

T1 CSU WIC for the Cisco 3600 and Cisco 1600 Series

Feature Summary

The Cisco T1 data service unit/channel service unit (DSU/CSU) WAN interface card is an integrated, managed, T1 or fractional T1 WAN interface card. It provides nonchannelized data rates of 1 to 24 X 64 kbps or 1 to 24 X 56 kbps and follows ANSI T1.403 and AT&T Publication 62411 standards.

The Cisco DSU/CSU WAN T1 interface management features include the following:

- You can remotely configure the interface using Telnet and the Cisco IOS command line interface (CLI).
- For monitoring purposes, the router and DSU/CSU are manageable as a single Simple Network Management Protocol (SNMP) entity, using CiscoWorks or CiscoView. DSU/CSU statistics are accessed from the CLI.
- The SNMP agent supports the standard Management Information Base II (MIB II), Cisco integrated DSU/CSU MIB, and T1 MIB (RFC 1406).
- Loopbacks (including a manual button for a network line loopback) and bit error rate tester (BERT) tests are provided for troubleshooting.
- Test patterns, alarm counters, and performance reports are accessible using the CLI.
- The module has carrier detect, loopback, and alarm LEDs.

Benefits

This T1 CSU card works on the Cisco 3600 and Cisco 1600 series, and allows customers to integrate more peripheral network components into the chassis. This is especially valuable to customers in the process of deploying large scale, end-to-end Cisco 3600/1600-based branch networks.

Other benefits of this solution include the following:

- Fewer devices to deploy and manage
- Simplified management of the router
- DSU/CSU as a single entity
- Remote/local configuration, monitoring, and troubleshooting possible via the Cisco IOS command line interface (CLI)
- Single vendor support

- Enhanced reliability
- Physical space savings

Platforms

This feature is supported on the Cisco 3600 and Cisco 1600 series.

Prerequisites

The following are prerequisites to enable the T1 CSU WIC:

- Leased line from your telephone company
- Configuration parameters depending on your specific telephone company. For most connections, the default settings should suffice:
 - `service-module t1 clock source line`
 - `service-module t1 data-coding normal`
 - `service-module t1 timeslots all speed 64`
 - `service-module t1 framing esf`
 - `service-module t1 lbo none`
 - `service-module t1 linecode b8zs`
 - `no service-module t1 remote-alarm-enable`
 - `no service-module t1 fdl`

Note To view the current configuration, enter the `show service-module serial slot/port` command. For further information about these commands and how to change them, refer to the Cisco IOS configuration guides and command references that shipped with your router.

Supported MIBs and RFCs

This feature supports the following MIBs and RFCs:

- Cisco Integrated CSU/DSU MIB
- RFC 1406 / DSX1 MIBs

For descriptions and instructions to use supported MIBs, see the Cisco MIB website on Cisco Connection Online (CCO) at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

Note URLs are subject to change. In case the URL above is no longer available, the path is as follows: *Cisco home page: Software and Support: Software Center: Network Management Products: MIB Files.*

Configuration Tasks

To configure the router to send SNMP traps, perform the following steps:

| Steps | Command |
|---|--|
| Step 1 Enter interface configuration mode. | interface serial <i>slot/port</i> , where <i>slot/port</i> corresponds to where the WIC card is installed in your router. |
| Step 2 Set the fdl parameter to either ansi or att. | service-module t1 fdl {ansi att} |
| Step 3 Exit interface configuration mode. | <Ctrl-z> |
| Step 4 Verify that the fdl parameter has been changed. | show running-config |

Configuration Examples

This section contains the following types of examples:

- Feature-Specific Configuration Example—Describes only how to configure the T1 CSU WIC feature while in interface configuration mode.
- Comprehensive Configuration Example—Describes how to configure the T1 CSU WIC feature, beginning with powering on your router.

Feature-Specific Configuration Example

This example shows how to set the fdl parameter to att while in interface configuration mode.

Step 1 Enter **service-module t1 fdl att** to set the fdl parameter to att:

```
panther2(config-if)#service-module t1 fdl att
```

Step 2 Exit interface configuration mode by entering **Cntl-z**.

```
panther2(config-if)#<^Z>
panther2#
```

Step 3 Enter **show running-config** to check that the fdl parameter was changed in the serial port and slot number specified in Step 5:

```
panther2#show running-config
.
.
!
interface Serial10/0
 no ip address
 no ip route-cache
 no ip mroute-cache
 no keepalive
 shutdown
 no fair-queue
 service-module t1 clock source internal
 service-module t1 fdl att
 no cdp enable
panther2#
```

Step 4 Enter exit to exit the router.

Comprehensive Configuration Example

This example shows how to set the fdl parameter to ansi, beginning with powering on the router.

Step 1 Power ON your router. When prompted, press **Return**:

```
Press RETURN to get started!
```

```
panther2>
```

Step 2 Enter privilege mode by entering **enable** at the prompt. Enter your password. The prompt changes to **panther2#**:

```
panther2>enable
Password:
panther2#
```

Step 3 Enter **show running-config** to display the current configuration:

```
panther2#show running-config
Building configuration...

Current configuration:
!
version 11.3
no service password-encryption
!
hostname panther2
```

```
!  
enable secret 5 $1$IZhn$Z.PDhePwyvy.hNuWQlIgw1  
enable password lab  
!  
memory-size iomem 40  
no ip routing  
isdn switch-type basic-5ess  
!  
!  
controller E1 3/0  
  linecode ami  
  channel-group 1 timeslots 1-31  
!  
controller E1 3/1  
!  
interface Ethernet0/0  
  no ip address  
  no ip route-cache  
  no ip mroute-cache  
  no keepalive  
  shutdown  
  no cdp enable  
!  
interface Serial0/0  
  no ip address  
  no ip route-cache  
  no ip mroute-cache  
  no keepalive  
  shutdown  
  no fair-queue  
  service-module t1 clock source internal  
  no cdp enable  
!  
interface TokenRing0/0  
  no ip address  
  no ip route-cache  
  no ip mroute-cache  
  no keepalive  
  shutdown  
  ring-speed 16  
  no cdp enable  
!  
interface Serial0/1  
  no ip address  
  no ip route-cache  
  no ip mroute-cache  
  no keepalive  
  shutdown  
  no fair-queue  
  service-module t1 clock source internal  
  no cdp enable  
  no clns route-cache  
!  
interface BRI2/0
```

```
no ip address
no ip route-cache
no ip mroute-cache
no keepalive
shutdown
isdn switch-type basic-5ess
no fair-queue
no cdp enable
!
interface Ethernet2/0
no ip address
no ip route-cache
no ip mroute-cache
shutdown
no cdp enable
!
interface Serial2/0
no ip address
no ip route-cache
no ip mroute-cache
no keepalive
no fair-queue
no cdp enable
!
interface TokenRing2/0
no ip address
no ip route-cache
no ip mroute-cache
shutdown
ring-speed 16
no cdp enable
!
interface Serial3/0:1
no ip address
no ip route-cache
no ip mroute-cache
no keepalive
shutdown
no fair-queue
no cdp enable
!
ip classless
no logging console
no cdp run
!
!
line con 0
exec-timeout 0 0
line aux 0
```

```
line vty 0 4
  password lab
  login
!
end
panther2#
```

Step 4 Enter configuration mode by entering **configure terminal**:

```
panther2#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

Step 5 Enter interface configuration mode by entering **interface serial slot/port**, where *slot/port* corresponds to where the WIC card is installed in your router:

```
panther2(config)#interface serial 0/0
```

Step 6 Enter **service-module t1 fdl ansi** to set the fdl parameter to ansi:

```
panther2(config-if)#service-module t1 fdl ansi
```

Step 7 Exit interface configuration mode by entering **Cntl-z**.

```
panther2(config-if)#<^Z>
```

```
panther2#
```

Step 8 Enter **show running-config** to check that the fdl parameter was changed in the serial port and slot number specified in Step 5:

```
panther2#show running-config
```

```
.
.
!
interface Serial0/0
  no ip address
  no ip route-cache
  no ip mroute-cache
  no keepalive
  shutdown
  no fair-queue
  service-module t1 clock source internal
  service-module t1 fdl ansi
  no cdp enable
panther2#
```

Step 9 Enter **exit** to exit the router.

Command Reference

This section contains the following commands:

- service-module t1 fdl (new command)
- service-module t1 clock source
- service-module t1 data-coding
- service-module t1 framing
- service-module t1 lbo
- service-module t1 linecode
- service-module t1 remote-alarm-enable
- service-module t1 remote-loopback
- service-module t1 timeslots
- show service-module serial
- test service-module

service-module t1 fdl

To set the fdl parameter to either att or ansi, use the **service-module t1 fdl** command. Use the **no** form of this command to ignore the fdl parameter.

service-module t1 fdl {ansi | att}

no service-module t1 fdl

Syntax Description

ansi Sets the fdl parameter to ansi.

att Sets the fdl parameter to att.

Default

no service-module t1 fdl.

Command Mode

Interface configuration mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2 P.

The default is **no service-module t1 fdl**. Whether you should specify **ansi** or **att** is determined by your service provider or telephone company.

service-module t1 clock source

To specify the clock source for the fractional T1/T1 CSU/DSU module, use the **service-module t1 clock source** interface configuration command. Use the **no** form of this command to enable the line clock.

service-module t1 clock source {**internal** | **line**}

no service-module t1 clock source {**internal** | **line**}

Syntax Description

internal Specifies the CSU/DSU internal clock.

line Specifies the line clock.

Default

line.

Command Mode

Interface configuration mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Example

The following example sets an internal clock source on serial line 0:

```
interface serial 0  
service-module t1 clock source line
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

service-module 56k clock source

service-module t1 data-coding

To guarantee the ones density requirement on an AMI line using the fractional T1/T1 module, use the **service-module t1 data-coding** inverted interface configuration command. Use the **no** form of this command to enable normal data transmission.

```
service-module t1 data-coding {inverted | normal}
```

```
no service-module t1 data-coding {inverted | normal}
```

Syntax Description

| | |
|-----------------|--|
| inverted | Inverts bit codes by changing all 1 bits into 0 bits and all 0 bits into 1 bits. |
| normal | Requests that no bit codes be inverted before transmission. |

Default

normal.

Command Mode

Interface configuration mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Data inversion is used to guarantee the ones density requirement on an AMI line when using bit-oriented protocols such as High-Level Data Link Control (HDLC), Point-to-Point Protocol (PPP), X.25, and Frame Relay. If the timeslot speed is set to 56 kbps, this command is rejected because line density is guaranteed when transmitting at 56 kbps. Use this command with the 64-kbps line speed.

If you transmit inverted bit codes, both CSU/DSUs must have this command configured for successful communication.

Example

The following example inverts bit codes using a timeslot speed of 64 kbps:

```
service-module t1 timeslots all speed 64  
service-module t1 data-coding inverted
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

```
service-module t1 linecode
```

```
service-module t1 timeslots
```

service-module t1 framing

To select the frame type for a line using the fractional T1/T1 (FT1/T1) module, use the **service-module t1 framing** interface configuration command. Use the **no** form of this command to select the default, which is Extended Super Frame (esf) as the T1 frame type.

service-module t1 framing {esf | sf}

no service-module t1 framing {esf | sf}

Syntax Description

esf Specifies Extended Super Frame as the T1 frame type.

sf Specifies D4 Super Frame as the T1 frame type.

Default

esf.

Command Mode

Interface configuration mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Use this command in configurations where the router communicates with FT1/T1 data lines. The service provider determines which framing type is required for your circuit, either esf or sf.

Example

The following example enables Super Frame as the FT1/T1 frame type:

service-module t1 framing sf

service-module t1 lbo

To configure the CSU line build out (LBO) on a fractional T1/T1 CSU/DSU module, use the **service-module t1 lbo** interface configuration command. Use the **no** form of this command to disable line build out.

```
service-module t1 lbo {-15 db | -7.5 db | none}
```

```
no service-module t1 lbo {-15 db | -7.5 db | none}
```

Syntax Description

| | |
|----------------|--|
| -15 db | Decreases outgoing signal strength by 15 dB. |
| -7.5 db | Decreases outgoing signal strength by 7.5 dB. |
| none | Transmits packets without decreasing outgoing signal strength. |

Default

none.

Configuration Mode

Interface configuration mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Use this command to decrease the outgoing signal strength to an optimum value for a fractional T1 line receiver. The ideal signal strength should be -15 dB to -22 dB, which is calculated by adding the phone company loss + cable length loss + line build out.

You may use this command in back-to-back configurations, but it is not needed on most T1 lines.

Example

The following example shows an Lbo setting of -7.5 dB:

```
service-module t1 lbo -7.5db
```

service-module t1 linecode

To select the line code for the fractional T1/T1 module, use the **service-module t1 linecode** interface configuration command. Use the **no** form of this command to select the default, which is the B8ZS line code.

service-module t1 linecode {ami | b8zs}

no service-module t1 linecode {ami | b8zs}

Syntax Description

ami Specifies alternate mark inversion (AMI) as the line code.

b8zs Specifies binary 8 zero substitution (B8ZS) as the line code.

Default

b8zs.

Command Mode

Interface configuration mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Configuring B8ZS is a method of ensuring the ones density requirement on a T1 line by substituting intentional bipolar violations in bit positions, four and seven, for a sequence of eight zero bits. When the CSU/DSU is configured for AMI, you must guarantee the ones density requirement in your router configuration using the **service-module t1 data-coding inverted** command or the **service-module t1timeslots speed 56** command.

Your T1 service provider determines which line code, either ami or b8zs, is required for your T1 circuit.

Example

The following example specifies AMI as the line code:

```
service-module t1 linecode ami
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

service-module t1 data-coding

service-module t1 timeslots

service-module t1 remote-alarm-enable

To generate remote alarms (yellow alarms) at the local CSU/DSU, or detect remote alarms sent from the remote CSU/DSU, use the **service-module t1 remote-alarm-enable** interface configuration command. Use the **no** form of this command to disable remote alarms.

service-module t1 remote-alarm-enable

no service-module t1 remote-alarm-enable

Syntax Description

This command has no arguments or keywords.

Default

Remote alarms disabled.

Command Mode

Interface configuration mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Remote alarms are transmitted by the CSU/DSU when it detects an alarm condition, such as a red alarm (loss of frame) or blue alarm (unframed ones). The receiving CSU/DSU then knows there is an error condition on the line.

With D4 Super Frame configured, a remote alarm condition is transmitted by setting the bit 2 of each time slot to zero. For received user data that has the bit 2 of each time slot set to zero, the CSU/DSU interprets the data as a remote alarm and interrupts data transmission, which explains why remote alarms are disabled by default. With Extended Super Frame configured, the remote alarm condition is signalled out of band in the facilities data link.

You can determine if the FT1/T1 CSU/DSU is receiving a remote alarm (yellow alarm) by issuing the **show service-module command**.

Example

The following example enables remote alarm generation and detection:

```
service-module t1 remote-alarm-enable
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

service-module t1 framing

service-module t1 remote-loopback

To specify that the fractional T1/T1 CSU/DSU module enter loopback mode when it receives a loopback code on the line, use the **service-module t1 remote-loopback** interface configuration command. Use the **no** form of this command to disable remote loopbacks.

service-module t1 remote-loopback {full | payload v54}

no service-module t1 remote-loopback {full | payload v54}

Syntax Description

| | |
|----------------|---|
| full | Configures the remote loopback code used to transmit or accept CSU loopback requests. |
| payload | Configures the loopback code used by the local CSU/DSU to generate or detect payload-loopback commands. |
| v54 | Industry standard loopback code. Use this configuration for CSU/DSUs that may not support the Accunet loopup standards. This keyword is used only with a payload request, not a full request. |

Note By entering the **service-module t1 remote-loopback full** command without specifying any keywords, you enable the standard loopup codes, which use a 1-in-5 pattern for loopup and a 1-in-3 pattern for loopdown. By entering the **service-module t1 remote-loopback payload v54** command without specifying any keywords, you enable the v54 pseudo-random loopup codes for loopup and v54 pseudo-random loopdown codes for loopdown.

Default

Full and payload loopbacks with standard-loopup codes.

Command Mode

Interface configuration mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

The **no** form of this command disables loopback requests. For example, the **no service-module t1 remote-loopback full** command ignores all full-bandwidth loopback transmissions and requests.

Configuring the **no** form of the command might not prevent telco line providers from looping your router in esf mode, because fractional T1/T1 lines use facilities data link messages to initiate loopbacks.

If you enable the **service-module t1 remote-loopback** command, the loopback remote commands on the FT1/T1 CSU/DSU module will not be successful.

Example

The following examples display two routers connected back-to-back through a fractional T1/T1 line.

The example for **loopback remote full**:

```
Router(config)#int s0/0
Router(config-if)#service-module t1 remote-loopback full
Router(config-if)#loopback remote full
Router(config-if)#
%SERVICE_MODULE-5-LOOPUPREMOTE: Unit Serial0/0 - Remote unit placed in loopback
Router(config-if)#no loopback remote
Router(config-if)#
%SERVICE_MODULE-5-LOOPDOWNREMOTE: Unit Serial0/0 - Remote loopback test cancelled
```

The example for **loopback remote payload v54**:

```
Router(config)#int s0/0
Router(config-if)#service-module t1 remote-loopback payload v54
Router(config-if)#loopback remote payload
Router(config-if)#
%SERVICE_MODULE-5-LOOPUPREMOTE: Unit Serial0/0 - Remote unit placed in loopback
Router(config-if)#no loopback remote
Router(config-if)#
%SERVICE_MODULE-5-LOOPDOWNREMOTE: Unit Serial0/0 - Remote loopback test cancelled
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

loopback remote (interface)

service-module t1 timeslots

To define timeslots that constitute a fractional T1/T1 (FT1/T1) channel, use the **service-module t1 timeslots** interface configuration command. Use the **no** form of this command to resume the default setting (all FT1/T1 timeslots transmit at 64 kbps).

```
service-module t1 timeslots {range | all} [speed {56 | 64}]
```

```
no service-module t1 timeslots {range | all}
```

Syntax Description

| | |
|--------------|--|
| range | The DS0 timeslots that constitute the FT1/T1 channel. The range is from 1 to 24, where the first timeslot is numbered 1 and the last timeslot is numbered 24. Specify this field by using a series of subranges separated by commas. |
| all | Selects all FT1/T1 timeslots. |
| speed | (Optional) Specifies the timeslot speed. |
| 56 | 56 kbps. |
| 64 | 64 kbps. This is the default for all timeslots. |

Default

64 kbps.

Command Mode

Interface configuration mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

This command specifies which timeslots are used in fractional T1 operation and determines the amount of bandwidth available to the router in each FT1/T1 channel.

The timeslot range must match the timeslots assigned to the channel group. Your service provider defines the timeslots that comprise a channel group.

To use the entire T1 line, enable the **service-module t1 timeslots all** command.

Example

The following example displays a series of timeslot ranges and a speed of 64 kbps:

```
service-module t1 timeslots 1-10,15-20,22 speed 64
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

service-module t1 data-coding

service-module t1 linecode

show service-module serial

To display the performance report for an integrated CSU/DSU, use the **show service-module serial** privileged EXEC command:

```
show service-module serial number [performance-statistics [interval-range]]
```

Syntax Description

| | |
|-------------------------------|---|
| <i>number</i> | Interface number: 0 or 1. |
| performance-statistics | (Optional) Displays the CSU/DSU performance statistics for the past 24 hours. This keyword applies only to the fractional T1/T1 module. |
| <i>interval-range</i> | (Optional) Specifies the number of 15-minute intervals displayed. You can choose a range from 1 to 96, where each value represents the CSU/DSU activity performed in that 15-minute interval. For example, a range of 2-3 displays the performance statistics for the intervals two and three. |

Command Mode

Privileged EXEC mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

This command applies to the 2- and 4-wire 56/64-kbps CSU/DSU module and FT1/T1 CSU/DSU module. The performance-statistics keyword applies only to the FT1/T1 CSU/DSU module.

Example

The following example shows sample output from the **show service-module serial** command issued on a Cisco 3640 modular access router:

```
router# show service-module serial 0/1
Module type is 4-wire Switched 56
  Hardware revision is B, Software revision is 1.00,
  Image checksum is 0x42364436, Protocol revision is 1.0
Connection state: Idle
Receiver has no alarms.
CSU/DSU Alarm mask is 0
Current line rate is 56 Kbits/sec
Last module self-test (done at startup): Passed
Last clearing of alarm counters 4d02h
  oos/oof           : 0,
  loss of signal    : 0,
  loss of sealing curren: 0,
  loss of frame     : 0,
  rate adaptation attemp: 0,
```

Table 1 describes the fields displayed by the show service-module serial command:

Table 1 show service-module Output Field Descriptions

| Field | Description |
|---------------------------------|---|
| Module Type | The CSU/DSU module installed in the router. The possible modules are T1/fractional, 2-wire switched 56-kbps, and 4-wire 56/64-kbps. |
| Receiver has AIS alarm | <p>Alarms detected by the FT1/T1 CSU/DSU module or 2- and 4-wire 56/64-kbps CSU/DSU modules.</p> <p>Possible T1 alarms are as follows:</p> <ul style="list-style-type: none"> • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms. <p>Possible switched 56k alarms are as follows:</p> <ul style="list-style-type: none"> • Receiver has loss of signal. • Receiver has loss of sealing current. • Receiver has loss of frame. • Receiver has rate adaptation attempts. |
| | <p>Unit is currently in test mode</p> <hr/> <p>Framing is ESF</p> <hr/> <p>Line Code is B8ZS</p> <hr/> <p>Current clock source is line</p> <hr/> <p>Fraction has 24 timeslots</p> <hr/> <p>Net bandwidth</p> <hr/> <p>Last user loopback performed</p> <hr/> <p>Last module self-test (done at startup): Passed</p> |
| | <p>Loopback tests are in progress.</p> <hr/> <p>Indicates frame type used on the line. Can be extended super frame or super frame.</p> <hr/> <p>Indicated line-code type configured. Can be alternate mark inversion (AMI) or binary 8-zero substitution (B8ZS).</p> <hr/> <p>Clock source configured on the line, which can be supplied by the service provider (line) or the integrated CSU/DSU module (internal).</p> <hr/> <p>Number of timeslots defined for the FT1/T1 module, which can range from 1 to 24.</p> <hr/> <p>Total bandwidth of the line (for example, 24 timeslots multiplied by 64 kbps equals a bandwidth of 1536 kbps).</p> <hr/> <p>Type and outcome of the last performed loopback.</p> <hr/> <p>Status of the last self test performed on an integrated CSU/DSU module.</p> |
| Last clearing of alarm counters | List of network alarms that were detected and cleared on the CSU/DSU module. |
| Total Data in Current interval | Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer. |
| Line Code Violations | Indicates the occurrence of either a bipolar violation or excessive zeroes error event. |
| Path Code Violations | Indicates a frame synchronization bit error in the D4 and E1-no CRC formats or a CRC error in the ESF and E1-CRC formats. |

Command Reference

| Field | Description |
|-------------------|---|
| Slip Secs | Indicates the replication or detection 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 error is detected. |
| Line Err Secs | Line errored seconds is a second in which one or more line code violation errors are detected. |
| Errored Secs | <p>In ESF and E1-CRC links, an errored second is a second in which one of the following is detected: one or more path code violations; one or more out of frame defects; one or more controlled slip events; a detected AIS defect.</p> <p>For D4 and E1-no CRC links, the presence of bipolar violation also triggers an errored second.</p> |
| Bursty Err Secs | A second with fewer than 320 and more than 1 path coding violation errors. No severely errored frame defects or incoming AIS defects are detected. Controlled slips are not included in this parameter. |
| Severely Err Secs | <p>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.</p> <p>For D4 signals, a count of 1-second intervals with framing errors, or an out of frame defect, or 1544 line code violations.</p> |
| Unavail Secs | Total time the line was out of service. |

Related Commands

You can use the master indexes or search online to find documentation of related commands.

clear service-module

test service-module

To perform self-tests on an integrated CSU/DSU serial interface module, such as a 4-wire 56/64 kbps CSU/DSU, issue the **test service-module** privileged EXEC command:

test service-module *type number*

Syntax Description

| | |
|---------------|-------------------|
| <i>type</i> | Interface type. |
| <i>number</i> | Interface number. |

Command Mode

Privileged EXEC mode

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

A series of tests are performed on the CSU/DSU, which include a ROM checksum test, RAM test, EEPROM checksum test, flash checksum test, and a DTE loopback with an internal pattern test. These self-tests are also performed at power on.

This command cannot be used if a DTE loopback, line loopback, or remote loopback is in progress.

Data transmission is interrupted for five seconds when you issue this command. To view the output of the most recent self-tests, enable the **show service-module** command.

Example

This example performs a self test on serial interface 0:

```
Router# test service-module serial 0
SERVICE_MODULE(0): Performing service-module self test
SERVICE_MODULE(0): self test finished: Passed
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

clear counters

clear service-module

show service-module

Debug Commands

debug service-module

Use the **debug service-module EXEC** command to display debugging information that monitors the detection and clearing of network alarms on the integrated channel service unit/data service unit (CSU/DSU) modules. The **no** form of this command disables debugging output.

debug service-module

no debug service-module

Syntax Description

This command has no keywords or arguments.

Command Mode

EXEC mode.

Usage Guidelines

Use this command to enable and disable debug logging for the serial 0 and serial 1 interfaces when an integrated CSU/DSU is present. This command enables debugging on all interfaces.

Network alarm status can also be viewed through the use of the show service-module command.

Note The debug output varies depending on the type of service module installed in the router.

Example

```
Router# debug service-module
SERVICE_MODULE(1): loss of signal ended after duration 00:05:36
SERVICE_MODULE(1): oos/oof ended after duration 01:05:14
SERVICE_MODULE(0): Unit has no clock
SERVICE_MODULE(0): detects loss of signal
SERVICE_MODULE(0): loss of signal ended after duration 00:00:33
```

What to Do Next

For information on how to configure serial interfaces, refer to the *Configuration Fundamentals Configuration Guide* for Cisco IOS Release 11.2.

Refer to the following publications for additional software configuration information:

- *Cisco 3600 Series Software Configuration Guide; Cisco 1600 Series Software Configuration Guide*
- *Cisco 3600 Series Command Reference; Cisco 1600 Series Command Reference*