The mAP and mAP lite:
The Wireless Swiss Knife
to have always in your pocket

by Lorenzo Busatti

UNITED STATES ON APRIL 28 - 29, 2016

About me

Lorenzo Busatti

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


linkwave
2006 2016
10 anni di wireless!

About me


Suisse
Svizzera
Switzerland
Liechtenstein
Graz
Klagenfurt am Wörthersee
Maribor
Slovenija
Slovenia
Zagreb
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
Monaco
Cannes
Toulon
Livorno
Firenze
Italia
Italy
Grosseto
Viterbo
Pescara
L'Aquila
Roma
Latina
Foggia
Bari
Napoli
Potenza
Salerno
Taranto
Brindi
Lecce
Ajaccio
Olbia
Sassari
Sardegna
Cagliari
Tyrrhenian Sea
Adriatic Sea
Cosenza
Catanzaro
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Catania
Agrigento
Gela
Siracusa
Ragusa
Annaba
Tunis
Google
Camaiore
Pistoia
Prato
Viareggio
Lucca
E76
Quarrata
Firenze
San Piero In Bagno
San Marin
Pisa
Empoli
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Pontedera
Urbania
Figline Valdarno
Sansepolcro
Livorno
Rosignano Solvay
Cecina
E80
Poggibonsi
Colle di Val d'Elsa
Montevarchi
Arezzo
Siena
Città di Castello
Gubbio
Castiglion Fiorentino
E35
Umbertide
Cortona
Sinalunga
Campiglia Marittima
Massa Marittima
Montepulciano
Perugia
Città della Pieve
Ribolla
Piombino
Follonica
Arcidosso
Marsciano
A1
Portoferraio
Grosseto
Todi
Castiglione della Pesc
Acquapendente
Orvieto
E45
Pitigliano
E80
Montefiascone
Amelia
Orbetello
Montalto di Castro
Viterbo
Narni
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 **P**rofit **O**rganization for

High Quality Training Partners

Dedicated to Max

mAP and the mAP lite

This presentation is dedicated to the "**mAP** *family*":

- A beautiful product;
- So smart;
- With tons of use and applications

Why this presentation?

I started to think about nice applications that will be perfect with the mAPs at the 10th MUM in Prague in the 2015.

Over my concepts, I hope you'll find new way to have RouterOS with you.

The mAP 2n

The mAP 2n

CPU	400 MHz
RAM	64 MB
10/100 Eth ports	TWO
USB ports	1 (power and DATA)
Wireless	802.11b/g/n
Number of chains	ONE
Antenna gain	1.2 dBi
Max TX power	17 dBm
Min RX signal	-96 dB
Powerable by	jack, PoE, USB
802.3af support	NO
input voltage	8 V - 57 V
PoE in	YES
PoE out	YES
Dimensions	68x68x19mm
Operating System	RouterOS L4

The mAP 2n

- I was excited when I buyed one
- Powerable by almost everything
- Small
- With PoE out
- USB port for storage or 4G key
- Cost only $ 45.00
- This is the product that I love to talk about it in my training classes


map 2n

What is “better” than a mAP ?

The mAP lite

The mAP lite

CPU	650 MHz
RAM	64 MB
10/100 Eth ports	ONE
USB ports	1 (only for power)
Wireless	802.11b/g/n
Number of chains	TWO
Antenna gain	1.5 dBi
Max TX power	22 dBm
Min RX signal	-96 dB
Powerable by	PoE, USB
802.3af/at support	YES
input voltage	5 V - 60 V
PoE in	YES
PoE out	NO
Dimensions	48x49x11mm
Operating System	RouterOS L4


map lite
PWR
ETH

The mAP lite

- After the mAP 2n, that I was excited for, with the mAP lite I become euphoric!!
- Smallest than the mAP
- With dual chain antennas
- Cost only $25.00 ☺

Comparing the mAP family

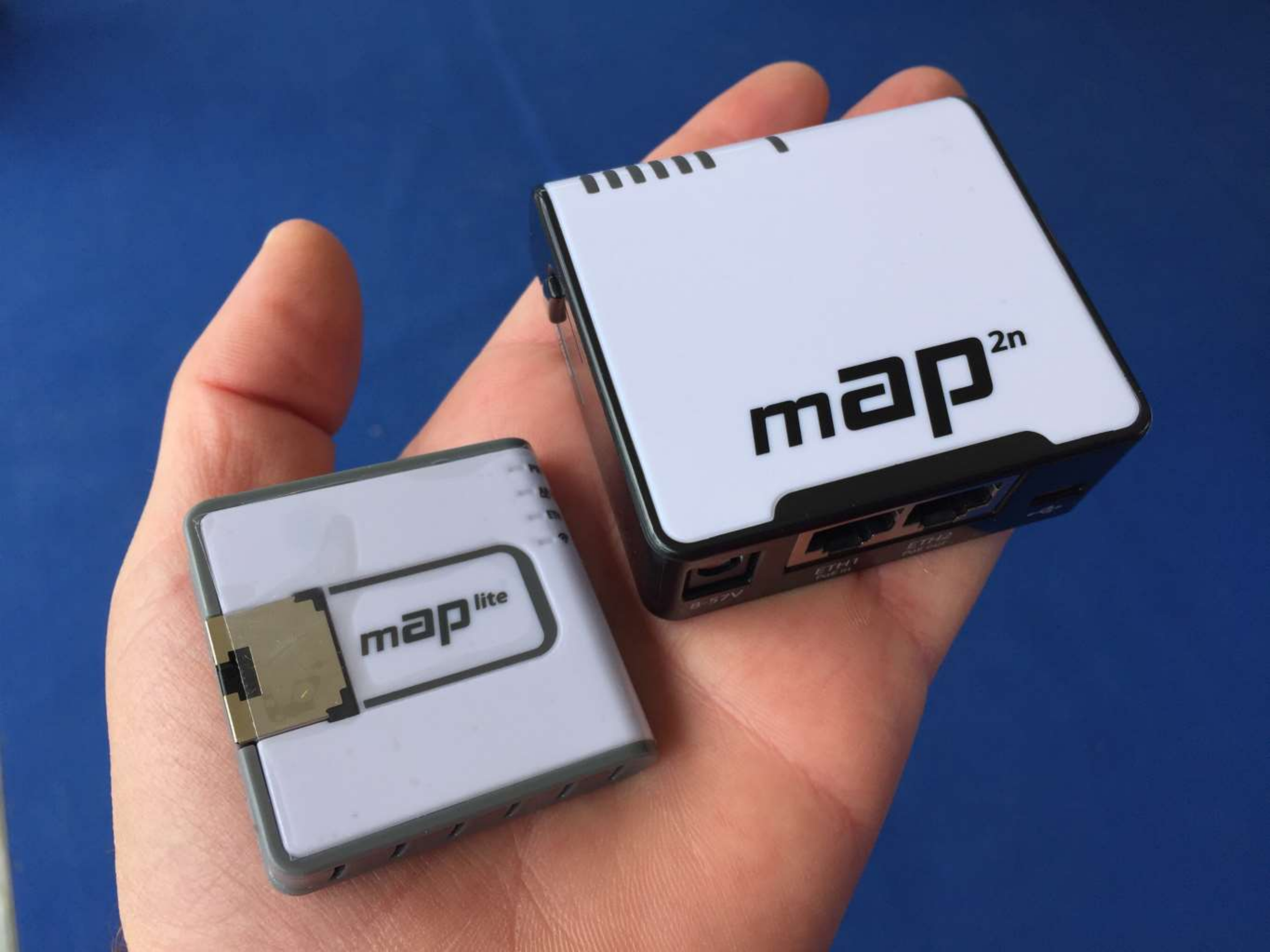
	mAP 2n	mAP lite
CPU	400 Mhz	650 MHz
RAM	64 MB	64 MB
10/100 Eth ports	TWO	ONE
USB ports	1 (power and data)	1 (only for power)
Wireless	802.11b/g/n	802.11b/g/n
Number of chains	ONE	TWO
Antenna gain	1.2 dBi	1.5 dBi
Max TX power	17 dBm	22 dBm
Min RX signal	-96 dB	-96 dB
Powerable by	Jack, PoE, USB	PoE, USB
802.3af/at support	NO	YES
input voltage	8 V - 57 V	5 V - 60 V
PoE in	YES	YES
PoE out	YES	NO
Price	$45.00	$25.00

Comparing the mAP family

	mAP 2n	mAP lite
CPU	400 Mhz	**650 MHz**
RAM	64 MB	64 MB
10/100 Eth ports	**TWO**	ONE
USB ports	1 (**power and data**)	1 (only for power)
Wireless	802.11b/g/n	802.11b/g/n
Number of chains	**ONE**	**TWO**
Antenna gain	1.2 dBi	**1.5 dBi**
Max TX power	17 dBm	**22 dBm**
Min RX signal	-96 dB	-96 dB
Powerable by	**Jack**, PoE, USB	PoE, USB
802.3af/at support	NO	**YES**
input voltage	8 V - 57 V	5 V - 60 V
PoE in	YES	YES
PoE out	**YES**	NO
Price	$45.00	**$25.00**

Comparing the mAP family

And what about sizes and weight?


map 2n
map lite


dew
7
8
9
13:09 30
MAX
ER-1500
ROWENTA


SAMSUNG
7
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15

Unique features

mAP 2n:

2 Ethernet ports

PoE OUT and powerable by a jack

USB for data (and power)

mAP lite:

Smaller and lighter than the mAP 2n

Powerful wireless with 2 chains

802.3af/at support

Cheaper

With a magnet


map lite

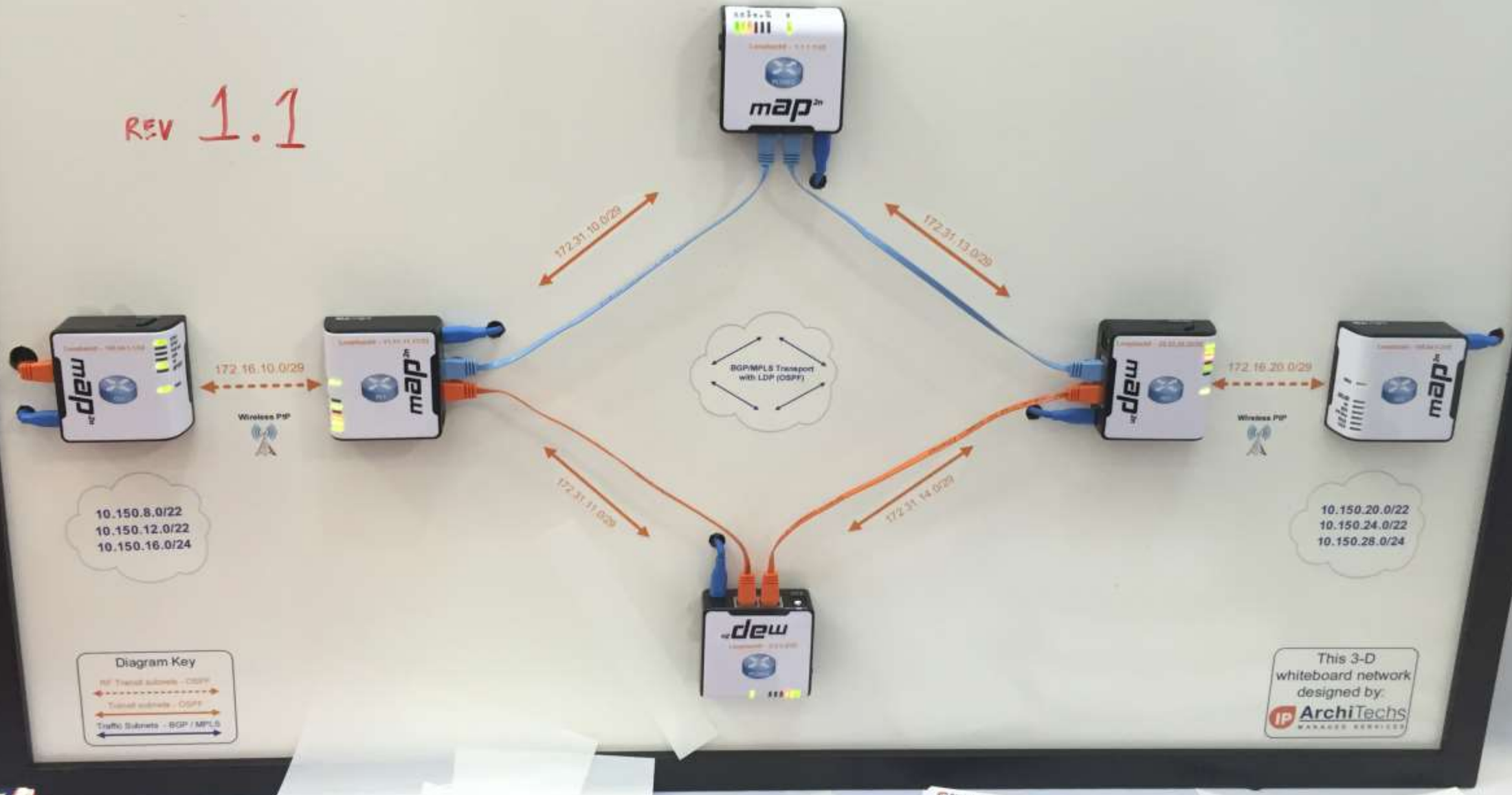
The power of RouterOS

- ALL the functions and his POWER into these small devices!
- APs, firewall, traffic shaper, hotspot, ospf, …. and also MPLS, BGP and the usermanager!
- Awesome!
- No, doesn’t run the Dude server

WORLD'S SMALLEST MPLS ISP

Powered by MikroTik

REV 1.1



PACKETS

An LSA Type 5 packet walks into a bar and asks the bartender for a drink.

FRAMES

Wireless performances

Trying them on the field, I didn't found differences in wireless performances.

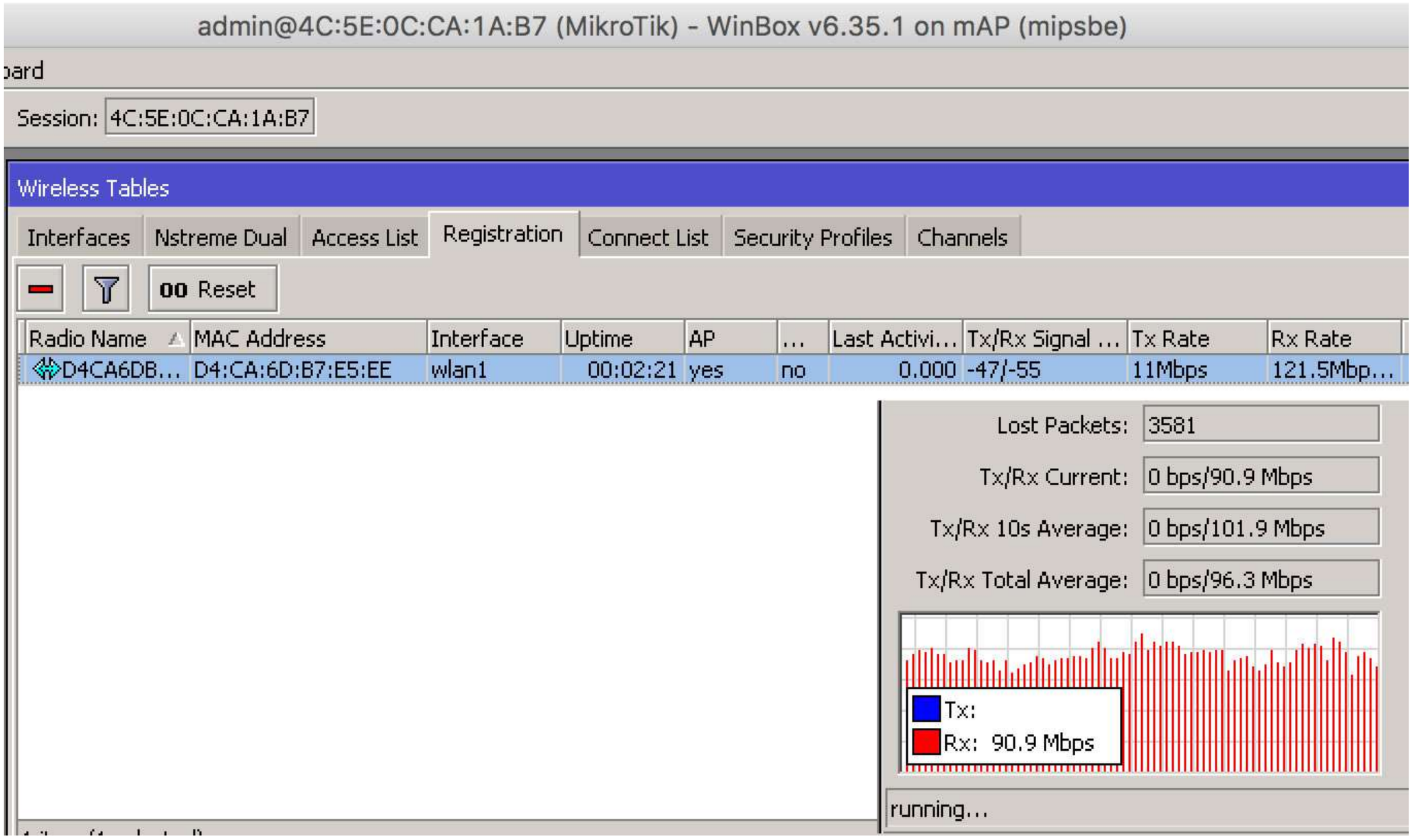
They have different Wireless chip:

- AR9331 on mAP 2n
- QCA9533 on mAP lite

The mAP 2n seem to receive better signals

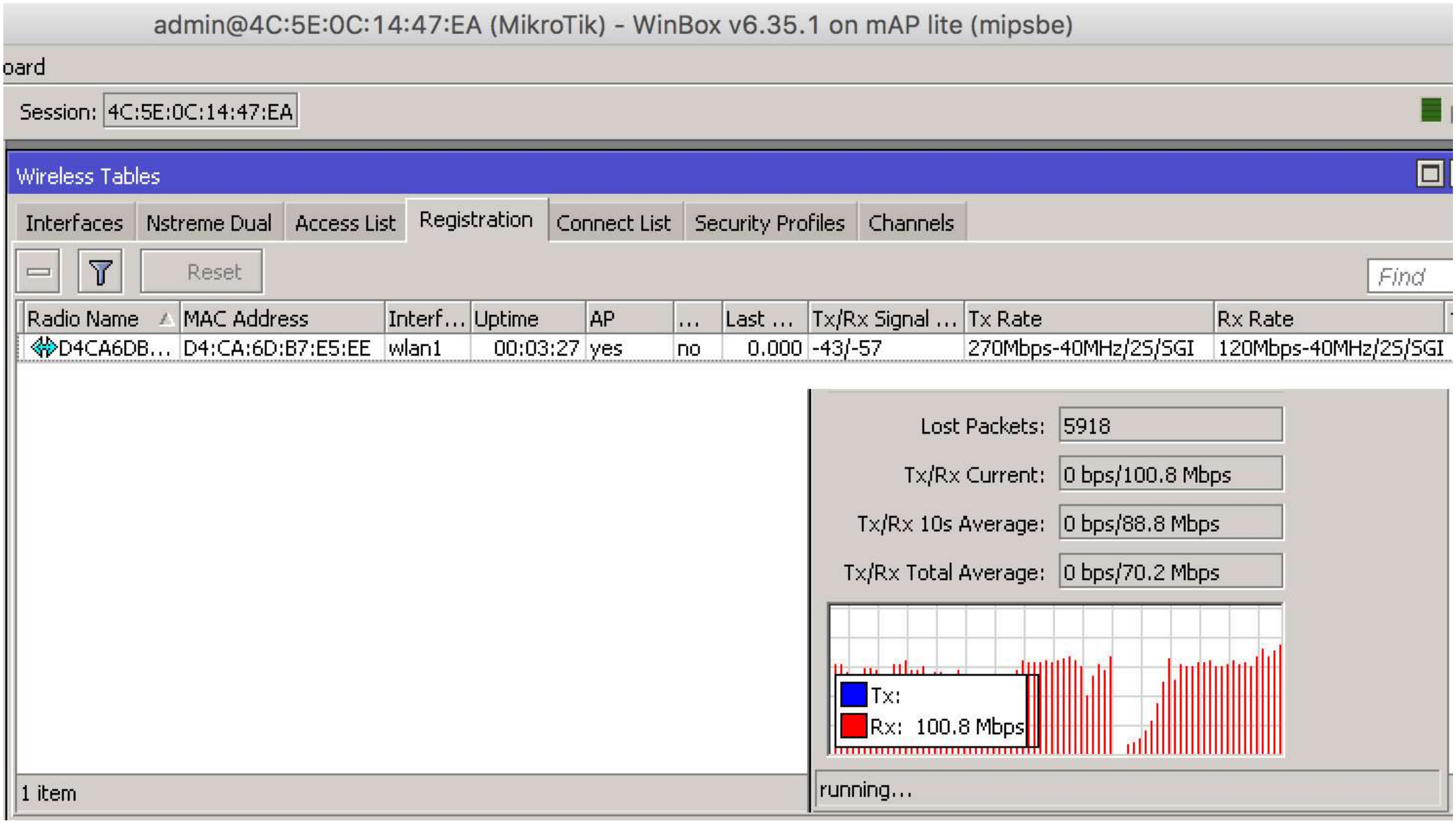
Wireless performances

Testing the mAP 2n (against hAP ac lite, indoor)



Wireless performances

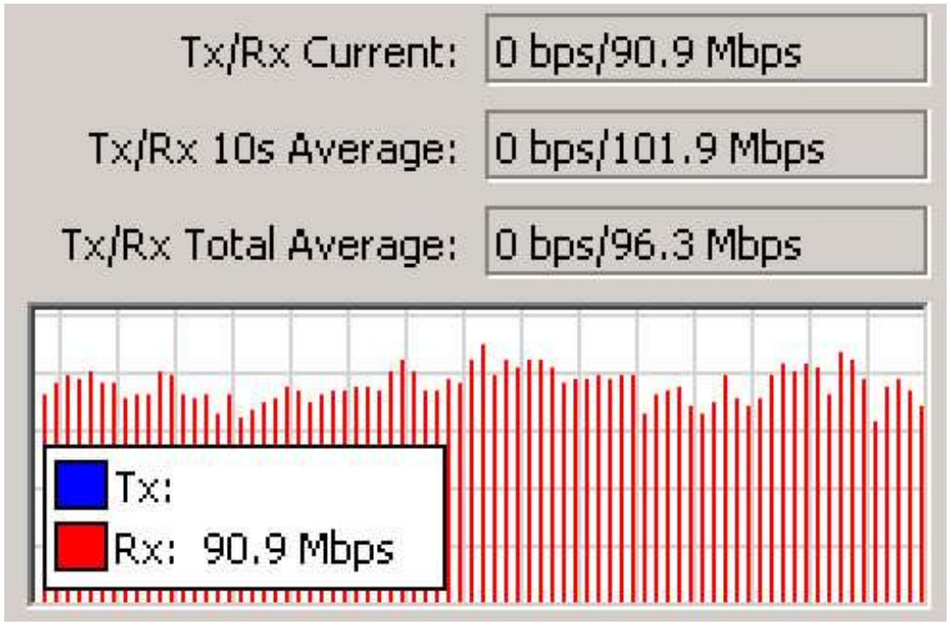
Testing the mAP lite (against hAP ac lite, indoor)



Wireless performances

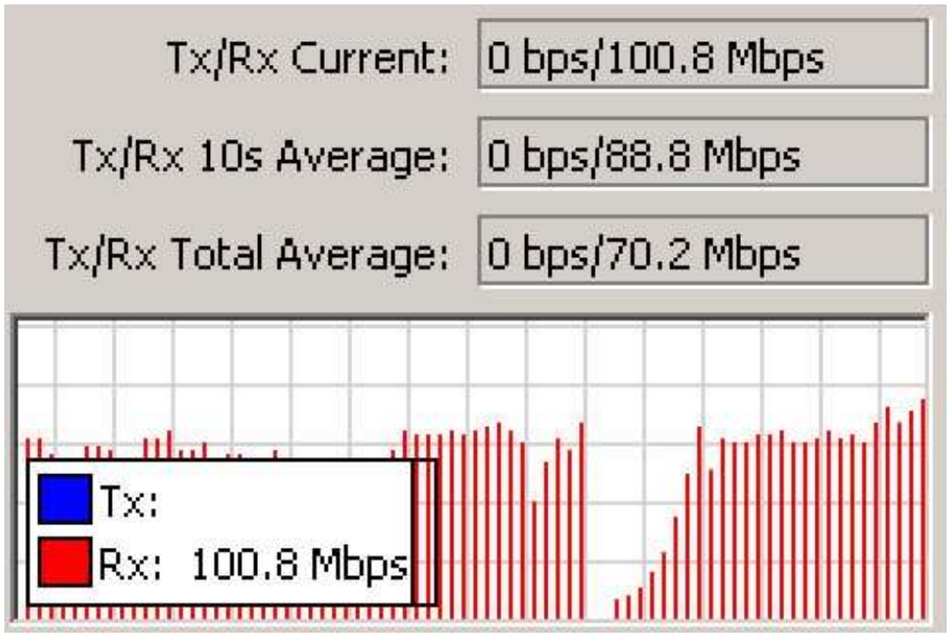
mAP

Tx/Rx Signal ...	Tx Rate	Rx Rate
-47/-55	11Mbps	121.5Mbp...



mAP lite

Tx/Rx Signal ...	Tx Rate	Rx Rate
-43/-57	270Mbps-40MHz/2S/SGI	120Mbps-40MHz/2S/SGI



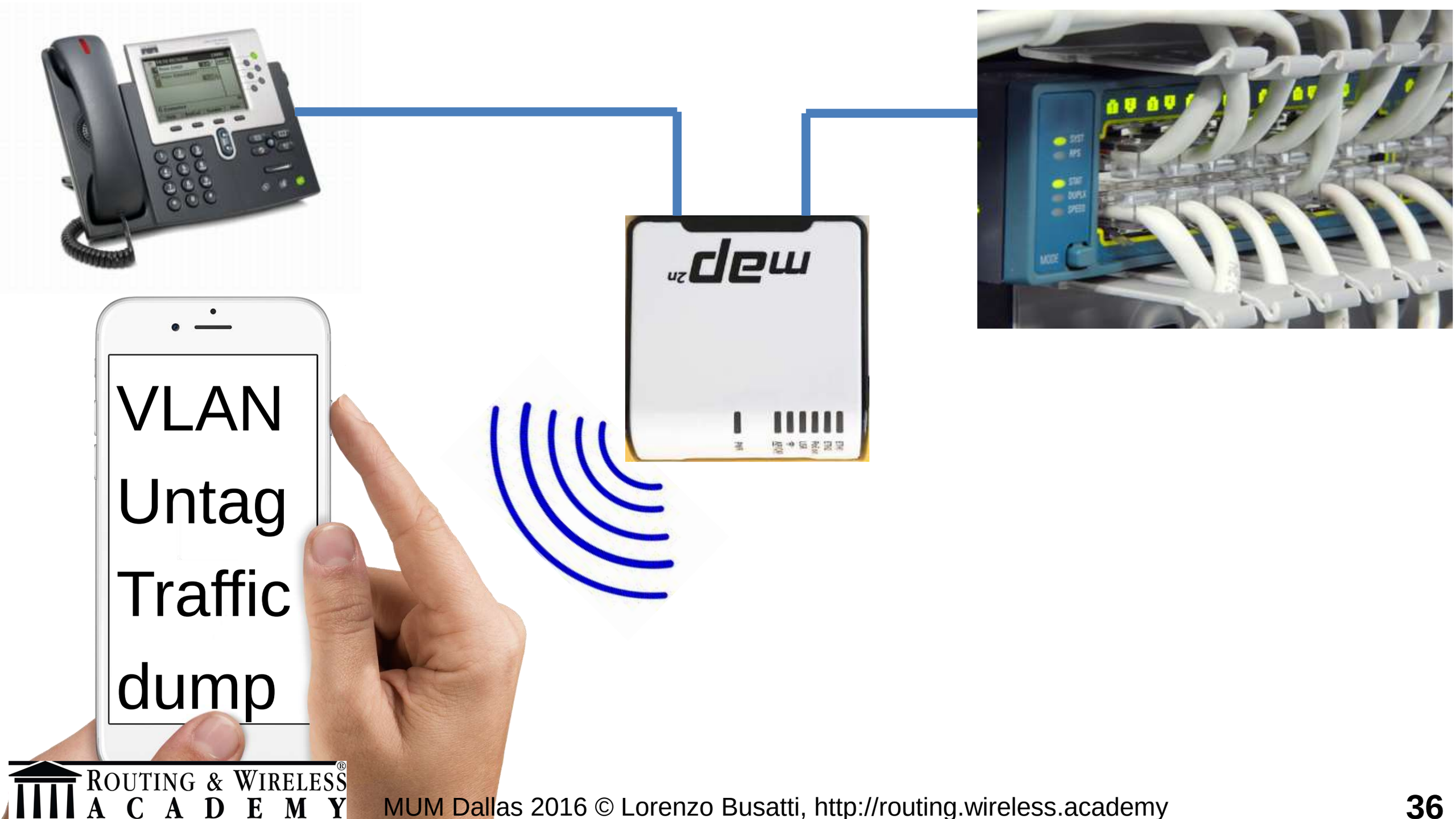
Practical applications of the mAPs

Probably they was designed as low cost home AP.

But these products are applicable in amazing wireless projects and in the security field.

My 1st impact

The first time I saw the mAP, I had this “vision”:



Inline pentest

(A security application for the mAP)


map2n

Inline pentest

"Inline" security test (and with poe) with the mAP:

- Vlan untagging
- Traffic filtering and manipulating (using the L2 bridge firewall)
- Traffic dump "live" on screen
- Traffic dump to remote Wireshark (wifi connected)

Inline pentest

We’re not at the Black Hat conference, so from here you have to use your own imagination about security applications of the mAP ☺

Wireless Applications

Wireless applications

Your mAP can be:

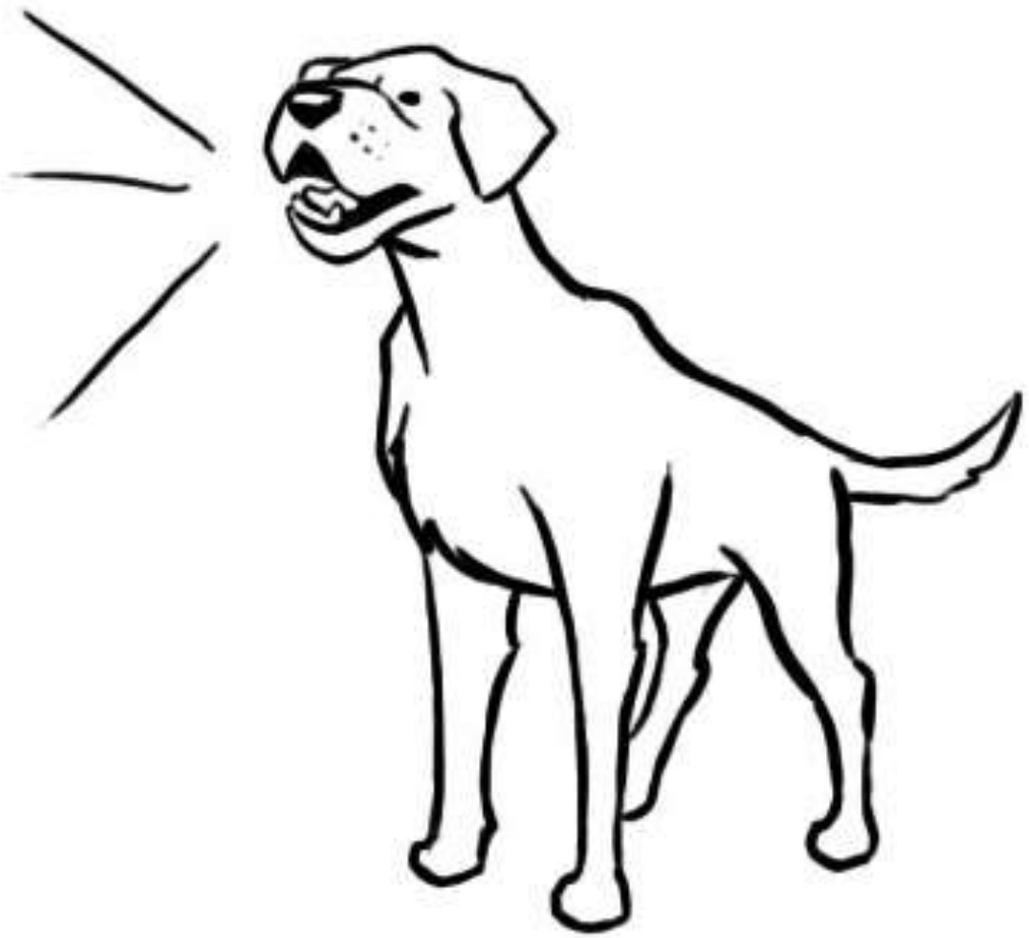
- A “simple” stand-alone AP
- An AP under a CAPsMAN control

But since ROS 6.35 (**wireless-rep**) can be:

- A repeater
- A station with multiple Virtual APs

Granular wireless coverage

"Some" vendors say that they support up to 500 concurrent user.



My question is:

With how much

Bandwidth each one?

Granular wireless coverage

Few “powerful” APs Vs a “team” of mAPs.

The total bandwidth is incomparable.

Granular wireless coverage

An hotel floor,

40 rooms.

With 2 peoples

each one the max

total is 80 peoples.

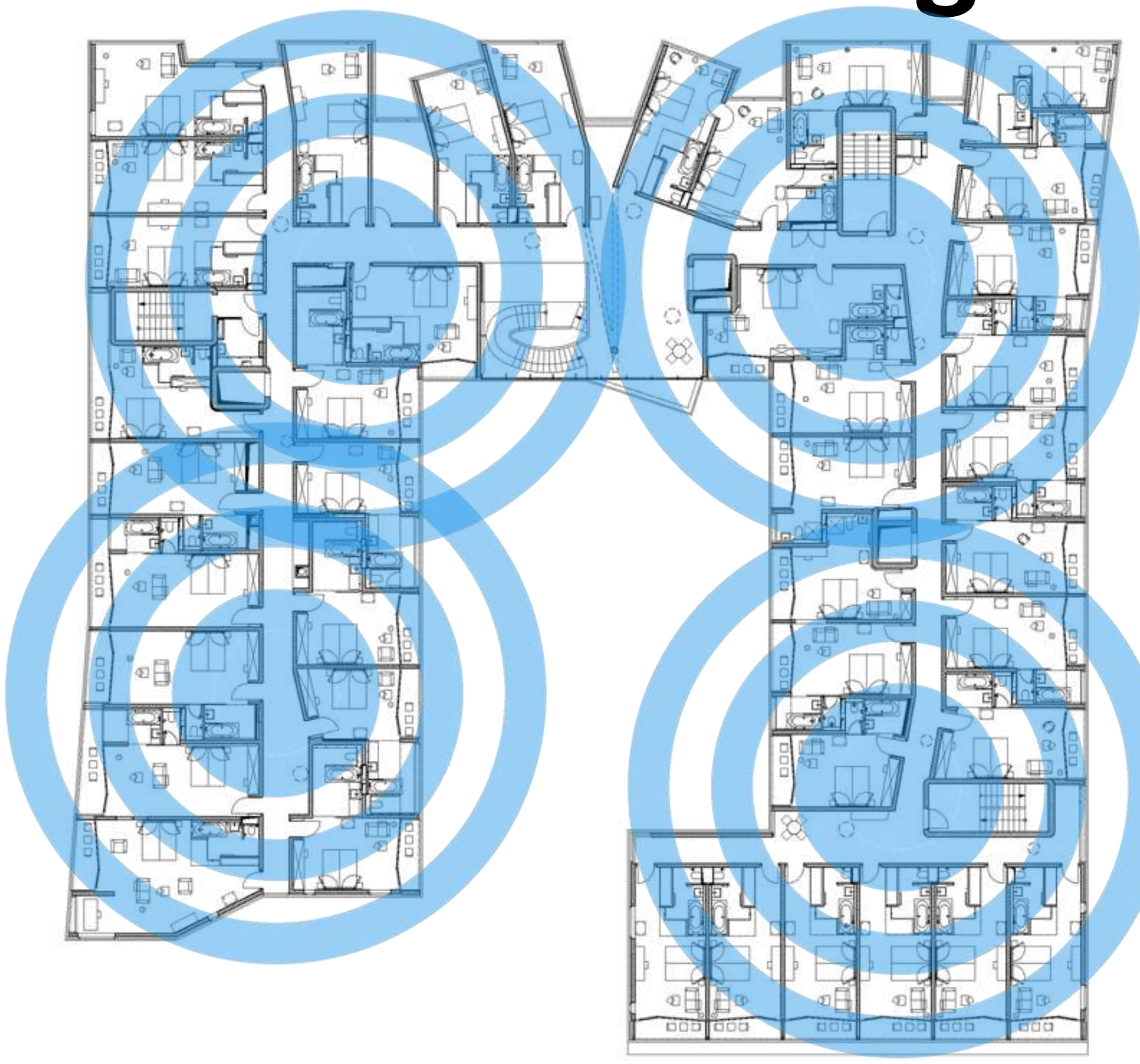
Common wireless coverage

A ”Common” hotel coverage:

4 “expensive” APs per floor.

Max total BW:

100 Mbps each.



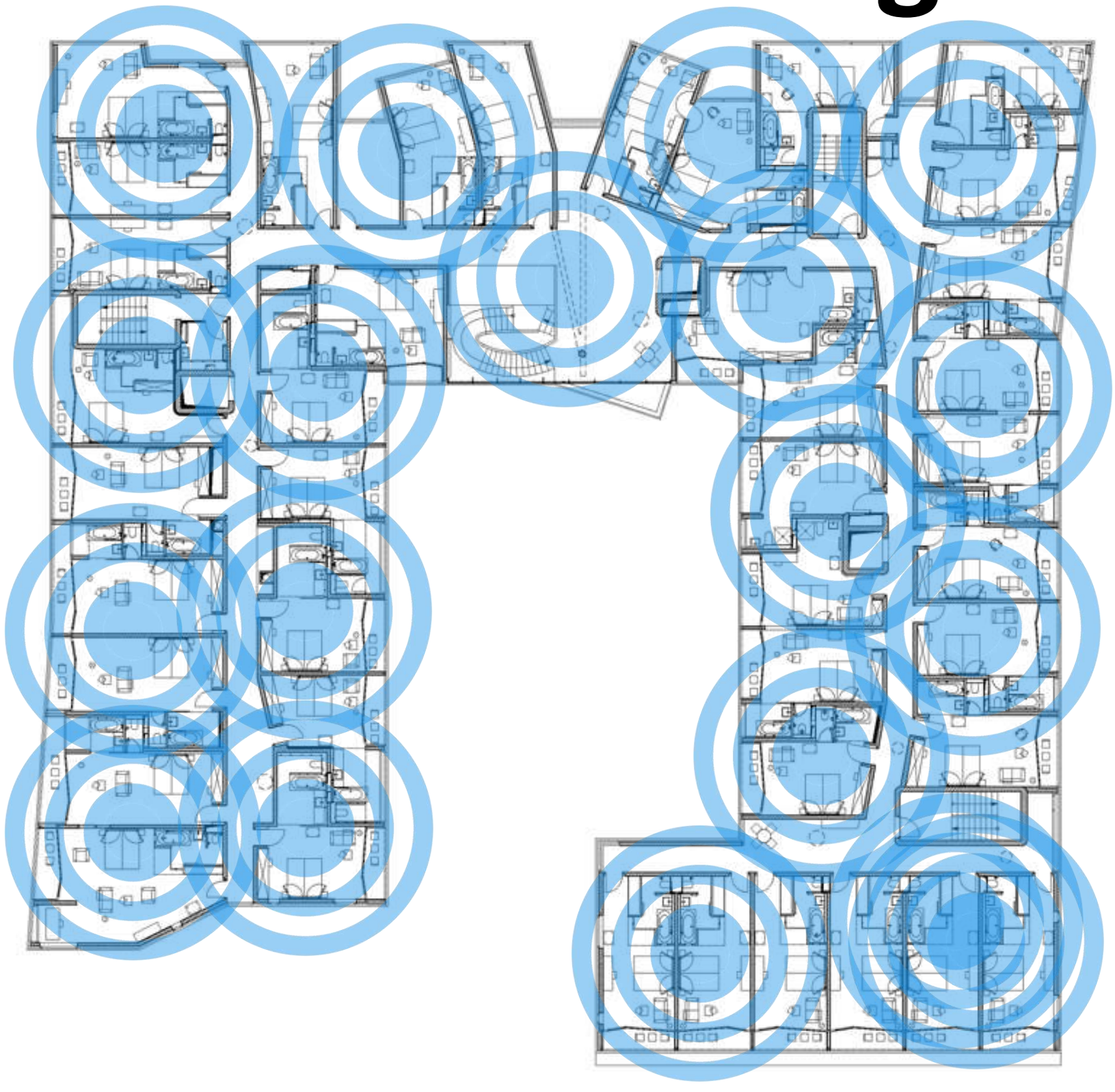
Granular wireless coverage

"Granular" hotel coverage:

20 mAP lite per floor.

Max total BW:

50 Mbps each.



Common wireless coverage

The “common” version:

4 “expensive” APs: $ 500.00 each

1 “expensive” controller: $ 1,000.00

Total devices expenses: $ 3,000.00

Total maximum BW: 400 Mbps

Min bandwidth each one: 5 Mbps

Granular wireless coverage

The “Granular” version:

20 mAP lite: $ 25.00 each

1 RB3011 as CAPsMAN: $ 179.00

Total devices expenses: $ 679.00

Total maximum BW: 1 Gbps

Min bandwidth each one: 12,5 Mbps

Granular wireless coverage

The “Granular” Vs “Common” version:

Saved more than: $ 2,000.00

Provided more than **double bandwidth**

More reliable (if one fail you’ll loose the 5% instead the 25%)

The mAP lite as

The Wireless Swiss Knife

The Wireless Swiss Knife

Thanks to the size of the mAP lite, the easy powering and the power of RouterOS, I developed my personal Wireless Swiss Knife:

a new “friend” always with me.

The Wireless Swiss Knife

He can “sleep” in your pocket ☺

Yes, it’s a little bit *nerd*, that will jump you in the 80’s ☺

But is very useful, you should consider that.

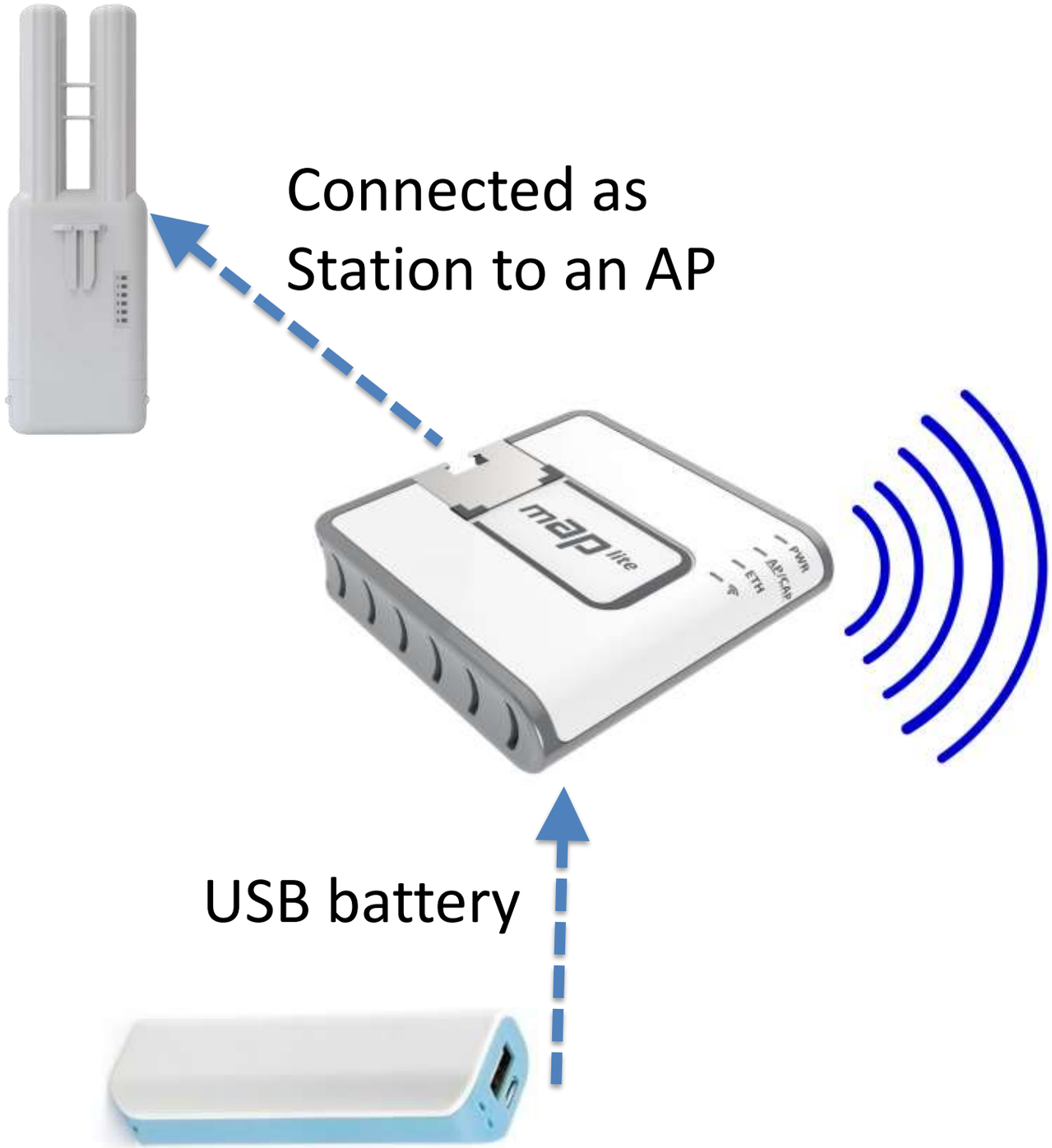
The Wireless Swiss Knife

The basic idea is to have lot of functions with you, easy manageable by a smartphone.

I build functions using Virtual APs:

1 function = 1 VirtualAP

The Wireless Swiss Knife



Multiple SSID:

- MyBridged
- MyRouted
- MyVPN
- MyFriends
- FreeInternet
- FastInternetAccess
- MyIPv6
- FunnyThings

The Wireless Swiss Knife

Step ONE: MyBridged

VirtualAP, with WPA2, in a Bridge with the physical WLAN (when applicable).

Useful for a “level 2” access in the wireless network.

The Wireless Swiss Knife

Step TWO: MyRouted

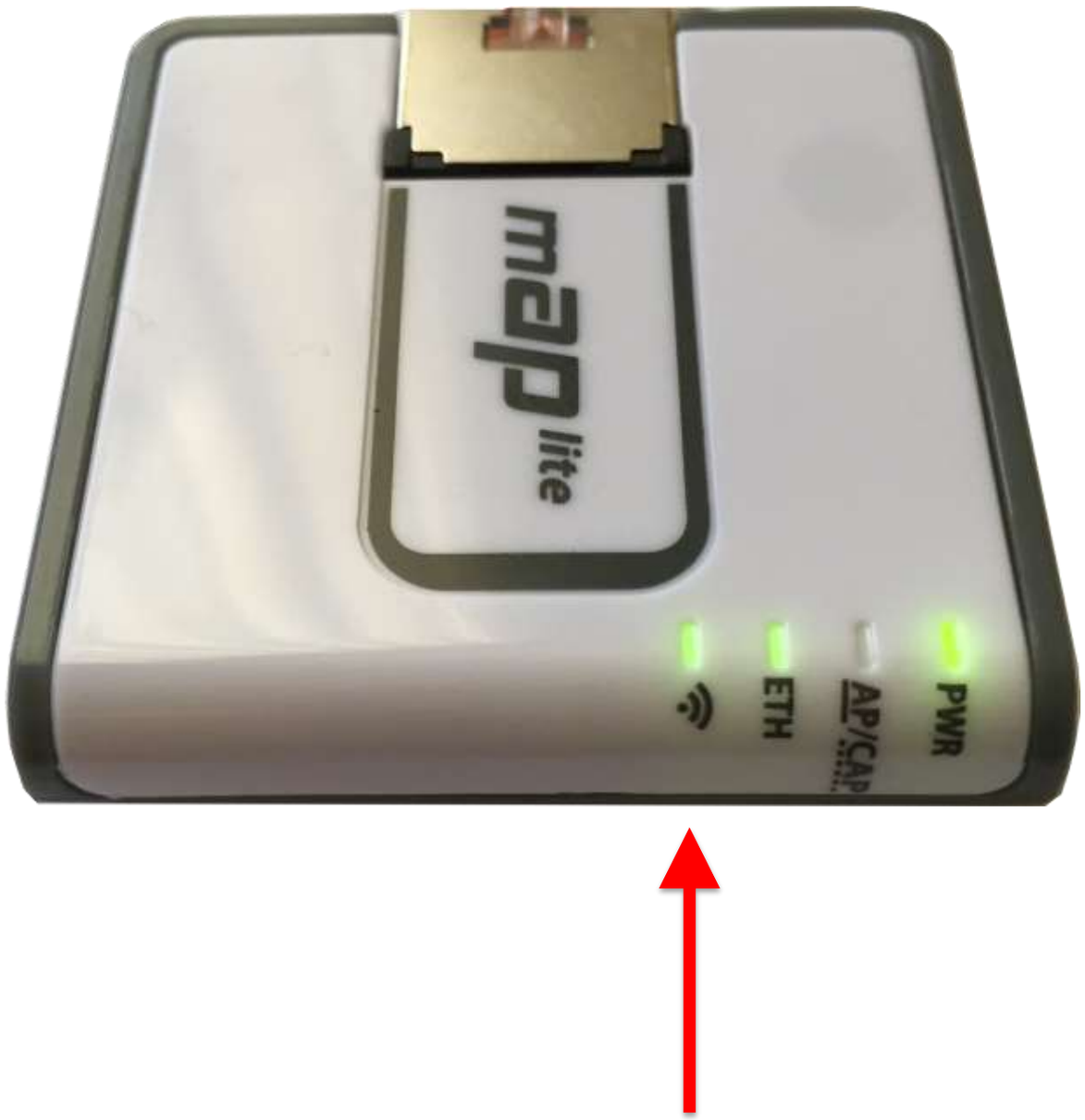
VirtualAP, with WPA2, with IP address, DHCP server, masquerade.

Your “standard” SSID for browsing the net.

The Wireless Swiss Knife

Step TWO: MyRouted

Using the Netwatch you can control the **wireless led** for knowing when there is internet available. With a quick look!



The Wireless Swiss Knife

Step TWO: MyRouted

Using the Netwatch you can control the **wireless led** for knowing when there is internet available. With a quick look!

```
/tool netwatch
add comment="Check Internet" down-
script="system leds set 1 type=off" host=\
8.8.8.8 up-script="system leds set 1
type=on"
```

The Wireless Swiss Knife

For working when outside the office you need a VPN.

But the only protocol that work in **every** occasion, behing nat, hotspot and firewall is **SSTP**, not supported by smartphone and OSs ≠ Windows

The Wireless Swiss Knife

Step THREE: MyVPN

Create SSTP client to your office, with care about nat and routes.

VirtualAP, with WPA2, with a routed SSTP client, and filters, to the office.

The Wireless Swiss Knife

Step THREE: MyVPN

Using the Netwatch you can control the **CAP led** for knowing when the SSTP VPN is available.

With a quick look!

The Wireless Swiss Knife

Step THREE: MyVPN

Using the Netwatch you can control the **CAP led** for knowing when the SSTP VPN is available.

```
/tool netwatch
add comment="Check SSTP VPN" down-
script="system leds set 2 type=off" host=\
<IP_inside_the_VPN> up-script="system leds
set 2 type=on"
```

The Wireless Swiss Knife

Step FOUR: MyFriends

VirtualAP, with a different WPA2, with a different subnet, DHCP server, masquerade.

For providing WiFi at the friends with you. It’s nice “to share”. ☺

The Wireless Swiss Knife

Step FOUR: MyFriends

Thanks to the firewall, your friends should not communicate with the other networks and, most important, with the VPN!

The Wireless Swiss Knife

Step FOUR: MyFriends

You know your friends:

But thanks to the Queues they will have a lower priority than your network.

The Wireless Swiss Knife

Step FIVE: FreeInternet

If you have a lot of friends near you, a better choice will be to use an Hotspot, instead a simple WPA2 PSK sharing.

The Wireless Swiss Knife

Step FIVE: FreeInternet

VirtualAP, no encryption, with a different subnet, DHCP server, masquerade and an HotSpot!

The Wireless Swiss Knife

Step FIVE: FreeInternet

Thanks to the firewall, the HotSpot users should not communicate with the other networks and, most important, with the VPN!

The Wireless Swiss Knife

Step FIVE: FreeInternet

You don’t personally know all these new friends:

But thanks to the Queues they will have a lower priority than the others.

The Wireless Swiss Knife

STEP Six: FastInternetAccess

Why not to try to get a free beer thanks to unknown peoples near me?

The Wireless Swiss Knife

STEP Six: FastInternetAccess

VirtualAP, no encryption, with a different subnet, DHCP server, masquerade.

And the **UserManager** with the **PayPal** integration!

The Wireless Swiss Knife

STEP Six: FastInternetAccess

Thanks to the firewall, this HotSpot users should not communicate with the other networks and, most important, with the VPN!

The Wireless Swiss Knife

STEP Six: FastInternetAccess

These are customers that pay:

thanks to the Queues they will have a better priority than the others, but less than your private networks.

The Wireless Swiss Knife

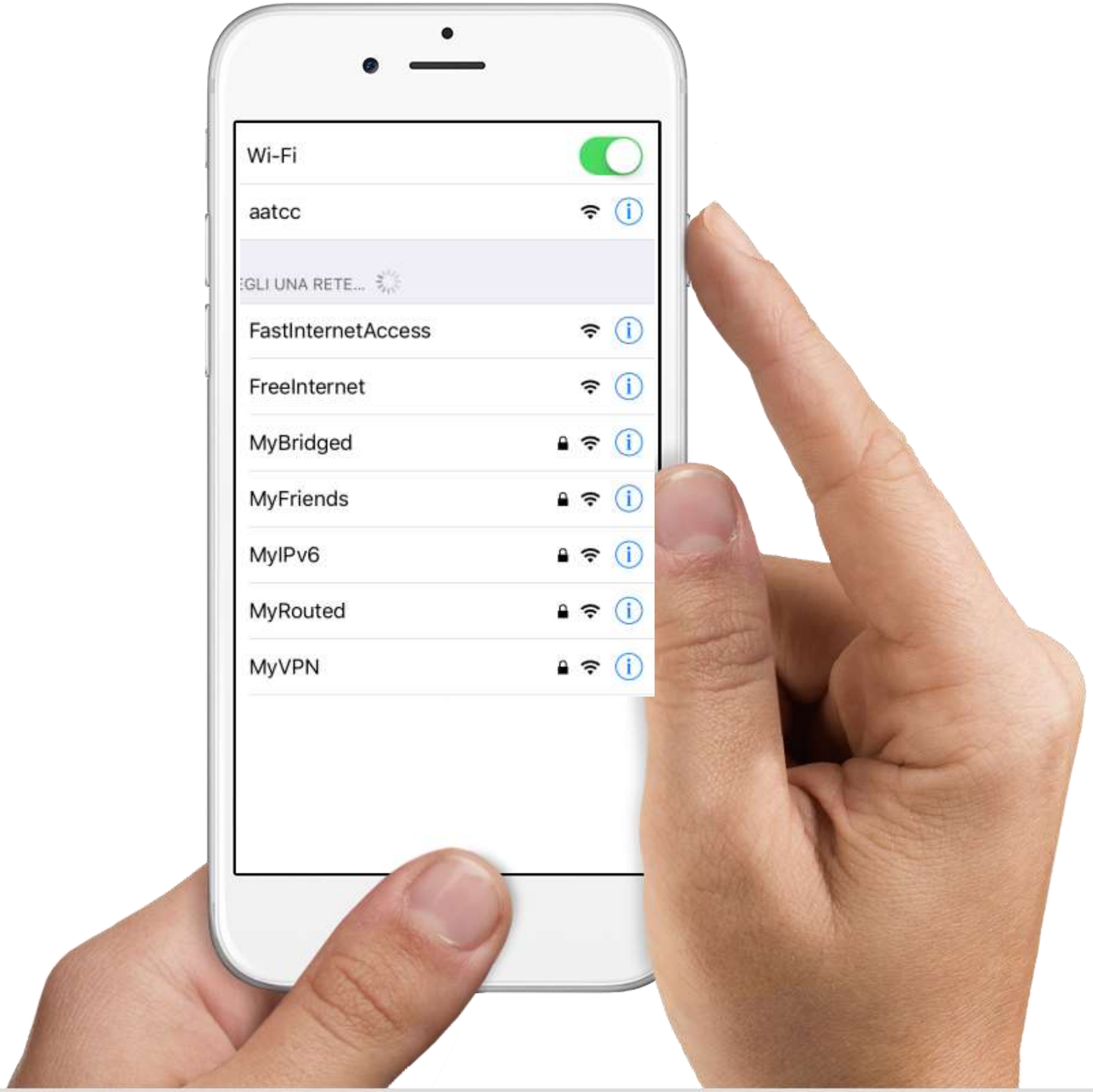
STEP Seven: IPv6 tunnel

If you need IPv6 and the wireless network you're using doesn't provide them, you can route them into a tunnel to your office.

Will be difficult to have a standard IPv6 tunnel working behind someone else NAT!

The Wireless Swiss Knife

How will look these networks:



The Wireless Swiss Knife

Interesting tool: background scan!

With this new tool (**wireless-rep** 6.35 and newer) you can scan for networks without stopping to work!

admin@10.10.10.1 (mAP lite MUM) - WinBox v6.35.1 on mAP lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: 10.10.10.1 Time: 09:34:49 Uptime: 02:26:24

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

RouterOS WinBox

Wireless Tables

Interfaces | Nstreme Dual | Access List | Registration | Connect List | Security Profiles | Channels

CAP | WPS Client | Setup Repeater | Scanner | Freq. Usage | Alignment | Wireless Sniffer | Wireless Snooper

	Name	Type	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx
R	wlan1	Wireless (Atheros AR...	3.8 kbps	30.1 kbps	6	34	0 bps	
	;;; MyBridged							
S	wlan2	Virtual						
	;;; MyRouted							
R	wlan3	Virtual						
	;;; MyVPN							
	wlan4	Virtual						
	;;; MyFriends							
	wlan5	Virtual						
	;;; FreeInternet							
	wlan6	Virtual						
	;;; FastInternetAccess							
	wlan7	Virtual						
	;;; MyIPv6							
	wlan8	Virtual						

8 items out of 11

Scanner (Running)

Interface: wlan1

Background Scan

Start | Stop | Close | Connect | New Window

	Address	SSID	Channel	Sign...	Nois...	Sign...	Radio Name	Router...
A	2C:E6:CC:33:CF:39	aatcc	2437/20/gn(30dBm)	-67	0	0		
A	00:18:6E:A1:B0:C0	aatcc	2462/20/g(30dBm)	-92	0	0		
A	C4:01:7C:0A:75:99	aatcc	2437/20/gn(30dBm)	-91	0	0		

3 items

The Wireless Swiss Knife

STEP Eight: FunnyThings

In few occasions will be nice to create some confusion around you: but just for fun! ☺

The Wireless Swiss Knife

STEP Eight: FunnyThings

The idea is:

To create 100 fake VirtualAP (with no internet behind) with just funny names.

Using a script for creating them, and another one for removing them.

The Wireless Swiss Knife

STEP Eight: FunnyThings

Andrew Cox from Bright WiFi Clever customer connections. is a Scripting “Wizard”. He wrote for me few lines of code for doing the job.

Let’s see how work!

What do we need more now?

A “dual band” mAp lite!

At the MUM in Ljubljana I asked John to make it:

but as I can see they didn’t make it in these 2 months ☺

And yes, it can be a little bigger ;)

Wrap up

- ✓ The mAP and the mAP lite are so powerful than you expect
- ✓ The use in the real world can solve lot of business needs
- ✓ The limits isn’t in technology anymore
- ✓ The limits are in your skill and in your Fantasy!

The last question

What is better than a mAP lite?

Better than one mAP lite?

Two mAP lite

Ten mAP lite;

Hundreds of mAP lite;

Thousands of mAP lite;

Millions of mAP lite ……

Wrap up

- ✓ I hope you enjoyed my presentation and from today you'll start to watch at the mAP *family* from a different perspective ☺

Thank you!

Q & A

http://training.grifonline.it
training@grifonline.it