

## Cisco CCNP Training 20 Day Course

**The Building Scalable Cisco Internetworks** exam is a qualifying exam for the CCNP, CCDP and CCIP certifications. The BSCI exam (642-901) tests materials covered under the new Building Scalable Cisco Internetworks (BSCI) course. The exam will certify that the successful candidate has important knowledge and skills necessary to use advanced IP addressing and routing in implementing scalability for Cisco routers connected to LANs and WANs. The exam covers topics on Advanced IP Addressing, Routing Principles, Configuring the EIGRP, Configuring the Open Shortest Path First Protocol, Configuring IS-IS, Manipulating Routing Updates, and configuring basic BGP.

### Level 1

#### Level 1

#### Course Introduction

##### 1.1 Introduction

#### Module 1

- 2.1 Overview
- 2.2 Demo - Routing Tables
- 2.3 Administrative
- 2.4 Routing Metric
- 2.5 Routing Protocols
- 2.6 Demo - Classful Protocols
- 2.7 Classless Protocols
- 2.8 Distance Vectors & Link-States
- 2.9 Review

#### Module 2

- 3.1 Overview
- 3.2 IP Addressing
- 3.3 Subnetting
- 3.4 Hierarchical Addressing
- 3.5 VLSM & Octet Summary
- 3.6 Demo - Octet Summary
- 3.7 Route Summary
- 3.8 IP Unnumbered
- 3.9 Demo - IP Unnumbered
- 3.10 Helper IP Address
- 3.11 Demo - Helper IP Address
- 3.12 Classless Inter-Domain Routing (CIDR)
- 3.13 Demo - Route Summarization
- 3.14 Review

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## Level 2

### Module 3

- 1.1 Overview
  - 1.2 Advantages
  - 1.3 Terminology
  - 1.4 Operation
  - 1.5 Neighbor
  - 1.6 Demo - Neighbor Tables
  - 1.7 EIGRP Route Selection
  - 1.8 Demo - Configuring EIGRP
  - 1.9 Diffusing Update Algorithm
  - 1.10 Demo - Configuring EIGRP
  - 1.11 Configuring EIGRP
  - 1.12 Demo - Configuring EIGRP
  - 1.13 Route Summarization
  - 1.14 Demo - Disabling Auto Summarization
  - 1.15 Manual Summarization
  - 1.16 Demo - Manual Summarization
  - 1.17 Load Balancing
  - 1.18 Demo - Load Balancing
  - 1.19 Unequal Load Balancing
  - 1.20 Demo - Unequal Load Balancing
- 2.21 EIGRP & WAN Links
- 2.22 Verifying Operation
- 2.23 Demo - Verifying Operations
- 2.24 Review

## Level 3

### Module 4

- 1.1 Overview
- 1.2 Terminology
- 1.3 OSPF Overview
- 1.4 Broadcast Topology
- 1.5 Hello Protocol
- 1.6 Designated Router (DR/BDR)
- 1.7 Demo - DR/BDR
- 1.8 Election Process
- 1.9 OSPF Startup
- 1.10 Demo - OSPF Review
- 1.11 Link State Update (LSU)
- 1.12 Network Types
- 1.13 Operation Modes
- 1.14 OSPF Configuration
- 1.15 Demo - OSPF Configuration
- 1.16 Verifying OSPF Configuration
- 1.17 Demo - Verifying Configuration
- 1.18 Frame relay (NBMA) Configuration
- 1.19 Demo - NBMA Configuration
- 1.20 Review

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### Module 5

- 2.1 Overview
- 2.2 OSPF Issues
- 2.3 Router Types
- 2.4 Demo - Router Types
- 2.5 Link-State Advertisements (LSA)
- 2.6 External Path Cost
- 2.7 Types of Areas
- 2.8 Demo - Review of Terms
- 2.9 Virtual Link
- 2.10 Demo - Virtual Link
- 2.11 Multi-Area OSPF Configuration
- 2.12 Demo - Multi-Area OSPF
- 2.13 Review

### Level 4

### Module 6

- 1.1 Overview
- 1.2 OSI Protocols & IS-IS Routing
- 1.3 IS-IS vs OSPF
- 1.4 IS-IS Terminology
- 1.5 OSI Routing Operations
- 1.6 OSI Address Assignment
- 1.7 OSI Network Types
- 1.8 IS-IS Neighbors & Adjacencies
- 1.9 Demo - Neighbor Table
- 1.10 Designated Routers
- 1.11 Subnetwork Independent Functions
- 1.12 IS-IS Configuration
- 1.13 Demo - IS-IS Configuration
- 1.14 Terminology Review
- 1.15 Demo - Basic IS-IS Configuration
- 1.16 Demo - Verifying IS-IS Operation
- 1.17 IS-IS Data Exchange
- 1.18 Demo - IS-IS Data Exchange
- 1.19 Review

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### Module 7

- 2.1 Overview
- 2.2 Redistribution
- 2.3 Demo - Route Redistribution
- 2.4 Router Selection
- 2.5 Redistribution Steps
- 2.6 Demo - Redistribution in OSPF
- 2.7 Redistribution in EIGRP
- 2.8 Demo - Redistribution in EIGRP
- 2.9 Defining the Default Metric
- 2.10 Redistribution Review
- 2.11 Routing Update Traffic & Filters
- 2.12 Demo - Routing Filters
- 2.13 Creating Filters
- 2.14 Verifying Routing Operation
- 2.15 Demo - Verifying Routing Operation
- 2.16 Routing Maps
- 2.17 Demo - Route Maps Configuration
- 2.18 Set Commands & Policy based Routing
- 2.19 Demo - Policy Based Routing
- 2.20 Review

### Level 5

### Module 8

- 1.1 Overview
- 1.2 BGP Overview
- 1.3 When to Use BGP?
- 1.4 BGP Terminology
- 1.5 Attributes
- 1.6 Attribute Definitions
- 1.7 BGP Synchronization
- 1.8 Demo - BGP Synchronization
- 1.9 Message Types
- 1.10 BGP Finite States
- 1.11 Route Selection
- 1.12 Multi-Exit Discriminator (MED)
- 1.13 VLSM & Summarization
- 1.14 BGP Configuration
- 1.15 Demo - Basic Configuration
- 1.16 Demo - Synchronization
- 1.17 Demo - Verification
- 1.18 Demo External Neighbors
- 1.19 Review

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### Module 9

- 2.1 Overview
- 2.2 Split Horizons
- 2.3 Route Reflector Issues
- 2.4 Route Reflector Configuration
- 2.5 Demo - Route Reflectors
- 2.6 Prefix List
- 2.7 Demo - Prefix List Configuration
- 2.8 Demo - Prefix List Verification
- 2.9 Multihoming
- 2.10 Demo - Multihoming
- 2.11 Redistribution
- 2.12 Review

### Level 6

### Module 10

- 1.1 IGMP
- 1.2 Explain how IP M-Cast Works
- 1.3 IP Multicast Group Membership
- 1.4 Multicast Address
- 1.5 IP Multicast Addresses
- 1.6 IP Multicast Source Distribution Trees
- 1.7 IP Multicast Shared Distribution Trees
- 1.8 RPF Check
- 1.9 Protocol-Independent Multicast Dense Mode
- 1.10 Protocol-Independent Multicast Sparse Mode
- 1.11 IGMP v1 — Packet Format
- 1.12 IGMP v2 — Packet Format
- 1.13 IGMP v3 — Query Message Format
- 1.14 IGMP v3 — Report Message Format
- 1.15 IGMP Snooping
- 1.16 Section 1 Review
  
- 2.1 Configuring IP Multicast
- 2.2 Enabling IP Multicast
- 2.3 Configuring Auto-RP
- 2.4 Configuring PIM Version 2
- 2.5 PIM Version Interoperability
- 2.6 Verifying and Monitoring IP Multicast
- 2.7 Section 2 Review
- 2.8 Course Closure

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## Cisco CCNP Training 20 Day Course

**BCMSN** is a qualifying exam for the Cisco Certified Network Professional CCNP as well as the Cisco Certified Design Professional CCDP certifications. The BCMSN exam (642-812) will test materials covered under the new Building Cisco Multilayer Switched Networks (BCMSN) CCNP course. The exam will certify that the successful candidate has important knowledge and skills necessary to build scalable multilayer switched networks; create and deploy a global intranet, and implement basic troubleshooting techniques in environments that use Cisco multilayer switches for client hosts and services. The exam covers topics on switching technology, implementation and operation, planning and design, and troubleshooting.

### Module 1

- 1.1 Introduction
- 1.2 Campus Network
- 1.3 Emerging Campus Network Technologies
- 1.4 Switching Technologies
- 1.5 The Hierarchical Model
- 1.6 Building Block Approach
- 1.7 Review

### Module 2

- 2.1 Overview
- 2.2 Connecting the Switch Block
- 2.3 Cable Media Types
- 2.4 Lab - Enable and Hostname Commands
- 2.5 Lab - Configuring Remote Accessibility
- 2.6 Lab - Port and Speed Settings
- 2.7 Lab - Overview
- 2.8 Review

### Module 3

- 1.1 VLANs
- 1.2 Boundaries
- 1.3 Memberships
- 1.4 VLAN Identification
- 1.5 Lab VLAN Creation and Configuration
- 1.6 VLAN Trunk Links
- 1.7 VLAN Trunk Configuration
- 1.8 VLAN Trunk Protocols
- 1.9 Lab - VTB Configuration
- 1.10 Lab - Overview

### Module 4

- 1.1 Transparent Bridging
- 1.2 Switching
- 1.3 STP Components

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### Module 5

- 1.1 Inter VLAN Routing
- 1.2 Lab - Configuration
- 1.3 Lab Review
- 1.4 EtherChannel
- 1.5 Lab - Trimmers and EtherChannel
- 1.6 Port Fast and Uplink Fast

### Module 6

- 1.1 Issues and Solutions
- 1.2 Lab - Configuring Inter-VLAN Routing

### Module 7

- 1.1 Multi Layer Switching Fundamentals
  - 1.2 Review

### Module 8

- 1.1 Introduction to Multicasting
  - 1.2 Addresses in Multicast Network
  - 1.3 IGMP
  - 1.4 CGMP Protocol
  - 1.5 Routing Multicast Traffic
  - 1.6 Shared Distribution Tree
  - 1.7 Managing the Scope Delivery
  - 1.8 Multicast Protocols

### Module 9

- 1.1 Quality of Service
  - 1.2 Lab QOS
  - 1.3 HSRP Hot Standby Routing Protocol
  - 1.4 HSRP Required Features
  - 1.5 Lab - HSRP

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## Module 10 - Implementing Spanning Tree

### Describing the STP

Transparent Bridging  
What Is a Bridge Loop?  
Preventing Bridge Loops  
802.1D STP  
Bridge Protocol Data Unit  
The STP Root Bridge  
Root Bridge Selection Criteria  
Extended System ID in Bridge ID Field  
802.1D 16-bit Bridge Priority Field Using the Extended System ID  
Configuring the Root Bridge  
Root Bridge Selection  
Spanning Tree Operation  
Spanning Tree Port States  
Local Switch Root Port Election  
Spanning Tree Path Cost  
Spanning Tree Protocol Root Port Selection  
STP Designated Port Selection  
Example: Layer 2 Topology Negotiation  
Enhancements to STP  
Describing PortFast  
Configuring PortFast  
IEEE Documents  
Section 1 Review

### Implementing RSTP

Rapid Spanning Tree Protocol  
RSTP Port Roles  
What Are Edge Ports?  
RSTP Link Types  
RSTP BPDU Flag Byte Use  
RSTP Proposal and Agreement Process  
Downstream RSTP Proposal and Agreement  
RSTP Topology Change Mechanism  
PVRST Implementation Commands  
How to Implement Rapid PVRST  
Verifying PVRST  
Section 2 Review

### Implementing MSTP

Multiple Spanning Tree Protocol  
MST Regions  
Extended System ID in Bridge ID Field  
Interacting Between MST Regions and 802.1D  
Configuring MSTP  
Verifying MSTP  
Section 3 Review

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**Configuring Link Aggregation with EtherChannel**

EtherChannel  
Dynamic Trunk Negotiation Protocols  
EtherChannel Configuration Commands  
Configuring Layer 2 EtherChannel  
Configuring Layer 3 EtherChannel  
Verifying EtherChannel  
Guidelines for Configuring EtherChannel  
EtherChannel Guidelines  
EtherChannel Load Balancing  
Configuring EtherChannel Load Balancing  
Section 4 Review

**Module 11 - Wireless LANs**

**Introducing WLANs**

Wireless Data Technologies  
Wireless LAN (WLAN)  
WLAN Evolution  
What Are WLANs?  
Similarities Between WLAN & LAN  
Differences Between WLAN & LAN  
Section 1 Review

**Describing WLAN Topologies**

WLAN Topologies  
WLAN and LAN  
Service Set Identifier (SSID)  
WLAN Access Topology  
Wireless Repeater Topology  
Workgroup Bridge Topology  
Alternative Peer-to-Peer Topology  
Service Sets and Modes  
Roaming Through Wireless Cells  
Client Roaming  
Layer 2 vs. Layer 3 Roaming  
Wireless VLAN Support  
Enterprise Voice Architecture  
Wireless Mesh Networking  
Adaptive Wireless Path Protocol (AWP)  
Wireless Mesh Networking  
Key Market Segments for Outdoor Wireless  
Section 2 Review

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### **Explaining WLAN Technology and Standards**

- Unlicensed Frequency Bands
- Radio Frequency Transmission
- WLAN Regulation and Standardization
- 802.11b Standard
- 2.4-GHz Channels
- 2.4-GHz Channel Use
- 802.11b/g (2.4 GHz) Channel Reuse
- 802.11b Access Point Coverage
- 802.11a Standard
- 802.11g Standard
- 802.11g Protection Mechanism
- 802.11 RF Comparison
- 802.11 Standards Comparison
- Range Comparisons
- Ratified IEEE 802.11 Standards
- Worldwide Availability
- General Office WLAN Design
- Why WLAN Security?
- WLAN Security Threats
- Mitigating the Threats
- Evolution of WLAN Security
- Wireless Client Association
- WPA and WPA2 Authentication
- WPA and WPA2 Encryption
- WLAN Security Summary
- Security Evaluation
- Section 3 Review

### **Configuring Cisco WLAN Clients**

- Cisco 802.11a/b/g WLAN Client Adapters
- Client Adapter Installation Wizard
- Cisco ADU Installation
- Install Cisco Aironet Site Survey Utility
- Choose Configuration Tool
- ADU Main Screen
- Advanced Status Information
- ADU: Main Profile Screen
- ADU: General Settings
- ADU: Security Settings
- ADU: Advanced Settings
- ADU Diagnostics: Advanced Statistics
- ADU Diagnostics: Adapter Information
- ADU Troubleshooting
- Cisco Aironet System Tray Icon
- Cisco Aironet Site Survey Utility
- Windows XP WLAN Configuration
- Comparison of Windows XP and Cisco ADU
- Aironet Client Administration Utility (ACAU)
- Aironet Configuration Administration Utility
- Cisco Wireless IP Phone
- Cisco Compatible Extensions
- Cisco Compatible Extensions Features

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## Cisco CCNP Training 20 Day Course

Cisco Compatible Extensions Program  
Section 4 Review

### **Implementing WLANs**

Cisco WLAN Implementation  
Autonomous WLAN Solution  
Lightweight WLAN Solution  
Lightweight Access Point Protocol  
LWAPP  
Association of Access Point to WLAN Controller  
Cisco Aironet WLCs  
Comparison of the WLAN Configuration  
WLAN Components  
Cisco Unified Wireless Network  
Cisco Aironet Access Points and Bridges  
Power over Ethernet (PoE)  
PoE Delivery  
Midspan Power Injection  
Power-Sourcing Equipment  
PoE Switch  
PoE Switch Port Status  
Antenna Concepts  
Antenna Theory  
Omnidirectional Antenna: Dipole  
Directional Antenna  
Connectorized 5-GHz Antennas  
Cisco Access Point/Bridge Antennas  
Multipath Distortion  
Section 5 Review

### **Configuring WLANs**

Autonomous Access Point Configuration  
Autonomous Access Point IP Address  
Role of Autonomous Access Points in a Radio Network  
Access Point Homepage  
Express Setup  
Lightweight WLAN Controller Configuration  
Lightweight WLAN Controller Interfaces  
WLAN Controller Boot Menu  
CLI Wizard Configuration Tool  
WLAN Controller CLI Commands  
Section 6 Review

## **Module 12 - Configuring Campus Switches to Support Voice**

### **Planning for Implementation of Voice in a Campus Network**

Benefits of a Converged Network  
Describing VoIP Network Components  
Characteristics of Voice and Data  
Describing VoIP Call Flow  
Auxiliary VLANs  
QoS Basics  
High Availability for VoIP  
Power Requirements in Support of VoIP  
Section 1 Review

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**"Accommodating Voice Traffic on Campus Switches"**

QoS and Voice Traffic in the Campus Model  
LAN-Based Classification and Marking  
Layer 2 Marking: 802.1p, CoS  
Layer 3 Marking: IP Precedence, DSCP  
Classification Tools: Trust Boundaries  
Configuring a Switch for Attachment of a Cisco IP Phone  
Switch Commands to Support Attachment of a Cisco IP Phone  
Configuration Example  
Cisco AutoQoS  
Configuring Cisco AutoQoS  
Configuring Cisco AutoQoS: Cisco Catalyst OS  
Configuring Cisco AutoQoS: Native OS  
Monitoring Cisco AutoQoS  
Automation with Cisco AutoQoS  
Section 2 Review

**Module 13 - Minimizing Service Loss and Data Theft in a Campus Network**

**Understanding Switch Security Issues**

Overview of Switch Security  
Rogue Access Points  
Switch Attack Categories  
MAC Flooding Attack  
Port Security  
Configuring Port Security on a Switch  
Verifying Port Security  
Port Security with Sticky MAC Addresses  
AAA Network Configuration  
Authentication Methods  
802.1x Port-Based Authentication  
Configuring 802.1x  
Section 1 Review

**Protecting Against VLAN Attacks**

Explaining VLAN Hopping  
VLAN Hopping with Double Tagging  
Mitigating VLAN Hopping  
Types of ACLs  
Configuring VACLs  
Private VLANs  
PVLAN Port Types  
Configuring PVLANS  
Configuring PVLAN Ports  
Section 2 Review

**Protecting Against Spoof Attacks**

DHCP Spoof Attacks  
DHCP Snooping  
Securing Against DHCP Snooping Attacks  
Verifying DHCP Snooping  
IP Source Guard  
Configuring IP Source Guard on a Switch  
ARP Spoofing  
Dynamic ARP Inspection  
Configuring DAI  
Protection from ARP Spoofing  
Section 3 Review

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### **Describing STP Security Mechanisms**

Protecting the Operation of STP  
Enabling & Verifying BPDU Guard  
Describing BPDU Filtering  
Describing Root Guard  
Describing Root Guard Configuration Commands  
Verifying Root Guard  
Section 4 Review

### **Preventing STP Forwarding Loops**

Unidirectional Link Failure Loop Guard  
Before Loop Guard  
With Loop Guard  
UDLD and Loop Guard Configuration Commands  
Configuring UDLD  
Resetting and Verifying UDLD  
Configuring Loop Guard  
Comparing Loop Guard and UDLD  
Section 5 Review

### **Securing Network Switches**

Describing Vulnerabilities in CDP  
Describing Vulnerabilities in the Telnet Protocol  
Describing the Secure Shell Protocol  
Describing vty ACLs  
Describing Commands to Apply ACLs  
Best Practices: Switch Security  
Section 6 Review  
Course Closure

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**The Implementing Secure Converged Wide Area Networks (ISCW 642-825)** is a qualifying exam for the Cisco Certified Network Professional CCNP®. The ISCW 642-825 exam will certify that the successful candidate has important knowledge and skills necessary to secure and expand the reach of an enterprise network to teleworkers and remote sites with focus on securing remote access and VPN client configuration. The exam covers topics on Cisco hierarchical network model as it pertains to the WAN, teleworker configuration and access, frame mode MPLS, site-to-site IPSEC VPN, Cisco EZVPN, strategies used to mitigate network attacks, Cisco device hardening and IOS firewall features.

### Chapter 1 - Describing Network Requirements

- Describing Network Requirements
- The Cisco IIN and SONA Framework
- Intelligent Information Network
- Cisco SONA Framework
- Cisco SONA Layers
- Cisco Hierarchical Network Models
- Cisco Enterprise Architecture
- Cisco Hierarchical Network Model
- Example: Enterprise Network
- Requirements for Remote Connections in a Cisco Converged Network
- Remote Site Requirements
- Example: Integrated Services for Secure Remote Access
- Chapter 1 Review

### Chapter 2 - Connect Teleworkers

- Topologies for Facilitating Remote Connections
- Types of Remote Connection Topologies
- Remote Connection Topologies
- Enterprise Architecture Framework
- Remote Connection Options
- What are the Challenges to Connect the Telecommuter
- The Teleworker Components
- The SOHO/Telecommuter Solution
- The Issues
- Traditional vs. Telecommuter
- Section 1 Review
- Describing Cable Technology
- Terms used with Cable Technology
- Cable Technology Terms
- Cable System Standards
- Components of a Cable System

- Cable System Components
- Cable Features
- What Is Cable?
- Cable System Benefits
- Digital Signals over RF Channels
- DOCSIS
- Digital Signals over Radio Waves
- Sending Data over Cable
- Fiber Benefits
- HFC Architecture
- Data over Cable
- Cable Technology: The Whole Picture
- Putting Cable Technology Together
- Data Cable Technology Issues
- Process of Provisioning a Cable Modem
- Section 2 Review
- Describing DSL Technology
- DSL Features
- What Is a DSL?
- DSL Types
- DSL Variants
- DSL Variants Examples
- DSL Limitations
- DSL Limitation Factors
- DSL Distance Limitations
- ADSL
- ADSL & POTS Coexistence
- ADSL Channels and Encoding
- CAP Modulation
- DMT Modulation
- Data over ADSL: PPPoE
- Data over ADSL
- PPP over Ethernet
- PPPoE Session Variables
- PPPoE Session Establishment
- Data over ADSL: PPPoA
- PPP over ATM
- Section 3 Review
- Configuring the CPE as the PPPoE or PPPoA Client
- Configuration of a Cisco Router as the PPPoE Client
- Configuring the CPE as the PPPoE Client over

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the Ethernet Interface  
CPE as the PPPoE Client over the Ethernet Interface  
Demo - DHCP Server Settings/NAT Configurations  
Configuring the CPE as the PPPoE Client over the ATM Interface  
CPE as the PPPoE Client over the ATM Interface  
Configuration of a PPPoE Client  
PPPoE Client Configuration  
Configuring PPPoE Client  
Configuration of the PPPoE DSL Dialer Interface  
Configuring the PPPoE Dialer Interface  
Demo - Setting up PPP Settings  
Configuration of PAT  
Port Address Translation  
Configure PAT  
PAT Configuration  
Configuration of DHCP to Scale DSL  
DHCP Server Configuration  
Configuration of a Static Default Route  
Configuring a Static Default Route  
Static Default Route  
Demo - Setup a Router with Dialer Interface  
Commands  
Verifying a PPPoE Configuration  
Debug VPDN PPPoE Events  
Debug PPP Authentication  
Verify DHCP Clients  
Verify DHCP Server  
Verify PAT  
PPPoE Sample Configuration  
Configuration of a PPPoA DSL Connection  
DSL Configuration Overview  
PPPoE vs. PPPoA  
Configuration of the DSL ATM Interface  
Configuring the DSL ATM Interface  
PPPoA Sample Configuration  
Section 4 Review  
Verifying Broadband ADSL Configurations  
Troubleshooting by the Layers  
Which Layer to Troubleshoot?  
OSI Layer 1 Issues  
Administratively Down State for an ATM Interface  
ATM Interface Status  
Correct DSL Operating Mode?  
Check the DSL Operating Mode. Is it Correct?  
OSI Layer 2 Issues  
Proper PPP Negotiation  
PPP Negotiation

PPP Authentication Example  
Section 5 Review

### Chapter 3 - Implement Frame Mode MPLS

Introducing MPLS Networks  
The Concepts of the MPLS Model  
Typical VPN Topologies  
Basic MPLS Features  
Basic MPLS Concepts Example  
Switching Mechanisms of Routers  
Cisco IOS Platform Switching Mechanisms  
Standard IP Switching Review  
CEF Switching Review  
MPLS Architecture  
The Components of the MPLS Architecture  
Control Plane Components Example  
MPLS Labels  
Label Format  
Label Stack  
Frame Mode MPLS  
Label Switch Routers (LSRs)  
Label Switch Routers  
LSR Component Architecture  
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How to Configure MPLS on the Frame Mode Interface  
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Cisco Easy VPN Server Configuration Tasks for the Easy VPN Server Wizard  
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Configuring NTP Client  
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**The Optimizing Converged Cisco Networks (642-845 ONT)** is a qualifying exam for the Cisco Certified Network Professional CCNP®. The ONT 642-845 exam will certify that the successful candidate has important knowledge and skills in optimizing and providing effective QoS techniques for converged networks. The exam topics include implementing a VOIP network, implementing QoS on converged networks, specific IP QoS mechanisms for implementing the DiffServ QoS model, AutoQoS, wireless security and basic wireless management.

### Course Introduction

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WFQ Classification  
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Benefits and Drawbacks of WFQ  
Configuring and Monitoring WFQ  
Configuring WFQ (Cont.)  
Additional WFQ Configuration Parameters  
Monitoring WFQ  
Section 4 Review  
Configuring CBWFQ and LLQ  
Describing Advanced Queuing Mechanisms  
Queuing Methods Combined  
Class-Based Weighted Fair Queuing

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CBWFQ Architecture and Benefits	Mechanisms
CBWFQ Architecture	Cisco IOS Traffic Policing Mechanism
Classification	Cisco IOS Traffic-Shaping Mechanisms
Scheduling	Applying Traffic Conditioners
Available Bandwidth	Applying Rate Limiting
CBWFQ Benefits and Drawbacks	Section 7 Review
Configuring and Monitoring CBWFQ	Understanding WAN Link Efficiency
Configuring CBWFQ	Mechanisms
Example of CBWFQ	Link Efficiency Mechanisms Overview
Monitoring CBWFQ	Compression
Low Latency Queuing	Link Efficiency Mechanisms
LLQ Architecture and Benefits	Layer 2 Payload Compression
LLQ Architecture	Layer 2 Payload Compression Results
LLQ Benefits	Header Compression
Configuring and Monitoring LLQ	Header Compression Results
Configuring LLQ	Large Packets "Freeze Out" Voice on Slow
Monitoring LLQ	WAN Links
Demo - LLQ Configuration	Link Fragmentation and Interleaving
Section 5 Review	Applying Link Efficiency Mechanisms
Introducing Congestion Avoidance	Example
Managing Interface Congestion with Tail Drop	Section 8 Review
Tail Drop Limitations	Implementing QoS Preclassify
TCP Synchronization	Virtual Private Networks
TCP Delay, Jitter, and Starvation	VPN Types
Random Early Detection	Encryption Overview
RED Profiles	VPN Protocols
RED Modes	Implementing QoS with Preclassification
TCP Traffic Before and After RED	QoS Preclassify
Weighted Random Early Detection	QoS Preclassify Applications
WRED Building Blocks	GRE Tunneling
Class-Based WRED	IPsec AH
Configuring CBWRED	IPsec ESP
Changing the WRED Traffic Profile	QoS Pre-classification Deployment Options
CBWFQ Using IP Precedence with CBWRED	Configuring QoS Preclassify
WRED Profiles: DSCP-Based WRED (Assured Forwarding)	QoS Preclassify: Example
Configuring DSCP-Based CBWRED	Section 9 Review
Changing the WRED Traffic Profile	Deploying End-to-End QoS
CBWRED Using DSCP with CBWFQ	QoS SLAs
Monitoring CBWRED	Enterprise Network with Traditional Layer 2
Demo - CBWRED Using DSCP with CBWFQ	Service
Section 6 Review	Enterprise Network with IP Service
Introducing Traffic Policing and Shaping	Know the SLA Offered by Your Service
Traffic Policing and Shaping Overview	Provider
Why Use Policing?	Typical SLA Requirements for Voice
Why Use Shaping?	Deploying End-to-End QoS
Why Use Traffic Conditioners?	Enterprise Campus QoS Implementations
Traffic Policing Example	Campus QoS General Guidelines
Traffic Policing and Shaping Example	Campus Access / Distribution Layer QoS
Policing vs. Shaping	Implementation
Measuring Traffic Rates	WAN Edge QoS Implementations
Single Token Bucket	Traffic Leaving Enterprise Network
Single Token Bucket Class-Based Policing	Traffic Leaving Service Provider Network
Cisco IOS Traffic Policing and Shaping	Managed Customer Edge with Three Service
	Classes

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WAN Edge Design  
What Is CoPP?  
Cisco Router Planes  
CoPP Deployment  
CoPP Example  
Section 10 Review

When Is Manual Modification of AutoQoS  
Configuration Required?  
Classification  
Policy  
Section 2 Review

### Chapter 5 - Implement Cisco AutoQoS

Introducing Cisco AutoQoS  
Cisco AutoQoS  
Enterprise QoS Challenges  
Cisco AutoQoS: Automating the Delivery of Network QoS  
Cisco AutoQoS Evolution  
Cisco AutoQoS: Automating Elements of QoS Deployment  
Protocol Discovery with NBAR  
Cisco AutoQoS Enterprise: Router Deployment Restrictions  
AutoQoS on Enterprise: Deployment Restrictions  
Cisco AutoQoS: Router Design Considerations  
Configuring Cisco AutoQoS: Router Prerequisites  
Deploying AutoQoS for Enterprise: Two-Phase  
Configuring AutoQoS: Traffic Profiling with Autodiscovery  
Configuring AutoQoS: QoS Policies  
Cisco AutoQoS for Enterprise: Router Configuration Example  
Deploying Cisco AutoQoS VoIP on Switches  
AutoQoS on Catalyst 2950 (EI) and 3550 Switches  
Cisco AutoQoS VoIP Switch Configuration Example  
Verifying AutoQoS  
How to Verify Cisco AutoQoS  
Monitoring AutoQoS  
Section 1 Review  
Mitigating Common Cisco AutoQoS Issues  
Automation with Cisco AutoQoS  
QoS Mechanisms Must Meet Enterprise QoS Requirements  
DiffServ QoS Mechanisms Enabled by Cisco AutoQoS  
Automated Cisco AutoQoS DiffServ Class Provisioning  
Interpreting AutoQoS Configurations  
Interpreting Generated Cisco AutoQoS Configuration  
Interpreting the show auto qos Command Output  
Modifying the Active AutoQoS Configuration with MQC

### Chapter 6 - Implement Wireless Scalability

Implementing WLAN QoS  
WLAN and LAN  
The Need for WLAN QoS  
The Need for QoS Wireless  
WLAN QoS Description  
WLAN QoS Queuing Overview  
WLAN QoS RF Backoff Timing  
Lightweight Access Point Split MAC Architecture  
QoS WLAN Deployment Issues  
QoS Description  
WLAN QoS Implementation  
QoS Implementation Overview  
QoS Implementation— Ethernet to Controller  
Feature: QoS Packet-Marking Translations From Access Point to Wireless Client  
From Client to Access Point  
Traffic from Access Point to Controller  
From Controller to Ethernet Switch  
QoS Implementation  
WLAN QoS Configuration  
QoS-Configurable Profiles  
Configuring WLAN IDs for QoS  
Section 1 Review  
Introducing 802.1x  
The Need for WLAN Security  
Security Methods Authentication and Encryption  
WLAN Security Issues  
WEP Attacks  
Overview of WLAN Security  
802.11 WEP  
802.11 Open Authentication  
802.11 Shared Key Authentication  
Cisco Enhanced 802.11 WEP Security  
Enhanced 802.11 Security  
Encryption—TKIP and MIC  
Encryption—AES  
802.1x Overview  
802.1x Authentication Overview  
802.1x Authentication Key Benefits  
802.1x and EAP Authentication Protocols  
Components Required for 802.1x Authentication  
EAP-Cisco Wireless

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Cisco LEAP  
Cisco LEAP Authentication  
EAP-FAST  
EAP-FAST: Flexible Authentication via Secure Tunneling  
EAP-FAST Authentication  
EAP-TLS  
EAP-TLS Authentication  
EAP-PEAP  
EAP-PEAP Authentication  
Wi-Fi Protected Access  
802.11i and WPA Authentication and Key Management Overview  
WPA Issues  
IEEE 802.11i—WPA2  
Wireless Intrusion Detection Systems  
WPA and WPA2 Modes  
WPA2 Issues  
Section 2 Review  
Configuring Encryption and Authentication on Lightweight Access Points  
Open Authentication  
Static WEP Key Authentication  
Static WEP Key  
WPA Preshared Key  
Web Authentication  
802.1x Authentication  
WPA with 802.1x  
WPA2  
Section 3 Review  
Managing WLANs  
Business Drivers  
Cisco Unified Wireless Network  
Cisco WLAN Implementation  
Describing WLAN Components  
Wireless LAN Components  
Comparison of WLAN Solutions  
The WLAN Solution Engine  
CiscoWorks WLSE Software Features  
CiscoWorks WLSE Key Benefits  
CiscoWorks WLSE and CiscoWorks WLSE Express  
Simplified CiscoWorks WLSE Express Setup  
CiscoWorks WLSE Configuration Template  
CiscoWorks WLSE Benefits  
The Cisco Wireless Control System  
Cisco WCS Overview  
Cisco WCS Location Tracking Options  
Cisco WCS Feature Set Overview  
Cisco WCS Base Software Features  
Cisco WCS Location Software Features  
Cisco WCS System Requirements  
Cisco WCS Network Summary Page  
Cisco WCS Controller Summary Page  
Wireless Location Appliance  
Cisco Wireless Location Appliance Overview  
Cisco Wireless Location Appliance Architecture  
Cisco Wireless Location Appliance Applications  
Cisco WCS Configuration Example  
Cisco WCS Server Login  
Cisco WCS Network Summary  
Adding a Controller  
Configure > Controller > Add Controller > Go  
Configure > Access Points  
Cisco WCS Maps  
Monitor > Maps > New Campus > Go  
Adding a New Building  
Rogue AP Detection  
Detecting and Locating Rogue Access Points  
Rogue Access Points Alarms  
Rogue Access Points Location  
Section 4 Review  
Course Closure

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