

KOENIG SOLUTIONS • COURSE OUTLINE

Certified Wireless Network Expert (CWNE)

Learn to secure, design, and troubleshoot enterprise Wi-Fi networks, from authentication and encryption to RF planning and protocol analysis.

16

MODULES

188

TOPICS

COURSE OVERVIEW

This course covers enterprise Wi-Fi security, starting with security fundamentals, wireless vulnerabilities, and policy before moving into authentication, key management, encryption, secure roaming, and network monitoring with WIPS and protocol analysis. It then addresses wireless network design, including requirements gathering, RF planning, hardware selection, site surveys, QoS, security, and troubleshooting across industry-specific scenarios. Finally, it examines WLAN communication principles, PHY and MAC layer formats, 802.11 protocol operation, 802.11n technologies, and the tools and methodology used for protocol and spectrum analysis.

WHO THIS COURSE IS FOR

Network Security Engineers

Wireless Network Engineers

WLAN Designers

Network Administrators

Network Troubleshooters

PREREQUISITES

- Need to attend below courses:
- Enterprise Wi-Fi Security (CWSP)
- Certified Wireless Design Professional (CWDP)
- Enterprise Wi-Fi Analysis & Troubleshooting (CWAP)

LEARNING OBJECTIVES

- Explain wireless security fundamentals and common vulnerabilities
- Apply authentication methods such as 802.1X, RADIUS, and EAP
- Configure encryption mechanisms including WEP, TKIP, and CCMP
- Plan secure roaming using mechanisms such as 802.11r FT and OKC
- Analyse network monitoring data from WIPS and protocol analyzers
- Assess WLAN design requirements across industry-specific scenarios
- Conduct site surveys and plan radio frequency coverage
- Troubleshoot WLAN issues using protocol and spectrum analysis tools

16 Modules, 188 Topics

COURSE 1 Enterprise Wi-Fi Security (CWSP)

01

Security Fundamentals

TOPICS

Security Basics · CWNA Security Review · Industry Organizations · Terminology · Wireless Vulnerabilities

02

Wireless Security Challenges

TOPICS

Network Discovery · Pseudo-Security · Legacy Security Mechanisms · Network Attacks · Recommended Practices

03

Security Policy

TOPICS

Defining Security Policies · Policy Enforcement · Policy Management · Policy Types

04

Understanding Authentication

TOPICS

Passphrase Authentication · AAA · RBAC · RADIUS · 802.1X · EAP

05

Authentication and Key Management

TOPICS

Robust Security Networks (RSN) · RSN Information Element · RSN Authentication and Key Management (AKM)

06

Encryption

TOPICS

Encryption Fundamentals · Encryption Algorithms · WEP · TKIP · CCMP

07

Security Design Scenarios

TOPICS

Virtual Private Networks (VPN) · Remote Networking · Guest Access Networks

08

Secure Roaming

TOPICS

Roaming Basics and Terminology · Preauthentication · PMK Caching · Opportunistic Key Caching (OKC) · 802.11r FT · Proprietary Roaming · Voice-Enterprise

09

Network Monitoring

TOPICS

Wireless Intrusion Prevention Systems (WIPS) · WIPS Deployment Models · WIPS Policy · Threat Mitigation · Location Services · WNMS · Protocol Analysis · Spectrum Analysis

WLAN Design Overview

TOPICS

- Importance of good design
- Impact of bad design
- Design process
- Design skills
- Design toolkit
- Pre-planning
- Customer interaction
- Requirements gathering
- Discovering existing systems
- Documenting the environment
- Defining constraints
- Creating documentation
- Client device types
- Application types
- Application-specific design
- High density design issues
- Standard corporate networks

INDUSTRY-SPECIFIC DESIGNS

- Government
- Healthcare
- Hospitality
- Education
- Retail
- Public hotspots
- Transportation
- Mobile offices
- Outdoor and mesh
- Remote networks and branch offices
- Last-mile/ISP and bridging
- Defining vendor issues
- Operational planes
- Design models
- Understanding architecture differences
- RF spectrum
- RF behaviors
- Modulation and coding schemes
- RF accessories
- Throughput factors
- Antennas
- 802.11n and antennas
- Choosing APs
- Powering APs
- Site survey tools
- Site survey preparation
- Predictive site surveys
- Manual site surveys
- Site survey principles and processes
- Quality of Service (QoS) overview
- QoS application points
- Roaming support
- Bad security
- Authentication solutions
- Encryption solutions
- Security best practices
- Intrusion prevention
- Network health status
- Troubleshooting and validation process
- Troubleshooting and validation tools
- Common problems

WLAN Design Overview (continued)

- Requirements Analysis
- Designing for Clients and Applications
- Designing for IndustryVendor
- Selection Processes
- Radio Frequency Planning
- WLAN Hardware Selection
- Site Surveys
- Designing for QoS
- Designing for Security
- Installation Testing, Validation and Troubleshooting
- Design Troubleshooting

COURSE 3 Enterprise Wi-Fi Analysis & Troubleshooting (CWAP)

Principles of WLAN Communication

TOPICS

- 802.11 Working Group
- OSI reference model and the 802.11 PHY and MAC
- Communication sublayers and data units
- WLAN architecture components
- Organization of station forwarding
- Addressing and internetworking operation
- Modern WLAN product architectures

Physical (PHY) and MAC Layer Formats and Technologies

TOPICS

- Physical layer functions
- Preamble function and format
- Header purpose and structure
- Analysis of PHY problems

PHYSICAL PPDU FORMATS

- 802.11b
- 802.11a
- 802.11g
- 802.11n
- MAC frame components
- MAC encapsulation
- Fields and subfields of the MAC header
- Frame Control
- Frame types and subtypes and their uses
- Addressing
- Frame body
- Data frame format
- Control frame format
- Management frame format
- Information elements and fields

Protocol Operation

TOPICS

- Beacons and synchronization
- Scanning
- Client state machine
- 802.11 contention
- QoS
- Admission control
- Band steering and airtime fairness mechanisms
- Fragmentation
- Acknowledgments and Block acknowledgments
- Protection mechanisms and backward compatibility
- Power management
- Dynamic Frequency Selection (DFS) and Transmit Power Control (TPC)
- Security components, methods, and exchanges
- Roaming procedures exchanges
- Future protocol enhancements

802.11n

TOPICS

- Transmit beamforming
- Spatial multiplexing
- Maximal Ratio Combining (MRC)
- Space-Time Block Coding
- 40 MHz channels
- Frame aggregation
- HT-OFDM format
- Modulation and Coding Schemes (MCS)
- HT frame formatting
- And More

Protocol Analysis Tools and Methodology

TOPICS

- Troubleshooting methodology
- Protocol analyzer types
- Analysis NIC/adaptor selection and constraints
- Interpreting results based on location
- Analyzer settings and features
- Filtering and channel scanning
- Interpreting decodes
- Using advanced analysis features
- Assessing WLAN health and behavior factors
- Evaluating network statistics
- Troubleshooting common problems
- Wired analysis to support wireless network issues

Spectrum Analysis Tools and Methodology

TOPICS

- Radio frequency behavior review
- Visualizing RF domains using spectrum measurement tools
- Spectrum analyzer types and operation
- Analyzer specifications and characteristics
- Understanding spectrum data presentation
- Interpreting plots and charts
- Common WLAN spectrum analyzer features
- Identifying transmit patterns
- Device classification and network impact
- Recognizing transmit signatures

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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