



# TSHOOT v2.0 Troubleshooting and Maintaining Cisco IP Networks

**Course Length:** 5

**Course Delivery:** Traditional Classroom • Online Live

## Course Overview

TSHOOT v2.0, a five-day ILT course, includes major updates and follows an updated blueprint. (However, note that this course does not cover all items listed on the blueprint.) Some older topics have been removed or simplified, while several new IPv6 routing topics have been added. The course content has been adapted to Cisco IOS Software Release 15 and technically updated.

The goal of the course is to build upon the knowledge and skills from CCNA Routing and Switching and help you expand competencies to plan, implement, and monitor a scalable routing network.

## Audience

Learners who aim to be network professionals and who have knowledge that is obtained from Cisco CCNA courses

## Prerequisites

- Layer 2 switching
  - VLANs, VLAN access control lists, port security
  - Switch security issues
- Link aggregation protocols
- STP
- Inter-VLAN routing solutions
- FHRPs, including HSRP, VRRP, and GLBP
- Branch office operations
- EIGRP
- OSPF
- Layer 3 path control
- Redistribution
- BGP
- IPv6 Networking



**At the end of this training course, you'll be able to:**

- Describe the troubleshooting tools and methodologies that are used to identify and resolve issues in complex enterprise networks
- Isolate and fix the network issues that your company, SECHNIK Networking Ltd., is facing
  - Describe the possible issues for non-functioning trunk link
  - Describe the possible issues for non-functioning network address translation
  - Describe how interface status can be interpreted
  - Describe IPv6 address assignment methods
  - Troubleshoot routing loops
  - Explain the TCP three-way handshake
  - Troubleshoot error-disabled port state
  - Describe how to troubleshoot DHCP
  - Describe how passive interfaces behave with different routing protocols
  - Describe basic IPv6 addressing
- Isolate and fix the network issues that your customer, TINC Garbage Disposal Ltd., is facing
  - Describe the possible port security issues
  - Describe the possible issues with the VLAN configuration
  - Describe the possible BGP neighborship issues
  - Describe the possible OSPF adjacency issues
  - Describe possible device management issues via SSH or telnet
  - Describe possible HSRP issues
  - Describe the possible issues with illegitimate routing sources
  - Describe common issues related to VRRP protocol
  - Describe the possible EtherChannel issues
  - Describe how to troubleshoot GLBP
  - Describe how to troubleshoot FHRPs
  - Describe usage of DHCP snooping
  - Describe Cisco Technical Assistant Center
- Isolate and fix the network issues that your customer, PILE Forensic Accounting Ltd., is facing
  - Describe common issues with EIGRP adjacencies
  - Troubleshooting BGP filtering
  - Describe what is a BGP transit area and what challenges it brings
  - Troubleshooting BGP
  - Describe NTP troubleshooting issues
  - Describe recommended practices to prepare for a disaster recovery in your network
  - Describe inter-VLAN routing issues and how to troubleshoot them
  - Describe DNS-related issues and how to troubleshoot them
  - Describe the challenges of remote management access
  - Troubleshoot EIGRP named configuration
  - Troubleshoot EIGRP stub behavior



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- Describe different ways to configure default route information on devices
- Troubleshoot BGP route selection
- Secure the management plane in your network
- Isolate and fix the network issues that your customer, Bank of POLONA Ltd., is facing
  - Troubleshoot redistribution in IPv4 environment
  - Troubleshooting first hop redundancy protocols
  - Troubleshoot IP SLAs
  - Troubleshoot EIGRP summarization
  - Troubleshoot basic RIPng
  - Describe ACL troubleshooting
  - Describe the possible issues with GRE tunnels
  - Troubleshoot OSPF summarization
  - Describe AAA services and commands for troubleshooting
  - Troubleshoot OSPF for IPv6 environment
  - Troubleshoot OSPF stubby areas
- Isolate and fix the network issues that your customer, RADULKO Transport Ltd., is facing
  - Describe STP troubleshooting and STP stability mechanisms
  - Troubleshoot policy based routing
  - Troubleshoot CDP and LLDP
  - Troubleshoot VTP
  - Troubleshoot EIGRP for IPv6
  - Troubleshoot BGP for IPv6
  - Troubleshoot address families in OSPFv3

## Outline

### Course Introduction

- Overview
- Course Goal and Objectives
- Course Flow
- Additional References
- Your Training Curriculum

### Module 1: Tools and Methodologies of Troubleshooting

#### Lesson 1: Describing Troubleshooting Methodologies

- What Is Troubleshooting?
- Diagnostic Principles
- Troubleshooting Methods
- Structured Network Troubleshooting
- Common Troubleshooting Approaches
- Top-Down Method



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- Bottom-Up Method
- Divide-and-Conquer Method
- Following the Traffic Path
- Spot the Differences
- Swapping Components
- Case Study: Troubleshooting Approaches

#### Lesson 2: Using Troubleshooting Procedures

- Network Troubleshooting Procedures
- Defining the Problem
- Gathering Information
- Analyzing the Gathered Information
- Proposing and Eliminating Potential Problem Causes
- Proposing a Hypothesis
- Testing and Verifying a Hypothesis
- Solving and Documenting the Problem
- Case Study: Troubleshooting Procedures

#### Lesson 3: Following Recommended Practices During Routine Network Maintenance

- Common Maintenance Tasks
- Troubleshooting as Part of Maintenance
- Maintenance Planning
- Change Control
- Saving Configurations
- Restoring Configurations
- Archiving Configurations
- Labeling Interfaces and Cables
- Documentation
- Implementing Time Services
- Implementing Logging Services
- Creating a Baseline
- Communication
- Summary

#### Lesson 4: Using Basic Cisco IOS Troubleshooting Tools

- Layer 2 Switching Process
- Layer 3 Routing Process
- Filtering show Commands
- Filtering show Command Output Using Regular Expressions



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- Redirecting show Command Output to a File
- Basic Hardware Diagnostics
- Debug Commands
- Summary

#### Lesson 5: Using Specialized Troubleshooting Tools

- Troubleshooting Tools
- Categories of Troubleshooting Tools
- Case Study: Syslog
- Case Study: Troubleshooting with SPAN
- Case Study: Troubleshooting with SNMP
- Case Study: NetFlow
- Introducing the Cisco IOS Embedded Event Manager
- EEM Example: Logging when Configuration Mode Is Entered
- EEM Example: Bring Up a Disabled Interface

#### Module 2: Troubleshooting at SECHNIK Networking Ltd.

##### Lesson 1: Debrief of the First Troubleshooting at SECHNIK Networking Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: PC1 Unable to Access Data on the Server
- Troubleshooting Trunks
- Example of Troubleshooting Flow: PC2 Unable to Access the Internet
- Troubleshooting NAT
- Example of Troubleshooting Flow: PC3 Unable to Use SSH to Connect to the Server
- Troubleshooting Interfaces
- Example of Troubleshooting Flow: PC4 Unable to Access the Internet Through IPv6
- Troubleshooting IPv6 Address Assignment on Clients

##### Lesson 2: Debrief of the Second Troubleshooting at SECHNIK Networking Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: PC1 Unable to Access the Internet Host
- Troubleshooting Network Layer Connectivity
- Example of Troubleshooting Flow: PC2 Cannot Use SSH to Connect to the Internal Server
- TCP Handshake
- Example of Troubleshooting Flow: PC4 Does Not Acquire an IP Address via DHCP After Port Security Is Implemented
- Troubleshooting an Error-Disabled Port



### Lesson 3: Debrief of the Third Troubleshooting at SECHNIK Networking Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: PC1 and PC2 Cannot Ping the Internet Host
- Troubleshooting DHCP
- Passive Interfaces with Different Routing Protocols
- Example of Troubleshooting Flow: PC3 Cannot Connect to the Internet
- IPv6 Review

### Module 3: Troubleshooting at TINC Garbage Disposal Ltd.

#### Lesson 1: Debrief of the First Troubleshooting at TINC Garbage Disposal Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: GW2 Does Not Serve as the Backup to the Internet
- Troubleshooting BGP Neighbor Relationships
- Example of Troubleshooting Flow: PC1 and PC2 Do Not Have Internet Connectivity
- Troubleshooting Port Security
- Example of Troubleshooting Flow: Classroom PC2 Does Not Have Internet Connectivity
- Troubleshooting VLANs
- Troubleshooting a Native VLAN

#### Lesson 2: Debrief of the Second Troubleshooting at TINC Garbage Disposal Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: GW1 Only Has OSPF Adjacency with GW2
- Troubleshooting OSPF Adjacency
- Example of Troubleshooting Flow: R2 Is Not Accessible Via SSH v2
- Troubleshooting Management Access
- Example of Troubleshooting Flow: Duplicate IP Addresses on Routers R1 and R2
- Troubleshooting HSRP

#### Lesson 3: Debrief of the Third Troubleshooting at TINC Garbage Disposal Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: Sporadic Access to Internet
- Troubleshooting Problems with Routing Sources
- Example of Troubleshooting Flow: Multiple Masters in a VRRP Group
- Troubleshooting VRRP
- Example of Troubleshooting Flow: Nonfunctional EtherChannel
- Troubleshooting EtherChannel



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#### Lesson 4: Debrief of the Fourth Troubleshooting at TINC Garbage Disposal Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: Occasional Lack of Network Connectivity for PCs 1 and 2
- Troubleshooting GLBP
- Troubleshooting FHRPs
- Example of Troubleshooting Flow: Sporadic Loss of Connectivity on PC4
- DHCP Snooping
- Cisco TAC
- Example of Troubleshooting Flow: No SSH Connectivity to GW2 From PC4

#### Module 4: Troubleshooting at PILE Forensic Accounting Ltd.

##### Lesson 1: Debrief of the First Troubleshooting at PILE Forensic Accounting Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: Branch Without Internet Connectivity
- Troubleshooting EIGRP Adjacency
- Example of Troubleshooting Flow: ISP2 Not Serving as a Backup
- Summary

##### Lesson 2: Debrief of the Second Troubleshooting at PILE Forensic Accounting Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: PC3 Unable to Remotely Access the Branch Router
- Example of Troubleshooting Flow: No Internet Connectivity
- BGP Filtering
- BGP Transit Area
- Troubleshooting BGP
- Example of Troubleshooting Flow: HQ1 Does Not Synchronize with the Primary NTP Server
- Troubleshooting NTP
- Summary

##### Lesson 3: Debrief of the Third Troubleshooting at PILE Forensic Accounting Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: Connectivity Issue After Disaster
- Disaster Recovery
- Troubleshooting Inter-VLAN Routing
- Example of Troubleshooting Flow: Connectivity Issue When Using Domain Names



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- Troubleshooting DNS
- Remote Device Management Challenges
- Summary

#### Lesson 4: Debrief of the Fourth Troubleshooting at PILE Forensic Accounting Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: EIGRP Reconfiguration Issue
- EIGRP Named Configuration
- Troubleshooting the EIGRP Stub
- Example of Troubleshooting Flow: Lack of Management Access
- Providing the Default Route on Layer 2 and Multilayer Devices
- Summary

#### Lesson 5: Debrief of the Fifth Troubleshooting at PILE Forensic Accounting Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: Internet Access via Router HQ0 Does Not Work
- Troubleshooting BGP Route Selection
- Example of Troubleshooting Flow: PC3 Is Able to Use Telnet to Connect to Router BR
- Securing the Management Plane
- Summary

### Module 5: Troubleshooting at Bank of POLONA Ltd.

#### Lesson 1: Debrief of the First Troubleshooting at Bank of POLONA Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: Lack of Connectivity
- Troubleshooting Redistribution
- Example of Troubleshooting Flow: Suboptimal Routing
- Troubleshooting FHRP Tracking
- Example of Troubleshooting Flow: IP SLA Does Not Start
- Troubleshooting IP SLA

#### Lesson 2: Debrief of the Second Troubleshooting at Bank of POLONA Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: Incorrect EIGRP Summarization
- Troubleshooting EIGRP Summarization
- Example of Troubleshooting Flow: IPv4 and IPv6 Internet Access Issue
- Troubleshooting Basic RIPng





- Example of Troubleshooting Flow: Internet Connectivity Lost
- Troubleshooting Access Lists

### Lesson 3: Debrief of the Third Troubleshooting at Bank of POLONA Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: Branch 1 Cannot Reach the Headquarters
- Troubleshooting GRE Tunnels
- Example of Troubleshooting Flow: Route Summarization from Branch 3 Does Not Work
- Troubleshooting OSPF Summarization
- Example of Troubleshooting Flow: AAA Does Not Work on Router BR1
- Troubleshooting AAA

### Lesson 4: Debrief of the Fourth Troubleshooting at Bank of POLONA Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: PC0 Does Not Have Connectivity to IPv6 Internet Sites
- Troubleshooting OSPF for IPv6
- Example of Troubleshooting Flow: Totally Stubby Area on the Branch Is Not Working
- Troubleshooting OSPF Stubby Areas

## Module 6: Troubleshooting at RADULKO Transport Ltd.

### Lesson 1: Debrief of the First Troubleshooting at RADULKO Transport Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: A Layer 2 Loop in the Network
- Troubleshooting STP
- Example of Troubleshooting Flow: Configuring a Route Map Causes a Local Connectivity Issue
- Troubleshooting PBR
- Example of Troubleshooting Flow: Cisco Discovery Protocol Neighboring Issue
- Troubleshooting Cisco Discovery Protocol and LLDP

### Lesson 2: Debrief of the Second Troubleshooting at RADULKO Transport Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: PC1 and PC2 Do Not Have Connectivity to the Internet
- Troubleshooting VTP



- Example of Troubleshooting Flow: BR Does Not Have Connectivity to the Internet Via IPv6
- Troubleshooting EIGRP for IPv6
- Example of Troubleshooting Flow: IPv6 BGP Is Not Established to ISP2
- Troubleshooting MP-BGP

Lesson 3: Debrief of the Third Troubleshooting at RADULKO Transport Ltd.

- Trouble Ticket Overview
- Example of Troubleshooting Flow: Lack of Connectivity
- Troubleshooting the OSPFv3 Address Families Feature
- Example of Troubleshooting Flow: Authentication Problem

Lesson 4: Debrief of the Fourth Troubleshooting at RADULKO Transport Ltd.

- Trouble Tickets Overview
- Example of Troubleshooting Flow: External OSPF Routes on Router DST
- Example of Troubleshooting Flow: PC1 and PC2 Cannot Access the Internet via IPv6

## Lab Outline

Discovery 1: Maintaining and Documenting a Network

Discovery 2: Troubleshooting Connectivity

Challenge 1: First Troubleshooting at SECHNIK Networking Ltd.

Challenge 2: Second Troubleshooting at SECHNIK Networking Ltd.

Challenge 3: Third Troubleshooting at SECHNIK Networking Ltd.

Challenge 4: First Troubleshooting at TINC Garbage Disposal Ltd.

Challenge 5: Second Troubleshooting at TINC Garbage Disposal Ltd.

Challenge 6: Third Troubleshooting at TINC Garbage Disposal Ltd.

Challenge 7: Fourth Troubleshooting at TINC Garbage Disposal Ltd.

Challenge 8: First Troubleshooting at PILE Forensic Accounting Ltd.

Challenge 9: Second Troubleshooting at PILE Forensic Accounting Ltd.

Challenge 10: Third Troubleshooting at PILE Forensic Accounting Ltd.

Challenge 11: Fourth Troubleshooting at PILE Forensic Accounting Ltd.

Challenge 12: Fifth Troubleshooting at PILE Forensic Accounting Ltd.

Challenge 13: First Troubleshooting at Bank of POLONA Ltd.

Challenge 14: Second Troubleshooting at Bank of POLONA Ltd.

Challenge 15: Third Troubleshooting at Bank of POLONA Ltd.

Challenge 16: Fourth Troubleshooting at Bank of POLONA Ltd.

Challenge 17: First Troubleshooting at RADULKO Transport Ltd.

Challenge 18: Second Troubleshooting at RADULKO Transport Ltd.

Challenge 19: Third Troubleshooting at RADULKO Transport Ltd.

Challenge 20: Fourth Troubleshooting at RADULKO Transport Lt



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