

# Introduction

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This chapter introduces the Catalyst 1900 series Ethernet switches, also referred to as the Catalyst 1900 switches, and covers the following topics:

- Summary of the key features
- Descriptions of the front and rear panels
- Examples of network configurations using the switch

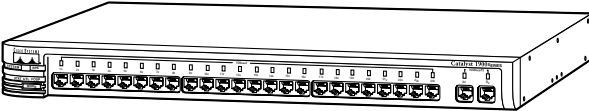
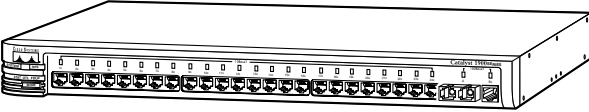
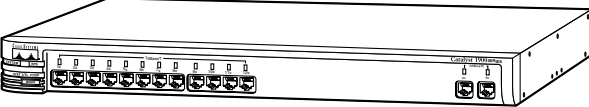
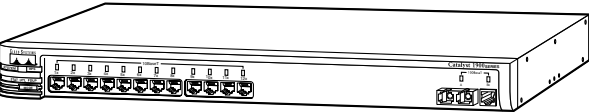
## Summary of Key Features

The Catalyst 1900 switches provide up to 24 10-Mbps switched Ethernet connections to 10BaseT-compatible devices (such as single workstations and 10BaseT hubs) and one 10-Mbps connection to an AUI. The switches also provide two 100BaseT connections to servers and backbones. Figure 1-1 describes the switches and provides an illustration of each model. Table 1-1 summarizes the key features that are common to all Catalyst 1900 switches.

## Summary of Key Features

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**Figure 1-1 Catalyst 1900 Switches**

Part Number	Description	Switch
WS-C1924-EN WS-C1924-A	24 switched 10BaseT ports 1 switched AUI port 2 switched 100BaseTX ports	 <p>A line drawing of a Catalyst 1924 switch. It is a rack-mountable device with a long front panel. On the left side, there are two ports labeled 'AUI'. The main section of the front panel contains 24 RJ45 ports arranged in two rows of 12. On the right side, there are two ports labeled '100BaseTX'.</p>
WS-C1924C-EN WS-C1924C-A	24 switched 10BaseT ports 1 switched AUI port 1 switched 100BaseFX port 1 switched 100BaseTX port	 <p>A line drawing of a Catalyst 1924C switch. It is a rack-mountable device with a long front panel. On the left side, there is one AUI port. The main section of the front panel contains 24 RJ45 ports arranged in two rows of 12. On the right side, there is one 100BaseFX port and one 100BaseTX port.</p>
WS-C1912-EN WS-C1912-A	12 switched 10BaseT ports 1 switched AUI port 2 switched 100BaseTX ports	 <p>A line drawing of a Catalyst 1912 switch. It is a rack-mountable device with a long front panel. On the left side, there is one AUI port. The main section of the front panel contains 12 RJ45 ports arranged in two rows of 6. On the right side, there are two ports labeled '100BaseTX'.</p>
WS-C1912C-EN WS-C1912C-A	12 switched 10BaseT ports 1 switched AUI port 1 switched 100BaseFX port 1 switched 100BaseTX port	 <p>A line drawing of a Catalyst 1912C switch. It is a rack-mountable device with a long front panel. On the left side, there is one AUI port. The main section of the front panel contains 12 RJ45 ports arranged in two rows of 6. On the right side, there is one 100BaseFX port and one 100BaseTX port.</p>

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**Table 1-1 Key Features**

Feature	Description
<b>Performance and Configuration</b>	<ul style="list-style-type: none"> <li>• Half- or full-duplex operation on all 10BaseT and 100BaseT ports.</li> <li>• IEEE 802.3x flow control on the 100BaseT ports operating in full-duplex mode.</li> <li>• Autonegotiation of full-duplex operation on the 100BaseTX ports.</li> <li>• Back pressure-based congestion control on half-duplex, 10-Mbps Ethernet ports (standard IEEE 802.3 Layer 2 backoff algorithms).</li> <li>• Enhanced Congestion Control (ECC) on half-duplex ports for accelerated transmissions when queues are full.</li> <li>• FragmentFree (cut-through) and store-and-forward switching modes for optimal performance or error checking.</li> <li>• Per-port broadcast storm control preventing faulty end stations from degrading overall system performance.</li> <li>• Support for ports to belong to up to four separate bridge groups within the switch.</li> <li>• Cisco Group Management Protocol limiting multicast flooding to predefined ports.</li> <li>• IEEE 802.1d Spanning-Tree Protocol with Port Fast.</li> </ul>
<b>Management</b>	<ul style="list-style-type: none"> <li>• Menu-based management console supports out-of-band management.</li> <li>• Web-based management console supports in-band management.</li> <li>• Simple Network Management Protocol (SNMP) and Telnet supports in-band management.</li> <li>• Cisco Discovery Protocol (CDP) to enable network management stations to discover the switch in a network topology.</li> <li>• Embedded remote monitoring (RMON).</li> </ul>
<b>Power Redundancy</b>	<ul style="list-style-type: none"> <li>• Connection for optional Cisco 600W AC redundant power system (RPS) as a backup power source.</li> </ul>

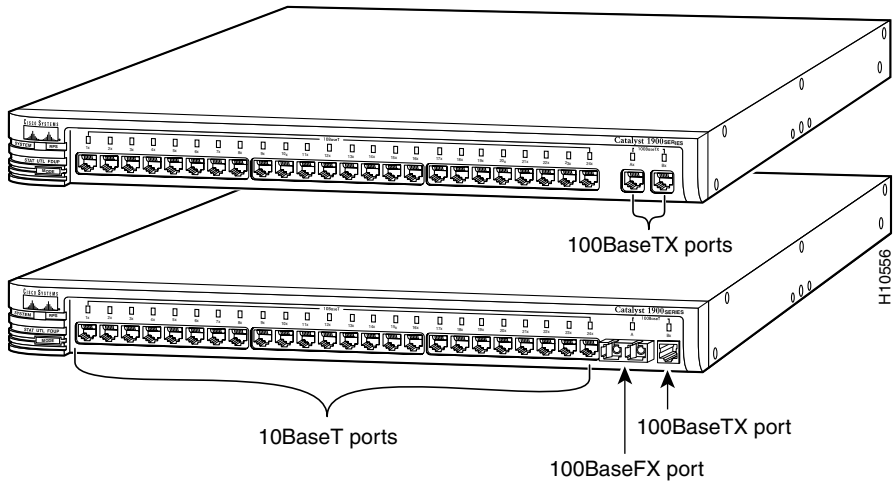
## Front Panel Description

The front panel of a Catalyst 1900 switch provides 10BaseT and 100BaseT switched ports, a set of LEDs, and a Mode button.

### Ports

The front of each switch provides switched 10-Mbps and 100-Mbps ports (see Figure 1-2).

**Figure 1-2 Front Panel Ports**



### Switched 10-Mbps Ports

Depending on the model, the 12 or 24 switched 10-Mbps ports (1x through 12x or 1x through 24x) use standard RJ-45 connectors. These fixed ports can connect to 10BaseT-compatible devices, such as individual workstations and hubs, with Category 3, 4, or 5 unshielded twisted-pair (UTP) cabling. For information on connecting to these ports, see the “Connecting to the Switched 10BaseT Ports” section on page 2-20.

## Switched 100-Mbps Ports

Depending on the model, the switch can have either:

- Two switched 100BaseTX ports
- One switched 100BaseTX port and one switched 100BaseFX port

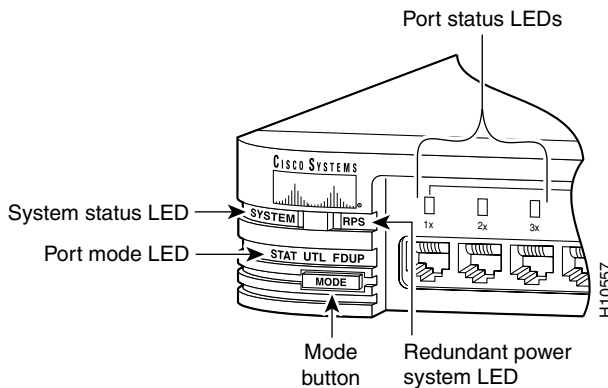
The 100BaseTX ports (ports Ax and Bx) use standard RJ-45 connectors. These ports can connect to 100BaseTX-compatible servers, hubs, backbone switches, and routers, with Category 5 UTP cabling. For information on connecting to these ports, see the “Connecting to the Switched 100BaseTX Ports” section on page 2-22.

The 100BaseFX port (port A) uses a duplex square connector (SC). This port can connect to other 100BaseFX-compatible devices with 50/125- or 62.5/125-micron multimode fiber-optic cabling. For information on connecting to this port, see the “Connecting to the Switched 100BaseFX Port” section on page 2-24.

## LEDs and Mode Button

You can use the LEDs to monitor network activity and switch performance. The Mode button is used to select the modes in which the port status LEDs operate (Figure 1-3).

**Figure 1-3 LEDs and Mode Button**



## Front Panel Description

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### System Status LED

The colors of the system status (SYSTEM) LED show if the switch is receiving power and functioning properly (Table 1-2).

**Table 1-2**      **SYSTEM LED Description**

<b>Color</b>	<b>System Status</b>
Off	Switch is not powered up.
Solid green	Switch is operating normally.
Solid amber	Switch is receiving power but might not be functioning properly. One or more power-on self-test (POST) errors occurred. The Menu Console Logon Screen message identifies which nonfatal test(s) failed.

**Note** No message is displayed if a fatal error occurs.

### Redundant Power Supply LED

The colors of the redundant power system (RPS) LED reflect the RPS status (Table 1-3).

**Table 1-3**      **RPS LED Description**

<b>Color</b>	<b>RPS Status</b>
Off	Power is OK (internal power supply is powered up).
Solid green	Power is OK (RPS is powered up and operational).
Solid amber	RPS is not operational or is not connected properly.
Flashing amber	RPS indicates the internal power supply and RPS are powered up, and that the internal power supply is powering the switch.

## Port Status LEDs, Port Mode LED, and Mode Button

The LEDs above the 10BaseT and 100BaseT ports reflect the status of those ports or of the switch. The port mode LED reflects the mode you selected with the Mode button. To change the mode being displayed by a port status LED, press the Mode button to highlight the modes: STAT (port status), UTL (bandwidth utilization), and FDUP (full-duplex mode). After you release the Mode button, the selected mode remains on for 30 seconds before returning to the default mode.

### STAT Mode

The colors of the port status LEDs in STAT mode reflect the status of the individual ports (Table 1-4).

**Table 1-4**      **STAT LED Description**

<b>Color</b>	<b>Port Status</b>
Off	No link.
Solid green	Link operational (with no link activity).
Flashing green	Link operational (with activity).
Alternating green and amber	Link fault. Error frames can affect connectivity. Excessive collisions, CRC errors, and alignment and jabber errors are monitored for a link-fault indication.
Solid amber	Port is not forwarding. This could be because the port was disabled by management, suspended due to an address violation, or suspended by Spanning-Tree Protocol due to network loops.

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**Note** The LEDs are solid amber for approximately 1 minute after power up during spanning-tree discovery.

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### UTL Mode

The colors of the port status LEDs in UTL mode reflect the current and peak bandwidth utilization of the switch (Table 1-5). Current bandwidth utilization is shown with a series of lit port status LEDs ending with a rapidly blinking one. Peak bandwidth utilization is indicated by the right-most solidly lit LED.

The peak utilization is recorded in the bandwidth-capture interval, described in the “Bandwidth Usage Report” section on page 5-63.

**Table 1-5 Bandwidth Utilization Scale with 12 and 24 10BaseT Ports**

<b>12 10BaseT Ports</b>		<b>24 10BaseT Ports</b>	
<b>Port Status LEDs</b>	<b>Mbps Activity</b>	<b>Port Status LEDs</b>	<b>Mbps Activity</b>
1 to 4	0.1 to < 1.5	1 to 8	0.1 to < 6
5 to 8	1.5 to < 20	9 to 16	6 to < 120
9 to 12	20 to 140	17 to 24	120 to 280

### FDUP Mode

The colors of the port status LEDs in FDUP mode reflect which 10BaseT and 100BaseT ports are operating in full-duplex mode (Table 1-6).

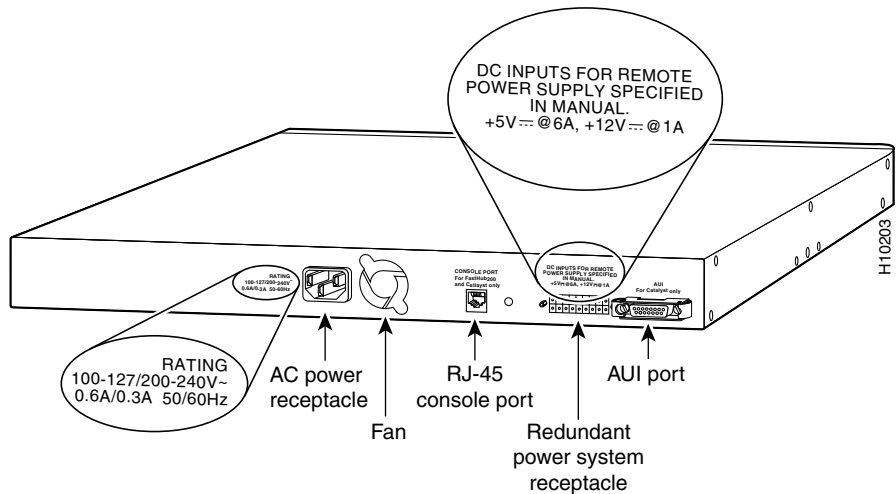
**Table 1-6 FDUP LED Description**

<b>Color</b>	<b>Full-Duplex</b>
Off	Half-duplex mode is operational.
Solid green	Full-duplex mode is operational.

## Rear Panel Description

The rear panel of a Catalyst 1900 switch has an AC power connection, an RJ-45 console port, a redundant power system (RPS) connection, and a switched Ethernet AUI port (see Figure 1-4).

**Figure 1-4 Rear Panel Ports and Receptacles**



## Console Port and Switched Ethernet AUI Port

You can configure and manage the switch through the menu-based management console. Connect the console port to a management station or modem with the supplied RJ-45-to-RJ-45 rollover cable and adapters. For additional information, see the “Connecting to the Console Port” section on page 2-14.

You can connect the switched Ethernet AUI port to an Ethernet transceiver, which is then connected to a 10-Mbps Ethernet device through thick coaxial, thin coaxial, fiber-optic, or UTP cable. For additional information on connecting to this port, see the “Connecting to the Switched Ethernet AUI Port” section on page 2-26.

### Power Connections

You can power the switch with the internal power supply and/or the Cisco 600W AC redundant power system (RPS). If you have the internal power supply and the RPS powered up at the same time, the RPS LED flashes amber. In this configuration, the internal power supply is powering the switch and the RPS will power the switch if the internal power supply fails.

To use the internal power supply, an autoranging unit supporting input voltages of 100 to 127/200 to 240 VAC, connect the supplied AC power cord to the AC power connection and to an AC power outlet.

For complete information about the RPS, see the Cisco RPS documentation.



**Warning** Attach only the Cisco RPS (model PWR600-AC-RPS) to the RPS receptacle.

### Network Configuration Examples

This section provides example configurations of networks using Catalyst 1900 switches:

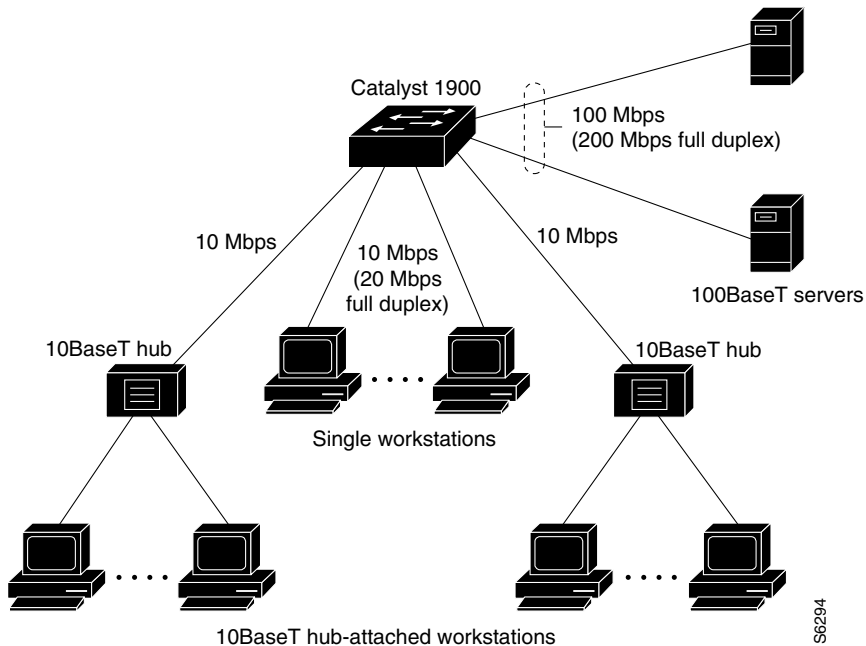
- Client/server workgroup with a single switch
- Distributed 100BaseT backbone with multiple switches
- 100BaseT collapsed backbone with multiple switches
- 100BaseT redundant backbone with multiple switches
- Extended network with multiple switches

## Client/Server Workgroup with a Single Switch

In Figure 1-5, a Catalyst 1900 switch supports up to 25 switched (dedicated) Ethernet connections to workstations or 10BaseT hubs. Each workstation or hub directly connected to a switch port has a dedicated bandwidth of 10 Mbps. However, the workstations connected to the 10BaseT hub or repeater share the available 10 Mbps of bandwidth available.

The two 100-Mbps servers are connected to the 100BaseTX ports on the switch. Each full-duplex switched port provides 200 Mbps of bandwidth to the server. These servers are accessible to all the users in the workgroup. Single workstations in full duplex have 20 Mbps of bandwidth from each switched port. Because hubs run only half duplex, each connected half-duplex port provides 10 Mbps of bandwidth.

**Figure 1-5 High-Performance Client/Server Workgroup with a Catalyst 1900 Switch**

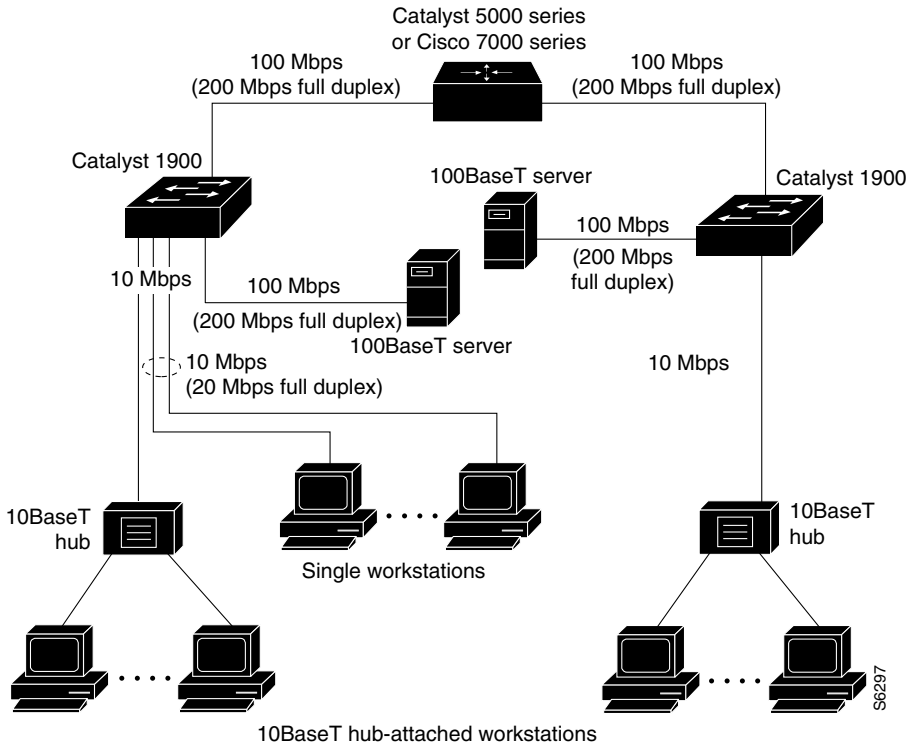




## 100BaseT Collapsed Backbone with Multiple Switches

You can create a 100-Mbps collapsed backbone by connecting Catalyst 1900 switches to a 100BaseT backbone switch or router, as shown in Figure 1-7. Two Catalyst 1900 switches connect to a Catalyst 5000 switch or Cisco 7000 router through the 100BaseT ports. In CollisionFree full-duplex mode, 200 Mbps of bandwidth is available to both Catalyst 1900 switches. The distance between each Catalyst 1900 switch and the backbone switch or router can be increased to 2 kilometers by using the 100BaseFX port in full-duplex mode with fiber-optic cabling.

**Figure 1-7 100BaseT Collapsed Backbone with Multiple Catalyst 1900 Switches**



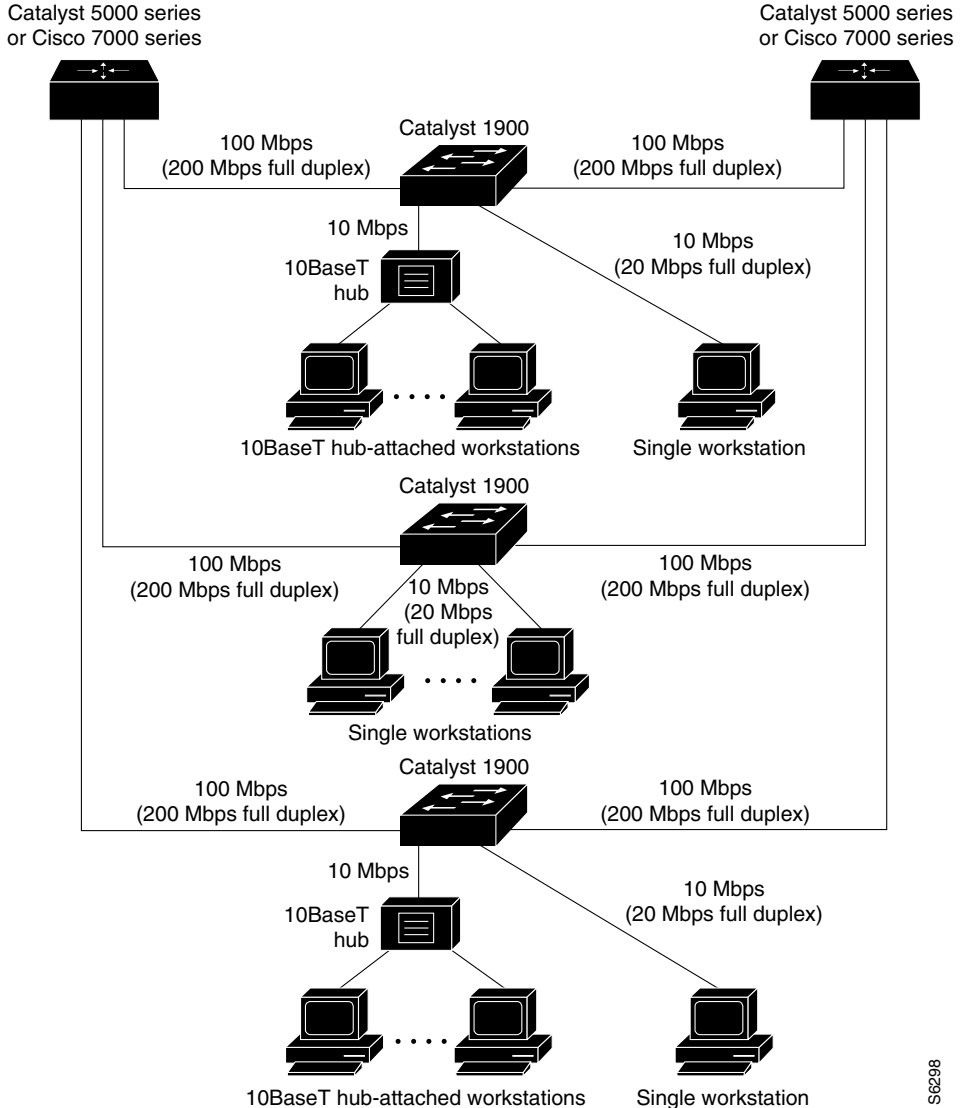
### 100BaseT Redundant Backbone with Multiple Switches

You can create a 100-Mbps redundant backbone network by connecting Catalyst 1900 switches to 100BaseT backbone switches or routers, as shown in Figure 1-8. Each Catalyst 1900 switch connects to the two Catalyst 5000 switches or Cisco 7000 routers, shown in the top-left and top-right corners, in a redundant configuration. If connectivity is lost to one of the backbone routers or switches, the network uses the redundant connection.

Spanning-Tree Protocol, available only on switches, ensures that only one of the two connections from each switch is active (the primary link), ensuring that there are no loops in the network paths. If the primary link fails, the secondary link becomes active.

The Catalyst 1900 switches in this example are connected to the backbone switches or routers through the 100BaseT ports in CollisionFree full-duplex mode. The distance between each Catalyst 1900 switch and the backbone switch or router can be increased to 2 kilometers by using a fiber-optic cable (full-duplex connection).

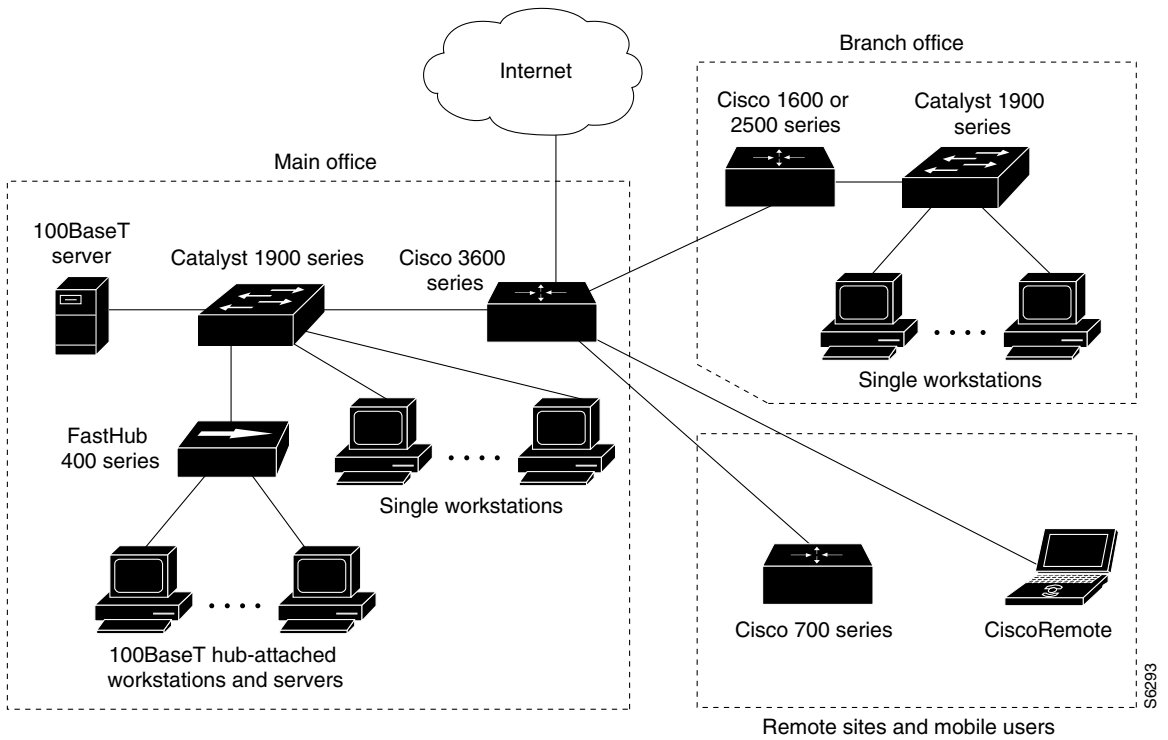
Figure 1-8 100BaseT Redundant Backbone with Multiple Catalyst 1900 Switches



## Extended Network with Multiple Switches

A system of routers, switches, and hubs can be combined to create a high-performance network that extends beyond the main office LAN to connect to branch offices, remote sites, mobile users, and the Internet. Figure 1-9 is an example of an extended network.

Figure 1-9 Extended Network with Multiple Catalyst 1900 Switches



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