11.5.3 WAN Troubleshooting Facts

You can use the **show interfaces** command on Cisco routers to view the interface status and identify connectivity problems on a WAN link.

Possible Conditions

The following table summarizes some possible conditions indicated by the interface status:

Line status	Protocol status	Condition
Administratively Down	Down	The interface is configured with the **shutdown** command.
Down	Down	There is a hardware or network connection problem (Physical layer), such as: ▪ No cable or bad cable ▪ A powered off device or administratively shut down interface on the other end of the cable

Up	Down	There is a connection or communication problem (Data Link layer), such as:
		▪ No clock rate provided by the DCE device
		▪ Mismatched encapsulation
		▪ Incorrect authentication parameters for PPP, including:
		  ▪ Mismatched authentication method
		  ▪ Missing **username** statements
		  ▪ Mismatched passwords

Up	Up	The interface is working correctly.

Troubleshooting TCP/IP Connectivity

After verifying that the interfaces have Layer 1 and Layer 2 connectivity, proceed to troubleshoot TCP/IP connectivity by verifying the following:

- Devices have unique IP addresses.
- The same subnet mask is used on all devices on the same subnet.
- The IP addresses assigned to each device are on the same subnet.
- Routing table entries are correct.

Remember the following about troubleshooting connectivity:

- If a problem exists at Layer 1, you must correct that problem before troubleshooting Layer 2 connectivity. If a problem exists at Layer 2, you must correct that problem before you can troubleshoot upper layer connectivity.
- **ping** and **traceroute** are used to verify Network layer connectivity, and Telnet is used to verify Application layer connectivity and configuration.
- A failed **ping** or **traceroute** test might indicate Layer 1, Layer 2, or Layer 3 problems. Examine the interface status to rule out Layer 1 and Layer 2 problems.
- A successful Telnet test means that **ping** and **traceroute** will also be successful. A failed Telnet test merely indicates a failure at the Application layer or below. It does not tell you at which layer the problem exists.
- Because some devices do not respond to ICMP messages, you might have Network layer connectivity between devices even if **ping** or **traceroute** fail.
- A successful **ping** test followed by an unsuccessful Telnet test means that Network layer connectivity exists. Troubleshoot the upper layer configuration.
- Even if Telnet to a router fails, the router might still be routing packets. Routing happens at the Network layer, while Telnet happens at the Application layer.

The following list of commands may help when troubleshooting WAN connections on a Cisco router:

Command	Action
router#show interfaces	Lists a large set of information about each interface.
router#show interface status	Displays summary information about the interface status.

router#show ip interfaces	Displays a small set of information about each IP interface.
router#show ip interfaces brief	Displays a single line of information about each IP interface.
router#show ip route *[ip address]*	Displays details about the route a packet takes to reach the specified IP address.
router#show controllers *[serial interface]*	Displays the serial interface configuration, such as the type of serial cable and which end of the cable is connected to the device (DCE or DTE).
router#ping *[ip address]*	Tests communication with a specific interface using its IP address.