

# Implementing Cisco Quality of Service QoS (642-642)



## Course Objective:

After completing this course the student should be able to:

- Identify the components of the Cisco Unity system, describe their standard and optional features, and explain and how they integrate into a unified messaging system
- explain the need to implement Quality of Service (QoS) and explain methods for implementing and managing QoS
- identify and describe different models used for ensuring QoS in a network and explain key IP QoS mechanisms used to implement the models
- explain the use of MQC and AutoQoS to implement QoS on the network
- use Cisco QoS queuing mechanisms to manage network congestion
- use Cisco QoS congestion avoidance mechanisms to reduce the effects of congestion on the network
- use Cisco QoS traffic policing and traffic shaping mechanisms to effectively limit the rate of network traffic
- successfully use Cisco link efficiency mechanisms to improve the bandwidth efficiency of the link
- correctly select the most appropriate QoS mechanisms for providing QoS using Cisco best practices

## Prerequisite:

Valid CCNA Certification.

## Certificate of Attendance :

Certificate of Attendance will be awarded to students completing the course achieving minimum 75% attendance.

## Training Methodology & Materials:

- Practical hands-on sessions, 75% lab-based and 25% theory-based.
- Well-designed lab sessions to enhance further understanding of the courseware.

## Training Duration:

Full-Time : 5days (9:30am – 5:30pm)

Part-Time : 10 sessions (twice a week ; 7:00pm – 10:00pm)

## DETAILED COURSE OUTLINE

### Module : Implementing Cisco Quality of Service (QoS) (642-642)

The QOS exam is one of the qualifying exams for the Cisco Certified Internetwork Professional, Cisco Certified Voice Professional, Cisco IP Telephony Design Specialist, Cisco IP Telephony Express Specialist, Cisco IP Telephony Operations Specialist, and Cisco IP Telephony Support Specialist certifications. The QOS 642-642 exam will test materials covered under the Implementing Cisco Quality of Service QOS v2.1 course. The exam will certify that the successful candidate has knowledge and skills necessary to configure and troubleshoot Cisco IOS routers running Quality of Service protocols in Service Provider and Enterprise environments. The exam covers topics on IP QOS, classification and marking Mechanisms, queuing mechanisms, traffic shaping and policing mechanisms, congestion avoidance mechanisms, link efficiency mechanisms, modular QOS command line interface, and QOS Best Practices

#### IP QoS Fundamentals

- Given a description of a converged network, identify problems that could lead to poor quality of service and explain how the problems might be resolved
- Define the term Quality of Service (QoS) and identify and explain the key steps to implementing QoS on a converged network

#### IP QoS Components

- List and explain the models for providing Quality of Service on a network
- Explain the purpose and function of the DiffServ model
- Describe the basic format of and explain the purpose of the DSCP field in the IP header
- Define and explain the different per hop behaviors used in DSCP
- Explain the interoperability between DSCP-based and IP-precedence-based devices in a network
- Given a list of QoS actions, correctly match the QoS actions to mechanisms for implementing QoS and identify where in a network the different QoS mechanisms are commonly used

#### Modular QoS CLI and Auto-QoS

- Given a network requiring QoS, explain how to implement a QoS policy using MQC
- Explain how AutoQoS is used to implement QoS policy

#### Classification and Marking

- Explain how link layer and network layer markings are used to define service classes and the different applications represented by each of these service classes

- Given a network and a description of QoS issues, use MQC CLI commands to classify packets
- Given a network and a description of QoS issues, use class-based marking to assign packets to a specific service class
- Describe the function of Network Based Application Recognition
- Describe the purpose of pre-classification to support QoS in various VPN (IPSEC, GRE, L2TP) configurations
- Describe QoS trust boundaries and their significance in LAN based classification and marking
- Identify the different classification and marking options available on Cisco L2 and L3 switching platforms

#### Congestion Management Methods

- List and explain the different queuing algorithms
- Explain the components of hardware and software queuing systems on Cisco routers and how they are effected by tuning and congestion
- Describe the benefits and drawbacks of using WFQ to implement QoS
- Explain the purpose and features of Class-Based WFQ (CBWFQ)
- Explain the purpose and features of Low Latency Queuing (LLQ)
- Identify the Cisco IOS commands required to configure and monitor LLQ on a Cisco router
- Describe and explain the different queuing capabilities available on the Cisco Catalyst 2950 Switch

**Congestion Avoidance Methods**

- Describe the drawbacks tail drop as a congestion control mechanism
- Describe the elements of a RED traffic profile
- Describe Weighted Random Early Detection and how it can be used to prevent congestion
- Identify the Cisco IOS commands required to configure and monitor DSCP-based CB-WRED
- Explain how ECN interacts with WRED in Cisco IOS

**Traffic Policing and Shaping**

- Describe the purpose of traffic conditioning using traffic policing and traffic shaping and differentiate between the features of each
- Explain how network devices measure traffic rates using single rate or dual rate, single or dual token bucket mathematical models
- Identify the Cisco IOS commands required to configure and monitor single rate and dual rate CB-Policing
- Identify the Cisco IOS commands required to configure and monitor percentage based CB-Policing
- Explain how the two rate limits, average rate and peak rate, can be used to rate limit traffic
- Identify the Cisco IOS commands required to configure and monitor CB-Shaping
- Identify the Cisco IOS commands required to configure and monitor Frame Relay adaptive CB-Shaping on Frame Relay interfaces

**Link Efficiency Mechanisms**

- Explain the various link efficiency mechanisms and their function
- Identify the Cisco IOS commands required to configure and monitor CB header compression
- Given a list of link speeds and a specific delay requirement, determine the proper fragment size to use at each link speed and identify the typical delay requirement for VoIP packets
- Identify the Cisco IOS commands required to configure and monitor Multilink PPP with Interleaving
- Identify the Cisco IOS commands required to configure and monitor FRF.12

**QoS Best Practices**

- Explain the QoS requirements of the different application types
- List typical enterprise traffic classes then identify the delay, jitter, packet loss and bandwidth requirements of each traffic class
- Explain the best practice QoS implementations and configurations within the campus LAN
- Explain the best practice QoS implementations and configurations on the WAN customer edge (CE) and provider edge (PE) routers

CISCO, CCNA, QoS are the trademarks or registered trademarks of Cisco Systems, Inc in the United States and/or certain countries.