Interface Commands

This chapter contains the commands used to configure nonprotocol-specific interface features. The commands are in alphabetical order. For hardware technical descriptions, and for information about installing the router interfaces, refer to the hardware installation and maintenance publication for your particular product.

For interface configuration tasks and examples, refer to the chapter entitled "Configuring Interfaces" in the *Router Products Configuration Guide*.

For a conversion table of the modular products and Cisco 7000 series processors, see the appendix entitled "Cisco 7000 Processors."

Note For information about the Channel Interface Processor (CIP), see the chapter entitled "IBM Channel Attach Commands" later in this addendum. The CIP is described in a separate chapter because of the interrelation of host system configuration values and router configuration values.

async default ip address

To assign the interface address that is used by the device connecting to the router via PPP or SLIP, unless you override the address at the command line, use the async default ip address interface configuration command. Use the no form of this command to remove the address from your configuration.

async default ip address ip-address no async default ip address

Syntax Description

ip-address Address of the client interface

Default

No interface address is assigned.

Command Mode

Interface configuration

Example

The following example specifies address 182.32.7.51 on asynchronous interface 1:

```
interface async 1
async default ip address 182.32.7.51
```

Related Command

async dynamic address

async dynamic address

To specify an address on an asynchronous interface (rather than using the default address), use the async dynamic address interface configuration command. Use the no form of this command to disable dynamic addressing.

async dynamic address no async dynamic address

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Example

The following example shows dynamic addressing assigned to an interface:

interface async 1 async dynamic address

Related Commands

ppp

slip

async dynamic routing

To implement asynchronous routing on an interface, use the async dynamic routing interface configuration command. The no form of this command disables use of routing protocols; static routing will still be used.

async dynamic routing no async dynamic routing

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Example

The following example shows how to enable asynchronous routing on asynchronous interface 1. The ip tcp header-compression passive command enables Van Jacobson TCP header compression and prevents transmission of compressed packets until a compressed packet arrives from the asynchronous link.

```
interface async 1
async dynamic routing
async dynamic address
async default ip address 1.1.1.2
ip tcp header-compression passive
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

```
async dynamic address
ip tcp header-compression †
```

async mode dedicated

To place a line into network mode using SLIP or PPP encapsulation, use the async mode dedicated interface configuration command. The no form of this command returns the line to interactive mode.

async mode dedicated no async mode

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

With dedicated asynchronous mode, the interface will use either SLIP or PPP encapsulation, depending on which encapsulation method is configured for the interface. An EXEC prompt does not appear, and the line is not available for normal interactive use.

If you configure a line for dedicated mode, you will not be able to use async dynamic address, because there is no user prompt. You must configure either async default ip address and ip unnumbered or ip address.

Example

The following example assigns an Internet address to an asynchronous line and places the line into network mode. Setting the stop bits to 1 enhances performance.

```
interface async 1
async default ip address 182.32.7.51
async mode dedicated
encapsulation slip
```

Related Command async mode interactive

async mode interactive

To enable the slip and ppp EXEC commands, use the async mode interactive line configuration command. Use the no form of this command to prevent users from implementing SLIP and PPP at the EXEC level.

async mode interactive no async mode

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Example

The following example enables the **ppp** and **slip** EXEC commands:

interface async 1 async mode interactive

Related Commands

async mode dedicated

ppp

slip

atm-dxi map

To map a given VPI and VCI to a DXI frame address, use the **atm-dxi map** interface configuration command. Use the **no** form of this command to remove the definition.

atm-dxi map protocol address vpi vci [broadcast] no atm-dxi map protocol address

Syntax Description

Specifies the protocol: apollo, appletalk, bridge, clns, decnet, ip, protocol

novell, vines, xns

Protocol-specific address address

Virtual path identifier in the range 0 to 15 vpi

Virtual circuit identifier in the range 0 to 63 vci

broadcast (Optional) Broadcasts should be forwarded to this address

Default

No map definition is established.

Command Mode

Interface configuration

Usage Guidelines

This command is used in configurations where the router is intended to communicate with an ATM network through an ATM Data Service Unit (ADSU). Given the circuit identifier parameters (VPI/VCI) for the ATM virtual circuit, the DXI frame address (DFA) that is used for communication between the router and the ADSU is computed and used.

Example

In the following example, all IP packets intended for the host with IP address 131.108.170.49 are converted into ATM cells identified with a VPI of 2 (binary 0000 0010) and a VCI of 46 (binary 0000 0000 0010 1110) by the ADSU. Using the mapping defined in Annex A of the ATM DXI Specification, this combination of VPI and VCI maps into to a DFA of 558 (binary 1000101110). The ADSU will then extract the VPI and VCI information from the DFA of the incoming frame when formulating ATM cells.

```
interface serial 0
atm-dxi map ip 131.108.170.49 2 46 broadcast
```

Related Command

encapsulation atm-dxi

auto-polarity

To enable automatic receiver polarity reversal on a hub port connected to an Ethernet interface of a Cisco 2505 or Cisco 2507, use the auto-polarity hub configuration command. To disable this feature, use the no form of this command.

auto-polarity no auto-polarity

Syntax Description

This command has no arguments or keywords.

Default

Enabled

Command Mode

Hub configuration

Usage Guidelines

This command applies to a port on an Ethernet hub only.

Example

The following example enables automatic receiver polarity reversal on hub 0, ports 1 through 3:

```
hub ether 0 1 3
auto-polarity
```

Related Command

hub

backup delay

To define how much time should elapse before a secondary line is set up or taken down after a primary line transition, use the backup delay interface configuration command. Use the no backup delay command to remove the definition.

backup delay { enable-delay | **never** } { disable-delay | **never** } **no backup delay** { enable-delay | **never**} { disable-delay | **never**}

Syntax Description

enable-delay Integer that specifies the delay in seconds after the primary line goes

down before the secondary line is activated.

Integer that specifies the delay in seconds after the primary line goes up disable-delay

before the secondary line is deactivated.

Prevents the secondary line from being activated or deactivated. never

Default

never

Command Mode

Interface configuration

Usage Guidelines

When a primary line goes down, the router delays the amount of seconds defined by the enable-delay argument before enabling the secondary line. If, after the delay period, the primary line is still down, the secondary line is activated.

When a primary line comes back up, the router will delay the amount of seconds defined by the disable-delay argument.

Note In cases where there are spurious signal disruptions that may appear as intermittent lost carrier signals, it is recommended that some delay be enabled before activating and deactivating a secondary.

Note The interval configured with the backup delay command does not affect the operation of the backup load command.

Examples

The following example sets a 10-second delay on deactivating the secondary line; however, the line is activated immediately:

```
interface serial 0
backup delay 0 10
```

The same example on the Cisco 7000 requires the following commands:

```
interface serial 1/1
backup delay 0 10
```

backup interface

To configure the serial interface as a secondary, or dial backup line, use the **backup interface** interface configuration command. Use the **no backup** command with the appropriate serial port designation to turn disable this feature.

backup interface interface-name
backup interface interface-name slot/port (for the Cisco 7000 series)
no backup interface interface-name

Syntax Description

interface-name Serial port to be set as the secondary interface line.

Slot On the Cisco 7000 series, specifies the slot number.

port On the Cisco 7000 series, specifies the port number.

Default

Disabled

Command Mode

Interface configuration

Examples

The following example sets serial 1 as the backup line to serial 0:

```
interface serial 0
backup interface serial 1
```

The following example on the Cisco 7000 sets serial 2 as the backup line to serial 1:

```
interface serial 1/1
backup interface serial 2/2
```

Related Command

down-when-looped

backup load

To set the traffic load thresholds for dial backup service, use the **backup load** interface configuration command. Use the **no backup load** command to remove the setting.

```
backup load {enable-threshold | never} {disable-load | never} no backup load {enable-threshold | never} {disable-load | never}
```

Syntax Description

enable- Integer that specifies a percentage of the primary line's available

threshold bandwidth.

never Specifies that the secondary line never be activated due to load.

disable-load Integer that specifies a percentage of the primary line's available

bandwidth.

never Specifies that the secondary line never be deactivated due to load.

Default

Both arguments default to never.

Command Mode

Interface configuration

Usage Guidelines

When the transmitted or received load on the primary line is greater than the value assigned to the *enable-threshold* argument, the secondary line is enabled.

When the transmitted load on the primary line plus the transmitted load on the secondary line is less than the value entered for the *disable-load* argument, and the received load on the primary line plus the received load on the secondary line is less than the value entered for the *disable-load* argument, the secondary line is disabled.

If the **never** keyword is used instead of an *enable-threshold* value, the secondary line is never activated because of load. If the **never** keyword is used instead of a *disable-load* value, the secondary line is never deactivated because of load.

Examples

The following example sets the traffic load threshold to 60 percent on the primary line. When that load is exceeded, the secondary line is activated, and will not be deactivated until the combined load is less than 5 percent of the primary bandwidth.

```
interface serial 0
backup load 60 5
```

The same example on the Cisco 7000 requires the following commands:

```
interface serial 1/1
backup load 60 5
```

bandwidth

To set a bandwidth value for an interface, use the **bandwidth** interface configuration command. Use the **no bandwidth** command to restore the default values.

bandwidth kilobits no bandwidth

Syntax Description

kilobits

Intended bandwidth in kilobits per second. For a full bandwidth DS3, enter the value **44736**.

Default

Default bandwidth values are set during startup and can be displayed with the EXEC command **show interfaces**.

Command Mode

Interface configuration

Usage Guidelines

The **bandwidth** command sets an informational parameter only; you cannot adjust the actual bandwidth of an interface with this command. For some media, such as Ethernet, the bandwidth is fixed; for other media, such as serial lines, you can change the actual bandwidth by adjusting hardware. For both classes of media, you can use the **bandwidth** configuration command to communicate the current bandwidth to the higher-level protocols.

Additionally, IGRP uses the minimum path bandwidth to determine a routing metric. The TCP protocol adjusts initial retransmission parameters based on the apparent bandwidth of the outgoing interface.

At higher bandwidths, the value you configure with the **bandwidth** command is not what is displayed by the **show interface** command. The value shown is that used in IGRP updates and also used in computing load.

Note This is a routing parameter only; it does not affect the physical interface.

Example

The following example sets the full bandwidth for DS3 transmissions:

interface serial 0 bandwidth 44736

Related Command

A dagger (†) indicates that the command is documented in another chapter.

vines metric †

channel-group

Use the **channel-group** controller configuration command to define the timeslots that belong to each T1 circuit.

channel-group number timeslots range [speed {48 | 56 | 64}]

Syntax Description

number Channel-group number. Channel-group numbers can be a value

from 0 to 23.

timeslots range Timeslot or range of timeslots belonging to the channel-group.

The first timeslot is numbered 1, the last timeslot is numbered

24.

speed {48 | 56 | 64} (Optional) Specifies the line speed (in kilobits per second) of

the T1 link.

Default

56 kbps

Command Mode

Controller configuration

Usage Guidelines

This command is used in configurations where the router is intended to communicate with T1 fractional data line. The channel-group *number* may be arbitrarily assigned and must be unique for the controller. The **timeslot** *range* must match the timeslots assigned to the circuit. The T1 service provider defines the timeslots that comprise a circuit.

Example

In the following example, three channel-groups are defined. Channel-group 0 consists of a single timeslot, channel-group 8 consists of 7 timeslots and runs at a speed of 64 kbps per timeslot, and channel-group 12 consists of a single timeslot.

```
channel-group 0 timeslots 1
channel-group 8 timeslots 5,7,12-15,20 speed 64
channel-group 12 timeslots 2
```

Related Commands

linecode framing

clear controller lex

To reboot the LAN Extender chassis and restart its operating software, use the **clear controller lex** privileged EXEC command.

clear controller lex number [prom]
clear controller lex slot/port [prom] (for the Cisco 7000 series)

Syntax Description

number Number of the LAN Extender interface corresponding to the

LAN Extender to be rebooted.

prom (Optional) Forces a reload of the PROM image, regardless of

any Flash image.

Slot On the Cisco 7000 series, specifies the backplane slot number.

On the Cisco 7000, the value can be 0, 1, 2, 3, or 4. On the

Cisco 7010, the value can be 0, 1, or 2.

port On the Cisco 7000 series, specifies the port number of the

interface. The value can be 0, 1, 2, or 3 for the serial interface.

Command Mode

Privileged EXEC

Usage Guidelines

The clear controller lex command halts operation of the LAN Extender and performs a cold restart.

Without the **prom** keyword, if an image exists in Flash memory, and that image has a newer software version than the PROM image, and that image has a valid checksum, then this command runs the Flash image. If any one of these three conditions is not met, this command reloads the PROM image.

With the **prom** keyword, this command reloads the PROM image, regardless of any Flash image.

Examples

The following example halts operation of the LAN Extender bound to LAN Extender interface 2 and causes the LAN Extender to perform a cold restart from Flash memory:

```
Router# clear controller lex 2 reload remote lex controller? [confirm] yes
```

The following example halts operation of the LAN Extender bound to LAN Extender interface 2 and causes the LAN Extender to perform a cold restart from PROM:

```
Router# clear controller lex 2 prom reload remote lex controller? [confirm] yes
```

clear controller t1

Use the **clear controller t1** EXEC command to reset the T1 controller interface on the Cisco 7000. **clear controller t1** *slot/port*

Syntax Description

slot Backplane slot number; can be 0, 1, 2, 3, or 4. The slots are numbered

from left to right.

port Port number of the interface. It can be 0 or 1 depending on the type of

controller, as follows:

• MIP (MultiChannel Interface Processor) 0 or 1

Ports on each interface processor are numbered from the top down.

Command Mode

EXEC

Example

The following example resets the T1 controller at slot 4, port 0:

clear controller t1 4/0

Related Command

controller t1

clear counters

To clear the interface counters, use the **clear counters** EXEC command.

```
clear counters [type number] [ethernet | serial] clear counters [type slotlport] [ethernet | serial] (for the Cisco 7000 series)
```

Syntax Description

type	(Optional) Specifies the interface type; it is one of the keywords listed in Table 6-1.
number	(Optional) Specifies the interface counter displayed with the show interfaces command.
ethernet	(Optional) If the <i>type</i> is lex , you can clear the interface counters on the Ethernet interface.
serial	(Optional) If the <i>type</i> is lex , you can clear the interface counters on the serial interface.
slot	(Optional) On the Cisco 7000 series, specifies the backplane slot number. On the Cisco 7000, the value can be $0, 1, 2, 3$, or 4 . On the Cisco 7010, the value can be $0, 1, $ or 2 .
port	(Optional) On the Cisco 7000 series, specifies the port number of the interface. The value can be 0, 1, 2, or 3 for the serial interface.

Table 6-1 Clear Counters Interface Type Keywords

Keyword	Interface Type
async	Asynchronous interface
bri	Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI)
dialer	Dialer interface
ethernet	Ethernet interface
fddi	Fiber Distributed Data Interface (FDDI)
hssi	High-Speed Serial Interface (HSSI)
lex	LAN Extender (LEX) interface
loopback	Loopback interface
null	Null interface
pcbus	ISA bus interface. This keyword is valid on LanOptics' Branchcard or Stacknet 2000 products only.
serial	Synchronous serial interface
tokenring	Token Ring interface
tunnel	Tunnel interface

Command Mode

EXEC

Usage Guidelines

This command clears all the current interface counters from the interface unless the optional arguments *type* and *number* are specified to clear only a specific interface type (serial, Ethernet, Token Ring, and so on).

Note This command will not clear counters retrieved using SNMP, but only those seen with the EXEC **show interface** command.

Examples

The following example illustrates how to clear all interface counters:

clear counters

The following example illustrates how to clear interface counters on the serial interface residing on a Cisco 1000 series LAN Extender:

clear counters lex 0 serial

Related Command

show interfaces

clear hub

To reset and reinitialize the hub hardware connected to an interface of a Cisco 2505 or Cisco 2507, use the **clear hub** EXEC command.

clear hub ether number

Syntax Description

ether Indicates the hub in front of an Ethernet interface.

number Hub number to clear, starting with 0. Since there is currently

only one hub, this number is 0.

Command Mode

EXEC

Example

The following example clears hub 0:

clear hub ether 0

Related Command

hub

clear hub counters

To set the hub counters on an interface of a Cisco 2505 or Cisco 2507 to zero, use the clear hub counters EXEC command.

clear hub counters [ether number [port [port]]]

Syntax Description

ether (Optional) Indicates the hub in front of an Ethernet interface.

number (Optional) Hub number for which to clear counters. Since there

is currently only one hub, this number is 0. If the keyword ether

is specified, the *number* is required.

port [port] (Optional) Beginning and ending port numbers on the hub. On

> the Cisco 2505, port numbers range from 1 through 8. On the Cisco 2507, port numbers range from 1 through 16. If a second port number follows, then this port number indicates the beginning of a port range. If no port number is specified,

counters for all ports are cleared.

Command Mode

EXEC

Example

The following example clears the counters displayed in a **show hub** command for all ports on hub 0:

clear hub counters ether 0

Related Command

show hub

clear interface

To reset the hardware logic on an interface, use the **clear interface** EXEC command.

clear interface type number

clear interface type slot/port (on a Cisco 7000 series)

clear interface type slot/port [:channel-group] (on a Cisco 7000 MIP T1 interface)

Syntax Description

Specifies the interface type; it is one of the keywords listed in Table 6-2. type number Specifies the port, connector, or interface card number. slot On the Cisco 7000 series, specifies the backplane slot number. On the 7000, value can be 0, 1, 2, 3, or 4. On the 7010, value can be 0, 1, or 2. On the Cisco 7000 series, specifies the port number of the interface and can port be 0, 1, 2, 3, 4 or 5 depending on the type of interface, as follows: • AIP (ATM Interface Processor) 0 • EIP (Ethernet Interface Processor) 0, 1, 2, 3, 4, or 5 • FIP (FDDI Interface Processor) 0 • HIP (HSSI Interface Processor) 0 • MIP (Multichannel Interface Processor) 0 or 1 • TRIP (Token Ring Interface Processor) 0, 1, 2, or 3

channel-group

(Optional) On the Cisco 7000 series supporting channelized T1, specifies the channel and can be between 0 and 23.

Table 6-2 Clear Interface Type Keywords

Keyword	Interface Type
async	Async interface
atm	Asynchronous Transfer Mode (ATM) interface
bri	Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI)
ethernet	Ethernet interface
fddi	Fiber Distributed Data Interface (FDDI)
hssi	High-Speed Serial Interface (HSSI)
loopback	Loopback interface
null	Null interface
pcbus	ISA bus interface. This keyword is valid on LanOptics' Branchcard or Stacknet 2000 products only.
serial	Synchronous serial interface
tokenring	Token Ring interface
tunnel	Tunnel interface

Command Mode

EXEC

Note Under normal circumstances, you do not need to clear the hardware logic on interfaces.

Example

The following example resets the interface logic on interface HSSI 1:

clear interface hssi 1

clear rif-cache

To clear entries from the Routing Information Field (RIF) cache, use the **clear rif-cache** EXEC command.

clear rif-cache

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Example

The following example illustrates how to clear the RIF cache:

clear rif-cache

Related Command

A dagger (†) indicates that the command is documented in another chapter.

multiring †

clear snapshot quiet-time

To end the quiet period on a client router within two minutes, use the clear snapshot quiet-time EXEC command.

clear snapshot quiet-time interface

Syntax Description

interface

Interface type and number

Command Mode

EXEC

Usage Guidelines

The clear snapshot quiet-time command places the client router in a state to reenter the active period withing two minutes. The two-minute hold period ensures a quiet period of at least two minutes between active periods.

Example

The following example ends the quiet period on dialer interface 1:

clear snapshot quiet-time dialer 1

Related Commands

show snapshot snapshot client

clock source (controller)

Use the **clock source** controller configuration command to set the T1-line clock-source for the MIP in the Cisco 7000.

clock source {line | internal}

Syntax Description

line Specifies the T1 line as the clock source.

internal Specifies the MIP as the clock source.

Default

T1 line

Command Mode

Controller configuration

Usage Guidelines

This command is used in configurations where the MIP interfaces are connected back-to-back, rather than to a T1 line, and one of the interfaces must provide a clocking signal. When the MIP interface is connected to a channelized T1 line, this command need never be used.

Example

The following example enables internal clocking:

clock source internal

Related Commands

framing

linecode

clock source (interface)

To control which clock a G.703-E1 interface will use to clock its transmitted data from, use the **clock source** interface configuration command. The **no** form of this command restores the default value.

clock source {line | internal}
no clock source

Syntax Description

line Specifies that the interface will clock its transmitted data from a

clock recovered from the line's receive data stream (default).

internal Specifies that the interface will clock its transmitted data from

its internal clock.

Default

By default, the applique uses the line's receive data stream.

Command Mode

Interface configuration

Usage Guidelines

This command applies to a Cisco 4000 router or Cisco 7000 series router. A G.703-E1 interface can clock its transmitted data from either its internal clock or from a clock recovered from the line's receive data stream.

Example

The following example specifies the G.703-E1 interface to clock its transmitted data from its internal clock:

clock source internal

clock rate

To configure the clock rate for appliques (connector hardware) on the serial interface of the MCI and SCI cards to an acceptable bit rate, use the **clock rate** interface configuration command. Use the **no clock rate** command to remove the clock rate if you change the interface from a DCE to a DTE device.

clock rate bps no clock rate

Syntax Description

bps Desired clock rate in bits per second: 1200, 2400, 4800, 9600, 19200, 38400,

56000, 64000, 72000, 125000, 148000, 500000, 800000, 1000000, 1300000,

2000000, or 4000000.

Default

No clock rate is configured.

Command Mode

Interface configuration

Usage Guidelines

Be aware that the fastest speeds might not work if your cable is too long, and that speeds faster than 148,000 bits per second are too fast for RS-232 signaling. It is recommended that you only use the synchronous serial RS-232 signal at speeds up to 64,000 bits per second. To permit a faster speed, use an RS-449 or V.35 applique.

Example

The following example sets the clock rate on the first serial interface to 64,000 bits per second:

interface serial 0 clock rate 64000

cmt connect

To start the processes that perform the connection management (CMT) function and allow the ring on one fiber to be started, use the cmt connect EXEC command.

cmt connect [interface-name [phy-a | phy-b]]

Syntax Description

interface-name (Optional) Specifies the FDDI interface.

(Optional) Selects Physical Sublayer A. phy-a

(Optional) Selects Physical Sublayer B. phy-b

Command Mode

EXEC

Usage Guidelines

In normal operation, the FDDI interface is operational once the interface is connected and configured. The cmt connect command allows the operator to start the processes that perform the CMT function.

The **cmt connect** command is not needed in the normal operation of FDDI; this command is used mainly in interoperability tests.

Examples

The following examples demonstrate use of the cmt connect command for starting the CMT processes on the FDDI ring.

The following command starts all FDDI interfaces:

```
cmt connect
```

The following command starts both fibers on the FDDI interface unit zero:

```
cmt connect fddi 0
```

The following command on the Cisco 7000 starts both fibers on the FDDI interface unit zero:

```
cmt connect fddi 1/0
```

The following command starts only Physical Sublayer A on the FDDI interface unit 0 (zero):

```
cmt connect fddi 0 phy-a
```

The following command on the Cisco 7000 starts only Physical Sublayer A on the FDDI interface unit 0 (zero):

```
cmt connect fddi 1/0 phy-a
```

cmt disconnect

To stop the processes that perform the connection management (CMT) function and allow the ring on one fiber to be stopped, use the **cmt disconnect** EXEC command.

cmt disconnect [interface-name [phy-a | phy-b]]

Syntax Description

interface-name (Optional) Specifies the FDDI interface.

phy-a (Optional) Selects Physical Sublayer A.

phy-b (Optional) Selects Physical Sublayer B.

Command Mode

EXEC

Usage Guidelines

In normal operation, the FDDI interface is operational once the interface is connected and configured, and is turned off using the **shutdown** interface configuration command. The **cmt disconnect** command allows the operator to stop the processes that perform the CMT function and allow the ring on one fiber to be stopped.

The **cmt disconnect** command is not needed in the normal operation of FDDI; this command is used mainly in interoperability tests.

Examples

The following examples demonstrate use of the **cmt disconnect** command for stopping the CMT processes on the FDDI ring.

The following command stops all FDDI interfaces:

```
cmt disconnect
```

The following command stops both fibers on the FDDI interface unit zero:

```
cmt disconnect fddi 0
```

The following command on the Cisco 7000 stops both fibers on the FDDI interface unit zero:

```
cmt disconnect fddi 1/0
```

The following command stops only Physical Sublayer A on the FDDI interface unit 0 (zero). This command causes the FDDI media to go into a wrapped state so that the ring will be broken.

```
cmt disconnect fddi 0 phy-a
```

The following command on the Cisco 7000 stops only Physical Sublayer A on the FDDI interface unit 0 (zero). This command causes the FDDI media to go into a wrapped state so that the ring will be broken.

```
cmt disconnect fddi 1/0 phy-a
```

compress predictor

To configure point-to-point software compression for a LAPB, use the **compress predictor** interface configuration command. To disable compression, use the no form of this command.

compress predictor no compress predictor

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

You can configure point-to-point software compression for all LAPB encapsulations. Compression reduces the size of LAPB frames via lossless data compression. (An explanation of "lossless" data appears in the note below.) The compression algorithm used is a predictor algorithm (the RAND compression algorithm), which uses a compression dictionary to predict what the next character in the frame will be.

Compression is performed in software and may significantly affect system performance. We recommend that you disable compression if CPU load exceeds 65%. To display the CPU load, use the show process cpu EXEC command.

Compression requires that both ends of the serial link be configured to use compression. You should never enable compression for connections to a public data network.

Note The best performance data compression algorithms "learn"; that is, adjust their compression methodology as they discover patterns in the data. For this to work well, no data can be lost, so the compression algorithm is run over LAPB to ensure that everything is sent in order, with no missing data and no duplicate data.

If the majority of your traffic is already compressed files, it is recommended that you not use compression.

When using compression, you should adjust the MTU for the serial interface and the LAPB N1 parameter as shown in the example to avoid informational diagnostics regarding excessive MTU or N1 sizes.

Example

The following example enables compression on serial interface 0 for a LAPB link:

```
interface serial 0
encapsulation lapb
compress predictor
mtu 1509
lapb n1 12072
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

```
encapsulation lapb †
encapsulation lapb-dce ^{\dagger}
encapsulation multi-lapb ^\dagger
encapsulation multi-lapb-dce ^\dagger
encapsulation x25 †
show compress
show processes †
```

controller t1

To configure a T1 controller interface and enter controller configuration mode, use the controller t1 global configuration command. This command is used only on a Cisco 7000.

controller t1 slot/port

Syntax Description

slot Backplane slot number; can be 0, 1, 2, 3, or 4. On the 7010, the slot

number can be 0, 1, or 2. The slots are numbered from left to right.

Port number of the interface. It can be 0 or 1 depending on the type of port

controller, as follows:

• MIP (MultiChannel Interface Processor) 0 or 1

Ports on each interface processor are numbered from the top down.

Default

No T1 controller interface is configured.

Command Mode

Global configuration

Usage Guidelines

This command is used in configurations where the router is intended to communicate with a T1 fractional data line. Additional parameters for the T1 line must be configured for the controller before the T1 circuits can be configured by means of the interface global configuration command.

Example

In the following example, the MIP in slot 4, port 0 is configured as a T1 controller:

```
controller t1 4/0
```

Related Commands

channel-group clear controller t1 clock source framing linecode

copy flash lex

To download an executable image from Flash memory on the core router to the LAN Extender chassis, use the **copy flash lex** privileged EXEC command.

copy flash lex number

Syntax Description

number

Number of the LAN Extender interface to which to download an image from Flash memory

Command Mode

Privileged EXEC

Usage Guidelines

If you attempt to download a version of the software older than what is currently running on the LAN Extender, a warning message is displayed.

Example

The following example illustrates how to copy the executable image *namexx* to the LAN Extender interface 0:

Related Command

copy tftp lex

copy tftp lex

To download an executable image from a TFTP server to the LAN Extender, use the **copy tftp lex** privileged EXEC command.

copy tftp lex number

Syntax Description

number

Number of the LAN Extender interface to which to download an image

Command Mode

Privileged EXEC

Usage Guidelines

If you attempt to download a version of the software older than what is currently running on the LAN Extender, a warning message is displayed.

Example

The following example illustrates how to copy the file *namexx* from the TFTP server:

crc

To set the length of the cyclic redundancy check (CRC) on a Fast Serial Interface Processor (FSIP) or HSSI Interface Processor (HIP) of the Cisco 7000 series only, use the **crc** interface configuration command. To set the CRC length to 16 bits, use the **no** form of this command.

```
crc size
```

Syntax Description

size

Default

16 bits

Command Mode

Interface configuration

Usage Guidelines

All interfaces use a 16-bit cyclic redundancy check (CRC) by default, but also support a 32-bit CRC. CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. The designators 16 and 32 indicate the length (in bits) of the frame check sequence (FCS). A CRC of 32 bits provides more powerful error detection, but adds overhead. Both the sender and receiver must use the same setting.

CRC-16, the most widely used throughout the United States and Europe, is used extensively with wide-area networks (WANs). CRC-32 is specified by IEEE 802 and as an option by some point-to-point transmission standards. It is often used on SMDS networks and LANs.

Example

In the following example, the 32-bit CRC is enabled on serial interface 3/0:

CRC size (16 or 32 bits)

```
interface serial 3/0
crc 32
```

crc4

To enable generation of the G.703-E1 CRC4, use the **crc4** interface configuration command. To disable this feature, use the **no** form of this command.

crc4 no crc4

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command applies to a Cisco 4000 router or Cisco 7000 series router. It is useful for checking data integrity while operating in framed mode. CRC4 provides additional protection for a frame alignment signal under noisy conditions. Refer to CCITT Recommendation G.704 for a definition of CRC4.

Example

The following example enables CRC4 generation on the G.703-E1 interface:

crc4

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 dce-terminal-timing-enable**, 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 keywords or arguments.

Default

DCE uses its own clock.

Command Mode

Interface configuration

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.

Example

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

interface serial 0
dce-terminal-timing enable

delay

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

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.

Default

Default delay values may be displayed with the EXEC command show interfaces.

Command Mode

Interface configuration

Example

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

```
interface serial 3
delay 30000
```

Related Command

show interfaces

description (controller)

To add a description to a T1 controller interface on a Cisco 7000 series router, use the **description** controller configuration command. Use the no description command to remove the description.

description string no description

Syntax Description

string

Comment or a description to help you remember what is attached to the interface

Default

No description is added.

Command Mode

Controller configuration

Usage Guidelines

The **description** command is meant solely as a comment to be put in the configuration to help you remember what certain T1 controllers are used for. The description affects the MIP interfaces only and appears in the output of the show controllers t1 and write terminal EXEC commands.

Example

The following example shows how to add a description for a T1 controller on slot 4, port 1, channel group 0:

```
interface serial 4/1:0
description Fractional T1 line to Mountain View -- 128 Kb/s
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

show controllers t1 write terminal †

description (interface)

To add a description to an interface configuration, use the **description** interface configuration command. Use the **no description** command to remove the description.

description string no description

Syntax Description

string

Comment or a description to help you remember what is attached to this interface

Default

No description is added.

Command Mode

Interface configuration

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: show configuration, show interfaces, and write terminal.

Example

The following example describes a 3174 controller on serial interface 0:

```
interface serial 0
description 3174 Controller for test lab
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

show configuration † show interfaces write terminal †

down-when-looped

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

down-when-looped

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

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

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

Example

In the following example, interface serial 0 is configured 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

backup interface loopback

dte-invert-txc

On the Cisco 4000 platform, you can specify the serial Network Interface 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. 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.

Default

Off

Command Mode

Interface configuration

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.

If the DCE accepts SCTE from the DTE, use no dte-invert-txc.

Example

The following example inverts the TXC on serial interface 0:

interface serial 0 dte-invert-txc

early-token-release

To enable early token release, use the early-token-release interface configuration command.

The CSC-C2CTR, CSC-R16 (or CSC-R16M), CSC-2R, and CSC-1R cards and the Token Ring Interface Processor (TRIP) on the Cisco 7000 all support early token release. Once enabled, use the **no early-token-release** command to disable this feature.

early-token-release no early-token-release

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

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.

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 7000 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. See Table 6-3 for a list of supported

encapsulation types.

Table 6-3 Encapsulation Types

Keyword	Encapsulation Type
arpa	Standard Ethernet Version 2.0 encapsulation using a 16-bit protocol type code.
atm-dxi	Asynchronous Transfer Mode-Data Exchange Interface.
bfex25	Blacker Front End Encryption X.25 operation (for serial interface).
ddnx25-dce	DDN X.25 DCE operation (for serial interface).
ddnx25	DDN X.25 DTE operation (for serial interface).
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.
sap	IEEE 802.3 encapsulation. In this encapsulation, the type code becomes the frame length for the IEEE 802.2 LLC encapsulation (destination and source Service Access Points and a control byte).
lapb-dce	X.25 LAPB DCE operation (for serial interface).
lapb	X.25 LAPB DTE operation (for serial interface).
multi-lapb-dce	X.25 LAPB multiprotocol DCE operation (for serial interface).
multi-lapb	X.25 LAPB multiprotocol DTE operation (for serial interface).
ppp	Point-to-Point Protocol (PPP) (for serial interface).
sdlc-primary	IBM serial SNA (for serial interface).
sdlc-secondary	IBM serial SNA (for serial interface).
smds	Switched Multimegabit Data Services (SMDS) (for serial interface).
snap	IEEE 802.2 Ethernet media. This encapsulation is specified in RFC 1042 and allows Ethernet protocols to run on IEEE 802.2 media.
stun	Cisco Serial Tunnel (STUN) protocol functions (for serial interface).
x25-dce	X.25 DCE operation (for serial interface).
x25	X.25 DTE operation (for serial interface).

Default

The default depends on the type of interface. For example, a synchronous serial interface defaults to HDLC. An Ethernet interface defaults to ARPA.

Command Mode

Interface configuration

Usage Guidelines

In order to use SLIP or PPP, the router 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.

Examples

The following example reenables standard Ethernet Version 2.0 encapsulation on Ethernet interface 0:

```
interface ethernet 0
encapsulation arpa
```

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

```
interface serial 1 encapsulation hdlc
```

The following example sets IEEE 802.3 encapsulation on Ethernet 1:

```
interface ethernet 1
encapsulation sap
```

The following example enables PPP encapsulation on serial interface 0:

```
interface serial 0
encapsulation ppp
```

The following example sets IEEE 802.2 encapsulation on Ethernet 1:

```
interface ethernet 1
encapsulation snap
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

```
keepalive †
ppp
ppp authentication chap
slip
```

encapsulation atm-dxi

Use the encapsulation atm-dxi interface configuration command to enable ATM-DXI encapsulation. The no encapsulation atm-dxi command disables ATM-DXI.

encapsulation atm-dxi no encapsulation atm-dxi

Syntax Description

This command has no arguments or keywords.

Default

HDLC

Command Mode

Interface configuration

Example

The following example configures ATM-DXI encapsulation on serial interface 1:

interface serial 1 encapsulation atm-dxi

Related Command atm-dxi map

fddi burst-count

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

fddi burst-count number no fddi burst-count

Syntax Description

number

Number of preallocated buffers in the range from 1 to 10

Default

3 buffers

Command Mode

Interface configuration

Usage Guidelines

This command applies to the FCI card only. The microcode software version should *not* be 128.45 or 128.43.

Example

The following example sets the number of buffers to 5:

```
interface fddi 0
fddi burst-count 5
```

fddi c-min

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

fddi c-min microseconds no fddi c-min

Syntax Description

microseconds Sets the timer value in microseconds.

Default

1600 microseconds

Command Mode

Interface configuration

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.

Example

The following example sets the C-Min timer to 2000 microseconds:

```
interface fddi 0
fddi c-min 2000
```

Related Commands

fddi tb-min fddi tl-min fddi t-out

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

fddi cmt-signal-bits signal-bits [phv-a | phv-b]

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.

Syntax Description

signal-bits

A hexadecimal number preceded by 0x; for example, 0x208. The FDDI standard defines ten bits of signaling information that must be transmitted, as follows:

bit 0—Escape bit. Reserved for future assignment by the FDDI standards committee.

bits 1 and 2—Physical type, as defined in Table 6-4.

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 6-5.

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.

Default

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 Mode

Interface configuration

Usage Guidelines

Use Table 6-4 and Table 6-5 to set the physical type and duration bits.

Table 6-4 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 6-5 FDDI Link Confidence Test Duration Bit Specification

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

Example

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

To turn on the duplicate address detection capability on the FDDI, use the **fddi duplicate-address-check** interface configuration command. 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.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

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

Example

The following example enables duplicate address checking on the FDDI:

interface fddi 0
fddi duplicate-address-check

fddi encapsulate

To specify encapsulating bridge mode on the CSC-C2/FCIT interface card, use the **fddi encapsulate** interface configuration command. Use the **no fddi encapsulate** 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.

Default

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 Mode

Interface configuration

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 b it-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 may be present in a multimedia bridged LAN and preventing communication from taking place. These problems are most prevalent when bridging between Token Rings and Ethernets 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.

Example

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

interface fddi 1 fddi encapsulate

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 feature, in which case the router will not generate or respond to SMT frames.

fddi smt-frames no fddi smt-frames

Syntax Description

This command has no arguments or keywords.

Default

Enabled

Command Mode

Interface configuration

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.

Example

The following example disables SMT frame processing:

interface fddi 0 no fddi smt-frames

fddi t-out

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

fddi t-out milliseconds no fddi t-out

Syntax Description

milliseconds Sets the timeout timer.

Default

100 milliseconds

Command Mode

Interface configuration

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.

Example

The following example sets the timeout timer to 200 milliseconds:

```
interface fddi 0
fddi t-out 200
```

Related Commands

fddi c-min fddi tb-min fddi tl-min

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

milliseconds Sets the TB-Min timer value in milliseconds.

Default

100 milliseconds

Command Mode

Interface configuration

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.

Example

The following example sets the TB-Min timer to 200 milliseconds:

interface fddi 0 fddi tb-min 200

Related Commands

fddi c-min fddi tl-min-time fddi t-out

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

microseconds

Integer 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

Default

30 microseconds

Command Mode

Interface configuration

Usage Guidelines

Interoperability tests have shown that some implementations of the FDDI standard need more than 30 microseconds to sense a signal.

Examples

The following example changes the TL-Min time from 30 microseconds to 100 microseconds:

```
interface fddi 0
fddi tl-min-time 100
```

The following example changes the TL-Min time from 30 microseconds to 100 microseconds on a Cisco 7000:

```
interface fddi 3/0
fddi tl-min-time 100
```

Related Commands

fddi c-min fddi tb-min fddi t-out

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

Integer that specifies the token rotation time (TRT) microseconds

Default

5000 microseconds

Command Mode

Interface configuration

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 7000:

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

fddi valid-transmission-time

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

fddi valid-transmission-time microseconds

Syntax Description

microseconds Integer that specifies the transmission valid timer (TVX) interval

Default

2500 microseconds

Command Mode

Interface configuration

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:

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

framing

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

framing {sf | esf}

Syntax Description

 \mathbf{sf} Specifies super frame as the T1 frame type.

Specifies extended super frame as the T1 frame type. esf

Default

sf

Command Mode

Controller configuration

Usage Guidelines

This command is used in configurations where the router is intended to communicate with T1 fractional data line. The T1 service provider determines which framing type, either sf or esf, is required for your T1 circuit.

Example

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

framing esf

Related Commands

channel-group linecode

hold-queue

To specify the hold-queue limit of an interface, use the **hold-queue** interface configuration command. Use the **no hold-queue** 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

length Integer that specifies the maximum number of packets in the queue.

in Specifies the input queue.

out Specifies the output queue.

Default

The default input hold-queue limit is 75 packets. The default output hold-queue limit is 40 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 Mode

Interface configuration

Usage Guidelines

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 queueing 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).

Example

The following example illustrates how to set a small input queue on a slow serial line:

interface serial 0 hold-queue 30 in

Related Command

show interfaces

hssi external-loop-request

To allow the router to support a CSU/DSU that uses the LC signal to request a loopback from the router, use the **hssi external-loop-request** interface configuration command. 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.

Default

Disabled

Command Mode

Interface configuration

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.

Example

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 45 MHz 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.

Default

Disabled

Command Mode

Interface configuration

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.

Example

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

hssi internal-clock

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 ether *number port* [*port*]

Syntax Description

ether Indicates that the hub is in front of an Ethernet interface.

number Hub number, starting with 0. Since there is currently only one

hub, this number is 0.

port Port number on the hub. On the Cisco 2505, port numbers range

from 1 through 8. On the Cisco 2507, port numbers range from 1 through 16. If a second port number follows, then the first port

number indicates the beginning of a port range.

[port] (Optional) Last port number of a range.

Default

No hub ports are configured.

Command Mode

Global configuration

Examples

The following example enables port 1 on hub 0:

```
hub ether 0 1 no shutdown
```

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

```
hub ether 0 1 8 no shutdown
```

Related Command

shutdown

idle-character

To specify the characters sent between packets, use the **idle-character** interface configuration command. To return to the default setting, use the **no** form of this command.

idle-character {flags | marks} no idle-character {flags | marks}

Syntax Description

flags Sends HDLC flag characters between packets. The characters

are sent in binary 01111110. This is the default.

marks Sends continuous mark characters between the flags that close a

packet. Mark characters are all 1s.

Default

flags

Command Mode

Interface configuration

Usage Guidelines

Platforms with the Hitachi chip support the sending of alternate characters. These platforms include the Cisco 4000 with the 4T NIM (but not the 2T NIM).

Example

The following example configures serial interface 1 to send mark characters between packets:

interface serial 1 idle-character marks

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 behavior.

ignore-dcd no ignore-dcd

Syntax Description

This command has no arguments or keywords.

Default

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

Command Mode

Interface configuration

Usage Guidelines

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

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.

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.

Example

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

interface serial 0
ignore-dcd

interface

To configure an interface type and enter interface configuration mode, use the **interface** global configuration command.

interface *type number*

interface type slot/port (for the Cisco 7000 series)

interface serial slot/port:channel-group (for channelized T1 or E1 on the Cisco 7000) interface serial number: channel-group (for channelized T1 or E1 on the Cisco 4000)

To configure a subinterface, use the **interface** global configuration command.

interface type number.subinterface-number [**multipoint** | **point-to-point**] interface type slot/port.subinterface-number [multipoint | point-to-point] (for the Cisco 7000 series)

Syntax Description

type Type of interface to be configured. See Table 1.

number Port, connector, or interface card number. On a Cisco 4000 series router,

> specifies the NIM or 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.

slot On the Cisco 7000 series, specifies the backplane slot number. On the 7000,

value can be **0**, **1**, **2**, **3**, or **4**. On the 7010, value can be **0**, **1**, or **2**. The slots

are numbered from left to right.

On the Cisco 7000 series, specifies the port number of the interface. It can *lport* be 0, 1, 2, 3, 4, 5, 6, or 7 depending on the type of interface, as follows:

• AIP (ATM Interface Processor) 0

• EIP (Ethernet Interface Processor) 0, 1, 2, 3, 4, or 5

• FIP (FDDI Interface Processor) 0

• FSIP (Fast Serial Interface Processor) 0, 1, 2, 3, 4, 5, 6, or 7

• HIP (HSSI Interface Processor) 0

• MIP (MultiChannel Interface Processor) **0** or **1**

• TRIP (Token Ring Interface Processor) 0, 1, 2, or 3

• Ports on each interface processor are numbered from the top down.

:channel-group On the Cisco 7000 series on a MIP/CxCT1 card, specifies the T1 channel

group number in the range of 0 to 23 defined with the **channel-group**

controller configuration command.

.subinterface-number Subinterface number in the range 1 to 4294967293. The number that

precedes the period (.) must match the number this subinterface belongs to.

multipoint | point-to-(Optional) Specifies a multipoint or point-to-point subinterface. The default is **multipoint**.

point

Table 1 Interface Type Key

Keyword	Interface Type	
async	Auxiliary 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.	
fddi	Fiber Distributed Data Interface (FDDI).	
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.	
serial	Serial 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.	

Default

The default mode for subinterfaces is multipoint.

Command Mode

Global configuration

Usage Guidelines

Subinterfaces can be configured to support partially meshed Frame Relay networks (refer to the chapter entitled "Configuring Interfaces" in the *Router Products 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.

Examples

In the following example, serial interface 0 is configured 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 7000 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 7000:

```
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

A dagger (†) indicates that the command is documented in another chapter.

```
circuit
controller
mac-address †
show interfaces
slip
```

invert-transmit-clock

Delays between the SCTE clock and data transmission indicate that the transmit clock signal might not be appropriate for the interface rate and length of cable being used. Different ends of the wire may have variances that differ slightly. To invert the clock signal to compensate for these factors, use the **invert-transmit-clock** interface configuration command. This command applies only to the Cisco 7000 series.

invert-transmit-clock no invert-transmit-clock

Syntax Description

This command has no arguments or keywords.

Command Mode

Interface configuration

Example

In the following example, the clock signal on serial interface 3/0 is inverted.

interface serial 3/0
invert-transmit-clock

isdn caller

To configure ISDN caller ID screening, use the **isdn caller** interface configuration command. To disable this feature, use the **no** form of this command.

isdn caller number no isdn caller number

Syntax Description

number

Telephone number for which to screen. Specify an x to represent a single "don't-care" character. The maximum length of each number is 25 characters.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

Caller ID screening is available only on Cisco 2500 and 3000 series routers that have a BRI.

The maximum length of each number is 25 characters. You can specify up to 64 numbers per interface.

Note Caller ID screening requires a local switch that is capable of delivering the caller ID to the router. If you enable caller ID screening but do not have such a switch, no calls will be allowed in.

Examples

The following example configures the router to accept a call with a delivered caller ID equal to 4155551234:

```
isdn caller 4155551234
```

The following example configures the router to accept a call with a delivered caller ID having 41555512 and anything in the last two positions:

```
isdn caller 41555512xx
```

Related Command

A dagger (†) indicates that the command is documented in another chapter.

show dialer †

isdn spid1

Use the **isdn spid1** interface configuration command to define at the router the service profile identifier (SPID) number that has been assigned by the ISDN service provider for the B1 channel. Use the **no isdn spid1** command to disable the specified SPID, thereby preventing access to the switch. If you include the LDN in the **no** form of this command, the access to the switch is permitted, but the other B channel may not be able to receive incoming calls.

isdn spid1 spid-number [ldn]
no isdn spid1 spid-number [ldn]

Syntax Description

spid-number Number identifying the service to which you have subscribed. This

value is assigned by the ISDN service provider and is usually a ten-

digit telephone number with some extra digits.

ldn (Optional) Local directory number. This is a seven-digit number also

assigned by the service provider.

Default

No SPID number is defined.

Command Mode

Interface configuration

Usage Guidelines

You must define the LDN if you want to receive any incoming calls on the B2-channel. The ISDN switch (DMS-100) checks for the LDN to determine whether both channels can be used to transmit and receive data. If the LDN is not present, then only the B1-channel can be used for full-duplex communication. However, the other channel can still be used for making outgoing calls.

Example

The following example defines, on the router, a SPID and LDN for the B1 channel:

isdn spid1 415555121301 5551215

isdn spid2

Use the **isdn spid2** interface configuration command to define at the router the SPID number that has been assigned by the ISDN service provider for the B2 channel. Use the no isdn spid2 command to disable the specified SPID, thereby preventing access to the switch. If you include the LDN in the **no** form of this command, the access to the switch is permitted, but the other B channel might not be able to receive incoming calls.

isdn spid2 *spid-number* [*ldn*] no isdn spid2 spid-number [ldn]

Syntax Description

spid-number Number identifying the service to which you have subscribed. This

value is assigned by the ISDN service provider and is usually a ten-

digit telephone number with some extra digits.

ldn(Optional) Local directory number. This is a seven-digit number also

assigned by the service provider.

Default

No SPID number is defined.

Command Mode

Interface configuration

Usage Guidelines

You must define the LDN if you want to receive any incoming calls on the B1-channel. The ISDN switch (DMS-100) checks for the LDN to determine whether both channels can be used to transmit and receive data. If the LDN is not present, then only the B2-channel can be used for full-duplex communication. However, the other channel can still be used for making outgoing calls.

Example

The following example defines, on the router, a SPID and LDN for the B2 channel:

isdn spid2 415555121202 5551214

isdn switch-type

To configure a central office switch on the ISDN interface, use the **isdn switch-type** global configuration command.

isdn switch-type switch-type

Syntax Description

switch-type

Central office switch type; see Table 6-1 for a list of supported switches.

Table 6-1 ISDN Office Switch Types

Keyword	Switch Type
basic-1tr6	German switch standard
basic-5ess	ATT 5ESS
basic-dms100	NT DMS-100
basic-net3	Switch type for NET3 in UK and Europe
basic-ni1	National ISDN-1
basic-nwnet3	Norway Net3 switches
basic-nznet3	New Zealand Net3 switches
basic-ts013	Australian TS013 switches
none	No switch defined
ntt	NTT ISDN switch (Japan)
primary-4ess	AT&T 4ESS switch type for the U.S. (Use for ISDN PRI only.)
primary-5ess	AT&T 5ESS switch type for the U.S. (Use for ISDN PRI only.)
primary-dms100	NT DMS-100 switch type for the U.S. (Use for ISDN PRI only.)
vn2	French VN2 standard
vn3	French VN3 standard

Default

The switch type defaults to **none**, which disables the switch on the ISDN interface.

Command Mode

Global configuration

Usage Guidelines

To disable the switch on the ISDN interface, specify isdn switch-type none.

Example

The following example configures the French VN3 ISDN switch type:

isdn switch-type vn3

isdn tei

To configure when ISDN Layer 2 terminal endpoint identifier (TEI) negotiation should occur, use the **isdn tei** global configuration command. Use the **no** form of this command to restore the default.

```
isdn tei [first-call | powerup]
no isdn tei
```

Syntax Description

first-call (Optional) ISDN TEI negotiation should occur when the first ISDN call

is placed or received.

powerup (Optional) ISDN TEI negotiation should occur when the router is

powered on.

Default

powerup

Command Mode

Global configuration

Usage Guidelines

Use this command with care.

Example

The following example configures the router to negotiate TEI when the first ISDN call is placed or received:

isdn tei first-call

keepalive

Use the **keepalive** interface configuration command to set the keepalive timer for a specific interface. The **no keepalive** command turns off keepalives entirely.

keepalive [seconds] **no keepalive** [seconds]

Syntax Description

seconds

(Optional) Unsigned integer value greater than 0. The default is 10 seconds.

Default

10 seconds

Command Mode

Interface configuration

Usage Guidelines

You can configure the keepalive interval, which is the frequency at which the router sends messages to itself (Ethernet and Token Ring) or to the other end (serial), to ensure a network interface is alive. The interval in previous software versions was 10 seconds; it is now adjustable in 1-second increments down to 1 second. An interface is declared down after three update intervals have passed without receiving a keepalive packet.

Setting the keepalive timer to a low value is very useful for rapidly detecting Ethernet interface failures (transceiver cable disconnecting, cable unterminated, and so on).

A typical serial line failure involves losing Carrier Detect (CD). Since this sort of failure is typically noticed within a few milliseconds, adjusting the keepalive timer for quicker routing recovery is generally not useful.

Note When adjusting the keepalive timer for a very low bandwidth serial interface, large datagrams can delay the smaller keepalive packets long enough to cause the line protocol to go down. You may need to experiment to determine the best value.

Example

The following example sets the keepalive interval to 3 seconds:

```
interface ethernet 0
keepalive 3
```

lex burned-in-address

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

lex burned-in-address ieee-address no lex burned-in-address

Syntax Description

ieee-address

48-bit IEEE MAC address written as a dotted triplet of fourdigit hexadecimal numbers

Default

No burned-in MAC address is set

Command Mode

Interface configuration

Usage Guidelines

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

Example

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

```
interface serial 4
encapsulation ppp
interface lex 0
lex burned-in-address 0000.0c00.0001
ip address 131.108.172.21 255.255.255.0
```

lex input-address-list

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

lex input-address-list access-list-number no lex input-address-list

Syntax Description

access-list-number

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

Default

No access lists are preassigned to a LAN Extender interface.

Command Mode

Interface configuration

Usage Guidelines

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

Example

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

```
access-list 710 permit 0800.0214.2776 0000.0000.0000
interface lex 0
lex input-address-list 710
```

Related Command

A dagger (†) indicates that the command is documented in another chapter.

access-list †

lex input-type-list

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

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

Syntax Description

access-list-number

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

Default

No access lists are preassigned to a LAN Extender interface.

Command Mode

Interface configuration

Usage Guidelines

Filtering is done on the LAN Extender chassis.

Example

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

```
access-list 220 permit 0x809B 0x0000
interface lex 0
lex input-type-list 220
```

Related Command

A dagger (†) indicates that the command is documented in another chapter.

access-list †

lex priority-group

To activate priority output queuing on the LAN Extender, use the **lex priority-group** interface configuration command. To disable priority output queuing, use the **no** form of this command.

```
lex priority-group group no lex priority-group
```

Syntax Description

group

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

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

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

```
priority-list list protocol protocol {high | medium | normal | low}
priority-list list protocol bridge {high | medium | normal | low} list list-number
```

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

Example

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

```
priority-list 5 protocol bridge medium list 701
lex interface 0
lex priority-group 5
```

Related Command

A dagger (†) indicates that the command is documented in another chapter.

```
priority-list protocol †
```

lex retry-count

To define the number of times to resend commands to the LAN Extender chassis, use the lex retrycount interface configuration command. To return to the default value, use the no form of this command.

lex retry-count number **no lex retry-count** [number]

Syntax Description

number

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

Default

10

Command Mode

Interface configuration

Usage Guidelines

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

Example

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

```
lex interface 0
lex retry-count 20
```

Related Command

lex timeout

lex timeout

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

lex timeout milliseconds
no lex timeout [milliseconds]

Syntax Description

milliseconds

Time, in milliseconds, to wait for a response from the LAN Extender before resending the command. It can be a number in the range 500 to 60000. The default is 2000 milliseconds (2 seconds).

Default

2000 milliseconds (2 seconds)

Command Mode

Interface configuration

Usage Guidelines

The **lex timeout** command defines the amount of time that the core router will wait to receive an acknowledgment after having sent a command to the LAN Extender.

Example

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

lex interface 0
lex timeout 4000

Related Command

lex retry-count

linecode

Use the **linecode** command to select the line-code type for the T1 line.

linecode {ami | b8zs}

Syntax Description

ami Specifies AMI as the line-code type.

b8zs Specifies B8ZS as the line-code type.

Default

AMI

Command Mode

Controller configuration

Usage Guidelines

This command is used in configurations where the router is intended to communicate with T1 fractional data line. The T1 service provider determines which line-code type, either **ami** or **b8zs**, is required for your T1 circuit.

Example

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

linecode b8zs

link-test

To re-enable the link test function on a port on an Ethernet hub of a Cisco 2505 or Cisco 2507, use the **link-test** hub configuration command. To disable this feature, use the **no** form of this command.

link-test no link-test

Syntax Description

This command has no arguments or keywords.

Default

Enabled

Command Mode

Hub configuration

Usage Guidelines

This command applies to a port on an Ethernet hub (repeater) only. You should disable this feature if a pre-10BaseT twisted-pair device not implementing Link Test is connected to the hub port.

Example

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

```
hub ether 0 1 3 no link-test
```

Related Command

hub

loopback

To diagnose equipment malfunctions between interface and device, use the **loopback** interface configuration command. The **no loopback** command disables the test.

loopback no loopback

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

On HSSI serial interface cards, the loopback function configures a two-way internal and external loop on the HSA applique of the specific interface.

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

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

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

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

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

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

Example

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

interface ethernet 4 loopback

Related Commands down-when-looped show interfaces loopback

loopback (controller)

To loop an entire E1 line (including all channel-groups defined on the controller) toward the line and back toward the router, use the loopback controller configuration command. To remove the loop, use the no form of this command.

loopback no loopback

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Controller configuration

Usage Guidelines

This command is useful for testing the DCE device (CSU/DSU) itself.

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

Example

The following example configures the loopback test on the E1 line:

controller el 0 loopback

loopback (interface)

To diagnose equipment malfunctions between interface and device, use the **loopback** interface configuration command. The **no loopback** command disables the test.

loopback no loopback

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

On HSSI serial interface cards, the loopback function configures a two-way internal and external loop on the HSA applique of the specific interface.

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

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

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

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

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

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

Example

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

interface ethernet 4 loopback

Related Commands down-when-looped show interfaces loopback

loopback applique

To configure an internal loop on the HSSI applique, use the **loopback** interface configuration command. To remove the loop, use the **no** form of this command.

loopback applique no loopback applique

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command loops the packets within the applique, thus providing a way to test for communication within the router. It is useful for sending pings to yourself to check functionality of the applique.

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

Example

The following example configures the loopback test on the HSSI applique:

interface serial 1
loopback applique

Related Command

loopback dte

To loop packets to DTE internally within the CSU/DSU at the DTE interface, when the device supports this feature, use the loopback interface configuration command. To remove the loop, use the no form of this command.

loopback dte no loopback dte

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command is useful for testing the DTE-to-DCE cable.

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

Example

The following example configures the loopback test on the DTE interface:

```
interface serial 1
loopback dte
```

Related Command

loopback line

To loop packets completely through the CSU/DSU to configure the CSU loop, when the device supports this feature, use the **loopback line** interface configuration command. To remove the loop, use the **no** form of this command.

loopback line no loopback line

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command is useful for testing the DCE device (CSU/DSU) itself.

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

Example

The following example configures the loopback test on the DCE device:

```
interface serial 1
loopback line
```

Related Command

loopback local (controller)

To loop an entire T1 line (including all channel-groups defined on the controller) toward the line and back toward the router, use the loopback local controller configuration command. To remove the loop, use the **no** form of this command.

loopback local no loopback local

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Controller configuration

Usage Guidelines

This command is useful for testing the DCE device (CSU/DSU) itself.

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

Example

The following example configures the loopback test on the T1 line:

controller t1 0 loopback local

loopback local (interface)

To loop a channelized T1 or channelized E1 channel-group, use the **loopback local** interface configuration command. To remove the loop, use the **no** form of this command.

loopback local no loopback local

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command is useful to loop a single channel-group in a channelized environment without disrupting the other channel-groups.

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

Example

The following example configures the loopback test on the T1 line:

interface serial 1/0:22
loopback local

Related Command

loopback remote (controller)

To loop packets from a MIP through the CSU/DSU, over a dedicated T1 link, to the remote CSU at the single destination for this T1 link and back, use the loopback remote controller configuration command. To remove the loop, use the **no** form of this command.

loopback remote no loopback remote

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Controller configuration

Usage Guidelines

This command applies only when the device supports the remote function. It is used for testing the data communication channels.

For MIP cards, this controller configuration command applies if only one destination exists at the remote end of the cloud, the entire T1 line is dedicated to it, and the device at the remote end is a CSU (not a CSU/DSU). This is an uncommon case; MIPs are not usually used in this way.

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

Example

The following example configures a remote loopback test:

interface serial 0 loopback remote

Related Command

loopback remote (interface)

To loop packets through a CSU/DSU, over a DS-3 link or a channelized T1 link, to the remote CSU/DSU and back, use the **loopback remote** interface configuration command. To remove the loop, use the **no** form of this command.

loopback remote no loopback remote

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command applies only when the remote CSU/DSU device supports the function. It is used for testing the data communication channels. The loopback usually is performed at the line port, rather than the DTE port, of the remote CSU/DSU.

For a multiport interface processor (MIP) connected to a network via a channelized T1 link, the loopback remote interface configuration command applies if the remote interface is served by a DDS line (56 Kbps or 64 Kbps), and the device at the remote end is a CSU/DSU. In addition, the CSU/DSU at the remote end *must* react to latched DDS CSU loopback codes. Destinations that are served by other types of lines or that have CSU/DSUs that do not react to latched DDS CSU codes cannot participate in an interface remote loopback. Latched DDS CSU loopback code requirements are described in AT&T specification TR-TSY-000476, "OTGR Network Maintenance Access and Testing."

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

Example

The following example configures a remote loopback test:

interface serial 0
loopback remote

Related Command

media-type

To specify the Ethernet Network Interface Module configuration on the Cisco 4000 series, use the media-type interface configuration command.

```
media-type [aui | 10baset]
no media-type [aui | 10baset]
```

Syntax Description

(Optional) Selects a 15-pin physical connection. aui

10baset (Optional) Selects an RJ45 10BaseT physical connection.

Default

AUI 15-pin physical connection

Command Mode

Interface configuration

Example

The following example selects an RJ45 10BaseT physical connection on Ethernet interface 1:

```
interface ethernet 1
media-type 10baset
```

mop enabled

To enable an interface to support the Maintenance Operation Protocol (MOP), use the **mop enabled** interface configuration command. To disable MOP on an interface, use the **no mop enabled** command.

mop enabled no mop enabled

Syntax Description

This command has no arguments or keywords.

Default

Enabled on Ethernet interfaces and disabled on all other interfaces.

Command Mode

Interface configuration

Example

In the following example, MOP is enabled for serial interface 0:

```
interface serial0
mop enabled
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

```
mop sysid mop retransmit-timer ^\dagger mop retries ^\dagger
```

mop sysid

To enable an interface to send out periodic Maintenance Operation Protocol (MOP) system identification messages, use the mop sysid interface configuration command. To disable MOP message support on an interface, use the no mop sysid command.

mop sysid no mop sysid

Syntax Description

This command has no arguments or keywords.

Default

Enabled

Command Mode

Interface configuration

Usage Guidelines

You can still run MOP without having the background system ID messages sent. This lets you use the MOP remote console, but does not generate messages used by the configurator.

Example

In the following example, serial interface 0 is enabled to send MOP system identification messages:

```
interface serial0
mop sysid
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

mop device-code † mop enabled

mtu

To adjust the maximum packet size or maximum transmission unit (MTU) size, use the **mtu** interface configuration command. Use the **no mtu** command to restore the MTU value to its original default value.

mtu bytes no mtu

Syntax Description

bytes Desired size in bytes

Default

Table 6-2 lists default MTU values according to media type.

Table 6-2 Default Media MTU Values

Media Type	Default MTU
Ethernet	1500
Serial	1500
Token Ring	4464
ATM	4470
FDDI	4470
HSSI (HSA)	4470

Command Mode

Interface configuration

Usage Guidelines

Each interface has a default maximum packet size or maximum transmission unit (MTU) size. This number generally defaults to the largest size possible for that type interface. On serial interfaces, the MTU size varies, but cannot be set smaller than 64 bytes.

Note Changing the MTU value with the **mtu** interface configuration command can affect values for the protocol-specific versions of the command (**ip mtu** for example). If the values specified with the **ip mtu** interface configuration command is the same as the value specified with the **mtu** interface configuration command, and you change the value for the **mtu** interface configuration command, the **ip mtu** value automatically matches the new **mtu** interface configuration command value. However, changing the values for the **ip mtu** configuration commands has no effect on the value for the **mtu** interface configuration command.

Example

The following example specifies an MTU of 1000 bytes:

```
interface serial 1
mtu 1000
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

encapsulation smds † ip mtu [†]

nrzi-encoding

To enable non-return to zero inverted (NRZI) line coding format, use the **nrzi-encoding** interface configuration command. Use the **no** form of this command to disable this capability.

nrzi-encoding no nrzi-encoding

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

All FSIP interface types support nonreturn to zero (NRZ) and nonreturn to zero inverted (NRZI) format. This is a line coding format that is required for serial connections in some environments. NRZ encoding is most common. NRZI encoding is used primarily with RS-232 connections in IBM environments.

Example

In the following example, serial interface 1 is configured for NRZI encoding:

interface serial 1
nrzi-encoding

ppp authentication chap

To enable Challenge Handshake Authentication Protocol (CHAP) on a serial interface, use the ppp authentication chap interface configuration command. Use the no ppp authentication chap command to disable this encapsulation.

ppp authentication chap [if-needed] no ppp authentication chap

Syntax Description

if-needed

(Optional) Indicates that the system will not perform CHAP authentication if the user has already been authenticated. This option applies only to asynchronous and virtual asynchronous interfaces.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

Once you have enabled CHAP, the local router requires a password from remote devices. If the remote device does not support CHAP, no traffic will be passed to that device.

Example

The following example enables CHAP on serial interface 4:

interface serial 4 encapsulation ppp ppp authentication chap

Related Command

dialer map encapsulation ppp username password

ppp authentication pap

To enable Password Authentication Protocol (PAP) on a serial interface, use the **ppp authenticate pap** interface configuration command. To disable this feature, use the **no** form of this command.

ppp authentication pap [if-needed] no ppp authentication pap

Syntax Description

if-needed

(Optional) Indicates that the system will not perform PAP authentication if the user has already been authenticated. This option applies only to asynchronous and virtual asynchronous interfaces.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

When you enable PAP, it forces the router to negotiate with the remote device for the Password Authentication Protocol. If the remote device does not support PAP, no traffic will be passed to that device.

If both sides of the serial link are running PPP and PAP, both username entries and their passwords must be present on both sides of the link. You define these with the **username** *name* **password** *secret* global configuration command.

Example

The following example enables PAP on serial interface 4:

```
interface serial 4
ppp authentication pap
```

Related Commands

dialer map encapsulation ppp username password

ppp quality

To enable Link Quality Monitoring (LQM) on a serial interface, use the **ppp quality** interface configuration command. Use the **no** form of this command to disable LQM.

```
ppp quality percentage
no ppp quality
```

Syntax Description

percentage Specifies the link quality threshold. Range is 1 to 100.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

The percentages are calculated for both incoming and outgoing directions. The outgoing quality is calculated by comparing the total number of packets and bytes sent to the total number of packets and bytes received by the peer. The incoming quality is calculated by comparing the total number of packets and bytes received to the total number of packets and bytes sent by the peer.

If the link quality percentage is not maintained, the link is deemed to be of poor quality and is taken down. The policy implements a time lag so that the link does not bounce up and down.

Example

The following example enables LQM on serial interface 4:

```
interface serial 4
encapsulation ppp
ppp quality 80
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

```
encapsulation ppp
keepalive †
```

pri-group

To specify ISDN Primary Rate Interface (PRI) on a channelized T1 card on the Cisco 7000 series, use the **pri-group** controller configuration command. Use the **no pri-group** command to remove the ISDN PRI.

```
pri-group [timeslots range]
no pri-group
```

Syntax Description

timeslots range

(Optional) Specifies a single range of values from 1 to 23.

Default

Disabled

Command Mode

Controller configuration

Usage Guidelines

When you configure ISDN PRI, you must first specify an ISDN switch type for PRI and a T1 controller.

Example

The following example specifies ISDN PRI on T1 slot 1, port 0:

```
isdn switch-type primary-4ess
controllers t1 1/0
framing esf
linecode b8zs
pri-group timeslots 2-6
```

Related Commands

controllers t1 framing isdn switch-type linecode

pulse-time

To enable pulsing DTR signal intervals on the serial interfaces, use the **pulse-time** interface configuration command. Use the **no pulse-time** command to restore the default interval.

pulse-time seconds no pulse-time

Syntax Description

seconds

Integer that specifies the DTR signal interval in seconds

Default

0 seconds

Command Mode

Interface configuration

Usage Guidelines

When the serial line protocol goes down (for example, because of loss of synchronization) the interface hardware is reset and the DTR signal is held inactive for at least the specified interval. This function is useful for handling encrypting or other similar devices that use the toggling of the DTR signal to resynchronize.

Example

The following example enables DTR pulse signals for three seconds on serial interface2:

```
interface serial 2
pulse-time 3
```

ring-speed

To set the ring speed for the CSC-1R and CSC-2R Token Ring interfaces, use the **ring-speed** interface configuration command.

ring-speed speed

Syntax Description

speed

Integer that specifies the ring speed, either 4 for 4-Mbps or 16 for 16-Mbps operation.

Default

16-Mbps operation



Caution Configuring a ring speed that is wrong or incompatible with the connected Token Ring will cause the ring to beacon, which effectively takes the ring down and makes it nonoperational.

Command Mode

Interface configuration

Example

The following example sets a Token Ring interface ring speed to 4 Mbps:

```
interface tokenring 0
ring-speed 4
```

show async status

To list the status of the asynchronous interface 1 associated with the router auxiliary port, use the **show async status** user EXEC command:

show async status

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

Shows all asynchronous sessions, whether they are using SLIP or PPP encapsulation.

Sample Display

The following is sample output from the **show async status** command:

Table 6-3 describes significant fields shown in the display.

Table 6-3 Show Async Status Field Descriptions

Field	Description
Rcvd:	Statistics on packets received.
5548 packets	Packets received.
7682760 bytes	Total number of bytes.
1 format errors	Packets with a bad IP header, even before the checksum is calculated.
0 checksum errors	Count of checksum errors.
0 overrun	Number of giants received.
0 no buffer	Number of packets received when no buffer was available.
Sent:	Statistics on packets sent.
5455 packets	Packets sent.
7682676 bytes	Total number of bytes.
0 dropped	Number of packets dropped.
Int	Interface number.
*	Line currently in use.

Field	Description
Local	Local IP address on the link.
Remote	Remote IP address on the link; "Dynamic" indicates that a remote address is allowed but has not been specified; "None" indicates that no remote address is assigned or being used.
Qd	Number of packets on hold queue (Qsz is max).
InPack	Number of packets received.
OutPac	Number of packets sent.
Inerr	Number of total input errors; sum of format errors, checksum errors, overruns and no buffers.
Drops	Number of packets received that would not fit on the hold queue.
MTU	Current maximum transmission unit size.
Qsz	Current output hold queue size.

Related Commands

async

interface async

show compress

To display compression statistics, use the **show compress** EXEC command.

show compress

Syntax Description

This command has no arguments or parameters.

Command Mode

EXEC

Sample Display

Router# show compress

The following is sample output from the **show compress** command:

```
Serial0
uncompressed bytes xmt/rcv 10710562/11376835
1 \quad \text{min avg ratio } xmt/rcv \ 2.773/2.474
5 min avg ratio xmt/rcv 4.084/3.793
10 min avg ratio xmt/rcv 4.125/3.873
no bufs xmt 0 no bufs rcv 0
resets 0
```

Table 6-4 describes the fields shown in the display.

Table 6-4 Show Compress Field Descriptions

Field	Description
Serial0	Name and number of the interface.
uncompressed bytes xmt/rcv	Total number of uncompressed bytes sent and received.
1 min avg ratio xmt/rcv 5 min avg ratio xmt/rcv 10 min avg ratio xmt/rcv	Static compression ratio for bytes sent and received, averaged over 1, 5, and 10 minutes.
no bufs xmt	Number of times buffers were not available to compress data being sent.
no bufs rev	Number of times buffers were not available to uncompress data being received.
resets	Number of resets.

Related Command compress predictor

show controllers bri

To display information about the ISDN Basic Rate Interface (BRI), use the **show controllers bri** privileged EXEC command.

show controllers bri number

Syntax Description

number

Interface number. The value is 0 through 7 if the router has one BRI NIM or 0 through 15 if the router has two BRI NIMs.

Command Mode

Privileged EXEC

Sample Display

The following is sample output from the **show controllers bri** command:

```
Router# show controllers bri 0
BRI unit 0
D Chan Info:
Layer 1 is ACTIVATED
idb 0x32089C, ds 0x3267D8, reset_mask 0x2
buffer size 1524
RX ring with 2 entries at 0x2101600 : Rxhead 0
00 pak=0x4122E8 ds=0x412444 status=D000 pak_size=0
01 pak=0x410C20 ds=0x410D7C status=F000 pak_size=0
TX ring with 1 entries at 0x2101640: tx_count = 0, tx_head = 0, tx_tail = 0
00 pak=0x000000 ds=0x000000 status=7C00 pak_size=0
0 missed datagrams, 0 overruns, 0 bad frame addresses
0 bad datagram encapsulations, 0 memory errors
0 transmitter underruns
B1 Chan Info:
Layer 1 is ACTIVATED
idb 0x3224E8, ds 0x3268C8, reset_mask 0x0
buffer size 1524
RX ring with 8 entries at 0x2101400 : Rxhead 0
00 pak=0x421FC0 ds=0x42211C status=D000 pak_size=0
01 pak=0x4085E8 ds=0x408744 status=D000 pak_size=0
02 pak=0x422EF0 ds=0x42304C status=D000 pak_size=0
03 pak=0x4148E0 ds=0x414A3C status=D000 pak_size=0
04 pak=0x424D50 ds=0x424EAC status=D000 pak_size=0
05 pak=0x423688 ds=0x4237E4 status=D000 pak_size=0
06 pak=0x41AB98 ds=0x41ACF4 status=D000 pak_size=0
07 pak=0x41A400 ds=0x41A55C status=F000 pak_size=0
TX ring with 4 entries at 0x2101440: tx_count = 0, tx_head = 0, tx_tail = 0
00 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
01 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
02 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
03 pak=0x000000 ds=0x000000 status=7C00 pak_size=0
0 missed datagrams, 0 overruns, 0 bad frame addresses
0 bad datagram encapsulations, 0 memory errors
0 transmitter underruns
B2 Chan Info:
Layer 1 is ACTIVATED
idb 0x324520, ds 0x3269B8, reset_mask 0x2
buffer size 1524
```

```
RX ring with 8 entries at 0x2101500 : Rxhead 0
00 pak=0x40FCF0 ds=0x40FE4C status=D000 pak_size=0
01 pak=0x40E628 ds=0x40E784 status=D000 pak_size=0
02 pak=0x40F558 ds=0x40F6B4 status=D000 pak_size=0
03 pak=0x413218 ds=0x413374 status=D000 pak_size=0
04 pak=0x40EDC0 ds=0x40EF1C status=D000 pak_size=0
05 pak=0x4113B8 ds=0x411514 status=D000 pak_size=0
06 pak=0x416ED8 ds=0x417034 status=D000 pak_size=0
07 pak=0x416740 ds=0x41689C status=F000 pak_size=0
TX ring with 4 entries at 0x2101540: tx_count = 0, tx_head = 0, tx_tail = 0
00 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
01 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
02 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
03 pak=0x000000 ds=0x000000 status=7C00 pak_size=0
0 missed datagrams, 0 overruns, 0 bad frame addresses
0 bad datagram encapsulations, 0 memory errors
0 transmitter underruns
```

Table 6-5 describes the significant fields in the display.

Table 6-5 Show Controllers BRI Field Descriptions

Field	Description
BRI unit 0	Interface type and unit number.
Chan Info	D and B channel numbers.
Layer 1 is ACTIVATED	Status can be DEACTIVATED, PENDING ACTIVATION, or ACTIVATED.
idb ds reset_mask	Information about internal data structures and parameters.
buffer size	Number of bytes allocated for buffers.
RX ring with - entries at -	Information about the Receiver Queue.
Rxhead	Start of the Receiver Queue.
pak ds status pak_size	Information about internal data structures and parameters.
TX ring with - entries at -	Information about the Transmitter Queue.
tx_count	Number of packets to transmit.
tx_head	Start of the transmit list.
tx_tail	End of the transmit list.
missed datagrams	Incoming packets missed due to internal errors.
overruns	Number of times the receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
bad frame addresses	Frames received with a CRC error and noninteger number of octets.
bad datagram encapsulations	Packets received with bad encapsulation.
memory errors	Internal DMA memory errors.
transmitter underruns	Number of times that the transmitter has been running faster than the router can handle.

show controllers cbus

Use the **show controllers cbus** privileged EXEC command on the AGS+ to display all information under the ciscoBus controller card. This command also shows the capabilities of the card and reports controller-related failures.

show controllers cbus

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Sample Displays

The following is sample output from the **show controllers cbus** command:

```
Router# show controllers cbus
```

```
cBus 1, controller type 3.0, microcode version 2.0
  128 Kbytes of main memory, 32 Kbytes cache memory
  40 1520 byte buffers, 14 4484 byte buffers
  Restarts: 0 line down, 0 hung output, 0 controller error
 --More--
HSCI 1, controller type 10.0, microcode version 129.3
  Interface 6 - Hssi0, electrical interface is Hssi DTE
    5 buffer RX queue threshold, 7 buffer TX queue limit, buffer size 1520
    ift 0004, rgl 2, tg 0000 0000, tgl 7
    Transmitter delay is 0 microseconds
 MEC 3, controller type 5.1, microcode version 130.6
  Interface 18 - Ethernet2, station address 0000.0c02.a03c (bia 0000.0c02.a03c)
    10 buffer RX queue threshold, 7 buffer TX queue limit, buffer size 1520
    ift 0000, rgl 10, tg 0000 0000, tgl 7
    Transmitter delay is 0 microseconds
  Interface 19 - Ethernet3, station address 0000.0c02.a03d (bia 0000.0c02.a03d)
    10 buffer RX queue threshold, 7 buffer TX queue limit, buffer size 1520
    ift 0000, rgl 10, tg 0000 0000, tgl 7
    Transmitter delay is 0 microseconds
```

Table 6-6 describes the fields shown in the following lines of output from the display.

```
cBus 1, controller type 3.0, microcode version 2.0
128 Kbytes of main memory, 32 Kbytes cache memory
40 1520 byte buffers, 14 4484 byte buffers
Restarts: 0 line down, 0 hung output, 0 controller error
```

Table 6-6 Show Controllers cBus Field Descriptions—Part 1

Field	Description
cBus 1	Card type and number (varies depending on card).
controller type 3.0	Version number of the card.
microcode version 2.0	Version number of the card's internal software (in read-only memory).
128 Kbytes of main memory	Amount of main memory on the card.
32 Kbytes cache memory	Amount of cache memory on the card.
40 1520 byte buffers	Number of buffers of this size on the card.
14 4484 byte buffers	Number of buffers of this size on the card.
Restarts 0 line down 0 hung output 0 controller error	Count of restarts due to the following conditions: Communication line down Output unable to transmit Internal error

Table 6-7 describes the fields shown in the following lines of output from the display:

```
HSCI 1, controller type 10.0, microcode version 129.3

Interface 6 - Hssi0, electrical interface is Hssi DTE

5 buffer RX queue threshold, 7 buffer TX queue limit, buffer size 1520 ift 0004, rql 2, tq 0000 0000, tql 7

Transmitter delay is 0 microseconds
```

Table 6-7 Show Controllers cBus Field Descriptions—Part 2

Field	Description
HSCI 1	Card type and number (varies depending on card).
controller type 10.0	Version number of the card.
microcode version 129.3	Version number of the card's internal software (in read-only memory).
Interface 6	Physical interface number.
Hssi 0	Logical name for this interface.
electrical interface is Hssi DTE	Self-explanatory.
5 buffer RX queue threshold	Maximum number of buffers allowed in the receive queue.
7 buffer TX queue limit	Maximum number of buffers allowed in the transmit queue.
buffer size 1520	Size of the buffers on this card (in bytes).
ift 0004	Interface type code. 0 = EIP 1 = FSIP 4 = HIP 5 = TRIP 6 = FIP 7 = AIP
rql 2	Receive queue limit. Current number of buffers allowed for the receive queue. It is used to limit the number of buffers used by a particular inbound interface. When equal to 0, all of that interface's receive buffers are in use.

Field	Description
tq 0000 0000	Transmit queue head and tail pointers.
tql 7	Transmit queue limit. Current number of buffers allowed for transmit queue. It limits the maximum cbus buffers allowed to sit on a particular interface's transmit queue.
Transmitter delay is 0 microseconds	Transmitter delay between the packets.

The **show controllers cbus** command displays the internal status of the SP and each cBus interface processor (IP), including the slot location, the card hardware version, and the currently-running microcode version. It also lists each interface (port) on each IP including the logical interface number, interface type, physical (slot/port) address, and hardware (station address) of each interface. The following display shows an AIP installed in IP slot 4, the running AIP microcode is Version 170.30, the PLIM type is 4B/5B, and the available bandwidth is 100 Mbps:

Router# show controllers cbus

```
Switch Processor 5, hardware version 11.1, microcode version 170.46
Microcode loaded from system
512 Kbytes of main memory, 128 Kbytes cache memory
60 1520 byte buffers, 91 4496 byte buffers
Restarts: 0 line down, 0 hung output, 0 controller error
AIP 4, hardware version 1.0, microcode version 170.30
Microcode loaded from system
Interface 32 - ATM4/0, PLIM is 4B5B(100Mbps)
15 buffer RX queue threshold, 36 buffer TX queue limit, buffer size 4496
ift 0007, rql 12, tq 0000 0620, tql 36
Transmitter delay is 0 microseconds
```

show controllers cxbus

Use the **show controllers cxbus** privileged EXEC command to display information about the Switch Processor (SP) CxBus controller on the Cisco 7000 series. This command displays information that is specific to the interface hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

show controllers cxbus

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Sample Display

The following is sample output on the Cisco 7000 from the **show controllers cxbus** command:

Router# show controllers cxbus

```
Switch Processor 5, hardware version 11.1, microcode version 172.6
 Microcode loaded from system
 512 Kbytes of main memory, 128 Kbytes cache memory
 75 1520 byte buffers, 86 4484 byte buffers
 Restarts: 0 line down, 0 hung output, 0 controller error
 CIP 3, hardware version 1.1, microcode version 170.1
 Microcode loaded from system
 CPU utilization 7%, sram 145600/512K, dram 86688/2M
 Interface 24 - Channel 3/0
    43 buffer RX queue threshold, 61 buffer TX queue limit, buffer size 4484
   ift 0007, rql 32, tq 0000 0468, tql 61
   Transmitter delay is 0 microseconds
  Interface 25 - Channel 3/1
    43 buffer RX queue threshold, 61 buffer TX queue limit, buffer size 4484
   ift 0007, rql 34, tq 0000 0000, tql 61
   Transmitter delay is 0 microseconds
```

Table 6-8 describes the fields shown in the display.

Table 6-8 Show Controllers CxBus Field Descriptions

Field	Description
IP type, slot number	Unit type and slot number.
hardware version	Version number of the controller.
microcode version	Version number of the controller's internal software (in read-only memory).
Microcode loaded from	Source of microcode; can be system, ROM, or Flash.
main memory cache memory	Amount of main and cache memory on the processor.
byte system buffer	An extra buffer left over after carving the normal pools. It is used for host-generated traffic when available.

Restarts line down hung output controller error	Number of restarts due to the following conditions: Communication line down Output unable to transmit Internal error
CPU utilization	Measure of how busy the CPU is during a given time interval.
sram	The first value is the number of bytes of sram free (that is, not being used by code or data). The second value is the total bytes available of sram, and is expressed in terms of kilobytes or megabytes. The sram is the high-speed static RAM that is used for running the operational code.
dram	The first value is the number of bytes of dram free (that is, not being used by code or data). The second value is the total bytes available of dram, and is expressed in terms of kilobytes or megabytes. The dram is normal dynamic RAM that is used for packet buffers, data, and so on.
Interface number	Names of interfaces by CxBus interface type, slot, and port number.
RX buffers	Number of buffers for received packets.
TX queue limit	Maximum number of buffers in transmit queue.
ift	Interface type code. 0 = EIP 1 = FSIP 4 = HIP 5 = TRIP 6 = FIP 7 = AIP
rql	Receive queue limit. Current number of buffers allowed for the receive queue. It is used to limit the number of buffers used by a particular inbound interface. When equal to 0, all of that interface's receive buffers are in use.
tq	Transmit queue head and tail pointers.
tql	Transmit queue limit. Current number of buffers allowed for transmit queue. It limits the maximum cbus buffers allowed to sit on a particular interface's transmit queue.
Transmitter delay	Delay between outgoing frames.
Station address	The hardware address of the interface.

The following is sample output showing an interface port that has a G.703 cable attached:

Router# show controllers cxbus

```
FSIP 2, hardware version 1.0, microcode version 170.10

Microcode loaded from flash xyzabc/fsip_q170-10

Interface 16 - Serial2/0, electrical interface is G.703 Unbalanced

10 buffer RX queue threshold, 15 buffer TX queue limit, buffer size 1520 ift 0001, rql 9, tq 0000 0000, tql 15

Transmitter delay is 0 microseconds

Interface 17 - Serial2/1, electrical interface is G.703 Unbalanced

11 buffer RX queue threshold, 14 buffer TX queue limit, buffer size 2104 ift 0001, rql 10, tq 0000 0000, tql 14

Transmitter delay is 0 microseconds

Interface 18 - Serial2/2, electrical interface is G.703 Balanced

10 buffer RX queue threshold, 15 buffer TX queue limit, buffer size 1520 ift 0001, rql 9, tq 0000 0000, tql 15

Transmitter delay is 0 microseconds
```

```
Interface 19 - Serial2/3, electrical interface is G.703 Balanced
  10 buffer RX queue threshold, 15 buffer TX queue limit, buffer size 1520
  ift 0001, rql 8, tq 0000 0428, tql 15
 Transmitter delay is 0 microseconds
```

In output, "balanced" and "unbalanced" refer to the electrical signal levels at the connector resulting from different line termination schemes.

show controllers ethernet

Use the **show controllers ethernet** EXEC command to display information on the Cisco 2500, 3000, or 4000.

show controllers ethernet number

Syntax Description

number

Interface number of the Ethernet interface

Command Mode

EXEC

Sample Display

The following is sample output from the **show controllers ethernet** command on the Cisco 4000:

```
Router# show controllers ethernet 0
```

```
LANCE unit 0, NIM slot 1, NIM type code 4, NIM version 1
Media Type is 10BaseT, Link State is Up, Squelch is Normal
idb 0x4060, ds 0x5C80, regaddr = 0x8100000
IB at 0x600D7AC: mode=0x0000, mcfilter 0000/0001/0000/0040
station address 0000.0c03.a14f default station address 0000.0c03.a14f
buffer size 1524
RX ring with 32 entries at 0xD7E8
Rxhead = 0x600D8A0 (12582935), Rxp = 0x5CF0(23)
00 pak=0x60336D0 ds=0x6033822 status=0x80 max_size=1524 pak_size=98
01 pak=0x60327C0 ds=0x6032912 status=0x80 max_size=1524 pak_size=98
02 pak=0x6036B88 ds=0x6036CDA status=0x80 max_size=1524 pak_size=98
03 pak=0x6041138 ds=0x604128A status=0x80 max_size=1524 pak_size=98
04 pak=0x603FAA0 ds=0x603FBF2 status=0x80 max_size=1524 pak_size=98
05 pak=0x600DC50 ds=0x600DDA2 status=0x80 max_size=1524 pak_size=98
06 pak=0x6023E48 ds=0x6023F9A status=0x80 max size=1524 pak size=1506
07 pak=0x600E3D8 ds=0x600E52A status=0x80 max_size=1524 pak_size=1506
08 pak=0x6020990 ds=0x6020AE2 status=0x80 max_size=1524 pak_size=386
09 pak=0x602D4E8 ds=0x602D63A status=0x80 max_size=1524 pak_size=98
10 pak=0x603A7C8 ds=0x603A91A status=0x80 max_size=1524 pak_size=98
11 pak=0x601D4D8 ds=0x601D62A status=0x80 max_size=1524 pak_size=98
12 pak=0x603BE60 ds=0x603BFB2 status=0x80 max_size=1524 pak_size=98
13 pak=0x60318B0 ds=0x6031A02 status=0x80 max_size=1524 pak_size=98
14 pak=0x601CD50 ds=0x601CEA2 status=0x80 max_size=1524 pak_size=98
15 pak=0x602C5D8 ds=0x602C72A status=0x80 max_size=1524 pak_size=98
16 pak=0x60245D0 ds=0x6024722 status=0x80 max_size=1524 pak_size=98
17 pak=0x6008328 ds=0x600847A status=0x80 max_size=1524 pak_size=98
18 pak=0x601EB70 ds=0x601ECC2 status=0x80 max_size=1524 pak_size=98
19 pak=0x602DC70 ds=0x602DDC2 status=0x80 max_size=1524 pak_size=98
20 pak=0x60163E0 ds=0x6016532 status=0x80 max_size=1524 pak_size=98
21 pak=0x602CD60 ds=0x602CEB2 status=0x80 max_size=1524 pak_size=98
22 pak=0x6037A98 ds=0x6037BEA status=0x80 max_size=1524 pak_size=98
23 pak=0x602BE50 ds=0x602BFA2 status=0x80 max_size=1524 pak_size=98
24 pak=0x6018988 ds=0x6018ADA status=0x80 max_size=1524 pak_size=98
25 pak=0x6033E58 ds=0x6033FAA status=0x80 max_size=1524 pak_size=98
26 pak=0x601BE40 ds=0x601BF92 status=0x80 max_size=1524 pak_size=98
27 pak=0x6026B78 ds=0x6026CCA status=0x80 max_size=1524 pak_size=98
28 pak=0x6024D58 ds=0x6024EAA status=0x80 max_size=1524 pak_size=74
29 pak=0x602AF40 ds=0x602B092 status=0x80 max_size=1524 pak_size=98
30 pak=0x601FA80 ds=0x601FBD2 status=0x80 max_size=1524 pak_size=98
```

```
31 pak=0x6038220 ds=0x6038372 status=0x80 max_size=1524 pak_size=98
TX ring with 8 entries at 0xDA20, tx_count = 0
tx_head = 0x600DA58 (12582919), head_txp = 0x5DC4 (7)
tx_tail = 0x600DA58 (12582919), tail_txp = 0x5DC4 (7)
00 pak=0x000000 ds=0x600CF12 status=0x03 status2=0x0000 pak_size=118
01 pak=0x000000 ds=0x602126A status=0x03 status2=0x0000 pak_size=60
02 pak=0x000000 ds=0x600CF12 status=0x03 status2=0x0000 pak_size=118
03 pak=0x000000 ds=0x600CF12 status=0x03 status2=0x0000 pak_size=118
04 pak=0x000000 ds=0x600CF12 status=0x03 status2=0x0000 pak_size=118
05 pak=0x000000 ds=0x600CF12 status=0x03 status2=0x0000 pak_size=118
06 pak=0x000000 ds=0x600CF12 status=0x03 status2=0x0000 pak_size=118
07 pak=0x000000 ds=0x6003ED2 status=0x03 status2=0x0000 pak_size=126
0 missed datagrams, 0 overruns, 2 late collisions, 2 lost carrier events
O transmitter underruns, O excessive collisions, O tdr, O babbles
0 memory errors, 0 spurious initialization done interrupts
0 no enp status, 0 buffer errors, 0 overflow errors
10 one_col, 10 more_col, 22 deferred, 0 tx_buff
0 throttled, 0 enabled
Lance csr0 = 0x73
```

show controllers fddi

Use the **show controllers fddi** user EXEC command to display all information under the FDDI controller card on the AGS+ or FDDI Interface Processor (FIP) on the Cisco 7000.

show controllers fddi

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command reflects the internal state of the chips and information the system uses for bridging and routing that is specific to the interface hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

Sample Display

The following is sample output from the **show controllers fddi** command on the Cisco 7000:

```
Router# show controllers fddi
```

```
Fddi2/0 - hardware version 2.2, microcode version 1.2
 Phy-A registers:
   cr0 4, cr1 0, cr2 0, status 3, cr3 0
 Phy-B registers:
   cr0 4, cr1 4, cr2 0, status 3, cr3 0
 FORMAC registers:
   irdtlb 71C2, irdtneg F85E, irdthtt F5D5, irdmir FFFF0BDC
   irdtrth F85F, irdtmax FBC5, irdtvxt 5959, irdstmc 0810
   irdmode 6A20, irdimsk 0000, irdstat 8060, irdtpri 0000
  FIP registers
   ccb: 002C cmd: 0006 fr: 000F mdptr: 0000 mema: 0000
   icb: 00C0 arg: 0003 app: 0004 mdpg: 0000 af: 0603
   clm: E002 bcn: E016 clbn: 0198 rxoff: 002A en: 0001
   clmbc: 8011 bcnbc: 8011 robn: 0004 park: 0000 fop: 8004
   txchn: 0000 pend: 0000 act: 0000 tail: 0000 cnt: 0000
   state: 0003 check: 0000 eof: 0000 tail: 0000 cnt: 0000
   rxchn: 0000 buf0: 0534 nxt0: 0570 eof: 0000 tail: 0000
   eofch: 0000 buf1: 051C nxt1: 0528 pool: 0050 err: 005C
   head: 0984 cur: 0000 t0: 0030 t1: 0027 t2: 000F
   tail: 0984 cnt: 0001 t3: 0000 rxlft: 000B used: 0000
   txq_s: 0018 txq_f: 0018 Aarm: 0000 Barm: 1388 fint: 8004
 Total LEM: phy-a 6, phy-b 13
```

The last line of output indicates how many LEM events occurred on the specific PHY.

show controllers lex

To show hardware and software information about the LAN Extender chassis, use the **show** controllers lex EXEC command.

```
show controllers lex [number]
                                                    (for the Cisco 7000 series)
show controllers lex [slot/port]
```

Syntax Description

number (Optional) Number of the LAN Extender interface about which

to display information.

slot (Optional) Specifies the backplane slot number on the Cisco

7000 series, and can be 0, 1, 2, 3, or 4.

(Optional) Specifies the port number of the controller and can port

be 0 or 1.

Command Mode

EXEC

Usage Guidelines

Use the **show controllers lex** command to display information about the hardware revision level, software version number, Flash memory size, serial number, and other information related to the configuration of the LAN Extender.

Sample Display

The following is sample output from the show controllers lex command:

```
Router# show controllers lex 0
Lex0:
FLEX Hardware revision 1
FLEX Software version 255.0
128K bytes of flash memory
Serial number is 123456789
Station address is 0000.4060.1100
```

The following is sample output from the show controllers lex command when the LAN Extender interface is not bound to a serial interface:

```
Router# show controller lex 1
Lex1 is not bound to a serial interface
```

Table 6-9 describes the fields shown in the output.

Table 6-9 Show Controllers Lex Field Description

Field	Description
Lex0:	Number of the LAN Extender interface
FLEX Hardware revision	Revision number of the Cisco 1000 series LAN Extender chassis
FLEX Software version	Revision number of the software running on the LAN Extender chassis
128K bytes of Flash memory	Amount of Flash memory in the LAN Extender
Serial number	Serial number of the LAN Extender chassis
Station address	MAC address of the LAN Extender chassis

show controllers mci

Use the **show controllers mci** privileged EXEC command to display all information under the Multiport Communications Interface card or the SCI. This command displays information the system uses for bridging and routing that is specific to the interface hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

show controllers mci

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Sample Display

The following is sample output from the **show controllers mci** command:

Router# show controllers mci

```
MCI 0, controller type 1.1, microcode version 1.8
  128 Kbytes of main memory, 4 Kbytes cache memory
22 system TX buffers, largest buffer size 1520
  Restarts: 0 line down, 0 hung output, 0 controller error
Interface 0 is Ethernet0, station address 0000.0c00.d4a6
  15 total RX buffers, 11 buffer TX queue limit, buffer size 1520
  Transmitter delay is 0 microseconds
Interface 1 is SerialO, electrical interface is V.35 DTE
   15 total RX buffers, 11 buffer TX queue limit, buffer size 1520
  Transmitter delay is 0 microseconds
  High speed synchronous serial interface
Interface 2 is Ethernet1, station address aa00.0400.3be4
  15 total RX buffers, 11 buffer TX queue limit, buffer size 1520
  Transmitter delay is 0 microseconds
Interface 3 is Serial1, electrical interface is V.35 DCE
  15 total RX buffers, 11 buffer TX queue limit, buffer size 1520
   Transmitter delay is 0 microseconds
  High speed synchronous serial interface
```

Table 6-10 describes significant fields shown in the display.

Table 6-10 Show Controllers MCI Field Descriptions

Field	Description
MCI 0	Card type and unit number (varies depending on card).
controller type 1.1	Version number of the card.
microcode version 1.8	Version number of the card's internal software (in read-only memory).
128 Kbytes of main memory	Amount of main memory on the card.
4 Kbytes cache memory	Amount of cache memory on the card.
22 system TX buffers	Number of buffers that hold packets to be transmitted.
largest buffer size 1520	Largest size of these buffers (in bytes).
Restarts 0 line down 0 hung output 0 controller error	Count of restarts due to the following conditions: Communication line down Output unable to transmit Internal error
Interface 0 is Ethernet0	Names of interfaces, by number.
electrical interface is V.35 DTE	Line interface type for serial connections. If the jumper on the AGS+ applique enables NRZI mode, then this field will indicate V.35 NRZI DTE or DCE.
15 total RX buffers	Number of buffers for received packets.
11 buffer TX queue limit	Maximum number of buffers in transmit queue.
Transmitter delay is 0 microseconds	Delay between outgoing frames.
Station address 0000.0c00.d4a6	Hardware address of the interface.

Note The interface type is only queried at startup. If the hardware changes *subsequent* to initial startup, then the wrong type is reported. This has *no* adverse effect on the operation of the software. For instance, if a DCE cable is connected to a dual-mode V.35 applique after the unit has been booted, then the display presented for **show interfaces** incorrectly reports attachment to a DTE device although the software recognizes the DCE interface and behaves accordingly.

Related Command tx-queue-limit

show controllers pcbus

To display all information about the ISA bus interface, use the show controllers pcbus privileged EXEC command.

show controllers pcbus

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

This command is valid on LanOptics' Branchcard or Stacknet 2000 products only.

Sample Display

The following is sample output from the **show controllers pcbus** command:

```
Router# show controllers pcbus
```

```
PCbus unit 0, Name = PCbus0 Hardware is ISA PCbus shared RAM
IDB at 0x3719B0, Interface driver data structure at 0x3735F8
Control/status register at 0x2110008, Shared memory at 0xC000000
Shared memory is initialized
Shared memory interface control block :
Magic no = 0x41435A56 (valid) Version = 1.0
Shared memory size = 64K bytes, Interface is NOT shutdown
Interface state is up, line protocol is up
Tx buffer : (control block at 0xC000010)
Start offset = 0x30, Size = 0x7FE8, Overflows = 1
GET_ptr = 0x4F6C, PUT_ptr = 0x4F6C, WRAP_ptr = 0x3BB0
Rx buffer : (control block at 0xC000020)
Start offset = 0x8018, Size 0x7FE8, Overflows = 22250698
GET_ptr = 0x60, PUT_ptr = 0x60, WRAP_ptr = 0x7FD0
Interrupts received = 567
```

show controllers serial

Use the **show controllers serial** privileged EXEC command to display information that is specific to the interface hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

show controllers serial

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Sample Display

Sample output of the **show controllers serial** command on the Cisco 4000 follows:

Router# show controllers serial

```
MK5 unit 0, NIM slot 1, NIM type code 7, NIM version 1
idb = 0x6150, driver structure at 0x34A878, regaddr = 0x8100300
IB at 0x6045500: mode=0x0108, local_addr=0, remote_addr=0
N1=1524, N2=1, scaler=100, T1=1000, T3=2000, TP=1
buffer size 1524
DTE V.35 serial cable attached
RX ring with 32 entries at 0x45560 : RLEN=5, Rxhead 0
00 pak=0x6044D78 ds=0x6044ED4 status=80 max_size=1524 pak_size=0
01 pak=0x60445F0 ds=0x604474C status=80 max_size=1524 pak_size=0
02 pak=0x6043E68 ds=0x6043FC4 status=80 max_size=1524 pak_size=0
03 pak=0x60436E0 ds=0x604383C status=80 max_size=1524 pak_size=0
04 pak=0x6042F58 ds=0x60430B4 status=80 max_size=1524 pak_size=0
05 pak=0x60427D0 ds=0x604292C status=80 max_size=1524 pak_size=0
06 pak=0x6042048 ds=0x60421A4 status=80 max_size=1524 pak_size=0
07 pak=0x60418C0 ds=0x6041A1C status=80 max_size=1524 pak_size=0
08 pak=0x6041138 ds=0x6041294 status=80 max_size=1524 pak_size=0
09 pak=0x60409B0 ds=0x6040B0C status=80 max_size=1524 pak_size=0
10 pak=0x6040228 ds=0x6040384 status=80 max_size=1524 pak_size=0
11 pak=0x603FAA0 ds=0x603FBFC status=80 max size=1524 pak size=0
12 pak=0x603F318 ds=0x603F474 status=80 max_size=1524 pak_size=0
13 pak=0x603EB90 ds=0x603ECEC status=80 max_size=1524 pak_size=0
14 pak=0x603E408 ds=0x603E564 status=80 max_size=1524 pak_size=0
15 pak=0x603DC80 ds=0x603DDDC status=80 max_size=1524 pak_size=0
16 pak=0x603D4F8 ds=0x603D654 status=80 max_size=1524 pak_size=0
17 pak=0x603CD70 ds=0x603CECC status=80 max_size=1524 pak_size=0
18 pak=0x603C5E8 ds=0x603C744 status=80 max_size=1524 pak_size=0
19 pak=0x603BE60 ds=0x603BFBC status=80 max_size=1524 pak_size=0
20 pak=0x603B6D8 ds=0x603B834 status=80 max size=1524 pak size=0
21 pak=0x603AF50 ds=0x603B0AC status=80 max_size=1524 pak_size=0
22 pak=0x603A7C8 ds=0x603A924 status=80 max_size=1524 pak_size=0
23 pak=0x603A040 ds=0x603A19C status=80 max_size=1524 pak_size=0
24 pak=0x60398B8 ds=0x6039A14 status=80 max_size=1524 pak_size=0
25 pak=0x6039130 ds=0x603928C status=80 max_size=1524 pak_size=0
26 pak=0x60389A8 ds=0x6038B04 status=80 max_size=1524 pak_size=0
27 pak=0x6038220 ds=0x603837C status=80 max_size=1524 pak_size=0
28 pak=0x6037A98 ds=0x6037BF4 status=80 max_size=1524 pak_size=0
29 pak=0x6037310 ds=0x603746C status=80 max_size=1524 pak_size=0
30 pak=0x6036B88 ds=0x6036CE4 status=80 max_size=1524 pak_size=0
31 pak=0x6036400 ds=0x603655C status=80 max_size=1524 pak_size=0
```

```
TX ring with 8 entries at 0x45790 : TLEN=3, TWD=7
tx_count = 0, tx_head = 7, tx_tail = 7
00 pak=0x0000000 ds=0x600D70C status=0x38 max_size=1524 pak_size=22
01 pak=0x000000 ds=0x600D70E status=0x38 max_size=1524 pak_size=2
02 pak=0x000000 ds=0x600D70E status=0x38 max_size=1524 pak_size=2
03 pak=0x000000 ds=0x600D70E status=0x38 max_size=1524 pak_size=2
04 pak=0x000000 ds=0x600D70E status=0x38 max_size=1524 pak_size=2
05 pak=0x000000 ds=0x600D70E status=0x38 max_size=1524 pak_size=2
06 pak=0x000000 ds=0x600D70E status=0x38 max_size=1524 pak_size=2
07 pak=0x000000 ds=0x6000000 status=0x38 max_size=1524 pak_size=0
XID/Test TX desc at 0xFFFFFF, status=0x30, max_buffer_size=0, packet_size=0
XID/Test RX desc at 0xFFFFFF, status=0x0, max_buffer_size=0, packet_size=0
Status Buffer at 0x60459C8: rcv=0, tcv=0, local_state=0, remote_state=0
phase=0, tac=0, currd=0x00000, curxd=0x00000
bad_frames=0, frmrs=0, T1_timeouts=0, rej_rxs=0, runts=0
0 missed datagrams, 0 overruns, 0 bad frame addresses
0 bad datagram encapsulations, 0 user primitive errors
O provider primitives lost, O unexpected provider primitives
O spurious primitive interrupts, O memory errors, O tr
%LINEPROTO-5-UPDOWN: Linansmitter underruns
mk5025 registers: csr0 = 0x0E00, csr1 = 0x0302, csr2 = 0x0704
                 csr3 = 0x5500, csr4 = 0x0214, csr5 = 0x0008
```

show controllers t1

Use the **show controllers t1** privileged EXEC command on the Cisco 7000 to display information about the T1 links supported by the Multichannel Interface Processor (MIP). This command displays controller status that is specific to the controller hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

show controllers t1 [slot/port]

Syntax Description

slot Specifies the backplane slot number and can be 0, 1, 2, 3, or 4.

port Specifies the port number of the controller and can be 0 or 1.

Command Mode

EXEC

Usage Guidelines

For the T1 interface on the Cisco 7000, the MIP can query the port adapters to determine their current status. Issue a **show controllers t1** command to display statistics about the T1 link.

If you specify a slot and port number, each 15 minute period will be displayed.

Sample Display

The following is sample output from the **show controllers t1** command on the Cisco 7000 series:

```
Router# show controllers t1

T1 0/0 is up.

No alarms detected.

Data in current interval (725 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

Total Data (last 24 hours)

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
```

Table 6-11 describes the **show controllers t1** display fields.

Table 6-11 Show Controllers T1 Field Descriptions

Field	Description
T1 0/0 is up.	The T1 controller 0 in slot 0 is operating. The controller's state can be up, down, administratively down. Loopback conditions are shown by (Locally looped) or (Remotely Looped).
No alarms detected.	Any alarms detected by the controller are displayed here. Possible alarms are as follows:
	Transmitter is sending remote alarm.
	Transmitter is sending AIS.
	Receiver has loss of signal.
	Receiver is getting AIS.
	Receiver has loss of frame.
	Receiver has remote alarm.
	Receiver has no alarms.
Data in current interval (725 seconds elapsed)	Shows the current accumulation period, which rolls into the 24 hour accumulation every 15 minutes. Accumulation period is from 1 to 900 seconds. The oldest 15 minute period falls off the back of the 24-hr accumulation buffer
Line Code Violations	Indicates the occurrence of either a Bipolar Violation (BPV) or Excessive Zeroes (EXZ) error event.
Path Code Violations	Indicates a frame synchronization bit error in the D4 and E1-noCRC formats, or a CRC error in the ESF and E1-CRC formats.
Slip Secs	Indicates the replication or deletion of the payload bits of a DS1 frame. A slip may be performed when there is a difference between the timing of a synchronous receiving terminal and the received signal.
Fr Loss Secs	Indicates the number of seconds an Out Of Frame (OOF) error is detected.
Line Err Secs	Line Errored Seconds (LES) is a second in which one or more Line Code Violation errors are detected.
Degraded Mins	A Degraded Minute is one in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3.
Errored Secs	In ESF and E1-CRC links, an Errored Second is a second in which one of the following are detected: one or more Path Code Violations; one or more Out of Frame defects; one or more Controlled Slip events; a detected AIS defect.
	For D4 and E1-noCRC links, the presence of Bipolar Violations also triggers an Errored Second.

Field	Description
Bursty Err Secs	A second with fewer than 320 and more than 1 Path Coding Violation error, no Severely Errored Frame defects and no detected incoming AIS defects. Controlled slips are not included in this parameter.
Severely Err Secs	For ESF signals, a second with one of the following errors: 320 or more Path Code Violation errors; one or more Out of Frame defects; a detected AIS defect.
	For E1-CRC signals, a second with one of the following errors: 832 or more Path Code Violation errors; one or more Out of Frame defects.
	For E1-nonCRC signals, a second with 2048 Line Code Violations or more.
	For D4 signals, a count of 1-second intervals with Framing Errors, or an Out of Frame defect, or 1544 Line Code Violations.
Unavail Secs	A count of the total number of seconds on the interface.

show controllers token

To display information about memory management, error counters, and the CSC-R, CSC-1R, CSC-2R, C2CTR, and CSC-R16 (or CSC-R16M) Token Ring interface cards or Token Ring Interface Processor (TRIP), in the case of the Cisco 7000 series, use the show controllers token privileged EXEC command.

show controllers token

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

Depending on the board being used, the output can vary. This command also displays information that is proprietary to Cisco Systems. Thus, the information that **show controllers token** displays is of primary use to Cisco technical personnel. Information that is useful to users can be obtained with the show interfaces tokenring command, described later in this chapter.

Sample Display

The following is sample output on the AGS+ from the **show controllers token** command:

```
Router# show controllers token
```

```
TR Unit 0 is board 0 - ring 0
 state 3, dev blk: 0x1D2EBC, mailbox: 0x2100010, sca: 0x2010000
  current address: 0000.3080.6f40, burned in address: 0000.3080.6f40
  current TX ptr: 0xBA8, current RX ptr: 0x800
  Last Ring Status: none
 Stats: soft:0/0, hard:0/0, sig loss:0/0
       tx beacon: 0/0, wire fault 0/0, recovery: 0/0
       only station: 0/0, remote removal: 0/0
  Bridge: local 3330, bnum 1, target 3583
    max_hops 7, target idb: 0x0, not local
   Interface failures: 0 -- Bkgnd Ints: 0
  TX shorts 0, TX giants 0
  Monitor state: (active)
    flags 0xC0, state 0x0, test 0x0, code 0x0, reason 0x0
 f/w ver: 1.0, chip f/w: '000000.ME31100', [bridge capable]
    SMT versions: 1.01 kernel, 4.02 fastmac
    ring mode: F00, internal enables: SRB REM RPS CRS/NetMgr
     internal functional: 0000011A (0000011A), group: 00000000 (00000000)
     if_state: 1, ints: 0/0, ghosts: 0/0, bad_states: 0/0
    t2m fifo purges: 0/0
    t2m fifo current: 0, t2m fifo max: 0/0, proto_errs: 0/0
    ring: 3330, bridge num: 1, target: 3583, max hops: 7
Packet counts:
      receive total: 298/6197, small: 298/6197, large 0/0
              runts: 0/0, giants: 0/0
```

```
local: 298/6197, bridged: 0/0, promis: 0/0
                     bad rif: 0/0, multiframe: 0/0
           ring num mismatch 0/0, spanning violations 0
           transmit total: 1/25, small: 1/25, large 0/0
                        runts: 0/0, giants: 0/0, errors 0/0
bad fs: 0/0, bad ac: 0
congested: 0/0, not present: 0/0
        Unexpected interrupts: 0/0, last unexp. int: 0
        Internal controller counts:
     line errors: 0/0, internal errors: 0/0
    burst errors: 0/0, ari/fci errors: 0/0
    abort errors: 0/0, lost frame: 0/0
    copy errors: 0/0, rcvr congestion: 0/0
     token errors: 0/0, frequency errors: 0/0
    dma bus errors: -/-, dma parity errors: -/-
       Internal controller smt state:
   Internal controller smt state:
Adapter MAC: 0000.3080.6f40, Physical drop: 00000000
NAUN Address: 0000.a6e0.11a6, NAUN drop: 00000000
Last source: 0000.a6e0.11a6, Last poll: 0000.3080.6f40
Last MVID: 0006, Last attn code: 0006
Txmit priority: 0006, Auth Class: 7FFF
Monitor Error: 0000, Interface Errors: FFFF
Correlator: 0000, Soft Error Timer: 00C8
Local Ring: 0000, Ring Status: 0000
Beacon rcv type: 0000, Beacon txmit type: 0000
Beacon type: 0000, Beacon NAUN: 0000.a6e0.11a6
```

Table 6-12 describes the fields shown in the following line of sample output:

```
TR Unit 0 is board 0 - ring 0
```

Table 6-12 Show Controllers Token Field Descriptions—Part 1

Field	Description
TR Unit 0	Unit number assigned to the Token Ring interface associated with this output.
is board 0	Board number assigned to the Token Ring controller board associated with this interface.
ring 0	Number of the Token Ring associated with this board.

In the following output line, state 3 indicates the state of the board. The rest of this output line displays memory mapping that is of primary use to Cisco engineers.

```
state 3, dev blk: 0x1D2EBC, mailbox: 0x2100010, sca: 0x2010000
```

The following line also appears in **show interface token** output as the address and burned in address, respectively:

```
current address: 0000.3080.6f40, burned in address: 0000.3080.6f40
```

The following line of output displays buffer management pointers that change by board:

```
current TX ptr: 0xBA8, current RX ptr: 0x800
```

The following line of output indicates the ring status from the controller chip set. This information is used by LAN Network Manager:

```
Last Ring Status: none
```

The following lines of output show Token Ring statistics. See the Token Ring specification for more information.

```
Stats: soft:0/0, hard:0/0, sig loss:0/0
      tx beacon: 0/0, wire fault 0/0, recovery: 0/0
      only station: 0/0, remote removal: 0/0
```

The following line of output indicates that Token Ring communication has been enabled on the interface. If this line of output appears, the message "Source Route Bridge capable" should appear in the **show interfaces tokenring** display.

```
Bridge: local 3330, bnum 1, target 3583
```

Table 6-13 describes the fields shown in this line of sample output:

```
max_hops 7, target idb: 0x0, not local
```

Table 6-13 Show Controllers Token Field Descriptions—Part 2

Field	Description
max_hops 7	Maximum number of bridges.
target idb: 0x0	Destination interface definition.
not local	Indicates whether the interface has been defined as a local or remote bridge.

The following line of output is specific to the hardware:

```
Interface failures: 0 -- Bkgnd Ints: 0
```

In the following line of output, TX shorts are the number of packets the interface transmits that are discarded because they are smaller than the medium's minimum packet size. TX giants are the number of packets the interface transmits that are discarded because they exceed the medium's maximum packet size.

```
TX shorts 0, TX giants 0
```

The following line of output indicates the state of the controller. Possible values include active, failure, inactive, and reset:

```
Monitor state: (active)
```

The following line of output displays detailed information relating to the monitor state shown in the previous line of output. This information relates to the firmware on the controller. This information is relevant to Cisco engineers only if the monitor state is something other than active.

```
flags 0xC0, state 0x0, test 0x0, code 0x0, reason 0x0
```

Table 6-14 describes the fields in the following line of output:

```
f/w ver: 1.0 expr 0, chip f/w: '000000.ME31100', [bridge capable]
```

Table 6-14 Show Controllers Token Field Descriptions—Part 3

Field	Description
f/w ver: 1.0	Version of the Cisco firmware on the board.
chip f/w: '000000.ME31100'	Firmware on the chip set.
[bridge capable]	Interface has not been configured for bridging, but that it has that capability.

The following line of output displays the version numbers for the kernel and the accelerator microcode of the Madge firmware on the board; this firmware is the LLC interface to the chip set:

```
SMT versions: 1.01 kernel, 4.02 fastmac
```

The following line of output displays LAN Network Manager information that relates to ring status:

```
ring mode: F00, internal enables: SRB REM RPS CRS/NetMgr
```

The following line of output corresponds to the functional address and the group address shown in **show interfaces tokenring** output:

```
internal functional: 0000011A (0000011A), group: 00000000 (00000000)
```

The following line of output displays interface board state information that is proprietary to Cisco Systems:

```
if_state: 1, ints: 0/0, ghosts: 0/0, bad_states: 0/0
```

The following output lines display information that is proprietary to Cisco Systems. Cisco engineers use this information for debugging purposes.

```
t2m fifo purges: 0/0
t2m fifo current: 0, t2m fifo max: 0/0, proto_errs: 0/0
```

Each of the fields in the following line of output maps to a field in the **show source bridge** display, as follows: ring maps to srn; bridge num maps to bn; target maps to trn; and max hops maps to max:

```
ring: 3330, bridge num: 1, target: 3583, max hops: 7
```

In the following lines of output, the number preceding the slash (/) indicates the count since the value was last displayed; the number following the slash (/) indicates count since the system was last booted:

```
Packet counts: receive total: 298/6197, small: 298/6197, large 0/0
```

In the following line of output, the number preceding the slash (/) indicates the count since the value was last displayed; the number following the slash (/) indicates count since the system was last booted. The runts and giants values that appear here correspond to the runts and giants values that appear in **show interfaces tokenring** output.

```
runts: 0/0, giants: 0/0
```

The following lines of output are receiver-specific information that Cisco engineers can use for debugging purposes:

```
local: 298/6197, bridged: 0/0, promis: 0/0
bad rif: 0/0, multiframe: 0/0
ring num mismatch 0/0, spanning violations 0
transmit total: 1/25, small: 1/25, large 0/0
    runts: 0/0, giants: 0/0, errors 0/0
```

The following output lines include very specific statistics that are not relevant in most cases, but exist for historical purposes. In particular, the internal errors, burst errors, ari/fci, abort errors, copy errors, frequency errors, dma bus errors, and dma parity errors fields are not relevant.

```
Internal controller counts:
line errors: 0/0, internal errors: 0/0
burst errors: 0/0, ari/fci errors: 0/0
abort errors: 0/0, lost frame: 0/0
copy errors: 0/0, rcvr congestion: 0/0
token errors: 0/0, frequency errors: 0/0
dma bus errors: -/-, dma parity errors: -/-
```

The following lines of output are low-level Token Ring interface statistics relating to the state and status of the Token Ring with respect to all other Token Rings on the line:

```
Internal controller smt state:
Adapter MAC: 0000.3080.6f40, Physical drop: 00000000
NAUN Address: 0000.a6e0.11a6, NAUN drop: 00000000
Last source: 0000.a6e0.11a6, Last poll: 0000.3080.6f40
Last MVID: 0006, Last attn code: 0006
Txmit priority: 0006, Auth Class: 7FFF
Monitor Error: 0000, Interface Errors: FFFF
Correlator: 0000, Soft Error Timer: 00C8
Local Ring: 0000, Ring Status: 0000
Beacon rcv type: 0000, Beacon txmit type: 0000
```

Sample Display

Sample output for the **show controllers token** command on the Cisco 7000 follows:

```
Router> show controllers token
Tokenring4/0: state administratively down
  current address: 0000.3040.8b4a, burned in address: 0000.3040.8b4a
  Last Ring Status: none
    Stats: soft: 0/0, hard: 0/0, sig loss: 0/0
             tx beacon: 0/0, wire fault 0/0, recovery: 0/0
             only station: 0/0, remote removal: 0/0
  Monitor state: (active), chip f/w: '000000.....', [bridge capable]
    ring mode: 0"
     internal functional: 00000000 (00000000), group: 00000000 (00000000)
    internal addrs: SRB: 0000, ARB: 0000, EXB 0000, MFB: 0000
                        Rev: 0000, Adapter: 0000, Parms 0000
    Microcode counters:
       MAC giants 0/0, MAC ignored 0/0
       Input runts 0/0, giants 0/0, overrun 0/0
       Input ignored 0/0, parity 0/0, RFED 0/0
       Input REDI 0/0, null rcp 0/0, recovered rcp 0/0
       Input implicit abort 0/0, explicit abort 0/0
       Output underrun 0/0, tx parity 0/0, null tcp 0/0
       Output SFED 0/0, SEDI 0/0, abort 0/0
       Output False Token 0/0, PTT Expired 0/0
     Internal controller counts:
       line errors: 0/0, internal errors: 0/0
       burst errors: 0/0, ari/fci errors: 0/0
       abort errors: 0/0, lost frame: 0/0
       copy errors: 0/0, rcvr congestion: 0/0
       token errors: 0/0, frequency errors: 0/0
     Internal controller smt state:
                                                                     00000000
       Adapter MAC: 0000.0000.0000, Physical drop:

        NAUN Address:
        0000.0000.0000, NAUN drop:
        00000000

        Last source:
        0000.0000.0000, Last poll:
        0000.0000.0000

        Last MVID:
        0000, Last attn code:
        0000

        Txmit priority:
        0000, Auth Class:
        0000

        Monitor Error:
        0000, Interface Errors:
        0000
```

I

 Correlator:
 0000,
 Soft Error Timer:
 0000

 Local Ring:
 0000,
 Ring Status:
 0000

 Beacon rcv type:
 0000,
 Beacon txmit type:
 0000

 Beacon type:
 0000,
 Beacon NAUN:
 0000.0000.0000

 Beacon drop:
 000000000,
 Reserved:
 0000

Table 6-15 describes key **show controllers token** display fields.

Table 6-15 Show Controllers Token Field Descriptions

Field	Description
Tokenring4/0	Interface processor type, slot, and port.
Last Ring Status	Last abnormal ring condition. Can be any of the following: Signal Loss HW Removal Remote Removal Counter Overflow Only station Ring Recovery

show hub

To display information about the hub (repeater) on an Ethernet interface of a Cisco 2505 or Cisco 2507, use the **show hub** EXEC command.

show hub [ether number [port [port]]]

Syntax Description

ether (Optional) Indicates that this is an Ethernet hub.

number (Optional) Hub number, starting with 0. Since there is currently

only one hub, this number is 0.

port [port] (Optional) Starting and ending port numbers on the hub. On the

Cisco 2505, port numbers range from 1 through 8. On the Cisco 2507, port numbers range from 1 through 16. If a second port number follows, then this port number indicates the beginning

of a port range.

Command Mode

EXEC

Usage Guidelines

If you do not specify a port or port range for the **show hub** command, the command displays all ports (for example, 1 through 8 for the Cisco 2505 and 1 through 16 for the cisco 2507) by default. Therefore, the commands **show hub**, **show hub ether 0**, and **show hub ether 0 1 16** all produce the same result.

If no ports are specified, the command displays some additional data about the internal port. The internal port is the hub's connection to Ethernet interface 0 inside the box. Ethernet interface 0 still exists; physical access to the interface is via the hub.

Sample Display

The following is sample output from the **show hub** command for hub 0, port 2 only:

```
Router# show hub ether 0 2

Port 2 of 16 is administratively down, link state is down 0 packets input, 0 bytes 0 errors with 0 collisions
        (0 FCS, 0 alignment, 0 too long, 0 short, 0 runts, 0 late, 0 very long, 0 rate mismatches) 0 auto partitions, last source address (none) Last clearing of "show hub" counters never

Repeater information (Connected to Ethernet0) 2792429 bytes seen with 18 collisions, 1 hub resets Version/device ID 0/1 (0/1) Last clearing of "show hub" counters never
```

The following is sample output from the **show hub** command for hub 0, all ports:

```
Port 1 of 16 is administratively down, link state is up 2458 packets input, 181443 bytes
```

```
3 errors with 18 collisions
     (0 FCS, 0 alignment, 0 too long,
      0 short, 3 runts, 0 late,
      0 very long, 0 rate mismatches)
  0 auto partitions, last source address was 0000.0cff.e257
  Last clearing of "show hub" counters never
Port 16 of 16 is down, link state is down
  0 packets input, 0 bytes
  0 errors with 0 collisions
     (0 FCS, 0 alignment, 0 too long,
      0 short, 0 runts, 0 late,
      0 very long, 0 rate mismatches)
  0 auto partitions, last source address (none)
  Last clearing of "show hub" counters never
Repeater information (Connected to Ethernet0)
  2792429 bytes seen with 18 collisions, 1 hub resets
  Version/device ID 0/1 (0/1)
  Last clearing of "show hub" counters never
Internal Port (Connected to Ethernet0)
  36792 packets input, 4349525 bytes
  0 errors with 14 collisions
     (0 FCS, 0 alignment, 0 too long,
      0 short, 0 runts, 0 late,
      0 very long, 0 rate mismatches)
  0 auto partitions, last source address (none)
  Last clearing of "show hub" counters never
```

Table 6-16 describes significant fields show in the display.

Table 6-16 Show Hub Field Descriptions

Field	Description
Port of is administratively down	Port number out of total ports; indicates whether the interface hardware is currently active, or down due to one of the following:
	• The link state test failed.
	 The MAC address was mismatched when the source address was configured.
	• It has been taken down by an administrator.
link state is up	Indicates whether port has been disabled by the link test function. If the link test function is disabled by the user, nothing will be shown here.
packets input	Total number of error-free packets received by the system.
bytes	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.
errors	Sum of FCS, alignment, too long, short, runts, very long, and rate mismatches.
collisions	Number of messages retransmitted due to Ethernet collisions.
FCS	Counter for the number of frames detected on the port with an invalid frame check sequence.
alignment	Counter for the number of frames of valid length (64 bytes to 1518 bytes) that have been detected on the port with an FCS error and a framing error.

Field	Description
too long	Counter for the number of frames that exceed the maximum valid packet length of 1518 bytes.
short	Counter for the number of instances when activity is detected with duration less than 74-82 bit times.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size. For example, any Ethernet packet that is less than 64 bytes is considered a runt.
late	Counter for the number of instances when a collision is detected after 480-565 bit times in the frame.
very long	Counter for the number of times the transmitter is active in excess of 4 to 7.5 ms.
rate mismatches	Counter for the number of occurrences when the frequency, or data rate of incoming signal is detectably different from the local transmit frequency.
auto partitions	Counter for the number of instances where the repeater has partitioned the port from the network.
last source address	Source address of last packet received by this port. Indicates "none" if no packets have been received since power on or a hub reset.
Last clearing of "show hub" counters	Elapsed time since clear hub counter command. Indicates "never" if counters have never been cleared.
Repeater information (Connected to Ethernet0)	Indicates that the following information is about the hub connected to the Ethernet interface shown.
bytes seen with collisions, hub resets	Hub resets is the number of times the hub has been reset by network management software or by the clear hub command.
Version/device ID 0/1 (0/1)	Hub hardware version. IMR+ version device of motherboard (daughter board)
Internal Port (Connected to Ethernet0)	Set of counters for the internal AUI port connected to the Ethernet interface.

Related Command

hub

show interfaces

Use the **show interfaces** EXEC command to display statistics for all interfaces configured on the router. The resulting output varies, depending on the network for which an interface has been configured.

show interfaces [type {unit}] [first] [last] [accounting] **show interfaces** [type slot/port] [accounting] (for the Cisco 7000 series)

Syntax Description

type unit (Optional) Specify that information for a particular interface

controller be displayed. Allowed values for type include **async**, **bri0**, **ethernet**, **fddi**, **hssi**, **loopback**, **null**, **serial**, **tokenring**, and **tunnel**. For the Cisco 7000 series, *type* can be **atm**, **ethernet**, **fddi**, **serial**, or **tokenring**.

okenring.

The argument *unit* must match a port number on the selected interface

controller.

first last (Optional) The Cisco 2500 and 3000 support the ISDN Basic Rate

Interface (BRI). The argument *first* can be either 1 or 2. The argument

last can only be 2, indicating B channels 1 and 2. D-channel information is obtained by using the command without the optional

arguments.

accounting (Optional) Displays the number of packets of each protocol type that

has been sent through the interface. You can show these numbers for

all interfaces, or you can specify a specific type and unit.

slot Specifies the backplane slot number and can be 0, 1, 2, 3, or 4.

port Specifies the port number of the interface and can be 0, 1, 2, 3, 4, or 5

depending on the type of interface, as follows:

• AIP (ATM Interface Processor) 0

• EIP (Ethernet Interface Processor) 0, 1, 2, 3, 4, or 5

• FIP (FDDI Interface Processor) 0

• FSIP (Fast Serial Interface Processor) 0, 1, 2, 3, 4, 5, 6, or 7

• HIP (HSSI Interface Processor) 0

• TRIP (Token Ring Interface Processor) 0, 1, 2, or 3

Command Mode

EXEC

Usage Guidelines

The **show interfaces** command displays statistics for the network interfaces. The resulting display on the Cisco 7000 series will show the interface processors in slot order. If you add interface processors after booting the system, they will appear at the end of the list, in the order in which they were inserted.

If you use the **show interfaces** command on the Cisco 7000 series without the *slot/port* arguments, information for all interface types will be shown. For example, if you type show interfaces ethernet you will receive information for all ethernet, serial, Token Ring, and FDDI interfaces. Only by adding the type slot/port argument can you specify a particular interface.

If you enter a **show interfaces** command for an interface type that has been removed from the router, interface statistics will be displayed accompanied by the following text: "Hardware has been removed."

You will use the **show interfaces** command frequently while configuring and monitoring routers. The various forms of the **show interfaces** commands are described in detail in the sections immediately following this command.

Sample Display

The following is sample output from the show interfaces command. Because your display will depend on the type and number of interface cards in your router, only a portion of the display is shown.

```
Router# show interfaces
Ethernet 0 is up, line protocol is up
  Hardware is MCI Ethernet, address is 0000.0c00.750c (bia 0000.0c00.750c)
  Internet address is 131.108.28.8, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 10000 Kbit, DLY 100000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input 0:00:00, output 0:00:00, output hang never
  Last clearing of "show interface" counters 0:00:00
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 2000 bits/sec, 4 packets/sec
     1127576 packets input, 447251251 bytes, 0 no buffer
     Received 354125 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     5332142 packets output, 496316039 bytes, 0 underruns
     O output errors, 432 collisions, O interface resets, O restarts
---More---
```

Sample Display with Accounting Option

To display the number of packets of each protocol type that have been sent through all configured interfaces, use the show interfaces accounting EXEC command. When you use the accounting option, only the accounting statistics are displayed.

Note Except for protocols that are encapsulated inside other protocols, such as IP over X.25, the accounting option also shows the total of all bytes sent and received, including the MAC header. For example, it totals the size of the Ethernet packet or the size of a packet that includes HDLC encapsulation.

Table 6-17 lists the protocols for which per-packet accounting information is kept.

Table 6-17 Per-Packet Counted Protocols

Protocol	Notes
Apollo	No note.
AppleTalk	No note.
ARP	For IP, Apollo, Frame Relay, SMDS.
CLNS	No note.
DEC MOP	The routers use MOP packets to advertise their existence to DEC machines that use the MOP protocol. A router periodically broadcasts MOP packets to identify itself as a MOP host. This results in MOP packets being counted, even when DECnet is not being actively used.
DECnet	No note.
HP Probe	No note.
IP	No note.
LAN Manager	LAN Network Manager and IBM Network Manager.
Novell	No note.
Serial Tunnel	SDLC.
Spanning Tree	No note.
SR Bridge	No note.
Transparent Bridge	No note.
VINES	No note.
XNS	No note.

Sample Display

The following is sample output from the **show interfaces accounting** command:

Router# show interfaces accounting

Interface TokenRingO is disabled

T + 1-		- 4-	\sim
H:Tn	ern	e^{-}	u

Protoco	ol Pkts In	Chars In	Pkts Out	Chars Out
I	P 873171	735923409	34624	9644258
Novel	.1 163849	12361626	57143	4272468
DEC MC)P 0	0	1	77
AF	RP 69618	4177080	1529	91740
Interface SerialO is di	sabled			
Ethernet1				
Protoco	ol Pkts In	Chars In	Pkts Out	Chars Out
I	IP 0	0	37	11845

Novel1 0 0 4591 275460
DEC MOP 0 0 1 77
ARP 0 0 7 420

Interface Seriall is disabled

Interface Seriall is disabled Interface Ethernet2 is disabled Interface Ethernet3 is disabled Interface Ethernet3 is disabled Interface Serial3 is disabled Interface Ethernet4 is disabled Interface Ethernet5 is disabled

```
Interface Ethernet6 is disabled
Interface Ethernet7 is disabled
Interface Ethernet8 is disabled
Interface Ethernet9 is disabled

Fddi0

Protocol Pkts In Chars In Pkts Out Chars Out
Novell 0 0 183 11163
ARP 1 49 0 0 0
```

When the output indicates an interface is "disabled," the router has received excessive errors (over 5000 in a keepalive period).

show interfaces async

Use the **show interfaces async** privileged EXEC command to display information about the serial interface.

show interfaces async [unit] [accounting]

Syntax Description

unit (Optional) Must be 1.

accounting (Optional) Displays the number of packets of each protocol type

that have been sent through the interface.

Command Mode

Privileged EXEC

Sample Display

The following is sample output from the **show interfaces async** command:

```
Router# show interfaces async 1
```

```
Async 1 is up, line protocol is up
  Hardware is Async Serial
Internet address is 1.0.0.1, subnet mask is 255.0.0.0
MTU 1500 bytes, BW 9 Kbit, DLY 100000 usec, rely 255/255, load 56/255
Encapsulation SLIP, keepalive set (0 \text{ sec})
Last input 0:00:03, output 0:00:03, output hang never
Last clearing of "show interface" counters never
Output queue 0/3, 2 drops; input queue 0/0, 0 drops
Five minute input rate 0 bits/sec, 1 packets/sec
Five minute output rate 2000 bits/sec, 1 packets/sec
273 packets input, 13925 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
221 packets output, 41376 bytes, 0 underruns
O output errors, O collisions, O interface resets, O restarts
0 carrier transitions
```

Table 6-18 describes the fields shown in the display.

Table 6-18 Show Interfaces Async Field Descriptions

Field	Description
Async is {up down}is administratively down	Indicates whether the interface hardware is currently active (whether carrier detect is present) and if it has been taken down by an administrator.
line protocol is {up down administratively down}	Indicates whether the software processes that handle the line protocol think the line is usable (that is, whether keepalives are successful).
Hardware is	Hardware type.
Internet address is	Internet address and subnet mask, followed by packet size.
MTU	Maximum Transmission Unit of the interface.

Field	Description
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes. The calculation uses the value from the bandwidth interface configuration command.
Encapsulation	Encapsulation method assigned to interface.
keepalive	Indicates whether keepalives are set or not.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Last clearing	The time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2 ³¹ ms (and less than 2 ³² ms) ago.
Output queue, drops input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.
Five minute input rate, Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.
no buffers	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.

Field	Description
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so that this sum may not balance with the other counts.
CRC	Cyclic redundancy checksum generated by the originating LAN station or far end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRC's is usually the result of collisions or a station transmitting bad data. On a serial link, CRC's usually indicate noise, gain hits or other transmission problems on the data link.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a serial line, this is usually the result of noise or other transmission problems.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be incremented.
abort	Illegal sequence of one bits on a serial interface. This usually indicates a clocking problem between the serial interface and the data link equipment.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.
restarts	Number of times the controller was restarted because of errors.
carrier transitions	Number of times the carrier detect signal of a serial interface has changed state. Indicates modem or line problems if the carrier detect line is changing state often.
Protocol	Protocol that is operating on the interface.
Pkts In	Number of packets received for that protocol.

Field	Description
Chars In	Number of characters received for that protocol.
Pkts Out	Number of packets transmitted for that protocol.
Chars Out	Number of characters transmitted for that protocol.

Sample Display with Accounting Option

The following is a sample display from the **show interfaces async accounting** command:

Router# show interfaces async 0 accounting

Async 0				
Protocol	Pkts In	Chars In	Pkts Out	Chars Out
IP	7344	4787842	1803	1535774
DEC MOP	0	0	127	9779
ARP	7	420	39	2340

The **show line** and **show slip** commands can also be useful in monitoring asynchronous interfaces.

show interfaces atm

Use the **show interfaces atm** privileged EXEC command to display information about the ATM interface.

show interfaces atm [slot/port]

Syntax Description

slot/port (Optional) Slot on the 7000 can be 0, 1, 2, 3, or 4. On the 7010, slot can be 0, 1, or 2. Port must be 0.

Command Mode

Privileged EXEC

Sample Display

The following is sample output from the **show interfaces atm** command:

```
Router# show interfaces atm4/0
ATM4/0 is up, line protocol is up
  Hardware is cxBus ATM
  Internet address is 131.108.97.165, subnet mask is 255.255.255.0
  MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ATM, loopback not set, keepalive set (10 sec)
  Encapsulation(s): AAL5, PVC mode
  256 TX buffers, 256 RX buffers, 1024 Maximum VCs, 1 Current VCs
  Signalling vc = 1, vpi = 0, vci = 5
  ATM NSAP address: BC.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.13
  Last input 0:00:05, output 0:00:05, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
     144 packets input, 3148 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     154 packets output, 4228 bytes, 0 underruns
     O output errors, O collisions, 1 interface resets, O restarts
```

Table 6-19 describes the fields shown in the display.

Table 6-19 Show Interfaces ATM Field Descriptions

Field	Description
ATM is {up down}is administratively down	Indicates whether the interface hardware is currently active (whether carrier detect is present) and if it has been taken down by an administrator.
line protocol is {up down administratively down}	Indicates whether the software processes that handle the line protocol think the line is usable (that is, whether keepalives are successful).
Hardware is	Hardware type.
Internet address is	Internet address and subnet mask.
MTU	Maximum Transmission Unit of the interface.
BW	Bandwidth of the interface in kilobits per second.

Field	Description
DLY	Delay of the interface in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes. The calculation uses the value from the bandwidth interface configuration command.
Encapsulation	Encapsulation method assigned to interface.
Encapsulation(s)	AAL5, PVC or SVC mode.
TX buffers	Number of buffers configured with the atm txbuff command.
RX buffers	Number of buffers configured with the atm rxbuff command.
Maximum VCs	Maximum number of virtual circuits.
Current VCs	Current number of virtual circuits.
Signaling VC	Number of the signaling PVC.
vpi	Virtual path identifier number.
vci	Virtual channel identifier number.
ATM NSAP address	NSAP address of the ATM interface.
keepalive	Indicates whether keepalives are set or not.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Last clearing	The time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2 ³¹ ms (and less than 2 ³² ms) ago.
Output queue, drops input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.
Five minute input rate, Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.

Field	Description
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so that this sum may not balance with the other counts.
CRC	Cyclic redundancy checksum generated by the originating LAN station or far end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRC's is usually the result of collisions or a station transmitting bad data. On a serial link, CRC's usually indicate noise, gain hits or other transmission problems on the data link.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be incremented.
abort	Illegal sequence of one bits on a serial interface. This usually indicates a clocking problem between the serial interface and the data link equipment.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the transmitter has been running faster than the router can handle. This may never be reported on some interfaces.

Field	Description
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.
restarts	Number of times the controller was restarted because of errors.

show interfaces bri

Use the **show interfaces bri** privileged EXEC command to display information about the BRI D and B channels.

show interfaces bri number [first] [last] [accounting]

Syntax Description

number	Interface number. The value is 0 through 7 if the router has one BRI NIM or 0 through 15 if the router has two BRI NIMs. Specifying just the <i>number</i> will display the D channel for that BRI interface.
first	(Optional) Specifies the first of the B channels; can be either 1 or 2. D-channel information is obtained by using the command without the optional arguments.
last	(Optional) Specifies the last of the B channels; can only be 2, indicating B channels 1 and 2. D-channel information is obtained by using the command without the optional arguments.
accounting	(Optional) Displays the number of packets of each protocol type that have been sent through the interface.

Command Mode

Privileged EXEC

Usage Guidelines

Use the command syntax sample combinations in Table 6-20 to display the associated output.

Table 6-20 Sample Show Interfaces BRI Combinations

Command Syntax	Displays
show interfaces	All interfaces in the router
show interfaces bri 2	Channel D for BRI interface 2
show interfaces bri 4 1	Channel B1 on BRI interface 4
show interfaces bri 4 2	Channel B2 on BRI interface 4
show interfaces bri 4 1 2	Channels B1 and B2 on BRI interface 4
show interfaces bri	Error message: "% Incomplete command."

Sample Display

The following is sample output from the **show interfaces** command for BRI:

```
Router# show interfaces bri 0
BRIO is up, line protocol is up (spoofing)
  Hardware is BRI
  Internet address is 150.136.190.203, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 0:00:07, output 0:00:00, output hang never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
      16263 packets input, 1347238 bytes, 0 no buffer
      Received 13983 broadcasts, 0 runts, 0 giants
       2 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 2 abort
       22146 packets output, 2383680 bytes, 0 underruns
       O output errors, O collisions, 2 interface resets, O restarts
       1 carrier transitions
```

Table 6-21 describes the fields shown in the display.

Table 6-21 Show Interfaces BRI Field Descriptions

Field	Description		
BRI is {up down}is administratively down	Indicates whether the interface hardware is currently active (whether line signal is present) and if it has been taken down by an administrator.		
line protocol is {up down administratively down}	Indicates whether the software processes that handle the line protocol consider the line usable (that is, whether keepalives are successful).		
Hardware is	Hardware type.		
Internet address is	IP address and subnet mask, followed by packet size.		
MTU	Maximum Transmission Unit of the interface.		
BW	Bandwidth of the interface in kilobits per second.		
DLY	Delay of the interface in microseconds.		
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.		
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.		
Encapsulation	Encapsulation method assigned to interface.		
loopback Indicates whether loopback is set or not.			
keepalive Indicates whether keepalives are set or not.			
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.		
output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.		

Field	Description	
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.	
Output queue, drops Input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.	
Five minute input rate Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.	
packets input	Total number of error-free packets received by the system.	
bytes	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.	
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.	
broadcasts	Total number of broadcast or multicast packets received by the interface.	
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.	
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.	
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors also can increment the count, so this sum may not balance with the other counts.	
CRC	Cyclic redundancy checksum generated by the originating station or far-end device does not match the checksum calculated from the data received. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link.	
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a serial line, this is usually the result of noise or other transmission problems.	
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.	
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. Broadcast storms and bursts of noise can cause the ignored count to be increased.	
abort	Illegal sequence of one bits on a serial interface. This usually indicates a clocking problem between the serial interface and the data link equipment.	
packets output	Total number of messages transmitted by the system.	
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.	
nderruns Number of times that the transmitter has been running fast the router can handle. This may never be reported on some interfaces.		

Field	Description	
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.	
collisions	Number of collisions. This could happen when you have several devices connected on a multiport line.	
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.	
restarts	Number of times the controller was restarted because of errors.	
carrier transitions	Number of times the carrier detect signal of a serial interface has changed state. Indicates modem or line problems if the carrier detect line is changing state often.	
Protocol	Protocol that is operating on the interface.	
Pkts In	Number of packets received for that protocol.	
Chars In	Number of characters received for that protocol.	
Pkts Out	Number of packets transmitted for that protocol.	
Chars Out	Number of characters transmitted for that protocol.	

show interfaces ethernet

Use the **show interfaces ethernet** privileged EXEC command to display information about an Ethernet interface on the router.

```
show interfaces ethernet unit [accounting]
show interfaces ethernet [slot/port] [accounting] (for the Cisco 7000 series)
```

Syntax Description

unit Must match a port number on the selected interface.

accounting (Optional) Displays the number of packets of each protocol type that

have been sent through the interface.

slot (Optional) On the Cisco 7000 series, slot location of the interface

processor.

port (Optional) On the Cisco 7000 series, port number on interface.

Command Mode

Privileged EXEC

Usage Guidelines

If you do not provide values for the argument *unit* (or *slot* and *port* on the Cisco 7000 series), the command will display statistics for all network interfaces. The optional keyword **accounting** displays the number of packets of each protocol type that have been sent through the interface.

Sample Display

The following is sample output from the **show interfaces** command for the Ethernet 0 interface:

```
Router# show interfaces ethernet 0
Ethernet 0 is up, line protocol is up
  Hardware is MCI Ethernet, address is aa00.0400.0134 (bia 0000.0c00.4369)
  Internet address is 131.108.1.1, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
   ARP type: ARPA, PROBE, ARP Timeout 4:00:00
  Last input 0:00:00, output 0:00:00, output hang never
  Output queue 0/40, 0 drops; input queue 0/75, 2 drops
  Five minute input rate 61000 bits/sec, 4 packets/sec
  Five minute output rate 1000 bits/sec, 2 packets/sec
       2295197 packets input, 305539992 bytes, 0 no buffer
       Received 1925500 broadcasts, 0 runts, 0 giants
       3 input errors, 3 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
       0 input packets with dribble condition detected
       3594664 packets output, 436549843 bytes, 0 underruns
       8 output errors, 1790 collisions, 10 interface resets, 0 restarts
```

Table 6-22 describes significant fields shown in the display.

Table 6-22 Show Interfaces Ethernet Field Descriptions

Field	Description	
Ethernet is up is administratively down	Indicates whether the interface hardware is currently active and has been taken down by an administrator. "Disabled" indicates router has received over 5000 errors in a keepalive interval, whi is 10 seconds by default.	
line protocol is {up down administratively down}	Indicates whether the software processes that handle the line protocol believe the interface is usable (that is, whether keepalives are successful) or if it has been taken down by an administrator.	
Hardware	Hardware type (for example, MCI Ethernet, SCI, cBus Ethernet) and address.	
Internet address	Internet address followed by subnet mask.	
MTU	Maximum Transmission Unit of the interface.	
BW	Bandwidth of the interface in kilobits per second.	
DLY	Delay of the interface in microseconds.	
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.	
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.	
Encapsulation	Encapsulation method assigned to interface.	
ARP type:	Type of Address Resolution Protocol assigned.	
loopback	Indicates whether loopback is set or not.	
keepalive	Indicates whether keepalives are set or not.	
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.	
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.	
output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by the interface. Useful for knowing when a dead interface failed.	
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.	
Last clearing	Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2 ³¹ ms (and less than 2 ³² ms) ago.	
Output queue, input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.	

Field	Description	
Five minute input rate, Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes. If the interface is not in promiscuous mode, it senses network traffic it sends and receives (rather than all network traffic).	
	The 5-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.	
packets input	Total number of error-free packets received by the system.	
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.	
no buffers	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.	
Received broadcasts	Total number of broadcast or multicast packets received by the interface.	
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size. For instance, any Ethernet packet that is less than 64 bytes is considered a runt.	
giants	Number of packets that are discarded because they exceed the medium's maximum packet size. For example, any Ethernet packet that is greater than 1,518 bytes is considered a giant.	
input error	Includes runts, giants, no buffer, CRC, frame, overrun, and ignor counts. Other input-related errors can also cause the input errors count to be increased, and some datagrams may have more than o error; therefore, this sum may not balance with the sum of enumerated input error counts.	
CRC	Cyclic redundancy checksum generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data.	
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a LAN, this is usually the result of collisions or a malfunctioning Ethernet device.	
overrun	Number of times the receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.	
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be increased.	
input packets with dribble condition detected	Dribble bit error indicates that a frame is slightly too long. This frame error counter is incremented just for informational purposes; the router accepts the frame.	
packets output	Total number of messages transmitted by the system.	

Field	Description	
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.	
underruns	Number of times that the transmitter has been running faster than the router can handle. This may never be reported on some interfaces.	
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.	
collisions	Number of messages retransmitted due to an Ethernet collision. This is usually the result of an overextended LAN (Ethernet or transceiver cable too long, more than two repeaters between stations, or too many cascaded multiport transceivers). A packet that collides is counted only once in output packets.	
interface resets	Number of times an interface has been completely reset. This ca happen if packets queued for transmission were not sent within several seconds. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carridetect line of a serial interface is up, but the line protocol is down periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.	
restarts	Number of times a Type 2 Ethernet controller was restarted because of errors.	

Sample Display on Cisco 7000

The following sample output illustrates the **show interfaces ethernet** command on the Cisco 7000:

```
Router> show interfaces ethernet 4/2
```

```
Ethernet4/2 is up, line protocol is up
  Hardware is cxBus Ethernet, address is 0000.0c02.d0ce (bia 0000.0c02.d0ce)
  Internet address is 131.108.7.1, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input 0:00:00, output 0:00:09, output hang never
  Last clearing of "show interface" counters 0:56:40
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 3000 bits/sec, 4 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
     4961 packets input, 715381 bytes, 0 no buffer
     Received 2014 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     567 packets output, 224914 bytes, 0 underruns
     0 output errors, 168 collisions, 0 interface resets, 0 restarts
```

Sample Display with Accounting Option

The following is sample output from the **show interfaces ethernet** command with the **accounting** option on the Cisco 7000:

Router# show interfaces ethernet 4/2 accounting

Et.h		

Protocol	Pkts In	Chars In	Pkts Out	Chars Out
IP	7344	4787842	1803	1535774
Appletalk	33345	4797459	12781	1089695
DEC MOP	0	0	127	9779
ARP	7	420	39	2340

show interfaces fddi

Use the **show interfaces fddi** EXEC command to display information about the FDDI interface.

```
show interfaces fddi unit [accounting]

show interfaces fddi [slot/port] [accounting] (for the Cisco 7000 series)
```

Syntax Description

unit Must match a port number on the selected interface.

accounting (Optional) Displays the number of packets of each protocol type that

have been sent through the interface.

slot (Optional) On the Cisco 7000 series, slot location of the interface

processor.

port (Optional) On the Cisco 7000 series, port number on interface.

Command Mode

EXEC

Sample Displays

The following is a sample partial display of FDDI-specific data from the **show interfaces fddi** command:

```
Router> show interfaces fddi 0
```

```
Fddi0 is up, line protocol is up
  Hardware is cBus Fddi, address is 0000.0c06.8de8 (bia 0000.0c06.8de8)
  Internet address is 131.108.33.9, subnet mask is 255.255.255.0
  MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive not set
  ARP type: SNAP, ARP Timeout 4:00:00
  Phy-A state is active, neighbor is
                                       B, cmt signal bits 008/20C, status ILS
  Phy-B state is connect, neighbor is unk, cmt signal bits 20C/000, status QLS
  ECM is insert, CFM is c_wrap_a, RMT is ring_op
  token rotation 5000 usec, ring operational 1d01
  Upstream neighbor 0000.0c06.8b7d, downstream neighbor 0000.0c06.8b7d
  Last input 0:00:08, output 0:00:08, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 5000 bits/sec, 1 packets/sec
  Five minute output rate 76000 bits/sec, 51 packets/sec
     852914 packets input, 205752094 bytes, 0 no buffer
     Received 126752 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     8213126 packets output, 616453062 bytes, 0 underruns
     0 output errors, 0 collisions, 4 interface resets, 0 restarts
     5 transitions, 0 traces
```

The following is a sample partial display of FDDI-specific data from the **show interfaces fddi** command on a Cisco 7000:

```
Router> show interfaces fddi 3/0
```

```
Fddi3/0 is up, line protocol is up
 Hardware is cxBus Fddi, address is 0000.0c02.adfl (bia 0000.0c02.adfl)
 Internet address is 131.108.33.14, subnet mask is 255.255.255.0
 MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
 Encapsulation SNAP, loopback not set, keepalive not set
 ARP type: SNAP, ARP Timeout 4:00:00
 Phy-A state is active, neighbor is B, cmt signal bits 008/20C, status ILS
 Phy-B state is active, neighbor is A, cmt signal bits 20C/008, status ILS
 ECM is in, CFM is thru, RMT is ring_op
 Token rotation 5000 usec, ring operational 21:32:34
 Upstream neighbor 0000.0c02.ba83, downstream neighbor 0000.0c02.ba83
 Last input 0:00:05, output 0:00:00, output hang never
 Last clearing of "show interface" counters 0:59:10
 Output queue 0/40, 0 drops; input queue 0/75, 0 drops
 Five minute input rate 69000 bits/sec, 44 packets/sec
 Five minute output rate 0 bits/sec, 1 packets/sec
    113157 packets input, 21622582 bytes, 0 no buffer
    Received 276 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     4740 packets output, 487346 bytes, 0 underruns
    O output errors, O collisions, O interface resets, O restarts
    O transitions, 2 traces, 3 claims, 2 beacons
```

The following is an example that includes the **accounting** option. When you use the **accounting** option, only the accounting statistics are displayed.

Router> show interfaces fddi 3/0 accounting

Fddi3/0					
Pro	tocol	Pkts In	Chars In	Pkts Out	Chars Out
	IP	7344	4787842	1803	1535774
Appl	.etalk	33345	4797459	12781	1089695
DE	C MOP	0	0	127	9779
	ARP	7	420	39	2340

Table 6-23 describes the **show interfaces fddi** display fields.

Table 6-23 Show Interfaces FDDI Field Descriptions

Field	Description
Fddi is {up down}is administratively down	Gives the interface processor unit number and tells whether the interface hardware is currently active and can transmit and receive or if it has been taken down by an administrator. "Disabled" indicates the router has received over 5000 errors in a keepalive interval, which is 10 seconds by default.
line protocol is {up down administratively down}	Indicates whether the interface hardware is currently active and can transmit and receive or if it has been taken down by an administrator.
Hardware	Provides the hardware type, followed by the hardware address.
Internet address	IP address, followed by subnet mask.
MTU	Maximum Transmission Unit of the interface.
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface in microseconds.

rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.	
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.	
Encapsulation	Encapsulation method assigned to interface.	
loopback	Indicates whether or not loopback is set.	
keepalive	Indicates whether or not keepalives are set.	
ARP type:	Type of Address Resolution Protocol assigned.	
Phy-{A B}	Lists the state the Physical A or Physical B connection is in; one of: off, active, trace, connect, next, signal, join, verify, or break.	
neighbor	 State of the neighbor: A—Indicates that the CMT process has established a connection with its neighbor. The bits received during the CMT signaling process indicate that the neighbor is a Physical A type dual-attachment station or concentrator that attaches to the primary ring IN and the secondary ring OUT when attaching to the dual ring. S—Indicates that the CMT process has established a connection with its neighbor and that the bits received during the CMT signaling process indicate that the neighbor is one Physical type in a single-attached station (SAS). B—Indicates that the CMT process has established a connection with its neighbor and that the bits received during the CMT signaling process indicate that the neighbor is a Physical B dual-attached station or concentrator that attaches to the secondary ring IN and the primary ring OUT when attaching to the dual ring. M—Indicates that the CMT process has established a connection with its neighbor and that the bits received during the CMT signaling process indicate that the router's neighbor is a Physical M-type concentrator that serves as a Master to a connected station or concentrator. unk—Indicates that the network server has not completed the CMT process, and as a result, does not know about its neighbor. See the section "Setting Bit Control" for an explanation of the bit patterns. 	
cmt signal bits	Shows the transmitted/received CMT bits. The transmitted bits are 0x008 for a Physical A type and 0x20C for Physical B type. The number after the slash (/) is the received signal bits. If the connection is not active, the received bits are zero (0); see the line beginning Phy-B earlier in this display.	

status	Status value displayed is the actual status on the fiber. The FDDI standard defines the following values:
	LSU—Line State Unknown, the criteria for entering or
	remaining in any other line state have not been met.
	NLS—Noise Line State is entered upon the occurrence of 16
	potential noise events without satisfying the criteria for entry into another line state.
	 MLS—Master Line State is entered upon the reception of eight or nine consecutive HQ or QH symbol pairs.
	 ILS—Idle Line State is entered upon receipt of four or five idle symbols.
	 HLS—Halt Line State is entered upon the receipt of 16 or 17 consecutive H symbols.
	 QLS—Quiet Line State is entered upon the receipt of 16 or 17 consecutive Q symbols or when carrier detect goes low.
	 ALS—Active Line State is entered upon receipt of a JK symbol pair when carrier detect is high.
	 OVUF—Elasticity buffer Overflow/Underflow. The normal states for a connected Physical type are ILS or ALS. If the report
	displays the QLS status, this indicates that the fiber is
	disconnected from Physical B, or that it is not connected to
	another Physical type, or that the other station is not running.
Off	Indicates that the CMT is not running on the Physical Sublayer. The state will be off if the interface has been shutdown or if the cmt disconnect command has been issued for Physical A or Physical B.
Brk	Break State is the entry point in the start of a PCM connection.
Tra	Trace State localizes a stuck beacon condition.
Con	Connect State is used to synchronize the ends of the connection for the signaling sequence.
Nxt	Next State separates the signaling performed in the Signal State and transmits Protocol Data Units (PDUs) while MAC Local Loop is performed.
Sig	Signal State is entered from the Next State when a bit is ready to be transmitted.
Join	Join State is the first of three states in a unique sequence of transmitted symbol streams received as line states—the Halt Line State, Master Line State, and Idle Line State, or HLS-MLS-ILS—that leads to an active connection.
Vfy	Verify State is the second state in the path to the Active State and will not be reached by a connection that is not synchronized.
Act	Active State indicates that the CMT process has established communications with its physical neighbor. The transition states are defined in the X3T9.5 specification. You are

ECM is	ECM is the SMT entity coordination management, which overlooks the operation of CFM and PCM. The ECM state can be one of the following: • out—The router is isolated from the network. • in—The router is actively connected to the network. This is the normal state for a connected router. • trace—The router is trying to localize a stuck beacon condition. • leave—The router is allowing time for all the connections to break before leaving the network. • path_test—The router is testing its internal paths. • insert—The router is allowing time for the optical bypass to insert. • check—The router is making sure optical bypasses switched correctly. • deinsert—The router is allowing time for the optical bypass to deinsert.
CFM is	Contains information about the current state of the MAC connection. The Configuration Management (CFM) state can be one of the following: • isolated—The MAC is not attached to any Physical type. • _wrap_a—The MAC is attached to Physical A. Data is received on Physical A and transmitted on Physical A. • wrap b—The MAC is attached to Physical B. Data is received on Physical B and transmitted on Physical B. • wrap_s—The MAC is attached to Physical S. Data is received on Physical S and transmitted on Physical S. This is the normal mode for a single attachment station (SAS). • thru—The MAC is attached to Physical A and B. Data is received on Physical A and transmitted on Physical B. This is the normal mode for a dual attachment station (DAS) with one MAC. The ring has been operational for 1 minute and 42 seconds.
RMT is	RMT (Ring Management) is the SMT MAC-related state machine. The RMT state can be one of the following: • isolated—The MAC is not trying to participate in the ring. This is the initial state. • non_op—The MAC is participating in ring recovery and ring is not operational. • ring_op—The MAC is participating in an operational ring. This is the normal state while the MAC is connected to the ring. • detect—The ring has been nonoperational for longer than normal. Duplicate address conditions are being checked. • non_op_dup—Indications have been received that the address of the MAC is a duplicate of another MAC on the ring. Ring is not operational. • ring_op_dup—Indications have been received that the address of the MAC is a duplicate of another MAC on the ring. Ring is operational in this state. • directed—The MAC is sending beacon frames notifying the ring of the stuck condition. • trace—Trace has been initiated by this MAC and the RMT state machine is waiting for its completion before starting an internal path test.
token rotation	Token rotation value is the default or configured rotation value as determined by the fddi token rotation-time command. This value is used by all stations on the ring. The default is 5000 microseconds.

ring operational	When the ring is operational, the displayed value will be the negotiated token rotation time of all stations on the ring. Operational times are displayed by the number of hours:minutes:seconds the ring has been up. If the ring is not operational, the message "ring not operational" is displayed.
Upstream downstream neighbor	Displays the canonical MAC address of outgoing upstream and downstream neighbors. If the address is unknown, the value will be the FDDI unknown address (0x00 00 f8 00 00 00).
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Last clearing	Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2 ³¹ ms (and less than 2 ³² ms) ago.
Output queue, input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.
Five-minute input rate Five-minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes. The five-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
packets input	Total number of error-free packets received by the system.
bytes	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
	Number of packets that are discarded because they exceed the

CRC	Cyclic redundancy checksum generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data.	
frame	Number of packets received incorrectly that have a CRC error and a noninteger number of octets. On a LAN, this is usually the result of collisions or a malfunctioning Ethernet device. On an FDDI LAN, this also may be the result of a failing fiber (cracks) or a hardware malfunction.	
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.	
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be increased.	
packets output	Total number of messages transmitted by the system.	
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.	
underruns	Number of transmit aborts (when the router cannot feed the transmitter fast enough).	
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, because some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.	
collisions	Because an FDDI ring cannot have collisions, this statistic is always zero.	
interface resets	Number of times an interface has been reset. The interface may be reset by the administrator or automatically when an internal error occurs.	
restarts	Should always be zero for FDDI interfaces.	
transitions	The number of times the ring made a transition from ring operational to ring nonoperational, or vice versa. A large number of transitions indicates a problem with the ring or the interface.	
traces	Trace count applies to both the FCI, FCIT, and FIP. Indicates the number of times this interface started a trace.	
claims	Pertains to FCIT and FIP only. Indicates the number of times this interface has been in claim state.	
	Pertains to FCIT and FIP only. Indicates the number of times the interface has been in beacon state.	
beacons		
Protocol		
	interface has been in beacon state.	
Protocol	interface has been in beacon state. Protocol that is operating on the interface.	
Protocol Pkts In	interface has been in beacon state. Protocol that is operating on the interface. Number of packets received for that protocol.	

show interfaces hssi

Use the **show interfaces hssi** privileged EXEC command to display information about the HSSI interface.

```
show interfaces hssi unit [accounting]
show interfaces hssi [slot/port] [accounting] (for the Cisco 7000 series)
```

Syntax Description

unit Must match a port number on the selected interface.

accounting (Optional) Displays the number of packets of each protocol type that

have been sent through the interface.

slot (Optional) On the Cisco 7000 series, slot location of the interface

processor.

port (Optional) On the Cisco 7000 series, port number on interface.

Command Mode

Privileged EXEC

Sample Display

The following is sample output from the **show interfaces hssi** command when HSSI is enabled:

```
Router# show interfaces hssi 0
HSSI 0 is up, line protocol is up
Hardware is cBus HSSI
Internet address is 150.136.67.190, subnet mask is 255.255.255.0
MTU 4470 bytes, BW 45045 Kbit, DLY 20000 usec, rely 255/255, load 1/255
Encapsulation HDLC, loopback not set, keepalive set (10 sec)
Last input 0:00:03, output 0:00:00, output hang never
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
Five minute input rate 0 bits/sec, 0 packets/sec
Five 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 parity, 0 rx disabled
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
17 packets output, 994 bytes, 0 underruns
0 output errors, 0 applique, 4 interface resets, 0 restarts
2 carrier transitions
```

Table 6-24 describes significant fields shown in the display.

Table 6-24 Show Interfaces HSSI Field Descriptions

Field	Description	
HSSI is {up down}is administratively down	Indicates whether the interface hardware is currently active (whether carrier detect is present) and if it has been taken down by an administrator. "Disabled" indicates the router has received over 5000 errors in a keepalive interval, which is 10 seconds by default.	
line protocol is {up down administratively down}	Indicates whether the software processes that handle the line protocol considers the line usable (that is, whether keepalives are successful).	
Hardware	Specifies the hardware type.	
Internet address	Lists the Internet address followed by subnet mask.	
MTU	Maximum Transmission Unit of the interface.	
BW	Bandwidth of the interface in kilobits per second.	
DLY	Delay of the interface in microseconds.	
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.	
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.	
Encapsulation	Encapsulation method assigned to interface.	
loopback	Indicates whether loopback is set and type of loopback test.	
keepalive	Indicates whether keepalives are set or not.	
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.	
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.	
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.	
Last clearing	Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2 ³¹ ms (and less than 2 ³² ms) ago.	
Output queue, drops Input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.	
Five minute input rate, Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.	
packets input	Total number of error-free packets received by the system.	

Field	Description
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.
no buffers	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
parity	Report of the parity errors on the HSSI.
rx disabled	Indicates the HSSI could not find a free buffer on the ciscoBus controller to reserve for use for the HSSI receiver. When this happens, the HSSI shuts down its receiver and waits until a buffer is available. Data is not lost unless a packet comes in and overflows the HSSI FIFO. Usually, the receive disables are frequent but do not last for long, and the number of dropped packets is less than the count in the "rx disabled" field. A receive disabled condition can happen in systems that are under heavy traffic load and that have shorter packets. In this situation, the number of buffers available on the ciscoBus controller is at a premium. One way to alleviate this problem is to reduce the mtu on the HSSI interface from 4500 (FDDI size) to 1500 (Ethernet size). Doing so allows the software to take the fixed memory of the ciscoBus controller and divide it into a larger number of smaller buffers, rather than a small number of large buffers. Receive disables are not errors, so they are not included in any error counts.
input errors	Sum of all errors that prevented the receipt of datagrams on the interface being examined. This may not balance with the sum of the enumerated output errors, because some datagrams may have more than one error and others may have errors that do not fall into any of the specifically tabulated categories.
CRC	Cyclic redundancy checksum generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link. CRC errors are also reported when a far-end abort occurs, and when the idle flag pattern is corrupted. This makes it possible to get CRC errors even when there is no data traffic.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a serial line, this is usually the result of noise or other transmission problems.

Field	Description
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be increased.
abort	Number of packets whose receipt was aborted.
packets output	Total number of messages transmitted by the system.
bytes output	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the far-end transmitter has been running faster than the near-end router's receiver can handle. This may never happen (be reported) on some interfaces.
congestion drop	Number of messages discarded because the output queue on an interface grew too long. This can happen on a slow, congested serial link.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
applique	Indicates an unrecoverable error has occurred on the HSA applique. The system then invokes an interface reset.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds time. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.
restarts	Number of times the controller was restarted because of errors.
carrier transitions	Number of times the carrier detect signal of a serial interface has changed state. Indicates modem or line problems if the carrier detect line is changing state often.
Protocol	Protocol that is operating on the interface.
Pkts In	Number of packets received for that protocol.
Chars In	Number of characters received for that protocol.
Pkts Out	Number of packets transmitted for that protocol.
Chars Out	Number of characters transmitted for that protocol.

The following is an example of the **show interfaces hssi** command on a Cisco 7000:

Router# show in hssi 1/0

```
Hssi1/0 is up, line protocol is up
 Hardware is cxBus HSSI
 Internet address is 131.108.38.14, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 45045 Kbit, DLY 1000000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 0:00:00, output 0:00:08, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 1000 bits/sec, 2 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
     630573548 packets input, 2077237628 bytes, 0 no buffer
     Received 2832063 broadcasts, 0 runts, 0 giants
             0 parity, 1970 rx disabled
     113 input errors, 20 CRC, 93 frame, 0 overrun, 0 ignored, 0 abort
     629721628 packets output, 1934313295 bytes, 0 underruns
     O output errors, O applique, 62 interface resets, O restarts
     309 carrier transitions
```

The following is an example of the **show interfaces hssi** command with the **accounting** option on a Cisco 7000:

Router# show interfaces hssi 1/0 accounting

HIP1/0

Protocol	Pkts In	Chars In	Pkts Out	Chars Out
IP	7344	4787842	1803	1535774
Appletalk	33345	4797459	12781	1089695
DEC MOP	0	0	127	9779
ARP	7	420	39	2340

show interfaces lex

To display statistics about a LAN Extender interface, use the **show interface lex** EXEC command.

show interfaces lex *number* [ethernet | serial]

Syntax Description

number Number of the LAN Extender interface that resides on the core

router about which to display statistics.

ethernet (Optional) Displays statistics about the Ethernet interface that

resides on the LAN Extender chassis.

serial (Optional) Displays statistics about the serial interface that

resides on the LAN Extender chassis.

Command Mode

EXEC

Usage Guidelines

To display statistics about the LAN Extender interface on the core router, use the **show interfaces lex** command without any keywords.

Administratively, the physical serial interface that connects the core router to the LAN Extender is completely hidden. The **show interfaces serial** command will show only that the serial interface is present. However, it will not report any statistics about the traffic passing over the physical line. All statistics are report by the **show interfaces lex** command.

Sample Displays

The following is sample output from the **show interfaces lex** command, showing the LAN Extender interface on the host router. Note the "Bound to ..." field, which is displayed only on a LAN Extender interface.

```
Router# show interfaces lex 0
```

```
Lex0 is up, line protocol is up
  Hardware is Lan Extender, address is 0204.0301.1526 (bia 0000.0000.0000)
  MTU 1500 bytes, BW 10000 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 4:00:00
  Bound to Serial3
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 1000 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
     1022 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     2070 packets output, 23663 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets, 0 restarts
```

The following is sample output from the **show interfaces lex** command when you specify the **ethernet** keyword:

Router# show interfaces lex 0 ethernet

```
Lex0-Ethernet0 is up, line protocol is up

Hardware is LAN-Extender, address is 0000.0c01.1526 (bia 0000.0c01.1526)

Last input 6w3d, output 6w3d

Last clearing of "show interface" counters 0:02:30

Output queue 40/50, 60 drops; input queue 10/40, 2 drops

Five minute input rate 0 bits/sec, 0 packets/sec

Five minute output rate 0 bits/sec, 0 packets/sec

3916 packets input, 960303 bytes, 3 no buffer

Received 2 broadcasts, 3 runts, 3 giants

2 input errors, 1 CRC, 1 frame, 1 overrun, 3 ignored, 2 abort

2500 packets output, 128288 bytes, 1 underruns

1 output errors, 1 collisions, 0 interface resets, 0 restarts
```

The following is sample output from the **show interfaces lex** command when you specify the **serial** keyword:

Router# show interfaces lex 0 serial

```
Lex0-SerialO is up, line protocol is up

Hardware is LAN-Extender

Last input 6w3d, output 6w3d

Last clearing of "show interface" counters 0:03:05

Input queue: 5/15/4 (size/max/drops); Total output drops: 450

Output queue: high 25/35/90, medium 70/80/180, normal 40/50/120, low 10/20/60

Five minute input rate 0 bits/sec, 0 packets/sec

Five minute output rate 0 bits/sec, 0 packets/sec

1939 packets input, 30998 bytes, 6 no buffer

Received 4 broadcasts, 6 runts, 6 giants

4 input errors, 2 CRC, 2 frame, 2 overrun, 6 ignored, 4 abort

1939 packets output, 219535 bytes, 2 underruns

2 output errors, 2 collisions, 0 interface resets, 0 restarts

2 carrier transitions
```

Table 6-25 describes the fields shown in these displays.

Table 6-25 Show Interfaces Lex Field Descriptions

Field	Description
Lex0 is up, line protocol is up	Indicates whether the logical LAN Extender interface on the core router is currently active (that is, whether carrier detect is present) and whether it has been taken down by an administrator.
Lex0-Ethernet0 is up, line protocol is up Lex0-Serial0 is up, line protocol is up	Indicates whether the physical Ethernet and serial interfaces on the LAN Extender chassis are currently active (that is, whether carrier detect is present) and if it has been taken down by an administrator.
Hardware is LAN-Extender	Hardware type of the interfaces on the LAN Extender.
address is	Logical MAC address of the interface.
bia	Burned-in MAC address of the interface. The LAN Extender interface does not have a burned in address; hence it appears as all zeroes.
MTU	Maximum transmission unit size of the interface.

Field	Description	
BW	Value of the bandwidth parameter that has been configured for the interface (in kilobits per second). The bandwidth parameter is used to compute IGRP metrics only. If the interface is attached to a serial line with a line speed that does not match the default (1536 or 1544 for T1 and 56 for a standard synchronous serial line), use the bandwidth command to specify the correct line speed for this serial line.	
DLY	Delay of the interface in microseconds.	
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.	
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.	
Encapsulation	Encapsulation method assigned to interface.	
ARP type	Type of Address Resolution Protocol assigned.	
ARP Timeout	Number of hours, minutes, and seconds an ARP cache entry will stay in the cache.	
Bound to	Number of the serial interface to which the logical LAN Extender interface is bound.	
Last input	Number of hours, minutes, and seconds (or never) since the last packet was successfully received by an interface. This is useful for knowing when a dead interface failed.	
Last output	Number of hours, minutes, and seconds (or never) since the last packet was successfully transmitted by an interface.	
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.	
Last clearing of "show interface" counters	Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared.	
	*** indicates the elapsed time is too large to be displayed.	
	0:00:00 indicates the counters were cleared more than 231ms (and less than 232ms) ago	
Output queue, drops input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.	
Five minute input rate Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.	
	The 5-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.	
packets input	Total number of error-free packets received by the system.	
bytes	Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.	

Field	Description	
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.	
Received broadcasts	Total number of broadcast or multicast packets received by the interface.	
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.	
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.	
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so that this sum might not balance with the other counts.	
CRC	Cyclic redundancy checksum generated by the originating station or far-end device does not match the checksum calculated from the data received. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link.	
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a serial line, this is usually the result of noise or other transmission problems.	
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.	
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. Broadcast storms and bursts of noise can cause the ignored count to be increased.	
abort	Illegal sequence of one bits on a serial interface. This usually indicates a clocking problem between the serial interface and the data link equipment.	
input packets with dribble condition detected	Does not apply to a LAN Extender interface.	
packets output	Total number of messages transmitted by the system.	
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.	
underruns	Number of times that the transmitter has been running faster than the router can handle. This might never be reported on some interfaces.	
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this might not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.	

Field	Description
collisions	Number of messages retransmitted due to an Ethernet collision. This usually is the result of an overextended LAN (Ethernet or transceiver cable too long, more than two repeaters between stations, or too many cascaded multiport transceivers). Some collisions are normal. However, if your collision rate climbs to around 4 or 5%, you should consider verifying that there is no faulty equipment on the segment and/or moving some existing stations to a new segment. A packet that collides is counted only once in output packets.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds' time. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.
restarts	Number of times the controller was restarted because of errors.

show interfaces loopback

Use the **show interfaces loopback** privileged EXEC command to display information about the loopback interface.

show interfaces loopback [unit] [accounting]

Syntax Description

unit (Optional) Must match a port number on the selected interface.

accounting (Optional) Displays the number of packets of each protocol type

that have been sent through the interface.

Command Mode

Privileged EXEC

Sample Displays

The following is sample output from the **show interfaces loopback** command:

```
Router# show int loop 0

Loopback0 is up, line protocol is up

Hardware is Loopback

MTU 1500 bytes, BW 1 Kbit, DLY 50 usec, rely 255/255, load 1/255

Encapsulation UNKNOWN, loopback not set, keepalive set (10 sec)

Last input never, output never, output hang never

Last clearing of "show interface" counters never

Output queue 0/0, 0 drops; input queue 0/75, 0 drops

Five minute input rate 0 bits/sec, 0 packets/sec

Five minute output rate 0 bits/sec, 0 packets/sec

O packets input, 0 bytes, 0 no buffer

Received 0 broadcasts, 0 runts, 0 giants

O input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort

O packets output, 0 bytes, 0 underruns

O output errors, 0 collisions, 0 interface resets, 0 restarts
```

The following is sample output when the **accounting** keyword is included:

```
Router# show int loop 0 acc

Loopback0

Protocol Pkts In Chars In Pkts Out Chars Out
No traffic sent or received on this interface.
Router#
```

Table 6-26 describes significant fields shown in the displays.

Table 6-26 Show Interfaces Loopback Descriptions

Field	Description
Loopback is {up down}is administratively down	Indicates whether the interface hardware is currently active (whether carrier detect is present) and if it has been taken down by an administrator. "Disabled" indicates the router has received over 5000 errors in a keepalive interval, which is 10 seconds by default.
line protocol is {up down administratively down}	Indicates whether the software processes that handle the line protocol considers the line usable (that is, whether keepalives are successful).
Hardware	Hardware is Loopback.
MTU	Maximum Transmission Unit of the interface.
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.
Encapsulation	Encapsulation method assigned to interface.
loopback	Indicates whether loopback is set and type of loopback test.
keepalive	Indicates whether keepalives are set or not.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Last clearing	Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2 ³¹ ms (and less than 2 ³² ms) ago.
Output queue, drops Input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.
Five minute input rate, Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.

Field	Description
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
input errors	Sum of all errors that prevented the receipt of datagrams on the interface being examined. This may not balance with the sum of the enumerated output errors, because some datagrams may have more than one error and others may have errors that do not fall into any of the specifically tabulated categories.
CRC	Cyclic redundancy checksum generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link. CRC errors are also reported when a far-end abort occurs, and when the idle flag pattern is corrupted. This makes it possible to get CRC errors even when there is no data traffic.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a serial line, this is usually the result of noise or other transmission problems.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be increased.
abort	Number of packets whose receipt was aborted.
packets output	Total number of messages transmitted by the system.
bytes output	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the far-end transmitter has been running faster than the near-end router's receiver can handle. This may never happen (be reported) on some interfaces.

Field	Description
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
collisions	A loopback interface does not have collisions.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds time. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.
restarts	Number of times the controller was restarted because of errors.
Protocol	Protocol that is operating on the interface.
Pkts In	Number of packets received for that protocol.
Chars In	Number of characters received for that protocol.
Pkts Out	Number of packets transmitted for that protocol.
Chars Out	Number of characters transmitted for that protocol.

show interfaces pcbus

To display information about an ISA bus interface, use the **show interfaces pcbus** privileged EXEC command.

show interfaces pcbus *number* [accounting | stats]

Syntax Description

number Number of the interface port.

accounting (Optional) Displays the number of packets of each protocol

type that have been sent through the interface.

stats (Optional) Displays packets sent and received.

Command Mode

Privileged EXEC

Usage Guidelines

This command is valid on LanOptics' Branchcard or Stacknet 2000 products only.

Sample Display

The following is sample output from the **show pcbus** command:

```
Router# show interfaces pcbus 0
PCbus0 is up, line protocol is up
  Hardware is ISA PCbus shared RAM
  Internet address is 198.135.1.43, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 0:00:00, output never, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
     135 packets input, 2918 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     135 packets output, 3776 bytes, 0 underruns
     O output errors, O collisions, O interface resets, O restarts
     0 carrier transitions
```

show interfaces serial

Use the **show interfaces serial** privileged EXEC command to display information about a serial interface.

```
show interfaces serial [number] [accounting]
show interfaces serial [slot/port] [accounting]
                                                            (for the Cisco 7000 series)
```

Syntax Description

number (Optional) Must match the interface port number.

accounting (Optional) Displays the number of packets of each protocol type that have

been sent through the interface.

slot (Optional) On the Cisco 7000 series, slot location of the interface

processor.

port (Optional) On the Cisco 7000 series, port number on interface.

Command Mode

Privileged EXEC

Sample Display

The following is sample output from the **show interfaces** command for a synchronous serial interface:

```
Router# show interfaces serial
```

```
Serial 0 is up, line protocol is up
  Hardware is MCI Serial
  Internet address is 150.136.190.203, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 0:00:07, output 0:00:00, output hang never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
       16263 packets input, 1347238 bytes, 0 no buffer
      Received 13983 broadcasts, 0 runts, 0 giants
       2 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 2 abort
1 carrier transitions
     22146 packets output, 2383680 bytes, 0 underruns
     O output errors, O collisions, 2 interface resets, O restarts
```

Table 6-27 describes significant fields shown in the display.

Table 6-27 Show Interfaces Serial Field Descriptions

Field	Description
Serial is {up down}is administratively down	Indicates whether the interface hardware is currently active (whether carrier detect is present) and if it has been taken down by an administrator. "Disabled" indicates the router has received over 5000 errors in a keepalive interval, which is 10 seconds by default.
line protocol is {up down}	Indicates whether the software processes that handle the line protocol consider the line usable (that is, whether keepalives are successful) or if it has been taken down by an administrator.
Hardware is	Specifies the hardware type.
Internet address is	Specifies the Internet address and subnet mask.
MTU	Maximum Transmission Unit of the interface.
BW 1544 Kbit	Indicates the value of the bandwidth parameter that has been configured for the interface (in kilobits per second). The bandwidth parameter is used to compute IGRP metrics only. If the interface is attached to a serial line with a line speed that does not match the default (1536 or 1544 for T1 and 56 for a standard synchronous serial line), use the bandwidth command to specify the correct line speed for this serial line.
DLY	Delay of the interface in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.
Encapsulation	Encapsulation method assigned to interface.
loopback	Indicates whether loopback is set or not.
keepalive	Indicates whether keepalives are set or not.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Output queue, drops	Number of packets in output and input queues. Each number is
input queue, drops	followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.
Five minute input rate Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.
	The 5-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
packets input	Total number of error-free packets received by the system.

Field	Description
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.
no buffers	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
Received broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
input error	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so that this sum may not balance with the other counts.
CRC	Cyclic redundancy checksum generated by the originating station or far-end device does not match the checksum calculated from the data received. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a serial line, this is usually the result of noise or other transmission problems.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. Broadcast storms and bursts of noise can cause the ignored count to be increased.
abort	Illegal sequence of one bits on a serial interface. This usually indicates a clocking problem between the serial interface and the data link equipment.
packets output	Total number of messages transmitted by the system.
bytes output	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the transmitter has been running faster than the router can handle. This may never be reported on some interfaces.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
collisions	Number of messages retransmitted due to an Ethernet collision. This usually is the result of an overextended LAN (Ethernet or transceiver cable too long, more than two repeaters between stations, or too many cascaded multiport transceivers). Some collisions are normal. However, if your collision rate climbs to around 4 or 5%, you should consider verifying that there is no faulty equipment on the segment and/or moving some existing stations to a new segment. A packet that collides is counted only once in output packets.

Field	Description
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds' time. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.
restarts	Number of times the controller was restarted because of errors.
carrier transitions	Number of times the carrier detect signal of a serial interface has changed state. For example, if data carrier detect (DCD) goes down and comes up, the carrier transition counter will increment two times. Indicates modem or line problems if the carrier detect line is changing state often.
alarm indications, remote alarms, rx LOF, rx LOS	Number of CSU/DSU alarms, and number of occurrences of receive loss of frame and receive loss of signal.
BER inactive, NELR inactive, FELR inactive	Status of G.703-E1 counters for bit error rate (BER) alarm, near-end loop remote (NELR), and far-end loop remote (FELR). Note that you cannot set the NELR or FELR.

The following is sample output of the **show interfaces serial** command for the HDLC synchronous serial interface on a Cisco 7000:

Router# show interfaces serial 1/0

```
Serial1/0 is up, line protocol is up
  Hardware is cxBus Serial
  Internet address is 150.136.190.203, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 0:00:07, output 0:00:00, output hang never
  Last clearing of "show interface" counters 2w4d
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
     16263 packets input, 1347238 bytes, 0 no buffer
     Received 13983 broadcasts, 0 runts, 0 giants
     2 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 2 abort
     22146 packets output, 2383680 bytes, 0 underruns
     O output errors, O collisions, 2 interface resets, O restarts
     1 carrier transitions
```

The following is sample output of the **show interfaces serial** command for a G.703 interface on which framing is enabled:

```
Router# show interfaces serial 2/3
Serial2/3 is up, line protocol is up
  Hardware is cxBus Serial
  Internet address is 5.4.4.1, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
  Last input 0:00:21, output 0:00:21, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
     53 packets input, 7810 bytes, 0 no buffer
     Received 53 broadcasts, 0 runts, 0 giants
     2 input errors, 2 CRC, 0 frame, 0 overrun, 0 ignored, 2 abort
     56 packets output, 8218 bytes, 0 underruns
     O output errors, O collisions, 2 interface resets, O restarts
     1 carrier transitions
     2 alarm indications, 333 remote alarms, 332 rx LOF, 0 rx LOS
     RTS up, CTS up, DTR up, DCD up, DSR up
     BER inactive, NELR inactive, FELR inactive
```

Table 6-27 describes significant fields shown in the display.

Sample Display with Frame Relay Encapsulation

When using the Frame Relay encapsulation, use the **show interfaces** command to display information on the multicast DLCI, the DLCI of the interface, and the LMI DLCI used for the local management interface.

The multicast DLCI and the local DLCI can be set using the **frame-relay multicast-dlci** and the frame-relay local-dlci configuration commands, or provided through the local management interface. The status information is taken from the LMI, when active.

The following is sample output from the show interfaces serial command when using Frame Relay encapsulation:

Router# show interfaces serial

```
Serial 2 is up, line protocol is up
  Hardware type is MCI Serial
  Internet address is 131.108.122.1, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation FRAME-RELAY, loopback not set, keepalive set (10 sec)
  multicast DLCI 1022, status defined, active
  source DLCI 20, status defined, active
  LMI DLCI 1023, LMI sent 10, LMI stat recvd 10, LMI upd recvd 2
  Last input 7:21:29, output 0:00:37, output hang never
  Output queue 0/100, 0 drops; input queue 0/75, 0 drops
   Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
      47 packets input, 2656 bytes, 0 no buffer
      Received 5 broadcasts, 0 runts, 0 giants
       5 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 57 abort
      518 packets output, 391205 bytes
      O output errors, O collisions, O interface resets, O restarts
       1 carrier transitions
```

In this display, the multicast DLCI has been changed to 1022 with the **frame-relay multicast-dlci** interface configuration command.

The display shows the statistics for the LMI are the number of status inquiry messages sent (LMI sent), the number of status messages received (LMI recvd), and the number of status updates received (upd recvd). See the *Frame Relay Interface* specification for additional explanations of this output.

Sample Display with ANSI LMI

For a serial interface with the ANSI LMI enabled, use the **show interfaces** command to determine the LMI type implemented.

The following is a sample display from the **show interfaces** output for a serial interface with the ANSI LMI enabled:

```
Router# show interfaces serial
```

```
Serial 1 is up, line protocol is up
  Hardware is MCI Serial
  Internet address is 131.108.121.1, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation FRAME-RELAY, loopback not set, keepalive set
  LMI DLCI 0, LMI sent 10, LMI stat recvd 10
  LMI type is ANSI Annex D
  Last input 0:00:00, output 0:00:00, output hang never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 1 packets/sec
  Five minute output rate 1000 bits/sec, 1 packets/sec
      261 packets input, 13212 bytes, 0 no buffer
      Received 33 broadcasts, 0 runts, 0 giants
       0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
       238 packets output, 14751 bytes, 0 underruns
       O output errors, O collisions, O interface resets, O restarts
```

Notice that the **show interfaces** output for a serial interface with ANSI LMI shown in this display is very similar to that for encapsulation set to Frame Relay, as shown in the previous display. Table 6-28 describes the few differences that exist.

Table 6-28 Show Interfaces Serial Field Description with ANSI LMI

Field	Description
LMI DLCI 0	Identifies the DLCI used by the LMI for this interface. Default: 1023.
LMI sent 10	Number of LMI packets the router sent.
LMI type is ANSI Annex D	Indicates that the interface is configured for the ANSI-adopted Frame Relay specification T1.617 Annex D.

Sample Display with LAPB Encapsulation

Use the **show interfaces** command to display operation statistics for an interface using LAPB encapsulation.

The following is sample output from the show interfaces command for a serial interface using LAPB encapsulation:

```
Router# show interfaces
```

```
LAPB state is DISCONNECT, T1 3000, N1 12000, N2 20, K7, TH 3000
Window is closed
IFRAMES 12/28 RNRS 0/1 REJS 13/1 SABMS 1/13 FRMRS 3/0 DISCS 0/11
```

Table 6-29 shows the fields relevant to all LAPB connections.

Table 6-29 Show Interfaces Serial Field Descriptions when LAPB Is Enabled

Parameter	Description
LAPB state is DISCONNECT	State of the LAPB protocol.
T1 3000, N1 12000,	Current parameter settings.
Window is closed	Indicates that no more frames can be transmitted until some outstanding frames have been acknowledged.
IFRAMEs 12/28 RNRs 0/1	Count of the different types of frames in the form of sent/received.

Show Interfaces Serial with PPP

An interface configured for synchronous PPP encapsulation differs from the standard show interface serial output. An interface configured for PPP might include the following information.

```
lcp state = OPEN
```

Table 6-30 show the fields relevant to PPP connections.

Table 6-30 Show Interfaces Serial Field Descriptions with PPP Encapsulation

Description
Link Control Protocol
Network Control Protocol Internet Protocol Control Protocol
Network Control Protocol OSI (CLNS) Control Protocol
Network Control Protocol IPX (Novell) Control Protocol
Network Control Protocol XNS Control Protocol
Network Control Protocol VINES Control Protocol
Network Control Protocol DECnet Control Protocol
Network Control Protocol Bridging Control Protocol
Network Control Protocol AppleTalk Control Protocol

Sample Display with SDLC Connections

Use the **show interfaces** command to display the SDLC information for a given SDLC interface. The following is sample output from the **show interfaces** command for an SDLC primary interface supporting the SDLLC function.

```
Router# show interfaces
Serial 0 is up, line protocol is up
Hardware is MCI Serial
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
Encapsulation SDLC-PRIMARY, loopback not set
   Timers (msec): poll pause 100 fair poll 500. Poll limit 1 \,
    [T1 3000, N1 12016, N2 20, K 7] timer: 56608 Last polled device: none
   SDLLC [ma: 0000.0C01.14--, ring: 7 bridge: 1, target ring: 10
            largest token ring frame 2052]
SDLC addr C1 state is CONNECT
     VS 6, VR 3, RCNT 0, Remote VR 6, Current retransmit count 0
     Hold queue: 0/12 IFRAMEs 77/22 RNRs 0/0 SNRMs 1/0 DISCs 0/0
     Poll: clear, Poll count: 0, chain: p: C1 n: C1
     SDLLC [largest SDLC frame: 265, XID: disabled]
 Last input 00:00:02, output 00:00:01, output hang never
 Output queue 0/40, 0 drops; input queue 0/75, 0 drops
 Five minute input rate 517 bits/sec, 30 packets/sec
 Five minute output rate 672 bits/sec, 20 packets/sec
     357 packets input, 28382 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     926 packets output, 77274 bytes, 0 underruns
     O output errors, O collisions, O interface resets, O restarts
     2 carrier transitions
```

Table 6-31 shows the fields relevant to all SDLC connections.

Table 6-31 Show Interfaces Serial Field Descriptions when SDLC Is Enabled

Parameter	Description
Timers (msec): poll pause, fair poll, Poll limit	Current values of these timers, as described in the configuration section, for this interface.
T1, N1, N2, K	Values for these parameters, as described in the configuration section, for this interface.

Table 6-32 shows other data given for each SDLC secondary configured to be attached to this interface.

Table 6-32 SDLC Secondary Descriptions

SDLC Secondary	Description
addr	Address of this secondary.
state is	Current state of this connection, which is one of the following:
DISCONNECT	No communication is being attempted to this secondary.
CONNECT	A normal connect state exists between this router and this secondary.
DISCSENT	This router has sent a disconnect request to this secondary and is awaiting its response.
SNRMSENT	This router has sent a connect request (SNRM) to this secondary and is awaiting its response.
THEMBUSY	This secondary has told this router that it is temporarily unable to receive any more information frames.
USBUSY	This router has told this secondary that it is temporarily unable to receive any more information frames.
BOTHBUSY	Both sides have told each other that they are temporarily unable to receive any more information frames.
ERROR	This router has detected an error and is waiting for a response from the secondary acknowledging this.
VS	Sequence number of the next information frame this station sends.
VR	Sequence number of the next information frame from this secondary that this station expects to receive.
Remote VR	Last frame transmitted by this station that has been acknowledged by the other station.
Current retransmit count:	Number of times the current I-frame or sequence of I-frames has been retransmitted.
Hold Queue	Number of frames in hold queue/Maximum size of hold queue.
IFRAMEs, RNRs, SNRMs, DISCs	Sent/received count for these frames.
Poll	"Set" if this router has a poll outstanding to the secondary; "clear" if it does not.
Poll Count	Number of polls in a row that have been given to this secondary at this time.
Chain	Shows the previous (p) and next (n) secondary address on this interface in the <i>round robin loop</i> of polled devices.

Sample Display with SDLLC

Use the **show interfaces serial** command to display the SDLLC statistics for SDLLC configured interfaces.

The following is sample output from the **show interfaces serial** command for an a serial interface configured for SDLLC:

```
Router# show interfaces serial
```

```
Serial 0 is up, line protocol is up
  Hardware is MCI Serial
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation SDLC-PRIMARY, loopback not set
      Timers (msec): poll pause 100 fair poll 500. Poll limit 1
       [T1 3000, N1 12016, N2 20, K 7] timer: 56608 Last polled device: none
      SDLLC [ma: 0000.0C01.14--, ring: 7 bridge: 1, target ring: 10
            largest token ring frame 2052]
  SDLC addr C1 state is CONNECT
      VS 6, VR 3, RCNT 0, Remote VR 6, Current retransmit count 0
      Hold queue: 0/12 IFRAMEs 77/22 RNRs 0/0 SNRMs 1/0 DISCs 0/0
      Poll: clear, Poll count: 0, chain: p: C1 n: C1
      SDLLC [largest SDLC frame: 265, XID: disabled]
  Last input 00:00:02, output 00:00:01, output hang never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 517 bits/sec, 30 packets/sec
  Five minute output rate 672 bits/sec, 20 packets/sec
      357 packets input, 28382 bytes, 0 no buffer
      Received 0 broadcasts, 0 runts, 0 giants
      0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
      926 packets output, 77274 bytes, 0 underruns
       O output errors, O collisions, O interface resets, O restarts
       6608 Last polled device: none
       SDLLC [ma: 0000.0C01.14--, ring: 7 brid2 carrier transitions
```

Most of the output shown in the display is generic to all SDLC encapsulated interfaces and is described in the "LLC2 and SDLC Commands" chapter. Table 6-33 shows the parameters specific to SDLLC.

Table 6-33 SDLLC Parameters

Parameter	Description
SDLLC ma	Lists the MAC address configured for this interface. The last byte is shown as "" to indicate that it is filled in with the SDLC address of the connection.
ring, bridge, target ring	Lists the parameters as configured by the sdllc traddr command.
largest token ring frame	Shows the largest Token Ring frame that is accepted on the LLC2 side of the connection.
largest SDLC frame	Shows the largest SDLC frame that is accepted and will be generated on the SDLC side of the connection.
XID	Enabled or disabled: Shows whether XID processing is enabled on the SDLC side of the connection. If enabled, it will show the XID value for this address.

Sample Display with Accounting Option

The following example illustrates the **show interfaces serial** command with the **accounting** option on a Cisco 7000:

Router# show interfaces serial 1/0 accounting

S	erial1/0				
	Protocol	Pkts In	Chars In	Pkts Out	Chars Out
	IP	7344	4787842	1803	1535774
	Appletalk	33345	4797459	12781	1089695
	DEC MOP	0	0	127	9779
	ARP	7	420	39	2340

show interfaces tokenring

Use the **show interfaces tokenring** privileged EXEC command to display information about the Token Ring interface and the state of source route bridging.

Syntax Description

unit Must match the interface port line number.

accounting (Optional) Displays the number of packets of each protocol type

that have been sent through the interface.

slot On the Cisco 7000 series, optional slot location of the interface

processor. On the 7000, value can be 0, 1, 2, 3, or 4. On the 7010,

value can be 0, 1, or 2.

port On the Cisco 7000 series, optional port number on interface.

Value can be 0, 1, 2, or 3.

Command Mode

Privileged EXEC

Usage Guidelines

If you do not provide values for the parameters *slot* and *port*, the command will display statistics for all the network interfaces. The optional keyword **accounting** displays the number of packets of each protocol type that have been sent through the interface.

Sample Display

The following is sample output from the **show interfaces tokenring** command:

```
Router# show interfaces tokenring
```

```
TokenRing 0 is up, line protocol is up
Hardware is 16/4 Token Ring, address is 5500.2000.dc27 (bia 0000.3000.072b)
  Internet address is 150.136.230.203, subnet mask is 255.255.255.0
  MTU 8136 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
  ARP type: SNAP, ARP Timeout 4:00:00
  Ring speed: 16 Mbps
  Single ring node, Source Route Bridge capable
  Group Address: 0x00000000, Functional Address: 0x60840000
  Last input 0:00:01, output 0:00:01, output hang never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
  16339 packets input, 1496515 bytes, 0 no buffer
       Received 9895 broadcasts, 0 runts, 0 giants
        0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     32648 packets output, 9738303 bytes, 0 underruns
O output errors, O collisions, 2 interface resets, O restarts
     5 transitions
```

Table 6-34 describes significant fields shown in the display.

Table 6-34 Show Interfaces Tokenring Field Descriptions

Field	Description		
Token Ring is up down	Interface is either currently active and inserted into ring (up) or inactive and not inserted (down).		
	On the Cisco 7000 series, gives the interface processor type, slot number, and port number.		
	"Disabled" indicates the router has received over 5000 errors in a keepalive interval, which is 10 seconds by default.		
Token Ring is Reset	Hardware error has occurred.		
Token Ring is Initializing	Hardware is up, in the process of inserting the ring.		
Token Ring is Administratively Down	Hardware has been taken down by an administrator.		
line protocol is {up down administratively down}	Indicates whether the software processes that handle the line protocol believe the interface is usable (that is, whether keepalives are successful).		
Hardware	Hardware type. "Hardware is Token Ring" indicates that the board is a CSC-R board. "Hardware is 16/4 Token Ring" indicates that the board is a CSC-R16 board. Also shows the address of the interface.		
Internet address	Lists the Internet address followed by subnet mask.		
MTU	Maximum Transmission Unit of the interface.		
BW Bandwidth of the interface in kilobits per second.			
DLY	Delay of the interface in microseconds.		
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.		

Field	Description		
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.		
Encapsulation Encapsulation method assigned to interface.			
loopback	Indicates whether loopback is set or not.		
keepalive	Indicates whether keepalives are set or not.		
ARP type:	Type of Address Resolution Protocol assigned.		
Ring speed:	Speed of Token Ring—4 or 16 Mbps.		
{Single ring/multiring node}	Indicates whether a node is enabled to collect and use source routing information (RIF) for routable Token Ring protocols.		
Group Address:	Interface's group address, if any. The group address is a multicast address; any number of interfaces on the ring may share the same group address. Each interface may have at most one group address.		
Last input Number of hours, minutes, and seconds since the last was successfully received by an interface. Useful for lawhen a dead interface failed.			
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.		
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.		
Last clearing Time at which the counters that measure cumulative state (such as number of bytes transmitted and received) should this report were last reset to zero. Note that variables the might affect routing (for example, load and reliability) and cleared when the counters are cleared. *** indicates the elapsed time is too large to be display 0:00:00 indicates the counters were cleared more than 2 (and less than 2 ³² ms) ago.			
Output queue, drops Input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.		
Five minute input rate, Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.		
	The 5-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.		
packets input	Total number of error-free packets received by the system.		
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.		

Field	Description
no buffers	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
CRC	Cyclic redundancy checksum generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of a station transmitting bad data.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be increased.
packets output	Total number of messages transmitted by the system.
bytes output	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the far-end transmitter has been running faster than the near-end router's receiver can handle. This may never be reported on some interfaces.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
collisions	Since a Token Ring cannot have collisions, this statistic is nonzero only if an unusual event occurred when frames were being queued or dequeued by the system software.
interface resets	Number of times an interface has been reset. The interface may be reset by the administrator or automatically when an internal error occurs.
Restarts	Should always be zero for Token Ring interfaces.
transitions	Number of times the ring made a transition from up to down, or vice versa. A large number of transitions indicates a problem with the ring or the interface.

The following is sample output from the **show interfaces tokenring** command on a Cisco 7000:

Router# show interfaces tokenring 2/0

```
TokenRing2/0 is administratively down, line protocol is down
  Hardware is cxBus Token Ring, address is 0000.3040.8b4a (bia 0000.3040.8b4a)
  MTU 8136 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
  ARP type: SNAP, ARP Timeout 4:00:00
  Ring speed: 0 Mbps
  Single ring node, Source Route Transparent Bridge capable
  Ethernet Transit OUI: 0x0000F8
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five 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 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     O output errors, O collisions, 1 interface resets, O restarts
     1 transitions
```

The following example on the Cisco 70000 includes the **accounting** option. When you use the accounting option, only the accounting statistics are displayed.

Router# show interfaces tokenring 2/0 accounting

TokenRing2/0				
Protocol	Pkts In	Chars In	Pkts Out	Chars Out
IP	7344	4787842	1803	1535774
Appletalk	33345	4797459	12781	1089695
DEC MOP	0	0	127	9779
ARP	7	420	39	2340

show interfaces tunnel

To list tunnel interface information, use the **show interfaces tunnel** privileged EXEC command.

show interfaces tunnel unit [accounting]

Syntax Description

unit Must match the interface port line number.

accounting (Optional) Displays the number of packets of each protocol

type that have been sent through the interface.

Command Mode

EXEC

Sample Display

The following is sample output from the **show interface tunnel** command:

```
Router# show interfaces tunnel 4
```

```
Tunnel4 is up, line protocol is down
  Hardware is Routing Tunnel
  MTU 1500 bytes, BW 9 Kbit, DLY 500000 usec, rely 255/255, load 1/255
  Encapsulation TUNNEL, loopback not set, keepalive set (10 sec)
  Tunnel source 0.0.0.0, destination 0.0.0.0
  Tunnel protocol/transport GRE/IP, key disabled, sequencing disabled
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/0, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five 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 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     O output errors, O collisions, O interface resets, O restarts
```

Table 6-35 describes significant fields shown in the display.

Table 6-35 Show Interfaces Tunnel Field Descriptions

Field	Description			
Tunnel is up down	Interface is currently active and inserted into ring (up) or inactive and not inserted (down).			
	On the Cisco 7000 series, gives the interface processor type, slot number, and port number.			
line protocol is {up down administratively down}	Shows line protocol up if a valid route is available to the tunnel destination. Shows line protocol down if no route is available, or if the route would be recursive.			
Hardware	Specifies the hardware type.			
MTU	Maximum Transmission Unit of the interface.			
BW	Bandwidth of the interface in kilobits per second.			

Field	Description		
DLY	Delay of the interface in microseconds.		
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.		
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.		
Encapsulation	Encapsulation method is always TUNNEL for tunnels.		
loopback	Indicates whether loopback is set or not.		
keepalive	Indicates whether keepalives are set or not.		
Tunnel source	IP address used as the source address for packets in the tunnel.		
destination	IP address of the host destination.		
Tunnel protocol	Tunnel transport protocol (the protocol the tunnel is using). This is based on the tunnel mode command, which defaults to GRE.		
key	ID key for the tunnel interface, unless disabled.		
sequencing	Indicates whether the tunnel interface drops datagrams that arrive out of order. Can be disabled.		
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.		
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.		
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.		
Last clearing	Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2 ³¹ ms (and less than 2 ³² ms) ago.		
Output queue, drops Input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.		
Five minute input rate, Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.		
	The 5-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.		
packets input	Total number of error-free packets received by the system.		
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.		

Field	Description		
no buffers	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.		
broadcasts	Total number of broadcast or multicast packets received by the interface.		
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.		
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.		
CRC	Cyclic redundancy checksum generated by the originating LA station or far-end device does not match the checksum calculat from the data received. On a LAN, this usually indicates noise transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of a station transmitting bad data.		
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets.		
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.		
Number of received packets ignored by the interface become interface hardware ran low on internal buffers. These but different than the system buffers mentioned previously in buffer description. Broadcast storms and bursts of noise of the ignored count to be increased.			
abort	Illegal sequence of one bits on a serial interface. This usually indicates a clocking problem between the serial interface and the data link equipment.		
packets output	Total number of messages transmitted by the system.		
bytes output	Total number of bytes, including data and MAC encapsulation, transmitted by the system.		
underruns	Number of times that the far-end transmitter has been running faster than the near-end router's receiver can handle. This may never be reported on some interfaces.		
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.		

Field	Description
collisions	Number of messages retransmitted due to an Ethernet collision. This usually is the result of an overextended LAN (Ethernet or transceiver cable too long, more than two repeaters between stations, or too many cascaded multiport transceivers). Some collisions are normal. However, if your collision rate climbs to around 4 or 5%, you should consider verifying that there is no faulty equipment on the segment and/or moving some existing stations to a new segment. A packet that collides is counted only once in output packets.
interface resets	Number of times an interface has been reset. The interface may be reset by the administrator or automatically when an internal error occurs.
Restarts	Number of times the controller was restarted because of errors.

Related Commands

A dagger (\dagger) indicates that the command is documented in another chapter.

show interfaces show ip route † show route †

show ip interface

To list a summary of an interface's IP information and status, use the **show ip interface** privileged EXEC command.

show ip interface [brief] [type] [number]

Syntax Description

brief (Optional) Displays a brief summary of IP status and configuration.

type (Optional) Specifies that information be displayed about that interface

type only. The possible value depends on the type of interfaces the system has. For example, it could be **ethernet**, **null**, **serial**, **tokenring**,

etc.

number (Optional) Interface number.

Command Mode

Privileged EXEC

Sample Displays

The following is sample output from the **show ip interface** command:

Router# show ip interface

```
Ethernet0 is administratively down, line protocol is down
  Internet address is 1.0.46.10, subnet mask is 255.0.0.0
  Broadcast address is 255.255.255.255
  Address determined by setup command
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is enabled
  Multicast groups joined: 224.0.0.1 224.0.0.2
  Outgoing access list is not set
  Inbound access list is not set
  Proxy ARP is enabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is enabled
  IP fast switching on the same interface is disabled
 IP SSE switching is disabled
  Router Discovery is disabled
  IP accounting is disabled
  TCP/IP header compression is disabled
  Probe proxy name replies are disabled
  Gateway Discovery is disabled
PCbus0 is administratively down, line protocol is down
  Internet address is 198.135.1.43, subnet mask is 255.255.255.0
  Broadcast address is 255.255.255.255
  Address determined by setup command
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is enabled
```

```
Multicast groups joined: 224.0.0.1 224.0.0.2
 Outgoing access list is not set
 Inbound access list is not set
 Proxy ARP is enabled
 Security level is default
 Split horizon is enabled
 ICMP redirects are always sent
 ICMP unreachables are always sent
 ICMP mask replies are never sent
 IP fast switching is enabled
 IP fast switching on the same interface is disabled
 IP SSE switching is disabled
 Router Discovery is disabled
 IP accounting is disabled
 TCP/IP header compression is disabled
 Probe proxy name replies are disabled
 Gateway Discovery is disabled
SerialO is administratively down, line protocol is down
 Internet address is 198.135.2.49, subnet mask is 255.255.255.0
 Broadcast address is 255.255.255.255
 Address determined by setup command
 MTU is 1500 bytes
 Helper address is not set
 Directed broadcast forwarding is enabled
 Multicast groups joined: 224.0.0.1 224.0.0.2
 Outgoing access list is not set
 Inbound access list is not set
 Proxy ARP is enabled
 Security level is default
 Split horizon is enabled
 ICMP redirects are always sent
 ICMP unreachables are always sent
 ICMP mask replies are never sent
 IP fast switching is enabled
 IP fast switching on the same interface is disabled
 IP SSE switching is disabled
 Router Discovery is disabled
 IP accounting is disabled
 TCP/IP header compression is disabled
 Probe proxy name replies are disabled
 Gateway Discovery is disabled
```

The following is sample output from the **show ip interface brief** command:

Router# show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
Ethernet0	1.0.46.10	YES	manual	administratively down	down
PCbus0	198.135.1.43	YES	manual	administratively down	down
Serial0	198.135.2.49	YES	manual	administratively down	down

The following is sample output from the **show ip interface brief pcbus 0** command:

Router# show ip interface brief pcbus 0

Interface	IP-Address	OK?	Method	Status	Protocol
PCbus0	198.135.1.43	YES	manual	administratively down	down

Related Command

show interfaces

show rif

Use the **show rif** EXEC command to display the current contents of the RIF cache.

show rif

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

Router# show rif

0000.2807.4C00 TR1 0000.2807.4coc ... 0000.28A8.4800 TR0

The following is sample output from the **show rif** command:

```
Codes: * interface, - static, + remote
Hardware Addr How Idle (min) Routing Information Field 5C02.0001.4322 rg5 - 0630.0053.00B0 5A00.0000.2333 TR0 3 08B0.0101.2201.0FF0 5B01.0000.4444 - - - -
0000.1403.4800 TR1
0000.2805.4C00 TR0
                                                0 -
```

0 10

In the display, entries marked with an asterisk (*) are the router/bridge's interface addresses. Entries marked with a dash (-) are static entries. Entries with a number are cached entries. If the RIF timeout is set to something other than the default of 15 minutes, the timeout is displayed at the top of the display.

0830.0052.2201.0FF0

Table 6-36 describes significant fields shown in the display.

Table 6-36 Show RIF Cache Display Field Descriptions

Field	Description		
Hardware Addr	Lists the MAC-level addresses.		
How	Describes how the RIF has been learned. Possible values include a ring group (rg), or interface (TR).		
Idle (min)	Indicates how long, in minutes, since the last response was received directly from this node.		
Routing Information Field	Lists the RIF.		

show snapshot

To display snapshot routing parameters associated with an interface, use the **show snapshot** EXEC command.

show snapshot [interface]

Syntax Description

interface Interface type and number

Command Mode

EXEC

Sample Display

The following is sample output from the **show snapshot** command:

```
Router# show snapshot serial 0

Serial1 is up, line protocol is up, snapshot up
Options: dialer support
Length of each activation period: 3 minutes
Period between activations: 10 minutes
Retry period on connect failure: 10

For dialer address 240

Current queue: active, remaining active time: 3 minutes
Updates received this cycle: ip, ipx, appletalk

For dialer address 1

Current queue: client quiet, time until next activation: 7 minutes
```

Table 2 explains the fields in the display.

Table 2 Show Snapshot Fields

Field	Description
Serial1 is up, line protocol is up	Indicates whether the interface hardware is currently active (whether carrier detect is present) and if it has has been taken down by an administrator.
snapshot up	Indicates whether the snapshot protocol is enabled on the interface.
Options:	Options configured on the snapshot client or snapshot server interface configuration command. It can be one of the following:
	 dialer support—Snapshot routing is configured with the dialer keyword.
	• stay asleep on carrier up—Snapshot routing is configured with the suppress-statechange-update keyword.
Length of each activation period	Length of the active period.
Period between activations	Length of the quiet period.
Retry period on connect failure	Length of the retry period.
For dialer address	Displays information about each dialer rotary group configured with the dialer map command.

Field	Description
Current queue:	Indicates which period snapshot routing is currently in. It can be one of the following:
	 active—Routing updates are being exchanged.
	 client quiet—The client router is in a quiet period and routing updates are not being exchanged.
	 server quiet—The server router is in a quiet period, awaiting an update from the client router before awakening, and routing updates are not being exchanged.
	 post active—Routing updates are not being exchanged. If the server router receives an update from the client router, it processes it but does not begin an active period. This allows time for resynchronization of active periods between the client and server routers.
	 no queue—This is a temporary holding queue for new snapshot routing interfaces and for interfaces being deleted.
remaining active time time until next activation	Time remaining in the current period.
Updates received this cycle	Protocols from which routing updates have been received in the current active period. This line is displayed only if the router is in an active period.

shutdown

To disable an interface, use the **shutdown** interface configuration command. To restart a disabled interface, use the **no shutdown** command.

shutdown no shutdown

Syntax Description

This command has no arguments or keywords.

Default

Enabled

Command Mode

Interface configuration

Usage Guidelines

The **shutdown** command disables all functions on the specified interface. On serial interfaces, this command causes the DTR signal to be dropped. On Token Ring interfaces, this command causes the interface to be deinserted from the ring. On FDDI interfaces, this command causes the optical bypass switch, if present, to go into bypass mode.

This command also marks the interface as unavailable. To check whether an interface is disabled, use the EXEC command **show interfaces**. An interface that has been shut down is shown as administratively down in the display from this command.

Examples

The following example turns off Ethernet interface 0:

```
interface ethernet 0
shutdown
```

The following example turns the interface back on:

```
interface ethernet 0
no shutdown
```

Related Command

show interfaces

shutdown (hub configuration)

To shut down a port on an Ethernet hub of a Cisco 2505 or Cisco 2507, use the shutdown hub configuration command. To restart the disabled hub, use the **no** form of this command.

shutdown no shutdown

Syntax Description

This command has no arguments or keywords.

Command Mode

Hub configuration

Example

The following example shuts down hub 0, ports 1 through 3:

hub ether 0 1 3 shutdown

Related Command

hub

smt-queue-threshold

To set the maximum number of unprocessed FDDI station management (SMT) frames that will be held for processing, use the smt-queue-threshold global configuration command. Use the no smt-queue-threshold command to restore the queue to the default.

smt-queue-threshold number no smt-queue-threshold

Syntax Description

number

Number of buffers used to store unprocessed SMT messages that are to be queued for processing. Acceptable values are positive integers.

Default

The default threshold value is equal to the number of FDDI interfaces installed in the router.

Command Mode

Global configuration

Usage Guidelines

This command helps ensure that the routers keep track of FDDI upstream and downstream neighbors, particularly when a router includes more than one FDDI interface.

In FDDI, upstream and downstream neighbors are determined by transmitting and receiving SMT Neighbor Information Frames (NIFs). The router can appear to lose track of neighbors when it receives an SMT frame and the queue currently contains an unprocessed frame. This occurs because the router discards incoming SMT frames if the queue is full. Discarding SMT NIF frames can cause the router to lose its upstream or downstream neighbor.

Note Use this command carefully, because the SMT buffer is charged to the inbound interface (input hold queue) until the frame is completely processed by the system. Setting this value to a high limit can impact buffer usage and the ability of the router to receive routable packets or routing updates.

Example

The following example specifies that the SMT queue can hold ten messages. As SMT frames are processed by the system, the queue is decreased by one:

smt-queue-threshold 10

snapshot client

To configure a client router for snapshot routing, use the **snapshot client** interface configuration command. To disable a client router, use the **no** form of this command.

snapshot client active-time quiet-time [suppress-statechange-updates] [dialer] no snapshot client active-time quiet-time [suppress-statechange-updates] [dialer]

Syntax Description

active-time Amount of time, in minutes, that routing updates are regularly

> exchanged between the client and server routers. This can be an integer in the range 5 to 100. There is no default value. A

typical value would be 5 minutes.

quiet-time Amount of time, in minutes, that routing entries are frozen and

> remain unchanged between active periods. Routes are not aged during the quiet period, so they remain in the routing table as if they were static entries. This argument can be an integer from 8 to 100000. There is not default value. The minimum quiet time

is generally the active time plus 3.

suppress-statechange-updates (Optional) Disables the exchange of routing updates each time

the line protocol goes from "down" to "up" or from "dialer

spoofing" to "fully up."

dialer (Optional) Allows the client router to dial up the remote router

in the absence of regular traffic.

Default

Snapshot routing is disabled.

The active-time and quiet-time arguments have no default values.

Command Mode

Interface configuration

Usage Guidelines

The value of the *active-time* argument must be the same for the client and server routers.

Example

The following example configures a client router for snapshot routing:

```
interface dialer 1
snapshot client 5 600 suppress-statechange-updates dialer
```

Related Commands

clear snapshot quiet-time dialer map show snapshot snapshot server

snapshot server

To configure a server router for snapshot routing, use the snapshot server interface configuration command. To disable a server router, use the **no** form of this command.

snapshot server active-time [dialer] no snapshot server active-time [dialer]

Syntax Description

Amount of time, in minutes, that routing updates are regularly active-time

> exchanged between the client and server routers. This can be an integer in the range 5 to 100. There is no default value. A

typical value would be 5 minutes.

dialer (Optional) Allows the client router to dial up the remote router

in the absence of regular traffic.

Default

Snapshot routing is disabled.

The active-time argument has no default value.

Command Mode

Interface configuration

Usage Guidelines

The value of the *active-time* argument must be the same for the client and server routers.

Example

The following example configures a server router for snapshot routing:

```
interface dialer 1
snapshot server 5
```

Related Commands

show snapshot snapshot client

source-address

To configure source address control on a port on an Ethernet hub of a Cisco 2505 or Cisco 2507, use the **source-address** hub configuration command. To remove a previously defined source address, use the **no** form of this command.

source-address [mac-address] no source-address

Syntax Description

mac-address

(Optional) MAC address in the packets that the hub will allow to access the network.

If you omit the MAC address, the hub uses the value in the last source address register, and if the address register is invalid, it will remember the first MAC address it receives on the previously specified port, and allow only packets from that MAC address onto that port.

Default

Disabled

Command Mode

Hub configuration

Usage Guidelines

On an Ethernet hub only, you can configure a security measure so that a hub port accepts packets only from a specific MAC address. For example, suppose your workstation is connected to port 3 on a hub, and source address control is enabled on port 3. Your workstation has access to the network because the hub accepts from port 3 any packet bearing your workstation's MAC address. Any packets arriving with a different MAC address cause the port to be disabled. The port is then reenabled after 1 minute and again the MAC address of incoming packets is checked.

Examples

The following example configures the hub to allow only packets from MAC address 1111.2222.3333 on port 2 of hub 0:

```
hub ether 0 2 source-address 1111.2222.3333
```

The following example configures the hub use the value of the last source address register. If the address register is invalid, it will remember the first MAC address it receives on port 2, and allow only packets from the learned MAC address on port 2:

```
Router(config)# hub ether 0 2
Router(config-hub)# source-address
```

Related Command

hub

squelch

To extend the Ethernet twisted-pair 10BaseT capability beyond the standard 100 meters on the Cisco 4000 platform, use the squelch interface configuration command. To restore the default, use the **no** form of this command.

```
squelch {normal | reduced}
no squelch {normal | reduced}
```

Syntax Description

normal Allows normal capability.

reduced Allows extended 10BaseT capability.

Default

Normal range

Command Mode

Interface configuration

Example

The following example extends the twisted-pair 10BaseT capability on the cable attached to Ethernet interface 2:

interface ethernet 2 squelch reduced

timeslot

To enable framed mode on a G.703-E1 interface, use the **timeslot** interface configuration command. To restore the default, use the **no** form of this command or set the start slot to 0.

timeslot start-slot – stop-slot no timeslot

Syntax Description

start-slot The first subframe in the major frame. Range is 1 to 31 and must be less

than or equal to stop-slot.

stop-slot The last subframe in the major frame. Range is 1 to 31 and must be

greater than or equal to start-slot.

Default

A G.703-E1 interface is configured for unframed mode.

Command Mode

Interface configuration

Usage Guidelines

This command applies to a Cisco 4000 router or Cisco 7000 series router. G.703-E1 interfaces have two modes of operation, framed and unframed. When in framed mode, the range from *start-slot* to *stop-slot* gives the number of 64-Kbps slots in use. There are 32 64-Kbps slots available.

Example

The following example enables framed mode on a G.703-E1 interface:

timeslot 1-3

Related Command

ts16

transmit-clock-internal

When a DTE does not return a transmit clock, use the transmit-clock-internal interface command to enable the internally generated clock on a serial interface on a Cisco 7000. Use the **no** form of this command to disable the feature.

transmit-clock-internal no transmit-clock-internal

Syntax Description

This command has no keywords or arguments.

Default

Disabled

Command Mode

Interface configuration

Example

In the following example, the internally generated clock is enabled on serial interface 3/0:

interface serial 3/0 transmit-clock-internal

transmitter-delay

To specify a minimum dead-time after transmitting a packet, use the **transmitter-delay** interface configuration command. The **no transmitter-delay** command restores the default.

transmitter-delay {*microseconds* | *hdlc-flags*} **no transmitter-delay**

Syntax Description

microseconds Approximate number of microseconds of minimum delay after transmitting a

packet on the MCI and SCI interface cards.

hdlc-flags Minimum number of HDLC flags to be sent between each packet on the HIP,

HSCI, FSIP, or HSSI. The valid range on the HSSI is 2 to 128000.

Default

0 microseconds

Command Mode

Interface configuration

Usage Guidelines

This command is especially useful for serial interfaces that can send back-to-back data packets over serial interfaces faster than some hosts can receive them.

The transmitter delay feature is implemented for the following Token Ring cards: CSC-R16, CSC-R16M, CSC-1R, CSC-2R, and CSC-CTR. For the first four cards, the command syntax is the same as the existing command and specifies the number of milliseconds to delay between sending frames that are generated by the router. Transmitter delay for the CSC-CTR uses the same syntax, but specifies a relative time interval to delay between transmission of all frames.

Example

The following example specifies a delay of 300 microseconds on serial interface 0:

```
interface serial 0
transmitter-delay 300
```

ts16

To control the use of time slot 16 for data on a G.703-E1 interface, use the ts16 interface configuration command. To restore the default, use the **no** form of this command.

ts16 no ts16

Syntax Description

This command has no arguments or keywords.

Default

Time slot 16 is used for signaling.

Command Mode

Interface configuration

Usage Guidelines

This command applies to a Cisco 4000 router or Cisco 7000 series router. By default, time slot 16 is used for signaling. Use this command to configure time slot 16 to be used for data. When in framed mode, in order to get all possible subframes or timeslots, you must use the ts16 command.

Example

The following example configures time slot 16 to be used for data on a G.703-E1 interface:

ts16

Related Command

timeslot

tunnel checksum

To enable encapsulator-to-decapsulator checksumming of packets on a tunnel interface, use the **tunnel checksum** interface configuration command. To disable checksumming, use the **no** form of this command.

tunnel checksum no tunnel checksum

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command currently applies to generic route encapsulation (GRE) only. Some passenger protocols rely on media checksums to provide data integrity. By default, the tunnel does not guarantee packet integrity. By enabling end-to-end checksums, the routers will drop corrupted packets.

Example

In the following example, all protocols will have encapsulator-to-decapsulator checksumming of packets on the tunnel interface:

tunnel checksum

tunnel destination

To specify a tunnel interface's destination, use the **tunnel destination** interface configuration command. To remove the destination, use the **no** form of this command.

```
tunnel destination {hostname | ip-address}
no tunnel destination
```

Syntax Description

hostname Name of the host destination

ip-address IP address of the host destination expressed in decimal in four-part, dotted

notation

Default

No tunnel interface destination is specified.

Command Mode

Interface configuration

Usage Guidelines

You cannot have two tunnels using the same encapsulation mode with exactly the same source and destination address. The workaround is to create a loopback interface and source packets off of the loopback interface.

Examples

The following example enables Cayman tunneling:

```
interface tunnel0
tunnel source ethernet0
tunnel destination 131.108.164.19
tunnel mode cayman
```

The following example enables GRE tunneling:

```
interface tunnel0
appletalk cable-range 4160-4160 4160.19
appletalk zone Engineering
tunnel source ethernet0
tunnel destination 131.108.164.19
tunnel mode gre ip
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

```
appletalk cable-range
appletalk zone<sup>†</sup>
tunnel mode
tunnel source
```

tunnel key

To enable an ID key for a tunnel interface, use the **tunnel key** interface configuration command. To remove the ID key, use the **no** form of this command.

tunnel key key-number no tunnel key

Syntax Description

key-number

Integer from 0 to 4294967295

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command currently applies to generic route encapsulation (GRE) only. Tunnel ID keys can be used as a form of *weak* security to prevent misconfiguration or injection of packets from a foreign source.

Note When using GRE, the ID key is carried in each packet. We do *not* recommend relying on this key for security purposes.

Example

In the following example, the tunnel key is set to 3:

tunnel key 3

tunnel mode

To set the encapsulation mode for the tunnel interface, use the **tunnel mode** interface configuration command. To set to the default, use the **no** form of this command.

tunnel mode {aurp | cayman | dvmrp | eon | gre ip | nos} no tunnel mode

Syntax Description

AppleTalk Update Routing Protocol (AURP) aurp

cayman Cayman TunnelTalk AppleTalk encapsulation

dvmrp Distance Vector Multicast Routing Protocol

eon EON compatible CLNS tunnel

Generic route encapsulation (GRE) protocol over IP gre ip

KA9Q/NOS compatible IP over IP nos

Default

GRE tunneling

Command Mode

Interface configuration

Usage Guidelines

You cannot have two tunnels using the same encapsulation mode with exactly the same source and destination address. The workaround is to create a loopback interface and source packets off of the loopback interface.

Cayman tunneling implements tunneling as designed by Cayman Systems. This enables our routers to interoperate with Cayman GatorBoxes. With Cayman tunneling, you can establish tunnels between two routers or between our router and a GatorBox. When using Cayman tunneling, you must not configure the tunnel with an AppleTalk network address. This means that there is no way to ping the other end of the tunnel.

Use DVMRP when a router connects to a mrouted router to run DVMRP over a tunnel. It is required to configure Protocol-Independent Multicast (PIM) and an IP address on a DVMRP tunnel.

Generic route encapsulation (GRE) tunneling can be done between our routers only. When using GRE tunneling for AppleTalk, you configure the tunnel with an AppleTalk network address. This means that you can ping the other end of the tunnel.

Examples

The following example enables Cayman tunneling:

```
interface tunnel 0
tunnel source ethernet 0
tunnel destination 131.108.164.19
tunnel mode cayman
```

The following example enables GRE tunneling:

```
interface tunnel 0
appletalk cable-range 4160-4160 4160.19
appletalk zone Engineering
tunnel source ethernet0
tunnel destination 131.108.164.19
tunnel mode gre ip
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

appletalk cable-range[†] appletalk zone[†] tunnel destination tunnel source

tunnel sequence-datagrams

To configure a tunnel interface to drop datagrams that arrive out of order, use the tunnel sequence-datagrams interface configuration command. To disable this function, use the no form of this command.

tunnel sequence-datagrams no tunnel sequence-datagrams

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command currently applies to generic route encapsulation (GRE) only. This command is useful when carrying passenger protocols that behave poorly when they receive packets out of order (for example, LLC2-based protocols).

Example

In the following example, the tunnel is configured to drop datagrams that arrive out of order:

tunnel sequence-datagrams

tunnel source

To set a tunnel interface's source address, use the **tunnel source** interface configuring command. To remove the source address, use the **no** form of this command.

```
tunnel source {ip-address | type number} no tunnel source
```

Syntax Description

ip-address IP address to use as the source address for packets in the tunnel.

type All interface types.

number Specifies the port, connector, or interface card 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.

Default

No tunnel interface's source address is set.

Command Mode

Interface configuration

Usage Guidelines

You cannot have two tunnels using the same encapsulation mode with exactly the same source and destination address. The workaround is to create a loopback interface and source packets off of the loopback interface.

When using tunnels to Cayman boxes, you must set the **tunnel source** to an explicit IP address on the same subnet as the Cayman box, not the tunnel itself.

Examples

The following example enables Cayman tunneling:

```
interface tunnel0
tunnel source ethernet0
tunnel destination 131.108.164.19
tunnel mode cayman
```

The following example enables GRE tunneling:

```
interface tunnel0
appletalk cable-range 4160-4160 4160.19
appletalk zone Engineering
tunnel source ethernet0
tunnel destination 131.108.164.19
tunnel mode gre ip
```

Related Commands

A dagger (\dagger) indicates that the command is documented in another chapter.

appletalk cable-range † appletalk zone † tunnel destination tunnel source

tx-queue-limit

To control the number of transmit buffers available to a specified interface on the MCI and SCI cards, use the **tx-queue-limit** interface configuration command.

tx-queue-limit number

Syntax Description

number

Maximum number of transmit buffers that the specified interface can subscribe.

Default

Defaults depend on the total transmit buffer pool size and the traffic patterns of all the interfaces on the card. Defaults and specified limits are displayed with the **show controllers mci** EXEC command.

Command Mode

Interface configuration

Usage Guidelines

This command should be used only under the guidance of a technical support representative.

Example

The following example sets the maximum number of transmit buffers on the interface to 5:

```
interface ethernet 0
tx-queue-limit 5
```

Related Command

show controllers mci