



Certified Wireless Engineer (MTCWE)

Training outline

- Duration:** 3 days
- Objectives:** By the end of this training session, the student will be able to understand major RouterOS wireless features and implement them into real life setups. Should be able to make common wireless network setups.
- Target Audience:** Network engineers and technicians wanting to deploy and support:
- Corporate wireless networks
 - WISPs and ISPs
- Course prerequisites:** MTCNA certificate

Title	Objective
<p>Module 1 Wireless Installations</p>	<ul style="list-style-type: none"> • Wireless routers <ul style="list-style-type: none"> • RouterBOARD hardware with integrated wireless • MikroTik wireless cards • Antenna types <ul style="list-style-type: none"> • Directional • Sector • Omnidirectional • Dual chain MIMO • Antenna polarization • Antenna parameters • Shielding and physical separation distances • Noise <ul style="list-style-type: none"> • Self interference • Amplification • Initial class setup • Module 1 laboratory
<p>Module 2 Wireless Theory</p>	<ul style="list-style-type: none"> • Decibels • Free-space path loss (FSPL) <ul style="list-style-type: none"> • 2.4 GHz vs. 5 GHz • Cable loss • Signal to noise and modulation rates (QAM/MCS) • Line of sight <ul style="list-style-type: none"> • Radio line of sight • Optical line of sight • Earth curvature • Fresnel zone • Wireless link budget calculation • Module 2 laboratory
<p>Module 3 Wireless Standards</p>	<ul style="list-style-type: none"> • 802.11a/b/g/n/ac wireless protocol <ul style="list-style-type: none"> • Features • Bands and channel width • Data rates • Frequencies • Scan list • Channel bonding • Frame aggregation • CSMA/CA • TX power • Chain settings • Priorities • Nstreme protocol • Nv2 protocol

	<ul style="list-style-type: none"> • Overview of TDMA • Nv2 security • Priorities • Future standards <ul style="list-style-type: none"> • Module 3 laboratory
<p>Module 4 Wireless Modes</p>	<ul style="list-style-type: none"> • AP bridge • Station bridge • Pseudobridge • Virtual AP/station • Wireless repeater • Station roaming <ul style="list-style-type: none"> • Module 4 laboratory
<p>Module 5 Country Regulation Settings</p>	<ul style="list-style-type: none"> • Country • Frequency mode • Tx power • Dynamic frequency selection (radar detect) • Lock package <ul style="list-style-type: none"> • Module 5 laboratory
<p>Module 6 Wireless Security</p>	<ul style="list-style-type: none"> • Access management • Access list • Connect list • Authentication • Encryption • Basic features of 802.11X <ul style="list-style-type: none"> • Module 6 laboratory

<p>Module 7 Wireless Troubleshooting</p>	<ul style="list-style-type: none"> • Troubleshooting wireless clients • Registration table analysis • Ack-timeout/distance • CCQ • TX/RX signal strength • Frames and HW frames • Data rates <ul style="list-style-type: none"> • HW retries • HW protection • Adaptive noise immunity • Wireless link debugging • Module 7 laboratory
<p>Module 8 Wireless Tools</p>	<ul style="list-style-type: none"> • Scan, background scan, scan to file • Frequency usage • Spectral scan/history • Snooper • Align • Sniffer • Module 8 laboratory
<p>Module 9 Other wireless technologies</p>	<ul style="list-style-type: none"> • Mobile <ul style="list-style-type: none"> • LTE • 5G • CAT-M • NB-IoT • GPS • 60 GHz <ul style="list-style-type: none"> • Security profile • Connected clients • Alignment • Backup link • Lockpack • LoRa networks • Module 9 laboratory