

Troubleshooting Tools

This chapter presents information about the wide variety of tools available to assist you in troubleshooting your internetwork.

Using Router Diagnostic Commands

Cisco routers provide numerous integrated commands to assist you in monitoring and troubleshooting your internetwork. The following sections describe the basic use of these commands:

- The **show** commands help monitor installation behavior and normal network behavior, as well as isolate problem areas.
- The **ping** commands help determine connectivity between devices on your network.
- The **trace** commands provide a method of determining the route by which packets reach their destination from one device to another.

Using show Commands

The **show** commands are powerful monitoring and troubleshooting tools. You can use the **show** commands to perform a variety of functions:

- Monitor router behavior during initial installation
- Monitor normal network operation
- Isolate problem interfaces, nodes, media, or applications
- Determine when a network is congested
- Determine the status of servers, clients, or other neighbors

The following are some of the most commonly used show commands:

- **show running-config**—Displays the router configuration currently running, means all configurations are done and still on.
- **show interfaces**—Displays statistics for all interfaces configured on the router or access server. The resulting output varies, depending on the network for which an interface has been configured.
- **show controllers**—Displays statistics for interface card controllers. Clock rates too For DCE.
- **Show ip route**—Displays the routing table to verify routes missing.

- **Show ip interface brief**—Displays all interfaces with IPs and status.
- **Show ip protocols**—Displays the dynamic routings protocols processes with their networks and passive interfaces.

Using the ping Commands

To check host reachability and network connectivity, use the **ping** command, which can be invoked from both user exec mode and privileged exec mode. After you log in to the router or access server, you are automatically in user exec command mode. The exec commands available at the user level are a subset of those available at the privileged level. In general, the user exec commands enable you to connect to remote devices, change terminal settings on a temporary basis, perform basic tests, and list system information. The **ping** command can be used to confirm basic network connectivity on AppleTalk, ISO Connectionless Network Service (CLNS), IP, Novell, Apollo, VINES, DECnet, or XNS networks.

For IP, the **ping** command sends Internet Control Message Protocol (ICMP) Echo messages. ICMP is the Internet protocol that reports errors and provides information relevant to IP packet addressing. If a station receives an ICMP Echo message, it sends an ICMP Echo Reply message back to the source.

The extended command mode of the **ping** command permits you to specify the supported IP header options. This allows the router to perform a more extensive range of test options. To enter **ping** extended command mode, enter **yes** at the extended commands prompt of the **ping** command.

It is a good idea to use the **ping** command when the network is functioning properly to see how the command works under normal conditions and so that you have something to compare against when troubleshooting.

For detailed information on using the **ping** and extended **ping** commands, refer to the *Cisco IOS Configuration Fundamentals Command Reference*.

Using the trace Commands

The **trace** user exec command discovers the routes that a router's packets follow when travelling to their destinations. The **trace** privileged exec command permits the supported IP header options to be specified, allowing the router to perform a more extensive range of test options.

The **trace** command works by using the error message generated by routers when a datagram exceeds its time-to-live (TTL) value. First, probe datagrams are sent with a TTL value of 1. This causes the first router to discard the probe datagrams and send back "time exceeded" error messages. The **trace** command then sends several probes and displays the round-trip time for each. After every third probe, the TTL is increased by 1.

Each outgoing packet can result in one of two error messages. A "time exceeded" error message indicates that an intermediate router has seen and discarded the probe. A "port unreachable" error

message indicates that the destination node has received the probe and discarded it because it could not deliver the packet to an application. If the timer goes off before a response comes in, **trace** prints an asterisk (*).

The **trace** command terminates when the destination responds, when the maximum TTL is exceeded, or when the user interrupts the trace with the escape sequence.

As with **ping**, it is a good idea to use the **trace** command when the network is functioning properly to see how the command works under normal conditions and so that you have something to compare against when troubleshooting.

For detailed information on using the **trace** and extended **trace** commands, refer to the *Cisco IOS Configuration Fundamentals Command Reference*.