l2 vfi manual through loopback PA-MC-8TE1 + port adapter

l2 vfi manual

To create a Layer 2 virtual forwarding instance (VFI) and enter Layer 2 VFI manual configuration mode, use the **l2vfimanual** command in global configuration mode. To remove the Layer 2 VFI, use the **no** form of this command.

l2 vfi *name* **manual**
no l2 vfi *name* **manual**

Syntax Description

name	Name of a new or existing Layer 2 VFI .

Command Default

The Layer 2 VFI is not configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(18)SXF	This command was introduced on the Supervisor Engine 720.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
15.0(1)M	This command was integrated into a release earlier than Cisco IOS Release 15.0(1)M.
Cisco IOS XE Release 3.7S	This command was integrated into Cisco IOS XE Release 3.7S.

Usage Guidelines

A VFI is a collection of data structures used by the data plane, software-based or hardware-based, to forward packets to one or more virtual circuits (VC). It is populated and updated by both the control plane and the data plane and also serves as the data structure interface between the control plane and the data plane.

Within the Layer 2 VFI manual configuration mode, you can configure the following parameters:

- VPN ID of a Virtual private LAN service (VPLS) domain
- Addresses of other PE routers in this domain
- Type of tunnel signaling and encapsulation mechanism for each peer

Within the Layer 2 VFI manual configuration mode, the following commands are available:

- **vpn id** *vpn-id*
- [**no**] **neighbor***remote-router-id* {**encapsulation** {**l2tpv3** | **mpls**} | **pw-class***pw-name*| **no-split-horizon**}

Examples

This example shows how to create a Layer 2 VFI, enter Layer 2 VFI manual configuration mode, and configure a VPN ID:

```
Router(config)# l2 vfi vfitest1 manual
Router(config-vfi)# vpn id 303
```

Related Commands

Command	Description
l2 vfi point-to-point	Establishes a point-to-point Layer 2 VFI between two separate networks.
vpn id	Configures a VPN ID in RFC 2685 format. You can change the value of the VPN ID only after its configuration, and you cannot remove it.
neighbor	Specifies the type of tunnel signaling and encapsulation mechanism for each peer.

l2protocol-tunnel

To enable the protocol tunneling on an interface and specify the type of protocol to be tunneled, use the **l2protocol-tunnel** command in global or interface configuration mode. To disable protocol tunneling, use the **no** form of this command.

Global Configuration
l2protocol-tunnel [**cos cos-value** | **global** | **mac-address**]
no l2protocol-tunnel

Interface Configuration
l2protocol-tunnel [**cdp** | **lldp** | **stp** | **vtp**]
no l2protocol-tunnel

Syntax Description

cos cos-value	(Optional) Specifies a class of service (CoS) value globally on all ingress Layer 2 protocol tunneling ports.
global	(Optional) Displays global settings.
mac-address	(Optional) Displays L2PT MAC address.
cdp	(Optional) Enables Cisco Discovery Protocol (CDP) tunneling.
lldp	(Optional) Enables Link Layer Discovery Protocol (LLDP) tunneling.
stp	(Optional) Enables Spanning Tree Protocol (STP) tunneling.
vtp	(Optional) Enables VLAN Trunking Protocol (VTP) tunneling.

Command Default

Disabled

Command Modes

Global configuration (config)

Interface configuration (config-if)

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
15.2(2)T	This command was modified. The **lldp**, cos, global, and mac-address keywords were added.

Usage Guidelines

On all the service provider edge switches, you must enable PortFast BPDU filtering on the 802.1Q tunnel ports by entering these commands:

```
Router(config-if)# spanning-tree bpdufilter enable
Router(config-if)# spanning-tree portfast
```

Note PortFast BPDU filtering is enabled automatically on tunnel ports.

If you do not specify a protocol, all protocols are tunneled.

You can configure protocol tunneling on VLAN and trunk interfaces.

You must enter the **switchport** command once without any keywords to configure the LAN port as a Layer 2 interface before you can enter additional **switchport** commands with keywords. This action is required only if you have not entered the **switchport** command for the interface.

Examples

This example shows how to enable a tunneling protocol on an interface:

```
Router> enable
Router# configure terminal
Router#(config)interface FastEthernet 0/0
Router(config-if)# l2protocol-tunnel cdp
```

This example shows how to disable a tunneling protocol on an interface:

```
Router> enable
Router# configure terminal
Router#(config)interface fastEthernet 4/0
Router(config-if)# no l2protocol-tunnel
Protocol tunneling disabled on interface fastEthernet 4/1
```

Related Commands

Command	Description
show l2protocol-tunnel	Displays the protocols that are tunneled on an interface or on all interfaces.
switchport	Modifies the switching characteristics of the Layer 2-switched interface.

l2protocol-tunnel cos

To specify a class of service (CoS) value globally on all ingress Layer-2 protocol tunneling ports, use the **l2protocol-tunnelcos**command in global configuration mode. To return to the default , use the **no** form of this command.

l2protocol-tunnel cos *cos-value*
no l2protocol-tunnel cos

Syntax Description

cos-value	CoS value; valid values are from 0 to 7.

Command Default

The *cos-value* is **5**

Command Modes

Global configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

The *cos-value* is the CoS value that you assign to the PDUs on a Layer 2-protocol tunnel port before tunneling the PDUs through the service-provider network.

You can specify a CoS value globally on all ingress Layer 2-protocol tunneling ports. Because the CoS value applies to all ingress tunneling ports, all encapsulated PDUs that are sent out by the Cisco 7600 series router have the same CoS value.

On all the service-provider edge switches, you must enable PortFast BPDU filtering on the 802.1Q tunnel ports by entering these commands:

```
Router(config-if)# spanning-tree bpdufilter enable
Router(config-if)# spanning-tree portfast
```

Note PortFast BPDU filtering is enabled automatically on tunnel ports.

Examples

This example shows how to specify a CoS value on all ingress Layer 2-protocol tunneling ports:

```
Router(config)# l2protocol-tunnel cos 6
Router(config)#
```

Related Commands

Command	Description
show l2protocol-tunnel	Displays the protocols that are tunneled on an interface or on all interfaces.

l2protocol-tunnel drop-threshold

To specify the maximum number of packets that can be processed for the specified protocol on that interface before being dropped, use the **l2protocol-tunneldrop-threshold** command in interface configuration mode. To reset all the threshold values to 0 and disable the drop threshold, use the **no** form of this command.

l2protocol-tunnel drop-threshold [**cdp** | **stp** | **vtp**] *packets*
no l2protocol-tunnel drop-threshold [**cdp** | **stp** | **vtp**]

Syntax Description

cdp	(Optional) Specifies CDP packets.
stp	(Optional) Specifies STP packets.
vtp	(Optional) Specifies VTP packets.
packets	Maximum number of packets; valid values are from 1 to 4096 packets.

Command Default

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

On all the service-provider edge switches, you must enable PortFast BPDU filtering on the 802.1Q tunnel ports by entering these commands:

```
Router(config-if)# spanning-tree bpdufilter enable
Router(config-if)# spanning-tree portfast
```

Note PortFast BPDU filtering is enabled automatically on tunnel ports.

If you do not specify a protocol, the threshold applies to all protocols.

You can configure protocol tunneling on switch ports only. You must enter the **switchport** command once without any keywords to configure the LAN port as a Layer 2 interface before you can enter additional **switchport** commands with keywords. This action is required only if you have not entered the **switchport** command for the interface.

Refer to the “Configuring IEEE 802.1Q Tunneling and Layer 2 Protocol Tunneling” chapter of the Cisco 7600 Series Router Cisco IOS Software Configuration Guide for additional information on setting the drop threshold value.

Examples

This example shows how to set the drop threshold:

```
Router(config-if)# switchport
Router(config-if)# l2protocol-tunnel drop-threshold 3000
Router(config-if)#
```

Related Commands

Command	Description
l2protocol-tunnel	Enables the protocol tunneling on an interface and specifies the type of protocol to be tunneled.
l2protocol-tunnel cos	Specifies a CoS value globally on all ingress Layer-2 protocol tunneling ports.
l2protocol-tunnel global drop-threshold	Enables rate limiting at the software level.
l2protocol-tunnel shutdown-threshold	Specifies the maximum number of packets that can be processed for the specified protocol on that interface in 1 second.
show l2protocol-tunnel	Displays the protocols that are tunneled on an interface or on all interfaces.
switchport	Modifies the switching characteristics of the Layer 2-switched interface.

l2protocol-tunnel global drop-threshold

To enable rate limiting at the software level, use the **l2protocol-tunnelglobaldrop-threshold** command in global configuration mode. To disable the software rate limiter on the Cisco 7600 series routers, use the **no** form of this command.

l2protocol-tunnel global drop-threshold *threshold*
no l2protocol-tunnel global drop-threshold

Syntax Description

threshold	Maximum rate of incoming PDUs before excessive PDUs are dropped; valid values are from 100 to 20000 PDUs.

Command Default

Global thresholds are not configured.

Command Modes

Global configuration

Command History

Release	Modification
12.2(17a)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

This command is not supported on Cisco 7600 series routers that are configured with a Supervisor Engine 2.

All three PDUs (normal BPDU, CDP, and VTP packets) that arrive on Layer 2-protocol tunnel-enabled ports are rate limited. Rate limiting occurs in the ingress direction in Layer 2-protocol tunneling. If the rate of the incoming PDUs exceeds the configured threshold , the excessive PDUs are dropped.

Examples

This example shows how to enable rate limiting globally:

```
Router(config)# l2protocol-tunnel global drop-threshold 3000
Router(config)#
```

Related Commands

Command	Description
l2protocol-tunnel	Enables the protocol tunneling on an interface and specifies the type of protocol to be tunneled.
l2protocol-tunnel cos	Specifies a CoS value globally on all ingress Layer-2 protocol tunneling ports.
l2protocol-tunnel drop-threshold	Specifies the maximum number of packets that can be processed for the specified protocol on that interface before being dropped.
l2protocol-tunnel shutdown-threshold	Specifies the maximum number of packets that can be processed for the specified protocol on that interface in 1 second.
show l2protocol-tunnel	Displays the protocols that are tunneled on an interface or on all interfaces.

l2protocol-tunnel point-to-point

To enable point-to-point protocol tunneling, use the l2protocol-tunnel point-to-point command in interface configuration mode. To disable, use the **no** form of this command.

l2protocol-tunnel point-to-point [**pagp** | **lacp** | **udld**]
no l2protocol-tunnel point-to-point [**pagp** | **lacp** | **udld**]

Syntax Description

pagp	(Optional) Enables port aggregation on a point-to-point protocol tunneling.
lacp	(Optional) Enables link aggregation on a point-to-point protocol tunneling.
udld	(Optional) Enables a unidirectional link dectection on a point-to-point protocol tunneling.

Command Default

If no keyword is selected, tunneling is enabled for all three protocols.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
15.2(2)T	This command was introduced.

Usage Guidelines

To avoid a network failure, make sure that the network is a point-to-point topology before you enable tunneling for PAgP, LACP, or UDLD packets.

Examples

The following example shows how to enable link aggregation on a point-to-point protocol tunneling:

```
Router(config-if
)# l2protocol-tunnel point-to-point lacp
```

Related Commands

Command	Description
show l2protocol-tunnel	Displays the enabled protocols and their values.

l2protocol-tunnel shutdown-threshold

To specify the maximum number of packets that can be processed for the specified protocol on that interface in 1 second, use the **l2protocol-tunnelshutdown-threshold**command in interface configuration mode. To reset all the threshold values to 0 and disable the shutdown threshold, use the **no** form ofthis command.

l2protocol-tunnel shutdown-threshold [**cdp** | **stp** | **vtp**] *packets*
no l2protocol-tunnel shutdown-threshold [**cdp** | **stp** | **vtp**] *packets*

Syntax Description

cdp	(Optional) Specifies CDP tunneling.
stp	(Optional) Specifies STP tunneling.
vtp	(Optional) Specifies VTP tunneling.
packets	Shutdown threshold; valid values are from 1 to 4096.

Command Default

This command has no default settings.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

When the number of *packets* is exceeded, the port is put in error-disabled state.

On all the service-provider edge switches, you must enable PortFast BPDU filtering on the 802.1Q tunnel ports by entering these commands:

```
Router(config-if)# spanning-tree bpdufilter enable
Router(config-if)# spanning-tree portfast
```

Note PortFast BPDU filtering is enabled automatically on tunnel ports.

If you do not specify a protocol, the *packets* value applies to all protocols.

You can configure protocol tunneling on switch ports only. You must enter the **switchport** command once without any keywords to configure the LAN port as a Layer 2 interface before you can enter additional **switchport** commands with keywords. This action is required only if you have not entered the **switchport** command for the interface.

Refer to the “Configuring IEEE 802.1Q Tunneling and Layer 2 Protocol Tunneling” chapter of the Cisco 7600 Series Router Cisco IOS Software Configuration Guide for additional information on setting the drop threshold value.

Examples

This example shows how to specify the maximum number of CDP packets that can be processed on that interface in 1 second:

```
Router(config-if)# switchport
Router(config-if)# l2protocol-tunnel shutdown-threshold cdp 200
Router(config-if)#
```

Related Commands

Command	Description
l2protocol-tunnel	Enables the protocol tunneling on an interface and specifies the type of protocol to be tunneled.
show l2protocol-tunnel	Displays the protocols that are tunneled on an interface or on all interfaces.
switchport	Modifies the switching characteristics of the Layer 2-switched interface.

l3vpn encapsulation ip

To configure an L3VPN encapsulation profile, use the **l3vpnencapsulationip** command in global configuration mode. To remove the encapsulation profile, use the **no** form of this command.

l3vpn encapsulation ip *profile name*
no l3vpn encapsulation ip *profile name*

Syntax Description

profile name	Name of the Layer 3 encapsulation profile.

Command Default

The L3VPN encapsulation profile is not configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SRE	This command was introduced.

Usage Guidelines

When you use the **l3vpnencapsulationip** command you enter into L3VPN encapsulation configuration mode. You can then specify the transport source mode and interface using the**transportipv4** command, set the GRE key using the **protocolgre** command, and configure the L3VPN encapsulation profile.

Examples

The following example shows how to configure an L3VPN encapsulation profile:

```
Router(config)# l3vpn encapsulation ip tunnelencap
```

Related Commands

Command	Description
show l3vpn encapsulation ip	Displays the profile health and the underlying tunnel interface.
transport ipv4	Specifies IPv4 transport source mode and the transport source interface.
protocol gre	Specifies GRE as the tunnel mode and sets the GRE key.

lacp active-port distribution automatic

To have an effective auto interleaved port priority distribution of active and bundled ports across different slots that are part of the same port channel distributed EtherChannel (DEC) and multichassis EtherChannel (MEC), use the **lacp active-port distribution automatic**command in port channel configuration mode.

lacp active-port distribution automatic
no lacp active-port distribution automatic

Syntax Description

This command has no keywords or arguments.

Command Default

Auto interleaved port priority is disabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(33)SXI4	This command was introduced.

Usage Guidelines

The auto interleaved port-priority feature automatically distributes active and bundled ports based on the position of a port link when it comes up and is effective only if you configure it on the system that has the higher LACP system priority.

The port priority per port that you configured continues to take precedence over a dynamic port number. You need to perform a shutdown and no shutdown on the interface port channel to enable the auto interleaved port priority feature on all ports.

Examples

This example shows how to configure interleaved port priority:

```
Router(config)# interface port23
Router(config-if)# lacp active-port distribution automatic
Please shut/no shut the port-channel for configuration to take effect immediately.
Router(config-if)# shutdown
Router(config-if)# no shutdown
Router(config-if)# end
```

This example shows how to verify that interleaved port priority is configured:

```
Router# show running interface port23
Building configuration...
Current configuration : 81 bytes
!
interface Port-channel23
no switchport
no ip address
lacp max-bundle 4
lacp active-port distribution automatic
end
Router# show etherchannel 23 summary
Flags: D - down P - bundled in port-channel
I - stand-alone s - suspended
H - Hot-standby (LACP only)
R - Layer3 S - Layer2
```

```
U - in use N - not in use, no aggregation
f - failed to allocate aggregator
M - not in use, no aggregation due to minimum links not met
m - not in use, port not aggregated due to minimum links not met
u - unsuitable for bundling
d - default port
w - waiting to be aggregated
Number of channel-groups in use: 9
Number of aggregators: 9
Group     Port-channel Protocol      Ports
------+-------------+-----------+-----------------------------------------------
23      Po23(RU)       LACP       Gi1/1/21(P) Gi1/1/22(P) Gi1/1/23(P)
                                  Gi1/1/24(P) Gi2/1/17(H) Gi2/1/18(H)
                                  Gi2/1/19(H) Gi2/1/20(H)
Last applied Hash Distribution Algorithm: Fixed
```

Note The four active and bundled ports are from the same chassis and slot.

Related Commands

Command	Description
show etherchannel	Displays EtherChannel information for a port channel.

lacp fast-switchover

To enable Link Aggregation Control Protocol (LACP) 1:1 link redundancy, use the **lacp fast-switchover** command in interface configuration mode. To dis able LACP 1:1 link redundancy, use the **no** form of this command.

lacp fast-switchover
no lacp fast-switchover

Syntax Description

This command has no arguments or keywords.

Command Default

LACP 1:1 link redundancy is disabled by default.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(33)SXH	This command was introduced.
12.2(33)SRC	This command was integrated into Cisco IOS Release 12.2(33)SRC.
12.2(33)SB	Support for this command was implemented on the Cisco 10000 series router and integrated into Cisco IOS Release 12.2(33)SB. The time allowed for a link switchover was modified from the default of 2 seconds to 250 milliseconds.
Cisco IOS XE Release 2.5	This command was integrated into Cisco IOS XE Release 2.5

Usage Guidelines

Prior to entering the **lacp fast-switchover** command, you must ensure the following:

- The port channel protocol type is LACP.
- The **lacp max-bundle 1**command has been entered on the port channel. The **lacp fast-switchover** command will not affect the **lacp max-bundle** command.

When you enable LACP 1:1 link redundancy, based on the system priority and port priority, the port with the higher system priority chooses the link as the active link and the other link as the standby link. When the active link fails, the standby link is selected as the new active link without taking down the port channel. When the original active link recovers, it reverts to its active link status. During this change-over, the port channel is also up.

Note We recommend that you configure two ports only (one active and one hot-standby) in the bundle for optimum performance.

You can enter this command on any port channels with different EtherChannel protocol types of LACP, Port Aggregation Protocol (PAgP), or Fast EtherChannel (FEC).

Examples

This example shows how to enable LACP 1:1 link redundancy:

```
Router(config-if)# lacp fast-switchover
```

This example shows how to disable LACP 1:1 link redundancy:

```
Router(config-if)# no lacp fast-switchover
```

Related Commands

Command	Description
lacp max-bundle	Assigns and configures an EtherChannel interface to an EtherChannel group.
show etherchannel	Displays the EtherChannel information for a channel.

lacp max-bundle

To define the maximum number of active bundled Link Aggregation Control Protocol (LACP) ports allowed in a port channel, use the **lacp max-bundle** command in interface configuration mode. To return to the default settings, use the **no** form of this command.

lacp max-bundle *max-bundles*
no lacp max-bundle

Syntax Description

max-bundles	Maximum number of active bundled ports allowed in the port channel. Valid values are from 1 to 8. On the Cisco ASR 1000 series router, valid values are 1 to 4. The default settings are as follows: • Maximum of 8 bundled ports per port channel. • Maximum of 8 bundled ports and 8 hot-standby ports per port channel if the port channels on both sides of the LACP bundle are configured in the same way. • On the Cisco 10000 series router, maximum of 8 bundled ports per port channel.

Command Default

A maximum number of active bundled ports is not configured.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(18)SXD	Support for this command was introduced on the Supervisor Engine 720.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	Support for this command was implemented on the Cisco 10000 series router and integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.
12.2(33)SB	On the Cisco 10000 series router, the maximum number of bundled ports per port channel was increased from 4 to 8.
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.
12.2(33)SRE	This command was integrated into Cisco IOS Release 12.2(33)SRE.

Usage Guidelines

The value specified in the *max-bundles* argument determines the number of active links that are bundled in the port channel. The remaining links are in hot-standby mode.

On the Cisco 10000 series router, this command requires a Performance Routing Engine 2 (PRE2) or PRE3.

Examples

This example shows how to set 3 ports to bundle in port channel 2:

```
Router(config)# interface port-channel 2
Router(config-if)# lacp max-bundle 3
Router(config-if)#
```

Related Commands

Command	Description
interface port-channel	Creates a port-channel virtual interface and puts the CLI in interface configuration mode.
ip address	Sets a primary or secondary IP address on an interface.
show etherchannel	Displays the EtherChannel information for a channel.
show interfaces port-channel	Displays traffic that is seen by a specific port channel.

lacp port-priority

To set the priority for a physical interface, use the **lacp port-priority** command in interface configuration mode. To return to the default setting, use the **no** form of this command.

lacp port-priority *priority*

no lacp port-priority

Syntax Description

priority	Integer from 1 to 65535 that indicates the priority for the physical interface. The default is 32768. • On the Cisco ASR 1000 series router, the range is 0 to 65535.

Command Default

The default port priority is set.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.1(13)EW	This command was introduced on the Cisco Catalyst 4500 series switches.
12.2(14)SX	Support for this command on the Supervisor Engine 720 was integrated into Cisco IOS Release12.2(14)SX.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was integrated into Cisco IOS Release12.2(17d) SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.
15.1(2)SNG	This command was implemented on the Cisco ASR 901 Series Aggregation Services Router.

Usage Guidelines

You may assign a port priority to each port on a device running Link Aggregation Control Protocol (LACP). You can specify the port priority by using the **lacp port-priority** command at the command-line interface (CLI) or use the default port priority (32768) that is carried as part of the LACP protocol data unit (PDU) exchanged with the partner. Port priority is used to decide which ports should be put in standby mode when a hardware limitation or the **lacp max-bundle** command configuration prevents all compatible ports from aggregating. Priority is supported only on port channels with LACP-enabled physical interfaces.

Note A high priority number means a low priority.

Port priority together with port number form a port identifier.

To verify the configured port priority, issue the **show lacp** command.

Examples

This example shows how to set a priority of 23700 for an interface:

```
Device> enable
Device#  configure terminal
Device(config)#  interface ethernet0/0
Device(config-if)# lacp port-priority 23700
Device(config-if)#
```

Related Commands

Command	Description
channel-group	Assigns and configures an EtherChannel interface to an EtherChannel group.
debug lacp	Enables debugging of LACP activities.
lacp max-bundle	Defines the maximum number of active bundled LACP ports allowed in a port channel.
lacp system-priority	Sets the priority of the system.
show lacp	Displays information about LACP activity on the device.

lacp rate

To set the rate at which Link Aggregation Control Protocol (LACP) control packets are ingressed to an LACP-supported interface, use the **lacp rate** command in interface configuration mode. To return to the default settings, use the **no** form of this command.

lacp rate {**normal** | **fast**}
no lacp rate

Syntax Description

normal	Specifies that LACP control packets are ingressed at the normal rate, every 30 seconds after the link is bundled.
fast	Specifies that LACP control packets are ingressed at the fast rate, once every 1 second.

Command Default

The default ingressed rate for control packets is 30 seconds after the link is bundled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(18)SXF2	This command was introduced on the Catalyst 6500 series switch.
12.2(33)SRC	This command was integrated into Cisco IOS Release 12.2(33)SRC.
Cisco IOS XE Release 3.6S	This command was implemented on Cisco ASR 1000 Series Aggregation Services Routers in Cisco IOS XE Release 3.6S.

Usage Guidelines

Use this command to modify the duration of a LACP timeout. The LACP timeout value is set on Cisco switches to a value of 90 seconds. Using the **lacp rate** command, you can select the LACP timeout value for a switch to be either 30 seconds or 1 second.

This command is supported only on LACP-enabled interfaces.

Examples

This example shows how to specify the fast (1-second) ingress rate on interface Ethernet 0/1:

```
Router(config)# interface ethernet 0/1
Router(config-if)# lacp rate fast
```

Related Commands

Command	Description
show lacp	Displays LACP information.

lacp system-priority

To set the priority for a system, use the **lacp system-priority** command in global configuration mode. To return to the default setting, use the **no** form of this command.

lacp system-priority *priority*

no lacp system-priority

Syntax Description

priority	Integer from 1 to 65535 that indicates the priority for the system. The default is 32768. • On the Cisco ASR 1000 series router, the range is 0 to 65535.

Command Default

The default system priority is set.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.1(13)EW	This command was introduced on the Cisco Catalyst 4500 series switches.
12.2(14)SX	Support for this command on the Supervisor Engine 720 was integrated into Cisco IOS Release12.2(14)SX.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was integrated into Cisco IOS Release12.2(17d) SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.
15.1(2)SNG	This command was implemented on the Cisco ASR 901 Series Aggregation Services Router.

Usage Guidelines

You can assign a system priority to each device running Link Aggregation Control Protocol (LACP). You can specify the system priority by using the **lacp system-priority** command at the command-line interface (CLI) or use the default system priority (32768) that is carried as part of the LACP protocol data unit (PDU) exchanged with the partner. System priority is used with the MAC address of the device to form the system ID and also is used during negotiation with other systems. Priority is supported only on port channels with LACP-enabled physical interfaces.

Note A high priority number means a low priority.

To verify the configured system priority, issue the **show lacp** command.

Examples

The following example shows how to set a system priority of 25500 for a device:

```
Router> enable
Router# configure terminal
Router(config)# lacp system-priority 25500
```

Related Commands

Command	Description
channel-group	Assigns and configures an EtherChannel interface to an EtherChannel group.
debug lacp	Enables debugging of LACP activities.
lacp port-priority	Sets the priority of a port.
show lacp	Displays information about LACP activity on the device.

lbo

To set a cable length longer than 655 feet for a DS-1 link, use the**lbo**command in interface configuration mode on the interface for a T1 link. To delete the **lbo**value, use the **no** form of this command.

lbo {**long** {**gain26** | **gain36**} {**-15db** | **-22.5db** | **-7.5db** | **0db**} | **short** {**133** | **266** | **399** | **533** | **655**}}
no lbo

Syntax Description

long	Specifies the long-haul mode where the gain and line build out must be configured.
gain26	Specifies the decibel pulse gain at 26 decibels. This is the default pulse gain.
gain36	Specifies the decibel pulse gain at 36 decibels.
-15db	Specifies the decibel pulse rate at -15 decibels.
-22.5db	Specifies the decibel pulse rate at -22.5 decibels.
-7.5db	Specifies the decibel pulse rate at -7.5 decibels.
0db	Specifies the decibel pulse rate at 0 decibels. This is the default.
short	Specifies the short-haul mode where the cable length, in feet, must be configured.
133	Specifies a cable length from 0 to 133 feet.
266	Specifies a cable length from 134 to 266 feet.
399	Specifies a cable length from 267 to 399 feet.
533	Specifies a cable length from 400 to 533 feet.
655	Specifies a cable length from 534 to 655 feet.

Command Default

gain26 and**0db**

Command Modes

Interface configuration

Command History

Release	Modification
11.3MA	This command was introduced as a Cisco MC3810 controller configuration command.
12.0(5)XE	The command was introduced as an ATM interface command.
12.0(7)XE1	This command was implemented on Cisco 7100 series routers.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command is supported on T1 links only.

Each T1 port can operate in long-haul or short-haul mode. In long haul mode, the user must specify the gain and the line build out. In short-haul mode, the user must specify the cable length in feet.

The transmit attenuation value is best obtained by experimentation. If the signal received by the far-end equipment is too strong, reduce the transmit level by entering additional attenuation.

Examples

On Cisco 7100 or Cisco 7200 series routers, the following example specifies a pulse gain of 36 decibels and a decibel pulse rate of -7.5 decibels:

```
Router(config)# interface atm 1/2
Router(config-if)# lbo long gain36 -7.5db
```

lex burned-in-address

To set the burned-in MAC address for a LAN Extender interface, use the **lexburned-in-address** command in interface configuration mode. To clear the burned-in MAC address, use the **no** form of this command.

lex burned-in-address *ieee-address*
no lex burned-in-addresslex burned-in-address command

Syntax Description

ieee-address	48-bit IEEE MAC address written as a dotted triplet of 4-digit hexadecimal numbers.

Command Default

No burned-in MAC address is set.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(15)T	This command is no longer supported in Cisco_IOS Mainline or Technology-based (T) releases. It may continue to appear in Cisco_IOS 12.2S-family releases.

Usage Guidelines

Use this command only on a LAN Extender interface that is not currently active (not bound to a serial interface).

Examples

The following example sets the burned-in MAC address on LAN Extender interface 0:

```
Router(config)# interface serial 4
Router(config-if)# encapsulation ppp
Router(config)# interface lex 0
Router(config-if)# lex burned-in-address 0000.0c00.0001
Router(config-if)  ip address 10.108.172.21 255.255.255.0
```

lex input-address-list

To assign an access list that filters on MAC addresses, use the **lexinput-address-list** command in interface configuration mode. To remove an access list from the interface, use the **no** form of this command.

lex input-address-list *access-list-number*
no lex input-address-listlex input-address-list command

Syntax Description

access-list-number	Number of the access list assigned with the **access-list** global configuration command. It can be a number from 700 to 799.

Command Default

No access lists are preassigned to a LAN Extender interface.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(15)T	This command is no longer supported in Cisco_IOS Mainline or Technology-based (T) releases. It may continue to appear in Cisco_IOS 12.2S-family releases.

Usage Guidelines

Use the **lexinput-address-list** command to filter the packets that are allowed to pass from the LAN Extender to the core router. The access list filters packets on the basis of the source MAC address.

The LAN Extender interface does not process MAC-address masks. Therefore, you should omit the mask from the **access-list** commands.

For LAN Extender interfaces, an implicit permit everything entry is automatically defined at the end of an access list. Note that this default differs from other access lists, which have an implicit deny everything entry at the end of each access list.

Examples

The following example applies access list 710 to LAN Extender interface 0. This access list denies all packets from MAC address 0800.0214.2776 and permits all other packets.

```
Router(config-if)# access-list 710 deny 0800.0214.2776
Router(config)# interface lex 0
Router(config-if)# lex input-address-list 710
```

Related Commands

Command	Description
access-list	Configures the access list mechanism for filtering frames by protocol type or vendor code.

lex input-type-list

To assign an access list that filters Ethernet packets by type code, use the **lexinput-type-list** command in interface configuration mode. To remove an access list from an interface, use the **no** form of this command.

lex input-type-list *access-list-number*
no lex input-type-list lex input-type-list command

Syntax Description

access-list-number	Number of the access list that you assigned with the **access-list** command. It can be a number in the range 200 to 299.

Command Default

No access lists are preassigned to a LAN Extender interface.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(15)T	This command is no longer supported in Cisco_IOS Mainline or Technology-based (T) releases. It may continue to appear in Cisco_IOS 12.2S-family releases.

Usage Guidelines

Filtering is done on the LAN Extender chassis.

The LAN Extender interface does not process masks. Therefore, you should omit the mask from the **access-list** commands.

For LAN Extender interfaces, an implicit permit everything entry is automatically defined at the end of an access list. Note that this default differs from other access lists, which have an implicit deny everything entry at the end of each access list.

Examples

The following example applies access list 220 to LAN Extender interface 0. This access list denies all AppleTalk packets (packets with a type field of 0x809B) and permits all other packets.

```
Router(config-if)# access-list 220 deny 0x809B 0x0000
Router(config)# interface lex 0
Router(config-if)# lex input-type-list 220
```

Related Commands

Command	Description
access-list	Configures the access list mechanism for filtering frames by protocol type or vendor code.

lex priority-group

To activate priority output queueing on the LAN Extender, use the **lexpriority-group** command in interface configuration mode. To disable priority output queueing, use the **no** form of this command.

lex priority-group *group*
no lex priority-group

Syntax Description

group	Number of the priority group. It can be a number in the range 1 to 10.

Command Default

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(15)T	This command is no longer supported in Cisco_IOS Mainline or Technology-based (T) releases. It may continue to appear in Cisco_IOS 12.2S-family releases.

Usage Guidelines

To define queueing priorities, use the **priority-listprotocol** global configuration command. Note that you can use only the following forms of this command:

```
priority-list

list
 protocol

protocol

{
high
 |
medium
 |
normal
 |
low
priority-list

list
 protocol
 bridge

{
high
 |
medium
 |
normal
 |
low
}
```

list

list-number

If you specify a protocol that does not have an assigned Ethernet type code, such as **x25**, **stun**, or **pad**, it is ignored and will not participate in priority output queueing.

Examples

The following example activates priority output queueing on LAN Extender interface 0:

```
Router(config-if)# priority-list 5 protocol bridge medium list 701
Router(config-if)# lex interface 0
Router(config-if)# lex priority-group 5
```

Related Commands

Command	Description
priority-list protocol	Establishes queueing priorities based on the protocol type.

lex retry-count

To define the number of times to resend commands to the LAN Extender chassis, use the **lexretry-count** command in interface configuration mode. To return to the default value, use the **no** form of this command.

lex retry-count *number*
no lex retry-count *number* **lex retry-count command**

Syntax Description

number	Number of times to retry sending commands to the LAN Extender. It can be a number in the range 0 to 100. The default is 10.

Command Default

10 retries

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(15)T	This command is no longer supported in Cisco_IOS Mainline or Technology-based (T) releases. It may continue to appear in Cisco_IOS 12.2S-family releases.

Usage Guidelines

After the router has sent a command the specified number of times without receiving an acknowledgment from the LAN Extender, it stops sending the command altogether.

Examples

The following example resends commands 20 times to the LAN Extender:

```
Router(config-if)# lex interface 0
Router(config-if)# lex retry-count 20
```

Related Commands

Command	Description
lex timeout	Defines the amount of time to wait for a response from the LAN Extender.

lex timeout

To define the amount of time to wait for a response from the LAN Extender, use the **lextimeout** command in interface configuration mode. To return to the default time, use the **no** form of this command.

lex timeout *milliseconds*
no lex timeout [*milliseconds*] **lex timeout command**

Syntax Description

milliseconds	Time, in milliseconds, to wait for a response from the LAN Extender before resending the command. It can be a number in the range 500 to 60,000. The default is 2000 ms.

Command Default

2000 ms (2 seconds)

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(15)T	This command is no longer supported in Cisco_IOS Mainline or Technology-based (T) releases. It may continue to appear in Cisco_IOS 12.2S-family releases.

Usage Guidelines

The **lextimeout** command defines the amount of time that the router waits to receive an acknowledgment after having sent a command to the LAN Extender.

Examples

The following example causes unacknowledged packets to be resent at 4-second intervals:

```
Router(config-if)# lex interface 0
Router(config-if)# lex timeout 4000
```

Related Commands

Command	Description
lex retry-count	Defines the number of times to resend commands to the LAN Extender chassis.

license feature gnss

To configure the license for the global navigation satellite system (GNSS) module on the Cisco ASR 920 routers, use the **license feature gnss** command in the global configuration mode. To remove the license, use the **no** form of this command.

license feature gnss
no license feature gnss

Command Default

No default behavior or values.

Command Modes

Global configuration (config)

Command History

Release	Modification
IOS-XE 3.17	This command was introduced on the Cisco ASR 920 routers.

Usage Guidelines

Only when the GNSS license is in use, the **shutdown** and **no shutdown** operations for the GNSS module can be performed.

Examples

The following example shows how to configure the GNSS license:

```
Router# configure terminal
Router(config)# license feature gnss
```

Related Commands

Command	Description
gnss	Configures the GNSS on the router.

linecard-group y-cable

To create a line card group for one-to-one line card redundancy, use the linecard-group y-cable command in redundancy mode. To remove the line card redundancy group, use the no form of this command.

linecard-group *linecard-groupId* **y-cable**
no linecard-group *linecard-groupId* **y-cable**

Syntax Description

linecard-groupId	An unsigned integer in the range 0 to the (maximum number of chassis line card subslots/2) -1.
y-cable	The link protection type for the line card group.

Command Default

No default behavior or values .

Command Modes

Redundancy

Command History

Release	Modification
12.2(28)SB	This command was introduced on the Cisco 10000 series router.

Usage Guidelines

The no linecard-group y-cable command removes the line card redundancy group and frees the *linecard-groupId*for reuse. The no linecard-group y-cable command succeeds only if there are no subslot members in the line card redundancy group.

Examples

The following example creates line card group number 1 for one-to-one line card redundancy:

```
Router(config)# redundancy
Router(config-red)# linecard-group 1 y-cable
```

Related Commands

Command	Description
member subslot	Configures the redundancy role of a line card in the line card group.
redundancy	Enters redundancy mode.
show redundancy linecard	Displays information about a redundant line card or line card group.

linecode

To select the line-code type for T1 or E1 lines, use the **linecode** command in controller configuration mode.

linecode {**ami** | **b8zs** | **hdb3**}

Syntax Description

ami	Specifies alternate mark inversion (AMI) as the line-code type. Valid for T1 or E1 controllers. This is the default for T1 lines.
b8zs	Specifies B8ZS as the line-code type. Valid for T1 controller only.
hdb3	Specifies high-density bipolar 3 (hdb3) as the line-code type. Valid for E1 controller only. This is the default for E1 lines.

Command Default

AMI is the default for T1 lines. High-density bipolar 3 is the default for E1 lines.

Command Modes

Controller configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
XE 3.18SP	This command was integrated into Cisco NCS 4200 Series.
XE Everest 16.5.1	This command was integrated into Cisco NCS 4200 Series and Cisco ASR 900 Series Routers.

Usage Guidelines

Use this command in configurations in which the router or access server must communicate with T1 fractional data lines. The T1 service provider determines which line-code type, either **ami** or **b8zs**, is required for your T1 circuit. Likewise, the E1 service provider determines which line-code type, either **ami** or **hdb3**, is required for your E1 circuit.

This command does not have a **no** form.

Examples

The following example specifies B8ZS as the line-code type:

```
Router(config-controller)# linecode b8zs
```

line-mode

To configure the mode of the controller for the Symmetrical High-Speed Digital Subscriber Line (SHDSL) port, use the **line-mode** command in controller configuration mode. To return to the default two-wire mode, use the **no** form of this command.

line-mode [**2-wire** | **4-wire** [**enhanced** | **standard**] | **auto**]
no line-mode

Syntax Description

2-wire	(Optional) Configures the controller to operate in two-wire mode.
4-wire	(Optional) Configures the controller to operate in four-wire mode.
enhanced	(Optional) Configures 4-wire mode to exchange handshake status on both wire pairs. This is the default if the handshake mode is not specified.
standard	(Optional) Configures 4-wire mode to exchange handshake status on the master wire pair only.
auto	(Optional) Configures the controller to automatically operate in the mode to match the other line termination. This mode is compatible with a remote host that is in one of the following modes: • line-mode 2-wire line 0 • line-mode 2-wire line 1 • line-mode 4-wire enhanced

Command Default

The default is two-wire mode if this command is omitted or if the **4-wire** keyword is omitted.

Command Modes

Controller configuration

Command History

Release	Modification
12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series and Cisco 3700 series routers.
12.3(11)T	This command was implemented on Cisco 2800 and Cisco 3800 series routers.
12.3(14)T	This command was implemented on Cisco 1800 series routers.
12.4(2)XA	The **enhanced** and **standard** keywords were added to four-wire mode.
12.4(5)A	Modified **auto** keyword to to disallow use of **line-rate** command
12.4(4)T	Modified **auto** keyword to to disallow use of **line-rate** command

Usage Guidelines

This command is used to configure the controller for two-wire or four-wire mode.

Note To operate in four-wire mode for SHDSL, the **line-mode4-wire**command must be set.

Note When the **line-mode** command is set to **auto**, the **line-rate** command is not available.

Examples

4-Wire Line Mode Example

The following example shows how to configure the controller mode of DSL on the controller in slot 4 and port 0 to operate in four-wire mode:

```
Router(config)# controller dsl 4/0
Router(config-controller)# line-mode
 4-wire
```

CPE Line Mode Example

The following example configures the controller in slot 1 and port 0. The router is set to terminate as CPE with the line mode automatically selecting between two-wire mode and four-wire mode.

```
Router(config)# controller dsl 1/0
Router(config-controller)# line-mode auto
Router(config-controller)# line-term cpe
```

Related Commands

Command	Description
line-rate	Specifies a line rate for the DSL controller.
line-term	Specifies a termination for a line.

line-mode bonding

To enable bonding mode on a CPE, use the **line-mode bonding** command in controller configuration mode. To disable the bonding mode, use the **no** form of this command.

line-mode bonding
no line-mode bonding

Syntax Description

This command has no keywords or arguments.

Command Default

Bonding is not the default mode.

Command Modes

Controller configuration (config-controller)#

Command History

Release	Modification
15.4(4)T	This command was introduced.

Usage Guidelines

Use this command when a CPE is expected to operate in bonding mode.

Examples

The following example shows how to enable bonding mode:

```
Router(config-controller)# line-mode bonding
```

The following example shows how to disable bonding mode:

```
Router(config-controller)# no line-mode bonding
```

Related Commands

Command	Description
line-mode single-wire line	Enables single-wire (nonbonding) mode on a selected line.

line-mode single-wire line

To enable single-wire (nonbonding) mode on a selected line, use the **line-mode single-wire line** command in controller configuration mode. To disable the mode, use the **no** form of this command.

line-mode single-wire line *line-number*
or
line-mode single-wire line *line-number* **[profile 30a]**
no line-mode single-wire line *line-number*

Syntax Description

line-number	Line number. Valid values are either 1 or 0.
profile 30a	Enables 30a profile on line 1. If profile 30a is not specified, profiles 8a to 17a are enabled on that line.

Command Default

By default, single-wire mode is enabled on line 0 with profiles from 8a to17a enabled.

Command Modes

Controller configuration (config-controller)#

Command History

Release	Modification
15.4(4)T	This command was introduced.

Usage Guidelines

Use this command to configure either line 0 or line 1 in single-wire (non-bonding) mode.

Examples

The following example shows how to enable 30a profile on line 1:

```
Router(config-controller)# line-mode single-wire line 1 profile 30a
```

Related Commands

Command	Description
line-mode bonding	Changes the mode of a CPE to bonding.

line-rate

To specify a line rate for the DSL controller, use the **line-rate** command in controller configuration mode.

line-rate {**auto***rate*}

Syntax Description

auto	Allows the controller to select the rate. This option is available only in two-wire mode.
rate	DSL line rate, in kbps. The line will train at the selected rate plus 8 kbps of DSL framing overhead. The supported line rates are as follows: • For two-wire mode: • 192, 256, 320, 384, 448, 512, 576, 640, 704, 768, 832, 896, 960, 1024, 1088, 1152, 1216, 1280, 1344, 1408, 1472, 1536, 1600, 1664, 1728, 1792, 1856, 1920, 1984, 2048, 2112, 2176, 2240, and 2304 • For four-wire mode: • 384, 512, 640, 768, 896, 1024, 1152, 1280, 1408, 1536, 1664, 1792, 1920, 2048, 2176, 2304, 2432, 2560, 2688, 2816, 2944, 3072, 3200, 3328, 3456, 3584, 3712, 3840, 3968, 4096, 4224, 4352, 4480, and 4608

Command Default

No default behavior or values.

Command Modes

Controller configuration

Command History

Release	Modification
12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
12.3(4)XG	This command was implemented on Cisco 1700 series routers.
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series and Cisco 3700 series routers.
12.(11)T	This command was implemented on Cisco 2800 and Cisco 3800 series routers.
12.3(14)T	This command was implemented on Cisco 1800 series routers.
12.4(5)A	Modified **line-rate** command to be disallowed when **line-mode**command is set to **auto**.
12.4(4)T	Modified **line-rate** command to be disallowed when **line-mode**command is set to **auto**.

Usage Guidelines

This command does not have a **no** form.

This command specifies the DSL line rate for the Symmetrical High-Speed Digital Subscriber Line (SHDSL) port. Use this command to configure the line rate in two-wire or four-wire mode. The SHDSL rate is in kbps, but the line trains at the selected rate plus two times the 8 kbps of DSL framing overhead.

Note Automatic rate mode (auto) is used only in two-wire mode. It is not available in four-wire mode.

Note If different DSL line rates are configured at opposite ends of the DSL uplink, the actual DSL line rate is always the lower rate.

Note The maximum peak cell rate is 8 kbps less than the line rate.

Note When the **line-mode** command is set to **auto**, the **line-rate** command is not available.

Examples

The following example displays the **line-mode** command selecting four-wire mode, which is different from the previous line mode of the router as indicated by the router output, and then the line rate is selected. The rate of 4608 is selected, and the output of the router is shown.

```
Router(config)# controller dsl 1/0
Router(config-controller)# line-mode
 4-wire
Router(config-controller)#
*Jun 15 18:00:48.159: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tn
*Jun 15 18:00:50.159: %LINK-3-UPDOWN: Interface ATM1/0, changed state to down
*Jun 15 18:00:51.159: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM1/0, cn
Router(config-controller)# line-rate
 4608
Router(config-controller)#
*Jun 15 18:01:36.627: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tn
*Jun 15 18:01:36.967: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tn
Router(config-controller)# exit
```

Related Commands

Command	Description
line-mode	Configures the mode of the controller.
line-term	Specifies a termination for a line.

line-term

To specify a termination for a line, use the **line-term** command in controller configuration mode.

line-term {**co** | **cpe**}

Syntax Description

co	Central office.
cpe	Customer premises equipment. This is the default.

Command Default

The default value is **cpe**.

Command Modes

Controller configuration

Command History

Release	Modification
12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series and Cisco 3700 series routers.
12.3(11)T	This command was implemented on Cisco 2800 and Cisco 3800 series routers.
12.3(14)T	This command was implemented on Cisco 1800 series routers.

Usage Guidelines

This command does not have a no form.

This command is used to configure the line termination for use as either the central office (CO) or the customer premises equipment (CPE).

Examples

The following example shows how to configure the controller in slot 1 and port 0. The router is set to terminate as CPE with the line mode automatically selecting between two-wire mode and four-wire mode.

```
Router(config)# controller dsl 1/0
Router(config-controller)# line-term
 cpe
Router(config-controller)# line-mode
auto

No change in line mode
```

Related Commands

Command	Description
line-mode	Configures the mode of the controller.
line-rate	Specifies a line rate for the DSL controller.

line-termination

To set the line termination on an E1 controller, use the **line-termination**command in controller configuration mode. To return to the default line termination, use the **no** form of this command.

line-termination {**75-ohm** | **120-ohm**}
no line-termination

Syntax Description

75-ohm	Specifies 75-ohm unbalanced termination.
120-ohm	Specifies 120-ohm balanced termination. This is the default.

Command Default

120-ohms

Command Modes

Controller configuration

Command History

Release	Modification
11.3(2)AA	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command applies only to E1 controllers. To determine the line termination setting for the controller, use the **showcontrollerse1**command.

Examples

In the following example, the line termination is set to 75 ohms for the E1 port located in shelf 6, slot 0, port 0:

```
Router# configure terminal
Router(config)# controller e1 6/0/0
Router(config-controller)# line-termination 75-ohm
Router(config-controller)# end
```

Related Commands

Command	Description
show controllers e1	Displays information about the E1 links supported by the NPM (Cisco 4000) or MIP (Cisco 7500 series).

link debounce

To enable the debounce timer on an interface, use the **linkdebounce** command in interface configuration mode. To disable the timer, use the **no** form of this command.

link debounce [**time** *time*]
no link debounce

Syntax Description

time *time*	(Optional) Specifies the extended debounce timer; va lid values are from 100 to 5000 milliseconds.

Command Default

The table below lists the debounce timer defaults.

Table 1: Port Debounce Timer Delay Time

Port Type	Debounce Timer Disabled	Debounce Timer Enabled
10BASE-FL ports	300 milliseconds	3100 milliseconds
10/100BASE-TX ports	300 milliseconds	3100 milliseconds
100BASE-FX ports	300 milliseconds	3100 milliseconds
10/100/1000BASE-TX ports	300 milliseconds	3100 milliseconds
1000BASE-TX ports	300 milliseconds	3100 milliseconds
Fiber Gigabit ports	10 milliseconds	100 milliseconds
10-Gigabit ports except WS-X6501-10GEX4 and WS-X6502-10GE	10 milliseconds	100 milliseconds
WS-X6501-10GEX4 and WS-X6502-10GE 10-Gigabit ports	1000 milliseconds	3100 milliseconds

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17a)SX	This command was changed to remove support for the following modules: • WS-X6501-10GEX4 • WS-X6502-10GE
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

The **time***time* keyword and argument are supported on Gigabit Ethernet and 10-Gigabit Ethernet interfaces only.

The **linkdebounce** command is not supported on the following modules in releases prior to Release 2.2(17a)SX:

- WS-X6501-10GEX4
- WS-X6502-10GE

The debounce timer sets the amount of time that the firmware waits before it notifies the software that the link is down. The debounce timer does not apply to linkup because the linkup is immediately notified by the firmware.

The default debounce time applies when you enter the **linkdebounce** command with no arguments. For example, when you enter the **linkdebouncetime100** command, it is equivalent to entering the **linkdebounce** command with no arguments and you will see the following link debounce entry in the configuration:

```
interface GigabitEthernet1/1
 no ip address
 link debounce
```

Enter the **showinterfacesdebounce** command to display the debounce configuration of an interface.

Examples

This example shows how to configure the debounce timer on a Gigabit Ethernet fiber interface:

```
Router(config-if)# link debounce time 100
Router(config-if)#
```

Related Commands

Command	Description
show interfaces debounce	Displays the status and configuration for the debounce timer.

link state group

To configure the link state group, use the **linkstategroup** command in interface configuration mode.

link state group [*number*] {**upstream** | **downstream**}

Syntax Description

number	Specifies a link-state group. The acceptable range of group number is between 1 to 10 and the default value is 1.
upstream	Configures the interface as an upstream interface in the group.
downstream	Configures the interface as a downstream interface in the group.

Command Default

The default **linkstategroup**number is 1.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
15.1(1)S	This command was introduced.

Usage Guidelines

Link State Ttracking (LST), also known as trunk failover, is a feature that binds the link state of multiple interfaces. When you configure LST for the first time, add upstream interfaces to the link state group before adding the downstream interface, otherwise the downstream interfaces would move into error-disable mode. The maximum number of link state groups configurable is 10. These are the limitations:

- An interface can only be an upstream or downstream interface.
- An interface cannot be part of more than one link state tracking group.

Examples

The following example shows how to configure the link state group number.

```
Router# configure terminal
Router(config)# link state track 1
Router(config)# interface gigabitethernet3/1
Router(config-if)# link state group 1 upstream
Router(config-if)# interface gigabitethernet3/3
Router(config-if)# link state group 1 upstream
Router(config-if)# interface gigabitethernet3/5
Router(config-if)# link state group 1 downstream
Router(config-if)# interface gigabitethernet3/7
Router(config-if)# link state group 1 downstream
```

Related Commands

Command	Description
link state track	Configures the link-state track number.
show link state group	Displays the link-state group information.

link state track

To configure a link state tracking number, use the **linkstatetrack** command in global configuration mode. To restore the default **linkstatetrack**number, use the no form of this command.

link state track *number*
no link state track *number*

Syntax Description

number	Specifies the link state tracking number. The acceptable range is between 1 and 10 and the default value is 1.

Command Default

The default link state track number is 1.

Command Modes

Global configuration (config)

Command History

Release	Modification
15.1(1)S	This command was introduced.

Usage Guidelines

Link State Ttracking (LST), also known as trunk failover, is a feature that binds the link state of multiple interfaces. When you configure LST for the first time, add upstream interfaces to the link state group before adding the downstream interface, otherwise the downstream interfaces would move into error-disable mode.

Examples

The following example shows how to configure the link state tracking number.

```
Router# configure terminal
Router(config)# link state track 1
```

Related Commands

Command	Description
link state group	Configures the link state group and the interface as either an upstream or downstream interface in the group.
show link state group	Displays the link state group information.

li-slot rp rate

To apply the user specified Packets Per Second (PPS) value when an Lawful Intercept (LI) is provisioned in RP mode, use the **li-slot rp rate** command in global configuration mode. To disable the user specified value, use the no form of this command .

li-slot rp rate *pps*

Syntax Description

pps	Packets per second (pps). The range is from 10 to 8500 for SUP720, 10 to 6000 for SUP32, and 10 to 12000 for RSP720.

Command Default

No default behavior or values.

Command Modes

Global configuration (config)

Command History

Release	Modification
15.0(1)S5	This command was introduced on the Cisco 7600 series routers.

Examples

This example shows how to apply PPS value when an LI is provisioned in RP mode:

```
router# configure terminal
router(config)# li-slot rp rate 5000
```

Related Commands

Command	Description
show mls rate-limit	Displays information about the configured rate limiters.

link-test

To reenable the link-test function on a port on an Ethernet hub of a Cisco 2505 or Cisco 2507 router, use the **link-test** command in hub configuration mode. To disable this function, use the **no** form of this command.

link-test commandlink-test
no link-test

Syntax Description

This command has no arguments or keywords.

Command Default

Enabled

Command Modes

Hub configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command applies to a port on an Ethernet hub only. Disable this feature if a 10Base-T twisted-pair device at the other end of the hub does not implement the link test function.

Examples

The following example disables the link test function on hub 0, ports 1 through 3:

```
Router(config)#
 hub ethernet 0 1 3
Router(config-hub)#
 no link-test
```

Related Commands

Command	Description
hub	Enables and configures a port on an Ethernet hub of a Cisco 2505 or Cisco 2507 router.

load-balancing

To apply a load-balancing method to a Gigabit EtherChannel (GEC) interface, use the **load-balancing** command in interface configuration mode. To reset to the default, use the **no** form of this command.

load-balancing {**flow** | **vlan**}
no load-balancing

Syntax Description

flow	Flow-based load balancing is used.
vlan	VLAN-manual load balancing is used.

Command Default

The port channel uses the global load-balancing configuration.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Cisco IOS XE Release 2.5	This command was introduced.

Usage Guidelines

The **load-balancing** command sets the load-balancing method on a specific port channel. The load-balancing method configured with this command takes precedence over the global configuration defined with the **port-channelload-balancingvlan-manual** command.

If you do not explicitly configure load balancing either globally or on the port channel, the load-balancing method on the port channel is set to flow-based.

Load balancing uses the concept of buckets to map traffic flows to the member links of the port channel. The different traffic flows are mapped to the buckets and each bucket has one active member link associated with it. All flows that are mapped to a bucket use the member link associated with that bucket.

There are two methods of load balancing on a GEC interface:

- VLAN-manual--All packets forwarded over the same VLAN subinterface are considered part of the same flow and are mapped to the member link specified in the configuration.
- Flow-based--Traffic flows are mapped to different member links based on the packet header.

Examples

This example shows how to set the load-balancing method to VLAN-manual:

```
Router(config)# interface port-channel 1
Router(config-if)# load-balancing vlan
```

Related Commands

Command	Description
interface port-channel	Creates a port-channel virtual interface.
port-channel load-balancing vlan-manual	Applies the VLAN-manual load-balancing method globally to all GEC interfaces.

Command	Description
show interfaces port-channel etherchannel	Displays the load-balancing bucket distribution currently in use for a GEC interface.
show etherchannel load-balancing	Displays the load-balancing method applied to GEC interfaces.

load-interval

To change the length of time for which data is used to compute load statistics, use the **load-interval** command in interface configuration, Frame Relay DLCI configuration, or template configuration modes. To revert to the default setting, use the **no**form of this command.

load-interval *seconds*
no load-interval *seconds*

Syntax Description

seconds	Length of time for which data is used to compute load statistics. Value is a multiple of 30, from 30 to 600 (30, 60, 90, 120, and so on). The default is 300 seconds.

Command Default

Enabled

Command Modes

Interface configuration

Frame Relay DLCI configuration

Template configuration (config-template)

Command History

Release	Modification
10.3	This command was introduced.
12.2(4)T	This command was made available in Frame Relay DLCI configuration mode.
12.2(18)SXF	Support for this command was introduced on the Supervisor Engine 720.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
15.1(2)SNG	This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers.
15.2(2)E	This command was integrated into Cisco IOS Release 15.2(2)E. This command is supported in template configuration mode.
Cisco IOS XE Release 3.6E	This command was integrated into Cisco IOS XE Release 3.6E. This command is supported in template configuration mode.

Usage Guidelines

To make computations more reactive to short bursts of traffic, you can shorten the length of time over which load averages are computed.

If the load interval is set to 30 seconds, new data is used for load calculations over a 30-second period. This data is used to compute load statistics, including the input rate in bits and packets per second, the output rate in bits and packets per second, the load, and reliability.

Load data is gathered every five seconds. This data is used for a weighted-average calculation in which recent load data has more weight in the computation than older load data. If the load interval is set to 30 seconds, the average is computed for the last 30 seconds of load data.

If you change the calculation interval from the default of five minutes to a shorter period of time, the input and output statistics that are displayed by the **show interface** command or the **show frame-relay pvc** command will be more current and will be based on more nearly instantaneous data, rather than reflecting the average load over a longer period of time.

This command is often used for dial backup purposes to increase or decrease the likelihood of implementation of a backup interface, but it can be used on any interface.

Examples

Interface Example

In the following example, the default average of five minutes is changed to a 30-second average. A burst in traffic that would not trigger a dial backup for an interface configured with the default five-minute interval might trigger a dial backup for this interface, which is set for the shorter 30-second interval.

```
Router(config)# interface serial 0
Router(config-if)# load-interval 30
```

Frame Relay PVC Example

In the following example, the load interval is set to 60 seconds for a Frame Relay PVC with the DLCI 100:

```
Router(config)# interface serial 1/1
Router(config-if)# frame-relay interface-dlci 100
Router(config-fr-dlci)# load-interval 60
```

Interface Template Example

In the following example, the load interval is set to 60 seconds in an interface template:

```
Device# configure terminal
Device(config)# template user-template1
Device(config-template)# load-interval 60
Device(config-template)# end
```

Related Commands

Command	Description
show interfaces	Displays statistics for all interfaces configured on the router or access server.

local ip address

To define an IP address to identify a local circuit emulation (CEM) channel, use the **localipaddress**command in CEM xconnect configuration mode.

local ip address *ip-address*

Syntax Description

ip-address	IP address of a regular or loopback interface in the local router. Default is 0.0.0.0

Command Default

The default local IP address is 0.0.0.0 for a CEM channel.

Command Modes

CEM xconnect configuration

Command History

Release	Modification
12.3(7)T	This command was introduced.

Usage Guidelines

This command does not have a **no** form. To remove a local IP address, either configure a new local IP address or enter the **noxconnect** command to disable the connection and all its parameters.

The local IP address used to identify the local end of a CEM connection must be the same as the IP address defined by the *remote-ip-address*argument used in the **xconnect** command to identify the CEM channel at the other end of the CEM connection.

Note If there are multiple CEM connections that originate from the same router, they may share the same local IP address provided that each local IP address defines a unique UDP port number using the**localudpport** command.

Examples

The following example demonstrates how to configure the IP address of the local endpoint of the CEM over IP (CEoIP) connection.

```
Router(config-cem-xconnect)# local ip address 10.0.5.1
```

Related Commands

Command	Description
clear cem	Clears CEM statistics.
local udp port	Defines the UDP port at the local end of a CEM connection.
show cem	Displays CEM statistics.
xconnect (CEM)	Builds one end of a CEM connection and enters CEM xconnect configuration mode.

local-priority

To set the PTP clock's local priority.

Note This command is used only for the G.8275.1 telecom profile.

local-priority *local-priority*

Syntax Description

local-priority	Local priority value of the clock. The valid values are from 1 to 255.

Command Default

The default local priority is 1.

Command Modes

PTP Clock Configuration

Command History

Release	Modification
IOS-XE 3.18	This command was introduced.

Usage Guidelines

The configured local priority is ignored on ports without the G.8275.1 or G.8275.2 profile.

Examples

The following example demonstrates how to configure the local priority of the master-only ordinary clock.

```
Router# configure terminal
Router(config)# ptp clock ordinary domain 24
Router(config-ptp-clk)# local-priority 1
```

Related Commands

Command	Description
ptp clock	Creates a Precision Time Protocol clock and specifies the clock mode .
priority1	Sets priority1.
priority2	Sets priority2.
show ptp clock dataset default	Verifies the local priority of the PTP clock.

local udp port

To define the User Datagram Protocol (UDP) port of the local endpoint of a circuit emulation (CEM) connection, use the **localudpport**command in CEM xconnect configuration mode.

local udp port *port*

Syntax Description

port	Number of the CEM local UDP port. Possible values are 0, 2141, and 15872 through 16383. The default is 0.

Command Default

The default local UDP port number is 0 for the local endpoint of a CEM connection.

Command Modes

CEM xconnect configuration

Command History

Release	Modification
12.3(7)T	This command was introduced.

Usage Guidelines

This command does not have a **no** form. To remove a local UPD port number, either configure a new UPD port number or enter the **noxconnect** command to disable the connection and all its parameters.

Examples

The following example demonstrates how to configure the UDP port of the local endpoint of the CEM over IP (CEoIP) connection.

```
Router(config-cem-xconnect)# local udp port 2141
```

Related Commands

Command	Description
remote udp port	Defines the UDP port of the remote endpoint of a CEM connection.
show cem	Displays CEM channel statistics.
xconnect (CEM)	Builds one end of a CEM connection and enters CEM xconnect configuration mode.

local-lnm

To enable Lanoptics Hub Networking Management of a PCbus Token Ring interface, use the **local-lnm** command in interface configuration mode. To disable Lanoptics Hub Networking Management, use the **no** form of this command.

local-lnm commandlocal-lnm
no local-lnm

Syntax Description

This command has no arguments or keywords.

Command Default

Management is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The Token Ring interface on the AccessPro PC card can be managed by a remote LAN manager over the PCbus interface. At present, the Lanoptics Hub Networking Management software running on an IBM compatible PC is supported.

Examples

The following example enables Lanoptics Hub Networking Management:

```
Router(config-if)# local-lnm
```

logging event

To enable notification of interface, subinterface, and Frame Relay data link connection identifier (DLCI) data link status changes, use the **loggingevent** command in interface configuration mode. To disable notification, use the **no** form of this command.

logging event {**dlci-status-change** | **link-status** | **subif-link-status** [**ignore-bulk**]}
no logging event {**dlci-status-change** | **link-status** | **subif-link-status** [**ignore-bulk**]}

Syntax Description

dlci-status-change	Enables notification of Frame Relay DLCI status changes. **Note** This option is supported only when the encapsulation on the interface is Frame Relay.
link-status	Enables notification of interface data link status changes.
subif-link-status	Enables notification of subinterface data link status changes.
ignore-bulk	Suppresses link status messages for subinterfaces when they are caused by a state change of the main interface.

Command Default

For system images, notification of interface, subinterface, and Frame Relay DLCI data link status changes is enabled by default.

For boot images, notification of Frame Relay subinterface and DLCI data link status changes is disabled by default. Notification of interface data link status changes is enabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
12.0	This command was introduced.
12.2(32)S	The **ignore-bulk** keyword was integrated into the Cisco IOS Release 12.2(32)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.3(7)T	The **ignore-bulk** keyword was integrated into Cisco IOS Release 12.3(7)T.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

The following example shows how to enable notification of subinterface link status changes:

```
Router(config-if)# logging event subif-link-status
```

The following are examples of Frame Relay DLCI and subinterface status change notification messages filtered by the **loggingevent** command:

```
00:16:22: %FR-5-DLCICHANGE: Inteface Serial3/0/0:1 - DLCI 105 state changed to INACTIVE
```

```
00:16:22: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0/0:1.5, changed state
to down
```

logging source-interface

To specify the source IPv4 or IPv6 address of system logging packets, use the **loggingsource-interface** command in global configuration mode . To remove the source designation, use the **no** form of this command.

logging source-interface *type number*
no logging source-interface

Syntax Description

type number	Interface type and number.

Command Default

The wildcard interface address is used.

Command Modes

Global configuration (config)

Command History

Release	Modification
11.2	This command was introduced.
12.4(4)T	This command was modified. IPv6 support was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command can be configured on the Virtual Routing and Forwarding (VRF) and non-VRF interfaces. Normally, a syslog message contains the IPv4 or IPv6 address of the interface used to leave the router. The **loggingsource-interface** command configures the syslog packets contain the IP or IPv6 address of a particular interface, regardless of which interface the packet uses to exit the router.

When no specific interface is configured, a wildcard interface address of 0.0.0.0 (for IPv4) or :: (for IPv6) is used, and the IP socket selects the best outbound interface.

Examples

In the following example, the user specifies that the IP address of Ethernet interface 0 is the source IP address for all syslog messages:

```
Router(config)# logging source-interface ethernet 0
```

The following example specifies that the IP address for Ethernet interface 2/1 is the source IP address for all syslog messages:

```
Router(config)# logging source-interface ethernet 2/1
```

The following sample output displays that the **loggingsource-interface** command is configured on a VRF source interface:

```
Router# show running interface loopback49
            Building configuration...
            Current configuration : 84 bytes
```

```
            !
            interface Loopback49
             ip vrf forwarding black
             ip address 49.0.0.1 255.0.0.0
            end
Router# show running | includes logging
      logging source-interface Loopback49 vrf black
      logging host 130.0.0.1 vrf black
```

Related Commands

Command	Description
logging	Logs messages to a syslog server host.

logging event link-status (global configuration)

To change the default or set the link-status event messaging during system initialization, use the **logging event link-status** command in global configuration mode. To disable the link-status event messaging, use the **no** form of this command.

logging event link-status {**default** | **boot**}
no logging event link-status {**default** | **boot**}

Syntax Description

default	Enables system logging of interface state-change events on all interfaces in the system.
boot	Enables system logging of interface state-change events on all interfaces in the system during system initialization.

Command Default

Interface state-change messages are not sent.

Command Modes

Global configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

You do not have to enter the **logging event link-status boot** command to enable link-status messaging during system initialization. The **logging event link-status default** command logs system messages even during system initialization.

If you enter both the **logging event link-status default** and the **no logging event link-status boot**commands, the interface state-change events are logged after all modules in the Cisco 7600 series router come online after system initialization. The **logging event link-status default** and the **no logging event link-status boot** commands are saved and retained in the running configuration of the system.

When both the **logging event link-status default** and the **no logging event link-status boot**commands are present in the running configuration and you want to display the interface state-change messages during system initialization, enter the **logging event link-status boot** command.

Examples

This example shows how to enable the system logging of the interface state-change events on all interfaces in the system:

```
Router(config)# logging event link-status default
Router(config)#
```

This example shows how to enable the system logging of interface state-change events on all interfaces during system initialization:

```
Router(config)# logging event link-status boot
Router(config)#
```

This example shows how to disable the system logging of interface state-change events on all interfaces:

```
Router(config)# no logging event link-status default
Router(config)#
```

This example shows how to disable the system logging of interface state-change events during system initialization:

```
Router(config)# no logging event link-status boot
Router(config)#
```

Related Commands

Command	Description
show running-config	Displays the status and configuration of the module or Layer 2 VLAN.

logging event link-status (interface configuration)

To enable link-status event messaging on an interface, use the **logging event link-status** command in interface configuration mode. To disable link-status event messaging, use the **no** form of this command.

logging event link-status [**bchan** | **dchan** | **nfas**]
no logging event link-status [**bchan** | **dchan** | **nfas**]

Syntax Description

bchan	(Optional) Logs B-channel status messages. This keyword is available only for integrated services digital network (ISDN) serial interfaces.
dchan	(Optional) Logs D-channel status messages. This keyword is available only for ISDN serial interfaces.
nfas	(Optional) Logs non-facility associated signaling (NFAS) D-channel status messages. This keyword is available only for ISDN serial interfaces.

Command Default

Interface state-change messages are not sent.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(14)SX	This command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	This command was modified to support the Supervisor Engine 2.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

To enable system logging of interface state-change events on a specific interface, enter the **logging event link-status** command.

Examples

The following example shows how to enable link-status event messaging on an interface:

```
Router(config-if)# logging event link-status
```

This example shows how to disable link-status event messaging on an interface:

```
Router(config-if)# no logging event link-status
```

logging event subif-link-status

To enable the link-status event messaging on a subinterface, use the **logging event subif-link-status** command in interface configuration mode. To disable the link-status event messaging on a subinterface, use the **no** form of this command.

logging event subif-link-status
no logging event subif-link-status

Syntax Description

This command has no arguments or keywords.

Command Default

Subinterface state-change messages are not sent.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

This command is not supported on Cisco 7600 series routers that are configured with a Supervisor Engine 720.

To enable system logging of interface state-change events on a specific subinterface, enter the **logging event subif-link-status** command.

To enable system logging of interface state-change events on a specific interface, enter the **logging event link-status** command.

To enable system logging of interface state-change events on all interfaces in the system, enter the **logging event link-status** command.

Examples

This example shows how to enable the system logging of the interface state-change events on a subinterface:

```
Router(config-if)# logging event subif-link-status
Router(config-if)#
```

This example shows how to disable the system logging of the interface state-change events on a subinterface:

```
Router(config-if)# no logging event subif-link-status
Router(config-if)#
```

Related Commands

Command	Description
show running-config	Displays the status and configuration of the module or Layer 2 VLAN.

logging-events

to print typical T3 controller Up and Down messages on a Channelized T3 Port Adapter**,**use the **logging-eventscommand**in T3 controller configuration mode**.UsethenoformofthiscommandtodisableprintingoftheT3controllerUpandDownmessages.**

logging-events [**detail**]
[**no**] **logging-events**

Syntax Description

detail	(Optional) Enables printing the reason code when a T3 controller changes from the Up to Down state.

Command Default

The **logging-eventscommandisthedefault.**

Command Modes

T3 controller configuration

Command History

Release	Modification
12.2(19c)	This command was introduced.

Usage Guidelines

When the no logging-events command disables printing of the T3 controller Up and Down messages, these messages will neither appear on the console nor in the logs.

Examples

The following example uses the **logging-events** [**detail**] command to show the Out-of-Frame (OOF) reason code when the T3 controller changes from an Up state to a Down state:

```
Router(config-controller)# logging-events detail
*Jun 19 17:47:50: %CONTROLLER-5-DOWNDETAIL: Controller T3 4/1, changed state to down due
to OOF
```

Related Commands

Command	Description
t1 logging-events	**Prints the typical T1 controller Up and Down messages** on a channelized T3 port adapter**.**

logging-events (T1-E1 controller)

To show the controller state change and alarms on a controller, use the **logging-events**command in controller configuration mode. To turn off controller state change reporting, use the **no** form of the command.

logging-events *detail*
no logging-events

Syntax Description

detail	Alarm along with the controller state change.

Command Default

Logging-events is the default.

Command Modes

Controller configuration

Command History

Release	Modification
12.2(18)SXE	This command was introduced to support SPAs on the Cisco 7600 series router and Catalyst 6500 series switch.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

Use the **logging-events**command to show the state change and alarms on a controller on an 8-Port Channelized T1/E1 Serial SPA.

Examples

The following shows enabling the logging-events command.

```
Router(config)#contr e1 2/1/0
Router(config-controller)# logging-events
```

Related Commands

Command	Description
controller	Configures a T1, E1, or T3 controller and enters controller configuration mode.
show controller	Displays controller configuration.

loopback (CEM)

To set the loopback method for testing a T1, E1, serial CEM interface, and VCoP Smart SFP, use the **loopback** command in controller configuration or CEM configuration mode. To remove any existing loopback, use the **no** form of this command.

Cisco NM-CEM-4SER
loopback {**local** | **network**}
no loopback

Cisco NM-CEM-4TE1
loopback {**local** {**payload** | **line**} | **network**}
no loopback

Cisco IOS XE Release 3.18SP
loopback {**diag** | **local** | {**payload** | **line**}}
no loopback

Cisco IOS XE Release 3.18.1SP
loopback {**local** | **network** {**payload** | **line**}}
no loopback

Syntax Description

diag	Loops the outgoing transmit signal back to the receive signal. This is done using the diagnostic loopback feature in the interface module's framer.
local	Places the interface into local loopback mode and creates a loopback wherein information received from the locally-attached customer premises equipment (CPE) is transmitted back to the locally-attached CPE. • **payload** --(Used only if a local loopback is specified for a T1/E1 channel) Creates a loopback of only the data in individual time slots. In this mode, framing bits are terminated and then regenerated instead of being looped back. This mode is not available if the port is configured for **framingunframed**. • **line** --(Used only if a local loopback is specified for a T1/E1 channel) Creates a full physical layer loopback of all bits, including data and framing bits.
network	Creates a loopback wherein data received over the network from the remote CPE is transmitted back to the remote CPE.

Command Default

No loopback is configured for a CEM interface.

Command Modes

CEM configuration

Controller configuration

Controller configuration

Controller configuration

Command History

Release	Modification
12.3(7)T	This command was introduced.
XE 3.18SP	This command was integrated in Cisco NCS 4200 Series.
XE 3.18.1SP	This command was integrated in Cisco 900 Series Router.
Cisco IOS XE Everest 16.5.1	This command was integrated in Cisco ASR 903 Series Router and Cisco NCS 4200 Series.

Usage Guidelines

Use this command to create a loopback for a CEM interface. You can use a loopback to test for equipment malfunction caused by the interface.

The NM-CEM-4TE1 does not respond to loopback requests initiated by the CPE, locally attached or remote, using the extended super frame (ESF) Facility Data Link (FDL) mechanism or by any other mechanism.

The NM-CEM-4SER does not respond to any form of loopback request initiated by the locally attached or remote CPE on the Local Loop (LL) or Remote Loop (RL) control leads. Nor does the NM-CEM-4SER respond to any form of loopback request initiated by the locally attached or remote CPE using in-band loopback codes.

Examples

The following example shows how to create a loopback on a CEM T1/E1 interface so that data received from a remote CPE is transmitted back to the remote CPE on the network.

```
Router(config-controller)# loopback network
```

The following example shows how to create a loopback of data in individual time slots on a CEM T1/E1 interface. Data received from a locally attached CPE will be sent back to the locally attached CPE.

```
Router(config-controller)# loopback local payload
```

The following example shows how to create a loopback on a serial CEM channel so that data received from a remote CPE is transmitted back to the remote CPE on the network.

```
Router(config-cem)# loopback network
```

The following example shows how to set a loopback on the T1 interfaces for loopback diag.

```
Router(config-controller)# loopback diag
```

The following example shows how to set a loopback on the C37.94 interface for loopback local.

```
Router(config-controller)# loopback local line
```

Related Commands

Command	Description
cem	Enters circuit emulation configuration mode.
controller	Enters controller configuration mode.

loopback (DSL controller)

To test the controller and configure the core loopback, use the **loopback(DSLController)**command in controller configuration mode. To remove the loopback interface, use the **no** form of this command.

loopback {**analog** | **digital**}
no loopback

Syntax Description

analog	Loops the circuit at the analog hybrid to verify the analog loopback hardware to the analog hybrid.
digital	Loops the circuit at the framer to verify the hardware to the framer.

Command Default

No default behavior or values.

Command Modes

Controller configuration

Command History

Release	Modification
12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
12.3(4)XG	This command was integrated into Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
12.3(7)T	This command was integrated in Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
12.3(11)T	This command was integrated into Cisco IOS Release 12.3(11)T on Cisco 2800 series and Cisco 3800 series routers.
12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T on Cisco 1800 series routers.

Usage Guidelines

Analog and digital loopbacks are local loopbacks. Digital loopbacks loop the circuit at the framer to verify the hardware to the framer, and analog loopbacks loop the circuit at the analog hybrid to verify the analog loopback hardware to the analog hybrid. The controller must be shut down before loopback can be configured.

Examples

If the controller is still up, the router will prompt you to turn the controller off as shown in this example:

```
Router(config-controller)# loopback
 analog

 Please shut down the xDSL controller
Router(config-controller)# loopback
 digital

 Please shut down the xDSL controller
```

The following example shows the configuration of a loopback digital interface:

```
Router(config-controller)# loopback digital
 Please shut down the xDSL controller
Router(config-controller)# shutdown
```

```
Router(config-controller)#
00:59:50: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to
administratively down
Router(config-controller)#
Router(config-controller)# loopback digital
Router(config-controller)# no shutdown
Apr 23 06:59:01.435:  DSL 0/0 controller Link up! line rate: 4608 Kbps
o
00:59:59: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
Router(config-controller)#end
Router# show controllers dsl 0/0
 DSL 0/0 controller UP
 Local Digital loopback is running
 Globespan xDSL controller chipset
 DSL mode: SHDSL Annex B
 Frame mode: Utopia
 Configured Line rate: 4608Kbps
 Line Re-activated 4 times after system bootup
 LOSW Defect alarm: ACTIVE
 CRC per second alarm: ACTIVE
 Line termination: CO
 FPGA Revision: 0xA7
Line 0 statistics
        Current 15 min CRC: 679
        Current 15 min LOSW Defect: 8
        Current 15 min ES: 5
        Current 15 min SES: 5
        Current 15 min UAS: 397
        Previous 15 min CRC: 0
        Previous 15 min LOSW Defect: 0
        Previous 15 min ES: 0
        Previous 15 min SES: 0
        Previous 15 min UAS: 0
Line 1 statistics
        Current 15 min CRC: 577
        Current 15 min LOSW Defect: 8
        Current 15 min ES: 7
        Current 15 min SES: 4
        Current 15 min UAS: 411
        Previous 15 min CRC: 0
        Previous 15 min LOSW Defect: 0
        Previous 15 min ES: 0
        Previous 15 min SES: 0
        Previous 15 min UAS: 0
 Line-0 status
 Chipset Version:  1
 Firmware Version:  A29733
 Modem Status:  un checked mode, Status 83
 Last Fail Mode:  No Failure status:0x0
 Line rate:  2312 Kbps
 Framer Sync Status: In Sync
 Rcv Clock Status: In the Range
 Loop Attenuation:  0.0 dB
 Transmit Power:  13.5 dB
 Receiver Gain:  936.8420 dB
 SNR Sampling:  16.960 dB
 Line-1 status
 Chipset Version:  1
 Firmware Version:  A29733
 Modem Status:  un checked mode, Status 83
 Last Fail Mode:  No Failure status:0x0
 Line rate:  2312 Kbps
 Framer Sync Status: In Sync
 Rcv Clock Status: In the Range
```

```
Loop Attenuation:  0.0 dB
Transmit Power:  13.5 dB
Receiver Gain:  936.8420 dB
SNR Sampling:  16.3590 dB
Dying Gasp: Present
```

Related Commands

Command	Description
show interfaces loopback	Displays information about the loopback interface.

loopback (E3 controller)

To loop an entire E3 line toward the line and back toward the router, use the **loopback**command in controller configuration mode. To remove the loop, use the no form of this command.

loopback {**local** | **network** {**line** | **payload**}}
no loopback

Syntax Description

local	Loops the data back toward the router and sends an AIS signal out toward the network. This is the default.
network line payload	Sets the loopback toward the network either before going through the framer (line) or after going through the framer (payload).

Command Default

local

Command Modes

Controller configuration

Command History

Release	Modification
11.3	This command was introduced.
12.2(11)YT	This command was integrated into Cisco IOS Release 12.2(11)YT and implemented on the following platforms for E3: Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3660 series, Cisco 3725, and Cisco 3745 routers.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.

Usage Guidelines

Use this command for troubleshooting purposes. To verify that a loopback is configured on the interface, use the **showcontrollerse3**EXEC command. Note that line loopback is available only in C-bit parity mode.

Examples

The following example shows how to configure the controller located in slot 1, port 0 for a local loopback:

```
Router(config)# controller e3 1/0
Router(config-controller)# loopback local
```

Related Commands

Command	Description
show controllers e3	Displays information about the E3 controllers.

loopback (interface)

To diagnose equipment malfunctions between the interface and device, use the **loopback**command in interface configuration mode. To disable the test, use the **no** form of this command.

loopback
no loopback

Syntax Description

This command has no arguments or keywords.

Command Default

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Loopback on HSSI Cards

On High-Speed Serial Interface (HSSI) cards, the loopback function configures a two-way internal and external loop on the HSA applique of the specific interface.

Loopback on MCI and SCI Serial Interface Cards

On MCI and SCI serial interface cards, the loopback functions when a CSU/DSU or equivalent device is attached to the router or access server. The**loopback** command loops the packets through the CSU/DSU to configure a CSU loop, when the device supports this feature.

Loopback on MCI and MEC Ethernet Cards

On the MCI and MEC Ethernet cards, the interface receives back every packet it sends when the **loopback** command is enabled. Loopback operation has the additional effect of disconnecting network server functionality from the network.

Loopback on CSC-FCI FDDI Cards

On the CSC-FCI FDDI card, the interface receives back every packet it sends when the **loopback** command is enabled. Loopback operation has the additional effect of disconnecting network server functionality from the network.

Loopback on Token Ring Interface Cards

On all Token Ring interface cards (except the 4-megabit CSC-R card), the interface receives back every packet it sends when the **loopback** command is enabled. Loopback operation has the additional effect of disconnecting network server functionality from the network.

Active Loopback Interfaces

To show interfaces currently in loopback operation, use the **showinterfacesloopback** EXEC command.

Note Loopback does not work on an X.21 DTE because the X.21 interface definition does not include a loopback definition.

Examples

The following example configures the loopback test on Ethernet interface 4:

```
Router(config)# interface ethernet 4
Router(config-if)# loopback
```

Related Commands

Command	Description
down-when-looped	Configures an interface to inform the system it is down when loopback is detected.
show interfaces loopback	Displays information about the loopback interface.

loopback (J1 controller)

To set the loopback method for testing the J1 interface, use the **loopback** command in controller configuration mode. To turn off loopback, use the **no** form of this command. This command should be used for testing purposes only.

loopback {**local** | **line** | **isolation**}
no loopback {**local** | **line** | **isolation**}

Syntax Description

local	Places the interface into local loopback mode.
line	Places the interface into external loopback mode at the line level.
isolation	Places the interface into both local and line loopback mode.

Command Default

No loopback is configured.

Command Modes

Controller configuration

Command History

Release	Modification
11.3 MA	This command was implemented on the Cisco MC3810.
12.0(5)T and 12.0(7)XR	The command was implemented on the Cisco 2600 and Cisco 3600 series.
12.0(5)XE	The command was implemented on the Cisco 7200 and Cisco 7500 series.
12.1(1)T	The command was implemented on the Cisco 2600 series.
12.2(8)T	The command was implemented on the Cisco 2600 and Cisco 3600 series.

Examples

The following example establishes a loopback of the incoming J1 signal on controller J1 3/0:

```
Router(config)# controller j1 3/0
Router(config-controller)# loopback line
```

loopback (PA-MC-8TE1+ port adapter)

To enable loopback testing of data for the PA-MC-8TE1+ port adapter, use the **loopback** command in interface configuration mode. To disable loopback testing, use the **no** form of this command.

loopback [**internal** | **line**]
no loopback [**internal** | **line**]

Syntax Description

internal	(Optional) Loops any data received at the PA-MC-8TE1+ port adapter's network interface back into the PA-MC-8TE1+ port adapter.
line	(Optional) Loops any data received at the PA-MC-8TE1+ port adapter's network interface back into the network.

Command Default

Loopback mode is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(13)T	This command was introduced.

Examples

In the following example, a loopback is set for the PA-MC-8TE1+ port adapter in slot 2:

```
Router(config)# interface 2/0
Router(config-if)# loopback line
```