



# Connecting Ethernet, Fast Ethernet, and Token Ring Network Modules

This chapter describes how to connect Ethernet, Fast Ethernet, and Token Ring network modules for Cisco access routers. It contains the following sections:

- [Ethernet Network Modules, page 3-1](#)
- [Fast Ethernet Network Modules, page 3-5](#)
- [Token Ring Network Modules, page 3-10](#)



Tip

To determine whether your router supports a specific network module, see [Table 1-6 on page 1-16](#).

## Ethernet Network Modules

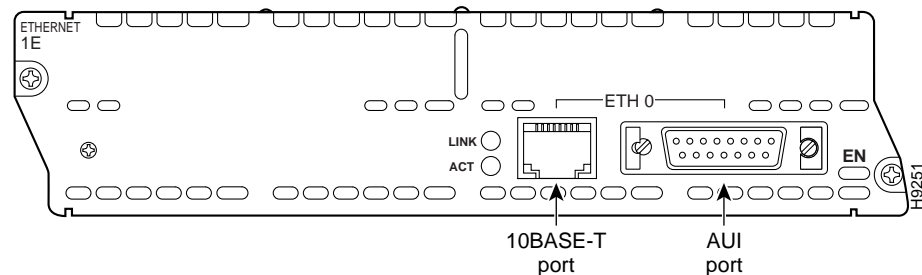
Ethernet connections are provided on 1- and 4-port Ethernet modules, and on 1-port Ethernet, 2-port Ethernet, and 1-port Ethernet 1-port Token Ring 2-WAN card slot modules.

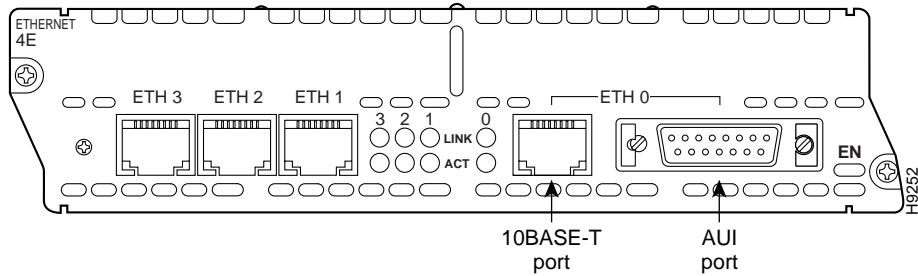
### 1- and 4-Port Ethernet Modules

The following network modules provide Ethernet interfaces:

- 1-port Ethernet network module (NM-1E) (see [Figure 3-1](#))
- 4-port Ethernet network module (NM-4E) (see [Figure 3-2](#))

*Figure 3-1 1-Port Ethernet Network Module*



**Figure 3-2 4-Port Ethernet Network Module**

## Ethernet 2-WAN Card Slot Modules

The following 2-slot network modules provide one or two Ethernet interfaces, plus two slots for optional WAN interface cards:

- 1-Ethernet 2-WAN card slot network module (NM-1E2W) (see [Figure 3-3](#))
- 2-Ethernet 2-WAN card slot network module (NM-2E2W) (see [Figure 3-4](#))
- 1-Ethernet 1-Token Ring 2-WAN card slot network module (NM-1E1R2W) (see [Figure 3-5](#))

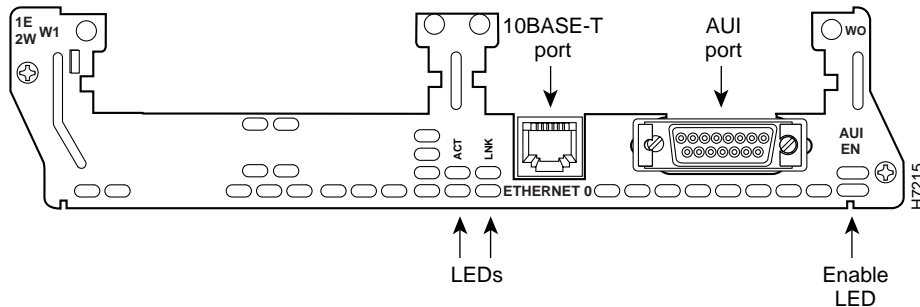
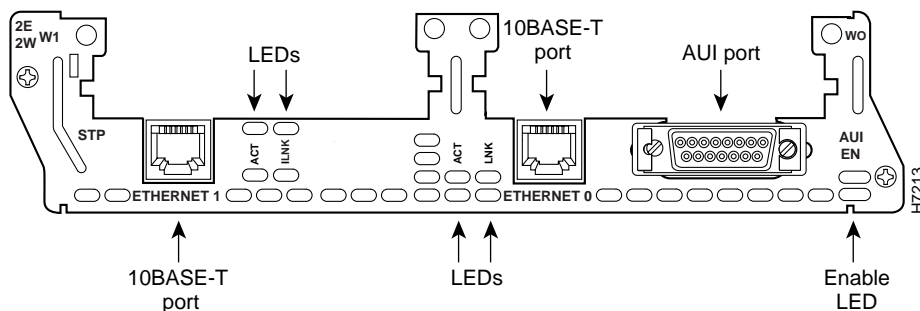
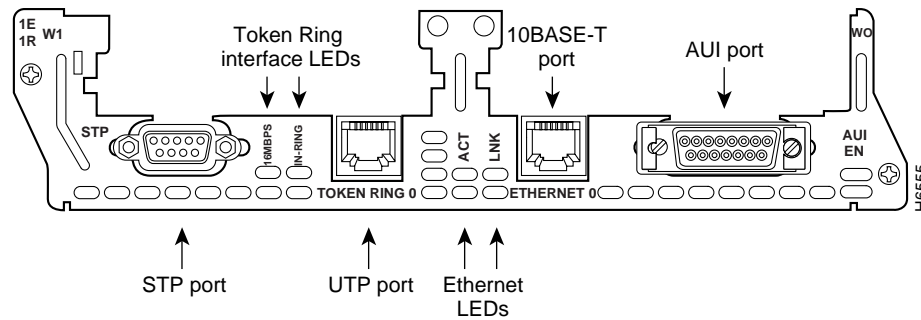
**Figure 3-3 1-Ethernet 2-WAN Card Slot Network Module****Figure 3-4 2-Ethernet 2-WAN Card Slot Network Module**

Figure 3-5 1-Ethernet 1-Token Ring 2-WAN Card Slot Network Module



## Ethernet Connectors

The 1-port Ethernet network module, the 1-Ethernet 2-slot network module, and the 1-Ethernet 1-Token Ring 2-slot network module each provide a single Ethernet port. This port uses either the attachment unit interface (AUI) DB-15 connector on the right side of the module or the 10BASE-T (RJ-45) connector next to it. Only one of these connectors can be active at a time. The active port is identified in software by port type (Ethernet), slot number on the module, and port number 0.

All modules detect the type of network connection automatically, and you do not need to choose the media type in software. If cables are plugged into both ports, the 10BASE-T connection is chosen.

The 4-port Ethernet network module has ports for four Ethernet connections (0, 1, 2, and 3). Port 0 offers a choice of an AUI or 10BASE-T interface. Ethernet ports 1, 2, and 3 use 10BASE-T connectors only. These ports do not provide an AUI connector.

The 2-Ethernet 2-slot network module has ports for two Ethernet connections. Port 0 offers a choice of AUI or 10BASE-T. Port 1 uses 10BASE-T only.

## Connecting Ethernet Ports

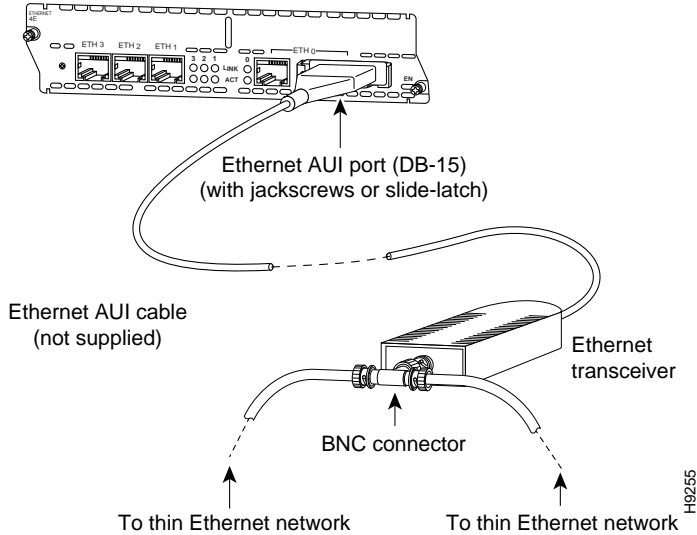
If an Ethernet port offers both an AUI connector and a 10BASE-T connector, you can use either connector, but not both at the same time.

## AUI Connections

Use an Ethernet AUI cable to connect an AUI port to an Ethernet transceiver. These ports are color-coded yellow. The female end of the AUI cable mates with the slide-latch connector of the transceiver cable. [Figure 3-6](#) shows a thin Ethernet transceiver as an example, but you can use any type of Ethernet transceiver.

If the transceiver cable has thumbscrew connectors, you can connect it directly to the AUI port by replacing the AUI port slide latch with a jackscrew (provided in a separate bag).

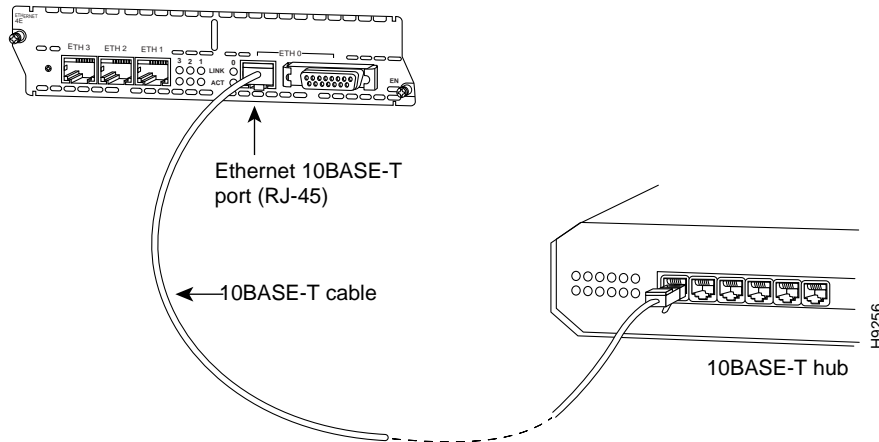
**Figure 3-6** Connecting an Ethernet AUI Port to a Transceiver



## 10BASE-T Connections

Use an Ethernet 10BASE-T cable to connect a 10BASE-T port to a hub or other network device. These ports are color-coded yellow. [Figure 3-7](#) shows the 10BASE-T port on an Ethernet network module connected to a hub.

**Figure 3-7** Connecting an Ethernet 10BASE-T Port to a Hub



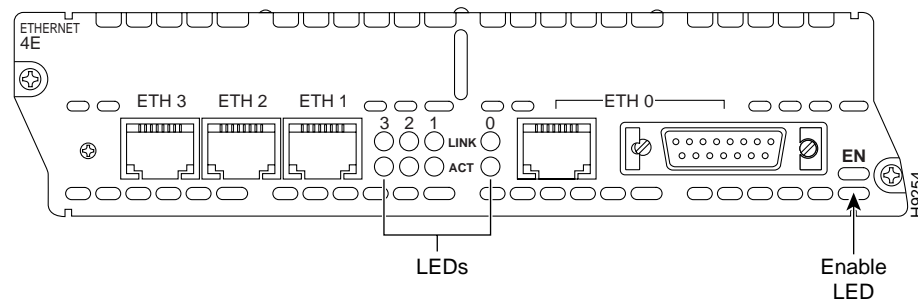
## Ethernet LEDs

This section describes Ethernet module LEDs. [Figure 3-8](#) shows 4-port Ethernet network module LEDs as an example.

All network modules have an enable (EN) LED. This LED indicates that the module has passed its self-tests and is available to the router.

Each Ethernet port has two LEDs. The activity (ACT) LED indicates that the router is sending or receiving Ethernet transmissions. The link (LINK) LED indicates that the Ethernet port is receiving the link integrity signal from the hub (10BASE-T only).

*Figure 3-8 Ethernet Network Module LEDs (Typical)*



## Fast Ethernet Network Modules

Fast Ethernet connections are provided on 1-port Fast Ethernet modules, and on 1-port Fast Ethernet, 2-port Fast Ethernet, and 1-port Fast Ethernet 1-port Token Ring 2-WAN card slot modules.



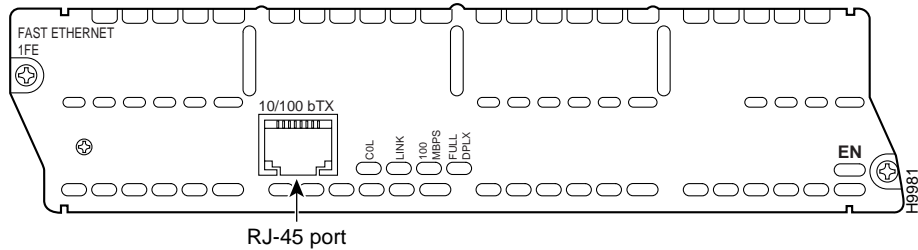
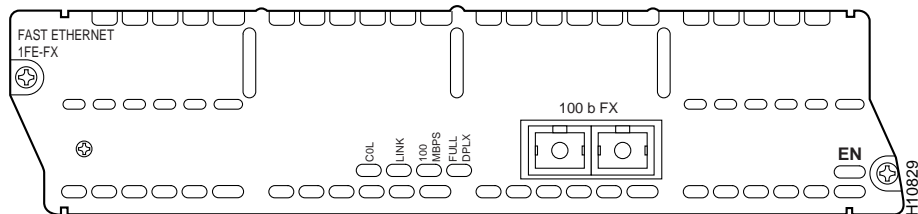
Note

The Fast Ethernet-PRI modules described in [Chapter 4, “Connecting Fast Ethernet-PRI Network Modules,”](#) also provide a Fast Ethernet interface. See that chapter for further information.

## 1-Port Fast Ethernet Modules

The following network modules provide Fast Ethernet interfaces:

- 1-port Fast Ethernet network module with TX connector, Cisco product number NM-1FE-TX. (See [Figure 3-9](#).) This module provides an RJ-45 connector for direct connection to 100BASE-T Ethernet networks.
- 1-port Fast Ethernet network module with FX connector, Cisco product number NM-1FE-FX. (See [Figure 3-10](#).) This module provides a duplex SC-type fiber-optic port for direct connection to 100BASE-FX Ethernet networks.

**Figure 3-9** 1-Port Fast Ethernet Network Module (TX Connector)**Figure 3-10** 1-Port Fast Ethernet Network Module (FX Connector)

## Fast Ethernet 2-WAN Card Slot Modules

The following 2-slot network modules provide one or two 100BASE-T Fast Ethernet interfaces, plus two slots for optional WAN interface cards:

- 1-Fast Ethernet 2-WAN card slot network module (NM-1FE2W and NM-1FE2W-V2). See [Figure 3-11](#) for a sample faceplate.
- 2-Fast Ethernet 2-WAN card slot network module (NM-2FE2W and NM-2FE2W-V2). See [Figure 3-12](#) for a sample faceplate.
- 1-Fast Ethernet 1-Token Ring 2-WAN card slot network module (NM-1FE1R2W and NM-1FE1R2W-V2). See [Figure 3-13](#) for a sample faceplate.



### Caution

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the 1-Fast Ethernet 2-WAN card slot network modules (NM-1FE2W-V2), the 2-Fast Ethernet 2-WAN card slot network modules (NM-2FE2W-V2), and the 1-Fast Ethernet 1-Token Ring 2-WAN card slot network modules (NM-1FE1R2W-V2) only to intrabuilding or nonexposed wiring or cabling. The intrabuilding cable must be shielded and the shield must be grounded at both ends.

Figure 3-11 1-Fast Ethernet 2-WAN Card Slot Network Module

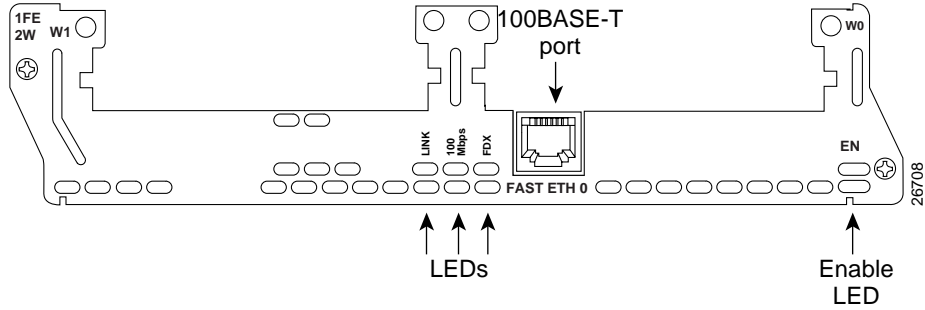


Figure 3-12 2-Fast Ethernet 2-WAN Card Slot Network Module

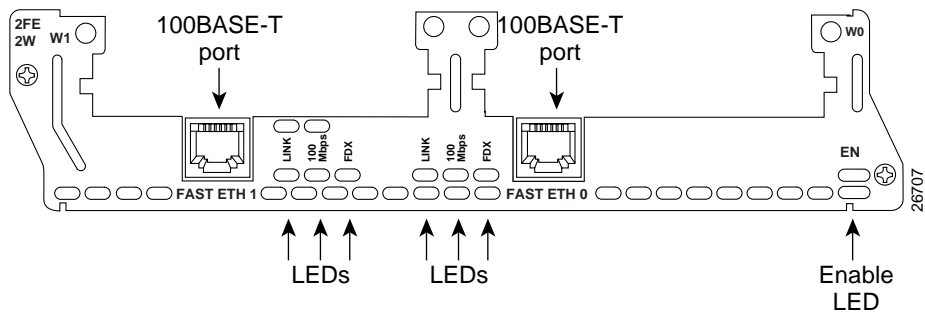
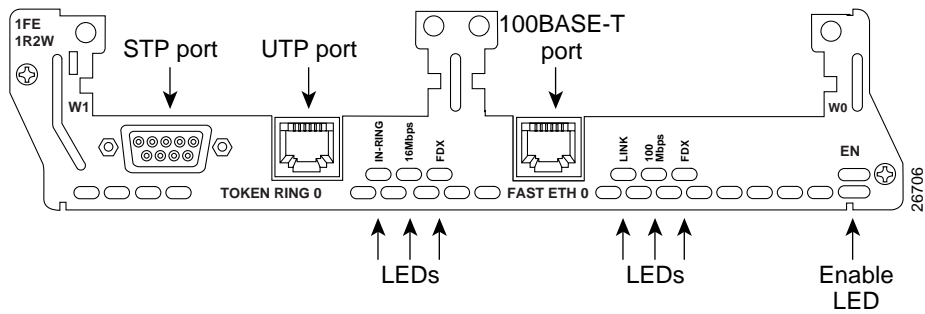


Figure 3-13 1-Fast Ethernet 1-Token Ring 2-WAN Card Slot Network Module



## Connecting Fast Ethernet Ports

Use the following sections for 100BASE-T or 100BASE-FX connections.

### 100BASE-T Connections

Use a two-pair Category 5 or unshielded twisted-pair (UTP) straight-through RJ-45 cable to connect a Fast Ethernet RJ-45 port to a switch, hub, repeater, server, or other network device. [Figure 3-14](#) shows an RJ-45 port connected to a hub.

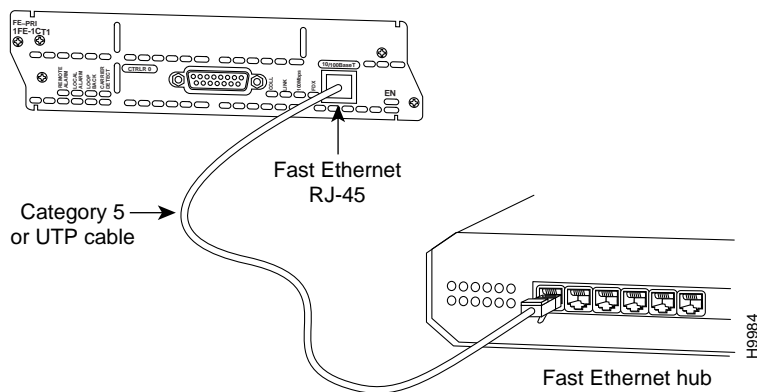
**Note**

RJ-45 cables are not available from Cisco Systems. These cables are widely available and must be Category 5 cables.

**Caution**

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the 1-Fast Ethernet 2-WAN card slot network modules (NM-1FE2W-V2), the 2-Fast Ethernet 2-WAN card slot network modules (NM-2FE2W-V2), and the 1-Fast Ethernet 1-Token Ring 2-WAN card slot network modules (NM-1FE1R2W-V2) only to intrabuilding or nonexposed wiring or cabling. The intrabuilding cable must be shielded and the shield must be grounded at both ends.

*Figure 3-14 Connecting a Fast Ethernet RJ-45 Port to a Hub*



## 100BASE-FX Connections

Attach a multimode fiber-optic cable with SC-type connectors directly to the port on the Fast Ethernet network module (remove the protective plug from the port if it is present). Use either one duplex SC connector (see [Figure 3-15](#) and [Figure 3-17](#)) or two simplex SC connectors (see [Figure 3-16](#) and [Figure 3-18](#)). Attach the other end of the cable to a repeater, hub, or wall outlet. Be sure to observe the correct relationship between the receive (RX) and transmit (TX) ports on the network module and the cable.

**Note**

Multimode SC-type fiber-optic cables are widely available commercially. Cisco Systems does not supply these cables.

**Caution**

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the 1-Fast Ethernet 2-WAN card slot network modules (NM-1FE2W-V2), the 2-Fast Ethernet 2-WAN card slot network modules (NM-2FE2W-V2), and the 1-Fast Ethernet 1-Token Ring 2-WAN card slot network modules (NM-1FE1R2W-V2) 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 3-15 Duplex SC Connector

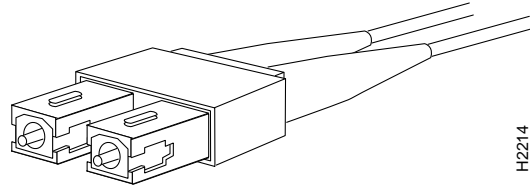


Figure 3-16 Simplex SC Connector

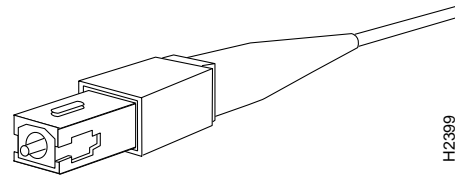


Figure 3-17 Connecting a Fast Ethernet FX Port to a Repeater or Hub (Duplex Connector)

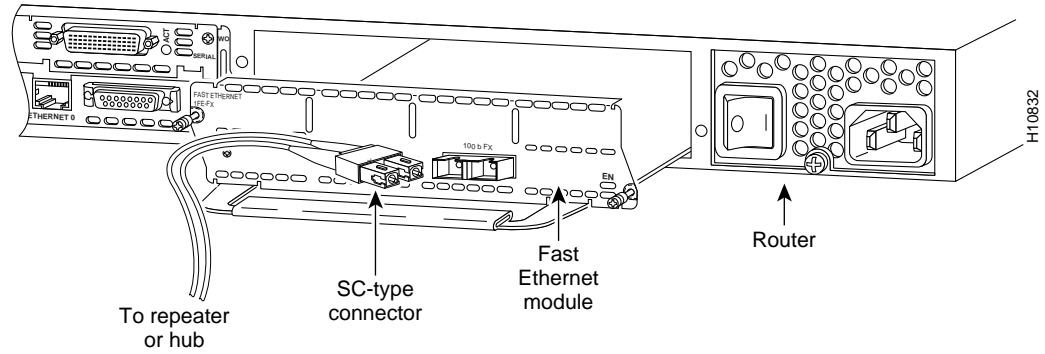
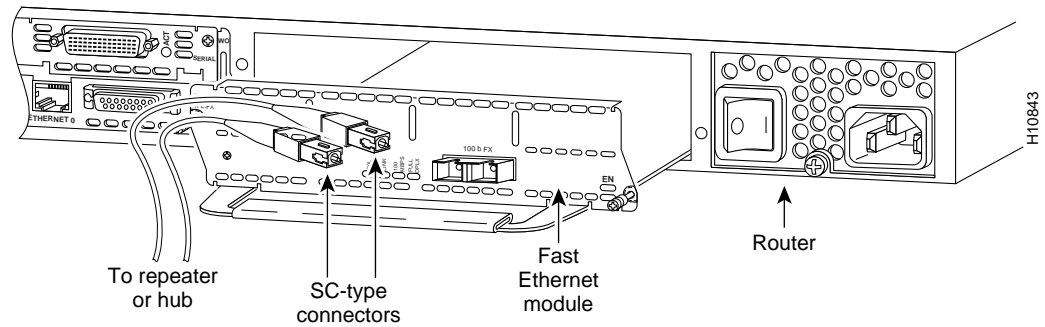


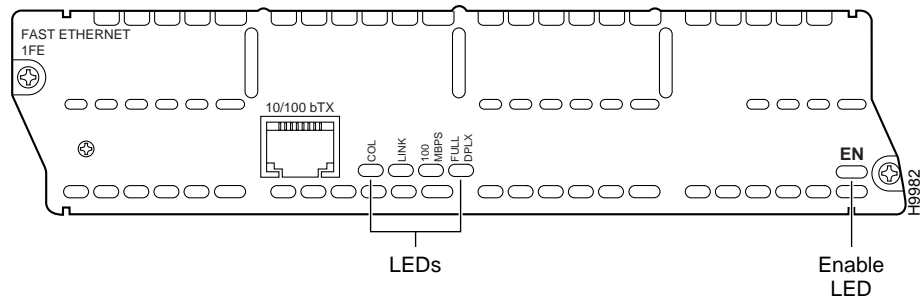
Figure 3-18 Connecting a Fast Ethernet FX Port to a Repeater or Hub (Simplex Connectors)



## Fast Ethernet LEDs

This section describes Fast Ethernet module LEDs. [Figure 3-19](#) shows 1-port Fast Ethernet network module LEDs as an example.

*Figure 3-19 1-Port Fast Ethernet Network Module LEDs*



All network modules have an enable (EN) LED. The enable LED indicates that the module has passed its self-tests and is available to the router.

Fast Ethernet network modules have the additional LEDs shown in [Table 3-1](#).

*Table 3-1 Fast Ethernet Network Module LEDs*

LED	Meaning
COL	Collision activity is occurring on the network.
LINK	A link has been established with the station at the other end of the cable.
100MBPS	Speed of the interface is 100 Mbps.
FULL DPLX	Interface is in full-duplex mode.

## Token Ring Network Modules

The following network modules provide Token Ring interfaces:

- 1-port Ethernet 1-port Token Ring 2-WAN card slot module (NM-1E1R2W) (see [Figure 3-20](#))
- 1-port Fast Ethernet 1-port Token Ring 2-WAN card slot module (NM-1FE2R2W) (see [Figure 3-21](#))

Figure 3-20 1-Ethernet 1-Token Ring 2-WAN Card Slot Network Module

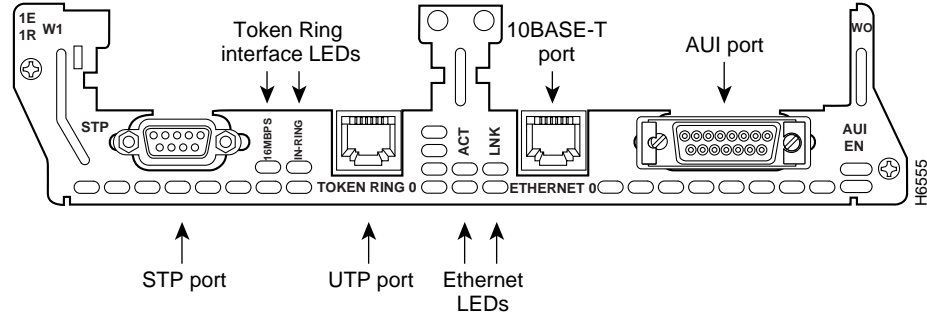
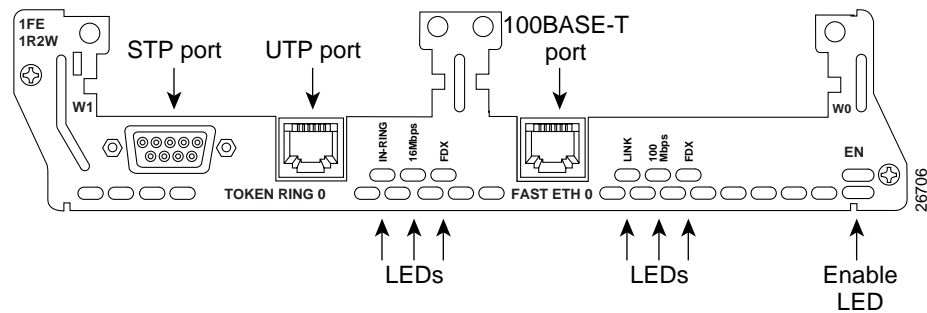


Figure 3-21 1-Fast Ethernet 1-Token Ring 2-WAN Card Slot Network Module

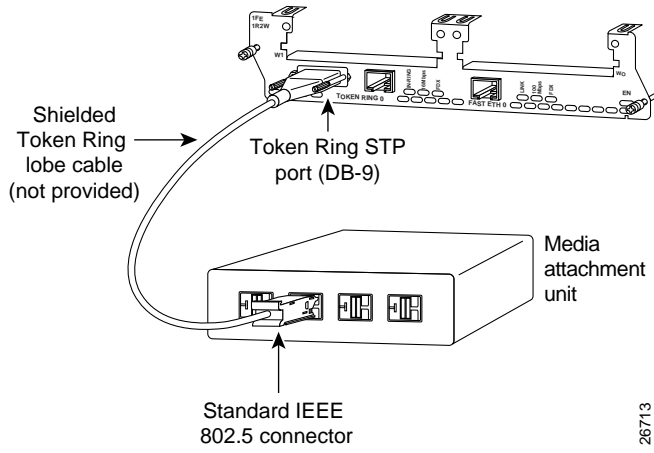


## Connecting Token Ring Ports

The 1-Ethernet 1-Token Ring 2-WAN card slot network module and the 1-Fast Ethernet 1-Token Ring 2-WAN card slot network module each have one DB-9 connector for an STP Token Ring connection and one RJ-45 connector for a UTP Token Ring connection. Only one connector can be active at a time.

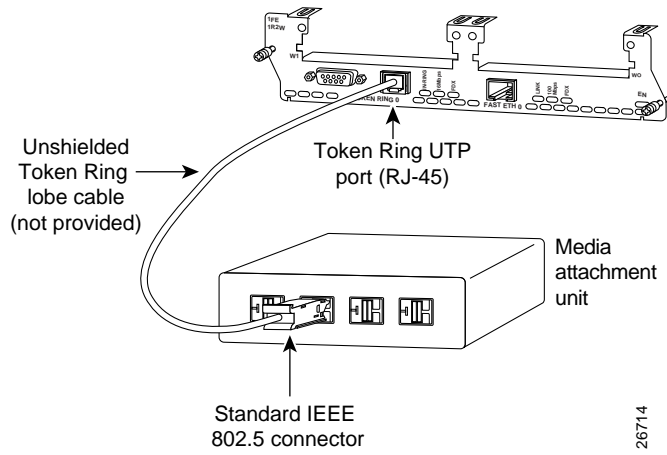
To connect the module to a Token Ring network, attach one end of a shielded Token Ring lobe cable to the DB-9 connector on the network module (see [Figure 3-22](#)), or attach one end of an unshielded Token Ring lobe cable to the UTP connector on the network module (see [Figure 3-23](#)). Attach the other end of the cable to the Token Ring media attachment unit (MAU). The network module automatically detects which connector is in use.

**Figure 3-22** Connecting a Token Ring STP Port (DB-9) to a MAU



26713

**Figure 3-23** Connecting a Token Ring UTP Port (RJ-45) to an MAU



26714

## Token Ring LEDs

All network modules have an enable (EN) LED. The enable LED indicates that the module has passed its self-tests and is available to the router.

The 1-Ethernet 1-Token Ring 2-WAN card slot network module and the 1-Fast Ethernet 1-Token Ring 2-WAN card slot network module both have the following Token Ring LEDs:

- The 16MBPS LED indicates a ring speed of 16 Mbps. If it is off, the ring speed is 4 Mbps.
- The IN-RING LED indicates that the Token Ring interface is inserted into the ring. If it is off, the interface is not inserted into the ring.

The 1-Fast Ethernet 1-Token Ring 2-slot network module also has the FDX LED, which indicates full-duplex mode.



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**Timesaver**

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When the IN-RING LED is off, you can unplug the Token Ring cable without causing a problem on the ring.

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