MTCEWE

Table 1. MikroTik Certified Enterprise Wireless Engineer

Раздел	Содержание
Wireless Introduction	• Беспроводные маршрутизаторы ◦ Аппаратное обеспечение RouterBOARD с интегрированным беспроводным модулем ◦ Беспроводные карты MikroTik
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 • Attenuation/absorption and reflective properties of building materials and how they affect radio signals • 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'
Wireless Standards	• 802.11a/b/g/n/ac Wireless Protocol ◦ 802.11 Standards Features Overview ◦ Bands, Channels (Frequencies) and Channel Widths ◦ Scan List ◦ Modulation schemes and 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)
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 with • Dynamic frequency selection (DFS radar detect)

Раздел	Содержание
Non CAPsMAN Wireless Modes	• Extending coverage with repeaters and extenders • Bridging with MikroTik’s mmWave Wireless Wire products
Wireless Security	• Authentication (Open / Shared) • Encryption (WEP, WPATM TKIP, WPA2TM AES) • Weaknesses of older encryption (WEP / WPATM TKIP) • Overview of 802.11X • Performance difference of TKIP vs. AES • Basic Access list (ACL) management • Mitigating against most common known vulnerabilities of 802.11
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 Snooper • Wireless Sniffer
Wireless Surveys	• Pre-install site surveys • Spectrum Analysis overview • Prediction software overview • Post-Install Validation Surveys

Раздел	Содержание
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 Configurations, Data Rates) • 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