN pseudowire class configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

■ **pw-class encapsulation mpls**

Note All L2VPN configurations can be deleted using the **no l2vpn** command.

Task ID

Task ID	Operations
l2vpn	read, write

Examples This example shows how to define MPLS pseudowire encapsulation:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)# pw-class kanata01
RP/0/RP0/CPU0:router(config-l2vpn-pwc)# encapsulation mpls
```

Related Commands

Command	Description
pw-class (L2VPN), on page 24	Enters pseudowire class submode to define a pseudowire class template.

p2p

To enter p2p configuration submode to configure point-to-point cross-connects, use the **p2p** command in L2VPN xconnect mode. To return to the default behavior, use the **no** form of this command.

p2p *xconnect-name*
no p2p *xconnect-name*

Syntax Description	*xconnect-name* (Optional) Configures the name of the point-to-point cross- connect.

Command Default None

Command Modes L2VPN xconnect

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The name of the point-to-point cross-connect string is a free format description string.

Task ID

Task ID	Operations
l2vpn	read, write

Examples The following example shows a point-to-point cross-connect configuration (including pseudowire configuration):

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)# xconnect group group 1
RP/0/RP0/CPU0:router(config-l2vpn-xc)# p2p xc1
```

Related Commands

Command	Description
interface (p2p), on page 14	Configures an attachment circuit.

show l2vpn collaborators

To display information about the state of the interprocess communications connections between l2vpn_mgr and other processes, use the **show l2vpn collaborators** command in EXEC mode.

show l2vpn collaborators

Syntax Description   This command has no arguments or keywords.

Command Default   None

Command Modes   EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read, write

Examples   The following example shows sample output for the **show l2vpn collaborators** command:

```
RP/0/RP0/CPU0:router# show l2vpn collaborators
L2VPN Collaborator stats:
Name                    State       Up Cnts      Down Cnts
--------------------    ----------  -----------  -----------
IMC                     Down        0            0
LSD                     Up          1            0
```

This table describes the significant fields shown in the display.

Table 2: show l2vpn collaborators Field Descriptions

Field	Description
Name	Abbreviated name of the task interacting with l2vpn_mgr.
State	Indicates if l2vpn_mgr has a working connection with the other process.
Up Cnts	Number of times the connection between l2vpn_mgr and the other process has been successfully established.

Field	Description
Down Cnts	Number of times that the connection between l2vpn_mgr and the other process has failed or been terminated.

Related Commands

Command	Description
clear l2vpn collaborators, on page 10	Clears the state change counters for L2VPN collaborators.

show l2vpn forwarding

To display forwarding information from the layer2_fib manager on the line card, use the **show l2vpn forwarding** command in EXEC mode.

show l2vpn forwarding
{**xconnect**|**bridge-domain**|**counter**|**detail**|**hardware**|**inconsistent**|**interface**|**l2tp**|**location**
[*node-id*]|**message**|**mstp**|**resource**|**retry-list**|**summary**|**unresolved**}

Syntax Description

xconnect	Displays the cross-connect related information.
bridge-domain	Displays bridge domain related forwarding information.
counter	Displays the cross-connect counters.
detail	Displays detailed information from the layer2_fib manager.
hardware	Displays hardware-related layer2_fib manager information.
inconsistent	Displays inconsistent entries only.
interface	Displays the match AC subinterface.
l2tp	Displays L2TPv3 related forwarding information.
location *node-id*	Displays layer2_fib manager information for the specified location. The *node-id* argument is entered in the *rack/slot/module* notation.
message	Displays messages exchanged with collaborators.
mstp	Displays multi-spanning tree related forwarding information.
resource	Displays resource availability information in the layer2_fib manager.
retry-list	Displays retry list related information.

summary	Displays summary information about cross-connects in the layer2_fib manager.
unresolved	Displays unresolved entries only.

Command Default   None

Command Modes   EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Task ID

Task ID	Operations
l2vpn	read

Examples   The following sample output is from the **show l2vpn forwarding bridge detail location** command for IOS-XR releases 5.3.1 and earlier:

```
RP/0/RP0/CPU0:router# show l2vpn forwarding bridge detail location 0/2/cpu0
Bridge-domain name: bg1:bd1, id: 0, state: up
 MAC learning: enabled
 Flooding:
   Broadcast & Multicast: enabled
   Unknown unicast: enabled
 MAC aging time: 300 s, Type: inactivity
 MAC limit: 4000, Action: none, Notification: syslog
 MAC limit reached: no
 Security: disabled
 DHCPv4 snooping: profile not known on this node
 IGMP snooping: disabled, flooding: disabled
 Bridge MTU: 1500 bytes
 Number of bridge ports: 1
 Number of MAC addresses: 0
 Multi-spanning tree instance: 0

  GigabitEthernet0/1/0/1.2, state: oper up
    Number of MAC: 0
    Statistics:
      packets: received 0, sent 0
      bytes: received 0, sent 0
    Storm control drop counters:
      packets: broadcast 0, multicast 0, unknown unicast 0
      bytes: broadcast 0, multicast 0, unknown unicast 0


Bridge-domain name: bg1:bd2, id: 1, state: up
  Type:  pbb-edge, I-SID: 1234
  Core-bridge: pbb-bd2
 MAC learning: enabled
 Flooding:
```

```
      Broadcast & Multicast: enabled
      Unknown unicast: enabled
   MAC aging time: 300 s, Type: inactivity
   MAC limit: 4000, Action: none, Notification: syslog
   MAC limit reached: no
   Security: disabled
   DHCPv4 snooping: profile not known on this node
   IGMP snooping: disabled, flooding: disabled
   Bridge MTU: 1500 bytes
   Number of bridge ports: 0
   Number of MAC addresses: 0
   Multi-spanning tree instance: 0

   PBB Edge, state: up
      Number of MAC: 0
   GigabitEthernet0/1/0/1.3, state: oper up
      Number of MAC: 0
      Storm control drop counters:
        packets: broadcast 0, multicast 0, unknown unicast 0
        bytes: broadcast 0, multicast 0, unknown unicast 0

Bridge-domain name: bg1:bd3, id: 2, state: up
  Type:  pbb-core
  Number of associated pbb-edge BDs: 1

MAC learning: enabled
 Flooding:
     Broadcast & Multicast: enabled
     Unknown unicast: enabled
 MAC aging time: 300 s, Type: inactivity
 MAC limit: 4000, Action: none, Notification: syslog
 MAC limit reached: no
 Security: disabled
 DHCPv4 snooping: profile not known on this node
 IGMP snooping: disabled, flooding: disabled
 Bridge MTU: 1500 bytes
 Number of bridge ports: 0
 Number of MAC addresses: 0
 Multi-spanning tree instance: 0

  PBB Core, state: up
  Vlan-id: 1

  GigabitEthernet0/1/0/1.4, state: oper up
    Number of MAC: 0
    Storm control drop counters:
      packets: broadcast 0, multicast 0, unknown unicast 0
      bytes: broadcast 0, multicast 0, unknown unicast 0
```

The following sample output is from the **show l2vpn forwarding bridge detail location** command for IOS-XR 5.3.2 release:

```
RP/0/RP0/CPU0:router# show l2vpn forwarding bridge detail location 0/0/CPU0

Bridge-domain name: pbb:pbb_core1, id: 10, state: up
 Type: pbb-core
 Number of associated pbb-edge BDs: 1
 MAC learning: enabled
 MAC port down flush: enabled
 Flooding:
   Broadcast & Multicast: enabled
   Unknown unicast: enabled
 MAC aging time: 300 s, Type: inactivity
```

```
      MAC limit: 4000, Action: none, Notification: syslog
      MAC limit reached: no
      MAC Secure: disabled, Logging: disabled
      DHCPv4 snooping: profile not known on this node
      Dynamic ARP Inspection: disabled, Logging: disabled
      IP Source Guard: disabled, Logging: disabled
      IGMP snooping: disabled, flooding: enabled
      MLD snooping: disabled, flooding: disabled
      MMRP Flood Optimization: disabled
      Storm control: disabled
      P2MP PW: disabled
      Bridge MTU: 1500 bytes
      Number of bridge ports: 1
      Number of MAC addresses: 5
      Multi-spanning tree instance: 0
      PBB-EVPN: enabled
      Statistics:
        packets: received 0, sent 963770
        bytes: received 0, sent 263433178

       PBB Core, state: Up
         Vlan-id: 1
         XC ID: 0x80000010
         Number of MAC: 0
         Statistics:
           packets: received 0 (unicast 0), sent 0
           bytes: received 0 (unicast 0), sent 0
           MAC move: 0
         Storm control drop counters:
           packets: broadcast 0, multicast 0, unknown unicast 0
           bytes: broadcast 0, multicast 0, unknown unicast 0
```

The following sample outputs shows the backup pseudowire information:

```
RP/0/RP0/CPU0:router#show l2vpn forwarding detail location 0/2/CPU0
Local interface: GigabitEthernet0/2/0/0.1, Xconnect id: 0x3000001, Status: up
  Segment 1
    AC, GigabitEthernet0/2/0/0.1, Ethernet VLAN mode, status: Bound
    RG-ID 1, active
    Statistics:
      packets: received 0, sent 0
      bytes: received 0, sent 0
  Segment 2
    MPLS, Destination address: 101.101.101.101, pw-id: 1000, status: Bound
    Pseudowire label: 16000
    Statistics:
      packets: received 0, sent 0
      bytes: received 0, sent 0
  Backup PW
    MPLS, Destination address: 102.102.102.102, pw-id: 1000, status: Bound
    Pseudowire label: 16001
    Statistics:
      packets: received 0, sent 0
      bytes: received 0, sent 0


RP/0/RP0/CPU0:router#show l2vpn forwarding bridge-domain detail location 0/2/CPU0
Bridge-domain name: bg1:bd1, id: 0, state: up
….
  GigabitEthernet0/2/0/0.4, state: oper up
    RG-ID 1, active
    Number of MAC: 0
```

```
    …..

  Nbor 101.101.101.101 pw-id 5000
     Backup Nbor 101.101.101.101 pw-id 5000
     Number of MAC: 0
….


RP/0/RP0/CPU0:router#show l2vpn forwarding bridge-domain detail location 0/2/CPU0
Bridge-domain name: bg1:bd1, id: 0, state: up
….
GigabitEthernet0/2/0/0.4, state: oper up
XC ID: 0x1880002
Number of MAC: 0
Statistics:
packets: received 0 (multicast 0, broadcast 0, unknown unicast 0, unicast 0), sent 963770
bytes: received 0 (multicast 0, broadcast 0, unknown unicast 0, unicast 0), sent 263433178
MAC move: 0
Storm control drop counters:
packets: broadcast 0, multicast 0, unknown unicast 0
bytes: broadcast 0, multicast 0, unknown unicast 0
Dynamic arp inspection drop counters:
packets: 0, bytes: 0
IP source guard drop counters:
packets: 0, bytes: 0



….
```

The following sample outputs displays the SPAN segment information of the xconnect:

```
RP/0/RP0/CPU0:router# show l2vpn forwarding counter location 0/7/CPU0
Legend: ST = State, DN = Down

Segment 1                            Segment 2         ST     Byte
                                                                       Switched
---------------------------- ----------------------    --     ---------
pw-span-test (Monitor-Session) mpls  2.2.2.2  UP        0


RP/0/RP0/CPU0:router #Show l2vpn forwarding monitor-session location 0/7/CPU0
Segment 1                          Segment 2                          State
---------------------------------- ---------------------------------- ------
pw-span-test(monitor-session)  mpls   2.2.2.2                          UP
pw-span-sess(monitor-session)  mpls   3.3.3.3                          UP


RP/0/RP0/CPU0:router #Show l2vpn forwarding monitor-session pw-span-test location 0/7/CPU0
Segment 1                          Segment 2                          State
---------------------------------- ---------------------------------- ------
pw-span-test(Monitor-Session) mpls    2.2.2.2                          UP


Example 4:
RP/0/RP0/CPU0:router #show l2vpn forwarding detail location 0/7/CPU0
  Xconnect id: 0xc000001, Status: up
  Segment 1
    Monitor-Session, pw-span-test, status: Bound
  Segment 2
    MPLS, Destination address: 2.2.2.2, pw-id: 1, status: Bound
    Pseudowire label: 16001
    Statistics:
      packets: received 0, sent 11799730
      bytes: received 0, sent 707983800
```

```
Example 5:
show l2vpn forwarding private location 0/11/CPU0
  Xconnect ID 0xc000001
  Xconnect info:
   Base info: version=0xaabbcc13, flags=0x0, type=2, reserved=0
    xcon_bound=TRUE, switching_type=0, data_type=3

  AC info:
   Base info: version=0xaabbcc11, flags=0x0, type=3, reserved=0
    xcon_id=0xc000001, ifh= none, subifh= none, ac_id=0, ac_type=SPAN,
    ac_mtu=1500, iw_mode=none, adj_valid=FALSE, adj_addr none


  PW info:
   Base info: version=0xaabbcc12, flags=0x0, type=4, reserved=0
    pw_id=1, nh_valid=TRUE, sig_cap_flags=0x20, context=0x0,
     MPLS, pw_label=16001
   Statistics:
     packets: received 0, sent 11799730
     bytes: received 0, sent 707983800

  Object: NHOP
  Event Trace History [Total events: 5]
----------------------------------------------------------------------
    Time                Event               Flags
    ====                =====               =====


----------------------------------------------------------------------


  Nexthop info:
   Base info: version=0xaabbcc14, flags=0x10000, type=5, reserved=0
    nh_addr=2.2.2.2, plat_data_valid=TRUE, plat_data_len=128, child_count=1

   Object: XCON
   Event Trace History [Total events: 16]
----------------------------------------------------------------------
    Time                Event               Flags
    ====                =====               =====

 ----------------------------------------------------------------------
RP/0/RP0/CPU0:router #show l2vpn forwarding summary location 0/7/CPU0
 Major version num:1, minor version num:0
Shared memory timestamp:0x31333944cf
Number of forwarding xconnect entries:2
  Up:2  Down:0
  AC-PW:1 (1 mpls)  AC-AC:0  AC-BP:0  AC-Unknown:0
  PW-BP:0  PW-Unknown:0 Monitor-Session-PW:1
Number of xconnects down due to:
  AIB:0  L2VPN:0  L3FIB:0
Number of p2p xconnects: 2
Number of bridge-port xconnects: 0
Number of nexthops:1
  MPLS:   Bound:1  Unbound:0  Pending Registration:0
Number of bridge-domains: 0
Number of static macs: 0
Number of locally learned macs: 0
Number of remotely learned macs: 0
Number of total macs: 0
```

The following sample output is from the **show l2vpn forwarding** command:

```
RP/0/RP0/CPU0:router# show l2vpn forwarding location 0/2/cpu0

ID   Segment 1        Segment 2
----------------------------------
1    Gi0/2/0/0 1      1.1.1.1   9)
```

The following sample output shows the MAC information in the layer2_fib manager summary:

```
RP/0/RP0/CPU0:router# show l2vpn forwarding summary location 0/3/CPU0

Major version num:1, minor version num:0
Shared memory timestamp:0x66ff58e894
Number of forwarding xconnect entries:2
  Up:1  Down:0
  AC-PW:0  AC-AC:0  AC-BP:1 PW-BP:1
Number of xconnects down due to:
  AIB:0  L2VPN:0  L3FIB:0
Number of nexthops:1
Number of static macs: 5
Number of locally learned macs: 5
Number of remotely learned macs: 0
Number of total macs: 10
```

Related Commands	Command	Description
	clear l2vpn forwarding counters, on page 11	Clears L2VPN forwarding counters.

show l2vpn pw-class

To display L2VPN pseudowire class information, use the **show l2vpn pw-class** command in EXEC mode.

show l2vpn pw-class [{**detail**|**name** *class name*}]

Syntax Description		
detail	(Optional) Displays detailed information.	
name *class-name*	(Optional) Displays information about a specific pseudowire class name.	

Command Default   None

Command Modes   EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read

Examples   The following example shows sample output for the **show l2vpn pw-class** command:

```
RP/0/RP0/CPU0:router# show l2vpn pw-class

Name                     Encapsulation      Protocol
------------------------ ----------         ----------
mplsclass_75             MPLS               LDP
l2tp-dynamic             L2TPv3             L2TPv3
```

This table describes the significant fields shown in the display.

Table 3: show l2vpn pw-class Command Field Descriptions

Field	Description
Name	Displays the name of the pseudowire class.
Encapsulation	Displays the encapsulation type.

Field	Description
Protocol	Displays the protocol type.

Related Commands

Command	Description
clear l2vpn forwarding counters, on page 11	Clears L2VPN forwarding counters.

show l2vpn resource

To display the memory state in the L2VPN process, use the **show l2vpn resource** command in EXEC mode.

show l2vpn resource

Syntax Description

This command has no arguments or keywords.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
l2vpn	read

Examples

The following example shows sample output for the **show l2vpn resource** command:

```
RP/0/RP0/CPU0:router# show l2vpn resource

Memory: Normal
```

describes the significant fields shown in the display.

Table 4: show l2vpn resource Command Field Descriptions

Field	Description
Memory	Displays memory status.

show l2vpn xconnect

To display brief information on configured cross-connects, use the **show l2vpn xconnect** command in EXEC mode.

Syntax Description

detail	(Optional) Displays detailed information.
group	(Optional) Displays all cross-connects in a specified group.
interface	(Optional) Filters the interface and subinterface.
neighbor	(Optional) Filters the neighbor.
state	(Optional) Filters the following xconnect state types: • up • down
summary	(Optional) Displays AC information from the AC Manager database.
type	(Optional) Filters the following xconnect types: • ac-pw • locally switched
state unresolved	(Optional) Displays information about unresolved cross-connects.

Command Default None

Command Modes EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If a specific cross-connect is specified in the command (for instance, AC_to_PW1) then only that cross-connect will be displayed; otherwise, all cross-connects are displayed.

When configuring Ethernet Connectivity Fault Managment (CFM) over l2vpn cross-connect, the CFM Continuity Check Messages (CCM) packets are not accounted for in the cross-connect pseudowire packet counters displayed in this show command output.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows sample output for the **show l2vpn xconnect** command:

```
RP/0/RP0/CPU0:router# show l2vpn xconnect
Wed May 21 09:06:47.944 UTC
Legend: ST = State, UP = Up, DN = Down, AD = Admin Down, UR = Unresolved,
        SB = Standby, SR = Standby Ready, (PP) = Partially Programmed

XConnect                    Segment 1                   Segment 2
Group       Name      ST    Description         ST      Description             ST
-----------------------     ----------------------      ---------------------------
L2TPV3_V4_XC_GRP
            L2TPV3_P2P_1
                      UP    Gi0/2/0/1.2         UP      26.26.26.26     100     UP
--------------------------------------------------------------------------------
L2TPV3_V4_XC_GRP
            L2TPV3_P2P_2
                      UP    Gi0/2/0/1.3         UP      26.26.26.26     200     UP
--------------------------------------------------------------------------------
```

The following sample output shows that the backup is in standby mode for the **show l2vpn xconnect detail** command:

```
RP/0/RP0/CPU0:router# show l2vpn xconnect detail

Group siva_xc, XC siva_p2p, state is up; Interworking none
  Monitor-Session: pw-span-test, state is configured
  AC: GigabitEthernet0/4/0/1, state is up
    Type Ethernet
    MTU 1500; XC ID 0x5000001; interworking none; MSTi 0
    Statistics:
      packet totals: send 90
      byte totals: send 19056
  PW: neighbor 10.1.1.1, PW ID 1, state is up ( established )
    PW class not set, XC ID 0x5000001
    Encapsulation MPLS, protocol LDP
    PW type Ethernet, control word enabled, interworking none
    PW backup disable delay 0 sec
    Sequencing not set
        MPLS          Local                       Remote
        ------------  --------------------------  ---------------------------
        Label         30005                       16003
        Group ID      0x5000300                   0x5000400
        Interface     GigabitEthernet0/4/0/1      GigabitEthernet0/4/0/2
         Interface    pw-span-test                GigabitEthernet0/3/0/1
        MTU           1500                        1500
        Control word  enabled                     enabled
        PW type       Ethernet                    Ethernet
        VCCV CV type  0x2                         0x2
                      (LSP ping verification)     (LSP ping verification)
        VCCV CC type  0x3                         0x3
                       (control word)              (control word)
                      (router alert label)        (router alert label)
        ------------  --------------------------  ---------------------------
     Create time: 20/11/2007 21:45:07 (00:49:18 ago)
```

```
      Last time status changed: 20/11/2007 21:45:11 (00:49:14 ago)
      Statistics:
        packet totals: receive 0
        byte totals: receive 0

    Backup PW:
    PW: neighbor 2.2.2.2, PW ID 2, state is up ( established )
      Backup for neighbor 1.1.1.1 PW ID 1 ( standby )
      PW class not set, XC ID 0x0
      Encapsulation MPLS, protocol LDP
      PW type Ethernet, control word enabled, interworking none
      PW backup disable delay 0 sec
      Sequencing not set
          MPLS         Local                          Remote
        ------------ ------------------------------ ------------------------------
        Label        30006                          16003
        Group ID     unassigned                     0x5000400
        Interface    unknown                        GigabitEthernet0/4/0/2
        MTU          1500                           1500
        Control word enabled                        enabled
        PW type      Ethernet                       Ethernet
        VCCV CV type 0x2                            0x2
                     (LSP ping verification)        (LSP ping verification)
        VCCV CC type 0x3                            0x3
                      (control word)                 (control word)
                     (router alert label)           (router alert label)
        ------------ ------------------------------ ------------------------------
      Backup PW for neighbor 10.1.1.1 PW ID 1
      Create time: 20/11/2007 21:45:45 (00:48:40 ago)
      Last time status changed: 20/11/2007 21:45:49 (00:48:36 ago)
      Statistics:
        packet totals: receive 0
        byte totals: receive 0
```

The following sample output shows that the backup is active for the **show l2vpn xconnect
 detail** command:

```
RP/0/RP0/CPU0:router# show l2vpn xconnect detail

Group siva_xc, XC siva_p2p, state is down; Interworking none
  Monitor-Session: pw-span-test, state is configured
  AC: GigabitEthernet0/4/0/1, state is up
    Type Ethernet
    MTU 1500; XC ID 0x5000001; interworking none; MSTi 0
    Statistics:
      packet totals: send 98
      byte totals: send 20798
  PW: neighbor 10.1.1.1, PW ID 1, state is down ( local ready )
    PW class not set, XC ID 0x5000001
    Encapsulation MPLS, protocol LDP
    PW type Ethernet, control word enabled, interworking none
    PW backup disable delay 0 sec
    Sequencing not set
        MPLS         Local                          Remote
      ------------ ------------------------------ ------------------------------
      Label        30005                          unknown
      Group ID     0x5000300                      0x0
      Interface    GigabitEthernet0/4/0/1         unknown
       Interface     pw-span-test                       GigabitEthernet0/3/0/1
      MTU          1500                           unknown
      Control word enabled                        unknown
      PW type      Ethernet                       unknown
      VCCV CV type 0x2                            0x0
                                                  (none)
```

```
                              (LSP ping verification)
        VCCV CC type 0x3                                    0x0
                                                            (none)
                    (control word)
                    (router alert label)
      ------------ ----------------------------- -----------------------------
    Create time: 20/11/2007 21:45:06 (00:53:31 ago)
    Last time status changed: 20/11/2007 22:38:14 (00:00:23 ago)
    Statistics:
      packet totals: receive 0
      byte totals: receive 0

  Backup PW:
  PW: neighbor 10.2.2.2, PW ID 2, state is up ( established )
    Backup for neighbor 10.1.1.1 PW ID 1 ( active )
    PW class not set, XC ID 0x0
    Encapsulation MPLS, protocol LDP
    PW type Ethernet, control word enabled, interworking none
    PW backup disable delay 0 sec
    Sequencing not set
        MPLS          Local                      Remote
      ------------ ----------------------------- -----------------------------
      Label        30006                         16003
      Group ID     unassigned                    0x5000400
      Interface    unknown                       GigabitEthernet0/4/0/2
      MTU          1500                          1500
      Control word enabled                       enabled
      PW type      Ethernet                      Ethernet
      VCCV CV type 0x2                           0x2
                   (LSP ping verification)       (LSP ping verification)
      VCCV CC type 0x3                           0x3
                    (control word)                (control word)
                   (router alert label)          (router alert label)
      ------------ ----------------------------- -----------------------------
    Backup PW for neighbor 10.1.1.1 PW ID 1
    Create time: 20/11/2007 21:45:44 (00:52:54 ago)
    Last time status changed: 20/11/2007 21:45:48 (00:52:49 ago)
    Statistics:
      packet totals: receive 0
      byte totals: receive 0
```

The following sample output displays the xconnects with switch port analyzer (SPAN) as one of the segments:

```
Show l2vpn xconnect type minotor-session-pw
Legend: ST = State, UP = Up, DN = Down, AD = Admin Down, UR = Unresolved,
        LU = Local Up, RU = Remote Up, CO = Connected

XConnect                        Segment 1              Segment 2
Group           Name     ST     Description       ST   Description           ST
------------------------------- -------------------------- --------------------------
g1              x1       UP     pw-span-test      UP   2.2.2.2        1      UP
-------------------------------------------------------------------------------------
```

The following sample output shows that one-way redundancy is enabled:

```
Group g1, XC x2, state is up; Interworking none
  AC: GigabitEthernet0/2/0/0.2, state is up, active in RG-ID 1
    Type VLAN; Num Ranges: 1
    VLAN ranges: [2, 2]
    MTU 1500; XC ID 0x3000002; interworking none
    Statistics:
      packets: received 103, sent 103
```

```
        bytes: received 7348, sent 7348
        drops: illegal VLAN 0, illegal length 0
  PW: neighbor 101.101.101.101, PW ID 2000, state is up ( established )
    PW class class1, XC ID 0x3000002
    Encapsulation MPLS, protocol LDP
    PW type Ethernet VLAN, control word disabled, interworking none
PW backup disable delay 0 sec
One-way PW redundancy mode is enabled
    Sequencing not set
…..
    Incoming Status (PW Status TLV):
      Status code: 0x0 (Up) in Notification message
    Outgoing Status (PW Status TLV):
      Status code: 0x0 (Up) in Notification message
…..
  Backup PW:
  PW: neighbor 102.102.102.102, PW ID 3000, state is standby ( all ready )
    Backup for neighbor 101.101.101.101 PW ID 2000 ( inactive )
    PW class class1, XC ID 0x3000002
    Encapsulation MPLS, protocol LDP
    PW type Ethernet VLAN, control word disabled, interworking none
    Sequencing not set
…..
    Incoming Status (PW Status TLV):
      Status code: 0x26 (Standby, AC Down) in Notification message
    Outgoing Status (PW Status TLV):
      Status code: 0x0 (Up) in Notification message
```

The following example shows sample output for the **show l2vpn xconnect** command:

```
RP/0/RP0/CPU0:router# show l2vpn xconnect

Legend: ST = State, UP = Up, DN = Down, AD = Admin Down, UR = Unresolved,
             LU = Local Up, RU = Remote Up, CO = Connected

XConnect                     Segment 1                  Segment 2
Group      Name      ST   Description           ST   Description             ST
----------------------------  --------------------------  ------------------------
siva_xc    siva_p2p  UP   Gi0/4/0/1             UP   1.1.1.1        1     UP
                                                     Backup
                                                     2.2.2.2        2     UP
--------------------------------------------------------------------------------
```

The following sample output shows that the backup is in standby mode for the **show l2vpn
 xconnect detail** command:

```
RP/0/RP0/CPU0:router# show l2vpn xconnect detail

Group siva_xc, XC siva_p2p, state is up; Interworking none
  AC: GigabitEthernet0/4/0/1, state is up
    Type Ethernet
    MTU 1500; XC ID 0x5000001; interworking none; MSTi 0
    Statistics:
      packet totals: received 90, sent 90
      byte totals: received 19056, sent 19056
  PW: neighbor 1.1.1.1, PW ID 1, state is up ( established )
    PW class not set, XC ID 0x5000001
    Encapsulation MPLS, protocol LDP
    PW type Ethernet, control word enabled, interworking none
    PW backup disable delay 0 sec
    Sequencing not set
        MPLS          Local                     Remote
        ------------ ------------------------------ ------------------------------
```

```
      Label       30005                          16003
      Group ID    0x5000300                      0x5000400
      Interface   GigabitEthernet0/4/0/1         GigabitEthernet0/4/0/2
      MTU         1500                           1500
      Control word enabled                       enabled
      PW type     Ethernet                       Ethernet
      VCCV CV type 0x2                           0x2
                  (LSP ping verification)        (LSP ping verification)
      VCCV CC type 0x3                           0x3
                   (control word)                 (control word)
                  (router alert label)           (router alert label)
      ------------ ------------------------------ -----------------------------
    Create time: 20/11/2007 21:45:07 (00:49:18 ago)
    Last time status changed: 20/11/2007 21:45:11 (00:49:14 ago)
    Statistics:
      packet totals: received 0, sent 0
      byte totals: received 0, sent 0

  Backup PW:
  PW: neighbor 2.2.2.2, PW ID 2, state is up ( established )
    Backup for neighbor 1.1.1.1 PW ID 1 ( standby )
    PW class not set, XC ID 0x0
    Encapsulation MPLS, protocol LDP
    PW type Ethernet, control word enabled, interworking none
    PW backup disable delay 0 sec
    Sequencing not set
        MPLS         Local                         Remote
      ------------ ------------------------------ -----------------------------
      Label       30006                          16003
      Group ID    unassigned                     0x5000400
      Interface   unknown                        GigabitEthernet0/4/0/2
      MTU         1500                           1500
      Control word enabled                       enabled
      PW type     Ethernet                       Ethernet
      VCCV CV type 0x2                           0x2
                  (LSP ping verification)        (LSP ping verification)
      VCCV CC type 0x3                           0x3
                   (control word)                 (control word)
                  (router alert label)           (router alert label)
      ------------ ------------------------------ -----------------------------
    Backup PW for neighbor 1.1.1.1 PW ID 1
    Create time: 20/11/2007 21:45:45 (00:48:40 ago)
    Last time status changed: 20/11/2007 21:45:49 (00:48:36 ago)
    Statistics:
      packet totals: received 0, sent 0
      byte totals: received 0, sent 0
```

The following sample output shows that the backup is active for the **show l2vpn xconnect detail** command:

```
RP/0/RP0/CPU0:router# show l2vpn xconnect detail

Group siva_xc, XC siva_p2p, state is down; Interworking none
  AC: GigabitEthernet0/4/0/1, state is up
    Type Ethernet
    MTU 1500; XC ID 0x5000001; interworking none; MSTi 0
    Statistics:
      packet totals: send 98
      byte totals: send 20798
  PW: neighbor 1.1.1.1, PW ID 1, state is down ( local ready )
    PW class not set, XC ID 0x5000001
    Encapsulation MPLS, protocol LDP
    PW type Ethernet, control word enabled, interworking none
    PW backup disable delay 0 sec
```

```
     Sequencing not set
        MPLS          Local                          Remote
     ------------ ----------------------------- -----------------------------
        Label       30005                          unknown
        Group ID    0x5000300                      0x0
        Interface   GigabitEthernet0/4/0/1         unknown
        MTU         1500                           unknown
        Control word enabled                       unknown
        PW type     Ethernet                       unknown
        VCCV CV type 0x2                           0x0
                                                   (none)

                    (LSP ping verification)
        VCCV CC type 0x3                           0x0
                                                   (none)

                     (control word)
                    (router alert label)
     ------------ ----------------------------- -----------------------------
     Create time: 20/11/2007 21:45:06 (00:53:31 ago)
     Last time status changed: 20/11/2007 22:38:14 (00:00:23 ago)
     Statistics:
       packet totals: received 0, sent 0
       byte totals: received 0, sent 0

   Backup PW:
   PW: neighbor 2.2.2.2, PW ID 2, state is up ( established )
     Backup for neighbor 1.1.1.1 PW ID 1 ( active )
     PW class not set, XC ID 0x0
     Encapsulation MPLS, protocol LDP
     PW type Ethernet, control word enabled, interworking none
     PW backup disable delay 0 sec
     Sequencing not set
        MPLS          Local                          Remote
     ------------ ----------------------------- -----------------------------
        Label       30006                          16003
        Group ID    unassigned                     0x5000400
        Interface   unknown                        GigabitEthernet0/4/0/2
        MTU         1500                           1500
        Control word enabled                       enabled
        PW type     Ethernet                       Ethernet
        VCCV CV type 0x2                           0x2
                    (LSP ping verification)        (LSP ping verification)
        VCCV CC type 0x3                           0x3
                     (control word)                 (control word)
                    (router alert label)           (router alert label)
     ------------ ----------------------------- -----------------------------
     Backup PW for neighbor 1.1.1.1 PW ID 1
     Create time: 20/11/2007 21:45:44 (00:52:54 ago)
     Last time status changed: 20/11/2007 21:45:48 (00:52:49 ago)
     Statistics:
       packet totals: received 0, sent 0
       byte totals: received 0, sent 0
```

This example shows that the PW type changes to Ethernet, which is Virtual Circuit (VC) type 5, on the interface when a double tag rewrite option is used.

```
RP/0/RP0/CPU0:router# show l2vpn xconnect pw-class pw-class1 detail

Group VPWS, XC ac3, state is up; Interworking none
AC: GigabitEthernet0/7/0/5.3, state is up
Type VLAN; Num Ranges: 1
VLAN ranges: [12, 12]
MTU 1508; XC ID 0x2440096; interworking none
Statistics:
```

```
packets: received 26392092, sent 1336
bytes: received 1583525520, sent 297928
drops: illegal VLAN 0, illegal length 0
PW: neighbor 3.3.3.3, PW ID 3, state is up ( established )
PW class VPWS1, XC ID 0x2440096
Encapsulation MPLS, protocol LDP
PW type Ethernet, control word disabled, interworking none
PW backup disable delay 0 sec
Sequencing not set

Preferred path tunnel TE 3, fallback disabled
PW Status TLV in use
     MPLS         Local                          Remote
     ------------ ------------------------------ ------------------------------
     Label        16147                          21355
     Group ID     0x120001c0                     0x120001c0
     Interface    GigabitEthernet0/7/0/5.3       GigabitEthernet0/7/0/5.3
     MTU          1508                           1508
     Control word disabled                       disabled
     PW type      Ethernet                       Ethernet
     VCCV CV type 0x2                            0x2
                  (LSP ping verification)        (LSP ping verification)
     VCCV CC type 0x6                            0x6
                  (router alert label)           (router alert label)
                  (TTL expiry)                   (TTL expiry)
     ------------ ------------------------------ ------------------------------
Incoming Status (PW Status TLV):
Status code: 0x0 (Up) in Notification message
Outgoing Status (PW Status TLV):
Status code: 0x0 (Up) in Notification message
MIB cpwVcIndex: 4294705365
Create time: 21/09/2011 08:05:01 (00:14:01 ago)
Last time status changed: 21/09/2011 08:07:01 (00:12:01 ago)
Statistics:
packets: received 1336, sent 26392092
bytes: received 297928, sent 1583525520
```

This table describes the significant fields shown in the display.

Table 5: show l2vpn xconnect Command Field Descriptions

Field	Description
XConnect Group	Displays a list of all configured cross-connect groups.
Group	Displays the cross-connect group number.
Name	Displays the cross-connect group name.
Description	Displays the cross-connect group description. If no description is configured, the interface type is displayed.
ST	State of the cross-connect group: up (UP) or down (DN).

Related Commands

Command	Description
xconnect group, on page 57	Configures cross-connect groups.

show tunnel-template

To display tunnel template information, use the **show tunnel-template** command in the EXEC mode.

show   tunnel-template *template-name*

Syntax Description

template-name	Name of the tunnel template.

Command Default   None

Command Modes   EXEC

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

Task ID

Task ID	Operation
tunnel	read

Example

The following example shows the output of the **show tunnel-template test** command for Local PE Tunnel:

```
RP/0/RP0/CPU0:router# show tunnel-template test
Fri Jan 30 06:22:46.428 UTC

Tunnel template
-----------------------------------------------------
Name:       test (ifhandle: 0x00080030)
MTU:        1464
TTL:        255
TOS:        0
Tunnel ID:  1
Source:     25.25.25.25
Session ID: 0x1D174108 Cookie: 8 bytes [0x24FD3ADAA4485333] being rolled into
    Session ID: 0x15A86E93 Cookie: 8 bytes [0xF486195660CCD522]
Next Session-id/Cookie rollover happens in 1 minute 49 seconds
Transmit:        14213298 pkts  1250770344 bytes
Cookie Mismatch: 0 pkts
MTU Violation:   0 pkts
```

The following example shows the output of the **show tunnel-template test** command for Remote PE Tunnel:

```
RP/0/RP0/CPU0:router# show tunnel-template test
Fri Jan 30 06:04:29.800 UTC
```

```
Tunnel template
------------------------------------------------------
Name:        test (ifhandle: 0x00080030)
MTU:         600
TTL:         255
TOS:         0
Tunnel ID:   1
Source:      35.35.35.35    Address Pool: 36.36.36.0/28
Session ID: 0x111F4312 Cookie: 8 bytes [0xB95A806145BE9BE7]
Transmit:        122168722 pkts  10750845295 bytes
Cookie Mismatch: 0 pkts
MTU Violation:   0 pkts
```

Related Commands	Command	Description
	tunnel-template, on page 56	Enters tunnel-template configuration submode.

storm-control

Storm control on ASR 9000 Series Routers can be applied at the following service attachment points:

- Bridge domain (BD)

- Attachment Circuit (AC)

- Access pseudowire (PW)

To enable storm control on all access circuits (AC) and access pseudowires (PW) in a VPLS bridge, use the **storm-control** command in l2vpn bridge group bridge-domain configuration mode. To disable storm control, use the **no** form of this command.

To enable storm control on an access circuit (AC) under a VPLS bridge, use the **storm-control** command in l2vpn bridge group bridge-domain access circuit configuration mode. To disable storm control, use the **no** form of this command.

To enable storm control on an access pseudowire (PW) in a VPLS bridge, use the **storm-control** command in l2vpn bridge group bridge-domain neighbor configuration mode. To disable storm control, use the **no** form of this command.

storm-control {**broadcast|multicast|unknown-unicast**} {**pps** *pps-value* | **kbps** *kbps-value*}
no storm-control {**broadcast|multicast|unknown-unicast**} {**pps** *pps-value* | **kbps** *kbps-value*}

Syntax Description		
broadcast	Configures storm control for broadcast traffic.
multicast	Configures storm control for multicast traffic.
unknown-unicast	Configures storm control for unknown unicast traffic.
	• Storm control does not apply to bridge protocol data unit (BPDU) packets. All BPDU packets are processed as if traffic storm control is not configured.
	• Storm control does not apply to internal communication and control packets, route updates, SNMP management traffic, Telnet sessions, or any other packets addressed to the router.
pps *pps-value*	Configures the packets-per-second (pps) storm control threshold for the specified traffic type. Valid values range from 1 to 160000.
kbps *kbps-value*	Configures the storm control in kilo bits per second (kbps). The range is from 64 to 1280000.

Command Default Storm control is disabled by default.

Command Modes l2vpn bridge group bridge-domain access circuit configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

- Bridge Protocol Data Unit (BPDU) packets are not filtered through the storm control feature.

- The traffic storm control monitoring interval is set in the hardware and is not configurable. On Cisco ASR 9000 Series Router, the monitoring interval is always one second.

- When there is a mix of kbps and pps storm control on bridge or bridge port, the pps value is translated to kbps inside the policer using 1000 bytes per packet as an average.

- The hardware can only be programmed with a granularity of 8 pps, so values are not divisible by eight. These are rounded to the nearest increment of eight.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example enables storm control thresholds throughout the bridge domain:

```
RP/0/RSP0/CPU0:a9k1# configure
RP/0/RSP0/CPU0:a9k1(config)# l2vpn
RP/0/RSP0/CPU0:a9k1(config-l2vpn)# bridge group BG1
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg)# bridge-domain BD1
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd)# storm-control unknown-unicast pps 100
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd)# storm-control multicast pps 100
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd)# storm-control broadcast pps 100
```

The following example enables storm control thresholds on an access circuit:

```
RP/0/RSP0/CPU0:a9k1# configure
RP/0/RSP0/CPU0:a9k1(config)# l2vpn
RP/0/RSP0/CPU0:a9k1(config-l2vpn)# bridge group BG1
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd)# bridge-domain BD2
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd)# interface Bundle-Ether9001.2001
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd-ac)# storm-control unknown-unicast pps 100
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd-ac)# storm-control multicast pps 100
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd-ac)# storm-control broadcast pps 100
```

The following example enables storm control thresholds on an access pseudowire:

```
RP/0/RSP0/CPU0:a9k1# configure
RP/0/RSP0/CPU0:a9k1(config)# l2vpn
RP/0/RSP0/CPU0:a9k1(config-l2vpn)# bridge group BG1
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd)# bridge-domain BD2
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd-ac)# neighbor 10.1.1.1 pw-id 20011001
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd-pw)# storm-control unknown-unicast pps 100
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd-pw)# storm-control multicast pps 100
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd-pw)# storm-control broadcast pps 100
RP/0/RSP0/CPU0:a9k1(config-l2vpn-bg-bd-pw)# commit
```

Running Configuration

```
l2vpn
 bridge group BG1
  bridge-domain BD1
   storm-control unknown-unicast pps 100
```

```
       storm-control multicast pps 100
       storm-control broadcast pps 100
      !
     bridge-domain BD2
      interface Bundle-Ether9001.2001
       storm-control unknown-unicast pps 100
       storm-control multicast pps 100
       storm-control broadcast pps 100
      !
     neighbor 10.1.1.1 pw-id 20011001
       storm-control unknown-unicast pps 100
       storm-control multicast pps 100
       storm-control broadcast pps 100
      !
     !
    !
   !
end
RP/0/RSP0/CPU0:a9k1(config)#
```

tag-rewrite

To configure VLAN tag rewrite, use the **tag-rewrite** command in Encapsulation MPLS configuration mode. To disable VLAN tag rewrite, use the **no** form of this command.

tag-rewrite ingress vlan *vlan-id*
no tag-rewrite ingress vlan *vlan-id*

Syntax Description		
	ingress	Configures ingress mode.
	vlan	Configures VLAN tagged mode
	vlan-id	Specifies the value of the ID of the VLAN.

Command Default None

Command Modes Encapsulation MPLS configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **tag-rewrite** command is applicable only to pseudowires with MPLS encapsulation.

Task ID

Task ID	Operations
l2vpn	read, write

Examples The following example shows how to configure preferred-path tunnel settings:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)# pw-class kanata01
RP/0/RP0/CPU0:router(config-l2vpn-pwc)# encapsulation mpls
RP/0/RP0/CPU0:router(config-l2vpn-pwc-encap-mpls)# tag-rewrite vlan 2000
RP/0/RP0/CPU0:router(config-l2vpn-pwc-encap-mpls)#
```

Related Commands

Command	Description
show l2vpn xconnect, on page 40	Displays brief information on configured cross-connects.

transport mode (L2VPN)

To configure L2VPN pseudowire class transport mode, use the **transport mode** command in L2VPN pseudowire class MPLS encapsulation mode. To disable the L@VPN pseudowire class transport mode configuration, use the **no** form of this command.

transport mode {ethernet|vlan }
no transport mode {ethernet|vlan }

Syntax Description

ethernet	Configures Ethernet port mode.
vlan	Configures VLAN tagged mode.

Command Default   None

Command Modes   L2VPN pseudowire class MPLS encapsulation

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 5.2.1	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

✎

Note   All L2VPN configurations can be deleted using the **no l2vpn** command.

Task ID

Task ID	Operations
l2vpn	read, write

Examples   This example shows how to configure Ethernet transport mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)# pw-class kanata01
```

```
RP/0/RP0/CPU0:router(config-l2vpn-pw)# encapsulation mpls
RP/0/RP0/CPU0:router(config-l2vpn-encap-mpls)# transport-mode ethernet
```

Related Commands	Command	Description
	pw-class (L2VPN), on page 24	Enters pseudowire class submode to define a pseudowire class template.

tunnel-template

To enter tunnel-template configuration submode, use the **tunnel-template** command in global configuration mode.

tunnel-template *template* *name*
no **tunnel-template** *template-name*

Syntax Description	*template-name* Configures a name for the tunnel template.

Command Default None

Command Modes Global configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
tunnel	read, write

Examples The following example shows how to enter tunnel-template configuration submode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# tunnel-template template_01
```

Related Commands

Command	Description
xconnect group, on page 57	Configures cross-connect groups.

xconnect group

To configure cross-connect groups, use the **xconnect group** command in L2VPN configuration mode. To return to the default behavior, use the **no** form of this command.

xconnect group *group-name*
no xconnect group *group-name*

Syntax Description

group-name	Configures a cross-connect group name using a free-format 32-character string.

Command Default

None

Command Modes

L2VPN configuration

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Note

You can configure up to a maximum of 16K cross-connects per box.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows how to group all cross -connects for customer_atlantic:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)# xconnect group customer_atlantic
```

Related Commands

Command	Description
show l2vpn xconnect, on page 40	Displays brief information on configured cross-connects.