



# CAPsMAN

# Implementation

*(Overview & Simple Configuration)*

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# Perkenalan



RIFQI IKHSAN FAUZI

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# CAPsMAN itu apa?

- **CAPsMAN** → **Controlled Access Point system Manager**
- Merupakan sebuah fitur wireless controller yang memudahkan kita untuk mengatur semua perangkat wireless access point MikroTik yang ada di jaringan secara terpusat

# CAPsMAN

- Dalam penggunaan CAPsMAN, perangkat yang digunakan ada 2 istilah:
  - **System Manager** (*CAPsMAN*), yaitu perangkat yang digunakan untuk mengatur CAP.
  - **CAP** (*Controlled Access Point*), yaitu perangkat wireless access point yang akan dikonfigurasi.

# Fitur CAPsMAN

- Manajemen secara terpusat Wireless AP MikroTik
- Mendukung komunikasi MAC & IP Layer dengan AP
- Autentikasi menggunakan certificate
- Autentikasi RADIUS berdasarkan MAC Address
- Autentikasi menggunakan WPA/WPA2
- Full & Local Data Forwarding Mode
- Dual Band AP Support

# Yang dibutuhkan

CAPsMAN	CAPs
Router Mikrotik x86 atau RB (tidak harus mempunyai wireless)	Perangkat routerboard yang mempunyai interface wireless
RouterOS versi 6.11 keatas (disarankan versi terbaru)	
	Minimal lisensi level 4
Package wireless sudah terinstall	

# Versi CAPsMAN

## 1. CAPsMAN v1

- Menggunakan package Wireless-fp
- Rilis 2014 → RouterOS v6.11

## 2. CAPsMAN v2

- Menggunakan package Wireless-cm2
- Rilis 2015 → RouterOS v6.23

# Versi CAPsMAN












Beberapa fitur baru di CAPsMAN v2:

- CAPsMAN upgrade otomatis untuk semua CAP Client. (Optional)
- Ditambahkan parameter “*Name Format, Name Prefix, Identity/CommonName Regexp, IP Address range*” pada Provisioning Rule
- Ditambahkan logging ketika ada “roaming client” antara perangkat CAPs.
- L2 Path MTU Discovery
- Peningkatan CAP <-> CAPsMAN Data Connection Protocol



# Tips dan Trik

1. CAPsMAN versi 1 tidak support dengan versi 2, begitu juga sebaliknya
2. Pastikan perangkat CAPsMAN dan CAP harus menggunakan wireless package yang sama
3. Bisa menggunakan CAPsMAN v2 yang lebih stabil & umum digunakan
4. Direkomendasikan untuk CAPsMAN menggunakan routerOS versi 6.37 keatas

 routeros-mipsbe	6.38	Dec/30/2016 11:33:56
 advanced-t...	6.38	Dec/30/2016 11:33:56
 dhcp	6.38	Dec/30/2016 11:33:56
 hotspot	6.38	Dec/30/2016 11:33:56
 ipv6	6.38	Dec/30/2016 11:33:56
 mpls	6.38	Dec/30/2016 11:33:56
 ppp	6.38	Dec/30/2016 11:33:56
 routing	6.38	Dec/30/2016 11:33:56
 security	6.38	Dec/30/2016 11:33:56
 custom	6.38	Dec/30/2016 11:33:56
 wireless	6.38	Dec/30/2016 11:33:56

# Koneksi CAP ↔ CAPsMAN

## MAC Layer2

Tanpa konfigurasi IP.

CAP & CAPsMAN harus dalam broadcast domain (layer 2) yang sama (baik fisik maupun layer 2 tunnel).

## IP (UDP) Layer3

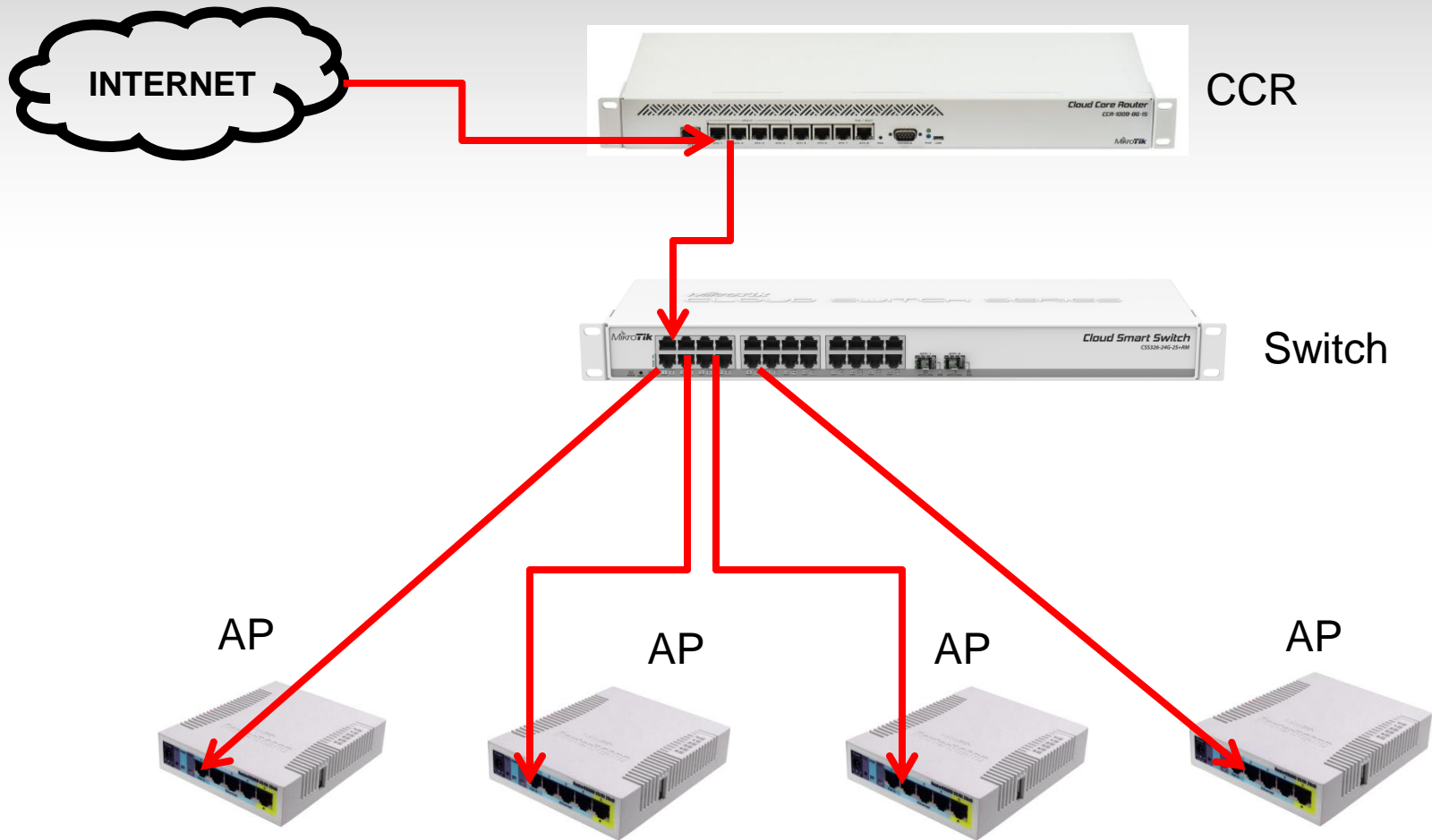
CAP harus bisa komunikasi dengan CAPsMAN melalui IP Protocol.

Dengan metode ini CAP & CAPsMAN tidak harus berada dalam layer2 yang sama, bahkan bisa berbeda lokasi geografis.

Mendukung penggunaan NAT

- Koneksi antara CAP & CAPsMAN menggunakan keamanan berupa DTLS Certificate.
- Apabila dibutuhkan enkripsi untuk mengamankan trafik data bisa menggunakan IPSec atau dengan jalur tunnel+encryption system. (*Optional*)

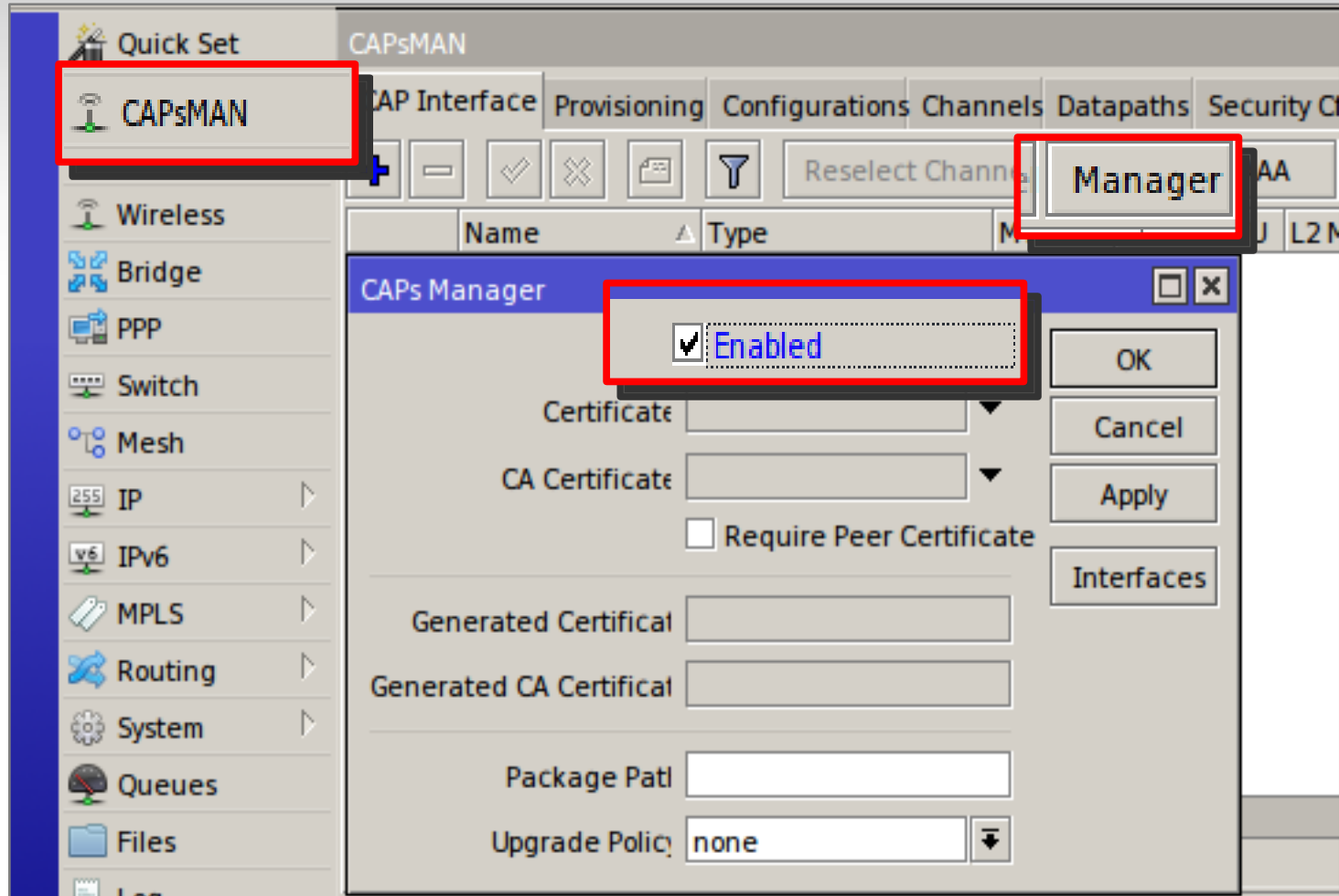
# CAPsMAN Simple Topologi



# CAPsMAN Simple Setup

- Mengaktifkan CAPsMAN Service
- Membuat Bridge Interface
- Konfigurasi IP Address pada Bridge Interface
- Konfigurasi DHCP Server dan NAT
- Konfigurasi CAPsMAN
- Konfigurasi Provisioning Rule
- Mengaktifkan CAP mode pada Access Point
- Roaming Client menggunakan Access List

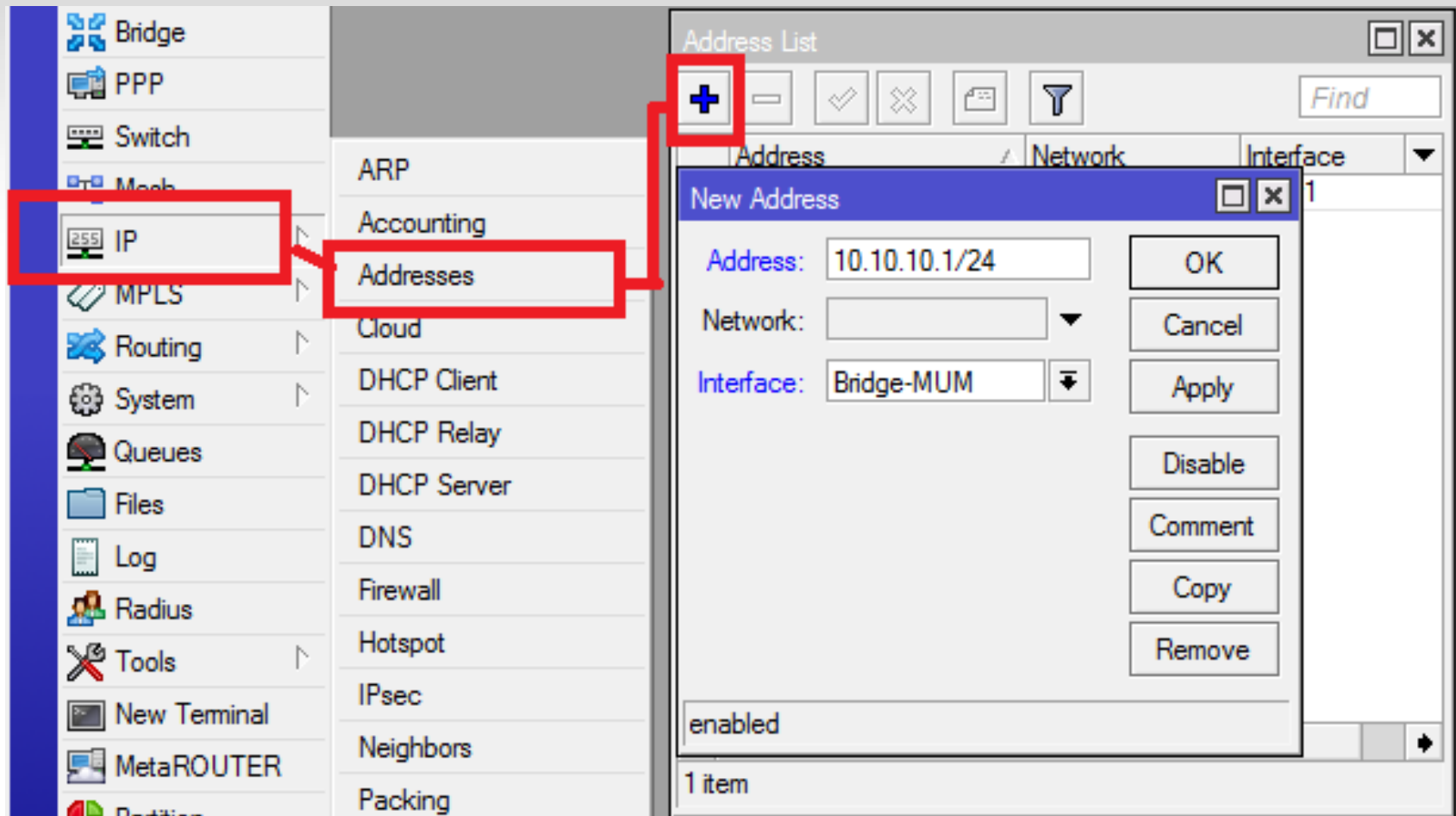
# CAPsMAN Simple Setup



# CAPsMAN Simple Setup

The screenshot displays the MikroTik WinBox interface. On the left sidebar, the 'Bridge' menu item is highlighted with a red box. The main window shows the 'Bridge' configuration page with tabs for 'Bridge', 'Ports', 'Filters', 'NAT', and 'Hosts'. A red box highlights the '+' icon in the toolbar. Below the toolbar, a table lists existing bridges. A 'New Interface' dialog box is open, showing the 'General' tab. The 'Name' field is highlighted with a red box and contains the text 'Bridge-MUM'. Other fields include 'Type' (Bridge), 'MTU', 'Actual MTU', 'L2 MTU', 'MAC Address', 'ARP' (enabled), 'ARP Timeout', and 'Admin. MAC Address'. On the right side of the dialog, there are buttons for 'OK', 'Cancel', 'Apply', 'Disable', 'Comment', 'Copy', 'Remove', and 'Torch'.

# CAPsMAN Simple Setup



# CAPsMAN Simple Setup

The image shows the MikroTik WinBox interface. On the left, the 'IP' menu item is highlighted with a red box. A red line indicates the path from 'IP' to 'DHCP Server', which is also highlighted with a red box. On the right, the 'DHCP Server' configuration window is open, with the 'DHCP Setup' tab selected and highlighted with a red box. Below this, a 'DHCP Setup' dialog box is shown, containing the text 'Select interface to run DHCP server on' and a dropdown menu for 'DHCP Server Interface' set to 'Bridge-MUM'. The dialog box has 'Back', 'Next', and 'Cancel' buttons.



# CAPsMAN Simple Setup

The screenshot shows the Mikrotik WinBox Firewall configuration interface. The 'NAT' tab is selected and highlighted with a red box. Below the tabs, a toolbar contains a '+' icon (highlighted with a red box), a '-' icon, a checkmark icon, an 'X' icon, a funnel icon, and buttons for 'Reset Counters' and 'Reset All Counters'. Below the toolbar is a table with columns: #, Action, Chain, Src. Address, Dst. Address, Proto..., Src. Port, and Dst. Port. Two 'New NAT Rule' entries are visible. The first rule is expanded to show its configuration:

General	Advanced	Extra	Action	Stat
Chain:	srcnat			
Src. Address:	<input type="checkbox"/>	10.10.10.0/24		
Dst. Address:				
Protocol:				
Src. Port:				
Dst. Port:				

The second rule is also expanded to show its configuration:

General	Advanced	Extra	Action	Statisti
Action:	masquerade			
<input type="checkbox"/>	Log			
Log Prefix:				

# CAPsMAN Simple Setup

CAPsMAN

Interfaces Provisioning Configuration: **Channels** **Datapaths** **Security Cfg.** Access List Rates Remote CAP Radio Registration Table

+ - [ ] [ ]

Name	Authentication Type	Encryption	Group Encryption	Passphrase	EAP Methods
CAPs Channel <channel>			CAPs Datapath Configuration <mum>		
Name: channel 11			Name: mum		
Frequency: 2462 MHz ▲			MTU: [ ] ▼		
Width: 20 MHz ▲			L2 MTU: [ ] ▼		
Band: 2ghz-b/g/n ▼ ▲			ARP: [ ] ▼		
Extension Channel: [ ] ▼			Bridge: Bridge-MUM ▼ ▲		
Tx. Power: [ ] ▼			Bridge Cost: [ ] ▼		
			Bridge Horizon: [ ] ▼		
			Local Forwarding: <input checked="" type="checkbox"/>		
			Client To Client Forwarding: <input checked="" type="checkbox"/>		
			VLAN Mode: [ ] ▼		
			VLAN ID: [ ] ▼		
CAPs Security Configuration <security>					
Name: security 1					
Authentication Type: <input checked="" type="checkbox"/> WPA PSK <input checked="" type="checkbox"/> WPA2 PSK <input type="checkbox"/> WP					
Encryption: <input checked="" type="checkbox"/> aes ccm <input type="checkbox"/> tkip					
Group Encryption: aes ccm					
Passphrase: mumindonesia					
EAP Methods: [ ]					
EAP Radius Accounting: [ ]					
TLS Mode: [ ]					
TLS Certificate: [ ]					

1 item (1 selected)

# CAPsMAN Simple Setup

CAPsMAN

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

+ - [ ] [ ]

Name	SSID	Hide SSID	Load Bal...	Country	Channel	Frequency	Band	Rate	Datapath	Bric
New CAPs Configuration										
Wireless	Channel	Rates	Datapath	New CAPs Configuration						
Name:	MUM	Channel:	channel 11	New CAPs Configuration						
Mode:	ap	Frequency:		Datapath:	mum	New CAPs Configuration				
SSID:	MUM2017	Width:		MTU:		Security:	security 1	New CAPs Configuration		
Hide SSID:		Band:		L2 MTU:		Authentication Type:		New CAPs Configuration		
Load Balancing Group:		Extension Channel:		ARP:		Encryption:		New CAPs Configuration		
Distance:		Tx. Power:		Bridge:		Group Encryption:		New CAPs Configuration		
Hw. Retries:				Bridge Cost:		Passphrase:		New CAPs Configuration		
Hw. Protection Mode:				Bridge Horizon:		EAP Methods:		New CAPs Configuration		
Frame Lifetime:				Local Forwarding:		EAP Radius Accounting:		New CAPs Configuration		
Disconnect Timeout:				Client To Client Forwarding:		TLS Mode:		New CAPs Configuration		
Country:	indonesia			VLAN Mode:		TLS Certificate:		New CAPs Configuration		
Max Station Count:				VLAN ID:		New CAPs Configuration				



# CAPsMAN Simple Setup

- Pilihan pada paramater 'Action' di Provisioning Rule :
  - **Create-disabled** → Sistem akan membuat secara otomatis sebuah CAP Interface ketika ada AP/Radio yang terkoneksi (Bounding). Interface bersifat static & tidak aktif (disabled). Harus mengaktifkan (*enabled*) secara manual supaya CAP Interface dapat berjalan.
  - **Create-enabled** → Sistem akan membuat secara otomatis sebuah CAP Interface ketika ada AP/Radio yang terkoneksi (Bounding). Interface bersifat static & aktif (enabled).
  - **Create-dynamic-enabled** → Sistem akan membuat secara otomatis sebuah CAP Interface ketika ada AP/Radio yang terkoneksi (Bounding). Interface bersifat dinamis & aktif (enabled).
  - **None** → Sistem *tidak* akan membuat secara otomatis sebuah CAP Interface, jadi harus dilakukan provisioning secara manual.

# CAPsMAN Simple Setup

SISI CAP

Wireless Tables

Interfaces | Nstreme Dual | Access List | Registration | Connect List | Security Pro

+ - ✓ ✗ [CAP] WPS Client Setup Repeat

Name	Type	Actual MTU	Tx
XS wlan1	Wireless (Atheros AR9...	1500	

**CAP** [OK] [Cancel] [Apply]

Enabled

Interfaces: wlan1

Certificate: none

Discovery Interfaces: bridge1

Lock To CAPsMAN

CAPsMAN Addresses: [ ]

CAPsMAN Names: [ ]

CAPsMAN Certificate Common Names: [ ]

Bridge: none

Static Virtual

Requested Certificate: [ ]

Locked CAPsMAN Common Name: [ ]

# CAP Status

Wireless Tables

Interfaces | Nstreme Dual | Access List | Registration | Connect List | Security Profiles | Channels

+ - ✓ ✗ [icon] [icon] CAP WPS Client Setup Repeater Scanner Freq. Usage Ali

Name	Type	Actual MTU	Tx	Rx	Tx Pa
-- managed by CAPsMAN					
-- channel: 2412/20-Ce/gn(20dBm), SSID: MUMID2017, local forwarding					
RS wlan1	Wireless (Atheros AR9...	1500	0 bps	0 bps	

Wireless Tables

Interfaces | Nstreme Dual | Access List | Registration | Connect List | Security Profiles | Channels

+ - ✓ ✗ [icon] [icon] CAP WPS Client Setup Repeater Scanner Freq. Usage Ali

Name	Type	Actual MTU	Tx	Rx	Tx
-- managed by CAPsMAN					
-- channel: 2462/20-eC/gn(20dBm), SSID: MUM2017, local forwarding					
RS wlan1	Wireless (Atheros AR9...	1500	0 bps	0 bps	

# CAPsMAN Status

CAPsMAN

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

+ - ✓ ✗ [Icon] [Icon] Manager AAA

	Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx
MB	cap-AP 1-1	Interfaces	1500	1500	1600		0 bps
DMB	cap-AP 2-1	Interfaces	1500	1500	1600		0 bps

Interface <cap-AP 1-1>

General Wireless Channel Rates Datapath

Name: cap-AP 1-1

Type: Interfaces

MTU: 1500

Actual MTU: 1500

L2 MTU: 1600

MAC Address: 4C:5E:0C:AA:16:3B

ARP: enabled

ARP Timeout:

Radio MAC: 4C:5E:0C:AA:16:3B

Master Interface: none

Interface <cap-AP 2-1>

General Wireless Channel Rates Datapath Security Status Traffic

Name: cap-AP 2-1

Type: Interfaces

MTU: 1500

Actual MTU: 1500

L2 MTU: 1600

MAC Address: D4:CA:6D:E5:66:81

ARP: enabled

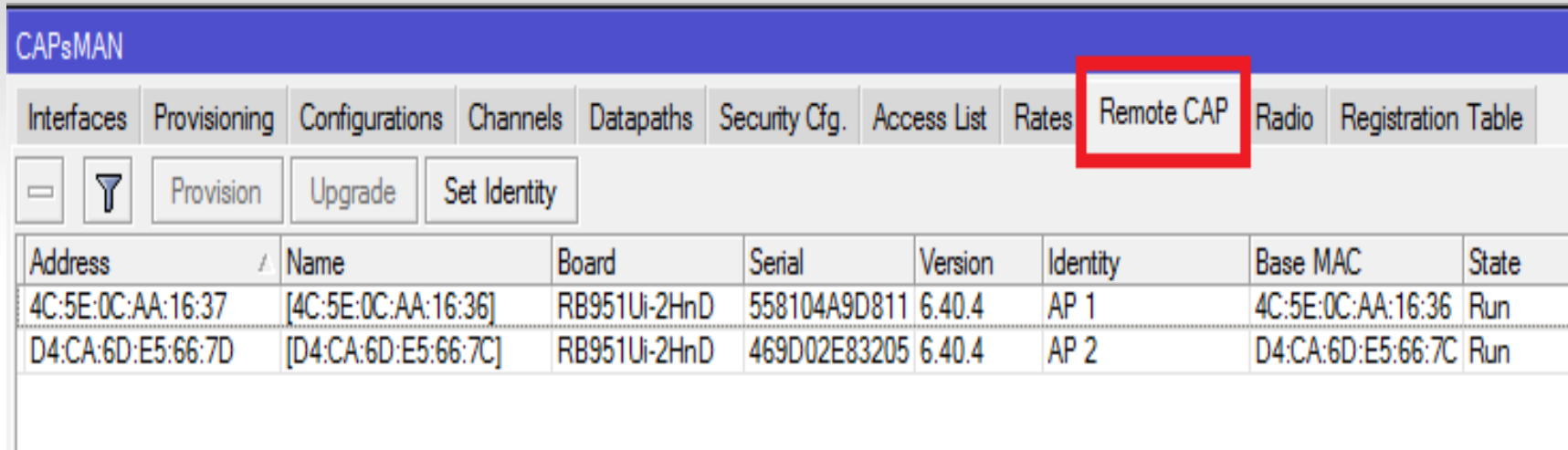
ARP Timeout:

Radio MAC: D4:CA:6D:E5:66:81

Master Interface: none



# CAPsMAN Status



The screenshot shows the Mikrotik WinBox CAPsMAN interface. The 'Remote CAP' tab is highlighted with a red box. Below the navigation tabs are buttons for 'Provision', 'Upgrade', and 'Set Identity'. A table displays the status of two CAPs.

Address	Name	Board	Serial	Version	Identity	Base MAC	State
4C:5E:0C:AA:16:37	[4C:5E:0C:AA:16:36]	RB951Ui-2HnD	558104A9D811	6.40.4	AP 1	4C:5E:0C:AA:16:36	Run
D4:CA:6D:E5:66:7D	[D4:CA:6D:E5:66:7C]	RB951Ui-2HnD	469D02E83205	6.40.4	AP 2	D4:CA:6D:E5:66:7C	Run

- MAC/IP Address
- Model/Jenis RouterBoard
- Serial Number CAP
- Versi RouterOS
- System Identity
- MAC Wireless
- Status CAP
- Jumlah Radio/Wlan di CAP

# CAPsMAN Status

CAPsMAN

Interfaces Provisioning Configurations Channels Datapaths Security Cfg. Access List Rates Remote CAP Rad... **Registration Table**

Interface	SSID	MAC Address	Tx Rate	Rx Rate	Tx Signal	Rx Signal	Uptime	Tx/Rx Packets
cap-AP 1-1	MUM2017	20:5E:F7:58:3C:80	65Mbps-...	1Mbps	0	-56	00:00:40...	269/276
cap-AP 2-1	MUMID2017	C8:FF:28:61:5C:77	11Mbps	39Mbps-...	0	-45	00:00:11...	92/178

CAPs AP Client <C8:FF:28:61:5C:77>

Interface: cap-AP 2-1

SSID: MUMID2017

MAC Address: C8:FF:28:61:5C:77

Tx Rate: 11Mbps

Rx Rate: 39Mbps-20MHz/1S

Tx Rate Set: CCK:1-11 OFDM:6-54 BW:1x-2x HT:...

Tx Signal: 0

Rx Signal: -45

Uptime: 00:00:11.66

Tx/Rx Packets: 92/178

Tx/Rx Bytes: 22.0 KiB/36.4 KiB

CAPs AP Client <20:5E:F7:58:3C:80>

Interface: cap-AP 1-1

SSID: MUM2017

MAC Address: 20:5E:F7:58:3C:80

Tx Rate: 65Mbps-20MHz/1S

Rx Rate: 1Mbps

Tx Rate Set: CCK:1-11 OFDM:6-54 BW:1x HT:0-7

Tx Signal: 0

Rx Signal: -56

Uptime: 00:00:40.29

Tx/Rx Packets: 269/276

Tx/Rx Bytes: 65.0 KiB/47.6 KiB

OK

Remove

Copy to Access List

# CAPsMAN Access List

- Mempunyai fungsi yang sama dengan 'Access List' pada menu wireless, yaitu untuk melakukan filtering koneksi client berdasarkan MAC Address dan juga parameter yang lain.
- Parameter di CAPsMAN Access List:
  - MAC Authentication
  - RADIUS Query
  - SSID Regexp
  - Signal Range
  - Time
  - Private Passphrase
  - VLAN ID Assignment

# Client Roaming Tips

CAPsMAN

Interfaces Provisioning Configurations Channels Datapaths Security Cfg. **Access List** Rates Remote CAI

+ - ✓ ✕ 📄 🏠

#	MAC Address	MAC Mask	Interface	Signal Ra...	Action	Client To Clie...
---	-------------	----------	-----------	--------------	--------	-------------------

CAPs Access Rule <>

MAC Address:

MAC Mask:

Interface: all

SSID Regexp:

Signal Range: -60..120

Time

Action: accept

AP Tx Limit:

Client Tx Limit:

Private Passphrase:

Client To Client Forwarding:

RADIUS Accounting:

New CAPs Access Rule

MAC Address:

MAC Mask:

Interface: all

SSID Regexp:

Signal Range: -120..-60

Time

Action: reject

AP Tx Limit:

Client Tx Limit:

Private Passphrase:

Client To Client Forwarding:

RADIUS Accounting:

# Client Roaming Tips

Pastikan juga anda konfigurasi beberapa point berikut di sisi CAPsMAN :

1. Tentukan Max Station Count
2. Turunkan Tx Power
3. Data rates

# Terima Kasih

Dijinkan menggunakan sebagian atau seluruh materi pada modul ini, baik berupa ide, foto, tulisan, konfigurasi dan diagram selama untuk kepentingan pengajaran, dan memberikan kredit kepada penulis serta link ke [www.mikrotik.co.id](http://www.mikrotik.co.id)

