

Certified Switching Engineer (MTCSWE)

Training outline

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| Duration: | 3 days |
| Outcomes: | By the end of this training session, the student will be familiar with RouterOS Layer 2 forwarding software and RouterBOARD hardware switch chip features and bridge features. The student will be able to configure and control Layer 2 forwarding using MikroTik networking solutions. |
| Target audience: | Network engineers and technicians wanting to deploy and support Layer 2 based networks. |
| Course prerequisites: | MTCNA certificate |
| Suggested reading: | Search for 'Layer 2 networking', 'Bridging', 'Switching', 'VLAN' |

| Title | Objective |
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| <p>Module 1 Introduction</p> | <ul style="list-style-type: none"> • Layer 2 forwarding concepts <ul style="list-style-type: none"> • Unicast, multicast and broadcast traffic • MAC learning in bridges and switches • Interface settings • RouterOS bridge overview • RouterBOARD switch chip overview <ul style="list-style-type: none"> • RouterBOARDS with basic switch chips • Cloud Router Switch (CRS) series devices with advanced switch chips • SwitchOS (SwOS) brief overview • Module 1 laboratory |
| <p>Module 2 MTU</p> | <ul style="list-style-type: none"> • MTU • RouterOS bridge overview • L2MTU • Jumbo frames • Potential MTU issues • Module 2 laboratory |
| <p>Module 3 VLAN</p> | <ul style="list-style-type: none"> • 802.1Q and 802.1ad VLAN overview and tagging concepts • RouterOS VLAN interfaces <ul style="list-style-type: none"> • Port based VLAN (VLAN bridging) • Inter-VLAN routing (<i>'router on a stick'</i>) • VLANs in basic switch chips <ul style="list-style-type: none"> • Port based VLAN • VLANs in bridge interfaces <ul style="list-style-type: none"> • Port based VLAN • MAC based VLAN • Protocol based VLAN • QinQ (802.1ad) <ul style="list-style-type: none"> • QinQ implementation with bridge VLAN filtering • QinQ implementation with VLAN interfaces • Module 3 laboratory |
| <p>Module 4 Spanning Tree Protocol</p> | <ul style="list-style-type: none"> • Spanning tree protocol (STP) concepts <ul style="list-style-type: none"> • STP bridge priority • STP port path cost • STP and RSTP comparison • Multiple Spanning tree (MSTP) concepts <ul style="list-style-type: none"> • MSTP definition • MSTP regions • CST/CIST • Bridge protocol data unit (BPDU) • Spanning tree security • Module 4 laboratory |
| <p>Module 5 Link Aggregation</p> | <ul style="list-style-type: none"> • RouterOS bonding <ul style="list-style-type: none"> • Bonding modes • Compatibility with other static link aggregation • Module 5 laboratory |

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| Module 6 Port Isolation | <ul style="list-style-type: none"> • RouterOS bridge horizon • Switch port isolation • Module 6 laboratory |
| Module 7 QoS | <ul style="list-style-type: none"> • Layer 2 QoS (802.1p) <ul style="list-style-type: none"> • RouterOS bridge filter priority • CRS priority configuration • Traffic shaping <ul style="list-style-type: none"> • Bandwidth limiting in bridge with queues • Bandwidth limiting in switch chip • Module 7 laboratory |
| Module 8 Layer 2 Security | <ul style="list-style-type: none"> • IGMP snooping • DHCP snooping • Loop protect • Traffic storm control • Layer 2 firewall <ul style="list-style-type: none"> • RouterOS bridge filter features • Switch access control list • BPDU guard • ARP modes • Port security • 802.1X • Switch security • Module 8 laboratory |
| Module 9 PoE | <ul style="list-style-type: none"> • RouterOS PoE modes and compatibility • RouterOS PoE priority settings • RouterOS PoE monitoring • Module 9 laboratory |
| Module 10 Tools | <ul style="list-style-type: none"> • Layer2 diagnostic tools • Port mirroring • Module 10 laboratory |
| Module 11 SwOS | <ul style="list-style-type: none"> • Introduction to SwOS • RouterBOARD dual-boot compatibility • Installing SwOS • Managing SwOS • Configuration of Layer 2 Features with SwOS <ul style="list-style-type: none"> • VLANS • (R)STP • Port trunking • QoS • Layer 2 security • Module 11 laboratory |