

# MikroTik RouterOS & RouterBoard Wireless features overview

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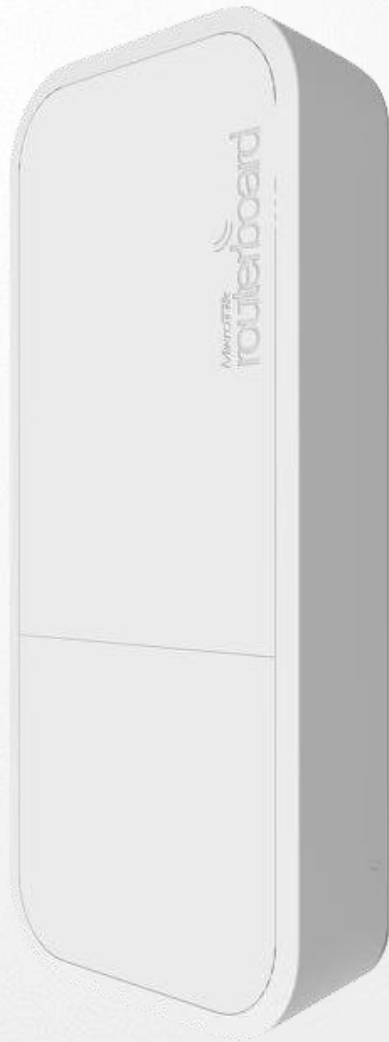
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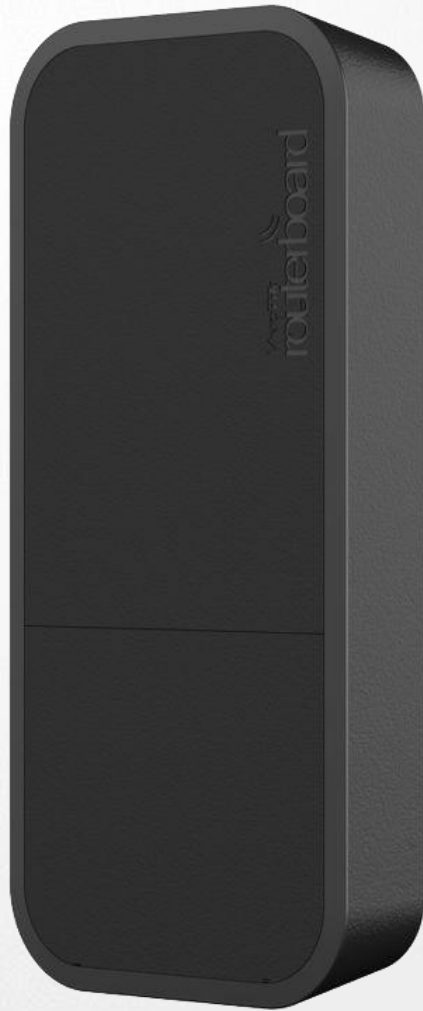
# Overview

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

# WAP



# Black and White edition



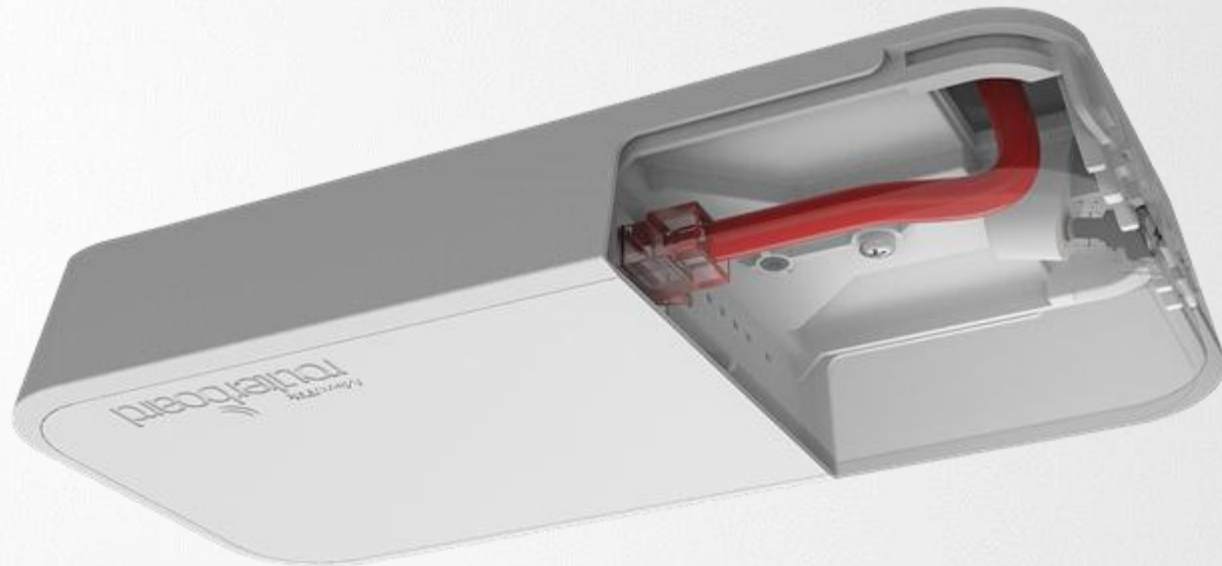
# Specification

- 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 displays two windows from a wireless management application. The top window, titled "Wireless Tables", shows a table of network statistics for the "wlan1" interface. The "Scanner" button is highlighted with a red box. The bottom window, titled "Scanner", shows the configuration for a scan on the "wlan1" interface. The "Connect" button is highlighted with a red box. Below the configuration, a table lists the detected wireless networks.

**Wireless Tables**

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)

**Scanner**

Interface: wlan1

Background Scan

Start  
Stop  
Close  
**Connect**  
New Window

	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 application with several tabs: Interfaces, Nstreme Dual, Access List, Registration, Connect List, Security Profiles, and Channels. The 'Freq. Usage' tab is selected and highlighted with a red box. Below the tabs, there are several icons and buttons: a plus sign, a minus sign, a checkmark, an X, a folder icon, a funnel icon, CAP, WPS Client, Setup Repeater, Scanner, Freq. Usage (highlighted), Alignment, Wireless Sniffer, and Wireless Snooper. A search bar with the text 'Find' is also present.

The main window displays a table with the following columns: Name, Type, Tx, Rx, Tx Packet (p/s), Rx Packet (p/s), FP Tx, and FP Rx. The table contains one entry for 'wlan1' with a type of 'Wireless (Atheros AR9...)' and zero values for Tx, Rx, and packets.

Below the table, it says '1 item out of 7 (1 selected)'. A second window titled 'Freq. Usage (Running)' is open, showing the interface for running a scan. It has a dropdown menu for 'Interface:' set to 'wlan1'. On the right side, there are four buttons: 'Start', 'Stop', 'Close', and 'New Window'.

The 'Freq. Usage (Running)' window displays a table with the following columns: Frequency (MHz), Usage, and Noise F... The table contains 11 rows of data:

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

At the bottom of the window, it says '11 items'.

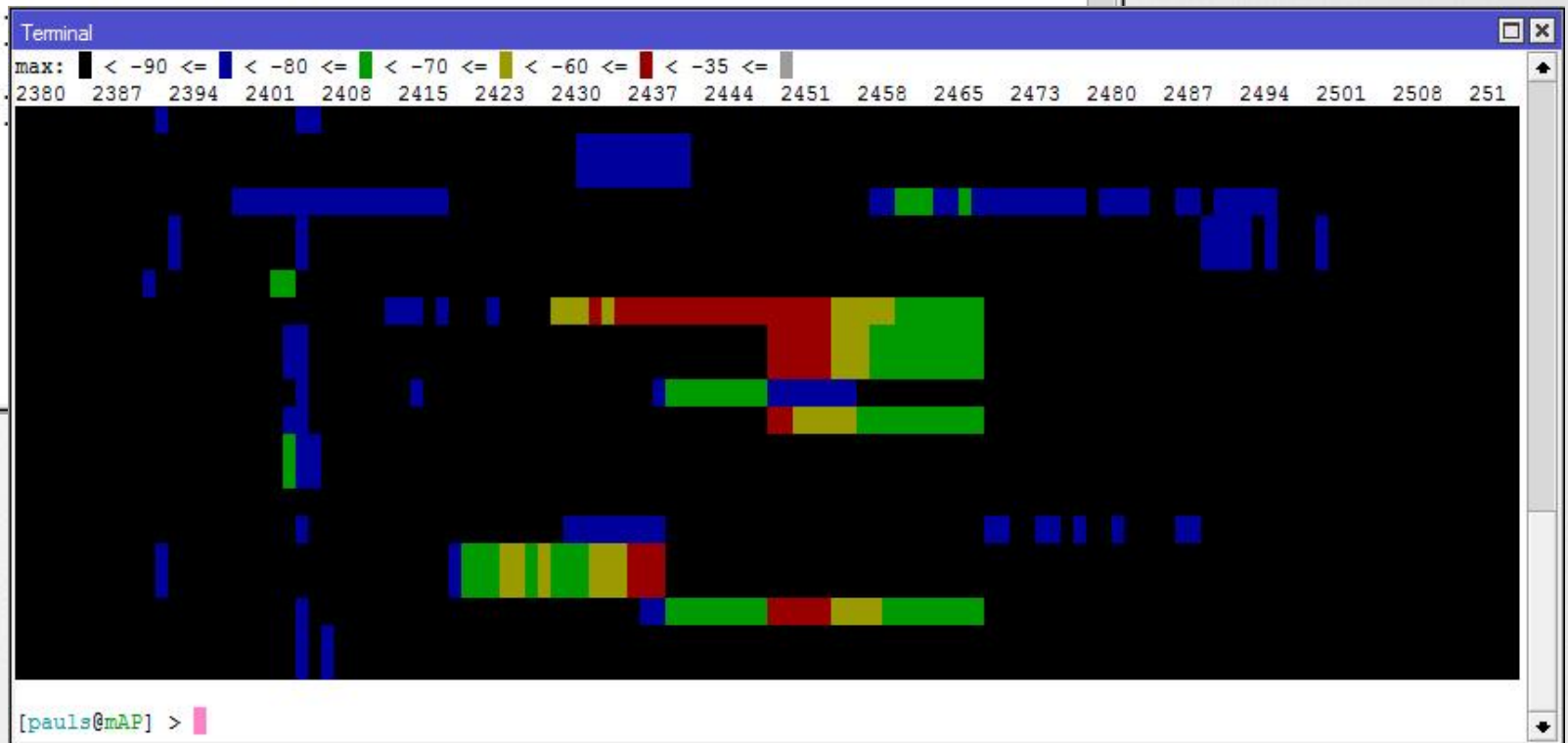


# CLI wireless scan

Use terminal to check used frequencies

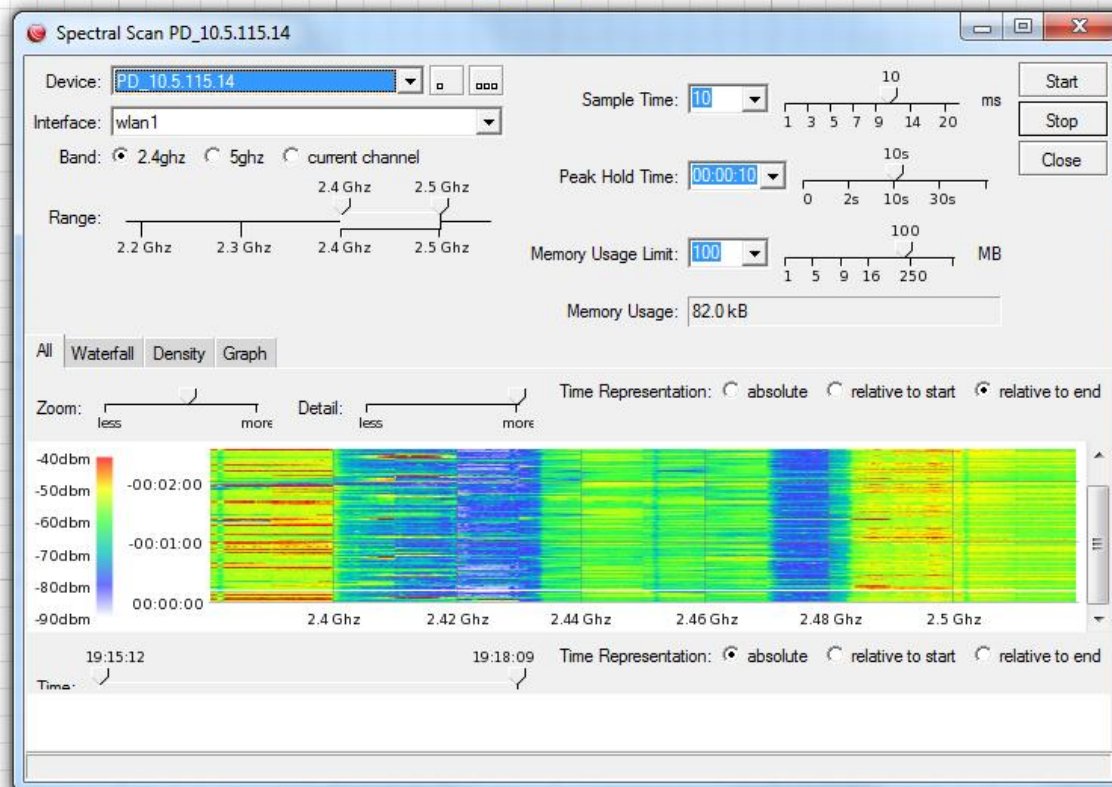
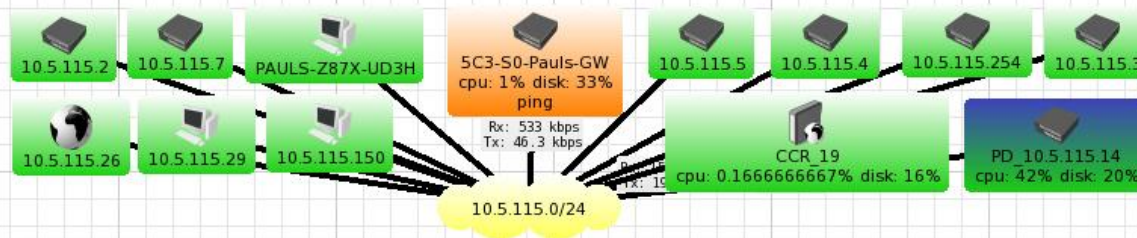
```
Terminal
2383 -97 .....
2389 -92 .....
2395 -90 .....
2401 -91 .....
2407 -90 .....
2413 -91 .....
2419 -92 .....
2425 -93 .....
2431 -94 .....
2437 -94 .....
2443 -95 .....
2449 -95 .....
2455 -94 .....
2461 -94 .....
2468 -96 .....
2474 -101 .....
2480 -103 .....
2486 -104 .....
2492 -104 .....
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 BTest Server interface with the Bandwidth Test tool active. The left sidebar lists various tools, with 'Bandwidth Test' selected. The main window shows the following configuration and results:

- Test To:** 192.168.1.1
- Protocol:** udp (selected), tcp
- Local UDP Tx Size:** 1500
- Remote UDP Tx Size:** 1500
- Direction:** receive
- TCP Connection Count:** 20
- Local Tx Speed:** [empty] bps
- Remote Tx Speed:** [empty] bps
- Random Data
- User:** pauls
- Password:** [masked]
- 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

A bar chart at the bottom shows the current throughput, with a legend indicating Tx (blue) and Rx (red). The Rx value is 35.8 Mbps. The status at the bottom 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 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!**