C H A P T E R 2

Installing the Catalyst 1600 Token Ring Switch

This chapter explains how to install and configure the Catalyst 1600 Token Ring switch, and how to connect the Catalyst 1600 to wiring concentrators, lobe stations, and other Catalyst 1600 Token Ring switch devices.

Before you install the Catalyst 1600, make sure you are familiar with the concepts of Token Ring switching (see Appendix B, "About Token Ring Switching") and controlling broadcast frames with virtual LANs. For information about virtual LANs, refer to the *TrueView Catalyst 1600 Manager User Guide*.

Warning The Catalyst 1600 does not contain any user-serviceable components. Do not open the unit except when installing an option card according to proper instructions.

Warning Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord. To see translated versions of this warning, refer to Appendix E, "Translated Safety Warnings."

Installation comprises the following steps:

1 Securing the Catalyst 1600 Token Ring switch in a standard 19-inch wide rack or placing the unit on a flat horizontal shelf, and connecting the power supply.

2 Configuring ports according to the devices you want to connect.

3 Connecting wiring concentrators, lobe stations, or other Catalyst 1600 devices.

4 Starting the Catalyst 1600 and running the self-test program.

5 Optimizing performance and monitoring traffic levels using the command-line interface or TrueView Catalyst 1600 Manager.

6 Setting up broadcast control strategies using TrueView Catalyst 1600 Manager.

For information about optimizing the performance of the Catalyst 1600 Token Ring switch, monitoring traffic levels and setting up broadcast control strategies, refer to the *TrueView Catalyst 1600 Manager User Guide*.

Installing the Catalyst 1600 Token Ring Switch

Before installing the Catalyst 1600 Token Ring switch, ensure that you are familiar with the safety procedures.

Warning The device is designed to work with TN power systems. To see translated versions of this warning, refer to Appendix E, "Translated Safety Warnings."

To install the Catalyst 1600:

Step 1 Either:

Secure the Catalyst 1600 in a standard 19-inch wide rack.

Warning To prevent overheating the switch, do not operate it in an area that exceeds the maximum recommended ambient temperature of 104 F (40 C). T o prevent airflow restriction, allow at least 3 inches (7.6 cm) of clearance around the ventilation openings. To see translated versions of this warning, refer to Appendix E, "Translated Safety Warnings."

Or:

Affix the self-adhesive rubber feet to the underside of the unit, and place the Catalyst 1600 on a flat, horizontal surface. If you install the unit on a shelf, ensure that the shelf can support the 22lb (10kg) weight of the unit.

Step 2 Connect the power cable to the mains power socket on the rear of the Catalyst 1600, then plug the cable into the AC outlet. The input voltage is auto-ranging; you do not need to set a voltage-selector switch.

Warning See the installation instructions before you connect the system to its power source. To see translated versions of this warning, refer to Appendix E, "Translated Safety Warnings."

Warning This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). To see translated versions of this warning, refer to Appendix E, "Translated Safety Warnings."

Warning Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected. To see translated versions of this warning, refer to Appendix E, "Translated Safety Warnings."

The Catalyst 1600 automatically runs a self-test routine to ensure that it is operating correctly (see the section "Starting the Self-test Program").

Step 3 The default port settings are:

Port interface: Node mode

Ring speed: 16 Mbps

Ring number: 401 (port 1) through 408 (port 8) or 40C (port 12)

For information about configuring Token Ring switch port settings according to the device you want to connect, refer to the section "Configuring the Token Ring Switch Ports".

Configuring the Token Ring Switch Ports

Each Token Ring port on the Catalyst 1600 can act in node or concentrator port interface mode. The port interface mode affects whether the Token Ring port behaves like a Token Ring adapter or a lobe attachment unit port, and determines whether the port generates or detects the phantom drive signal.

Table 2-1   Interface Modes for Token Ring Switch Ports

Interface Mode	Description
Node	The port behaves like an adapter card and generates a phantom drive signal to insert into the connected device.
Concentrator	The port behaves like a Lobe Attachment Module (LAM) port and detects the phantom drive signal that is generated when the connected device attempts to insert.

By default each Token Ring port is configured for node interface mode, to behave like an adapter card, with a ring speed of 16 Mbps.

To configure alternative port settings:

- Connect a port to the network with the default settings and use TrueView Catalyst 1600 Manager to configure ports from the management station. For information about installing and using TrueView Catalyst 1600 Manager, refer to *TrueView Catalyst 1600 Manager User Guide*.

- Connect a terminal to the serial port on the front of the Catalyst 1600 using a null-modem EIA/TIA-232 cable with a 25-pin D-type connector (not supplied). For information about using the serial interface, refer to Chapter 4, "Serial Management."

Note   EIA/TIA-232 and EIA/TIA-449 were known as recommended standards RS-232 and RS-449 before their acceptance as standards by the Electronics Industries association (EIA) and Telecommunications Industry association (TIA).

To connect a device to the Catalyst 1600 Token Ring switch, ensure that you use the correct connector and configure the interface mode of the Token Ring switch port appropriately (see Table 2-2).

Table 2-2   Port Interface Mode for Attaching Devices

Attached Device	Connector on Device	Port Interface Mode
UTP or STP LAM	Lobe connector	Node
UTP or STP MAU or other wiring concentrator	Lobe connector	Node
Workstation/server	Adapter card	Concentrator

To identify the connector that you use to attach a device to the Catalyst 1600 Token Ring switch, see the sections "Connecting Token Ring Switch Ports in Node Mode" and "Connecting Token Ring Switch Ports in Concentrator Mode" later in this chapter.

Connecting Devices

Token Ring networks are resilient to the temporary disruption of network signals that occur when nodes insert into and deinsert from the network. Therefore, you do not need to switch off the Catalyst 1600 when connecting and disconnecting cables.

Each Token Ring switch port on the Catalyst 1600 has both UTP (RJ-45) and STP (DB-9) connectors. You do not need to configure the Token Ring switch ports to accept UTP or STP media.

Caution   Attaching devices to the UTP and STP connectors of a Token Ring switch port at the same time may result in damage to the Catalyst 1600 Token Ring switch.

In addition, always make sure that the following conditions are met:

- The Token Ring switch port is configured to support the proper ring speed, or the ring will enter a beaconing condition.

- The Token Ring switch port is configured for the proper port interface mode.

- The Token Ring switch port is the only switch port connected to the ring. Do not connect two Token Ring switch ports to the same ring.

Connecting Token Ring Switch Ports in Node Mode

The default port interface mode of each Token Ring switch port on the Catalyst 1600 is node mode. In node mode, a port behaves like a Token Ring adapter and generates a phantom drive signal to insert into the device that is connected.

Warning   Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translated versions of this warning, refer to Appendix E, "Translated Safety Warnings."

Caution   Connecting a port in node mode to another device that generates the phantom drive signal causes the port to close, and may result in unpredictable network behavior.

You can connect ports in node mode to the following devices, as shown in Figure 2-1:

- UTP or STP Lobe Attachment Module (LAM). You can connect active and passive LAMs to the Catalyst 1600 Token Ring switch.

- UTP or STP Multistation Access Unit (MAU), or other wiring concentrator with one or more connectors that support the direct attachment of Token Ring lobe stations.

Figure 2-1   Connecting Devices to Ports in Node Mode
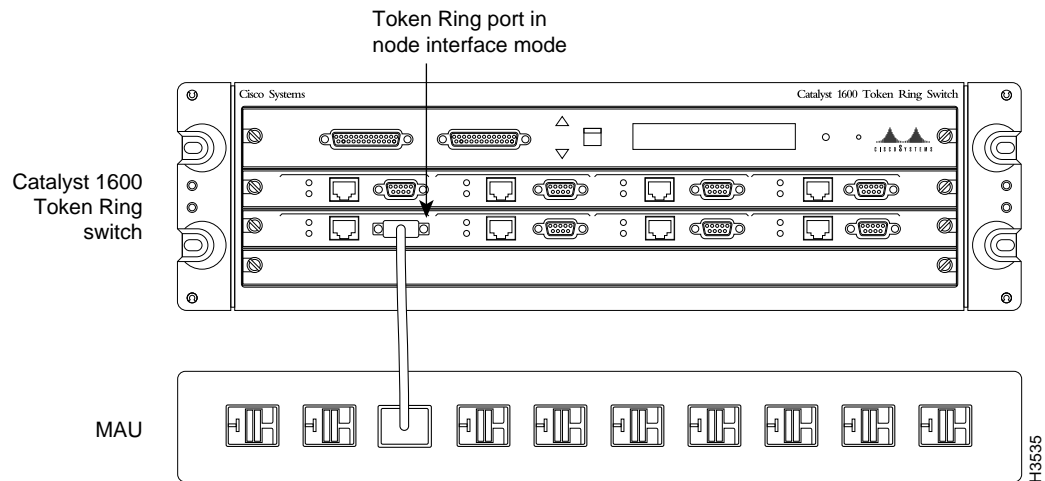
When you connect a LAM to the Catalyst 1600:

- Connect the LAM to a controlled access unit (CAU).

- Do not connect the LAM management cables to the Catalyst 1600.

Connecting Token Ring Switch Ports in Concentrator Mode

In concentrator mode, a port behaves like a MAU or LAM port and detects the phantom drive signal that is generated when the connected device attempts to insert.
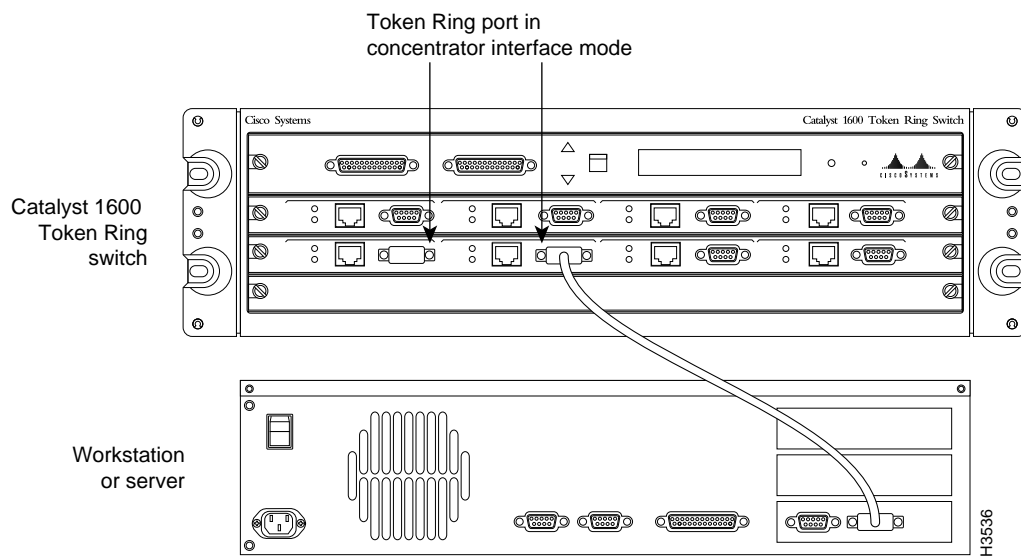
⚠️ **Caution**   Connecting a port in concentrator mode to another device that detects the phantom drive signal results in a single-station error.

You can connect a port in concentrator mode directly to the UTP or STP connector on a Token Ring adapter card in a workstation or server, as shown in Figure 2-2.

Figure 2-2   Connecting Devices to Ports in Concentrator Mode

Connecting Another Catalyst 1600 Token Ring Switch

You can connect Catalyst 1600 devices by their Token Ring ports, with one in concentrator interface mode and one in node interface mode, as shown in Figure 2-3.

Figure 2-3   Connecting Catalyst 1600 Token Ring Switch Devices Together

Token Ring port in concentrator interface mode

Token Ring port in node interface mode
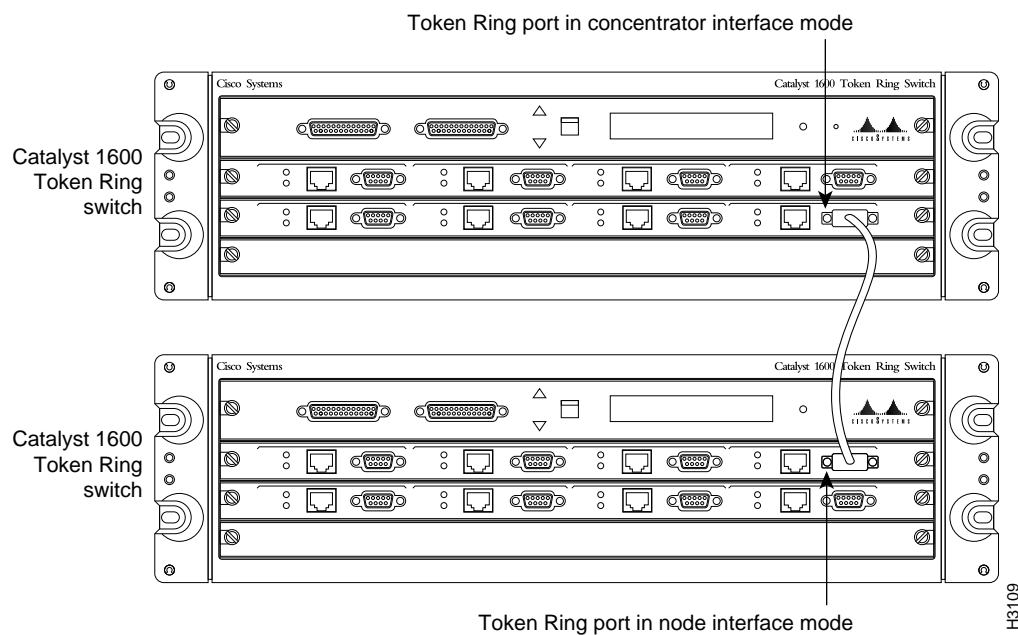
When you connect two Catalyst 1600 devices by their Token Ring ports, make sure the ring number is identical for both Token Ring ports.

To set the ring number:

Step 1   Connect the device to the network and use Catalyst 1600 Manager to configure the Catalyst 1600 from the management station. For more information, refer to *TrueView Catalyst 1600 Manager User Guide*.

Step 2   Connect a terminal to the serial interface and use the **set port segment** command (see Chapter 4 "Serial Management").

Starting the Self-test Program

When you start up or reset the Catalyst 1600, the self-test program automatically checks that the Catalyst 1600 is operating correctly.

Note   The software containing the self-test program is resident in the Catalyst 1600. You do not need to install the software.

At the start of the self-test, some low-level hardware functions are tested. If the Catalyst 1600 fails the low-level test, the startup process is halted. Otherwise the Catalyst 1600 enters the high-level self-test.

During the higher level self-test, the LCD panel displays the messages listed in Table 2-3.

Table 2-3   LCD Displays During the High-level Self-test

Startup stage	Description
`Catalyst 1600 Token Ring Switch` `1.00   10-03-95   10:34`	Displays the version number of the boot software, and the date and time that the software was released.
`System Self Test` `Test number <test number>`	Displays the number of each stage in the self-test. Normally the tests are carried out too quickly for the numbers to be visible.
`System Self Test PASSED`	Indicates that the self-test is complete and the Catalyst 1600 has passed the test. If the Catalyst 1600 fails a high-level test, the self-test program restarts, and the number of the failed test is displayed.
	High-level tests are repeated until the self-test is completed successfully.

If a hardware error occurs, contact your customer service representative quoting the test number and the version number of the software containing the self-test program.

Planning Considerations

The maximum cable lengths and number of nodes that you can use with the Catalyst 1600 Token Ring switch are determined by the type of device that you connect to each port and the interface mode that you configure for each port.

Table 2-4 **Port Interface Modes**

Interface Mode	Description
Node	Port behaves like an adapter card. For information about maximum cable lengths, refer to the documentation supplied with the device that is attached to the port.
Concentrator	Port behaves like a LAM port. For information about maximum cable lengths for UTP and STP cabling, see Table 2-5.

The port interface mode also determines the pin connections when you attach a device to the UTP (RJ-45) or STP (DB-9) connector of a Token Ring switch port.

Cabling Distances

Table 2-5 shows the maximum cabling distances for UTP and STP cabling media at ring speeds of 4 or 16 Mbps.

Table 2-5   Maximum Cabling Distances for UTP and STP Cabling Media

Cable Type	4 Mbps	16 Mbps
UTP Category 3	120m	See below
UTP Category 4/5	160m	100m
STP Type 1	375m	145m
STP Type 2	375m	145m
STP Type 6	250m	95m
STP Type 8	185m	70m
STP Type 9	250m	95m

Two different categories of UTP cable are commonly used. The preferred type is *data-grade* Category 4 or Category 5 cable, such as AT&T 2061 and Northern Telecom BDN.

You are **not** advised to use ordinary *voice-grade* UTP Category 3 cable, such as IBM Type-3, AT&T DIW, and Belden Type-1154A, on a 16 Mbps Token Ring. However, it may be possible to use well-installed UTP Category 3 cable over a distance of up to 50m. The distance may be further reduced if temperatures exceed 20˚C (68˚F).

Note   Ensure that the Tx+ and Tx- cables are in the same twisted pair, and the Rx+ and Rx- cables are in the same twisted pair. To further improve reliability, use the two pairs of cable with the highest number of twists-per-unit-length.

Pin Connections for the RJ-45 Connector

To attach a device to the UTP (RJ-45) connector of a Token Ring switch port, determine the port interface mode and observe the standard pin connections as in Table 2-6.

Table 2-6   Pin Connections for RJ-45 Connector

RJ-45 Pin	Node Mode	Concentrator Mode
3	Tx-	Rx-
4	Rx+	Tx+
5	Rx-	Tx-
6	Tx+	Rx+

Pin Connections for the DB-9 Connector

To attach a device to the STP (DB-9) connector of a Token Ring switch port, determine the port interface mode and observe the standard pin connections as in Table 2-7.

Table 2-7   Pin Connections for DB-9 Connector

DB-9 Pin	Node Mode	Concentrator Mode
1	Rx+	Tx+
5	Tx-	Rx-
6	Rx-	Tx-
9	Tx+	Rx+