

# 642-832 TSHOOT: Troubleshooting and Maintaining Cisco IP Networks

## **Course Introduction**

6m

Course Introduction

## **Module 01 - Planning Maintenance for Complex Networks**

2h

### **Lesson: Applying Maintenance Methodologies**

What Is Involved in Network Maintenance?

Network Maintenance Approaches

Benefits of a Structured Approach

Network Maintenance Methodology

Models and Tools

Summary

### **Lesson: Common Maintenance Processes and Procedures**

Common Maintenance Tasks

Common Maintenance Tasks (Cont.)

Common Maintenance Processes

Scheduled Maintenance

Change Control Procedures

Network Documentation

Teamwork and Communication

The Importance of Consistency

Replacing Failed Equipment

Measuring Network Health

Summary

### **Lesson: Network Maintenance Tools, Applications, and Resources**

A Basic Network Maintenance Toolkit

Backup and Restore

Backup and Restore (Cont.)

Archiving Configurations

Archiving Configurations (Cont.)

Demo - File Archiving Part 1

Demo - File Archiving Part 2

Restoring Configurations

Demo - Configuration Restoration

Network Time Protocol Example

Demo - Time Commands

Configuring Logging Example

Demo - Logging

Online Resources

Documentation Support

Resource Management

Proactive Fault Management

Measuring Network Performance

Measuring Network Performance (Cont.)

Summary

Module 01 Review

## **Module 02 - Planning Troubleshooting Processes for Complex Enterprise Networks**

1h 34m

### **Lesson: Applying Troubleshooting Methodologies**

What Is Troubleshooting?

Diagnostic Principles

Troubleshooting Methods

The "Shoot from the Hip" Method  
Structured Troubleshooting  
Top-Down Troubleshooting  
Top-Down Troubleshooting (Cont.)  
Bottom-Up Troubleshooting  
Bottom-Up Troubleshooting (Cont.)  
Divide and Conquer  
Follow the Path  
Spot the Differences  
Move the Problem  
Discussion: Troubleshooting Case  
Summary

**Lesson: Planning and Implementing Troubleshooting Procedures**

The Troubleshooting Process  
Defining the Problem  
Gathering Information  
Analyzing the Facts  
Eliminating Possible Causes  
Example: Elimination and Assumptions  
Discussion: Elimination and Assumptions  
Formulating a Hypothesis  
Testing the Hypothesis  
Solving the Problem  
Demo - Duplex Problem  
Summary

**Lesson: Integrating Troubleshooting into the Network Maintenance Process**

Network Maintenance Tasks  
Troubleshooting as Part of Maintenance  
Updating Documentation  
Defining Network Performance Profiles  
Troubleshooting and Communication  
Troubleshooting and Changes  
Summary  
Module 02 Review

**Module 03 - Maintenance and Troubleshooting Tools and Applications**

1h 49m

**Lesson: Assembling a Basic Diagnostic Toolkit Using Cisco IOS Software**

Filtering Command Output  
Example: Filtering show ip route  
Example: Filtering show ip route (Cont.)  
Filtering show Command Output  
Filtering show Command Output (Cont.)  
Redirecting show Command Output  
Redirecting show Command Output (Cont.)  
Extended Ping  
Extended Ping (Cont.)  
Demo - Information Gathering  
Using Telnet to Test the Transport Layer  
Basic Hardware Diagnostics  
Example: show processes cpu  
Example: show memory  
Example: show interface  
Additional Hardware Diagnostics  
Demo - Hardware Information  
Summary

**Lesson: Using Specialized Maintenance and Troubleshooting Tools**

Supporting the Troubleshooting Process  
Supporting the Troubleshooting Process (Cont.)  
Using a Packet Sniffer  
SPAN and RSPAN  
Example: SPAN Configuration  
Demo - Network Sniffing  
Example: RSPAN Configuration  
Example: RSPAN Verification  
Creating a Baseline Using SNMP and NetFlow Technology  
Example: Configuring a Device for SNMP Access  
Demo - Configuring SNMP  
Example: Configuring a Device for NetFlow Accounting  
Example: Examining the NetFlow Cache  
Example: Configuring a Device for NetFlow Export  
Event Notification  
Example: Notification Through SNMP Traps  
Example: Cisco IOS EEM Configuration  
Example: EEM Configuration (Cont.)  
Summary  
Module 03 Review

## **Module 04 - Maintaining and Troubleshooting Campus Switching-Based Solutions**

3h 7m

### **Lesson: Troubleshooting VLANs**

LAN Switching Review  
Layer 2 Switching Process  
Layer 2 Switching Process (Cont.)  
Discussion: Typical LAN Switching Problems  
Layer 2 Frame Forwarding Information  
Verifying Layer 2 Forwarding  
Summary

### **Lesson: Troubleshooting Spanning Tree**

Spanning-Tree Review  
Spanning Tree: Root Bridge  
Spanning Tree: Root Ports  
Spanning Tree: Designated Ports  
Spanning Tree: Forwarding and Blocking  
Spanning-Tree Verification  
Spanning Tree Cisco IOS Commands  
Spanning Tree Cisco IOS Commands (Cont.)  
Demo - Troubleshooting Spanning Tree  
Bridging Loops and Broadcast Storms  
Bridging Loops and Broadcast Storms (Cont.)  
EtherChannel Technology  
Summary

### **Lesson: Troubleshooting Switched Virtual Interfaces and Inter-VLAN Routing**

Routing and Multilayer Switching  
Control Plane Versus Data Plane  
Control Plane Versus Data Plane (Cont.)  
Routed Ports and SVIs  
Routed Ports and SVIs (Cont.)  
Demo - Troubleshooting Inter-VLAN Routing  
Summary

### **Lesson: Troubleshooting FHRPs**

First Hop Redundancy Protocols  
HSRP Example

HSRP Example (Cont.)  
Discussion: HSRP Convergence  
Analyzing HSRP Operation (Cont.)  
HSRP Debug Example  
HSRP Debug Example (Cont.)  
Demo - Troubleshooting HSRP  
Compare and Contrast: VRRP and GLBP  
HSRP, VRRP, and GLBP Commands  
Equivalent Troubleshooting Commands  
Summary  
**Lesson: Troubleshooting Performance Problems on Switches**  
Defining Performance Problems  
Switch Performance  
Checking for Interface Errors  
Duplex Mismatches  
Case Study: Duplex Problem  
Duplex Mismatch: Full-Duplex Side  
Duplex Mismatch: Half-Duplex Side  
Auto-MDIX and Duplex  
Configuring Auto-MDIX  
Verifying Auto-MDIX  
Forwarding Hardware  
Ternary Content Addressable Memory  
Troubleshooting TCAM Utilization  
Verifying TCAM Utilization  
TCAM Allocation Failures  
Traffic Forwarding to the CPU  
Displaying CPU Load on a Switch  
Troubleshooting CPU Problems  
Summary  
Module 04 Review

## **Module 05 - Maintaining and Troubleshooting Routing-Based Solutions**

4h 29m

### **Lesson: Troubleshooting Network Layer Connectivity**

IP Routing Review  
Case Study: Routing a Packet  
Case Study: Routing a Packet (Cont.)  
Quiz: Packet and Frame Headers  
Answers: Packet and Frame Headers  
Data Structures Used for Routing  
Verifying Routing Information  
Verifying Layer 2 Encapsulation  
Demo - CEF  
Summary  
**Lesson: Troubleshooting EIGRP**  
Exchanging and Processing Routing Information  
EIGRP Data Structures  
EIGRP Routing Update Process  
EIGRP Commands  
Case Study: Troubleshooting EIGRP  
Case Study: Troubleshooting EIGRP (Cont.)

Demo - Troubleshooting EIGRP

Summary

**Lesson: Troubleshooting OSPF**

Exchanging and Processing Routing Information

OSPF Data Structures

The OSPF Link-State Database

OSPF Quiz: LSA Type Review

OSPF Quiz: Answers

OSPF Quiz: Answers (Cont.)

Requirement to Become OSPF Neighbors

Establishing OSPF Adjacencies

OSPF Interarea Routing

OSPF Commands

Case Study: Troubleshooting OSPF

Case Study: Troubleshooting OSPF (Cont.)

Demo - Troubleshooting OSPF

Summary

**Lesson: Troubleshooting Route Redistribution**

Route Injection and Redistribution

Redistribution and the Routing Table

Seed Metrics

Troubleshooting Redistribution

Commands to Verify Redistribution

Case Study: Redistribution from OSPF to EIGRP

Case Study: Redistribution from OSPF to EIGRP (Cont.)

Summary

**Lesson: Troubleshooting BGP**

Exchanging and Processing Routing Information

BGP Data Structures

BGP Routing Update Process

BGP Commands

Case Study: Troubleshooting BGP

Case Study: Troubleshooting BGP (Cont.)

Summary

**Lesson: Troubleshooting Performance Problems on Routers**

Introduction to High CPU Utilization

Slow Router Performance

Router Does Not Respond to Service Requests

Common Causes of High CPU Utilization

Common Causes of High CPU Utilization (Cont.)

Useful Commands

Useful Commands (Cont.)

Understanding Cisco IOS Switching Options

Process Switching

Fast Switching

Cisco Express Forwarding

Troubleshooting Process and Fast Switching

Troubleshooting Process and Fast Switching (Cont.)

Troubleshooting Cisco Express Forwarding

Troubleshooting Cisco Express Forwarding (Cont.)

Using Cisco IOS Tools to Analyze Packet Forwarding

Troubleshooting Router Memory Issues

Common Memory Problems

Common Memory Problems (Cont.)  
BGP Memory Use  
BGP Memory Use (Cont.)  
Summary  
Module 05 Review

## **Module 06 - Maintaining and Troubleshooting Network Security Solutions**

1h 37m

### **Lesson: Troubleshooting Security Features**

Network Security  
Network Device Security  
Management Plane Security  
Management Plane Security (Cont.)  
Control Plane Security  
Data Plane Security  
Troubleshooting Network Security Guidelines  
Summary

### **Lesson: Security Features Review**

Troubleshooting Flow for Layer 4 Problems  
Troubleshooting Flow for Layer 4 Problems (Cont.)  
Cisco IOS Firewall  
Cisco IOS Firewall (Cont.)  
Cisco IOS Firewall Verification  
Cisco IOS Firewall Logging and Debugging  
Zone-Based Policy Firewall  
Zone-Based Policy Firewall Configuration Example  
Zone-Based Policy Firewall Logging and Debugging  
Zone-Based Policy Firewall Verification  
AAA  
Authentication  
Authorization  
Accounting  
TACACS+ and RADIUS  
Common TACACS+ Failures  
Common RADIUS Failures  
Common RADIUS Failures (Cont.)  
Demo - AAA Authentication and Access Lists  
Cisco Secure Access Control Server  
Summary  
Module 06 Review

## **Module 07 - Maintaining and Troubleshooting Integrated, Complex Enterprise Networks**

19m

### **Lesson: Troubleshooting Complex Environments**

Troubleshooting Complex Environments  
Summary  
Module 07 Review  
Course Closure

Total Duration: 15h 1m