

# CSPE



## CAPsMAN Real-life scenarios

Markham, ON, Canada

September 2019

# *First and foremost!*

*More bla bla bla before raffle and drinks; let's have fun!*



# About Alain Casault (*That's me!*)

- Electrical Engineering
- Over 25 years of experience
  - MikroTik (MTCNA, MTCRE, MTCWE)
  - Cisco (CCNA, CCDA)
  - Microsoft & Linux / UNIX
- Author of MikroTik's latest update of **MTCNA** course material (*about 2011*)
- **CSPE**'s CTO (*and maintenance engineer, i.e. janitor, handyman*)

# About CSPE (*That's my company!*)

- **Centre de Services Professionnels en Éducation**
  - Operating since 2014
  - *Learning centre*
- “**Young ones**” division (<https://educationhmo.com>)
  - Helping kids and adults with learning disabilities
- **Telecommunications** division (<https://alaincasault.com>)
  - MikroTik and general telco training
  - MikroTik consulting

# Presentation objective

- Demonstrate three CAPsMAN (*Controlled Access Points System Manager*) configurations

***Quick and dirty definition*** : Centralized controller that manages the APs that are attached to it

**CSPE**

Centre de services  
professionnels  
en éducation

Let's begin somewhere!

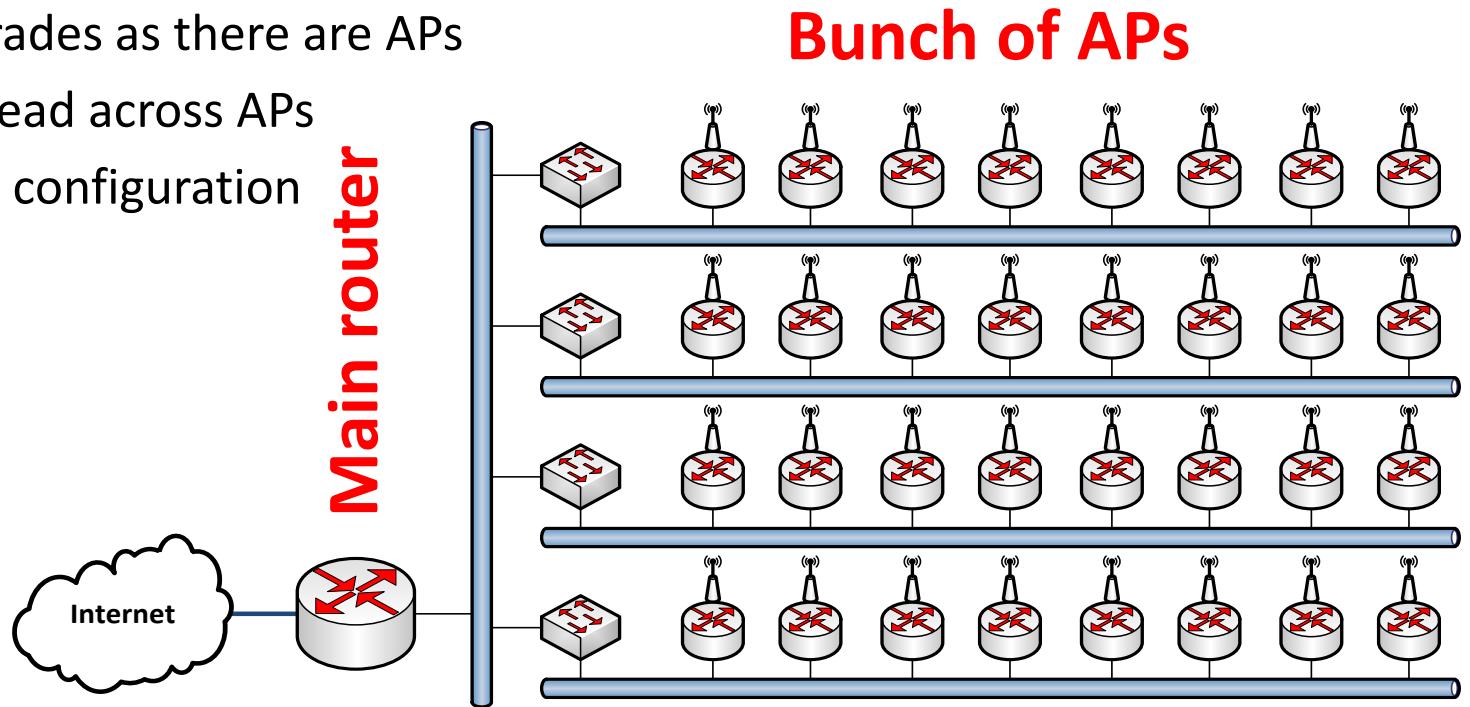
# INTRODUCTION



# Why CAPsMAN?

- **In the old days**

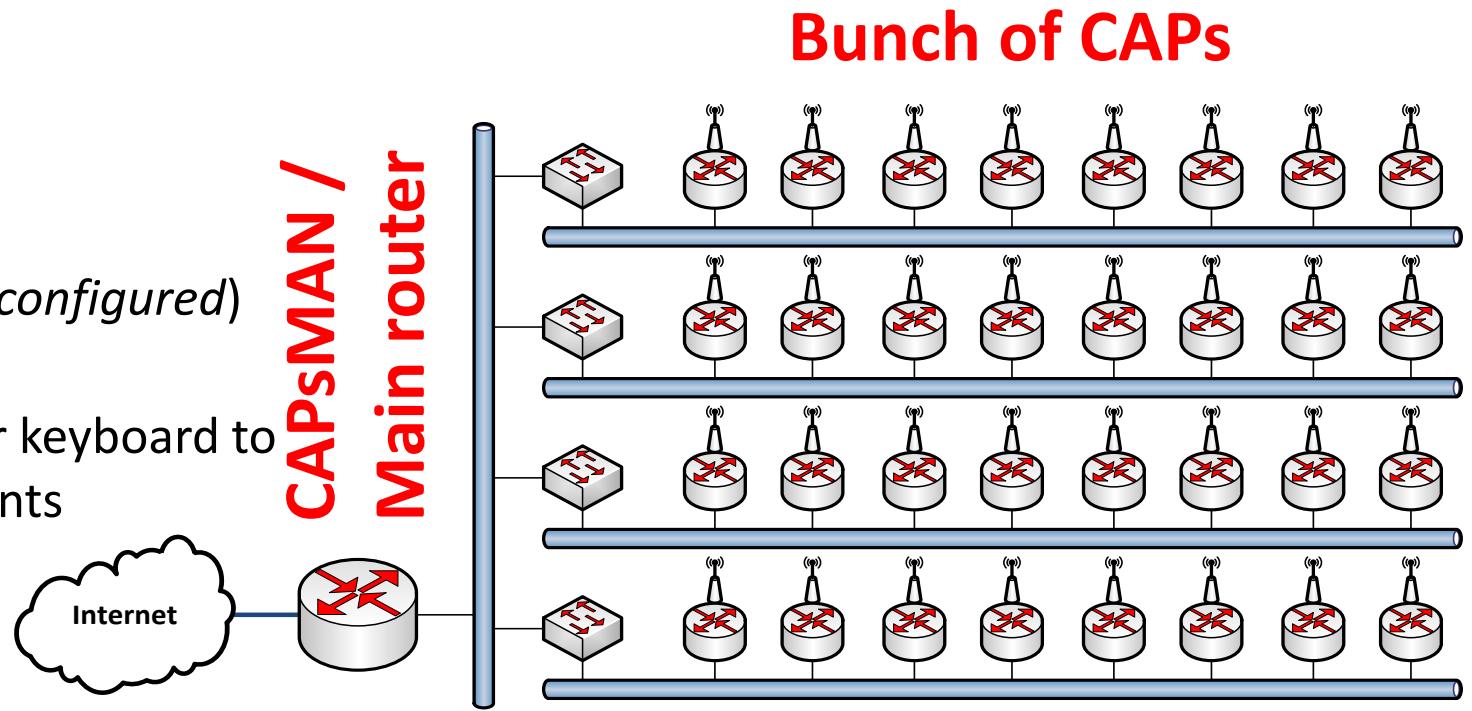
- As many configurations to maintain as there are APs
- As many (ROS / Firmware) upgrades as there are APs
- Clients management / stats spread across APs
- Maybe walk around the site for configuration changes



# Why CAPsMAN?

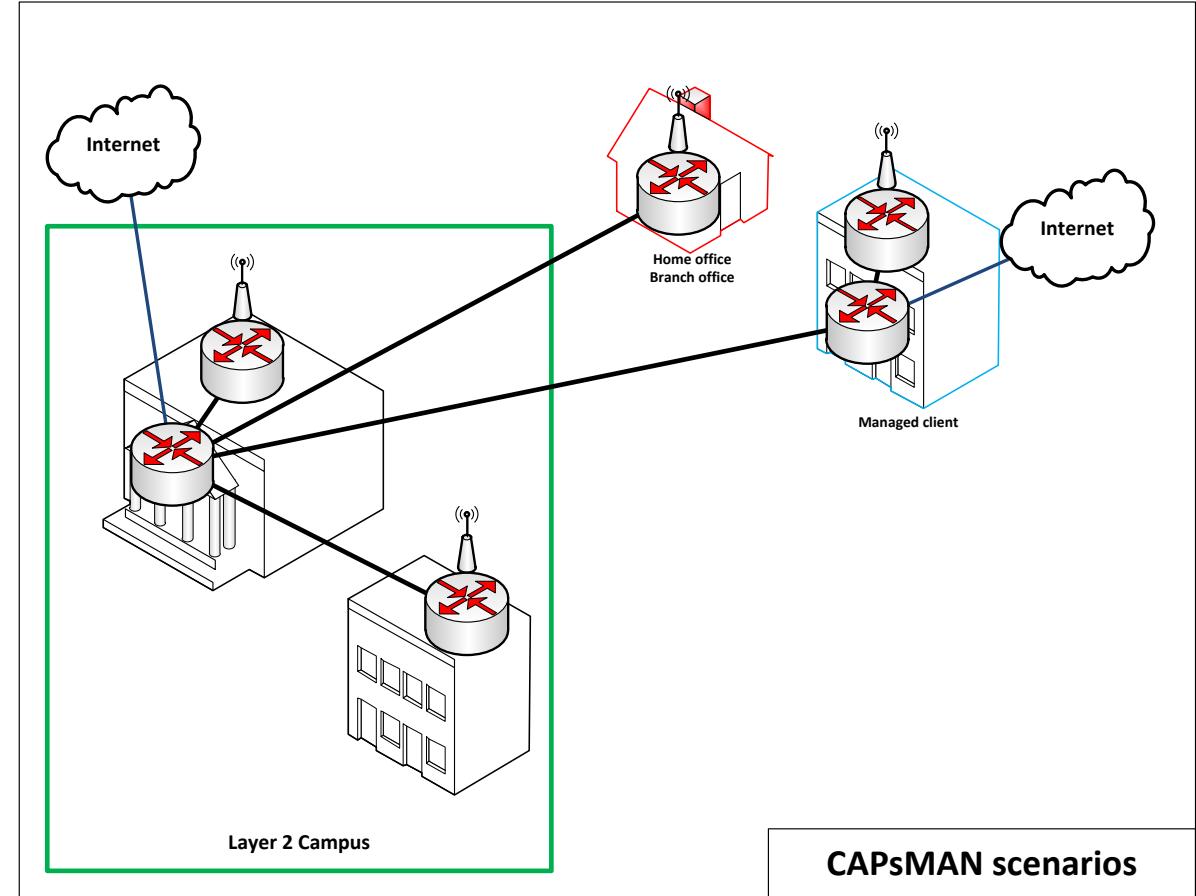
- **In the modern days**

- Centralized configuration, amount of APs is irrelevant
  - Everything is on the CAPsMAN!
  - Template style configuration
- Centralized client management
- Automatic ROS upgrades (*If so configured*)
  - Nothing (*so far*) for firmware
- Fast & simple: Stay behind your keyboard to make changes and manage clients
  - (*Efficient=pay raise... maybe*)

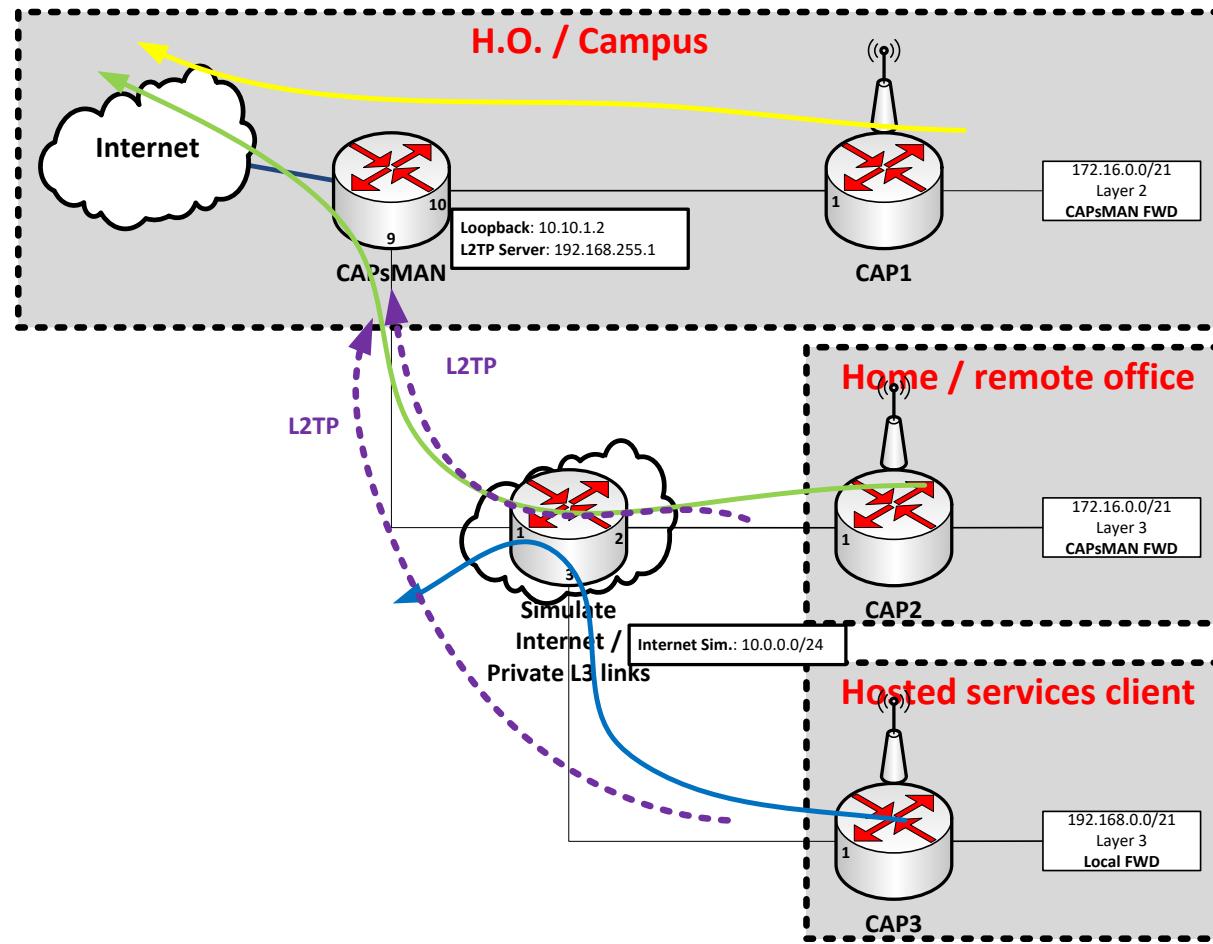


# Three scenarios

- Layer 2 campus
  - *L2, CAPsMAN forwarding*
- Home / Branch office
  - *L3, CAPsMAN forwarding*
- Managed clients
  - *Local forwarding (L3)*



# Demonstration setup



First scenario

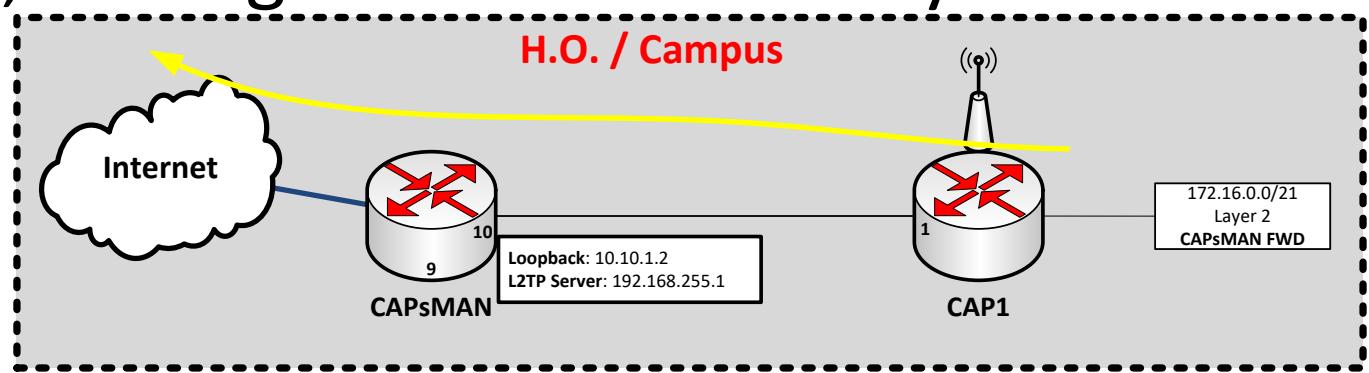
# **LAYER 2, CAPSMAN FORWARDING**

# Layer 2, CAPsMAN forwarding

- Most standard setup
- Same building or campus, as long as it's the same layer 2 network

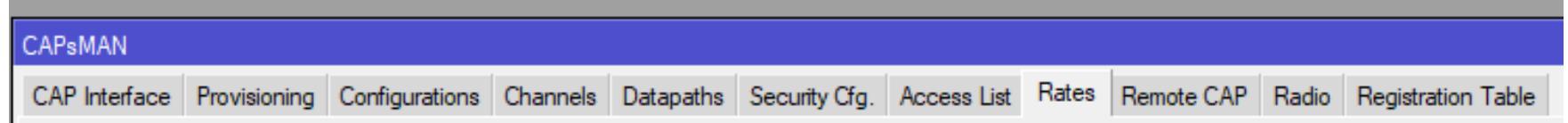
- **Notes**

- No IP configuration on the CAP
- Port on CAPsMAN can be blank (*no IP or bridge*)



# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN
  - Rates
  - Access-list (*optional*)
  - Security
  - Channels
  - Configuration
  - Provisioning
  - Manager



# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN

- Rates
- Access-list (*optional*)
- Security
- Channels
- Configuration
- Provisioning
- Manager

The allowed “basic” and “supported” rates.

*“Suggestion, consult **CWNP.COM** for tips on basic / supported rates”*

# CAPsMAN (Rates)

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapaths Security Cfg. Access List Rates Remote CAP Radio

**Rates-CSPE**

Name	Basic Rates	Supported Rates	HT Basic MCS	HT Supported MCS	VHT
Rates-CSPE	24Mbps	24Mbps 36Mbps 48M... 3		3 4 5 6 7 8 9 10 11 12...	

**CAPs Rate <Rates-CSPE>**

Name: Rates-CSPE

Basic Rates

Basic Rates:  1Mbps  2Mbps  5.5Mbps  11Mbps  6Mbps  9Mbps  
 12Mbps  18Mbps  24Mbps  36Mbps  48Mbps  54Mbps

Supported Rates

Supported Rates:  1Mbps  2Mbps  5.5Mbps  11Mbps  6Mbps  9Mbps  
 12Mbps  18Mbps  24Mbps  36Mbps  48Mbps  54Mbps

HT Basic MCS

HT Basic MCS:  0  1  2  3  4  5  
 6  7  8  9  10  11  
 12  13  14  15  16  17  
 18  19  20  21  22  23

HT Supported MCS

HT Supported MCS:  0  1  2  3  4  5  
 6  7  8  9  10  11  
 12  13  14  15  16  17  
 18  19  20  21  22  23

VHT Basic MCS:

VHT Supported MCS:

OK Cancel Apply Comment Copy Remove

1 item

# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN

- Rates
- Access-list (*optional*)
- Security
- Channels
- Configuration
- Provisioning
- Manager

Rules by which wireless clients are accepted.

*“I use it to quickly identify clients”*

# CAPsMAN (Access-list (*optional*)))

CAPsMAN						
CAP Interface		Provisioning		Configurations		Channels
#	MAC Address	MAC Mask	Interface	Signal Ra...	Action	Client To
::: ==Alain cell phone==:						
0	00:57:C1:CF:6D:E2					
::: ***Default action***						
1	00:57:C1:CF:6D:E2			-75.0	accept	

CAPsMAN						
CAP Interface		Provisioning		Configurations		Channels
- CAPs Scanner		CAPs Scanner				
Interface	SSID	MAC Address	EAP Identity	Tx Rate	Rx Rate	Tx Sign
::: ==Alain cell phone==:						
CAP1-1	CSPE	00:57:C1:CF:6D:E2		130Mbps-20MHz/2S...	144.4Mbps-20MHz/2S/SGI	

# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN

- Rates
  - Access-list (*optional*)
  - Security
  - Channels
  - Configuration
  - Provisioning
  - Manager
- Authentication, encryption,  
PSKs, etc.

# CAPsMAN (Security)

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapaths Security Cfg. Access List Rates Remote CAP Radio

**Security Configuration <Nothing>**

Name	Authentication Type	Encryption	Group Encryption	Group Key Update	Passphrase
CSPE-Guest	WPA2 PSK	aes ccm	aes ccm		wpa2-guest
CSPE-Home	WPA2 PSK	aes ccm	aes ccm		wpa2-home
Nothing	WPA2 PSK	aes ccm	aes ccm		ydyatDDE!12FVF!zxZX

**CAPs Security Configuration <Nothing>**

Name:

Authentication Type:  WPA PSK  WPA2 PSK  WPA EAP  WPA2 EAP

Encryption:  aes ccm  tkip

Group Encryption:

Group Key Update:

Passphrase:

Disable PMKID:

EAP Methods:

EAP Radius Accounting:

TLS Mode:

TLS Certificate:

OK Cancel Apply Comment Copy Remove

The screenshot shows the CAPsMAN software interface. At the top, there's a navigation bar with tabs: CAP Interface, Provisioning, Configurations, Channels, Datapaths, Security Cfg., Access List, Rates, Remote CAP, and Radio. Below the tabs is a toolbar with icons for adding (+), deleting (-), creating a folder (yellow folder), and filtering (magnifying glass). The main area displays a table of security profiles. The 'Nothing' profile is selected, highlighted with a blue background. The table columns include Name, Authentication Type, Encryption, Group Encryption, Group Key Update, and Passphrase. The 'Nothing' row shows WPA2 PSK authentication, aes ccm encryption, and a specific passphrase. Below the table, a modal dialog titled 'CAPs Security Configuration <Nothing>' is open, allowing modification of these settings. The dialog fields correspond to the table entries, with 'Nothing' as the name, 'WPA2 PSK' selected as the authentication type, 'aes ccm' as the encryption, and the same passphrase. On the right side of the dialog are buttons for OK, Cancel, Apply, Comment, Copy, and Remove.

# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN

- Rates
- Access-list (*optional*)
- Security
- Channels
- Configuration
- Provisioning
- Manager

The channels to use. For 802.11n in North America, stick with 1,6 and 11



# CAPsMAN (Channels)

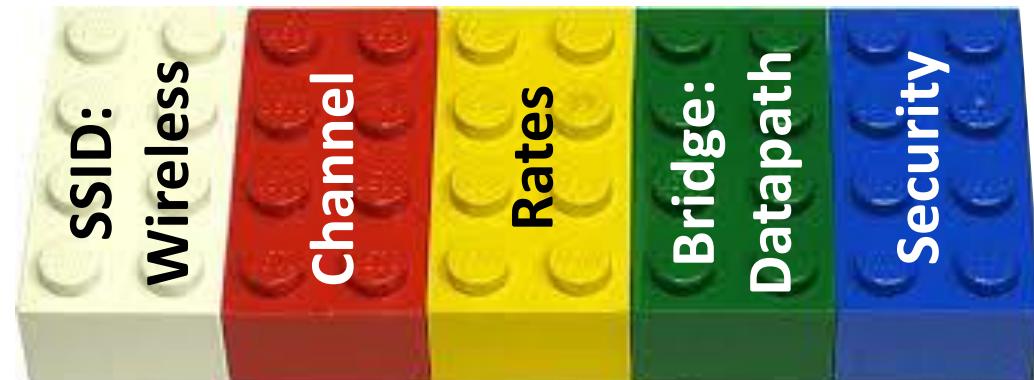
CAPsMAN

CAP Interface	Provisioning	Configurations	Channels	Datapaths	Security Cfg.	Access List	Rates	Remote CAP	Radio	Registration Tab
Name	Frequency	Secondary Frequency	Control Channel Width	Band	Extension Channel	Tx Power				
channel-1	2412		20Mhz	2ghz-onlyn	disabled	11				
channel-6	2437		20Mhz	2ghz-onlyn	disabled	11				
channel-11	2462		20Mhz	2ghz-onlyn	disabled	11				
channel-36	5180		20Mhz	5ghz-onlyac	Ce	15				
channel-40	5220		20Mhz	5ghz-onlyac	Ce	15				
channel-44	5220		20Mhz	5ghz-onlyac	Ce	15				
channel-149	5745		20Mhz	5ghz-onlyac	Ce	15				
::: =====NEW=====										
channels-tous-ac	5180, 5200, 5220, 5745		20Mhz	5ghz-onlyac	disabled	0				
channels-tous-n	2412, 2437, 2462		20Mhz	2ghz-onlyn	disabled	0				

# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN
  - Rates
  - Access-list (*optional*)
  - Security
  - Channels
  - Configuration
  - Provisioning
  - Manager

A “configuration” object holds the parameters that can be assigned to CAPs (*Kinda like a BSS’s template*).



# CAPsMAN (Configuration)

CAPsMAN														
CAP Interface		Provisioning	Configurations	Channels	Datapaths	Security Cfg.	Access List	Rates	Remote CAP	Radio	Registration Table			
Name	SSID	Country	Install...	Channel	Frequency	Secondary Freq...	Band	Tx Power	Rate	Datapath	Bridge	VLAN Mo...	VLAN ID	Security
... =====BOGUS=====														
Bidon-Corpo-ac.cfg	CSPE-blank	united states3		channels-tous-ac					Rates-CSPE					Nothing
Bidon-Corpo-n.cfg	CSPE-blank	united states3		channels-tous-n					Rates-CSPE					Nothing
... =====Local CSPE (EMPLOYEE)=====														
CSPE-empl-1.cfg	CSPE	united states3		channel-1					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-6.cfg	CSPE	united states3		channel-6					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-11.cfg	CSPE	united states3		channel-11					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-36.cfg	CSPE	united states3		channel-36					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-40.cfg	CSPE	united states3		channel-40					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-44.cfg	CSPE	united states3		channel-44					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-149.cfg	CSPE	united states3		channel-149					Rates-CSPE	BR-VLAN102				CSPE-Home
... =====Local CSPE (GUEST)=====														
CSPE-guest-1.cfg	CSPE-guest	united states3		channel-1					Rates-CSPE	BR-VLAN107				CSPE-Guest
CSPE-guest-6.cfg	CSPE-guest	united states3		channel-6					Rates-CSPE	BR-VLAN107				CSPE-Guest
CSPE-guest-11.cfg	CSPE-guest	united states3		channel-11					Rates-CSPE	BR-VLAN107				CSPE-Guest
... =====Remote HOME (Family)=====														
Maison-fam-1.cfg	DSWLANr	united states3		channel-1					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-6.cfg	DSWLANr	united states3		channel-6					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-11.cfg	DSWLANr	united states3		channel-11					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-36.cfg	DSWLANr	united states3		channel-36					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-40.cfg	DSWLANr	united states3		channel-40					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-44.cfg	DSWLANr	united states3		channel-44					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-149.cfg	DSWLANr	united states3		channel-149					Rates-CSPE			use tag	102	CSPE-Home
... =====Remote HOME (guest)=====														
Maison-guest-1.cfg	guestr	united states3		channel-1					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-6.cfg	guestr	united states3		channel-6					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-11.cfg	guestr	united states3		channel-11					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-36.cfg	guestr	united states3		channel-36					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-40.cfg	guestr	united states3		channel-40					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-44.cfg	guestr	united states3		channel-44					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-149.cfg	guestr	united states3		channel-149					Rates-CSPE			use tag	107	CSPE-Guest

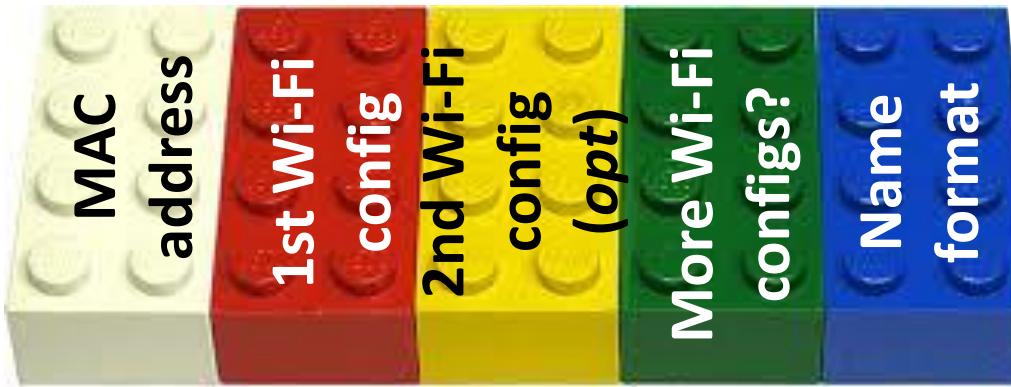
26 items (1 selected)

# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN

- Rates
- Access-list (*optional*)
- Security
- Channels
- Configuration
- Provisioning
- Manager

A rule containing 1 or many “configurations” that is assigned to a CAP’s **interface** (*identified by its MAC*). The CAP’s interface will also be dynamically assigned a local identifier. A provisioning rule is a **fully configured** Wi-Fi interface.

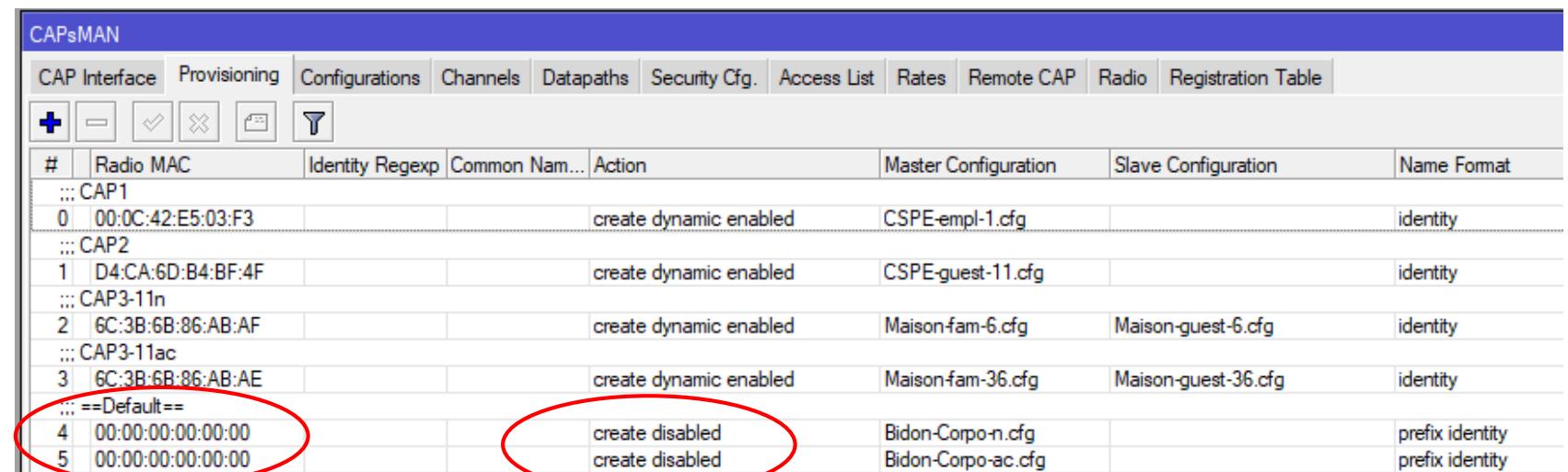


# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN

- Rates
- Access-list (*optional*)
- Security
- Channels
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- Provisioning
- Manager

**Suggestion :** Always end this list with provisioning rules that will assign a new CAP a bogus (and non-dangerous) configuration



#	Radio MAC	Identity Regexp	Common Nam...	Action	Master Configuration	Slave Configuration	Name Format
0	00:0C:42:E5:03:F3			create dynamic enabled	CSPE-empl-1.cfg		identity
1	D4:CA:6D:B4:BF:4F			create dynamic enabled	CSPE-guest-11.cfg		identity
2	6C:3B:6B:86:AB:AF			create dynamic enabled	Maison-fam-6.cfg	Maison-guest-6.cfg	identity
3	6C:3B:6B:86:AB:AE			create dynamic enabled	Maison-fam-36.cfg	Maison-guest-36.cfg	identity
4	00:00:00:00:00:00			create disabled	Bidon-Corpo-n.cfg		prefix identity
5	00:00:00:00:00:00			create disabled	Bidon-Corpo-ac.cfg		prefix identity

# CAPsMAN (Provisioning)

#	Radio MAC	Identity Regexp	Common Nam...	Action	Master Cfg
0	E4:8D:8C:44:21:F8			create dynamic en	CSPE.Com
1	E4:8D:8C:44:21:F7				
2	6C:3B:6B:55:07:43				
3	6C:3B:6B:55:07:42				
4	E4:8D:8C:44:2D:43				
5	E4:8D:8C:44:2D:42				
6	00:00:00:00:00:00				
7	00:00:00:00:00:00				

8 items (1 selected)

enabled

CAPs Provisioning <00:00:00:00:00:00>

Radio MAC:	00:00:00:00:00:00
Hw. Supported Modes:	gn
Identity Regexp:	
Common Name Regexp:	
IP Address Ranges:	
Action:	create disabled
Master Configuration:	Bidon-Corpo-n.cfg
Slave Configuration:	
Name Format:	prefix identity
Name Prefix:	TEMP

CAPsMAN

	Name	Type	MTU	Actual MTU	L2 MTU
DSMB	CAPS-HMO02R04-1	CAP Interface	1500	1500	160
DRSB	CAPS-HMO02R04-1-1	CAP Interface	1500	1500	160
DSB	CAPS-HMO02R04-1-2				
DSMB	CAPS-HMO02R04-2				
DSB	CAPS-HMO02R04-2-1				
DSB	CAPS-HMO02R04-2-2				
DSMB	CAPS-HMO02R08-1				
DSB	CAPS-HMO02R08-1-1				
DSMB	CAPS-HMO02R08-2				
DSB	CAPS-HMO02R08-2-1				
DRSMB	CAPS-HMO02R10-1				
DSB	CAPS-HMO02R10-1-1				
DSB	CAPS-HMO02R10-1-2				
DRSMB	CAPS-HMO02R10-2				
DSB	CAPS-HMO02R10-2-1				
DRSB	CAPS-HMO02R10-2-2				
XMBI	TEMP-CAP-test-1				

Interface <TEMP-CAP-test-1>

General	Wireless	Channel	Rates	Datapath	Security
Name:	TEMP-CAP-test-1				
Type:	CAP Interface				
MTU:	1500				
Actual MTU:					
L2 MTU:					
MAC Address:	E4:8D:8C:95:83:D4				
ARP:	enabled				
ARP Timeout:					
Radio MAC:	E4:8D:8C:95:83:D4				
Radio Name:	E48D8C9583D4				
Master Interface:	none				

17 items out of 40 (1 selected)

# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN

- Rates
- Access-list (*optional*)
- Security
- Channels
- Configuration
- Provisioning
- Manager

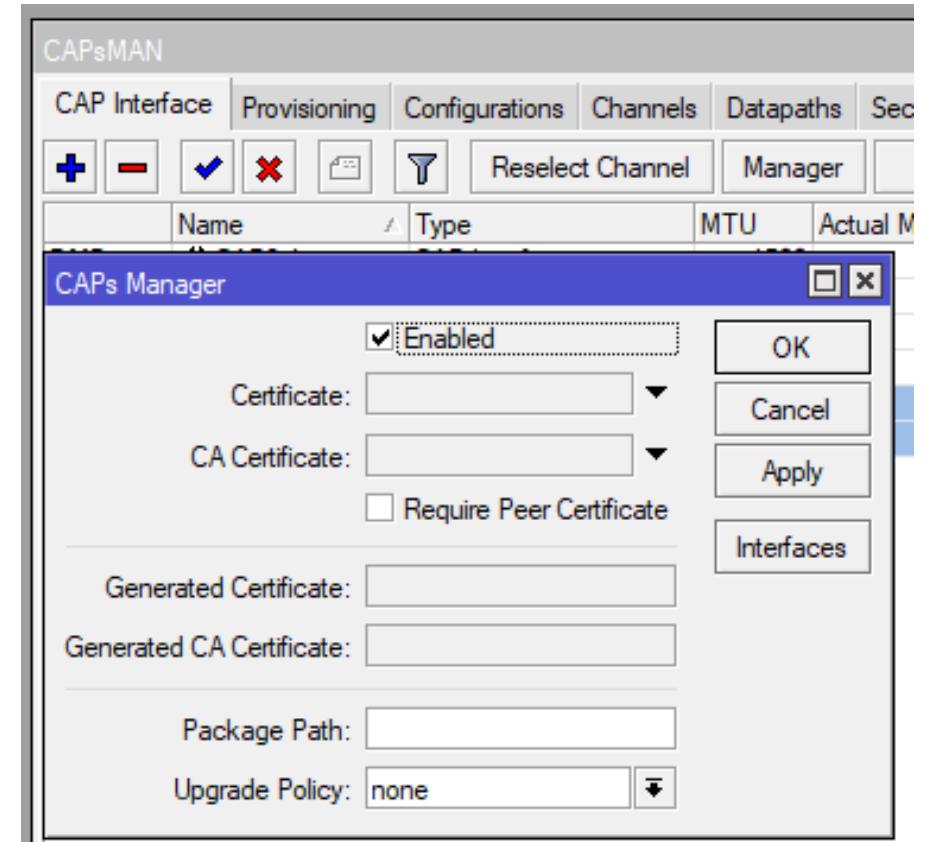
Why bogus configurations?

With bogus CAP interfaces, you can do an exit survey if you enable them. With the weird and hard to guess password (*and no bridge attached*), it's not a security issue!

# Layer 2, CAPsMAN forwarding

- Configuration steps – CAPsMAN
  - Rates
  - Access-list (*optional*)
  - Security
  - Channels
  - Configuration
  - Provisioning
  - Manager

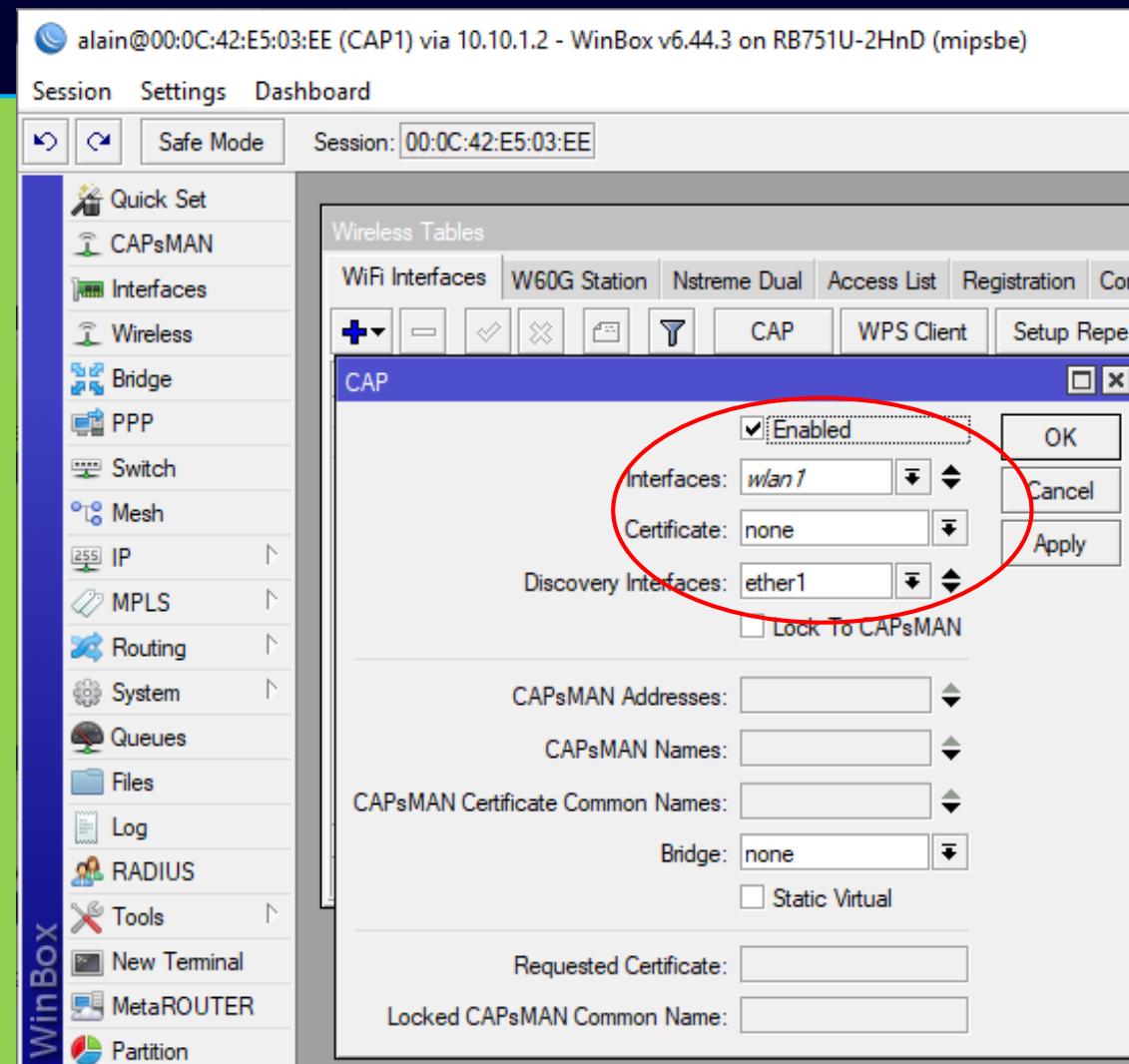
Enable CAPsMAN



# Layer 2, CAPsMAN forwarding

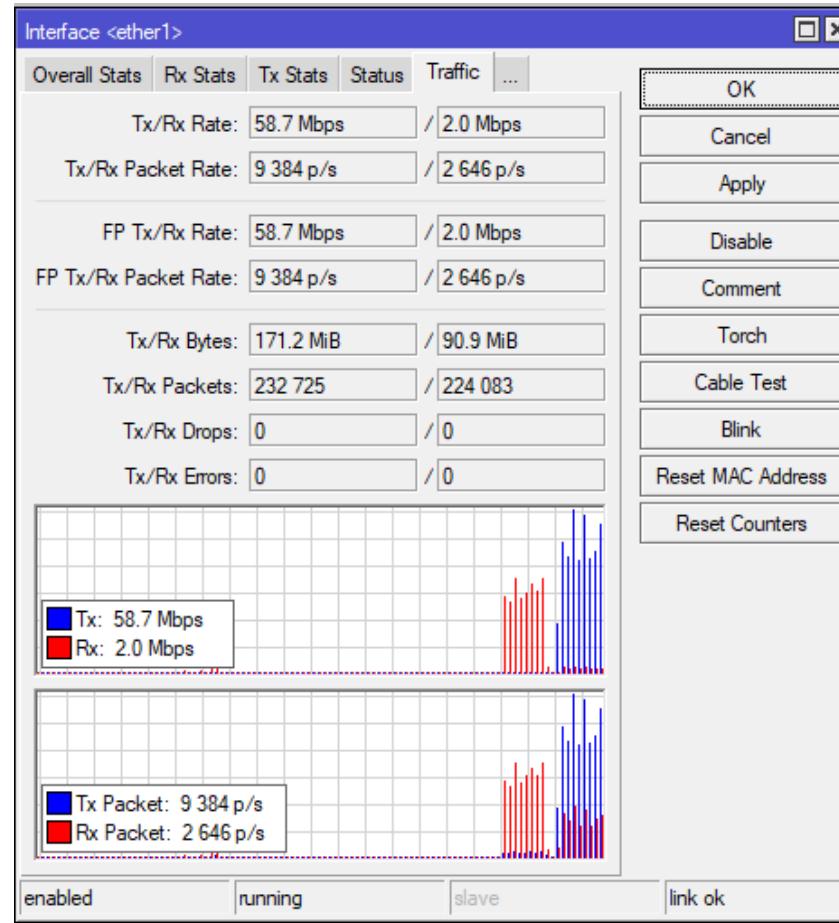
- Configuration steps – **CAP**
  - Give it a name (*system identity*) and **Ptouch it!**
  - CAP setup
    - Enable it
    - Specify the wireless interfaces that will be used on the CAPs
    - Specify discovery interface
  - RoMON (*with password*) would be a good idea in case of problems

# CAP



# Layer 2, CAPsMAN forwarding

Speedtest  
CAP interfaces



Second scenario

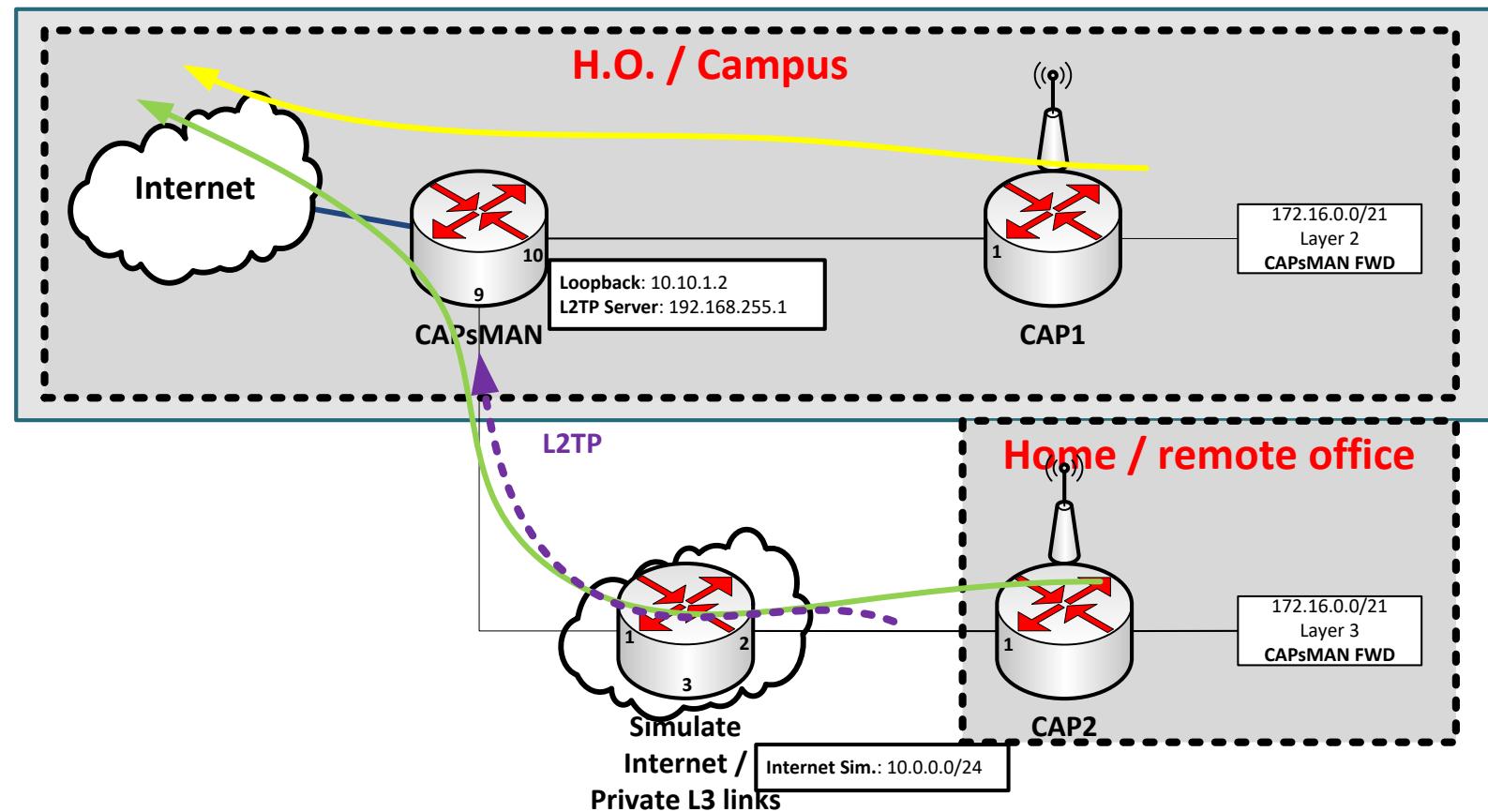
# **LAYER 3, CAPSMAN FORWARDING (REMOTE CAP)**

# Layer 3, CAPsMAN forwarding (remote CAP)

- Same setup, minor differences
- Remote CAPs use **an IP address instead of multicast traffic to reach CAPsMAN**
- Home workers and remote office workers use the same parameters for their wireless devices for true mobility
- Same corporate network access rules are applied to all as if they were located in the H.O.

# Layer 3, CAPsMAN forwarding (remote CAP)

- CAP is on different subnet



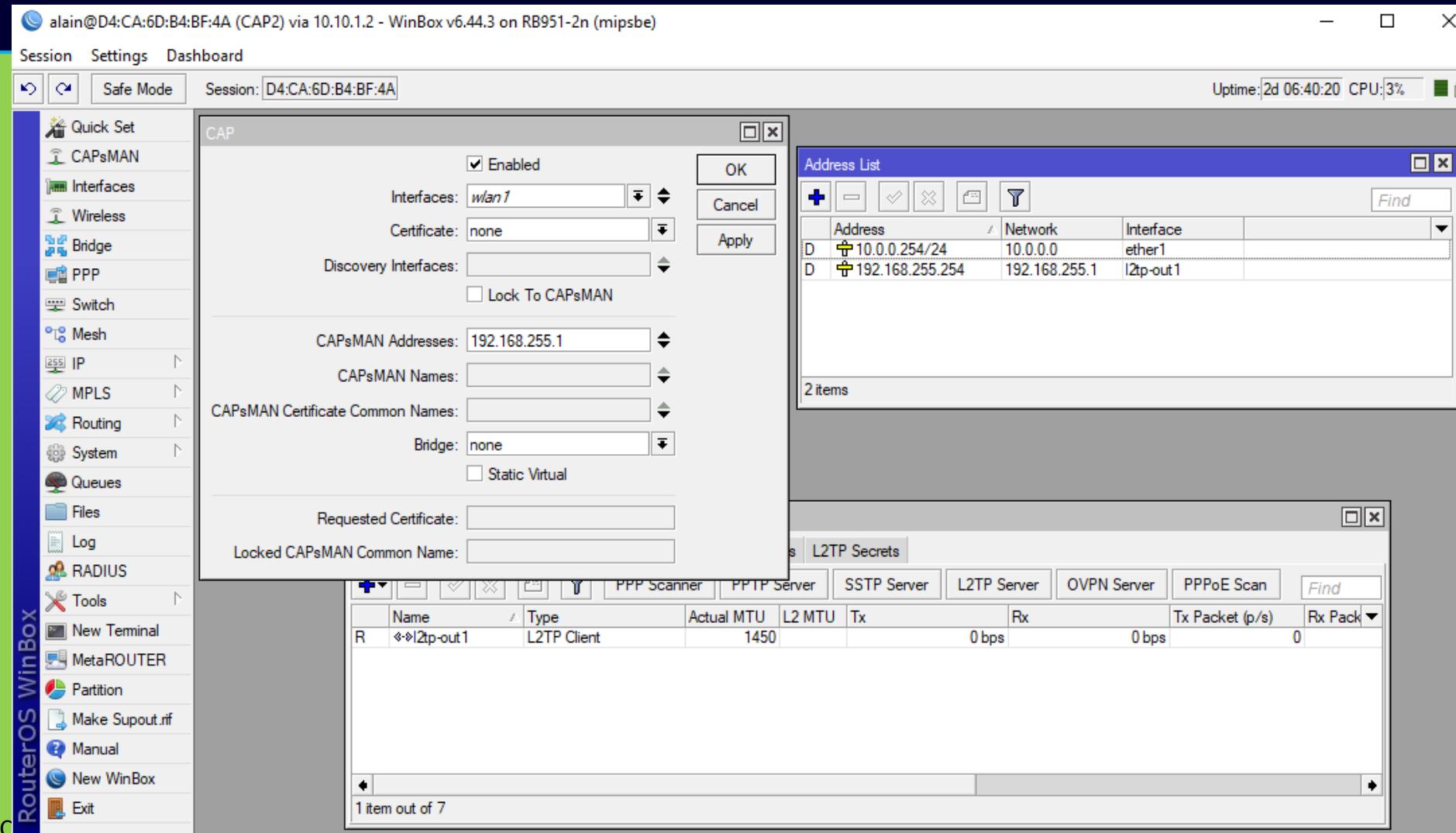
# Layer 3, CAPsMAN forwarding (remote CAP)

- CAPsMAN
  - Provisioning rule for the remote CAP, **THAT'S IT!**

# Layer 3, CAPsMAN forwarding (remote CAP)

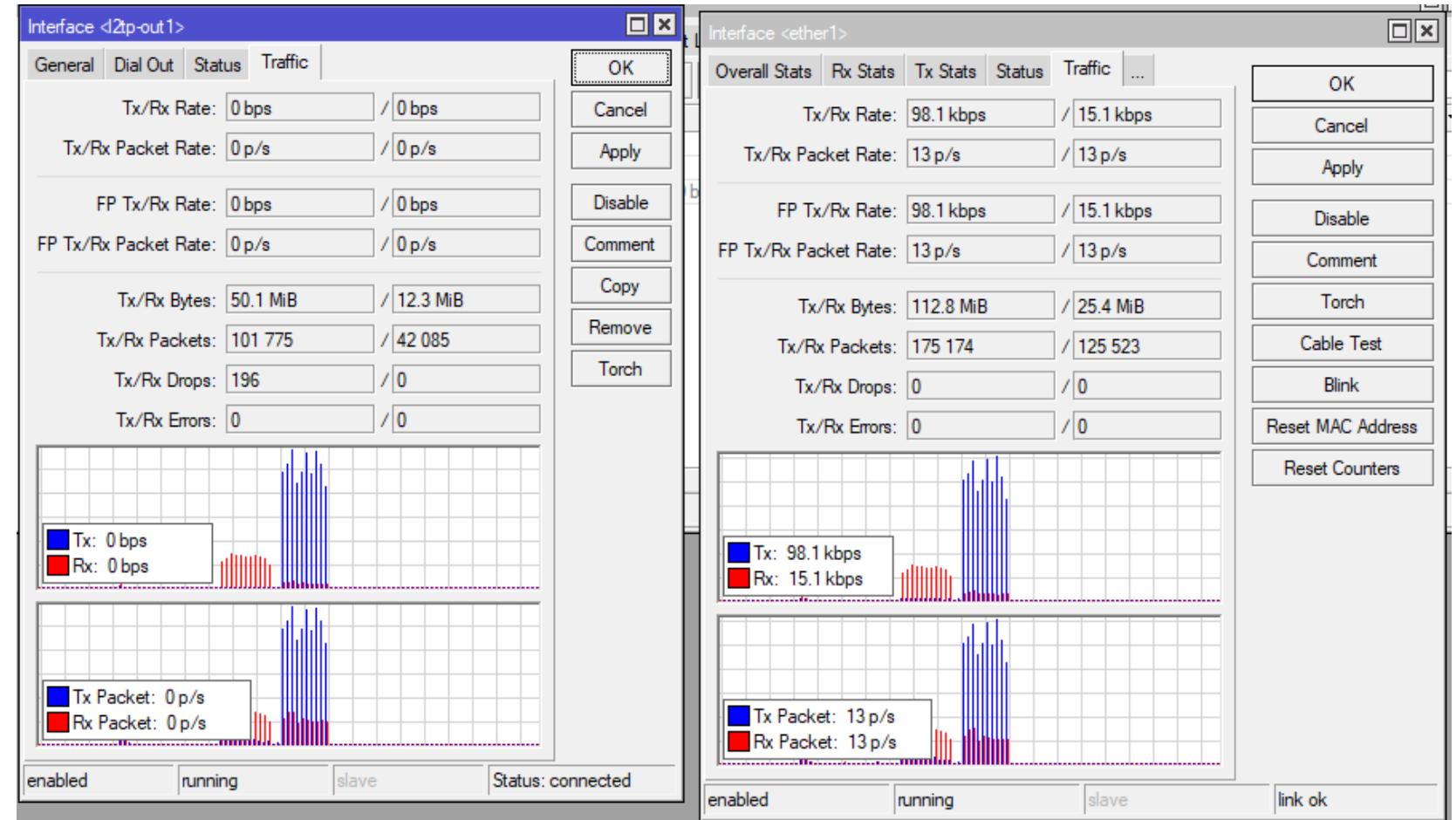
- Configuration steps – CAP
  - Give it a name (*system identity*) and **Ptouch it!**
  - CAP
    - Enable CAP
    - Specify the wireless interfaces that will be CAPs
    - Specify **CAPsMAN IP address instead of discovery interface**
  - RoMON (*with password*) would be a good idea in case of problems
  - DHCP-client on an Ethernet interface
    - With default route
  - Create L2TP tunnel to H.O.

# CAP



# Layer 3, CAPsMAN forwarding (remote CAP)

Speedtest  
CAP interfaces



**CSPE**

Centre de services  
professionnels  
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Third scenario

## **LAYER 3, LOCAL FORWARDING (REMOTE CAP)**



# Layer 3, Local forwarding (remote CAP)

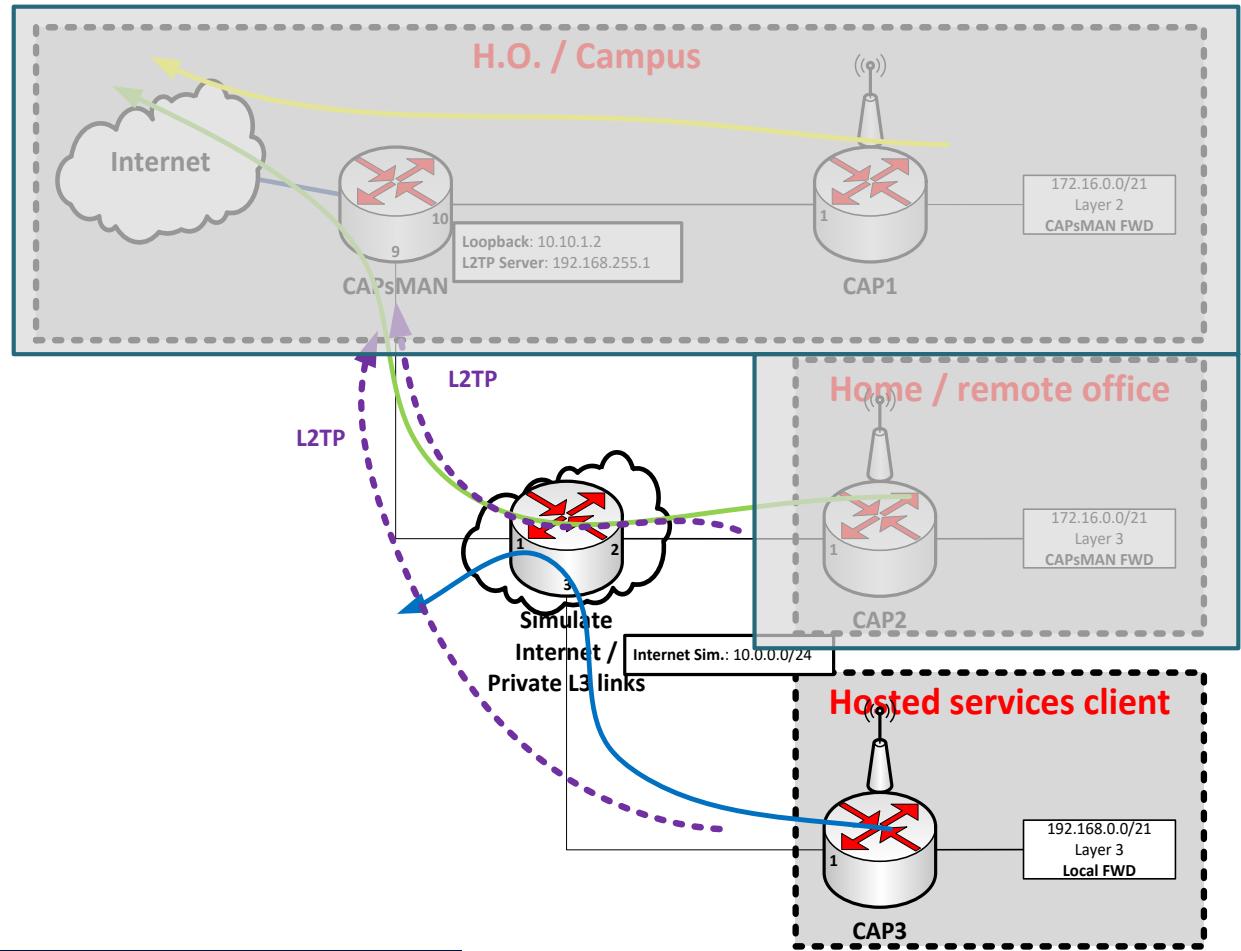
- More elaborate setup
- Remote CAPs use **an IP address to reach CAPsMAN**

# Layer 3, Local forwarding (remote CAP)

- Good setup for managed services but :
  - Wireless parameters must vary per client (*SSID & Security*)
- Client traffic is left on the **LOCAL** network
  - CAPsMAN **never** sees client traffic

# Layer 3, Local forwarding (remote CAP)

- CAP is on different subnet



# Layer 3, Local forwarding (remote CAP)

- Keep in mind that this router is your client's home router, not just a CAP
- Configuration steps – CAP
  - Full layer 3 configuration, including :
    - All bridges and VLANs (*I use software VLANs*)
    - IP addresses (bridges & WAN port)
    - A default gateway for Internet access
    - Firewall filters

# Layer 3, Local forwarding (remote CAP)

- CAPsMAN
  - “Configuration” rules and one “Security” profile for each client
    - Config rules : Channels (*up to 3 x 802.11n, 4 x 802.11ac*) + SSID
    - Copy and modify existing ones
  - One “Provisioning” rule per client CAP
  - **THAT'S IT!**

# CAPsMAN (Configuration)

**CAPsMAN**

**Configurations**

Name	SSID	Country	Install...	Channel	Frequency	Secondary Freque...	Band	Tx Power	Rate	Datapath	Bridge	VLAN Mo...	VLAN ID	Security
... == Local CSPE (EMPLOYEE) ==														
Bidon-Corpo-ac.cfg	CSPE-blank	united states3		channels-tous-ac					Rates-CSPE					Nothing
Bidon-Corpo-n.cfg	CSPE-blank	united states3		channels-tous-n					Rates-CSPE					Nothing
... == Local CSPE (GUEST) ==														
CSPE-empl-1.cfg	CSPE	united states3		channel-1					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-6.cfg	CSPE	united states3		channel-6					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-11.cfg	CSPE	united states3		channel-11					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-36.cfg	CSPE	united states3		channel-36					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-40.cfg	CSPE	united states3		channel-40					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-44.cfg	CSPE	united states3		channel-44					Rates-CSPE	BR-VLAN102				CSPE-Home
CSPE-empl-149.cfg	CSPE	united states3		channel-149					Rates-CSPE	BR-VLAN102				CSPE-Home
... == Remote HOME (Family) ==														
Maison-fam-1.cfg	DSWLANr	united states3		channel-1					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-6.cfg	DSWLANr	united states3		channel-6					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-11.cfg	DSWLANr	united states3		channel-11					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-36.cfg	DSWLANr	united states3		channel-36					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-40.cfg	DSWLANr	united states3		channel-40					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-44.cfg	DSWLANr	united states3		channel-44					Rates-CSPE			use tag	102	CSPE-Home
Maison-fam-149.cfg	DSWLANr	united states3		channel-149					Rates-CSPE			use tag	102	CSPE-Home
... == Remote HOME (guest) ==														
Maison-guest-1.cfg	guesr	united states3		channel-1					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-6.cfg	guesr	united states3		channel-6					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-11.cfg	guesr	united states3		channel-11					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-36.cfg	guesr	united states3		channel-36					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-40.cfg	guesr	united states3		channel-40					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-44.cfg	guesr	united states3		channel-44					Rates-CSPE			use tag	107	CSPE-Guest
Maison-guest-149.cfg	guesr	united states3		channel-149					Rates-CSPE			use tag	107	CSPE-Guest

26 items (1 selected)

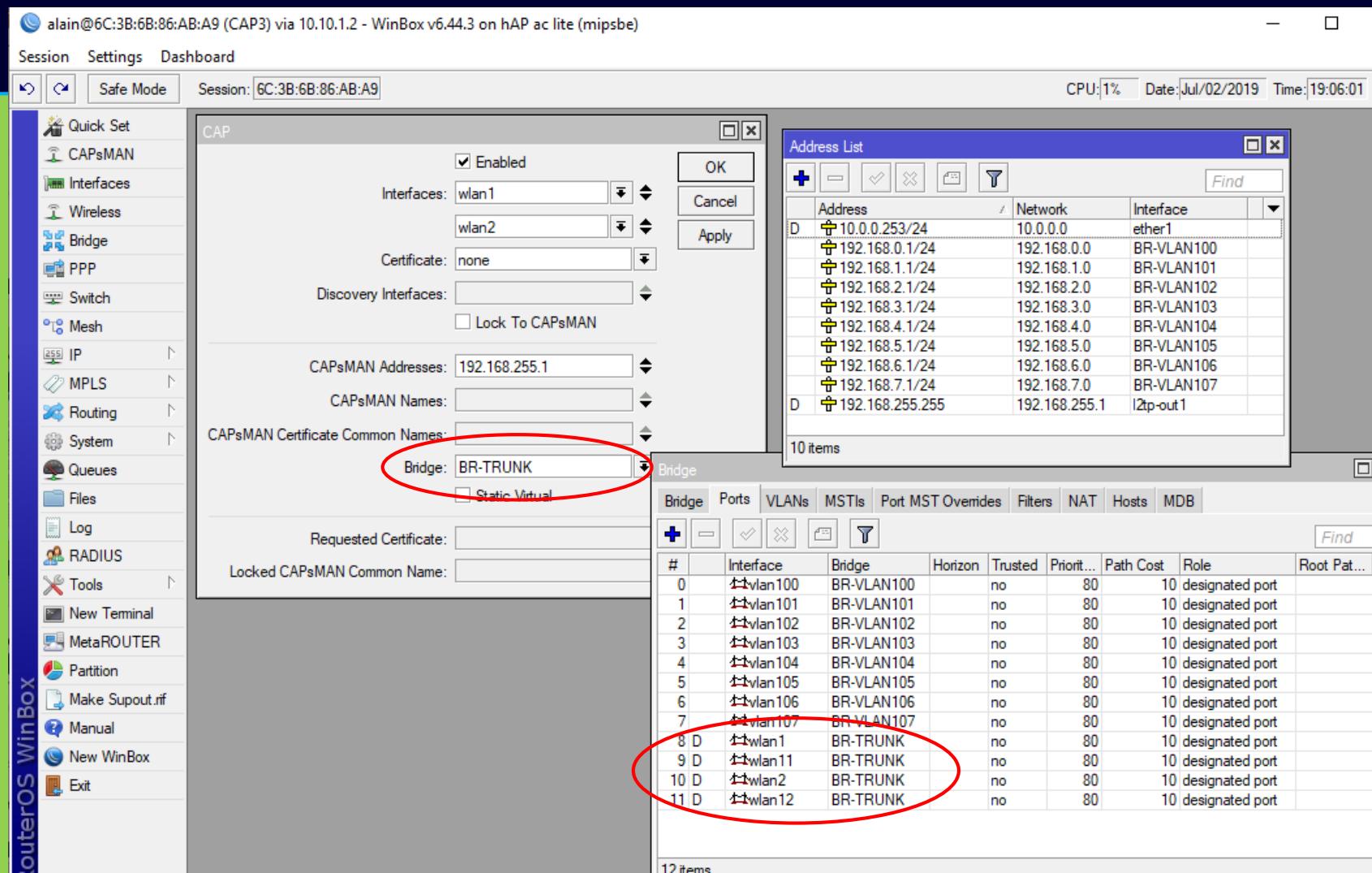
CAPs Configuration <Maison-fam-1.cfg>

Wireless	Channel	Rates	Datapath	Security
Datapath:				
MTU:				
L2 MTU:				
ARP:				
Bridge:				
Bridge Cost:				
Bridge Horizon:				
Local Forwarding: <input checked="" type="checkbox"/>				
Client To Client Forwarding: <input checked="" type="checkbox"/>				
VLAN Mode: <input type="checkbox"/> use tag				
VLAN ID: <input type="text"/> 102				
Interface List:				

# Layer 3, Local forwarding (remote CAP)

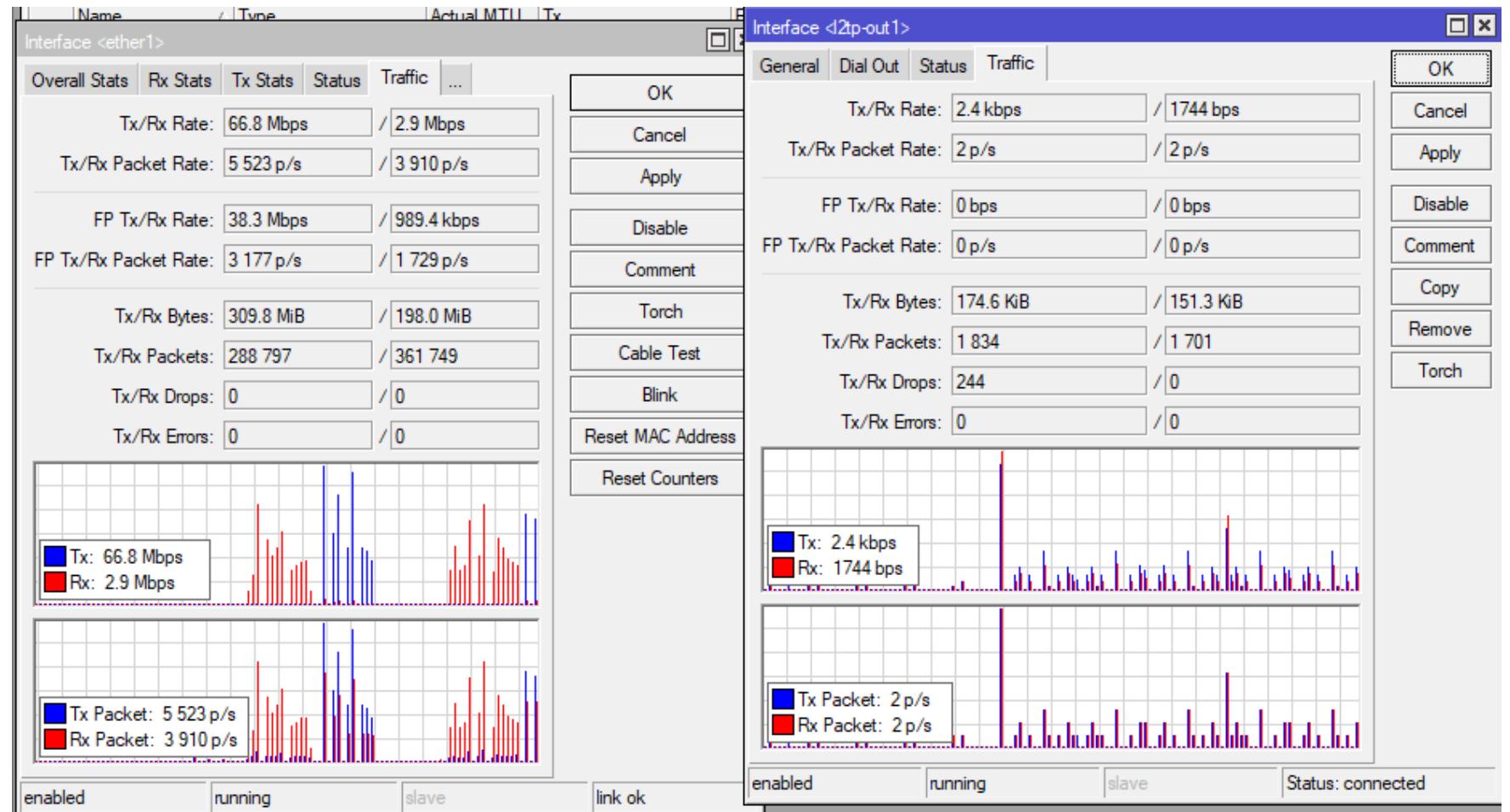
- Configuration steps – CAP
  - Enable it
  - Specify the wireless interfaces that will be CAPs
  - Specify **CAPsMAN IP address instead of discovery interface**
  - **Specify the bridge into which CAP interfaces will be assigned**

# CAP (Local forwarding)



# Layer 3, Local forwarding (remote CAP)

Speedtest  
CAP interfaces



# Conclusion

CAPsMAN offers all the options to address most if not all of our needs

# Remember me for your training needs



OK, maybe not for him.  
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routers!

Training given by Mr. **Alain Casault**, Eng.  
**MTCNA, MTCRE, MTCWE**  
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<http://alaincasault.com>  
casault.alain@educationhmo.com

# Thank you!

Questions, eh?



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# END OF THE “CAPSMAN” PRESENTATION

