WITSHOOT: Troubleshooting Cisco Wireless Enterprise Networks

Course ID #: 1575-991-ZZ-W

Hours: 35

Course Content

Course Description:

Troubleshooting Cisco Wireless Enterprise Networks (WITSHOOT) v1.1 is a 3-day ILT training program that provides students information to troubleshoot Cisco wireless networks. The course provides guidelines for troubleshooting Wi-Fi architectures of Cisco wireless components. WITSHOOT provides students hands-on labs to reinforce concepts. Concepts taught include troubleshooting Cisco AireOS Release 8.0, Cisco Prime Infrastructure Release 2.2, and Cisco Identity Services Engine (Cisco ISE) Release 1.3 features. WITSHOOT is targeted toward wireless network engineers with 3-5 years of experience in the networking or security fields.

At Course Completion:

Upon completing this course, you will be able to meet these objectives:

- Identify common troubleshooting approaches
- Identify and describe wireless infrastructure issues
- Identify core wireless infrastructure issues
- Identify wireless security issues

Prerequisites:

The knowledge and skills that a learner should have before attending this course are as follows:

- Interconnecting Cisco Networking Devices Part 1 (ICND1)
- Implementing Cisco Wireless Network Fundamentals (WIFUND)

It is also recommended that learners considered for this training have a basic knowledge of the following:

- Cisco Prime Infrastructure
- Cisco Identity Services Engine
- Metageek Channelizer Software
- Voice Signaling Protocol
- Basic QoS
- Application Visibility and Control
- LAN switching

Target Student:

WITSHOOT is targeted toward wireless network engineers with 3-5 years of experience in the networking or security fields

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Deliver Method:

This course is delivered through a mix of instructor-led training (ILT) and hands-on labs.

Topics:

Module 1: Identify Common Troubleshooting Approaches

Objective: Identify common troubleshooting approaches

Lesson 1: Describing Network Troubleshooting Methodology

Objective: Describe the network troubleshooting methodology and approaches

This lesson includes these topics:

- Describing Network Troubleshooting Methodology
    - Objective: Describe the network troubleshooting methodology
- Systematic Approach
- Preparing for Network Failure
- Structured Troubleshooting Methodologies
- Bottom-Up Approach
- Use of the Bottom-Up Approach
- Bottom-Up Approach: Example
- Top-Down Approach
- Use of the Top-Down Approach
- Top-Down Approach: Example
- Divide-and-Conquer Approach
- Use of the Divide-and-Conquer Approach
- Divide-and-Conquer Approach: Example
- Follow-the-Path Approach
- Follow-the-Path Approach: Example
- Documentation
- Summary
    - Objective:

Lesson 2: Describing Network Troubleshooting Tools and Resources

Objective: Describe network troubleshooting tools and resources

This lesson includes these topics:

- Define Common Show and Debug Commands
    - Objective: Describe common show and debug commands
- Debug Commands for Intercontroller Mobility Issues
- Describe Packet Captures
- Objective: Describe packet captures
- Using Packet Captures
- Sniffer Mode Setup
- Wireshark Configuration
- Configure SPAN and RSPAN
- Configure Switch Capture
- Discovery 1: Setting Up and Analyzing Packet Captures
    - Topology
    - Required Resources
    - Job Aid
    - Task 1: Set Up Access Point in Sniffer Mode
    - Task 2: Set Up Wireshark and Capture Packets
    - Task 3: Analyze Packets from a Capture File
    - Task 4: Lab Cleanup

- Discovery 2: Analyzing Switch Packet Capture of AP Joining a WLC
    - Topology
    - Required Resources
    - Job Aid
    - Task 1: Set Up Converged Access Wireshark Packet Capture
    - Task 2: View the AP Discovery/Join Packets from Wireshark
- Describe RF Spectrum Analysis
    - Objective: Describe RF spectrum analysis
- Spectrum Analysis Functions
- Monitor the Air Quality of Radio Bands
- Cisco CleanAir Detail
- Interference Device Report
- Air Quality and Device Trap Control
- Interference Reporting
- Unclassified Interference
- Cisco Spectrum Expert GUI
- Use Cisco Prime Infrastructure as a Troubleshooting Tool
- Objective: Use Cisco Prime Infrastructure as a troubleshooting tool
- Cisco Prime Infrastructure Troubleshooting Capabilities
- Cisco Prime Infrastructure Security Dashboard
- Describe Third-Party Tools
- Objective: Describe third-party tools
- Ekahau Troubleshooting Capabilities
- MetaGeek Troubleshooting Capabilities
- Network Viewing Tools
- Describe the WLCCA Tool
    - Objective: Describe the WLCCA
- Describe Message Logging
- Objective: Describe message logging
- Management > Logs > Message Logs
- Management > SNMP > General / SNMPv3 Users
- Management > SNMP > Communities and Trap Receiver
- Management > SNMP > Trap Logs
- Management > SNMP > Trap Controls
- Management > Tech Support > Controller Crash
- Management > Tech Support > AP Crash Log
- Management > Tech Support > System Resource Information
- Discovery 3: Viewing CleanAir Reports from Cisco Prime Infrastructure
    - Topology
    - Required Resources
    - Job Aid
    - Task 1: Set Up Access Point for CleanAir
    - Task 2: View CleanAir Reports on Cisco Prime
- Summary
    - Objective:

Module 2: Identify Core Wireless Infrastructure Issues

Objective: Identify core wireless infrastructure issues

Lesson 1: Troubleshooting Wireless-Related Wired Infrastructure Issues

Objective: Describe how to troubleshoot wired infrastructure that is related to wireless network

This lesson includes these topics:

- Describe Wireless-Related Wired Infrastructure Issues
    - Objective: Describe wireless-related wired infrastructure issues
- Describe and Troubleshoot IP, DHCP, and DNS Issues
    - Objective: Describe and troubleshoot IP, DHCP, and DNS issues

- DHCP and DNS Troubleshooting Best Practices
- Troubleshoot DHCP and DNS Issues
- CLI Command: debug dhcp message
- CLI Command: debug dhcp packet
- Controller > Internal DHCP Server > New or Edit
- DHCP Relay Suboptions: Introduction
- Cisco AireOS show and debug Commands
- CLI Command: show arp switch
- Cisco IOS XE show and debug Commands
- Describe and Troubleshoot VLANs and Trunks
- Objective: Describe and troubleshoot VLANs and trunks
- Cisco IOS XE show and debug Commands
- Troubleshooting VLAN Issues
- Cisco IOS XE show and debug Commands
- Describe and Troubleshoot PoE
    - Objective: Describe and troubleshoot PoE issues
- Troubleshoot PoE Issues
- PoE Standards
- Current Implementations
- Impact of Adopting Newer PoE Capabilities
- Power Draw of Cisco Aironet 3700 Series Access Points
- 802.11ac-Ready Cisco Switches
- Cisco Aironet 3700 Series Access Points: Access Layer Switches
- Cisco Aironet 2700 Series Access Points: Power Requirements
- PoE with Aironet 3700 Series AP Using 15.4 W (802.3af)
- PoE with Aironet 3700 Series AP Using PoE+ (802.3at)
- Troubleshoot PoE Issues
- Identify an AP
    - Objective: Identify an AP
- Troubleshoot Cisco Catalyst 3650 and 3850 Series Switch Stacking Issues
    - Objective: Troubleshoot Cisco Catalyst 3650 and 3850 Series Switch stacking issues
- Troubleshoot Switch Stacking Issues
- Challenge 1: Troubleshooting Client DHCP Issues
    - Topology
    - Job Aid
    - Task 1: Resolve the Issue of a Client Not Getting an IP Address (Centralized Access on AireOS)
    - Task 2: Resolve the Issue of a Client Not Getting an IP Address (Converged Access on IOS-XE)
- Summary
    - Objective:

Lesson 2: Troubleshooting AP-to-Controller Issues

Objective: Describe how to troubleshoot AP-to-controller issues

This lesson includes these topics:

- Describe and Troubleshoot the CAPWAP AP Join Process
    - Objective: Describe and troubleshoot the CAPWAP AP join process
- Troubleshooting AP Discover and Join
- CAPWAP State Machine
- Troubleshoot AP-to-Controller Issues
    - Objective: Troubleshoot AP-to-controller issues
- Additional AP-to-Controller Issues
- Controller Discovery Issues: DHCP Option 43
- Controller Discovery Issues: Discovery Via DNS
- Describe Cisco WLC Tools
    - Objective: Describe Cisco WLC tools
- GUI Summary

- Command: show system
- AP Name Change and Join Stats
- Ping from Dynamic Interfaces (Extended Ping)
- CLI Command: debug ?
- Debug Filtering
- CLI Command: debug capwap
- Describe Best Practice Approaches for Troubleshooting
- Objective: Describe Cisco WLC Example Scenarios
- Cisco AireOS show and debug Commands
- Common Issues with AP Joins
- Common AireOS show and debug Commands
- Troubleshoot DTLS Session Establishment Issues
- Troubleshoot DTLS Session Establishment: Certificate Issues
- Troubleshoot DTLS Session Establishment: Time Issues
- Describe Converged Access Scenarios
    - Objective: Describe converged access scenarios
- Describe Common Cisco IOS-XE show and debug Commands
- Common Reasons for AP Join Failure
- Best Practices for Troubleshooting AP Failover
    - Objective: Troubleshoot AP Failover
    - Objective: Describe how to troubleshoot AP failover
- Challenge 2: Troubleshooting AP Discovery and Join Failures
    - Topology
    - Job Aid
    - Task 1: Troubleshoot APs AP failing to Discover or Join the Converged WCM
    - Task 2: Troubleshoot APs AP Failing to Discover or Join the Centralized WCM
- Summary
    - Objective:

Lesson 3: Troubleshooting Cisco FlexConnect

Objective: Troubleshoot Cisco FlexConnect

This lesson includes these topics:

- Troubleshoot Cisco FlexConnect
- Objective: Troubleshoot Cisco FlexConnect
- Cisco Wireless Hardware Installation
- Important Concepts
- Cisco FlexConnect in Standalone Mode
- Cisco FlexConnect Fault Tolerance
- Troubleshoot Central or Local Switching Mode Errors
- Common Cisco AireOS and Switch show and debug Commands
- Summary
- Objective:
- Self-Check

Module 3: Identify Wireless Infrastructure Issues

Objective: Identify and describe wireless infrastructure issues

Lesson 1: Troubleshooting Client Connectivity Issues

Objective: Describe client connectivity troubleshooting

This lesson includes these topics:

- Describe Troubleshooting of Client Connectivity Issues
    - Objective: Describe troubleshooting of client connectivity issues
- Current State of the 2.4-GHz Spectrum
- Current State of the 5-GHz Spectrum in the United States
- Common Client Connection Utilities

- Troubleshooting WLAN Configuration Errors
- Common Client Problems
- Describe Troubleshooting of Client Connections
    - Objective: Describe troubleshooting of client connections
- Monitor > Clients > Client MAC Address
- Describe Other Tools
    - Objective: Describe other troubleshooting tools
- Command: show client detail
- Common Issues
- Spectrum Analysis
- Common Interference Devices and RF Propagation Issues
- Causes of Interference and Propagation Issues
- Command: debug client
- Debug Client Shows the AP
- Describe Third-Party Tools
    - Objective: Describe third-party troubleshooting tools
- Using Ekahau to Troubleshoot RF Signal Issues
- Troubleshoot End-to-End Issues
- Discovery 4: Check Client Speed/Throughput
    - Topology
    - Required Resources
    - Job Aid
    - Task 1: Check the Client Speed Using the Windows Wireless Client Tool
    - Task 2: Check the Client Throughput Using the Tamosoft Throughput Tester
- Summary
- Objective:

Lesson 2: Troubleshooting Client Performance Issues

Objective: Describe client performance troubleshooting

This lesson includes these topics:

- Describe Issues Affecting Client Performance
    - Objective: Describe issues that can affect client performance
- Common Client Performance Problems
- Cisco Aironet 802.11n and 802.11ac AP Comparison
- AP and Client Power Levels
- Power Levels and Client Density
- Signal Power vs. Coverage
- Enterprise WLAN Coverage and Capacity
- Developing an SSID Design Plan
- 802.11ac Channel and Enhancements
- Airtime Fairness
- Rate-Shifting Boundaries
- Describe Client Performance Troubleshooting Tools
    - Objective: Describe client performance troubleshooting tools
- Using Ekahau to Troubleshoot Performance
- Troubleshoot Throughput and Data Rate Issues
- Describe Cisco Wireless LAN Controller CLI Tools
    - Objective: Describe Cisco Wireless LAN Controller (Cisco WLC) CLI tools
- Summary
- Objective:

Module 4: Identify Wireless Security Issues
Objective: Identify wireless security issues

Lesson 1: Troubleshooting Client Authentication Issues
Objective: Describe how to troubleshoot client authentication issues

This lesson includes these topics:

- Best Practice Approaches for Troubleshooting
    - Objective: Describe client authentication issues and explain how to troubleshoot them
- Troubleshoot Client Authentication Issues
    - Objective: Describe client authentication issues and explain how to troubleshoot them
- Common Issues with Client Authentication
- CLI Command debug dot11
- CLI Command debug dot1x
- CLI Command debug aaa
- Mobility Troubleshooting CLI Commands
- Voice Troubleshooting CLI Commands
- Example Scenarios
    - Objective: Present some examples of client authentication issues
- Challenge 3: Verifying Client Authentication Issues Using Prime Troubleshooting Tools
    - Topology
    - Job Aid
    - Task 1: Use Prime to Verify the failure/success of a Client Using WPA2-PSK Authentication
    - Task 2: Use Prime to Verify the failure/success of a Client Using 802.1X Authentication
- Discovery 5: Using Debug to Troubleshoot a Client with 802.1x Authentication
    - Topology
    - Required Resources
    - Job Aid
    - CLI Command List and Controller GUI Navigation Support
    - Task 1: Setting Up the WLC and Client for 802.1x Authentication
    - Task 2: Debugging the 802.1x Authentication
- Summary
    - Objective:

Lesson 2: Troubleshooting Guest Access Issues
Objective: Describe guest access issues and troubleshooting approaches

This lesson includes these topics:

- Describe Guest Access
    - Objective: review guest access
- Auto-Anchor
- Web Authentication
- Troubleshoot Guest Access Issues
    - Objective: Describe guest access troubleshooting options
- Common Issues with Client Guest Access
- Troubleshoot Guest Access: WebAuth
- Common Issues with Guest Access Anchoring (Local and Central)
- Troubleshoot Guest Access: Mobility Groups
- Troubleshoot Guest Access: Mobility Anchor
- Troubleshoot Guest Access: mping, eping
- Challenge 4: Troubleshooting Guest Network Issues
    - Topology
    - Job Aid
    - Task 1: Resolve the Issue of Guests Not Being Able to Authenticate to the Network Using Web-Authentication (Centralized Access on AireOS)

    - Task 2: Resolve the Issue of Guests Not Being Prompted for Web Authentication. (Converged Access on IOS-XE)
- Summary
    - Objective:

Lesson 3: Troubleshooting Issues with RF-Related Security Threats

Objective: Describe issues with RF-related security threats and how to troubleshoot them

This lesson includes these topics:

- Common Issues with RF Security Threats
- Troubleshoot Issues with RF-Related Security Threats
    - Objective: Troubleshoot issues with RF-related security threats
- Common Issues with Rogue Devices
- Rogue Access Points and Clients
- Monitoring Rogue APs Using Cisco WLC GUI
- Monitoring and Managing Rogue Devices Using Cisco Prime Infrastructure
- Cisco Prime Infrastructure Security Dashboard
- Rogue Clients and APs
- Hacker APs
- Denial of Service
- Over-the-Air Attacks
- Interference
- Troubleshoot Issues with Non-802.11 Interferers
    - Objective: Troubleshoot issues with non-802.11 interferers
- Non-802.11 Interference: Bluetooth Example
- Non-802.11 Interference: Microwave Oven Example
- Non-802.11 Interference: Cordless 2.4-GHz Phone Example
- Non-802.11 Interference: Wireless Video Camera Example
- Troubleshoot Non-802.11 Interference Issues
- Challenge 5: Spectrum Analysis Using metageek Chanalyzer
    - Topology
    - Job Aid
    - Task 1: Setup Access Point for SE-Connect Mode
    - Task 2: Configure metageek Chanalyzer - Spectrum Analyzer software
    - Task 3: Analyze RF Captures Information into metageek Chanalyzer - spectrum analyzer software
- Discovery 6: Identifying Rogue APs and Clients Using WLCs and Prime Infrastructure
    - Topology
    - Required Resources
    - Job Aid
    - Task 1: Identify Rogue APs and Clients on a WLC
    - Task 2: Identify Rogue APs and Clients on Prime Infrastructure
- Summary
- Objective: