Course Outline

1. Introduction to IP QoS

- Understanding the Need for QoS
- Understanding QoS
- Implementing QoS

2. The Building Blocks of IP QoS

- Identifying Models for Implementing QoS
- The Integrated Services Model
- The Differentiated Services Model
- Identifying QoS Mechanisms
- QoS in the Life of a Packet

3. Introduction to Modular QoS CLI and AutoQoS

- Modular QoS CLI
- Cisco AutoQoS VoIP
- Cisco AutoQoS Enterprise

4. Classification and Marking

- Understanding Classification and Marking
- Using MQC for Classification
- Using MQC for Class-Based Marking
- Using NBAR for Classification
- Configuring QoS Pre-Classify
- Configuring QoS Policy Propagation Through BGP
- Configuring LAN Classification and Marking

5. Congestion Management

- Introducing Queuing
- Understanding Queuing Implementations
- Configuring FIFO and WFQ
- Configuring CBWFQ and LLQ
- Configuring LAN Congestion Management

6. Congestion Avoidance

- Introducing Congestion Avoidance
- RED
- Configuring Class-Based Weighted RED
- Configuring Explicit Congestion Notification

7. Traffic Policing and Shaping

- Understanding Traffic Policing and Shaping
- Configuring Class-Based Policing
- Configuring Class-Based Shaping
- Configuring Class-Based Shaping on Frame Relay Interfaces
- Frame Relay Voice-Adaptive Traffic Shaping and Fragmentation

8. Link Efficiency Mechanisms

- Understanding Link Efficiency Mechanisms
- Configuring Class-Based Header Compression
- Configuring Link Fragmentation and Interleaving

9. QoS Best Practices

- Understanding Traffic Classification Best Practices
- Deploying End-to-End QoS
- Providing QoS for Security

Labs

Lab 1: QoS Lab Setup and Initialization

Initial router and switch configuration; familiarization with the lab environment.

Lab 2: Classification and Marking Using MQC

Configure MQC classification using ACLs. Configure and monitor Class-Based Marking.

Lab 3: Classification Using NBAR

Configure NBAR protocol discovery. Configure MQC Classification via NBAR.

Lab 4: LAN-Based Packet Classification and Marking

Configure Catalyst trust boundaries and COS-to-DSCP mapping. Configure MQC classification and marking on Catalyst switch.

Lab 5: Configuring QoS Pre-Classify

Configure QoS pre-classify on a router using a GRE tunnel. Monitor the operation of QoS pre-classification.

Lab 6: Configuring Basic Queuing

Configure FIFO queuing on WAN routers. Configure WFQ queuing on WAN routers. Measure and analyze network performance.

Lab 7: Configuring LLQ

Configure LLQ on a WAN router to provide bandwidth and latency guarantees. Measure and analyze the results.

Lab 8: Queuing on Catalyst Switches

Configure COS-to-queue mapping on the Catalyst 2950 switch. Configure and monitor WRR queuing on the Catalyst 2950.

Lab 9: Configuring DSCP-Based WRED

Configure and monitor DSCP-Based CB-WRED. Add Explicit Congestion Notification (ECN).

Lab 10: Configuring Class-Based Policing

Configure CB-Policing and analyze the results.

Lab 11: Configuring Class-Based Shaping

Configure CB-Shaping and analyze the results.

Lab 12: Configuring Class-Based Header Compression

Configure and monitor Class-Based RTP header compression on a PPP WAN link.

Lab 13: Configuring LFI

Configure and monitor link fragmentation and interleaving on a PPP WAN link.

Lab 14: Configuring QoS with AutoQoS for VoIP

Configure AutoQoS on WAN routers and monitor the results. Configure AutoQoS on Catalyst access switches and monitor the results.