Troubleshooting and Maintaining Cisco IP Networks

ID TSHOOT **Preis** 2.590,- € (exkl. MwSt.) **Dauer** 5 Tage

Zielgruppe

- Netzwerkspezialisten, die für das Troubleshooting in komplexen Cisco IP Netzwerke verantwortlich sind.
- Network Engineers, Network Operations Center (NOC), Technical Support Personal, oder Help Desk Techniker.

Voraussetzungen

- CCNA Zertifizierung oder gleichwertiges Wissen
- Implementing Cisco IP Routing (ROUTE)
- Implementing Cisco IP Switched Networks (SWITCH)

Kursziele

Der Kurs Troubleshooting and Maintaining Cisco IP Networks (TSHOOT) vermittelt Netzwerkspezialisten das Wissen und die Fähigkeiten um Unternehmensnetzwerke zu warten und Netzwerkprobleme schnell und effektiv zu diagnostizieren und zu lösen. Der Kurs bietet Informationen zu Wartung und Troubleshooting bestimmter Technologien, sowie organisatorische Aspekte des Troubleshooting- und Wartungsprozesses.

Kursinhalt

Nach Abschluss des Kurses werden die Teilnehmer folgende Fähigkeiten erworben haben:

- Planen und Dokumentieren der meistverwendeten Funktionen in einem komplexen Unternehmensnetzwerk.
- Entwicklungs- und Troubleshootingprozesse zur Identifizierung und Neulösung von Problemen in komplexen Unternehmensnetzwerken.
- Auswahl der Tools die am besten spezifische Troubleshooting- und Wartungsprozesse in großen, komplexen Unternehmensnetzwerken unterstützen.
- Übung von Wartungsprozessen und Fehlerbehebung in Switching-basierten Umgebung
- Übung von Wartungsprozessen und Fehlerbehebung in Routing-basierten Umgebung
- Übung von Wartungsprozessen und Fehlerbehebung in einer sicheren Infrastruktur
- Übung von Wartungsprozessen und Fehlerbehebung von Problemen in einer komplexen Umgebung

Detaillierter Kursinhalt

Module 1: Planning Maintenance for Complex Networks Plan and document the most commonly performed maintenance functions in complex enterprise networks

Lesson 1: Applying Maintenance Methodologies This lesson defines how to evaluate and rate commonly practiced models and methodologies for network maintenance. Upon completing this lesson, the learner will be able to meet these objectives:

- Evaluate the commonly practiced models and methodologies used for network maintenance and identify the benefits that these models bring to an organization
- Select generalized maintenance models and planning tools that fit your organization

Lesson 2: Common Maintenance Processes and Procedures This lesson defines how to identify the processes and procedures that are a fundamental part of any network maintenance methodology. Upon completing this lesson, the learner will be able

to meet these objectives:

- Identify essential network maintenance tasks
- Describe the advantages of scheduled maintenance
- Evaluate the key decision factors that affect change control procedures in order to create procedures that fit your organization's needs
- Describe the essential elements of network documentation and their function
- Plan for efficient disaster recovery
- Describe the importance of network monitoring and performance measurement as an integral element of a proactive network maintenance strategy

Lesson 3: Network Maintenance Tools, Applications, and Resources This lesson defines how to identify, evaluate and select tools, applications, and resources to support network maintenance processes. Upon completing this lesson, the learner will be able to meet these objectives:

- Identify, evaluate, and implement the elements of a basic network maintenance toolkit
- Evaluate tools that support the documentation process and select the tools appropriate to your organization
- Describe how configuration, software, and hardware resource management software can improve disaster recovery procedures
- Describe how network monitoring software benefits the maintenance process
- Analyze the metrics that could be used to measure network performance and the key elements of the performance measurement process in order to create a performance measurement plan that is appropriate to your organization

Lab:

- Lab 1-1: Lab Access

Module 2: Planning Troubleshooting Processes for Complex Enterprise Networks Develop a troubleshooting process to identify and resolve problems in complex enterprise networks **Lesson 1: Lab 2-1 Debrief** This lesson defines how to identify the key procedural aspects of a troubleshooting process. Upon completing this lesson, the learner will be able to meet these objectives:

- Compare your solution, findings, and action log against a set of checkpoints provided by the instructor and identify common and alternative solutions
- Consolidate the lessons learned during the review discussions into a set of best-practice methods and commands to aid you in future troubleshooting procedures

Lesson 2: Applying Troubleshooting Methodologies This lesson defines how to identify troubleshooting principles and evaluate and rate commonly practiced troubleshooting methodologies. Upon completing this lesson, the learner will be able to meet these objectives:

- Identify the fundamental elements of a troubleshooting process
- Describe the advantages of a structured network troubleshooting method
- Evaluate and assess common troubleshooting approaches
- Select a combination of troubleshooting methods that are appropriate to a specific troubleshooting scenario

Lesson 3: Planning and Implementing Troubleshooting Procedures This lesson defines how to plan and implement troubleshooting procedures as part of a structured troubleshooting methodology. Upon completing this lesson, the learner will be able to meet these objectives:

- Identify the fundamental sub-processes of the generic troubleshooting process
- Formulate correct problem definitions and assign responsibilities
- Gather information in a structured manner
- Interpret and analyze the gathered information
- Isolate a problem through a process of elimination
- Formulate a hypothesis and evaluate the necessary actions to take after you have

formulated a hypothesis
- Test a hypothesis and roll back if a hypothesis is not confirmed
- Integrate a solution into the existing network

Lesson 4: Integrating Troubleshooting into the Network Maintenance Process This lesson defines how to plan and implement troubleshooting and network maintenance procedures that effectively support each other. Upon completing this lesson, the learner will be able to meet these objectives:

- Evaluate the benefits gained by aligning troubleshooting procedures to network maintenance procedures
- Create and update documentation as part of routine maintenance to support the troubleshooting process and routinely update documentation as part of the troubleshooting process to keep the documentation accurate and up-to-date.
- Identify abnormal network behavior through the comparison of actual behavior to a baseline created as part of the network maintenance process
- Implement communication processes that increase the effectiveness of the troubleshooting process
- Implement change procedures that are flexible enough to support the changes that need to be made during troubleshooting, but also controlled enough so that changes are integrated into the standard maintenance and documentation procedures

Lab:

- Lab 2-1: Introduction to Troubleshooting

Module 3: Maintenance and Troubleshooting Tools and Applications Select tools that best support specific troubleshooting and maintenance processes in large, complex enterprise networks.

Lesson 1: Assembling a Basic Diagnostic Toolkit Using Cisco IOS Software This lesson defines how to use Cisco IOS commands to selectively gather information in support of basic diagnostic processes. Upon completing this lesson, the learner will be able to meet these objectives:

- Apply filtering to Cisco IOS commands to select relevant output
- Test network connectivity using Cisco IOS commands
- Diagnose basic hardware related problems

Lesson 2: Using Specialized Maintenance and Troubleshooting Tools This lesson defines how to identify tools that are commonly used for specific maintenance and troubleshooting processes. Upon completing this lesson, the learner will be able to meet these objectives:

- Identify tools and their underlying technologies to support the troubleshooting process
- Enable SPAN and RSPAN to facilitate the use of packet sniffers
- Configure routers and switches for communication with Simple Network Management Protocol (SNMP) or NetFlow based network management systems in order to facilitate the collection of device and traffic statistics that are part of a network baseline
- Configure routers and switches to send SNMP traps to provide fault notification to SNMP based network management systems

Lesson 3: Lab 3-1 Debrief This lesson defines how to describe the key aspects of the baseline design and implementation of the lab network. Upon completing this lesson, the learner will be able to meet these objectives:

- Validate your understanding of the network and available tools and fill in any potential gaps in your documentation
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid in future troubleshooting procedures

Lab:

- Lab 3-1: Assembling Maintenance and Troubleshooting Tools

Module 4: Maintaining and Troubleshooting

Campus Switching Based Solutions Practice maintenance procedures and fault resolution in switching based environments **Lesson 1: Troubleshooting VLANs** This lesson defines how to diagnose VLAN and trunking problems using the Cisco IOS command line interface. Upon completing this lesson, the learner will be able to meet these objectives:

- Understand the process involved in switching a frame from a host in a VLAN to another host in the same VLAN across multiple switched hops
- Analyze information gathered from switch data structures to verify proper operation of Layer 2 forwarding within a VLAN

Lesson 2: Troubleshooting Spanning Tree This lesson defines how to diagnose Spanning Tree problems using the Cisco IOS command line interface. Upon completing this lesson, the learner will be able to meet these objectives:

- Understand the steps that Spanning Tree goes through to attain a loop free topology
- Determine the Spanning Tree topology using Cisco IOS commands
- Recognize the symptoms of Spanning Tree failures and remediate such failures
- Understand the mechanisms involved in Etherchannel load balancing

Lesson 3: Lab 4-1 Debrief This lesson defines how to diagnose and resolve layer 2 connectivity problems using a structured, methodical approach. Upon completing this lesson, the learner will be able to meet these objectives:

- Compare your solution, findings, and action log against a set of checkpoints provided by the instructor and identify common and alternative solutions
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid you in future troubleshooting procedures

Lesson 4: Troubleshooting Switched Virtual Interfaces and Inter-VLAN Routing This lesson defines how to diagnose problems with SVIs and inter-VLAN routing. Upon completing this lesson, the learner will be able to meet these objectives:

- Utilize the information contained in the data structures used in the operation of multilayer switching to diagnose issues related to multilayer switching
- Diagnose problems related to switched virtual interfaces (SVI) and routed ports based on an understanding of the essential differences between these two types of Layer 3 interfaces on a multilayer switch

Lesson 5: Troubleshooting First Hop Redundancy Protocols This lesson defines how to diagnose and resolve problems related to First Hop Redundancy Protocols like HSRP, VRRP, and GLBP. Upon completing this lesson, the learner will be able to meet these objectives:

- Understand the HSRP election process and packet forwarding via HSRP routers
- Verify the operation of HSRP using Cisco IOS commands
- Understand the similarities and major differences between HSRP, VRRP, and GLBP

Lesson 6: Lab 4-2 Debrief This lesson defines how to diagnose and resolve problems involving multilayer switching and first-hop redundancy protocols using a structured, methodical approach. Upon completing this lesson, the learner will be able to meet these objectives:

- Compare your solution, as well as your findings and action log against a set of checkpoints provided by the instructor and identify common and alternative solutions
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid you in future troubleshooting procedures

Lesson 7: Troubleshooting Performance Problems on Switches This lesson defines how to diagnose performance problems on Catalyst LAN switches. Upon completing this lesson, the learner will be able to meet these objectives:

- Use Cisco IOS commands to diagnose physical and data link layer problems on switch ports
- Use Cisco IOS commands to analyze ternary content addressable memory (TCAM) utilization on switches in order to determine the root cause of TCAM allocation failures
- Use Cisco IOS commands to determine the root cause of high CPU usage on a switch

Lesson 8: Preview E-Learning on Troubleshooting Performance Problems, Wireless, Voice, Video, and Multicast This lesson defines how to display a list of real-world problems that occur with switch performance, wireless, voice, and video. Upon completing this lesson, the learner will be able to meet these objectives:

- Diagnose performance problems on catalyst switches
- Diagnose wireless connectivity problems
- Diagnose problems in transporting Voice over IP
- Diagnose problems in transporting video

Labs:

- Lab 4-1: Layer 2 Connectivity and Spanning Tree
- Lab 4-2: Layer 3 Switching and First-Hop Redundancy

Module 5: Maintaining and Troubleshooting Routing Based Solutions Practice maintenance procedures and fault resolution in routing based environments

Lesson 1: Troubleshooting Network Layer Connectivity This lesson defines how to diagnose network layer connectivity problems using the Cisco IOS command line interface. Upon completing this lesson, the learner will be able to meet these objectives:

- Describe the processes involved in routing packets across multiple router hops from one host to another host in a different subnet
- Analyze information gathered from a router's routing table and Forwarding Information Base (FIB) in order to verify the IP packet forwarding process
- Verify the mapping of Layer 3 information to Layer 2 information to ensure that routed packets are correctly encapsulated and transmitted using the data link protocol of the egress interface

Lesson 2: Troubleshooting EIGRP This lesson defines how to diagnose and resolve problems related to the exchange of routing information by use of the Enhanced Interior Gateway Routing Protocol (EIGRP). Upon completing this lesson, the learner will be able to meet these objectives:

- Apply your knowledge of EIGRP data structures to plan the gathering of necessary information as part of a structured approach to troubleshooting EIGRP routing problems
- Apply your knowledge of the processes that EIGRP uses to exchange routing information to interpret and analyze the information that is gathered during an EIGRP troubleshooting process
- Use Cisco IOS commands to gather information from the EIGRP data structures and track the flow of EIGRP routing information to troubleshoot EIGRP operation

Lesson 3: Lab 5-1 Debrief This lesson defines how to diagnose and resolve IP routing and EIGRP related problems using a structured, methodical approach. Upon completing this lesson, the learner will be able to meet these objectives:

- Compare your solution, findings, and action log against a set of checkpoints provided by the instructor and identify common and alternative solutions
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid you in future troubleshooting procedures

Lesson 4: Troubleshooting OSPF This lesson defines how to diagnose and resolve problems related to the exchange of routing information by use of the Open

- Shortest Path First (OSPF) routing protocol.

Upon completing this lesson, the learner will be able to meet these objectives:

- Apply your knowledge of OSPF data structures to plan the gathering of necessary information as part of a structured approach to troubleshooting OSPF routing problems
- Apply your knowledge of the processes that OSPF uses to exchange network topology information within an area, to interpret and analyze the information that is gathered during an OSPF troubleshooting process
- Apply your knowledge of the processes that OSPF uses to exchange network topology information between areas to interpret and analyze the information that is gathered during an OSPF troubleshooting process
- Use Cisco IOS commands to gather information from the OSPF data structures and track the flow of OSPF routing information in order to troubleshoot OSPF operation

Lesson 5: Troubleshooting Route Redistribution This lesson defines how to diagnose problems related to route redistribution. Upon completing this lesson, the learner will be able to meet these objectives:

- Describe the data structures and processes involved in route redistribution
- Verify the correct operation of a route redistribution process

Lesson 6: Lab 5-2 Debrief This lesson defines how to diagnose and resolve problems related to OSPF and route redistribution using a structured, methodical approach. Upon completing this lesson, the learner will be able to meet these objectives:

- Compare your solution, findings, and action log against a set of checkpoints provided by the instructor and identify common and alternative solutions
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid you in future troubleshooting procedures

Lesson 7: Troubleshooting BGP This lesson defines how to diagnose and resolve problems related to the exchange of routing information by use of the Border Gateway Protocol (BGP). Upon completing this lesson, the learner will be able to meet these objectives:

- Apply your knowledge of BGP data structures to plan the gathering of necessary information as part of a structured approach to troubleshooting BGP routing problems
- Apply your knowledge of the processes that BGP uses to exchange routing information to interpret and analyze the information that is gathered during a BGP troubleshooting process
- Use Cisco IOS commands to gather information from the BGP data structures and track the flow of BGP routing information in order to troubleshoot BGP operation

Lesson 8: Lab 5-3 Debrief This lesson defines how to diagnose and resolve problems related to BGP. Upon completing this lesson, the learner will be able to meet these objectives:

- Compare your solution, findings, and action log against a set of checkpoints provided by the instructor and identify common and alternative solutions
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid you in future troubleshooting procedures

Lesson 9: Troubleshooting Performance Problems on Routers This lesson defines how to diagnose performance problems on routers. Upon completing this lesson, the learner will be able to meet these objectives:

- Use the IOS tools to analyze CPU usage
- Use the IOS tools to analyze packet forwarding through a router
- Use the IOS tools to analyze memory usage

Lesson 10: Lab 5-4 Debrief This lesson defines how to diagnose and resolve performance problems involving high CPU and memory utilization. Upon completing this lesson, the learner will be able to meet these objectives:

- Review and verify your solution, as well as

your findings and action log against a set of checkpoints provided by the instructor
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid you in future troubleshooting procedures

Lesson 11: Preview E-Learning on Troubleshooting NAT, DHCP, and Other Protocols This lesson defines how to display a list of real-world problems that occur with NAT, DHCP, and Other Protocols. Upon completing this lesson, the learner will be able to meet these objectives:

- Preview E-Learning Products teaching how to troubleshoot NAT problems
- Diagnose DHCP problems

Labs:

- Lab 5-1: Layer 3 Connectivity and EIGRP
- Lab 5-2: OSPF and Route Redistribution
- Lab 5-3: Border Gateway Protocol (BGP)
- Lab 5-4: Router Performance

Module 6: Maintaining and Troubleshooting Network Security Solutions Practice maintenance procedures and fault resolution in a secure infrastructure **Lesson 1: Troubleshooting Security Features** This lesson defines how to diagnose problems related to security features implemented on routers and switches. Upon completing this lesson, the learner will be able to meet these objectives:

- Describe the impact of security features on network troubleshooting

Lesson 2: Lab 6-1 Debrief This lesson defines how to diagnose and resolve problems related to access lists and authentication using a structured, methodical approach. Upon completing this lesson, the learner will be able to meet these objectives:

- Compare your solution, findings, and action log against a set of checkpoints provided by the instructor and identify common and alternative solutions
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid you in future troubleshooting procedures

Lesson 3: Security Features Review This lesson defines how to diagnose and resolve problems related to IOS based security features. Upon completing this lesson, the learner will be able to meet these objectives:

- Understand the general flow of troubleshooting transport layer / layer 4 problems
- Understand the process of the stateful IOS firewall and the tools to verify its operation
- Understand Authentication, Authorization and Accounting on IOS routers and switches

Lesson 4: Lab 6-2 Debrief This lesson defines how to diagnose and resolve problems related to security features embedded in the Cisco IOS software using a structured, methodical approach. Upon completing this lesson, the learner will be able to meet these objectives:

- Compare your solution, findings, and action log against a set of checkpoints provided by the instructor and identify common and alternative solutions
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid you in future troubleshooting procedures

Lesson 5: Preview of E-Learning products for Maintaining and Troubleshooting Network Applications Services and Troubleshooting Branch Office and Remote Worker Problems This lesson defines how to display a list of real-world problems that occur with Network Applications Services and Branch Office and Remote Worker connectivity. Upon completing this lesson, the learner will be able to meet these objectives:

- Preview E-Learning products teaching troubleshooting Applications Services Problems
- Preview E-Learning products teaching troubleshooting of Branch Office and Remote Workers problems

Labs:

- Lab 6-1: Introduction to Network Security
- Lab 6-2: Cisco IOS Security Features

Module 7: Maintaining and Troubleshooting Integrated, Complex Enterprise Networks Practice maintenance procedures and fault resolution problems in a complex environment

Lesson 1: Troubleshooting Complex Environments This lesson defines how to commence troubleshooting complex enterprise networks using a structured approach. Upon completing this lesson, the learner will be able to meet these objectives:

- List the key lessons learned about network maintenance and troubleshooting tasks during previous labs
- Initiate the capstone lab in order to practice troubleshooting in a complex environment and be assessed on the skills acquired during this course

Lesson 2: Lab 7-1 Debrief This lesson defines how to diagnose and resolve network problems in a complex environment using a structured, methodical approach. Upon completing this lesson, the learner will be able to meet these objectives:

- Compare your solution, findings, and action log against a set of checkpoints provided by the instructor and identify common and alternative solutions
- Consolidate the lessons learned during the review discussions into a set of best practice methods and commands to aid you in future troubleshooting procedures

Lab:

- Lab 7-1: Troubleshooting Complex Environments