Easy Setup of IP Based CAPsMAN with link failover & CAPs monitor

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MUM Philippines (Manila)

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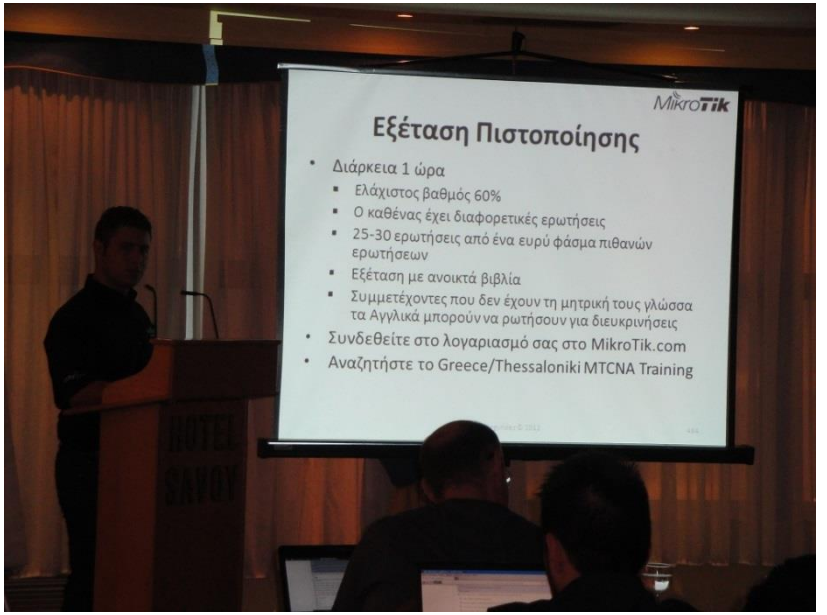
About Me

My Name:

Georgios Argyrides

- You can call me “George” (its easier)



- I came from South Europe

About Me

- Born in Cyprus
  (Europe, Near Greece)
  - Can Speak English & Greek

- Have been working in Industry since 2006
  - ITSP Consultant / Voice Engineer
  - Systems / Network Administrator
  - Internet Security Consultant
  - ISP / WISP Consultant

About Me

- 1st MikroTik Certified Consultant in Greece since 2011 [MTCRE,MTCWE,MTCTCE]
- MikroTik Certified Trainer in Greece since 2012

- Cyberoam Certified Network & Security Professional (CCNSP)
- BSc (Hon) Applied Computing , Sheffield Hallam University(UK)

- Providing MikroTik Training (On-Site) & Consultancy (On-site or remote)
  - in Greece & Cyprus(EU Region)
  - Worldwide as well

This Presentation Objective

- Introduce the IP Based CAPsMAN even for new users of MikroTik products
  - Through an Easy SetUP
- Small Routed Network
  - CAPs communicating with CAPsMAN by redundant connections (routing protocol will take care of this)
- Monitor CAPs
  - Get notified when one goes down

CAPsMAN Features

- Centralized management of RouterOS APs
- Dual Band AP support
- Provisioning of APs
- MAC and IP Layer communication with APs
- Certificate support for AP communication
- Full and Local data forwarding mode
- RADIUS MAC authentication
- Custom configuration support

Definitions

?CAP?? CAPs? CAPsMAN? AP? Router?

CAPsMAN

- **C**ontrolled **A**ccess **P**oint **s**ystem **M**anager

CAP

- **C**ontrolled **A**ccess **P**oint

- **CAPsMAN** = a MikroTik router

- **CAP** = a MikroTik router
- **CAPs** = many Mikrotik routers

Requirements

CAPsMAN

1. x86 or RouterBOARD based device
2. RouterOS v6.11+ version (Use Latest!)
3. Wireless-fp package installed and enabled

CAPs

1. X86 or RouterBOARD based device
2. RouterOS v6.11+ version(Use Latest!)
3. Atheros chipset (a/b/g/n/ac) wireless card
4. Wireless-fp package installed and enabled
5. At least Level4 RouterOS license

CAPsMAN v1 & v2(New)

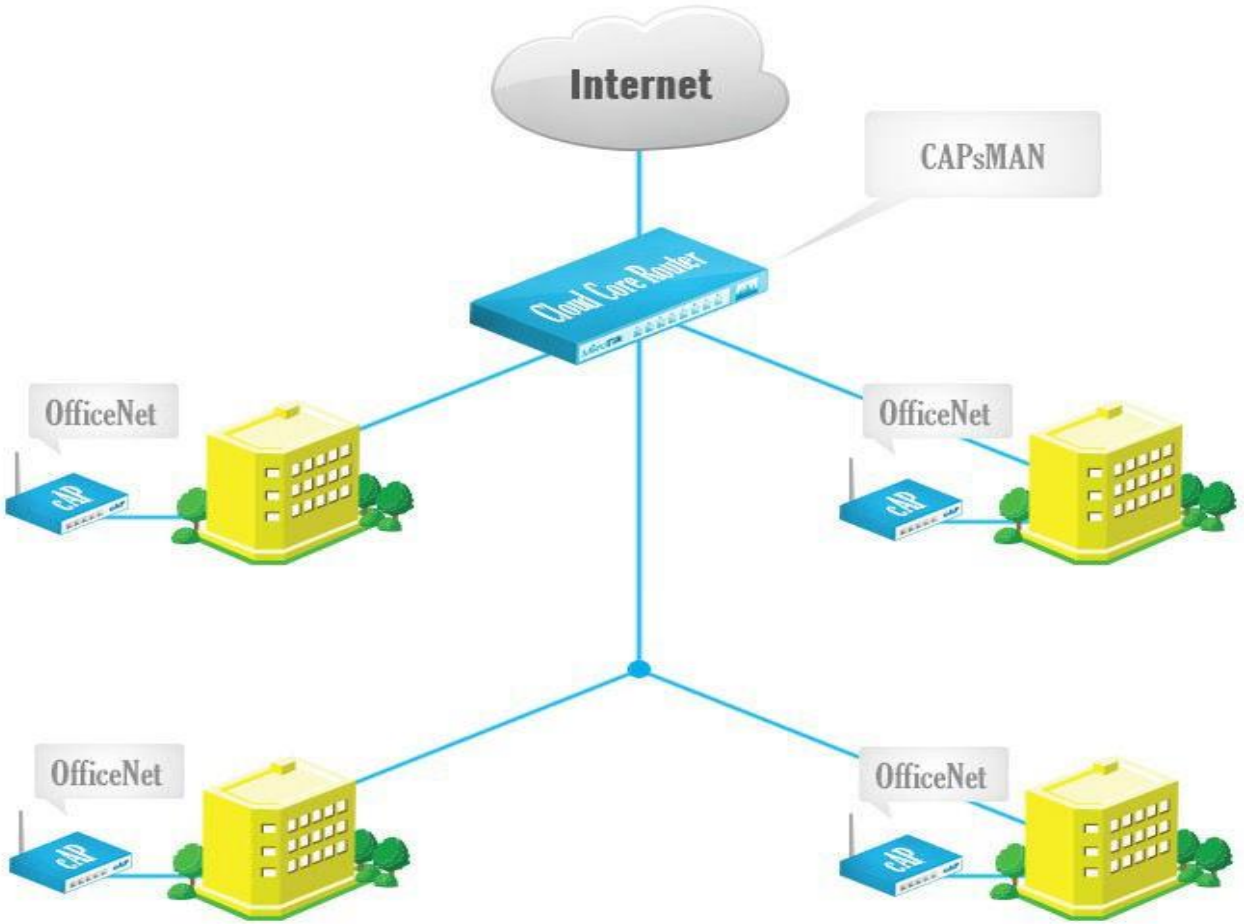
- ❖ CAPsMAN v.6.23+ introduces CAPsMAN v2
  - Improvements
  - Some new feautures

- ❖ CAPsMAN v1 is already stable and can be used for production

- ⊗ Warning: CAPsMAN/CAP v1 is not compatible with v2!
  - ➢ Upgrade or downgrade everything in the network

- ❖ Try CAPsMAN v2 initially on non-production environment
  - ❖ Help us make it better by reporting any possible issues appeared in v2

CAPsMAN Simple Setup

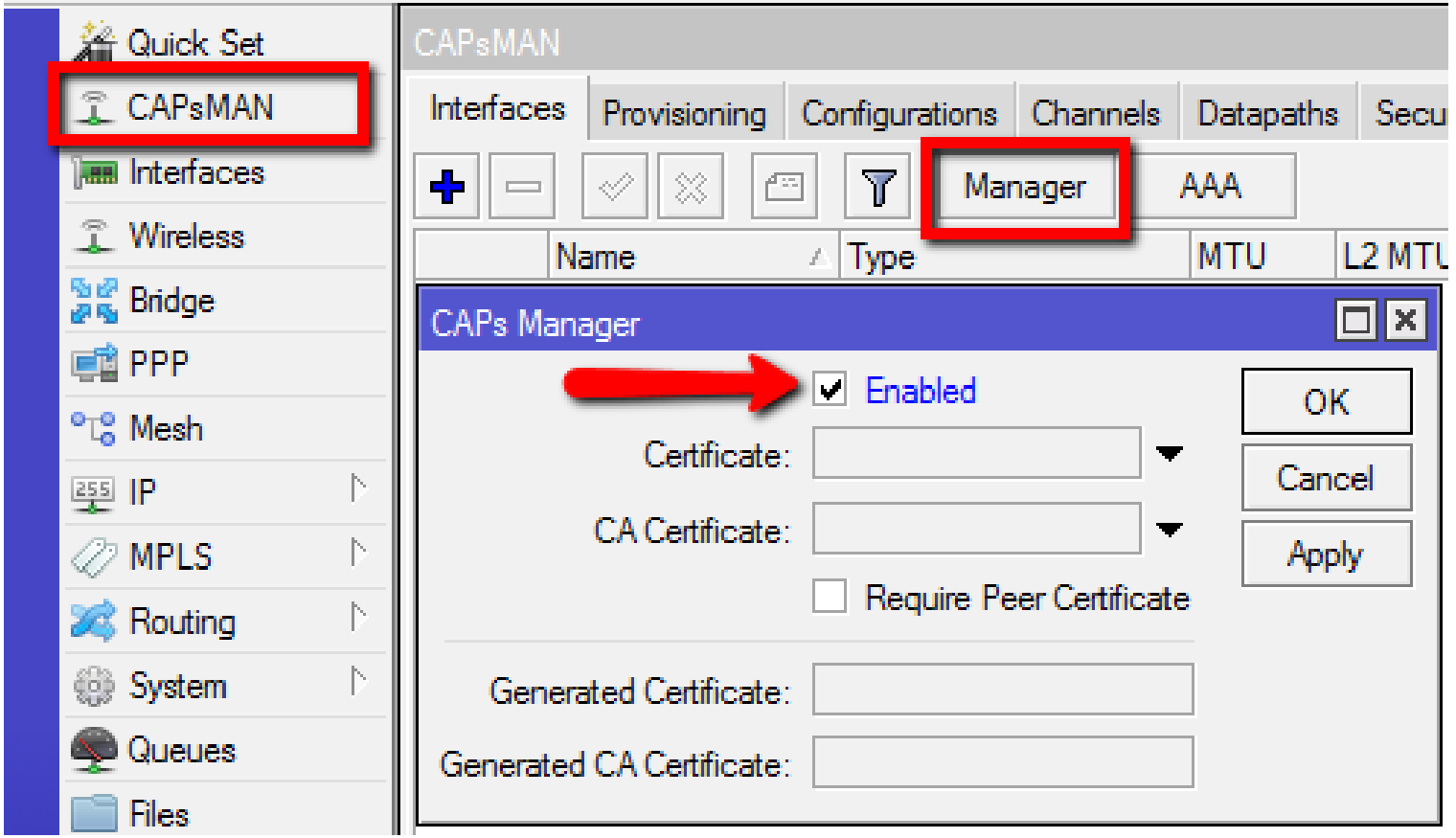


CAPsMAN Simple Setup

- Enable CAPsMAN service
- Create Bridge interface
- Add IP configuration to Bridge interface
- Create CAPsMAN Configuration
- Create Provisioning rule
- Enable CAP mode on the APs

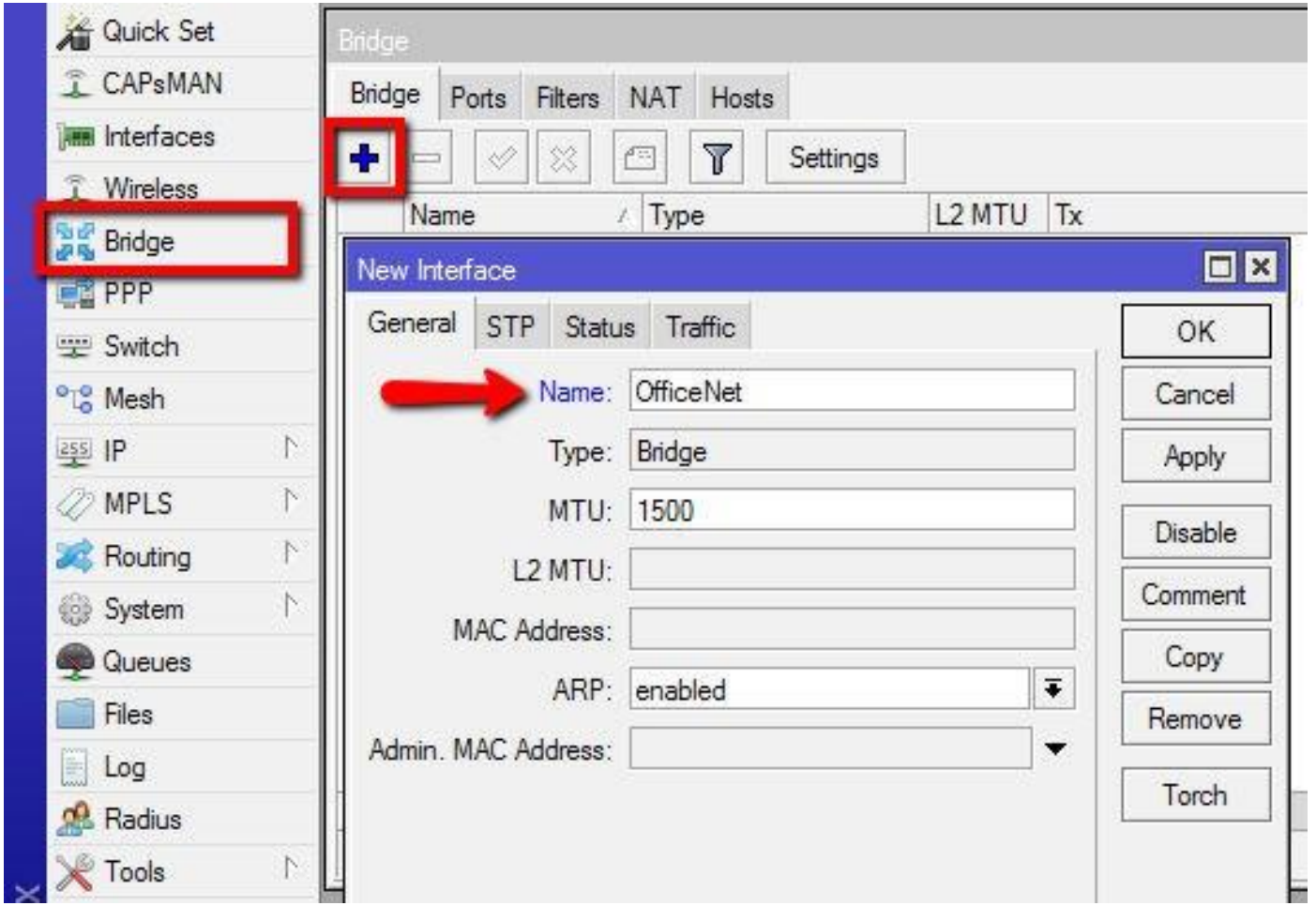
CAPsMAN Simple Setup

- Enable the CAPsMAN service



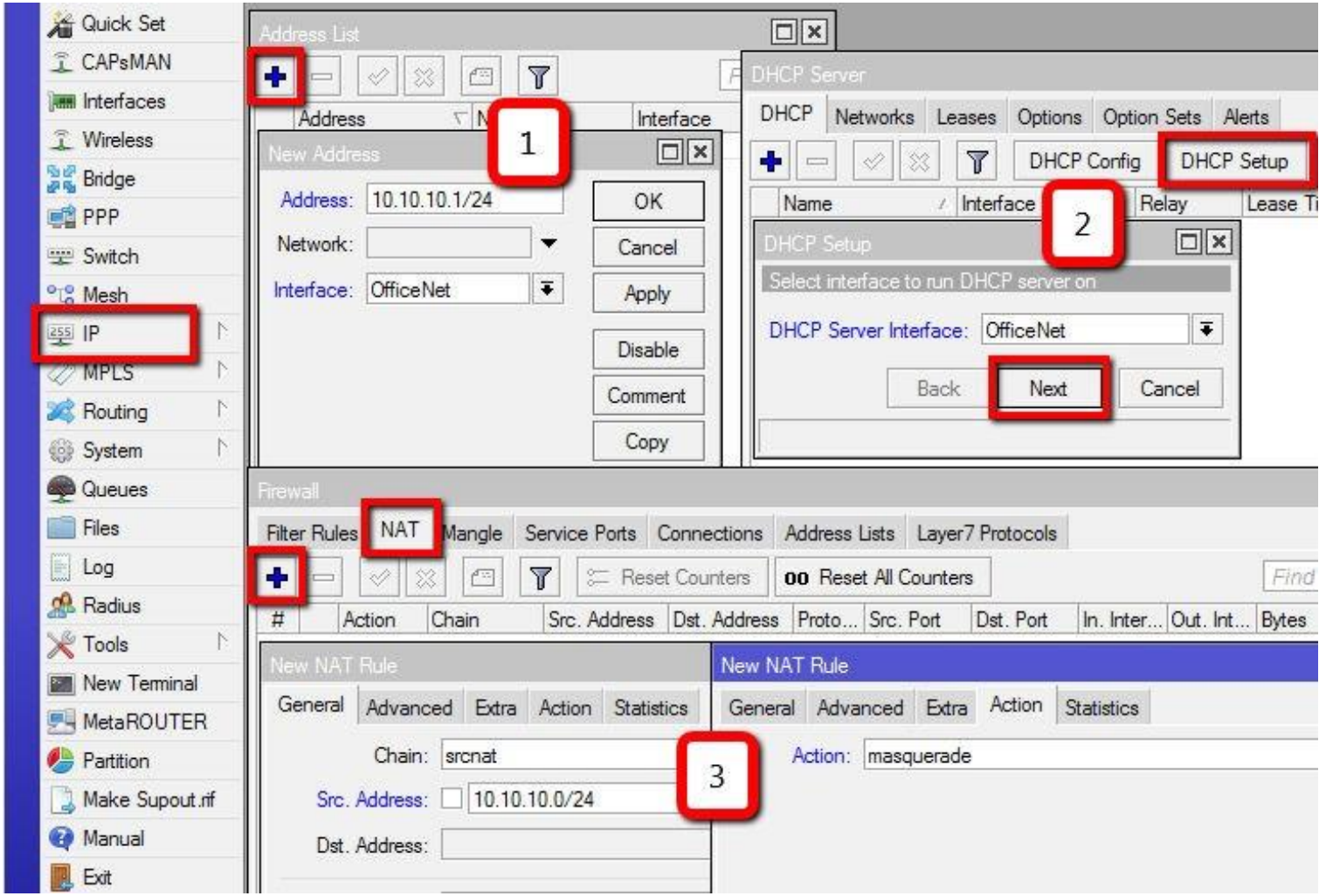
CAPsMAN Simple Setup

- Create Bridge Interface



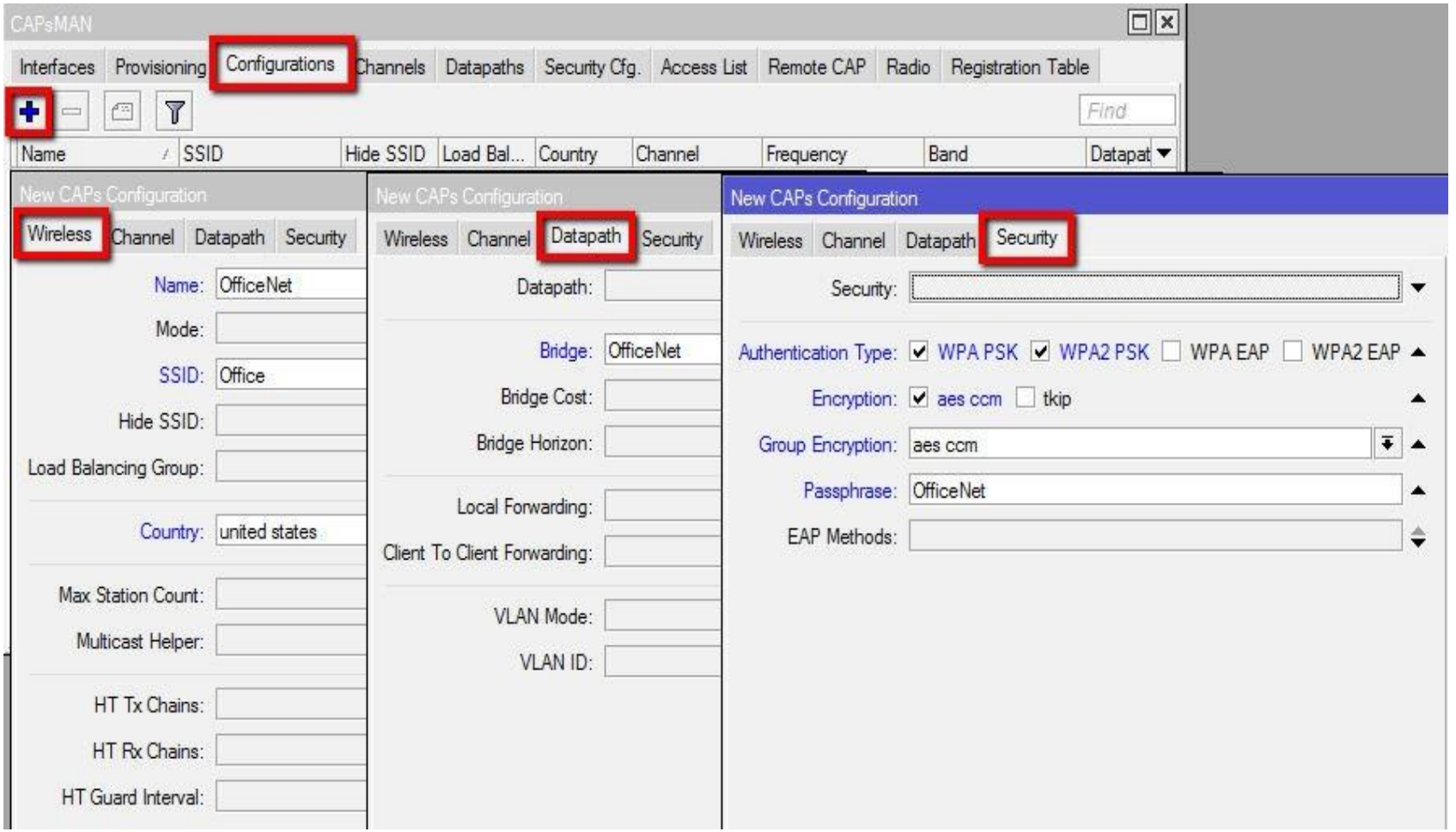
CAPsMAN Simple Setup

1. Add IP address
2. Add DHCP Server
3. Add NAT rule



CAPsMAN Simple Setup

- Add new CAPsMAN Configuration

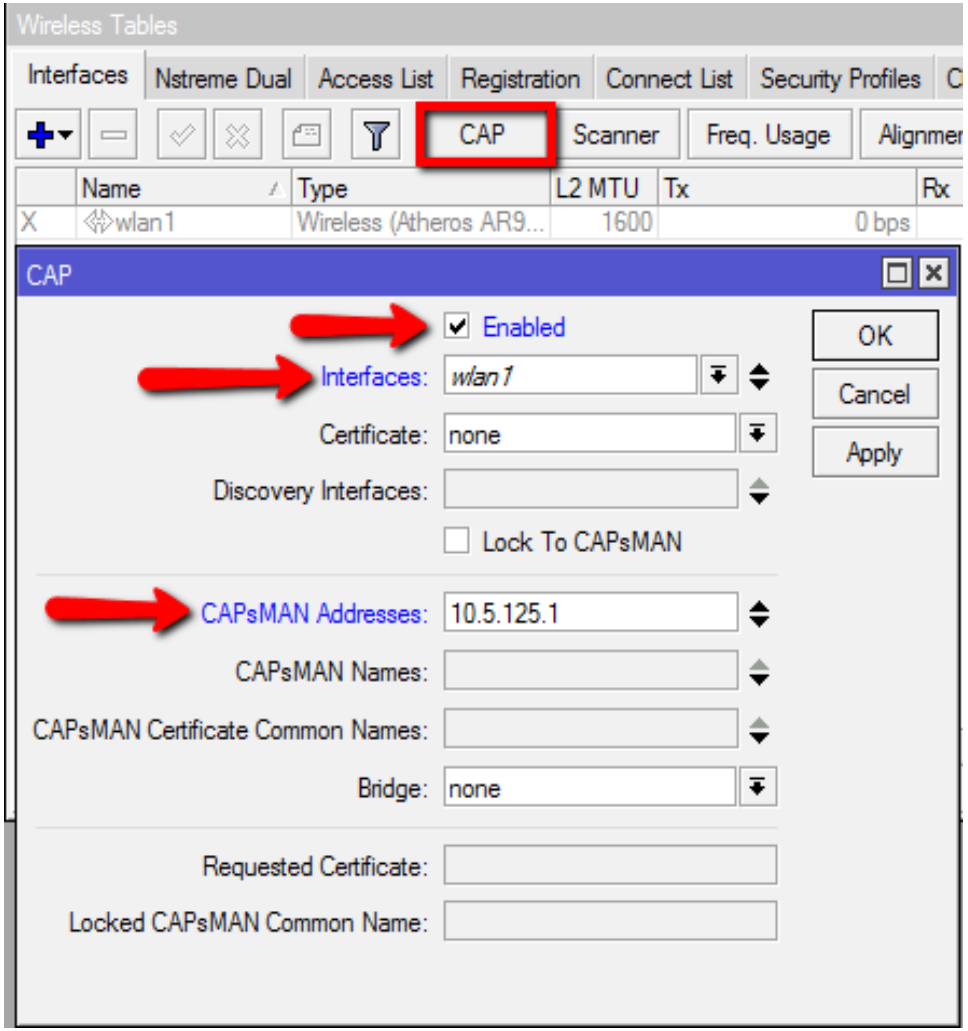


CAP to CAPsMAN IP Based Connection

IP (UDP) Layer3

- ➢ CAP communicates CAPsMAN using IP protocol
- ✓ Can traverse NAT when required
- ▪ Management connection between CAP and CAPsMAN is secured using DTLS
- ▪ CAP client data traffic is not secured
  - ➢ If encryption is required IPSec or encrypted tunnels can be used

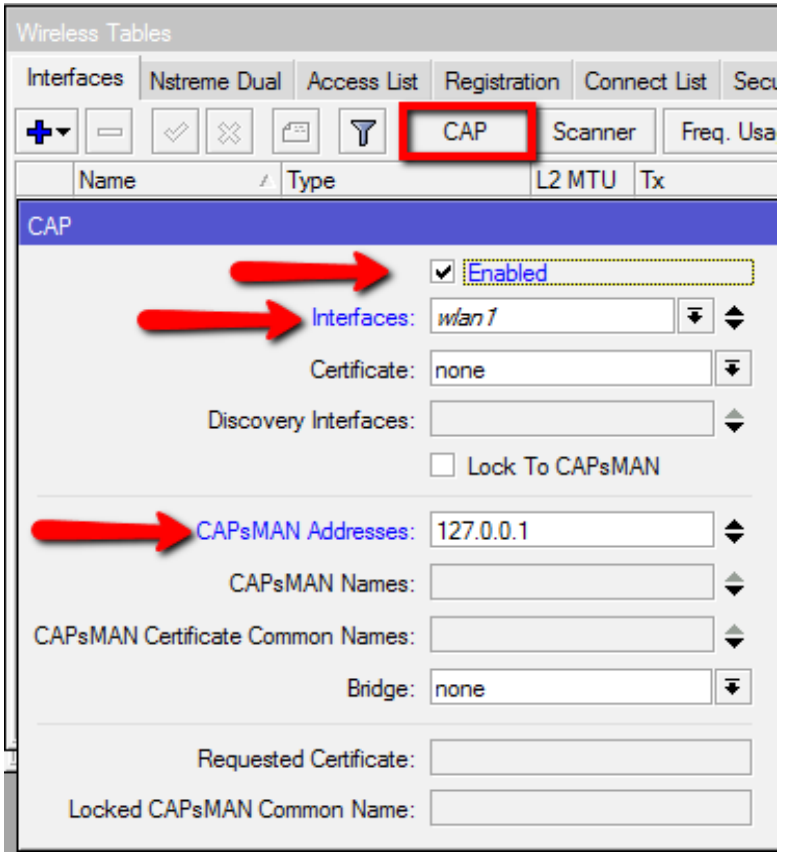
Specify IP on The CAP



CAPsMAN and CAP in one board

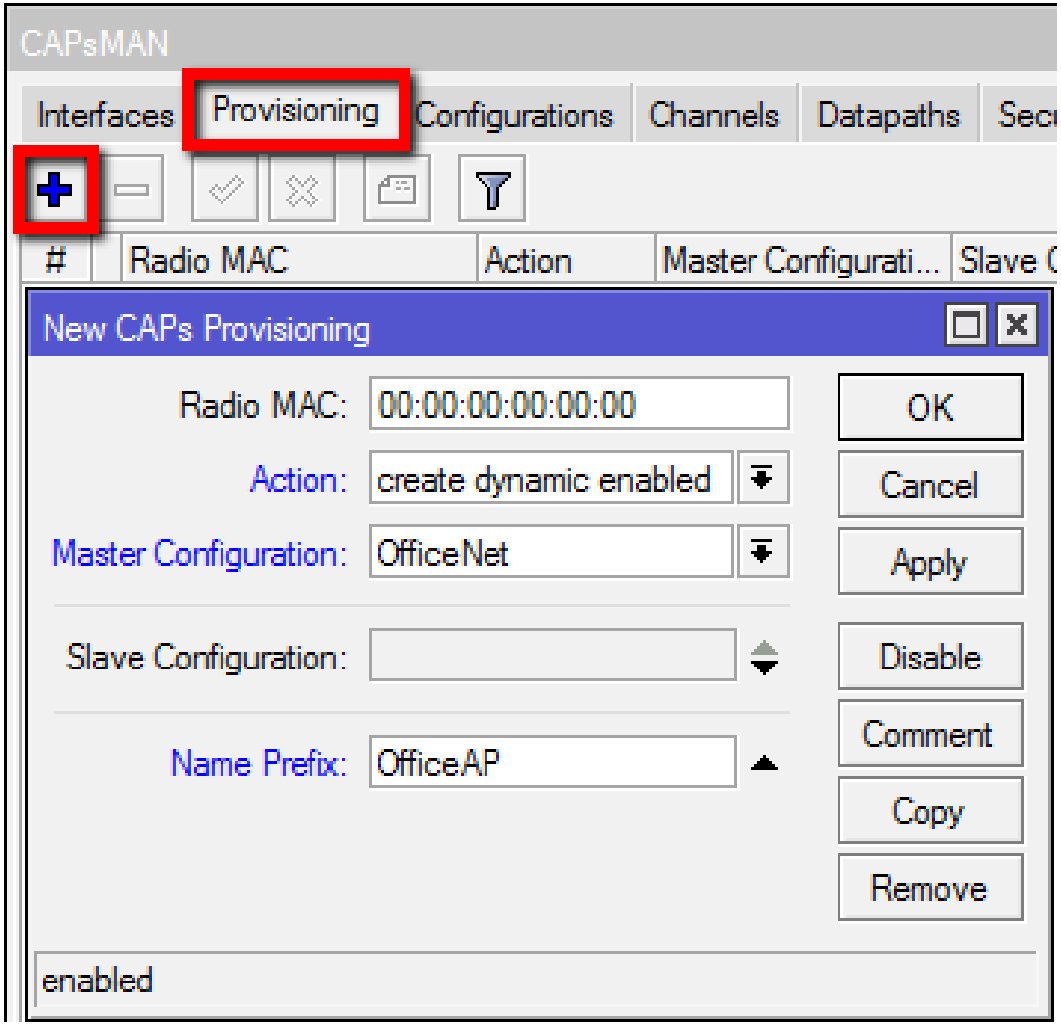
- Does your CAPsMAN router has a wireless interface too?

✓ Enable CAP & Connect it to it self (127.0.0.1) for central management



CAPsMAN Simple Setup

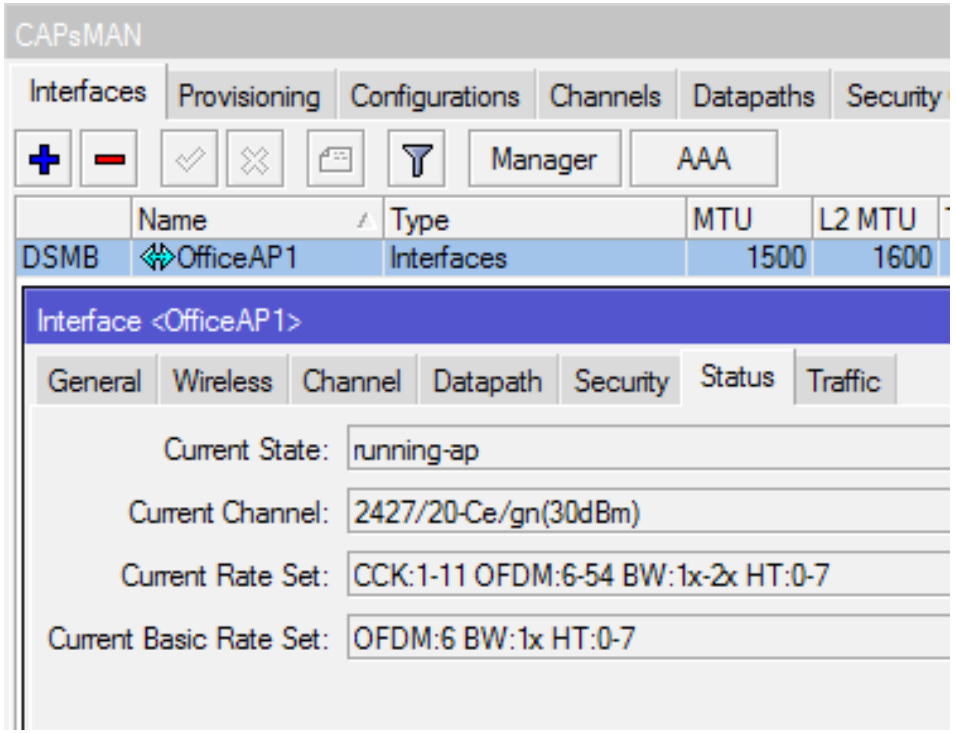
- Add new Provisioning rule



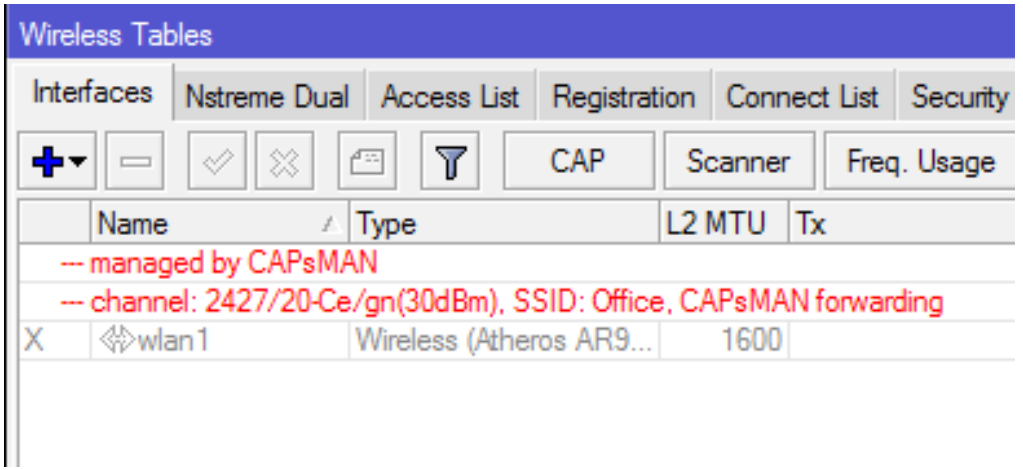
CAPsMAN Simple Setup

- Check the “Interface” status on:

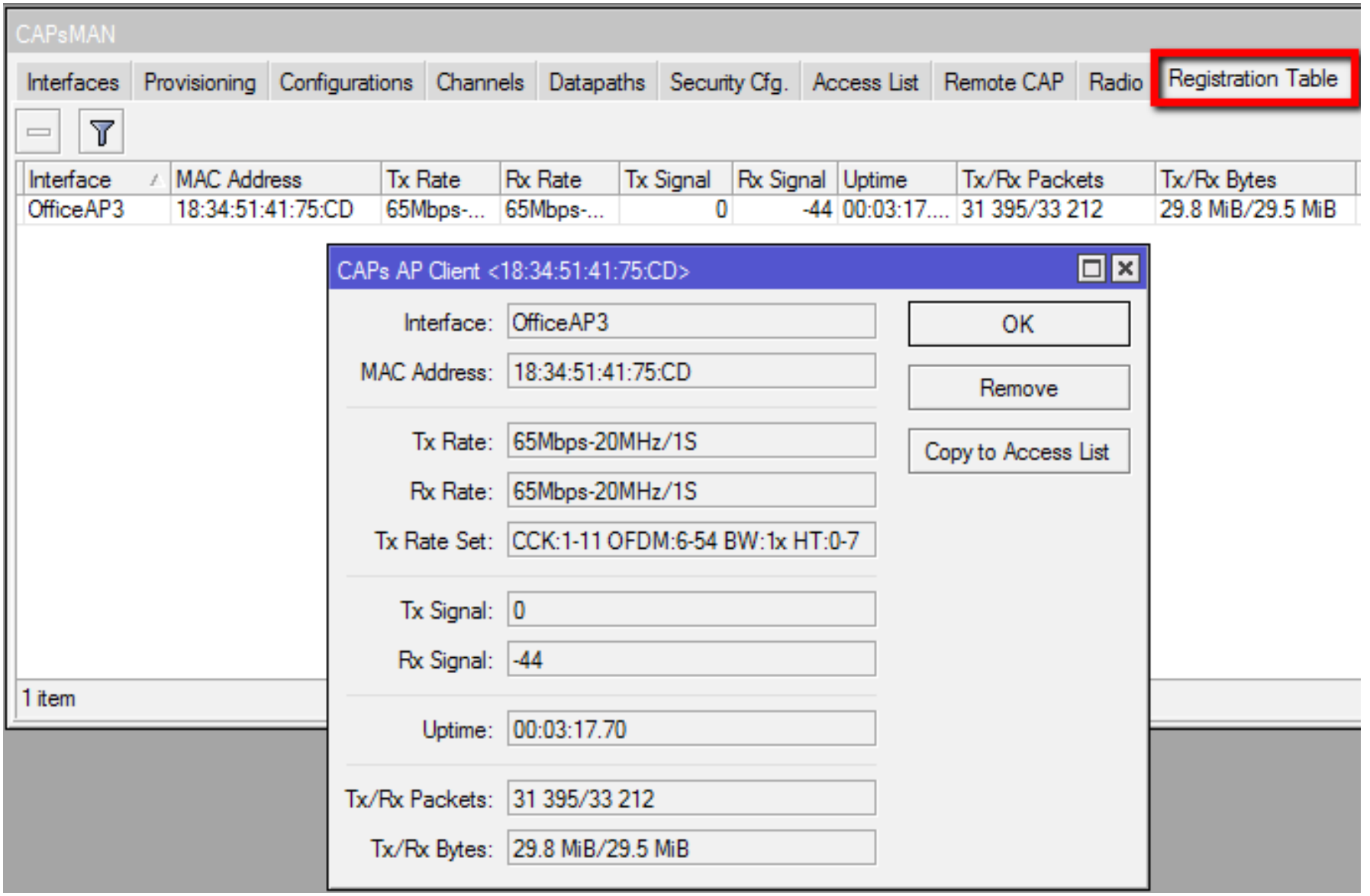
CAPsMAN



CAP

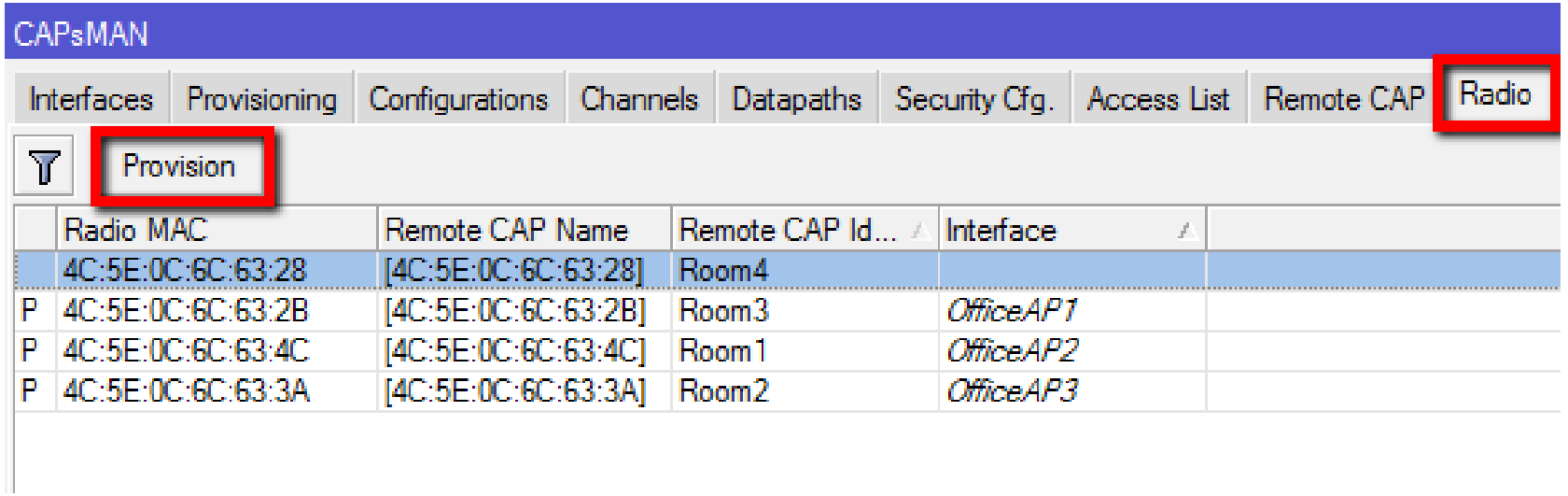


CAPsMAN Registration table



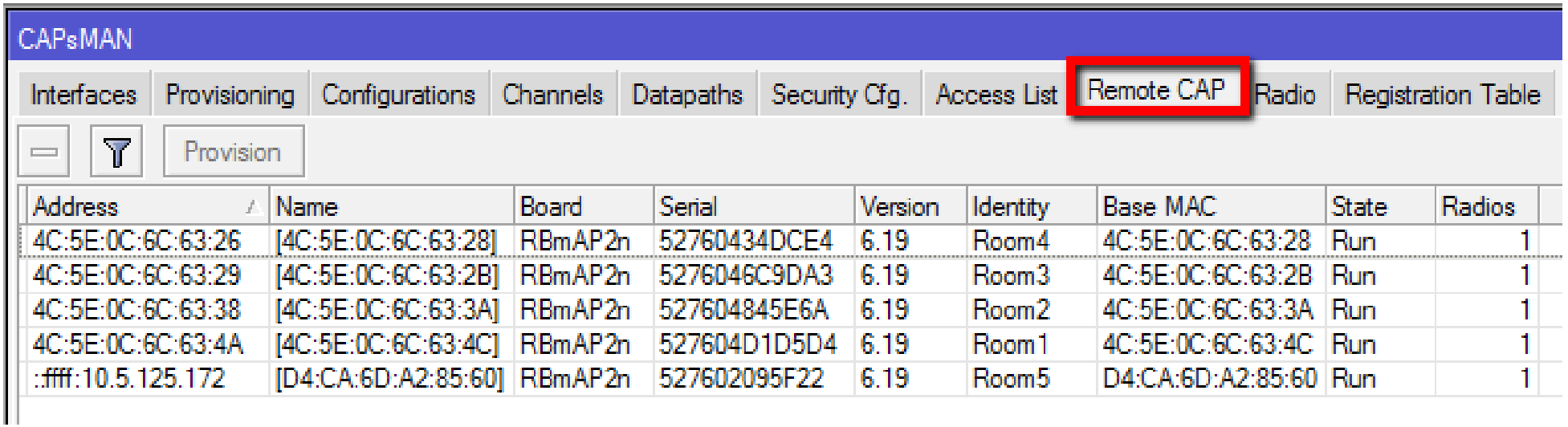
Manual Provisioning

- Changing Provisioning rules doesn't effect already configured CAPs, manual Provisioning required:
  - Remove CAP interface
  - Initiate Provision command on the CAP



CAP Identification

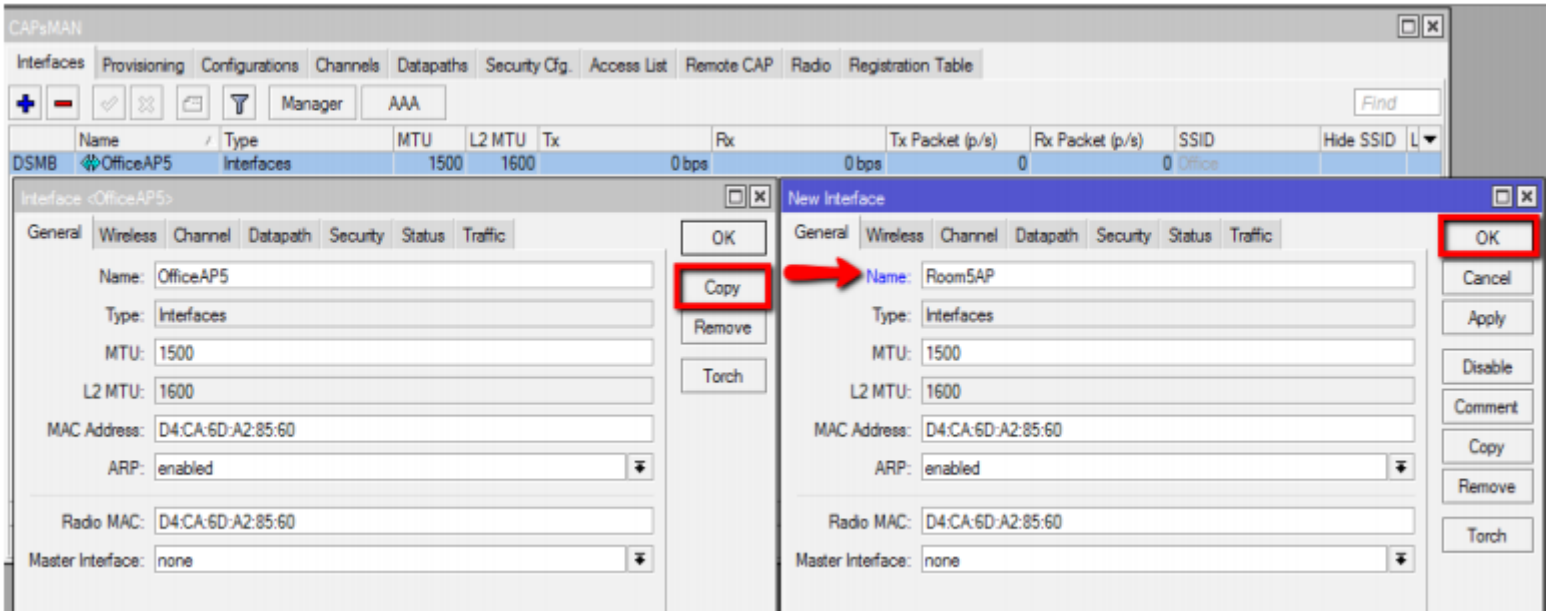
- MAC/IP address
- RouterBoard model
- Serial Number of the Board
- RouterOS version
- System Identity
- Main wireless MAC
- State of the CAP
- Radio count



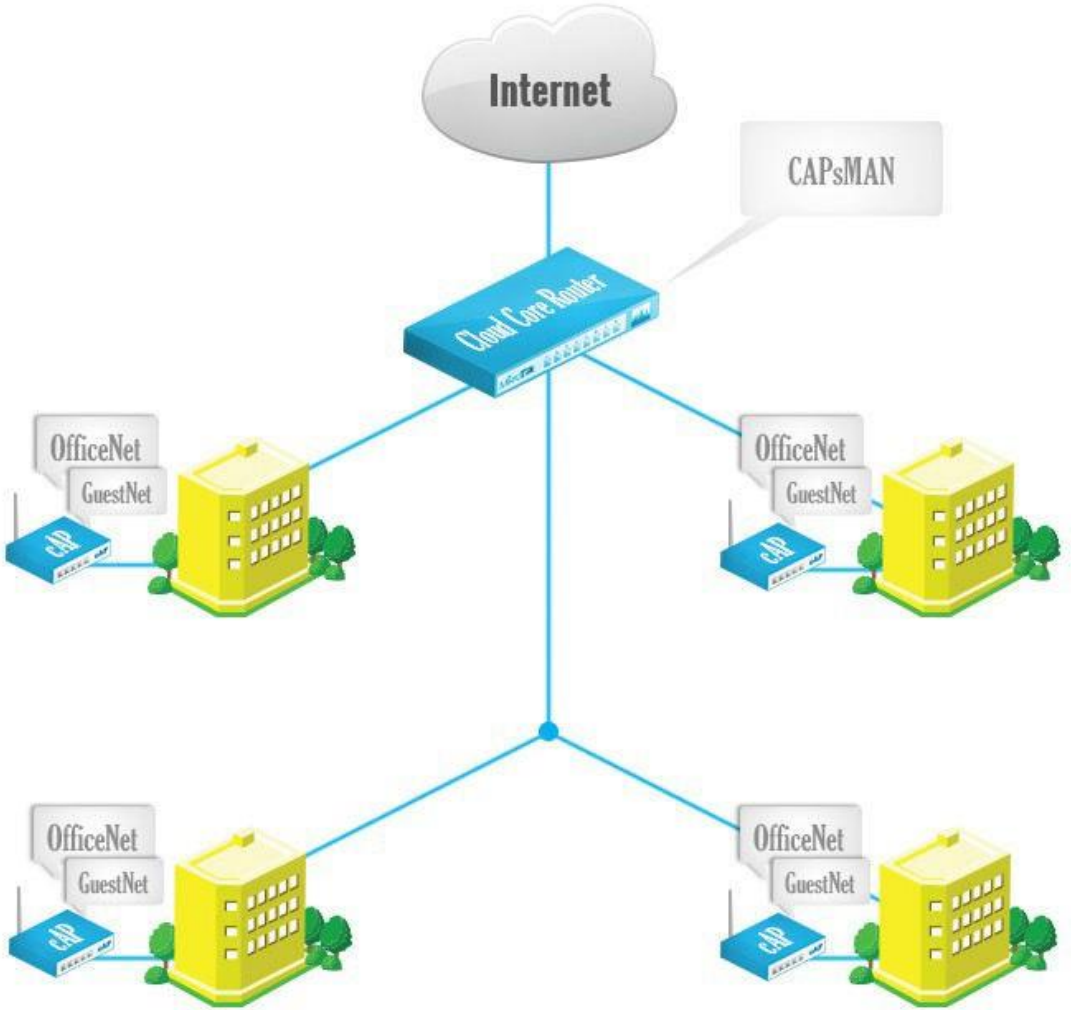
Address	Name	Board	Serial	Version	Identity	Base MAC	State	Radios
4C:5E:0C:6C:63:26	[4C:5E:0C:6C:63:28]	RBmAP2n	52760434DCE4	6.19	Room4	4C:5E:0C:6C:63:28	Run	1
4C:5E:0C:6C:63:29	[4C:5E:0C:6C:63:2B]	RBmAP2n	5276046C9DA3	6.19	Room3	4C:5E:0C:6C:63:2B	Run	1
4C:5E:0C:6C:63:38	[4C:5E:0C:6C:63:3A]	RBmAP2n	527604845E6A	6.19	Room2	4C:5E:0C:6C:63:3A	Run	1
4C:5E:0C:6C:63:4A	[4C:5E:0C:6C:63:4C]	RBmAP2n	527604D1D5D4	6.19	Room1	4C:5E:0C:6C:63:4C	Run	1
:ffff:10.5.125.172	[D4:CA:6D:A2:85:60]	RBmAP2n	527602095F22	6.19	Room5	D4:CA:6D:A2:85:60	Run	1

CAPsMAN static CAP interface

- Interface name or setting does not change after a reboot
- Additional manual setting override
- Copy dynamic interface to make static interface



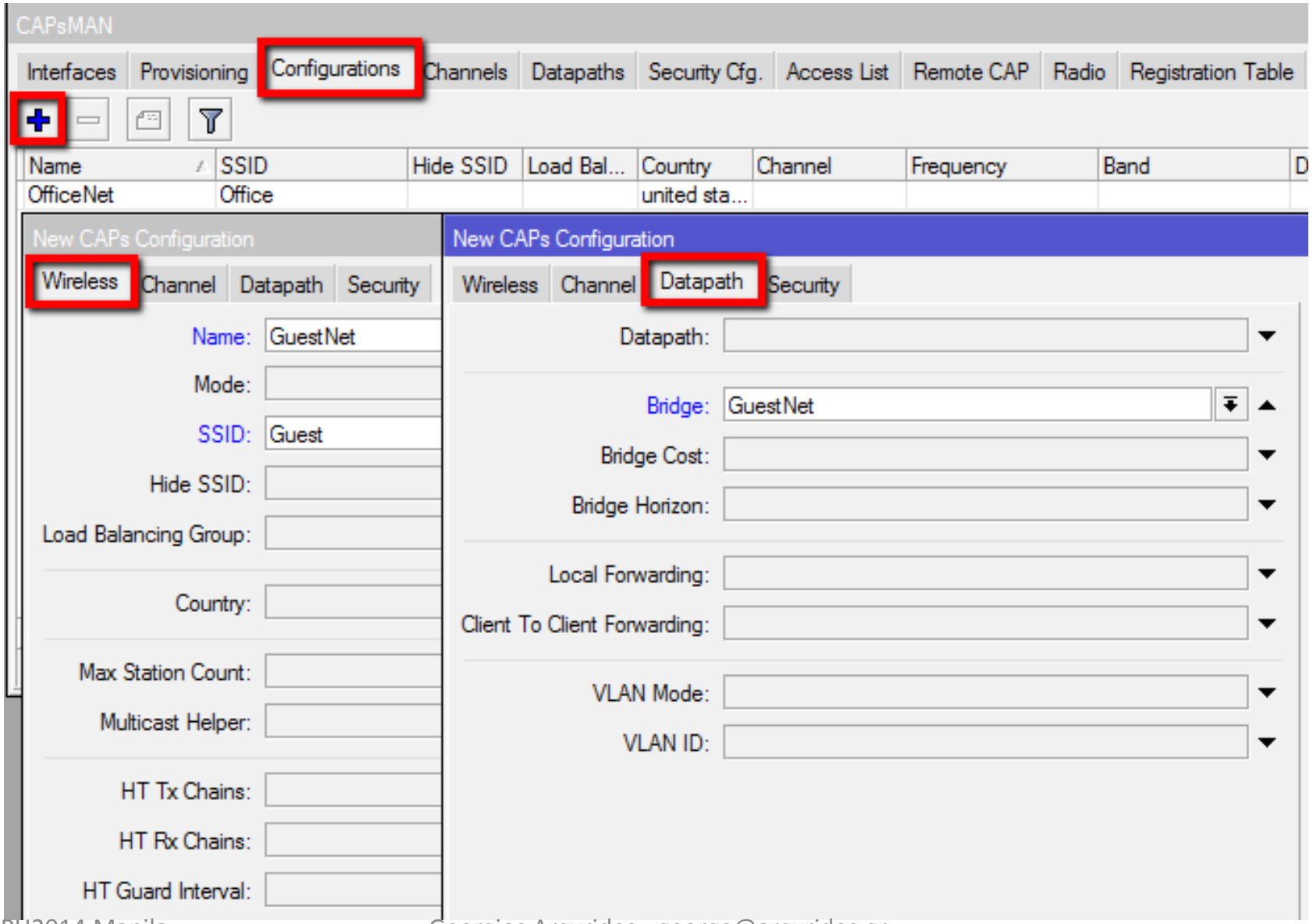
CAPsMAN Virtual AP



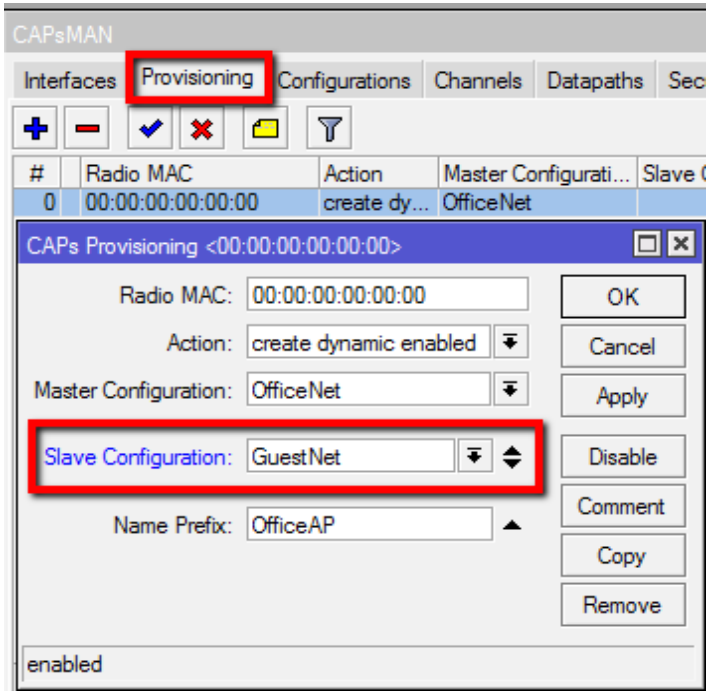
CAPsMAN VirtualAP Configuration

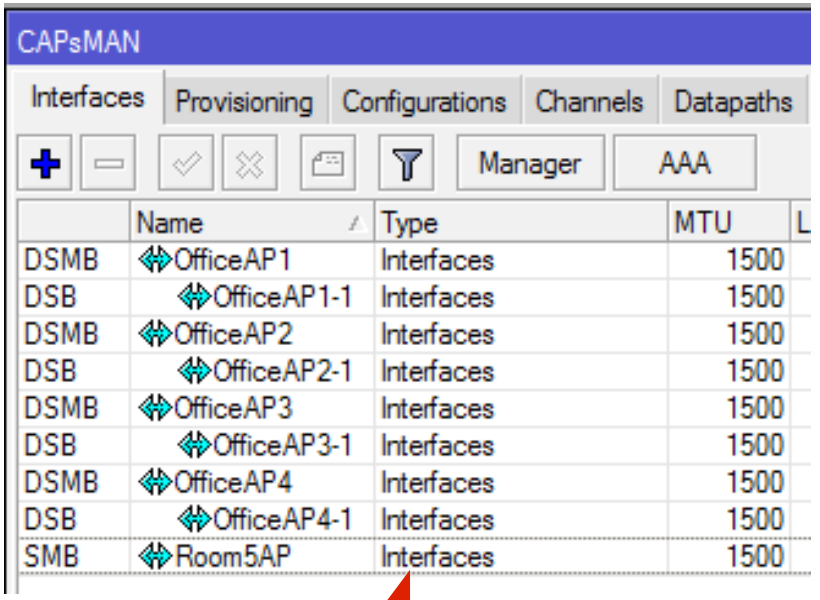
- Create new Bridge interface and IP configuration for the VirtualAPs
  - Or use the same bridge interface used for Master AP
- Create a new configuration for the VirtualAP
- Specify the new configuration in Provisioning rule as Slave Configuration
- Remove all CAP interfaces
- Initiate Manual Provisioning on all the CAPs

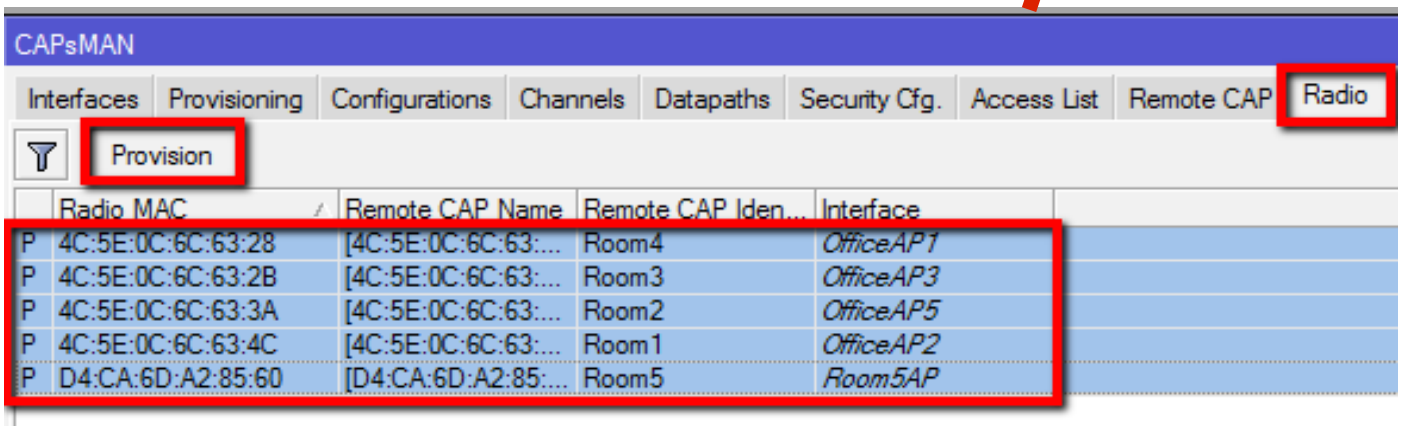
CAPsMAN VirtualAP Setup



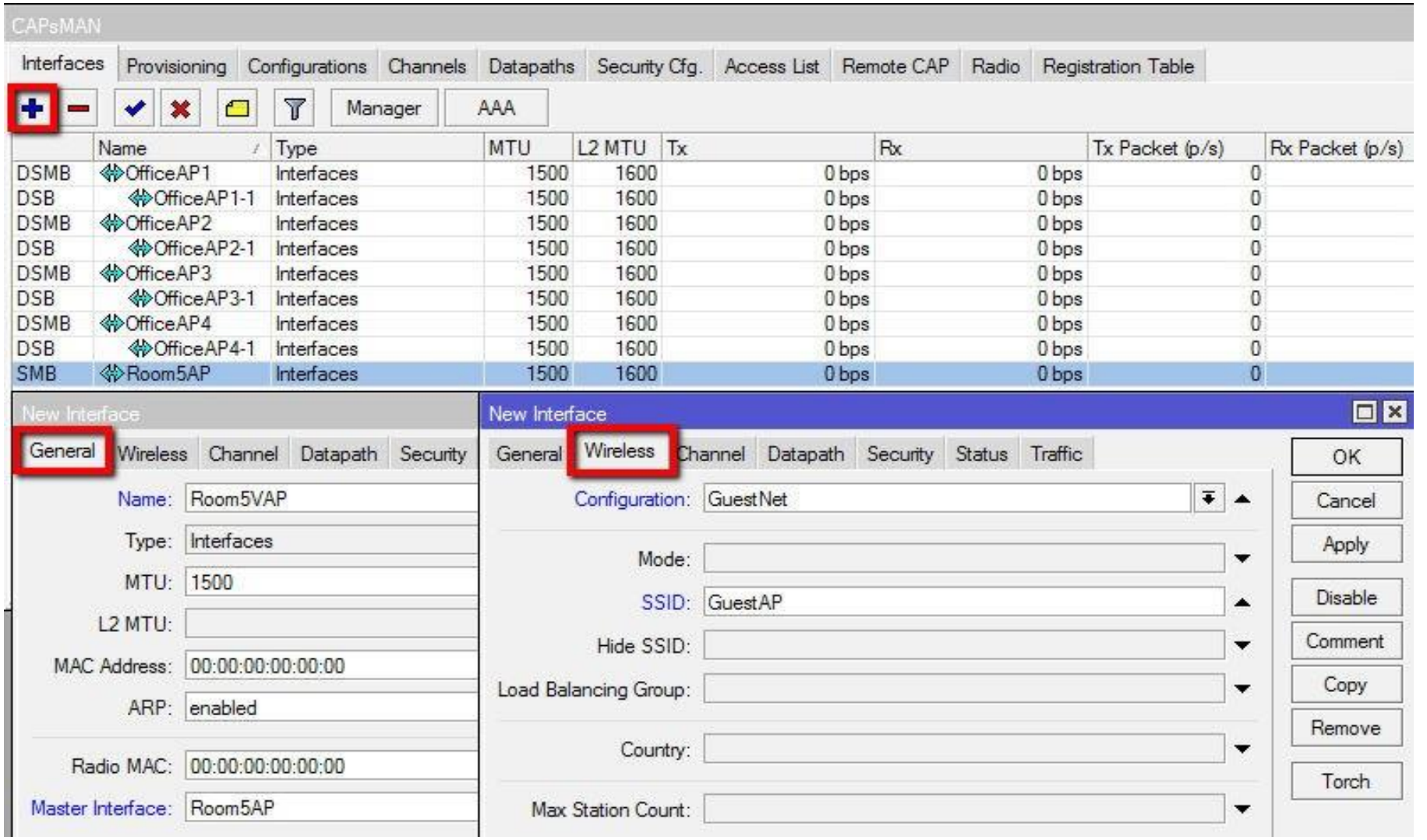
CAPsMAN VirtualAP Setup







CAPsMAN static VirtualAP

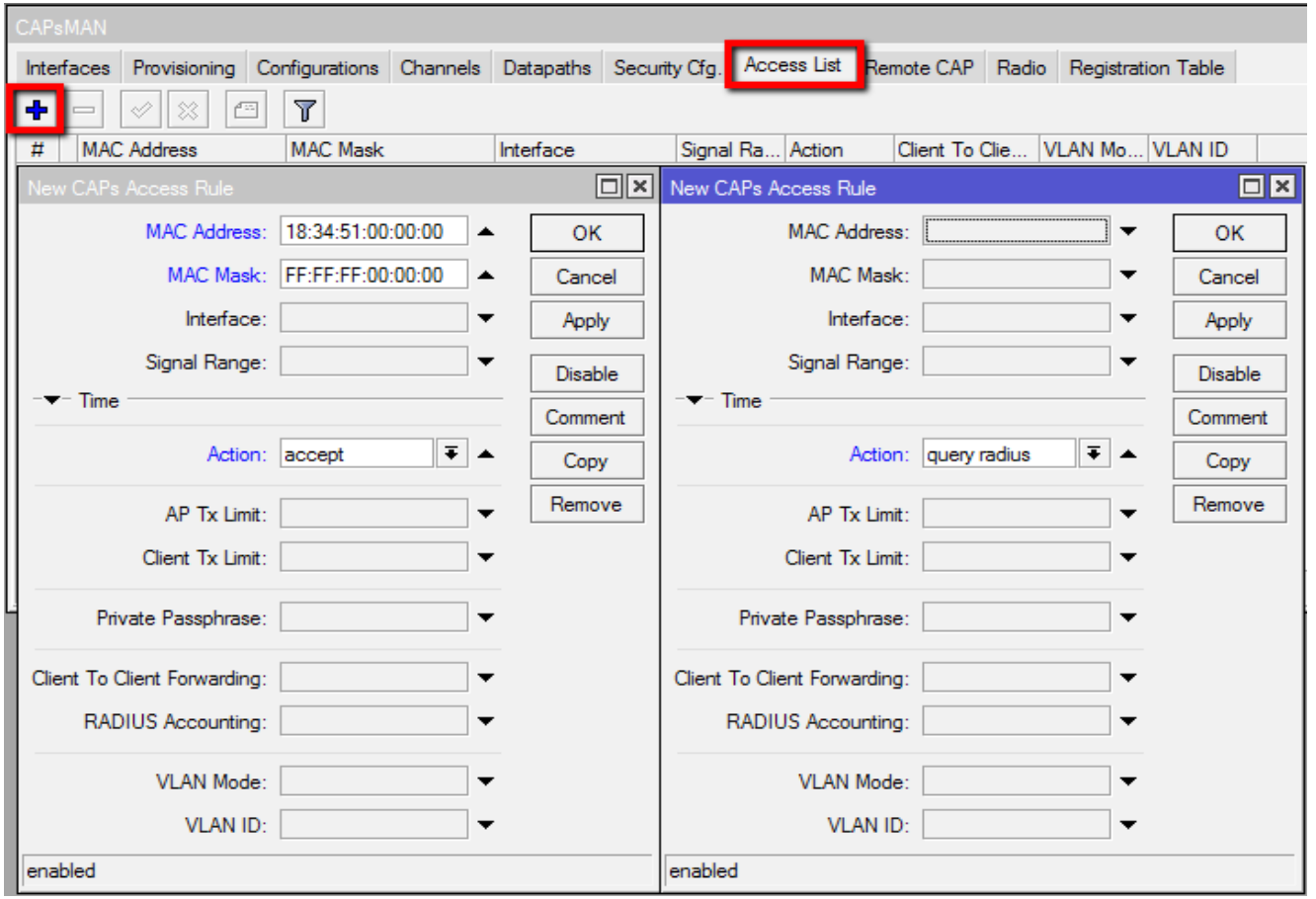


CAPsMAN Access List Features

- MAC Authentication
- Radius Query support
- MAC Mask support
- Signal Range
- Time
- Private Passphrase
- VLAN ID assignment

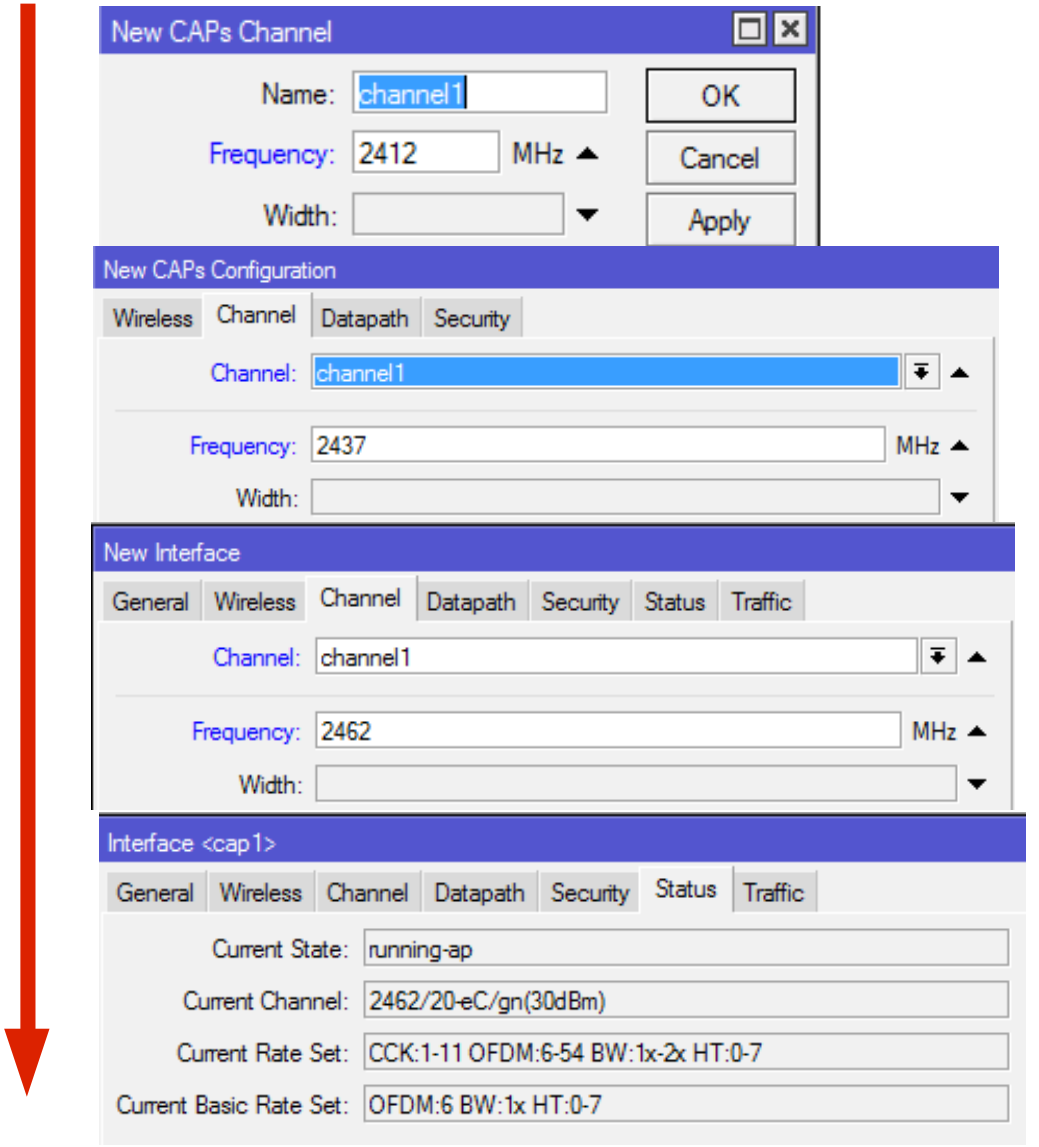
CAPsMAN Access List

- Allow Apple devices to connect
- Let RADIUS server decide for the rest of devices



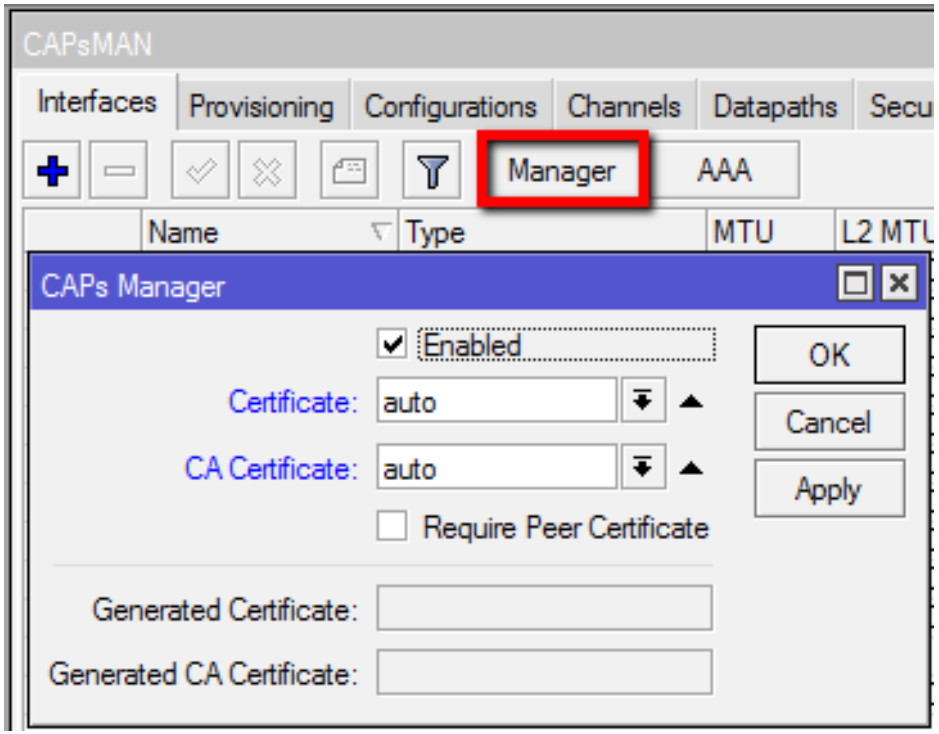
CAPsMAN Configuration override

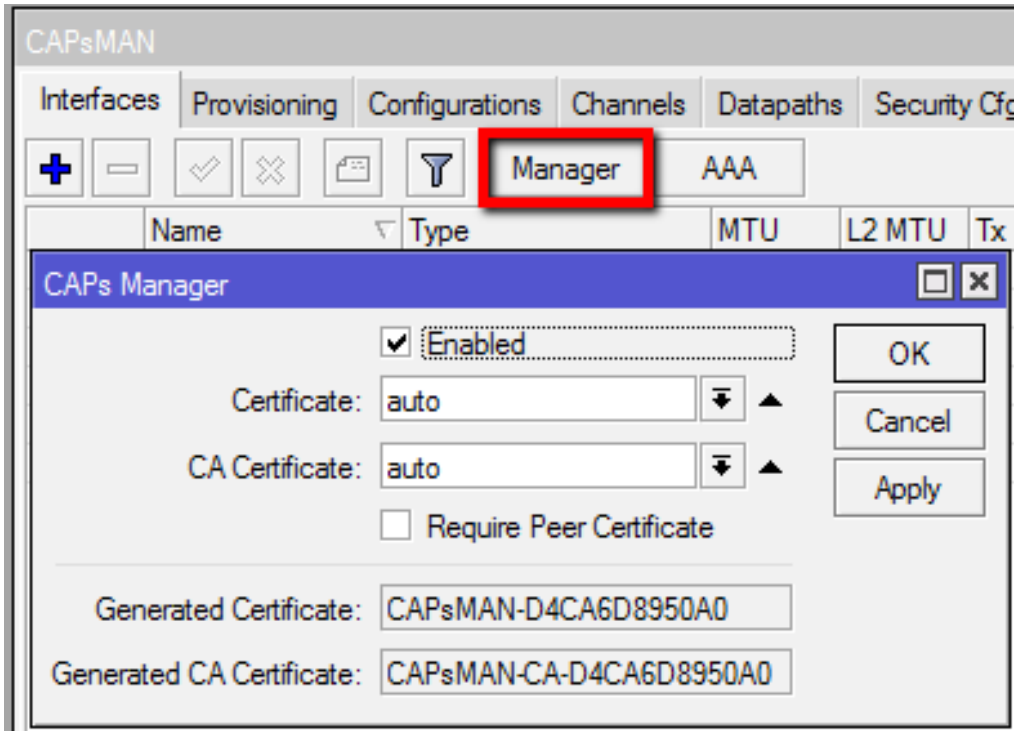
- Configuration overrides Channel setting
- Interface overrides Channel and Configuration setting



CAPsMAN Auto Certificate

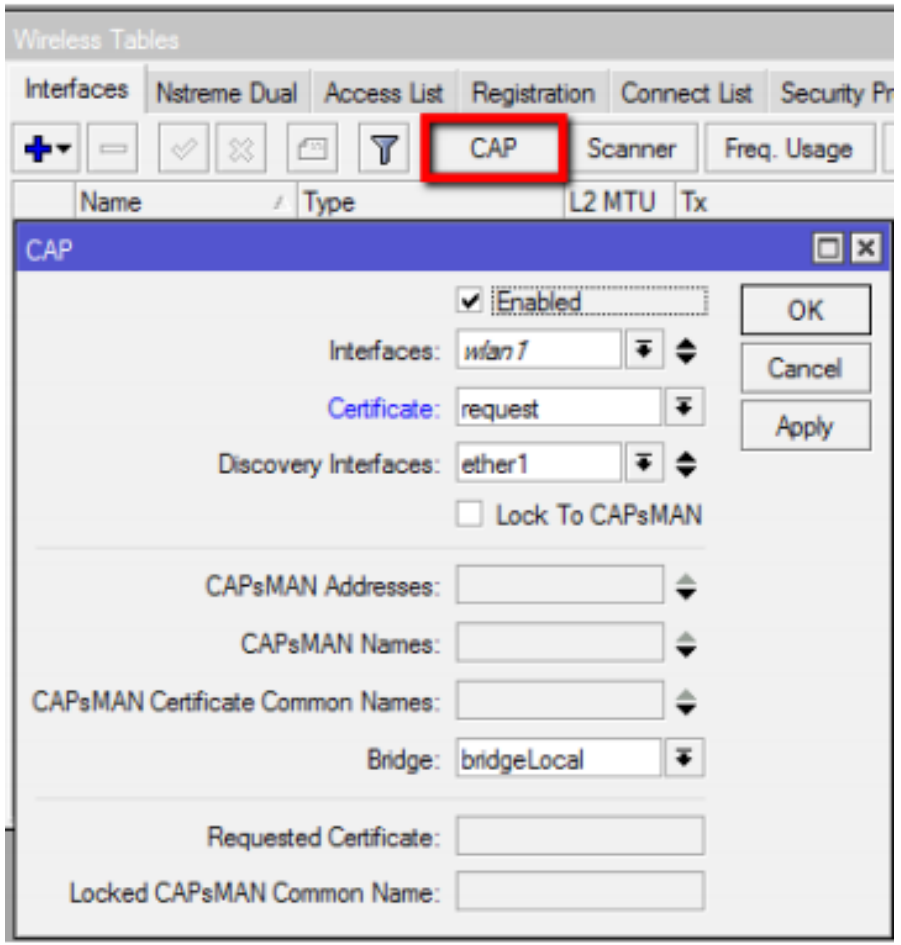
- Enable Certificate and CA Certificate on CAPsMAN

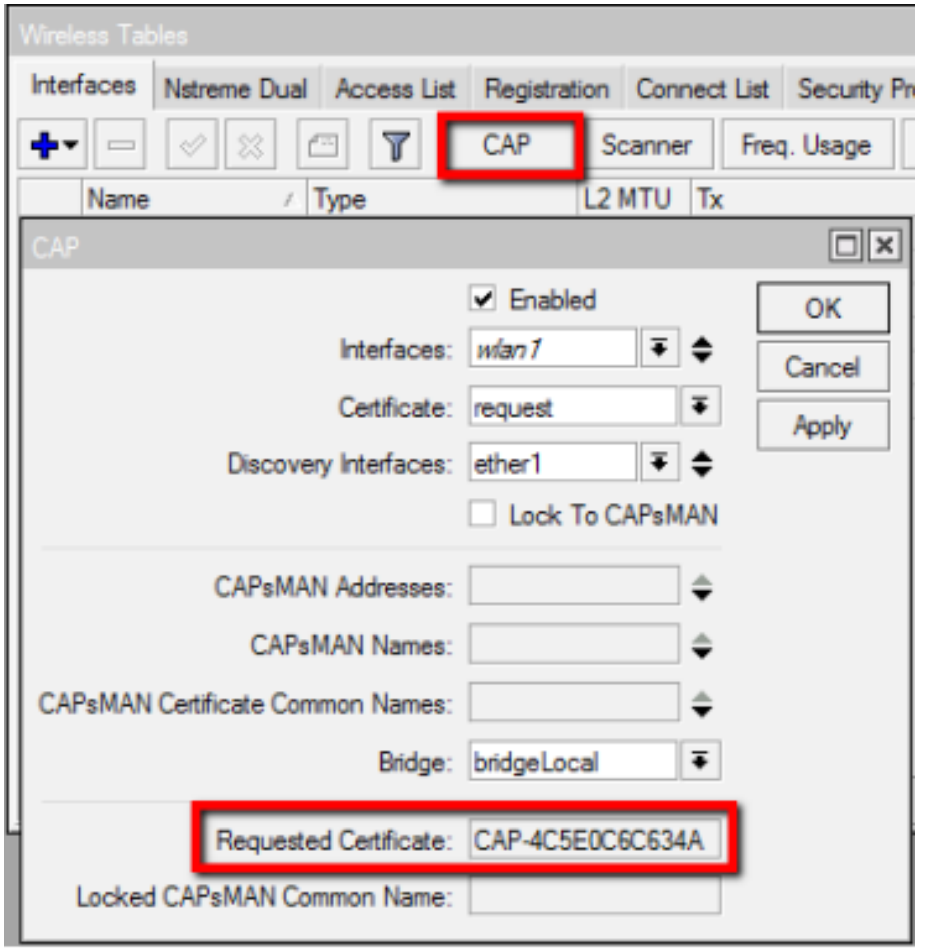




CAPsMAN Auto Certificate

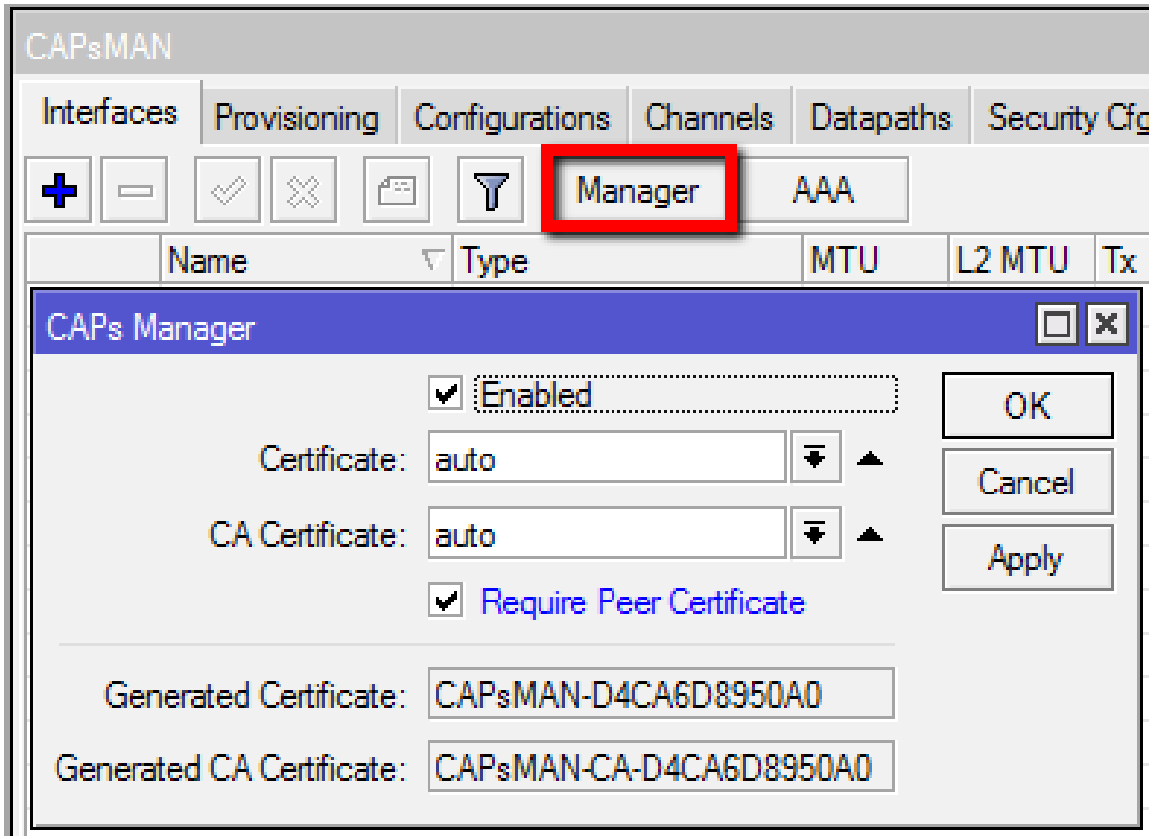
- Enable “Request” Certificate on CAP





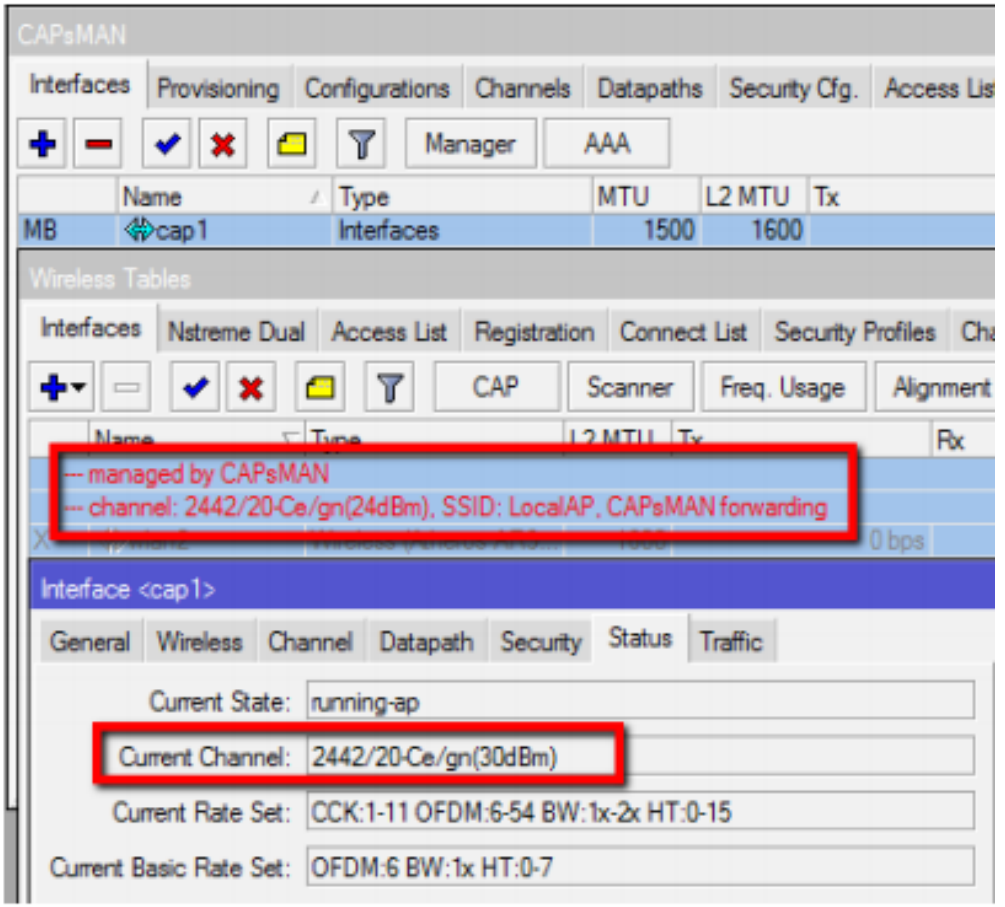
CAPsMAN Auto Certificate

- Accept connections only from CAPs with valid certificate



CAPsMAN Antenna Gain (Country Regulations)

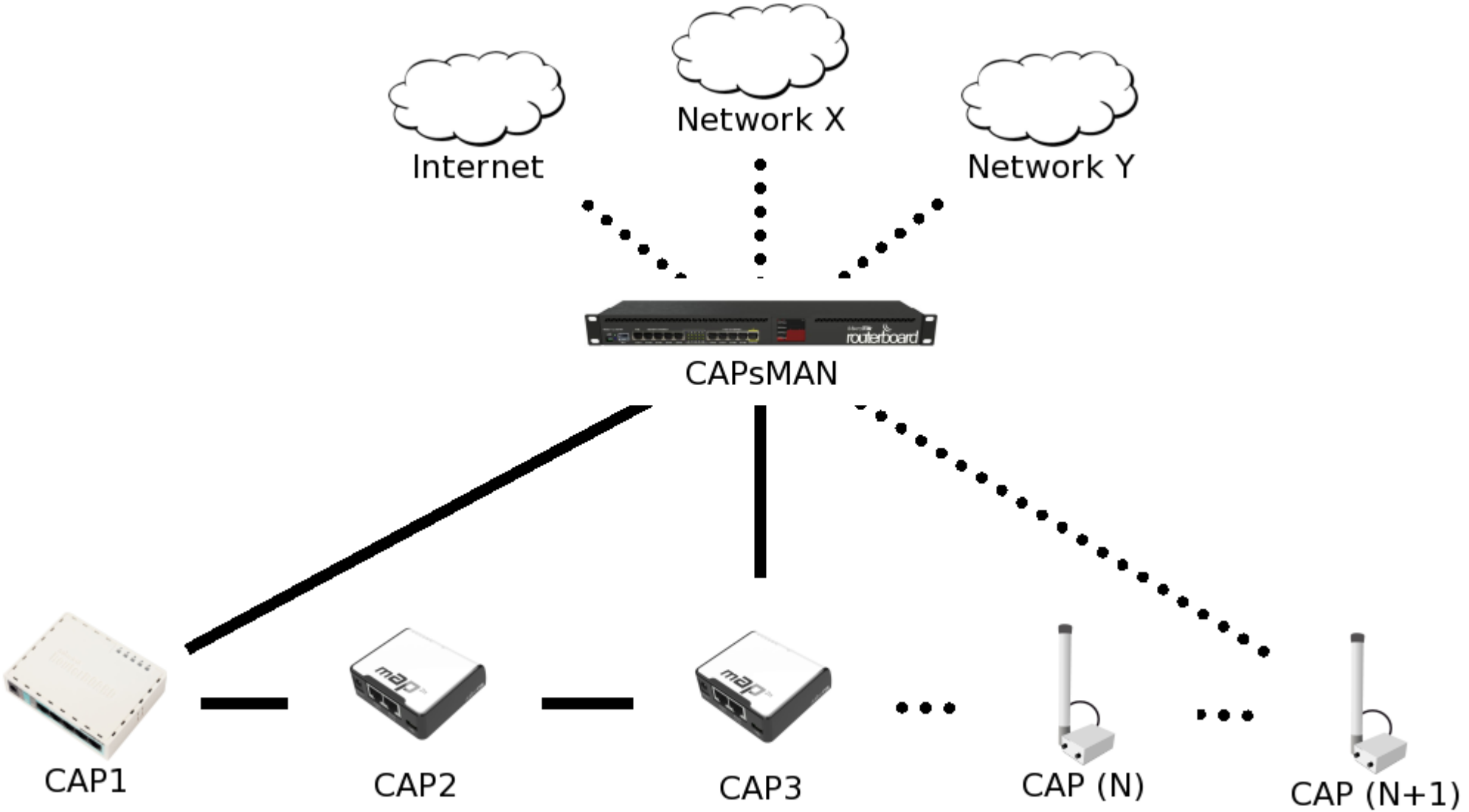
- Antenna-gain value is taken from the CAP interface
- Must be configured on AP before you enable radio in CAP mode



Example

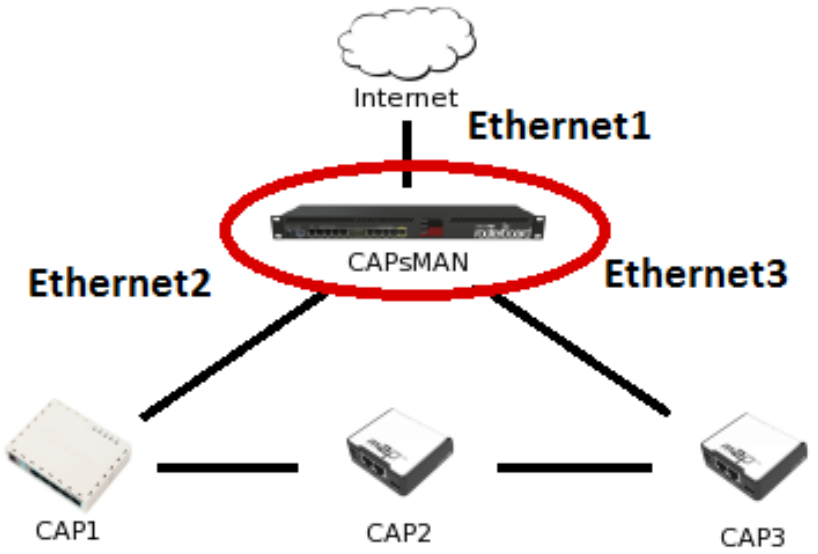
- Antenna-gain: 6dBi
- EIRP: 30dB

Simple Routed CAPs Network (with redundancy)



Simple Routed CAPs Network (with redundancy)

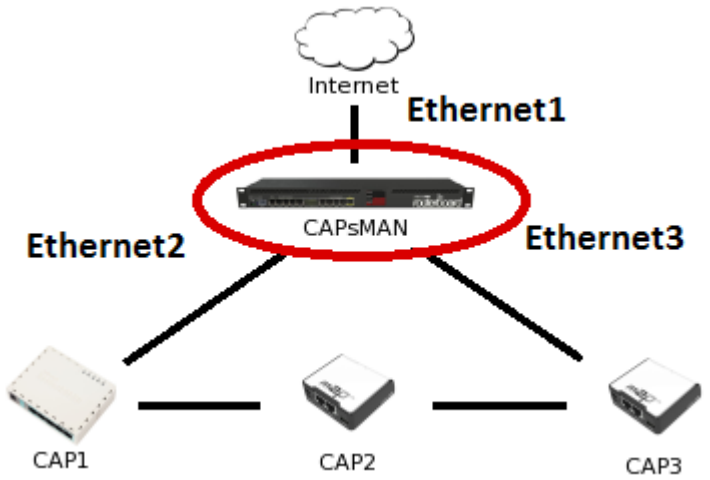
CAPsMAN

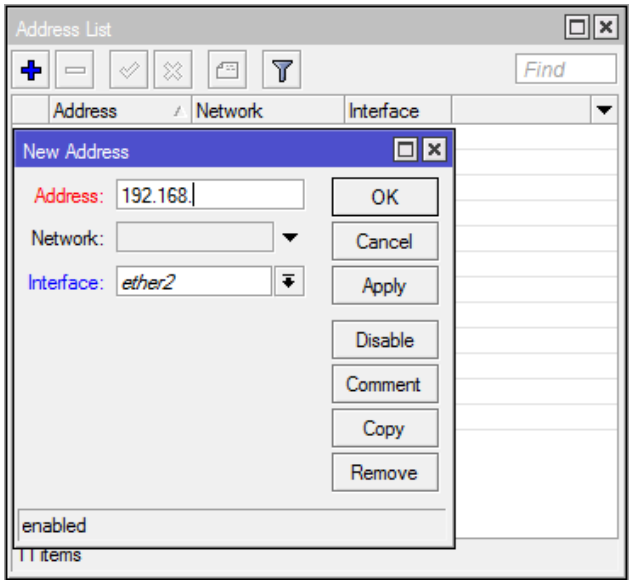


- Ethernet1: Internet Connection
- Ethernet2: Connection with CAP1
- Ethernet3: Connection with CAP2

Simple Routed CAPs Network (with redundancy)

CAPsMAN

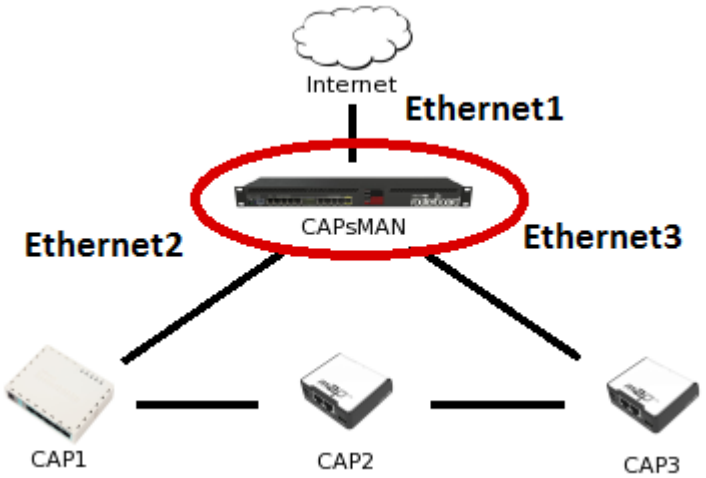


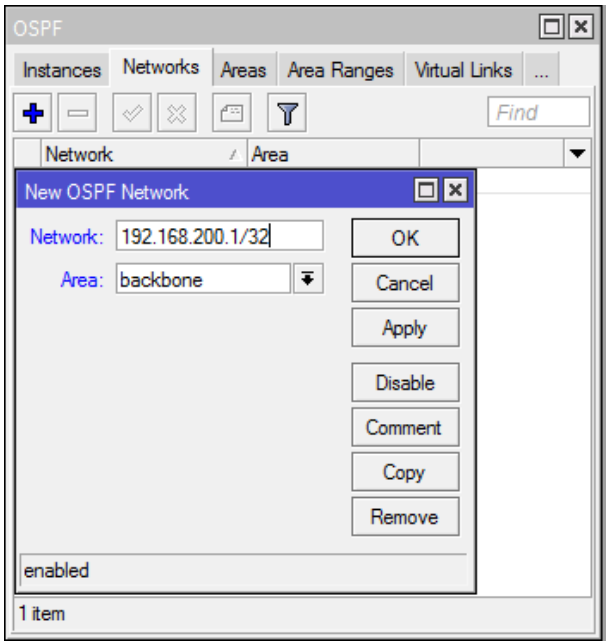


- Add IP addresses for CAPsMAN <-> CAP1 & CAP3 communication
  - CAPsMAN Ethernet2(to CAP1 Ethernet1): 192.168.100.1/30
  - CAPsMAN Ethernet3(to CAP3 Ethernet2): 192.168.100.14/30
- Create a Bridge interface and add IP address 192.168.200.1/32 on it
  - From now on known as loopback IP address of CAPsMAN

Simple Routed CAPs Network (with redundancy)

CAPsMAN



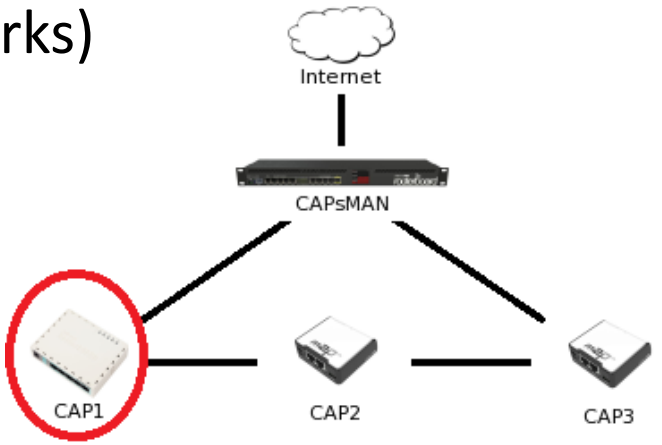


- Enable OSPF routing protocol (add networks)
  - 192.168.100.0/30
  - 192.168.100.12/30
  - 192.168.200.1/32

Simple Routed CAPs Network (with redundancy)

Similarly do on CAP1

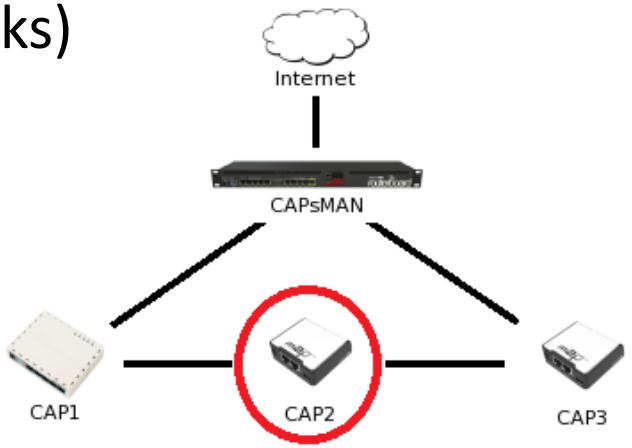
- Add IP addresses
  - CAP1 Ethernet1(to CAPsMAN Ethernet2): 192.168.100.2/30
  - CAP1 Ethernet2(to CAP2 Ethernet1): 192.168.100.5/30
- Add loopback interface(new bridge) and IP address 192.168.101.1/32 on it
- Enable OSPF routing protocol (add networks)
  - 192.168.100.0/30
  - 192.168.100.4/30
  - 192.168.101.1/32



Simple Routed CAPs Network (with redundancy)

Similarly do on CAP2

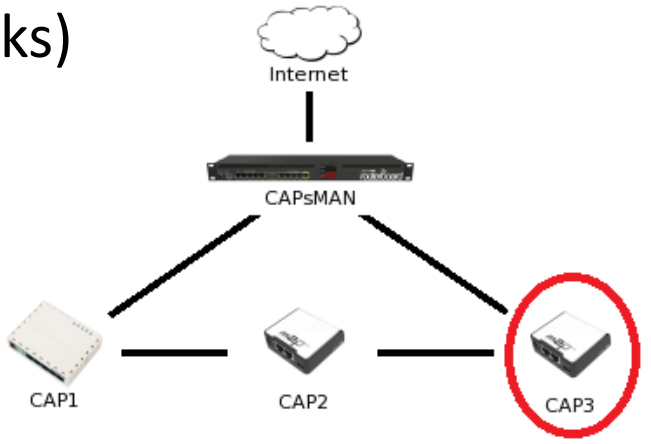
- Add IP addresses
  - CAP2 Ethernet1(to CAP1 Ethernet2): 192.168.100.6/30
  - CAP2 Ethernet2(to CAP3 Ethernet1): 192.168.100.9/30
- Add loopback interface(new bridge) and IP address 192.168.101.2/32 on it
- Enable OSPF routing protocol (add networks)
  - 192.168.100.4/30
  - 192.168.100.8/30
  - 192.168.101.2/32



Simple Routed CAPs Network (with redundancy)

Similarly do on CAP3

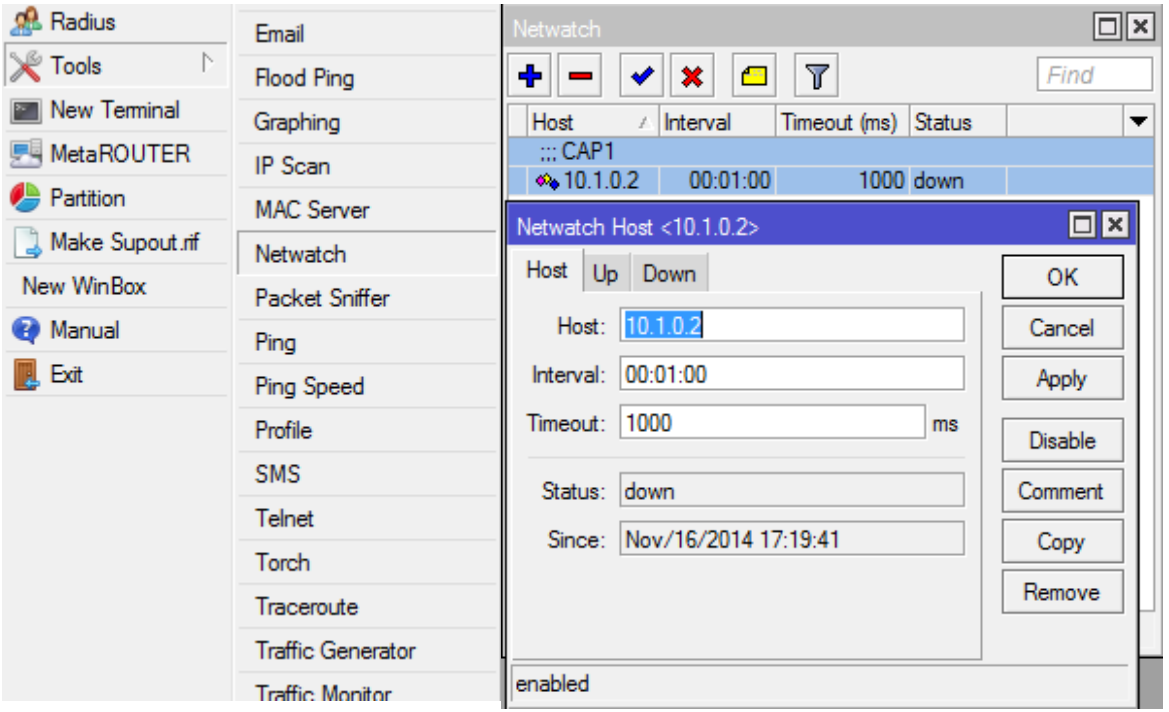
- Add IP addresses
  - CAP3 Ethernet1(to CAP2 Ethernet2): 192.168.100.10/30
  - CAP3 Ethernet2(to CAPsMAN Ethernet3): 192.168.100.13/30
- Add loopback interface(new bridge) and IP address 192.168.101.3/32 on it
- Enable OSPF routing protocol (add networks)
  - 192.168.100.8/30
  - 192.168.100.12/30
  - 192.168.101.3/32



Monitor CAPs

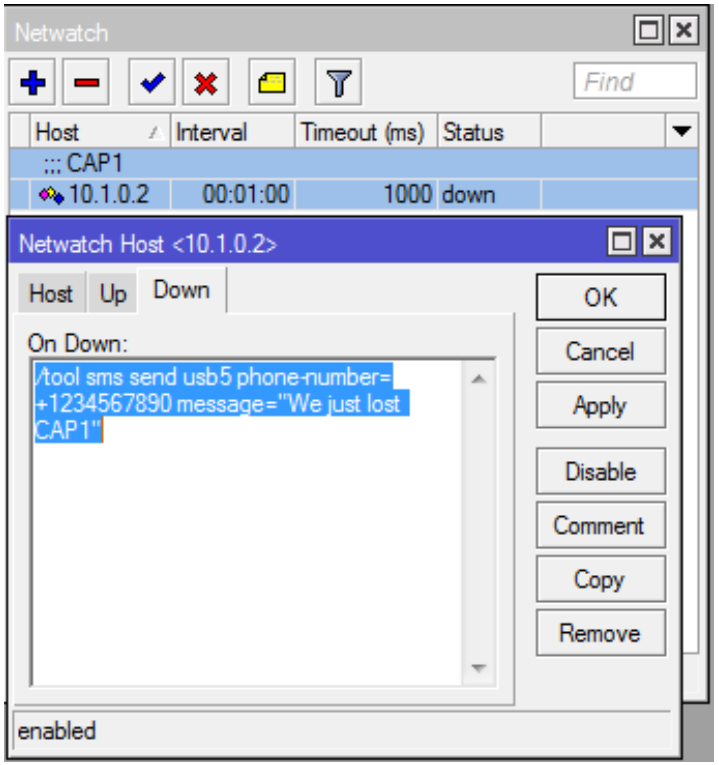
- Get notified when any of your **C**ontrolled **A**ccess **P**oint**s** goes down
  - Power Supply Failure?
  - Board Failure?
  - Any other reason

➢ Just use loopback address of each CAP as “host”



Monitor CAPs

- You can use sms or email tool



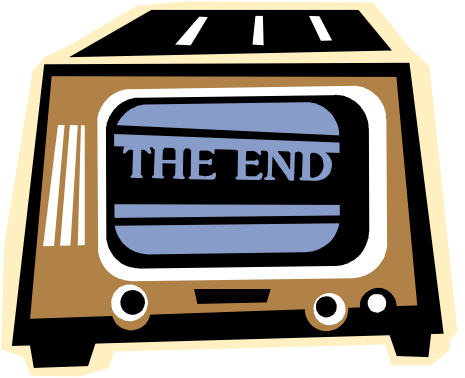
Suggestion/idea for
MikroTik Development Team
(maybe in CAPsMAN v2)

- ❑ Option to Enable Monitoring for IP Managed CAPs(one/a group/all)
- ❑ Every time "Monitoring" is enabled for an IP CAP ,a Dynamic rule could be created on Netwatch
  - Dynamic Rule will be remove if monitoring option is disabled
  - The same option/tab can configure the Up/Down Scripts

Comments? Questions?

Thank You!

Enjoy the Rest of the MUM



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