Wireless to Wireless

MikroTik User Meeting

Markham, Canada, September 2019

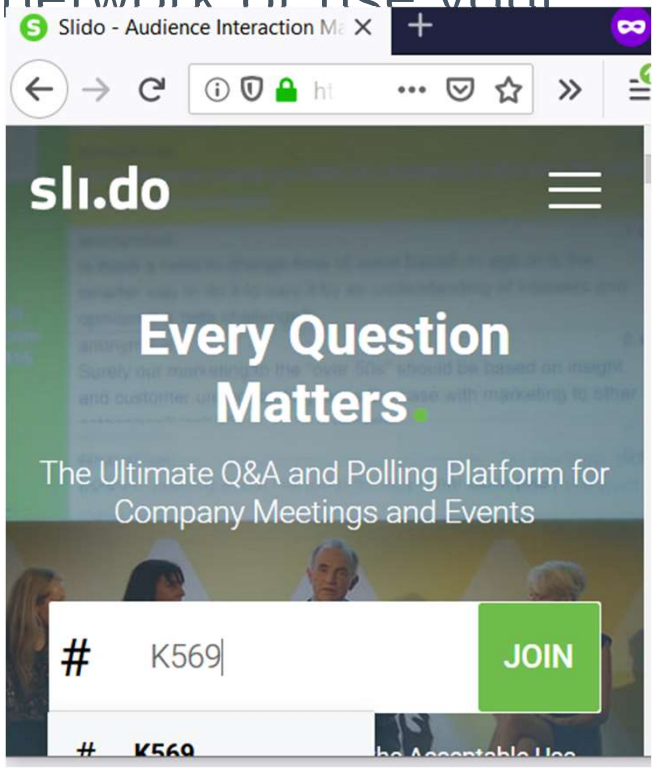
By: Payam Poursaied

Important notes:

- Ask if it is not clear
- Exit doors!
- Let's be casual!
- Eliminations
- Legal notice: Always check the regulations!

Please be engaged!

- Please open a browser on your mobile
- Connect to the wireless network or use your Cellular network
  - iHotel Conference
  - AU14A
- Go to https://sli.do
- Enter K569

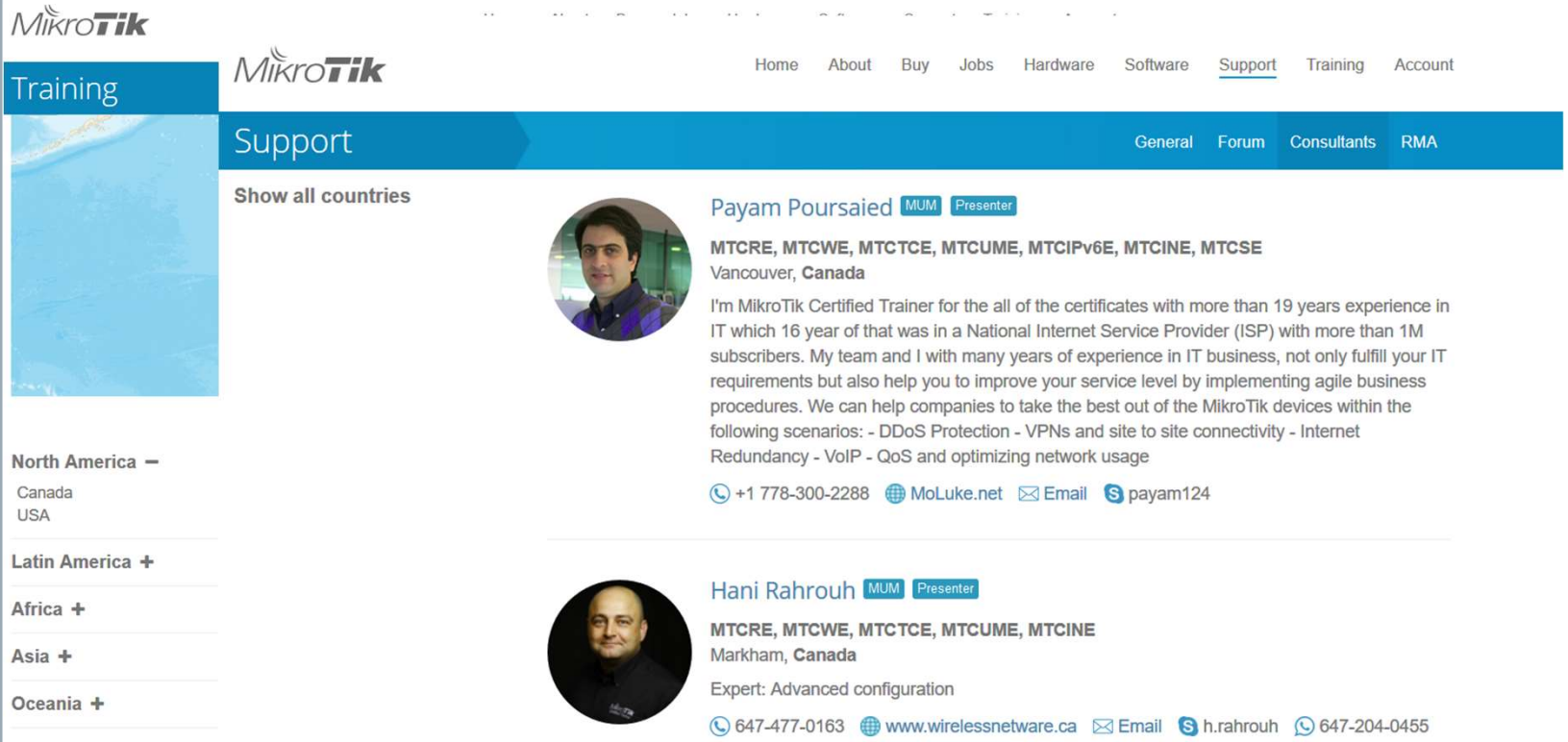


Who I am?

- Payam (like “Pa”[L] +”yum”)
  - payam@MoLuke.net
- Background in Computer Engineering and Industrial engineering
- 17+ years experience in Service Provider (ISP)
- Now, Based in Vancouver (Canada)
- MoLuke Inc.
  - System Integration
  - Telecom Solutions
  - Network Hardware

Where to find me?

› MikroTik Trainers list and Consultants list



Session Objective

- Connect to a wireless network and feed local clients over copper and ***wireless***
- Learn something fascinating about MikroTik which shows how powerful and feature-rich it is!

Session Sub-Objective

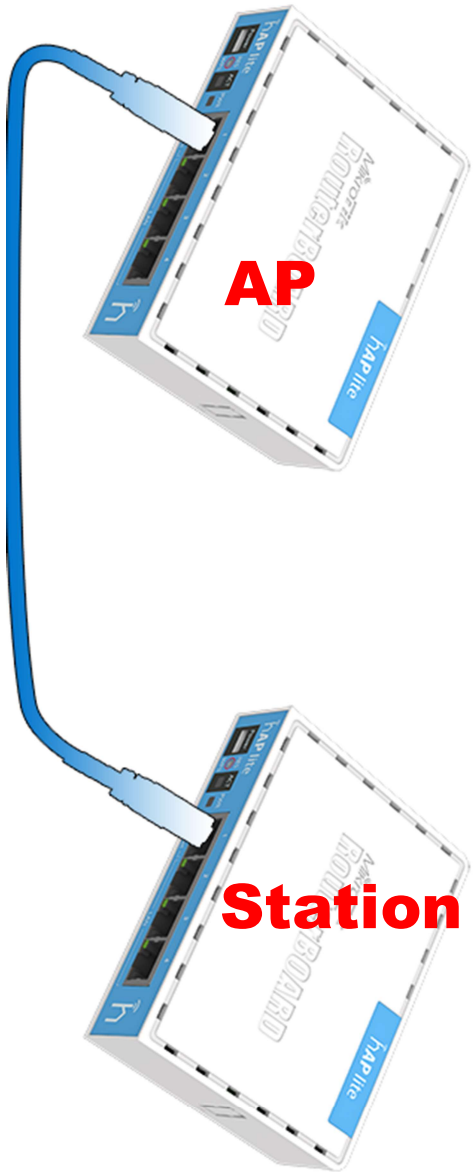
- Connect to a wireless network and feed local clients over copper and ***wireless***
- Why?
  - Local devices does not have Wireless NIC
  - Wireless signal is not strong enough (repeater)
  - You have a Chromecast and want to use it in a hotel
  - You want to connect your tablet, mobile and laptop to an in-flight internet

How to Solve?

Back to Back

› Pros:
  – Simple, Easy, Straight forward

› Cons:
  – More devices (i.e. 2)
  – Not for travel
  – Not portable
  – Need cable



How to Solve?

Dual band: a routerboard with 2 wireless

- Pros
  - A professional solution
  - Simple working solution.
- Cons
  - ~~No ready to use product (*)~~
  - ~~Expensive: RB922UAGS-5HPacD (99USD)+ R52HnD (59USD)+ enclosure (15USD) + Power…~~
  - Need professional/costly device(s)
    - Price? hAP ac lite*(49.95USD), hAP ac (129 USD)
  - 2 different bands

And the Magic!

From RouterOS v6.35rc

- Introduced in March 2016
- "wireless-rep" package
  - Now integrated in default Wireless Package
- added support for wireless ***repeater*** mode for 802.11 protocol
- Having Station and AP mode simultaneously on a single WLAN

mAP lite

- Introduced January 2016

The Magic in the Reality!

Announcement of 6.35rc

v6.35rc [release candidate] is released, new wireless package! by sergejs » Fri Jan 29, 2016 6:54 pm

v6.35rc has a new wireless package, that has the same features as wireless-cm2 package and will contain many new interesting features. Few of the added functions are listed in the changelog below, more to come!

Documentation for the new wireless package is in progress. Please test new wireless-rep package before adding it to the production networks. Thank you very much for your feedback in the advance!

Package is available on download page with 'All packages' file.

What's new in 6.35rc1 (2016-Jan-29 13:59):

*) route - do not show duplicate gateway on connected route;
*) wireless - added new package "wireless-rep";
*) wireless-rep - initial support for station roaming for station mode in 802.11 protocol;
*) wireless-rep - added support for wireless repeater mode for 802.11 protocol;
*) wireless-rep - added support for wireless background scan for 802.11protocol;
*) wireless-rep - added support for saving wireless scan results to file;
*) wireless-rep - added support for wireless scan rounds setting;
*) wireless-rep - added WPS client support;
*) wireless-rep - added STEP feature for the scan-list;

Alternative RouterBoards

- Small
- USB jack for power cord
  - Use with powerpack
- But any other RouterBoard would work

hAP lite

hAP lite Classic

Other Accessories

- Battery, 16000mAh aliexpress less than 20USD
- 20-30 cm Micro USB Cable aliexpress 1USD (or longer)
- 0.5-1 M Network Cable (good to have)
  - 5FT CAT5e Retractable Cable from PrimeCables.ca

How to?

› schematic

Interface type: Virtual AP
Interface name: wlan-client
Mode: station (*)
Upstream WiFi:
"training_w2w"
WPA2: 1122334455

IP: DHCP Client
NAT: scrcnat, outgoing int: wlan-client, masqrd

MikroTik

Interface type: **physical**
Interface name: wlan-ap
Mode: ap-bridge
SSID:myap-g[*GROUPNUMER*]
i.e. myap-g1
WPA2: 99887766

IP: 172.17.[groupnumber].1/24
i.e. 172.17.1.1/24
DHCP Server:
pool: 172.17.[G].2-172.17.[G].254

How to?

Preparation:

- Latest version of winbox (as of today 3.19)
- Update to the latest version of RouterOS (as of today **6.45.6** [anything above 6.35.1])
- ~~Download extra packages install "wireless-rep"~~
- Set the physical WLAN in "ap bridge" with your own wireless security profile
- Setup IP and DHCP Server
- Add a "Virtual" WLAN and set its mode to "station"
- Add DHCP Client for Virtual WLAN Interface
- Add Masquerade NAT

How to? (continue)

- Connect your device to the MikroTik wireless network
- Connect to MikroTik (Winbox, SSH, telnet, IOS/Android APP)
- Use a WiFi Analyzer to find channel of the public wifi
  - Or Background SCAN by mikrotik
- Change channel of the physical wlan to match the Upstream AP
- Put SSID of the Upstream WiFi in the Virtual AP
  - Wait for connecting
- Hooray! You are there!

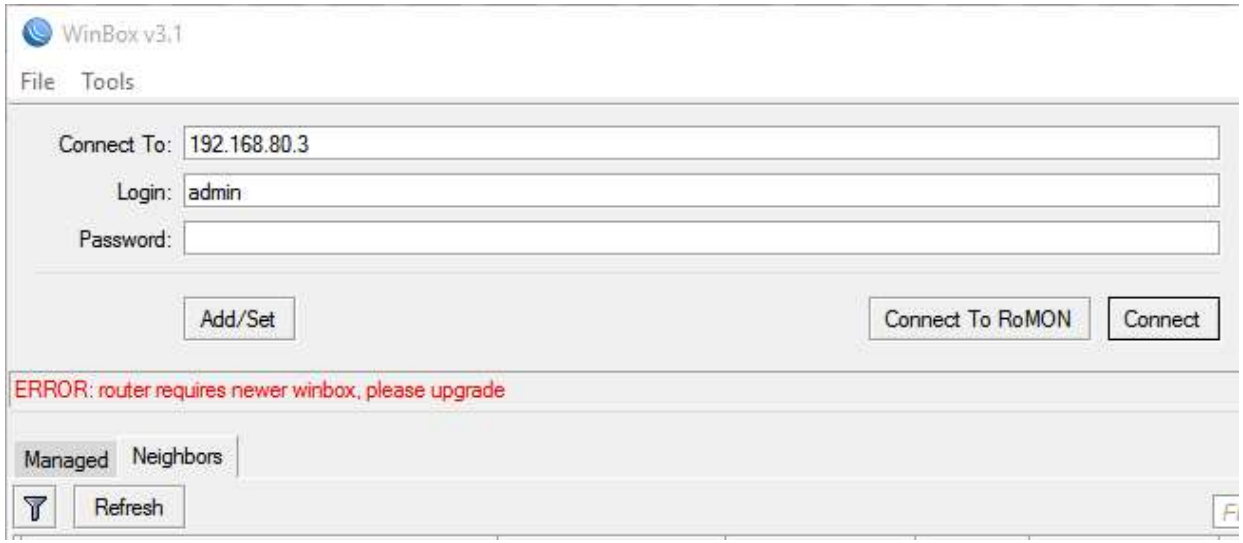
Good to Have Tools

- Wifi Analyzer for Android
  - https://play.google.com/store/apps/details?id=com.farproc.wifi.analyzer&hl=en
- Fing for android
  - https://play.google.com/store/apps/details?id=com.overlook.android.fing&hl=en
- Xirrus WiFi inspector (windows)
  - http://www.xirrus.com/wifi-inspector
- iNetTools for iOS
- IT Tools for iOS



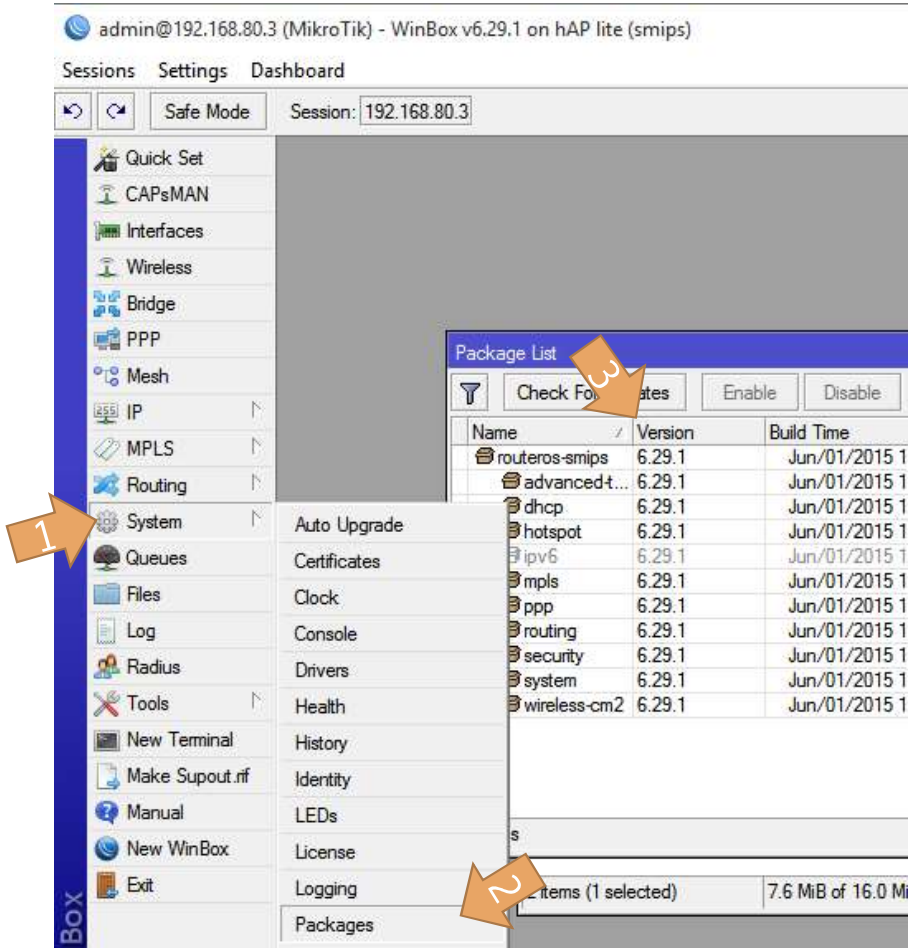

Use latest Winbox!

- Always use update Winbox to latest version before touching your RouterBoard!
- http://www.mikrotik.com/download



1.1 Check Version

```
[admin@MikroTik] > system package print
Flags: X - disabled
 #    NAME            VERSION
 0    routeros-smips  6.29.1
 1    system          6.29.1
 2 X  ipv6            6.29.1
 3    wireless-cm2    6.29.1
 4    hotspot         6.29.1
 5    dhcp            6.29.1
 6    mpls            6.29.1
 7    routing         6.29.1
 8    ppp             6.29.1
 9    security        6.29.1
10    advanced-tools  6.29.1
```



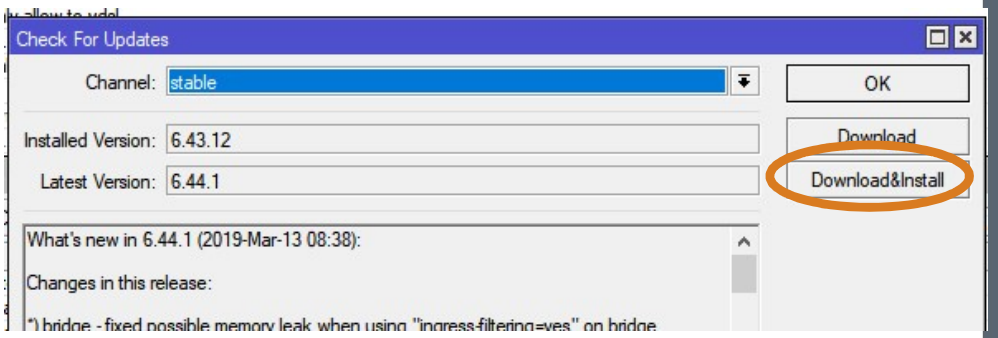
Upgrade

› Check Update

```
[admin@MikroTik] > system package update check-for-updates
  current-version: 6.43.12
   latest-version: 6.45.6
```

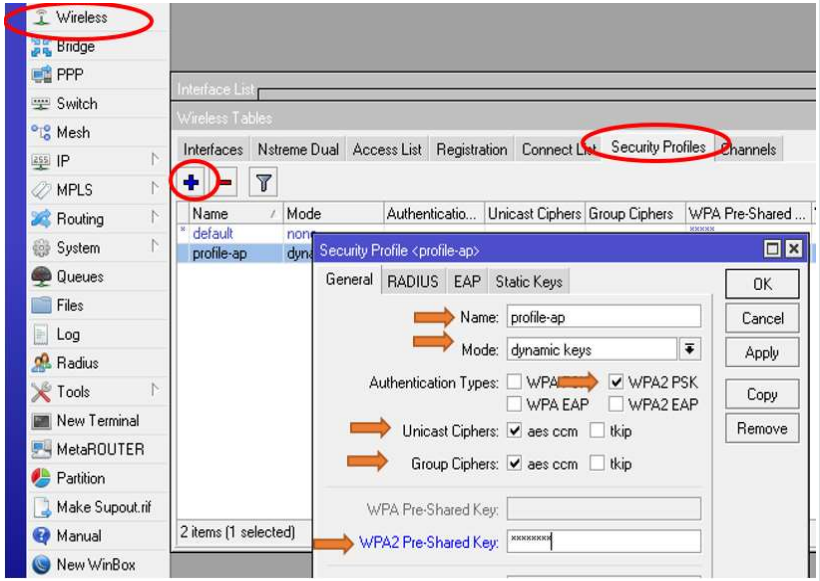
› Upgrade

```
[admin@MikroTik] > system package update upgrade
  current-version: 6.43.12
   latest-version: 6.45.5
           status: Downloaded 56% (3.9MiB)
```



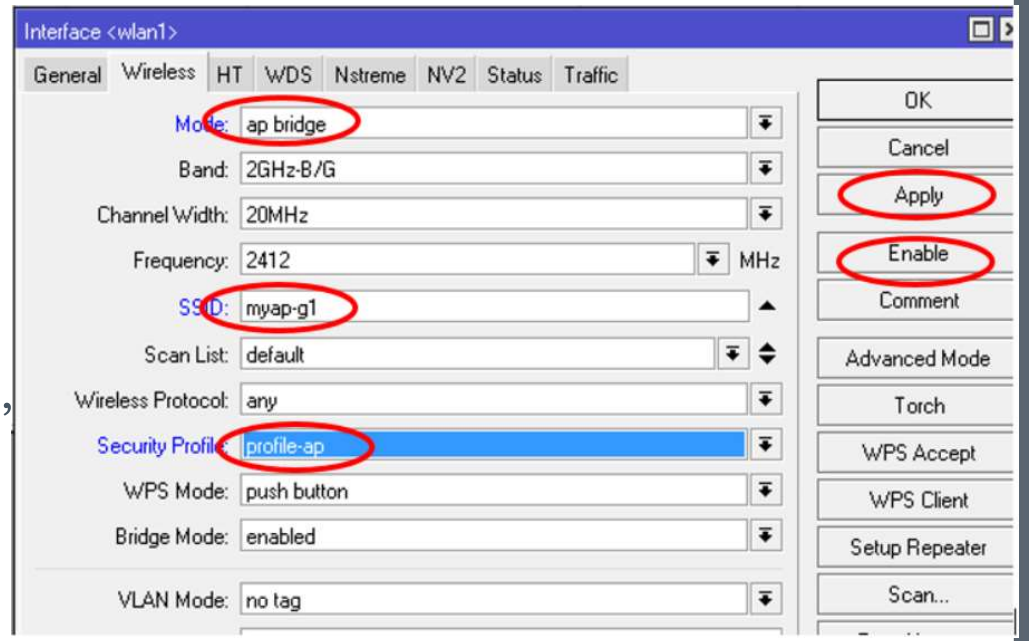
4.1 Setup AP

- Setup Security profile
  - Wireless->Security Profiles->add
  - Name: profile-ap
  - Mode: dynamic keys
  - Authentication type: WPA2 PSK
  - Unicast and group Ciphers: aesc cm
  - WPA2 Pre-Shared Key 99887766



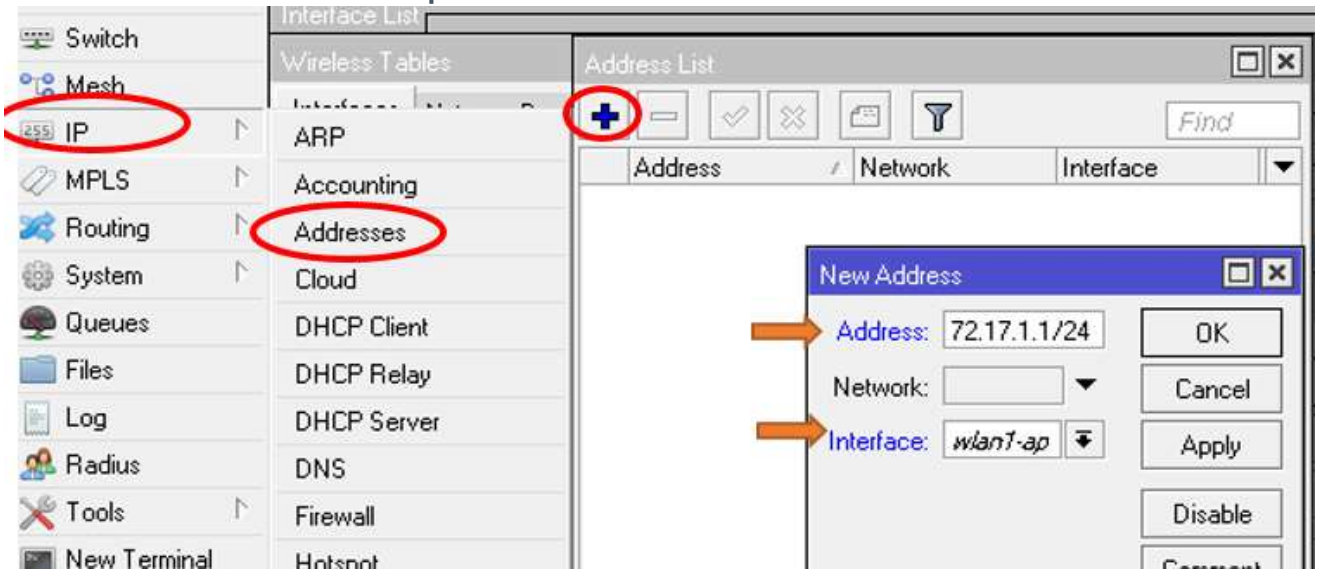
4.2 Setup AP

› Wireless->
- Mode: ap bridge
- Frequency: leave it now
- SSID: myap-g*[GROUPID]*
- i.e. if you are group no 1, then set myap-g1
- Security Profile: profile-ap (as configured in the previous section)
- Apply
- Enable



4.3 Setup IP address for AP

- IP->Addresses->Add
  - Address: 172.17.[GROUPID].1/24
    - i.e. if your Group no is 1, then put 172.17.1.1/24
  - Interface: wlan1-ap

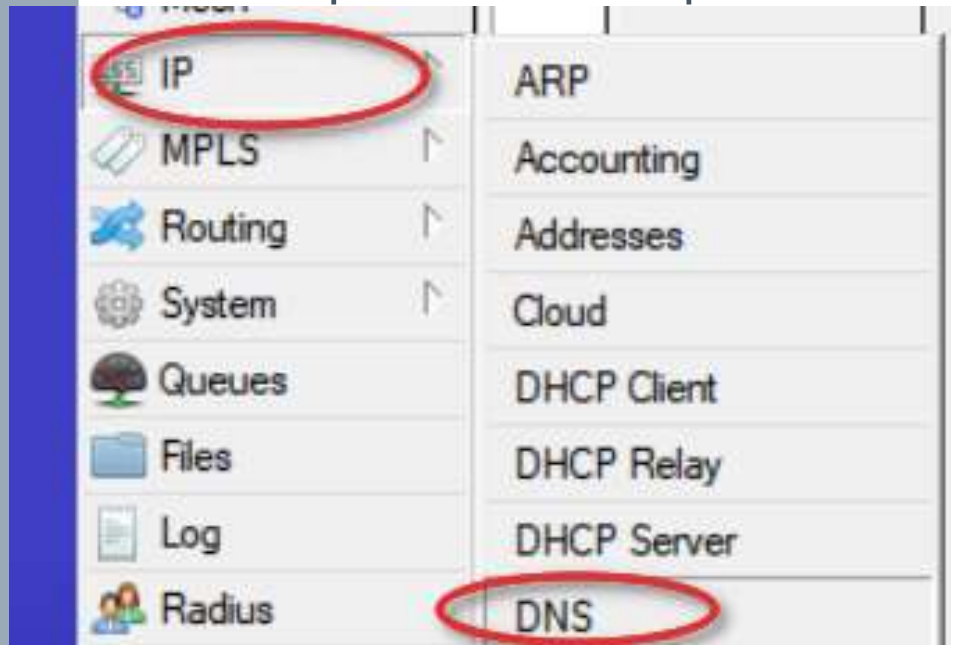


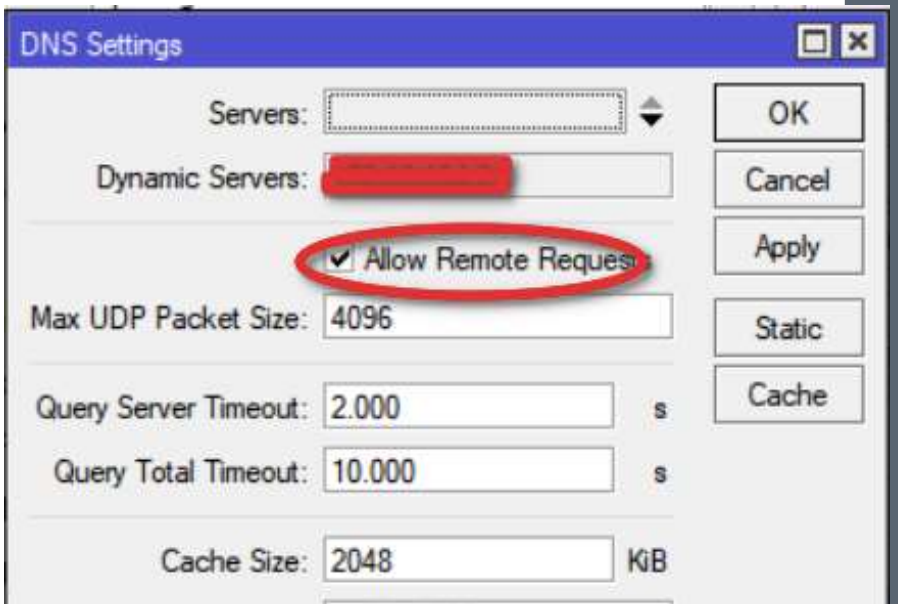
4.4 Setup DNS server and secure it

› This is the trick!

› IP->DNS->Allow Remote Requests

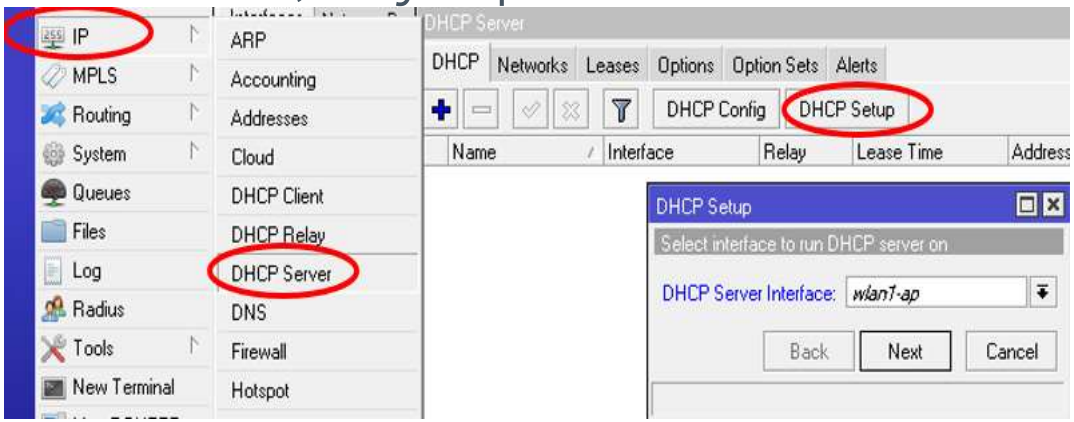
› Setup Firewall to prevent access from WAN (internet) side





4.5 Setup DHCP Server for AP

- IP->DHCP Server->DHCP Setup
- DHCP Server Interface: wlan1-ap ->next
- DHCP Address Space: 172.17.[GROUPID].0/24 ->next
  - i.e. if your group no is 1, then put 172.17.1.0/24
  - DNS: Router IP, very important.



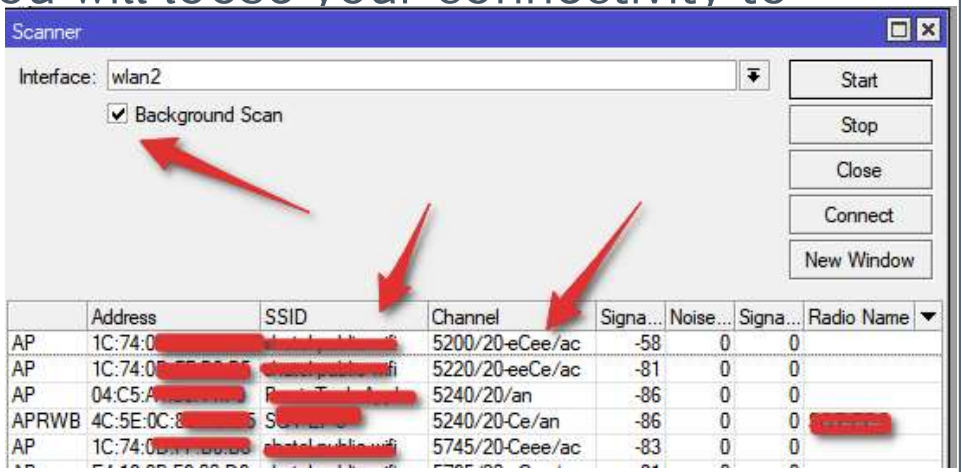
4.6 Verify AP

› What IP has your mobile received?

5 Connect the router to Upstream WiFi

› 5.2 Find Frequency of the upstream WiFi
  – Xirrus wifi Inspector
  – WiFi Analyzer

› 5.2 Find Frequency of the upstream WiFi MikroTik Way
  – Background SCAN
  – If you use the default scan, you will loose your connectivity to the RouterBoard

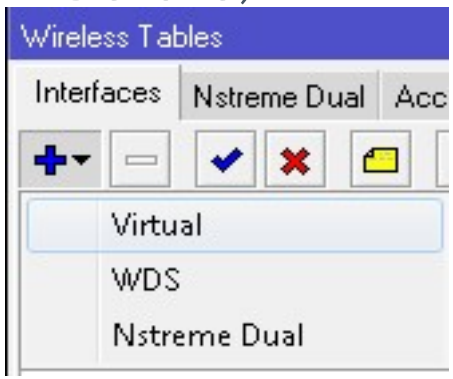


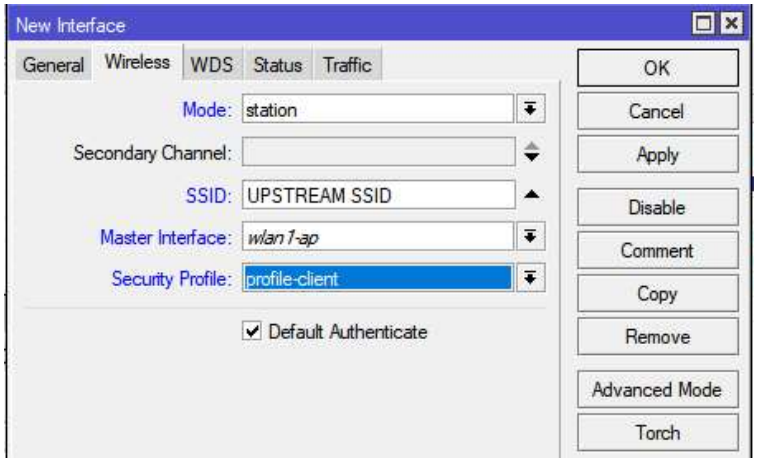
5 Connect the router to Upstream WiFi

- 5.3 Change the Physical Interface frequency/band/CHW
  - Wireless->Interfaces->wlan1-ap->wirless->Frequency
- 5.4 Create Security Profile if Upstream WiFi has any
- 5.4 Wireless->Security Profiles->add
  - Name: profile-client
  - Mode: dynamic keys
  - Authentication type: WPA2 PSK
  - Unicast and group Ciphers: aesc cm
  - WPA2 Pre-Shared Key 1122334455

5.5 Create Virtual Wireless

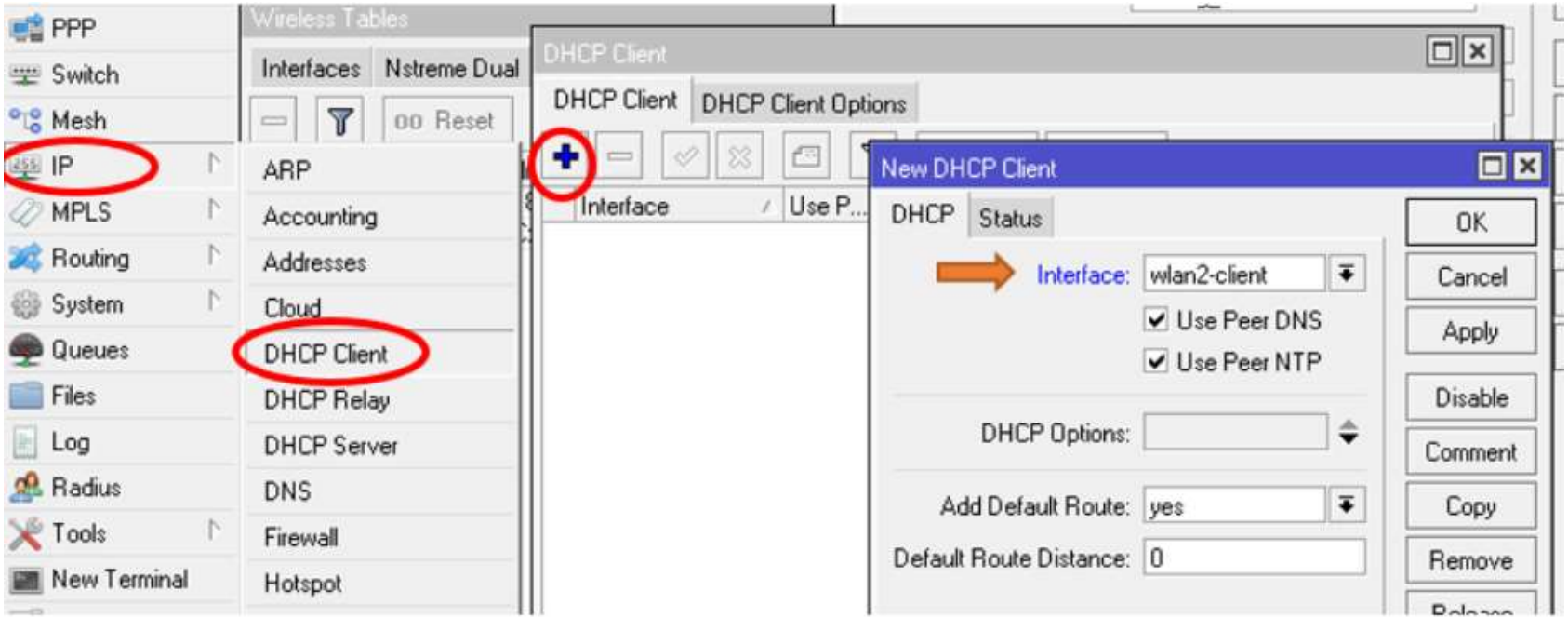
- General->Name: wlan2-client
- Wireless->Mode: station
- Wireless->SSID: Upstream WiFi SSID
- Wireless->Security profile: profile-client (as created before)





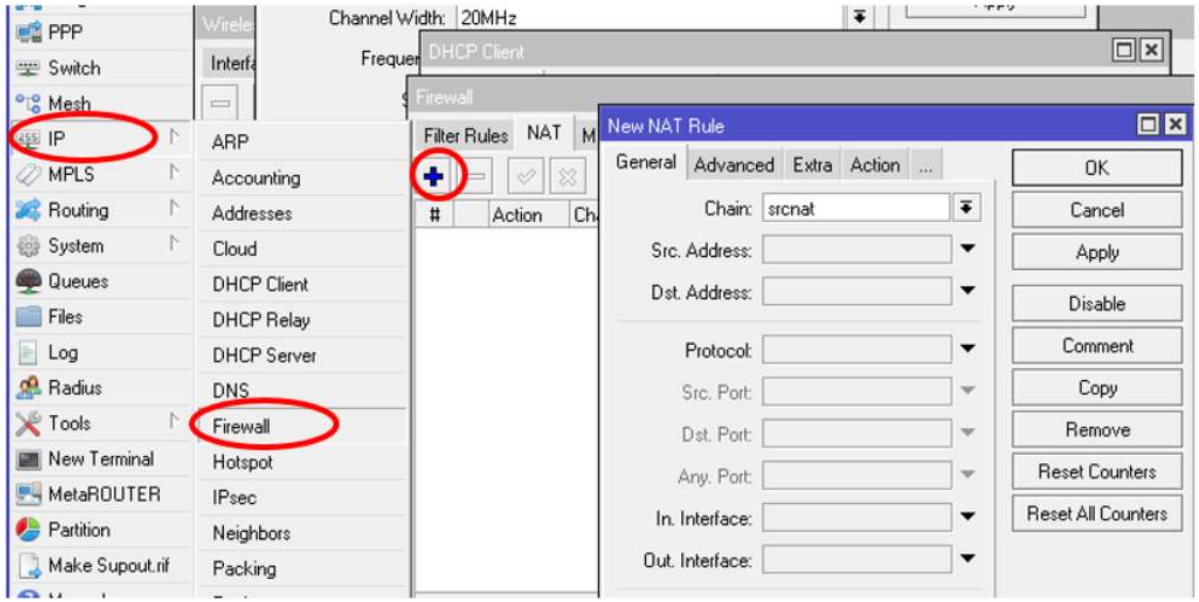
5.7 Setup DHCP Client

› IP->DHCP Client->add->DHCP: interface=wlan2-client



5.9 Setup NAT

› IP->Firewall->NAT->add
  – General-> Chan: srcnat
  – General-> Out. Interface: wlan-client
  – Action-> Action: masquerade



Which WLAN interface as AP/Station?

- The setup could be done in 2 different ways:
- Physical interface: AP, virtual interface: Station
  - You can easily connect to the RB, but you would get disconnected when you want to connect the RB to the upstream WiFi due to channel change
- Physical interface: Station, virtual interface: AP
  - RB trying to search and find suitable upstream WiFi to connect to
  - Changing the channels
  - Most probably you can not connect to the RB without the RB gets connected to the upstream WiFi

Funny things to do

- Turn your mobile cellular into an uplink for redundancy
- Create a Hotspot and resell! (Don't do that!)
- Turn it into an appliance by developing some script and webpages
  - Scan all channels. Store results. Change into default channel, wait for client. Show client available network. Select network, change channel, start!

Question?

Extra

› hAP lite ac

› Have station as physical interface