

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

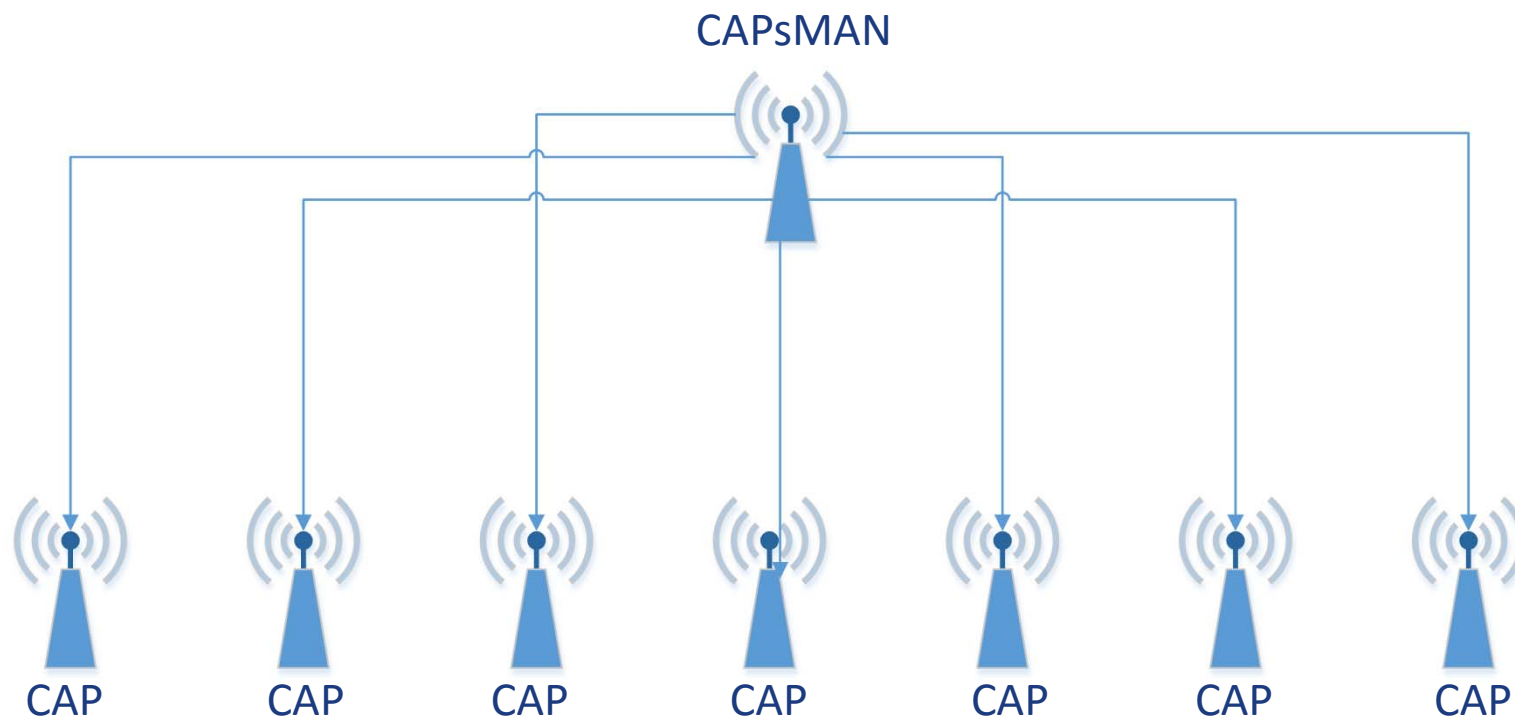
Network Infrastructure Consultant



CAPsMAN ດ້ວຍໂຮ?

- ເຣີມມີຕັ້ງແຕ່ RouterOS 6.11 ຍ້ອມຈາກ
Controlled Access Point system MANager
- Centralized management of RouterOS APs

CAPsMAN? คืออะไร?



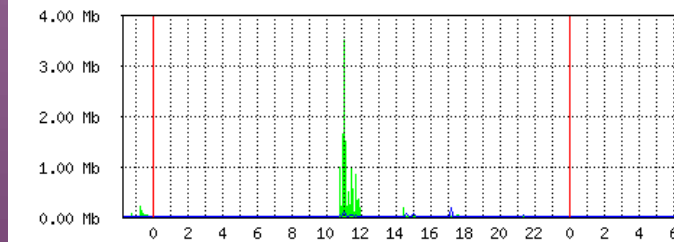
Centralized management ทำให้ดูและระบบง่ายขึ้น

/tools graphing

Interface <wan3> Statistics

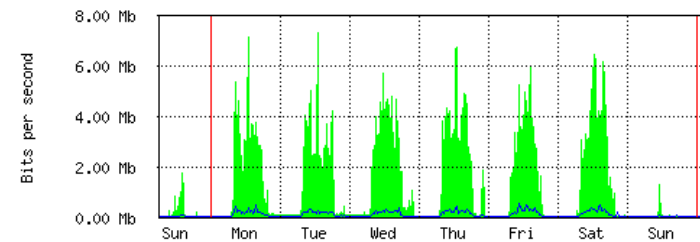
• Last update: Mon Aug 31 06:15:54 2015

"Daily" Graph (5 Minute Average)



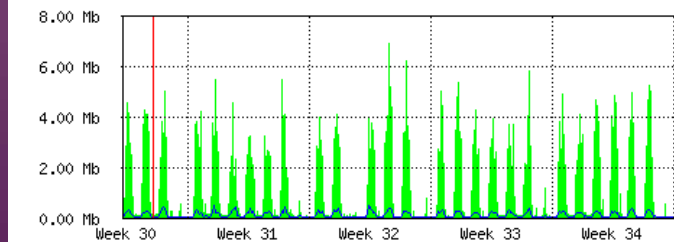
Max In: 3.53Mb; Average In: 33.96Kb; Current In: 392b;
Max Out: 159.44Kb; Average Out: 2.39Kb; Current Out: 176b;

"Weekly" Graph (30 Minute Average)

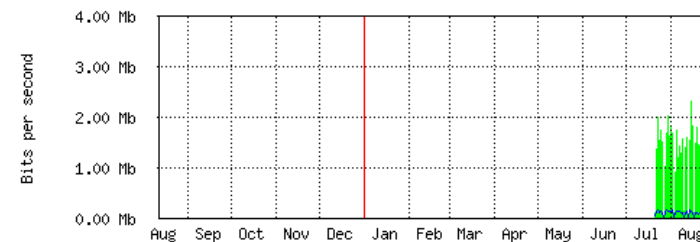


Max In: 7.35Mb; Average In: 1.30Mb; Current In: 248b;
Max Out: 548.72Kb; Average Out: 74.26Kb; Current Out: 280b;

"Monthly" Graph (2 Hour Average)



"Yearly" Graph (1 Day Average)



Centralized management ทำให้ดูแลระบบง่ายขึ้น

รวมศูนย์กลางระบบ Access Point
ทั้งหมดเป็นภาพรวม ในการดูแล และ
การจัดการ

Interface List						
Interface Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE						
	Name	Type	L2 MTU	Tx	Rx	
R	Hotspot1	Bridge	65535		0 bps	
R	LAN	Bridge	1598	156.0 kbps	8.2	
DRS	MuM1	Interfaces	1600		0 bps	
DRS	MuM1-1	Interfaces	1600		0 bps	
DSB	MuM1-2	Interfaces	1600		0 bps	
DRS	MuM2	Interfaces	1600		0 bps	
DSB	MuM2-1	Interfaces	1600		0 bps	
DSB	MuM2-2	Interfaces	1600		0 bps	
DRS	MuM3	Interfaces	1600		0 bps	
DSB	MuM3-1	Interfaces	1600		0 bps	
DSB	MuM3-2	Interfaces	1600		0 bps	
X	PPPoE Client	PPPoE Client			0 bps	
R					0 bps	
R	ether2	Ethernet	1598	2.1 kbps	130	
R	ether3	Ethernet	1598		0 bps	
S	ether4	Ethernet	1598		0 bps	
RS	ether5	Ethernet	1598	156.7 kbps	11.8	
RS	vlan1	VLAN	1594		0 bps	
X	khaothong	PPTP Client			0 bps	

Traffic and system resource graph

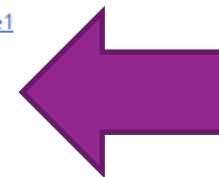
[CPU usage](#)
[Memory usage](#)
[Disk usage](#)

You have access to 2 queues:

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

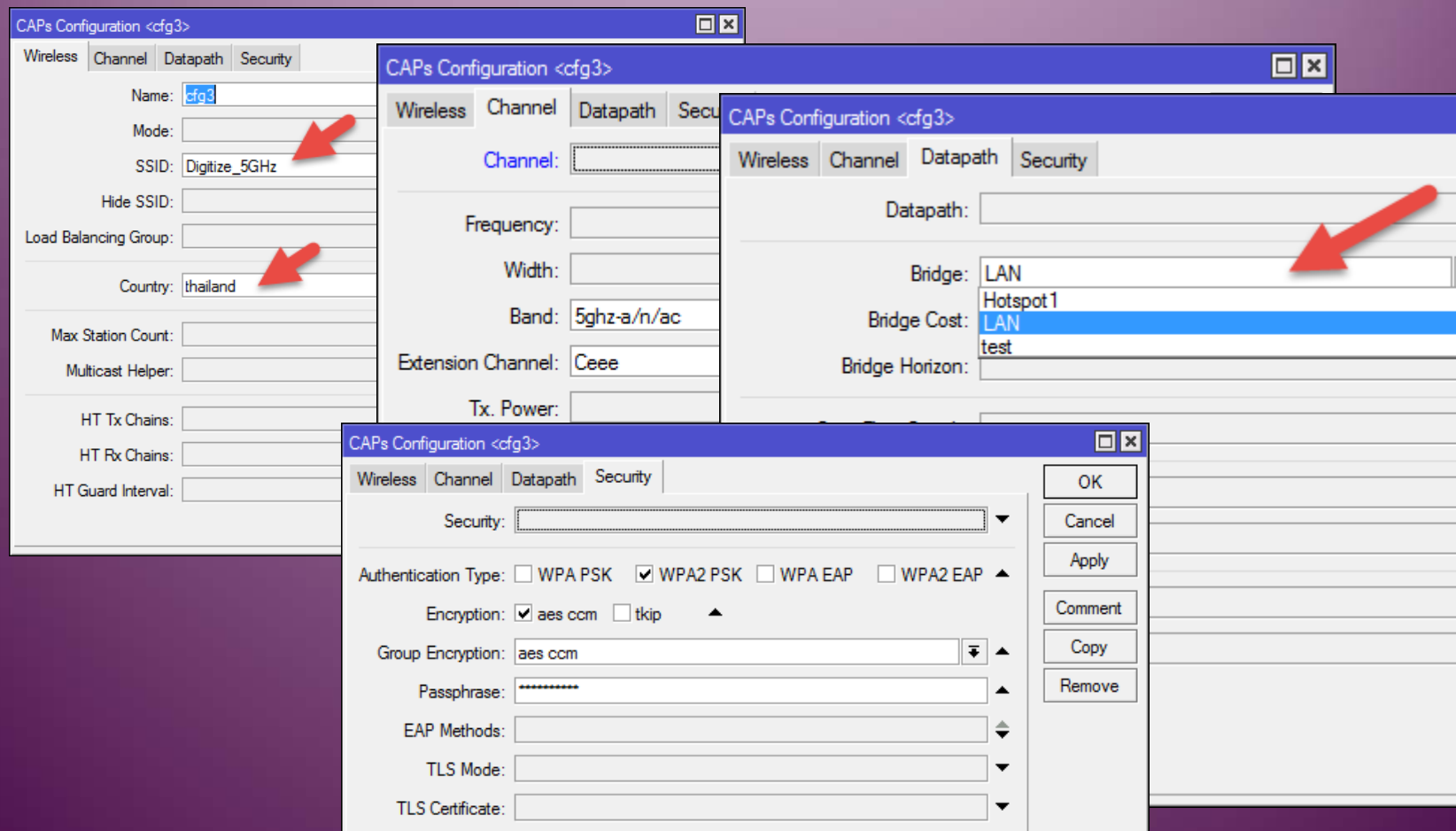
You have access to 28 interfaces:

[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>](#)

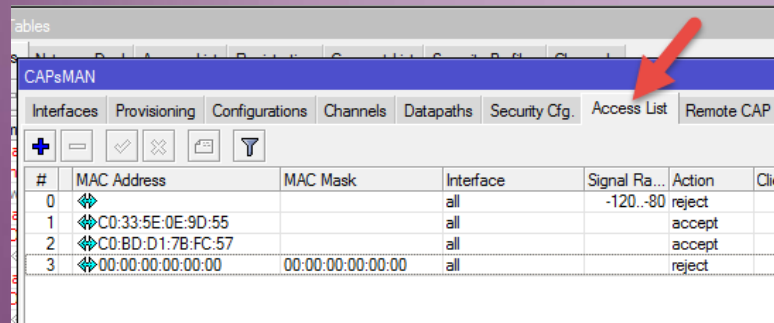


Centralized management ทำให้ดูแลระบบง่ายขึ้น

กำหนดค่าทีเดียว



Centralized management ทำให้ดูแลระบบง่ายขึ้น

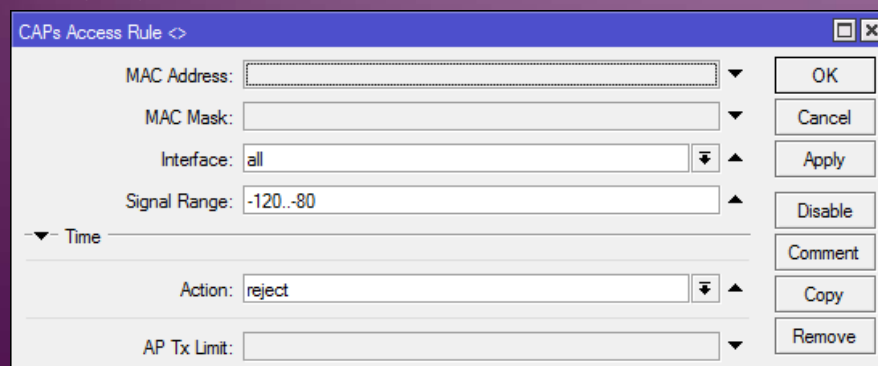


#	MAC Address	MAC Mask	Interface	Signal Ra...	Action	Cli
0			all	-120...-80	reject	
1	C0:33:5E:0E:9D:55		all		accept	
2	C0:8D:D1:7B:FC:57		all		accept	
3	00:00:00:00:00:00	00:00:00:00:00:00	all		reject	

กำหนดค่าทีเดียว

เมื่อไขการเชื่อม Wireless กำหนดเป็นเฉพาะจุด หรือทั้งหมด

สัณฐานภาพแก้ไขให้สะดวก



CAPs Access Rule <>

MAC Address: OK

MAC Mask: Cancel

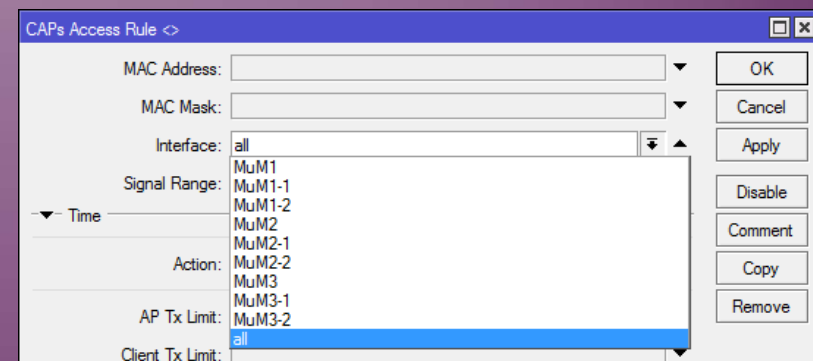
Interface: all Apply

Signal Range: -120...-80 Disable

Time: Comment

Action: reject Copy

AP Tx Limit: Remove



CAPs Access Rule <>

MAC Address: OK

MAC Mask: Cancel

Interface: all Apply

Signal Range: MuM1 MuM1-1 MuM1-2 MuM2 MuM2-1 MuM2-2 MuM3 MuM3-1 MuM3-2

Time: Disable

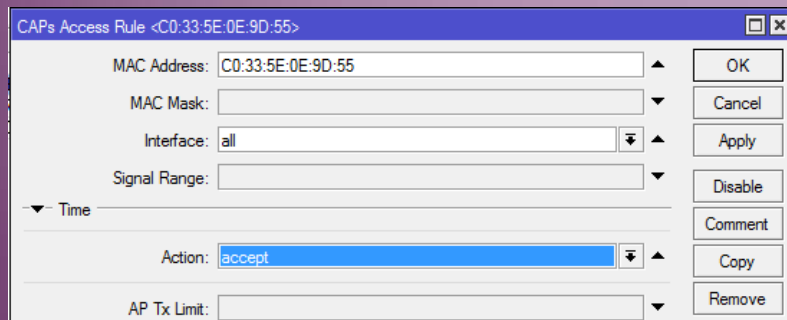
Action: MuM2-2 Comment

AP Tx Limit: MuM3-1 Copy

Client Tx Limit: all 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:

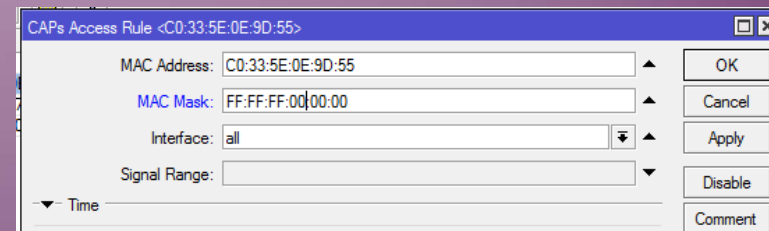
Time

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

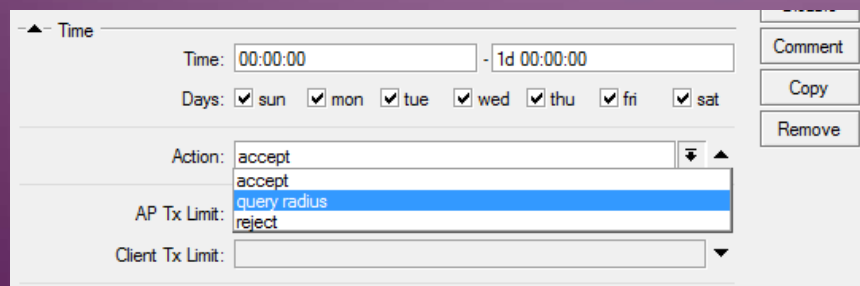
Interface: all

Signal Range:

Time

Buttons: OK, Cancel, Apply, Disable, Comment

RADIUS MAC authentication



Time: 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

☒ Enabled

Interfaces: wlan1

Certificate: request

Discovery Interfaces:

☐ Lock To CAPsMAN

CAPsMAN Addresses: 192.168.1.1

CAPsMAN Names:

CAPsMAN Certificate Common Names:

Bridge: none

Requested Certificate: CAP-4C5E0CFEF4EB

Locked CAPsMAN Common Name: CAPsMAN-D4CA6DF49A6E

OK

Cancel

Apply

L2

L3

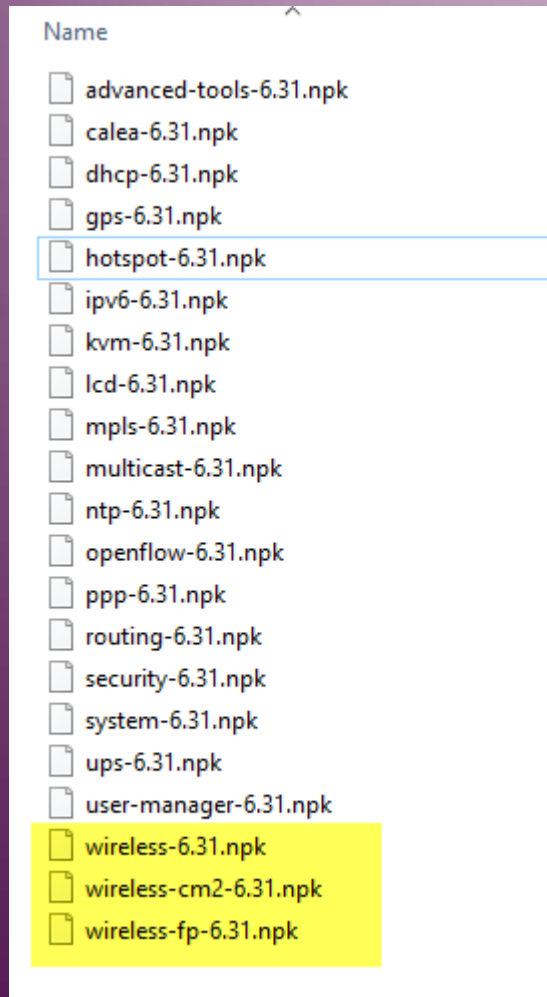
CAPsMAN

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

Provision

Address	Name	Board	Serial	Version	Identity	Base MAC	State
::ffff:127.0.0.1	[D4:CA:6D:F4:9A:73]	RB951G-2HnD	469A02034C5E	6.31	MainRouter	D4:CA:6D:F4:9A:73	Run
::ffff: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 ທີ່ຕ້ອງໃຊ້



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

CAPsMAN Requirement

- 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?

ຟັງ CAPsMAN

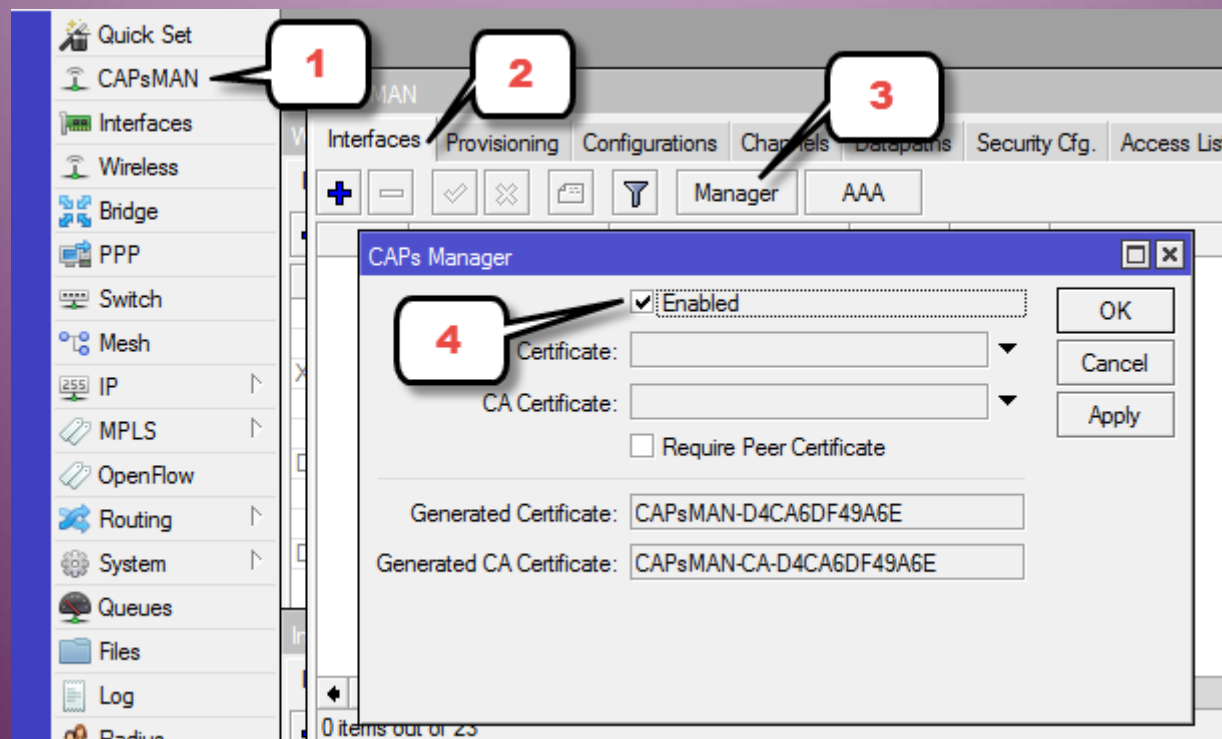
- ເປີດ Service CAPs Manager
- ສ້າງ Bridge interface
 - ກຳນົດ IP configuration ໃຫ້ Bridge interface
 - ກຳນົດ DHCP Server
 - ກຳນົດ Masquerade
- ສ້າງ CAPsMAN Configuration
- ສ້າງ Provisioning rule

ຟັງ CAP

- Enable CAP mode on the APs

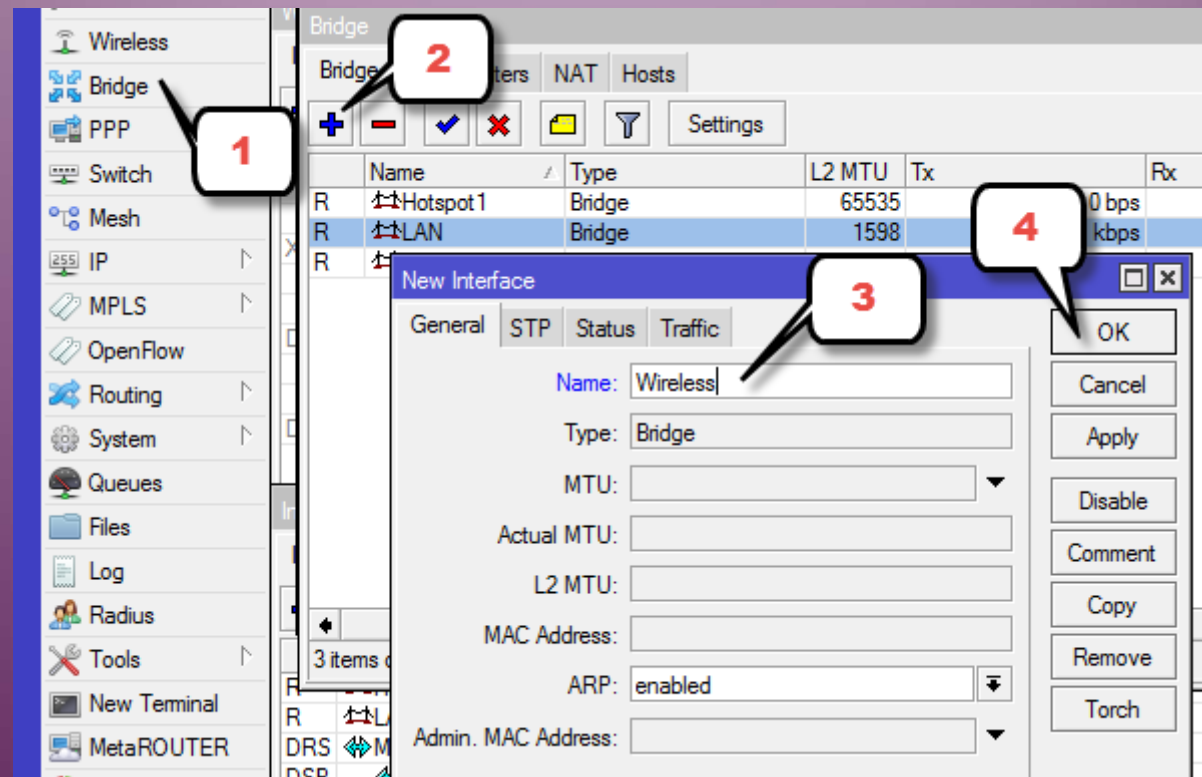
CAPs MAN ต้องตั้งค่าอะไรบ้าง?

เปิด Service CAPs Manager



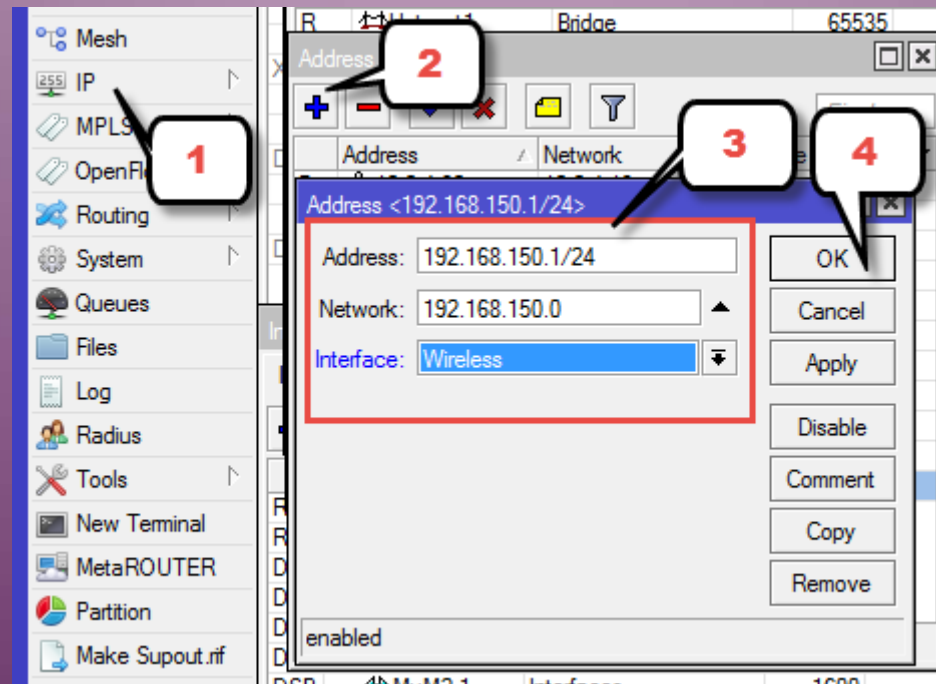
CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง Bridge interface และกำหนด IP Address



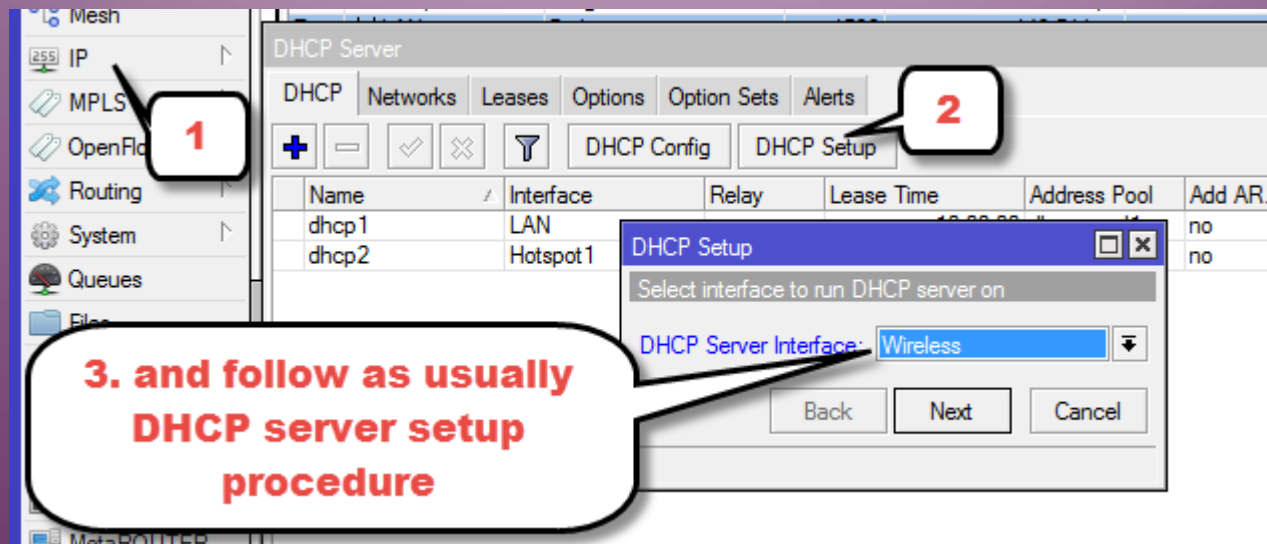
CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง Bridge interface และกำหนด IP Address



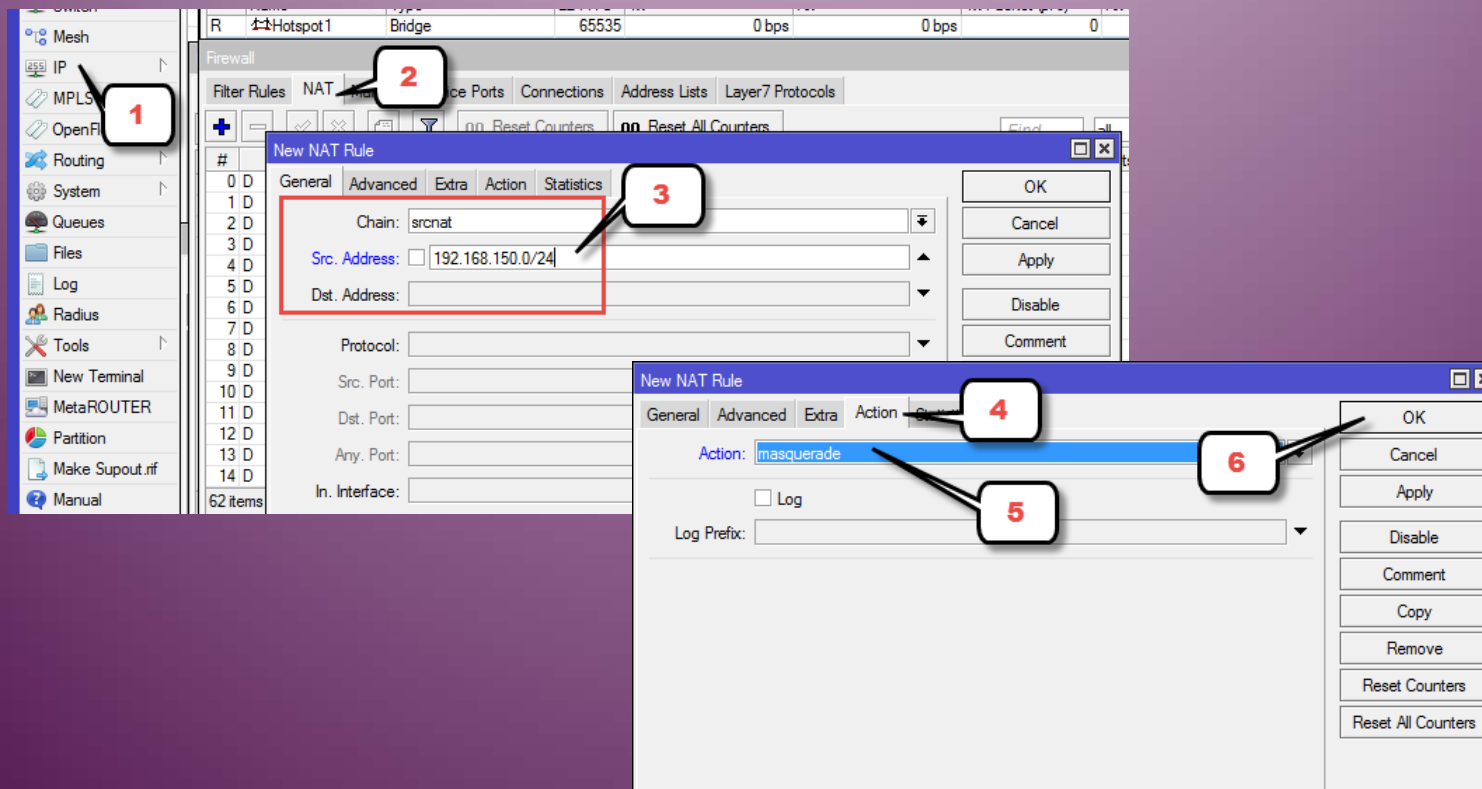
CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง Bridge interface และกำหนด IP Address



CAPs MAN ต้องตั้งค่าอะไรบ้าง?

ทำ Masquerade



CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง CAPsMAN Configuration

The image shows the Mikrotik WinBox interface for configuring CAPsMAN. The main window is titled 'CAPsMAN' and has several tabs: Interfaces, Provisioning, Configurations, Channels, Datapaths, Security Cfg., and Access. The 'Configurations' tab is active, showing a list of configurations. A new configuration is being created, with the following fields visible:

- 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]

Two sub-windows are also shown, both titled 'New CAPs Configuration'.

The top sub-window has tabs: Wireless, Channel, Datapath, and Security. The 'Datapath' tab is active, showing the following fields:

- Datapath: [empty]
- Bridge: Hotspot1
- Bridge Cost: LAN
- Bridge Horizon: test
- OpenFlow Switch: [empty]
- Local Forwarding: [empty]

The bottom sub-window has tabs: Wireless, Channel, Datapath, and Security. The 'Security' tab is active, showing the following fields:

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

Numbered callouts (1-8) indicate the following steps:

- Click on the 'Configurations' tab in the main window.
- Click on the 'New CAPs Configuration' button.
- Click on the 'Wireless' tab in the 'New CAPs Configuration' sub-window.
- Click on the 'Channels' tab in the 'New CAPs Configuration' sub-window.
- Click on the 'Datapath' tab in the 'New CAPs Configuration' sub-window.
- Click on the 'Security' tab in the 'New CAPs Configuration' sub-window.
- Click on the 'Authentication Type' dropdown menu.
- Click on the 'OK' button.

ต้องตั้งค่าอะไรบ้าง?

สร้าง Provisioning rule

The image shows two screenshots of the 'CAPs Provisioning' dialog box. The left screenshot shows the initial state with callouts 1 through 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 dialog after some changes, with callouts 5 through 7. Callout 5 points to the 'Radio MAC' field. Callout 6 points to the 'Name Prefix' field. Callout 7 points to the 'OK' button.

1: Provisioning tab

2: Add button (+)

3: Radio MAC field

4: Action dropdown menu

5: Radio MAC field

6: Name Prefix field

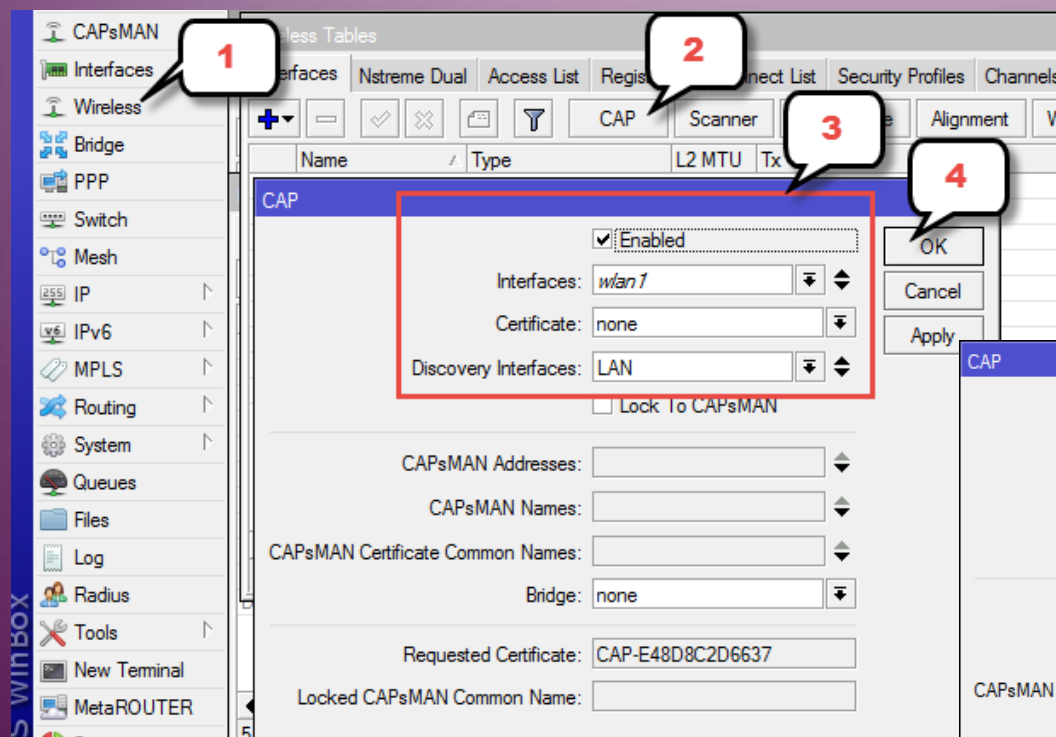
7: OK button



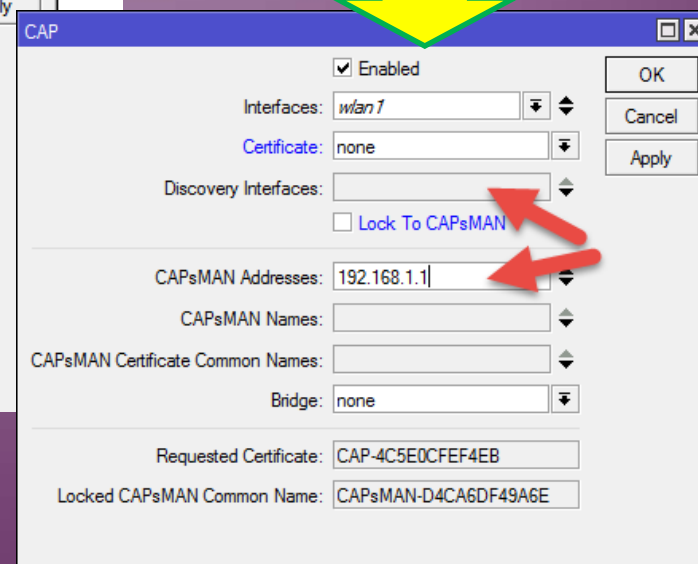
CAPsMAN				
Interfaces Provisioning Configurations Channels Datapaths Security Cfg. Acc				
+ - ✓ ✗ [icon] [icon]				
#	Radio MAC	Action	Master Configurati...	Slav
0	00:00:00:00:00:00	create dynamic enabled	cfg5	

CAP ต้องตั้งค่าอะไรบ้าง?

Enable CAP mode on the APs



กรณีต้องการลิงค์เป็น L3
ให้กำหนดค่า IP Address
แทน 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							
+ - ✓ ✗ [icon] 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							
+ - ✓ ✗ [icon] 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				
[icon] 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

OK Cancel Apply Disable Comment Copy Remove

CAPsMAN

Interfaces Provisioning Configurations Channels Datapaths Security Cfg. Access List Re

+ - ✓ ✕ [icon] [icon] Manager AAA

	Name	Type	MTU	L2 MTU	Tx
DSMB	MuM1	Interfaces	1500	1600	0 bps
DSB	MuM1-1	Interfaces	1500	1600	0 bps
DMBI	MuM2	Interfaces	1500		0 bps
DBI	MuM2-1	Interfaces	1500		0 bps
DMBI	MuM3	Interfaces	1500		0 bps
DBI	MuM3-1	Interfaces	1500		0 bps

ถ้ามีการเปลี่ยน
Provision จะต้องมา
ทำการ re-Provision
ด้วยตัวเองอีกครั้ง

CAPsMAN

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

Provision

	Radio MAC	Remote CAP Name	Remote CAP Identity	Interface	Radio	Registration
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

กรณี Access Point บางตัวต้องการค่า Config เป็นพิเศษ

CAPsMAN

Interfaces

Provisioning

Configurations

Channels

Datapaths

Security Cfg.

Access List

Remote CAP

Radio

+

-

✓

✗

#	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:

Signal Range:

Time:

Action:

AP Tx Limit:

Client Tx Limit:

Private Passphrase:

Client To Client Forwarding:

RADIUS Accounting:

VLAN Mode:

VLAN ID:

enabled

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

MAC Address:

MAC Mask:

Interface:

Signal Range:

Time:

Action:

AP Tx Limit:

Client Tx Limit:

Private Passphrase:

Client To Client Forwarding:

RADIUS Accounting:

VLAN Mode:

VLAN ID:

enabled

Q & A

Thank you

<http://www.mikrotiktutorial.com>