# 1-Port DSU/CSU T1 WIC for the Cisco 1700, Cisco 2600, Cisco 3600, and Cisco 3700 Series Routers

**Feature History**

| Release | Modification |
|---------|--------------|
| 11.2 | This feature was introduced on the Cisco 1600 series and Cisco 3600 series routers. |
| 12. 2( 15)ZL | Version 2 of this feature is introduced on the Cisco 1700, Cisco 2600, Cisco 3600 and Cisco 3700 series routers, and the Cisco ICS 7750 communications manager. |

This feature module describes the 1-port data service unit/channel service unit (DSU/CSU) WAN interface card (WIC) for Cisco 1700, 2600, 3600, and 3700 series routers. It describes the benefits of the new feature, supported platforms, configuration, and related documents, and provides command reference information.

This document includes the following sections:

- Feature Overview
- Supported Platforms
- Supported Standards, MIBs, and RFCs
- Prerequisites
- Configuration Tasks
- Configuration Example
- Command Reference

# Feature Overview

The Cisco WIC-1DSU-T1-V2 is an integrated, managed, T1 or fractional T1 WAN interface card (WIC). 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 WIC-1DSU-T1-V2 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) are provided for troubleshooting.

- Transmission attenuation can be tailored to cable length using the CLI.

- Test patterns, alarm counters, and performance reports are accessible using the CLI.

- The module has carrier detect, loopback, and alarm LEDs.

# Benefits

This T1 DSU/CSU card works on the Cisco 1700, 2600, and 3600 series platforms, and allows customers to integrate more peripheral network components into the chassis. This is especially valuable to customers who deploy large scale, end-to-end Cisco-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 by using the CLI

- Single vendor support

- Enhanced reliability

- Physical space savings

# Related Documents

### Cisco Interface Card Documentation

- *Cisco Interface Card Installation Guide*

- *Quick Start Guide: Interface Cards for Cisco 1600 Series, Cisco 1700 Series, Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers*

### Cisco 1700 Series Routers Documentation

- *Cisco 1720 Router Hardware Installation Guide*

- *Quick Start Guide, Cisco 1720 Router*
- *Cisco 1721 Router Hardware Installation Guide*
- *Quick Start Guide, Cisco 1721 Router*
- *Cisco 1751 Router Hardware Installation Guide*
- *Cisco 1760 Router Hardware Installation Guide*
- *Quick Start Guide, Cisco 1760 Router*

**Cisco 2600 Series Routers Documentation**

- *Cisco 2600 Series Hardware Installation Guide*

**Cisco 3600 Series Routers Documentation**

- *Cisco 3600 Series Hardware Installation Guide*
- *Quick Start Guide, Cisco 3631 Router*

**Cisco 3700 Series Routers Documentation**

- *Cisco 3700 Series Routers Hardware Installation Guide*
- *Quick Start Guide, Cisco 3725 Router*
- *Quick Start Guide, Cisco 3745 Router*

**Cisco ICS 7750 Documentation**

- *ICS 7750 Documentation Roadmap*

# Supported Platforms

This feature is supported on the following platforms:

- Cisco 1700 series routers
- Cisco 2600XM and Cisco 2691 routers
- Cisco 3631 routers
- Cisco 3700 series routers
- Cisco ICS 7750 communications manager

**Determining Platform Support Through Cisco Feature Navigator**

Cisco IOS software is packaged in feature sets that are supported on specific platforms. To get updated information regarding platform support for this feature, access Cisco Feature Navigator. Cisco Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Cisco Feature Navigator is a web-based tool that enables you to determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or release. Under the release section, you can compare releases side by side to display both the features unique to each software release and the features in common.

To access Cisco Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

http://www.cisco.com/register

Cisco Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Cisco Feature Navigator home page at the following URL:

http://www.cisco.com/go/fn

### Availability of Cisco IOS Software Images

Platform support for particular Cisco IOS software releases is dependent on the availability of the software images for those platforms. Software images for some platforms may be deferred, delayed, or changed without prior notice. For updated information about platform support and availability of software images for each Cisco IOS software release, refer to the online release notes or, if supported, Cisco Feature Navigator.

# Supported Standards, MIBs, and RFCs

### Standards

No new or modified standards are supported by this feature.

### MIBs

No new or modified MIBs are supported by this feature.

### RFCs

No new or modified RFCs are supported by this feature.

# Prerequisites

The following are prerequisites to enable the T1 CSU WIC:

- Leased line from your telephone company
- Configuration parameters as specified by your telephone company. For most connections, the following 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

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**Note** In telephone company initiated loopback tests that use the QRSS test pattern, the WIC-1DSU-T1-V2 *must* be clocked from the line. Configuring the WIC-1DSU-T1-V2 and the telephone company to use the same clock source will result in errors.

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**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.

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# Configuration Tasks

See the following sections for configuration tasks for this feature.

- Configuring Short Cable Transmission Attenuation
- Enabling Remote Loopback Testing

## Configuring Short Cable Transmission Attenuation

To configure transmission attenuation for short cable lengths (under 660 feet in length), use the following commands beginning in global configuration mode.

| | Command | Purpose |
|---|---|---|
| **Step 1** | `Router(config)# interface serial0/0` | Enter the interface configuration mode. |
| **Step 2** | `Router(config-if)# service-module t1 cablelength short {110ft |220ft |330ft |440ft | 550ft |660ft}` | Optional. Sets the transmission attenuation according to the length of the cable. For example, use the keyword **110ft** if the cable length is from 0 to 110 feet. Use the keyword **220ft** if the cable length is from 110 to 220 feet, and so on. |

## Verifying Configuration of Short Cable Transmission Attenuation

To verify the configuration of short cable transmission attenuation, enter the EXEC command **show running-config interface serial**<*slot/port*> replacing <*slot/port*> with the slot and port number of the serial interface. The following sample output shows transmission attenuation for a cable length between 0 and 110 feet:

```
Router#show running-config interface serial0/0

Building configuration...

Current configuration : 252 bytes
!
interface Serial0/0
 no ip address
 load-interval 30
 no keepalive
 no fair-queue
 service-module t1 cablelength short 110ft
 service-module t1 framing sf
```

```
 service-module t1 linecode ami
 service-module t1 timeslots 1-24 speed 56
 no cdp enable
end
```

# Enabling Remote Loopback Testing

To enable remote loopback testing for the WIC, use the following commands beginning in global configuration mode.

| | Command | Purpose |
|---|---|---|
| **Step 1** | Router(config)# **interface serial0/0** | Enter the interface configuration mode. |
| **Step 2** | Router(config-if)# **service-module t1 remote-loopback {full \| payload v54}** | Optional. Specifies that the WIC-1DSU-T1-V2 card will enter loopback mode when it receives a loopback code on the line. |
| | | The keywords are as follows: |
| | | • **full**—enables standard loopup codes: 1-in-5 pattern for loopup mode and 1-in-3 pattern for loopdown mode. |
| | | • **payload v54**—enables v54 pseudo-random loopup and loopdown codes for loopup and loopdown modes. |

# Verifying Enabling of Remote Loopback Testing

To verify the loopback status of the current interface, after the far end has been put in loopback mode, enter the command **show service-module serial**<*slot/port*> replacing <*slot/port*> with the slot and port number of the serial interface. The output "Unit is currently in test mode: remote loopback is in progress", as shown in the following example, indicate that remote loopback testing is enabled:

```
Router#show service-module serial0/0
Module type is T1/fractional
    Hardware revision is 0.1, Software revision is 20021210,
    Image checksum is 0x81277248, Protocol revision is 0.1
Receiver has no alarms.
Unit is currently in test mode:
    remote loopback is in progress
Framing is SF, Line Code is AMI, Current clock source is line,
Fraction has 24 timeslots (56 Kbits/sec each), Net bandwidth is 1344 Kbits/sec.
Last module self-test (done at startup): Passed
Last clearing of alarm counters 01:52:27
    loss of signal       :    1, last occurred 01:45:24
    loss of frame        :    2, last occurred 01:45:24
    AIS alarm            :    0,
    Remote alarm         :    0,
    Module access errors :    0,
Total Data (last 7 15 minute intervals):
    255 Line Code Violations, 0 Path Code Violations
    1 Slip Secs, 326 Fr Loss Secs, 6 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 7 Severely Err Secs, 327 Unavail Secs
Data in current interval (445 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, 1 Severely Err Secs, 0 Unavail Secs
```

# Configuration Example

This section provides a configuration example for a Cis co 1751 router with a WIC-1DSU-T1-V2 card installed. It is in a short cable environment (between 330 and 440 feet here), and is set to enter loopback when a loopback code is received on the line.

```
Current configuration :
!
version 12.2
no parser cache
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 1751-uut1
!
interface Serial0/0
 ip address 10.0.0.51 255.0.0.0
 service-module t1 framing esf
 service-module t1 linecode b8zs
 service-module t1 timeslots 1-12 speed 64
 service-module t1 data-coding normal
 service-module t1 cablelength short 440ft
 service-module t1 remote-loopback full
!
interface FastEthernet0/0
 ip address 6.0.0.1 255.0.0.0
 speed auto
 full-duplex
!
ip classless
no ip http server
!
!
line con 0
line aux 0
line vty 0 4
 login
!
end
```

# Command Reference

This section documents new and modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2T command reference publications.

**New**

- **service-module t1 cablelength short**

**Modified**

- **service-module t1 remote-loopback**

# service-module t1 cablelength short

To set transmission attenuation for shorter cable lengths, use the **service-module t1 cablelength short** command in interface configuration mode. To disable, use the **no** form of this command.

**service-module t1 cablelength short {110ft | 220ft | 330ft | 440ft | 550ft | 660ft}**

**no service-module t1 cablelength short**

| Syntax Description | | |
|---|---|---|
| | **110ft** | For a cable length of from 0 to 110 feet. |
| | **220ft** | For a cable length of from 110 to 220 feet. |
| | **330ft** | For a cable length of from 220 to 330 feet. |
| | **440ft** | For a cable length of from 330 to 440 feet. |
| | **550ft** | For a cable length of from 440 to 550 feet. |
| | **660ft** | For a cable length of from 550 to 660 feet. |

**Defaults**     No default behavior or values.

**Command Modes**     Interface configuration mode.

**Command History**

| Release | Modification |
|---|---|
| 12.2( 15)ZL | This command was introduced. |

**Usage Guidelines**     This command is intended only for the Version 2 card, WIC-1-DSU-T1 V2, as part of the **service-module t1** configuration options.

Use this command to configure the tx attenuation for cables whose length is shorter than 660ft. The related command, **service-module t1 lbo**, is used to define the line-build-out values for cablelengths longer than 660ft. At any time, only one, either the short configuration or the lbo configuration, can exist. They cannot co-exist. The configuration of one command will cause the effect of the other command to cease and only the new command will be in effect. The **no** form of this command will configure the attenuation to the default line-build-out gain of 0 db.

**Examples**     The following example sets the short cablelength to 220ft.

```
Router(config)#int s0/0
Router(config-if)#service-module t1 cablelength short 220ft
```

**Related Commands**

| Command | Description |
|---|---|
| **service-module t1 lbo** | Configures the CSU line-build-out (lbo) on a fractional T1/T1 DSU/CSU module. |

# service-module t1 remote-loopback

To specify that the fractional T1/T1 DSU/CSU module enters 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.

**Defaults**  Full and payload loopbacks with standard-loopup codes.

**Command Modes**  Interface configuration mode.

**Command History**

| Release | Modification |
|---|---|
| 11.2 | This command was introduced. |
| 12.2( 15)ZL | The provision for an **alternate** loopback code was removed. |

**Usage Guidelines**  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.

To have the loopback remote commands on the FT1/T1 CSU/DSU module function successfully, you need to enable the **service-module t1 remote-loopback** command.

**Examples**

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**

| Command | Description |
| --- | --- |
| **loopback remote (interface)** | Loops packets through a DSU/CSU to a remote DSU/CSU and back, over a channelized T1 link. |

■ **service-module t1 remote-loopback**