KOENIG SOLUTIONS · COURSE OUTLINE

Wireless: MIMO, 802.11ac & WPA3-SAE

Learn to design, deploy and troubleshoot wireless networks using RF fundamentals, MIMO, 802.11ac and WPA3-SAE security.

9	45
MODULES	TOPICS

COURSE OVERVIEW

This course covers RF fundamentals, signal measurement and the mathematics behind link budgets and path loss, followed by spread spectrum technologies such as FHSS, DSSS and OFDM. It examines MIMO technology in 802.11n and 802.11ac, WLAN architectures, 802.11 frame types, and the configuration of SSIDs, VLANs, DHCP and RADIUS authentication. It then addresses merging wireless controllers into a network, managing wireless clients, roaming and guest network design with authentication methods including WPA3-SAE and EAP-TLS. Finally, it covers monitoring, troubleshooting, interference management, firmware management and security auditing of wireless networks.

WHO THIS COURSE IS FOR

- **Network Engineers**
- **Wireless Engineers**
- **Network Administrators**
- **Security Engineers**
- **IT Support Technicians**

LEARNING OBJECTIVES

- Explain RF characteristics and propagation fundamentals
- Calculate signal-to-noise ratio, link budget and path loss
- Compare FHSS, DSSS and OFDM spread spectrum techniques
- Describe MIMO principles including spatial multiplexing and beamforming
- Analyse 802.11 frame types such as beacon, RTS and CTS
- Configure WLANs including SSIDs, VLANs and RADIUS authentication
- Plan controller deployment models and WLAN profiles
- Troubleshoot connectivity, interference and performance issues

COURSE SYLLABUS

9 Modules, 45 Topics

01

Introduction to Wireless Networking and RF Fundamentals

TOPICS

- Introduction to Wireless Communication
- Evolution of Wireless Technologies
- **RF Characteristics:** Frequency, Amplitude, Phase
- Electromagnetic Spectrum and Frequency Allocation
- Basics of RF Propagation

02

RF Measurements and Mathematics

TOPICS

RF Signal Measurement Techniques · Analyzing Signal Strength and Quality · Understanding Signal-to-Noise Ratio (SNR) · **Power Conversion:** dBm to mW and vice versa · Calculating Link Budget and Path Loss

03

Wireless Networks and Spread Spectrum Technologies

TOPICS

- Wireless Network Fundamentals and Topologies
- Types of Wireless Communication
- FHSS vs. DSSS vs. OFDM
- Impact of Spread Spectrum Techniques on Interference
- Dynamic Channel Allocation and Frequency Hopping

04

MIMO Technology: HT and VHT

TOPICS

MIMO Principles and Benefits · Understanding Antenna Diversity · MIMO in 802.11n (HT) and 802.11ac (VHT) · Spatial Multiplexing and Beamforming · Real-World Applications of MIMO in WLANs

05

WLAN Architectures and 802.11 Frame Types

TOPICS

- Autonomous vs. Controller-Based WLAN Architectures
- Overview of CAPWAP and LWAPP Protocols
- Understanding Beacon Frame and its Components
- **Control Frame Subtypes:** RTS and CTS
- In-Depth Analysis of QoS Data and Management Frames

06

Configuring and Managing WLANs

TOPICS

- **Site Survey:** Coverage and Capacity Planning
- **Configuring SSIDs:** Broadcast vs. Hidden SSIDs
- Implementing VLANs for Segmentation and Security
- Role of DHCP and IP Assignment in WLANs
- Utilizing RADIUS Servers for Enhanced Authentication

07

Merging Wireless Controllers into the Network

TOPICS

- Introduction to Wireless Controllers
- **Controller Deployment Models:** Centralized vs. Distributed
- Configuring WLAN Profiles and Policies
- Wireless Controller Redundancy and Failover
- Network Segmentation and WLAN Design Considerations

08

Understanding Wireless Clients and Implementing Guest Networks

TOPICS

- Analysis of Client Roaming Behaviors and Challenges
- Implementing Fast BSS Transition (802.11r)
- **Isolation Modes:** Client, SSID, VLAN
- Designing Secure Guest Networks with Captive Portals
- **Authentication Methods:** Open, WPA3-SAE, EAP-TLS

09

Maintaining and Troubleshooting Wireless Networks

TOPICS

- **WLAN Monitoring:** Tools and Techniques
- Identifying and Resolving Connectivity and Performance Issues
- **Managing RF Interference:** Wi-Fi and Non-Wi-Fi Sources
- **Firmware Management:** Best Practices and Rollback Strategies
- Security Auditing and Compliance in Wireless Networks

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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