

MikroTik Certified Enterprise Wireless Engineer



Online Course



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Course Modules

1. Wireless Introduction

- Wireless routers
 - RouterBOARD hardware with integrated wireless
 - MikroTik wireless cards

2. RF Wireless Characteristics

- The RF Radio Spectrum and Electromagnetic Energy
- Decibels
- Antenna theory and examples of use
 - Isotropic
 - Directional
 - Omnidirectional
- Antenna polarization
- Initial class setup
- 2.4/5GHz indoor/outdoor cell sizes and transmitter powers
- Client roaming
- RouterOS station roaming setting
- Co-channel and Adjacent-channel interference
- Choosing correct access point placement
- Physical network infrastructure
- Understanding 'Airtime'



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3. Wireless Standards

- 802.11a/b/g/n/ac wireless protocol
- 802.11 standards feature overview
- Bands, channels (frequencies) and channel widths
- Scan list
- Modulation schemes and MCS data rates
- Channel bonding
- Frame aggregation overview
- Chains (SISO, MIMO and MU-MIMO)
- CSMA/CA overview
- HW protection (RTS/CTS)
- QoS priorities / WMM®
- Future standards (802.11ax)

4. Country / Regulatory Domain Settings in CAPsMAN

- Antenna gain and control of maximum EIRP
- Setting antenna gain on CAP
- Selecting the country code and purpose of 'installation' setting
- Dynamic frequency selection (DFS radar detect)



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5. Non CAPsMAN Wireless Modes

- Extending coverage with repeaters and extenders
- Bridging with MikroTik 60GHz Wireless Wire products

6. Wireless Security

- Authentication (Open / Shared)
- Encryption (WEP, WPA™ TKIP, WPA2™ AES)
- Weaknesses of older encryption (WEP / WPA™ TKIP)
- Overview of 802.11X (RADIUS and EAP)
- Performance difference of TKIP vs. AES
- Basic access list (ACL) management
- Mitigating against most common known vulnerabilities of 802.11

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7. Wireless Troubleshooting

- Troubleshooting wireless clients
- Registration table analysis
- TX/RX signal strength
- Signal to noise ratio
- CCQ, frames and HW frames, hardware retries
- Data rates
- Analysing the System log for wireless problems
- Scan, background scan
- Frequency usage
- Wireless snoopers
- Wireless sniffer

8. Wireless Surveys

- Pre-install site surveys
- Spectrum analysis overview
- Prediction software overview
- Post-install validation surveys



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9.CAPsMAN v2

- MikroTik CAPsMAN version 2 features
- CAP hardware/software requirements
- L2 (broadcast/multicast) vs L3 (via UDP) CAPs communication methods
- Using DHCP option 138
- Configuration of a CAP
 - CAPsMAN discovery and selection by CAP
 - Authentication and locking by SSL certificates
 - Auto certificate & locking
 - Auto upgrading feature
 - Securing the CAP configuration
- CAPsMAN configuration settings (channels, datapaths, security)
- Provisioning CAP Interfaces (single and dual band APs)
- Datapath / local forwarding
- Dynamic vs static CAP interfaces on CAPsMAN
- Virtual AP (additional SSIDs)
- Static interfaces on CAPs (slave virtual interfaces with VLANs)
- Access list features

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**For contact: +91 8680961847
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