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Course Outline

Implementing and Administering Cisco Solutions with Virtual Reality
Course CCNA: 5 days Instructor Led

All Cisco courses are delivered by a Cisco Authorized Platinum Learning Partner

About this course

Implementing and Administering Cisco Solutions with Virtual Reality (CCNAVR) is a robust 5-day blended class that teaches learners how to install, operate, configure, and verify IPv4 and IPv6 networks, leveraging Virtual Reality technology as part of the learning medium. Students will learn to configure the network components, such as switches, routers, and Wireless LAN Controllers; managing network devices, and identifying basic security threats.

Learners will also gain experience by participating in virtual classrooms lectures about selected topics and hands-on experience with racking and connecting Cisco routing and switching devices in a virtual environment using NterOne's ClearConnect VR application. Today's networking professional job roles are changing more than ever, thus, the new CCNA will now cover wireless, overview of SD-WAN, DNA Center and Security threats.

The goal of the course is to provide learners with the knowledge and skills that are necessary to install, configure, and operate a small to medium-sized network. Practical skills will be achieved using real-world scenarios and examples in a traditional lab as well as a state-of-the-art virtual reality environment developed by NterOne.

Also included with this course: FREE Oculus Quest VR Headset

Audience profile

- Individuals seeking the Cisco CCNA certification
- Entry-level network engineer
- Network administrator
- Network support technician
- Help desk technician

At course completion

After completing this course, students will be able to:

- Identify the components of a computer network and describe their basic characteristics
- Understand the model of host-to-host communication
- Describe the features and functions of the Cisco Internetwork Operating System (IOS®) software
- Install, rack and connect Cisco routing and switching devices.
- Describe LANs and the role of switches within LANs
- Describe Ethernet as the network access layer of TCP/IP and describe the operation of switches
- Install a switch and perform the initial configuration
- Describe the TCP/IP Internet layer, IPv4, its addressing scheme, and subnetting
- Describe the TCP/IP Transport layer and Application layer
- Explore functions of routing
- Implement basic configuration on a Cisco router
- Explain host-to-host communications across switches and routers
- Identify and resolve common switched network issues and common problems associated with IPv4 addressing
- Describe IPv6 main features and addresses, and configure and verify basic IPv6 connectivity
- Describe the operation, benefits, and limitations of static routing

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- Describe, implement, and verify Virtual Local Area Networks (VLANs) and trunks
- Describe the application and configuration of inter-VLAN routing
- Explain the basics of dynamic routing protocols and describe components and terms of Open Shortest Path First (OSPF)
- Explain how Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP) work
- Configure link aggregation using EtherChannel
- Describe the purpose of Layer 3 redundancy protocols
- Describe basic WAN and VPN concepts
- Describe the operation of Access Control Lists (ACLs) and their applications in the network
- Configure Internet access using Dynamic Host Configuration Protocol (DHCP) clients and explain and configure Network Address Translation (NAT) on Cisco routers
- Describe basic Quality of Service (QoS) concepts
- Describe the concepts of wireless networks, which types of wireless networks can be built, and how to use Wireless LAN Controllers (WLCs)
- Describe network and device architectures and introduce virtualization
- Introduce the concept of network programmability and Software-Defined Networking (SDN) and describe smart network management solutions such as Cisco DNA Center™, Software-Defined Access (SD-Access), and Software-Defined Wide Area Network (SD-WAN)
- Configure basic IOS system monitoring tools
- Describe the management of Cisco devices
- Describe the current security threat landscape
- Describe threat defense technologies
- Implement a basic security configuration of the device management plane
- Implement basic steps to harden network devices

Course Outline

Section 1: Exploring the Functions of Networking

- Identify the components of a computer network and describe their basic characteristics
- Define a network and describe examples of networks
- Implementing and Administering Cisco Solutions (CCNA)
- Components of a Network
- Characteristics of a Network
- Physical vs. Logical Topologies
- Compare and contrast logical and physical topologies
- Interpreting a Network Diagram
- Impact of User Applications on the Network

Section 2: Introducing the Host-To-Host Communications Model

- Host-To-Host Communications Overview
- ISO OSI Reference Model
- TCP/IP Protocol Suite
- Peer-To-Peer Communications
- Encapsulation and De-Encapsulation
- Describe the process of encapsulation and de-encapsulation
- TCP/IP Stack vs OSI Reference Model

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Section 3: Operating Cisco IOS Software

- Cisco IOS Software Features and Functions
- Cisco IOS Software CLI Functions
- Cisco IOS Software Modes

Section 4: Introducing LANs

- Local Area Networks
- LAN Components
- Need for Switches
- Characteristics and Features of Switches

Section 5: Exploring the TCP/IP Link Layer

- Ethernet LAN Connection Media
- Ethernet Frame Structure
- Describe the fields of an Ethernet frame
- LAN Communication Types
- MAC Addresses
- Frame Switching
- Duplex Communication

Section 6: Starting a Switch

- Switch Installation
- Connecting to a Console Port
- Switch LED Indicators
- Basic show Commands and Information

Section 7: Introducing the TCP/IP Internet Layer, IPv4 Addressing, and Subnets

- Internet Protocol
- Decimal and Binary Number Systems
- Binary-to-Decimal Conversion
- Decimal-to-Binary Conversion
- IPv4 Address Representation
- IPv4 Header Fields
- IPv4 Address Classes
- Subnet Masks
- Subnets
- Implementing Subnetting: Borrowing Bits
- Implementing Subnetting: Determining the Addressing Scheme
- Benefits of VLSM and Implementing VLSM
- Private vs. Public IPv4 Addresses
- Reserved IPv4 Addresses
- Verifying IPv4 Address of a Host

Section 8: Explaining the TCP/IP Transport Layer and Application Layer

- TCP/IP Transport Layer Functions
- Reliable vs. Best-Effort Transport
- TCP Characteristics

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- UDP Characteristics
- TCP/IP Application Layer
- Introducing HTTP
- Domain Name System
- Explaining DHCP for IPv4

Section 9: Exploring the Functions of Routing

- Role of a Router
- Router Components
- Router Functions
- Routing Table
- Path Determination

Section 10: Configuring a Cisco Router

- Initial Router Setup
- Configuring Router Interfaces
- Configuring IPv4 Addresses on Router Interfaces
- Checking Interface Configuration and Status
- Exploring Connected Devices
- Using Cisco Discovery Protocol
- Configure and Verify LLDP
- Implement an Initial Router Configuration

Section 11: Exploring the Packet Delivery Process

- Layer 2 Addressing
- Layer 3 Addressing
- Default Gateways
- Address Resolution Protocol
- Host-To-Host Packet Delivery

Section 12: Troubleshooting a Simple Network

- Troubleshooting Methods
- Troubleshooting Tools
- Troubleshooting Common Switch Media Issues
- Troubleshooting Common Switch Port Issues
- Identify common access port issues
- Troubleshooting Common Problems Associated with IPv4 Addressing

Section 13: Introducing Basic IPv6

- IPv4 Address Exhaustion Workarounds
- IPv6 Features
- IPv6 Addresses and Address Types
- Comparison of IPv4 and IPv6 Headers
- Internet Control Message Protocol Version 6
- Neighbor Discovery
- IPv6 Address Allocation
- Verification of End-To-End IPv6 Connectivity

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Section 14: Configuring Static Routing

- Routing Operation
- When to Use Static Routing
- IPv4 Static Route Configuration
- Default Routes
- Verifying Static and Default Route Configuration
- Configuring IPv6 Static Routes
- Implement IPv4 Static Routing
- Implement IPv6 Static Routing

Section 15: Implementing VLANs and Trunks

- VLAN Introduction
- Creating a VLAN
- Assigning a Port to a VLAN
- Trunking with 802.1Q
- Configuring an 802.1Q Trunk
- VLAN Design Consideration
- Troubleshoot VLANs and Trunk

Section 16: Routing Between VLANs

- Purpose of Inter-VLAN Routing
- Options for Inter-VLAN Routing
- Implement Multiple VLANs and Basic Routing Between the VLANs

Section 17: Introducing OSPF

- Dynamic Routing Protocols
- Path Selection
- Link-State Routing Protocol Overview
- Link-State Routing Protocol Data Structures
- Introducing OSPF
- Establishing OSPF Neighbor Adjacencies
- OSPF Neighbor States
- SPF Algorithm
- Building a Link-State Database
- Routing for IPv6

Section 18: Building Redundant Switched Topologies

- Physical Redundancy in a LAN
- Issues in Redundant Topologies
- Spanning Tree Operation
- Types of Spanning Tree Protocols
- Rapid Spanning Tree Protocol
- PortFast and BPDU Guard

Section 19: Improving Redundant Switched Topologies with EtherChannel

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- EtherChannel Overview
- EtherChannel Configuration Options
- Configuring and Verifying EtherChannel
- Improve Redundant Switched Topologies with EtherChannel

Section 20: Exploring Layer 3 Redundancy

- Need for Default Gateway Redundancy
- Understanding FHRP
- Understanding HSRP

Section 21: Introducing WAN Technologies

- Introduction to WAN Technologies
- WAN Devices and Demarcation Point
- WAN Topology Options
- WAN Connectivity Options
- Virtual Private Networks
- Enterprise-Managed VPNs
- Provider-Managed VPNs

Section 22: Explaining Basics of ACL

- ACL Overview
- ACL Operation
- ACL Wildcard Masking
- Wildcard Mask Abbreviations
- Types of Basic ACLs
- Configuring Standard IPv4 ACLs
- Configuring Extended IPv4 ACLs
- Verifying and Modifying IPv4 ACLs
- Applying IPv4 ACLs to Filter Network Traffic
- Implement Numbered and Named IPv4 ACLs

Section 23: Enabling Internet Connectivity

- Configure internet access using DHCP clients and explain and configure NAT on Cisco routers
- Introducing Network Address Translation
- NAT Terminology and Translation Mechanisms
- Benefits and Drawbacks of NAT
- Static NAT and Port Forwarding
- Dynamic NAT
- Port Address Translation
- Configuring and Verifying Inside IPv4 NAT
- Implement PAT

Section 24: Introducing QoS

- Converged Networks
- Quality of Service Defined
- QoS Policy
- QoS Mechanisms

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- QoS Models
- Deploying End-to-End QoS

Section 25: Explaining Wireless Fundamentals

- Wireless Technologies
- WLAN Architectures
- WLAN Components
- WiFi Channels
- AP and WLC Management

Section 26: Introducing Architectures and Virtualization

- Introduction to Network Design
- Enterprise Three-Tier Hierarchical Network Design
- Spine-Leaf Network Design
- Cisco Enterprise Architecture Model
- Cloud Computing Overview
- Device Architecture
- Virtualization Fundamentals

Section 27: Explaining the Evolution of Intelligent Networks

- Overview of Network Programmability in Enterprise Networks
- Software-Defined Networking
- Common Programmability Protocols and Methods
- Configuration Management Tools
- Introducing Cisco DNA Center
- Cisco SD-Access
- Introducing Cisco SD-WAN

Section 28: Introducing System Monitoring

- Introducing Syslog
- Syslog Message Format
- SNMP Overview
- Enabling Network Time Protocol
- Configure System Message Logging

Section 29: Managing Cisco Devices

- Cisco IOS Integrated File System and Devices
- Stages of the Router Power-On Boot Sequence
- Loading and Managing System Images Files
- Loading Cisco IOS Configuration Files
- Validating Cisco IOS Images Using MD5
- Managing Cisco IOS Images and Device Configuration Files

Section 30: Examining the Security Threat Landscape

- Security Threat Landscape Overview
- Malware

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- Hacking Tools
- Denial of Service and Distributed Denial of Service
- Spoofing
- Reflection and Amplification Attacks
- Social Engineering
- Evolution of Phishing
- Password Attacks
- Reconnaissance Attacks
- Buffer Overflow Attacks
- Man-in-the-Middle Attacks
- Vectors of Data Loss and Exfiltration
- Other Considerations

Section 31: Implementing Threat Defense Technologies

- Information Security Overview
- Firewalls
- Intrusion Prevention Systems
- Introduction to Cryptographic Technologies
- IPsec Security Services
- Secure Sockets Layer and Transport Layer Security
- Wireless Security Protocols
- Configure WPA2 PSK

Section 32: Securing Administrative Access

- Network Device Security Overview
- Securing Access to Privileged EXEC Mode
- Securing Console Access
- Securing Remote Access
- Configuring the Login Banner
- Limiting Remote Access with ACLs
- External Authentication Options
- Secure Device Administrative Access

Section 33: Implementing Device Hardening

- Securing Unused Ports
- Infrastructure ACL
- Disabling Unused Services
- Port Security Overview
- Mitigating VLAN Attacks
- DHCP Snooping
- Dynamic ARP Inspection
- Implement Device Hardening

Lab Outline

- VR-Lab 1: Exploring the virtual reality NterOne ClearConnect VR app

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- VR-Session 1: Virtual Classroom Lecture: Section 1 - Exploring the Functions of Networking
- VR-Lab 2: Virtual Classroom exploration design session: Simple Enterprise Network Architecture
- Discovery 1: Get Started with Cisco CLI
- VR-Session 2: Virtual Classroom Lecture: Section 4 - Introducing LANs
- Discovery 2: Observe How a Switch Operates
- Discovery 3: Perform Basic Switch Configuration
- FASTLab 1: Implement the Initial Switch Configuration
- Discovery 4: Inspect TCP/IP Applications
- VR-Session 3: Virtual Classroom Lecture: Section 9 - Exploring the Functions of Routing
- Discovery 5: Configure an Interface on a Cisco Router
- Discovery 6: Configure and Verify Layer 2 Discovery Protocols
- FASTLab 2: Implement an Initial Router Configuration
- VR-Lab 3: Virtual Classroom exploration of Cisco ISR4451 and Catalyst 9000 family components
- VR-Lab 4: Virtual Server Room racking and stacking exploration tutorial
- Discovery 7: Configure Default Gateway
- Discovery 8: Explore Packet Forwarding
- Discovery 9: Troubleshoot Switch Media and Port Issues
- Discovery 10: Troubleshoot Port Duplex Issues
- Discovery 11: Configure Basic IPv6 Connectivity
- Discovery 12: Configure and Verify IPv4 Static Routes
- Discovery 13: Configure IPv6 Static Routes
- FASTLab 3: Implement IPv4 Static Routing
- FASTLab 4: Implement IPv6 Static Routing
- Discovery 14: Configure VLAN and Trunk
- FASTLab 5: Troubleshoot VLANs and Trunk
- Discovery 15: Configure a Router on a Stick
- FASTLab 6: Implement Multiple VLANs and Basic Routing Between the VLANS
- Discovery 16: Configure and Verify Single-Area OSPF
- VR-Session 4: Virtual Classroom Lecture: Section 18: Building Redundant Switched Topologies
- Discovery 17: Configure and Verify EtherChannel
- FASTLab 7: Improve Redundant Switched Topologies with EtherChannel
- VR-Session 5: Virtual Classroom Lecture: Section 21 - Introducing WAN Technologies
- Discovery 18: Configure and Verify IPv4 ACLs
- FASTLab 8: Implement Numbered and Named IPv4 ACLs
- Discovery 19: Configure a Provider-Assigned IPv4 Address
- Discovery 20: Configure Static NAT
- Discovery 21: Configure Dynamic NAT and PAT
- FASTLab 9: Implement PAT
- VR-Session 6: Virtual Classroom Lecture: Section 25 - Explaining Wireless Fundamentals
- Discovery 22: Log into the WLC
- Discovery 23: Monitor the WLC
- Discovery 24: Configure a Dynamic (VLAN) Interface
- Discovery 25: Configure a DHCP Scope
- Discovery 26: Configure a WLAN
- Discovery 27: Define a RADIUS Server
- Discovery 28: Explore Management Options

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- VR-Session 7: Virtual Classroom Lecture: Section 26 - Introducing Architectures and Virtualization
- Discovery 29: Explore the Cisco DNA Center
- Discovery 30: Configure and Verify NTP
- FASTLab 10: Configure System Message Logging
- Discovery 31: Create the Cisco IOS Image Backup
- Discovery 32: Upgrade Cisco IOS Image
- Discovery 33: Configure WLAN Using WPA2 PSK Using the GUI
- Discovery 34: Secure Console and Remote Access
- Discovery 35: Enable and Limit Remote Access Connectivity
- FASTLab 11: Secure Device Administrative Access
- Discovery 36: Configure and Verify Port Security
- FASTLab 12: Implement Device Hardening
- VR Lab 5: VR Server Room Core and Distribution switches racking
- VR Lab 6: VR Server Room Access switches racking
- VR lab 7: VR Server Room Enterprise Network data cabling
- VR Lab 8: VR Server Room Management Switch Rack/Stack and Cabling