Certified Switching Engineer (MTCSWE)

Training outline

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

Module 1
Introduction
	• Layer 2 forwarding concepts
	  • Unicast, multicast and broadcast traffic
	  • MAC learning in bridges and switches
	  • Interface settings
	• RouterOS bridge overview
	• RouterBOARD switch chip overview
	  • RouterBOARDs with basic switch chips
	  • Cloud Router Switch (CRS) series devices with advanced switch chips
	• SwitchOS (SwOS) brief overview
	• **Module 1 laboratory**

Module 2 MTU	• MTU • RouterOS bridge overview • L2MTU • Jumbo frames • Potential MTU issues • **Module 2 laboratory**

Module 3
VLAN
	• 802.1Q and 802.1ad VLAN overview and tagging concepts
	• RouterOS VLAN interfaces
	  • Port based VLAN (VLAN bridging)
	  • Inter-VLAN routing (*'router on a stick'*)
	• VLANs in basic switch chips
	  • Port based VLAN
	• VLANs in bridge interfaces
	  • Port based VLAN
	  • MAC based VLAN
	  • Protocol based VLAN
	• QinQ (802.1ad)
	  • QinQ implementation with bridge VLAN filtering
	  • QinQ implementation with VLAN interfaces
	• **Module 3 laboratory**

Module 4
Spanning Tree Protocol
	• Spanning tree protocol (STP) concepts
	  • STP bridge priority
	  • STP port path cost
	  • STP and RSTP comparison
	• Multiple Spanning tree (MSTP) concepts
	  • MSTP definition
	  • MSTP regions
	  • CST/CIST
	• Bridge protocol data unit (BPDU)
	• Spanning tree security
	• **Module 4 laboratory**

Module 5
Link Aggregation
	• RouterOS bonding
	  • Bonding modes
	  • Compatibility with other static link aggregation
	• **Module 5 laboratory**

Module 6 Port Isolation	• RouterOS bridge horizon • Switch port isolation • **Module 6 laboratory**

Module 7
QoS
	• Layer 2 QoS (802.1p)
	  • RouterOS bridge filter priority
	  • CRS priority configuration
	• Traffic shaping
	  • Bandwidth limiting in bridge with queues
	  • Bandwidth limiting in switch chip
	• **Module 7 laboratory**

Module 8
Layer 2 Security
	• IGMP snooping
	• DHCP snooping
	• Loop protect
	• Traffic storm control
	• Layer 2 firewall
	  • RouterOS bridge filter features
	  • Switch access control list
	• BPDU guard
	• ARP modes
	• Port security
	• 802.1X
	• Switch security
	• **Module 8 laboratory**

Module 9 PoE	• RouterOS PoE modes and compatibility • RouterOS PoE priority settings • RouterOS PoE monitoring • **Module 9 laboratory**

Module 10 Tools	• Layer2 diagnostic tools • Port mirroring • **Module 10 laboratory**

Module 11
SwOS
	• Introduction to SwOS
	• RouterBOARD dual-boot compatibility
	• Installing SwOS
	• Managing SwOS
	• Configuration of Layer 2 Features with SwOS
	  • VLANS
	  • (R)STP
	  • Port trunking
	  • QoS
	  • Layer 2 security
	• **Module 11 laboratory**