

Troubleshooting Frame Relay

This section discusses troubleshooting procedures for connectivity problems related to Frame Relay links. It describes specific Frame Relay symptoms, the problems that are likely to cause each symptom, and the solutions to those problems.

The following sections cover the most common network issues in Frame Relay networks:

- Frame Relay: Frame Relay Link Is Down
- Frame Relay: Cannot **ping** Remote Router
- Frame Relay: Cannot **ping** End to End

Frame Relay: Frame Relay Link Is Down

Symptom: Connections over a Frame Relay link fail. The output of the **show interfaces serial** exec command shows that the interface and line protocol are down, or that the interface is up and the line protocol is down.

Table 18-1 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 18-1 Frame Relay: Frame Relay Link Is Down	
Possible Problem	Solution
A cabling, hardware, or carrier problem has occurred.	<p>Perform these steps for the local and remote router:</p> <ol style="list-style-type: none">1. Use the show interfaces serial command to see whether the interface and line protocol are up.2. If the interface and line protocol are down, check the cable to make sure that it is a DTE¹ serial cable. Make sure that cables are securely attached.3. If the cable is correct, try moving it to a different port. If that port works, then the first port is defective. Replace either the card or the router.4. If the cable doesn't work on the second port, try replacing the cable. If it still doesn't work, there might be a problem with the DCE². Contact your carrier about the problem. <p>For detailed information on troubleshooting serial lines, refer to Chapter 15, "Troubleshooting Serial Lines."</p>
An LMI ³ type mismatch has	<ol style="list-style-type: none">1. Use the show interfaces serial command to check the state of the

occurred.	<p>interface.</p> <ol style="list-style-type: none"> If the output shows that the interface is up but the line protocol is down, use the show frame-relay lmi exec command to see which LMI type is configured on the Frame Relay interface. Make sure that the LMI type is the same for all devices in the path from source to destination. Use the frame-relay lmi-type {ansi cisco q933a} interface configuration command to change the LMI type on the router.
Keepalives are not being sent.	<ol style="list-style-type: none"> Enter the show interfaces command to find out whether keepalives are configured. If you see a line that says "keepalives not set," keepalives are not configured. Use the keepalive seconds interface configuration command to configure keepalives. The default value for this command is 10 seconds.
Encapsulation mismatch has occurred.	<ol style="list-style-type: none"> When connecting Cisco devices with non-Cisco devices, you must use IETF⁴ encapsulation on both devices. Check the encapsulation type on the Cisco device with the show frame-relay map exec command. If the Cisco device is not using IETF encapsulation, use the encapsulation frame-relay ietf interface configuration command to configure IETF encapsulation on the Cisco Frame Relay interface. <p>For information on viewing or changing the configuration of the non-Cisco device, refer to the vendor documentation.</p>
The DLCI ⁵ is inactive or has been deleted.	<ol style="list-style-type: none"> Use the show frame-relay pvc exec command to view the status of the interface's PVC. If the output shows that the PVC⁶ is inactive or deleted, there is a problem along the path to the remote router. Check the remote router or contact your carrier to check the status of the PVC.
The DLCI is assigned to the wrong subinterface.	<ol style="list-style-type: none"> Use the show frame-relay pvc privileged exec command to check the assigned DLCIs. Make sure that the correct DLCIs are assigned to the correct subinterface. If the DLCI is incorrect, use the no frame-relay map interface-dlci command to delete the incorrect DLCI number entry under the interface. Use the frame-relay map interface-dlci interface configuration command to define the mapping between an address and the correct DLCI used to connect to the address. <p>Syntax:</p> <p>frame-relay map protocol protocol-address dlci [broadcast] [ietf cisco]</p>

	<p>Syntax description:</p> <ul style="list-style-type: none"> • <i>protocol</i>—Supported protocols: AppleTalk, DECnet, IP, XNS, IPX, and VINES. • <i>protocol-address</i>—Address for the protocol. • <i>dlci</i>—DLCI number for the interface. • <i>broadcast</i>—(Optional) Broadcasts should be forwarded to this address when multicast is not enabled. • <i>ietf</i>—(Optional) IETF form of Frame Relay encapsulation. Use when the communication server is connected to another vendor's equipment across a Frame Relay network. • <i>cisco</i>—(Optional) Cisco encapsulation method. <p>Example:</p> <p>The following example maps IP address 131.108.123.1 to DLCI 100:</p> <pre>interface serial 0 frame-relay map ip 131.108.123.1 100 broadcast</pre> <p>2. If the DLCIs appear to be correct, shut down the main interface using the shutdown interface configuration command, and then bring the interface back up using the no shutdown command.</p>
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¹ DTE = data terminal equipment

² DCE = data circuit-terminating equipment

³ LMI = Local Management Interface

⁴ IETF = Internet Engineering Task Force

⁵ DLCI = Data link connection identifier

⁶ PVC = permanent virtual circuit

Frame Relay: Cannot ping Remote Router

Symptom: Attempts to **ping** the remote router across a Frame Relay connection fail.

Table 18-2 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 18-2 Frame Relay: Cannot ping Remote Router	
Possible Problem	Solution
Encapsulation mismatch has occurred.	<ol style="list-style-type: none">1. When connecting Cisco devices with non-Cisco devices, you must use IETF encapsulation on both devices. Check the encapsulation type on the Cisco device with the show frame-relay map exec command.2. If the Cisco device is not using IETF encapsulation, use the encapsulation frame-relay ietf interface configuration command to configure IETF encapsulation on the Cisco Frame Relay interface. <p>For information on viewing or changing the configuration of the non-Cisco device, refer to the vendor documentation.</p>
DLCI is inactive or has been deleted.	<ol style="list-style-type: none">1. Use the show frame-relay pvc exec command to view the status of the interface's PVC.2. If the output shows that the PVC is inactive or deleted, there is a problem along the path to the remote router. Check the remote router, or contact your carrier to check the status of the PVC.
DLCI is assigned to the wrong subinterface.	<ol style="list-style-type: none">1. Use the show frame-relay pvc privileged exec command to check the assigned DLCIs. Make sure that the correct DLCIs are assigned to the correct subinterfaces.2. If the DLCIs appear to be correct, shut down the main interface using the shutdown interface configuration command, and then bring the interface back up using the no shutdown command.
An access list was misconfigured.	<ol style="list-style-type: none">1. Use the show access-list privileged exec command to see whether there are access lists configured on the router.2. If there are access lists configured, test connectivity by disabling access lists using the no access-group global configuration command. Check whether connectivity is restored.

	<p>3. If connections work, re-enable access lists one at a time, checking connections after enabling each access list.</p> <p>4. If enabling an access list blocks connections, make sure that the access list does not deny necessary traffic. Make sure to configure explicit permit statements for any traffic that you want to pass.</p> <p>5. Continue testing access lists until all access lists are restored and connections still work.</p>
The frame-relay map command is missing.	<p>1. Use the show frame-relay map privileged exec command to see whether an address map is configured for the DLCI.</p> <p>2. If you do not see an address map for the DLCI, enter the clear frame-relay-inarp privileged exec command and then use the show frame-relay map command again to see whether there is now a map to the DLCI.</p> <p>3. If there is no map to the DLCI, add a static address map. Use the frame-relay map interface configuration command.</p> <p>Syntax:</p> <ul style="list-style-type: none"> • frame-relay map <i>protocol protocol-address dlci [broadcast] [ietf cisco]</i> <p>Syntax Description:</p> <ul style="list-style-type: none"> • <i>protocol</i>—Supported protocols: AppleTalk, DECnet, IP, XNS, IPX, and VINES. • <i>protocol-address</i>—Address for the protocol. • <i>dlci</i>—DLCI number for the interface. • <i>broadcast</i>—(Optional) Broadcasts should be forwarded to this address when multicast is not enabled. • <i>ietf</i>—(Optional) IETF form of Frame Relay encapsulation. Use when the communication server is connected to another vendor's equipment across a Frame Relay network. • <i>cisco</i>—(Optional) Cisco encapsulation method.

	<p>Example:</p> <p>The following example maps IP address 131.108.123.1 to DLCI 100:</p> <pre>interface serial 0 frame-relay map ip 131.108.123.1 100 broadcast</pre> <p>4. Make sure that the DLCIs and next-hop addresses specified in frame-relay map commands are correct. The specified protocol address should be in the same network as your local Frame Relay interface.</p> <p>For complete information on configuring Frame Relay address maps, refer to the Cisco IOS <i>Wide-Area Networking Configuration Guide</i>.</p>
<p>No broadcast keyword is found in frame-relay map statements.</p>	<p>1. Use the show running-config privileged exec command on local and remote routers to view the router configuration. Check frame-relay map command entries to see whether the broadcast keyword is specified.</p> <p>2. If the keyword is not specified, add the broadcast keyword to all frame-relay map commands.</p> <p>Syntax:</p> <pre>frame-relay map protocol protocol-address dlci [broadcast] [ietf cisco]</pre> <p>Syntax Description:</p> <ul style="list-style-type: none"> <i>protocol</i>—Supported protocols: AppleTalk, DECnet, IP, XNS, IPX, and VINES. <i>protocol-address</i>—Address for the protocol. <i>dlci</i>—DLCI number for the interface. <i>broadcast</i>—(Optional) Broadcasts should be forwarded to this address when multicast is not enabled. <i>ietf</i>—(Optional) IETF form of Frame Relay encapsulation. Use when the communication server is connected to another

	<p>vendor's equipment across a Frame Relay network.</p> <ul style="list-style-type: none">• <i>cisco</i>—(Optional) Cisco encapsulation method. <p>Example:</p> <p>The following example maps IP address 131.108.123.1 to DLCI 100:</p> <pre>interface serial 0 frame-relay map ip 131.108.123.1 100 broadcast</pre> <p>Note: By default, the broadcast keyword is added to dynamic maps learned via Inverse ARP¹.</p>
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¹ ARP = Address Resolution Protocol

Frame Relay: Cannot ping End to End

Symptom: Attempts to **ping** devices on a remote network across a Frame Relay connection fail.

Table 18-3 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 18-3 Frame Relay: Cannot ping End to End	
Possible Problem	Solution
Split horizon problem	<p>In a hub-and-spoke Frame Relay environment, you must configure subinterfaces to avoid problems with split horizon. For detailed information on configuring subinterfaces, refer to the Cisco IOS <i>Wide-Area Networking Configuration Guide</i> and <i>Wide-Area Networking Command Reference</i>.</p> <p>Frame Relay subinterfaces provide a mechanism for supporting partially meshed Frame Relay networks. Most protocols assume transitivity on a logical network; that is, if station A can talk to station B, and station B can talk to station C, then station A should be capable of talking to station C directly. Transitivity is true on LANs, but not on Frame Relay networks, unless A is directly connected to C.</p> <p>Additionally, certain protocols such as AppleTalk and transparent bridging cannot be supported on partially meshed networks because they require <i>split horizon</i>, in which a packet received on an interface cannot be transmitted out the same interface even if the packet is received and transmitted on different virtual circuits.</p> <p>Configuring Frame Relay subinterfaces ensures that a single physical interface is treated as multiple virtual interfaces. This capability enables us to overcome split horizon rules. Packets received on one virtual interface can now be forwarded out another virtual interface, even if they are configured on the same physical interface.</p> <p>Subinterfaces address the limitations of Frame Relay networks by providing a way to subdivide a partially meshed Frame Relay network into a number of smaller, fully meshed (or point-to-point) subnetworks. Each subnetwork is assigned its own network number and appears to the protocols as if it is reachable through a separate interface. (Note that point-to-point subinterfaces can be unnumbered for use with IP, reducing the addressing burden that might otherwise result.)</p>

<p>No default gateway on workstation</p>	<ol style="list-style-type: none"><li data-bbox="443 205 1354 310">1. From the local workstation or server, try to ping the remote workstation or server. Make several attempts to ping the remote device if the first ping is unsuccessful.<li data-bbox="443 352 1300 422">2. If all your attempts fail, check whether the local workstation or server can ping the local router's Frame Relay interface.<li data-bbox="443 464 1292 569">3. If you are unable to ping the local interface, check the local workstation or server to see whether it is configured with a default gateway specification.<li data-bbox="443 611 1354 716">4. If no default gateway is specified, configure the device with a default gateway. The default gateway should be the address of the local router's LAN interface. <p data-bbox="443 758 1300 829">For information on viewing or changing the workstation or server's default gateway specification, refer to the vendor documentation.</p>
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