



# Troubleshooting Voice over Frame Relay Interfaces to the IP Network

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Voice over Frame Relay (VoFR) enables a router to carry voice traffic (for example, telephone calls and faxes) over a Frame Relay network, using the FRF.11 protocol. This protocol specification defines multiplexed data, voice, fax, dual-tone multifrequency (DTMF) digit-relay, and channel-associated signaling (CAS).

The Cisco VoFR implementation enables you to make dynamic- and tandem-switched calls and Cisco trunk calls. Dynamic-switched calls have dial-plan information included that processes and routes calls based on the telephone numbers. The dial-plan information is contained within dial-peer entries.

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## Verifying the Voice Connections

To verify switched call voice connections, perform the following tasks:

- Pick up the telephone handset and verify that there is a dial tone.
- Call from a local telephone to the configured dial peer and verify that the call completes.

To verify the FXO-FXS trunk calls to a remote PBX, perform the following tasks:

- Pick up the telephone and listen for a dial tone from the remote PBX.
- Dial a telephone number, so that the remote PBX routes the call.

To verify voice connections, perform the following tasks:



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- Check the validity of the dial peer and voice port configuration by performing the following tasks:
  - Enter the **show dial-peer voice** command to verify that the data configured is correct.
  - Enter the **show dial-peer voice summary** command to check the validity of the dial peer configurations.
  - Enter the **show voice port** command to show the status of the voice ports.
  - Enter the **show call active voice** with the keyword **brief** to show the call status for all voice ports.
  - Enter the **show voice call** command to check the validity of the voice port configuration.
  - Enter the **show voice dsp** command to show the current status of all DSP voice channels.
  - Enter the **show voice permanent** command to show the status of Cisco trunk permanent calls.
  - Enter the **show call history** command to show the active call table.
- Check the validity of the VoFR configuration on the DLCI by entering the **show frame-relay vofr** command to show the VoFR configuration.

## Verifying the Frame Relay Configuration

Check the validity of the configuration by performing the following tasks:

- Enter the **show frame-relay pvc** command to show the status of the PVCs.
- Enter the **show frame-relay vofr** command with the arguments *interface*, *dldci*, and *cid* to show statistics and information on the open subchannels.
- Enter the **show frame-relay fragment** command with the arguments *interface number* and *dldci* to show the Frame Relay fragmentation configuration.
- Enter the **show traffic-shape queue** command to display the traffic-shaping information if Frame Relay traffic shaping is configured. The **queue** option displays the queueing statistics. For more information about traffic shaping, refer to [Frame Relay Traffic Shaping for VoIP and VoFR, document 14073](#).

## Troubleshooting Tasks

To troubleshoot and resolve configuration issues, perform the following tasks:

- If no calls are going through, ensure that the **frame-relay voice bandwidth** command is configured.
- If VoFR is configured on a PVC and there are problems with data connectivity on that PVC, ensure that the **frame-relay fragment** command has been configured.
- If data is not being transmitted but fragmentation is configured, ensure that Frame Relay traffic shaping is turned on.
- If the problem is with the dial plan or the dial peers, use the **show dial-plan number** command with the argument *dial string* to display which dial peers are being used when a specific number is called.
- If there are problems connecting an FRF.11 trunk call, ensure that the **session protocol** command in dial peer configuration is set to **frf11-trunk**.
- If FRF.11 trunk calls on the Cisco 2600 or Cisco 3600 series routers are being configured, verify that the **called-number vofr** command in dial peer configuration is configured and that its number matches the destination pattern of the corresponding POTS dial peer.

- Ensure that the voice port is set to **no shutdown**.
- Ensure that the serial port or the T1/E1 controller is set to **no shutdown**.
- Toggle the voice port by first entering **shutdown** and then **no shutdown** every time the **connection trunk** or **no connection trunk** command is entered.

## Monitoring and Maintaining the VoFR Configuration

To monitor and maintain the VoFR configuration, use the following commands in EXEC mode as needed:

Command	Purpose
Router# <b>show call active voice</b> [ <b>brief</b> ]	Displays the active call table.
Router# <b>show call history voice</b> [ <b>last number</b> ]   [ <b>brief</b> ] OR Router# <b>show call history voice record</b>	Displays the call history table.
Router# <b>show dial-peer voice</b>	Displays configuration information and call statistics for dial peers.
Router# <b>show frame-relay fragment</b>	Displays information about the Frame Relay fragmentation taking place in the Cisco router.
Router# <b>show frame-relay pvc</b>	Displays statistics about PVCs for Frame Relay interfaces.
Router# <b>show frame-relay vofr</b>	Displays the FRF.11 subchannel information on VoFR DLCIs.
Router# <b>show interfaces serial</b>	Displays information about a serial interface.
Router# <b>show traffic-shape queue</b>	Displays information about the elements queued at a particular time at the VC (DLCI) level.
Router# <b>show voice permanent-call</b>	Displays information about the permanent calls on a voice interface.

## Troubleshooting VoFR with QoS

This section provides information you can use to confirm that your VoFR configuration with QoS is working properly.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only), which allows you to view an analysis of **show** command output.

### LLQ and IP RTP Priority Commands

The following **show** and **debug** commands can help you verify your LLQ and IP RTP priority configurations.

- **show policy-map interface serial interface#**—This command is useful for viewing the LLQ operation and any drops in the PQ.
- **show policy-map policy\_map\_name**—Displays information about the policy-map configuration.

- **show queue** *interface-type interface-number*—Lists fair queueing configuration information and statistics for a particular interface.
- **debug priority**—Displays PQ events and shows whether dropping occurs in this queue.
- **show class-map** *class\_name*—Displays information about the class-map configuration.
- **show call active voice**—Used to check for lost packets at the DSP level.
- **show frame-relay ip rtp header-compression**—Displays RTP header compression statistics.

For more information about low-latency queueing for VoFR, refer to the [Low Latency Queueing for Frame Relay](#) feature document.

## Fragmentation Commands

Use the following **debug** and **show** commands to verify and troubleshoot fragmentation configurations.

- **show frame-relay fragment**—Displays information about the Frame Relay fragmentation taking place in the Cisco router.
- **debug frame-relay fragment**—Displays event or error messages related to Frame Relay fragmentation. It is enabled at the PVC level on the selected interface.

## Frame Relay Interface Commands

Use the following **show** commands to verify and troubleshoot the Frame Relay interface configurations.

- **show traffic-shape queue** *interface*—Displays information about the elements queued at the VC data-link connection identifier (DLCI) level. The command is used to verify the operation of IP RTP priority over Frame-Relay. When the link is congested, voice flows are identified with a weight of zero. This indicates that the voice flow is using the PQ.
- **show traffic-shape**—Displays information such as Tc, Bc, Be, and CIR configured values.
- **show frame-relay pvc** *dcci-#*—Displays information such as traffic shaping parameters, fragmentation values, and dropped packets.

For more information about VoIP over Frame Relay with quality of service (QoS), refer to [VoIP over Frame Relay with Quality of Service \(Fragmentation, Traffic Shaping, LLQ/IP RTP Priority\)](#), document 12156.

# Troubleshooting VoIP over Frame Relay with Multipoint PVCs and Prioritization

When you are troubleshooting the traffic-shaping and prioritization for a VoIP over Frame Relay network with hub and spoke topology, the configuration of the hub is such that there are two permanent virtual circuits (PVCs) for each remote spoke, and both data and voice are sent over both PVCs.

**Note**

The prioritization and fragmentation discussed in this document applies not only to this scenario but also to a scenario where you may have one PVC with voice and data and another with only data. The data PVCs need to be traffic-shaped just as the voice and data PVCs are. This is because when a single physical pipe is shared, in this case at the hub, the serialization delay affects all data items, regardless of the PVC they are destined for.

The following debug commands can help you troubleshoot traffic-shaping and prioritization for VoIP over Frame Relay.

- **debug priority**—Displays PQ events and indicates whether dropping occurs in this queue. Frame Relay is a special case with respect to policing the priority queue. The PQ is policed to ensure that the fair queues are not starved of bandwidth. When you configure the PQ, you specify in kbps the maximum amount of bandwidth available to that queue. Packets that exceed that maximum are dropped. Originally, the priority queue of a service-policy configured in a Frame Relay map class was policed during periods of congestion and noncongestion. Cisco IOS Release 12.2 removes this exception. PQ is still policed with FRF.12, but other nonconforming packets are only dropped if there is congestion.
- **debug frame-relay fragment**—Displays event or error messages related to Frame Relay fragmentation. The command is only enabled at the PVC level on the selected interface.

```
newyork# debug priority
Priority output queueing debugging is on
newyork#ping 172.16.120.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.120.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 56/57/60 ms
newyork#
00:42:40: PQ: Serial2/0: ip -> normal
00:42:40: PQ: Serial2/0 output (Pk size/Q 104/2)
00:42:40: PQ: Serial2/0: ip -> normal
00:42:40: PQ: Serial2/0 output (Pk size/Q 104/2)
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00:42:40: PQ: Serial2/0: ip -> normal
00:42:40: PQ: Serial2/0 output (Pk size/Q 104/2)
00:42:41: PQ: Serial2/0 output (Pk size/Q 13/0)
```

```
newyork# debug frame-relay fragment interface serial 2/0 100
This may severely impact network performance.
You are advised to enable no logging console debug. Continue?[confirm]
Frame Relay fragment/packet debugging is on
Displaying fragments/packets on interface Serial2/0 dlci 100 only
```

```
Serial2/0(i): dlci 100, rx-seq-num 126, exp_seq-num 126, BE bits set, frag_hdr 04 C0 7E
```

```
Serial2/0(o): dlci 100, tx-seq-num 82, BE bits set, frag_hdr 04 C0 52
```

For more information about VoIP over Frame Relay with Multipoint PVCs and Prioritization, refer to [VoIP over Frame Relay with Multipoint PVCs and Prioritization, document 12162](#).

# VoFR Testing Commands

To diagnose problems in switched Frame Relay networks, use one or both of the following privileged EXEC commands:

Command	Purpose
Router# <b>show frame-relay pvc</b>	Displays statistics about PVCs for Frame Relay interfaces.
Router# <b>debug frame-relay switching</b>	Displays debug messages for switched Frame Relay PVCs.

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