

dce-terminal-timing enable

When running the line at high speeds and long distances, use the **dce-terminal-timing enable** interface configuration command to prevent phase shifting of the data with respect to the clock. If SCTE is not available from the DTE, use **no** form of this command, which causes the DCE to 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.

Defaults DCE uses its own clock.

Command Modes Interface configuration

Release	Modification
10.0	This command was introduced.

Usage Guidelines On the Cisco 4000 platform, 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-timing enable** command causes the DCE to use SCTE from the DTE.

Examples The following example prevents phase shifting of the data with respect to the clock:

```
interface serial 0
dce-terminal-timing enable
```

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.
- **fdi**—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.

Defaults

Existing interface configuration values are not reset.

Command Modes

Global configuration

Command History

Release	Modification
11.1	This command was introduced.

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.

delay

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

delay *tens-of-microseconds*

no delay

Syntax Description	<i>tens-of-microseconds</i>	Integer that specifies the delay in tens of microseconds for an interface or network segment.
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Defaults Default delay values may be displayed with the EXEC command **show interfaces**.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Examples The following example sets a 30,000-microsecond delay on serial interface 3:

```
interface serial 3
delay 3000
```

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

description (controller)

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

description *string*

no description

Syntax Description

<i>string</i>	Comment or a description (up to 80 characters) to help you remember what is attached to the interface.
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Defaults

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.

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 MIP interfaces only and appears in the output of the **show controller t3**, **show controller e1**, **show controller t1**, and **more system:running-config EXEC** commands.

Examples

The following example describes a 3174 controller:

```
controller t1
  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.
more system:running-config	Displays the running configuration.

down-when-looped

Use the **down-when-looped** interface configuration command to configure an interface to inform the system it is down when loopback is detected.

down-when-looped

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines This command is valid for HDLC or PPP encapsulation on serial and HSSI interfaces.

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 only enabled 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, **down-when-looped** should not be configured; otherwise, packets will not be transmitted out the interface that is being tested.

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

```
interface serial0
 encapsulation hdlc
 down-when-looped
```

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

dsu bandwidth

To specify the maximum allowable bandwidth used by the PA-E3 port adapter and PA-T3 port adapter, use the **dsu bandwidth** interface configuration command. To return to the default bandwidth, use the **no** form of this command.

dsu bandwidth *kbps*

no dsu bandwidth

Syntax Description	<i>kbps</i>	Maximum bandwidth in the range of 22 kbps to 44736 kbps. The default varies for different port adapters.
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Defaults	34010 kbps for PA-E3 44736 kbps for PA-T3
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Command Modes	Interface configuration
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Command History	Release	Modification
	11.1 CA	This command was introduced.

Usage Guidelines	<p>The local interface configuration must match the remote interface configuration. For example, if you reduce the maximum bandwidth to 16000 on the local port, you must also do the same on the remote port.</p> <p>The dsu bandwidth command reduces the bandwidth by padding the E3 and T3 frame.</p> <p>To verify the data service unit (DSU) bandwidth configured on the interface, use the show controllers serial EXEC command.</p>
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Examples	<p>The following example sets the DSU bandwidth to 16000 kbps on interface 1/0/0:</p> <pre>interface serial 1/0/0 dsu bandwidth 16000</pre>
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Related Commands	Command	Description
	show controllers serial	Displays information that is specific to the interface hardware.

dsu mode

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

dsu mode {0 | 1 | 2}

no dsu mode

Syntax Description

0	Sets the interoperability mode to 0. This is the default. Specify mode 0 to connect a PA-E3 port adapter to another PA-E3 port adapter or to a Digital Link DSU (DL3100). Use mode 0 to connect a PA-T3 port adapter to another PA-T3 port adapter or to a Digital Link DSU (DL3100).
1	Sets the interoperability mode to 1. Specify mode 1 to connect a PA-E3 port adapter or PA-T3 port adapter to a Kentrox DSU.
2	Sets the interoperability mode to 2. Specify mode 2 to connect a PA-T3 port adapter to a Larscom DSU.

Defaults

0

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CA	This command was introduced.

Usage Guidelines

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

You must know what type of DSU is connected to the remote port to determine if it interoperates with a PA-E3 port adapter or a PA-T3 port adapter. Use mode 0 to connect a PA-E3 port adapter to another PA-E3 port adapter or to a Digital Link DSU (DL3100). Use mode 0 to connect a PA-T3 port adapter to another PA-T3 port adapter or to a Digital Link DSU (DL3100). Use mode 1 to connect a PA-E3 port adapter or a PA-T3 port adapter to a Kentrox DSU. Use mode 2 to connect a PA-T3 port adapter to a Larscom DSU. The **dsu mode** command enables and improves interoperability with other DSUs.

The **dsu mode** command enables and improves interoperability with other DSUs.

To verify the DSU mode configured on the interface, use the **show controller serial EXEC** command.

Examples

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

```
interface serial 1/0/0
 dsu mode 1
```

Related Commands

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

dte-invert-txc

On the Cisco 4000 series, you can specify the serial Network Processor Module timing signal configuration. When the board is operating as a DTE, use the **dte-invert-txc** interface configuration command to invert the TXC clock signal received from the DCE. Use the **no** form of this command if the DCE accepts SCTE from the DTE.

dte-invert-txc

no dte-invert-txc

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	9.1	This command was introduced.

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. This 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 **no dte-invert-txc**.

Examples The following example inverts the TXC on serial interface 0:

```
interface serial 0
dte-invert-txc
```

duplex

To configure the duplex operation on an interface, use the **duplex** interface configuration command. Use the **no** form of this command to return the system to half-duplex mode, which is the system default.

duplex { **full** | **half** | **auto** }

no duplex

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

Defaults Half-duplex mode

Command Modes Interface configuration

Command History	Release	Modification
	11.2(10)P	This command was introduced.

Usage Guidelines To use the auto-negotiation capability (that is, detect speed and duplex modes automatically), you must set both speed and duplex to auto. Setting speed to auto negotiates speed only, and setting duplex to auto negotiates duplex only.

Table 5 describes the access server's performance for different combinations of the duplex and speed modes. The specified **duplex** command configured with the specified **speed** command produces the resulting system action.

Table 5 Relationship between duplex and speed Commands

Duplex Commands	Speed Commands	Resulting System Action
duplex auto	speed auto	Auto negotiates both speed and duplex modes.
duplex auto	speed 100 or speed 10	Auto negotiates both speed and duplex modes.
duplex half or duplex full	speed auto	Auto negotiates both speed and duplex modes.
duplex half	speed 10	Forces 10 Mbps and half duplex.
duplex full	speed 10	Forces 10 Mbps and full duplex.

Table 5 Relationship between duplex and speed Commands (continued)

Duplex Commands	Speed Commands	Resulting System Action
duplex half	speed 100	Forces 100 Mbps and half duplex.
duplex full	speed 100	Forces 100 Mbps and full duplex.

For the Cisco AS5300, the **duplex {full | half | auto}** command syntax replaces the following two earlier duplex commands:

- **half-duplex**
- **full-duplex**

You will get the following error messages if you try to use these commands on a Cisco AS5300:

```
router(config)# interface fastethernet 0
router(config-if)# full-duplex
Please use duplex command to configure duplex mode
router(config-if)#
router(config-if)# half-duplex
Please use duplex command to configure duplex mode
```

Examples

The following example shows the different duplex configuration options you can configure on a Cisco AS5300:

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# interface fastethernet 0
router(config-if)# duplex ?
  auto  Enable AUTO duplex configuration
  full  Force full duplex operation
  half  Force half-duplex operation
```

Related Commands

Command	Description
duplex	Configures the duplex operation on an interface.
interface fastethernet	Selects a particular Fast Ethernet interface for configuration.
show controllers fastethernet	Displays information about initialization block information, transmit ring, receive ring, and errors for the Fast Ethernet controller chip on the Cisco 4500, Cisco 7200 series, or Cisco 7500 series routers.
speed	Configures the speed for a Fast Ethernet interface.

early-token-release

To enable early token release on Token Ring interfaces, use the **early-token-release** interface configuration command. Once enabled, use the **no** form of this command to disable this feature.

early-token-release

no early-token-release

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Release	Modification
10.0	This command was introduced.

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:

```
interface tokenring 1
  early-token-release
```

On the Cisco 7500 series, to enable the use of early token release on your Token Ring interface processor in slot 4 on port 1, issue the following configuration commands:

```
interface tokenring 4/1
  early-token-release
```

encapsulation

To set the encapsulation method used by the interface, use the **encapsulation** interface configuration command.

encapsulation *encapsulation-type*

Syntax Description

encapsulation-type

Encapsulation type; one of the following keywords:

- **atm-dxi**—Asynchronous Transfer Mode-Data Exchange Interface.
- **bstun**—Block Serial Tunnel.
- **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.
- **isl** — Inter-Switch Link (ISL) (for virtual LANs)
- **lapb**—X.25 LAPB DTE operation (for serial interface).
- **ppp**—Point-to-Point Protocol (PPP) (for serial interface).
- **sde**—IEEE 802.10 Security Data Exchange.
- **sdhc**—IBM serial SNA.
- **sdhc-primary**—IBM serial SNA (for primary serial interface).
- **sdhc-secondary**—IBM serial SNA (for secondary serial interface).
- **slip**—Specifies SLIP encapsulation for an interface configured for dedicated asynchronous mode or DDR.
- **smpls**—Switched Multimegabit Data Services (SMDS) (for serial interface).

Defaults

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.

Usage Guidelines

To use SLIP or PPP, the router or access server must be configured with an IP routing protocol or with the **ip host-routing** command. This configuration is done automatically if you are using old-style **slip address** commands. However, you must configure it manually if you configure SLIP or PPP via the **interface async** 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 **show interface** command shows that line is up, use the **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 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 **no keepalive** command can be used to disable echo requests. For more information about the **no keepalive** command, refer to the chapter “IP Services Commands” in the *Networking Protocols Command Reference, Part 1* and the chapter “Configuring IP Services” in the *Networking Protocols Configuration Guide, Part 1*.

In order to use SLIP or PPP, the Cisco IOS software must be configured with an IP routing protocol or with the **ip host-routing** command. This configuration is done automatically if you are using old-style **slip address** commands. However, you must configure it manually if you configure SLIP or PPP via the **interface async** command.

**Note**

Disable software flow control on SLIP and PPP lines.

Examples

The following example resets HDLC serial encapsulation on serial interface 1:

```
interface serial 1
 encapsulation hdlc
```

The following example enables PPP encapsulation on serial interface 0:

```
interface serial 0
 encapsulation ppp
```

In the following example, async interface 1 is configured for PPP encapsulation.

```
router# config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# interface async 1
router(config-if)# encapsulation ppp
```

Related Commands

Command	Description
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.

fddi burst-count

Use the **fddi burst-count** interface configuration command to allow the FCI card to preallocate buffers to handle bursty FDDI traffic (for example, NFS bursty traffic). Use the **no** form of this command to revert to the default value.

fddi burst-count *number*

no fddi burst-count

Syntax Description	<i>number</i>	Number of preallocated buffers in the range from 1 to 10.
Defaults	3 buffers	
Command Modes	Interface configuration	
Command History	Release	Modification
	10.0	This command was introduced.
Usage Guidelines	This command applies to the FCI card only. The microcode software version should <i>not</i> be 128.45 or 128.43.	
Examples	The following example sets the number of buffers to 5:	
	<pre>interface fddi 0 fddi burst-count 5</pre>	

fdi c-min

To set the C-Min timer on the PCM, use the **fdi c-min** interface configuration command. Use the **no** form of this command to revert to the default value.

fdi c-min *microseconds*

no fdi c-min

Syntax Description	<i>microseconds</i> Sets the timer value in microseconds.								
Defaults	1600 microseconds								
Command Modes	Interface configuration								
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>10.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	10.0	This command was introduced.				
Release	Modification								
10.0	This command was introduced.								
Usage Guidelines	This command applies to the processor CMT only. You need extensive knowledge of the PCM state machine to tune this timer. Use this command when you run into PCM interoperability problems.								
Examples	<p>The following example sets the C-Min timer to 2000 microseconds:</p> <pre>interface fdi 0 fdi c-min 2000</pre>								
Related Commands	<table border="1"> <thead> <tr> <th>Command</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>fdi tb-min</td> <td>Sets the TB-Min timer in the PCM.</td> </tr> <tr> <td>fdi tl-min-time</td> <td>Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).</td> </tr> <tr> <td>fdi t-out</td> <td>Sets the t-out timer in the PCM.</td> </tr> </tbody> </table>	Command	Description	fdi tb-min	Sets the TB-Min timer in the PCM.	fdi tl-min-time	Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).	fdi t-out	Sets the t-out timer in the PCM.
Command	Description								
fdi tb-min	Sets the TB-Min timer in the PCM.								
fdi tl-min-time	Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).								
fdi t-out	Sets the t-out timer in the PCM.								

fddi cmt-signal-bits

To control the information transmitted during the connection management (CMT) signaling phase, use the **fddi cmt-signal-bits** interface configuration command.

fddi cmt-signal-bits *signal-bits* [**phy-a** | **phy-b**]

Syntax Description

<i>signal-bits</i>	A hexadecimal number preceded by 0x; for example, 0x208. The FDDI standard defines ten bits of signaling information that must be transmitted, as follows: <ul style="list-style-type: none"> bit 0—Escape bit. Reserved for future assignment by the FDDI standards committee. bits 1 and 2—Physical type, as defined in Table 6. bit 3—Physical compatibility. Set if topology rules include the connection of a physical-to-physical type at the end of the connection. bits 4 and 5—Link confidence test duration; set as defined in Table 7. bit 6—Media Access Control (MAC) available for link confidence test. bit 7—Link confidence test failed. The setting of bit 7 indicates that the link confidence was failed by the Cisco end of the connection. bit 8—MAC for local loop. bit 9—MAC on physical output.
phy-a	(Optional) Selects Physical Sublayer A.
phy-b	(Optional) Selects Physical Sublayer B.

Defaults

The default signal bits for the **phy-a** and **phy-b** keywords are as follows:

- phy-a** is set to 0x008 (hexadecimal) or 00 0000 1000 (binary). Bits 1 and 2 are set to 00 to select Physical A. Bit 3 is set to 1 to indicate “accept any connection.”
- phy-b** is set to 0x20c (hexadecimal) or 10 0000 1100 (binary). Bits 1 and 2 are set to 10 to select Physical B. Bit 3 is set to 1 to indicate “accept any connection.” Bit 9 is set to 1 to select MAC on output. The normal data flow on FDDI is input on Physical A and output on Physical B.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

If neither the **phy-a** nor **phy-b** keyword is specified, the signal bits apply to both physical connections.

**Note**

Use of the **fddi cmt-signal-bits** configuration command is *not* recommended under normal operations. This command is used when debugging specific CMT implementation issues.

Table 6 lists the physical types.

Table 6 FDDI Physical Type Bit Specifications

Bit 2	Bit 1	Physical Type
0	0	Physical A
1	0	Physical B
0	1	Physical S
1	1	Physical M

Table 7 lists the duration bits.

Table 7 FDDI Link Confidence Test Duration Bit Specification

Bit 5	Bit 4	Test Duration
0	0	Short test (default 50 ms)
1	0	Medium test (default 500 ms)
0	1	Long test (default 5 seconds)
1	1	Extended test (default 50 seconds)

Examples

The following example sets the CMT signaling phase to signal bits 0x208 on both physical connections:

```
interface fddi 0
  fddi cmt-signal-bits 208
```

fddi duplicate-address-check

Use the **fddi duplicate-address-check** interface configuration command to turn on the duplicate address detection capability on the FDDI. Use the **no** form of this command to disable this feature.

fddi duplicate-address-check

no fddi duplicate-address-check

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines If you use this command, the Cisco IOS software will detect a duplicate address if multiple stations are sharing the same MAC address. If the software finds a duplicate address, it will shut down the interface.

Examples The following example enables duplicate address checking on the FDDI:

```
interface fddi 0
 fddi duplicate-address-check
```

fddi encapsulate

Use the **fddi encapsulate** interface configuration command to specify encapsulating bridge mode on the CSC-C2/FCIT interface card. Use the **no** form of this command to turn off encapsulation bridging and return the FCIT interface to its translational, nonencapsulating mode.

fddi encapsulate

no fddi encapsulate

Syntax Description

This command has no arguments or keywords.

Defaults

The FDDI interface by default uses the SNAP encapsulation format defined in RFC 1042. It is not necessary to define an encapsulation method for this interface when using the CSC-FCI interface card.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

The **no fddi encapsulate** command applies only to CSC-C2/FCIT interfaces, because the CSC-FCI interfaces are always in encapsulating bridge mode. The CSC-C2/FCIT interface card fully supports transparent and translational bridging for the following configurations:

- FDDI to FDDI
- FDDI to Ethernet
- FDDI to Token Ring

The command **fddi encapsulate** puts the CSC-C2/FCIT interface into encapsulation mode when doing bridging. In transparent mode, the FCIT interface interoperates with earlier versions of the CSC-FCI encapsulating interfaces when performing bridging functions on the same ring.



Caution

Bridging between dissimilar media presents several problems that can prevent communications from occurring. These problems include bit-order translation (or usage of MAC addresses as data), maximum transfer unit (MTU) differences, frame status differences, and multicast address usage. Some or all of these problems might be present in a multimedia bridged LAN and might prevent communication from taking place. These problems are most prevalent when bridging between Token Rings and Ethernet or between Token Rings and FDDI nets. This is because of the different way Token Ring is implemented by the end nodes.

The following protocols have problems when bridged between Token Ring and other media: Novell IPX, DECnet Phase IV, AppleTalk, VINES, XNS, and IP. Further, the following protocols may have problems when bridged between FDDI and other media: Novell IPX and XNS. We recommend that these protocols be routed whenever possible.

Examples

The following example sets FDDI interface 1 on the CSC-C2/FCIT interface card to encapsulating bridge mode:

```
interface fddi 1
  fddi encapsulate
```

fdi frames-per-token

To specify the maximum number of frames that the FDDI interface will transmit per token capture, use the **fdi frames-per-token** interface configuration command. Use the **no** form of this command to revert to the default value.

fdi frames-per-token *number*

no fdi frames-per-token

Syntax Description	<i>number</i>	Maximum number of frames to transmit per token capture. Valid values are from 1 to 10.
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Defaults	3 frames
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Command Modes	Interface configuration
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Command History	Release	Modification
	11.2 P	This command was introduced.

Usage Guidelines

Changing the value will increase or decrease the maximum number of frames that the FDDI interface can transmit when it receives a token. Increasing the value does not necessarily mean more frames will be transmitted on each token capture. This is heavily dependent on the traffic load of the specific interface.

When the interface captures a token, it transmits all of the frames that are queued in the interface's transmit ring, up to a maximum value specified by the **fdi frames-per-token** command.

If there are no frames ready for transmission, the token is passed on, and no frames are transmitted. If there are less than the **fdi frames-per-token** value in the transmit ring, all frames in the transmit ring are transmitted before the token is passed on. If there are more than the **fdi frames-per-token** value in the transmit ring, the specified value is transmitted before the token is passed on. The remaining frames in the transmit ring remain queued until the token is captured again.

Examples

The following example shows how to configure the FDDI interface to transmit four frames per token capture:

```
! Show fdi frames-per-token command options
4700(config-if)#fdi frames-per-token ?
<1-10> Number of frames per token, default = 3
! Specify 4 as the maximum number of frames to be transmitted per token
4700(config-if)#fdi frames-per-token 4
```

fddi smt-frames

To enable the SMT frame processing capability on the FDDI, use the **fddi smt-frames** interface configuration command. Use the **no** form of this command to disable this function and prevent the Cisco IOS software from generating or responding to SMT frames.

fddi smt-frames

no fddi smt-frames

Syntax Description This command has no arguments or keywords.

Defaults Enabled

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines Use the **no** form of this command to turn off SMT frame processing for diagnosing purposes. Use the **fddi smt-frames** command to reenable the feature.

Examples The following example disables SMT frame processing:

```
interface fddi 0
no fddi smt-frames
```

fddi tb-min

To set the TB-Min timer in the physical connection management (PCM), use the **fddi tb-min** interface configuration command. Use the **no** form of this command to revert to the default value.

fddi tb-min *milliseconds*

no fddi tb-min

Syntax Description	<i>milliseconds</i> Number that sets the TB-Min timer value.								
Defaults	100 milliseconds								
Command Modes	Interface configuration								
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>10.3</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	10.3	This command was introduced.				
Release	Modification								
10.3	This command was introduced.								
Usage Guidelines	This command applies to the processor CMT only. You need extensive knowledge of the PCM state machine to tune this timer. Use this command when you run into PCM interoperability problems.								
Examples	<p>The following example sets the TB-Min timer to 200 milliseconds:</p> <pre>interface fddi 0 fddi tb-min 200</pre>								
Related Commands	<table border="1"> <thead> <tr> <th>Command</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>fddi c-min</td> <td>Sets the C-Min timer on the PCM.</td> </tr> <tr> <td>fddi tl-min-time</td> <td>Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).</td> </tr> <tr> <td>fddi t-out</td> <td>Sets the t-out timer in the PCM.</td> </tr> </tbody> </table>	Command	Description	fddi c-min	Sets the C-Min timer on the PCM.	fddi tl-min-time	Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).	fddi t-out	Sets the t-out timer in the PCM.
Command	Description								
fddi c-min	Sets the C-Min timer on the PCM.								
fddi tl-min-time	Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).								
fddi t-out	Sets the t-out timer in the PCM.								

fddi tl-min-time

To control the TL-Min time (the minimum time to transmit a Physical Sublayer, or PHY line state, before advancing to the next physical connection management [PCM] state, as defined by the X3T9.5 specification), use the **fddi tl-min-time** interface configuration command.

fddi tl-min-time *microseconds*

Syntax Description	<i>microseconds</i>	Number that specifies the time used during the connection management (CMT) phase to ensure that signals are maintained for at least the value of TL-Min so the remote station can acquire the signal.
Defaults	30 microseconds	
Command Modes	Interface configuration	
Command History	Release	Modification
	10.0	This command was introduced.
Usage Guidelines	Interoperability tests have shown that some implementations of the FDDI standard need more than 30 microseconds to sense a signal.	
Examples	<p>The following example changes the TL-Min time from 30 microseconds to 100 microseconds:</p> <pre>interface fddi 0 fddi tl-min-time 100</pre> <p>The following example changes the TL-Min time from 30 microseconds to 100 microseconds on a Cisco 7500 series router:</p> <pre>interface fddi 3/0 fddi tl-min-time 100</pre>	
Related Commands	Command	Description
	fddi c-min	Sets the C-Min timer on the PCM.
	fddi tl-min-time	Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).
	fddi t-out	Sets the t-out timer in the PCM.

fdi t-out

To set the t-out timer in the physical connection management (PCM), use the **fdi t-out** interface configuration command. Use the **no** form of this command to revert to the default value.

fdi t-out *milliseconds*

no fdi t-out

Syntax Description	<i>milliseconds</i> Number that sets the timeout timer.								
Defaults	100 milliseconds								
Command Modes	Interface configuration								
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>10.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	10.0	This command was introduced.				
Release	Modification								
10.0	This command was introduced.								
Usage Guidelines	This command applies to the processor CMT only. You need extensive knowledge of the PCM state machine to tune this timer. Use this command when you run into PCM interoperability problems.								
Examples	<p>The following example sets the timeout timer to 200 milliseconds:</p> <pre>interface fdi 0 fdi t-out 200</pre>								
Related Commands	<table border="1"> <thead> <tr> <th>Command</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>fdi c-min</td> <td>Sets the C-Min timer on the PCM.</td> </tr> <tr> <td>fdi tb-min</td> <td>Sets the TB-Min timer in the PCM.</td> </tr> <tr> <td>fdi tl-min-time</td> <td>Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).</td> </tr> </tbody> </table>	Command	Description	fdi c-min	Sets the C-Min timer on the PCM.	fdi tb-min	Sets the TB-Min timer in the PCM.	fdi tl-min-time	Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).
Command	Description								
fdi c-min	Sets the C-Min timer on the PCM.								
fdi tb-min	Sets the TB-Min timer in the PCM.								
fdi tl-min-time	Controls the TL-Min time (the minimum time to transmit a PHY line state before advancing to the PCM state, as defined by the X3T9.5 specification).								

fddi token-rotation-time

To control ring scheduling during normal operation and to detect and recover from serious ring error situations, use the **fddi token-rotation-time** interface configuration command.

fddi token-rotation-time *microseconds*

Syntax Description	<i>microseconds</i>	Number that specifies the token rotation time (TRT).
---------------------------	---------------------	--

Defaults	5000 microseconds
-----------------	-------------------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	The FDDI standard restricts the allowed time to be greater than 4000 microseconds and less than 165,000 microseconds. As defined in the X3T9.5 specification, the value remaining in the TRT is loaded into the token holding timer (THT). Combining the values of these two timers provides the means to determine the amount of bandwidth available for subsequent transmissions.
-------------------------	---

Examples	The following example sets the rotation time to 24,000 microseconds:
-----------------	--

```
interface fddi 0
  fddi token-rotation-time 24000
```

The following example sets the rotation time to 24,000 microseconds on a Cisco 7500 series router:

```
interface fddi 3/0
  fddi token-rotation-time 24000
```

fdi valid-transmission-time

To recover from a transient ring error, use the **fdi valid-transmission-time** interface configuration command.

fdi valid-transmission-time *microseconds*

Syntax Description	<i>microseconds</i> Number that specifies the transmission valid timer (TVX) interval.
---------------------------	--

Defaults	2,500 microseconds
-----------------	--------------------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Examples The following example changes the transmission timer interval to 3000 microseconds:

```
interface fddi 0
 fddi valid-transmission-time 3000
```

The following example changes the transmission timer interval to 3000 microseconds on a Cisco 7000 series routers or Cisco 7200 series routers:

```
interface fddi 3/0
 fddi valid-transmission-time 3000
```

fdl

To set the facilities data link exchange standard for the CSU controllers, enter the **fdl** controller configuration command. Use the **no** form of this command, to disables facilities data-link support.

fdl { **att** | **ansi** | **both** }

no fdl { **att** | **ansi** | **both** }

Syntax Description	att	Selects AT&T technical reference 54016 for extended superframe facilities data link exchange support.
	ansi	Selects ANSI T1.403 for extended superframe facilities data link exchange support.
	both	(Supported on the Cisco MC3810 only) Specifies to support both AT&T technical reference 54016 and ANSI T1.403 for extended superframe facilities data link exchange support.

Defaults Disabled

Command Modes Controller configuration

Command History	Release	Modification
	11.3	This command was introduced.
	12.0	This command was modified to add command syntax both for the Cisco MC3810.

Usage Guidelines You must configure this command on both T1 controllers if you want to support the CSU function on each T1 line. However, you must use the same facilities data link exchange standard as your service provider. You can have a different standard configured on each T1 controller.

Examples The following example configures the ANSI T1.403 standard for both T1 controllers:

```
Router(config)# controller t1 0
Router(config-controller)# fdl ansi
Router(config-controller)# exit
Router(config)# controller t1 1
Router(config-controller)# fdl ansi
```

framing (E1/T1 controller)

Use the **framing** controller configuration command to select the frame type for the E1 or T1 data line.

T1 Lines

```
framing {sf | esf}
```

Ei Lines

```
framing {crc4 | no-crc4} [australia]
```

Syntax Description	Command	Description
	sf	Specifies super frame as the T1 frame type.
	esf	Specifies extended super frame as the T1 frame type.
	crc4	Specifies CRC4 frame as the E1 frame type.
	no-crc4	Specifies no CRC4 frame as the E1 frame type.
	australia	(Optional) Specifies the E1 frame type used in Australia.

Defaults

Super frame is the default on a T1 line.

CRC4 frame is the default on an E1 line.

Command Modes

Controller configuration

Usage Guidelines

Use this command in configurations where the router or access server is intended to communicate with T1 or E1 fractional data line. The service provider determines which framing type, either **sf**, **esf**, or **crc4**, is required for your T1/E1 circuit.

Examples

The following example selects extended super frame as the T1 frame type:

```
framing esf
```

Related Commands

Command	Description
cablelength	Specifies the distance of the cable from the routers to the network equipment.
linecode	Selects the linecode type for T1 or E1 line.

framing (E3/T3 interface)

To specify E3 or T3 line framing for a PA-E3 port adapter or PA-T3 port adapter, use the **framing** interface configuration command. To return to the default G.751 framing or C-bit framing, use the **no** form of this command.

PA-E3

```
framing {bypass | g751}
```

PA-T3

```
framing {c-bit | m13 | bypass}
```

```
no framing
```

Syntax Description		
	bypass	Specifies bypass E3 framing.
	g751	Specifies G.751 E3 framing. This is the default for the PA-E3.
	c-bit	Specifies that the C-bit framing is used as the T3 framing type. This is the default for the PA-T3.
	m13	Specifies m13 T3 framing.

Defaults

G.751 framing for PA-E3

C-bit framing for PA-T3

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CA	This command was introduced.

Usage Guidelines

The default framing is described in the ITU-T Recommendation G.751.



Note

The ITU-T carries out the functions of the former Consultative Committee for International Telegraph and Telephone (CCITT).

When the framing mode is **bypass**, the E3 frame data is not included in the E3 frame, just the data.

When the framing mode is **bypass**, the T3 frame data is not included in the T3 frame, just the data.

If you use the **bypass** option, scrambling must be set to the default (disabled), the dsu mode must be set to the default (0), and the dsu bandwidth must be set to the default (44736).

To verify the framing mode configured on the interface, use the **show controller serial EXEC** command.

Examples

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

```
interface serial 1/0/0
 framing bypass
```

Related Commands

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

framing (T3 controller)

To specify T3 line framing used by the CT3IP port adapter, use the **framing** controller configuration command. Use the **no** form of this command to restore the default framing type.

framing { **c-bit** | **m23** | **auto-detect** }

no framing

Syntax Description		
	c-bit	Specifies that the C-bit framing is used as the T3 framing type.
	m23	Specifies that the M23 framing is used as the T3 framing type.
	auto-detect	Specifies that the CT3IP detects the framing type it receives from the far-end equipment.

Defaults auto-detect for CT3IP

Command Modes Controller configuration

Command History	Release	Modification
	11.1 CA	This command was introduced.

Usage Guidelines

If you do not specify the **framing** command, the default **auto-detect** is used by the CT3IP to automatically determine the framing type received from the far-end equipment.

Because the CT3IP supports the Application Identification Channel (AIC) signal, the setting for the framing might be overridden by the CT3IP firmware.

You can also set the framing for each T1 channel by using the **t1 framing** controller configuration command.

Examples The following example sets the framing for the CT3IP to C-bit:

```
controller t3 9/0/0
 framing c-bit
```

Related Commands	Command	Description
	t1 framing	Specifies the type of framing used by the T1 channels on the CT3IP in Cisco 7500 series routers.

full-duplex

To specify full-duplex mode on full-duplex single-mode and multimode port adapters, use the **full-duplex** interface configuration command. Use the **no** form of this command to restore the default half-duplex mode.

full-duplex

no full-duplex

Syntax Description

This command has no arguments or keywords.

Defaults

Half-duplex mode is the default mode on a Cisco 7500 series router and a FEIP.

Half-duplex mode is the default mode for serial interfaces that are configured for bisynchronous tunneling.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.
11.3	This command was modified to include information on FDDI full-duplex, single-mode and multimode port adapters.

Usage Guidelines

Use this command if the equipment on the other end is capable of full-duplex mode.

This command specifies full-duplex mode on full-duplex single-mode and multimode port adapters available on the following routers:

- Cisco 7200 series routers
- Second-generation Versatile Interface Processors (VIP2s) in Cisco 7500 series routers
- Fast Ethernet Interface Processor (FEIP) port
- Serial interface port that uses bisynchronous tunneling.

Refer to the *Cisco Product Catalog* for hardware compatibility information and for specific model numbers of port adapters.

To enable half-duplex mode, use the **no full-duplex** or **half-duplex** commands.

**Caution**

For the Cisco AS5300, the **duplex {full | half | auto}** command syntax replaces the **full-duplex** and **half-duplex** commands. You will get the following error messages if you try to use the **full-duplex** and **half-duplex** command on a Cisco AS5300:

```
router(config)# interface fastethernet 0
router(config-if)# full-duplex
Please use duplex command to configure duplex mode
router(config-if)#
router(config-if)# half-duplex
Please use duplex command to configure duplex mode
```

Support for this Command

Use the question mark command (?) to find out which port adapters support this command. If the interface does not support full-duplex, an informational message similar to the one shown below is displayed, and no changes are made to the interface. To determine if the interface supports full-duplex, use the **show interfaces** command. For example, the following message is displayed if the interface does not support full-duplex:

```
% interface does not support full-duplex.
```

Use on FDDI

Full-duplex on the FDDI full-duplex port adapters allows an FDDI ring with exactly two stations to transform the ring into a full-duplex, point-to-point topology. To operate in full-duplex mode, there must be only two stations on the ring, the two stations must be capable of operating in full-duplex mode, and both stations must complete a full-duplex autoconfiguration protocol. There is no FDDI token in full-duplex mode. Refer to the *Cisco Product Catalog* for specific model numbers of port adapters.

Full-duplex autoconfiguration protocol allows an FDDI station to dynamically and automatically operate in either half-duplex (or ring) or full-duplex mode, and ensures that the stations fall back to ring mode when a configuration change occurs, such as a third station joining the ring.

After booting up, the FDDI stations begin operation in half-duplex mode. While the station performs the full-duplex autoconfiguration protocol, the station continues to provide data-link services to its users. Under normal conditions, the transition between half-duplex mode and full-duplex mode is transparent to the data-link users. The data-link services provided by full-duplex mode are functionally the same as the services provided by half-duplex mode.

If you change the full-duplex configuration (for example from disabled to enabled) on supported interfaces, the interface resets.

Examples

The following example configures full duplex mode on the Cisco 7000 series routers:

```
interface fastethernet 0/1
full-duplex
```

The following example specifies full-duplex binary synchronous communications (BSC) mode:

```
interface serial 0
encapsulation bstun
full-duplex
```

The following example enables full-duplex mode on FDDI interface 0:

```
interface fddi 0/1/0
full-duplex
```

Related Commands

Command	Description
half-duplex	Specifies half-duplex mode on an SDLC interface or on the FDDI full-duplex, single-mode port adapter and FDDI full-duplex, multimode port adapter on the Cisco 7200 series and Cisco 7500 series routers.
interface	Configures an interface type and enters interface configuration mode.
interface fastethernet	Selects a particular Fast Ethernet interface for configuration.
interface serial	Specifies a serial interface created on a channelized E1 or channelized T1 controller (for ISDN PRI, CAS, or robbed bit signalling).
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show interfaces fddi	Displays information about the FDDI interface.

half-duplex

Use the **half-duplex** interface configuration command to specify half-duplex mode on an SDLC interface or on the FDDI full-duplex, single-mode port adapter and FDDI full-duplex, multimode port adapter on the Cisco 7200 series, and Cisco 7500 series routers. Refer to the *Cisco Product Catalog* for specific model numbers of port adapters.

Use the **no** form of this command to reset the interface for full-duplex mode.

half-duplex

no half-duplex

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	11.1	This command was introduced.
	11.3	This command was modified to include information on FDDI full-duplex, single-mode and multimode port adapters.

Usage Guidelines



Note

The **half-duplex** command replaces both the **sdlc hdx** and **media-type half-duplex** commands.

SDLC Interfaces

The **half-duplex** command is used to configure an SDLC interface for half-duplex mode and is used on a variety of port adapters. Use the question mark command (?) to find out which port adapters support this command.

**Caution**

For the Cisco AS5300, the **duplex {full | half | auto}** command syntax replaces the **full-duplex** and **half-duplex** commands. You will get the following error messages if you try to use the **full-duplex** and **half-duplex** command on a Cisco AS5300:

```
router(config)# interface fastethernet 0
router(config-if)# full-duplex
Please use duplex command to configure duplex mode
router(config-if)#
router(config-if)# half-duplex
Please use duplex command to configure duplex mode
```

Enable Full-Duplex Mode

To enable full-duplex mode, use the **no half-duplex** or **full-duplex** commands.

**Note**

The **media-type half-duplex** command exists in Cisco IOS Release 11.0(5). As of Release 11.0(6), the keyword **half-duplex** was removed from the **media-type** command. In Release 11.0(6), the functionality for specifying half-duplex mode is provided by the **half-duplex** command.

Examples

The following example configures an SDLC interface for half-duplex mode:

```
encapsulation sdlc-primary
half-duplex
```

Related Commands

Command	Description
full-duplex	Specifies full-duplex mode on full-duplex single-mode and multimode port adapters.

half-duplex controlled-carrier

Use the **half-duplex controlled-carrier** interface configuration command to place a low-speed serial interface in controlled-carrier mode, instead of constant-carrier mode. Use the **no** form of this command to return the interface to constant-carrier mode.

half-duplex controlled-carrier

no half-duplex controlled-carrier

Syntax Description This command has no arguments or keywords.

Defaults Constant-carrier mode, where DCD is held constant and asserted by the DCE half-duplex interface.

Command Modes Interface configuration

Command History	Release	Modification
	11.2	This command was introduced.

Usage Guidelines This command applies only to low-speed serial DCE interfaces in half-duplex mode. Configure a serial interface for half-duplex mode by using the **media-type half-duplex** command. These interfaces are available on the following Cisco High Density Serial Routers: 2520, 2521, 2522, and 2523.

Controlled-carrier operation means that the DCE interface has DCD deasserted in the quiescent state. When the interface has something to transmit, it asserts DCD, waits a user-configured amount of time, then starts the transmission. When the interface has finished transmitting, it waits a user-configured amount of time and then deasserts DCD.

Examples The following examples place the interface in controlled-carrier mode and back into constant-carrier operation.

Changing to controlled-carrier mode from the default of constant-carrier operation:

```
interface serial 2
  half-duplex controlled-carrier
```

Changing to constant-carrier operation from controlled-carrier mode:

```
interface serial 2
  no half-duplex controlled-carrier
```

Related Commands

Command	Description
half-duplex timer	Tunes half-duplex timers.
physical-layer	Specifies the mode of a slow-speed serial interface on a router as either synchronous or asynchronous.

half-duplex timer

To tune half-duplex timers, use the **half-duplex timer** interface configuration command. Use the **no** form of this command, along with the appropriate keyword, to return to the default value for that parameter.

half-duplex timer { **cts-delay** *value* | **cts-drop-timeout** *value* | **dcd-drop-delay** *value* | **dcd-txstart-delay** *value* | **rts-drop-delay** *value* | **rts-timeout** *value* | **transmit-delay** *value* }

no half-duplex timer { **cts-delay** *value* | **cts-drop-timeout** *value* | **dcd-drop-delay** *value* | **dcd-txstart-delay** *value* | **rts-drop-delay** *value* | **rts-timeout** *value* | **transmit-delay** *value* }

You can configure more than one of these options, but each option must be specified as a separate command.

Syntax Description		
cts-delay <i>value</i>		Specifies the delay introduced by the DCE interface between the time it detects RTS to the time it asserts CTS in response. The range is dependent on the serial interface hardware.
cts-drop-timeout <i>value</i>		Determines the amount of time a DTE interface waits for CTS to be deasserted after it has deasserted RTS. If CTS is not deasserted during this time, an error counter is incremented to note this event. The range is 0 to 1140000 milliseconds (1140 seconds).
dcd-drop-delay <i>value</i>		Applies to DCE half-duplex interfaces operating in controlled-carrier mode (see the half-duplex controlled-carrier command). This timer determines the delay between the end of transmission by the DCE and the deassertion of DCD. The range is 0 to 4400 milliseconds (4.4 seconds).
dcd-txstart-delay <i>value</i>		Applies to DCE half-duplex interfaces operating in controlled-carrier mode. This timer determines the time delay between the assertion of DCD and the start of data transmission by the DCE interface. The range is 0 to 1140000 ms (1140 seconds).
rts-drop-delay <i>value</i>		Specifies the time delay between the end of transmission by the DTE interface and deassertion of RTS. The range is 0 to 1140000 milliseconds (1140 seconds).
rts-timeout <i>value</i>		Determines the number of milliseconds the DTE waits for CTS to be asserted after the assertion of RTS before giving up on its transmission attempt. If CTS is not asserted in the specified amount of time, an error counter is incremented. The range is dependent on the serial interface hardware.
transmit-delay <i>value</i>		Specifies the number of milliseconds a half-duplex interface will delay the start of transmission. In the case of a DTE interface, this delay specifies how long the interface waits after something shows up in the transmit queue before asserting RTS. For a DCE interface, this dictates how long the interface waits after data is placed in the transmit queue before starting transmission. If the DCE interface is in controlled-carrier mode, this delay shows up as a delayed assertion of DCD. This timer enables the transmitter to be adjusted if the receiver is a little slow and is not able to keep up with the transmitter. The range is 0 to 4400 milliseconds (4.4 seconds).

Defaults

The default **cts-delay** value is 0 milliseconds.

The default **cts-drop-timeout** value is 250 milliseconds.

The default **dcd-drop-delay** value is 100 milliseconds.

The default **dcd-txstart-delay** value is 100 milliseconds.

The default **rts-drop-delay** value is 3 milliseconds.

The default **rts-timeout** value is 3 milliseconds.

The default **transmit-delay** value is 0 milliseconds.

Command Modes

Interface configuration

Command History

Release	Modification
11.3	This command was introduced.

Usage Guidelines

The **half-duplex timer** command is used to tune half-duplex timers. With these timer tuning commands you can adjust the timing of the half-duplex state machines to suit the particular needs of their half-duplex installation.

**Note**

The **half-duplex timer cts-delay** command replaces the **sdlc cts-delay** command. The **half-duplex timer rts-timeout** command replaces the **sdlc rts-timeout** command.

Value Ranges

The range of values for the **cts-delay** and **rts-timeout** keywords are dependent on the serial interface hardware.

Examples

The following example set the cts-delay timer to 10 ms and the transmit-delay timer to 50 milliseconds:

```
interface serial 2
  half-duplex timer cts-delay 10
  half-duplex timer transmit-delay 50
```

Related Commands

Command	Description
half-duplex controlled-carrier	Places a low-speed serial interface in controlled-carrier mode, instead of constant-carrier mode.
physical-layer	Specifies the mode of a slow-speed serial interface on a router as either synchronous or asynchronous.

hold-queue

To limit the size of the IP output queue on an interface, use the **hold-queue** interface configuration command. Use the **no** form of this command with the appropriate keyword to restore the default values for an interface.

hold-queue *length* {**in** | **out**}

no hold-queue {**in** | **out**}

Syntax Description

<i>length</i>	Integer that specifies the maximum number of packets in the queue. The range of allowed values is 0 to 65535.
in	Specifies the input queue.
out	Specifies the output queue.

Defaults

The default input hold-queue limit is 75 packets.

The default output hold-queue limit is 40 packets.

For asynchronous interfaces the default is 10 packets.

These limits prevent a malfunctioning interface from consuming an excessive amount of memory. There is no fixed upper limit to a queue size.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
11.1	The no hold-queue command was added.

Usage Guidelines

The default of 10 packets allows the Cisco IOS software to queue a number of back-to-back routing updates. This is the default for asynchronous interfaces only; other media types have different defaults.

The hold queue stores packets received from the network that are waiting to be sent to the client. It is recommended that the queue size not exceed ten packets on asynchronous interfaces. For most other interfaces, queue length should not exceed 100.

The input hold queue prevents a single interface from flooding the network server with too many input packets. Further input packets are discarded if the interface has too many input packets outstanding in the system.

If priority output queuing is being used, the length of the four output queues is set using the **priority-list** global configuration command. The **hold-queue** command cannot be used to set an output hold queue length in this situation.

For slow links, use a small output hold-queue limit. This approach prevents storing packets at a rate that exceeds the transmission capability of the link. For fast links, use a large output hold-queue limit. A fast link may be busy for a short time (and thus require the hold queue), but can empty the output hold queue quickly when capacity returns.

To display the current hold queue setting and the number of packets discarded because of hold queue overflows, use the EXEC command **show interfaces**.

**Note**

Increasing the hold queue can have detrimental effects on network routing and response times. For protocols that use seq/ack packets to determine round trip times, do not increase the output queue. Dropping packets instead informs hosts to slow down transmissions to match available bandwidth. This is generally better than having duplicate copies of the same packet within the network (which can happen with large hold queues).

Examples

The following example sets a small input queue on a slow serial line:

```
interface serial 0
hold-queue 30 in
```

Related Commands

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

hssi external-loop-request

Use the **hssi external-loop-request** interface configuration command to allow the router to support a CSU/DSU that uses the LC signal to request a loopback from the router. Use the **no** form of this command to disable the feature.

hssi external-loop-request

no hssi external-loop-request

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

The HSA applique (on the HSSI) contains an LED that indicates the LA, LB, and LC signals transiting through the devices. The CSU/DSU uses the LC signal to request a loopback from the router. The CSU/DSU may want to do this so that its own network management diagnostics can independently check the integrity of the connection between the CSU/DSU and the router.

Use this command to enable a two-way, internal, and external loopback request on HSSI from the CSU/DSU.



Note

If your CSU/DSU does not support this feature, it should not be enabled in the router. Not enabling this feature prevents spurious line noise from accidentally tripping the external loopback request line, which would interrupt the normal data flow.

Examples

The following example enables a CSU/DSU to use the LC signal to request a loopback from the router:

```
hssi external-loop-request
```

hssi internal-clock

To convert the HSSI interface into a clock master, use the **hssi internal-clock** interface configuration command. Use the **no** form of this command to disable the clock master mode.

hssi internal-clock

no hssi internal-clock

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines Use this command in conjunction with the HSSI null-modem cable to connect two Cisco routers together with HSSI. You must configure this command at both ends of the link, not just one.



Note

HSSI network module provides full-duplex connectivity at Synchronous Optical Network (SONET) OC-1/STS-1 (51.840 Mhz), T3 (44.736 MHz), and E3 (34.368 MHz) rates in conformance with the EIA/TIA-612 and EIA/TIA-613 specifications. The actual rate of the interface depends on the external data service unit (DSU) and the type of service to which it is connected.

Examples The following example converts the HSSI interface into a 45 MHz clock master:

```
hssi internal-clock 45 MHz
```

hub

To enable and configure a port on an Ethernet hub of a Cisco 2505 or Cisco 2507, use the **hub** global configuration command.

hub ethernet *number port [end-port]*

Syntax Description	ethernet	Indicates that the hub is in front of an Ethernet interface.
	<i>number</i>	Hub number, starting with 0. Since there is only one hub, this number is 0.
	<i>port</i>	Port number on the hub. On the Cisco 2505, port numbers range from 1 to 8. On the Cisco 2507, port numbers range from 1 to 16. If a second port number follows, then the first port number indicates the beginning of a port range.
	<i>end-port</i>	(Optional) Last port number of a range.

Defaults No hub ports are configured

Command Modes Global configuration

Command History	Release	Modification
	10.3	This command was introduced.

Examples The following example enables port 1 on hub 0:

```
hub ethernet 0 1
no shutdown
```

The following example enables ports 1 through 8 on hub 0:

```
hub ethernet 0 1 8
no shutdown
```

Related Commands	Command	Description
	shutdown (hub)	Shuts down an interface or the virtual interface on the CMCC adapter in interface configuration mode. Also shuts down TN3270 entities such as PU, DLUR, and DLUR SAP, depending on the configuration mode when the command is issued.

ignore-dcd

Use the **ignore-dcd** interface configuration command to configure the serial interface to monitor the DSR signal (instead of the DCD signal) as the line up/down indicator. Use the **no** form of this command to restore the default.

ignore-dcd

no ignore-dcd

Syntax Description

This command has no arguments or keywords.

Defaults

The serial interface, operating in DTE mode, monitors the DCD signal as the line up/down indicator.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command applies to Quad Serial NIM interfaces on the Cisco 4000 series routers and Hitachi-based serial interfaces on the Cisco 2500 and 3000 series routers.

Serial Interfaces in DTE Mode

When the serial interface is operating in DTE mode, it monitors the Data Carrier Detect (DCD) signal as the line up/down indicator. By default, the attached DCE device sends the DCD signal. When the DTE interface detects the DCD signal, it changes the state of the interface to up.

SDLC Multidrop Environments

In some configurations, such as an SDLC multidrop environment, the DCE device sends the Data Set Ready (DSR) signal instead of the DCD signal, which prevents the interface from coming up. Use this command to tell the interface to monitor the DSR signal instead of the DCD signal as the line up/down indicator.

Examples

The following example configures serial interface 0 to monitor the DSR signal as the line up/down indicator:

```
interface serial 0
  ignore-dcd
```

ignore-hw local-loopback

To disable the monitoring of the LL pin when in DCE mode, enable the **ignore-hw local-loopback** interface configuration command. To return to the default, use the **no** form of this command.

ignore-hw local-loopback

no ignore-hw local-loopback

Syntax Description This command has no arguments or keywords.

Defaults Enabled

Command Modes Interface configuration

Command History	Release	Modification
	11.3	This command was introduced.

Usage Guidelines Use this command if your system is experiencing spurious modem interrupts, which momentarily causes the interface to enter loopback mode. The end result of this behavior is flapping and the loss of SDLLC sessions.



Note

This command only works with the low-speed serial interfaces.

Examples The following example displays how to disable the monitoring of the LL pin when in DCE mode:

```
Router#conf term
Router(config)#interface serial 2
```

interface

Use the **interface** global configuration command to configure an interface type and enter interface configuration mode.

```
interface type number
```

Cisco 7200 Series and Cisco 7500 Series with a Packet over SONET Interface Processor

```
interface type slot/port
```

Cisco 7500 Series with Ports on VIP Cards

```
interface [type slot/port-adapter/port] [ethernet | serial]
```

Cisco 7500 Series with Channelized T1 or E1

```
interface serial slot/port:channel-group
```

Cisco 4000 Series with Channelized T1 or E1 and the Cisco MC3810

```
interface serial number:channel-group
```

Cisco 7500 Series with Ports on VIP Cards (subinterface , global configuration)

```
interface type slot/port-adapter/port.subinterface-number { multipoint | point-to-point }
```

Cisco 7200 Series (subinterface , global configuration)

```
interface type slot/port.subinterface-number { multipoint | point-to-point }
```

Cisco 7500 Series (subinterface , global configuration)

```
interface type slot/port-adapter.subinterface-number { multipoint | point-to-point }
```

Syntax Description

<i>type</i>	Type of interface to be configured. See Table 8.
<i>number</i>	Port, connector, or interface card number. On a Cisco 4000 series router, specifies the NPM number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the show interfaces command.
<i>slot</i>	Refer to the appropriate hardware manual for slot and port information.
<i>port</i>	Refer to the appropriate hardware manual for slot and port information.
<i>port-adapter</i>	Refer to the appropriate hardware manual for information about port adapter compatibility.

<i>:channel-group</i>	<p>The Cisco 4000 series routers specifies the T1 channel group number in the range of 0 to 23 defined with the channel-group controller configuration command. On a dual port card, it is possible to run channelized on one port and primary rate on the other port.</p> <p>The Cisco MC3810 specifies the T1/E1 channel group number in the range of 0 to 23 defined with the channel-group controller configuration command.</p>
<i>.subinterface-number</i>	Subinterface number in the range 1 to 4294967293. The number that precedes the period (.) must match the number to which this subinterface belongs.
multipoint point-to-point	(Optional) Specifies a multipoint or point-to-point subinterface. There is no default.

Defaults

No interface types are configured.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced for the Cisco 7000 series routers.
11.0	This command was introduced for the Cisco 4000 series routers.
11.2	This command was changed to change the posi keyword to pos .
11.3	This command was changed.
12.0	This command was changed to add the switch keyword.

Usage Guidelines

Subinterfaces can be configured to support partially meshed Frame Relay networks. Refer to the part entitled “Configuring Serial Interfaces” in the *Cisco IOS Interface Configuration Guide*.

There is no correlation between the number of the physical serial interface and the number of the logical LAN Extender interface. These interfaces can have the same or different numbers.

Table 8 *interface Type Keywords*

Keyword	Interface Type
async	Port line used as an asynchronous interface.
atm	ATM interface.
bri	Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI). This interface configuration is propagated to each of the B channels. B channels cannot be individually configured. The interface must be configured with dial-on-demand commands in order for calls to be placed on that interface.
dialer	Dialer interface.
ethernet	Ethernet IEEE 802.3 interface.

Table 8 *interface Type Keywords (continued)*

Keyword	Interface Type
fastethernet	100-Mbps Ethernet interface on the Cisco 4500, Cisco 4700, Cisco 7000 and Cisco 7500 series routers.
fddi	Fiber Distributed Data Interface (FDDI).
group-async	Master asynchronous interface.
hssi	High-Speed Serial Interface (HSSI).
lex	LAN Extender (LEX) interface.
loopback	Software-only loopback interface that emulates an interface that is always up. It is a virtual interface supported on all platforms. The <i>interface-number</i> is the number of the loopback interface that you want to create or configure. There is no limit on the number of loopback interfaces you can create.
null	Null interface.
port-channel	Port channel interface
pos	Packet OC-3 interface on the Packet over SONET Interface Processor
serial	Serial interface.
switch	Switch interface
tokenring	Token Ring interface.
tunnel	Tunnel interface; a virtual interface. The <i>number</i> is the number of the tunnel interface that you want to create or configure. There is no limit on the number of tunnel interfaces you can create.
vg-anylan	100VG-AnyLAN port adapter

Examples

The following example configures serial interface 0 with PPP encapsulation:

```
interface serial 0
 encapsulation ppp
```

The following example enables loopback mode and assigns an IP network address and network mask to the interface. The loopback interface established here will always appear to be up:

```
interface loopback 0
 ip address 131.108.1.1 255.255.255.0
```

The following example for the Cisco 7500 series router shows the interface configuration command for Ethernet port 4 on the EIP that is installed in (or recently removed from) slot 2:

```
interface ethernet 2/4
```

The following example begins configuration on the Token Ring interface processor in slot 1 on port 0 of a Cisco 7500 series routers:

```
interface tokenring 1/0
```

The following example shows how a partially meshed Frame Relay network can be configured. In this example, subinterface serial 0.1 is configured as a multipoint subinterface with three Frame Relay PVCs associated, and subinterface serial 0.2 is configured as a point-to-point subinterface.

```
interface serial 0
  encapsulation frame-relay
interface serial 0.1 multipoint
  ip address 131.108.10.1 255.255.255.0
  frame-relay interface-dlci 42 broadcast
  frame-relay interface-dlci 53 broadcast
interface serial 0.2 point-to-point
  ip address 131.108.11.1 255.255.0
  frame-relay interface-dlci 59 broadcast
```

The following example configures circuit 0 of a T1 link for Point-to-Point Protocol (PPP) encapsulation:

```
controller t1 4/1
circuit 0 1
interface serial 4/1:0
  ip address 131.108.13.1 255.255.255.0
  encapsulation ppp
```

The following example configures LAN Extender interface 0:

```
interface lex 0
```

Related Commands

Command	Description
controller	Configures a T1 or E1 controller and enters controller configuration mode.
mac-address	Sets the MAC layer address of the Cisco Token Ring.
ppp	Starts an asynchronous connection using PPP.
show interfaces	Displays statistics for all interfaces configured on the router or access server.
slip	Starts a serial connection to a remote host using SLIP.

interface dialer

To designate a dialer rotary group leader, use the **interface dialer** global configuration command.

```
interface dialer interface-number
```

Syntax Description	<i>interface-number</i> Integer that you select to indicate a dialer rotary group in the range 0 to 9.
---------------------------	--

Defaults	No dialer rotary group leader is specified.
-----------------	---

Command Modes	Global configuration
----------------------	----------------------

Usage Guidelines

Dialer rotary groups allow you to apply a single interface configuration to a set of interfaces. Once the interface configuration is propagated to a set of interfaces, those interfaces can be used to place calls using the standard dial-on-demand criteria. When many destinations are configured, any of these interfaces can be used for outgoing calls.

Dialer rotary groups are useful in environments that require many calling destinations. Only the rotary group needs to be configured with all of the **dialer map** commands. The only configuration required for the interfaces is the **dialer rotary-group** command that indicates which interface is part of a dialer rotary group. For more information, see the “*Dial Solutions*” books.

Although a dialer rotary group is configured as an interface, it is not a physical interface. Instead it represents a group of interfaces. Any number of dialer groups can be defined.

Interface configuration commands entered after the **interface dialer** command will be applied to all physical interfaces assigned to specified rotary group.

Examples

The following example identifies dialer interface 1 as the dialer rotary group leader. Dialer interface 1 is not a physical interface, but represents a group of interfaces. The interface configuration commands that follow apply to all interfaces included in this group.

```
interface dialer 1
  encapsulation ppp
  dialer in-band
  dialer map ip 172.30.2.5 username YYY 14155553434
  dialer map ip 172.30.4.5 username ZZZ
```

Related Commands	Command	Description
	dialer rotary-group	Includes a specified interface in a dialer rotary group.