

# Getting started with CAPsMAN



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MUM Thailand in Aug 31, 2015

# Introduce



## Ruamrudee International School

Technology Committee / Network Admin  
2,400 users : Computer 1,300 Units

## Live Inc. Public Company

IT Director  
Broadcasting, High Availability system, Networking

## Now

Network Infrastructure Consultant



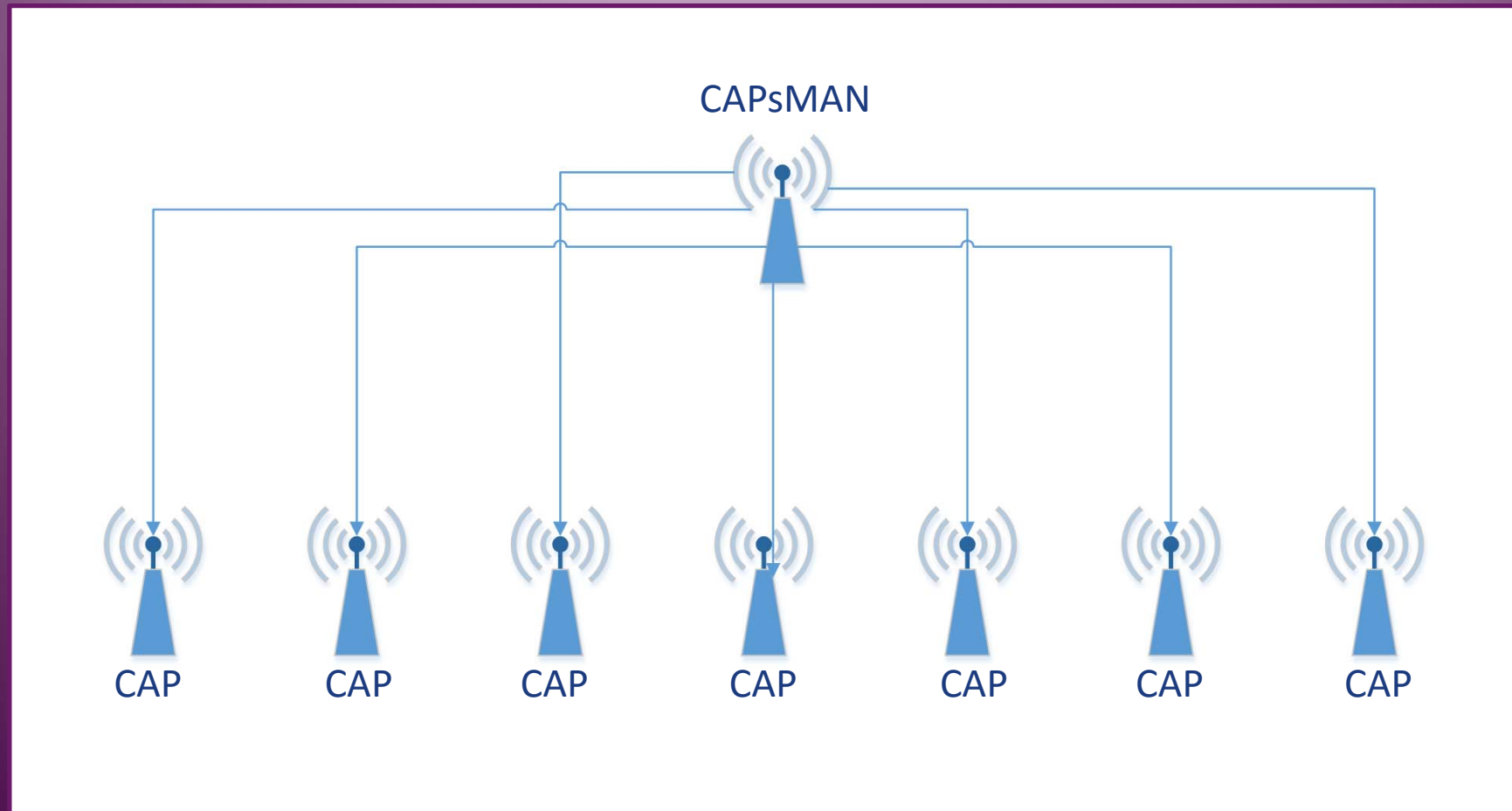
# CAPsMAN ได้อย่างไร?

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- เริ่มมีตั้งแต่ RouterOS 6.11 ย่อมาจาก  
Controlled Access Point system MANager
- Centralized management of RouterOS APs

# CAPsMAN? คืออะไร?

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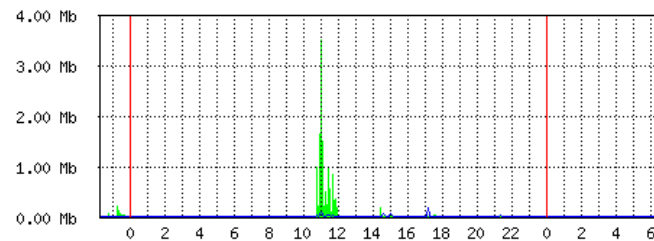
# Centralized management ทำให้ดูและระบบง่ายขึ้น

/tools graphing

## Interface <wan3> Statistics

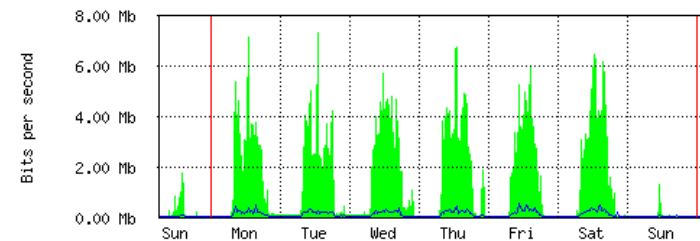
• Last update: Mon Aug 31 06:15:54 2015

"Daily" Graph (5 Minute Average)



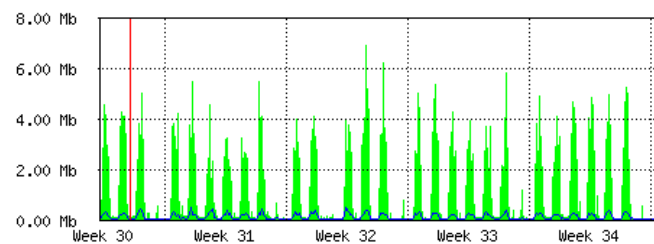
Max In: 3.53Mb; Average In: 33.96Kb; Current In: 392b;  
Max Out: 159.44Kb; Average Out: 2.39Kb; Current Out: 176b;

"Weekly" Graph (30 Minute Average)

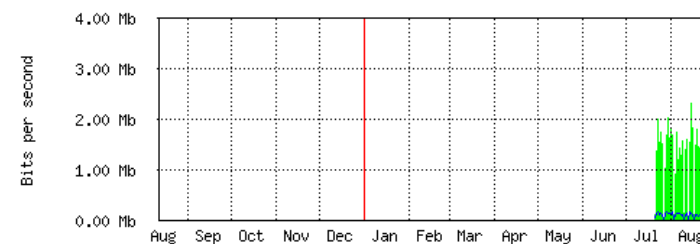


Max In: 7.35Mb; Average In: 1.30Mb; Current In: 248b;  
Max Out: 548.72Kb; Average Out: 74.26Kb; Current Out: 280b;

"Monthly" Graph (2 Hour Average)



"Yearly" Graph (1 Day Average)



# Centralized management ทำให้ดูและระบบง่ายขึ้น

รวมศูนย์กลางระบบ Access Point  
ทั้งหมดเป็นภาพรวม ในการดูแล และ  
การจัดการ

Interface List								
Interface	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
R	Hotspot1							
R	LAN							
DRS	MuM1							
DRS	MuM1-1							
DSB	MuM1-2							
DRS	MuM2							
DSB	MuM2-1							
DSB	MuM2-2							
DRS	MuM3							
DSB	MuM3-1							
DSB	MuM3-2							
X	...							
R	ether2							
R	ether3							
S	ether4							
RS	ether5							
RS	vlan1							
X	khaothong							

## Traffic and system resource graph

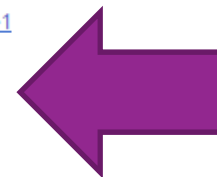
[CPU usage](#)  
[Memory usage](#)  
[Disk usage](#)

You have access to 2 queues:

[queue1](#)  
[hs-<hotspot1>](#)

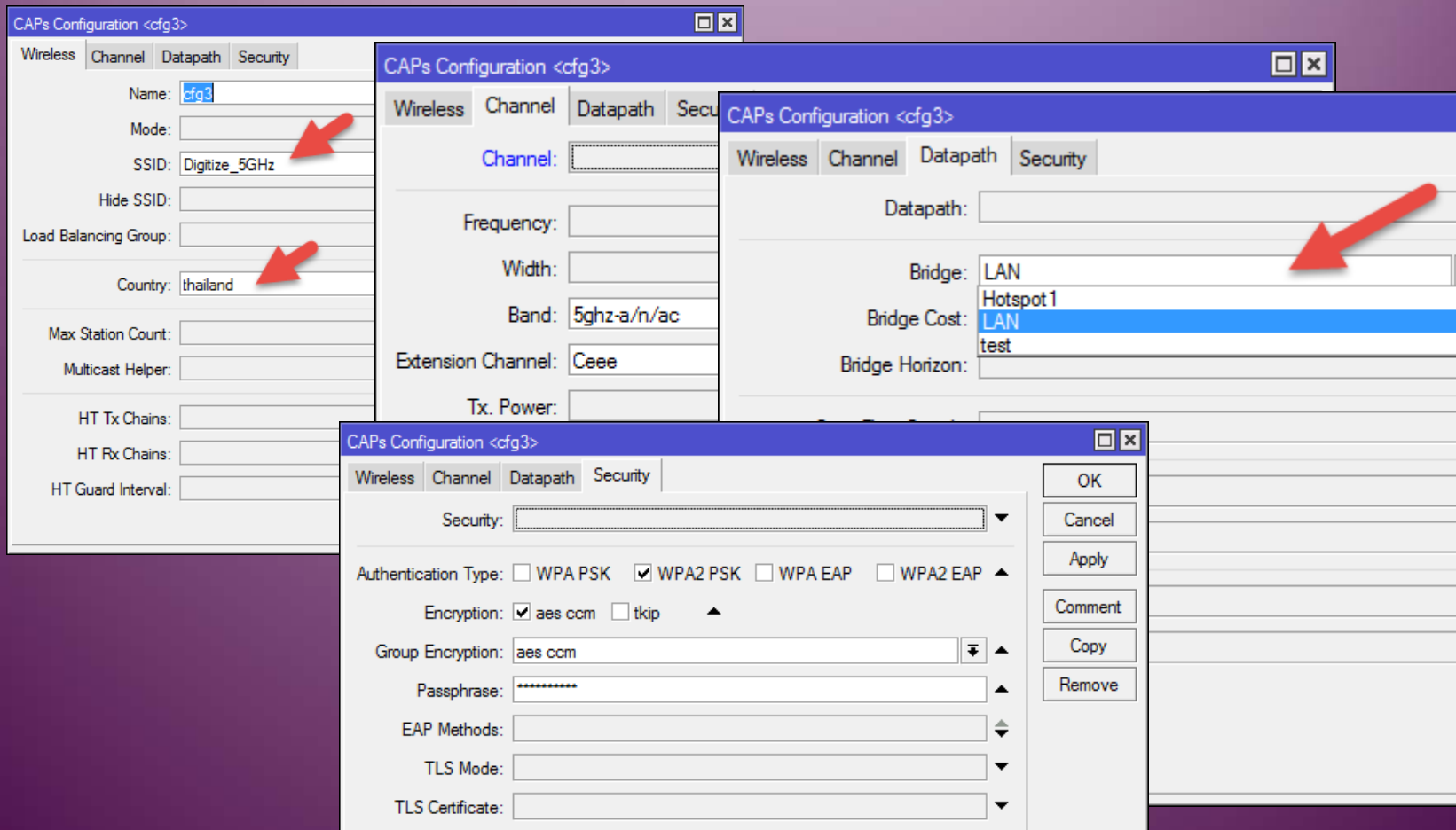
You have access to 28 interfaces:

[wan1](#)  
[ether2](#)  
[ether3](#)  
[ether4](#)  
[ether5](#)  
[wlan1](#)  
[Hotspot1](#)  
[LAN](#)  
[test](#)  
[charcoal design - l2tp](#)  
[rcw](#)  
[pptp-mikrotik tutorial public](#)  
[thaidphoto-MT](#)  
[vlan1](#)  
[CapManBridge1](#)  
[MuM2](#)  
[MuM2-1](#)  
[MuM2-2](#)  
[MuM3](#)  
[MuM3-1](#)  
[MuM3-2](#)  
[wlan10](#)  
[wlan11](#)  
[MuM1](#)  
[MuM1-1](#)  
[MuM1-2](#)  
[<l2tp-ple\\_site2site>](#)

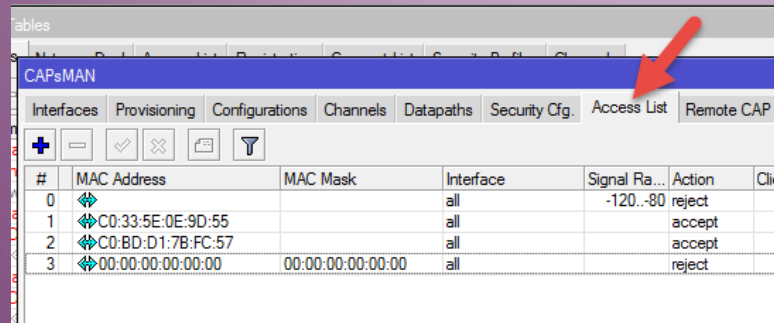


# Centralized management ทำให้ดูแลระบบง่ายขึ้น

กำหนดค่าทีเดียว



# Centralized management ทำให้ดูและระบบง่ายขึ้น

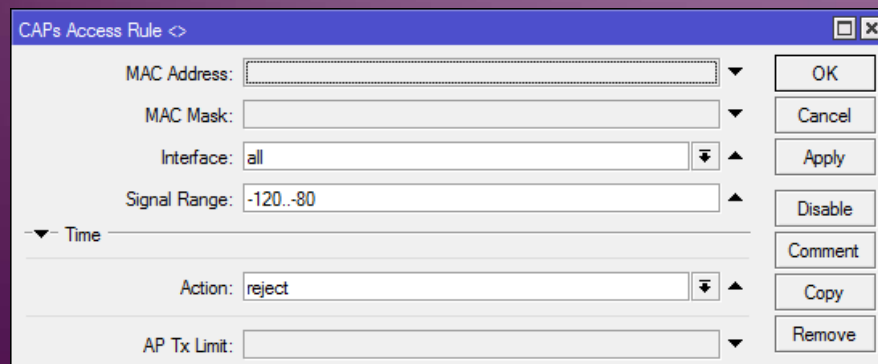


#	MAC Address	MAC Mask	Interface	Signal Ra...	Action	Cli
0			all	-120..-80	reject	
1	C0:33:5E:0E:9D:55		all		accept	
2	C0:BD:D1:7B:FC:57		all		accept	
3	00:00:00:00:00:00	00:00:00:00:00:00	all		reject	

กำหนดค่าทีเดียว

เมื่อใช้การเชื่อม Wireless กำหนดเป็นเฉพาะจุด หรือทั้งหมด

สัณฐานภาพแก้ไขให้สะดวก



CAPs Access Rule <>

MAC Address:  OK

MAC Mask:  Cancel

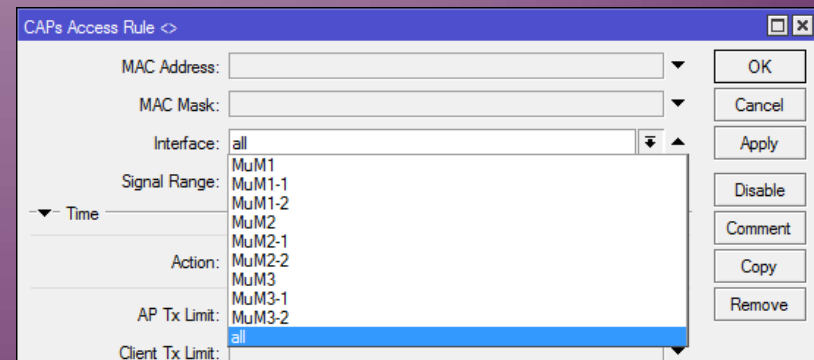
Interface: all   Apply

Signal Range: -120..-80

Time

Action: reject   Disable

AP Tx Limit:  Comment



CAPs Access Rule <>

MAC Address:  OK

MAC Mask:  Cancel

Interface: all   Apply

Signal Range:    Disable

Time

Action:  Comment

AP Tx Limit:  Copy

Client Tx Limit:  Remove



# Centralized management ทำให้ดูแลระบบง่ายขึ้น

กำหนดค่าให้ใครใช้งานได้บ้าง

CAPs Access Rule <C0:33:5E:0E:9D:55>

MAC Address: C0:33:5E:0E:9D:55

MAC Mask:

Interface: all

Signal Range:

Time

Action: accept

AP Tx Limit:

Buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove

ทำ MAC Mask ได้เหมือน Subnet Mask

CAPs Access Rule <C0:33:5E:0E:9D:55>

MAC Address: C0:33:5E:0E:9D:55

MAC Mask: FF:FF:FF:00:00:00

Interface: all

Signal Range:

Time

Buttons: OK, Cancel, Apply, Disable, Comment

## RADIUS MAC authentication

Time

Time: 00:00:00 - 1d 00:00:00

Days:  sun  mon  tue  wed  thu  fri  sat

Action: accept

AP Tx Limit: query radius

Client Tx Limit:

Buttons: Comment, Copy, Remove

# Centralized management ทำให้ดูแลระบบง่ายขึ้น

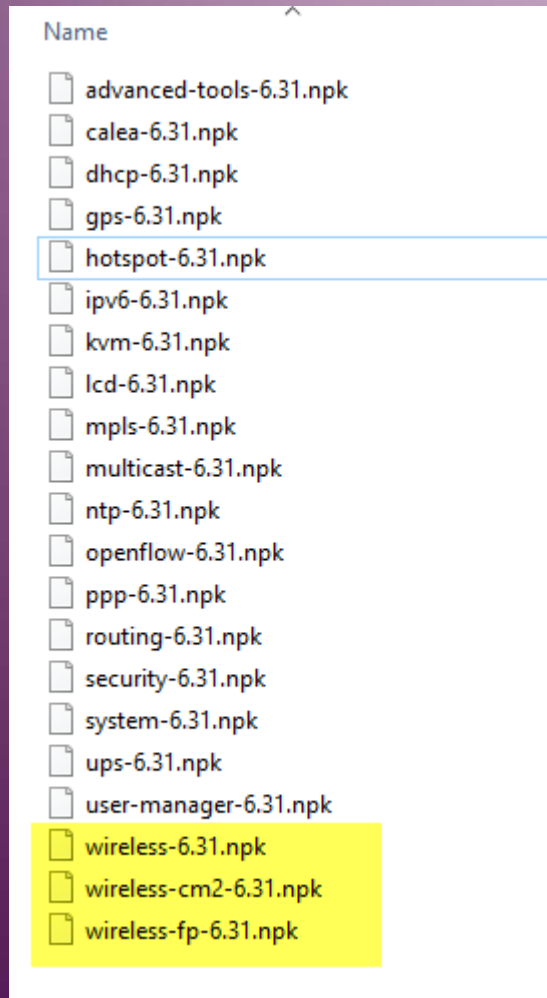
ทำงานได้ทั้งในระดับ L2 และ L3

CAP configuration window showing settings for CAPsMAN. The 'Enabled' checkbox is checked. The 'Interfaces' dropdown is set to 'wan1'. The 'Certificate' dropdown is set to 'request'. The 'Discovery Interfaces' dropdown is empty. The 'Lock To CAPsMAN' checkbox is unchecked. The 'CAPsMAN Addresses' field contains '192.168.1.1'. The 'CAPsMAN Names' field is empty. The 'CAPsMAN Certificate Common Names' field is empty. The 'Bridge' dropdown is set to 'none'. The 'Requested Certificate' field contains 'CAP-4C5E0CFEF4EB'. The 'Locked CAPsMAN Common Name' field contains 'CAPsMAN-D4CA6DF49A6E'. Callouts 'L2' and 'L3' point to the 'CAPsMAN Addresses' and 'CAPsMAN Names' fields respectively.

CAPsMAN configuration page showing the Provisioning tab. The table displays the following data:

Address	Name	Board	Serial	Version	Identity	Base MAC	State
127.0.0.1	[D4:CA:6D:F4:9A:73]	RB951G-2HnD	469A02034C5E	6.31	MainRouter	D4:CA:6D:F4:9A:73	Run
192.168.1.121	CAP-4C5E0CFEF4EB	RB911G-5HPacD	5F8804D47065	6.31	5GHzAP	4C:5E:0C:FE:F4:EC	Run
E4:8D:8C:2D:66:37	[E4:8D:8C:2D:66:38]	RB912UAG-2HPnD	638A05B4905B	6.31	BaseBox2	E4:8D:8C:2D:66:38	Run

# Package ที่ต้องใช้



- wireless-###.npk  
Wireless
- wireless-cm2-###.npk Wireless  
with CAPsMAN v2  
(ตั้งแต่ RouterOS 6.22rc7)
- wireless-fp-###.npk  
Wireless with CAPsMAN

# CAPsMAN Requirement

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- CAPsMAN
  - x86 or RouterBOARD based device
  - Newest RouterOS v6 version
  - Wireless-fp package installed and enabled
- CAP
  - X86 or RouterBOARD based device
  - Newest RouterOS v6 version
  - Atheros chipset (a/b/g/n/ac) wireless card
  - Wireless-fp package installed and enabled
  - At least Level4 RouterOS license

# ຕ້ອງຕັ້ງຄ່າອະໄກບ້າງ?

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## ຟັງ CAPsMAN

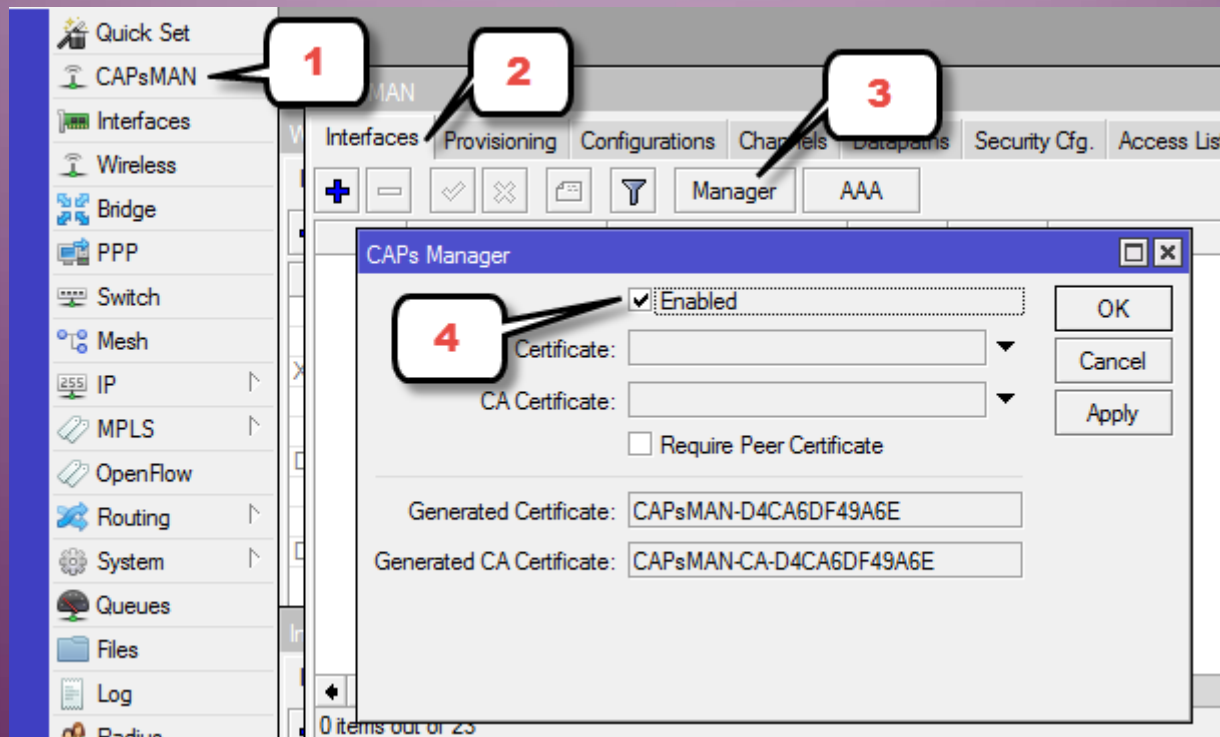
- ເປີດ Service CAPs Manager
- ສ້າງ Bridge interface
  - ກຳນົດ IP configuration ໃຫ້ Bridge interface
  - ກຳນົດ DHCP Server
  - ກຳ ມາສເກຣາດ
- ສ້າງ CAPsMAN Configuration
- ສ້າງ Provisioning rule

## ຟັງ CAP

- Enable CAP mode on the APs

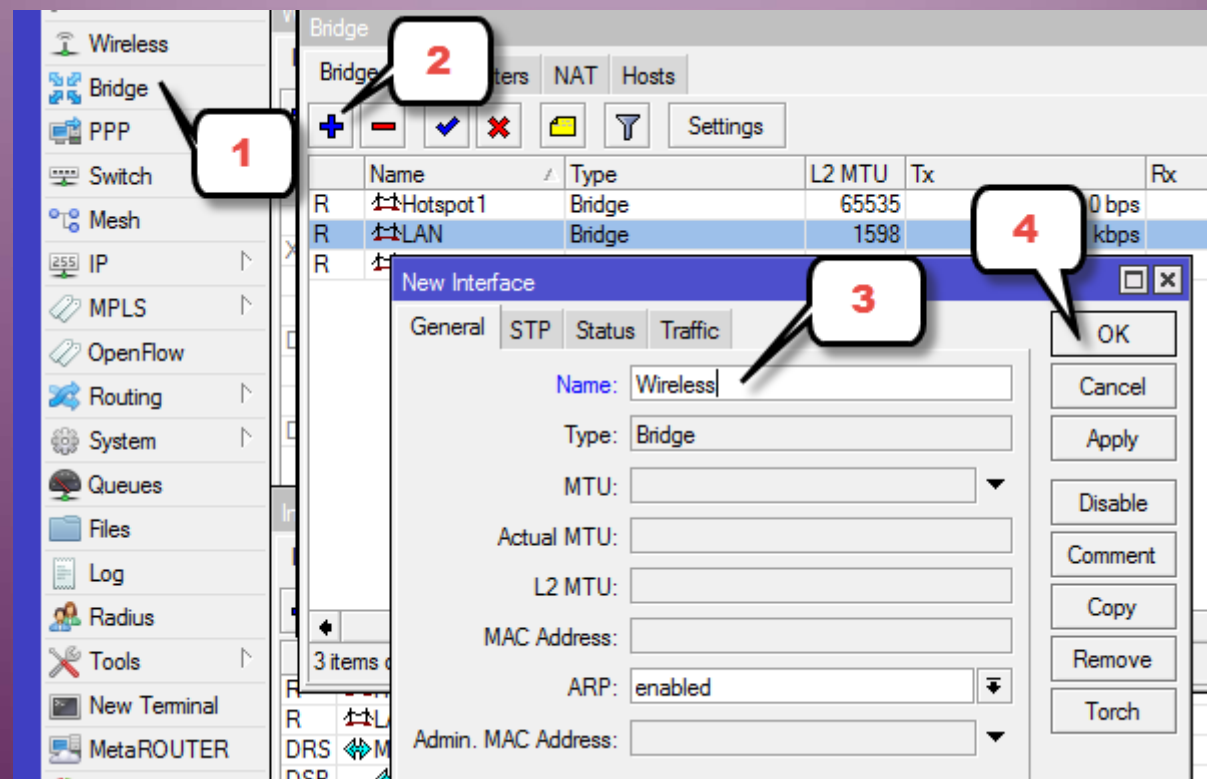
# CAPs MAN ต้องตั้งค่าอะไรบ้าง?

เปิด Service CAPs Manager



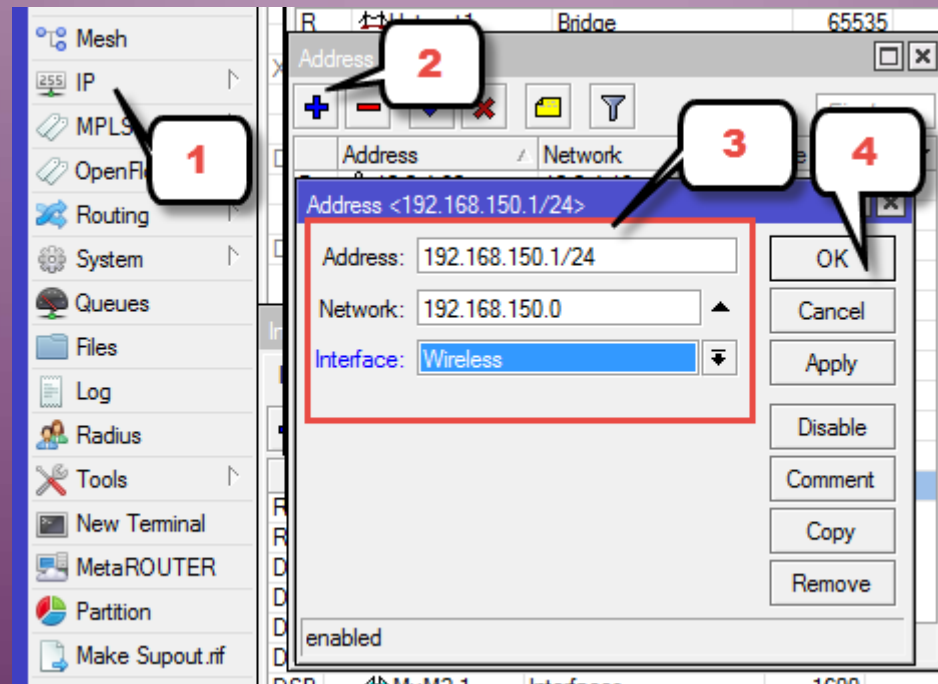
# CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง Bridge interface และกำหนด IP Address



# CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง Bridge interface และกำหนด IP Address





# CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง Bridge interface และกำหนด IP Address

The screenshot shows the Mikrotik WinBox DHCP Server configuration window. The left sidebar has a callout '1' pointing to the 'IP' menu. The main window has a callout '2' pointing to the 'DHCP Setup' button. A table lists DHCP servers:

Name	Interface	Relay	Lease Time	Address Pool	Add AR..
dhcp1	LAN				no
dhcp2	Hotspot 1				no

A 'DHCP Setup' dialog box is open, showing 'Wireless' selected in the 'DHCP Server Interface' dropdown. A callout '3' points to this dialog with the text: **3. and follow as usually DHCP server setup procedure**

# CAPs MAN ต้องตั้งค่าอะไรบ้าง?

ทำ Masquerade

The image shows the Mikrotik WinBox interface for configuring a NAT rule. The following steps are highlighted with numbered callouts:

1. Selecting the **IP** menu item in the left sidebar.
2. Selecting the **NAT** tab in the main window.
3. In the **New NAT Rule** dialog, selecting the **General** tab and setting the **Chain** to `srcnat` and **Src. Address** to `192.168.150.0/24`.
4. In the **New NAT Rule** dialog, selecting the **Action** tab.
5. Selecting **masquerade** as the action.
6. Clicking the **Apply** button to save the rule.

# CAPs MAN ต้องตั้งค่าอะไรบ้าง?

## สร้าง CAPsMAN Configuration

The image illustrates the configuration process for CAPsMAN in Mikrotik WinBox. It shows the main configuration window and two detailed dialog boxes for Datapath and Security settings.

**1** CAPsMAN menu

**2** Configurations tab

**3** New CAPs Configuration button

**4** Wireless tab

**5** Datapath field

**6** Bridge field

**7** Authentication Type and Encryption options

**8** OK button

**Main Configuration Fields:**

- Name: cfg5
- Mode: [Empty]
- SSID: MUM
- Hide SSID: [Empty]
- Load Balancing Group: [Empty]
- Country: thailand
- Max Station Count: [Empty]
- Multicast Helper: [Empty]
- HT Tx Chains: [Empty]
- HT Rx Chains: [Empty]
- HT Guard Interval: [Empty]

**Datapath Dialog Fields:**

- Datapath: [Empty]
- Bridge: Hotspot1
- Bridge Cost: LAN
- Bridge Horizon: Wireless
- OpenFlow Switch: [Empty]
- Local Forwarding: [Empty]

**Security Dialog Fields:**

- Security: [Empty]
- Authentication Type:  WPA PSK  WPA2 PSK  WPA EAP  WPA2 EAP
- Encryption:  aes ccm  tkip
- Group Encryption: aes ccm
- Passphrase: [Masked]
- EAP Methods: [Empty]
- TLS Mode: [Empty]
- TLS Certificate: [Empty]

# ต้องตั้งค่าอะไรบ้าง?

สร้าง Provisioning rule

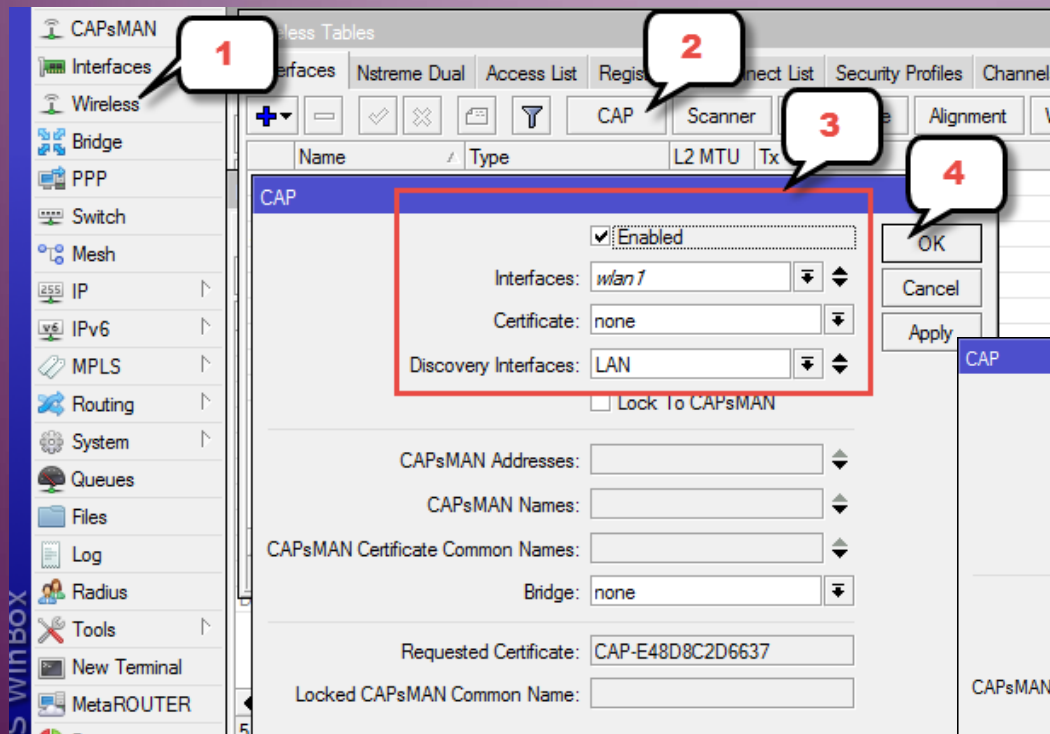
The image shows two screenshots of the 'CAPs Provisioning' dialog box in Mikrotik WinBox. The left screenshot shows the initial configuration with callouts 1-4. Callout 1 points to the 'Provisioning' tab. Callout 2 points to the '+' button. Callout 3 points to the 'Radio MAC' field. Callout 4 points to the 'Action' dropdown menu. The right screenshot shows the configuration after clicking 'OK', with callouts 5-7. Callout 5 points to the 'Radio MAC' field. Callout 6 points to the 'Name Prefix' field. Callout 7 points to the 'OK' button.



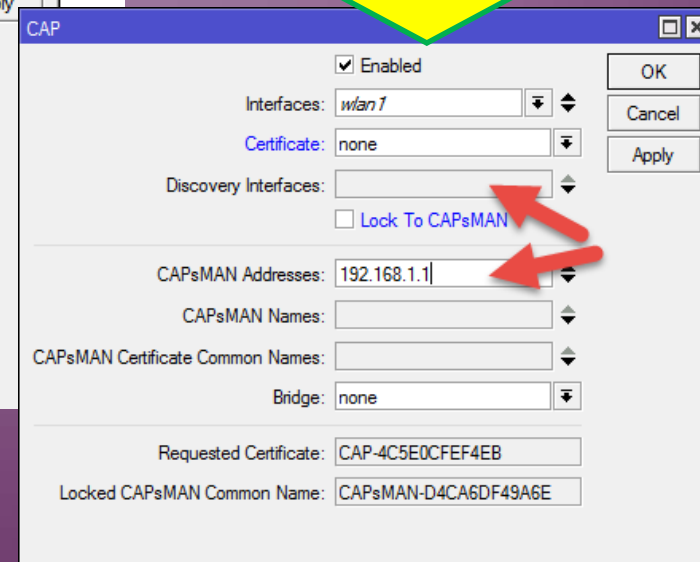
CAPsMAN				
Interfaces Provisioning Configurations Channels Datapaths Security Cfg. Acc				
+ - ✓ ✗ ☰ 🔍				
#	Radio MAC	Action	Master Configurati...	Slav
0	00:00:00:00:00:00	create dynamic enabled	cfg5	

# CAP ต้องตั้งค่าอะไรบ้าง?

Enable CAP mode on the APs



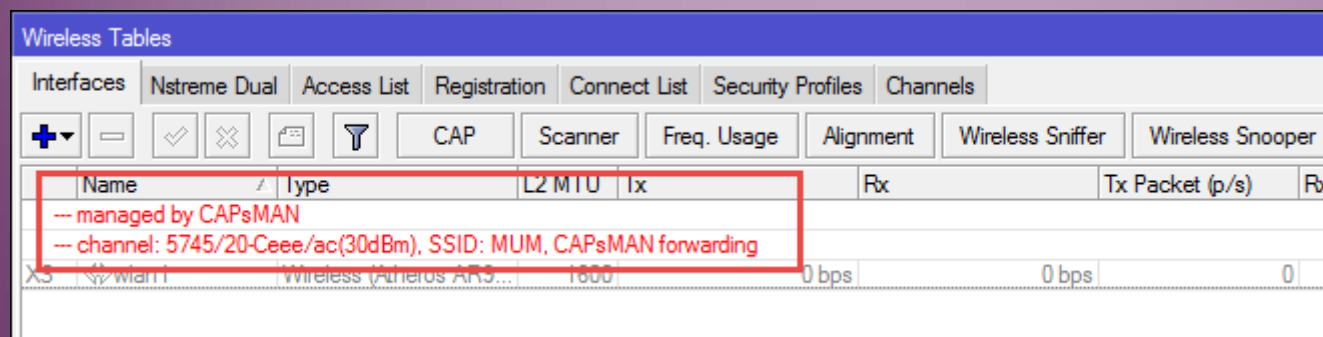
กรณีต้องการลิงค์เป็น L3  
ให้กำหนดค่า IP Address  
บน Interface



หมายเหตุ : ถ้า CAPsMAN และ CAP เป็นตัวเดียวกัน ให้กำหนด CAPsMAN Addresses เป็น 127.0.0.1

# ระบบเริ่มทำงาน

## ค่าที่แสดงผลบน CAP



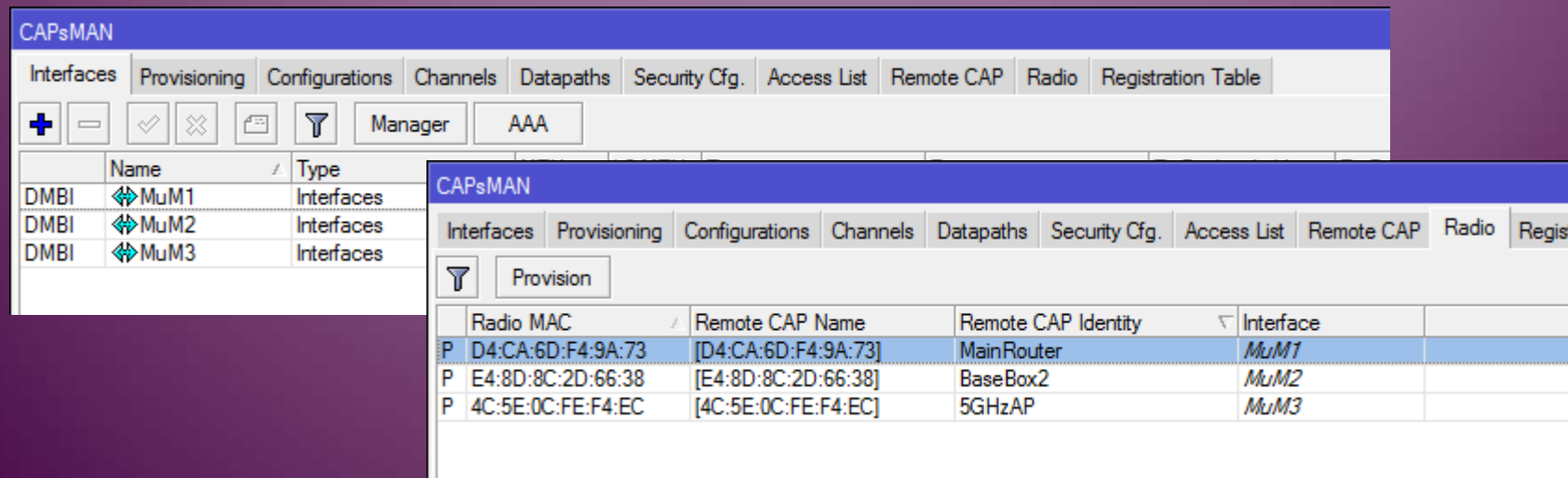
Wireless Tables

Interfaces Nstreme Dual Access List Registration Connect List Security Profiles Channels

+ - ✓ ✗ [Filter] CAP Scanner Freq. Usage Alignment Wireless Sniffer Wireless Snooper

Name	Type	L2 MTU	Ix	Rx	Tx Packet (p/s)	Rx
--- managed by CAPsMAN						
--- channel: 5745/20-Ceee/ac(30dBm), SSID: MUM, CAPsMAN forwarding						
X3 wlan1	Wireless (Atheros AR3...	1600		0 bps	0 bps	0

## ค่าที่แสดงผลบน CAPsMAN



CAPsMAN

Interfaces Provisioning Configurations Channels Datapaths Security Cfg. Access List Remote CAP Radio Registration Table

+ - ✓ ✗ [Filter] Manager AAA

Name	Type
DMBI MuM1	Interfaces
DMBI MuM2	Interfaces
DMBI MuM3	Interfaces

CAPsMAN

Interfaces Provisioning Configurations Channels Datapaths Security Cfg. Access List Remote CAP Radio Registration Table

[Filter] Provision

Radio MAC	Remote CAP Name	Remote CAP Identity	Interface
P D4:CA:6D:F4:9A:73	[D4:CA:6D:F4:9A:73]	MainRouter	MuM1
P E4:8D:8C:2D:66:38	[E4:8D:8C:2D:66:38]	BaseBox2	MuM2
P 4C:5E:0C:FE:F4:EC	[4C:5E:0C:FE:F4:EC]	5GHzAP	MuM3

# เทคนิคเพิ่มเติม

กรณีมี Config มากกว่า 1

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

Radio MAC: 00:00:00:00:00:00

Hw. Supported Modes:

Action: create dynamic enabled

Master Configuration: cfg5

Slave Configuration: **cfg1**

Name Prefix: MuM

enabled

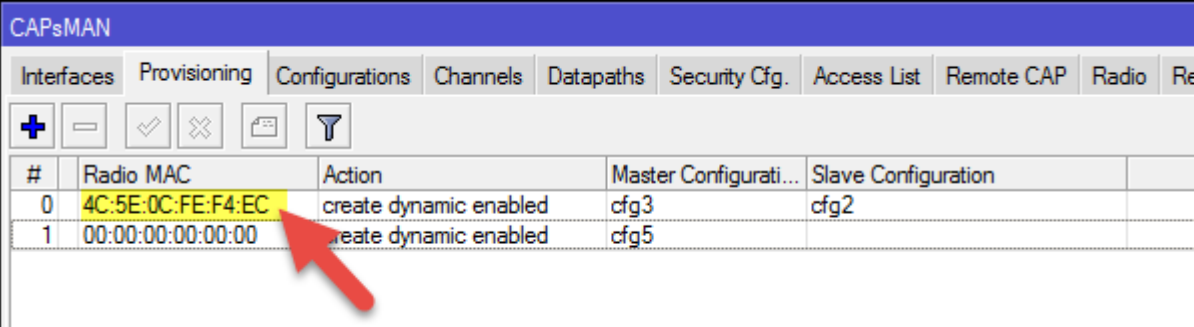
Name	Type	MTU	L2 MTU	Tx
MuM1	Interfaces	1500	1600	0 bps
MuM1-1	Interfaces	1500	1600	0 bps
MuM2	Interfaces	1500		0 bps
MuM2-1	Interfaces	1500		0 bps
MuM3	Interfaces	1500		0 bps
MuM3-1	Interfaces	1500		0 bps

ถ้ามีการเปลี่ยน Provision จะต้องมาทำการ re-Provision ด้วยตัวเองอีกครั้ง

Radio MAC	Remote CAP Name	Remote CAP Identity	Interface
D4:CA:6D:F4:9A:73	[D4:CA:6D:F4:9A:73]	MainRouter	MuM1
E4:8D:8C:2D:66:38	[E4:8D:8C:2D:66:38]	BaseBox2	MuM2
4C:5E:0C:FE:F4:EC	[4C:5E:0C:FE:F4:EC]	5GHzAP	MuM3

# เทคนิคเพิ่มเติม

กรณี Access Point บางตัวต้องการค่า Config เป็นพิเศษ



The screenshot shows the CAPsMAN interface with a table of configurations. The table has columns for #, Radio MAC, Action, Master Configurati..., and Slave Configuration. Row 0 has Radio MAC 4C:5E:0C:FE:F4:EC, Action create dynamic enabled, Master Configurati... cfg3, and Slave Configuration cfg2. Row 1 has Radio MAC 00:00:00:00:00:00, Action create dynamic enabled, and Master Configurati... cfg5. A red arrow points to the Radio MAC 4C:5E:0C:FE:F4:EC in row 0.

#	Radio MAC	Action	Master Configurati...	Slave Configuration
0	4C:5E:0C:FE:F4:EC	create dynamic enabled	cfg3	cfg2
1	00:00:00:00:00:00	create dynamic enabled	cfg5	



# เทคนิคเพิ่มเติม

## ตัวอย่างการกำหนดสิทธิ์ในการใช้ Wireless ผ่าน Access List

CAPsMAN

Interfaces Configurations Channels Datapaths Security Cfg. Access List Remote CAP Radio Regist

#	MAC Address	MAC Mask	Interface	Signal Range	Action	Client To Clie...
0			all	-120..80	reject	
1	C0:33:5E:0E:9D:55		all		accept	
2	C0:BD:D1:7B:FC:57		all		accept	
3	00:00:00:00:00:00	00:00:00:00:00:00	all		reject	

CAPs Access Rule <>

MAC Address:

MAC Mask:

Interface: all

Signal Range: -120..80

Time

Action: reject

AP Tx Limit:

Client Tx Limit:

Private Passphrase:

Client To Client Forwarding:

RADIUS Accounting:

VLAN Mode:

VLAN ID:

enabled

OK Cancel Apply Disable Comment Copy Remove

CAPs Access Rule <00:00:00:00:00:00>

MAC Address: 00:00:00:00:00:00

MAC Mask: 00:00:00:00:00:00

Interface: all

Signal Range:

Time

Action: reject

AP Tx Limit:

Client Tx Limit:

Private Passphrase:

Client To Client Forwarding:

RADIUS Accounting:

VLAN Mode:

VLAN ID:

enabled

OK Cancel Apply Disable Comment Copy Remove

Q & A

# Thank you

<http://www.mikrotiktutorial.com>