

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

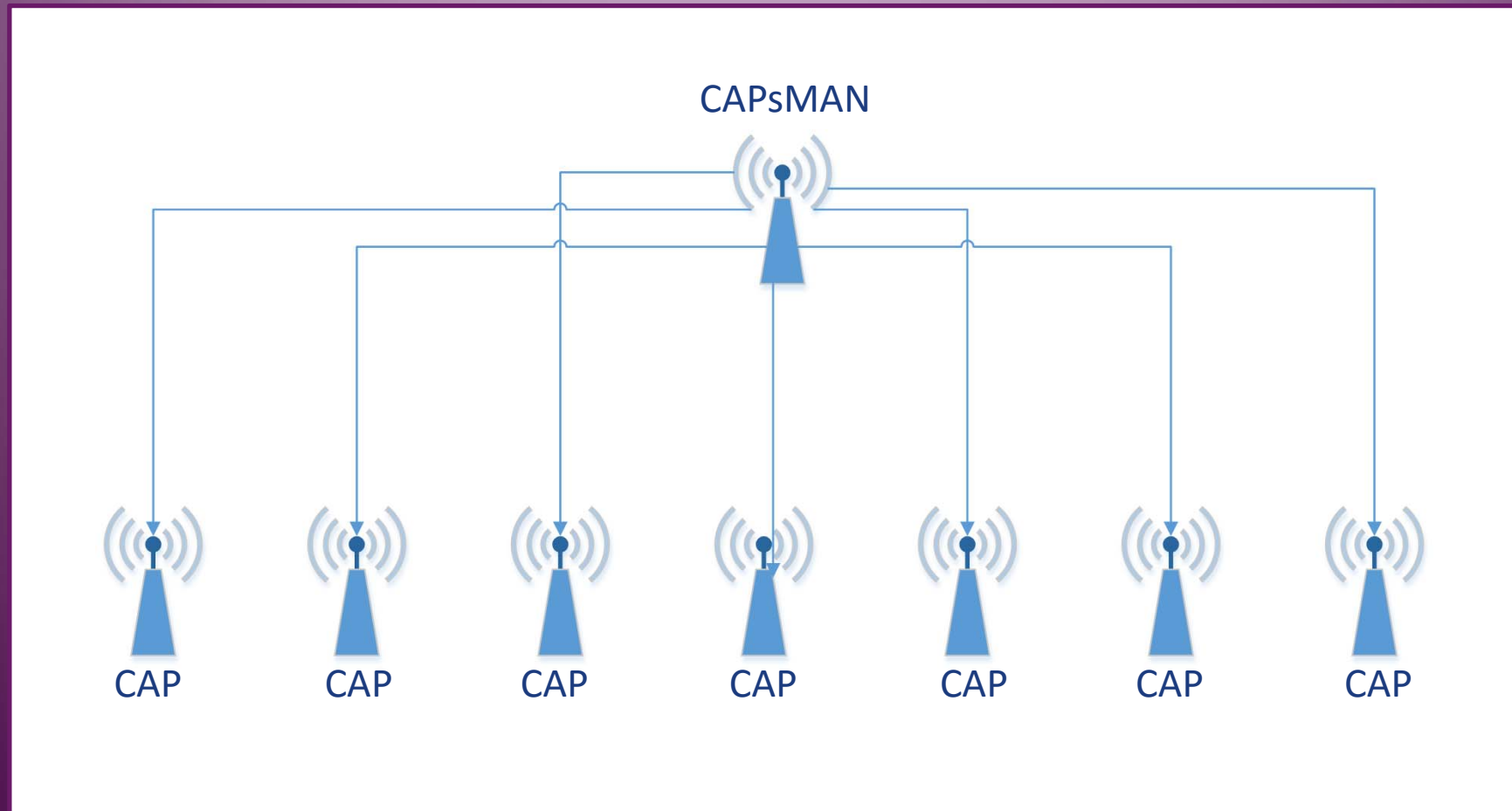
Network Infrastructure Consultant



CAPsMAN ได้อย่างไร?

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

CAPsMAN? คืออะไร?



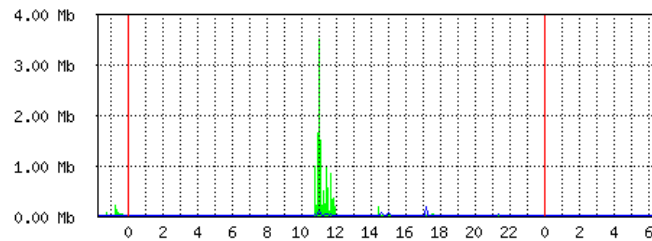
Centralized management ทำให้ดูและระบบง่ายขึ้น

/tools graphing

Interface <wan3> Statistics

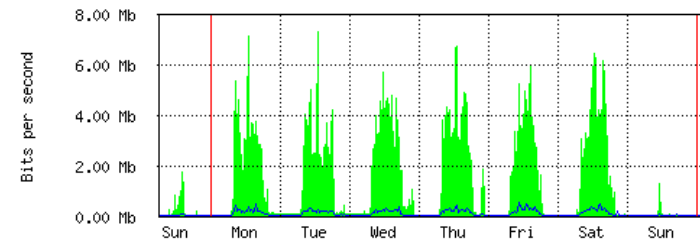
• Last update: Mon Aug 31 06:15:54 2015

"Daily" Graph (5 Minute Average)



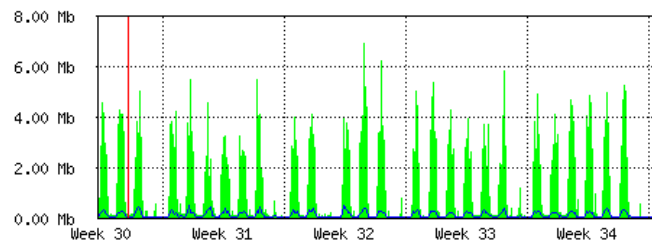
Max In: 3.53Mb; Average In: 33.96Kb; Current In: 392b;
Max Out: 159.44Kb; Average Out: 2.39Kb; Current Out: 176b;

"Weekly" Graph (30 Minute Average)

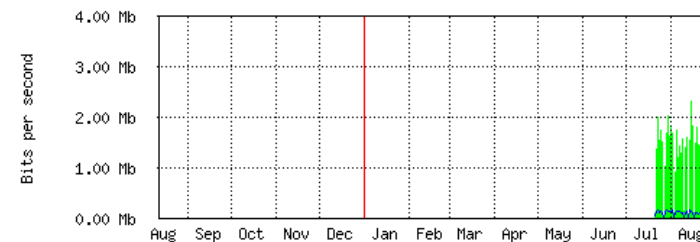


Max In: 7.35Mb; Average In: 1.30Mb; Current In: 248b;
Max Out: 548.72Kb; Average Out: 74.26Kb; Current Out: 280b;

"Monthly" Graph (2 Hour Average)



"Yearly" Graph (1 Day Average)



Centralized management 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

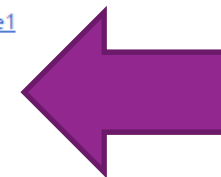
[CPU usage](#)
[Memory usage](#)
[Disk usage](#)

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](#)
[pftp-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>](#)

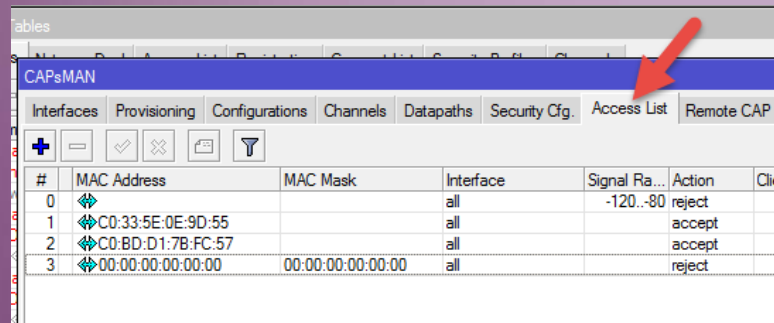


Centralized management ทำให้ดูแลระบบง่ายขึ้น

กำหนดค่าทีเดียว

The image displays three overlapping screenshots of the CAPs Configuration interface, illustrating centralized management. The top-left window shows the 'Wireless' tab with fields for Name (cfg3), Mode, SSID (Digitize_5GHz), Country (thailand), and Max Station Count. The top-right window shows the 'Channel' tab with fields for Channel, Frequency, Width, Band (5ghz-a/n/ac), Extension Channel (Ceee), and Tx. Power. The bottom window shows the 'Security' tab with fields for Security, Authentication Type (WPA2 PSK selected), Encryption (aes ccm selected), Group Encryption (aes ccm), Passphrase, EAP Methods, TLS Mode, and TLS Certificate. Red arrows point to the Name, SSID, Country, and Bridge fields across the different windows, indicating that these settings are shared and managed centrally.

Centralized management ทำให้ดูและระบบง่ายขึ้น

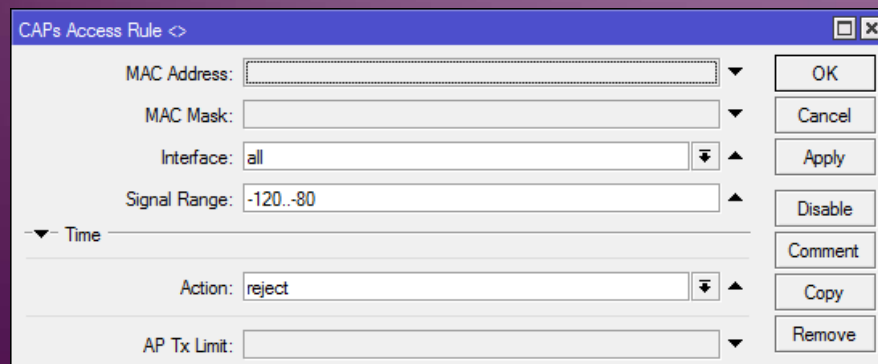


#	MAC Address	MAC Mask	Interface	Signal Ra...	Action	Cli
0			all	-120..-80	reject	
1	C0:33:5E:0E:9D:55		all		accept	
2	C0:BD:D1:7B:FC:57		all		accept	
3	00:00:00:00:00:00	00:00:00:00:00:00	all		reject	

กำหนดค่าทีเดียว

เมื่อใช้การเชื่อม Wireless กำหนดเป็นเฉพาะจุด หรือทั้งหมด

สัณฐานภาพแก้ไขให้สะดวก



CAPs Access Rule <>

MAC Address: OK

MAC Mask: Cancel

Interface: all ▲ Apply

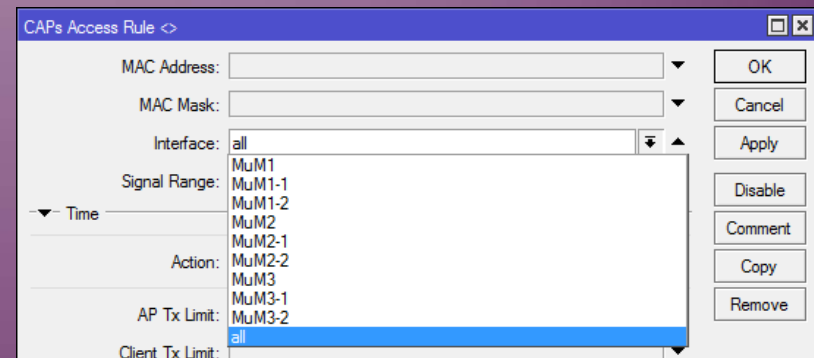
Signal Range: -120..-80 ▲ Disable

Time

Action: reject ▲ Comment

AP Tx Limit: Copy

Remove



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

- MuM1
- MuM1-1
- MuM1-2
- MuM2
- MuM2-1
- MuM2-2
- MuM3
- MuM3-1
- MuM3-2
- all

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 ทำให้ดูและระบบง่ายขึ้น

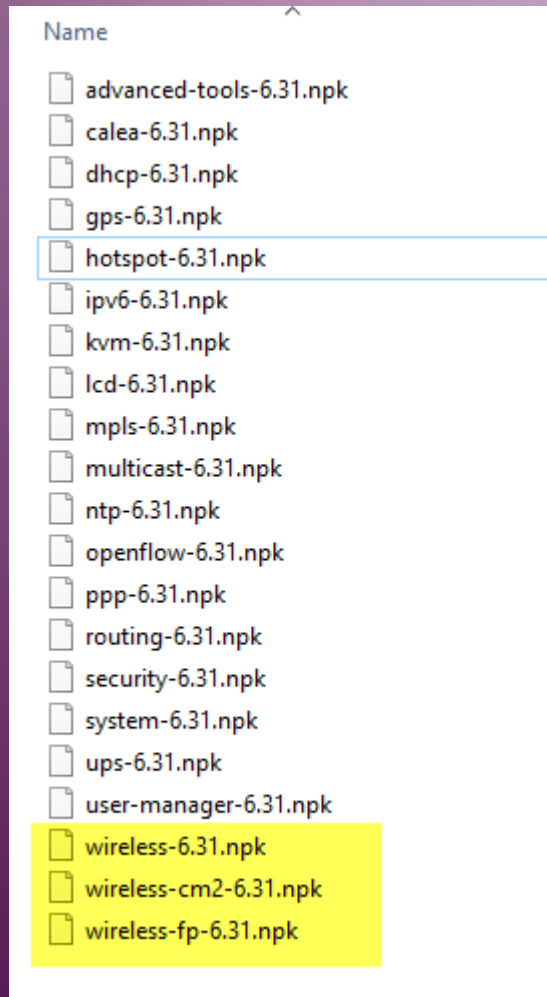
ทำงานได้ทั้งในระดับ L2 และ L3

CAP configuration window showing fields: Enabled (checked), Interfaces: wan1, 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. Red callouts L2 and L3 point to the CAPsMAN Addresses and CAPsMAN Names fields respectively.

CAPsMAN configuration page showing the Provisioning tab. The table below lists provisioned devices:

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

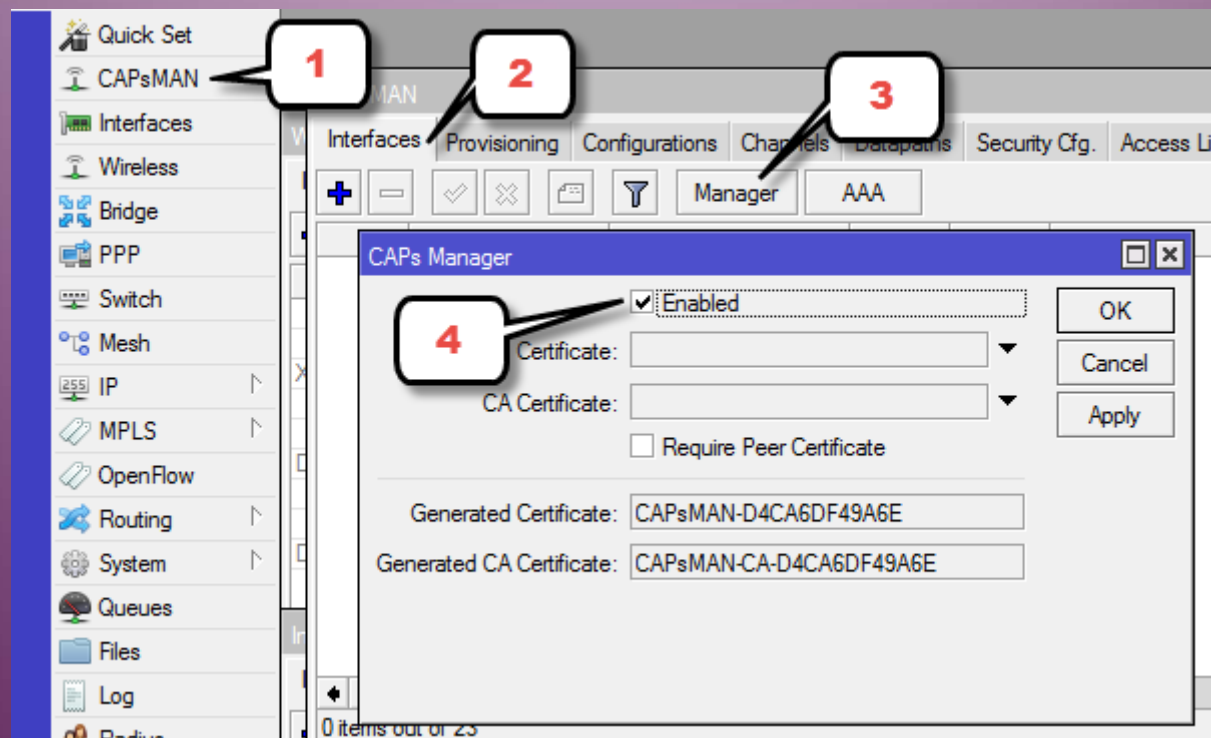
- ເປີດ Service CAPs Manager
- ສ້າງ Bridge interface
 - ກຳນົດ IP configuration ໃຫ້ Bridge interface
 - ກຳນົດ DHCP Server
 - ກຳ Masquerade
- ສ້າງ CAPsMAN Configuration
- ສ້າງ Provisioning rule

ຟັງ CAP

- Enable CAP mode on the APs

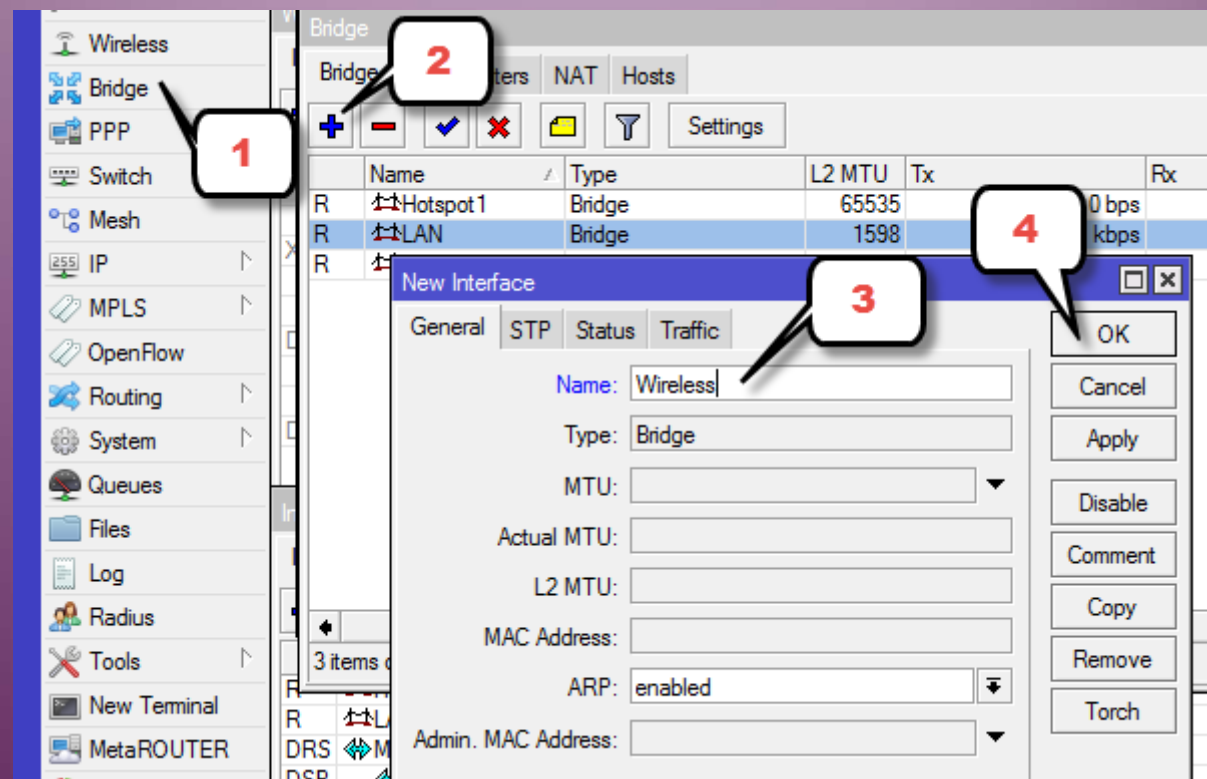
CAPs MAN ต้องตั้งค่าอะไรบ้าง?

เปิด Service CAPs Manager



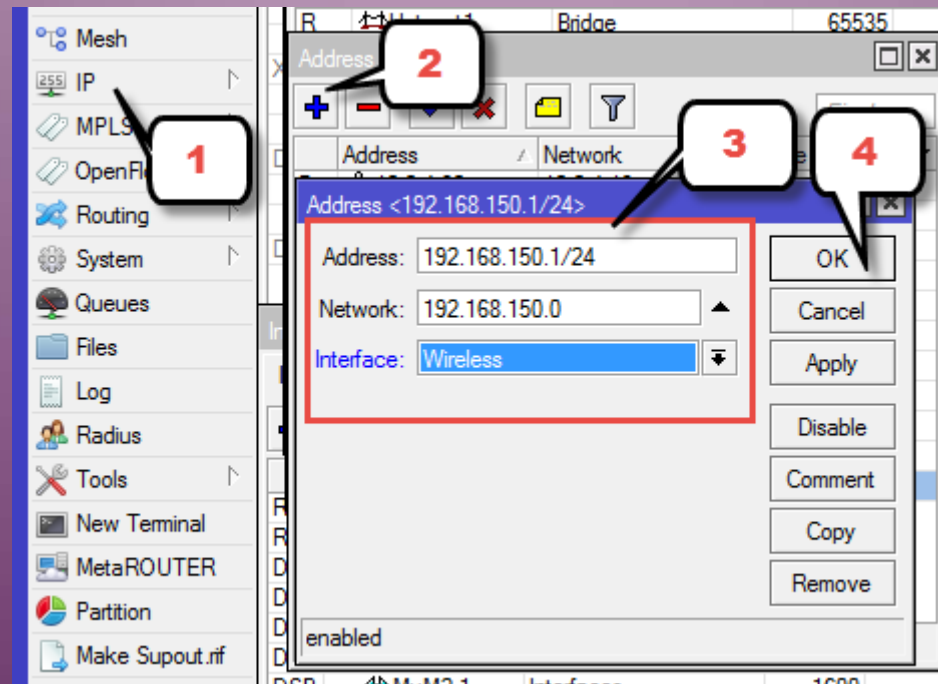
CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง Bridge interface และกำหนด IP Address



CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง Bridge interface และกำหนด IP Address



CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง Bridge interface และกำหนด IP Address

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 'NAT' option in the left sidebar.
2. Selecting the 'NAT' tab in the main window.
3. In the 'New NAT Rule' dialog, setting the 'Chain' to 'srcnat' and the 'Src. Address' to '192.168.150.0/24'.
4. In the 'New NAT Rule' dialog, selecting 'masquerade' in the 'Action' tab.
5. In the 'New NAT Rule' dialog, checking the 'Log' checkbox.
6. Clicking the 'Apply' button in the 'New NAT Rule' dialog.

CAPs MAN ต้องตั้งค่าอะไรบ้าง?

สร้าง CAPsMAN Configuration

The image illustrates the steps to create a CAPsMAN configuration in Mikrotik WinBox. The main window shows the 'New CAPs Configuration' dialog with the following settings:

- Wireless:** Name: cfg5, Mode: [empty], SSID: MUM, Hide SSID: [empty], Load Balancing Group: [empty], Country: thailand
- Channel:** [empty]
- Datapath:** Datapath: [empty], Bridge: Hotspot1, Bridge Cost: LAN, Bridge Horizon: Wireless, test
- Security:** Security: [empty], Authentication Type: WPA PSK, WPA2 PSK, WPA EAP, WPA2 EAP, Encryption: aes ccm, tkip, Group Encryption: aes ccm, Passphrase: [masked]

Callouts 1-8 indicate the following steps:

- Click on the CAPsMAN menu.
- Click on the Configurations tab.
- Click on the New CAPs Configuration button.
- Click on the Datapath tab.
- Click on the Datapath field.
- Click on the Bridge dropdown menu.
- Click on the Security tab.
- Click on the OK button.

ต้องตั้งค่าอะไรบ้าง?

สร้าง Provisioning rule

The left screenshot shows the 'CAPs Provisioning' dialog box with the following fields and callouts:

- Callout 1: Provisioning tab selected.
- Callout 2: '+' button.
- Callout 3: Radio MAC field (00:00:00:00:00:00).
- Callout 4: Action dropdown menu (create dynamic enabled selected).

The right screenshot shows the same dialog box after clicking OK, with the following fields and callouts:

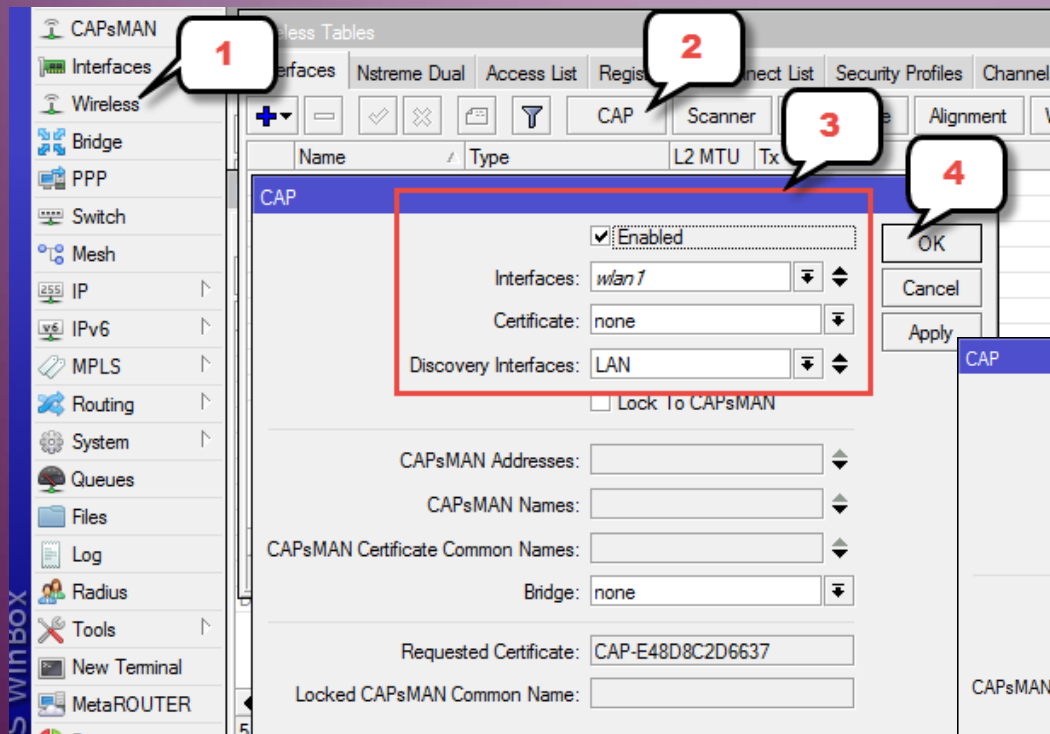
- Callout 5: Radio MAC field (00:00:00:00:00:00).
- Callout 6: Name Prefix field (MuM).
- Callout 7: OK button.



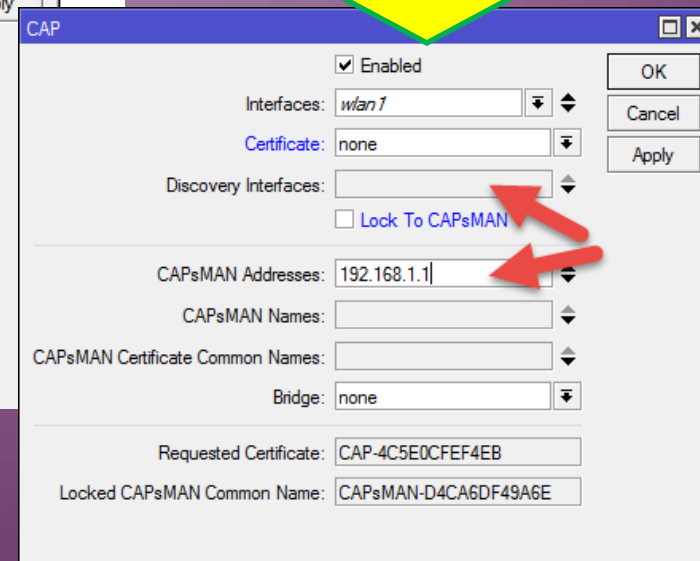
CAPsMAN				
Interfaces Provisioning Configurations Channels Datapaths Security Cfg. Acc				
+ - ✓ ✗ [icon] [icon]				
#	Radio MAC	Action	Master Configurati...	Slav
0	00:00:00:00:00:00	create dynamic enabled	cfg5	

CAP ต้องตั้งค่าอะไรบ้าง?

Enable CAP mode on the APs



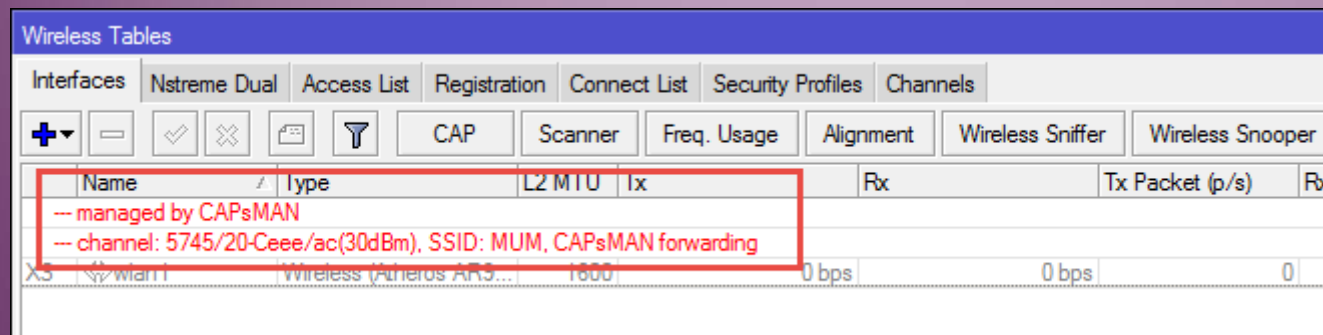
กรณีต้องการลิงค์เป็น L3
ให้กำหนดค่า IP Address
บน Interface



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

ระบบเริ่มทำงาน

ค่าที่แสดงผลบน CAP



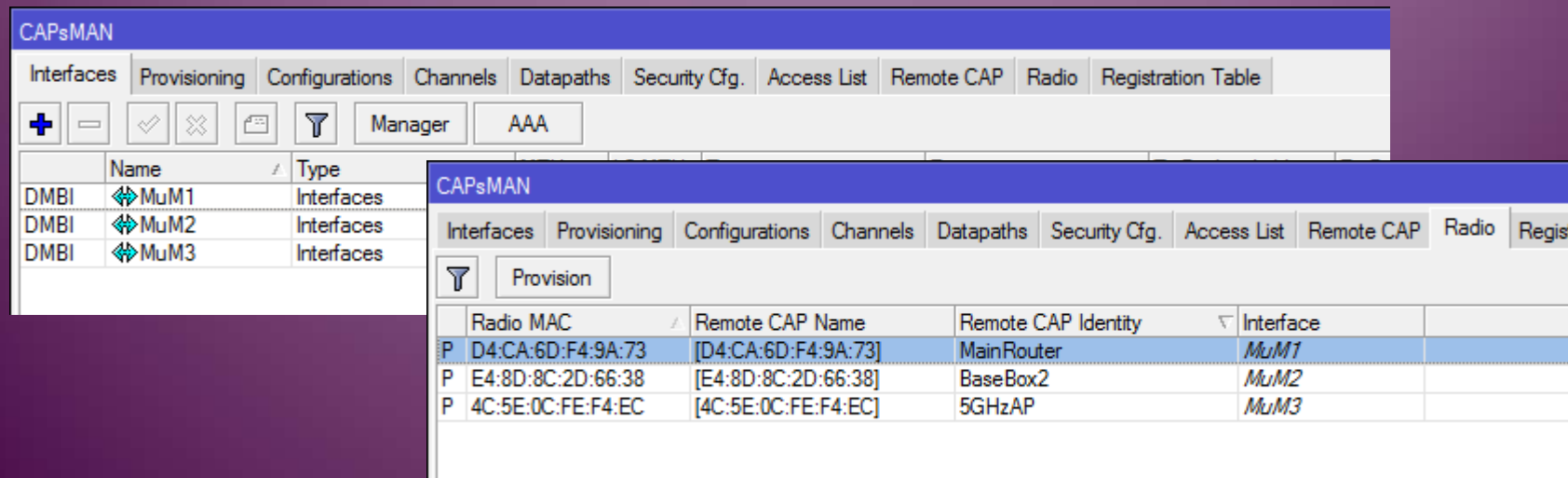
Wireless Tables

Interfaces Nstreme Dual Access List Registration Connect List Security Profiles Channels

+ - ✓ ✗ [icon] [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] [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

กรณี 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

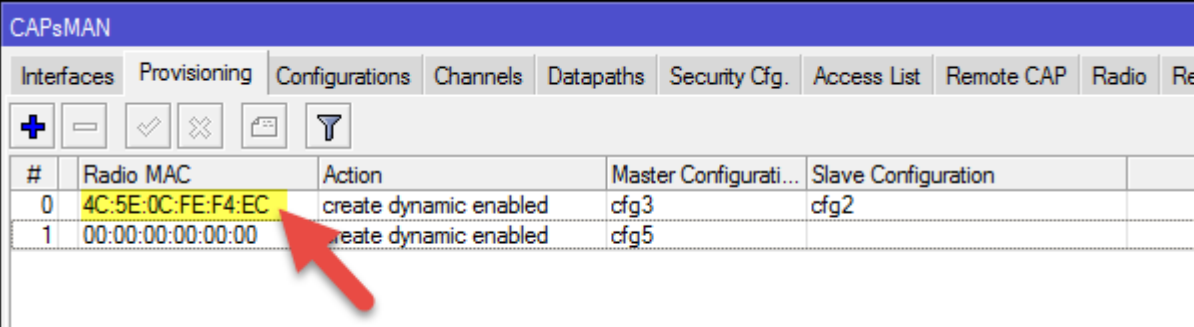
Name	Type	MTU	L2 MTU	Tx
DSMB MuM1	Interfaces	1500	1600	0 bps
DSB MuM1-1	Interfaces	1500	1600	0 bps
DMBI MuM2	Interfaces	1500		0 bps
DBI MuM2-1	Interfaces	1500		0 bps
DMBI MuM3	Interfaces	1500		0 bps
DBI MuM3-1	Interfaces	1500		0 bps

ถ้ามีการเปลี่ยน Provision จะต้องมาทำการ re-Provision ด้วยตัวเองอีกครั้ง

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

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>