C H A P T E R **3**

Connecting Serial Interface Cards to a Network

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

Serial WAN Interface Cards (WICs)

This section describes how to connect 1- and 2-port serial Cisco WAN interface cards (WICs) to a network and contains the following subsections:

1- and 2-Port Serial WICs

The 1-port serial WIC (WIC-1T), shown in Figure 3-1, and the 2-port serial WIC (WIC-2T), 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 series and Cisco 2600 series routers, the 2-port serial WIC supports both asynchronous (up to 115.2 kbps) and synchronous (up to 2.048 Mbps) data rates. The 1-port serial WIC supports only synchronous data rates up to 2.048 Mbps.

> **Note** In the Cisco 1720 series router, the 1-port and 2-port serial WICs support both asynchronous (up to 115.2 kbps) and synchronous (up to 2.048 Mbps) data rates.

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

Each serial WIC 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.

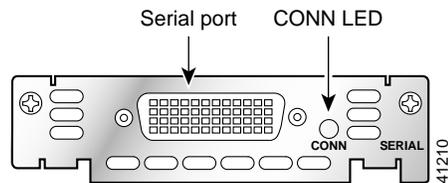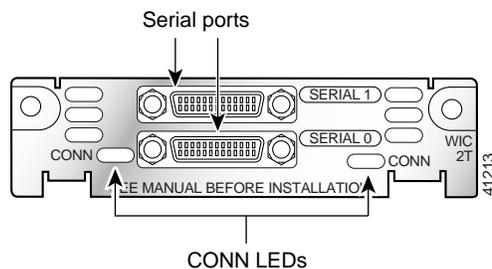*Figure 3-1   1-Port Serial WIC Front Panel (WIC-1T)*

Figure 3-2   2-Port Serial WIC Front Panel (WIC-2T)

2-Port Asynchronous/Synchronous Serial WIC

The 2-port asynchronous/synchronous (A/S) WIC (WIC-2A/S), 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.

Caution To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the 2-port A/S WAN interface card (WIC-2A/S) only to intra-building or non-exposed wiring or cabling. The intrabuilding cable must be shielded and the shield must be grounded at both ends.
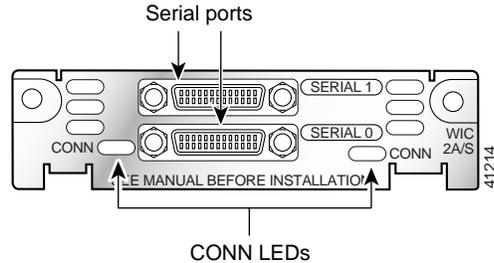
Note In Cisco 3700 series, Cisco 3600 series, Cisco 2600 series, Cisco 1720, and Cisco MWR 1941-DC routers, the 2-port A/S WIC supports both asynchronous (up to 115.2 kbps) and synchronous (up to 128 kbps) data rates.

Note The 2-port A/S WIC is not supported in Cisco 1600 series routers.

Figure 3-3   2-Port A/S Serial WIC Front Panel (WIC-2A/S)

Connecting 1- and 2-Port Serial WICs to a Network

The 1-port serial WIC has a DB-60 serial port, whereas the 2-port serial WIC and the 2-port A/S WIC have Cisco smart serial ports. Use the correct cable for your serial WIC.

The serial cable attached to a smart serial port determines the port's electrical interface type and mode (DTE or DCE).

Tip   A cable providing surge protection (CAB-SS-SURGE) is also available from Cisco Systems. See the "Connecting the Serial WAN Interface Card to the Network" section on page 3-4 for instructions on connecting the surge protector cable.

Types of Cables for 1- and 2-Port Serial WICs

Six types of serial cables (also called *serial adapter cables* or *serial transition cables*) are available from Cisco Systems for 1- and 2-port serial WICs:

- 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 Serial WAN Interface Card to the Network

After you install the serial WIC, use the appropriate serial cable to connect the WIC's serial port to one of the following types of equipment. (See Figure 3-5.):

- An asynchronous modem, if connecting to an analog telephone line

- A synchronous modem, DSU or CSU, or other DCE, if connecting to a digital WAN line

Note For connection limitations, see the "1- and 2-Port Serial WICs" section on page 3-1, and the "2-Port Asynchronous/Synchronous Serial WIC" section on page 3-2.

To connect the serial card to the WAN, follow these steps:

Step 1 Confirm that the router is turned off.

On the Cisco MWR 1941-DC router, turn off power by turning OFF the DC power source at the circuit breaker and taping the circuit breaker into the OFF position.

Caution To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the 2-port A/S WAN interface card (WIC-2A/S) only to intra-building or non-exposed wiring or cabling. The intrabuilding cable must be shielded and the shield must be grounded at both ends.

Step 2 (Optional) Connect the surge protection cable to the connector on the card faceplate. (See Figure 3-4.)

Step 3 (Optional) Connect one end of the appropriate serial cable to the other connector on the surge protector cable. (See Figure 3-4.)
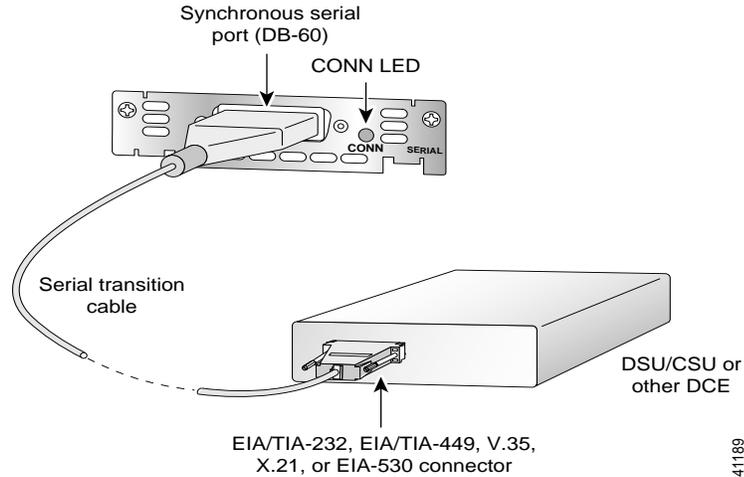
Figure 3-4   Connecting the Cisco Surge Protector Cable (CAB-SS-SURGE) to a Serial WAN Interface
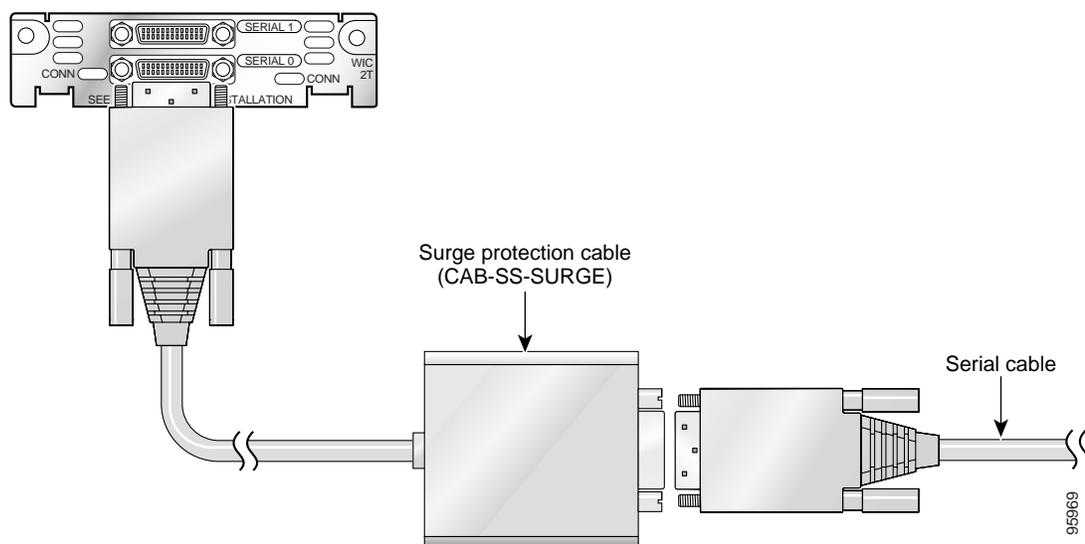
Step 4 Connect one end of the appropriate serial cable to the connector on the card faceplate.

Step 5 Connect the other end of the cable to the appropriate type of equipment, as shown in Figure 3-5.

Figure 3-5   *Connecting the Serial WAN Port to a Modem or DSU/CSU*

Step 6   Turn on power to the router by pressing the power switch to the ON (|) position.

On the Cisco MWR 1941-DC router, turn on power to the router by turning ON the DC power source at the circuit breaker.

Step 7   Check that the CONN LED goes on, which indicates that the card's serial port detects the WAN serial connection.

Serial High Speed WICs (HWICs)

There are five Cisco serial high speed WICs (HWICs). This section describes the HWICs and tells how to connect them to a network. It contains the following subsections:

- 4-Port Multiprotocol High Speed HWIC, page 3-6
- 4-Port Multiprotocol Low Speed Asynchronous/Synchronous HWIC, page 3-6
- 8-Port RS-232 Asynchronous/Synchronous HWIC, page 3-7
- 8-Port Asynchronous HWIC, page 3-7
- 16-Port Asynchronous HWIC, page 3-8
- LED Status, page 3-8
- Types of Cables for Serial HWICs, page 3-9
- Connecting Serial HWICs to the Network, page 3-11

4-Port Multiprotocol High Speed HWIC

The 4-port multiprotocol high speed HWIC (HWIC-4T) is illustrated in Figure 3-6. Protocols supported are Async (SLIP), Async (PPP), HDLC, Bisync, and transparent.

Interfaces supported are as follows:

- In both DTE and DCE formats: V35, X21, RS-232, and RS-449
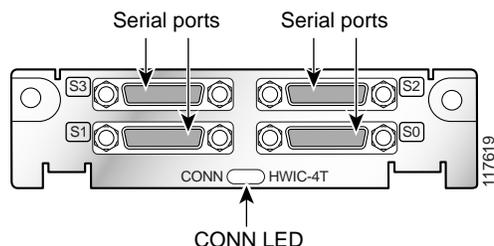- In DTE format only: EIA-530 and EIA-530A

The maximum data rate supported is 8 Mbps per port.

⚠

Caution   To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the 4-port multiprotocol high speed HWIC (HWIC-4T) only to intra-building or non-exposed wiring or cabling. The intrabuilding cable must be shielded and the shield must be grounded at both ends.

Figure 3-6   4-Port Multiprotocol HWIC Front Panel (HWIC-4T)

4-Port Multiprotocol Low Speed Asynchronous/Synchronous HWIC

The 4-port multiprotocol low speed asynchronous/synchronous HWIC (HWIC-4A/S) is illustrated in Figure 3-7. Protocols supported are Async (SLIP), Async (PPP), HDLC, Bisync, and transparent.

Interfaces supported are as follows:

- In both DTE and DCE formats: V35, X21, RS-232, and RS-449
- In DTE format only: EIA-530 and EIA-530A

The maximum data rate supported is 256 kbps per port (synchronous).
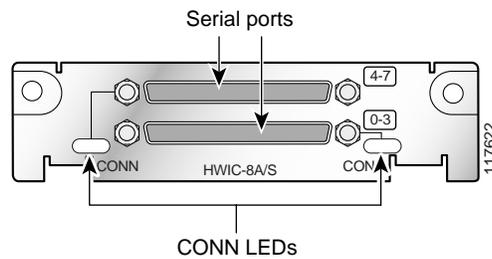
⚠

Caution   To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the 4-port multiprotocol low speed asynchronous/synchronous HWIC (HWIC-4A/S) only to intra-building or non-exposed wiring or cabling. The intrabuilding cable must be shielded and the shield must be grounded at both ends.

Figure 3-7   4-Port Multiprotocol A/S HWIC Front Panel (HWIC-4A/S)
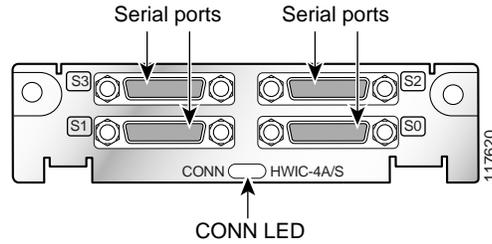
Serial ports   Serial ports

CONN LED

8-Port RS-232 Asynchronous/Synchronous HWIC

The 8-port RS-232 asynchronous/synchronous HWIC (HWIC-8A-RS232), illustrated in Figure 3-8, provides 8 asynchronous/synchronous RS-232 interfaces in both DCE and DTE formats. Data rates of up to 230.4 kbps are supported in asynchronous mode, and up to 256 kbps in synchronous mode.
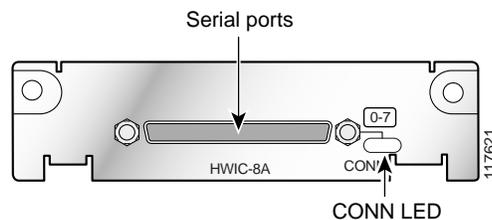
Figure 3-8   8-Port RS-232 Asynchronous/Synchronous HWIC Front Panel (HWIC-8A/S-RS232)

Serial ports

CONN LEDs

8-Port Asynchronous HWIC

The 8-port asynchronous HWIC (HWIC-8A), illustrated in Figure 3-9, provides 8 asynchronous RS-232 interfaces in DTE format, at data rates of up to 230.4 kbps.

⚠

Caution   To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the 8-port asynchronous HWIC (HWIC-8A) only to intra-building or non-exposed wiring or cabling. The intrabuilding cable must be shielded and the shield must be grounded at both ends.

Figure 3-9   8-Port Asynchronous HWIC Front Panel (HWIC-8A)

Serial ports

CONN LED

16-Port Asynchronous HWIC

The 16-port asynchronous HWIC (HWIC-16A), illustrated in Figure 3-10, provides 16 asynchronous RS-232 interfaces in DTE format, at data rates of up to 230.4 kbps.

⚠️

Caution   To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the 16-port asynchronous HWIC (HWIC-16A) only to intra-building or non-exposed wiring or cabling. The intrabuilding cable must be shielded and the shield must be grounded at both ends.

Figure 3-10   *16-Port Asynchronous HWIC Front Panel (HWIC-16A)*
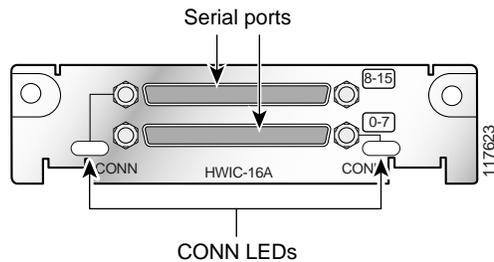
LED Status

Due to the high port density on the HWIC front panels, the amount of LED status per port is limited. There is no room for individual LEDs to indicate transmit or receive activity, or clock status.

HWIC-4T and HWIC-4A/S have a single bi-color LED to monitor status over four ports. HWIC-8A has a single LED to monitor status over 8 ports. There are two LEDs on the HWIC-8A/S-RS232 that monitor 4 ports each. On the HWIC-16A, two LEDs monitor 8 ports each.

See Table 3-1 for the definition of HWIC LED Status.

Table 3-1   *HWIC LED Status*

LED Status	Definition
Solid Green	Monitored ports are active (have initialized without error).
Solid Yellow	At least one monitored port is in loopback mode.
Off	Monitored ports are not active or have failed to initialize.

Types of Cables for Serial HWICs

The 4-port serial HWICs have 26-pin 12-in-1 Cisco smart serial ports, whereas the 8- and 16-port serial HWICs have 68-pin serial ports. Use the correct cable for your serial HWIC.

Cables for 4-Port Serial HWICs

The 4-port serial HWICs use Cisco smart serial cables. Six types of smart serial cables are available:

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

All of these serial cables provide a 26-pin 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.

Refer to the *Cisco Modular Access Router Cable Specifications* for network end connectors and pinouts of these cables.

The EIA-530 and EIA-530A serial cables are available in DTE format only. All other cables are available in either DTE or DCE format.

Cables for 8-Port and 16-Port Serial HWICs

The following cables are available from Cisco Systems for the 8-port and 16-port serial HWICs.

Cable for the 8-Port RS-232 Asynchronous/Synchronous HWIC

The 8-port RS-232 asynchronous/synchronous HWIC uses a quad cable, consisting of a 68-pin connector on the interface card end and four DB25 connectors on the system end. (See Figure 3-11.) This cable is available in either DCE or DTE format.

Figure 3-11   Quad Serial Cable
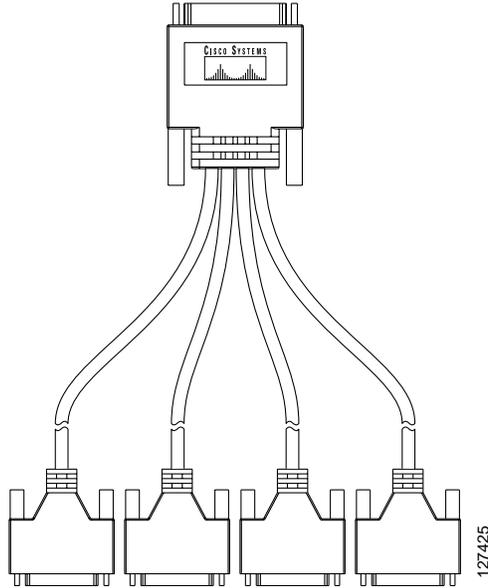
Cable for the 8-Port and 16-Port Asynchronous HWICs

The 8-port and 16-port asynchronous HWICs use an octal cable, consisting of a 68-pin connector on the interface card end and eight RJ45 connectors on the system end. See Figure 3-12. This cable is available in DTE format only.

Figure 3-12   Octal Serial Cable
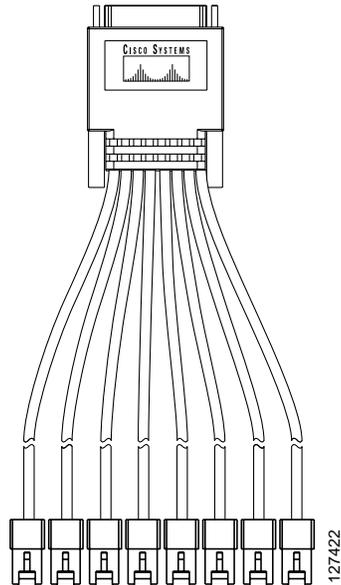
Connecting Serial HWICs to the Network

After you install the serial HWIC, use the appropriate serial cable to connect the HWIC ports to the following types of equipment:

- Asynchronous modems, if connecting to analog telephone lines
- Synchronous modems, data service units/channel service units (DSUs/CSUs), or other DCEs, if connecting to digital WAN lines

To connect the serial HWIC to the network, follow these steps:

Step 1 Confirm that the router is turned off.

Step 2 Connect one end of the appropriate serial cable to the connector on the card faceplate.

Step 3 Connect the other end (or ends) of the cable to the appropriate type of equipment.

Step 4 Turn on power to the router.

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

Related Documentation

Related documentation is available on Cisco.com or on the Product Documentation DVD. For more information, see the "Obtaining Documentation" section on page xvii.

- *2-Port Async/Sync WAN Interface Card (WIC-2A/S)*, tech note
- *Understanding the 1-Port Serial WAN Interface Card (WIC-1T)*, tech note
- *Understanding 2-Port Serial WAN Interface Card (WIC-2T)*, tech note
- *Cisco Network Modules and Interface Cards Regulatory Compliance and Safety Information*
- "Configuring Asynchronous Connections" chapter of the *Cisco 1700 Series Router Software Configuration Guide*
- "Configuring Serial Interfaces" chapter of the *Cisco IOS Interface Configuration Guide* for your Cisco IOS software release
- *Cisco Signaling Link Terminal G.732 Support*, Cisco IOS Release 12.2(2)T feature module
- *Cisco Signaling Link Terminal*, Cisco IOS Release 12.1(1)T feature module
- *Multilink PPP Across Two Serial Physical-layer Async Interfaces*, sample configuration
- *Configuring PPP Dialin with External Modems*, sample configuration
- *Configuring Basic MPLS Using IS-IS*, sample configuration
- *Inverse MUX Application using Multilink PPP*, sample configuration
- *Configuring a Basic MPLS VPN*, sample configuration
- *Multilink Via Virtual-Template on Two Serial Interfaces*, sample configuration

■ **Related Documentation**