

# **Mikrotik User Meeting in Jakarta, Indonesia**

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# Profile

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## Rivan Firman Maulana

MTCNA, MTCRE, MTCINE, MTCUME,  
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Mikrotik Since 2005 V 2.97

## Activity

Bina Techindo Solution

<http://www.bitech.net.id/>

Ponpes Daar El-Qolam

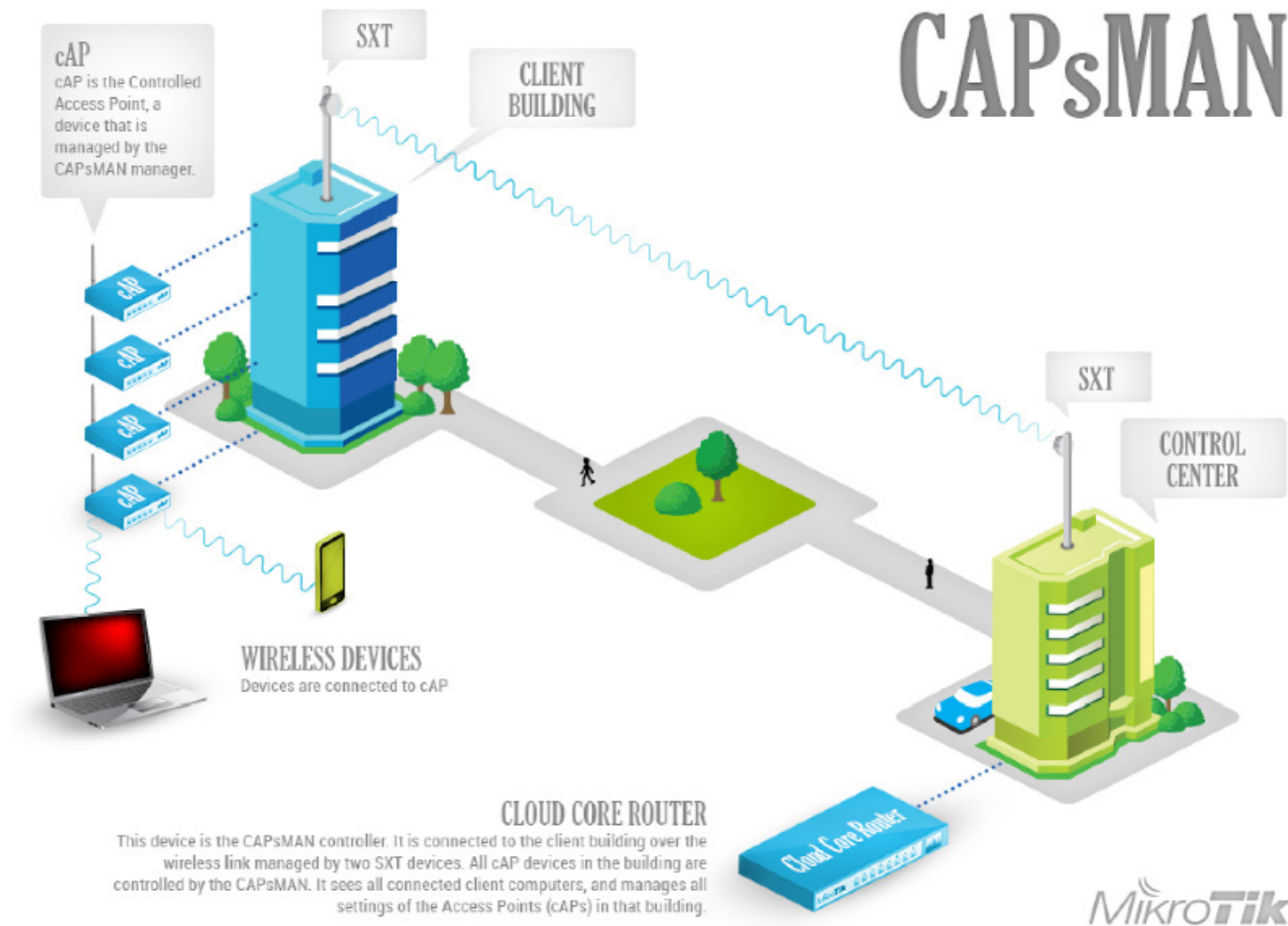
<http://www.daarelqolam3.sch.id/>

Ponpes Ar-Rahman

<http://www.arahmancidadap.com/>



# CAPsMAN



## Implementasi CAPsMAN di Sekolah

# CAPsMAN overview

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**Apa itu CAPsMAN**



# CAPsMAN Definitions

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- CAP (Controlled Access Point) yaitu Perangkat Akses Point yang konfigurasi nya di menej oleh CAPsMAN
- CAPsMAN (Controlled Access Point system Manager) yaitu Perangkat yang Mengatur CAP cofigurasi secara terpusat

# CAPsMAN Features

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- Central Management Access Points
- Radius MAC Authentication
- Manage Client Authentication
- Grouping Configuration
- Datapath Configuration
- Rate Configuration

# Missing CAPsMAN Features

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- Nstream AP Support
- Nv2 AP Support

# CAP to CAPsMAN Connection

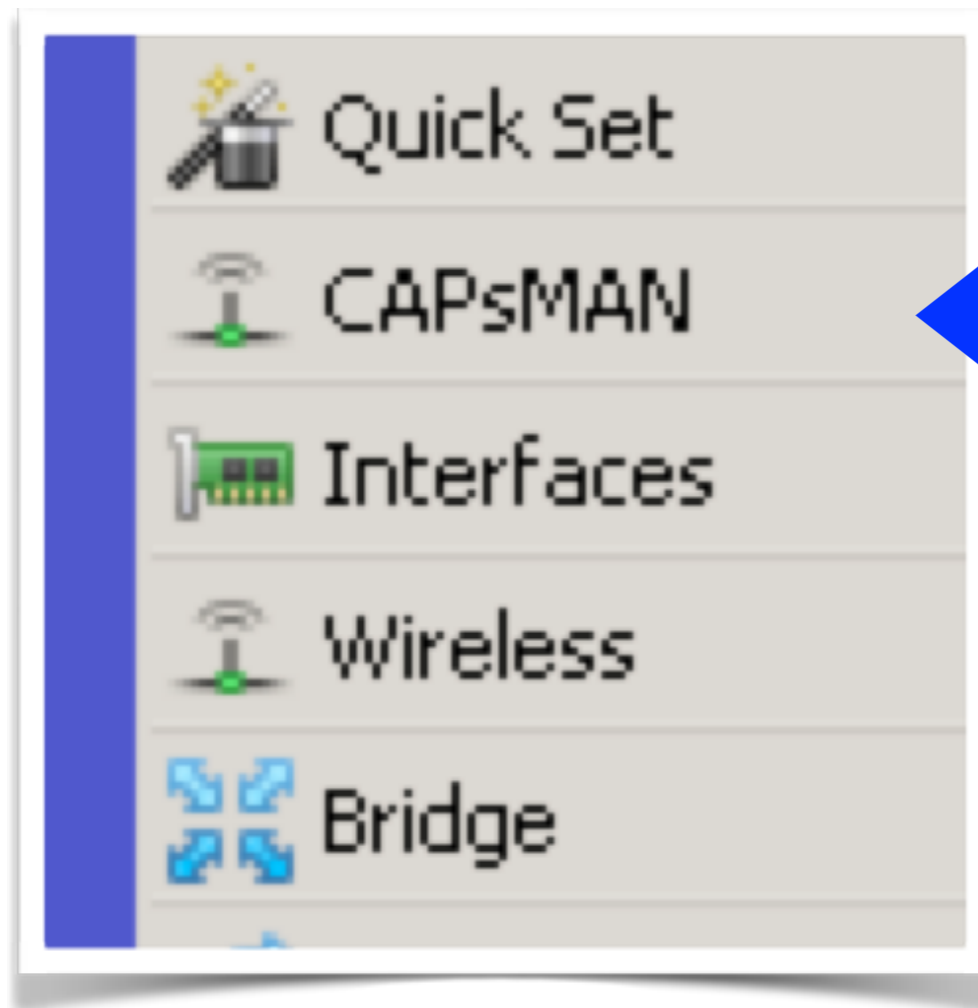
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- Establish using 2 Transport Protocols
- Management Connection between CAP and CAPsMAN is secured using DTLS



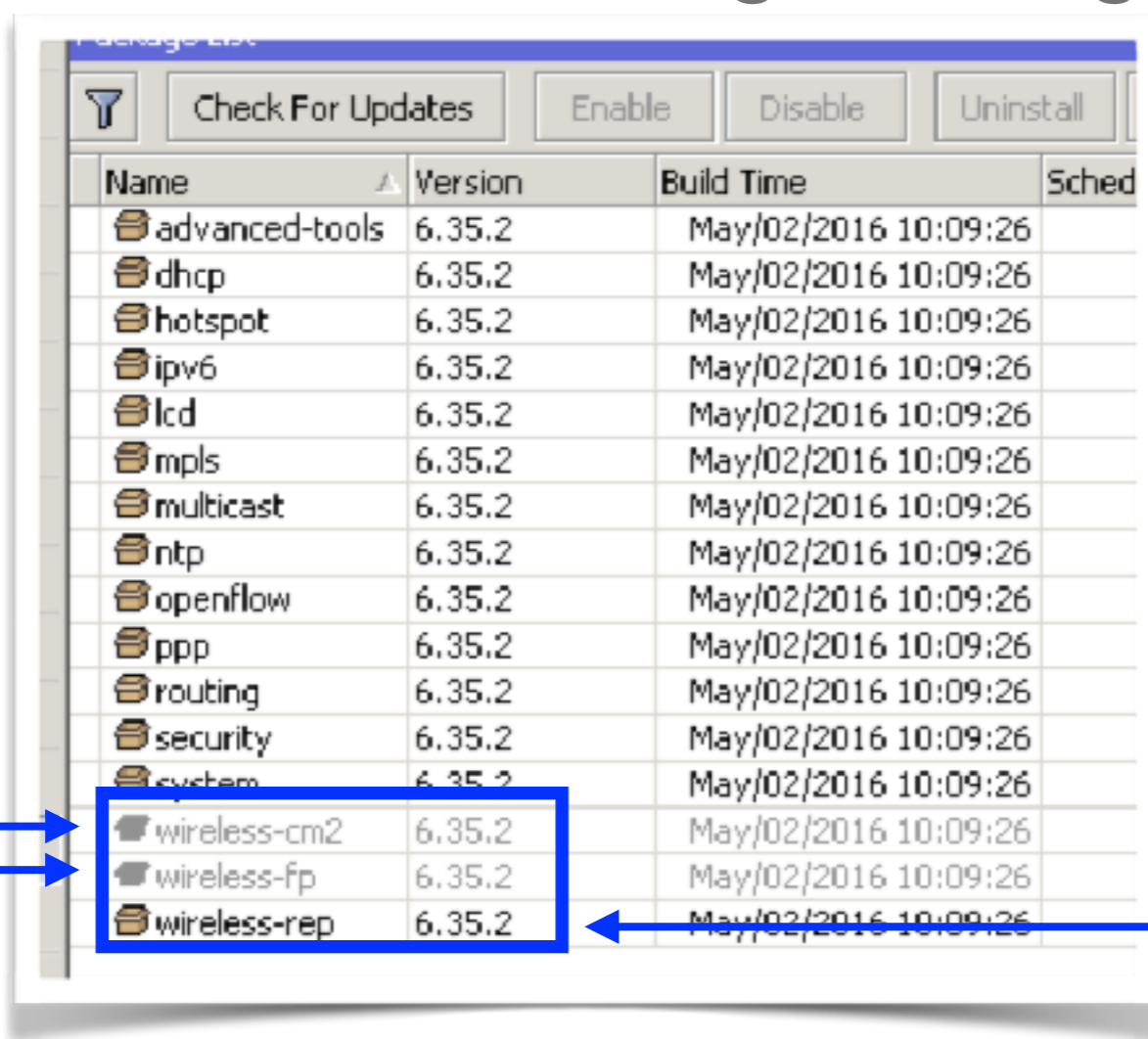
# CAPsMAN

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# CAPsMAN Requirement

- **CAPsMAN v2** working starting from **v6.23**



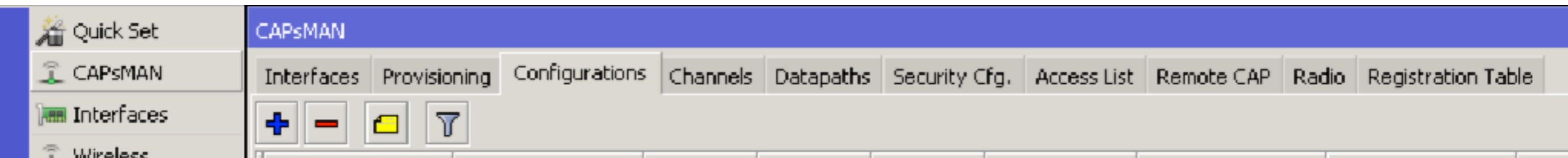
Name	Version	Build Time	Sched
advanced-tools	6.35.2	May/02/2016 10:09:26	
dhcp	6.35.2	May/02/2016 10:09:26	
hotspot	6.35.2	May/02/2016 10:09:26	
ipv6	6.35.2	May/02/2016 10:09:26	
lcd	6.35.2	May/02/2016 10:09:26	
mpls	6.35.2	May/02/2016 10:09:26	
multicast	6.35.2	May/02/2016 10:09:26	
ntp	6.35.2	May/02/2016 10:09:26	
openflow	6.35.2	May/02/2016 10:09:26	
ppp	6.35.2	May/02/2016 10:09:26	
routing	6.35.2	May/02/2016 10:09:26	
security	6.35.2	May/02/2016 10:09:26	
system	6.35.2	May/02/2016 10:09:26	
wireless-cm2	6.35.2	May/02/2016 10:09:26	
wireless-fp	6.35.2	May/02/2016 10:09:26	
wireless-rep	6.35.2	May/02/2016 10:09:26	

- **CAPsMAN v2** working starting from **v6.35**

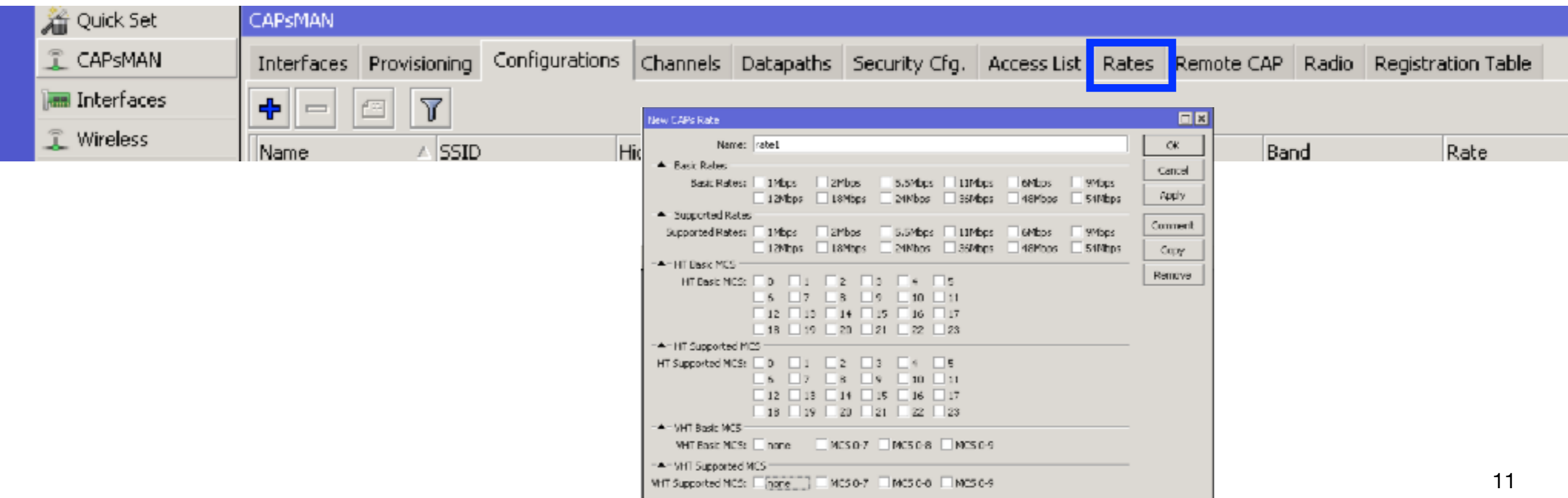
- **CAPsMAN** work on RouterOS **v6.11**

# CAPsMAN v2

- wireless-cm2



- wireless-rep



# CAPsMAN v2

- wireless-cm2

The screenshot shows the 'New CAPs Configuration' dialog box with the 'Wireless' tab selected. The configuration is as follows:

Field	Value
Name	cfg1
Mode	ap
SSID	test
Hide SSID	
Load Balancing Group	
Country	Indonesia
Max Station Count	
Multicast Helper	
HT Tx Chains	
HT Rx Chains	
HT Guard Interval	

Buttons on the right: OK, Cancel, Apply, Comment, Copy, Remove.

- wireless-rep

The screenshot shows the 'New CAPs Configuration' dialog box with the 'Wireless' tab selected. The configuration is as follows:

Field	Value
Name	cfg1
Mode	ap
SSID	test
Hide SSID	
Load Balancing Group	
Distance	
Hw. Retries	
Hw. Protection Mode	
Frame Lifetime	
Disconnect Timeout	
Country	Indonesia
Max Station Count	
Multicast Helper	
HT Tx Chains	
HT Rx Chains	
HT Guard Interval	

A blue box highlights the 'Distance', 'Hw. Retries', 'Hw. Protection Mode', 'Frame Lifetime', and 'Disconnect Timeout' fields.

Buttons on the right: OK, Cancel, Apply, Comment, Copy, Remove.

# CAPsMAN v2

- wireless-cm2

New CAPs Channel

Name: channel1

Frequency: 2412 MHz

Width:

Band: 2ghz-b

Extension Channel:

Tx. Power:

- 2ghz-b
- 2ghz-b/g
- 2ghz-b/g/n
- 2ghz-onlyg
- 2ghz-onlyn
- 5ghz-a
- 5ghz-a/n
- 5ghz-a/n/ac
- 5ghz-onlyac
- 5ghz-onlyn

- wireless-rep

CAPs Channel <channel1 >

Name: channel1

Frequency: 2412 MHz

Width:

Band: 2ghz-g/n

Extension Channel:

Tx. Power:

- 2ghz-b
- 2ghz-b/g
- 2ghz-b/g/n
- 2ghz-g/n
- 2ghz-onlyg
- 2ghz-onlyn
- 5ghz-a
- 5ghz-a/n
- 5ghz-a/n/ac
- 5ghz-onlyac
- 5ghz-onlyn

# CAPsMAN Service

- Certificate auto generate

The image illustrates the steps to configure CAPsMAN for automatic certificate generation. It shows three numbered steps:

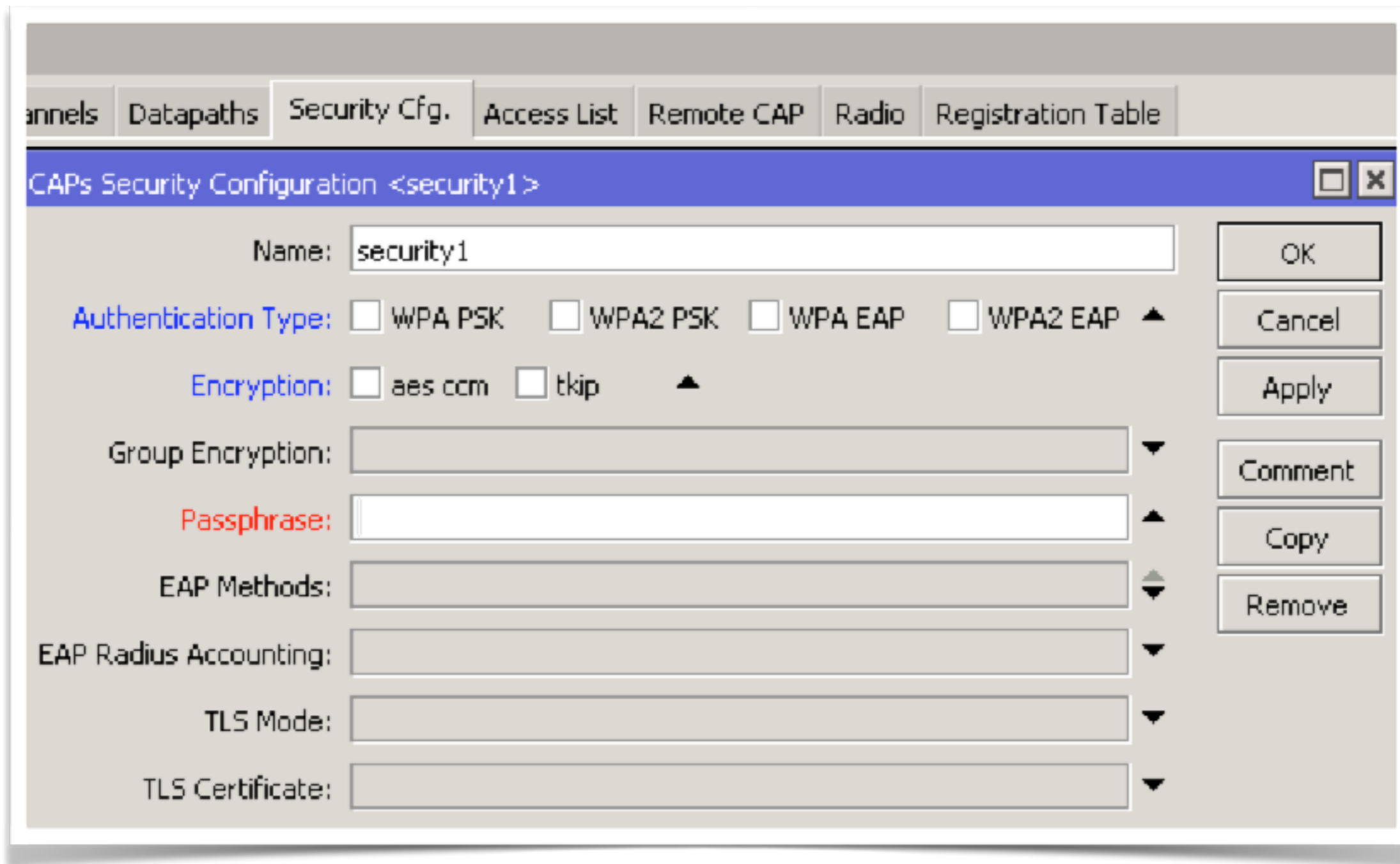
- 1**: Selecting the **CAPsMAN** menu item from the main navigation pane.
- 2**: Clicking the **Manager** tab in the CAPsMAN configuration window.
- 3**: Setting the **Certificate** and **CA Certificate** dropdown menus to **auto** in the CAPs Manager dialog box. The **Enabled** checkbox is also checked.

The CAPs Manager dialog box includes the following options:

- Enabled
- Certificate: auto
- CA Certificate: auto
- Require Peer Certificate
- Generated Certificate: [Empty field]
- Generated CA Certificate: [Empty field]

The CAPsMAN configuration window shows the following tabs: Interfaces, Provisioning, Configurations, Channels, Datapaths, and Security. The Manager tab is currently selected.

# CAPsMAN Security Config



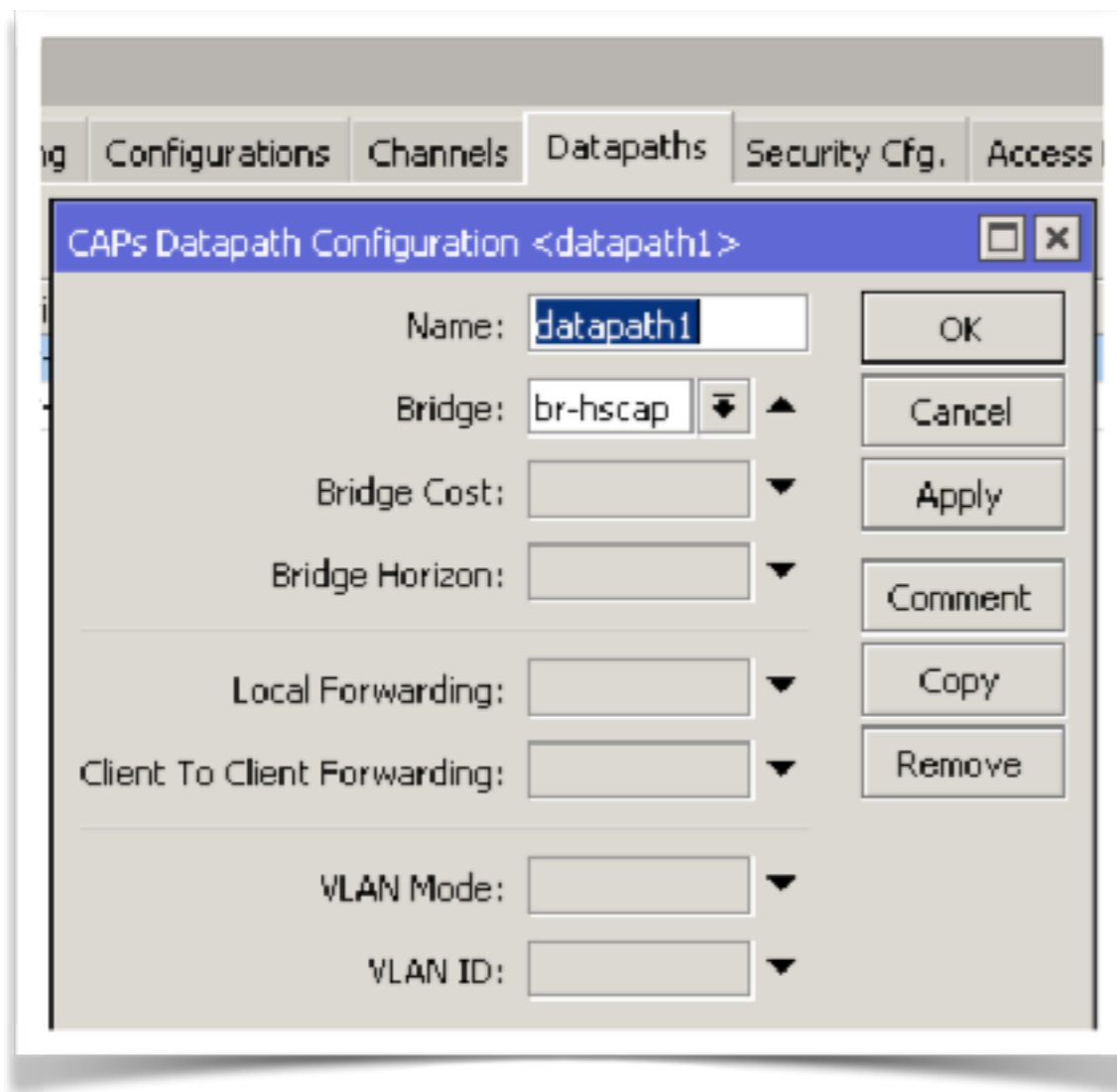
The image shows a screenshot of a network configuration interface for CAPsMAN Security Configuration. The window title is "CAPs Security Configuration <security1>". The interface includes several tabs: Channels, Datapaths, Security Cfg. (selected), Access List, Remote CAP, Radio, and Registration Table. The main configuration area contains the following fields and options:

- Name: security1
- Authentication Type:  WPA PSK  WPA2 PSK  WPA EAP  WPA2 EAP ▲
- Encryption:  aes ccm  tkip ▲
- Group Encryption: [Dropdown menu]
- Passphrase: [Text input field]
- EAP Methods: [Dropdown menu]
- EAP Radius Accounting: [Dropdown menu]
- TLS Mode: [Dropdown menu]
- TLS Certificate: [Dropdown menu]

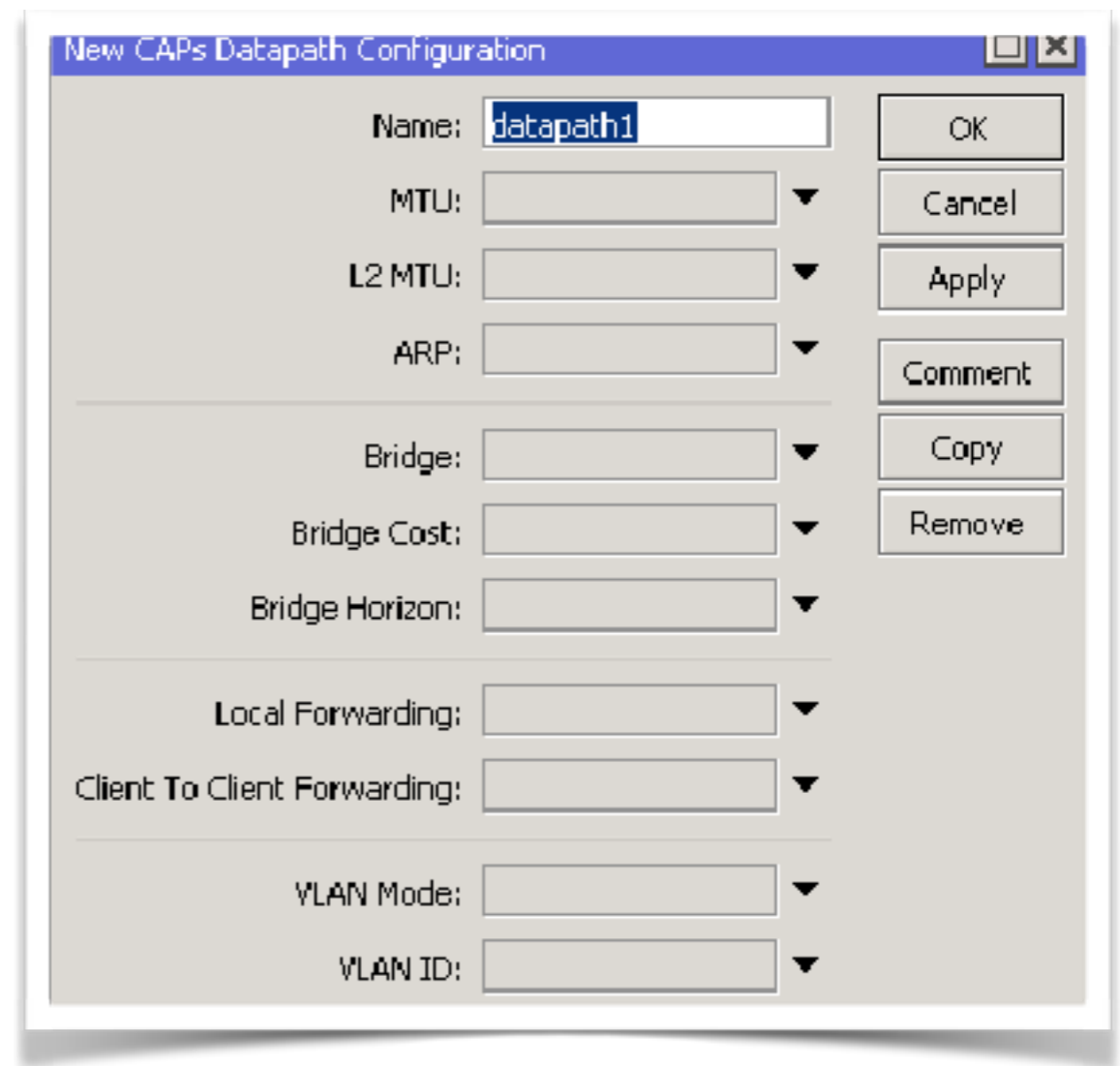
On the right side of the dialog, there are several action buttons: OK, Cancel, Apply, Comment, Copy, and Remove.

# CAPsMAN Datapaths

- ROS V 6.37.1



- ROS V 6.38rc12





# CAPsMAN Channels

The screenshot displays the CAPsMAN configuration interface. At the top, there are tabs for 'Interfaces', 'Provisioning', 'Configurations', 'Channels', 'Datapaths', 'Security Cfg.', and 'A'. Below the tabs are icons for adding (+), deleting (-), saving (floppy), and filtering (funnel). A table lists the channels, with 'channel1' selected. The table has columns for Name, Frequency, Width, Band, and Extension Channel.

Name	Frequency	Width	Band	Ex
channel1	2412MHz	20MHz	2ghz-b/g/n	

Below the table, a dialog box titled 'CAPs Channel <channel1>' is open, showing the configuration for the selected channel. The fields are:

- Name: channel1
- Frequency: 2412 MHz
- Width: 20 MHz
- Band: 2ghz-b/g/n
- Extension Channel: (empty)
- Tx. Power: (empty)

Buttons on the right side of the dialog include OK, Cancel, Apply, Comment, Copy, and Remove.

# CAPsMAN Config

The screenshot displays the Mikrotik WinBox interface for configuring CAPsMAN. The top navigation bar includes 'Quick Set', 'CAPsMAN', 'Interfaces', 'Provisioning', 'Configurations', 'Channels', 'Datapaths', 'Security Cfg.', 'Access List', 'Rates', 'Remote CAP', 'Radio', and 'Registration Table'. The 'Configurations' tab is selected and highlighted with a blue box and a circled '1'. Below the navigation bar, a toolbar contains a plus sign, a left arrow, a right arrow, and a filter icon. A blue box and a circled '2' highlight the plus sign and left arrow. The main area shows four 'New CAPs Configuration' panels, each with a different tab selected: 'Wireless', 'Channel', 'Datapath', and 'Security'. The 'Wireless' panel shows fields for Name (rfc1), Mode (ap), SSID (test), Hide SSID, Load Balancing Group, Distance, Hw. Retries, Hw. Protection Mode, Frame Lifetime, Disconnect Timeout, Country (Indonesia), Max Station Count, Multicast Helper, HT Tx Chains, HT Rx Chains, and HT Guard Interval. The 'Channel' panel shows fields for Channel (channel:), Frequency, Width, Band, Extension Channel, and Tx. Power. The 'Datapath' panel shows fields for Datapath (datapath1), Bridge, Bridge Cost, Bridge Horizon, Local Forwarding, Client To Client Forwarding, VLAN Mode, and VLAN ID. The 'Security' panel shows fields for Security (security1), Authentication Type, Encryption, Group Encryption, Passphrase, EAP Methods, CAP Radius Accounting, TLS Mode, and TLS Certificate.

# CAPsMAN Interfaces

The screenshot displays the CAPsMAN configuration interface. The main window shows a list of interfaces: 'MI' with 'cap1' and 'RSMB' with 'cap2'. Two configuration dialog boxes are open for the 'cap1' interface.

**Left Dialog Box (Interface <cap1>):**

- General tab selected.
- Name: cap1
- Type: Interfaces
- MTU: 1500
- L2 MTU: 1600
- MAC Address: E4:8D:8C:E7:XX:XX
- ARP: enabled
- Radio MAC: E4:8D:8C:E7:XX:XX
- Master Interface: none
- Status: enabled

**Right Dialog Box (Interface <cap1>):**

- Configuration: @wifi.bitech
- Mode: ap
- SSID: @wifi.bitech
- Hide SSID: (empty)
- Load Balancing Group: (empty)
- Distance: (empty)
- Hw. Retries: (empty)
- Hw. Protection Mode: (empty)
- Frame Lifetime: (empty)
- Disconnect Timeout: (empty)
- Country: indonesia
- Max Station Count: (empty)
- Multicast Helper: (empty)
- HT Tx Chains: (empty)
- HT Rx Chains: (empty)
- HT Guard Interval: (empty)
- Status: enabled

# CAPsMAN Interfaces

CAPsMAN													
Interfaces													
Provisioning													
Configurations													
Channels													
Datapaths													
Security Cfg.													
Access List													
Rates													
Remote CAP													
Radio													
Registration Table													
Manager													
AAA													
Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx			
cap30	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap31	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap32	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap33	Interfaces	1500	1500	1600	0 kbps	0 kbps	0	0	0 kbps	0 kbps			
cap34	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap35	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap36	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap37	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap38	Interfaces	1500	1500	1600	0 kbps	0 kbps	0	0	0 kbps	0 kbps			
cap39	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap40	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap41	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap42	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap43	Interfaces	1500	1500	1600	0 kbps	0 kbps	0	0	0 kbps	0 kbps			
cap44	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap45	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap46	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap47	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap48	Interfaces	1500	1500	1600	0 kbps	0 kbps	0	0	0 kbps	0 kbps			
cap49	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap50	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap51	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap52	Interfaces	1500	1500	1600	0 kbps	0 kbps	0	0	0 kbps	0 kbps			
cap53	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap54	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap55	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap56	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap57	Interfaces	1500	1500	1600	0 kbps	0 kbps	0	0	0 kbps	0 kbps			
cap58	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap59	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap60	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap61	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap62	Interfaces	1500	1500	1600	0 kbps	0 kbps	0	0	0 kbps	0 kbps			
cap63	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			
cap64	Interfaces	1500	1500	1600	0 bps	0 bps	0	0	0 bps	0 bps			

# CAPsMAN Registration Table

Interface	SSID	MAC Address	Tx Rate	Rx Rate	Tx Signal	Rx Signal	Uptime	Tx/Rx Packets	Tx/Rx Bytes
cap1	HotSpot Dca Izza	F0:1A:07:32:04:30	125Mbps...	125Mbps...	0	-52	01:00:2...	3 156/3 259	1769.0 KB/791.1...
cap1	HotSpot Dca Izza	A8:18:5A:4E:0B:E7	81Mbps...	6Mbps	0	-69	00:34:1...	2 131/2 191	327.1 KB/258.5 KB
cap12	HotSpot Dca Izza	F0:79:59:10:B4:05	26Mbps...	35Mbps...	0	-65	00:29:1...	5 549/5 935	1042.1 KB/1222....
cap12	HotSpot Dca Izza	10:2A:B3:AC:5C:FE	24Mbps	13.5Mbps	0	-80	00:06:1...	2 737/2 355	3715.4 KB/189.6...
cap13	HotSpot Dca Izza	D0:37:42:AF:F1:4F	6Mbps	1Mbps	0	-82	00:01:1...	4/57	34.3/4434.3
cap15	HotSpot Dca Izza	44:DB:30:8E:37:5F	54Mbps...	81Mbps...	0	-80	01:02:5...	39 122/30 021	36.7 MB/7.5 MB
cap15	HotSpot Dca Izza	40:E2:3D:E3:94:4A	39Mbps...	27Mbps...	0	-81	00:57:2...	43 495/34 258	44.6 MB/5.3 MB
cap15	HotSpot Dca Izza	7C:C7:D9:5A:10:FE	54Mbps...	81Mbps...	0	-74	00:57:2...	38 805/38 083	30.1 MB/6.9 MB
cap15	HotSpot Dca Izza	6C:81:12:04:47:3E	52Mbps...	65Mbps...	0	-70	00:55:2...	54 808/55 116	39.1 MB/8.7 MB
cap15	HotSpot Dca Izza	54:D8:C9:A2:60:B4	65Mbps...	40.5Mbps	0	-84	00:46:0...	39 374/55 119	52.9 MB/6.5 MB
cap15	HotSpot Dca Izza	74:29:AF:D9:C0:DD	19.5Mbps	65Mbps...	0	-74	00:43:2...	60 269/55 285	47.9 MB/7.1 MB
cap15	HotSpot Dca Izza	9C:87:0D:E1:9B:DE	54Mbps...	1Mbps	0	-84	00:40:3...	21 211/21 409	14.7 MB/6.2 MB
cap15	HotSpot Dca Izza	E0:CA:31:EA:5A:B1	108Mbps...	121.5Mbps	0	-60	00:38:1...	51 161/55 076	10.3 MB/26.7 MB
cap15	HotSpot Dca Izza	CC:79:CF:D7:39:1A	108Mbps...	121.5Mbps	0	-77	00:11:1...	7 351/7 137	7.0 MB/925.1 KB
cap15	HotSpot Dca Izza	E8:76:3F:1F:11:8D	108Mbps...	81Mbps...	0	-82	00:10:0...	5 155/5 193	2613.0 KB/285.1...
cap15	HotSpot Dca Izza	58:01:A7:88:0E:ED	11.7Mbps...	65Mbps...	0	-71	00:05:1...	17 107/16 749	20.3 MB/1625.7...
cap15	HotSpot Dca Izza	00:1C:85:A9:C1:48	216Mbps...	81Mbps...	0	-80	00:02:5...	3 803/3 837	2933.2 KB/158.3...
cap15	HotSpot Dca Izza	00:1F:6A:33:0A:C8	50Mbps...	25Mbps...	0	-85	00:00:1...	13 608/14 910	10.8 MB/1692.0...
cap16	HotSpot Dca Izza	14:C1:81:31:A2:77	54Mbps	138Mbps...	0	-71	01:27:2...	5 004/6 014	3163.1 KB/1001.2...
cap16	HotSpot Dca Izza	4C:1B:7D:06:F4:95	0Mbps...	121.5Mbps	0	-71	01:10:3...	5 900/7 891	1002.2 KB/162.1...
cap16	HotSpot Dca Izza	44:1C:A0:4B:C0:61	24Mbps	27Mbps...	0	-75	01:15:2...	176 267/121 936	230.5 MB/10.9 MB
cap16	HotSpot Dca Izza	CC:79:CF:0B:40:E2	20Mbps...	54Mbps...	0	-02	01:14:1...	76 702/64 349	51.0 MB/6.5 MB
cap16	HotSpot Dca Izza	40:E2:44:01:00:05	54Mbps...	54Mbps...	0	-03	01:07:0...	36 462/75 309	50.7 MB/7.5 MB
cap16	HotSpot Dca Izza	74:C5:3D:7F:05:4F	0Mbps...	0Mbps...	0	-00	00:50:5...	76 930/50 302	25.0 MB/7.2 MB
cap16	HotSpot Dca Izza	F0:7E:CB:22:14:9B	36Mbps	24Mbps	0	-84	00:52:4...	54 078/44 737	59.0 MB/4872.3...
cap16	HotSpot Dca Izza	18:A5:F7:9F:94:0A	108Mbps...	121.5Mbps	0	-65	00:31:2...	190/479	17.2 KB/57.5 KB
cap16	HotSpot Dca Izza	E0:D2:1D:09:B2:E7	26Mbps...	19.5Mbps	0	-85	00:30:5...	54 361/53 396	58.3 MB/8.0 MB
cap16	HotSpot Dca Izza	9C:99:A0:03:75:D9	36Mbps	13Mbps...	0	-77	00:26:1...	25 149/23 093	28.9 MB/4265.6...
cap16	HotSpot Dca Izza	74:2F:63:6F:DE:3E	56.5Mbps	25Mbps...	0	-85	00:21:1...	19 574/16 707	19.9 MB/2207.1...
cap16	HotSpot Dca Izza	10:08:B1:EE:02:91	26Mbps...	35Mbps...	0	-85	00:07:4...	10 557/9 375	11.1 MB/1215.8...
cap16	HotSpot Dca Izza	40:FC:2F:68:6F:25	39Mbps...	52Mbps...	0	-75	00:05:1...	10 010/9 522	8.7 MB/1365.4 KB
cap16	HotSpot Dca Izza	4C:88:58:8B:65:11	26Mbps...	6.5Mbps...	0	-81	00:03:3...	58 069/53 028	58.8 MB/8.2 MB
cap16	HotSpot Dca Izza	D8:5D:E2:A1:5A:39	39Mbps...	52Mbps...	0	-75	00:02:0...	1 950/1 577	2094.7 KB/235.6...
cap16	HotSpot Dca Izza	E0:A5:89:71:45:D9	19.5Mbps	54Mbps...	0	-85	00:01:2...	1 179/1 154	1485.5 KB/129.6...
cap17	HotSpot Dca Izza	E0:A5:89:30:60:E9	81Mbps...	121.5Mbps	0	-72	01:04:3...	205 713/149 197	252.5 MB/14.3 MB
cap17	HotSpot Dca Izza	48:ED:60:A3:61:13	13.5Mbps	5Mbps...	0	-75	01:03:4...	27 815/24 357	34.7 MB/7.0 MB



# CAPsMAN Access List

#	MAC Address	MAC Mask	Interface	Signal Ra...	Action	Client To Clie...	VLAN Mode	VLAN ID
0	↔		all	-120..-75	reject			

CAPs Access Rule <>

MAC Address:  ▼

MAC Mask:  ▼

Interface: all ▼ ▲

SSID Regexp:

Signal Range: -120..-75 ▲

Time ▼

Action: reject ▼ ▲

AP Tx Limit:  ▼

Client Tx Limit:  ▼

Private Passphrase:  ▼

Client To Client Forwarding:  ▼

RADIUS Accounting:  ▼

OK

Cancel

Apply

Disable

Comment

Copy

Remove

# CAP

The screenshot shows the Mikrotik WinBox interface. On the left sidebar, the 'Wireless' menu item is highlighted with a blue box and a circled '1'. In the top toolbar, the 'CAP' button is highlighted with a blue box and a circled '2'. Below the toolbar, the 'Wireless Tables' section is visible, showing a table with columns for Name, Type, Tx, and Rx. The table contains one entry for 'wlan1' with a Tx rate of 409.5 kbps and an Rx rate of 11.9 kbps. Red text above the table indicates that the interface is managed by CAPsMAN and provides channel and SSID information.

Name	Type	Tx	Rx
--- managed by CAPsMAN			
--- channel: 2412/20-Ce/gn(20dBm), SSID: @wifi.bitech, CAPsMAN forwarding			
wlan1	Wireless (Atheros AR...	409.5 kbps	11.9 kbps

# CAP Service

- L2 Connection

The image shows a screenshot of the Mikrotik WinBox configuration interface for a CAP (Certificate Authentication Protocol) service. The interface is divided into several sections, with a 'Wireless Tables' tab selected. The 'CAP' tab is highlighted, and a blue box labeled '2' is drawn around it. A blue line labeled '1' points from the 'Wireless' menu item in the left sidebar to the 'CAP' tab. A blue box labeled '3' is drawn around the 'CAP' configuration dialog box, which is open in the foreground. The dialog box contains the following fields and options:

- Enabled
- Interfaces: wlan1
- Certificate: request
- Discovery Interfaces: ether1
- Lock To CAPsMAN
- CAPsMAN Addresses: (empty)
- CAPsMAN Names: RO-CAPsMAN
- CAPsMAN Certificate Common Names: (empty)
- Bridge: none
- Requested Certificate: CAP-D4CA6DF24E80
- Locked CAPsMAN Common Name: CAPsMAN-000C42A493A3

A blue arrow points from the text 'CAPsMAN Identity Router' to the 'RO-CAPsMAN' field in the 'CAPsMAN Names' section. The 'OK', 'Cancel', and 'Apply' buttons are visible at the bottom right of the dialog box.



# CAP Service

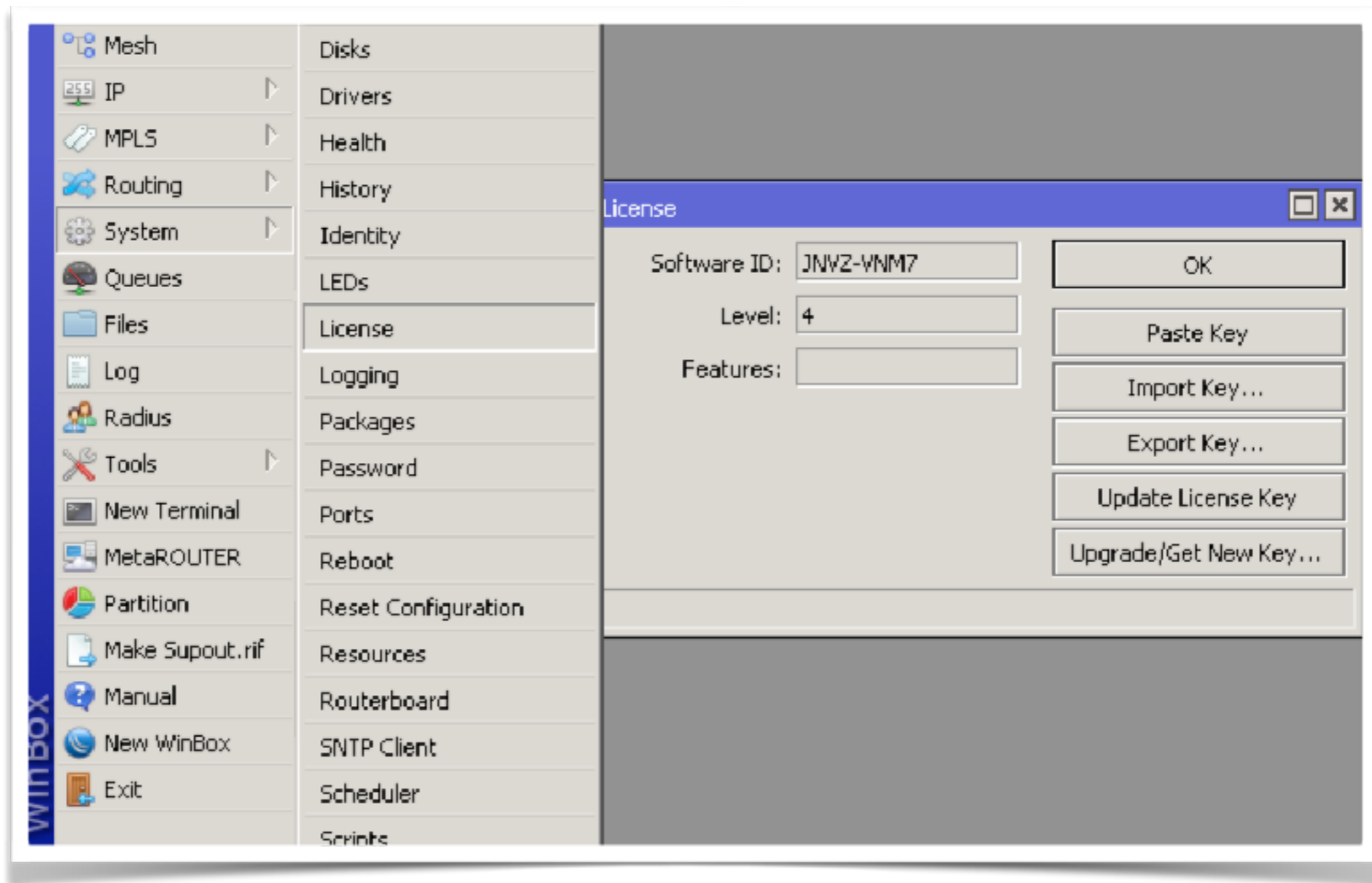
- L3 Connection

The screenshot shows a network configuration interface for a CAP service. The interface is divided into several sections:

- Sidebar:** Contains 'Interfaces', 'Wireless', 'Bridge', and 'CAP'. The 'Wireless' option is selected, indicated by a blue circle with the number '1'.
- Top Navigation:** Contains 'Interfaces', 'Nstreme Dual', 'Access List', 'Registration', 'Connect List', and 'Security Profil'. The 'CAP' option is selected, indicated by a blue circle with the number '2'.
- Main Configuration Panel:** Contains various fields and buttons. A blue box highlights the configuration fields, and a blue circle with the number '3' is placed over the 'CAPsMAN Addresses' field. The fields include:
  - Enabled:**
  - Interfaces:** wlan1
  - Certificate:** request
  - Discovery Interfaces:** (empty)
  - Lock To CAPsMAN:**
  - CAPsMAN Addresses:** 10.0.0.1 (indicated by a blue arrow and the text 'CAPsMAN IP Address')
  - CAPsMAN Names:** (empty)
  - CAPsMAN Certificate Common Names:** (empty)
  - Bridge:** none
  - Requested Certificate:** CAP-D4CA6DF24E80
  - Locked CAPsMAN Common Name:** CAPsMAN-000C42A493A3
- Buttons:** OK, Cancel, and Apply.

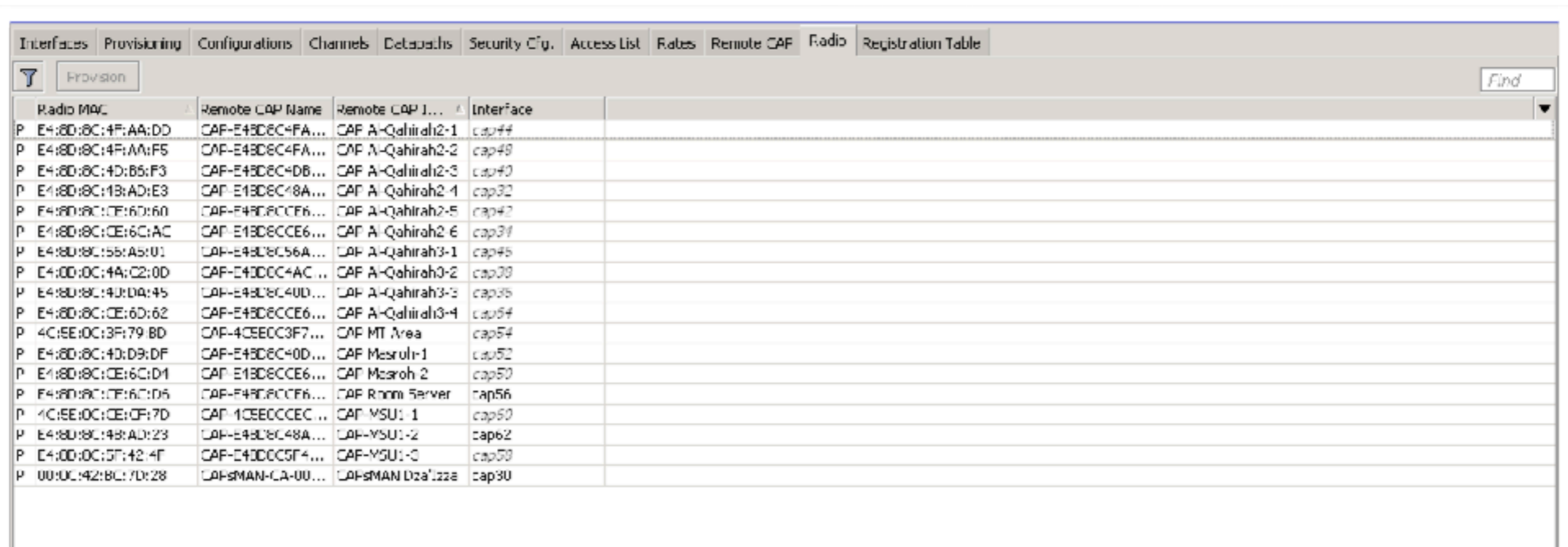
# CAP Requirement

- CAP Device **Level 4** RouterOS license



# CAPs Connection

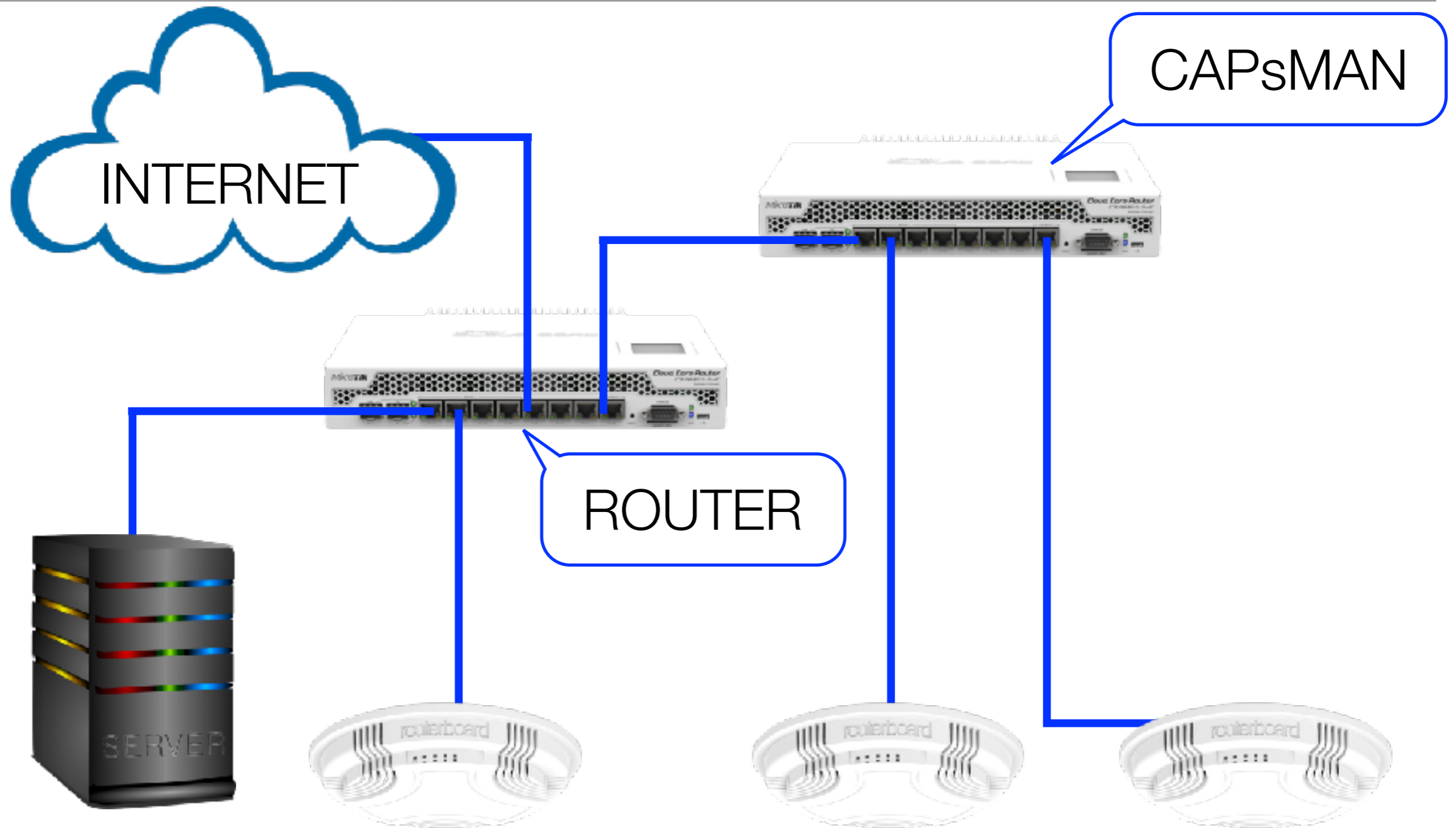
- Result CAP Connection in CAPsMAN



The screenshot shows a network management interface with a 'Registration Table' tab selected. The table lists various CAPs (Client Access Points) and their connections to a central controller. The columns are: Radio MAC, Remote CAP Name, Remote CAP ID, and Interface. The table contains 18 rows of data.

Radio MAC	Remote CAP Name	Remote CAP ID	Interface
P E4:8D:8C:4F:AA:D0	CAP-E48D8C4FA...	CAP A-Qahirah2-1	cap44
P E4:8D:8C:4F:AA:F5	CAP-E48D8C4FA...	CAP A-Qahirah2-2	cap49
P E4:8D:8C:4D:B5:F3	CAP-E48D8C4DB...	CAP A-Qahirah2-3	cap40
P E4:8D:8C:1B:AD:E3	CAP-E18D8C18A...	CAP A-Qahirah2-4	cap32
P E4:8D:8C:CE:6D:60	CAP-E48D8CCE6...	CAP A-Qahirah2-5	cap42
P E4:8D:8C:CE:6C:AC	CAP-E18D8CCE6...	CAP A-Qahirah2-6	cap31
P E4:8D:8C:55:A5:01	CAP-E48D8C56A...	CAP A-Qahirah3-1	cap45
P E4:0D:0C:4A:C2:0D	CAP-E40D0C4AC...	CAP A-Qahirah3-2	cap39
P E4:8D:8C:4D:DA:45	CAP-E48D8C40D...	CAP A-Qahirah3-3	cap35
P E4:8D:8C:CE:6D:62	CAP-E48D8CCE6...	CAP A-Qahirah3-4	cap54
P 4C:5E:0C:3F:79:BD	CAP-4CE0C3F7...	CAP MT Area	cap54
P E4:8D:8C:4D:D9:DF	CAP-E48D8C40D...	CAP Mesruh-1	cap52
P E4:8D:8C:CE:6C:D1	CAP-E18D8CCE6...	CAP Mesroh-2	cap50
P E4:8D:8C:CF:67:D5	CAP-E48D8CCE6...	CAP Room Server	cap56
P 4C:5E:0C:CE:CF:7D	CAP-4CE0CCEC...	CAP MSU1-1	cap50
P E4:8D:8C:4B:AD:23	CAP-E48D8C48A...	CAP-MSU1-2	cap62
P E4:0D:0C:5F:42:4F	CAP-E40D0C5F4...	CAP-MSU1-3	cap59
P 00:0C:14:2:8C:7D:28	CAPsMAN-CA-00...	CAPsMAN Dza'izza	cap30

# Implementation



# Implementation

## 1. Enable or Install CAP and CAPsMAN

The screenshot shows the Mikrotik WinBox interface. The left sidebar contains a menu with 'System' highlighted. The 'System' submenu is open, showing 'Packages' highlighted. The 'Package List' window is open, displaying a table of installed packages. The 'wireless-rep' package is highlighted. The 'Enable' button is highlighted.

Name	Version	Build	Time	Sched
advanced-tools	6.35.2		May/02/2016 10:09:26	
dhcp	6.35.2		May/02/2016 10:09:26	
hotspot	6.35.2		May/02/2016 10:09:26	
ipv6	6.35.2		May/02/2016 10:09:26	
lcd	6.35.2		May/02/2016 10:09:26	
mpls	6.35.2		May/02/2016 10:09:26	
multicast	6.35.2		May/02/2016 10:09:26	
ntp	6.35.2		May/02/2016 10:09:26	
openflow	6.35.2		May/02/2016 10:09:26	
ppp	6.35.2		May/02/2016 10:09:26	
routing	6.35.2		May/02/2016 10:09:26	
security	6.35.2		May/02/2016 10:09:26	
system	6.35.2		May/02/2016 10:09:26	
wireless-cm2	6.35.2		May/02/2016 10:09:26	
wireless-fp	6.35.2		May/02/2016 10:09:26	
wireless-rep	6.35.2		May/02/2016 10:09:26	

# Implementation

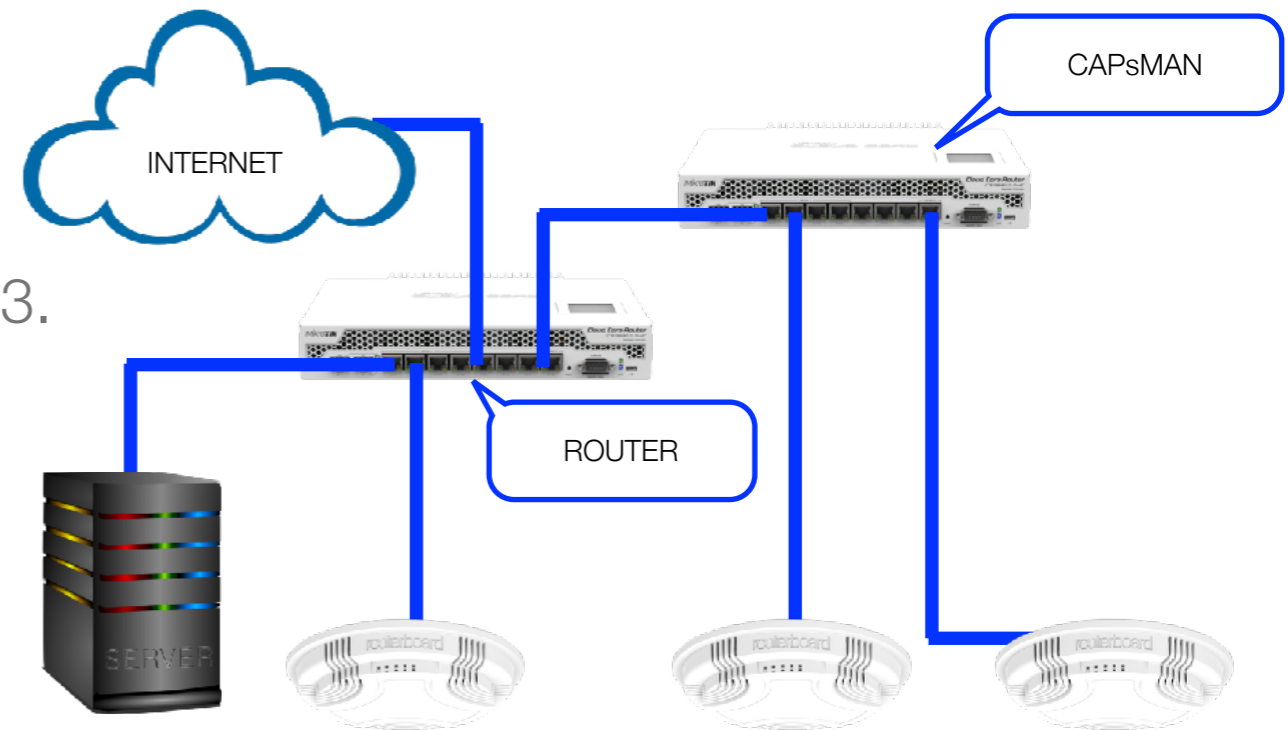
## 1. Interface WAN to Internet

## 2. Interface Lan

- create vlan
  - ether1 : vlan101, vlan102, and vlan103.
- ether1 CAPsMAN = 192.168.1.1/30
- ether2 CAP = 192.168.2.1/30
- vlan101 = 172.16.1.1/24
- vlan102 = 172.16.2.1/24

## 3. Interface Bridge

- create br-hs = 172.16.3.1/24 and add port interface vlan103 to br-hs



# Implementation

## 4. CAPsMAN Configuration

The image illustrates the steps to configure CAPsMAN in Mikrotik WinBox:

- 1**: Selecting the **CAPsMAN** option from the left sidebar.
- 2**: Clicking the **Manager** button in the CAPsMAN configuration window.
- 3**: Configuring the CAPs Manager dialog, including:
  - Enabled:
  - Certificate: auto
  - CA Certificate: auto
  - Require Peer Certificate:
  - Generated Certificate: [Empty field]
  - Generated CA Certificate: [Empty field]



# Implementation

## 5. CAP1 Configuration

The image shows the Mikrotik WinBox configuration interface for a CAP (Control Access Point) and a corresponding network diagram. The configuration window is titled "Wireless Tables" and has several tabs: "Interfaces", "Nstreme Dual", "Access List", "Registration", "Connect List", "Security Profile", "CAP", "Scanner", "Freq. Usage", and "Align". The "CAP" tab is selected, and the configuration is for the "wan1" interface. The configuration includes:

- Enabled
- Interfaces: wan1
- Certificate: request
- Discovery Interfaces: (empty)
- Lock To CAPsMAN
- CAPsMAN Addresses: 192.168.1.2
- CAPsMAN Names: RO-CAPsMAN
- CAPsMAN Certificate Common Names: (empty)
- Bridge: none
- Requested Certificate: CAP-D4CA6DF24E80
- Locked CAPsMAN Common Name: CAPsMAN-000C42A493A3

The network diagram illustrates the following components and connections:

- INTERNET**: A cloud icon representing the external network.
- SERVER**: A server rack icon connected to the Internet cloud.
- ROUTER**: A central router icon connected to the Internet cloud and the CAPsMAN switch.
- CAPsMAN**: A switch icon connected to the Router and three CAPs.
- CAP1**, **CAP2**, and **CAP3**: Three access point icons connected to the CAPsMAN switch.

Blue callouts and lines connect the configuration window to the diagram: "1" points to the "Wireless" menu, "2" points to the "CAP" tab, and "3" points to the "Enabled" checkbox.



# Implementation

## 6. CAP2 dan CAP3 Configuration

The image displays the Mikrotik WinBox configuration interface for a CAP (Client Access Profile) and a corresponding network diagram. The CAP configuration window is titled "CAP" and is currently set to "Enabled". The configuration includes the following fields:

- Interfaces: wlan1
- Certificate: request
- Discovery Interfaces: ether1
- Lock To CAPsMAN:
- CAPsMAN Addresses: (empty)
- CAPsMAN Names: RO-CAPsMAN
- CAPsMAN Certificate Common Names: (empty)
- Bridge: none
- Requested Certificate: CAP-D4CA6DF24E80
- Locked CAPsMAN Common Name: CAPsMAN-000C42A493A3

The network diagram illustrates the implementation of CAP2 and CAP3. It shows a central "ROUTER" connected to an "INTERNET" cloud and a "SERVER". The router is also connected to a "CAPsMAN" device. Three "CAP" devices (CAP1, CAP2, and CAP3) are connected to the router. CAP1 is connected to the router's ether1 interface. CAP2 and CAP3 are connected to the router's wlan1 interface. The diagram also shows a "SERVER" connected to the router's ether1 interface.

Numbered callouts in the WinBox screenshot indicate the following steps:

1. Select the "Wireless" menu item in the left sidebar.
2. Click the "CAP" button in the top toolbar.
3. Click the "Apply" button in the CAP configuration window.

# Implementation

## 10. CAPsMAN Security

The screenshot shows the CAPsMAN Security Configuration dialog box for a configuration named 'security1'. The dialog is titled 'CAPs Security Configuration <security1>' and contains the following fields and options:

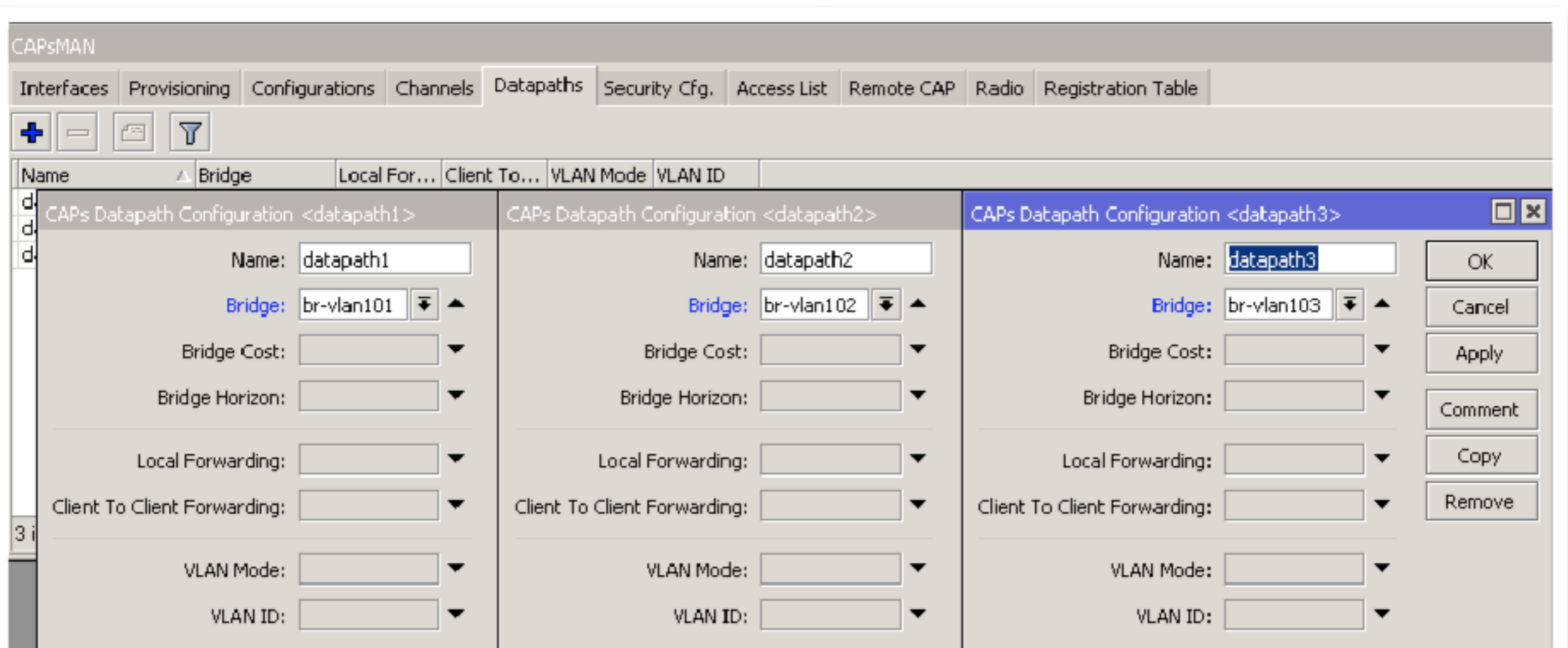
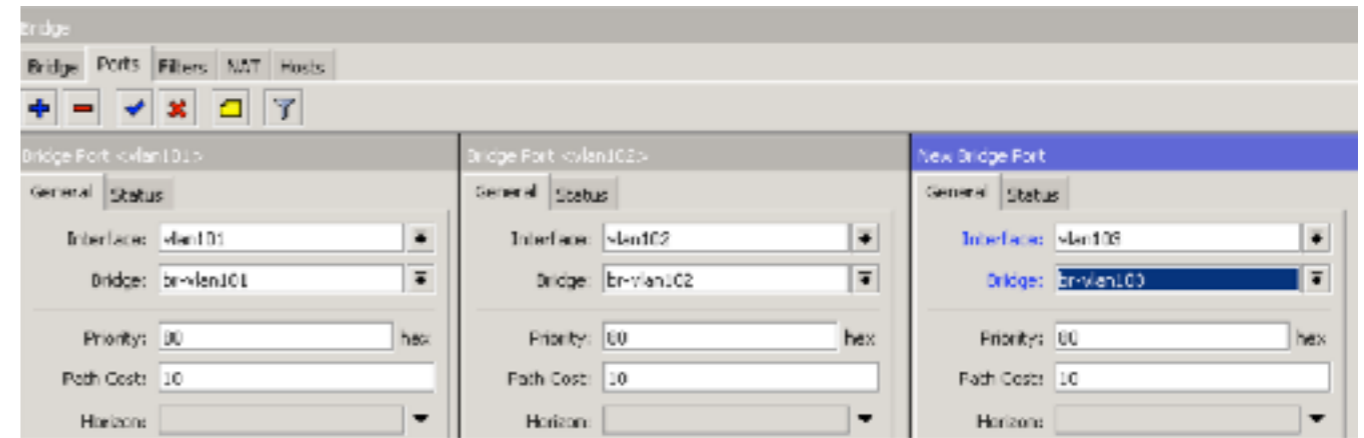
- Name: security1
- Authentication Type:  WPA PSK,  WPA2 PSK,  WPA EAP,  WPA2 EAP
- Encryption:  aes ccm,  tkip
- Group Encryption: (empty field)
- Passphrase: \*\*\*\*\*
- EAP Methods: (empty field)
- EAP Radius Accounting: (empty field)
- TLS Mode: (empty field)
- TLS Certificate: (empty field)

Buttons on the right side of the dialog include OK, Cancel, Apply, Comment, Copy, and Remove. The background window shows a table with the following data:

Name	Authentication T...	Encryption	Group Encryption	Passphrase	EAP Methods
security1	WPA PSK WPA2 ...	aes ccm tkip		*****	

# Implementation

## 9. CAPsMAN Datapaths



# Implementation

## 8. CAPsMAN Configuration

CAPsMAN

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

+ - [ ] [ ]

Name	Frequency	Width	Band	Extension Channel	Tx. Power
channel1	2412MHz	20MHz	2ghz-b/g/n		
channel6	2437MHz	20MHz	2ghz-b/g/n		
channel12	2462MHz	20MHz	2ghz-b/g/n		

CAPs Channel <channel1>

Name:

Frequency:  MHz ▲

Width:  MHz ▲

Band:  ▼ ▲

Extension Channel:  ▼

Tx. Power:  ▼

CAPs Channel <channel6>

Name:

Frequency:  MHz ▲

Width:  MHz ▲

Band:  ▼ ▲

Extension Channel:  ▼

Tx. Power:  ▼

CAPs Channel <channel12>

Name:

Frequency:  MHz ▲

Width:  MHz ▲

Band:  ▼ ▲

Extension Channel:  ▼

Tx. Power:  ▼

OK

Cancel

Apply

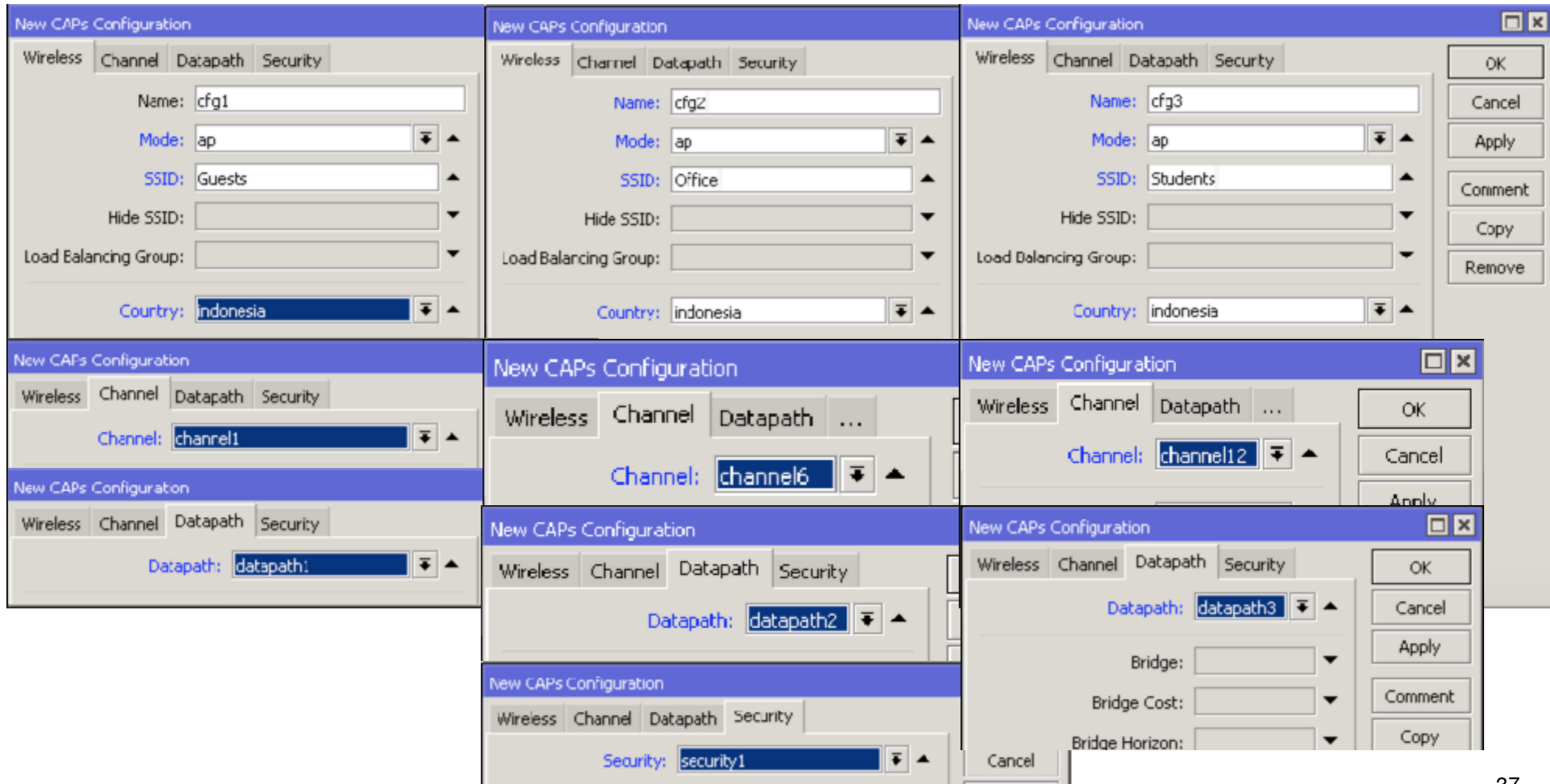
Comment

Copy

Remove

# Implementation

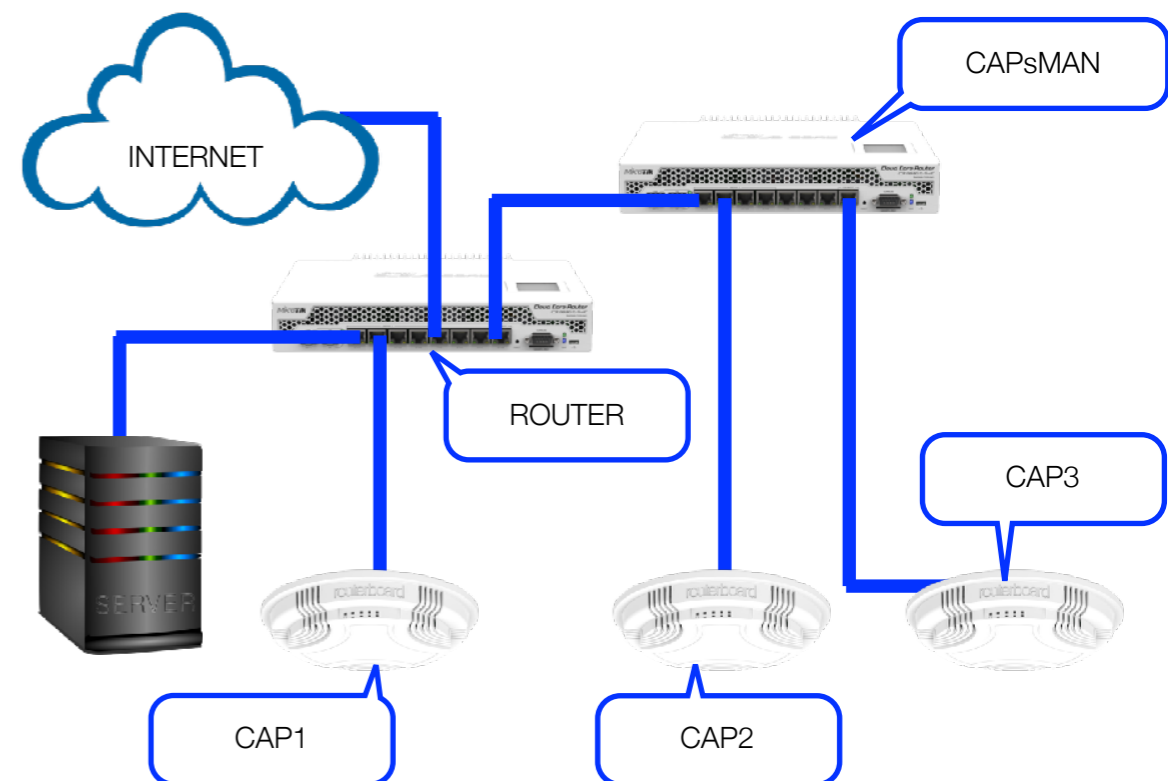
## 7. CAPsMAN Configuration



# Implementation

## 11. CAPsMAN Interfaces

- CAP1 = Office and Student
- CAP2 = Guest, Office and Student
- CAP3 = Guest and Office



# Kesimpulan

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- ▶ CAPsMAN mempermudah administrator memonitor Akses Point secara terpusat
- ▶ CAPsMAN memungkinkan untuk dapat menentukan lewat mana trafik data yang akan dilewatkan user

# Further Reading

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- ▶ <http://wiki.mikrotik.com/wiki/Manual:CAPsMAN>
- ▶ <http://download2.mikrotik.com/news/mikrotik-news-59-JUN2014.pdf>





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– Rivan Firman Maulana



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