The evolution of the wireless package

(6.40-6.42)

By Lorenzo Busatti

ROUTING & WIRELESS ACADEMY®

About me

Lorenzo Busatti

- Founder of Grifonline S.r.l. [ISP] 1997
- A user of MikroTik since 2006
- Founder of Linkwave [WISP] 2006
- MikroTik Trainer 2010
- Member of RIPE, AMS-IX, MIX-IT

About me

About me

Suisse
Svizzera
Switzerland
Liechtenstein
Graz
Klagenfurt am Wörthersee
Maribor
Slovenija
Slovenia
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Pécs
Karlovac
Milano
Verona
Venezia
Padova
Torino
Asti
Parma
Bologna
Genova
Ravenna
Hrvatska
Croatia
Bosna i Hercegovi
Босна и Херцегови
Bosnia an Herzegovi
Zadar
Šibenik
Mostar
San Marino
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Italy
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Pescara
Viterbo
L'Aquila
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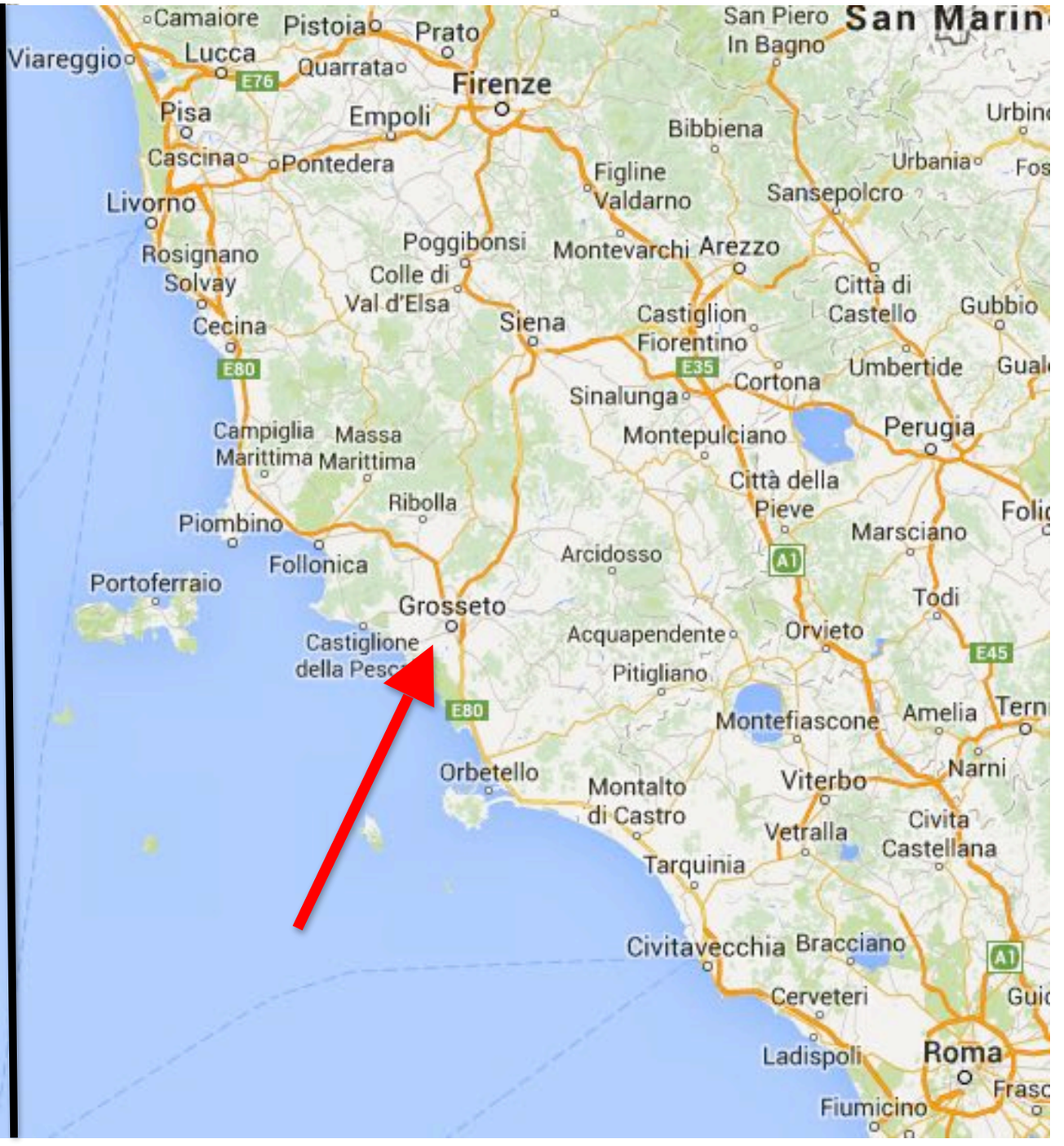
Latina
Foggia
Bari
Napoli
Potenza
Salerno
Taranto
Brindi
Lecce
Adriatic Sea
Ajaccio
Olbia
Sassari
Sardegna
Tyrrhenian Sea
Cagliari
Cosenza
Catanzaro
Palermo
Messina
Trapani
Marsala
Catania
Agrigento
Gela
Siracusa
Ragusa
Ionia
Annaba
Tunis
Google


Camaiore
Pistoia
Prato
Viareggio
Lucca
E76
Quarrata
Firenze
San Piero In Bagno
San Marin
Pisa
Empoli
Bibbiena
Urbin
Cascina
Pontedera
Urbania
Figline Valdarno
Sansepolcro
Livorno
Rosignano Solvay
Poggibonsi
Montevarchi
Arezzo
Colle di Val d'Elsa
Città di Castello
Gubbio
Cecina
Siena
Castiglion Fiorentino
E80
E35
Umbertide
Cortona
Sinalunga
Campiglia Marittima
Massa Marittima
Montepulciano
Perugia
Città della Pieve
Ribolla
Piombino
Follonica
Arcidosso
Marsciano
Portoferraio
A1
Todi
Grosseto
Acquapendente
Orvieto
Castiglione della Pesc
Pitigliano
E45
E80
Montefiascone
Amelia
Orbetello
Viterbo
Narni
Montalto di Castro
Vetralla
Civita Castellana
Tarquinia
Civitavecchia
Bracciano
Cerveteri
Ladispoli
Roma
Fiumicino

I'm a MikroTik *enthusiast*

I'm a MikroTik *enthusiast*

I'm a MikroTik *evangelist*

About me

- Founder (2016) of the

ROUTING & WIRELESS® ACADEMY

Non Profit Organization for

High Quality Training Partners

Dedicated to Max

The new wireless package

The new wireless package (since vers. 6.37), in RouterOS brought these features:

- The DFS “settings”
- Background scan
- Wireless Scan features (on files, etc.)
- Station Roaming
- Repeater function
- New Wireless Interfaces

The new wireless package

My MUM presentation in Milan (2017) about the v 6.37 features :

PDF: https://goo.gl/2TFtf8

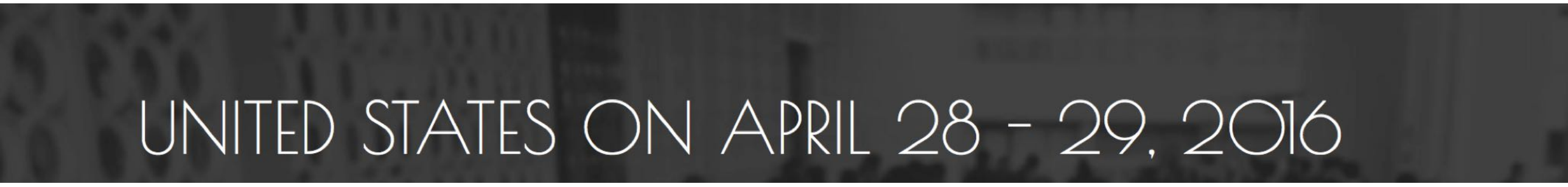
Youtube: https://youtu.be/1MsbivitzEw

The new wireless package

and don’t miss this amazing presentation about “The mAP and mAP lite” as a Wireless Swiss Knife

PDF: https://goo.gl/gHw9MB

Youtube: https://youtu.be/VeZetH9uX_Y



The evolution of the wireless package

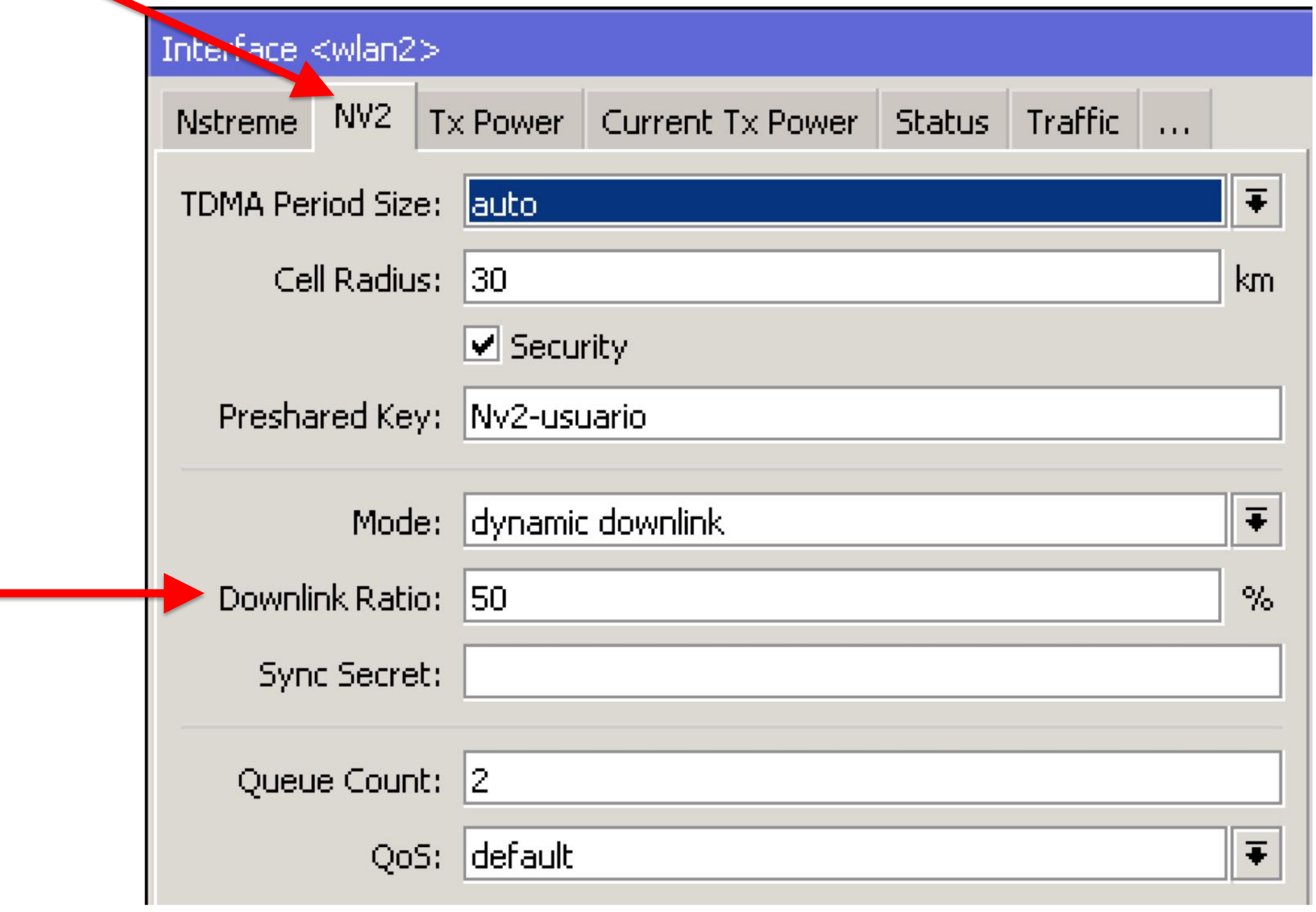
The new wireless features from v 6.40:

- nv2-downlink-ratio
- NV2 APs synch
- and much more. .

nv2-downlink-ratio

- A new feature available since RouterOS 6.40
- Will allow you to setup the download/upload ratio from the AP to the stations.
- Can be setup in two ways:
  - **Dynamic-downlink**
  - **Fixed-downlink**

nv2-downlink-ratio



nv2-downlink-ratio

- This new feature will allow you to give “more [*transmission*] time” for the download *(or upload)* of the stations
- Giving your customer more download *(or upload)* bandwidth

nv2-downlink-ratio

- The default value is 50
- The minimum value is 20
- The maximum is 80

nv2-uplink-ratio

- The Uplink ratio is automatically calculated from the downlink-ratio value.

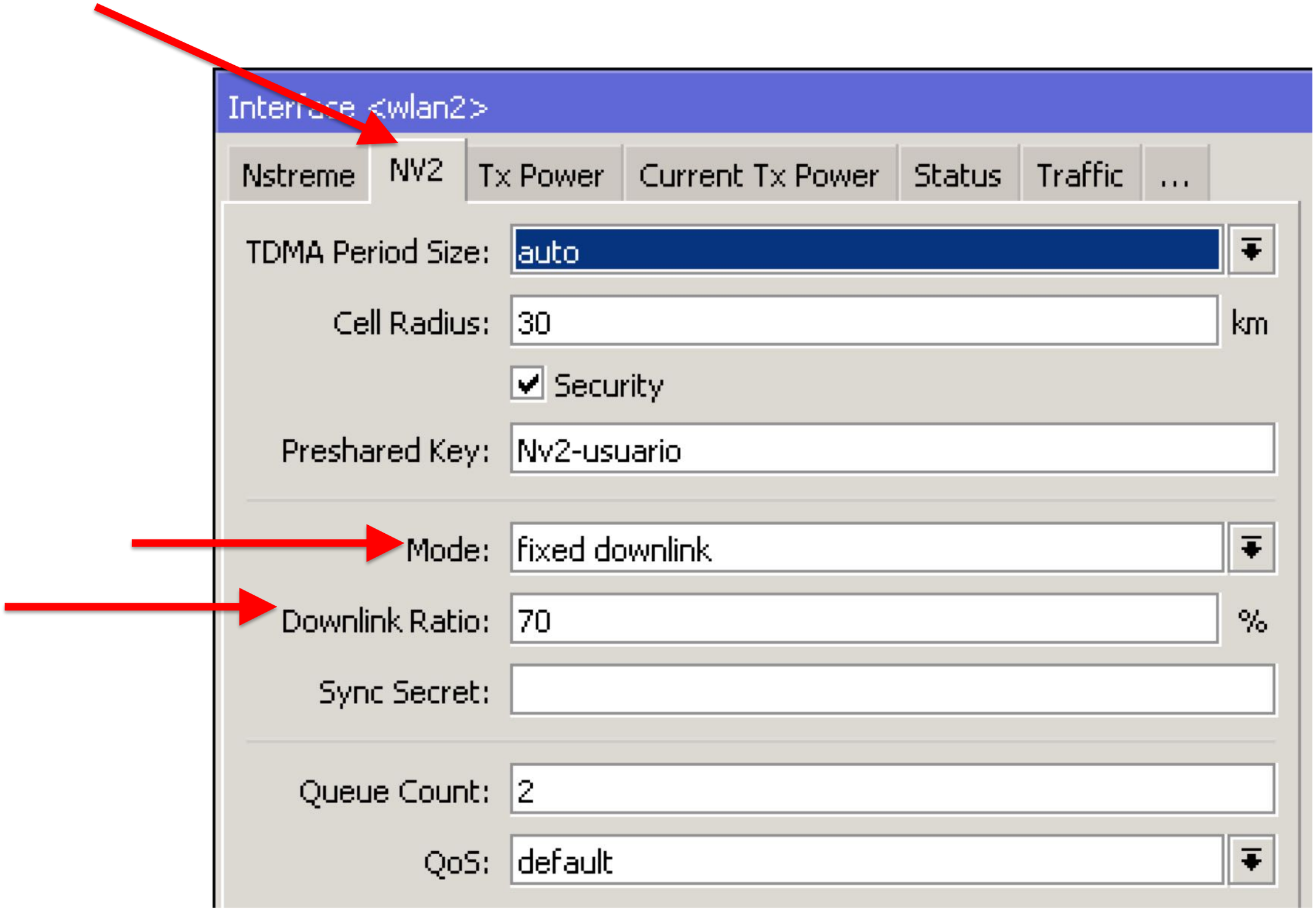
For example:

- With downlink-ratio=70 -> Uplink = 30
- With downlink-ratio=60 -> Uplink = 40

nv2-mode=fixed-downlink

- This new feature will allow you to **statically** schedule “more time” for the download of the stations.
- Setting up a value of 70 the AP will schedule:
  - –70% of the time for the download of the clients
  - –30% of the time for the upload of the clients

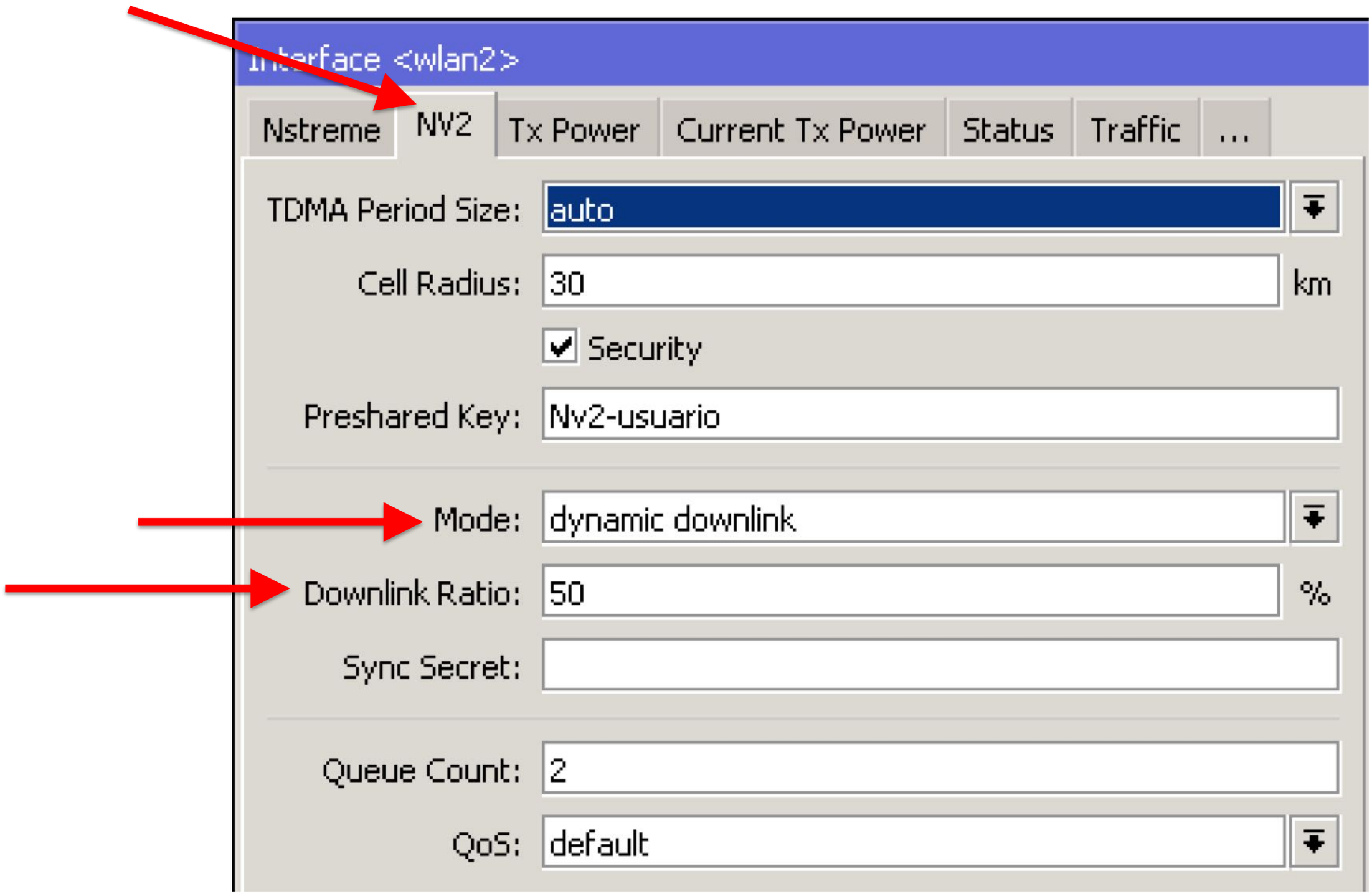
nv2-mode=fixed-downlink



nv2-mode=dynamic-downlink

- This feature will allow you to let the AP **dynamically** assign the time slots for the stations.
- **BUT**: when link get fully saturated it will use the `Nv2-downlink-ratio` that you specified (the default is 50)

nv2-mode=dynamic-downlink



Real life bandwidth

Delivering bandwidth to one station is simple, to more stations is difficult, because of:

- Different distances of the stations
- Different setup and/or datarates
- Interference
- The time that the AP “loses” for managing time slots for the stations
- And so on

Real life test

We experimented different scenario using different settings, to show you how you can manage more bandwidth, specially in PtMP environment.

Lab1: dynamic-downlink 50

1 concurrent station

2 HT chains

N protocol Ce

Total bandwidth from the AP:

127 Mbps

Lab2: dynamic-downlink 50

9 concurrent stations

2 HT chains

N protocol Ce

Total bandwidth from the AP:

80 Mbps

Lab3: fixed-downlink 70

9 concurrent stations

2 HT chains

N protocol Ce

Total bandwidth from the AP:

106 Mbps

Lab3: fixed-downlink 70

admin@192.168.33.4 (MikroTik) - WinBox v6.40.5 on RB3011UiAS (arm)

Session Settings Dashboard

Safe Mode Session: 192.168.33.4 CPU: 5%

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
LCD
Partition
Make Supout.rif
Manual
New WinBox
Exit

RouterOS WinBox

Terminal

```
             direction: transmit
               tx-size: 1500

[admin@MikroTik] > tool bandwidth-test protocol=udp user
=admin password="" direction=transmit address=192.168.33
.11
                status: running
              duration: 14m29s
            tx-current: 8.9Mbps
  tx-10-second-average: 9.3Mbps
```

Terminal

```
..              Move up one level
/command        Use command at the base le
vel
[admin@MikroTik] > tool bandwidth-test pro
tocol=udp user=admin password="" direction
=transmit address=192.168.33.12
                status: running
              duration: 14m
            tx-current: 8.4Mbps
  tx-10-second-average: 9.1Mbps
```

Terminal

```
/               Move up to base level
..              Move up one level
/command        Use command at the base level
[admin@MikroTik] > tool bandwidth-test protocol=udp user=admin
password="" direction=transmit address=192.168.33.13
                status: running
              duration: 13m57s
            tx-current: 9.1Mbps
  tx-10-second-average: 9.1Mbps
```

Interface List

Interface | Interface List | Ethernet | EoIP Tunnel | IP Tunnel | GRE Tunnel | VLAN | VRRP | Bonding | LTE

Find

	Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx Packet (p/
R	bonding1	Bonding	1500	1598	106.3 Mbps	24.3 kbps	8 785	33	0 bps	23.8 kbps	0	
RS	ether1	Ethernet	1500	1598	53.1 Mbps	11.8 kbps	4 392	16	53.9 Mbps	13.4 kbps	4 465	
RS	ether2	Ethernet	1500	1598	53.2 Mbps	12.4 kbps	4 393	17	53.9 Mbps	12.0 kbps	4 465	
	ether3	Ethernet	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	
	ether4	Ethernet	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	
	ether5	Ethernet	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	
	ether6	Ethernet	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	
	ether7	Ethernet	1500	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	

12 items

```
        tx-total-average: 6.4Mbps
          random-data: no
            direction: transmit
              tx-size: 1500
```

```
          random-data: no
            direction: transmit
              tx-size: 1500
-- [Q quit|D dump|C-z pause]
```

```
            tx-current: 9.3Mbps
tx-10-second-average: 9.2Mbps
```

Terminal

```
..              Move up one level
/command        Use command at the base level
[admin@MikroTik] > tool bandwidth-test protocol=udp use
r=admin password="" direction=transmit address=192.168.
33.17
                status: running
              duration: 13m37s
            tx-current: 9.1Mbps
  tx-10-second-average: 9.2Mbps
      tx-total-average: 6.4Mbps
          random-data: no
            direction: transmit
              tx-size: 1500
-- [Q quit|D dump|C-z pause]
```

Terminal

```
                status: can not connect
              duration: 0s
            tx-current: 0bps
  tx-10-second-average: 0bps
      tx-total-average: 0bps
          random-data: no
            direction: transmit
              tx-size: 1500

[admin@MikroTik] > tool bandwidth-test protocol
=udp user=admin password="" direction=transmit
address=192.168.33.18
```

Terminal

```
/               Move up to base level
..              Move up one level
/command        Use command at the base level
[admin@MikroTik] > tool bandwidth-test protocol=udp user=
admin password="" direction=transmit address=192.168.33.1
9
                status: running
              duration: 13m28s
            tx-current: 9.3Mbps
  tx-10-second-average: 9.3Mbps
      tx-total-average: 6.5Mbps
          random-data: no
            direction: transmit
              tx-size: 1500
-- [Q quit|D dump|C-z pause]
```

Lab4: fixed-downlink 80

9 concurrent stations

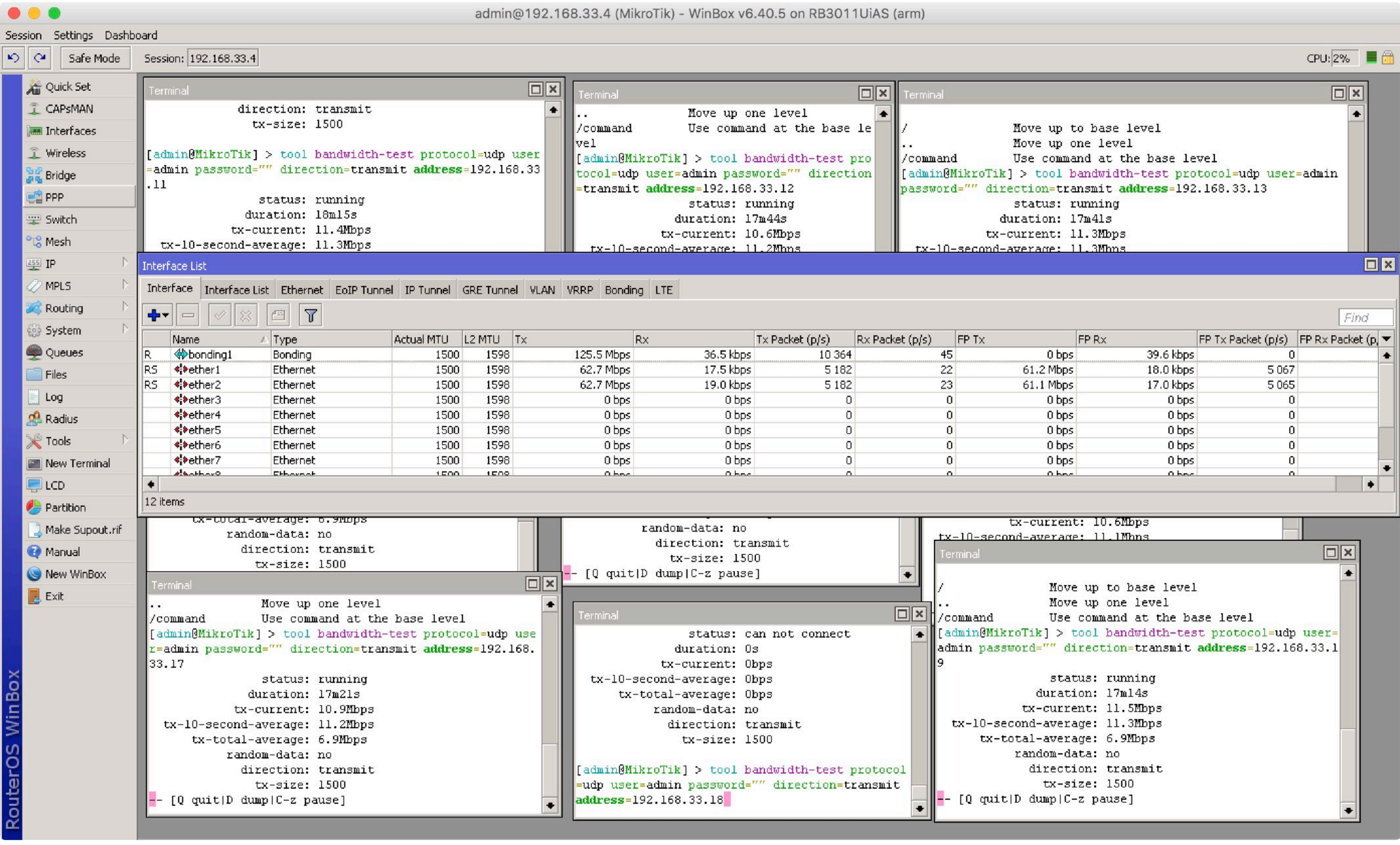
2 HT chains

N protocol Ce

Total bandwidth from the AP:

125 Mbps

Lab4: fixed-downlink 80



Labs results

1 station, ratio **d** 50 -> 127 Mbps

9 stations, ratio **d** 50 -> 80 Mbps

9 stations, ratio **f** 70 -> 106 Mbps

9 stations, ratio **f** 80 -> 125 Mbps

Nv2 AP **synchronization**

[experimental support]

Nv2 AP synchronization

- Introduced with RouterOS 6.40
- This feature will allow multiple MikroTik Nv2 APs at the same location to coexist in a better fashion by reducing the interference between each other.
- One of the most desired wireless implementations in RouterOS
- Different from other vendors (no GPS)

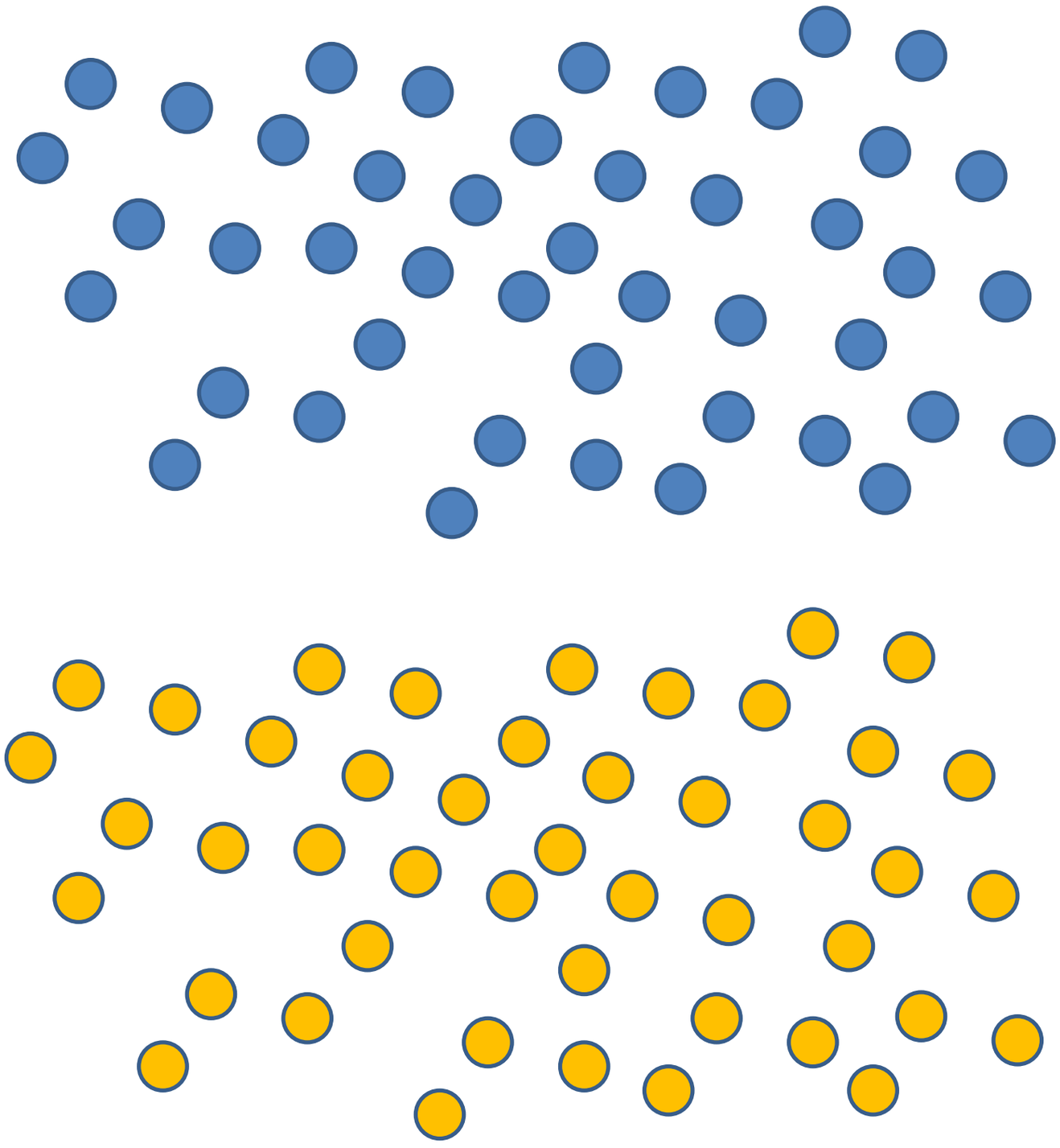
Nv2 AP synchronization

- This feature will synchronize the transmit/ receive “time windows” of APs on the same frequency, so that all “synced MikroTik Nv2 Aps” **transmit/receive at the same time**.
- That allows to reuse the same wireless frequency on the location for multiple APs, giving more flexibility in frequency planning.

Nv2 AP synchronization

SSID: Rede1
Freq: 5600

SSID: Rede2
Freq: 5600



Nv2 AP synchronization

In the scenario there is:

- ONE “master” APs
- MULTIPLE “slaves” APs

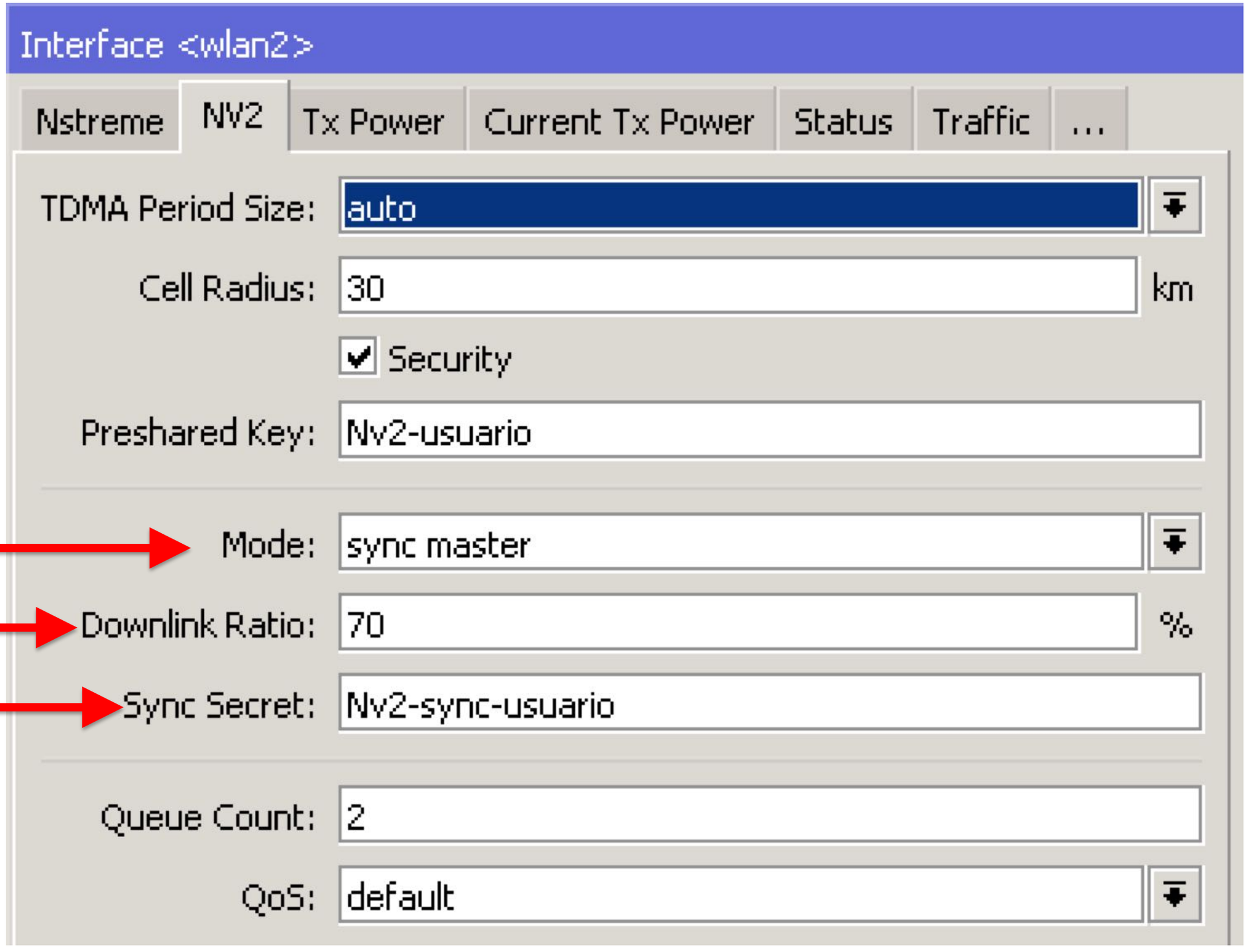
- All of them **must** use the **SAME frequency**
- They can have **different** SSIDs
- The can use **different** Nv2 **encryption password**

Nv2 AP synchronization

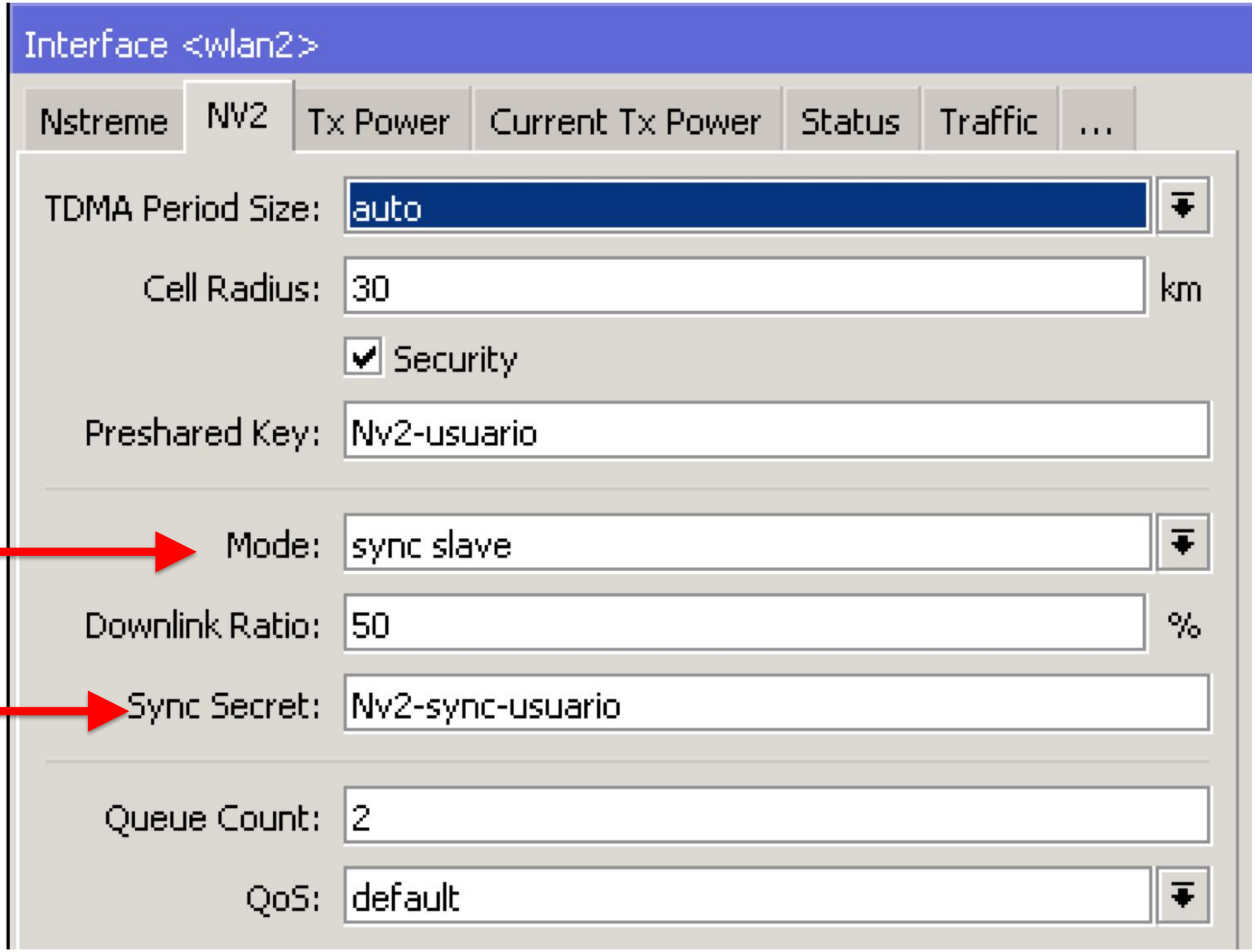
But all of them must use the SAME nv2-sync-secret.

They will synchronize using **this** “password”, regardless of the SSID and the Nv2 encryption password.

Nv2 AP synchronization



Nv2 AP synchronization



Nv2 AP synchronization

Slave APs will first start to search for a Master AP by matching it against specified "nv2-sync-secret".

After a Master AP is found the Slave AP will calculate the **distance** to the Master AP because it is possible that the Master AP is not located in the same location.

Nv2 AP synchronization

Then the Slave AP starts to operate as AP, adapting the period size and the downlink ratio from the synced Master AP.

In addition after the Slave AP is operational other Slave APs can use this Slave AP to sync with.

Nv2 AP synchronization

```
[lorenzo@Trainer] > interface wireless monitor wlan1
                        ;;; AP - control
                     status: running-ap
                    channel: 2472/20/gn
          wireless-protocol: nv2
                noise-floor: -116dBm
           registered-clients: 0
         authenticated-clients: 0
              nv2-sync-state: searching
           current-tx-powers: 1Mbps:5(5/8),2Mbps:5(5/8),5.5Mbps:5(5,
                              12Mbps:5(5/8),18Mbps:5(5/8),24Mbps:5(5
                              HT20-0:5(5/8),HT20-1:5(5/8),HT20-2:5(5
                              HT20-6:5(5/8),HT20-7:5(5/8)
        notify-external-fdb: no
```

Nv2 AP synchronization

```
[lorenzo@Trainer] > interface wireless monitor wlan2
                        ;;; AP -Testset
                     status: running-ap
                    channel: 5600/20/ac
          wireless-protocol: nv2
                noise-floor: -107dBm
          registered-clients: 4
        authenticated-clients: 4
              nv2-sync-state: synced
             nv2-sync-master: E4:8D:8C:6B:78:BF
            nv2-sync-distance: 1
          nv2-sync-period-size: 2
       nv2-sync-downlink-ratio: 50
          notify-external-fdb: no
-- [Q quit|D dump|C-z pause]
```

Nv2 AP synchronization

- Slave AP periodically listens for the Master AP and will check if the "nv2-sync-secret" still matches and adapting the parameters again.
- If the Master AP wireless interface will be disabled/enabled all the Slaves will be also disabled accordingly, then they will start the synchronization process from the beginning.
- If the Master AP will stop to work then the Slave APs will do the same as they do not have sync information.

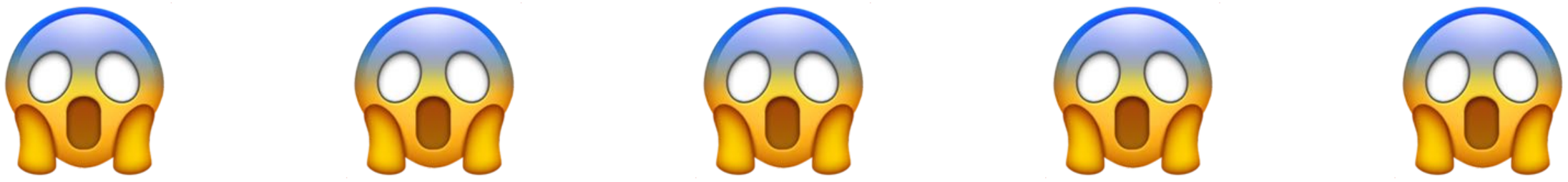
Nv2 AP synchronization

Please remember that this specific resource is still in the process of development.

More features?

On Tue Mar 20, 2018 12:30 pm Uldis created a topic in the MikroTik forum with the title:

Significant improvement for wireless Nv2 PtMP

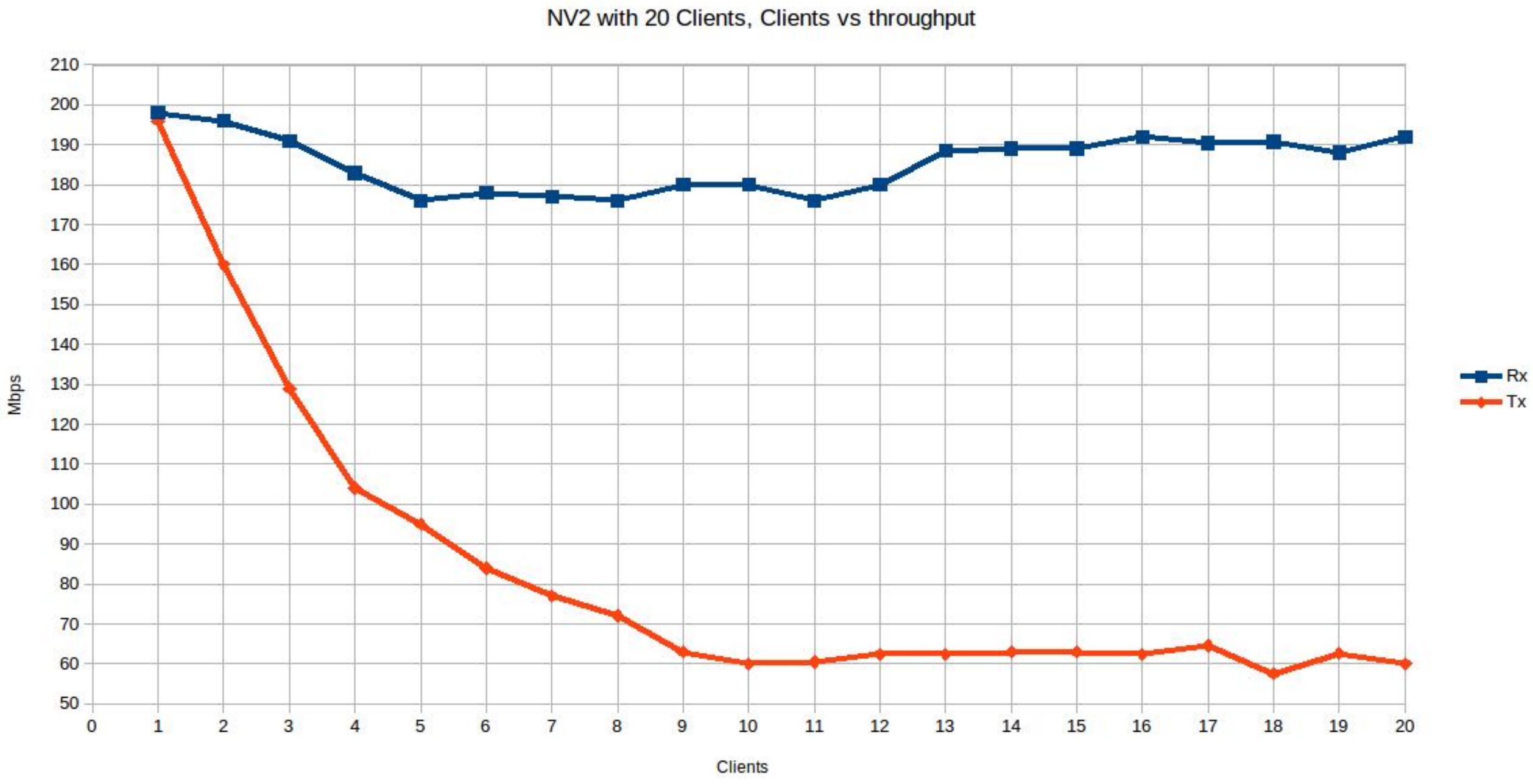


Significant improvement for wireless Nv2 PtMP

MikroTik made significant improvement for wireless **Nv2 PtMP** configurations from the **6.42rc46** version release, where the clients can still use the old version.

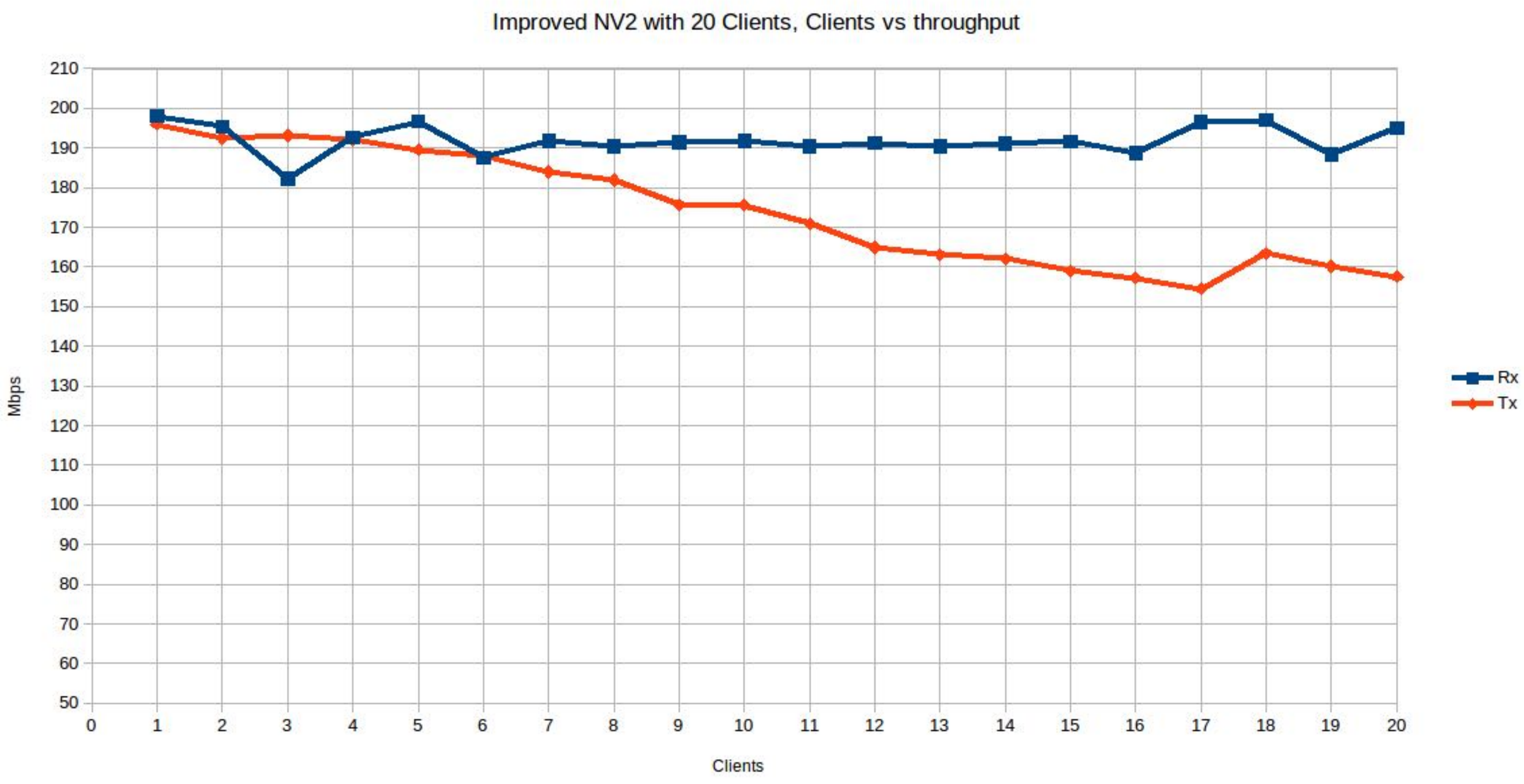
Significant improvement for wireless Nv2 PtMP

Before the improvement (MT Labs)



Significant improvement for wireless Nv2 PtMP

After the improvement (MT Labs)



Significant improvement for wireless Nv2 PtMP

It is still in development, but almost everyone that tried obtained a better aggregated bandwidth from an AP to the clients:

- “only” 20 % more
- 40-50 % more
- 60-65% more

“Live” testing the 6.42rc NV2 PtMP

Tested in a real life outdoor environment, using a Netmetal with:

- 2 chain
- 20 Mhz channel
- 802.11n protocol and Nv2

“Live” testing the 6.42rc NV2 PtMP

The customers distances and devices:

Wireless Tables

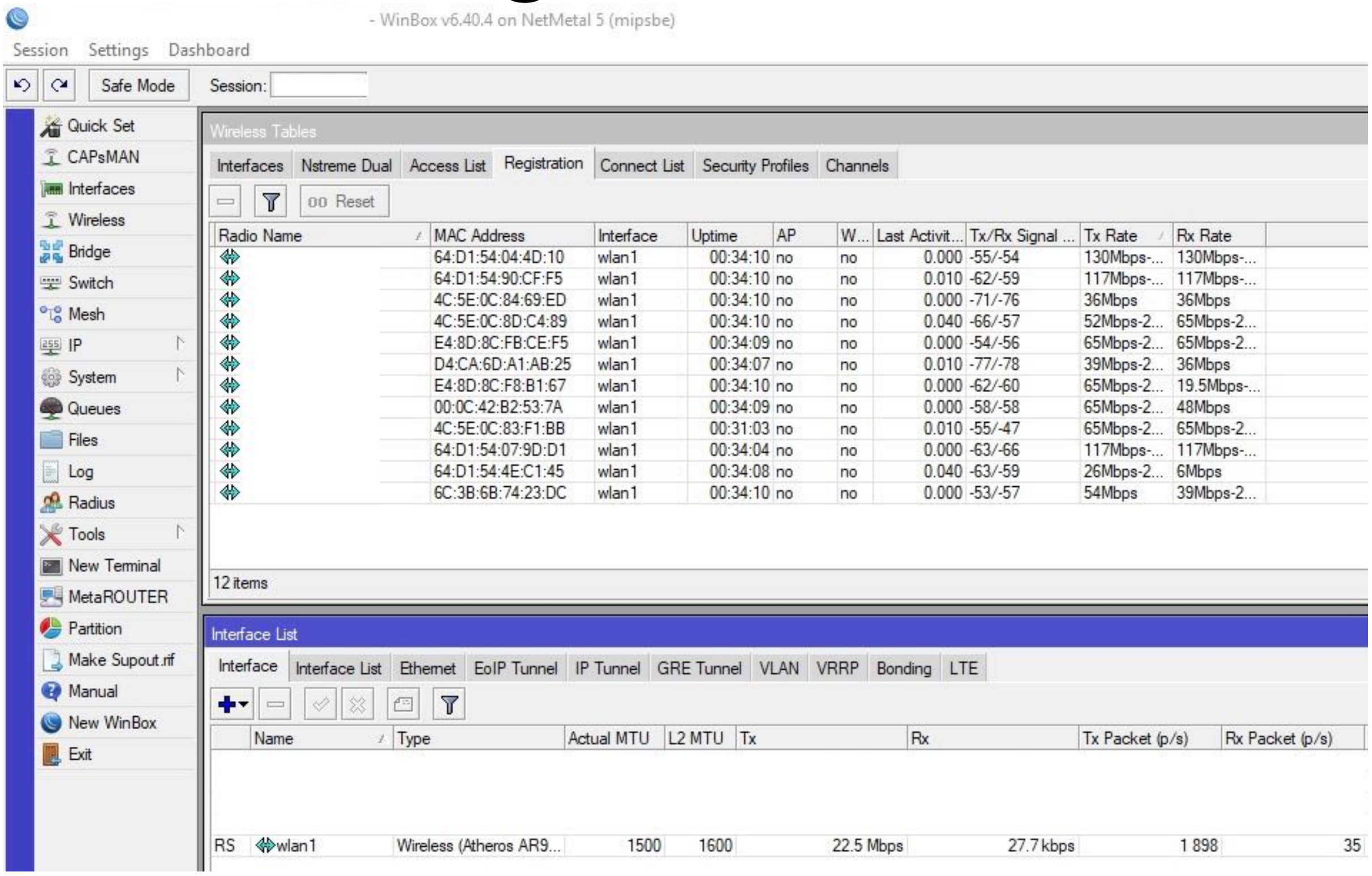
WiFi Interfaces | W60G Station | Nstreme Dual | Access List | Registration | Connect List | Security Profiles | Channels

oo Reset

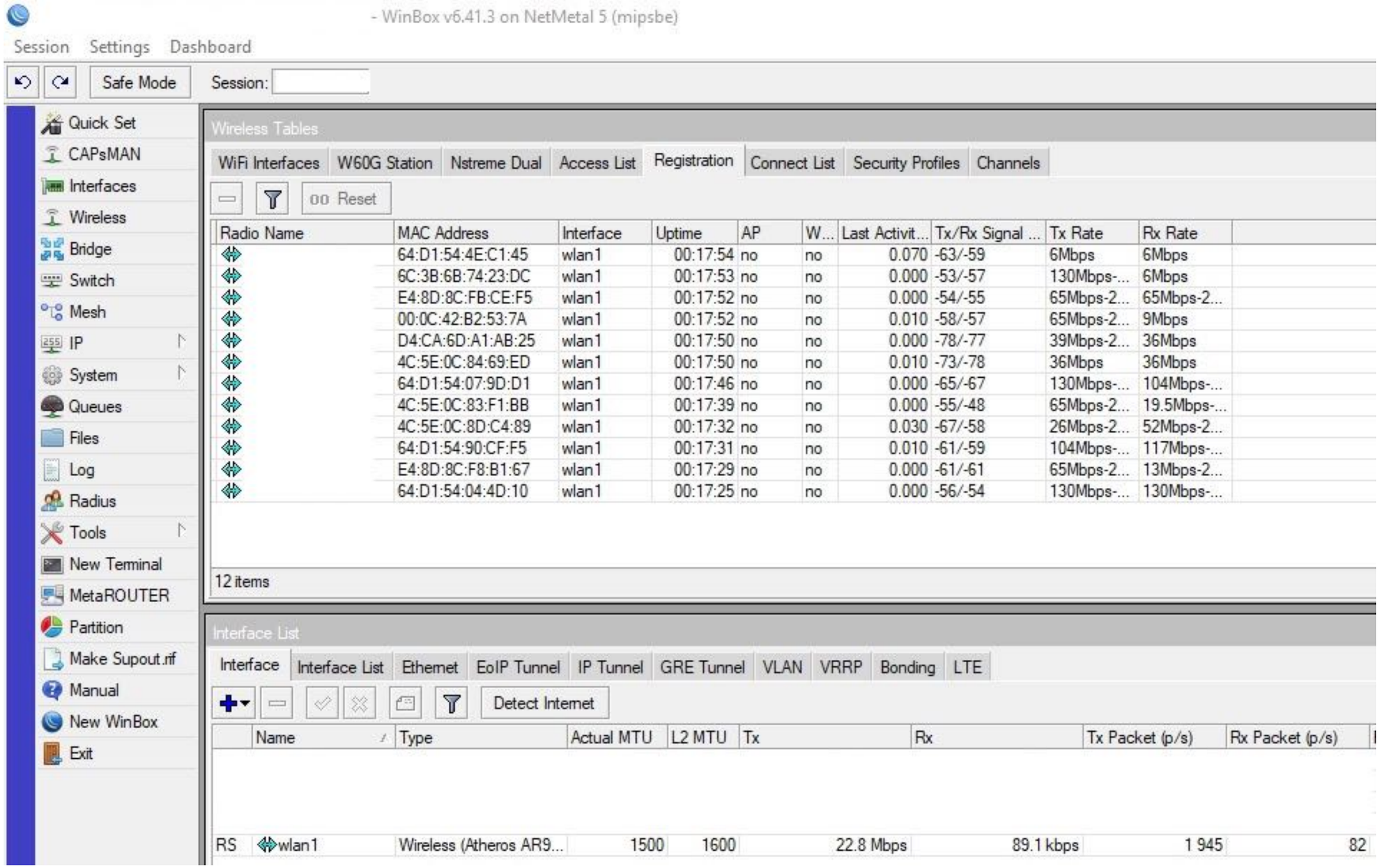
Radio Name	MAC Address	Interface	Uptime	Distance (km)	AP	W...	Last Activit...	Tx/Rx Signal ...	Tx Rate	Rx Rate
	64:D1:54:4E:C1:45	wlan1	03:00:31	14	no	no	0.000	-63/-58	52Mbps-2...	6Mbps
	6C:3B:6B:74:23:DC	wlan1	03:00:30	4	no	no	0.000	-53/-57	130Mbps-...	39Mbps-2...
	E4:8D:8C:FB:CE:F5	wlan1	03:00:30	4	no	no	0.000	-54/-53	65Mbps-2...	65Mbps-2...
	00:0C:42:B2:53:7A	wlan1	03:00:29	4	no	no	0.010	-57/-57	65Mbps-2...	36Mbps
	D4:CA:6D:A1:AB:25	wlan1	03:00:28	4	no	no	0.010	-78/-76	48Mbps	36Mbps
	4C:5E:0C:84:69:ED	wlan1	03:00:27	4	no	no	0.010	-74/-76	36Mbps	36Mbps
	64:D1:54:07:9D:D1	wlan1	03:00:23	14	no	no	0.010	-63/-66	130Mbps-...	78Mbps-2...
	4C:5E:0C:83:F1:BB	wlan1	03:00:16	3	no	no	0.010	-55/-48	65Mbps-2...	65Mbps-2...
	4C:5E:0C:8D:C4:89	wlan1	03:00:09	4	no	no	0.010	-65/-58	19.5Mbps-...	58.5Mbps-...
	64:D1:54:90:CF:F5	wlan1	03:00:09	3	no	no	0.010	-63/-59	117Mbps-...	104Mbps-...
	E4:8D:8C:F8:B1:67	wlan1	03:00:06	4	no	no	0.010	-61/-60	54Mbps	18Mbps
	64:D1:54:04:4D:10	wlan1	03:00:03	10	no	no	0.010	-58/-53	117Mbps-...	117Mbps-...

12 items

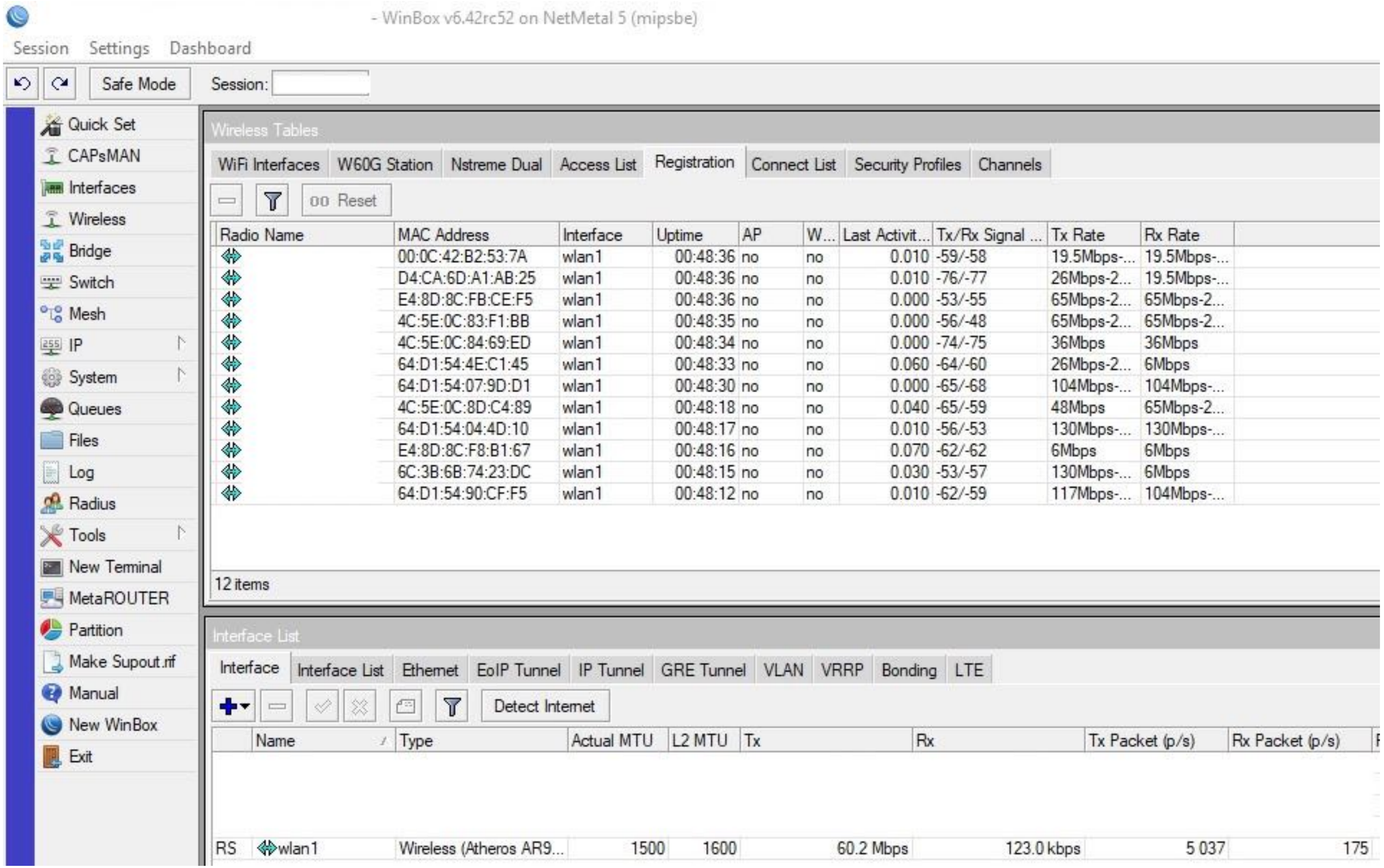
“Live” testing the 6.40.4 NV2 PtMP



“Live” testing the 6.41.3 NV2 PtMP



“Live” testing the 6.42rc52 NV2 PtMP



Wrap up

- ✓ I think that MikroTik started to put their hands on the wireless part of RouterOS in a PtMP evironment.
- ✓ I hope you enjoyed my presentation and the news in the wireless package since the version 6.40

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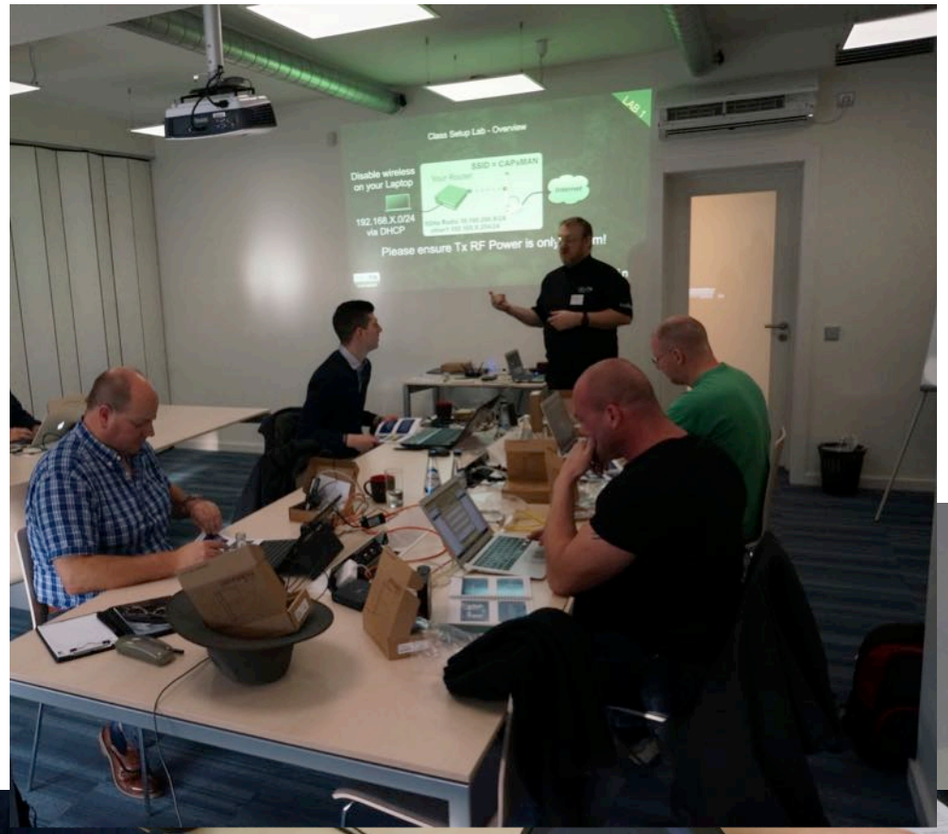
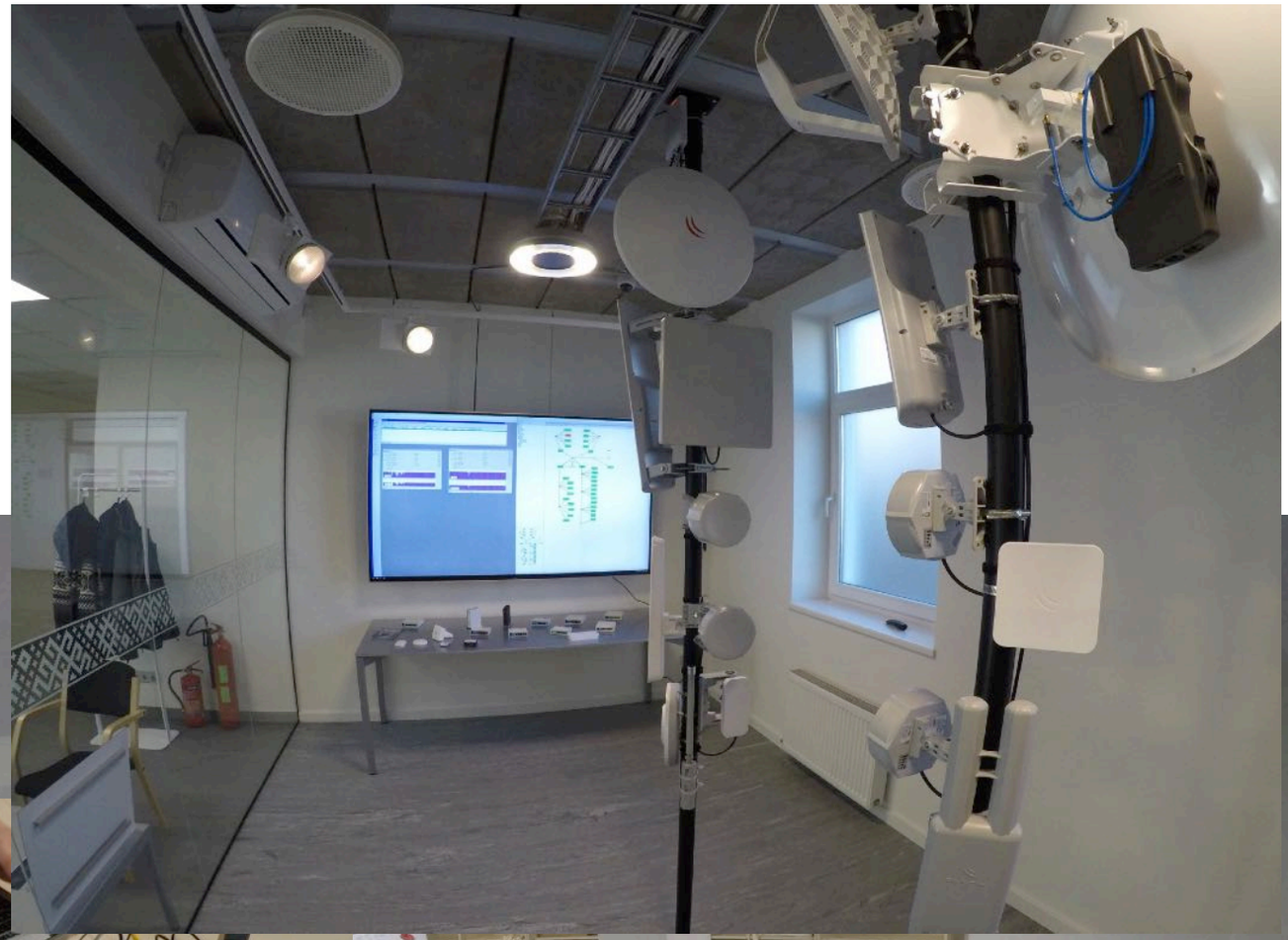
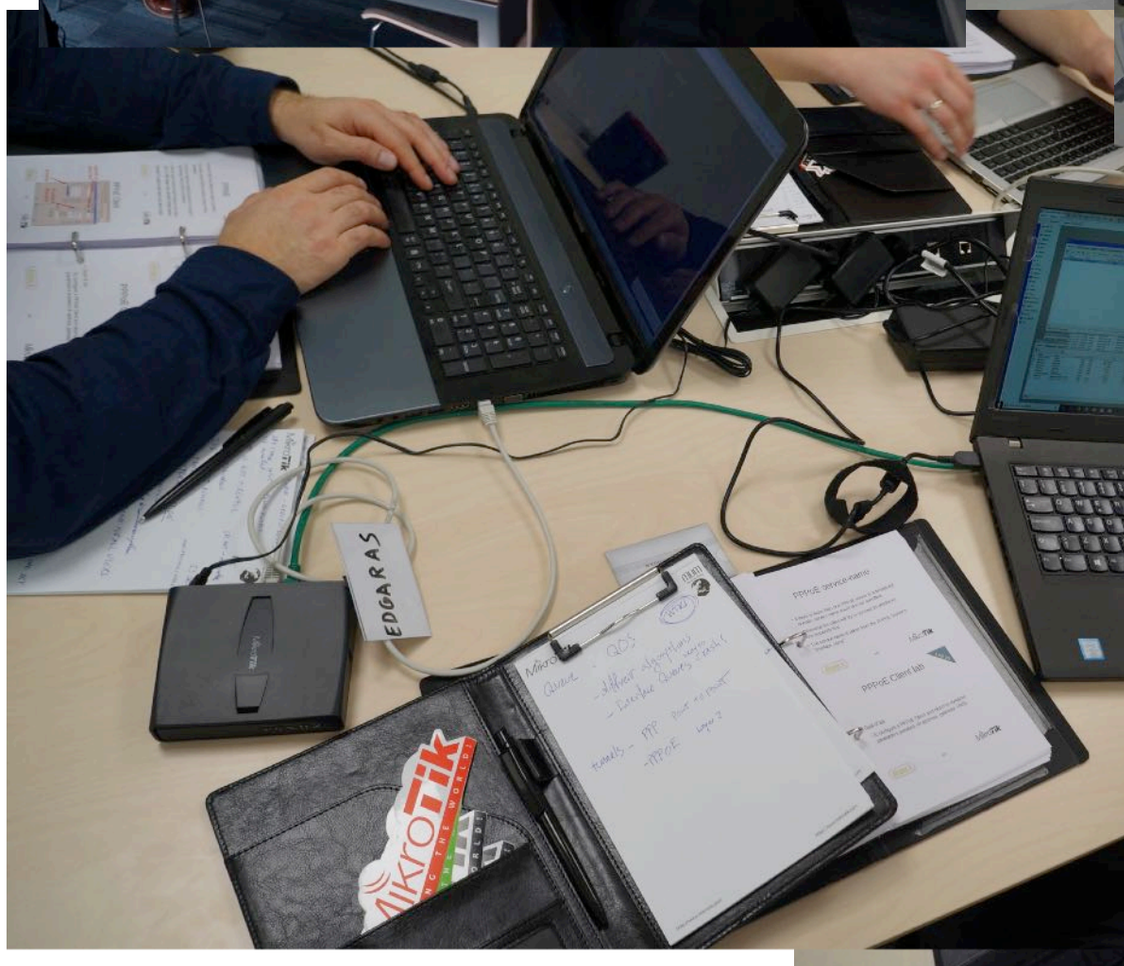

Class Setup Lab - Overview
Disable wireless on your Laptop
192.168.X.0/24 via DHCP
SSID = CAPsMAN
Internet
Please ensure Tx RF Power is only




EDGARAS
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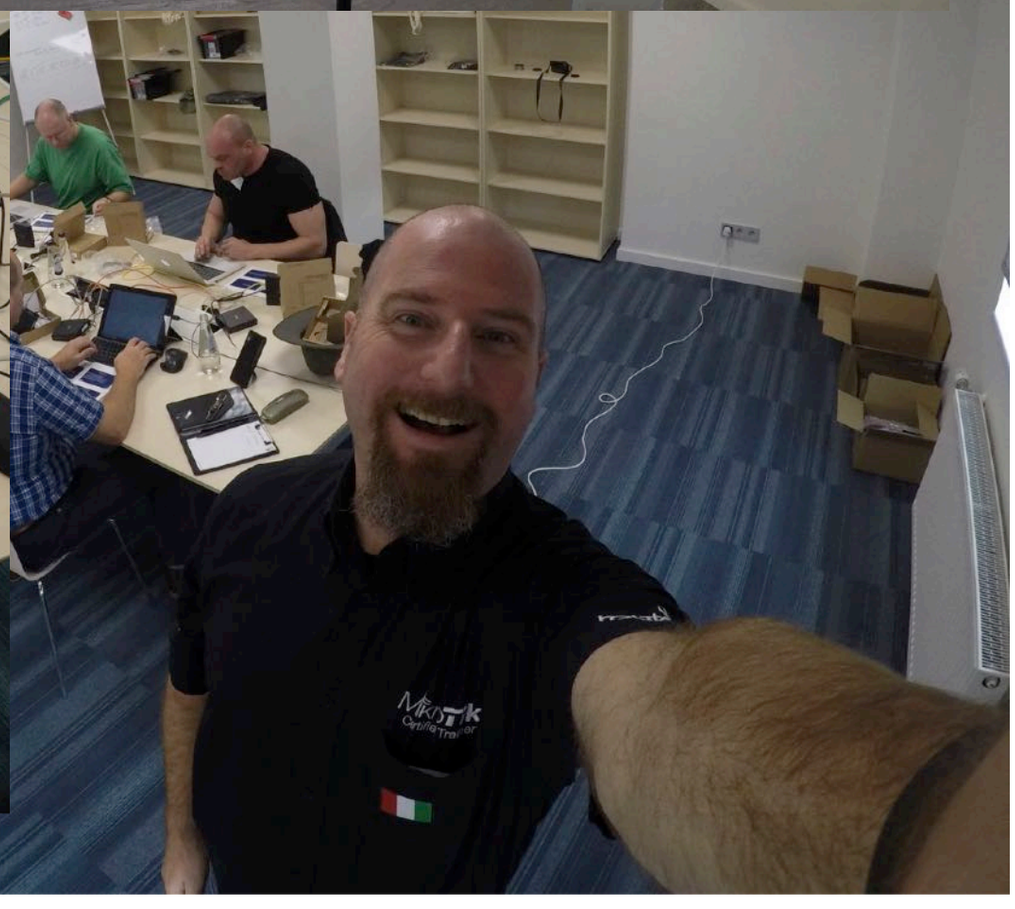
MikroTik
Certified Trainer

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10/June SUN	11/June MON	12/June TUE	13/June WED	14/June THU	15/June FRI	16/June SAT
MTCNA			Guide Tour City	MTCRE		
MTCTCE		Refresh MTCNA, MTCRE	Guide Tour City	MTCIPv6E		Renewal Day: MTCNA, MTCRE, MTCINE, MTCWE, MTCUME, MTCTCE, MTCIPv6E
MTCRE			Guide Tour City	MTCINE		
MTCWE			Guide Tour City	MTCUME		
	MTCIPv6E		Guide Tour City	MTCNA		

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Thank you!

Q & A

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