Reference Resources

MikroTik wAP 60G and wAP 60G AP

OS Selections

- RouterOS archive
 Index of /downloads (mikrotik-software.de)
- [No Supported Drivers] Researcher version of Openwrt for wAP 60G/LHGG-60ad/wAP 60Gx3 AP

<u>GitHub - IMDEANetworksWNG/Mikrotik-researcher-tools: An OpenWRT fork for all the IEEE 802.11ad MikroTik devices</u>

Troubleshoot

- Common Procedures for MikroTik RouterBoard Products
 [OpenWrt Wiki] Common Procedures for MikroTik RouterBoard Products
- If the device is bricked: Manual: Netinstall Manual: Netinstall - MikroTik Wiki

Configuration Tools

- Winbox in Linux: winobx-installer GitHub - mriza/winbox-installer: Install winbox in fedora/ubuntu linux, using wine
- [RouterOS 7] New beta versions have alignment mode included (it will update information much faster) to use run from CLI:
 - o /interface w60g align wlan60-1

Commonly Used Router OS Configuration Options

 Get SSID iw dev wlan0 info

Measurement Tools

- Measurement Tool for RouterOS: https://github.com/wyfbw07/MikroTik-RouterOS-Measurement-Tool
- Measurement Tool for OpenWRT: [Need to add]
- Owamp:

https://software.internet2.edu/sources/I2util/

Throughput Test Tool: iPerf3
 https://iperf.fr/iperf-download.php
 https://github.com/ar51an/iperf3-win-builds

Communication Protocols

QUIC

QUIC: quiche
 GitHub - cloudflare/quiche: Savoury implementation of the QUIC transport protocol and HTTP/3

Multipath QUIC: quiche
 (Old version of MP-QUIC)
 https://github.com/qdeconinck/quiche/tree/multipath
 (New version of MP-QUIC)

https://github.com/qdeconinck/quiche/tree/multipath-new-path-id-ietf-120

OWAMP

Download and install i2-utils

https://software.internet2.edu/sources/I2util/

```
./configure
sudo make
sudo make install
```

Install OWAMP

http://software.internet2.edu/sources/owamp/

```
./configure --with-I2util=/usr/local/lib/
sudo make
sudo make install
```

To run owamp under a restricted user, create a dedicated owamp user

sudo useradd owamp

Create the directory and assign ownership to the owamp user

```
sudo mkdir -p /var/lib/owamp
sudo chown owamp:owamp /var/lib/owamp
```

Modify datadir in the owampd.conf file

```
# location for "recv" session files.
# The "catalog" subdirectory is completely cleaned and recreated each
time
# owampd is restarted. DONT PUT ANYTHING IN THERE!
# (defaults to $cwd)
datadir /var/lib/owamp
```

Put the conf file under this place:

/usr/local/etc/owampd.conf

Finally, start the daemon during testing on both end

sudo /usr/local/bin/owampd -c /usr/local/etc -Z

Start a one way ping test to a machine (replace the IP address)

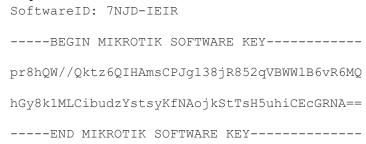
/usr/local/bin/owping -v 192.168.1.1

Troubleshoot if there are negative time delay value Verify and synchronize system time

```
timedatectl status
sudo ntpdate ntp.ubuntu.com
```

Fact Sheet for wAP 60G Devices

Key for wAP 60G AP



• Width of single antenna pattern and full span in degrees:

15-20 degrees single pattern and full span 60 degrees over horizontal and 30 degrees vertical plane.

• Operational channels / Maximum output power:

58.32 GHz / 40 dBm 60.48 GHz / 40 dBm 62.64 GHz / 40 dBm

• Channel Bandwidth 60 GHz (802.11ad/aj/ay)

Refer to the <u>802.11ad/aj/ay</u> standards, also known as <u>WiGig</u>, operate in the 60 GHz <u>V</u> band unlicensed ISM band spectrum.

Selection	Channel Center (GHz)	Min. (GHz)	Max. (GHz)	BW (GHz)
1	58.32	57.24	59.4	2.16
2	60.48	59.4	61.56	2.16
3	62.64	61.56	63.72	2.16
4	64.8 (Not available)	63.72	65.88	2.16
5	66.96 (Not available)	65.88	68.04	2.16
6	69.12 (Not available)	68.04	70.2	2.16

Archive: OpenWRT on wAP 60G AP

AP (wAP 60G AP) on OpenWRT

```
......
root@OpenWrt:~# hostapd -B /etc/hostapd.conf
Configuration file: /etc/hostapd.conf
wlan0: interface state UNINITIALIZED->COUNTRY UPDATE
Using interface wlan0 with hwaddr 48:a9:8a:41:50:cd and ssid "Mikrotik"
wlan0: interface state COUNTRY_UPDATE->ENABLED
wlan0: AP-ENABLED
root@OpenWrt:~# arp
IP address
               HW type
                          Flags
                                     HW address
                                                         Mask
                                                                 Device
192.168.1.2
               0x1
                          0x2
                                     50:9a:4c:59:d1:eb
                                                                 br-lan
```

STA (wAP 60G) on OpenWRT

root@OpenWrt:~# wpa_supplicant -D nl80211 -i wlan0 -c /etc/wpa_supplicant.conf -B Successfully initialized wpa_supplicant

```
root@OpenWrt:~# arp
              HW type
                            Flags
                                       HW address
                                                                     Device
IP address
                                                             Mask
                                       00:00:00:00:00:00
                                                                     br-lan
192.168.1.2
                0x1
                            0x0
192.168.1.4
              0x1
                            0x2
                                       2c:16:db:aa:8e:6b
                                                                     br-lan
```

```
root@OpenWrt:~# ping 192.168.1.2
PING 192.168.1.2 (192.168.1.2): 56 data bytes
^C
--- 192.168.1.2 ping statistics ---
5 packets transmitted, 0 packets received, 100% packet loss
```

