

## Certified Wireless Network Administrator (CWNA)

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### Course Summary

#### Description

Get a head start right out of the gate with a Certified Wireless Network Administrator (CWNA) certification. It is the base certification for Enterprise Wi-Fi within the CWNP family of certifications and a springboard toward earning your security, design, analysis, and network expert certifications. Achieving it enhances your networking career profile, providing evidence that you have sought after Wi-Fi knowledge and skills. The goal of this course is to add Wi-Fi expertise to a networking professional's skill set while covering all CWNA-107 exam topics. The course begins with discussion topics and hands-on lab exercises covering the basic operation of 802.11 Wi-Fi technology. Once a base of Wi-Fi knowledge is established, enterprise relevant topics such as Wi-Fi design, security, and troubleshooting are covered. You will use enterprise-class hardware and software tools during live lab exercises, all accessible remotely for any instructor-led or virtual class.

As an added bonus, you will receive a free exam voucher.

#### Objectives

At the end of this course, students will be able to:

- Background and roles of Wi-Fi governing bodies, including the IEEE and Wi-Fi Alliance
- Radiofrequency properties and behaviors
- Wireless signal fundamentals, including measurement principles
- Antenna information, including types and installation best practices
- Wi-Fi standards, including 802.11 extensions ac, ad, af, and ah
- Wi-Fi device types and infrastructure options
- Wi-Fi communications processes, including connection, roaming, and data transfer
- General troubleshooting tips to common real-world 802.11n issues
- Wi-Fi architecture best practices, including both network and wireless design
- Similarities, differences, and peculiarities about Wi-Fi deployments in differing environments (offices, K-12 education, health care facilities, and more)
- Security standards, best practices, known vulnerabilities, and remediation techniques for Wi-Fi networks
- Site surveying, including requirements gathering, design, installation, and validation
- Troubleshooting methodology, tools, and techniques, along with common issues

#### Topics

- WLAN and Networking Industry Organizations
- RF Characteristics and Behavior
- RF Mathematics and Measurements
- RF Antennas and Hardware
- 802.11 PHYs and Network Types
- 802.11 Network Devices
- 802.11 MAC Operations
- 802.11 Channel Access Methods
- WLAN Network Architectures
- WLAN Requirements and Solutions
- Security Solutions for WLANs
- Site Surveys, Network Design, and Validation
- WLAN Troubleshooting

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### Course Summary (cont'd)

#### Audience

This course is designed for:

- Administrators: network, systems, infrastructure, security, and LAN/WLANs
- Support professionals: technical assistance and field support
- Designers: network, systems, and infrastructure
- Developers: wireless software and hardware products
- Consultants and integrators: IT and security
- Decision-makers: infrastructure managers, IT managers, security directors, chief security officers, and chief technology officers
- CCNA's

#### Prerequisites

There are no prerequisites for this course.

#### Duration

Five days

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### Course Outline

#### I. WLAN and Networking Industry Organizations

- A. Wi-Fi Related Organizations
- B. The IEEE
- C. PHY Amendments
- D. 802.11 Amendments
- E. Wi-Fi Alliance
- F. PoE (802.3)

- C. Wireless Monitoring Systems (Analytics)
- D. WLAN Controller Functionality
- E. Network Architecture Planes
- F. WLAN Bridging
- G. Client Devices
- H. Client Device OS Configuration
- I. Power over Ethernet (PoE) Functionality

#### II. RF Characteristics and Behavior

- A. Electromagnetic Spectrum
- B. Wavelength, amplitude, and other RF characteristics
- C. Reflection, refraction, and other RF behavior
- D. RF Propagation
- E. Basic Types of Modulation

#### VII. 802.11 MAC Operations

- A. 802.11 Frames
- B. Frame Aggregation
- C. Guard Interval
- D. General Frame Format
- E. PHY Preamble
- F. Management, Control, and Data Frames
- G. Locating WLANs

#### III. RF Mathematics and Measurements

- A. RF units of measure
- B. Basic RF mathematics
- C. RF signal measurements
- D. Understand link budgets

#### VIII. 802.11 Channel Access Methods

- A. Differences between CSMA/CD and CSMA/CA
- B. Distributed Coordination Function (DCF)
- C. Network Allocation Vector (NAV)
- D. Clear Channel Assessment (CCA)
- E. Interframe Spacing (IFS)
- F. Contention Window (CW)
- G. Quality of Service in 802.11 WLANs
- H. Hybrid Coordination Function (HCF)
- I. Additional Control Frames and Protection Modes

#### IV. RF Antennas and Hardware

- A. RF Units of Measure
- B. Types of Antennas and Antenna Systems Commonly Used With 802.11 WLANs
- C. Antenna Polarization and Gain
- D. Antenna Implementation
- E. Types of Antenna Cables, Connectors, and Other Accessories

#### IX. WLAN Network Architectures

- A. Control, Management, and Data Planes
- B. WLAN Controller Solutions
- C. Network Architectures
- D. RF Channel Planning
- E. Service Set Configurations
- F. Cell Sizing and Interference

#### V. 802.11 PHYs and Network Types

- A. 802.11 PHYs and Network Types
- B. 802.11 Frequency Bands
- C. 802.11 Channels Explained
- D. OSI Model Layers and Wi-Fi
- E. 802.11 Physical Layers (PHYs)
- F. Throughput vs. Data Rate
- G. RF Modulation Methods
- H. 802.11 Use Case Scenarios
- I. WLAN Operating Modes including BSS, ESS and Roaming

#### X. WLAN Requirements and Solutions

- A. Explore WLAN Deployment Scenarios
- B. BYOD and Guest Access
- C. Mobile Device Management
- D. Radio Resource Management (RRM) and other automatic RF management solutions
- E. Additional Management Features

#### VI. 802.11 Network Devices

- A. Access Point Features and Capabilities
- B. AP and WLAN Management Systems

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#### *XI. Security Solutions for WLANs*

- A. Additional Authentication Features
- B. Deprecated Standard Security
- C. Weak Security Mechanisms
- D. Pre-shared Key and IEEE 802.1X/EAP
- E. Wireless Intrusion Prevention Systems (WIPS)
- F. Protocol and Spectrum Analysis for Security
- G. Using Secure Protocols

#### *XII. Site Surveys, Network Design, and Validation*

- A. Survey Processes
- B. Understanding Requirements
- C. Verify Design Requirements
- D. Documentation
- E. Locating Interference
- F. Spectrum Analysis
- G. Application and Throughput Testing
- H. Protocol Analysis

#### *XIII. WLAN Troubleshooting*

- A. CWNP Troubleshooting Methodology
- B. Protocol Analysis Troubleshooting Features
- C. Spectrum Analysis Troubleshooting Features
- D. RF Interference
- E. Hidden Nodes
- F. Connectivity Problems
- G. Classroom Live Labs

#### *XIV. Remote Lab Familiarization*

- A. Overview
- B. Task 1: Navigate the GigaWave Remote Lab
- C. Task 2: Navigate the Interactive Diagram Page
- D. Task 3: Closing the Lab

#### *XV. Lab 1: Visualizing RF Principles*

- A. Activity Objective
- B. Visual Objective
- C. Required Resources
- D. Task 1: Prepare the Client Laptop in the Remote Lab

- E. Task 2: Use Ekahau to visualize Free Space Path Loss
- F. Task 3: Use Ekahau to Visualize Attenuation
- G. Task 4: Closing the Lab

#### *XVI. Lab 2: RF Mathematics*

- A. Activity Objective
- B. Required Resources
- C. Task 1: Complete These Power Conversions
- D. Task 2: Calculate EIRP
- E. Task 3: Calculate a Link Budget

#### *XVII. Lab 3: Visualizing Antenna Patterns*

- A. Activity Objective
- B. Required Resources
- C. Task 1: Open the FSPL File in Ekahau
- D. Task 2: Use Various 2.4 Antenna and Observe the Change in RF Coverage
- E. Closing the Lab

#### *XVIII. Lab 4: 802.11 Basics*

- A. Activity Objective
- B. Task 1: Analyze Wireless Frames
- C. Task 2: Closing the Lab

#### *XIX. Lab 5: Initialize an Autonomous WLAN Deployment*

- A. Activity Objective
- B. Task 1: Configure an Autonomous AP via CLI
- C. Task 2: Configure Your Standalone AP from the GUI
- D. Task 3: Closing the Lab

#### *XX. Lab 6: Configure Security on Autonomous AP WLAN Deployment*

- A. Activity Objective
- B. Task 1: Configure the Autonomous AP for PSK
- C. Task 2: Configure Windows 7 Client to Connect to the Pod-X-Auto Using PSK
- D. Task 3: Add a Local Radius Client to the Autonomous AP
- Task 4: Configure Local RADIUS Server on the Autonomous AP

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---

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- E. Task 5: Configure an SSID for Local EAP on the Autonomous AP
- F. Task 6: Configure the Windows Supplicant
- G. Task 7: Closing the Lab

#### *XXI. Lab 7: Configuring the WLC Central Switch WLAN Deployment*

- A. Activity Objective
- B. Task 1: Prepare the Client Laptop in the Remote Lab
- C. Task 2: Review and Modify Management Access
- D. Task 3: Review AP Status
- E. Task 4: Configure a WLAN
- F. Task 5: Associate the Client
- G. Task 6: Disassociate the Client
- H. Task 7: Closing the Lab

#### *XXII. Lab 8: Configuring Security in a Centralized WLAN Deployment*

- A. Activity Objective
- B. Task 1: Configure the Data WLAN for PSK
- C. Task 2: Configure the Wireless Client to Connect to the PSK WLAN
- D. Task 3: Modify the WLAN to Support WPA2 with 802.1X Authentication
- E. Task 4: Configure the Client and Access the Network
- F. Task 5: Modify the WLAN to Support WebAuth
- G. Task 6: Create a Local Net User
- H. Task 7: Connect the Client to the WebAuth WLAN
- I. Task 8: Closing the Lab

#### *XXIII. Lab 9: Implement a WLC Local Switch WLAN Deployment*

- A. Activity Objective
- B. Task 1: Configure the Controller
- C. Task 2: Connect to the WLAN
- D. Task 3: Closing the Lab

#### *XXIV. Lab 10: Configure Security on a Cloud WLAN Deployment*

- A. Activity Objective
- B. Task 1: Implement PSK Authentication on a Cloud WLAN Deployment
- C. Task 2: Implement Local EAP-PEAP on a Cloud WLAN Deployment
- D. Task 3: Implement WebAuth on a Cloud WLAN Deployment
- E. Task 4: Disable SSIDs on the Cloud WLAN Deployment

#### *XXV. Lab 11: Perform Wi-Fi Scanning*

- A. Activity Objective
- B. Topology
- C. Task 1: Enable Metageek insider
- D. Task 2: Review 2.4 GHz Activity
- E. Task 3: Review 5 GHz Activity
- F. Task 4: Close the Lab

#### *XXVI. Lab 12: Perform a Predictive WLAN Design*

- A. Activity Objective
- B. Task 1: Familiarization with Ekahau Site Survey Pro + Planner
- C. Task 2: Perform a Basic Predictive WLAN Design using a Single Floor Layout
- D. Task 3: Closing the Lab

#### *XXVII. Lab 13: Perform Passive Site Survey*

- A. Activity Objective
- B. Task 1: Configure AP for Spectrum Expert AP Mode of Operation
- C. Task 2: Configure Cisco Spectrum Expert – Spectrum Analyzer Software
- D. Task 3: Closing the Lab