

MikroTik RouterOS & RouterBOARD Wireless features overview

Pauls Jukonis
MikroTik, Latvia

MUM Lebanon
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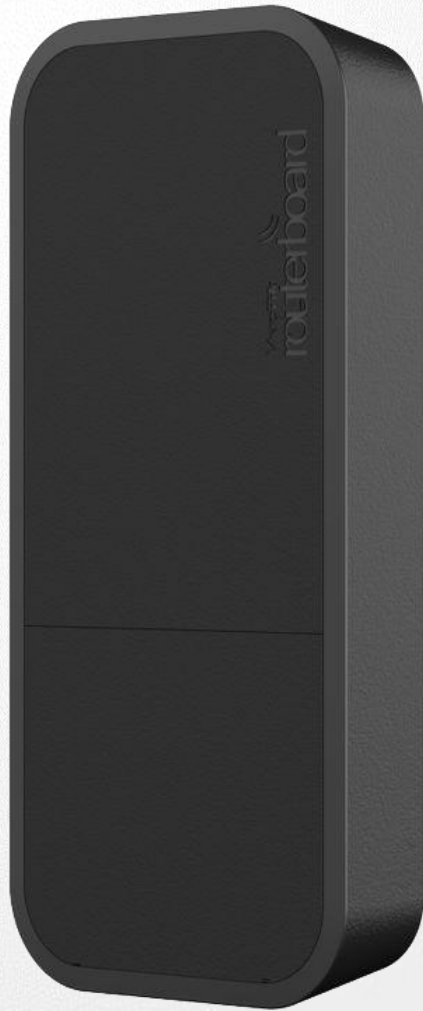
Overview

- RouterBOARD wAP
- Wireless quick guide
- Wireless-rep package

WAP



Black and White edition



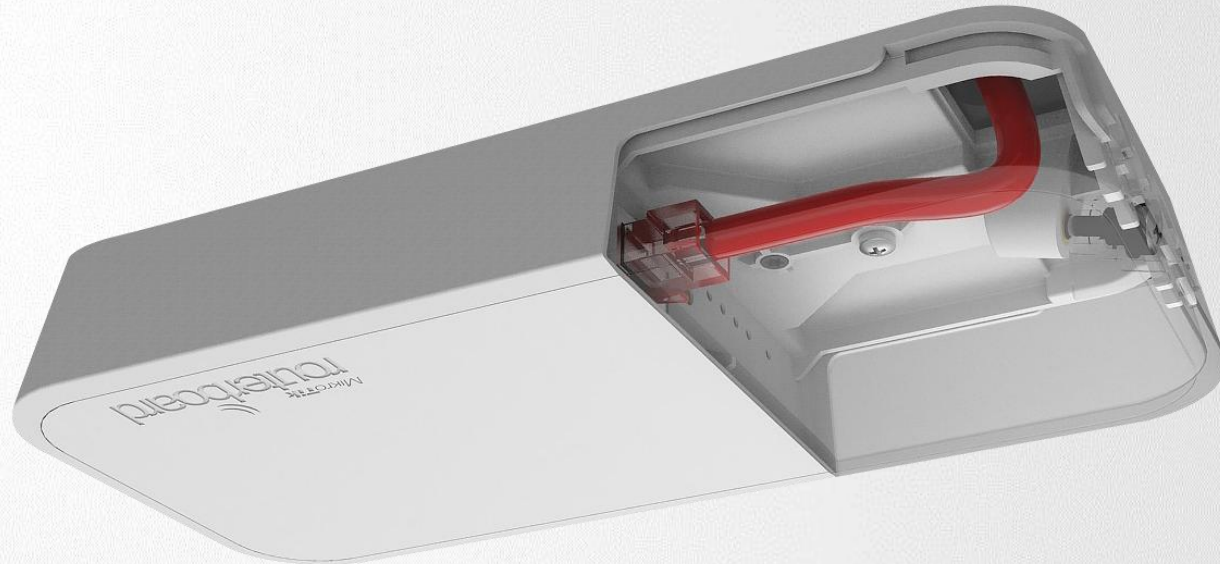
Specification

- 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 power input range (11-57V)
- Supports 802.3af/at and Passive PoE
- Low Power Consumption
- High Operating Temperatures
- Suitable for indoor and outdoor
- Waterproof case design

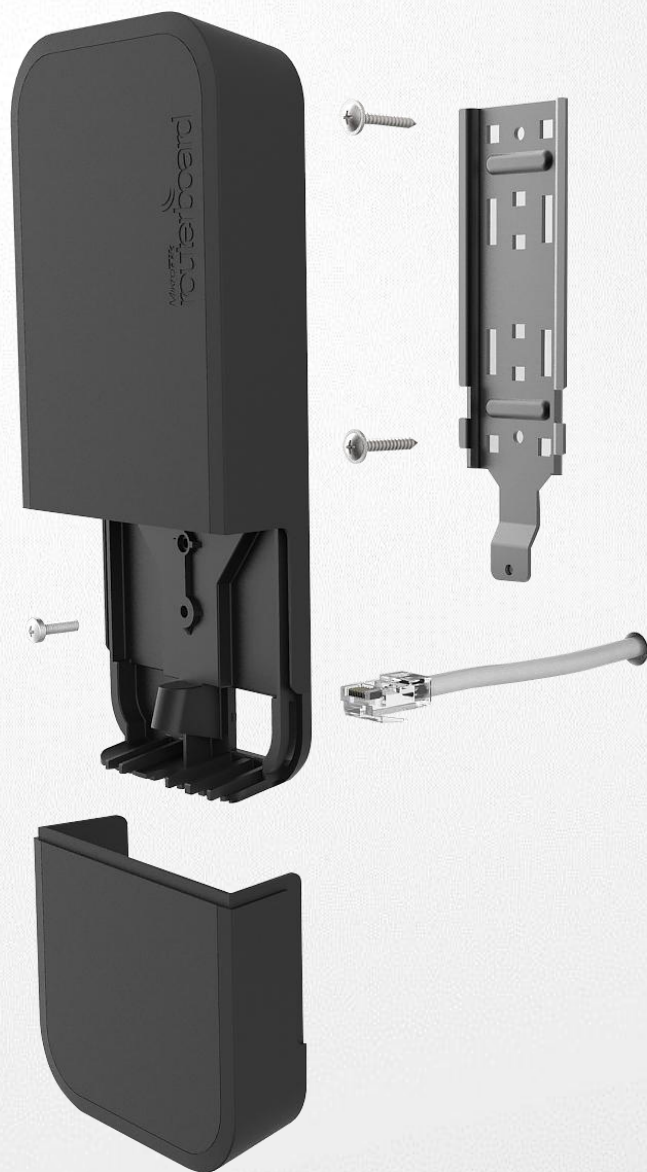
Usage Cases



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
- Consumption up to 12W
- Operating Temperatures -40C to +50C
- Dimensions 185 x 85 x 30 mm

Wireless quick guide

Frequency limitations

Regulatory-domain – Limit available channels and maximum transmit power for each channel according to the country limitations

manual-txpower – Use frequency limitations by country, without limiting the maximum transmit power

superchannel – Allow all frequencies supported by the card

Lock specific frequencies – Request factory installed lock package, to discard use of specific wireless frequencies

Wireless usage

PTP (Creates a connection between 2 points)

- PTP devices use **directional** antennas to send signal to narrow beam

PTMP (Allows multiple clients to establish connection)

Sector

- Uses **semi-directional** antenna to cover a specific range with signal, also called sector antenna

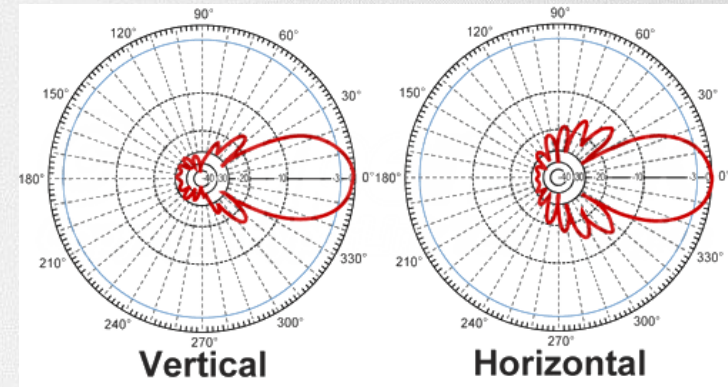
Regular (omni)

- Uses **omni-directional** antenna
- Allows clients to connect from all directions

Directional antenna...

Used for PTP links

- Focused beam
- Increased antenna gain
- Extended distance
- Reduced interference

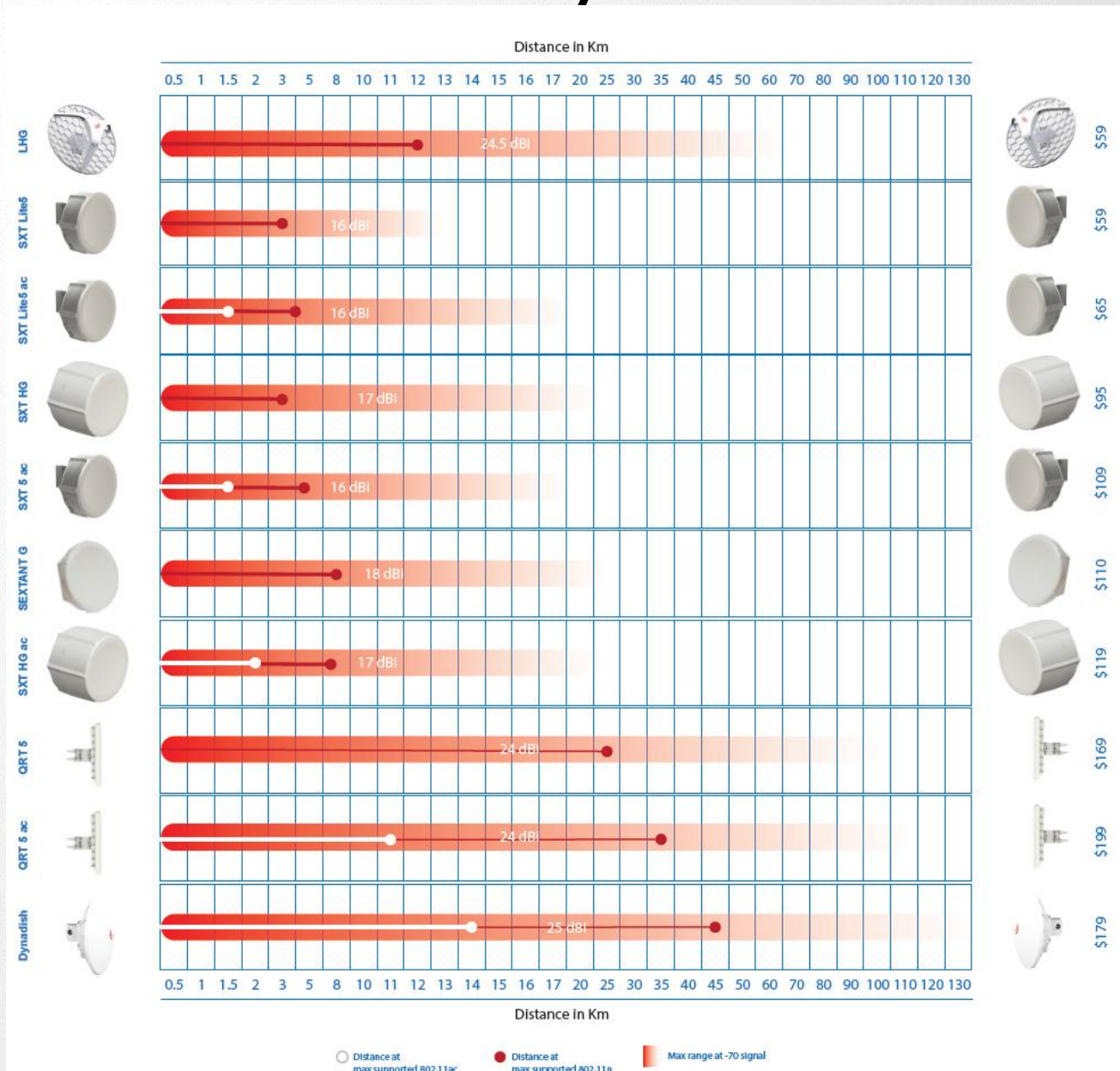


MikroTik PTP devices: DynaDish, LHG, SXT, QRT, Sextant

Mikrotik PTP antenna: mANT – parabolic dish antenna

mANT can be used with: NetMetal, BaseBox, NetBox or any other RP-SMA connector compatible device

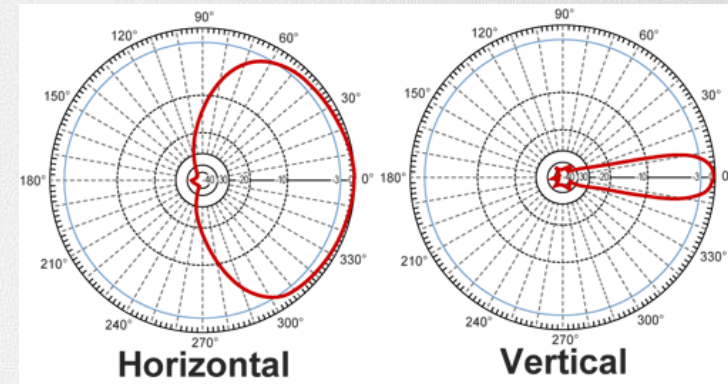
Choose by distance



Sector antenna...

Used for PTMP links

- Specific angle
- Covers large area
- Allows multiple clients
- Lower interference

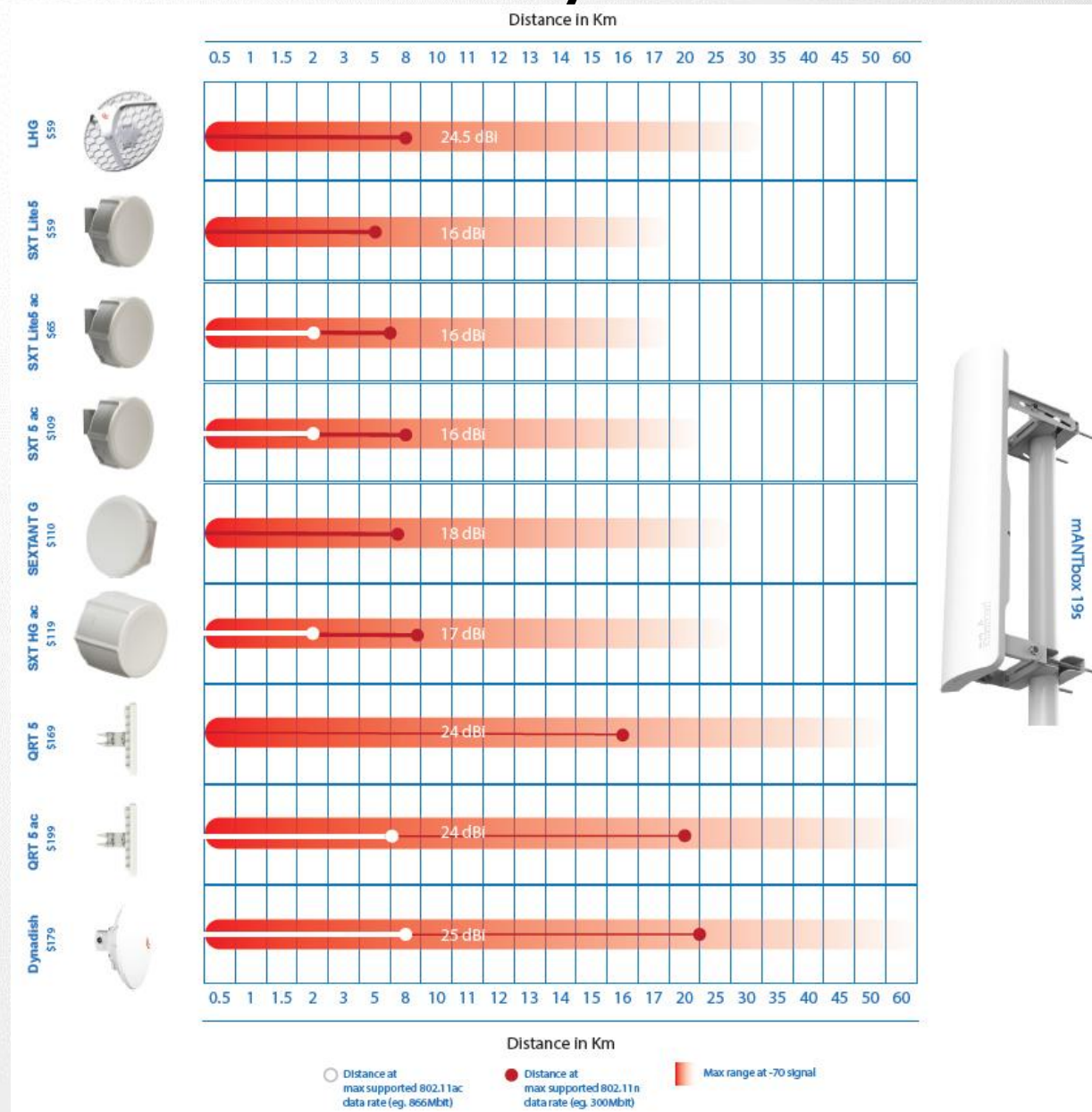


MikroTik PTMP devices: SXT SA5, SXT SA5 ac, mANTBox 15s/19s

Mikrotik PTMP antenna: mANT 15s/19s – sector antenna

mANT can be used with: NetMetal, BaseBox, NetBox or any other RP-SMA connector compatible device

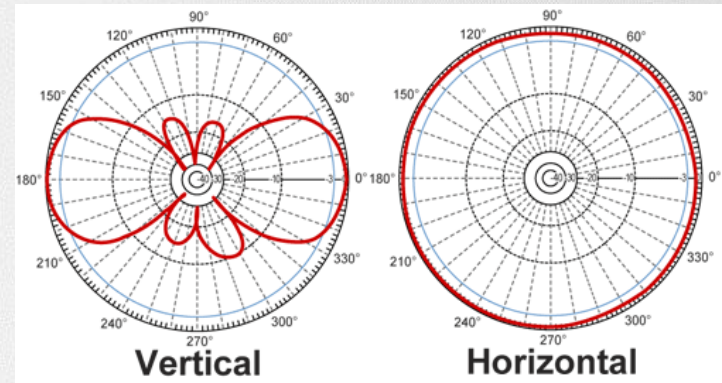
Choose by distance



Omni antenna...

Used to cover 360 degrees

- Receives and transmits signals to all directions
- Do not need to be pointed
- Allows multiple clients



MikroTik industrial omni devices: RB Groove, RB Metal, OmniTIK

MikroTik home/office wireless devices are equipped with omni antennas

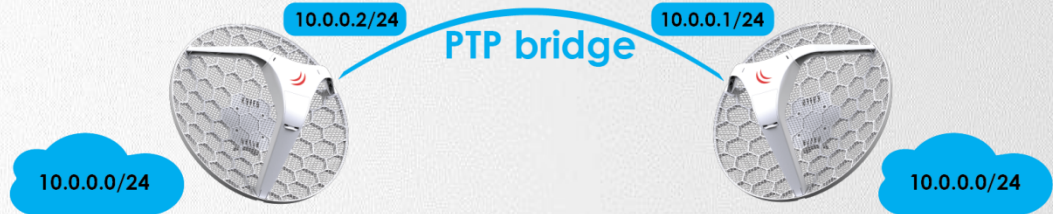
RouterBOARD: any wireless device with attached omni antenna

Wireless **station** modes

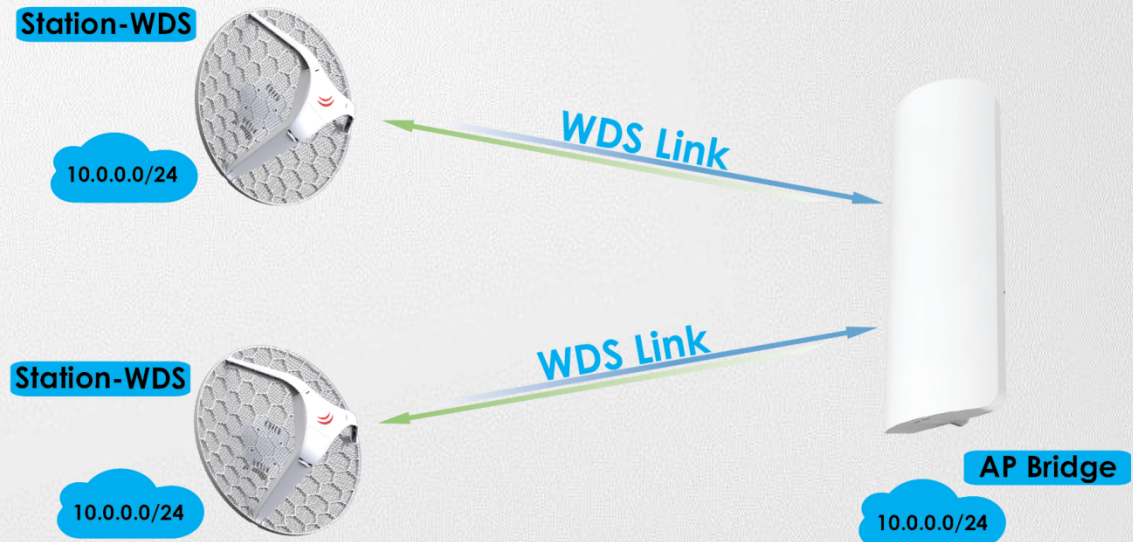
Station



Station-bridge



Station-WDS

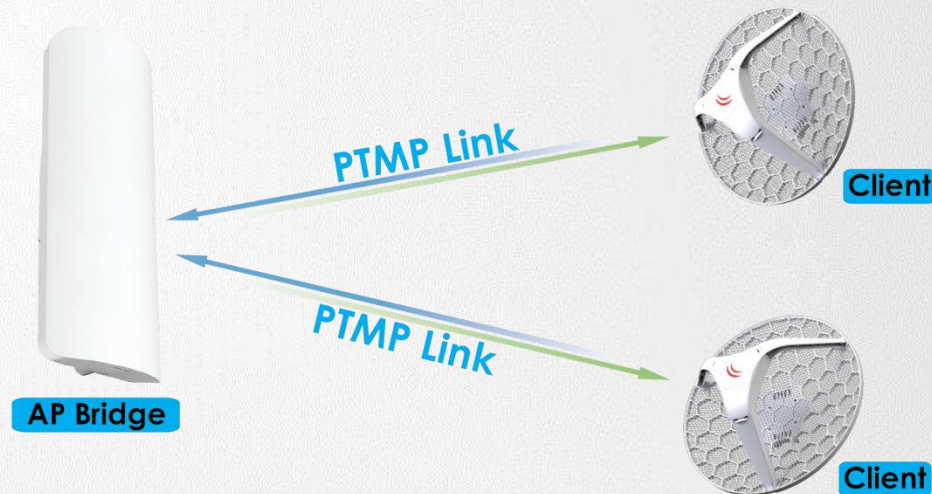


Wireless **AP** modes

Bridge



AP-Bridge



WDS-Slave



Wireless modes

AP modes:

- AP-bridge (Requires at least level 4 license)
- bridge (Requires at least level 3 license)

Station modes:

- Requires at least level 3 license

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

The fastest way to connect to AP

The screenshot shows a software interface for wireless network management. 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
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 APs.

Address	SSID	Channel	Signa...	Noise...	Signa...	Radio Name	RouterO...
30:91:8F:9E:5A:03	TNCAP9...	2437/20-Ce/gn	-77	-108	31		
D4:CA:6D:83:77:03	BackBone	2447/20-eC/gn	-70	-107	37	D4CA6D837703	6.35.1
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

The screenshot shows the RouterOS WinBox interface with the 'Quick Set' window open for a 'Home AP'. The interface is divided into several sections for configuration:

- Wireless:** Network Name: HomeAP, Frequency: 2447 MHz, Band: 2GHz-B/G/N, Country: no_country_set, MAC Address: 00:0C:42:37:B1:37. Includes a 'WPS Accept' button.
- Internet:** Address Acquisition: Automatic (selected), IP Address, Netmask, Gateway, MAC Address: 00:E1:42:E1:B1:32, Firewall Router checkbox.
- Local Network:** IP Address: 192.168.88.1, Netmask: 255.255.255.0 (/24), DHCP Server (checked), DHCP Server Range: 192.168.88.10-192.168.88.100, NAT (checked), UPnP checkbox.
- VPN:** VPN Access checkbox, VPN Address field.
- System:** Check For Updates, Reset Configuration buttons, Password and Confirm Password fields.

On the left, a sidebar lists various configuration options like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Partition, Make Supout.rf, Manual, New WinBox, and Exit.

At the bottom, there is a table for 'Wireless Clients' with columns for MAC Address, In ACL, Last IP, Uptime, and Sig. The table contains one entry: D8:E1:C4:D8:27:08, no, 192.168.4.203, 00:01:47, -25. Below the table is a signal strength indicator showing -30 dB and buttons for 'Copy To ACL' and 'Remove From ACL'.

Frequency scan

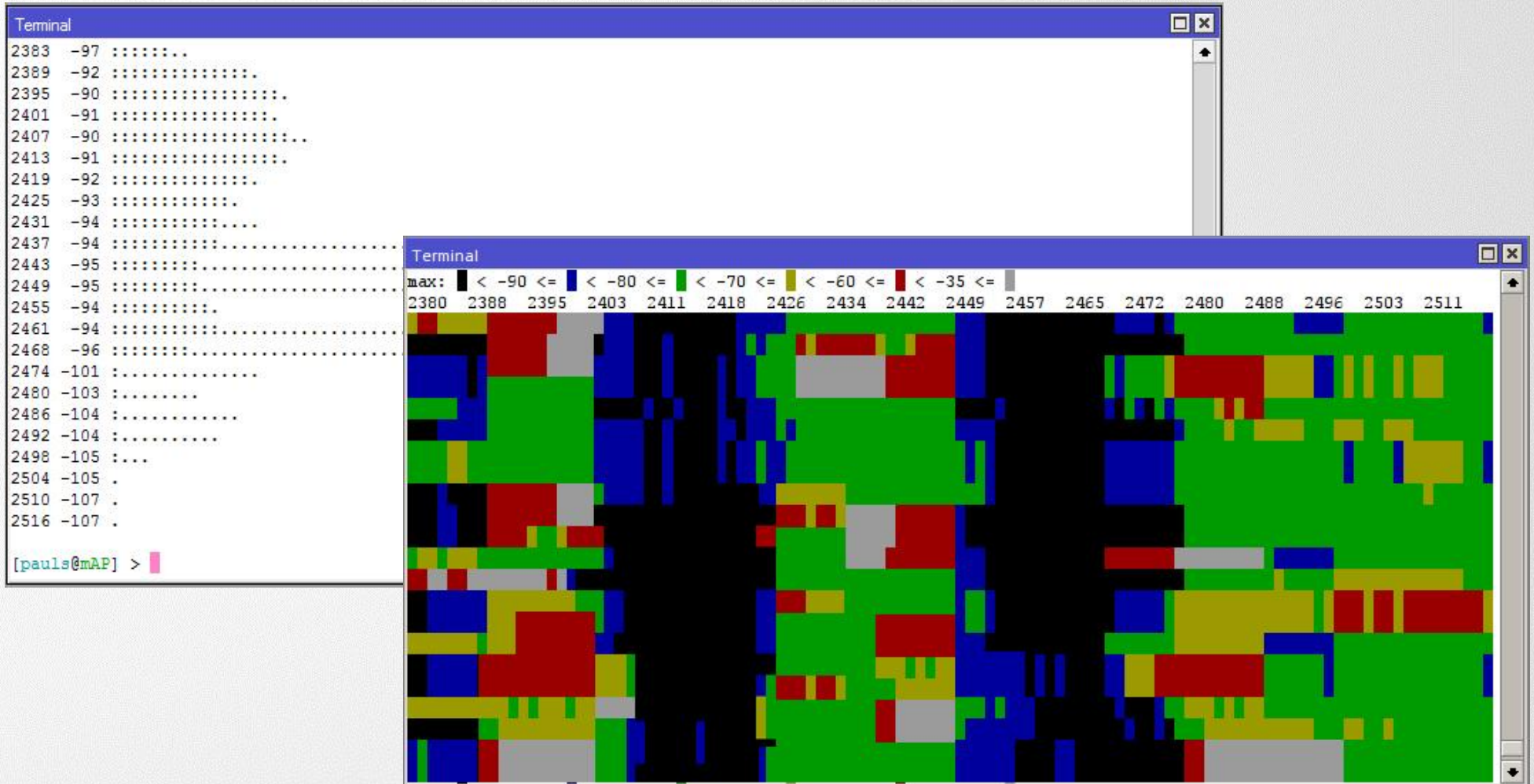
Use scan tool, to find the best frequency

The screenshot displays the Mikrotik WinBox interface. The top toolbar includes various utility buttons, with 'Freq. Usage' highlighted in red. Below the toolbar, a table shows the status of the 'wlan1' interface. The 'Freq. Usage (Running)' window is open, showing the selected interface 'wlan1' and a table of frequency scan results.

Frequency (MHz)	Usage	Noise F...
2412	0.5	-113
2417	2.1	-110
2422	15.3	-109
2427	13.5	-110
2432	17.0	-111
2437	18.2	-111
2442	29.8	-111
2447	17.3	-111
2452	3.7	-110
2457	0.6	-110
2462	0.2	-111

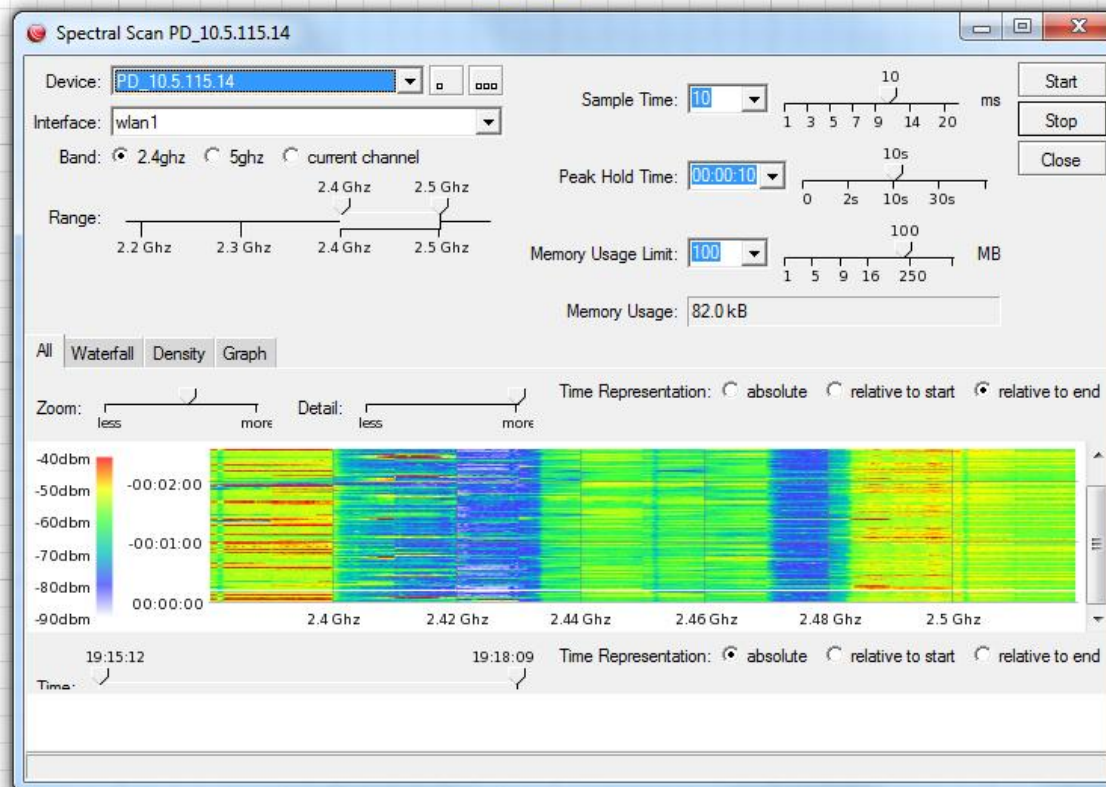
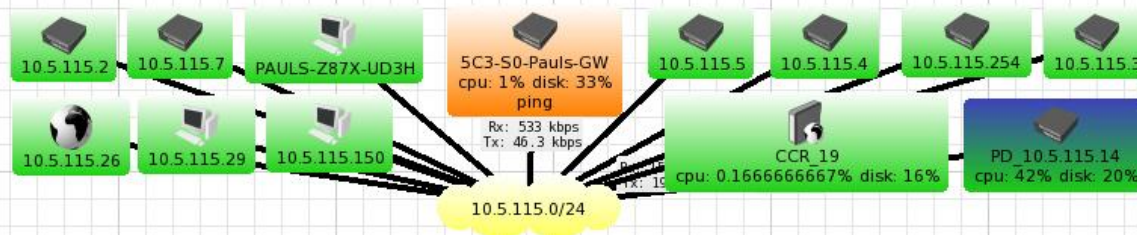
CLI wireless spectral scan

Use terminal to check used frequencies



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

Frequency	Rx Mbps	Tx Mbps	Rx CCQ	Tx CCQ
2407	46.8	46	42	37
2417	74.7	70.3	66	76
2427	88.8	90.2	84	88
2437	98.1	97.3	89	86
2447	77.4	70.7	75	77
2457	63.3	65.4	62	65
2467	85.8	86.8	87	84
2477	95.8	93.3	62	92
2487	66	59.1	57	55

Test throughput

Measure throughput between wireless devices

The screenshot displays the BTest Server application interface. On the left is a 'Tools' menu with options: New Terminal, Partition, Make Supout.rif, Manual, New WinBox, and Exit. The main menu lists various tools, with 'Bandwidth Test' selected. The 'Bandwidth Test (Running)' window shows the following configuration and results:

- Test To: 192.168.1.1
- Protocol: udp tcp
- Local UDP Tx Size: 1500
- Remote UDP Tx Size: 1500
- Direction: both
- TCP Connection Count: 20
- Local Tx Speed: [] bps
- Remote Tx Speed: [] bps
- Random Data
- User: admin
- Password: []
- Lost Packets: 947
- Tx/Rx Current: 182.8 Mbps/179.9 Mbps
- Tx/Rx 10s Average: 183.8 Mbps/177.0 Mbps
- Tx/Rx Total Average: 172.0 Mbps/166.9 Mbps

At the bottom, a bar chart shows the current Tx (182.8 Mbps) and Rx (179.9 Mbps) rates. The status bar at the bottom indicates 'running...'.

Wireless Snooper

Monitor wireless devices

The screenshot displays the 'Wireless Snooper' application window. The top section, 'Wireless Tables', shows a list of interfaces with 'wlan1' selected. The 'Wireless Snooper (Running)' window below it shows the interface set to 'wlan1' and a list of 20 detected wireless networks. The list includes columns for Channel, Address, SSID, Signal strength, and traffic statistics.

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		
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

Wireless Sniffer

Capture frames & packets

The screenshot displays the 'Wireless Tables' application interface, which is used for monitoring and capturing wireless network traffic. The interface is divided into several sections:

- Wireless Tables (Top):** This section shows a list of network interfaces. The 'wlan1' interface is selected. The table below shows the status of the interface:

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 (Middle):** This section provides configuration and control for the sniffing process. The interface is set to 'wlan1'. The 'Processed Packets' counter shows 384. Other settings include 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), and Memory Limit (10 KiB). Control buttons include Start, Stop, Close, Settings, Save..., and Sniffed Packets.
- Wireless Sniffed Packets (Bottom):** This section displays a list of captured packets. The table below shows the first few entries:

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

rep

Wireless-

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

Suggestions?
Feature requests?

THANK YOU!