

## CCNP Syllabus

### Course Details:

- Duration: 14 Days (2 Hours Daily).
- Certificates: CCNP - ROUTE.
- Exams: 642-902.

## ROUTE (Implementing Cisco IP Routing)

### **Module 0: CCNA Course Revision**

- Routers & Switches
- Addressing
- Routing and its Importance

### **Module 1: Describing Network Requirements**

- Cisco Network Models
- Enterprise Composite Network Model
- Traffic Conditions in a Converged Network
- Cisco SONA Framework and IIN
- Routing and Routing Protocols

### **Module 2: *Introducing EIGRP***

- EIGRP Capabilities and Attributes
- Underlying Processes and Technologies
- EIGRP Operation
- EIGRP Tables
- EIGRP Metric
- Calculating the EIGRP Metric
- Integrating the EIGRP and IGRP Routes

### ***Module 3: Implementing and Verifying EIGRP***

- Configuring Basic EIGRP
- Using a Wildcard Mask in EIGRP
- Configuring the ip default-network Command
- ip default-network Command
- Verify EIGRP IP Routes
- EIGRP Configuration
- Verify EIGRP IP Operations

### ***Module 4: Configuring Advanced EIGRP Options***

- Route Summarization
- Configuring Manual Route Summarization
- Load Balancing Across Equal Paths
- Configuring Load Balancing Across Unequal-Cost Paths
- Variance
- EIGRP Bandwidth Use Across WAN Links
- Configuring EIGRP Bandwidth Use Across WAN Links
- WAN Configuration—Frame Relay Hub-and-Spoke Topology
- WAN Configuration—Hybrid Multipoint

### ***Module 5: Configuring EIGRP Authentication***

- Router Authentication
- MD5 Authentication
- Configuring MD5 Authentication
- Verifying MD5 Authentication
- Troubleshooting MD5 Authentication

### ***Module 6: Using EIGRP in an Enterprise Network***

- Scalability in Large Networks
- EIGRP Queries
- EIGRP Stubs
- Limiting Updates and Queries: Using EIGRP Stub
- EIGRP stub Parameters
- SIA Connections
- Preventing SIA Connections
- Graceful Shutdown

### **Module 7: *Introducing the OSPF Protocol***

- Link-State Routing Protocols
- OSPF Area Structure
- OSPF Adjacency Databases
- Calculating the OSPF Metric
- Link-State Data Structures

### **Module 8: *OSPF Packets***

- OSPF Neighbor Adjacencies
- Exchanging and Synchronizing LSDBs
- Maintaining Network Routes
- Maintaining Link-State Sequence Numbers
- debug ip ospf packet

### **Module 9: *Configuring OSPF Routing***

- Configuring Basic Single-Area and Multiarea OSPF
- Configuring OSPF on Internal Routers of a Single Area
- Configuring OSPF for Multiple Areas
- Configuring a Router ID
- Verifying the OSPF Router ID
- Verifying OSPF Operation
- The show ip route ospf Command
- The show ip ospf interface Command
- The show ip ospf neighbor Command

## **Module 10: *OSPF Network Types***

- Introducing OSPF Network Types
- Adjacency Behavior for a Point-to-Point Link
- Adjacency Behavior for a Broadcast Network Link
- Selecting the DR and BDR
- Adjacency Behavior for an NBMA Network
- OSPF over Frame Relay Configuration Options
- Sample Configuration of a Router Using OSPF Broadcast Mode
- OSPF over Frame Relay NBMA Configuration
- neighbor Command
- OSPF over Frame Relay Point-to-Multipoint Configuration
- Point-to-Multipoint Configuration
- Using Subinterfaces in OSPF over Frame Relay Configuration
- Point-to-Point Subinterface
- Multipoint Subinterface
- OSPF over NBMA Topology Summary
- Tracking OSPF Adjacencies

## **Module 11: *Link-State Advertisements***

- OSPF Router Types
- OSPF Hierarchical Routing
- OSPF Virtual Links
- OSPF Virtual Link Configuration
- show ip ospf virtual-links Command
- OSPF LSA Types
- Type 1
- Type 2
- Types 3 and 4
- Type 5
- Type 6
- Type 7
- Type 8
- Types 9, 10, and 11
- LSA Type 4—Summary LSA
- Interpreting the OSPF LSDB and Routing Table
- Interpreting the OSPF Database
- Configuring OSPF LSDB Overload Protection
- Changing the Cost Metric

## **Module 12: *OSPF Route Summarization***

- OSPF Route Summarization
- Using Route Summarization
- Configuring OSPF Route Summarization
- Route Summarization Configuration at ABR
- Route Summarization Configuration at ASBR
- Benefits of a Default Route in OSPF
- Default Routes in OSPF
- Configuring a Default Route in OSPF
- Default Route Configuration

## **Module 13: *Configuring OSPF Special Area Types***

- Configuring OSPF Area Types
- Configuring Stub Areas
- Configuring Totally Stubby Areas
- Interpreting Routing Tables
- Routing Table in a Standard Area
- Routing Table in a Stub Area
- Routing Table in a Stub Area with Summarization
- Routing Table in a Totally Stubby Area
- Configuring NSSAs

## **Module 14: *Configuring OSPF Authentication***

- Types of Authentication
- Configuring Simple Password Authentication
- Troubleshooting Simple Password Authentication
- Configuring MD5 Authentication
- Verifying MD5 Authentication
- Troubleshooting MD5 Authentication

### **Module 15: *Introducing IS-IS and Integrated IS-IS Routing***

- IS-IS Routing
- Integrated IS-IS Routing
- Principles and Issues of Integrated IS-IS Design
- The ES-IS Protocol
- OSI Routing Levels
- Level 0 Routing
- IS-IS Level 1 Routing
- IS-IS Level 2 Routing
- Level 3 Routing
- Comparing IS-IS to OSPF

### **Module 16: *Performing IS-IS Routing Operations***

- IS-IS Routing Levels
- Intra-Area and Interarea Addressing and Routing

### **Module 17: *Configuring Basic Integrated IS-IS***

- Configuring Integrated IS-IS
- Optimizing IS-IS
- Configuring Route Summarization in IS-IS
- Verifying IS-IS Configuration
- Verifying CLNS IS-IS Structures

### **Module 18: *Operating a Network Using Multiple IP Routing Protocols***

- Using Multiple IP Routing Protocols
- Defining Route Redistribution
- Using Seed Metrics

### **Module 19: *Configuring and Verifying Route Redistribution***

- Configuring Redistribution
- Redistributing Routes into RIP
- Redistributing Routes into OSPF
- Redistributing Routes into EIGRP
- Redistributing Routes into IS-IS
- Verifying Route Redistribution

## **Module 20: Controlling Routing Update Traffic**

- Configuring a Passive Interface
- Configuring Route Filtering Using Distribute Lists
- Implementing the Distribute List
- Defining Route Maps
- Using route-map Commands
- Implementing Route Maps with Redistribution
- Defining Administrative Distance
- Modifying Administrative Distance

## **Module 21: DHCP (Dynamic Host Configuration Protocol)**

- Describing the Purpose of DHCP
- Understanding the Function of DHCP
- Configuring DHCP
- Configuring the DHCP Client
- Explaining the IP Helper Address
- Configuring DHCP Relay Services

## **Module 22: Explaining BGP Concepts and Terminology**

- Using BGP in an Enterprise Network
- BGP Multihoming Options
- BGP Routing Between Autonomous Systems
- BGP Is Used Between Autonomous Systems
- AS Numbers
- Comparison with IGPs
- Path-Vector Functionality
- Features of BGP
- BGP Message Types

## **Module 23: Explaining EBGP and IBGP**

- BGP Neighbor Relationships
- Establishing EBGP Neighbor Relationships
- Establishing IBGP Neighbor Relationships
- IBGP on All Routers in Transit Path
- IBGP in a Transit AS
- IBGP in a Nontransit AS
- TCP and Full Mesh

## **Module 24: Configuring Basic BGP Operations**

- Initiate Basic BGP Configuration
- Activate a BGP Session
- The BGP neighbor Command
- Shutting Down a BGP Neighbor
- BGP Configuration Considerations
- Identifying BGP Neighbor States
- Authenticating in BGP
- Troubleshooting BGP

## **Module 25: Selecting a BGP Path**

- Characteristics of BGP Attributes
- AS Path Attribute
- Next-Hop Attribute
- Origin Attribute
- Local Preference Attribute
- MED Attribute
- Weight Attribute
- Determining the BGP Path Selection
- Selecting a BGP Path
- Path Selection with Multihomed Connection

## **Module 26: Using Route Maps to Manipulate Basic BGP Paths**

- Setting Local Preference with Route Maps
- Setting the MED with Route Maps
- Implementing BGP in an Enterprise Network

## **Module 31: *Implementing IPv6***

- Introduction to IPv6
- Describing IPv6 Features

## **Module 32: *Defining IPv6 Addressing***

- Describing IPv6 Addressing Architecture
- Defining Address Representation
- IPv6 Address Types
- Multiple ISPs and LANs with Multiple Routers



## SWITCH

### Course Details:

- Duration: 14 Days (2 Hours Daily).
- Certificates: CCNP - SWITCH.
- Exams: 642-813.

## SWITCH (Implementing Cisco IP Switched Networks)

### *Module 0: Cisco Switches Revision*

- Introduction to Switches
- Switches Models
- Switches Configuration Commands
- Switched Protocols
- VLANs

### *Module 1: Introducing Campus Networks*

- IIN and Cisco SONA Framework
- Cisco Network Models
- Describing Nonhierarchical Campus Network Issues
- Describing Layer 2 Network Issues
- Describing Routed Network Issues
- What Is a Multilayer Switch?
- The Enterprise Composite Network Model
- Cisco CatOS

### *Module 2: Implementing VLAN Topologies*

- Describing Issues in a Poorly Designed Network
- Grouping Business Functions into VLANs
- Guidelines for Applying IP Address Space in the Enterprise Network
- Describing Interconnection Technologies
- Determining Equipment and Cabling Needs
- Mapping VLANs in a Hierarchical Network

### ***Module 3: Implementing VLANs***

- Describing End-to-End VLANs
- Describing Local VLANs
- Benefits of Local VLANs in an Enterprise Campus Network
- VLAN Configuration Modes
- VLAN Database Mode
- Explaining VLAN Access Ports
- Dynamic Access Port Association
- Describing VLAN Implementation Commands
- Implementing a VLAN
  - Create or Configure a VLAN
  - Verify VLAN Configuration
  - Associate Switch Ports with the VLAN
  - Verify Switch Port Configuration
  - Test VLAN Connectivity
  - Implement Switch and VLAN Security Measures

### ***Module 4: Implementing Trunks***

- Explaining VLAN Trunks
- VLAN Trunking Protocols
- Comparing ISL and 802.1Q Trunking Protocols
- Describing ISL Trunking
- ISL Encapsulation
- Describing 802.1Q Trunking
- 802.1Q Tagging Process
- Explaining 802.1Q Native VLANs
- Describing Trunking Configuration Commands
- Identifying the Modes for Trunking
- Configuring Trunking
- Configuring an 802.1Q Trunk
- Verify the 802.1Q Configuration
- Configuring an ISL Trunk
- Configuring a Port for ISL Trunking with No DTP
- Verifying the ISL Trunk Configuration

### ***Module 5: Propagating VLAN Configurations with VTP***

- Explaining VTP Domains
- Describing the VTP
- VTP Versions
- VTP in the Campus Infrastructure Module
- VTP Modes
- Describing VTP Pruning
- Describing VTP Operation
- Configuration Revision Number
- VTP Advertisement Types
- Describing VTP Configuration Commands
- Configuring a VTP Management Domain
- Configuring VTP on a Switch
- Verifying the VTP Configuration
- VTP Counters
- Adding New Switches to an Existing VTP Domain

### ***Module 6: Correcting Common VLAN Configuration Errors***

- Issues with 802.1Q Native VLANs
- Trunk Link Problems
- Common Problems with VTP Configuration
- Practice for VTP Configuration

### ***Module 7: Describing the STP***

- Describing Transparent Bridges
- Identifying Traffic Loops
- Explaining a Loop-Free Network
- Describing the 802.1D STP
- BPDU Fields Associated with Root Bridge Selection
- Priority Field in the BPDU
- How to Configure a Root Bridge
- Describing Port Roles
- Forming an Association with the Root Bridge
- Path Cost
- Selecting the Root Port
- Selecting the Designated Port
- Topology Changes in STP
- Explaining Enhancements to STP
- PortFast

### ***Module 8: Implementing RSTP***

- Describing the RSTP
- Describing RSTP Port States
- Describing RSTP Port Roles
- Explaining Edge Ports
- Describing RSTP Link Types
- Examining the RSTP BPDU
- Identifying the RSTP Proposal and Agreement Process
- Downstream RSTP Proposal Process
- Identifying the RSTP TCN Process
- Describing PVRST Implementation Commands
- Implementing PVRST Commands
- Verifying the PVRST Configuration

### ***Module 9: Implementing MSTP***

- Explaining MSTP
- Describing MST Regions
- Describing the Extended System ID
- Interacting Between MST Regions and 802.1Q
- Describing MSTP Implementation Commands
- Configuring and Verifying MSTP

### ***Module 10: Configuring Link Aggregation with EtherChannel***

- Describing EtherChannel
- EtherChannel Features and Benefits
- Describing the PAgP and LACP Protocols
- Interface Modes
- Describing EtherChannel Configuration
- Configuring Port Channels Using EtherChannel
- Configuring Layer 3 EtherChannel
- Configure EtherChannel
- Verifying EtherChannel
- Guidelines and Best Practices for Configuring EtherChannel
- Guidelines and Best Practices Example
- Configuring Load Balancing over EtherChannel
- EtherChannel Configuration
- Configuring and Verifying EtherChannel Load Balancing

### ***Module 11: Describing Routing Between VLANs***

- Inter-VLAN Routing Using an External Router
- Describing Inter-VLAN Routing Using External Router Configuration Commands
- Configuring Inter-VLAN Routing Using an External Router
- Configuring an External Router Using ISL
- Verifying the Inter-VLAN Routing Configuration
- Explaining Multilayer Switching
- Layer 2 Switch Forwarding
- Layer 3 Switch Forwarding
- Frame Rewrite
- Which Switching Tables Are Used?
- TCAM Table

### ***Module 12: Enabling Routing Between VLANs on a Multilayer Switch***

- Describing Layer 3 SVI
- Describing Configuration Commands for Inter-VLAN Communication on a Multilayer Switch
- Configuring Inter-VLAN Routing on a Multilayer Switch
- Describing Commands for Routed Ports on a Multilayer Switch
- Describing Routed Ports on a Multilayer Switch
- Configuring Routed Ports on a Multilayer Switch

### ***Module 13: Deploying CEF-Based Multilayer Switching***

- Explaining Layer 3 Switch Processing
- Distributed Hardware Forwarding
- Explaining CEF-Based Multilayer Switches
- Identifying the Multilayer Switch Packet Forwarding Process
- CEF-Based Tables and MLS Lookups
- FIB Table Updates
- ARP Throttling
- CEF-Based MLS Operation
- Describing CEF Configuration Commands
- Enabling CEF-Based MLS
- Describing Common CEF Problems and Solutions
- Describing CEF Troubleshooting Commands
- Display CEF Statistics
- Troubleshooting Layer 3 CEF-Based MLS

### ***Module 14: Configuring Layer 3 Redundancy with HSRP***

- Describing Routing Issues
- Using Default Gateways
- Using Proxy ARP
- Identifying the Router Redundancy Process
- Router Redundancy Providing Continual Access
- Describing HSRP
- Identifying HSRP Operations
- Virtual Router
- Active Router
- ARP Resolution with HSRP
- Standby and Other HSRP Routers in the Group
- HSRP Active and Standby Router Interaction
- Describing HSRP States
- HSRP State Transition
- Standby State
- Active State
- Describing HSRP Configuration Commands

### ***Module 15: Optimizing HSRP***

- Describing HSRP Optimization Options
- Establishing HSRP Priorities
- Verify the HSRP Standby Priority
- HSRP Standby Preempt
- Hello Message Timers
- HSRP Interface Tracking
- Configuring HSRP Tracking
- Tuning HSRP Operations
- Subsecond Failover
- Preempt Time Aligned with Router Boot Time
- Describing Load Sharing
- Example of Multiple HSRP Groups on the Same Segment
- Addressing HSRP Groups Across Trunk Links
- Example of Load Sharing Across Different IP Subnets
- Describing HSRP Debug Commands
- Debugging HSRP Operations

### ***Module 16: Configuring Layer 3 Redundancy with VRRP and GLBP***

- Describing VRRP
- Identifying the VRRP Operations Process
- VRRP Transition Process
- Configuring VRRP
- Describing the GLBP
- GLBP Functions
- Identifying the GLBP Operations Process
- GLBP Implementation

### ***Module 17: Introducing WLANs***

- Wireless Data Technologies
- Wireless Technologies
- Wireless LANs
- Wireless LAN Evolution
- WLANs and Other Wireless Technologies
- WLANS and LANs
- Similarities Between WLANs and LANs
- Differences Between WLANs and LANs

### ***Module 18: Describing WLAN Topologies***

- WLAN Topologies
- Wired and Wireless LAN
- Service Set Identifier
- Typical WLAN Topologies
- Wireless Repeater Topology
- Work Group Bridge Topology
- Peer-to-Peer Topology
- WLAN Service Set and Modes
- Roaming Through Wireless Cells
- Client Roaming
- Layer 2 and Layer 3 Roaming
- Wireless VLAN Support
- Enterprise Voice Architecture
- Wireless Mesh Networking
- Wireless Mesh Applications
- AWP Protocol
- Key Market Segments for Outdoor Wireless Technology

### ***Module 19: Planning for Implementation of Voice in a Campus Network***

- Explaining Converged Network Benefits
- Describing VoIP Network Components
- Explaining Traffic Characteristics of Voice and Data
- Describing VoIP Call Flow
- Explaining Auxiliary VLANs
- Describing QoS
- Explaining the Importance of High Availability for VoIP
- Explaining Power Requirements in Support of VoIP

### ***Module 20: Accommodating Voice Traffic on Campus Switches***

- QoS and Voice Traffic in the Campus Model
- LAN-Based Classification and Marking
- Layer 2 QoS Marking
- Layer 3 QoS Marking
- Describing QoS Trust Boundaries
- Configuring a Switch for Attachment of a Cisco IP Phone
- Describing Basic Switch Commands to Support Attachment of a Cisco IP Phone
- What Is Cisco AutoQoS VoIP?
- Configuring Cisco AutoQoS VoIP on a Cisco Catalyst Switch
- Example: Using the Port-Specific Cisco AutoQoS Macro
- Automation with Cisco AutoQoS

### ***Module 21: Understanding Switch Security Issues***

- Overview of Switch Security Concerns
- Describing Unauthorized Access by Rogue Devices
- Switch Attack Categories
- Describing a MAC Flooding Attack
- Suggested Mitigation for MAC Flooding Attacks
- Describing Port Security
- Configuring Port Security on a Switch
- Caveats to Port Security Configuration Steps
- How to Verify Port Security
- Verifying Network Access Security
- Port Security with Sticky MAC Addresses
- Authentication, Authorization, and Accounting
- Authentication and Authorization Methods
- 802.1x Port-Based Authentication
- Configuring 802.1x Port-Based Authentication



### ***Module 22: Protecting Against VLAN Attacks***

- Explaining VLAN Hopping
- Switch Spoofing
- Double Tagging
- Mitigating VLAN Hopping
- VLAN Access Control Lists
- Configuring VACLs
- Explaining PVLANS
- PVLAN Port Types
- Configuring PVLANS

### ***Module 23: Protecting Against Spoof Attacks***

- Describing a DHCP Spoof Attack
- Describing DHCP Snooping
- Configuring DHCP Snooping
- Verifying the DHCP Snooping Configuration
- IP Source Guard
- Configuring IP Source Guard on the Switch
- Describing ARP Spoofing
- Describing DAI
- Describing Commands to Configure DAI
- Protecting Against ARP Spoofing Attacks

### ***Module 24: Describing STP Security Mechanisms***

- Protecting the Operation of STP
- BPDU Guard
- BPDU Filtering
- BPDU Root Guard
- Describing BPDU Guard Configuration
- BPDU Filtering Applied Globally Versus Per-Port
- Configuring BPDU Guard
- Verifying BPDU Guard
- Describing BPDU Filtering Configuration
- BPDU Filtering Applied Globally Versus Per-Port
- Configuring BPDU Filtering
- Describing Root Guard
- Describing Root Guard Configuration Commands

TSHOOT – Troubleshooting & Maintaining Cisco IP  
Networks

Course Details:

- Duration: 5 Days (2 Hours Daily).
- Certificates: CCNP – TSHOOT.
- Exams: 642-832.

**Module 1: Planning Maintenance for Complex Networks**

**Module 2: Selecting Maintenance and Troubleshooting Tools and Applications**

**Module 3: Planning Troubleshooting Processes for Complex Enterprise Networks**

**Module 4: Maintaining and Troubleshooting Campus Switching-Based Problems**

**Module 5: Maintaining and Troubleshooting Routing Based Solutions**

**Module 6: Maintaining and Troubleshooting Network Security Solutions**

**Module 7: Maintaining and Troubleshooting Integrated, Complex Enterprise Networks**