D through E

data-protection

To enable data protection for a circuit emulation (CEM) channel, use the **data-protection**command in CEM configuration mode. To disable data protection, use the **no** form of this command.

data-protection
no data-protection

Syntax Description

This command has no arguments or keywords.

Command Default

Data protection is disabled for a CEM channel.

Command Modes

CEM configuration

Command History

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

Examples

The following example demonstrates how to enable data protection.

```
Router(config-cem)# data-protection
```

Related Commands

Command	Description
cem	Enters circuit emulation configuration mode.
clear cem	Clears CEM channel statistics.
show cem	Displays CEM channel statistics.

data-strobe

To specify an input control lead to be monitored as an indicator of valid data, use the **data-strobe** command in CEM configuration mode. To disable the monitoring of an input control lead, use the **no** form of this command.

data-strobe input-lead {**on** | **off**}
no data-strobe

Syntax Description

input-lead	Specifies the input lead. The choice of leads depends on whether the port is DCE or DTE.
on	Enables packet creation when the lead is asserted.
off	Enables packet creation when the lead is deactivated.

Command Default

No input control lead is monitored.

Command Modes

CEM configuration

Command History

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

Usage Guidelines

Any input control signal on a serial data port may be configured as a “data strobe” to indicate to the NM-CEM-4SER network module whether ingress data on the port should be encapsulated for transmission or ignored. If the **data-strobe** command is specified with the **on** keyword, data packets are created and sent when the input lead is asserted. If the data strobe is off (either intentionally or as a result of the failure of the customer premises equipment [CPE]), no data packets are created, and this results in preservation of bandwidth in the IP network.

This command applies only to serial ports.

Examples

The following example demonstrates how to specify that packets are to be created and sent to the far end only when the DTR input control lead is asserted.

```
Router(config-cem)# data-strobe dtr on
```

Related Commands

Command	Description
cem	Enters circuit emulation configuration mode.
clear cem	Clears CEM channel statistics.
control-lead sampling rate	Configures the sampling rate of input control leads.
control-lead state	Specifies the state of an output control lead.
show cem	Displays CEM channel statistics.

dce-terminal-timing enable

To prevent phase shifting of the data with respect to the clock when running the line at high speeds and long distances, use the **dce-terminal-timingenable** command in interface configuration mode. If serial clock transmit external (SCTE) terminal timing is not available from the DTE, use the **no**form of this command; the DCE will use its own clock instead of SCTE from the DTE.

dce-terminal-timing enable
no dce-terminal-timing enable

Syntax Description

This command has no arguments or keywords.

Command Default

The DCE uses its own clock.

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

On the Cisco 4000 router, you can specify the serial Network Interface Module timing signal configuration. When the board is operating as a DCE and the DTE provides terminal timing (SCTE or TT), the **dce-terminal-timingenable** command causes the DCE to use SCTE from the DTE.

Examples

The following example shows how to prevent phase shifting of the data with respect to the clock:

```
Router(config)# interface serial 0
Router(config-if)# dce-terminal-timing enable
```

debug l2protocol-tunnel

To configure the debugging option of Layer 2 Protocol Tunneling (L2PT), use the **debugl2protocol-tunnel** command in EXEC mode.

debug l2protocol-tunnel [{**error** | **event** | **misc** | **packet**}]

Syntax Description

error	(Optional) Displays L2PT errors.
event	(Optional) Displays L2PT events.
misc	(Optional) Displays L2PT miscellaneous.
packet	(Optional) Displays L2PT activities.

Command Default

If you do not specify a debugging option, all options are enabled.

Command Modes

User EXEC (>)

Command History

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

Examples

The following example shows how to debug the **l2protocol-tunnel** command:

```
Router# debug l2protocol-tunnel error
```

Related Commands

Command	Description
l2protoco-tunnel	Enables Layer 2 protocol tunneling for CDP, STP, or VTP packets on an interface.
show l2protocol-tunnel	Displays information about L2PT ports.

debug platform link-dc

To display debugging messages for the link daughter card, use the **debugplatformlink-dc**command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

debug platform link-dc {**dwdm** | **interface** | **interrupt** | **netclk** | **serdes** | **transceiver** | **wanphy**}
no debug platform link-dc {**dwdm** | **interface** | **interrupt** | **netclk** | **serdes** | **transceiver** | **wanphy**}

Syntax Description

dwdm	OTN G.709/DWDM driver debug information.
interface	Interface driver debug information.
interrupt	Interrupt debug information.
netclk	Network clocking debug information.
serdes	Physical layer (PHY) and SerDes debug information.
transceiver	Pluggable optics module information.
wanphy	WAN PHY driver debug information.

Command Default

Debugging is not enabled.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(33)SRD	This command was introduced. **Note** This command applies only to the Cisco 7600 Series Ethernet Services Plus (ES+) line card on the Cisco 7600 series router.
12.2(33)SRD1	This command added the dwdm and wanphy keywords.

Usage Guidelines

Use this command with the remote command command or the attach command in privileged EXEC mode.

Examples

The following examples show the output for both the debug platform link-dc tranceiver command and the debug platform link-dc interrupt command. Notice that the show platform hardware transceiver command shows the status for the port.

```
Router# remote command module 1 debug platform link-dc tranceiver
Link-DC transceiver debugging is on
Router# remote command module 1 debug platform link-dc interrupt
Link-DC interrupt debugging is on
Router# remote command module 1 show debug
x40g subsystem:
  Link-DC transceiver debugging is on
  Link-DC interrupt debugging is on
Router# remote command module 1 show platform hardware transceiver status 1
Show status info for port 1:
```

```
TenGigabitEthernet1/1:
        State: Enabled
        Environmental Information - raw values
                Temperature: 7616
                Tx voltage: 0 in units of 100uVolt
                Tx bias: 28722 uA
                Tx power: -2 dBm (5441 in units of 0.1 uW)
                Rx power: 0 dBm (7712 in units of 0.1 uW)
                (AUX1) Laser Temperature: 8704
                (AUX2) +3.3V Supply Voltage: 32928
        XFP TX is enabled.
        XFP TX is soft enabled.
        XFP is ready.
        XFP is not power down.
        XFP is not soft power down.
        XFP doesn't have interrupt(s).
        XFP is not LOS.
        XFP data is ready.
        XFP TX path is ready.
        XFP TX laser is not in fault condition.
        XFP TX path CDR is locked.
        XFP RX path is ready.
        XFP RX path CDR is locked.
        No active alarms
        No active warning
Router-dfc1#
*Aug 15 11:20:26.436 PDT: DFC1: TenGigabitEthernet1/1 XFP: show status
*Aug 15 11:20:26.436 PDT: DFC1: TenGigabitEthernet1/1 XFP: show environmental monitoring
*Aug 15 11:20:26.436 PDT: DFC1: pluggable optics read - addr: 50, offset: 60, len: 14,
dataptr: 2377A668
*Aug 15 11:20:26.448 PDT: DFC1: pluggable optics read - addr: 50, offset: 6E, len: 2,
dataptr: 21AA028E
*Aug 15 11:20:26.452 PDT: DFC1: pluggable optics read - addr: 50, offset: 50, len: 2,
dataptr: 2377A6A0
*Aug 15 11:20:26.456 PDT: DFC1: pluggable optics read - addr: 50, offset: 52, len: 2,
dataptr: 2377A6A2
```

Note The following console log is seen when both the debug platform link-dc tranceiver command and the debug platform link-dc interrupt command are entered (as in the preceding example), and there is a transceiver Rx loss of signal (LOS) event.

```
Router-dfc1#
*Aug 15 11:23:52.127 PDT: DFC1: x40g_link_dc_interrupt_handler:  intr_status 0x8000
*Aug 15 11:23:52.127 PDT: DFC1: x40g_link_xphy_isr: xphy intr intr_st 0x80000
*Aug 15 11:23:52.127 PDT: DFC1: x40g_link_xphy_isr: xphy intr port 1
*Aug 15 11:23:52.127 PDT: DFC1: x40g_xphy_link_status_callout: port 1 link status 0
*Aug 15 11:23:52.131 PDT: DFC1: x40g_link_dc_interrupt_handler:  intr_status 0x8000
*Aug 15 11:23:52.131 PDT: DFC1: x40g_link_xphy_isr: xphy intr intr_st 0x80000
*Aug 15 11:23:52.131 PDT: DFC1: x40g_link_xphy_isr: xphy intr port 1
*Aug 15 11:23:52.131 PDT: DFC1: x40g_xphy_link_status_callout: port 1 link status 1
*Aug 15 11:23:52.135 PDT: DFC1: x40g_link_dc_process: interrupt msg_id 6, msg_num 1
*Aug 15 11:23:52.135 PDT: DFC1: x40g_link_dc_interrupt_handler:  intr_status 0x8000
*Aug 15 11:23:52.135 PDT: DFC1: x40g_link_xphy_isr: xphy intr intr_st 0x80000
*Aug 15 11:23:52.135 PDT: DFC1: x40g_link_xphy_isr: xphy intr port 1
*Aug 15 11:23:52.135 PDT: DFC1: x40g_xphy_link_status_callout: port 1 link status 0
*Aug 15 11:23:52.135 PDT: DFC1: x40g_link_dc_interrupt_handler:  intr_status 0x4000
*Aug 15 11:23:52.135 PDT: DFC1: x40g_link_xcvr_isr: intr_st 0x2, start 0, end 4, type
2,port_offset 0x0
*Aug 15 11:23:52.135 PDT: DFC1: Link xcvr port 1: Rx LOS interrupt
*Aug 15 11:23:52.135 PDT: DFC1: x40g_link_dc_process: interrupt msg_id 2, msg_num 1
```

```
*Aug 15 11:23:52.135 PDT: DFC1: Port 2: transceiver Rx LOS event
*Aug 15 11:23:52.147 PDT: DFC1: x40g_link_dc_process: xcvr oir timer timeout
00:12:37: %LINEPROTO-DFC1-5-UPDOWN: Line protocol on Interface TenGigabitEthernet1/2, changed
 state to down
*Aug 15 11:24:46.576 PDT: DFC1: x40g_link_dc_interrupt_handler:  intr_status 0x4000
*Aug 15 11:24:46.576 PDT: DFC1: x40g_link_xcvr_isr: intr_st 0x2, start 0, end 4, type
2,port_offset 0x0
*Aug 15 11:24:46.576 PDT: DFC1: Link xcvr port 1: Rx LOS interrupt
*Aug 15 11:24:46.576 PDT: DFC1: x40g_link_dc_process: interrupt msg_id 2, msg_num 1
*Aug 15 11:24:46.576 PDT: DFC1: Port 2: transceiver Rx LOS recovered
*Aug 15 11:24:46.580 PDT: DFC1: x40g_link_dc_interrupt_handler:  intr_status 0x8000
*Aug 15 11:24:46.580 PDT: DFC1: x40g_link_xphy_isr: xphy intr intr_st 0x80000
*Aug 15 11:24:46.580 PDT: DFC1: x40g_link_xphy_isr: xphy intr port 1
*Aug 15 11:24:46.580 PDT: DFC1: x40g_xphy_link_status_callout: port 1 link status 0
*Aug 15 11:24:46.584 PDT: DFC1: x40g_link_dc_interrupt_handler:  intr_status 0x8000
*Aug 15 11:24:46.584 PDT: DFC1: x40g_link_xphy_isr: xphy intr intr_st 0x80000
*Aug 15 11:24:46.584 PDT: DFC1: x40g_link_xphy_isr: xphy intr port 1
*Aug 15 11:24:46.584 PDT: DFC1: x40g_xphy_link_status_callout: port 1 link status 1
*Aug 15 11:24:46.584 PDT: DFC1: x40g_link_dc_process: interrupt msg_id 6, msg_num 1
*Aug 15 11:24:46.600 PDT: DFC1: x40g_link_dc_process: xcvr oir timer timeout
00:13:31: %LINEPROTO-DFC1-5-UPDOWN: Line protocol on Interface TenGigabitEthernet1/2, changed
 state to up
```

The following example shows the output for the debug platform link-dc dwdm command.

```
Router-dfc1# debug platform link-dc dwdm
Link-DC OTN G.709/DWDM debugging is on
*Jan 28 12:10:38.784 PDT: DFC1: Port 1: OTN Alarm Query, return ptr 228E877C
los 1, oof 0, lof 0, mfas 1, lom 0
otuAis 0, otuIae 0-0, otuBdi 0, otuTim 0
oduAis 0, oduBdi 0, oduLck 0, oduOci 0, oduPtim 0
*Jan 28 12:10:38.864 PDT: DFC1: x40g_link_pemaquid_pm_tick_timer_event(1): pm_tick timer
timeout
*Jan 28 12:10:39.364 PDT: DFC1: x40g_link_pemaquid_pm_tick_timer_event(1): pm_tick timer
timeout
*Jan 28 12:10:39.840 PDT: DFC1: Port 1: OTN Alarm Query, return ptr 228E877C
los 1, oof 0, lof 0, mfas 1, lom 0
otuAis 0, otuIae 0-0, otuBdi 0, otuTim 0
oduAis 0, oduBdi 0, oduLck 0, oduOci 0, oduPtim 0
```

The following example shows the output for the debug platform link-dc wanphy command.

```
Router-dfc1# debug platform link-dc wanphy
Link-DC WAN PHY debugging is on
*Jan 28 11:59:16.184 PDT: DFC1: Port 1 WIS alarms:
     ser 0, plm_p_far 0, ais_p_far 0, lof 0, los 0
     rdi 0, ais_l 0, lcd_p 0, plm_p 0, ais_p 0, lop 0

*Jan 28 11:59:17.184 PDT: DFC1: Port 1 WIS alarms:
     ser 0, plm_p_far 0, ais_p_far 0, lof 0, los 0
     rdi 0, ais_l 0, lcd_p 0, plm_p 0, ais_p 0, lop 0
*Jan 28 11:59:17.184 PDT: DFC1: Port 1 WIS counters: b1 0, b2 0, b3 0, fe_b2 0, fe_b3 0
*Jan 28 11:59:17.184 PDT: DFC1: Port 1 WIS J1RX: 0x0000000000000089.0x302E302E302E3000
...
*Jan 28 11:59:22.288 PDT: DFC1: Port 1 WIS alarms:
     ser 0, plm_p_far 0, ais_p_far 0, lof 0, los 0
     rdi 0, ais_l 0, lcd_p 0, plm_p 0, ais_p 0, lop 0
*Jan 28 11:59:22.288 PDT: DFC1: Port 1 WIS counters: b1 0, b2 0, b3 0, fe_b2 0, fe_b3 0
*Jan 28 11:59:22.288 PDT: DFC1: Port 1 WIS J1RX: 0x0000000000000089.0x302E302E302E3000
```

Related Commands

Command	Description
show platform hardware transceiver	Displays transceiver information on a port.

debug platform network-clock

To debug issues related to the network clock, such as alarms, out-of-resource (OOR), and active-standby sources not selected correctly, use the debug platform network-clock command in the privileged EXEC mode. To disable debugging, use the **no**no form of this command. .

debug platform network-clock
no debug platform network-clock

Command Default

This command has no arguments or keywords.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
Cisco IOS XE Release 3.2	This command was integrated into Cisco ASR 1000 Series routers.
Cisco IOS Release 12.2(33)SRE	This command was introduced on the Cisco 7600 Series routers.

Examples

The following example shows how to debug the network clock:

```
Router(config)# debug platform network-clock
```

debug platform software ucse

To debug the Cisco UCS E-Series Server platform software and display debug messages, use the **debug platform software ucse** command in privileged EXEC mode. To disable debug, use the **no** form of this command.

debug platform software ucse {**all** | **error** | **normal**}
no debug platform software ucse {**all** | **error** | **normal**}

Syntax Description

all	Displays all platform debug messages.
error	Displays error debug messages.
normal	Displays normal debug messages.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
Cisco IOS XE Release 3.9S	This command was introduced on the Cisco UCS E-Series Servers installed in the Cisco 4400 Series Integrated Services Router (ISR).

Usage Guidelines

After you use the **debug platform software ucse all** command, use the appropriate **ucse** command to display debug messages.

Examples

The following example shows how to display debug messages for the **ucse subslot imc password-reset** command:

```
Router# debug platform software ucse all
Router#
Router# ucse subslot 2/0 imc password-reset
 ucse2/0/0
Password reset command sent.
Router#
 IMC ACK: UCSE password reset successful for IMC
 ACK received for UCSE: Password Reset Command
```

debug snmp tunnel-mib

To enable the debugging for configuring the IP Tunnel Management Information Base (MIB) through Simple Network Management Protocol (SNMP), use the **debugsnmptunnel-mib** command in privileged EXEC mode. To disable debugging, use the **no** form of this command.

debug snmp tunnel-mib
no debug snmp tunnel-mib

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(33)SRB	This command was introduced.
12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
12.2(33)SB1	This command was integrated into Cisco IOS Release 12.2(33)SB1.
12.2(44)SG	This command was integrated into Cisco IOS Release 12.2(44)SG.
Cisco IOS Release XE 2.1	This command was integrated into Cisco IOS Release XE 2.1.

Usage Guidelines

Use the **debugsnmptunnel-mib** command to verify whether a tunnel is created or deleted.

Examples

The following is sample output from the **debugsnmptunnel-mib** command. The output shows that a tunnel is created through SNMP.

```
Router# debug snmp tunnel-mib
SNMP TUNNEL-MIB debugging is on
k_tunnelInetConfigEntry_get: Entering
k_tunnelInetConfigEntry_get: Exact search
tim_client_tunnel_endpoint_data_get: Entering
tim_client_tunnel_endpoint_data_get: Exact search
tim_client_tunnel_endpoint_data_get: No element found
k_tunnelInetConfigEntry_get: Client service failed
k_tunnelInetConfigEntry_test: Entering
k_tunnelInetConfigEntry_test: Completed
k_tunnelInetConfigEntry_set: Entering
tim_client_tunnel_endpoint_data_get: Entering
tim_client_tunnel_endpoint_data_get: Exact search
tim_client_tunnel_endpoint_data_get: No element found
k_tunnelInetConfigEntry_set: Calling tunnel create
tim_client_tunnel_create: Entering
tim_client_tunnel_create: Completed
```

default (CEM)

To reset channel options to their default values, use the **default**command in CEM configuration mode.

default {**data-protection** | **dejitter-buffer** | **idle-pattern** | **ip dscp** | **ip tos** | **ip precedence** | **payload-compression** | **payload-size** | **signaling**}

Syntax Description

data-protection	Resets data protection to its default value.
dejitter-buffer	Resets the dejitter buffer to its default value.
idle-pattern	Resets the idle pattern to its default value.
ip dscp	Resets the IP differentiated services code point (DSCP) field to its default value.
ip tos	Resets the IP type of service (ToS) field to its default value.
ip precedence	Resets the IP precedence field to its default value.
payload-compression	Resets payload compression to its default value.
payload-size	Resets payload size to its default value.
signaling	Resets signaling to its default value.

Command Default

The CEM channel options are set at their configured values.

Command Modes

CEM configuration

Command History

Release	Modification
12.3(7)T	This command was introduced for CEM configuration mode.

Examples

The following example demonstrates how to reset CEM channel data protection to its default value.

```
Router(config-cem)# default data-protection
```

Related Commands

Command	Description
cem	Enters circuit emulation configuration mode.
clear cem	Clears CEM channel statistics.
data-protection	Enables data protection.
dejitter-buffer	Configures the dejitter buffer size.
idle-pattern	Defines the idle pattern that the channel transmits when it goes down.
payload-compression	Enables payload compression.

Command	Description
payload-size	Configures the payload size.
show cem	Displays CEM channel statistics.
signaling	Enables CAS signaling.

default interface

To reset the configuration of an interface back to its default values, use the **default**command in global configuration mode.

default *interface-type interface-number*

Syntax Description

interface-type	Type of interface. The interface types that are available to be reset to their default values will vary depending on the available interface types on the networking device and the Cisco IOS release that is installed on the device. Not all possible interface types are documented here. • **async** --Reconfigures the specified async interface to its default value. • **atm** --Reconfigures the specified ATM interface to its default value. • **bvi** --Reconfigures the specified bridge-group virtual interface to its default value. • **dialer** --Reconfigures the specified dialer interface to its default value. • **ethernet** --Reconfigures the specified Ethernet interface to its default value. • **fastethernet** --Reconfigures the specified Fast Ethernet interface to its default value. • **fddi** --Reconfigures the specified FDDI interface to its default value. • **gigabitethernet** --Reconfigures the specified Gigabit Ethernet interface to its default value. • **group-async** --Reconfigures the specified group async interface to its default value. • **loopback** --Reconfigures the specified loopback interface to its default value. • **null** --Reconfigures the specified null interface to its default value. • **pos** --Reconfigures the specified Packet over SONET (POS) interface to its default value. • **serial** --Reconfigures the specified serial interface to its default value. • **tunnel** --Reconfigures the specified tunnel interface to its default value.
interface-number	Number of the interface, slot, router shelf, unit, port, or port adaptor if appropriate for the interface type. Slash marks may be required between elements of this argument.

Command Default

Existing interface configuration values are not reset.

Command Modes

Global configuration

Command History

Release	Modification
11.1	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Release	Modification
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 **default** command is a general-purpose command that is not limited to interfaces; it resets defaults based on the command name that follows it. Use the **default**(interface) command when you need to remove any configuration for a specified interface and reset the interface to its default values.

Examples

The following example demonstrates how to reset serial interface 0 to its default values.

```
Router(config)# default serial 0
```

Related Commands

Commands	Description
interface	Enters interface configuration mode.

define interface-range

To create an interface-range macro, use the **define interface-range** command in global configuration mode. To remove an interface-range macro, use the **no** form of this command.

define interface-range *macro-name interface-range*

Syntax Description

macro-name	Name of the interface-range macro.
interface-range	Type of interface range. • For a list of valid values, see the "Usage Guidelines" section.

Command Default

Interface-range macro is not configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(14)SX	This command was introduced.
12.2(17d)SXB	This command was integrated into Cisco IOS XE Release 12.2(17d)SXB.
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.

Usage Guidelines

- The **define interface-range** command applies a particular configuration on multiple interfaces and creates multiple logical, and sub interfaces.
- An interface range macro name can comprise up to 32 characters.
- An interface range for a macro can accept a maximum of five ranges. However, the subinterface range for a macro accepts only one range.
- An interface range cannot span slots.
- Use the *interface-type slot/first-interface last-interface* format to enter the interface range.
- Valid values for the *interface-type* argument are as follows:
  - **atm** —Supported on Cisco 7600 series routers that are configured with a Supervisor Engine 2
  - **ethernet**
  - **fastethernet**
  - **ge-wan** —Supported on Cisco 7600 series routers that are configured with a Supervisor Engine 2
  - **gigabitethernet**
  - **loopback**
  - **port-channel** *interface-number* —Valid values are from 1 to 256
  - **pos** —Supported on Cisco 7600 series routers that are configured with a Supervisor Engine 2

- **tengigabitethernet**
- **tunnel**
- **vlan** *vlan-id* —Valid values are from 1 to 4094

Examples

The following example shows how to create a multiple-interface macro:

```
Device(config)# define interface-range macro1 ethernet 1/2 - 5, fastethernet 5/5 - 10
```

The following example shows how to create multiple loopback interfaces:

```
Device(config)# define interface-range loopback1-10
```

Related Commands

Command	Description
interface range	Executes a command on multiple ports at the same time.

dejitter-buffer

To configure the size of the dejitter buffer, use the **dejitter-buffer** command in CEM configuration mode. To restore the dejitter buffer to its default size, use the **no** form of this command.

dejitter-buffer *size*
no dejitter-buffer

Syntax Description

size	Size, in milliseconds, of the dejitter buffer. The range is from 5 to 500. The default is 60. For Cisco ASR 901 Series Aggregation Services Routers, the range is from 4 to 500; the default is 4.

Command Default

The dejitter buffer defaults to 60 milliseconds. For Cisco ASR 901 Series Aggregation Services Routers, the default is 4.

Command Modes

CEM configuration

Command History

Release	Modification
15.1(2)SNG	This command was implemented on Cisco ASR 901 Series Aggregation Services Routers.
15.1(2)SNG	This command was implemented on Cisco ASR 901 Series Aggregation Services Routers.

Examples

The following example shows how to set the dejitter buffer to 200 milliseconds.

```
Router(config-cem)# dejitter-buffer 200
```

The following example shows how to specify the size of the dejitter buffer to 10 milliseconds on the Cisco ASR 901 Series Aggregation Services Router:

```
Router# configure terminal
Router(config)# interface cem 0/0
Router(config-if)# no ip address
Router(config-if)# cem 0
Router(config-if-cem)# dejitter-buffer 10
Router(config-if-cem)# xconnect 10.10.10.10 200 encapsulation mpls
Router(config-if-cem-xconn)# exit
Router(config-if-cem)# exit
Router(config-if)# exit
Router(config)# exit
```

Related Commands

Command	Description
cem	Enters circuit emulation configuration mode.
clear cem	Clears CEM channel statistics.
clear cem	Clears CEM channel statistics.
clear cem	Clears CEM channel statistics.

Command	Description
show cem	Displays CEM channel statistics.

delay-asymmetry

To perform the PTP asymmetry readjustment on a PTP node to compensate for the delay in the network, use the **delay-asymmetry** command in the PTP clock configuration mode. To revert to default setting, use the **no** form of this command.

delay-asymmetry *asymmetry_compensation_offset*
no delay-asymmetry *asymmetry_compensation_offset*

Syntax Description

asymmetry_compensation_offset	Asymetry value of the clock that defines if a one way delay of forward or reverse path occurs.Value ranges from -500000000 to 500000000 nanoseconds.

Command Default

The default asymmetry offset value is zero.

Command Modes

PTP Clock Configuration (for default Telecom profile), Clock-Port Configuration (for G8275.1 Telecom profile)

Command History

Release	Modification
Cisco IOS XE Gibraltar 16.10.1	This command was introduced.

Usage Guidelines

The asymmetry compensation offset value can be configured on default, G8275.1 Telecom profile.

The following example demonstrates how to configure the delay asymmetry for ports with default Telecom profile.

```
Router# configure terminal
Router(config)#ptp clock
Router(config-ptp-clk)#clock-port sla slave
Router(config-ptp-port)#clock source 1.1.1.1 delay-asymmetry 300 nanoseconds
```

The following example demonstrates how to configure the delay asymmetry for ports with G8275.1 Telecom profile.

```
Router# configure terminal
Router(config)#ptp clock
Router(config-ptp-clk)#clock-port sla slave
Router(config-ptp-port)#delay-asymmetry 500
```

Related Commands

Command	Description
ptp clock	Creates a Precision Time Protocol clock and specifies the clock mode.
clock-port	Specifies the clocking mode of a Precision Time Protocol clock port.

delay (interface)

To set a delay value for an interface, use the **delay** command in interface configuration mode. To restore the default delay value, use the **no** form of this command.

delay *tens-of-microseconds*
no delay

Syntax Description

tens-of-microseconds	Integer that specifies the delay in tens of microseconds for an interface or network segment. To see the default delay, use the **showinterfaces** command.

Command Default

Default delay values may be displayed with the **showinterfaces**EXEC command.

Command Modes

Interface configuration (config-if) Virtual network interface (config-if-vnet)

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.
Cisco IOS XE Release 3.2S	This command was modified. Support was added for this command in virtual network interface configuration mode.

Examples

The following example shows how to set a delay of 30,000 microseconds on serial interface 3:

```
Router(config)# interface serial 3
Router(config-if)# delay 3000
```

Related Commands

Command	Description
show interfaces	Displays the statistical information specific to a serial interface.

delay-req interval

To specify a recommended interval for Precision Time Protocol member devices to send delay request messages, use the **delay-reqinterval** command in PTP clock port configuration mode. To remove a delay request interval configuration, use the **no** form of this command.

delay-req interval *interval-value* **unicast**
no delay-req interval *interval-value* **unicast**

Syntax Description

interval-value	Specifies the length of the interval for delay request messages. The intervals are set using log base 2 values, as follows: • 4--1 packet every 16 seconds • 3--1 packet every 8 seconds • 2--1 packet every 4 seconds • 1--1 packet every 2 seconds • 0--1 packet every second • -1--1 packet every 1/2 second, or 2 packets per second • -2--1 packet every 1/4 second, or 4 packets per second • -3--1 packet every 1/8 second, or 8 packets per second • -4--1 packet every 1/16 seconds, or 16 packets per second. • -5--1 packet every 1/32 seconds, or 32 packets per second. • -6--1 packet every 1/64 seconds, or 64 packets per second. The recommended value is -6.
unicast	(Optional) Specifies that the device send PTP delay request messages using unicast mode.

Command Default

The default value is -4 (16 packets per second).

Command Modes

PTP clock-port configuration (config-ptp-port)

Command History

Release	Modification
15.0(1)S	This command was introduced.

Usage Guidelines

This configuration is only required when an interface is in PTP subordinate mode.

Examples

The following example shows how to use the **delay-req** command:

```
Router# configure terminal
Router(config)# ptp clock ordinary domain 0
```

```
Router(config-ptp-clk)# clock-port slaveport slave
Router(config-ptp-port)# delay-req interval 2 unicast
Router(config-ptp-port)# end
```

Related Commands

Command	Description
clock-port	Specifies the mode of a PTP clock port.

description (controller)

To add a description to an E1 or T1 controller or the Channelized T3 Interface Processor (CT3IP) in Cisco 7500 series routers, use the **description**command in controller configuration mode. To remove the description, use the **no**form of this command.

description *string*
no description

Syntax Description

string	Comment or description (up to 80 characters) to help you remember what is attached to an interface.

Command Default

No description is added.

Command Modes

Controller configuration

Command History

Release	Modification
10.3	This command was introduced.
11.3	This command was modified to include the CT3IP controller.
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 **description** command is meant solely as a comment to be put in the configuration to help you remember what certain controllers are used for. The description affects the CT3IP and Multichannel Interface Processor (MIP) interfaces only and appears in the output of the **showcontrollere1**, **showcontrollert1,showcontrollert3**, and**showrunning-config**EXEC commands.

Examples

The following example shows how to add a description for a 3174 controller:

```
Router(config)# controller t1
Router(config-controller)# description 3174 Controller for test lab
```

Related Commands

Command	Description
show controllers e1	Displays information about the E1 links supported by the NPM (Cisco 4000) or MIP (Cisco 7500 series).
show controllers t1	Displays information about the T1 links.
show controllers t3	Displays information about the CT3IP on Cisco 7500 series routers.

description (interface configuration)

To add a description to an interface configuration, use the **description** command in interface configuration mode. To remove the description, use the **no**form of this command.

description *string*
no description

Syntax Description

string	Comment or a description to help you remember what is attached to this interface. This string is limited to 238 characters.

Command Default

No description is added.

Command Modes

Interface configuration

Command History

Release	Modification
9.21	This command was introduced.

Usage Guidelines

The **description** command is meant solely as a comment to be put in the configuration to help you remember what certain interfaces are used for. The description appears in the output of the following EXEC commands:**morenvram:startup-config**, **showinterfaces**, and**moresystem:running-config**

Examples

The following example shows how to add a description for a T1 interface:

```
interface serial 0
 description Fractional T1 line to remote office -- 128 kbps
```

Related Commands

Command	Description
more nvram:startup-config	Displays the startup configuration file contained in NVRAM or specified by the CONFIG_FILE environment variable.
more system:running-config	Displays the running configuration.
show interfaces	Displays statistics for all interfaces configured on the router or access server.

diagnostic level

To turn on power-on diagnostic tests for the network service engines (NSEs) installed in a Cisco 7300 series router, use the **diagnostic level** command in privileged EXEC configuration mode. There is no **no** form of this command.

diagnostic level {**power-on** | **bypass**}

Syntax Description

power-on	Power-on diagnostic tests are performed at system bootup on the NSEs.
bypass	No diagnostic tests are performed. This is the default.

Command Default

No diagnostic tests are performed.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(10)EX2	This command was introduced.
12.2(18)S	This command was introduced on Cisco 7304 routers running Cisco IOS Release 12.2 S.
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

Use this command to enable power-on diagnostic tests to run on the installed NSEs of a Cisco 7300 series router when the system is booted. It is recommended that you issue this command only if you are experiencing problems with an NSE and are planning on rebooting the router. Issuing this command causes an increase in the boot time.

Examples

The following example shows how to enable diagnostic power-on tests:

```
diagnostic level power-on
```

The following sample output shows the output that is displayed upon system bootup after a power cycle or router crash:

```
.
.
.
System Power On Diagnostics
DRAM Size .....................128 MB
Testing DRAM...................Passed
Level2 Cache ..................Present
Testing Level2 Cache (256  KB)Passed
Level3 Cache ..................Present
Testing Level3 Cache (1024 KB)Passed
System Power On Diagnostics Complete
```

Note This output is displayed when the system is booting, not when the command is issued.

Related Commands

Command	Description
debug redundancy	Enables NSE redundancy debugging.
show c7300	Displays the types of cards (NSE and line cards) installed in a Cisco 7300 series router.
show redundancy (7300)	Displays redundancy information for the active and standby NSEs.

dial-tdm-clock

To configure the clock source and priority of the clock source used by the time-division multiplexing (TDM) bus on the dial shelf of the Cisco AS5800, use the **dial-tdm-clock** command in global configuration mode. To return the clock source and priority to the default values, use the **no** form of this command.

dial-tdm-clock priority *number* {**external** {**e1** | **t1**} [**120ohm**] | **freerun** | **trunk-slot** *slot* **port** *port*} [**line** {**0** | **1**}]
no dial-tdm-clock priority *number* {**external** {**e1** | **t1**} [**120ohm**] | **freerun** | **trunk-slot** *slot* **port** *port*} [**line** {**0** | **1**}]

Syntax Description

priority *number*	Specifies the priority of the clock source. The range is from 1 to 50. Priority 1 is the highest priority, and 50 is the lowest.
external	Specifies the priority of an external clock source. The external clock source is connected to the front panel of the Dial Shelf Controller (DSC) card.
e1 | **t1**} [**120ohm**]	Specifies priority of the E1 (2.048 MHz) or T1 (1.54 MHz) external clock source. The default value of the external coaxial cable impedance is 75 ohm. Specify the **120ohm**option if a 120 ohm coaxial cable is connected.
freerun	Specifies the priority of the local oscillator clock source.
trunk-slot *slot*	Specifies the priority of the trunk card to provide the clock source. The slot number is from 0 to 5 (these are the only slots capable of providing clock sources).
port *port*	Specifies the controller number on the trunk used to provide the clock source. The port number is from 0 to 28. The T1 and E1 trunk cards each have 12 ports. The T3 trunk card has 28 ports.
line {**0** | **1**	(Optional) Specifies the optical port. If the physical optical port is 0, the**line** value is also 0.

Command Default

If no clock sources are specified, the software selects the first available good clock source on a trunk port.

Command Modes

Global configuration

Command History

Release	Modification
11.3(2)AA	This command was introduced.
12.2(15)T	The **line** keyword 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 train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The TDM bus in the backplane on the dial shelf must be synchronized to the T1/E1 clocks on the trunk cards. The DSC card on the dial shelf provides hardware logic to accept multiple clock sources as input and use one

of them as the primary source to generate a stable, PPL synchronized output clock. The input clock can be any of the following sources:

- Trunk port in slots 0 through 5 (up to 12 can be selected (two per slot)
- An external T1 or E1 clock source fed directly through a connector on the DSC card
- A free running clock from an oscillator in the clocking hardware on the DSC card

The clock commands are listed in the configuration file with the highest priority listed first.

If the current primary clock source is good, specifying another clock source of higher priority does not cause the clock source to switch to the higher priority clock source. The new higher priority clock source is used as a backup clock source. This prevents switching of the clock source as you enter multiple dial-tdm-clock priority configuration commands in random order. Also, it is important not to disturb the existing clock source as long as it is good. To force the new higher priority clock source to take over from a currently good primary clock source, configure the new clock source and use the **no** dial-tdm-clock priority command to remove the current primary clock source.

To display the current primary and backup clocks along with their priorities, use the **showdial-shelfclocks**EXECcommand.

Examples

In the following example, an external clock source is set at priority 1 and the trunk card in slot 4, port 1 is set at priority 5:

```
Router(config)# dial-tdm-clock priority 1 external t1
Router(config)# dial-tdm-clock priority 5 trunk-slot 4 port 1
Router(config)# exit
```

Related Commands

Command	Description
show dial-shelf	Displays information about the dial shelf, including clocking information.

dot1q tunneling ethertype

To define the Ethertype field type used by peer devices when implementing Q-in-Q VLAN tagging, use the **dot1qtunnelingethertype**command in interface configuration mode. To remove the VLAN tag Ethertype, use the **no** form of this command.

no dot1q tunneling ethertype{*0x88A8 0x9100 0x9200*}
no dot1q tunneling ethertype

Syntax Description

0x88A8 |0x9100|0x9200	Type of Ethertype field.

Command Default

The Ethertype field used by peer devices when implementing Q-in-Q VLAN tagging is 0x8100.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(7)T	This command was introduced.
12.3(7)XI1	This command was implemented on the Cisco 10000 series routers.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRC	This command was integrated into Cisco IOS Release 12.2(33)SRC.
Cisco IOS XE Release 2.2	This command was integrated into Cisco IOS XE Release 2.2.

Usage Guidelines

Use the **dot1qtunnelingethertype** command if the peer switching devices are using an Ethertype field value of 0x9100 or 0x9200. All Cisco switching devices use the default Ethertype field value of 0x88A8. The Cisco 10000 series router also supports the 0x9200 Ethertype field value.

Note On the Cisco 10000 series router, the Ethertype field for the outer VLAN ID can be changed, but the Ethertype field for the inner VLAN ID cannot be changed.

This command is used with the IEEE 802.1Q-in-Q VLAN Tag Termination feature in which double VLAN tagging is configured using the **encapsulationdot1q** command. 802.1Q double tagging allows a service provider to use a single VLAN to support customers who have multiple VLANs.

Examples

The following example shows how to configure an Ethertype field as 0x9100:

```
Router(config
)
# interface gigabitethernet 1/0/0
Router(config
-if)#
 dot1q tunneling ethertype 0x9100
```

The following example shows how to configure an Ethertype field as 0x9200 on a Cisco 10000 series router:

```
Router(config)# interface gigabitethernet 1/0/0
Router(config-if)# dot1q tunneling ethertype 0x9200
```

Related Commands

Command	Description
encapsulation dot1q	Enables 802.1Q encapsulation of traffic on a specified subinterface or range of subinterfaces.
interface	Configures an interface and enters interface configuration mode.

down-when-looped

To configure an interface to inform the system that it is down when loopback is detected, use the **down-when-looped**command in interface configuration mode.

down-when-looped

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

This command is valid for High-Level Data Link Control (HDLC) or PPP encapsulation on serial and High-Speed Serial Interface (HSSI) interfaces.

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

Note

- This command cannot be enabled when default speed or 1000BaseT advertisement is enabled on the GMII interface.
- 1000BaseT advertisement cannot be configured when down-when-looped is enabled.

Backup Interfaces

When an interface has a backup interface configured, it is often desirable that the backup interface be enabled when the primary interface is either down or in loopback. By default, the backup is enabled only if the primary interface is down. By using the **down-when-looped** command, the backup interface will also be enabled if the primary interface is in loopback.

Testing an Interface with the Loopback Command

If testing an interface with the loopback command, or by placing the DCE into loopback, the **down-when-looped** command should not be configured; otherwise, packets will not be transmitted out the interface that is being tested.

Examples

The following example shows how to configure interface serial 0 for HDLC encapsulation. The interface is then configured to let the system know that it is down when in loopback mode.

```
Router(config)# interface serial0
```

```
Router(config-if)# encapsulation hdlc
Router(config-if)# down-when-looped
```

Related Commands

Command	Description
backup interface	Configures an interface as a secondary or dial backup interface.
loopback (E3 controller)	Diagnoses equipment malfunctions between an interface and a device.

ds0-group (J1 controller)

To configure channelized J1 time slots, use the**ds0-group**commandincontroller configuration mode. To remove the DS0 group, use the**no** form of this command.

ds0-group *ds0-group-no* **timeslots** *timeslot-list* **type** *external-signaling*
no ds0-group *ds0-group-no* **timeslots** *timeslot-list* **type** *external-signaling*

Syntax Description

ds0-group-no	Specifies the DS0 group number.
timeslots *timeslot-list*	Specifies the DS0 time slot range of values from 1 to 31 for J1 interfaces. Time slot 16 is reserved for signaling.
type *external-signaling*	Specifies that the signaling traffic comes from an outside source. The signaling method selection for type depends on the connection that you are making.

Command Default

No DS0 group is defined.

Command Modes

Controller configuration

Command History

Release	Modification
11.2	This command was originally the **cas-group** command.
12.0(1)T	The **cas-group** command was introduced for the Cisco 3600 series.
12.0(5)XE	The command was renamed**ds0-group** on the Cisco AS5300 and on the Cisco 2600 and Cisco 3600 series.
12.0(7)T	The command was integrated into the Cisco IOS Release 12.0(7)T.
12.2(8)T	The command was introduced as a J1 configuration command for the Cisco 2600 and Cisco 3600 series.

Usage Guidelines

The ds0-group command replaces the existing cas-group command. Making the command generic allows flexibility and scalability. It is not restricted to channel associated signaling (CAS) or channel bundling.

The **ds0-group** command automatically creates a logical voice port that is numbered as follows on Cisco 2600 and Cisco 3600 series routers: *slot*/*port***:***ds0-group-no*. Although only one voice port is created for each group, applicable calls are routed to any channel in the group.

Examples

The following example is sample output from the **showcontrollersj1**command on the Cisco 3660 series after channelized J1 time slots have been configured:

```
Router(config-controller)# ds0-group 1 timeslots 1-15,17-31 type e&m-wink-start

Router(config-controller)# end
Router# show controllers j1
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(1), cp
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(2), cp
```

```
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(3), cp
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(4), cp
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(5), cp
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(6), cp
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(7), cp
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(8), cp
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(9), cp
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(10), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(11), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(12), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(13), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(14), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(15), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(17), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(18), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(19), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(20), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(21), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(22), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(23), p
*Mar  1 03:12:26.259: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(24), p
*Mar  1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(25), p
*Mar  1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(26), p
*Mar  1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(27), p
*Mar  1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(28), p
*Mar  1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(29), p
*Mar  1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(30), p
*Mar  1 03:12:26.263: %LINK-3-UPDOWN: Interface recEive and transMit3/0:0(31), p
```

Related Commands

Command	Description
ds0 busyout	Busyouts one or more signal level 0s (DS0s).

dsl-group

To create and configure a digital subscriber line (DSL) group, and enter config-controller-dsl-group mode, or to automatically configure an ATM group, use the **dsl-group**command in configuration controller mode. To disable the DSL group, use the **no** form of this command.

dsl-group [**pairs**] [{[*number*] **pairs** *link-number* | **auto** [{**default** | **exit** | **no** | **shdsl** {**4-wire** | **annex**}}]}] [**efm-bond**]
no dsl-group [**pairs**] [{[*number*] **pairs** *link-number* | **auto** [{**default** | **exit** | **no** | **shdsl** {**4-wire** | **annex**}}]}] [**efm-bond**]

Syntax Description

pairs	(Optional) Defines the DSL wire pairs.
number	(Optional) DSL group number. The DSL group number can be one of the following numbers: • 0 • 1
efm-bond	(Optional) Defines the DSL group as Ethernet First Mile (EFM) group bonding group.

link-number	(Optional) Link number of the pair. Link number options are limited to one of the following choices, based on the hardware interface and the desired DSL group: **HWIC-4SHDSL-E** EFM-bond DSL Group • 0 • 1 • 2 • 3 • Any combination of the numbers 0, 1, 2, and 3 1-Pair DSL Group • 0 • 1 • 2 • 3 In the case of 1-pair DSL group (2-wire), only one pair needs to be configured. **HWIC-4SHDSL** IMA DSL Group • 0 • 1 • 2 • 3 • Any combination of the numbers 0, 1, 2, and 3

	M-Pair DSL Group • 0-1 • 0-2 • 0-3 2-Pair DSL Group • 0-1 • 2-3 1-Pair DSL Group • 0 • 1 • 2 **HWIC-2SHDSL** DSL Group 0 • 0 • 0-1 DSL Group 1 • 1
auto	(Optional) Automatically assigns the Central Office's (CO) wire configuration to an ATM DSL group on the Customer Premise Equipment (CPE).
default	(Optional) Sets a command to the default values.
exit	(Optional) Exits DSL group command mode.
no	(Optional) Negates a command or set its defaults.
shdsl	(Optional) Configures the symmetric g.shdsl.
4-wire	(Optional) Configures the 4-wire symmetric g.shdsl.
annex	(Optional) Configures the annex symmetric g.shdsl.

Command Default

No DSL group is defined or automatically configured.

Command Modes

Configuration controller (config-controller)

Configuration controller DSL group (config-controller-dsl-group)

Command History

Release	Modification
12.4(15)T	This command was introduced for the Cisco HWIC-4SHDSL and HWIC-2SHDSL running on the Cisco 1841 router and the Cisco 2800 and 3800 series access routers.
15.1(1)T	This command was modified to support automatic configuration of Cisco HWIC-4SHDSL and HWIC-2SHDSL running on the Cisco 1841 router and the Cisco 2800 and 3800 series access routers. Added **dsl-grouppairs***link-number* [**efm-bond**] for the Cisco HWIC-4SHDSL-E.
15.1(1)T1	This command was modified. The auto configuration options **default**,**exit**,**no**, and **shdsl**were added to the dsl-group.

Usage Guidelines

Use the **dsl-group** command in configuration controller mode to define the DSL group, and manually configure the DSL group from configuration controller DSL group mode. Use the **dsl-groupauto** command to automatically adopt the Central Office (CO) wire configuration on an ATM DSL group. Use the **dsl-grouppairs** to define the DSL group as Ethernet First Mile (EFM) group bonding group.

Note Automatic configuration is not supported on IMA groups.

Automatic configuration is limited to only one DSL group and ATM interface. After a group is automatically configured, no other group can be created. All manually created groups must be deleted before creating an automatic configuration group.

Examples

The following example shows how to use the dsl-group command to create an IMA-DSL group and enter configuration controller DSL group mode:

```
Router(config-controller)# dsl-group 1 pairs 0-1 ima
Router(config-controller-dsl-group)#
Sep 14 13:15:40.285:%HWIC_SHDSL-5-DSLGROUP_UPDOWN: SHDSL 0/2/0 dsl-group(1) state changed
to down.
Sep 14 13:15:42.285:%LINK-3-UPDOWN: Interface ATM0/2/IMA1, changed state to down
Sep 14 13:15:43.285:%LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/2/IMA1, changed
state to down
```

The following example shows how to use the dsl-group auto command to automatically adopt the Central Office (CO) configuration on an ATM group:

```
Router(config-controller)# dsl-group auto
Router(config-controller-dsl-group-auto)#
*May 14 18:56:33.136: %HWIC_SHDSL-5-DSLGROUP_UPDOWN: SHDSL 0/0/0 dsl-group(0) state changed
 to down.
*May 14 18:56:35.136: %LINK-3-UPDOWN: Interface ATM0/0/0, changed state to down
*May 14 18:56:36.136: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/0,
changed state to down
```

The following example shows how to configure a single-pair DSL group and enters the configuration controller DSL group mode:

```
Router(config-controller)# dsl-group pairs 0
Router(config-controller-dsl-group)#
```

The following example shows how to create a 4-pair EFM bonding group:

```
Router(config-controller)# dsl-group pairs 0-3 efm-bond
Router(config-controller-dsl-group)#
```

Related Commands

Command	Description
controller shdsl	Configures a controller for SHDSL mode and enters configuration controller mode.
ima group	Defines physical links as IMA group members.
ima group clock-mode	Sets the clock mode for an IMA group.
ima link	Defines physical links in an IMA group.
shdsl 4-wire mode enhanced	Defines the SHDSL to use enhanced mode in a 2-pair DSL group.
shdsl annex	Defines the SHDSL G.991.2 standard.
shdsl rate	Defines the SHDSL rate.
show controller shdsl	Displays the status of the controller that is configured for SHDSL mode.

dsl-mode shdsl symmetric annex

To specify the operating mode of the digital subscriber line (DSL) controller, use the **dsl-mode shdsl symmetric annex**command in controller configuration mode.

To specify the line coding type of the DSL controller, use the **dsl-mode shdsl symmetric annex coding**command in controller configuration mode. To return the DSL to the default Annex A, use the **no** form of the command.

dsl-mode shdsl symmetric annex mode [**coding type**]
no dsl-mode shdsl symmetric annex mode [**coding type**]

Syntax Description

mode	Sets the DSL operating mode. The valid values are: • **a** : Supports Annex A of the G.991.2 standard for North America. This is the default. • **b** : Supports Annex B of the G.991.2 standard for Europe. • **a-b** : Supports Annex A or B. For CPE mode only. Not supported in CO mode. Selected when the line trains. • **a-b-anfp** : Supports Annex A or B-ANFP. For CPE mode only. Not supported in CO mode. Selected when the line trains. • **b-anfp** : Supports Annex B-ANFP. • f: Supports Annex F, 2-wire mode, line 0 only. • f-g: Supports Annex F-G, 2-wire mode, line 0 only. • g: Supports Annex G, 2-wire mode, line 0 only.
coding	TCPAM line coding.
Type	The valid values are: • 16bit-TCPAM: Sets the line coding to16 bit-TCPAM. • 32bit-TCPAM: Sets the line coding to 32 bit-TCPAM. • AUTO-TCPAM: Detects the central office coding type.

The annex defaults to A for North America.

Command Modes

Controller configuration (config-controller)

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 the Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.

Release	Modification
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
12.3(11)T	Support for the following additional annex parameters was integrated into Cisco IOS Release 12.3(11)T to support Cisco 1700, Cisco 2600, Cisco 2800, Cisco 3700, and Cisco 3800 series routers: • **b** • **a-b** • **a-b-anfp** • **b-anfp**
12.3(14)T	This command was implemented on Cisco 1800 series routers.
12.4(15)T	Support for the following additional annex parameters was integrated into Cisco IOS Release 12.X(X)T to support Cisco to support Cisco 1700, Cisco 2600, Cisco 2800, Cisco 3700, and Cisco 3800 series routers: • f • f-g • g
12.4(20)T	Support for **coding** *type* parameters was added.

Usage Guidelines

This command is used to configure the DSL controller interface to operate in a specified DSL mode and to set regional operating parameters. The **shdsl** keyword is used to set the mode to SHDSL and configures multirate, high-speed DSL per ITU G.991.2. The **symmetric** keyword configures the controller to symmetric mode. The **annex** keyword configures the controller to use regional operating parameters. The regional operating parameters default to North America. The coding keyword configures the controller Trellis Encoded Pulse Amplitude Modulation (TCPAM) line coding type.

Examples

The following example displays the use of the **controller dsl 0/0**commandto configure the controller in the router configured on the central office (CO) side. Use the **dsl-mode shdsl symmetric annex b**command to configure the controller for multirate, high-speed DSL with symmetric mode for European operating parameters.

```
Router# configure terminal

Router(config)# controller dsl 0/0
Router(config-controller)# line-term co
Router(config-controller)# dsl-mode shdsl symmetric annex b
Router(config-controller)# mode atm
Router(config-controller)#
00:22:07: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to down
Router(config-controller)# line-mode 4-wire
00:23:25: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
00:23:31: %LINK-3-UPDOWN: Interface ATM0/0, changed state to up
00:23:32: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0, changed state to up
```

The following example uses the **dsl-mode shdsl symmetric annex command to configure the controller for 2-wire line 0, annex F, AUTO-TCPAM line coding.**

```
Router> enable
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# controller dsl 0
Router(config-controller)# line-mode 2-wire line-zero
Router(config-controller)# dsl-mode shdsl symmetric annex f coding ?
 16bit-TCPAM  16bit-TCPAM line coding
 32bit-TCPAM  32bit-TCPAM line coding
 AUTO-TCPAM   AUTO-TCPAM line coding
Router(config-controller)# dsl-mode shdsl symmetric annex f coding auto-tcpam
Router(config-controller)#
Router#
```

Related Commands

Command	Description
controller dsl	Configures the DSL controller.

dsu bandwidth

To specify the maximum allowable bandwidth used by a T3 or E3 controller or the PA-T3 and PA-E3 port adapters, use the **dsubandwidth**command in interface configuration mode. To return to the default bandwidth, use the **no** form of this command.

dsu bandwidth *kbps*
no dsu bandwidth

Syntax Description

kbps	Maximum bandwidth, in kbps. Range is from 22 to 44736. Default values are as follows: • 34,010 for E3 or PA-E3 • 44,210 for T3 • 44,736 for PA-T3 • 34,368 kbps for E3 on a Cisco_10000 Series Router • 44,210 kbps for T3 on a Cisco_10000 Series Router

Command Default

34,010 kbps

44,210 kbps

44,736 kbps

34,368 kbps for E3

44,210 kbps for T3

Command Modes

Interface configuration

Command History

Release	Modification
11.1CA	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: 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.
12.2(31)SB	This command was integrated into Cisco IOS Release 12.2(31)SB.
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

Local and Remote Bandwidths

The local interface configuration must match the remote interface configuration. For example, if you reduce the maximum bandwidth to 16,000 on the local port, you must also do the same on the remote port.

The **dsubandwidth**command reduces the bandwidth by padding the E3 and T3 frame.

Verifying DSU Bandwidth

To verify the data service unit (DSU) bandwidth configured on the interface, use the show interfaces serial user EXEC command.

G.751 Framing

When G.751 framing is used, DSU bandwidth can be used to select a payload subrate from 34,010 kbps down to 22 kbps. Before framing bypass can be used, a DSU bandwidth of 34,010 kbps must be configured.

Continuous Range of Bandwidth

Even though Cisco_IOS software allows you to configure a continuous range of bandwidths in subrate modes, vendors support bandwidths only in quantums (for example, in an E3 digital link, bandwidth must be in multiples of 358 kbps). Therefore, the software sets the user-configured bandwidth to the closest vendor-supported bandwidth. Use the show interfaces serial slot/port command to display the actual bandwidth that is configured.

Subrates

The user-configured subrate mode, subrate bandwidth, actual subrate bandwidth configured, and scramble configuration are displayed near the end of the show interfaces serial command output.

DSU Modes and Vendor-Supported Bandwidths

The following table shows DSU modes and vendor-supported bandwidths.

Mode	DSU	Bandwidth Range	Bandwidth Multiples
0	Digital Link or Cisco	358-34,010 kbps for E3 300-44,210 kbps for T3	358 kbps 300.746 kbps
1	ADC Kentrox T3/E3 IDSU	1000-34,010 kbps for E3 1500-44,210 kbps for T3	500 kbps 500 kbps
2	Larscom Access T45	3100-44,210 kbps	3158 kbps
3	Adtran T3SU 300	75-44,210 kbps	75.186 kbps
4	Verilink HDM 2182	1500-44,210 kbps	1579 kbps

Examples

The following example sets the maximum allowable DSU bandwidth to 16,000 kbps on interface 1/0/0:

```
Router(config)# interface serial 1/0/0
Router(config-if)# dsu bandwidth 16000
```

The following example shows the user-configured subrate bandwidth and the actual configured subrate bandwidth as displayed in the output of the show interfaces serial command:

```
Router# show interfaces serial
Serial1/0 is up, line protocol is up
```

```
 Hardware is DSXPNM Serial
 MTU 1500 bytes, BW 44210 Kbit, DLY 20000 usec,
    reliability 253/255, txload 1/255, rxload 1/255
 Encapsulation HDLC, crc 16, loopback not set
 Keepalive not set
 DTR is pulsed for 0 seconds on reset, Restart-Delay is 1637167 secs
 Last input 04:59:04, output 04:59:04, output hang never
 Last clearing of "show interface" counters 00:00:02
 Input queue:0/75/0/0 (size/max/drops/flushes); Total output drops:0
 Queueing strategy:fifo
 Output queue :0/40 (size/max)
 5 minute input rate 0 bits/sec, 0 packets/sec
 5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
DSU mode 0, bandwidth 34010, real bandwidth 34010, scramble 0
```

Related Commands

Command	Description
show interfaces serial	Displays information that is specific to the interface hardware.

dsu mode

To specify the interoperability mode used by a T3 or E3 controller or the PA-T3 and PA-E3 port adapters, use the **dsumode**command in interface configuration mode. To return to the default mode, use the **no** form of this command.

dsu mode {**0** | **1** | **2** | **3** | **4**}
no dsu mode

Cisco 10000 Series Router
dsu mode {**adtran** | **cisco** | **digital-link** | **kentrox** | **larscom** | **verilink-highbit** | **verilink-lowbit**}
no dsu mode

Syntax Description

0	Sets the interoperability mode to 0. This is the default. • Specify mode 0 to connect an E3 controller to another E3 controller or to a Digital Link data service unit (DSU) DL3100. • Specify mode 0 to connect a PA-E3 port adapter to another PA-E3 port adapter or to a DL3100. • Specify mode 0 to connect a PA-T3 port adapter to another PA-T3 port adapter or to a DL3100.
1	Sets the interoperability mode to 1. Specify mode 1 to connect an E3 or T3 controller or a PA-E3 or PA-T3 port adapter to a Kentrox DSU.
2	Sets the interoperability mode to 2. Specify mode 2 to connect a T3 controller or a PA-T3 port adapter to a Larscom DSU.
3	Sets the interoperability mode to 3. Specify mode 3 to connect a T3 controller to an Adtran T3SU 300.
4	Sets the interoperability mode to 4. Specify mode 4 to connect a T3 controller to a Verilink HDM 2182.
adtran	Connects a T3 interface to an Adtran DSU.
cisco	Connects an E3 or T3 interface to a Cisco DSU.
digital-link	Connects an E3 or T3 interface to a Digital Link DSU.
kentrox	Connects an E3 or T3 interface to a Kentrox DSU.
larscom	Connects a T3 interface to a Larscom DSU.
verilink-highbit	Connects a T3 interface to a Verilink High Bit DSU.
verilink-lowbit	Connects a T3 interface to a Verilink Low Bit DSU.

Command Default

0

cisco

Command Modes

Interface configuration

Command History

Release	Modification
11.1CA	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 and T3 controllers: 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.
12.2(31)SB	This command was integrated into Cisco IOS Release 12.2(31)SB.
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

Scrambling Support in DSU Mode 1

DSU mode 1 refers to Kentrox mode. If DSU mode is used on a T3 serial interface and the bandwidth is greater than or equal to 35,000 bits per second (bps), the scrambling option is not supported. Likewise, if DSU mode 1 is used for an E3 serial interface and the bandwidth is greater than or equal to 24,510 bps, scrambling is not supported.

Match Local and Remote DSU Configurations

The local interface configuration must match the remote interface configuration. For example, if you define the DSU interoperability mode as 1 on the local port, you must also do the same on the remote port.

Know the DSU Type

You must know what type of DSU is connected to the remote port to determine if it interoperates with an E3 or T3 controller or a PA-E3 or PA-T3 port adapter. The **dsumode** command enables and improves interoperability with other DSUs.

Verify DSU Mode

To verify the DSU mode configured on the interface, use the **showcontrollersserial** or **showinterfacesserial** user EXEC commands.

Cisco 10000 Series Router

Only Cisco, Digital Link, and Kentrox DSUs are supported on E3 interfaces.

Examples

Setting DSU Mode

The following example sets the DSU mode to 1 on interface 1/0/0:

```
Router(config)# interface serial 1/0/0
Router(config-if)# dsu mode 1
```

Serial Interface in DSI Mode 1

The following example shows the configuration for a serial interface configured in DSU mode 1. The bandwidth is set higher than that supported by the Kentrox firmware allows for scrambling. therefore, the scrambling option is not supported in this configuration.

```
Router(config
)#
 interface serial 1/0/0
Router(config-if)# mtu 4474
Router(config-if)# ip address 192.168.93.114 255.255.255.252
Router(config-if)# ip mtu 4470
Router(config-if)# dsu mode 1
Router(config-if)# dsu bandwidth 44210
```

Cisco 10000 Series Router

The following example sets the DSU mode to cisco:

```
Router(config)# interface serial 1/0/0
Router(config-if)# dsu mode cisco
```

Related Commands

Command	Description
show controllers	Displays information about the controllers.
show interfaces	Displays statistics for all interfaces configured on the router.

dte-invert-txc

To invert the transmit external clock (TXC) signal received from the DCE when the device is operating as a DTE, use the **dte-invert-txc** command in interface configuration mode. If the DCE accepts serial clock transmit external (SCTE) signal when the device is operating as a DTE, use the **no** form of this command.

dte-invert-txc
no dte-invert-txc

Syntax Description

This command has no arguments or keywords.

Command Default

The TXC signal is not inverted.

Command Modes

Interface configuration

Command History

Release	Modification
9.1	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

Use this command if the DCE cannot receive SCTE from the DTE, the data is running at high speeds, and the transmission line is long. The **dte-invert-txc** command prevents phase shifting of the data with respect to the clock.

On the Cisco 4000 series, you can specify the serial Network Processor Module timing signal configuration. When the board is operating as a DTE, the **dte-invert-txc** command inverts the TXC clock signal it gets from the DCE that the DTE uses to transmit data.

If the DCE accepts SCTE from the DTE, use **nodte-invert-txc**.

Examples

The following example inverts the TXC on serial interface 0:

```
Router(config)# interface serial 0
Router(config-if)# dte-invert-txc
```

duplex

To configure the duplex operation on an interface, use the **duplex** command in interface configuration mode. To return to the default configuration, use the **no** form of this command.

duplex {**full** | **half** | **auto**}
no duplex

Syntax Description

full	Specifies full-duplex operation.
half	Specifies half-duplex operation.
auto	Enables autonegotiation. The interface automatically operates at half-duplex or full-duplex mode depending on environmental factors, such as the type of media and the transmission speeds for the peer routers, hubs, and switches used in the network configuration.

Command Default

Half-duplex mode is enabled.

For the 4-port 10/100 Fast Ethernet Shared Port Adapter (SPA) and the 2-port 10/100/1000 Gigabit Ethernet SPA on the Cisco 7304 router, autonegotiation is enabled. The command is set to **auto**.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
11.2(10)P	This command was introduced.
12.2S	This command was integrated into Cisco IOS Release 12.2S.
12.2(14)SX	This command was implemented on the Supervisor Engine 720.
12.2(17d)SXB	This command was integrated into Cisco IOS Release 12.2 SXB.
12.2(20)S2	This command was implemented on the 4-port 10/100 Fast Ethernet SPA and the 2-port 10/100/1000 Gigabit Ethernet SPA on the Cisco 7304 router.
Cisco IOS XE Release 3.9S	This command was integrated into Cisco IOS XE Release 3.9S.
15.2(02)SA	This command was implemented on the Cisco ME 2600X Series Ethernet Access Switches.

Usage Guidelines

To use the autonegotiation capability (that is, to automatically detect speed and duplex modes), you must set both the **speed** command and the **duplex** command to **auto**.

Cisco Cloud Services Router 1000V Series

Cisco Cloud Services Router 1000V Series does not support the **duplex** command.

Duplex Options and Interfaces

The table below lists the supported command options by interface type.

Table 1: Supported Duplex Command Options

Interface Type	Supported Syntax	Default Setting	Usage Guidelines
10/100-Mbps module	**duplex** [**half** | **full**]	See the "Usage Guidelines" column.	Run the **no duplex auto** command to set the speed to **auto**. If the speed is set to **10** or **100**, without configuring the duplex setting, the duplex is set to **half**.
100-Mbps fiber modules	**duplex** [**half** | **full**]	**half**	
Gigabit Ethernet interfaces	**duplex full**	**full**	
10-Mbps ports	**duplex** [**half** | **full**]	**half**	

If the transmission speed on a 16-port RJ-45 Gigabit Ethernet port is set to 1000, the duplex mode is set to full. If the transmission speed is changed to 10 or 100, the duplex mode stays at half duplex. You must configure the correct duplex mode when the transmission speed is changed to 10 or 100 from 1000.

Gigabit Ethernet is full duplex only. You cannot change the mode on Gigabit Ethernet ports.

When manually configuring the interface speed to either 10 or 100-Mbps, you should also configure the duplex mode on the interface.

Caution Changing the interface speed and duplex mode configuration might shut down and reenable the interface during reconfiguration.

4-Port 10/100 Fast Ethernet SPA and 2-Port 10/100/1000 Gigabit Ethernet SPA on the Cisco 7304 Router

The **duplex** command is applied to the SPA interfaces that use the RJ-45 media. Gigabit Ethernet interfaces using fiber media support full-duplex mode only and use the **negotiation** command to enable and disable autonegotiation.

To enable the autonegotiation capability on an RJ-45 interface, you must set either the **speed** command or the **duplex** command to **auto**. The default configuration is that both commands are set to **auto**.

Note For the Cisco AS5300, the **duplex** {**full** | **half** | **auto**} command syntax replaces the **duplex** commands—**half-duplex** and **full-duplex**. Cisco 7600 series routers can automatically negotiate the interface speed and the duplex mode only if one of the connected interfaces are configured to **auto**.

The table below describes the interface behavior for different combinations of the **duplex** and **speed** command settings. The specified **duplex** command configured with the specified **speed** command produces the resulting system action.

If you specify both **duplex** and **speed** settings other than **auto** on an RJ-45 interface, autonegotiation is disabled for the interface.

Note If you need to force an interface port to operate with certain settings and, therefore, need to disable autonegotiation, you must be sure that the remote link is configured with compatible link settings for proper transmission including the support of flow control on the link.

Note Every interface on a 4-port 10/100 Fast Ethernet SPA supports transmission of pause frames to stop packet flow when the Modular Services Card (MSC) is full. You cannot disable flow control for an interface on the 4-port 10/100 Fast Ethernet SPA. Hence, the flow control support is not configurable, but it is advertised during autonegotiation. If you disable autonegotiation, you must be sure that the remote device is configured to support flow control because flow control is automatically enabled for all interfaces on the 4-port 10/100 Fast Ethernet SPA.

Table 2: Relationship Between duplex and speed Commands

duplex Command	speed Command	Resulting System Action
duplex auto	**speed auto**	Autonegotiates both speed and duplex modes. The interface advertises the capability for the following link settings: • 10 Mbps and half duplex • 10 Mbps and full duplex • 100 Mbps and half duplex • 100 Mbps and full duplex • 1000 Mbps and half duplex • 1000 Mbps and full duplex
duplex auto	**speed 10** or **speed 100** or **speed 1000**	Autonegotiates the duplex mode. The interface advertises the capability for the configured speed with the capability for both half-duplex or full-duplex mode. For example, if the **speed 100** command is configured with **duplex auto**, then the interface advertises the following capability: • 100 Mbps and half duplex • 100 Mbps and full duplex

duplex Command	speed Command	Resulting System Action
duplex half or **duplex full**	**speed auto**	Autonegotiates the speed. The interface advertises the capability for duplex mode for Fast Ethernet interfaces at a speed of 10-Mbps and 100-Mbps, and Gigabit interfaces at 10-Mbps, 100-Mbps, and 1000-Mbps. For example, if the **duplex full** command is configured with the **speed auto** command, then the interface advertises the following capability: • 10 Mbps and full duplex • 100 Mbps and full duplex • 1000 Mbps and full duplex (Gigabit Ethernet interfaces only)
duplex half	**speed 10**	Forces 10-Mbps speed and the half-duplex operation, and disables autonegotiation on the interface.
duplex full	**speed 10**	Forces a speed of 10-Mbps and the full-duplex operation, and disables autonegotiation on the interface.
duplex half	**speed 100**	Forces a speed of 100-Mbps and the half-duplex operation, and disables autonegotiation on the interface.
duplex full	**speed 100**	Forces a speed of 100-Mbps and the full-duplex operation, and disables autonegotiation on the interface.
duplex half	**speed 1000**	Forces a speed of 1000-Mbps and the half-duplex operation, and disables autonegotiation on the interface (Gigabit Ethernet only).
duplex full	**speed 1000**	Forces a speed of 1000-Mbps and the full-duplex operation, and disables autonegotiation on the interface (Gigabit Ethernet only).

Examples

The following example shows how to configure a full-duplex operation on a Cisco AS5300 router:

```
Device(config)# interface fastethernet 0
Device(config-if)# duplex full
```

The following example shows how to specify the advertisement of only half-duplex support and either 10-Mbps or 100-Mbps capability during autonegotiation for the second interface (port 1) on the SPA located in the bottom subslot (1) of the MSC that is installed in slot 2 of the Cisco 7304 router:

```
Device# configure terminal
Device(config)# interface fastethernet 2/1/1
Device(config-if)# duplex half
Device(config-if)# speed auto
```

With this configuration, the interface advertises the following capabilities during autonegotiation:

- 10 Mbps and half duplex
- 100 Mbps and half duplex

Note Flow control support is always advertised when autonegotiation is enabled.

Related Commands

Command	Description
interface	Configures an interface and enters interface configuration mode.
interface fastethernet	Selects a particular Fast Ethernet interface for configuration.
interface gigabitethernet	Selects a particular Gigabit Ethernet interface for configuration.
show controllers	Displays information that is specific to the hardware on a module.
show controllers fastethernet	Displays Fast Ethernet interface information, transmission statistics, and errors, and the applicable MAC destination address and VLAN filtering tables.
show controllers gigabitethernet	Displays Gigabit Ethernet interface information, transmission statistics, and errors, and the applicable MAC destination address and VLAN filtering tables.
show interfaces	Displays traffic that is seen by a specific interface.
show interfaces fastethernet	Displays information about Fast Ethernet interfaces.
show interfaces gigabitethernet	Displays information about Gigabit Ethernet interfaces.
speed	Sets the port speed for a Fast Ethernet interface.

dxi interface-dfa

To specify a map command for a point to point serial interface, use the Data Exchange Interface (dxi) command **dxiinterface-dfa** in interface configuration mode. To deletct the map command, use the **no** form of this command.

dxi interface-dfa *vpi-number vci* [{**snap** | **mux**}]
no dxi interface-dfa *vpi-number vci*

Syntax Description

vpi-number	ATM network virtual path identifier (VPI) of the permanent virtual circuit (PVC), in the range from 0 to 15. The VPI is a 4-bit field in the header of the ATM DXI frame. The VPI value is unique only on a single interface, not throughout the ATM network, because it has local significance only. Both *vpi* and *vci* cannot be specified as 0; if one is 0, the other cannot be 0.
vci	ATM network virtual channel identifier (VCI) of this PVC, in the range from 0 to 63. The VCI is a 6-bit field in the header of the ATM DXI frame. The VCI value is unique only on a single interface, not throughout the ATM network, because it has local significance only. Both *vpi* and *vci* cannot be specified as 0; if one is 0, the other cannot be 0.
snap	(Optional) LLC/SNAP encapsulation based on the protocol used in the packet. This keyword defines a PVC that can carry multiple network protocols. This is the default.
mux	(Optional) Enables multiplex (mux) encapsulation.

Command Default

No map command is specified.

Command Modes

Interface configuration

Command Default

No map definition is established.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
12.4	This command was integrated into Cisco IOS Release 12.4.

Examples

The following example shows how to specify a map command.

```
Router(config)# interface serial 1
Router(config-if)# dxi interface-dfa 10
```

Related Commands

Command	Description
encapsulation atm-dxi	Enables ATM-DXI encapsulation.

Command	Description
dxi pvc	Configures multiprotocol or single protocol AMT-Data Exchange Interface (dxi) encapsulation.
dxi map	Maps a protocol address to a given virtual path identifier (VPI) and virtual channel identifier (VCI).
show dxi pvc	Displays the PVC statistics for a serial interface.
smds dxi	Enables Data Exchange Interface (dxi) version 2.2 support.

dxi pvc	Configures multiprotocol or single protocol AMT-Data Exchange Interface (dxi) encapsulation.

dxs3mode

To define the controller type as an E3 or T3 controller, use the dxs3mode command in controller configuration mode. To remove the controller, use the no form of this command.

dxs3mode [{**e3** | **t3**}]
no dxs3mode [{**e3** | **t3**}]

Syntax Description

e3	(Optional) Defines an E3 controller.
t3	(Optional) Defines a T3 controller.

Command Default

t3

Command Modes

Controller configuration

Command History

Release	Modification
12.2S	This command was introduced.

Examples

The following example defines a T3 controller:

```
Router(config
)
# controller dsx3 2/0/0
Router(config
-controller)
# dsx3mode t3
```

Related Commands

Command	Description
description	Adds a description to identify particulars about a controller.

e2-clockrate

To configure serial interface 0 for E2 (8 MHz full duplex) and to shut down the other three serial interfaces (1 to 3), use the **e2-clockrate** command in interface configuration mode. To disable the full duplex E2, use the **no** form of this command.

e2-clockrate
no e2-clockrate

Syntax Description

This command has no arguments or keywords.

Command Default

All interfaces are running.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(2)XD	This command was introduced.
12.0(3)T	This command was integrated into Cisco IOS Release 12.0(3)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

The **e2-clockrate** command is an interface configuration command and is seen only with **interfaceserial0**. When this command is used, serial interface 0 supports speeds up to E2 (8 MHz full duplex) and the other three serial interfaces (1 to 3) are put in the "shutdown" state. Also, running this command displays the following warning message:

```
Serial interface 0 is configured to support E2 rates and serial ports "1-3" are moved to
shutdown state
.
```

Examples

The following example shows sample display output for the **e2-clockrate** EXEC command.

```
Router(config-if)#
e2-clockrate
Interface Serial 0 is configured to support clockrates up to E2 (8Mbps)
Interfaces serial 1-3 will not be operational
```

Related Commands

Command	Description
clock rate	Configures the clock rate for the hardware connections on serial interfaces such as NIMs and interface processors to an acceptable bit rate.

early-token-release

To enable early token release on Token Ring interfaces, use the **early-token-release** command in interface configuration mode. To disable this function, use the **no** form of this command.

early-token-release
no early-token-release

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

Early token release is a method whereby the Token Ring interfaces can release the token back onto the ring immediately after transmitting, rather than waiting for the frame to return. This feature helps increase the total bandwidth of the Token Ring.

The Token Ring Interface Processor (TRIP) on the Cisco 7500 series routers and the Token Ring adapters on the Cisco 7200 series routers all support early token release.

Examples

The following example enables the use of early token release on Token Ring interface 1:

```
Router(config)# interface tokenring 1
Router(config-if)# early-token-release
```

The following example enables the use of early token release on the Token Ring interface processor in slot 4 on port 1 on the Cisco 7500 series routers:

```
Router(config)# interface tokenring 4/1
Router(config-if)# early-token-release
```

efm-grp

The efm-grp command is used to perform the necessary link operations (add, delete, and shutdown) of a single link after the creation of efm-bonding group. To perform the link operations in the efm-grp command, enter the config-controller-dsl-group mode. Use the no form of the command to shut down the related command.

efm-grp [{**add** | **delete** | **shutdown**}] **link** *link number*
no efm-grp [{**add** | **delete** | **shutdown**}] *link link number*

Syntax Description

link number	Designates the pairs link number.
add	Adds a link to the efm-bonding group.
delete	Deletes a link from the efm-bonding group
shutdown	Shuts down a link in the efm-bonding group.

Command Default

No default behavior or values.

Command Modes

Config-controller-dsl-group (config-controller-dsl-group)

Command History

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

Usage Guidelines

This command is used to add, delete, or shutdown a link in the efm-bond.

Examples

The following example shows how **efm-grp** command is used.

```
Router(config-controller-dsl-group)# efm-grp ?
add       Add a link to the EFM Bonding group
delete    Delete a link from the EFM Bonding group
shutdown  Shutdown a link in the EFM Bonding group
Router(config-controller-dsl-group)# efm-grp add ?
link  EFM Bonding group link configuration

Router(config-controller-dsl-group)# efm-grp add link ?
<0-3>  Link pair number
```

Related Commands

Command	Description
controller shdsl	Configures a controller for SHDSL mode and enters config-controller mode.
shdsl annex	Defines the SHDSL G.991.2 standard.
shdsl rate	Defines the SHDSL rate.
show controller shdsl	Displays the status of the controller that is configured for SHDSL mode.

eigrp interface

Note Effective with Cisco IOS Release 15.0(1)M, the **eigrp interface**command is replaced by the **dampening-change** command and the **dampening-interval** command. See the **dampening-change** and **dampening-interval**commands for more information.

To set a threshold value to minimize hysteresis in a router-to-radio configuration, use the **eigrp interface** command in interface configuration mode. To reset the hysteresis threshold to the default value, use the **no** form of this command.

eigrp *vmi-interface-number* **interface** [**dampening-change** *value*] [**dampening-interval** *value*]
no eigrp *vmi-interface-number* **interface** [**dampening-change** *value*] [**dampening-interval** *value*]

Syntax Description

vmi-interface-number	The number assigned to the VMI interface.
dampening-change *value*	(Optional) Value used to minimize the effect of frequent routing changes in router-to-radio configurations. Percent interface metric must change to cause update. Value range is 1 to 100.
dampening-interval *value*	(Optional) Specifies the time interval in seconds to check the interface metrics at which advertising of routing changes occurs. The default value is 30 seconds. Value range is 1 to 65535.

Command Default

Default for change-based dampening is 50 percent of the computed metric.

Default for interval-based dampening is 30 seconds.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.4(15)XF	This command was introduced.
12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
15.0(1)M	This command was replaced. This command was replaced by the **dampening-change**command and the **dampening-interval** command.

Usage Guidelines

This command advertises routing changes for EIGRP traffic only.

The REPLY sent to any QUERY will always contain the latest metric information. Exceptions which will result in immediate UPDATE being sent:

- A down interface
- A down route
- Any change in metric which results in the router selecting a new next hop

Change-based Dampening

The default value for the change tolerance will be 50% of the computed metric. It can be configured in the range from 0 to 100 percent. If the metric change of the interface is not greater (or less) than the current metric plus or minus the specified amount, the change will not result in a routing change, and no update will be sent to other adjacencies.

Interval-based Dampening

The default value for the update intervals is 30 seconds. It can be configured in the range from 0 to 64535 seconds. If this option is specified, changes in routes learned though this interface, or in the interface metrics, will not be advertised to adjacencies until the specified interval is met. When the timer expires, any changes detected in any routes learned through the interface, or the metric reported by the interfaces will be sent out.

Examples

Change-based Dampening Example

The following example sets the threshold to 50 percent tolerance routing updates involving VMI interfaces and peers:

```
interface vmi1
 ip address 10.2.2.1 255.255.255.0
 ipv6 address 2001:0DB1:2::1/96
 ipv6 enable
 eigrp 1 interface dampening-change 50
 physical-interface Ethernet0/0
```

Interval-based Dampening Example

The following example sets the interval to 30 seconds at which updates occur for topology changes that affect VMI interfaces and peers:

```
interface vmi1
 ip address 10.2.2.1 255.255.255.0
 ipv6 address 2001:0DB1:2::1/96
 ipv6 enable
 eigrp 1 interface dampening-interval 30
 physical-interface Ethernet0/0
```

Related Commands

Command	Description
debug vmi	Displays debugging output for virtual multipoint interfaces (VMIs)
interface vmi	Creates a virtual multipoint interface (VMI) that can be configured and applied dynamically.

emulation-mode

To configure Configuration Circuit Emulation (CEM), use the emulation-mode command in unidirectional mode.

emulation-mode {**bidirectional** | **unidirectional** {**rx** | **tx**}}
no emulation-mode

Syntax Description

rx	When the CEM is in rx-only mode, there is no data transmitted by that CEM. The CEM status shows "active (rx-only)".
tx	The CEM in tx-only mode does not receive any data. There is no data sent to the IP side and the received data is silently dropped at the CEM. The CEM status shows "active (tx-only)".

Command Default

Default mode is unidirectional mode.

Command Modes

Configuration CEM mode (emulation-mode).

Command History

Release	Modification
12.4(20)YA	This command was introduced.

Usage Guidelines

You can use the emulation-mode command to configure the CEM in unidirectional mode. Once configured, traffic will flow only in that direction through the CEM channel. The CEM status will show as "active (rx-only)" or "active (tx-only)" depending on the configuration. To disable the command's effect, use the **no** form of this command.

Examples

The following example shows how the command configures the traffic in unidirectional mode:

```
Router(config-cem
)# emulation-mode unidirectional tx
```

The following example shows how the command configures the traffic in bidirectional mode:

```
Router(config-cem
)# emulation-mode bidirectional
```

encapsulation

To set the encapsulation method used by the interface, use the **encapsulation** command in interface configuration mode. To remove the encapsulation, use the **no** form of this command.

encapsulation *encapsulation-type*
no encapsulation *encapsulation-type*

Syntax Description

encapsulation-type	Encapsulation type; one of the following keywords: • **atm-dxi** -- ATM Mode-Data Exchange Interface. • **bstun** --Block Serial Tunnel. • **dot1q** *vlan-id* [**native**]--Enables IEEE 802.1q encapsulation of traffic on a specified subinterface in VLANs. The *vlan-id* argument is a virtual LAN identifier. The valid range is from 1 to 1000. The optional **native** keyword sets the PVID value of the port to the *vlan-id* value. • **frame-relay** --Frame Relay (for serial interface). • **hdlc** -- High-Level Data Link Control (HDLC) protocol for serial interface. This encapsulation method provides the synchronous framing and error detection functions of HDLC without windowing or retransmission. This is the default for synchronous serial interfaces. • **isl** *vlan-id* --Inter-Switch Link (ISL) (for VLANs). • **lapb** --X.25 Link Access Procedure, Balanced. Data link layer protocol (LAPB) DTE operation (for serial interface). • **ppp** -- PPP (for serial interface). • **sde** *said* --IEEE 802.10. The *said* argument is a security association identifier. This value is used as the VLAN identifier. The valid range is from 0 to 0xFFFFFFFE. • **sdlc** --IBM serial Systems Network Architecture (SNA). • **sdlc-primary** --IBM serial SNA (for primary serial interface) . • **sdlc-secondary** --IBM serial SNA (for secondary serial interface). • **slip** --Specifies Serial Line Internet Protocol (SLIP) encapsulation for an interface configured for dedicated asynchronous mode or dial-on-demand routing (DDR). This is the default for asynchronous interfaces. • **smds** --Switched Multimegabit Data Services (SMDS) (for serial interface). • **ss7** --Sets the encapsulation type to SS7 and overrides the serial interface objects high-level data link control (HDLC) default.

Command Default

The default depends on the type of interface. For example, synchronous serial interfaces default to HDLC and asynchronous interfaces default to SLIP.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
10.3	The **sde** keyword was added to support IEEE 802.10
11.1	The **isl** keyword was added to support the Interswitch Link (ISL) Cisco protocol for interconnecting multiple switches and routers, and for defining virtual LAN (VLAN) topologies.
11.3(4)T	The **tr-isltrbrf-vla**n keyword was added to support TRISL, a Cisco proprietary protocol for interconnecting multiple routers and switches and maintaining VLAN information as traffic goes between switches.
12.0(1)T	The **dot1q** keyword was added to support IEEE 8021q standard for encapsulation of traffic on a specified subinterface in VLANs.
12.1(3)T	The **native** keyword was added.
12.2(11)T	This command was modified to include the **ss7** keyword in support of integrated signaling link terminal capabilities.
12.2(13)T	Support for IPv6 was added.
12.3(2)T	The **tr-isltrbrf-vla**n keyword was removed because support for the TRISL protocol is no longer available in Cisco IOS software.
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.
Cisco IOS XE Release 2.5	This command was updated. It was integrated into Cisco IOS XE Release 2.5.

Usage Guidelines

SLIP and PPP

To use SLIP or PPP, the router or access server must be configured with an IP routing protocol or with the **iphost-routing** command. This configuration is done automatically if you are using old-style **slipaddress** commands. However, you must configure it manually if you configure SLIP or PPP via the **interfaceasync** command.

On lines configured for interactive use, encapsulation is selected by the user when they establish a connection with the **slip** or **ppp** EXEC command.

IP Control Protocol (IPCP) is the part of PPP that brings up and configures IP links. After devices at both ends of a connection communicate and bring up PPP, they bring up the control protocol for each network protocol that they intend to run over the PPP link such as IP or IPX. If you have problems passing IP packets and the **showinterface** command shows that line is up, usethe**negotiations** command to see if and where the negotiations are failing. You might have different versions of software running, or different versions of PPP, in which case you might need to upgrade your software or turn off PPP option negotiations. All IPCP options

as listed in RFC 1332, *PPP Internet Protocol Control Protocol (IPCP)* , are supported on asynchronous lines. Only Option 2, TCP/IP header compression, is supported on synchronous interfaces.

PPP echo requests are used as keepalive packets to detect line failure. The **nokeepalive** command can be used to disable echo requests. For more information about the **nokeepalive** command, refer to the chapter "IP Services Commands" in the *CiscoIOSIPCommandReference,Volume1of4:AddressingandServices*and to thechapter"Configuring IP Services" in the *CiscoIOSIPConfigurationGuide*.

To use SLIP or PPP, the Cisco IOS software must be configured with an IP routing protocol or with the **iphost-routing** command. This configuration is done automatically if you are using old-style **slipaddress** commands. However, you must configure it manually if you configure SLIP or PPP via the **interfaceasync** command.

Note Disable software flow control on SLIP and PPP lines before using the **encapsulation** command.

SS7

The SS7 encapsulation command is new with the Integrated SLT feature and is available only for interface serial objects created by the channel-group command. For network access server (NAS) platforms, the encapsulation for channel group serial interface objects defaults to HDLC. You must explicitly set the encapsulation type to SS7 to override this default.

When encapsulation is set to SS7, the encapsulation command for that object is no longer available. A serial SS7 link is deleted only when its associated dial feature card (DFC) card is removed. As with existing Cisco 26xx-based SLTs, you do not need to specify whether the SS7 link is to be used as an A-link or an F-link.

By itself this command does not select the correct encapsulation type. Therefore, once created, you must set the encapsulation type to the new SS7 value, as well as assign a session channel ID to the link at the serial interface command level. The configuration on a digital SS7 link can be saved (no shutdown) only when its encapsulation is successfully set to SS7 and it has been assigned a channel identifier.

VLANs

Do not configure encapsulation on the native VLAN of an IEEE 802.1q trunk without the **native** keyword. (Always use the **native** keyword when the *vlan-id* is the ID of the IEEE 802.1q native VLAN.)

For detailed information on use of this command with VLANs, refer to the *Cisco IOS Switching Services Configuration Guide* and the *Cisco IOS Switching Services Command Reference* .

Examples

The following example shows how to reset HDLC serial encapsulation on serial interface 1:

```
Router(config)# interface serial 1
Router(config-if)# encapsulation hdlc
```

The following example shows how to enable PPP encapsulation on serial interface 0:

```
Router(config)# interface serial 0
Router(config-if)# encapsulation ppp
```

The following example shows how to configure async interface 1 for PPP encapsulation:

```
Router(config)# interface async 1
Router(config-if)# encapsulation ppp
```

To learn more about the virtual serial interface and check SS7 encapsulation, enter the show interfaces serial *slot*/*trunk*:*channel-group* command in privileged EXEC mode, as in the following example:

```
Router# show interfaces serial 7/3:1
Serial7/3:1 is up, line protocol is down
 Hardware is PowerQUICC Serial
 MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
  reliability 255/255, txload 4/255, rxload 1/255
 Encapsulation SS7 MTP2, loopback not set
 Keepalive set (10 sec)
 Last input never, output 00:00:00, output hang never
 Last clearing of "show interface" counters 03:53:40
 Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 26000 bits/sec, 836 packets/sec
  0 packets input, 0 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  11580159 packets output, 46320636 bytes, 0 underruns
  0 output errors, 0 collisions, 1 interface resets
  0 output buffer failures, 0 output buffers swapped out
  2 carrier transitions
  DCD=up DSR=down DTR=down RTS=down CTS=down
```

Related Commands

Command	Description
channel-group	Assigns a channel group and selects the DSO time slots desired for SS7 links.
encapsulation x25	Specifies operation of a serial interface as an X.25 device.
keepalive	Sets the keepalive timer for a specific interface.
ppp	Starts an asynchronous connection using PPP.
ppp authentication	Enables CHAP or PAP or both and specifies the order in which CHAP and PAP authentication are selected on the interface.
ppp bap call	Sets PPP BACP call parameters.
slip	Starts a serial connection to a remote host using SLIP.

end (satellite initial configuration)

To exit satellite initial configuration mode, save any new or changed parameters, and reset the Cisco IP VSAT satellite WAN network module (NM-1VSAT-GILAT), use the **end** command in satellite initial configuration mode.

end

Syntax Description

This command has no arguments or keywords.

Command Default

No default behavior or values

Command Modes

Satellite initial configuration

Command History

Release	Modification
12.3(14)T	This command was introduced.

Usage Guidelines

The **end** command is identical to the **exit** command in satellite initial configuration mode.

When you enter the **exit** or **end** command to exit satellite initial configuration mode, the system automatically saves any changed parameters to the NM-1VSAT-GILAT network module nonvolatile memory and resets the NM-1VSAT-GILAT network module.

Examples

The following example shows what appears when you enter the **end** or **exit**command after changing one or more initial configuration parameters:

```
Router(sat-init-config)# end

Applying changed parameters to the satellite module.
Parameter update succeeded.  Module is now resetting.
Router#
```

The following example shows what appears when you enter the **end** or **exit** command when no parameters have been changed:

```
Router(sat-init-config)# end

Router#
```

Related Commands

Command	Description
apply	Saves new or changed satellite initial configuration parameters and resets the Cisco IP VSAT satellite WAN network module (NM-1VSAT-GILAT).
exit (satellite initial configuration)	Exits satellite initial configuration mode, saves any new or changed parameters, and resets the Cisco IP VSAT satellite WAN network module (NM-1VSAT-GILAT).

equipment loopback

To run loopbacks in conjunction with remote equipment, use the **equipmentloopback**command in controller configuration mode. To terminate the loopback, use the no form of this command.

equipment [{**customer** | **network**}] **loopback**
no equipment [{**customer** | **network**}] **loopback**

Syntax Description

customer	(Optional) Enables the line card to respond to remote T3 loopback commands from the remote T3 equipment.
network	(Optional) Causes the line card to ignore remote T3 loopback commands.

Command Default

No default behavior or values.

Command Modes

Controller configuration

Command History

Release	Modification
12.2S	This command was introduced

Examples

The following example configures an equipment network loopback:

```
Router(config
)
# controller t3 1/0/0
Router(config
-controller)
# equipment network loopback
```

Related Commands

Command	Description
loopback	Enables controller loopbacks.

errdisable detect cause

To enable error-disable detection, use the **errdisable detect cause** command in global configuration mode. To disable error-disable detection, use the **no** form of this command.

errdisable detect cause {**all** | **bpduguard** | **dtp-flap** | **l2ptguard** | **link-flap** | **packet-buffer-error** | **pagp-flap** | **rootguard** | **udld**}
no errdisable detect cause {**all** | **bpduguard** | **dtp-flap** | **l2ptguard** | **link-flap** | **pagp-flap** | **rootguard** | **udld**}

Syntax Description

all	Specifies error-disable detection for all error-disable causes.
bpduguard	Specifies detection for the Bridge Protocol Data Unit (BPDU)-guard error-disable cause.
dtp-flap	Specifies detection for the Dynamic Trunking Protocol (DTP)-flap error-disable cause.
l2ptguard	Specifies detection for the Layer 2 Protocol Tunneling guard error-disable cause.
link-flap	Specifies detection for the link flap error-disable cause.
packet-buffer-error	Causes the packet buffer error to error-disable the affected port.
pagp-flap	Specifies detection for the Port Aggregation Protocol (PAgP)-flap error-disable cause.
rootguard	Specifies detection for the root-guard error-disable cause.
udld	Specifies detection for the Unidirectional Link Detection (UDLD) error-disable cause.

Command Default

Error-disable detection is enabled for all causes.

Command Modes

Global configuration (config)

Command History

Release	Modification
15.0(1)M	This command was introduced in a release earlier than Cisco IOS Release 15.0(1)M.
12.2(14)SX	This command was modified. Support was added for the Supervisor Engine 720.
12.2(17b)SXA	This command was modified. The **packet-buffer-error** keyword was added.
12.2(17d)SXB	This command was modified. 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

Note Entering the **no errdisable detect cause packet-buffer-error** command allows you to detect the fault that triggers a power cycle of the affected module.

A cause (bpduguard, dtp-flap, link-flap, pagp-flap, root-guard, udld) is defined as the reason why the error-disable state occurred. When a cause is detected on an interface, the interface is placed in an error-disable state (an operational state that is similiar to the link-down state).

You must enter the **shutdown** and then the **no shutdown** commands to recover an interface manually from the error-disable state.

Examples

The following example shows how to enable error-disable detection for the Layer 2 protocol-tunnel guard error-disable cause:

```
Router(config)#
errdisable detect cause l2ptguard
```

Related Commands

Command	Description
show errdisable detect	Displays the error-disable detection status.
show interfaces status	Displays the interface status or a list of interfaces in an error-disable state on LAN ports only.
shutdown	Disables an interface.

errdisable recovery

To configure recovery mechanism variables, use the **errdisable recovery** command in global configuration mode. To return to the default state, use the **no** form of this command.

errdisable recovery {**cause** {**all** | **arp-inspection** | **bpduguard** | **channel-misconfig** | **dhcp-rate-limit** | **dtp-flap** | **gbic-invalid** | **l2ptguard** | **link-flap** | **pagp-flap** | **psecure-violation** | **security-violation** | **rootguard** | **udld** | **unicast-flood**} | **interval** *seconds*}
no errdisable recovery {**cause** {**all** | **arp-inspection** | **bpduguard** | **channel-misconfig** | **dhcp-rate-limit** | **dtp-flap** | **gbic-invalid** | **l2ptguard** | **link-flap** | **pagp-flap** | **psecure-violation** | **security-violation** | **rootguard** | **udld** | **unicast-flood**} | **interval** *seconds*}

Syntax Description

cause	Enables error-disable recovery from a specific cause.
all	Enables the recovery timers for all error-disable causes.
arp-inspection	Enables error-disable recovery from an Address Resolution Protocol (ARP) inspection cause.
bpduguard	Enables the recovery timer for the Bridge Protocol Data Unit (BPDU)-guard error-disable cause.
channel-misconfig	Enables the recovery timer for the channel-misconfig error-disable cause.
dhcp-rate-limit	Enables the recovery timer for the Dynamic Host Configuration Protocol (DHCP)-rate-limit error-disable cause.
dtp-flap	Enables the recovery timer for the Dynamic Trunking Protocol (DTP)-flap error-disable cause.
gbic-invalid	Enables the recovery timer for the Gigabit Interface Converter (GBIC)-invalid error-disable cause.
l2ptguard	Enables the recovery timer for the Layer 2 Protocol Tunneling (L2PT) error-disable cause.
link-flap	Enables the recovery timer for the link-flap error-disable cause.
pagp-flap	Enables the recovery timer for the Port Aggregation Protocol (PAgP)-flap error-disable cause.
psecure-violation	Enables the recovery timer for the psecure-violation error-disable cause.
security-violation	Enables the automatic recovery of ports that were disabled because of 802.1X security violations.
rootguard	Enables the recovery timer for the root-guard error-disable cause.
udld	Enables the recovery timer for the Unidirectional Link Detection (UDLD) error-disable cause.
unicast-flood	Enables the recovery timer for the unicast-flood error-disable cause.

interval	*seconds*	Specifies the time, in seconds, to recover from a specified error-disable cause. The range is from 30 to 86400. The default interval is 300.

Command Default

The recovery mechanisms are disabled.

Command Modes

Global configuration (config)

Command History

Release	Modification
15.0(1)M	This command was introduced in a release earlier than Cisco IOS Release 15.0(1)M.
12.2(14)SX	This command was modified. This command was implemented on the Supervisor Engine 720.
12.2(17d)SXB	This command was modified. This command was implemented on the Supervisor Engine 2.
12.2(18)SXD	This command was modified. The **arp-inspection** keyword was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

A cause (bpduguard, channel-misconfig, dhcp-rate-limit, dtp-flap, l2ptguard, link-flap, pagp-flap, psecure-violation, security-violation, rootguard, udld, or unicast-flood) is defined as the reason why the error-disable state occurred. When a cause is detected on an interface, the interface is placed in an error-disable state (an operational state that is similar to the link-down state). If you do not enable error-disable recovery for the cause, the interface stays in the error-disable state until a shutdown and no shutdown occur. If you enable recovery for a cause, the interface is brought out of the error-disable state and allowed to retry operation once all the causes have timed out.

You must enter the **shutdown** command and then the **no shutdown** command to manually recover an interface from the error-disable state.

Note A separate line is required each time you want to enter the **errdisable recovery cause** command to add a new reason for recovery; each new reason does not get appended to the original single line. This means you must enter each new reason separately.

Examples

This example shows how to enable the recovery timer for the BPDU-guard error-disable cause:

```
Router(config)#
 errdisable recovery cause bpduguard
```

This example shows how to set the recovery timer to 300 seconds:

```
Router(config)#
 errdisable recovery interval 300
```

Related Commands

Command	Description
show errdisable recovery	Displays the information about the error-disable recovery timer.
show interfaces status	Displays the interface status or a list of interfaces in an error-disabled state on LAN ports only.
shutdown	Disables an interface.

error throttling

To stop receiving error data packets on multiple channel groups configured on all interfaces on the T1 controller of a channelized T3 port adapter or on the E1 controller of a channelized E3 port adapter, use the **errorthrottling** command in controller configuration mode. To continue receiving error data packets on all channels on the T1 or E1 controller, use the no form of this command.

error throttling
no error throttling

Syntax Description

This command has no arguments or keywords.

Command Default

The **errorthrottling** command is enabled by default on a T3 or a E3 port adapter.

Command Modes

Controller configuration (config-controller)

Command History

Release	Modification
12.2(19c)	This command was introduced.
15.0(1)M3	This command was modified. This command can be enabled on E1 controllers.
12.2(33)SRD5	This command was integrated into Cisco IOS Release 12.2(33)SRD5.

Usage Guidelines

Use the **showcontrollerst3** command or **showcontrollerse3** command to display whether the current router configuration has error throttling enabled or disabled.

The **errorthrottling** command disables the T1 or E1 level clock in order to stop receiving error data packets on a T1 or E1 controller.

When a T1 or a E1 has multiple channel groups configured over it, error throttling affects all the channels on a T1 or a E1. If any single interface receives a burst of errors, over a short duration, such as 400 errors in 100 milliseconds (ms), the T1 or E1 clock is turned off for a period of 100 ms. When there is a high rate of errors, the error rate is likely to continue for a long duration of time. Using error throttling to stop receiving the error data packets reduces wasteful processing and discarding of error packets.

The **noerrorthrottling** command allows all the error data packets to be processed, dropped, and accounted for on a T1 or a E1 controller. When the error rate is high, the CPU can become overloaded.

When the **noerrorthrottling** command is used to configure a T3 or a E3 port, the configuration applies to all of the 28 associated T1 or E1 channels.

Examples

The following example enables error throttling by disabling the T1 clock in order to stop receiving error data packets on a T1 controller:

```
Router(config-controller)# error throttling
```

The following example uses the **showcontrollerst3** command to display partial output showing that error throttling is enabled on the T1 controller:

```
Router# show controllers t3 2/1/0
```

```
T3 2/1/0 is down.  Hardware is 2CT3 single wide port adapter
  CT3 H/W Version: 0.2.2, CT3 ROM Version: 1.0, CT3 F/W Version: 2.5.1
  FREEDM version: 1, reset 0 resurrect 0
  Applique type is Channelized T3
  Transmitter is sending remote alarm.
  Receiver has loss of signal.
  FEAC code received: No code is being received
  Framing is M23, Line Code is B3ZS, Clock Source is Internal
  Rx-error throttling on T1's ENABLED
  .
```

The following example uses the **showcontrollerse3** command to display partial output showing that error throttling is enabled on the E1 controller:

```
Router# show controller e3 5/0
*Mar 14 21:19:06.795: %SYS-5-CONFIG_I: Configured from console by console
E3 5/0 is up.
  CE3 H/W Version : 3.1.0, CE3 ROM Version : 1.1, CE3 F/W Version : 1.2.1
  Applique type is Channelized E3
  Total available channels 128, used 4
  No alarms detected. Line Code is HDB3, Clock Source is Line.
  Rx-error throttling on E1's ENABLED
  Data in current interval (564 seconds elapsed):
     0 Line Code Violations, 0 P-bit Coding Violation
     0 C-bit Coding Violation
     0 P-bit Err Secs, 0 P-bit Severely Err Secs
     0 Severely Err Framing Secs, 0 Unavailable Secs
     0 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
E3 5/0 E1 1
  No alarms detected.
  Framing is crc4, Clock Source is line, National bits are 0x1F.
  Data in current interval (565 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
     0 Unavail Secs
E3 5/0 E1 2
  No alarms detected.
  Framing is crc4, Clock Source is line, National bits are 0x1F.
```

Related Commands

Command	Description
show controllers e3	Displays information about E3 links, and displays hardware and software driver information for the E3 controller.
show controllers t3	Displays information about T3 links, and displays hardware and software driver information for the T3 controller.

esmc mode ql-disabled

To disable the Ethernet synchronization message channel (ESMC) on an interface, use the **esmc mode ql-disabled**command in interface configuration mode. To remove the quality level (QL) disabled mode and get back to the default ql-enabled mode, use the **no** form of this command.

esmc mode ql-disabled
no esmc mode ql-disabled

Syntax Description

This command has no arguments or keywords.

Command Default

The ESMC mode is ql-enabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
15.0(1)S	This command was introduced.
15.1(2) SNI	This command was introduced in Cisco ASR 901 Aggregation Services Router.
Cisco IOS XE Release 3.8S	This command was integrated into Cisco IOS XE Release 3.8S.

Usage Guidelines

You can use the **esmc modeql-disabled** command only if a synchronous Ethernet (SyncE) capable interface is installed on the device. When this command is used no QL ESMC packets are sent during network clock synchronization.

Examples

The following example shows how to enable ESMC process:

```
Device(config-if)# esmc mode ql-disabled
```

Related Commands

Command	Description
esmc process	Enables the ESMC process in a device.
show esmc	Displays the enabled ESMCs in a device.
show interfaces accounting	Displays the number of packets of each protocol type that have been sent through all configured interfaces.

esmc process

To enable the Ethernet synchronization message channel (ESMC) process in a router, use the **esmc process**command in global configuration mode. To disable the process, use the **no** form of this command.

esmc process
no esmc process

Syntax Description

This command has no arguments or keywords.

Command Default

The ESMC process is disabled.

Command Modes

Global configuration (config)

Command History

Release	Modification
15.0(1)S	This command was introduced.
15.1(2) SNI	This command was introduced in Cisco ASR 901 Aggregation Services Router.
Cisco IOS XE Release 3.8S	This command was integrated into Cisco IOS XE Release 3.8S.

Usage Guidelines

You can use the **esmc process** command only if a synchronous Ethernet (SyncE) capable interface is installed on the device. ESMC is the communication channel for conveying clock information in SyncE. You can use the ESMC process in a SyncE to synchronize the clock frequency over an Ethernet port.

Examples

The following example shows how to enable ESMC process:

```
Device(config)# esmc process
```

Related Commands

Command	Description
esmc mode ql-disabled	Disables the ESMC on an interface.
show esmc	Displays the enabled ESMCs in a device.
show interfaces accounting	Displays the number of packets of each protocol type that have been sent through all configured interfaces.

exit (satellite initial configuration)

To exit satellite initial configuration mode, save any new or changed parameters, and reset the Cisco IP VSAT satellite WAN network module (NM-1VSAT-GILAT), use the **exit** command in satellite initial configuration mode.

exit

Syntax Description

This command has no arguments or keywords.

Command Default

No default behavior or values

Command Modes

Satellite initial configuration

Command History

Release	Modification
12.3(14)T	This command was introduced.

Usage Guidelines

The **exit**command is identical to the **end** command in satellite initial configuration mode.

When you enter the **exit** or **end** command to exit satellite initial configuration mode, the system automatically saves any changed parameters to the NM-1VSAT-GILAT network module nonvolatile memory and resets the NM-1VSAT-GILAT network module.

Examples

The following example shows what appears when you enter the **exit** or **end**command after changing one or more initial configuration parameters:

```
Router(sat-init-config)# exit

Applying changed parameters to the satellite module.
Parameter update succeeded.  Module is now resetting.
Router#
```

The following example shows what appears when you enter the **exit** or **end**command when no parameters have been changed:

```
Router(sat-init-config)# exit

Router#
```

Related Commands

Command	Description
apply	Saves new or changed satellite initial configuration parameters and resets the Cisco IP VSAT satellite WAN network module (NM-1VSAT-GILAT).
end (satellite initial configuration)	Exits satellite initial configuration mode, saves any new or changed parameters, and resets the Cisco IP VSAT satellite WAN network module (NM-1VSAT-GILAT).