

Connecting WAN and Voice Interface Cards to a Network

This chapter describes how to connect Cisco WAN interface cards to a network and contains the following sections:

- Serial Cards on page 3-1
- 1-Port ISDN BRI Cards on page 3-6
- 1-Port ISDN BRI S/T Leased-Line Card on page 3-15
- 1-Port 56/64-kbps DSU/CSU Card on page 3-18
- 1-Port T1/FT1 DSU/CSU Card on page 3-20
- Voice Interface Cards on page 3-23
- Multiflex Trunk Interface Cards on page 3-34

Serial Cards

This section describes the following Cisco WAN interface cards:

- 1-Port and 2-Port Serial Cards on page 3-2
- 2-Port Asynchronous/Synchronous Serial Card on page 3-3

1-Port and 2-Port Serial Cards

The 1-port serial WAN interface card, shown in Figure 3-1, and the 2-port serial WAN interface card, shown in Figure 3-2, provide an EIA/TIA-232, EIA/TIA-449, V.35, X.21, data terminal equipment/data communications equipment (DTE/DCE), EIA-530 DTE, or nonreturn to zero/nonreturn to zero inverted (NRZ/NRZI) serial interface to a Cisco modular router.

Note In Cisco 3600 and Cisco 2600 series routers, the 2-port serial WAN interface card supports both asynchronous (up to 115.2 kbps) and synchronous (up to 2.048 Mbps) data rates. The 1-port serial WAN interface card supports only synchronous data rates up to 2.048 Mbps.

In the Cisco 1720 router, the 1-port and 2-port serial WAN interface cards support both asynchronous (up to 115.2 kbps) and synchronous (up to 2.048 Mbps) data rates.

In Cisco 1600 series routers, the 1-port serial WAN interface card supports asynchronous data rates up to 115.2 kbps, and synchronous data rates up to 2.048 Mbps. The 2-port serial WAN interface card is not supported on this platform.

Each serial card has one LED, labeled CONN for each port, which lights when the serial port is connected. When the port is in DTE mode, the CONN LED indicates that Data Send Ready (DSR), Data Carrier Detect (DCD), and Clear To Send (CTS) have been detected. When the port is in DCE mode, it indicates that Data Terminal Ready (DTR) and Ready To Send (RTS) have been detected.

Figure 3-1 1-Port Serial WAN Interface Card—Front Panel

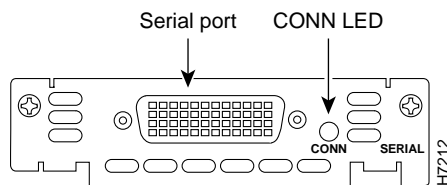
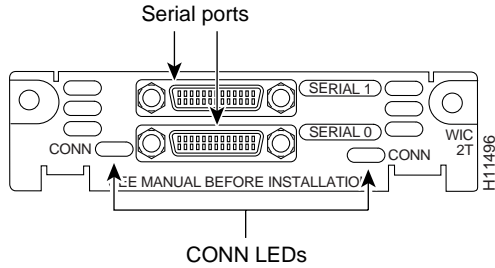


Figure 3-2 2-Port Serial WAN Interface Card—Front Panel



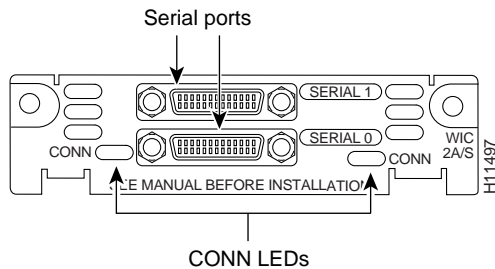
2-Port Asynchronous/Synchronous Serial Card

The 2-port asynchronous/synchronous (A/S) WAN interface card, shown in Figure 3-3, provides an EIA/TIA-232, EIA/TIA-449, V.35, X.21, DTE/DCE, EIA-530, or EIA-530A serial interface to a Cisco modular router.

Note In Cisco 3600 series, 2600 series, and 1720 routers, the 2-port A/S WAN interface card supports both asynchronous (up to 115.2 kbps) and synchronous (up to 128 kbps) data rates.

The 2-port A/S WAN interface card is not supported in Cisco 1600 series routers.

Figure 3-3 2-Port A/S Serial WAN Interface Card—Front Panel



Connecting Serial WAN Interface Cards to a Network

The 1-port serial WAN interface card has a DB-60 serial port, whereas the 2-port serial WAN interface card and the 2-port A/S WAN interface card have “smart serial” ports. Use the correct cable for your serial WAN interface card.

The serial cable attached to this receptacle determines the port’s electrical interface type and mode (DTE or DCE).

Types of Serial Cables

Six types of serial cables (also called serial adapter cables or serial transition cables) are available from Cisco Systems:

- EIA/TIA-232 serial cable assembly
- EIA/TIA-449 serial cable assembly
- V.35 serial cable assembly
- X.21 serial cable assembly
- EIA/TIA-530 serial cable assembly
- EIA/TIA-530A serial cable assembly

All serial cables provide a universal plug at the interface card end. The network end of each cable provides the physical connectors most commonly used for the interface. For example, the network end of the EIA/TIA-232 serial cable is a DB-25 connector, the most widely used EIA/TIA-232 connector.

All serial interface types except EIA-530 are available in DTE or DCE format: DTE with a plug connector at the network end and DCE with a receptacle at the network end. V.35 is available in either mode with either gender at the network end. EIA-530 is available in DTE only.

Connecting the Card to the Network

After you install the serial WAN interface card, use the appropriate serial cable to connect the interface card's serial port to one of the following types of equipment (see Figure 3-4):

- An asynchronous modem, if connecting to an analog telephone line
- A synchronous modem, data service unit/channel service unit (DSU/CSU), or other DCE, if connecting to a digital WAN line

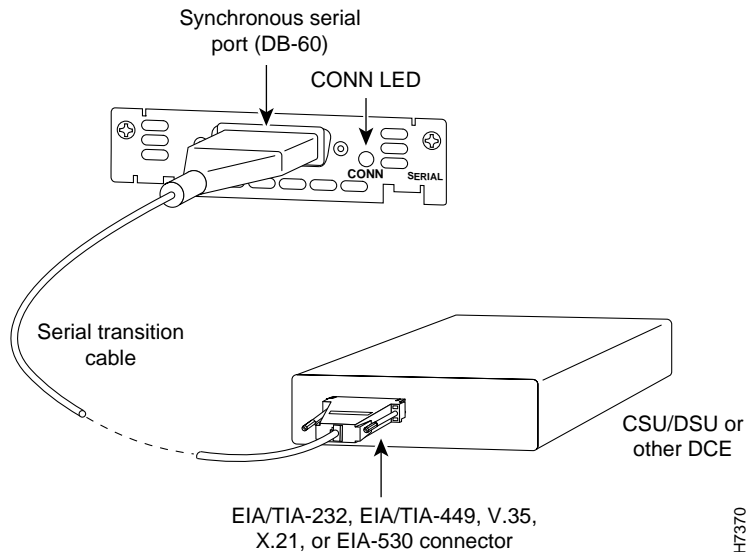
Note For connection limitations, see the “1-Port and 2-Port Serial Cards” section on page 3-2, and the “2-Port Asynchronous/Synchronous Serial Card” section on page 3-3.

Take the following steps to connect the serial card to the WAN:

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of the appropriate serial cable to the card's DB-60 port.
- Step 3** Connect the other end of the cable to the appropriate type of equipment, as shown in Figure 3-4.

1-Port ISDN BRI Cards

Figure 3-4 Connecting the Serial WAN Port to a Modem or DSU/CSU



Step 4 Turn ON power to the router by pressing the power switch to the ON (|) position.

Step 5 Check that the CONN LED goes on, which indicates that the card's serial port detects the WAN serial connection.

If you have additional cards to install, proceed to the appropriate section(s) in this manual. When you have finished all installations, see the software configuration guide that shipped with your hardware.

1-Port ISDN BRI Cards

This section describes the following Cisco ISDN BRI WAN interface cards:

- 1-Port BRI S/T WAN Cards (WIC36-1B-S/T, WIC-1B-S/T) on page 3-7
- 1-Port BRI with NT1 WAN Cards (WIC36-1B-U, WIC-1B-U) on page 3-7

1-Port BRI S/T WAN Cards (WIC36-1B-S/T, WIC-1B-S/T)

You can distinguish between WIC36 and WIC models of a BRI WAN interface card by the location and labeling of the LEDs, and the number and location of cutouts in the faceplate.

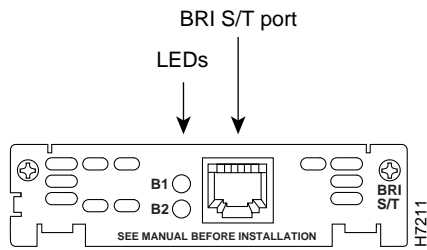
1-Port BRI S/T WAN Cards (WIC36-1B-S/T, WIC-1B-S/T)

The 1-Port ISDN-BRI WAN interface cards (WIC36-1B-S/T, WIC-1B-S/T) connect to an ISDN WAN through an external NT1 device. (See Figure 3-5 and Figure 3-6.) This interface is also known as an S/T interface.

1-Port BRI with NT1 WAN Cards (WIC36-1B-U, WIC-1B-U)

The 1-Port ISDN-BRI with NT1 WAN interface cards (WIC36-1B-U, WIC-1B-U) connect to an ISDN WAN using a built-in NT1 device. (See Figure 3-7 and Figure 3-8.) This interface is also known as a U interface.

Figure 3-5 1-Port ISDN BRI WAN Interface Card (S/T Interface) (WIC36-1B-S/T)



1-Port ISDN BRI Cards

Figure 3-6 1-Port ISDN BRI WAN Interface Card (S/T Interface) (WIC-1B-S/T)

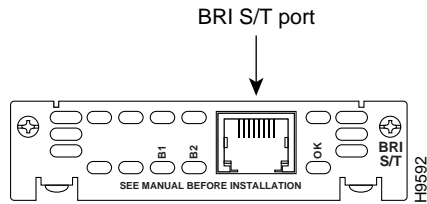


Figure 3-7 1-Port ISDN BRI with NT1 WAN Interface Card (U Interface) (WIC36-1B-U)

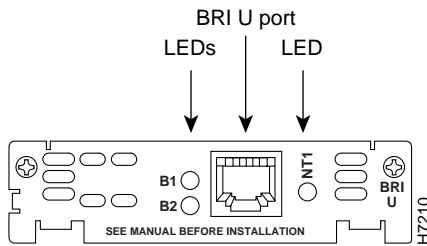
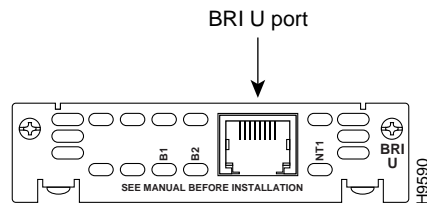


Figure 3-8 1-Port ISDN-BRI with NT1 WAN Interface Card (U Interface) (WIC-1B-U)



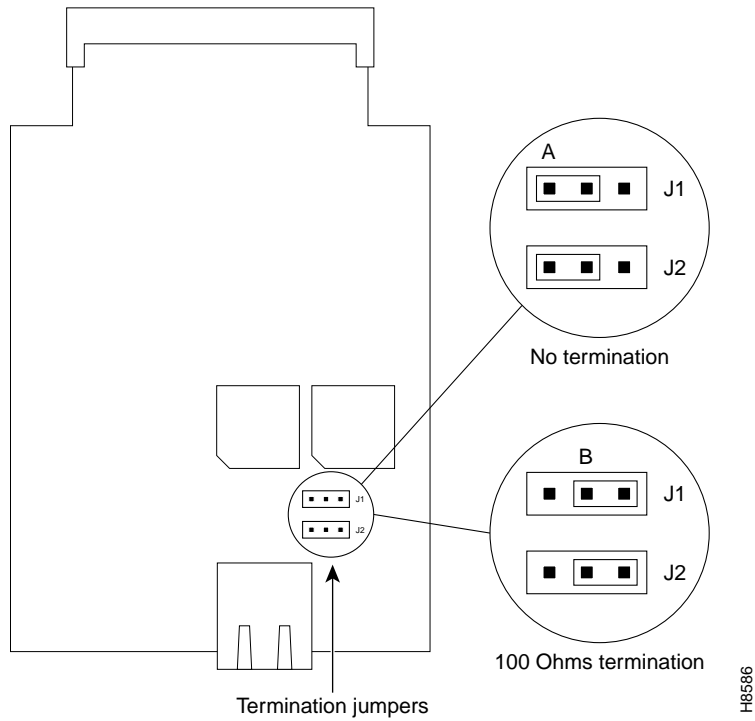
Setting Jumpers on ISDN BRI Cards

The older BRI S/T WAN interface cards (product numbers WIC36-1B-S/T, WIC36-1B-U, CPAWIC36-1B-S/T, CPAWIC36-1B-U) have two termination jumpers, labeled J1 and J2. Before installing this card, ensure that the termination jumpers are set appropriately for your installation.

The jumpers are factory-configured in the B position (100-ohms termination). Keep the jumpers in this position to use the BRI S/T WAN interface card in a point-to-point connection or as the last device on the line of a passive-bus connection. Set the termination jumpers to the A position to use the BRI S/T WAN interface card in a passive-bus connection where it is not the last device on the line. The jumpers are shown in Figure 3-9.

The newer BRI interface cards (product numbers WIC-M1B-S/T or WIC-M1B-U) do not have termination jumpers.

Figure 3-9 Termination Jumpers on the Older BRI S/T WAN Interface Card



Connecting ISDN BRI Cards

Note The older BRI WAN interface cards mount only in the W1 slot of a two-slot module and provide a single BRI interface. The newer BRI WAN interface cards can mount in either slot of a two-slot module.

For more information on BRI network modules, see the publication *Cisco Network Modules Hardware Installation Guide*.



Warning Network hazardous voltages are present in the BRI cable. If you detach the BRI cable, detach the end away from the router first to avoid possible electric shock. Network hazardous voltages also are present on the system card in the area of the BRI port (RJ-48C connector), regardless of when power is turned OFF. (To see translated versions of this warning, see the *Regulatory Compliance and Safety Information* document that accompanied the router.)



Warning The ISDN connection is regarded as a source of voltage that should be inaccessible to user contact. Do not attempt to tamper with or open any public telephone operator (PTO)-provided equipment or connection hardware. Any hardwired connection (other than by a nonremovable, connect-one-time-only plug) must be made only by PTO staff or suitably trained engineers. (To see translated versions of this warning, see the *Regulatory Compliance and Safety Information* document that accompanied the router.)

Use a BRI cable (not included) to connect the BRI WAN interface card directly to an ISDN. See the online document *Cisco Modular Access Router Cable Specifications* for pinouts. This document is located on both the Documentation CD-ROM that accompanied your router package, and Cisco Connection Online.

Take the following steps to connect an ISDN BRI S/T WAN interface card to an NT1 device:

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of a straight-through RJ-48C-to-RJ-48C cable to the card's RJ-48C connector.
- Step 3** Connect the other end of the cable to the NT1, as shown in Figure 3-10.
- Step 4** Connect the NT1 to the ISDN wall jack according to the documentation that came with the NT1.
- Step 5** Turn ON power to the router.

1-Port ISDN BRI Cards

Take the following steps to connect an ISDN BRI with NT1 WAN interface card to an ISDN network:

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of a straight-through RJ-48C-to-RJ-48C cable to the card's RJ-48C connector.
- Step 3** Connect the other end of the cable directly to the ISDN wall jack as shown in Figure 3-11.
- Step 4** Turn ON power to the router.

Figure 3-10 Connecting a BRI S/T WAN Interface Card to an NT1

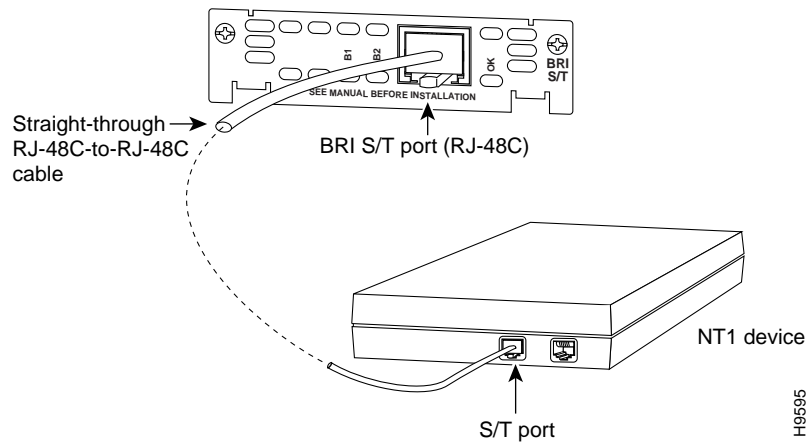
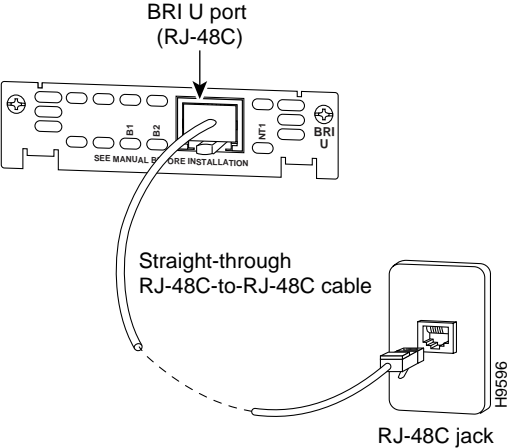


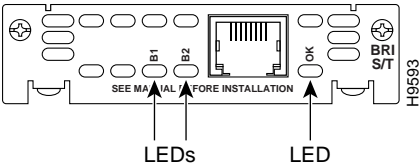
Figure 3-11 Connecting a BRI U WAN Interface Card to an ISDN Outlet



BRI WAN Interface Card LEDs

BRI S/T WAN interface cards have three LEDs, shown in Figure 3-12 for WIC-1B-S/T and Figure 3-13 for the WIC36-1B-S/T, and described in Table 3-1. The B1 and B2 LEDs indicate call activity on the two ISDN BRI B channels. The OK LED indicates that the ISDN port has synchronized with the central office switch (the D channel is active).

Figure 3-12 ISDN BRI S/T WAN Interface Card LEDs (WIC-1B-S/T)



1-Port ISDN BRI Cards

Figure 3-13 ISDN BRI S/T WAN Interface Card LEDs (WIC36-1B-S/T)

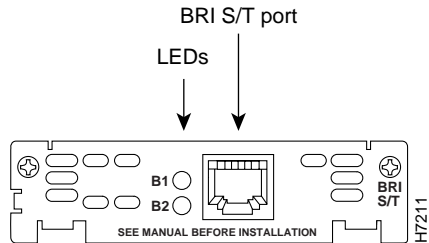


Table 3-1 BRI S/T WAN Interface Card LEDs

LED	Meaning
B1	Active connection on B1 channel.
B2	Active connection on B2 channel.
OK	ISDN port has established a connection with the central office switch.

BRI U WAN interface cards also have three LEDs, shown in Figure 3-14 for WIC-1B-U and Figure 3-15 for WIC36-1B-U, and described in Table 3-2. The B1 and B2 LEDs indicate call activity on the two ISDN BRI B channels. The NT1 LED indicates synchronization status of the NT1.

Figure 3-14 ISDN BRI U WAN Interface Card LEDs (WIC-1B-U)

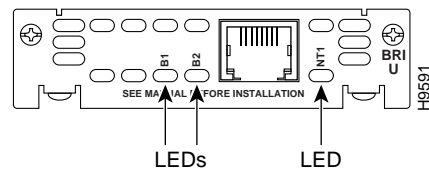


Figure 3-15 ISDN BRI U WAN Interface Card LEDs (WIC36-1B-U)

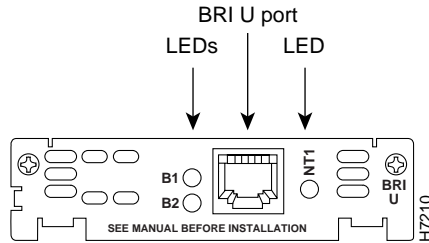


Table 3-2 ISDN BRI U WAN Interface Card LEDs

LED	Meaning
B1	Active connection on B1 channel.
B2	Active connection on B2 channel.
NT1	NT1 has established a connection with the central office switch.

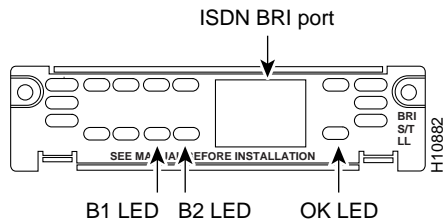
If you have additional cards to install, proceed to the appropriate section(s) in this manual. When you have finished all installations, see the software configuration guide that shipped with your hardware.

1-Port ISDN BRI S/T Leased-Line Card

The ISDN BRI S/T Leased-Line card provides a single B channel operating in leased-line mode. (See Figure 3-16.)

1-Port ISDN BRI S/T Leased-Line Card

Figure 3-16 ISDN BRI S/T Leased-Line Card—Front Panel



Connecting the ISDN BRI S/T Leased-Line Card to the Network

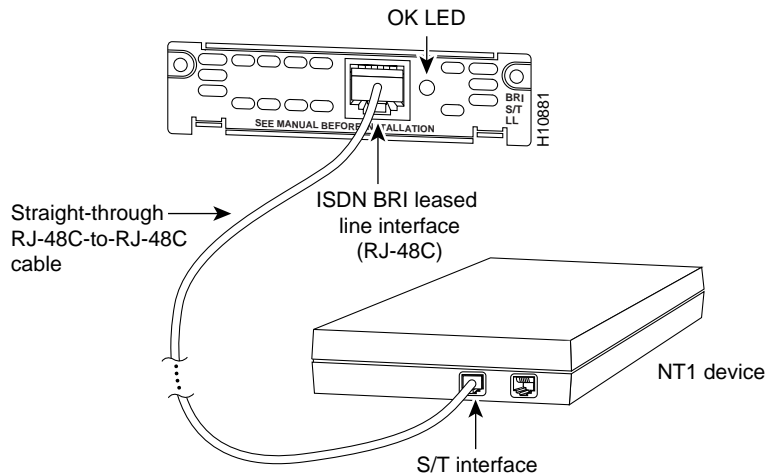
You must provide an RJ-48C-to-RJ-48C cable and an external NT1 for this connection.

Note Turn the router OFF before making cable connections to the WAN interface card ISDN BRI S/T leased-line port.

Take the following steps to connect the ISDN cables:

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of the RJ-48C cable to the card's ISDN BRI leased-line port.
- Step 3** Connect the other end of the cable to the NT1, as shown in Figure 3-17.
- Step 4** Connect the NT1 to the ISDN wall jack according to the documentation that came with the NT1.

Figure 3-17 Connecting the ISDN BRI S/T Leased-Line Card to the NT1



- Step 5** Turn ON power to the router by pressing the power switch to the ON (|) position.
- Step 6** Check that the OK LED goes on, which indicates that the card's ISDN port has synchronized with the central office switch.

Configuring the ISDN BRI S/T Leased-Line Interface

After you connect the ISDN cable, you can configure the ISDN interface. The leased-line WAN interface card supports a 64-kbps leased line on the B1 channel only. The WAN interface card is automatically configured in leased-line mode. Refer to the software configuration guide that came with your router for information on how to configure the ISDN interface.

ISDN BRI S/T Leased-Line WAN Interface Card LEDs

ISDN BRI S/T Leased-Line card has three LEDs, which are described in Table 3-3.

1-Port 56/64-kbps DSU/CSU Card

Table 3-3 ISDN BRI S/T Leased Line Card LEDs

LED	Meaning
B1	ISDN connection on B1 channel.
B2 ¹	ISDN connection on B2 channel.
OK	ISDN port has synchronized with the central office switch.

1 Always off for 64 kbps, which is available on B1 only.

If you have additional cards to install, proceed to the appropriate section(s) in this manual. When you have finished all installations, see the software configuration guide that shipped with your hardware.

1-Port 56/64-kbps DSU/CSU Card

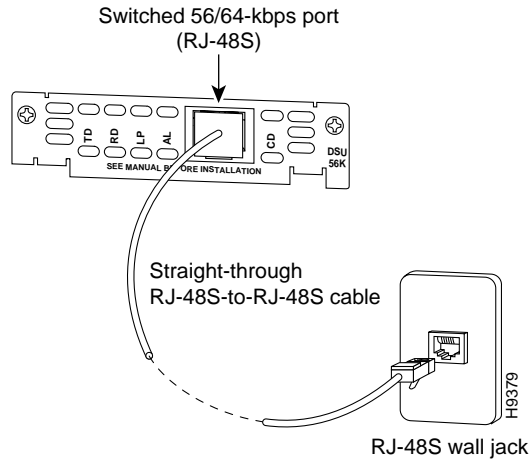
The 1-port 56/64-kbps WAN interface card includes an integral DSU/CSU and can be configured to provide circuit-switched, dedicated, or leased-line service at 56 kbps. This card also supports 64-kbps dedicated lines.

Connecting the 56/64-kbps Card to the Network

You must provide a straight-through RJ-48S-to-RJ-48S or a straight-through RJ-48C-to-RJ-48C cable for this connection.

- Step 1** Confirm that the router is OFF.
- Step 2** Connect one end of the cable to the card's 56/64-kbps port.
- Step 3** Connect the other end to the 56/64-kbps services wall jack, as shown in Figure 3-18.

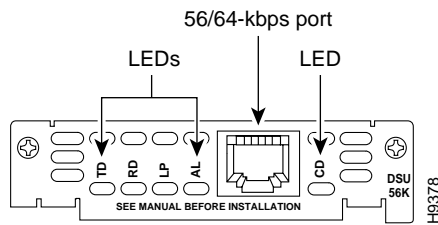
Figure 3-18 Connecting the 56/64-kbps Card to an RJ-48S Jack



56/64-kbps WAN Interface Card LEDs

The 56/64-kbps card has five LEDs, which are shown in Figure 3-19 and described in Table 3-4.

Figure 3-19 56/64-kbps Card Front Panel



1-Port T1/FT1 DSU/CSU Card

Table 3-4 56/64-kbps Card LEDs

LED	Meaning
TD	Data is being transmitted to the DTE interface.
RD	Data is being received from the DTE interface.
LP	Internal DSU/CSU is in loopback mode.
AL	One of these alarm conditions is present: no receive signal, loss of frame signal from the remote station, or out of service signal from the remote station. This LED is off during normal operation.
CD	Internal DSU/CSU in the WAN interface card is communicating with another DSU/CSU.

If you have additional cards to install, proceed to the appropriate section(s) in this manual. When you have finished all installations, see the software configuration guide that shipped with your hardware.

1-Port T1/FT1 DSU/CSU Card

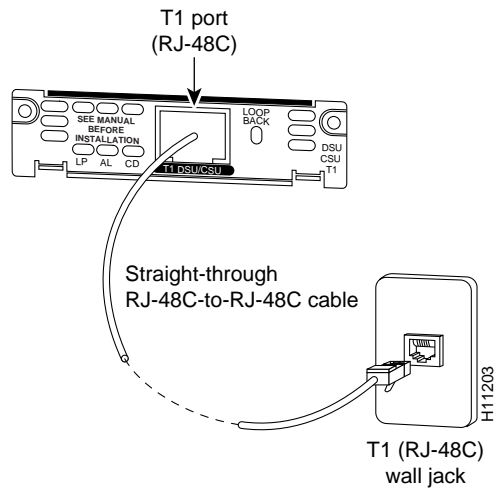
The 1-port T1/Fractionalized T1 (FT1) WAN interface card includes an integrated data service unit/channel service unit (DSU/CSU) and can be configured for either full T1 or fractionalized T1 services.

Connecting the T1/FT1 Card to the Network

For this connection, use the straight-through RJ-48C-to-RJ-48C cable that came with your card.

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of the cable to the T1 port on the card.
- Step 3** Connect the other end to the T1 wall jack (RJ-48C) at your site, as shown in Figure 3-20.

Figure 3-20 Connecting the T1/FT1 Card to the T1 Wall Jack



Step 4 Turn ON power to the router.

Step 5 Check that the CD LED goes on, which means that the card's internal DSU/CSU is communicating with the DSU/CSU at the T1 service provider's central office.

T1/FT1 WAN Interface Card LEDs

The T1/FT1 card has three LEDs and a loopback button, which are shown in Figure 3-21 and described in Table 3-5.

Figure 3-21 T1/FT1 Card—Front Panel

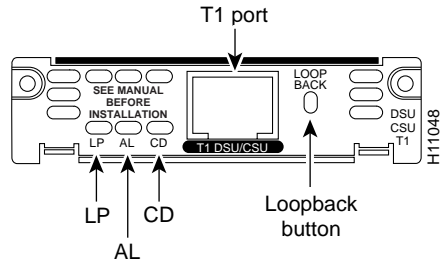


Table 3-5 T1/FT1 Card LEDs and Button

Feature	Color	Description
LP LED	Yellow	Line or loopback state is detected or is manually set by the user.
	Off	Normal operation.
AL LED	Red	No receive signal.
	Yellow	Remote station has an alarm condition.
	Blue	The remote station is probably out of service. If the remote station is an IOS-based router, its interface may be shut down.
	Off	Normal operation.
CD LED	Green	Internal DSU/CSU in the WAN interface card is communicating with another DSU/CSU. This LED is on during normal operation.

Table 3-5 T1/FT1 Card LEDs and Button (continued)

Feature	Color	Description
Loopback button		<p>Push this button to place the WAN interface card into loopback mode. The service provider can send a signal to test the connection from your site to the central office switch.</p> <p>Push this button again to turn loopback mode off.</p>

If you have additional cards to install, proceed to the appropriate section(s) in this manual. When you have finished all installations, see the software configuration guide that shipped with your hardware.

Voice Interface Cards

Voice network modules convert telephone voice signals into a form that can be transmitted over an IP network, and have no connectors. Voice interface cards provide the connection to the telephone equipment or network.

This section contains the following topics:

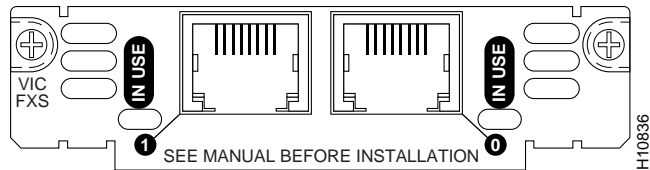
- 2-Port FXS Card on page 3-23
- 2-Port FXO Card on page 3-25
- 2-Port E&M Card on page 3-28
- 2-Port FXS, FXO, and E&M Card LEDs on page 3-29
- 2-Port ISDN BRI Card on page 3-30

2-Port FXS Card

A Foreign Exchange Station (FXS) interface connects directly to a standard telephone, fax machine, or similar device. This interface supplies ringing voltage, dial tone, and so on to the station. The ports are shown in Figure 3-22.

Voice Interface Cards

Figure 3-22 2-Port FXS Card Front Panel



Connecting the 2-Port FXS Card

Use a standard RJ-11 modular telephone cable to connect this card to a telephone or fax machine.

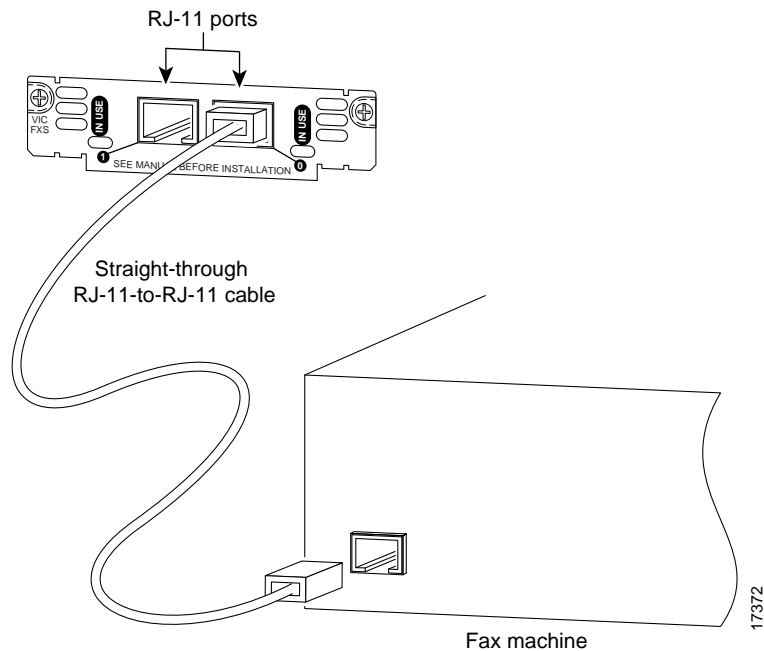
Note Ports on this interface card are color-coded gray.

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of the cable to an RJ-11 port on the card. (See Figure 3-23.)
- Step 3** Connect the other end to the RJ-11 port on the telephone or fax machine.



Caution Do not connect an FXS interface directly to the public switched telephone network.

Figure 3-23 Connecting the 2-Port FXS Card



2-Port FXO Card

A Foreign Exchange Office (FXO) interface connects local calls to a central office or PBX. This is the interface a standard telephone provides. The card is illustrated in Figure 3-24.

Note Ports on this interface card are color-coded pink.

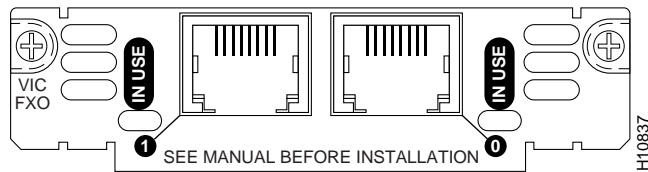
VIC-2FXO and VIC-2FXO-M1 are intended for use in North America (United States, Canada, and Mexico).

VIC-2FXO-EU and VIC-2FXO-M2 are intended for use in Europe.

Voice Interface Cards

VIC-2FXO-M3 is intended for use in Australia.

Figure 3-24 2-Port FXO Card Front Panel



Setting Jumpers on the 2-Port FXO Card

The FXO voice interface card includes two jumper headers, W3 and W4, to set loop-start or ground-start mode. One jumper configures each FXO port. The default setting, which should be satisfactory in most installations, is loop start. In this setting, jumpers are placed over positions 2 and 3 of headers W3 and W4.

Most modern central office equipment, such as DMS-100 and 5ESS switches, provides calling party control (CPC) and Ring on Seize on loop-start lines. CPC allows quicker disconnection, and Ring on Seize minimizes glare (collision of inbound and outbound calls on the same interface). If your central office does not provide these features on loop start, you may want to configure the FXO card for ground-start operation instead by moving the jumpers to positions 1 and 2.

For proper operation, both jumpers must be configured identically. In most cases, jumper setting should have little or no effect on operation.

Note This setting does not apply to VIC-2FXO-EU.

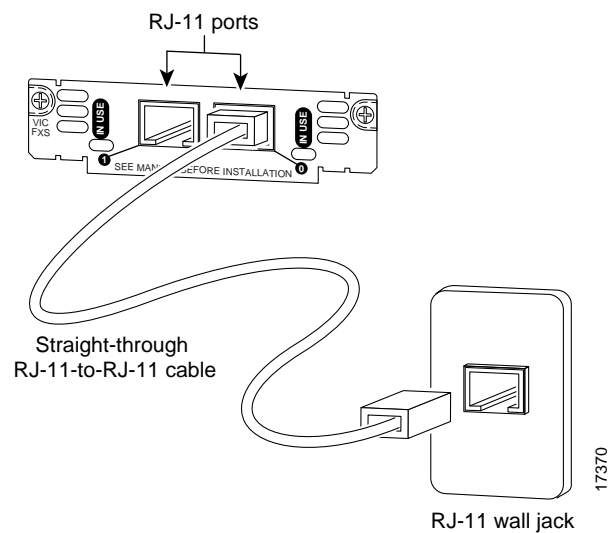
Connecting the 2-Port FXO Card

Use a standard RJ-11 modular telephone cable to connect the VIC-2FXO voice interface card to the PSTN or PBX through a telephone wall outlet.

Step 1 Confirm that the router is still turned OFF.

- Step 2** Connect one end of the cable to an RJ-11 port on the card. (See Figure 3-25.)
- Step 3** Connect the other end to the telephone wall outlet (RJ-11 port).

Figure 3-25 Connecting the 2-Port FXO Card



VIC-2FXO-EU is intended for use in Europe; VIC-2FXO-M3 is intended for use in Australia.

In countries where PSTNs do not use RJ-11 wall outlets, use a suitable adapter to convert the plug on an RJ-11 modular cable to the type of wall outlet connector used locally. These adapters are not sold by Cisco Systems, but are available from other vendors.



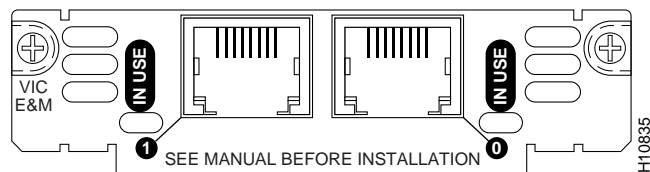
Caution Connect only an FXO interface approved for use in your country to the PSTN. Otherwise, connect the FXO interface only to a PBX. Connections from the PBX to the PSTN are permitted.

2-Port E&M Card

RecEive and transMit (E&M) is a signaling technique for two-wire and four-wire telephone and trunk interfaces. The E&M interface typically connects remote calls from an IP network to a PBX. The card is illustrated in Figure 3-26.

Note Ports on the E&M voice interface card are color-coded brown.

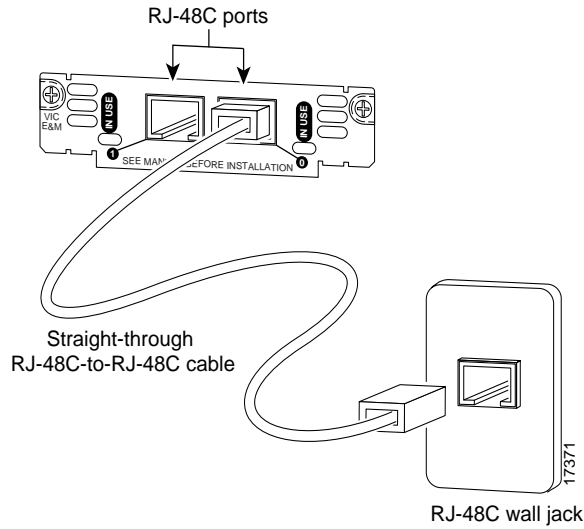
Figure 3-26 2-Port E&M Card Front Panel



Connecting the 2-Port E&M Card

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of a straight-through RJ-48C-to-RJ-48C cable to the card's RJ-48C port. (See Figure 3-27.)
- Step 3** Connect the other end to the RJ-48C wall outlet.

Figure 3-27 Connecting the 2-Port E&M Card



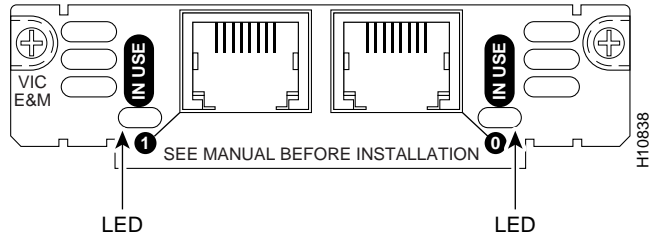
Caution Do not connect an E&M interface directly to the PSTN.

2-Port FXS, FXO, and E&M Card LEDs

Each voice interface card has two IN USE LEDs, one for each channel.

Figure 3-28 shows a voice interface card with E&M interface as an example.

Figure 3-28 Voice Interface Card LEDs

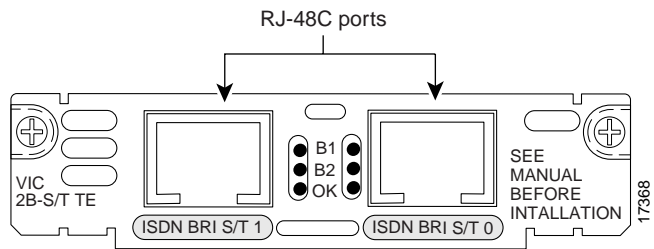


2-Port ISDN BRI Card

The ISDN BRI voice interface card provides a client-side (TE) ISDN S/T physical interface for connection to an NT1 terminating an ISDN telephone network. Each of its two ports can carry two voice calls (one over each ISDN B channel) for a total of four calls per ISDN BRI card.

The card is illustrated in Figure 3-29.

Figure 3-29 2-Port ISDN BRI Card Front Panel



ISDN BRI Card Considerations

To use all four voice channels, you must install the ISDN BRI card in slot 0 of a two-slot voice network module (Cisco part number NM-2V). Slot 1 should remain empty.

Note If slot 0 is unoccupied, the system treats it as a pair of analog voice ports.

If you install any of the following configurations, the Cisco IOS software disables certain ports, as shown in Table 3-6:

- An ISDN BRI voice interface card in a one-slot voice network module (Cisco part number NM-1V)
- Two ISDN BRI voice interface cards in a two-slot voice network module
- One ISDN BRI voice interface card and one analog voice interface card (VIC-2FXS, VIC-2FXO, VIC-2FXO-EU, VIC-2FXO-M3, or VIC-2E/M) in a two-slot voice network module

Table 3-6 Voice Interface Card Configurations

Network Module	Slot	Voice Interface Card	Port	Status
NM-1V	0	VIC-2BRI-S/T-TE	0	Up
			1	Down
NM-2V	0	VIC-2BRI-S/T-TE	0	Up
			1	Up
NM-2V	0	VIC-2BRI-S/T-TE	0	Up
			1	Up
	1	VIC-2BRI-S/T-TE	0	Down
			1	Down
NM-2V	0	VIC-2BRI-S/T-TE	0	Up
			1	Up

Voice Interface Cards

Table 3-6 Voice Interface Card Configurations (continued)

Network Module	Slot	Voice Interface Card	Port	Status
	1	Analog voice interface card	0	Down
			1	Down
	0	Analog voice interface card	0	Up
			1	Up
	1	VIC-2BRI-S/T-TE	0	Up
			1	Down

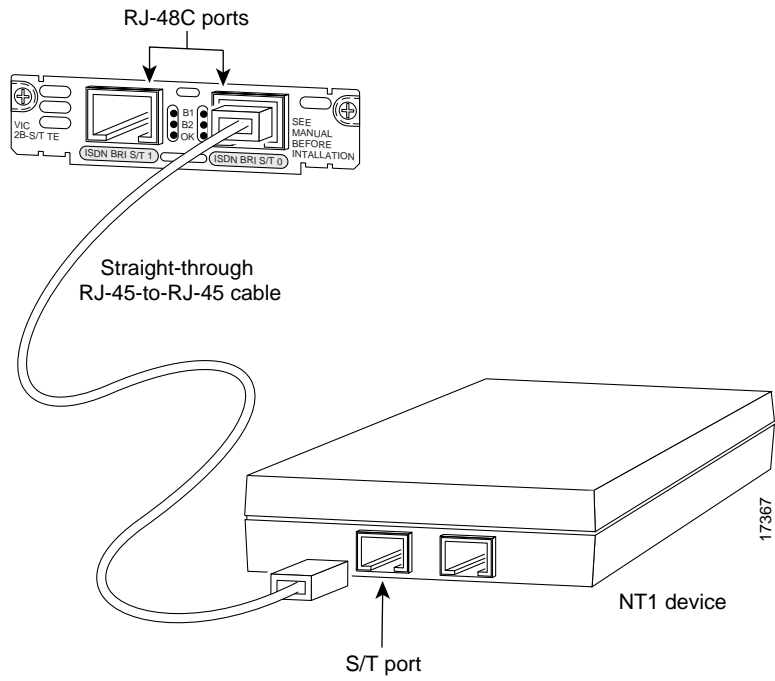
Connecting the 2-Port ISDN BRI Card

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of a straight-through RJ-48C-to-RJ-48C cable to the card's RJ-48C port. (See Figure 3-30.)
- Step 3** Connect the other end to the RJ-48C wall outlet.



Caution To prevent damage to the router, be sure to connect the BRI cable to the BRI connector only, and not to any other RJ-48C connector.

Figure 3-30 Connecting the 2-Port ISDN BRI Card



Multiflex Trunk Interface Cards

ISDN BRI Card LEDs

ISDN BRI voice interface cards have three LEDs as listed in Table 3-7.

Table 3-7 ISDN BRI Voice Interface Card LEDs

LED	Meaning
B1	Call active on B1 channel
B2	Call active on B2 channel
OK	Interface is connected to an ISDN network

If you have additional cards to install, proceed to the appropriate section(s) in this manual. When you have finished all installations, see the software configuration guide that shipped with your hardware.

Multiflex Trunk Interface Cards

The 1- and 2-port T1 and E1 multiflex trunk interface cards support generic single- or dual-port T1 or E1 trunk interfaces for voice, data, and integrated voice/data applications. These cards provide basic structured and unstructured service for T1 or E1 networks. They can be used as trunk interfaces for voice/data services, as fractional n x 64-kbps service for WANs (Frame Relay or leased line), or for time-division multiplexing (TDM) drop-and-insert (voice/data integration) services.

This section contains the following topics:

- 1-Port Multiflex Trunk Interface Cards on page 3-35
- 2-Port Multiflex Trunk Interface Card on page 3-38

1-Port Multiflex Trunk Interface Cards

This section describes the following Cisco 1-port multiflex trunk interface cards:

- 1-Port T1 Multiflex Trunk Interface Card (VWIC-1MFT-T1)
- 1-Port E1 Multiflex Trunk Interface Card (VWIC-1MFT-E1)

You can distinguish between T1 and E1 interface cards by the labeling on the faceplate, as shown in Figure 3-31 and Figure 3-32.

The 1-port T1 and E1 multiflex trunk interface cards provide voice and data access to the Public Switched Telephone Network (PSTN) domain through time-division multiplexing (TDM) ports. The multiflex trunk interface cards are generic single-port trunk interfaces for voice, data, and integrated voice/data applications. These cards provide basic structured and unstructured service for T1 networks and structured service for fractional E1 networks and include an integrated data service unit/channel service unit (DSU/CSU).

Figure 3-31 1-Port T1 Multiflex Trunk Interface Card (VWIC-1MFT-T1)—Front Panel

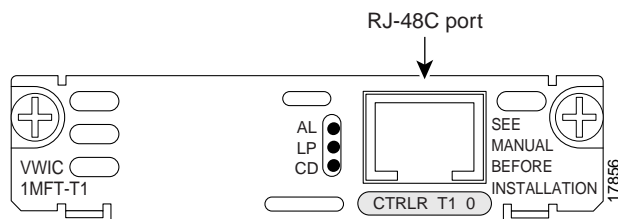
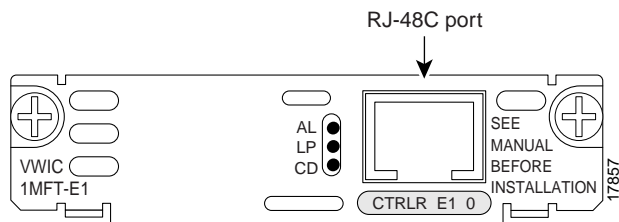


Figure 3-32 1-Port E1 Multiflex Trunk Interface Card (VWIC-1MFT-E1)—Front Panel

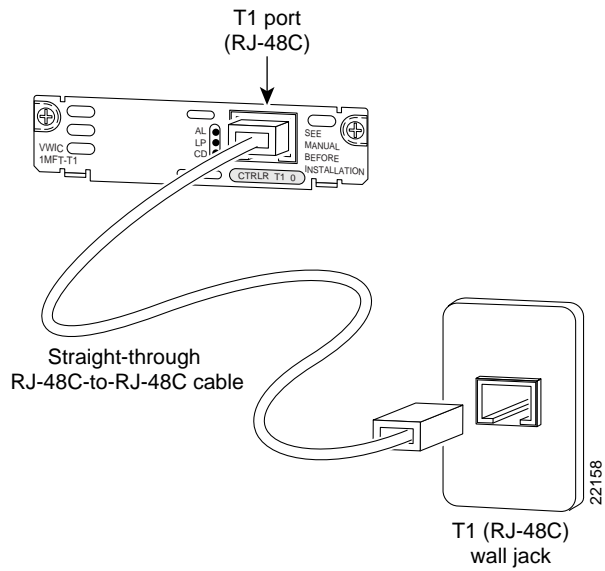


Connecting the 1-Port Multiflex Trunk Interface Card

For this connection, use the straight-through RJ-48C-to-RJ-48C cable that came with your card.

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of the cable to the T1 or E1 port on the card.
- Step 3** Connect the other end to the T1 or E1 wall jack (RJ-48C) at your site, as shown in Figure 3-33.
- Step 4** Turn ON power to the router.
- Step 5** Check that the CD LED goes on, which means that the card's internal DSU/CSU is communicating with the DSU/CSU at the T1 or E1 service provider's central office.

Figure 3-33 Connecting the 1-Port Multiflex Trunk Interface Card to the T1 Wall Jack



Multiflex Trunk Interface Cards

1-Port Multiflex Trunk Interface Card LEDs

The 1-port multiflex trunk interface card has three LEDs, which are shown in Figure 3-31 and Figure 3-32, and described in Table 3-8.

Table 3-8 1-Port Multiflex Trunk Interface Card LEDs

LED	Description	Color
LP LED	On means that a loopback or line state is detected or is manually set by the user. This LED is off during normal operation.	Yellow
AL LED	On means that there is a local or remote alarm state. This LED is off during normal operation.	Yellow
CD LED	On means that a carrier has been detected and the internal DSU/CSU in the WAN interface card is communicating with another DSU/CSU. This LED is on during normal operation.	Green

2-Port Multiflex Trunk Interface Card

This section describes the following Cisco 2-port multiflex trunk interface cards:

- 2-Port T1 Multiflex Trunk Interface Card (VWIC-2MFT-T1)
- 2-Port E1 Multiflex Trunk Interface Card (VWIC-2MFT-E1)
- 2-Port T1 Multiflex Trunk Interface Card with Drop and Insert (VWIC-2MFT-T1-DI)
- 2-Port E1 Multiflex Trunk Interface Card with Drop and Insert (VWIC-2MFT-E1-DI)

You can distinguish between T1, E1, and drop and insert interface cards by the labeling on the faceplate, as shown in Figure 3-34, Figure 3-35, Figure 3-36, and Figure 3-37.

The 2-port multiflex trunk interface card provides voice and data access to the PSTN domain through TDM ports. The 2-port multiflex trunk interface cards are generic dual-port trunk interfaces for voice, data, and integrated voice/data applications. This card provides basic structured and unstructured service for T1 networks and structured service for fractional E1 networks and includes an integrated DSU/CSU. Some 2-port multiflex trunk cards also support the drop and insert process, which adds data to a T1 or E1 data stream, or terminates data from a T1 or E1 data stream to other devices connected to the drop and insert equipment.

Figure 3-34 2-Port T1 Multiflex Trunk Interface Card (VVIC-2MFT-T1) —Front Panel

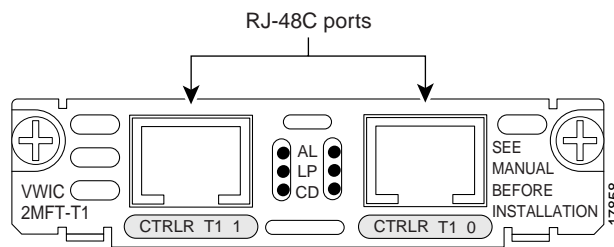
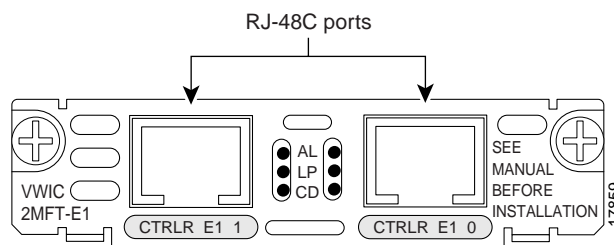


Figure 3-35 2-Port E1 Multiflex Trunk Interface Card (VVIC-2MFT-E1) —Front Panel



Multiflex Trunk Interface Cards

Figure 3-36 2-Port T1 Multiflex Trunk Interface Card with Drop and Insert (VVIC-2MFT-T1-DI) —Front Panel

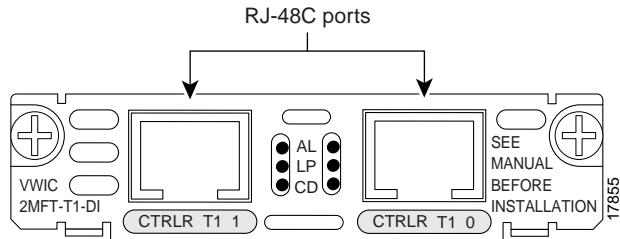
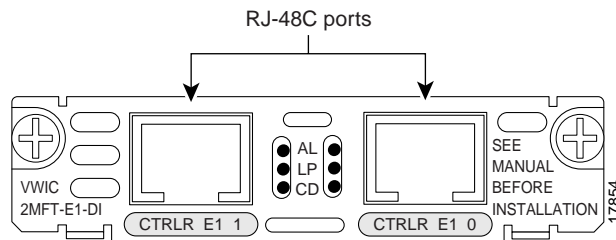


Figure 3-37 2-Port E1 Multiflex Trunk Interface Card with Drop and Insert (VVIC-2MFT-E1-DI) —Front Panel



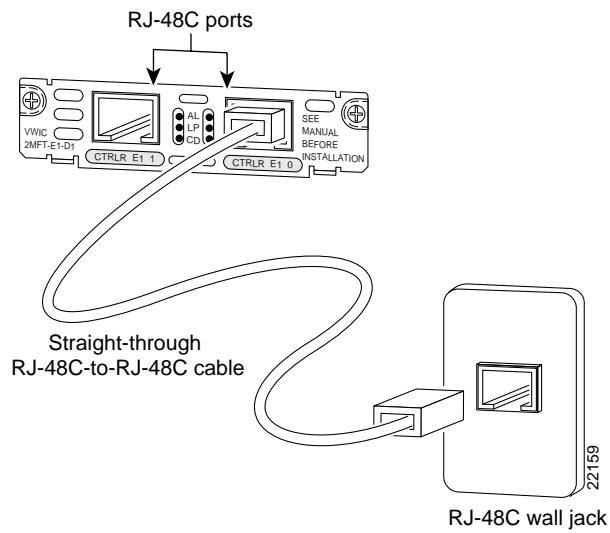
Connecting the 2-Port Multiflex Trunk Interface Card

For this connection, use the straight-through RJ-48C-to-RJ-48C cable that came with your card.

- Step 1** Confirm that the router is still turned OFF.
- Step 2** Connect one end of the cable to the T1 or E1 port on the card.
- Step 3** Connect the other end to the T1 or E1 wall jack (RJ-48C) at your site, as shown in Figure 3-38.

- Step 4** Turn ON power to the router.
- Step 5** Check that the CD LED goes on, which means that the card's internal DSU/CSU is communicating with the DSU/CSU at the T1 or E1 service provider central office.

Figure 3-38 Connecting the 2-Port Multiflex Trunk Interface Card



Multiflex Trunk Interface Cards

2-Port Multiflex Trunk Interface Card LEDs

The 2-port multiflex port interface cards have three LEDs as listed in Table 3-9.

Table 3-9 T1/E1 Multiflex Trunk Interface Card LEDs

LED	Description	Color
LP LED	On means that a loopback or line state is detected or is manually set by the user. This LED is off during normal operation.	Yellow
AL LED	On means that there is a local or remote alarm state. This LED is off during normal operation.	Yellow
CD LED	On means that a carrier has been detected and the internal DSU/CSU in the WAN interface card is communicating with another DSU/CSU. This LED is on during normal operation.	Green