



QoS Features for Voice

Real-time applications such as voice applications have different characteristics and requirements from those of traditional data applications. Because they are real-time-based, voice applications tolerate minimal variation in the amount of delay affecting delivery of their voice packets. Voice traffic is also intolerant of packet loss and jitter, both of which degrade unacceptably the quality of the voice transmission delivered to the recipient end user. To effectively transport voice traffic over IP, mechanisms are required that ensure reliable delivery of packets with low latency. Cisco IOS QoS features collectively embody these techniques, offering the means to provide priority service that meets the stringent requirements of voice packet delivery.

This chapter only provides a high-level overview of Cisco IOS QoS features for voice. For complete conceptual and configuration information for each feature, see the referenced chapters in this book.

For a list of related Cisco IOS voice documentation, see the section “For More Information” in this chapter.

Cisco IOS QoS for Voice Features

Cisco IOS includes a rich set of features that enables you to deploy mechanisms that deliver quality of service throughout your network. Following are some of the Cisco IOS features that address the requirements of end-to-end QoS and service differentiation for voice packet delivery:

- Class-based weighted fair queueing (CBWFQ)—Extends the standard WFQ functionality to provide support for user-defined traffic classes. Using CBWFQ, you can create a specific class for voice traffic. For conceptual information on CBWFQ, see the chapter “Congestion Management Overview” in this book. For information on how to configure CBWFQ, see the chapter “Configuring Weighted Fair Queueing” in this book.
- Committed access rate (CAR)—Provides a rate-limiting feature that allows you to allocate both bandwidth commitments and bandwidth limitations to traffic sources and destinations while specifying policies for handling traffic that exceeds the bandwidth allocation. For conceptual information on CAR, see the chapter “Classification Overview” in this book. For information on how to configure CAR, see the chapter “Configuring Committed Access Rate” in this book.
- Compressed Real-Time Protocol (CRTP)—Used in conjunction with RTP, compresses the extensive RTP header, resulting in decreased consumption of available bandwidth for voice traffic. A corresponding reduction in delay is realized. For conceptual information on CRTP, see the chapter “Link Efficiency Mechanisms Overview” in this book. For information on how to configure CRTP, see the chapter “Configuring Compressed Real-Time Protocol” in this book.

- **Frame Relay Traffic Shaping (FRTS)**—Delays excess traffic using a buffer, or queueing mechanism, to hold packets and shape the flow when the data rate of the source is higher than expected. For conceptual information on FRTS, see the chapter “Policing and Shaping Overview” in this book. For information on how to configure FRTS, see the chapter “Configuring Frame Relay and Frame Relay Traffic Shaping” in this book.
- **FRF.12**—Ensures predictability for voice traffic, aiming to provide better throughput on low-speed Frame Relay links by interleaving delay-sensitive voice traffic on one virtual circuit (VC) with fragments of a long frame on another VC utilizing the same interface. For more information about FRF.12, refer to the *Cisco IOS Multiservice Applications Configuration Guide*.
- **IP RTP Priority**—Provides a strict priority queueing scheme that allows delay-sensitive data such as voice to be dequeued and sent first—that is, before packets in other queues are dequeued. This feature is especially useful on slow-speed WAN links, including Frame Relay, Multilink PPP (MLP), and T1 ATM links. It works with WFQ and CBWFQ. For conceptual information on IP RTP Priority, see the chapter “Congestion Management Overview” in this book. For information on how to configure IP RTP Priority, see the chapter “Configuring Weighted Fair Queueing” in this book.
- **IP to ATM Class of Service (CoS)**—Includes a feature suite that maps QoS characteristics between IP and ATM. Offers differential service classes across the entire WAN, not just the routed portion. Gives mission-critical applications exceptional service during periods of high network usage and congestion. For conceptual information on IP to ATM CoS, see the chapter “IP to ATM Class of Service Overview” in this book. For information on how to configure IP to ATM CoS, see the chapter “Configuring IP to ATM Class of Service” in this book.
- **Low latency queueing (LLQ)**—Provides strict priority queueing on ATM VCs and serial interfaces. This feature allows you to configure the priority status for a class within CBWFQ, and is not limited to UDP port numbers, as is IP RTP Priority. For conceptual information on LLQ, see the chapter “Congestion Management Overview” in this book. For information on how to configure LLQ, see the chapter “Configuring Weighted Fair Queueing” in this book.
- **Multilink PPP (MLP) with Link Fragmentation and Interleaving (LFI)**—Allows large packets to be multilink-encapsulated and fragmented so that they are small enough to satisfy the delay requirements of real-time traffic. LFI also provides a special transmit queue for the smaller, delay-sensitive packets, enabling them to be sent earlier than other flows. For conceptual information on MLP with LFI, see the chapter “Link Efficiency Mechanisms Overview” in this book. For information on how to configure MLP with LFI, see the chapter “Configuring Link Fragmentation and Interleaving for Multilink PPP” in this book.
- **QoS Policy Propagation via Border Gateway Protocol (BGP)**—Leverages BGP to distribute QoS policy to remote routers in your network. It allows you to classify packets and then use other QoS features such as CAR and WRED to specify and enforce business policies to fit your business model. For conceptual information on Policy Propagation via BGP, see the chapter “Classification Overview” in this book. For information on how to configure Policy Propagation via BGP, see the chapter “Configuring QoS Policy Propagation via Border Gateway Protocol” in this book.
- **Resource Reservation Protocol (RSVP)**—Supports the reservation of resources across an IP network, allowing end systems to request QoS guarantees from the network. For networks supporting voice over IP (VoIP), RSVP—in conjunction with features that provide queueing, traffic shaping, and voice call signalling—can provide call admission control for voice traffic. For conceptual information on RSVP, see the chapter “Signalling Overview” in this book. For information on how to configure RSVP, see the chapter “Configuring RSVP” in this book.

- Weighted fair queueing (WFQ) and Distributed WFQ (DWFQ)—Segregates traffic into flows and then schedules traffic onto the outputs to meet specified bandwidth allocation or delay bounds. For conceptual information on WFQ and DWFQ, see the chapter “Congestion Management Overview” in this book. For information on how to configure WFQ and DWFQ, see the chapter “Configuring Weighted Fair Queueing” in this book.
- Weighted Random Early Detection (WRED) and Distributed WRED (DWRED)—Provides differentiated performance characteristics for different classes of service—thus allowing for preferential handling of voice traffic under congestion conditions without exacerbating the congestion. For conceptual information on WRED and DWRED, see the chapter “Congestion Avoidance Overview” in this book. For information on how to configure WRED and DWRED, see the chapter “Configuring Weighted Random Early Detection” in this book.

Cisco IOS QoS for voice features are best deployed at different points in the network and are designed to be used in conjunction with other QoS features to achieve specific goals such as control over jitter and delay. Not all QoS for voice features are supported on all platforms.

For More Information

For additional information about Cisco IOS QoS for voice, refer to the following publications:

- *Cisco IOS Multiservice Applications Configuration Guide*—This guide shows you how to configure your Cisco router or access server to support voice, video, and broadband transmission.
- *Cisco IOS Multiservice Applications Command Reference*—This publication documents commands used to configure your Cisco router or access server to support voice, video, and broadband transmission.

