

TSHOOT: Troubleshooting and Maintaining Cisco IP Networks

Course Overview

This course provides students with the knowledge and skills to troubleshoot and maintain Cisco IP networks, including complex enterprise and converged networks.

<u>Course Introduction</u>	3m
Course Introduction	
<u>Chapter 01 - Planning Maintenance for Complex Networks</u>	47m
Planning Maintenance for Complex Networks	
Maintenance Models and Methodologies	
Benefits of Structured Maintenance over Interrupt-driven Maintenance	
Maintenance Models and Methodologies - Cont.	
The Configuration Management Element of the FCAPS Model	
Network Maintenance Processes and Procedures	
Network Maintenance Tools, Applications, and Resources	
NTP Example	
Cisco Configuration and Documentation Tools	
Logging Services	
Logging to a Server	
Network Monitoring and Performance Measurement Tools	
Implementing Backup and Restore Services using FTP	
Implementing Backup and Restore Services using Archive	
Implementing Backup and Restore Services using configure replace	
Disaster Recovery Tools	
Demo - Creating a Physical and Logical Topology	
Chapter 01 Review	
<u>Chapter 02 - Troubleshooting Processes for Complex Enterprise Networks</u>	1h 25m
Troubleshooting Processes for Complex Enterprise Networks	
Troubleshooting Methodologies	
Troubleshooting Approaches	
Troubleshooting Approaches - Spot the Differences Example	
Troubleshooting Approaches - Move the Problem Example	
Implementing Troubleshooting Procedures	
The Troubleshooting Process – Verify and Define the Problem	
The Troubleshooting Process – Gather Information	
The Troubleshooting Process – Analyze	
The Troubleshooting Process – Eliminate	
The Troubleshooting Process – Propose Hypothesis	
The Troubleshooting Process – Test Hypothesis	
The Troubleshooting Process – Solve Problem	
The Troubleshooting and Network Maintenance	
Communication and Change Control – Cont.	

Disaster Recovery Tools
Demo - Configuring Devices
Demo - Doing a Baseline Configuration
Chapter 02 Review

Chapter 03 - Using Maintenance and Troubleshooting Tools and Applications

41m

Using Maintenance and Troubleshooting Tools and Applications
Collecting and Filtering Information Using IOS show Commands
Testing Network Connectivity Using Cisco IOS Commands
Collecting Real-time Information Using Cisco IOS debug Commands
Diagnosing Hardware Issues Using Cisco IOS Commands
Using Traffic Capturing Tools
Gathering Information with SNMP
Gathering Information with NetFlow
SNMP and NetFlow Comparison
Enabling Network Event Notification
Enabling Network Event Notification – SNMP
Enabling Network Event Notification – Embedded Event Manager (EEM)
Enabling Network Event Notification – EEM
Demo - Collecting and Filtering Information with the show ip Command
Chapter 03 Review

**Chapter 04 - Maintaining and Troubleshooting Campus Switched Solutions
Troubleshooting Tools and Applications**

1h 14m

Maintaining and Troubleshooting Campus Switched Solutions Troubleshooting
Tools and Applications
LAN Switch Operation
Verifying Layer 2 Forwarding
Spanning Tree Operation
Spanning Tree Failures
EtherChannel Operation
EtherChannel Problems
EtherChannel Diagnostic Commands
EtherChannel Diagnostics
Inter-VLAN Routing and Multilayer Switching
Troubleshooting Routers and Multi-Layer Switches
Troubleshooting Multi-layer Switches
Switched Virtual Interfaces (SVIs) and Routed Ports
Multilayer Switches, VLANs and Routing
Routed Interfaces vs. SVIs
Checking SVI Status
First Hop Redundancy Protocols (FHRPs)
Using First Hop Redundancy
Verifying HSRP Operation
Alternatives to HSRP
HSRP, VRRP, and GLBP Diagnostic Commands
Demo - Checking Connectivity & Show Commands
Demo - First-Hop Redundancy Protocol
Chapter 04 Review

Chapter 05 - Maintaining and Troubleshooting Routing Solutions

1h 34m

Maintaining and Troubleshooting Routing Solutions
Routing and Routing Data Structures
Using IOS Commands to Verify Routing Functions
IGP Routing Protocol Review
EIGRP Review
Monitoring EIGRP with show Commands
Monitoring EIGRP with debug Commands
EIGRP Troubleshooting Example
OSPF Review: Process and Operation
OSPF Review: Data Structures
OSPF Review: Network Areas and LSAs
OSPF Review: Information Flow Within an Area
OSPF Review: Information Flow Between Areas
Monitoring OSPF with show Commands
Monitoring OSPF with debug Commands
OSPF Troubleshooting Example
Route Redistribution Review
Verifying and Troubleshooting Route Propagation
OSPF to EIGRP Redistribution Troubleshooting Process
BGP Overview
BGP Route Processing and Data Structures
BGP Routing Information Flow: Peering
Monitoring BGP with show Commands
Monitoring BGP with debug Commands
BGP Troubleshooting Example
Demo - Troubleshooting Various Dynamic Routing Protocols
Chapter 05 Review

Chapter 06 - Troubleshooting Addressing Services

1h 31m

Troubleshooting Addressing Services
NAT/PAT Operation Review
Troubleshooting NAT/PAT Issues
NAT/PAT Troubleshooting Example 1: Routing Issue
Using NBAR for Protocol Discovery
NAT/PAT Troubleshooting Example 2: Incorrect Access List
DHCP Overview
DHCP Overview: Client-Server Communication
DHCP Overview: Client-Server Communication – DHCP Packets (Message Types)
Common DHCP Troubleshooting Issues: Three DHCP Roles a Router May Take
DHCP Troubleshooting Issues: DHCP Relay Agent
DHCP Troubleshooting Issues: DHCP Parameters and Options
DHCP Troubleshooting Issues
DHCP Troubleshooting Commands
DHCP Troubleshooting Example 1: Problems After a Security Audit
DHCP Troubleshooting Example 2: Duplicate Client IP Addresses
DHCP Troubleshooting Example 3: Relay Agent Issue
IPv6 Routing Overview – IPv6 vs IPv4
Troubleshooting IPv6 Issues - Cont.
IPv6 Troubleshooting – show Commands

IPv6 Troubleshooting – debug Commands
IPv6 Troubleshooting Example 1: IPv6 Routing Problems
IPv6 Troubleshooting Example 2: Redistribution Issue
IPv6 Troubleshooting Example 3: OSPFv3 Configuration Errors
IPv6 Troubleshooting Example 4: OSPFv3 over 6to4 Tunnel
IPv6 Troubleshooting Example 4 - Summary
Demo - IP Addressing NAT and DHCP
Chapter 06 Review

Chapter 07 - Troubleshooting Network Performance Issues

1h 39m

Troubleshooting Network Performance Issues
Cisco Application Networking Services (ANS) Overview
ANS Optimization Cycle
ANS Baselineing and Application Optimization Tools
NetFlow Overview
NetFlow Configuration
NetFlow Statistics Example
Cisco IP SLA Overview
Cisco IP SLA Configuration
Cisco IP SLA Configuration Example
Cisco IP SLA Responder
NBAR Overview
Using NBAR for Protocol Discovery
NBAR PDLMS
SLB Overview
QoS and AutoQoS Overview
AutoQoS Autodiscovery and Configuration
AutoQoS Discovery Results
Common NetFlow Issues
Common IP SLA Issues
Common NBAR Issues
Common AutoQoS Issues
Network Application Service Troubleshooting Commands
NetFlow Troubleshooting Example
IP SLA Troubleshooting Example
AutoQoS Troubleshooting Example
Identifying Switch Performance Issues
AutoQoS Troubleshooting Example – Cont.
Identifying Switch Performance Issues – Cont.
Switch Port/Interface Issues
Troubleshooting Example: Duplex
Automatic Medium-Dependent Interface Crossover (Auto-MDIX)
Switch Forwarding Hardware
Troubleshooting TCAM Problems
Control Plane: Troubleshooting High CPU Load on Switches
Troubleshooting High Switch CPU Load
DHCP Issues
Spanning-Tree Issues
HSRP Issues
Switch Performance Troubleshooting Issue 1: Speed and Duplex Settings
Switch Performance Troubleshooting Issue 2: Excessive Broadcasts

Switch Performance Troubleshooting Issue 3: Excessive Security
Troubleshooting High Router CPU Load
High Router CPU Load: ARP Input
High Router CPU Load: Net Background, IP Background and TCP Timer Processes
Troubleshooting Switching Paths
Troubleshooting CEF
IOS Tools to Analyze Packet Forwarding
Analyzing Packet Forwarding: Step 1
Analyzing Packet Forwarding: Step 2
Analyzing Packet Forwarding: Step 3
Analyzing Packet Forwarding: Step 4
Analyzing Packet Forwarding: Step 5
Analyzing Packet Forwarding: Step 6
Analyzing Packet Forwarding: Step 7
Troubleshooting Router Memory Issues
Demo - Network Performance
Chapter 07 Review

Chapter 08 - Troubleshooting Converged Networks

1h 2m

Troubleshooting Converged Networks
Section 1 Overview
Common Wireless Integration Issues
Standalone Wireless Solution
Split MAC or Lightweight Solution
Wireless Integration Issues
Wireless Integration Issue Tools
WLAN Connectivity Troubleshooting Example 1: Misconfigured Trunk
WLAN Connectivity Troubleshooting Example 2: Duplex and Trust Issues
WLAN Connectivity Troubleshooting Example 3: LWAPP Denied by New Security
WLAN Connectivity Troubleshooting Example 4: DHCP Issues
Section 2 Overview
Unified Communications Integration Issues
Unified Communications Design
Unified Communications Components
Unified Communications – IP Phones
IP Phone Boot Process
VLAN Considerations
Troubleshooting Scenarios
Modular QoS CLI (MQC)
QoS Policy
Unified Communications Commands
Converged Network Troubleshooting Commands
Example 1: Port Security and Voice VLAN Issues
Voice Troubleshooting Example 1 – Cont.
Example 2: Invalid Marking of VoIP Packets
Voice Troubleshooting Example 2 – Cont.
Example 3: ACL and Trunk Issues
Voice Troubleshooting Example 3 – Cont.
Section 3 Overview
Troubleshooting Video Issues in a Converged Network: Video Application Types

Common Video-Integration Issues
Multicast Operation
Troubleshooting Video Integration Issues
Video-Integration Troubleshooting Example 1: Performance Issues Due to STP Topology
Video Troubleshooting Example 1 – Cont.
Example 2: IP Multicast Configuration Error
Video Troubleshooting Example 2 – Cont.
Demo - Troubleshooting Converged Networks
Chapter 08 Review

Chapter 09 - Maintaining and Troubleshooting Network Security Implementations

44m

Maintaining and Troubleshooting Network Security Implementations
Security Features Review – Functional Planes
Troubleshooting Management Plane Security
Management Plane Security: AAA
Management Plane Security: RADIUS & TACACS+
Securing the Management Plane
Securing the Management Plane - ACS
Management Plane Authentication: AAA/TACACS+
Management Plane Authorization: AAA/TACACS+
Management Plane Accounting: AAA/TACACS+
Management Plane: Common TACACS+ Issues
Management Plane: TACACS+ Issues – Cont.
Management Plane: Common RADIUS Issues
Management Plane: RADIUS Issues – Cont.
Troubleshooting Control Plane Security
Securing the Control Plane: Overview
Troubleshooting Data Plane Security
Using IOS Stateful Packet Inspection (SPI)
IOS SPI Example
Zone-Based Policy Firewall Overview
ZPF Example Topology
ZPF Configuration Example: Process
ZPF Configuration Example: Commands
Other Methods of Securing the Data Plane
Troubleshooting Data Plane Security – Cont.
Troubleshooting ZPF Using Syslog - Example
Troubleshooting ZPF Using show Commands
Branch Office and Remote Worker Connectivity
Branch Office & Remote Worker Connectivity Issues
Branch Office Connectivity Issues with GRE
Branch Office Connectivity Issues – Cont.
Remote Connectivity Troubleshooting Commands
BO/RW Troubleshooting Example – Main Diag.
BO/RW TSHOOT Example 1: Address Translation Error
BO/RW TSHOOT Example 2: Crypto Map ACL Error
BO/RW TSHOOT Example 3: GRE Config. Error
BO/RW TSHOOT Example 4: Recursive Routing Issue
BO/RW TSHOOT Example 5: ACL Denies IPsec
Chapter 09 Review

Chapter 10 - Review and Preparation for Troubleshooting Complex Enterprise Networks

57m

Review and Preparation for Troubleshooting Complex Enterprise Networks

Section 1 Overview

Review of Key Topics: Chapter 1

Review of Key Topics: Chapter 2

Review of Key Topics: Chapter 3

Review of Key Topics: Chapter 4

Review of Key Topics: Chapter 5

Review of Key Topics: Chapter 6

Review of Key Topics: Chapter 7

Review of Key Topics: Chapter 8

Review of Key Topics: Chapter 9

Section 2 Overview

Network Element and Protocol Relationships

Troubleshooting Tips and Suggestions

Demo - Reviewing Routing and Switching Concepts Particular to Troubleshooting

Chapter 10 Review

Course Closure

Total Duration: 11h 37m