

CCNP: ENCOR – Implementing and Operating Cisco Enterprise Network Core Technologies (Exam 350-401)

Overview: This course teaches students about working with network core technologies. Topics covered include enterprise architecture, VLANs, EtherChannels, OSPF, Spanning-Tree Protocol, multicast protocols, Python, and more.

Course Modules:

Module 01 – Enterprise Architecture

(Duration: 26m)

1. Workbook (Pdf)
2. Instructor Introduction
3. Cisco Enterprise Architecture Model
4. Campus LAN Design Fundamentals
5. Layers in the Hierarchical Model
6. Routed vs. Switched Campus Architecture
7. Traditional Multilayer Campus Layer Design
8. Access Layer
9. Distribution Layer
10. Core Layer
11. When the Core Layer is Needed
12. When the Core Layer is Needed (Cont.)
13. Campus Distribution Layer Design

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14. Campus Distribution Layer Design (Cont.)
15. Campus Distribution Layer Design (Cont.)
16. Campus Distribution Layer Design (Cont.)
17. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 02 – VLANs and 802.1Q Trunking

(Duration: 25 m)

1. Workbook (Pdf)
2. Revisiting VLANs
3. Creating a VLAN
4. Assigning a Port to a VLAN
5. Creating a VLAN
6. Creating a VLAN (Cont.)
7. Creating a VLAN (Cont.)
8. Trunking with 802.1Q
9. Trunking with 802.1Q (Cont.)
10. VLAN Tagging
11. IEEE 802.1Q
12. Native VLAN
13. Configuring an 802.IQ Trunk
14. Configuring an 802.IQ Trunk (Cont.)
15. Configuring an 802.IQ Trunk (Cont.)
16. Inter-VLAN Routing
17. Option 1: Router with a Separate Interface in Each VLAN
18. Option 2: Layer 3 Switch
19. Demo – Troubleshooting
20. **Review Quiz (Number of attempts allowed: Unlimited)**

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Module 03 – Switching

(Duration: 20m)

1. Workbook (Pdf)
2. Layer 2 Switch Operation
3. Layer 2 Switch Operation (Cont.)
4. MAC-Address Table and TCAM
5. Demo – The CAM
6. Control and Data Plane
7. Cisco Switching Mechanisms
8. Cisco Switching Mechanisms (Cont.)
9. Cisco Switching Mechanisms (Cont.)
10. Process Switching and Fast Switching
11. Cisco Express Forwarding
12. Demo – Cisco Express Forwarding
13. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 04 – Ether Channels

(Duration: 19m)

1. Workbook (Pdf)
2. Need for EtherChannel
3. Need for EtherChannel (Cont.)
4. Need for EtherChannel (Cont.)
5. EtherChannel Mode Interactions
6. Layer 2 EtherChannel Configuration Guidelines
7. Layer 2 EtherChannel Configuration Guidelines (Cont.)
8. EtherChannel Load-Balancing Options
9. EtherChannel Load-Balancing Operation

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10. Troubleshoot EtherChannel Issues
11. Troubleshoot EtherChannel Issues (Cont.)
12. Troubleshoot EtherChannel Issues (Cont.)
13. Demo – Troubleshoot EtherChannel Issues
14. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 05 – EIGRP

(Duration: 33m)

1. Workbook (Pdf)
2. EIGRP Features
3. EIGRP Reliable Transport
4. EIGRP Operation Overview
5. EIGRP Packet Format
6. Establishing EIGRP Neighbor Adjacency
7. EIGRP Metrics
8. EIGRP Classic Metric Calculation
9. EIGRP-Wide Metrics
10. EIGRP Path Selection
11. Loop Free Path Selection
12. EIGRP Load Balancing
13. Equal Cost Load Balancing
14. Unequal Cost Load Balancing
15. Traffic Sharing
16. Traffic Sharing (Cont.)
17. EIGRP for IPv6
18. EIGRP Components
19. Compare EIGRP and OSPF Routing Protocols
20. Demo – EIGRP Stub
21. Demo – EIGRP Load Balancing and Authentication
22. **Review Quiz (Number of attempts allowed: Unlimited)**

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Module 06 – BGP

(Duration: 24 m)

1. Workbook (Pdf)
2. Inter-domain Routing with BGP
3. BGP Characteristics
4. Path Vector Functionality in BGP
5. BGP Routing Policies
6. BGP Operations
7. BGP Message Types
8. Types of BGP Neighbor Relationships
9. eBGP Neighbor Relationships
10. BGP Path Selection
11. BGP Best Path Selection Algorithm
12. BGP Path Attributes
13. BGP Path Attributes (Cont.)
14. Weight Attribute
15. Local Preference Attribute
16. AS-Path Attribute
17. MED Attribute
18. Demo – eBGP
19. **Review Quiz (Number of attempts allowed: Unlimited)**

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Module 07 – OSPF

(Duration: 45m)

1. Workbook (Pdf)
2. Describe OSPF
3. Describe OSPF (Cont.)
4. The OSPF Process
5. The OSPF Process (Cont.)
6. The OSPF Process (Cont.)
7. The OSPF Process (Cont.)
8. The OSPF Process (Cont.)
9. OSPF Neighbor Adjacencies
10. OSPF Neighbor Adjacencies (Cont.)
11. Building a Link-State Database
12. OSPF Packet Types
13. OSPF Packet Header Format
14. OSPF LSA Types
15. OSPF LSA Types (Cont.)
16. Compare Single-Area and Multi-Area OSPF
17. Compare Single-Area and Multi-Area OSPF (Cont.)
18. OSPF Area Structure
19. OSPF Area Structure (Cont.)
20. OSPF Network Types
21. Demo – Configuring OSPFv3 using the Newer Syntax
22. OSPF Cost
23. OSPF Cost (Cont.)
24. OSPF Cost (Cont.)
25. OSPF Route Summarization
26. Route Summarization Benefits
27. Distribute List Example
28. Prefix List Example

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29. Explore Route Maps
30. Route Map Applications
31. Route Map Operation
32. Route Match Statement
33. Route Map Configuration
34. Demo – OSPF Stub and Totally Stubby
35. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 08 – Network Address Translation

(Duration: 15m)

1. Workbook (Pdf)
2. Define Network Address Translation
3. NAT Address Types
4. Explore NAT Implementations
5. Understanding Static NAT
6. Understanding Dynamic NAT
7. Understanding PAT
8. NAT Virtual Interface
9. NAT Virtual Interface (Cont.)
10. Demo – Configuring Network Address Translation
11. **Review Quiz (Number of attempts allowed: Unlimited)**

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Module 09 – Redundancy

(Duration: 0h 0m)

1. Workbook (Pdf)
2. Need for Default Gateway Redundancy
3. Define FHRP
4. Define FHRP (Cont.)
5. HSRP Interface Tracking
6. HSRP Interface Tracking (Cont.)
7. HSRP Interface Tracking (Cont.)
8. HSRP Load Sharing with HSRP Multigroup
9. HSRP Load Sharing with HSRP Multigroup (Cont.)
10. HSRP Load Sharing with HSRP Multigroup (Cont.)
11. HSRP Authentication
12. HSRP Versions
13. Cisco Switch High Availability Features
14. Nonstop Forwarding with Stateful Switchover on Catalyst 9400
15. Demo – HSRP
16. Demo – VRRP
17. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 10 – Spanning-Tree Protocol

(Duration: 30m)

1. Workbook (Pdf)
2. Spanning-Tree Protocol Overview
3. Spanning-Tree Protocol Overview (Cont.)
4. BPDU
5. BPDU (Cont.)



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6. Root Bridge Election
7. Root Bridge Election (Cont.)
8. Designated Port Election
9. STP Port States
10. Spanning-Tree Protocol Types and Features
11. Comparison of STP Protocols
12. Default Spanning-Tree Configuration
13. Multiple Spanning Tree Protocol
14. Multiple Spanning Tree Protocol Recommended Practices
15. Multiple Spanning Tree Protocol Recommended Practices (Cont.)
16. Demo – Multiple Spanning Tree Protocol
17. PortFast and BPDU Guard
18. PortFast and BPDU Guard (Cont.)
19. Configuring PortFast and BPDU Guard
20. Verifying PortFast and BPDU Guard
21. Verifying PortFast and BPDU Guard (Cont.)
22. Verifying PortFast and BPDU Guard (Cont.)
23. Verifying PortFast and BPDU Guard (Cont.)
24. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 11 – Virtualization and VPNs

(Duration: 47m)

1. Workbook (Pdf)
2. Server Virtualization
3. Physical Server
4. Virtualized Server
5. Basic Virtualized Server Environment
6. Server Virtualization Benefits
7. Hypervisor: Abstraction Layer

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8. VM Definition
9. Accessing vSphere Hosts Directly
10. Centralized Control of vSphere Hosts
11. Need for Network Virtualization
12. Need for Network Virtualization (Cont.)
13. Path Isolation Overview
14. Device Virtualization
15. Data Path Virtualization
16. Introducing VRF
17. Demo – VRF
18. Introducing Generic Routing Encapsulation
19. Site-to-Site VPN Technologies
20. Site-to-Site VPN Technologies (Cont.)
21. IPsec VPN Overview
22. IPSec Security Associations
23. IPsec: IKE
24. IPsec Modes
25. IPsec VPN Types
26. Dynamic Multipoint VPN
27. Cisco IOS FlexVPN
28. Cisco IOS VTI
29. Cisco IOS VTI (Cont.)
30. Cisco IOS VTI (Cont.)
31. Basic IKE Peering
32. Basic IKE Peering (Cont.)
33. Configuring Basic IKE Peering
34. Configuring Basic IKE Peering (Cont.)
35. Verifying IKE Peering
36. Verifying IKE Peering (Cont.)
37. Demo – VTI
38. **Review Quiz (Number of attempts allowed: Unlimited)**

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Module 12 – Wireless Options and Services

(Duration: 1h 47m)

1. Workbook (Pdf)
2. RF Principles
3. Frequency
4. Watts and Decibels
5. Watts and Decibels (Cont.)
6. Antenna Power
7. Effective Isotropic-Radiated Power (EIRP)
8. Antenna Types
9. Omni-directional Antennas
10. Omni-directional Antennas (Cont.)
11. Omni-directional Antennas (Cont.)
12. Omni-directional Antennas (Cont.)
13. Directional Antennas
14. Directional Antennas (Cont.)
15. Directional Antennas (Cont.)
16. 802.11n/802.11ac MIMO
17. 802.11n/802.11ac MIMO – MRC
18. 802.11n/802.11ac MIMO – Beamforming
19. 802.11n/802.11ac MIMO – Spatial Multiplexing
20. 802.11ac MU-MIMO
21. Client and AP Association
22. Split MAC
23. CAPWAP
24. MC and MA Functions
25. PoP and PoA Functions
26. Wireless Deployment Overview
27. Autonomous AP Deployment
28. Autonomous Deployment Traffic Flow
29. Cisco Autonomous Deployment Overview
30. Centralized Cisco WLC Deployment
31. Centralized Control and Provisioning of APs

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32. Centralized Deployment Traffic
33. FlexConnect Deployment
34. FlexConnect Deployment Traffic Flow
35. FlexConnect Deployment Traffic Flow (Cont.)
36. FlexConnect Deployment Traffic Flow
37. FlexConnect Deployment
38. FlexConnect Deployment (Cont.)
39. Cloud Deployment and Its Effect on Enterprise Networks
40. Cloud Deployment and Its Effect on Enterprise Networks (Cont.)
41. Cloud Computing Services
42. Cloud-Managed Meraki Solution
43. Cisco Meraki Deployment Traffic Flow
44. Demo – Meraki
45. Cisco Catalyst 9800 Series Controller Deployment Options
46. Catalyst 9800 Embedded Wireless Controller
47. Catalyst 9800 Cloud Controller
48. Cisco Mobility Express
49. Wireless Roaming Overview
50. Scanning for a new AP
51. Mobility Groups and Domains
52. Wireless Roaming Types
53. Layer 2 Inter-Controller Roaming
54. Layer 2 Inter-Controller Roaming (Cont.)
55. Network Analytics
56. Cisco CMX
57. Cisco CMX Analytics Tools
58. Location Accuracy
59. Surveying Location-Based Services
60. Universal AP Priming
61. CAPWAP Discovery
62. AP Join Order
63. AP Join Phase with Master
64. AP Join Phase without Master
65. AP Fail-over
66. AP-Specific High Availability
67. N + 1 WLC High Availability
68. AP SSO High Availability
69. AP SSO High Availability (Cont.)
70. Local Mode

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71. FlexConnect Mode
72. FlexConnect Mode (Cont.)
73. Bridge Mode
74. Bridge Mode (Cont.)
75. Other Modes
76. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 13 – Authenticating and Troubleshooting Wireless Clients

(Duration: 52 m)

1. Workbook (Pdf)
2. Authentication Methods
3. Pre-Shared Key (PSK) Authentication
4. PSK Authentication Process
5. 802.1X User Authentication
6. 802.1X User Authentication (Cont.)
7. PKI and 802.1X Certificate-Based Authentication
8. Asymmetric Encryption of User Credentials
9. Digital Signatures
10. Certificates and Certificate Authorities (CA)
11. Retrieving CA Certificates
12. Authentication Using Certificates
13. Introduction to Extensible Authentication Protocol (EAP)
14. EAP Frame Format
15. EAP Authentication Types
16. EAP-Transport Layer Security (EAP-TLS)
17. Protected Extensible Authentication Protocol (PEAP)
18. EAP-FAST

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19. PAC Creation
20. PAC Exchange
21. EAP-FAST Authentication
22. Guest Access with Web Auth
23. Local Web Authentication
24. Local Web Authentication with Auto-Anchor
25. Local Web Portal with External Authentication
26. Centralized Web Authentication
27. Wireless Troubleshooting Tools
28. Spectrum Analysis
29. Spectrum Analysis (Cont.)
30. Wi-Fi Scanning
31. Packet Analysis
32. Cisco AireOS GUI and CLI Tools
33. Cisco AireOS GUI and CLI Tools (Cont.)
34. Cisco Wireless Config Analyzer Express
35. Common Wireless Client Connectivity Issues
36. Client to AP Connectivity
37. Client Association with AP
38. Client Association with AP (Cont.)
39. WLAN Configuration
40. Infrastructure Configuration
41. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 14 – QoS

(Duration: 21m)

1. Workbook (Pdf)
2. Batch Applications
3. Interactive Applications
4. Real-Time Applications
5. IPv4 Header Address Fields
6. Traffic Characteristics
7. Need for Quality of Service (QoS)

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8. QoS Mechanisms
9. Trust Boundary
10. Classification and Markings
11. Classification Tools
12. NBAR Advanced Classification Tool
13. Policing, Shaping, and Re-Marking
14. Policing, Shaping, and Re-Marking (Cont.)
15. Managing Congestion
16. Class Based Weighted Fair Queuing
17. Tools for Congestion Avoidance
18. Define and Interpret a QoS Policy
19. Method for Implementing a QoS Policy
20. MQC QoS Scenario
21. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 15 – Multicast Protocols

(Duration: 22m)

1. Workbook (Pdf)
2. Multicast Overview
3. Multicast Overview
4. Unicast vs. Multicast
5. How Does IP Multicast Work?
6. Multicast Advantages and Disadvantages
7. IP Multicast Applications
8. IP Multicast Group Address
9. IP Multicast Group Address
10. IP Multicast Service Model
11. IP Multicast Service Model (Cont.)
12. Internet Group Management Protocol
13. IGMPv1
14. IGMPv2

15. IGMPv3
16. Source Trees
17. Shared Trees
18. IP Multicast Routing
19. PIM-DM
20. PIM-SM
21. PIM-SM Shared Tree Join
22. PIM-SM Sender Registration
23. PIM-SM Sender Registration (Cont.)
24. PIM-SM Sender Registration (Cont.)
25. Rendezvous Point
26. Static RP
27. BSR
28. Auto-RP
29. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 16 – Cisco DNA

(Duration: 29m)

1. Workbook (Pdf)
2. Need for Digital Transformation
3. Need for Digital Transformation (Cont.)
4. Cisco Digital Network Architecture
5. Cisco Intent-Based Network
6. Building Blocks of Intent-Based Enterprise Networks
7. Assurance
8. Cisco DNA Center
9. Cisco DNA Center (Cont.)
10. Cisco DNA Assurance
11. Cisco DNA Assurance (Cont.)
12. Cisco DNA Assurance (Cont.)
13. Network Discovery and Management
14. Inventory Management
15. Manage Software Image

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16. Network Hierarchy
17. IP Address Pools
18. Day 0 Network Provisioning
19. Day N Network Automation
20. Cisco DNA Assurance Workflow
21. Demo – DNA Center
22. **Review Quiz (Number of attempts allowed: Unlimited)**

Module 17 – APIs

(Duration: 12m)

1. Workbook (Pdf)
2. Application Programming Interfaces
3. Application Programming Interfaces (Cont.)
4. Application Programming Interfaces (Cont.)
5. REST API Response Codes and Results
6. REST API Response Codes and Results (Cont.)
7. REST API Success Codes
8. REST API Client Error Codes
9. REST API Server Error Codes
10. REST API Security
11. REST API Security (Cont.)
12. API in DNA-Center
13. REST API in vManage
14. vManage REST API Resources
15. vManage REST API Resources (Cont.)
16. vManage REST Methods
17. **Review Quiz (Number of attempts allowed: Unlimited)**

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Module 18 – Python

(Duration: 23m)

1. Workbook (Pdf)
2. Python Concepts
3. Python Concepts (Cont.)
4. Executing Python Code
5. Python Scripts
6. Python Helper Utilities and Functions
7. Write Idiomatic Python
8. Common Python Data Types
9. String Data Types
10. Printing Strings
11. Concatenating Strings
12. String Built in Methods
13. Variable Assignment
14. Numbers Data Types
15. Boolean Data Types
16. Conditionals
17. Conditionals (Cont.)
18. Script Writing and Execution
19. Executing Scripts
20. Analyzing Code
21. Analyzing Code (Cont.)
22. Analyzing Code (Cont.)
23. Analyzing Code (Cont.)
24. Analyzing Code (Cont.)
25. Analyzing Code (Cont.)
26. **Review Quiz (Number of attempts allowed: Unlimited)**

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Module 19 – Network Tools and Services

(Duration: 1h 18m)

1. Workbook (Pdf)
2. Troubleshooting Concepts
3. Diagnostic Principles
4. Network Troubleshooting Procedures: Overview
5. Defining the Problem
6. Gathering Information
7. Analyzing Information
8. Eliminating Potential Causes and Proposing a Hypothesis
9. Testing a Hypothesis
10. Solving the Problem and Documenting the Solution
11. Demo – Troubleshooting
12. Basic Hardware Diagnostics
13. Basic Hardware Diagnostics (Cont.)
14. Basic Hardware Diagnostics (Cont.)
15. Basic Hardware Diagnostics (Cont.)
16. Basic Hardware Diagnostics (Cont.)
17. Basic Hardware Diagnostics (Cont.)
18. Basic Hardware Diagnostics (Cont.)
19. Filtered Show Commands
20. Exclude Filter
21. Include Filter
22. Begin Filter
23. Section Filter
24. Regular Expressions in Filters
25. Regular Expressions in Filters (Cont.)
26. Cisco IOS IP SLAs
27. IP SLA Source and Responder
28. Demo – IP SLAs
29. Switch Port Analyzer (SPAN)
30. Local SPAN
31. Local SPAN Configuration



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32. Validating Local SPAN Configuration
33. Remote SPAN (RSPAN)
34. RSPAN Configuration
35. RSPAN Configuration (Cont.)
36. Verifying RSPAN Configuration
37. Verifying RSPAN Configuration (Cont.)
38. Encapsulated Remote Switch Port Analyzer (ERSPAN)
39. ERSPAN Configuration
40. ERSPAN Source Configuration
41. ERSPAN Destination Configuration
42. ERSPAN Verification
43. Cisco Packet Capture Tools
44. Network Time Protocol (NTP)
45. Network Time Protocol (NTP) (Cont.)
46. NTP Modes
47. Securing NTP
48. Securing NTP (Cont.)
49. Logging Services
50. Understanding Syslog
51. Syslog
52. Syslog Messages
53. Demo – Logging
54. Simple Network Management Protocol (SNMP)
55. SNMP Operations
56. NetFlow
57. Analyzing NetFlow Data
58. Format of Export Data
59. Where Can NetFlow Be Implemented in the Network?
60. NetFlow Applications
61. Traditional NetFlow Configuration and Verification
62. Traditional NetFlow Configuration and Verification (Cont.)
63. Flexible NetFlow
64. Traditional vs. Flexible NetFlow
65. Demo – Flexible NetFlow
66. Cisco IOS Embedded Event Manager (EEM)
67. Demo – EEM
68. **Review Quiz (Number of attempts allowed: Unlimited)**

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Module 20 – Security

(Duration: 1h 50m)

1. Workbook (Pdf)
2. ACL
3. ACL (Cont.)
4. ACL (Cont.)
5. ACL Wildcard Masking
6. ACL Wildcard Masking (Cont.)
7. ACL Wildcard Masking (Cont.)
8. Wildcard Bit Mask Abbreviations
9. Types of ACLs
10. Types of ACLs (Cont.)
11. Configure Numbered Standard IPv4 ACLs
12. Configure Numbered Standard IPv4 ACLs (Cont.)
13. Configure Numbered Standard IPv4 ACLs (Cont.)
14. Configure Numbered Standard IPv4 ACLs (Cont.)
15. Configure Numbered Extended IPv4 ACLs
16. Configure Numbered Extended IPv4 ACLs (Cont.)
17. Configure Numbered Extended IPv4 ACLs (Cont.)
18. Use ACLs to Filter Network Traffic
19. Use ACLs to Filter Network Traffic (Cont.)
20. Apply ACLs to Interfaces
21. Apply ACLs to Interfaces (Cont.)
22. Apply ACLs to Interfaces (Cont.)
23. Configure Named Access Lists
24. Configure Named Access Lists (Cont.)
25. Configure Named Access Lists (Cont.)
26. Configure Named Extended ACLs
27. Demo – ACLs
28. Control Plane Overview
29. Control Plane Policing
30. Control Plane Policing (Cont.)
31. Control Plane Policing (Cont.)

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32. Control Plane Policing Configuration
33. Control Plane Policing Configuration (Cont.)
34. Control Plane Policing Configuration (Cont.)
35. Control Plane Policing Verification
36. Control Plane Policing Verification (Cont.)
37. Control Plane Policing Verification (Cont.)
38. Control Plane Policing Verification (Cont.)
39. Demo – CoPP
40. Threatscape
41. Intrusion Prevention Systems
42. Virtual Private Networks
43. Content Security
44. Content Security (Cont.)
45. Logging
46. Endpoint Security
47. Personal Firewalls
48. Antivirus and Antispyware
49. Centralized Endpoint Policy Enforcement
50. Cisco AMP for Endpoints
51. Cisco AMP for Endpoints (Cont.)
52. Firewall Concepts
53. Firewall Concepts (Cont.)
54. Firewall Concepts (Cont.)
55. Firewall Concepts (Cont.)
56. TrustSec
57. SGT Classification
58. Inline SGT Support
59. Enforcement Using SGFW
60. Enforcement Using SGFW with the ASA
61. MACsec
62. Identify Management
63. Identify Management (Cont.)
64. 802.1X for Wired and Wireless Endpoint Authentication
65. 802.1X Message Flow
66. 802.1X Authorization
67. 802.1X VLAN Assignment
68. 802.1X Named ACLs
69. 802.1X Downloadable ACLs
70. 802.1X Host Modes

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71. 802.1X Host Modes
72. Change of Authorization
73. 802.1X Implementation Guidelines
74. MAC Authentication Bypass
75. MAC Authentication Bypass: Benefits and Limitations
76. MAC Authentication Bypass Behavior
77. Web Authentication
78. Web Authentication (Cont.)
79. Web Authentication Process
80. Web Authentication Scenarios
81. Demo – Email Security
82. Securing Device Access
83. Securing Device Access (Cont.)
84. Securing Device Access (Cont.)
85. Line Password
86. Username and Password
87. Device Hardening Options
88. AAA Framework Overview
89. Benefits of AAA
90. Authentication Options
91. RADIUS and TACACS+
92. RADIUS and TACACS+ (Cont.)
93. RADIUS AAA Communications
94. TACACS+ AAA Communications
95. Enabling AAA and Configuring a Local User for Fallback
96. Configuring RADIUS for Console and VTY Access
97. Configuring RADIUS for Console and VTY Access (Cont.)
98. Configuring TACACS+ for Console and VTY Access
99. Configure Authorization and Accounting
100. Configure Authorization and Accounting (Cont.)
101. **Review Quiz (Number of attempts allowed: Unlimited)**

1001 Wilshire Boulevard #1071
Los, Angeles, CA 90017
support@toittraining.com
(909) 760-0217
(909) 760-0218 Fax
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Module 21 – Software-Defined Access and WANs

(Duration: 54m)

1. Workbook (Pdf)
2. Customer Challenges in Campus Network
3. Cisco Digital Network Architecture
4. Need for Cisco SD-Access
5. Need for Cisco SD-Access (Cont.)
6. Need for Cisco SD-Access (Cont.)
7. Need for Cisco SD-Access (Cont.)
8. Cisco SD-Access Fabric Overview
9. Types of Overlay
10. Why Overlays
11. Fabric Underlay – Manual vs. Automated
12. LISP and the Cisco SD-Access Fabric Control Plane
13. LISP and the Cisco SD-Access Fabric Control Plane (Cont.)
14. LISP Terms and Components
15. LISP Packet Flow
16. LISP Packet Flow (Cont.)
17. LISP Host Mobility Deployment Models
18. LISP Host Mobility Deployment Models (Cont.)
19. Host Mobility in LISP
20. Host Mobility in LISP (Cont.)
21. Cisco SD-Access Fabric Data Plane Based on VXLAN
22. Understanding VXLAN
23. VXLAN Encapsulation
24. VXLAN Encapsulation (Cont.)
25. VXLAN Gateways
26. VXLAN-GPO Header
27. Cisco SD-Access Fabric Policy Plane
28. Traditional Access Control
29. Role of Cisco TrustSec
30. Cisco TrustSec and Cisco ISE
31. Cisco SD-Access Fabric Policy Plane



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32. Cisco SD-Access Fabric Nodes
33. Cisco SD-Access Control Plane Node
34. Cisco SD-Access Edge Node
35. Cisco SD-Access Border Node
36. Wireless LAN Controller and Fabric Mode APs
37. DNA Center and ISE Integration
38. DNA Center SD-Access Workflow
39. Cisco SD-Access Wireless Integration
40. Cisco SD-Access Wireless Integration (Cont.)
41. Cisco SD-Access Wireless Workflow – Adding WLC to Fabric
42. Cisco SD-Access Wireless Workflow – AP Join Process
43. Cisco SD-Access Wireless Workflow – Client Onboarding
44. Cisco SD-Access Wireless Workflow – Client Roaming
45. Traditional Campus Inter-operating with Cisco SD-Access
46. Traditional Campus Inter-operating with Cisco SD-Access (Cont.)
47. Need for Software Defined Networking for WAN
48. Need for Software Defined Networking for WAN (Cont.)
49. SD-WAN Components
50. SD-WAN Orchestration Plane
51. SD-WAN Management Plane
52. SD-WAN Management Plane (Cont.)
53. SD-WAN Management Plane (Cont.)
54. SD-WAN Control Plane
55. SD-WAN Data Plane
56. SD-WAN Automation and Analytics
57. SD-WAN vAnalytics
58. SD-WAN vAnalytics (Cont.)
59. Demo – SD-WAN
60. **Review Quiz (Number of attempts allowed: Unlimited)**

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Module 22 – Network Programming

(Duration: 31m)

1. Workbook (Pdf)
2. Configuration Management
3. Configuration Management (Cont.)
4. Evolution of Device Management and Programmability
5. Evolution of Device Management and Programmability (Cont.)
6. Evolution of Device Management and Programmability (Cont.)
7. Evolution of Device Management and Programmability (Cont.)
8. Evolution of Device Management and Programmability (Cont.)
9. Data Encoding Formats
10. JSON
11. JSON (Cont.)
12. JSON (Cont.)
13. JSON (Cont.)
14. JSON (Cont.)
15. JSON (Cont.)
16. JSON (Cont.)
17. JSON (Cont.)
18. JSON (Cont.)
19. JSON (Cont.)
20. JSON (Cont.)
21. JSON (Cont.)
22. Data Models
23. Data Models (Cont.)
24. YANG
25. YANG Models
26. Model Driven Programmability Stack
27. Model Driven Programmability Stack (Cont.)
28. Describe YANG
29. YANG Overview
30. REST
31. REST (Cont.)



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32. REST (Cont.)
33. REST (Cont.)
34. REST (Cont.)
35. Common HTTP Response Codes
36. Common HTTP Response Codes (Cont.)
37. Common HTTP Response Codes (Cont.)
38. REST Tools
39. NETCONF
40. NETCONF Protocol Stack
41. NETCONF Data Stores
42. NETCONF over SSH
43. NETCONF over SSH (Cont.)
44. NETCONF over SSH (Cont.)
45. NETCONF over SSH (Cont.)
46. NETCONF over SSH (Cont.)
47. XML Encoding
48. XML Encoding (Cont.)
49. Utilities and Tools
50. NETCONF and YANG
51. NETCONF and YANG Side by Side
52. NETCONF Protocol Operations
53. NETCONF Protocol Operations (Cont.)
54. NETCONF Configuration Datastores
55. Describe RESTCONF
56. RESTCONF Methods
57. RESTCONF Sample: GET Interface
58. RESTCONF Sample: GET Interface Description
59. RESTCONF Sample: GET YANG Library Version
60. RESTCONF Sample: Invoke RPC
61. Cisco IOS XE and IOS XR Systems Overview
62. **Review Quiz (Number of attempts allowed: Unlimited)**

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support@toittraining.com

(909) 760-0217

(909) 760-0218 Fax

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