

MikroTik RouterOS & RouterBoard Wireless features overview

Pauls Jukonis
MikroTik, Latvia

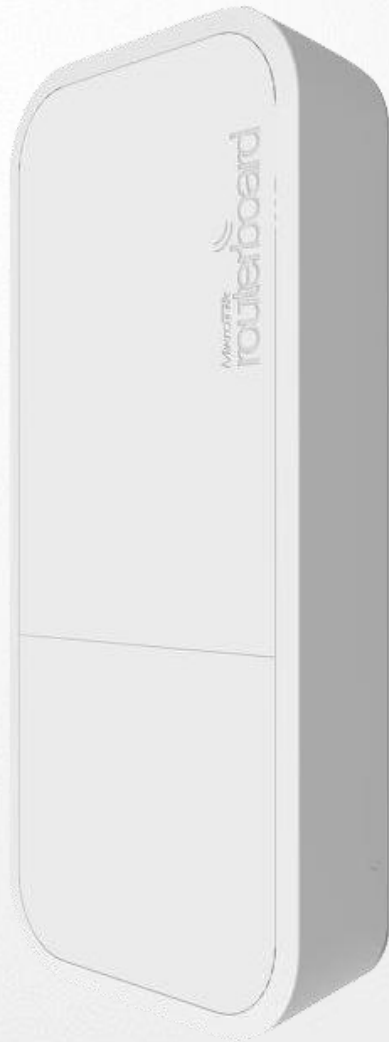
MUM Portugal

May 2016

Overview

- Gift from MikroTik – wAP
- Wireless quick guide
- Wireless-rep package

WAP



Black and White edition



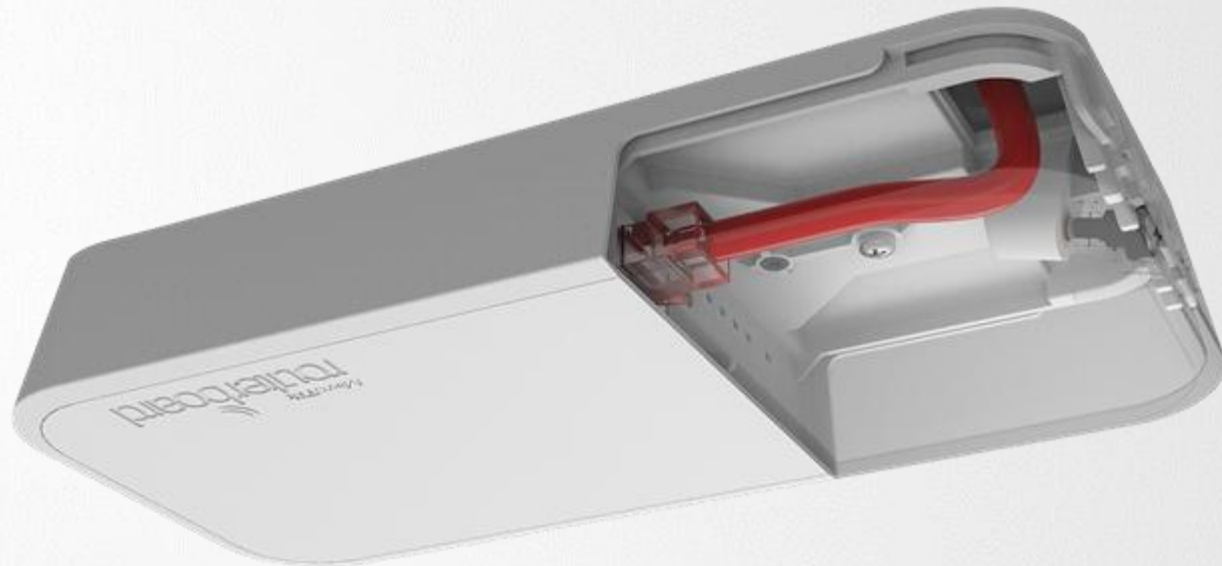
Specification

- CPU 650 MHz
- RAM 64 MB
- Flash 16 MB
- Wireless 802.11b/g/n dual-chain
- Gain 2dBi antennas
- Ethernet 10/100Mbps
- Voltage 11-57V
- Consumption up to 4W
- Operating Temperatures -40C to +70C
- Dimensions 185 x 85 x 30 mm

Features

- 2 chain Wireless radio
- Jack and PoE power option
- Wide input Voltage (11-57V)
- Supports 802.3af/at and Passive PoE
- Low Power Consumption
- High Operating Temperatures
- Suitable for indoor and outdoor
- Waterproof case design

Usage Cases



Use it on the ceiling!

- The WAP comes bundled with all the necessary things to be mounted on ceiling
- Cable breakout provides ability to run cable through the ceiling

Usage Cases



Use it on the wall!

- Wall mounting is easy thanks to the provided drill template and screw anchor. Everything included

New wAP ac

- CPU 720 MHz
- RAM 64 MB
- Flash 16 MB
- Wireless 802.11b/g/n dual-chain
- Wireless 802.11a/n/ac triple-chain
- Gain 2dBi antennas
- Ethernet 10/100/1000Mbps
- Voltage 11-57V with 802.3at POE
- Consumption up to 12W
- Operating Temperatures -30C to +70C
- Dimensions 185 x 85 x 30 mm

Wireless quick guide

Wireless modes

Station modes:

- station
- station-bridge
- station-wds

AP modes:

- AP-bridge
- bridge
- wds-slave

Other modes are available!

Router as station

Configure wireless settings manually to connect to any access point.

- Configure security profiles (authentication-type, mode, key)
- Configure wireless settings (station mode, frequency, band, SSID)

Or use wireless scan feature.

Wireless scan

Fastest way to connect to AP

The screenshot shows a software interface for managing wireless networks. The top window, titled "Wireless Tables", has several tabs: "Interfaces", "Nstreme Dual", "Access List", "Registration", "Connect List", "Security Profiles", and "Channels". The "Scanner" tab is highlighted with a red box. Below the tabs are various icons and buttons, including "CAP", "WPS Client", "Setup Repeater", "Scanner" (highlighted), "Freq. Usage", "Alignment", "Wireless Sniffer", and "Wireless Snooper". A table below shows network statistics for the "wlan1" interface.

Name	Type	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx
R wlan1	Wireless (Atheros AR9...	0 bps	1280 bps	0	2	0 bps	1280

1 item out of 6 (1 selected)

The bottom window, titled "Scanner", shows the interface for performing a scan. The "Interface" is set to "wlan1". There is a "Background Scan" checkbox which is unchecked. On the right side, there are buttons for "Start", "Stop", "Close", "Connect" (highlighted with a red box), and "New Window". Below these buttons is a table of detected access points.

	Address	SSID	Channel	Signa...	Noise...	Signa...	Radio Name	RouterO...
AP	30:91:8F:9E:5A:03	TNCAP9...	2437/20-Ce/gn	-77	-108	31		
APRB	D4:CA:6D:83:77:03	BackBone	2447/20-eC/gn	-70	-107	37	D4CA6D837703	6.35.1
APRB	4E:5E:0C:61:B4:63	testAP	2447/20-eC/gn	-44	-107	63	4C5E0C61B463	6.36rc10

3 items (1 selected)

Create AP using Quickset

Quickset allows you to configure wireless with few steps:

- CAP
- CPE
- Home AP
- PTP Bridge
- Wisp AP

Quickset

RouterOS WinBox

Session Settings Dashboard

Safe Mode Session: 00:0C:42:E1:B1:33

Home AP Quick Set

- Wireless

Network Name: HomeAP

Frequency: 2447 MHz

Band: 2GHz-B/G/N

Country: no_country_set

MAC Address: 00:0C:42:E1:B1:37

Use Access List (ACL)

WiFi Password: 12345678 Hide

WPS Accept

- Guest Wireless Network

Guest Network:

- Wireless Clients

MAC Address	In ACL	Last IP	Uptime	Sig
B4:E1:C4:D8:27:08	no	192.168.4.203	00:01:47	-25

Signal Strength: -30 dB

Copy To ACL Remove From ACL

- Internet

Address Acquisition: Static Automatic PPPoE

IP Address: Renew Release

Netmask:

Gateway:

MAC Address: 00:0C:42:E1:B1:32

Firewall Router

- Local Network

IP Address: 192.168.88.1

Netmask: 255.255.255.0 (/24)

DHCP Server

DHCP Server Range: 192.168.88.10-192.168.88.100

NAT

UPnP

- VPN

VPN Access

VPN Address: 2c4f013ce985.sn.mynetname.net

- System

Check For Updates Reset Configuration

Password:

Confirm Password:

OK Cancel Apply

Frequency scan

Use scan tool, to find the best frequency

The screenshot shows a network management interface with the following components:

- Wireless Tables** window: Contains tabs for Interfaces, Nstreme Dual, Access List, Registration, Connect List, Security Profiles, and Channels. A toolbar includes buttons for adding, deleting, and filtering. The 'Freq. Usage' button is highlighted with a red box. Below the toolbar is a table with columns: Name, Type, Tx, Rx, Tx Packet (p/s), Rx Packet (p/s), FP Tx, and FP Rx. The 'wlan1' interface is selected, showing 0 bps for Tx and Rx.
- Freq. Usage (Running)** window: Shows the selected interface as 'wlan1'. It has buttons for Start, Stop, Close, and New Window.
- Frequency Scan Results Table:**

Frequency (MHz)	Usage	Noise F...
2412	0.5	-113
2417	0.0	-113
2422	1.7	-114
2427	0.0	-110
2432	0.0	-112
2437	2.3	-109
2442	5.0	-110
2447	5.3	-109
2452	25.3	-111
2457	1.2	-110
2462	0.5	-110

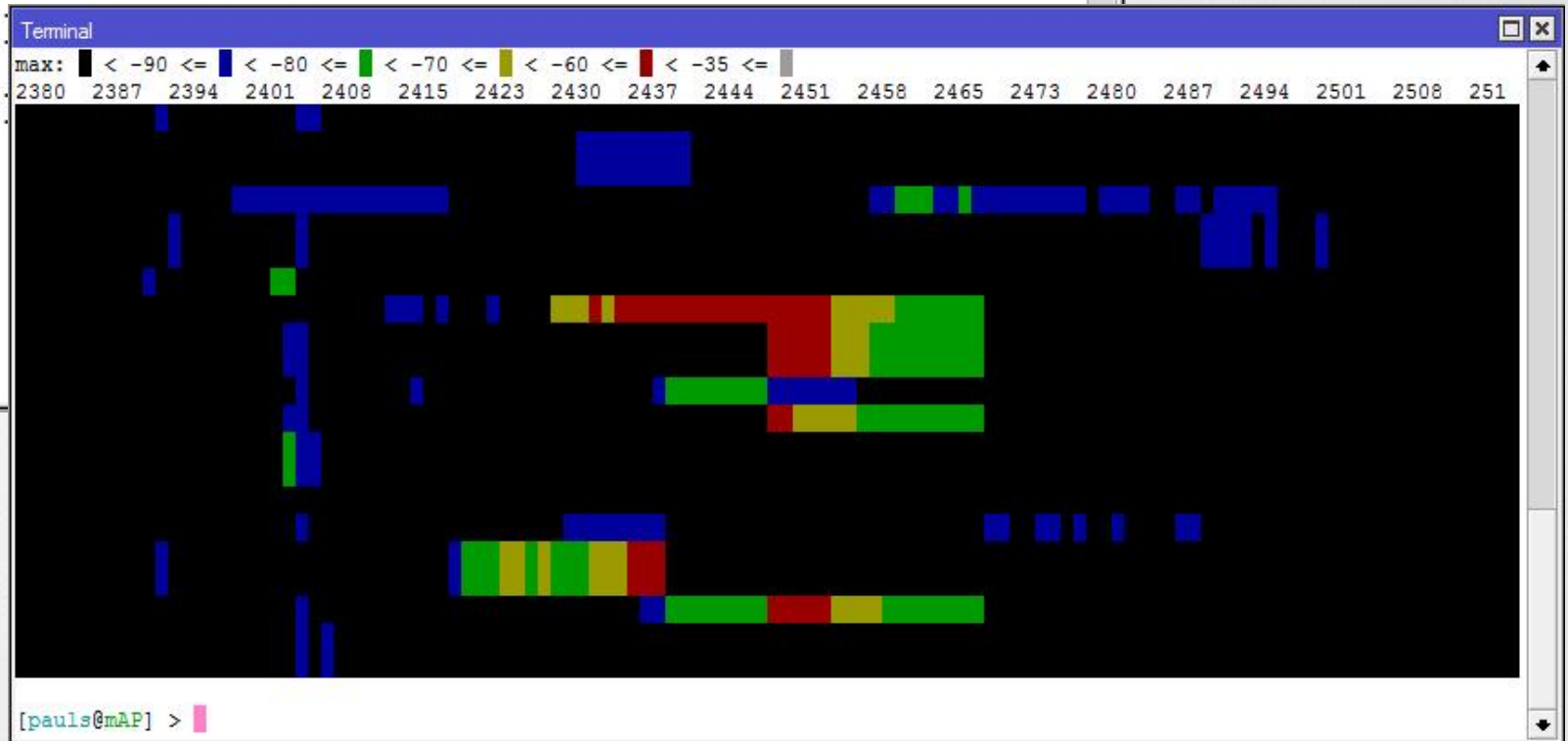
11 items

CLI wireless scan

Use terminal to check used frequencies

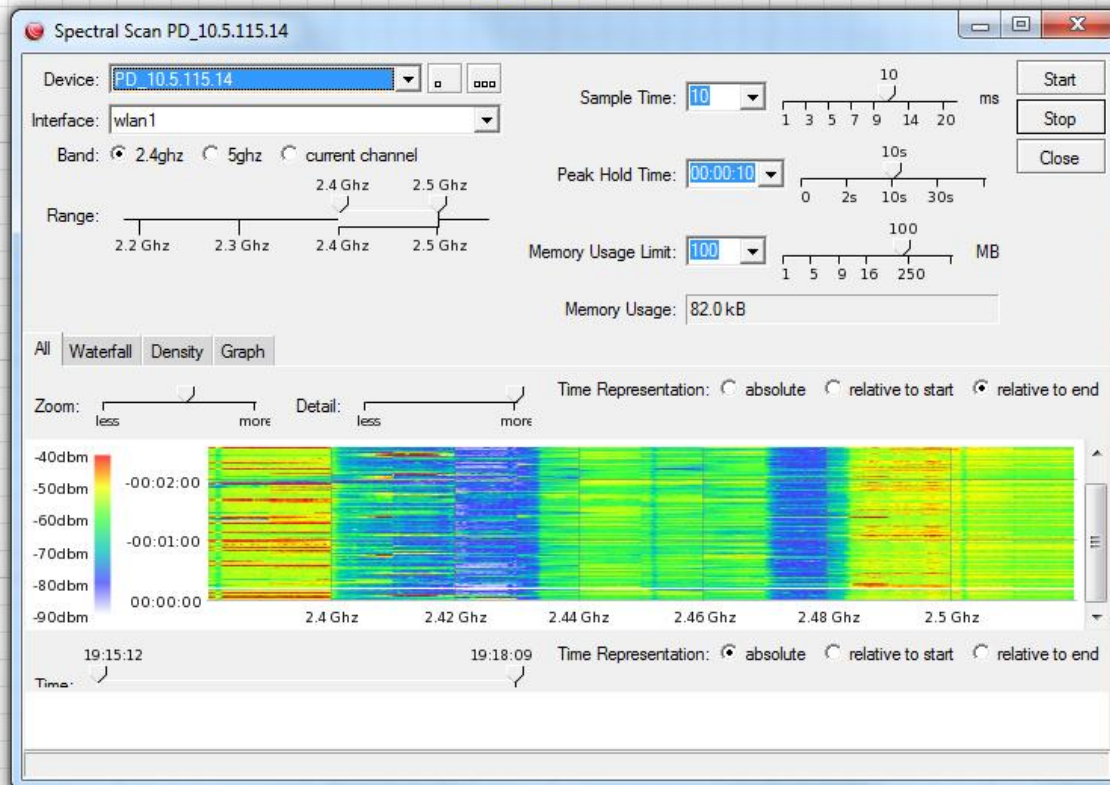
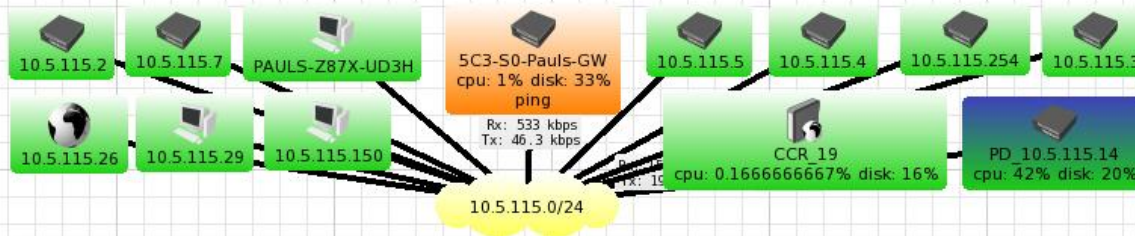
```
Terminal
2383 -97 .....
2389 -92 .....
2395 -90 .....
2401 -91 .....
2407 -90 .....
2413 -91 .....
2419 -92 .....
2425 -93 .....
2431 -94 .....
2437 -94 .....
2443 -95 .....
2449 -95 .....
2455 -94 .....
2461 -94 .....
2468 -96 .....
2474 -101 .....
2480 -103 .....
2486 -104 .....
2492 -104 .....
2498 -105 ....
2504 -105 .
2510 -107 .
2516 -107 .

[pauls@mAP] >
```



Dude

Scan wireless from Dude



- Settings
- Appearance
- Tools
 - Reprobe
 - Ack
 - Unack
 - Upgrade
 - Force Upgrade
 - Notes
 - Remove
 - Select Adjacent
- Ping
- Traceroute
- Snmpwalk
- Winbox
- Terminal
- Remote Connection
- Torch
- Bandwidth Test
- Spectral Scan
- Telnet
- Web
- Ftp
- Dude

Results

Compare throughput in different frequencies

Performance test: Date: 2016_05_05 11:24:08 RouterBOARD_3011UiAS-2HnD SN:5BFB0436E82D							
Freq	Rx	Tx	ccq	rxc	txc	sig	txs
2357	42.41	3.875	6.6	51.35	6.6	-37.7	-37.55
2377	0.87	28.765	38.6	9.05	38.6	-44.45	-41.8
2397	5.555	0.69	21.6	39.25	21.6	-38.4	-37
2417	80.025	80.07	88.35	94.75	88.6	-33.9	-33.95
2437	4.645	75.305	63.75	54.5	63.8	-38.15	-37.9
2457	62.285	78.845	54.4	74.4	54.4	-38.7	-40.3
2477	65.485	36.92	33.65	83.4	33.65	-36.85	-35.05
2497	0	0	0	0	0	0	0
2517	80.015	79.61	90.45	65.9	90.45	-39.05	-38.3

Test throughput

Measure throughput between wireless devices

The screenshot displays the 'Bandwidth Test' window within the BTest Server application. The interface is divided into a left-hand menu and a main configuration/monitoring area.

Left-hand menu (Tools):

- New Terminal
- MetaROUTER
- Partition
- Make Supout.rf
- Manual
- New WinBox
- Ext

Main Configuration Area:

- Test To:** 192.168.1.1
- Protocol:** udp tcp
- Local UDP Tx Size:** 1500
- Remote UDP Tx Size:** 1500
- Direction:** receive
- TCP Connection Count:** 20
- Local Tx Speed:** [] bps
- Remote Tx Speed:** [] bps
- Random Data
- User:** pauls
- Password:** []
- Lost Packets:** 304
- Tx/Rx Current:** 0 bps/35.8 Mbps
- Tx/Rx 10s Average:** 0 bps/26.6 Mbps
- Tx/Rx Total Average:** 0 bps/42.4 Mbps

Monitoring and Status:

- A bar chart at the bottom shows Tx (blue) and Rx (red) activity. The Rx bar is highlighted with a value of 35.8 Mbps.
- The status at the bottom left is 'stopped'.

Wireless sniffer

Capture frames & packets

The screenshot displays a software interface for a wireless sniffer, divided into three main sections:

- Wireless Tables:** A table listing available wireless interfaces. The 'wlan1' interface is selected.

Name	Type	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx
wlan1	Wireless (Atheros AR9...	0 bps	0 bps	0	0	0	0
- Wireless Sniffer:** Configuration panel for the selected interface.
 - Interface: wlan1
 - Processed Packets: 384
 - Memory Size: 9.9 KiB
 - Memory Saved Packets: 32
 - Memory Over Limit Packets: 352
 - File Size: 0 B
 - File Saved Packets: 0
 - File Overlimit Packets: 0
 - Stream Dropped Packets: 0
 - Stream Sent Packets: 0
 - File Limit: 10 KiB
 - Memory Limit: 10 KiB
- Wireless Sniffed Packets:** A table showing the details of captured packets.

Time (s)	Interfa...	Channel	Signal ...	Rate	Dst.	Src.	Type
0.069	wlan1	2447/20-eC/gn	-42	1Mbps	FF:FF:FF:FF:FF:FF	4E:5E:0C:61:B4:63	beacon
0.073	wlan1	2447/20-eC/gn	-70	1Mbps	FF:FF:FF:FF:FF:FF	D4:CA:6D:83:77:03	beacon
0.172	wlan1	2447/20-eC/gn	-42	1Mbps	FF:FF:FF:FF:FF:FF	4E:5E:0C:61:B4:63	beacon
0.176	wlan1	2447/20-eC/gn	-68	1Mbps	FF:FF:FF:FF:FF:FF	D4:CA:6D:83:77:03	beacon
0.227	wlan1	2447/20-eC/gn	-41	1Mbps	D4:CA:6D:83:77:03	4C:5E:0C:61:B4:63	unknown
0.229	wlan1	2447/20-eC/gn	-69	1Mbps	4C:5E:0C:61:B4:63	D4:CA:6D:83:77:03	unknown
0.274	wlan1	2447/20-eC/gn	-41	1Mbps	FF:FF:FF:FF:FF:FF	4E:5E:0C:61:B4:63	beacon

Wireless snoopers

Monitor frequency usage

The image shows two windows from a network monitoring application. The top window, titled "Wireless Tables", displays a table of network interfaces. The bottom window, titled "Wireless Snooper (Running)", shows a list of detected wireless networks with various metrics.

Wireless Tables

Name	Type	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx
wlan1	Wireless (Atheros AR9...	0 bps	0 bps	0	0	0 bps	0

1 item out of 7 (1 selected)

Wireless Snooper (Running)

Interface: wlan1

Channel	Address	SSID	Signal	Of Freq. (%)	Of Traf. (%)	Bandwidth	Net...	Stati...
2412/2...				13.1		107.0 kbps	0	0
2417/2...				0.0		0 bps	0	0
2422/2...				10.0		81.7 kbps	0	0
2427/2...	4C:5E:0C:61:B4:63	BackBone	-36	12.6	95.8	102.7 kbps		
2427/2...				13.1		102.7 kbps	0	1
2432/2...				2.2		20.6 kbps	0	0
2437/2...	30:91:8F:9E:5A:03	TNCAP9E...		2.2	100.0	20.5 kbps		1
2437/2...	30:91:8F:9E:5A:03	TNCAP9E...	-77	2.2	100.0	20.5 kbps		1
2437/2...				2.2		20.5 kbps	1	1
2442/2...				3.8		34.4 kbps	0	0
2447/2...	4E:5E:0C:61:B4:63	testAP		2.3	63.6	21.7 kbps		1
2447/2...	D4:CA:6D:83:77:03	BackBone		1.3	36.3	12.5 kbps		2
2447/2...	4E:5E:0C:61:B4:63	testAP	-45	2.3	63.6	21.7 kbps		
2447/2...	D4:CA:6D:83:77:03	BackBone	-78	1.3	36.3	12.5 kbps		
2447/2...	54:35:30:60:51:F3		-41	0.0	0.0	0 bps		
2447/2...	B4:E1:C4:D8:27:08	BackBone	-30	0.0	0.0	0 bps		
2447/2...				3.7		34.3 kbps	2	4
2452/2...				4.9		46.0 kbps	0	0
2457/2...				0.0		0 bps	0	0
2462/2...				0.0		0 bps	0	0

20 items

Wireless-rep
package

Wireless-rep package

- Repeater setup
- Background scan
- Virtual Wireless Interfaces
- WPS client
- New Wireless Scan features
- Scan-list Step support
- Station Roaming support
- G/N band support
- CAPsMAN additional settings enabled
- CAPsMAN Rates support

Repeater Setup

- Allow to receive signal from the AP and repeat the signal using the same physical interface locally for connecting other clients
- Allows to extend wireless service for the wireless clients
- Steps that this setup command does:
 - Configure wireless interface to connect to the AP
 - Create a Virtual AP interface
 - Create Bridge interface
 - Adds both (main and virtual) interfaces to bridge ports

Background Scan

- Supported for 802.11 protocol only
- Working conditions
 - Wireless interface should be enabled
 - For AP mode – when operating on fixed channel
 - For Station mode – when connected to AP
- Supported also on Virtual interfaces
 - Scan is only performed in channel where master interface is running

Virtual Wireless Interfaces

- Supported for 802.11 protocol only
- Virtual AP and Client interface can be added on the same physical interface
- Multiple Virtual Wireless interfaces can be added
- Background scan is supported on Virtual Wireless Interfaces and is only performed in channel where master interface is running

WPS Client Support

- Allows wireless client to get Pre-Shared Key configuration of the AP that has WPS Server enabled
- Gets information from any WPS Server running or can be specified to get only with specific SSID or MAC address
- Received configuration is shown on the screen and can be also saved to a new wireless security profile

Wireless Scan features

- Scan to file
 - Allows to save the scan results in a CSV format file
 - Supported with background scan
- Scan Round setting
 - Allows to do full scan of the scan-list and then stop scanning
 - Useful for remote scans on the clients
 - Supported with background scan as well

Scan-list Step feature

- Scan-list Step feature allows to make compact scan-list entries
- To make scan-list from 5500-5700 with 20mhz step now you need just one entry:
 - Scan-list=5500-5700:20
 - In system it will create scan-list with such frequencies:
5500,5520,5540,5560,5580,5600,5620,5640,5660,
5680,5700

Station Roaming support

- Supported for 802.11 protocol only
- While connected to AP station does periodic background scans to look for a better AP
- When a better AP is found station roams to the new AP
- Time intervals between scans becomes shorter when signal becomes worse
- Time intervals between scans becomes longer when signal becomes better

G/N Band Setting

- Regular Wireless Interface and CAPsMAN supports '2ghz-g/n' band setting
 - basic-rates – 6-54Mbps
 - supported – 6-54Mbps
 - ht-basic-mcs – None
 - ht-supported-mcs – 0-23

CAPsMAN Settings

- CAPsMAN now supports the following settings:
 - distance – default value is 'indoors'
 - hw-retries
 - hw-protection-mode
 - frame-lifetime
 - disconnect-timeout

CAPsMAN Rates support

- CAPsMAN supports Rates configuration tab:
 - Basic – B and A/G basic-rates
 - supported – B and a/G supported data-rates
 - ht-basic-mcs – N basic-rates
 - ht-supported-mcs – N supported data-rates
 - vht-basic-mcs – AC basic rates
 - vht-supported-mcs – AC supported data-rates

Sugessesions ?
Feature requests?

THANK YOU!