

# Ultimate CCNA Online Training

(200-301 CCNA)

In this Cisco Certified Network Associate training, Keith Barker, John McGovern, and Jeff Kish prepare learners to take the 200-301 CCNA exam, which is required to earn the CCNA certification.

[CBT Nuggets course material](#) →

## WEEK 1

<b>Use Models to Understand IP Networking</b>	58 min.
Intro	1 min.
IP Networking Overview	4 min.
Network Models	5 min.
Application and Transport Layers	10 min.
Layer 3, Network Layer	11 min.
Layer 2, Data Link Layer	9 min.
Layer 1, Physical Layer	5 min.
Validation	13 min.
<b>Understand the Role of a Layer 2 Switch</b>	63 min.
Intro	1 min.
Layer 2 Switching Overview	10 min.
What Does a Layer 2 Switch Look Like?	9 min.
Hosts and Switches Need to Learn MAC Addresses	5 min.
How IPv4 Hosts Learn MAC Addresses	10 min.
How IPv4 Hosts Learn MAC Addresses (router side)	9 min.
Viewing the MAC Address Table on a Layer 2 Switch	5 min.
Validation	7 min.
Lab Walkthrough	3 min.
Practice Exam Question	1 min.
Practice Exam Walkthrough	3 min.
<b>Understand the Role of a Layer 3 Router</b>	62 min.
Intro to Understanding a L3 Router	1 min.
IP Routing Overview	16 min.
What does a Router Look Like?	7 min.
How L3 Routers Learn About Networks	5 min.
Directly Connected Networks	4 min.
Static Routes	6 min.
Dynamic Routing Protocols	6 min.
Validation	17 min.

<b>Use APs, NGFWs, and Controllers</b>	63 min.
Intro to Firewalls, APs, and Controllers	9 min.
Wireless Access Points (APs)	8 min.
Power over Ethernet (PoE) Overview	5 min.
Providing PoE From a Cisco Switch	10 min.
Controllers for Centralized Management	7 min.
WLC as an AP Controller	11 min.
Next Generation Firewalls (NGFWs)	7 min.
Validation	6 min.

<b>Describe the Hierarchical Network Model</b>	43 min.
The Need for a Model	6 min.
Basic Topologies	10 min.
Modular Hierarchy and Scaling	7 min.
The Hierarchical Network Model	8 min.
Enterprise Campus Networks	8 min.
Validation	4 min.

## WEEK 2

<b>Describe the Hierarchical Network Blocks</b>	49 min.
Intro	3 min.
The Access Block	6 min.
The Distribution Block	5 min.
The Core Block	6 min.
The Aggregation Block	7 min.
The WAN Block	6 min.
The Internet Block	6 min.
Collapsed Architectures	6 min.
Validation	4 min.

<b>Describe Network Topology Architectures</b>	48 min.
Intro	3 min.
Three-Tier Architectures	6 min.
Two-Tier Architectures	7 min.

Small Office - Home Office (SOHO) Architectures	8 min.
Spine-Leaf Architectures	8 min.
Cloud and On-Premise Architectures	11 min.
Validation	5 min.

<b>Describe Wide Area Network (WAN) Technologies</b>	45 min.
Intro	3 min.
Wide Area Networks (WANs)	7 min.
Leased Lines	11 min.
Ethernet Switching and Metro Ethernet	9 min.
MPLS	10 min.
Validation	5 min.

<b>Describe WAN Topologies and Connectivity</b>	51 min.
Intro	3 min.
WAN Topologies	6 min.
Sharing Bandwidth and SLAs	8 min.
Lit and Dark Fiber	10 min.
Wireless Bridging	7 min.
L2 WAN Links	5 min.
L3 WAN Links	6 min.
Validation	6 min.

<b>Identify Copper Cabling and Termination</b>	48 min.
Intro	2 min.
Signals Sent over Copper	10 min.
Shielded and Unshielded Cables	4 min.
Ethernet Cable Types	7 min.
Plenum Cables	4 min.

Opening an Ethernet Cable	5 min.
Ethernet Pinouts	5 min.
RJ45 Connector Termination	8 min.
Validation	3 min.

<b>Identify Copper Interface Transmissions</b>	47 min.
Intro	3 min.
Transmission Pairs	10 min.
Crossover Cables	6 min.
Crossover Cable Pinouts	5 min.
Console/Rollover Cables	5 min.
T1/E1 and T3/E3 Cables	5 min.
RJ45 Receptacle Termination	8 min.
Validation	5 min.

<b>Identify Fiber Optics and Cables</b>	48 min.
Intro	2 min.
Optics and Cables	9 min.
Optical Transmissions	8 min.
Fiber Connection Demo	6 min.
Signal Loss	6 min.
Single-mode Fiber (SMF) and Multimode Fiber (MMF)	9 min.
Fiber Cable Demo	3 min.
Validation	5 min.

<b>Identify Transceiver and Cabling Types</b>	53 min.
Intro	2 min.
Long Range Transceivers	9 min.
Short Range Transceivers	7 min.
Copper Transceivers	3 min.

Transceiver Data Sheets	11 min.
Fiber Connectors	7 min.
Infrastructure Fiber	9 min.
Validation	5 min.

<b>Identify Cisco Transceivers and Compatibility</b>	56 min.
Intro	2 min.
SFP Technology	10 min.
QSFP Technology	8 min.
SFP56 and QSFP56	3 min.
QSFP-DD and QSFP-800DD	5 min.
Twinax (DACs) and Active Optical Cables (AOCs)	6 min.
SFP and QSFP Data Sheets	8 min.
SFP Demo	6 min.
Switch Configurations	4 min.
Validation	4 min.

<b>Explain Ethernet Structure and Transmissions</b>	45 min.
Intro	2 min.
Bits, Bytes, and Frames	9 min.
Ethernet Standards	8 min.
Layer 2 Ethernet Frame Structure	10 min.
Ethernet Transmissions	7 min.
Half-Duplex and Collisions	5 min.
Validation	4 min.

<b>Explain Ethernet Communications</b>	57 min.
Intro	2 min.
Carrier Sense Multiple Access - Collision Detection (CSMA/CD)	10 min.
Late Collisions	7 min.
Collision Domains	8 min.

## WEEK 3

Ethernet Switches	7 min.
Half-duplex and Full-duplex Operations	10 min.
Ethernet Broadcasts	9 min.
Validation	4 min.

<b>Configure Ethernet Interface Speed and Duplex</b>	49 min.
Intro	3 min.
Interface Speeds	10 min.
Confirming Speed Options on Data Sheets	9 min.
Auto-Negotiation	8 min.
Speed and Duplex Considerations	6 min.
Configure Interface Speed and Duplex	7 min.
Validation	6 min.

## WEEK 4

<b>Identify Interface and Cable Issues</b>	53 min.
Intro	1 min.
L1 Interface Status	7 min.
L2 Interface Status	5 min.
Err-Disabled Status	6 min.
Speed Mismatches	5 min.
Duplex Mismatches	12 min.
Runts and Giants	8 min.
CRC Failures	5 min.
Validation	4 min.

<b>Use Layer 4 Transport Protocols</b>	73 min.
Intro to Layer 4 Transport Protocols	1 min.
Layer 4 Transport Protocols Overview	12 min.
TCP and UDP Port Numbers	11 min.
Verifying the L4 Protocols in Use	11 min.

TCP vs UDP	7 min.
Verifying TCP and UDP Behavior	8 min.
Sequence of Events On a Client Computer	5 min.
Validation	18 min.

<b>Understand IPv4 Addressing</b>	57 min.
Intro to IPv4 Addressing	1 min.
IPv4 Addressing Overview	11 min.
IPv4 Dotted Decimal Addresses	4 min.
Numbering Systems: Decimal & Binary	5 min.
Converting Binary to Decimal	4 min.
Converting Decimal to Binary	5 min.
Unveiling the Mask	8 min.
Configuring an IP Address on a Router	8 min.
Validation	11 min.

<b>Configure IPv4 Private Addresses</b>	70 min.
Intro to Private IPv4 Addresses	1 min.
IPv4 Classes	8 min.
Private (RFC 1918) IPv4 Addresses	9 min.
Private IPv4 Address Planning	10 min.
Configuring L3 Router 1	10 min.
Configuring L3 Router 2	6 min.
Configure the Client PC and Default G/W	8 min.
Validation	18 min.

## WEEK 5

<b>Use IPv4 Subnetting</b>	76 min.
Intro to IPv4 Subnetting	1 min.
IPv4 Subnetting Overview	5 min.
Making the Mask Longer	9 min.
How Many Bits to Take and the Finger Game	11 min.

Identify the New Subnet IDs	9 min.
Ranges for Subnets	7 min.
Calculating Number of Hosts per Subnet	3 min.
Subnetting Scenario	9 min.
Implementing our IP Subnet Addressing	7 min.
Validation	15 min.

<b>Use IPv4 Variable Length Subnets Masks (VLSM)</b>	73 min.
Intro to Use IPv4 Variable Length Subnet Masks	2 min.
Why VLSM is Needed	11 min.
The Starting Point for VLSM Calculations	10 min.
Calculating the Rest of the Subnet IDs and Masks with VLSM	7 min.
VLSM Example Across Octets	15 min.
Creating a New VLSM Based IPv4 Subnetting Plan	9 min.
Configuring the IPv4 VLSM on Cisco Routers	11 min.
Validation	8 min.

<b>Use Additional IPv4 Addressing</b>	74 min.
Intro to Additional IPv4 Addresses	1 min.
Additional IPv4 Address Types	11 min.
Unicast Addresses	8 min.
Using Loopbacks	8 min.
IPv4 Anycast Addressing	7 min.
APIPA Link Local IPv4 Address	6 min.
Broadcast Addresses, L3 and L2	10 min.
Multicast	9 min.
Validation present lab for IPv4 Special Addresses	14 min.

<b>Understand IPv6 Addressing</b>	72 min.
Intro to IPv6 Addressing	1 min.
Compare IPv6 to IPv4	11 min.
Shortcuts for Writing Out IPv6 Addresses	5 min.

## WEEK 6

IPv6 Address Types	15 min.
EUI-64 for the Host ID	11 min.
Link-Local Addresses	9 min.
Multicast in IPv6	7 min.
Validation	13 min.

<b>Configure IPv6 Addressing</b>	67 min.
Intro to Configuring IPv6 Addressing	1 min.
Game Plan for IPv6 Addressing	8 min.
Configure R1	6 min.
Configure R2	8 min.
Configure R3	7 min.
Configure PC-1,2,3	8 min.
Configure Windows Server DC-NUG	5 min.
Configure the Client_PC	14 min.
Validation	10 min.

<b>Explain Virtualization Fundamentals</b>	55 min.
Intro	2 min.
Servers and Applications	8 min.
Bare Metal and Hypervisors	10 min.
Data Center Vendors	4 min.
Virtual Machines (VMs)	8 min.
Virtual Switching	6 min.
Network Function Virtualization	6 min.
Data Centers and Cloud	8 min.
Validation	3 min.

<b>Understand L2 Switch Forwarding</b>	76 min.
Intro	1 min.
Layer 2 switching Overview	14 min.
Building the MAC Address-table	11 min.
MAC Address Aging Time	5 min.

Forwarding to a Known MAC Address	8 min.
Forwarding a broadcast to all other ports	9 min.
Flooding Unknown Unicast Frames	10 min.
Layer 2 Switches Don't Modify MAC Addresses	8 min.
Validation	10 min.

<b>Understand L2 VLANs</b>	58 min.
Intro	1 min.
VLAN Overview	13 min.
VLANs and IP Subnets	8 min.
Creating New VLANs	12 min.
Update Configurations, Based on Updated Topology	13 min.
Validation	11 min.

## WEEK 7

<b>Configure Inter VLAN Routing</b>	66 min.
Intro	2 min.
Inter VLAN Routing Overview	10 min.
Inter VLAN Routing with 1 External Router and 2 Physical Interfaces	9 min.
Inter VLAN Routing Using Router on a Stick (ROAS)	9 min.
ROAS Plan and SW1 Configuration	9 min.
ROAS R1 config	11 min.
Validation ROAS	16 min.

<b>Configure a Multi-Layer Switch</b>	78 min.
Intro	1 min.
Connecting to the CLI Using a Console Cable	10 min.
Initial Configurations for a Switch	11 min.
Configuring a Switched Virtual Interface (SVI) for Management	14 min.
Connecting to a Switch IP Address, Through a VTY Line	8 min.

Converting a Physical Layer 2 Switchport to a L3 Routed Port	6 min.
Enabling IPv4 Routing on a Multi-Layer Switch	6 min.
Using L3 SVIs for IP Routing on a Multi-Layer Switch	12 min.
Validation	10 min.

<b>Configure Cisco 802.1Q Trunking</b>	68 min.
Intro	1 min.
802.1 Trunking Overview	9 min.
Configure Trunking	12 min.
The Cisco Native VLAN	15 min.
Controlling Which VLANs Are Allowed on the Trunks	8 min.
Inter VLAN Routing	10 min.
Validation	13 min.

<b>Configure Cisco DTP</b>	57 min.
Intro	1 min.
Dynamic Trunking Protocol (DTP) Overview	12 min.
Using DTP	11 min.
Disabling DTP	7 min.
Confirm Access Ports and SVIs	8 min.
Validation	18 min.

## WEEK 8

<b>Configure Cisco VTP</b>	71 min.
Intro	2 min.
VTP Overview	17 min.
Preparing 802.1Q Trunks	5 min.
Configure a VTP Domain	11 min.
VTP Client and Transparent Modes	6 min.
Testing with SVIs	7 min.
No VLAN, No Forwarding	8 min.
Validation	15 min.

<b>Configure Cisco EtherChannel</b>	81 min.
Intro	1 min.
EtherChannel, The Big Picture	7 min.
EtherChannel Protocol Options	12 min.
Layer 2 EtherChannel Access Port	21 min.
L2 EtherChannel Trunk Port	12 min.
L3 EtherChannel Routed Interface	15 min.
Validation	13 min.

<b>Understand Cisco STP</b>	83 min.
Intro	1 min.
STP Overview	10 min.
Cisco and Spanning Tree	8 min.
Electing a Root Bridge for Spanning Tree	11 min.
Port Roles and States	16 min.
Non-Root Bridges Get 1 Root Port	13 min.
Designated Ports and Ports That Will Block	11 min.
Validation	13 min.

<b>Configure Cisco STP</b>	80 min.
Intro	1 min.
STP Recap	9 min.
Spanning Tree Modifications We May Want to Use	14 min.
Configure PortFast on an Interface	14 min.
Enable PortFast Globally	6 min.
Use Rapid PVST	8 min.
Controlling the STP Root	12 min.
Validation	15 min.

## WEEK 9

<b>Configure Cisco Voice VLANs</b>	49 min.
Intro	2 min.
Voice VLAN Overview	11 min.
Implementing a Voice VLAN	16 min.
Validation	20 min.

<b>Configure Cisco CDP and LLDP</b>	74 min.
Intro	2 min.
CDP and LLDP Overview	11 min.
CDP Defaults	11 min.
Use CDP to Learn the IP of a Neighbor	9 min.
Customize CDP	6 min.
Enable LLDP	10 min.
Customize LLDP	8 min.
Validation	18 min.

<b>Describe Wireless Principles</b>	51 min.
Intro	1 min.
What is Wireless Networking?	5 min.
Physics of Light	8 min.
Anatomy of RF Waveforms	7 min.
Frequency and Wavelength	8 min.
Phase	9 min.
The Electromagnetic Spectrum	10 min.
Validation	3 min.

<b>Describe Wireless Transmissions and Interference</b>	52 min.
Intro	2 min.
Transmissions and Receptions	7 min.
Carrier Sense Multiple Access-Collision Avoidance (CSMA/CA)	10 min.

RF Interference	8 min.
Collisions and Overlapping Signals	7 min.
Modulation and Data Encoding	14 min.
Validation	4 min.

<b>Calculate Wireless Measurements</b>	47 min.
Intro	2 min.
Wireless Transmit Power	7 min.
Introducing the Decibel	7 min.
Decibels and Linearity	7 min.
dBm Measurements and Math	8 min.
Wireless dBm Calculations	9 min.
Validation	7 min.

## WEEK 10

<b>Explain Wireless Bands and Channels</b>	48 min.
Intro	2 min.
Wireless Channels	10 min.
Wireless Bands	11 min.
Bonded Channels	9 min.
Access Point Radios	10 min.
Validation	6 min.

<b>Describe Wi-Fi Standards</b>	49 min.
Intro	1 min.
What is Wi-Fi?	9 min.
802.11 and 802.11a	5 min.
802.11b and 802.11g	7 min.
802.11n (Wi-Fi 4)	9 min.
802.11ac (Wi-Fi 5)	6 min.
802.11ax (Wi-Fi 6 and 6E)	8 min.
Validation	4 min.

<b>Describe Wireless Cells and Roaming</b>	45 min.
Intro	2 min.
APs and Cells	8 min.
Noise Floor	5 min.
RSSI and SNR	8 min.
Station Roaming	7 min.
Service Set Identifiers (SSIDs)	5 min.
Basic and Extended Service Sets	6 min.
Validation	4 min.

<b>Explain Wireless Security Principles</b>	45 min.
Intro	2 min.
Wireless Security Challenges	8 min.
Authentication and Encryption	8 min.
Wi-Fi Protected Access (WPA)	6 min.
WPA Personal and Enterprise	5 min.
802.1X and EAP	6 min.
RADIUS and TACACS+	6 min.
Validation	4 min.

<b>Explain WPA Operation and Benefits</b>	46 min.
Intro	3 min.
WPA Encryption	7 min.
WPA 4-Way Handshake	6 min.
WPA3 Overview	8 min.
Simultaneous Authentication of Equals (SAE)	6 min.
Opportunistic Wireless Encryption (OWE)	7 min.
Validation	9 min.

<b>Describe Wireless Network Components</b>	45 min.
ss Intro	2 min.
Access Points (APs) and Stations (STAs)	7 min.
Mesh APs and Bridges	6 min.



AP Options	7 min.
Antenna Effects and Types	9 min.
Distribution Systems and Media	4 min.
Wireless LAN Controllers (WLCs)	7 min.
Validation	3 min.

## WEEK 11

### Explain Wireless Network Architectures 47 min.

Intro	2 min.
Autonomous Architecture	6 min.
Lightweight Architecture	8 min.
CAPWAP Tunneling	7 min.
Tunneling and Data Flow	10 min.
Cloud-Managed Architecture	10 min.
Validation	4 min.

### Explain AP Modes of Operation 46 min.

Intro	2 min.
Local Mode	7 min.
FlexConnect Mode	7 min.
Monitor and Sniffer Modes	8 min.
Bridge and Flex+Bridge Modes	6 min.
Access and Trunk Links	8 min.
Validation	8 min.

### Explain Cisco WLC Architecture 47 min.

Intro	2 min.
Legacy AireOS Controllers	7 min.
Catalyst 9800 Controllers	8 min.
WLC Discovery	11 min.
WLC Redundancy	6 min.
WLC Authentication	5 min.
Lightweight Design Considerations	7 min.
Validation	1 min.

### Explain Cisco WLC Interfaces for AireOS 43 min.

Intro	2 min.
Physical Ports	8 min.
Logical Interfaces	10 min.
Redundancy Interfaces	6 min.
Dynamic Interfaces	5 min.
AP-Manager Interfaces	7 min.
Validation	5 min.

### Explain Cisco WLC Configurations 44 min.

Welcome to Explain Cisco WLC Configurations!	2 min.
WLC Management	6 min.
WLC GUI Overview	9 min.
AP Connection and Configuration	7 min.
Cisco WLANs	6 min.
VLANs and Dynamic Interfaces	7 min.
AP Groups	4 min.
Validation	3 min.

### Perform Cisco WLC Initial Configuration 49 min.

Intro	1 min.
Labbing with WLCs	12 min.
Initial Configuration CLI	15 min.
Switch Configuration	3 min.
Interface Configuration	5 min.
AP Connections	10 min.
Validation	2 min.
Conclusion	1 min.

## WEEK 12

### Configure Cisco WLC WLANs 47 min.

Intro	2 min.
WLAN Configuration	12 min.
Wireless Security Review	5 min.

Security Configuration Options	4 min.
WPA2-PSK Configuration	3 min.
WPA2 Enterprise Configuration	8 min.
Quality of Service	4 min.
Validation	9 min.

### **Configure IPv4 Static Routes** 65 min.

Intro	1 min.
Static Route Overview	15 min.
Confirming Current Topology and Routes	6 min.
Game Plan for Static Routes	9 min.
Configure a Static /24 Network Route	7 min.
Configure a Static /32 Host Route	5 min.
Default Route	9 min.
Validation	13 min.

### **Describe OSPF** 87 min.

Intro	1 min.
Benefits of Using a Dynamic Routing Protocol	6 min.
Overview of OSPF	13 min.
Designated Router	5 min.
Enable OSPF and Include All Interfaces	13 min.
OSPF Router ID Selection Process	12 min.
Confirming OSPF Network Types and Timers	11 min.
Identify the DR and BDR for a Network Segment	10 min.
Validation	16 min.

### **Configure OSPF** 85 min.

Intro	1 min.
Router ID, Interfaces, and DR	4 min.
Administratively Configuring an OSPF Router ID	6 min.
Adding OSPF Interfaces with Interface Commands	12 min.

Verifying OSPF Enabled Interfaces and IP Routing	6 min.
OSPF Network Statement With All Wildcard Bits On	9 min.
Using Network Statements for a Group of Interfaces	6 min.
Adding Additional Routers and Interfaces to OSPF Area 0	8 min.
Interface Priority Impacts the DR Elections	7 min.
3rd OSPF Router on a Shared Ethernet Network Subnet	5 min.
Validation	21 min.

## **WEEK 13**

### **Understand OSPF's Cost & Default Route** 76 min.

Intro	1 min.
OSPF Default Costs and Default Route Overview	13 min.
Interface and Path Cost	11 min.
Auto Cost Reference Bandwidth	12 min.
Using a Consistent Reference Bandwidth	7 min.
Changing Interface Cost	6 min.
Default Routes in OSPF	11 min.
Validation	15 min.

### **Understand Administrative Distance** 70 min.

Intro	1 min.
Administrative Distance Overview	14 min.
Default Administrative Distances	7 min.
BGP Administrative Distances of 20 and 200	8 min.
RIP Administrative Distance of 120	8 min.
OSPF and EIGRP Administrative Distances of 110 and 90	8 min.
Static Routes with an Administrative Distance of 1	5 min.
Validation	19 min.

### **Use IPv4 Floating Static Routes** 62 min.

Intro	1 min.
Floating Static Route Overview	11 min.
Establishing Initial Default Routes	6 min.

Adding Backup “Floating” Default Routes	9 min.
Testing Floating Static Routes	7 min.
Floating Static Network Routes	8 min.
Validation	20 min.

<b>Use Dual Stack IPv4 and IPv6</b>	64 min.
Intro	1 min.
Game Plan for IPv4 and IPv6 Dual Stack Network	10 min.
Configuring IPv4 Addressing	10 min.
Configure OSPF Routing for IPv4	7 min.
Configure IPv6 Global and Link-local Addressing	12 min.
Configure Basic IPv6 Routing Using RIP	8 min.
Using IPv6 Anycast	8 min.
Validation	8 min.

## WEEK 14

<b>Configure Static IPv6 Routes</b>	91 min.
Intro	1 min.
IPv6 Static Routing Overview	13 min.
Configure Static IPv6 Network Routes	11 min.
Configure a Floating IPv6 Static Route	8 min.
Configure a Static IPv6 Host Route	9 min.
Configure IPv6 Primary and Floating Static Default Routes	6 min.
Additional Static Routes, to All Loopback IPv6 Addresses	15 min.
Validation	28 min.

<b>Routes That Must Win Twice</b>	85 min.
Intro	1 min.
The Winning IPv4 Route Overview	9 min.
Confirming Longest Match Wins, and the Use of AD	7 min.
Equal Cost Routes, AD, and Longest Match Examples	9 min.
Calculate the Range of an IPv4 Route	12 min.

Calculate Range Example, and When the Default Route is Used	6 min.
Interpreting a Routing Table	6 min.
The Price of a Route: Cost   Hop Count   Metric	12 min.
Validation	23 min.

<b>Use First Hop Redundancy Protocols</b>	68 min.
Intro	2 min.
First Hop Redundancy Protocol (FHRP) Overview	9 min.
Cisco’s Hot Standby Router Protocol (HSRP)	11 min.
Configure HSRP	11 min.
Testing an HSRP Failover, and Updating to HSRP v2	7 min.
Configure and Test VRRP	11 min.
Validation	17 min.

<b>Explain Network Address Translation (NAT)</b>	40 min.
Intro	2 min.
Network Address Translation (NAT)	6 min.
Private IP Addressing	10 min.
NAT Architecture	7 min.
Source and Destination NAT	10 min.
Address Pools and Overload	1 min.
Validation	4 min.

## WEEK 15

<b>Define NAT Operation</b>	46 min.
Intro	2 min.
NAT Terminology	6 min.
Dynamic NAT	5 min.
Static NAT	7 min.
Port Address Translation (PAT)	8 min.
PAT Example	7 min.
NAT Address Types	7 min.
Validation	4 min.

<b>Configure Network Address Translation (NAT)</b>	47 min.
Intro	1 min.
Configuration Overview	4 min.
Topology and NAT Interfaces	5 min.
Configure Static NAT	6 min.
Configure Dynamic NAT	7 min.
Configure PAT	5 min.
Validation	19 min.

<b>Explain Dynamic Host Configuration Protocol (DHCP)</b>	57 min.
Intro	2 min.
Dynamic Host Configuration Protocol	8 min.
DHCP Considerations	8 min.
DHCP Process	9 min.
DHCP Example	8 min.
DHCP Relay	7 min.
Configure DHCP Relay	6 min.
Validation	9 min.

<b>Explain the Domain Name System (DNS)</b>	53 min.
Intro	2 min.
DNS and Resolution	7 min.
DNS Servers and Hierarchy	9 min.
DNS Process	8 min.
DNS on IOS-XE	9 min.
Configure DNS	6 min.
Validation	12 min.

<b>Explain Simple Network Management Protocol (SNMP)</b>	57 min.
Intro	3 min.
SNMP Framework	7 min.
SNMP Operation	8 min.
SNMP Versions	7 min.
SNMPv3 IOS-XE Structure	9 min.
Configure SNMP Parameters	4 min.
Configure SNMPv2c	5 min.
Configure SNMPv3	5 min.
Validation	9 min.

## WEEK 16

<b>Configure Syslog and NTP</b>	58 min.
Intro	2 min.
System Logging	10 min.
Syslog Servers	4 min.
Logging Severity Levels	7 min.
Buffer and Syslog Logging	6 min.
Console and Terminal Logging	6 min.
Network Time Protocol (NTP)	6 min.
Configure NTP	6 min.
Validation	11 min.

<b>Configure Cisco Device Management</b>	57 min.
Intro	2 min.
Telnet and SSH	5 min.
VTY Lines	7 min.
VTY at the CLI	5 min.
VTY Security	8 min.
VTY Configuration	9 min.
Enabling SSH	7 min.
Configuring and Testing SSH	4 min.
Validation	11 min.

<b>Configure IOS File Management</b>	48 min.
Intro	2 min.
IOS Storage System	5 min.
Configurations and NVRAM	8 min.
Managing IOS Files	5 min.
Trivial File Transfer Protocol (TFTP)	8 min.
TFTP and MD5 Demo	9 min.
FTP, SFTP, and SCP	5 min.
FTP Demo	4 min.
Validation	1 min.
Conclusion	1 min.

<b>Describe Network Quality of Service (QoS)</b>	58 min.
Intro	2 min.
The Need for QoS	7 min.
Queuing and Scheduling	11 min.
Classification and Marking	7 min.
L2 and L3 Marking	8 min.
DSCP Tagging	10 min.
Shaping and Policing	8 min.
Validation	5 min.

<b>Describe Network Security Fundamentals</b>	54 min.
Intro	2 min.
Security Concepts	6 min.
Data Authentication, Privacy, and Integrity	7 min.
Logical and Physical Security	6 min.
Password Policies and MFA	10 min.
Network Access Control (NAC)	5 min.

## WEEK 17

User Compliance	5 min.
Common Network Attacks	8 min.
Validation	5 min.

<b>Describe Cisco VPNs</b>	74 min.
Intro	1 min.
VPN Overview	13 min.
IPsec Fundamentals	13 min.
IPsec Site to Site VPN Example	1 min.
Using ACLs and Hit Counts to Confirm Tunnel Use	9 min.
Creating Static Routes to Send Traffic Through the Tunnel	8 min.
Verifying Results of IPsec Protected GRE Traffic	5 min.
Validation	24 min.

<b>Create Standard IPv4 ACLs</b>	86 min.
Intro	1 min.
Access Control List Overview	14 min.
Capabilities of Standard vs Extended ACLs	11 min.
Creating a Standard Numbered ACL	16 min.
Applying and Testing a Standard ACL	10 min.
Standard Named ACL	11 min.
Validation	23 min.

<b>Create Extended IPv4 ACLs</b>	76 min.
Intro	1 min.
Extended ACL Review, and Game Plan	9 min.
Create an Extended Numbered ACL	21 min.
Apply and Test the Numbered ACL	13 min.
Create an Extended Named ACL	10 min.
Validation	22 min.

<b>Use ACLs with NAT and PAT</b>	72 min.
Intro	1 min.
Overview of ACLs Used with NAT and PAT	7 min.
ACL, NAT, and PAT Game Plan	6 min.
Configure ACLs for Use with Address Translation	10 min.
Configure IP NAT Interfaces	4 min.
Configure NAT POOL	5 min.
Configure NAT Rules	8 min.
Testing the NAT One to One Mappings	8 min.
Testing the PAT/Overload Translations	5 min.
Validation	18 min.

## WEEK 18

<b>Use Cisco IPv4 DHCP Snooping</b>	74 min.
Intro	1 min.
IPv4 DHCP Snooping Overview	10 min.
Game Plan for DHCP Services and DHCP Snooping	7 min.
Configure R4 as a DHCP server	6 min.
Configure DHCP Relay	8 min.
Enable DHCP Snooping	4 min.
Configuring DHCP Snooping Trusted Ports	8 min.
Using the Snooping Database and Agent	5 min.
Validation	25 min.

<b>Use Cisco L2 Port Security</b>	89 min.
Intro	2 min.
Port Security Overview	20 min.
Configure the Layer 2 Switched Environment	10 min.
Configure and then Enable Port Security	13 min.
Manually Configuring Secure MAC Addresses	9 min.
When Port-Security Interacts with Other Features	14 min.
Validation	21 min.

<b>Understand L2 Security Controls</b>	77 min.
Intro	1 min.
DAI and using DHCP Snooping Binding Information	11 min.
Layer 2 Controls To Protect Spanning Tree Protocol (STP)	7 min.
Mitigate VLAN Hopping Attacks	9 min.
Enable DHCP Services and Snooping	13 min.
Configure Dynamic ARP Inspection (DAI)	9 min.
STP BPDU Guard	6 min.
STP Root Guard	7 min.
Validation	14 min.

<b>Describe Cisco AAA</b>	71 min.
Intro	1 min.
AAA Concepts	15 min.
RADIUS & TACACS+	11 min.
AAA Local Authentication of Telnet	17 min.
AAA Local Authentication of SSH	12 min.
Validation	15 min.

## WEEK 19

<b>Understand Automation for Network Management</b>	65 min.
Introduction to Network Automation	1 min.
What is Network Automation?	10 min.
What should we Automate?	11 min.
Push vs Pull	9 min.
What is Ansible?	8 min.
Ansible in Action	13 min.
Puppet and Chef	8 min.
Validation	5 min.

<b>Understand REST APIs and Data Formats</b>	74 min.
Intro	1 min.
What is an API?	8 min.
Understanding REST APIs	7 min.
Methods and Headers	10 min.
HTTP Status Codes	8 min.
Understanding Structured Data	9 min.
Data Serialization and JSON	14 min.
XML and YAML	5 min.
Exploring RESTCONF	7 min.
Validation	5 min.

<b>Understand Software-Defined Networking</b>	60 min.
Intro	1 min.
The Data Plane	6 min.
The Control and Management Planes	7 min.
Software-Defined Networking Fundamentals	10 min.
Comparing Traditional networks & Controller-based networks	6 min.
Understanding Software-Defined Access	13 min.
Exploring DNA Center	12 min.
Validation	5 min.

<b>Troubleshoot Cisco Wireless Networks</b>	49 min.
Intro	1 min.
Review Quiz	40 min.
Configuration Review	8 min.

## WEEK 20

<b>Troubleshoot Cisco Routing - Labs</b>	112 min.
Intro	2 min.
Welcome to 7 Troubleshooting Scenarios	8 min.
Troubleshooting Lab #1	14 min.
Troubleshooting Lab #2	14 min.
Troubleshooting Lab #3	17 min.
Troubleshooting Lab #4	15 min.
Troubleshooting Lab #5	16 min.
Troubleshooting Lab #6	12 min.
Troubleshooting Lab #7	14 min.

<b>Troubleshoot Cisco Switching - Labs</b>	70 min.
Intro	1 min.
Customer Symptoms for Each of the Five Labs	7 min.
Troubleshooting Lab #1	15 min.
Troubleshooting Lab #2	10 min.
Troubleshooting Lab #3	12 min.
Troubleshooting Lab #4	12 min.
Troubleshooting Lab #5	13 min.