



Create Virtual AP for Network Campus with Mikrotik

Mikrotik User Meeting
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Introduction

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- Bachelor degree on Physics, 2007
- Work at Ufoakses Indonesia
 - Mikrotik Resseler, ISP, Mikrotik & Training Partners

My Company

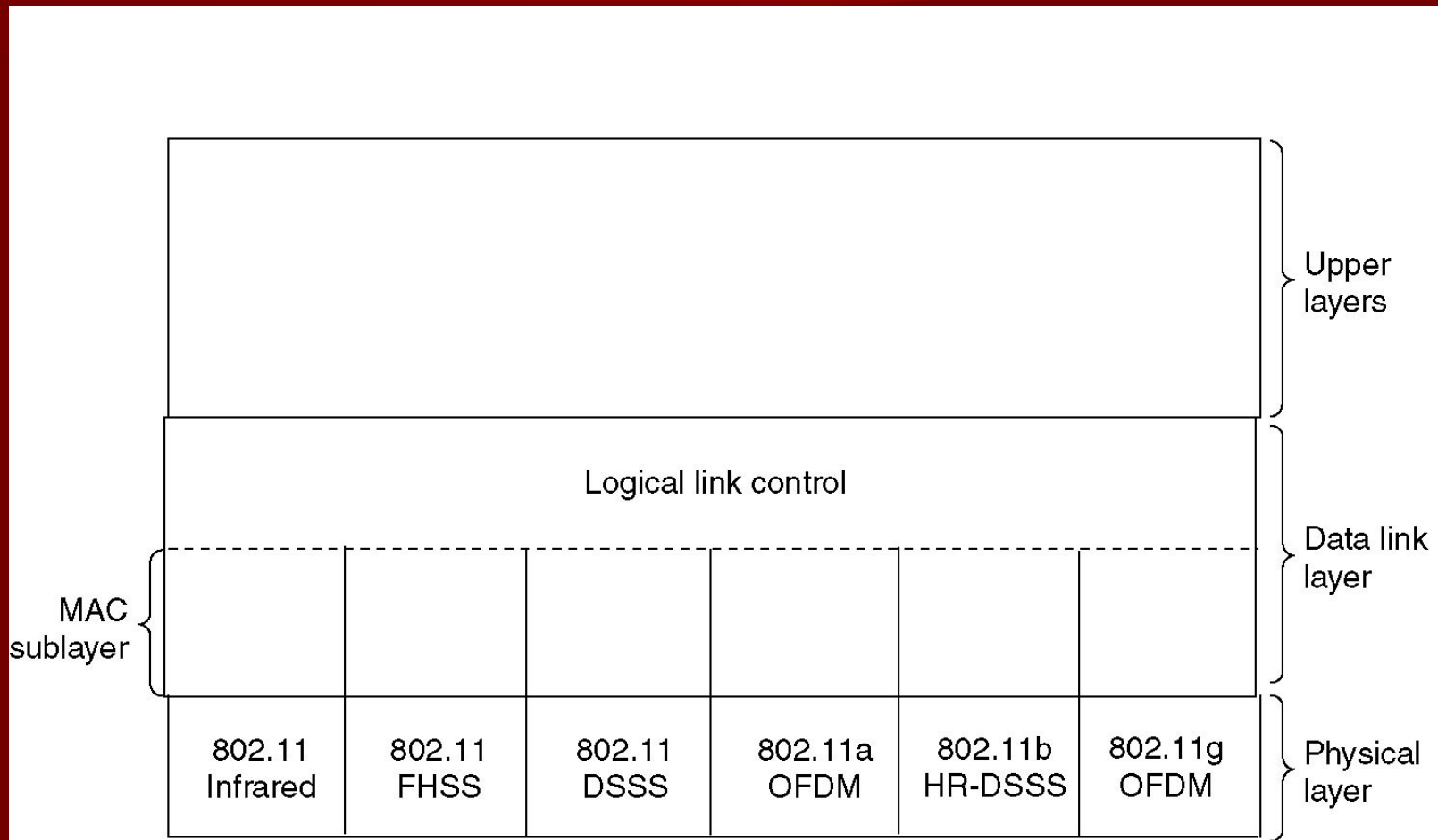
- PT Ufoakses Sukses Luarbiasa
- Located at Jakarta Indonesia
- Using RouterOs since 2005



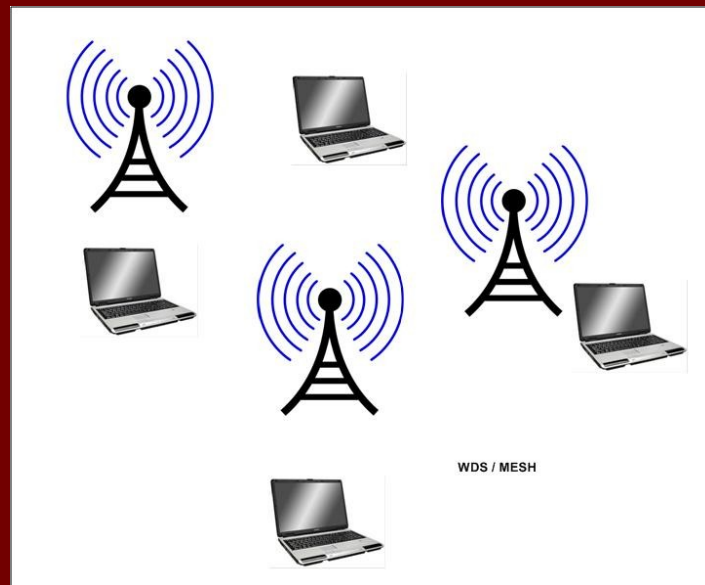
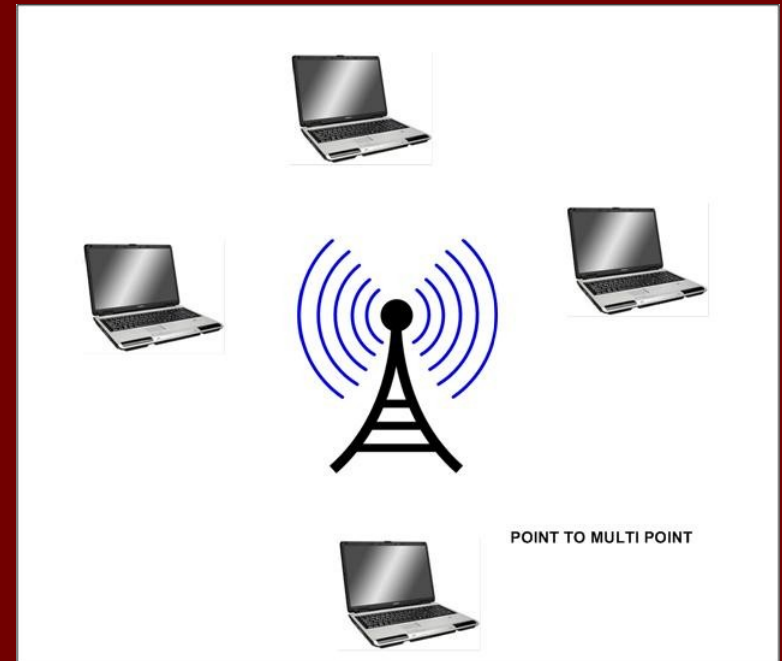
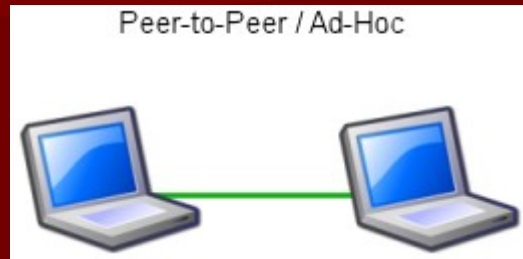
Basic Wireless

- Wireless network is technology which interconnected to computer using radio frequency as transmission media
- Wireless networking work in the data link layer and Uses Protocol 802.11 a/b/g/e

The 802.11 Protocol Stack



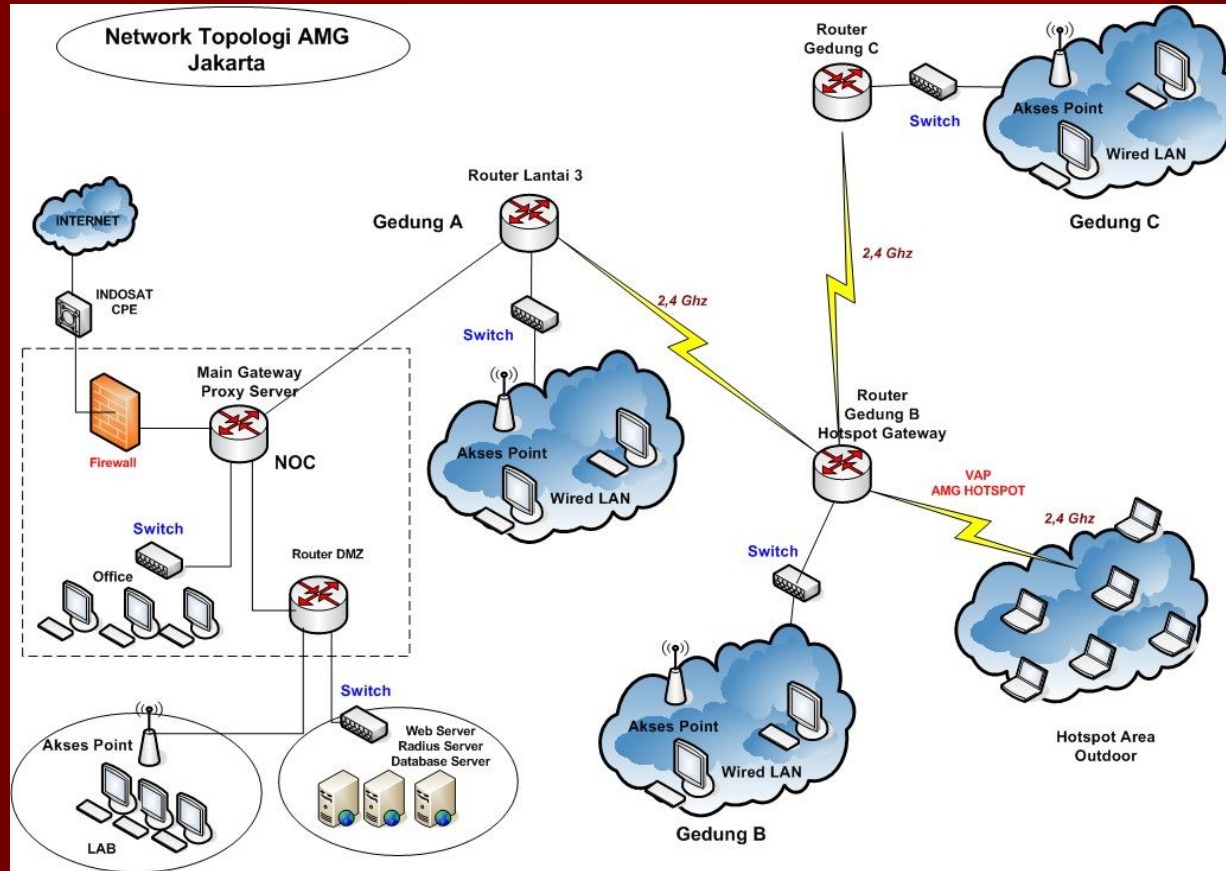
Wireless Topology



Wireless & Mikrotik

- Why Using Mikrotik Wireless
 - Flexible
 - Powerfull
 - Routing Capabilities
 - Capability to do virtual AP
 - Wide range voltage power input
 - Lots of feature

Wireless Network



Wireless Network with VAP

What is Access Point ?

- A device that allows wireless communication devices to connect to a wireless network.
- As RF Signal Transmitter
- There are several modes of AP
 - AP Bridge (Point To Multi Point)
 - Bridge (Point to Point)

What is Virtual AP ?

- Virtual Access Point (VAP) interface is used to have an additional AP
- You can create a new AP with different **ssid** and **mac-address**
- It can be compared with a VLAN where the **ssid** from VAP is the VLAN **tag** and the hardware interface is the VLAN switch.
- You can add up to 128 VAP interfaces for each hardware interface.

When Use Virtual AP ?

- The Lack of physical wireless Interface
- Virtual APs allow a single interface to offer multiple services, as well as enabling multiple function to share the same physical infrastructure. Such As for Hotspot, Connecting to building,etc..
- Allow a single provider to offer multiple services, as well as enabling multiple providers to share the same physical infrastructure.

Why used Virtual AP ?

- Profitable because we only use just a single interface for many services
- This works as a “VLAN”, but on a wireless interface
- Every virtual AP could be given a IP address and unique SSID

How to Create Virtual AP in Mikrotik

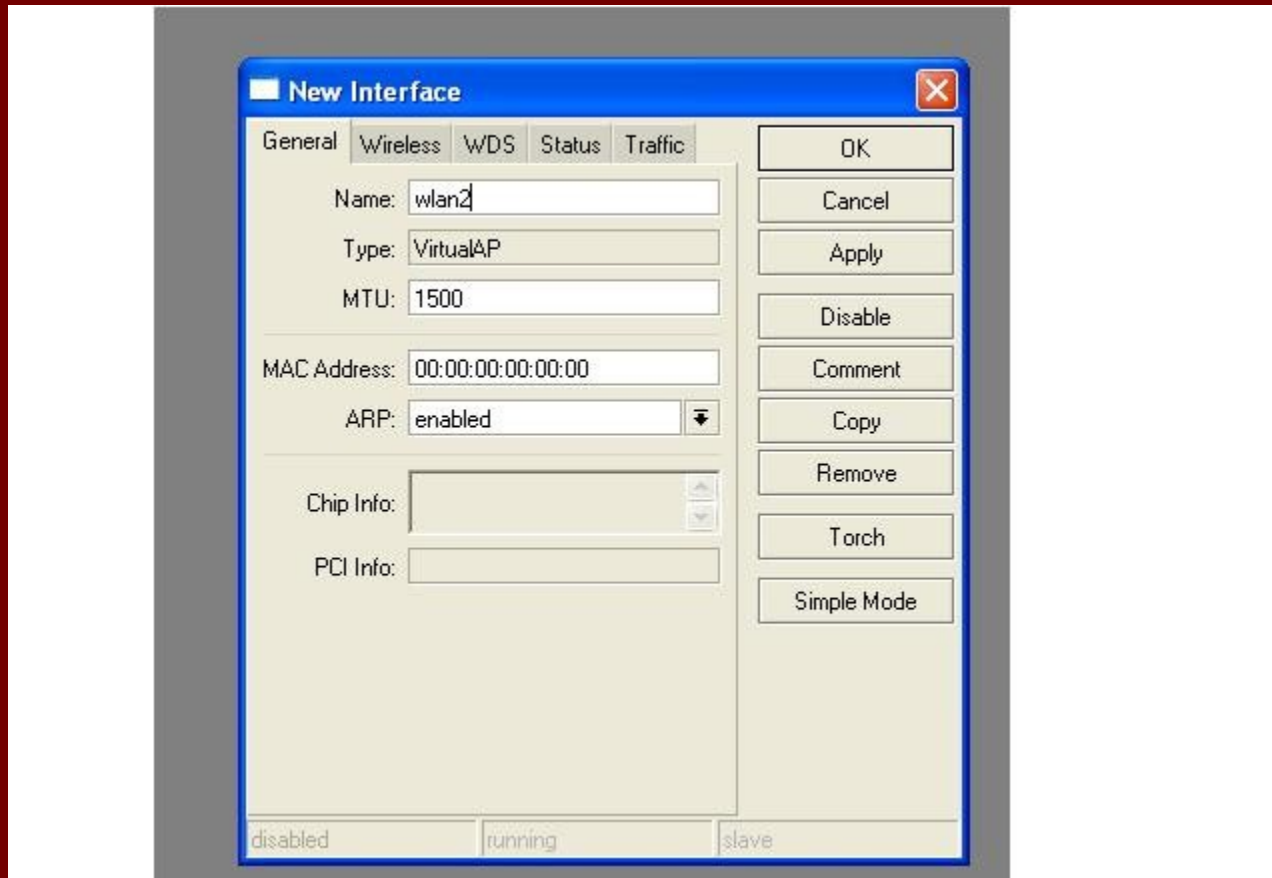
The screenshot shows the Mikrotik WinBox 'Interface List' window. The 'Interface' tab is selected, and the 'Type' column is visible. The 'VirtualAP' option is highlighted in a red circle, and a red arrow points to it with the text 'VIRTUAL AP INTERFACE'.

Interface	Type	Tx	Rx	Tx Pac...	Rx Pac...
EoIP Tunnel	Ethernet	29.5 kbps	4.1 kbps	4	4
IP Tunnel	Ethernet	0 bps	0 bps	0	0
VLAN	Ethernet	0 bps	0 bps	0	0
VRRP	Ethernet	0 bps	0 bps	0	0
Bonding	Ethernet	0 bps	0 bps	0	0
Bridge	Ethernet	0 bps	0 bps	0	0
PPP Server	Ethernet	0 bps	0 bps	0	0
PPP Client	Ethernet	0 bps	0 bps	0	0
PPTP Server	Ethernet	0 bps	0 bps	0	0
PPTP Client	Wireless (Atheros AR5...	0 bps	0 bps	0	0
L2TP Server					
L2TP Client					
OVPN Server					
OVPN Client					
PPPoE Server					
PPPoE Client					
VirtualAP					
WDS					
Nstreme Dual					

Or Create in Wireless table



How to Create New Virtual AP ?



Wireless Tab

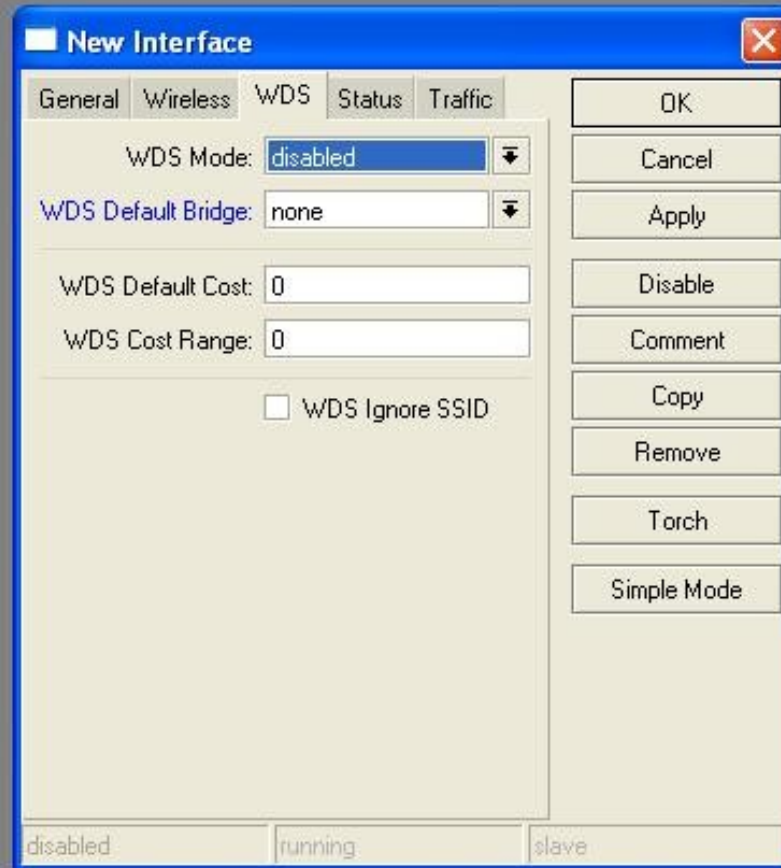
The image shows a screenshot of a network configuration window titled "New Interface". The "Wireless" tab is selected, showing various settings for a wireless interface. The "General" tab is also visible. The "Wireless" tab contains the following fields and options:

- SSID: [Empty field]
- Master Interface: wlan1
- Area: [Empty field]
- Security Profile: default
- Max Station Count: 2007
- Proprietary Extensions: post-2.9.25
- WMM Support: disabled
- Default AP Tx Rate: [Empty field] bps
- Default Client Tx Rate: [Empty field] bps
- Default Authenticate
- Default Forward
- Hide SSID

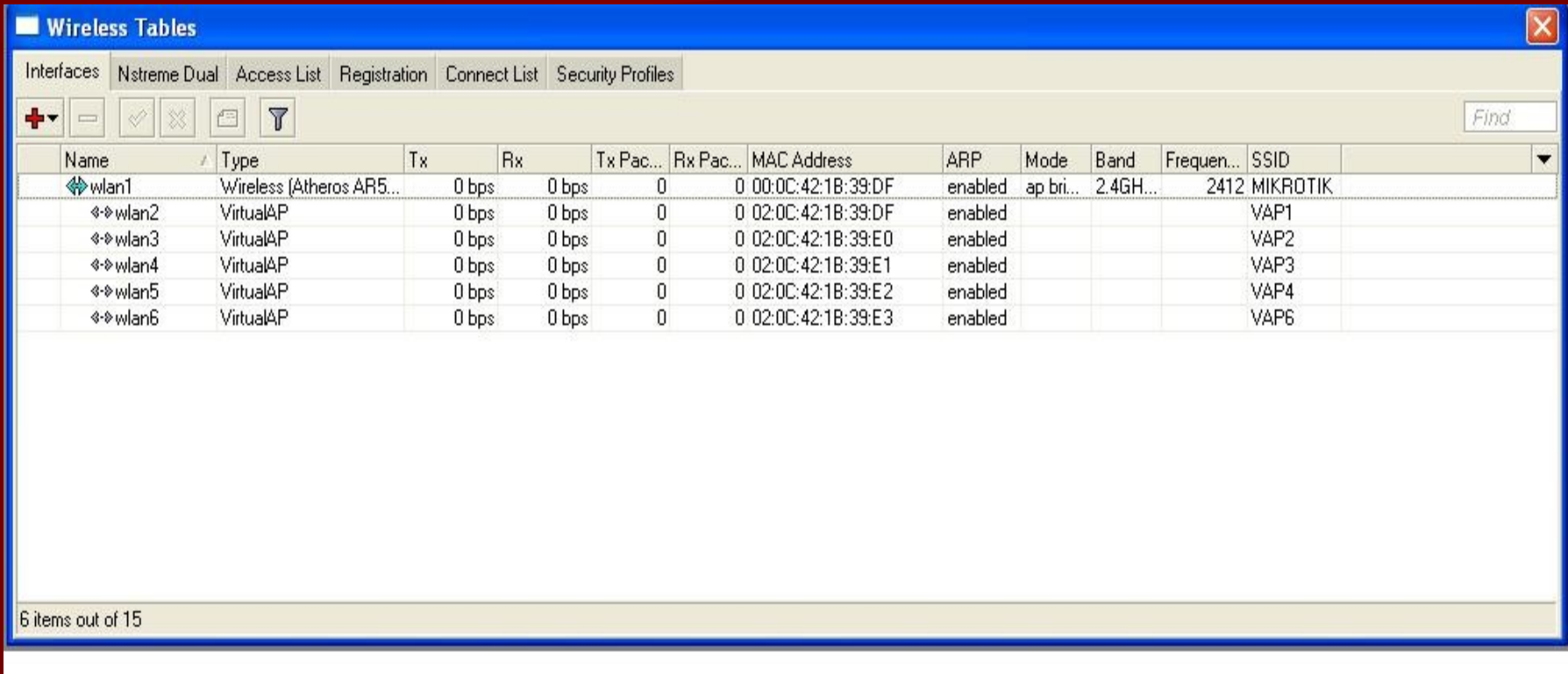
At the bottom of the window, there are three status indicators: "disabled", "running", and "slave".

On the right side of the window, there are several buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove, Torch, and Simple Mode.

WDS Mode In VAP



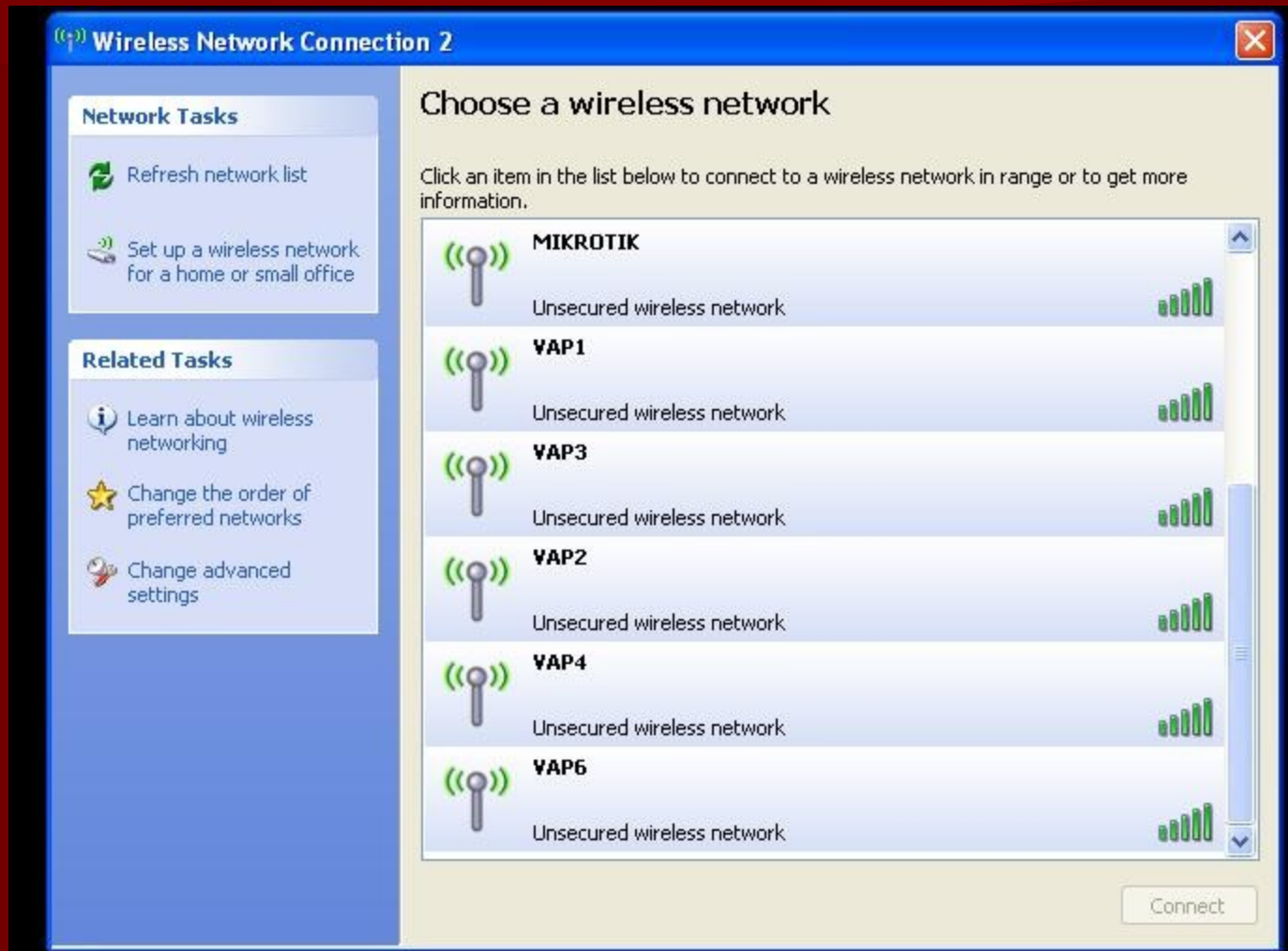
Look at the new Interfaces !!!



The screenshot shows the 'Wireless Tables' window in Mikrotik WinBox. The window has a blue title bar and a menu bar with 'Interfaces', 'Nstreme Dual', 'Access List', 'Registration', 'Connect List', and 'Security Profiles'. Below the menu bar is a toolbar with icons for adding, deleting, and filtering, and a search box labeled 'Find'. The main area contains a table with the following columns: Name, Type, Tx, Rx, Tx Pac..., Rx Pac..., MAC Address, ARP, Mode, Band, Frequen..., and SSID. The table lists six wireless interfaces: wlan1 (Wireless (Atheros AR5...)), wlan2 (VirtualAP), wlan3 (VirtualAP), wlan4 (VirtualAP), wlan5 (VirtualAP), and wlan6 (VirtualAP). The status bar at the bottom indicates '6 items out of 15'.

Name	Type	Tx	Rx	Tx Pac...	Rx Pac...	MAC Address	ARP	Mode	Band	Frequen...	SSID
wlan1	Wireless (Atheros AR5...	0 bps	0 bps	0	0	00:0C:42:1B:39:DF	enabled	ap bri...	2.4GH...	2412	MIKROTIK
wlan2	VirtualAP	0 bps	0 bps	0	0	02:0C:42:1B:39:DF	enabled				VAP1
wlan3	VirtualAP	0 bps	0 bps	0	0	02:0C:42:1B:39:E0	enabled				VAP2
wlan4	VirtualAP	0 bps	0 bps	0	0	02:0C:42:1B:39:E1	enabled				VAP3
wlan5	VirtualAP	0 bps	0 bps	0	0	02:0C:42:1B:39:E2	enabled				VAP4
wlan6	VirtualAP	0 bps	0 bps	0	0	02:0C:42:1B:39:E3	enabled				VAP6

The Results



Virtual AP Properties

- Arp = ARP mode
- default-authentication = whether to accept or reject a client that wants to associate, but is not in the access-list
- default-forwarding = whether to forward frames to other AP clients or not
- Hide-ssid = whether to hide ssid or not in the beacon frames:
- MAC-address = MAC address of VAP. You can
- Define your own value for mac-address
- Master-interface = hardware interface to use for VAP
- SSID = the service set identifier

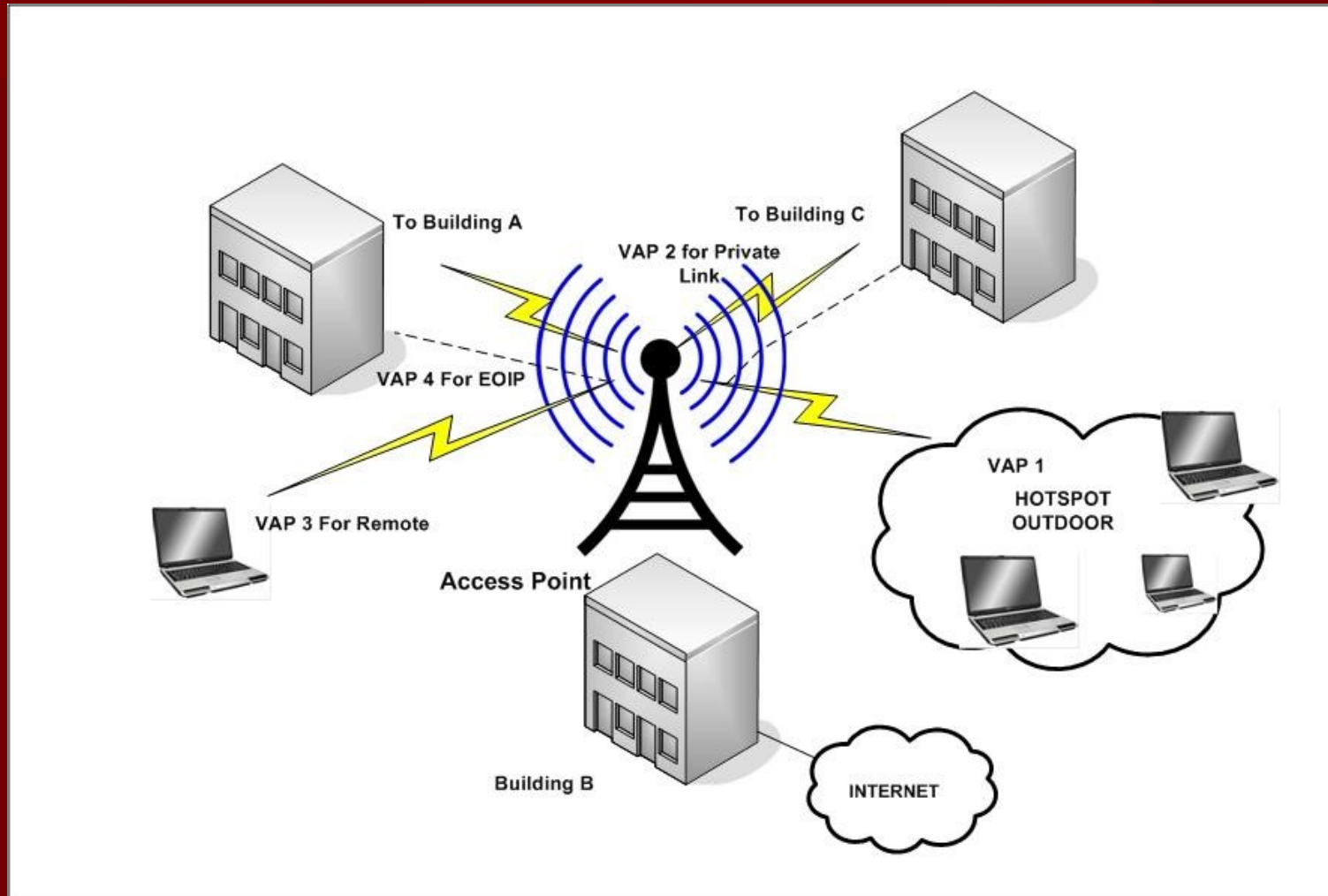
VAP Scenarios

- 1 SSID for link intranet with hidden SSID
- 1 SSID for remote access with Security profile (WPA, WEP)
- 1 SSID for tunnel with EOIP
- 1 SSID for public Hotspot
- 1 SSID for WDS / Mesh
- 1 SSID for dial PPP via Wifi
- Etc...

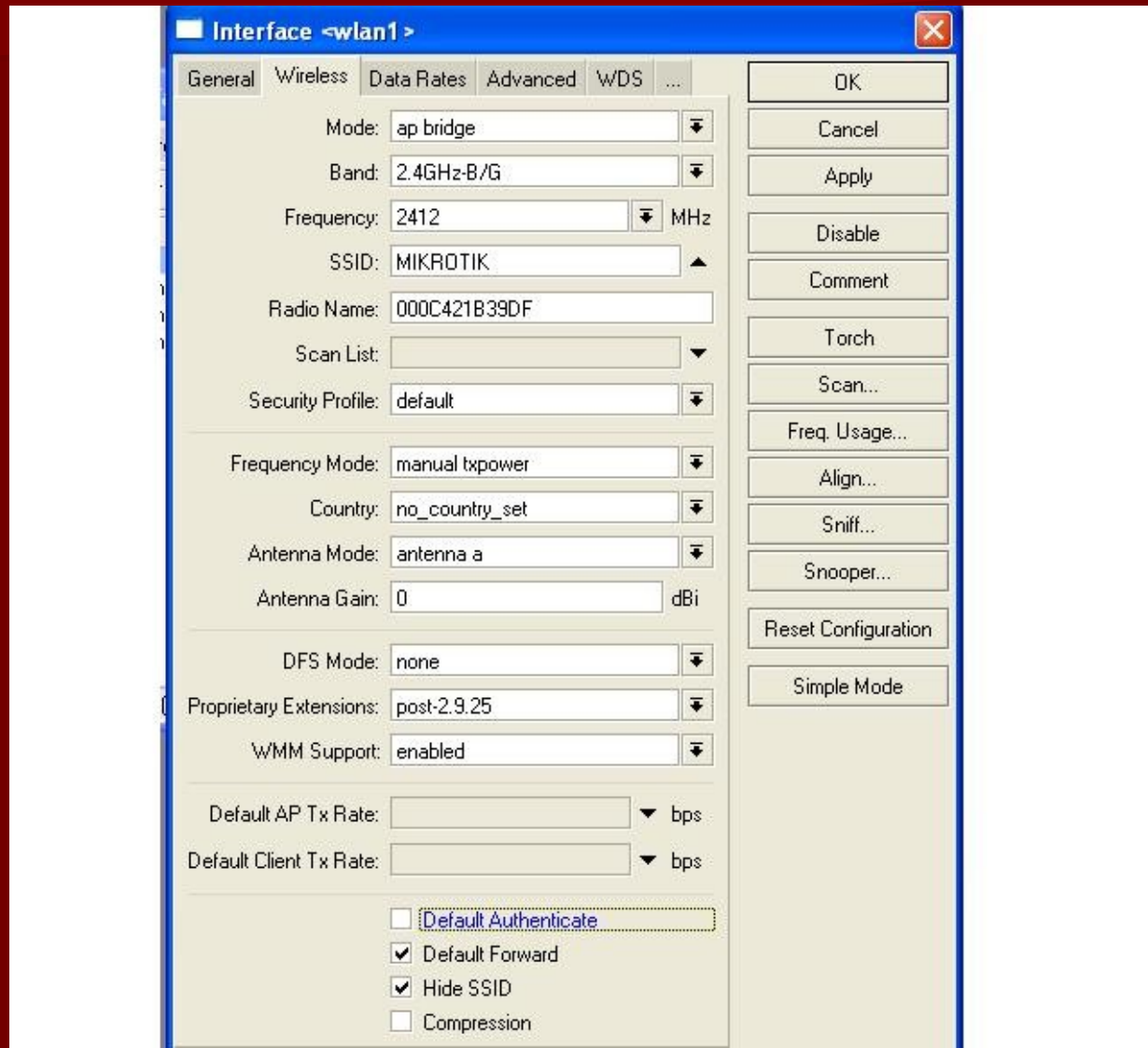
Case Study in Campus Network

- Requirements :
 - Utilizing wireless network link
 - 3 building must be connected, each parted with approximately 300m range
- Solutions :
 - Equipments :
 - 1 RB 600 and 1 antenna omni 9 dBi
 - 2 RB 411 for station with panel antenna 14 dBi
 - Use 3 VAP for
 - Connected the building A,B,C
 - Must Be Public hotspot in outdoor area
 - Need Tunnel EOIP for VOIP Server
 - Monitoring wifi

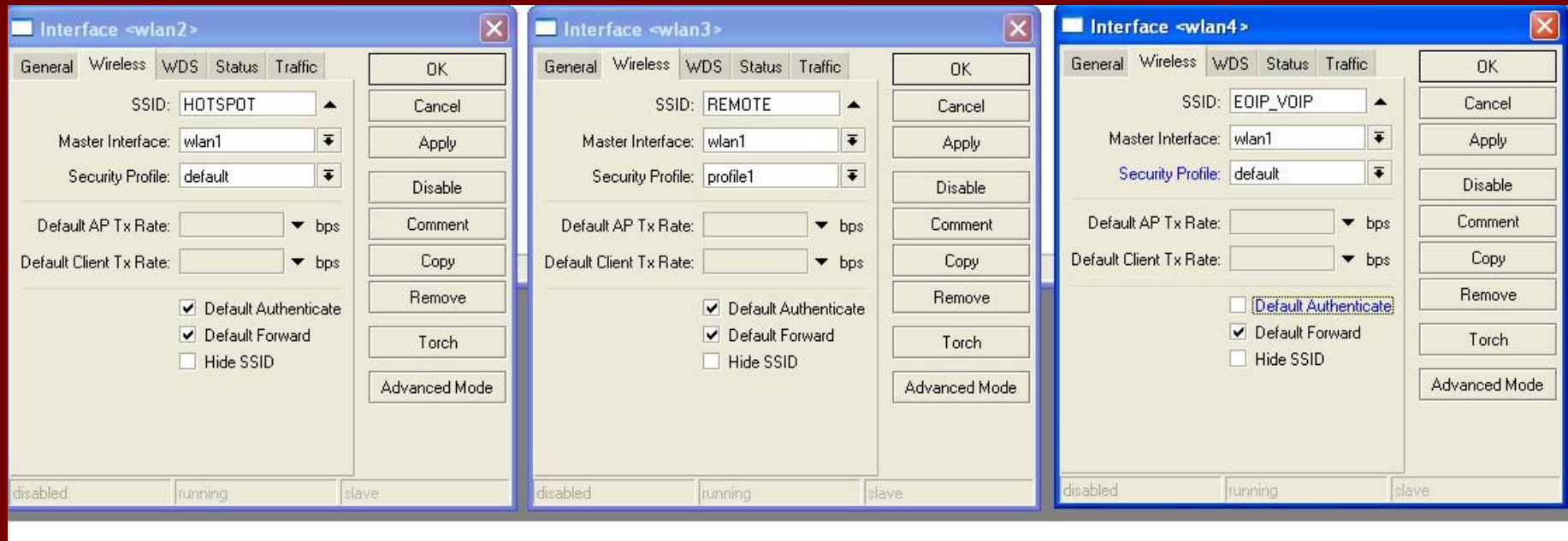
Network Scheme in Campus



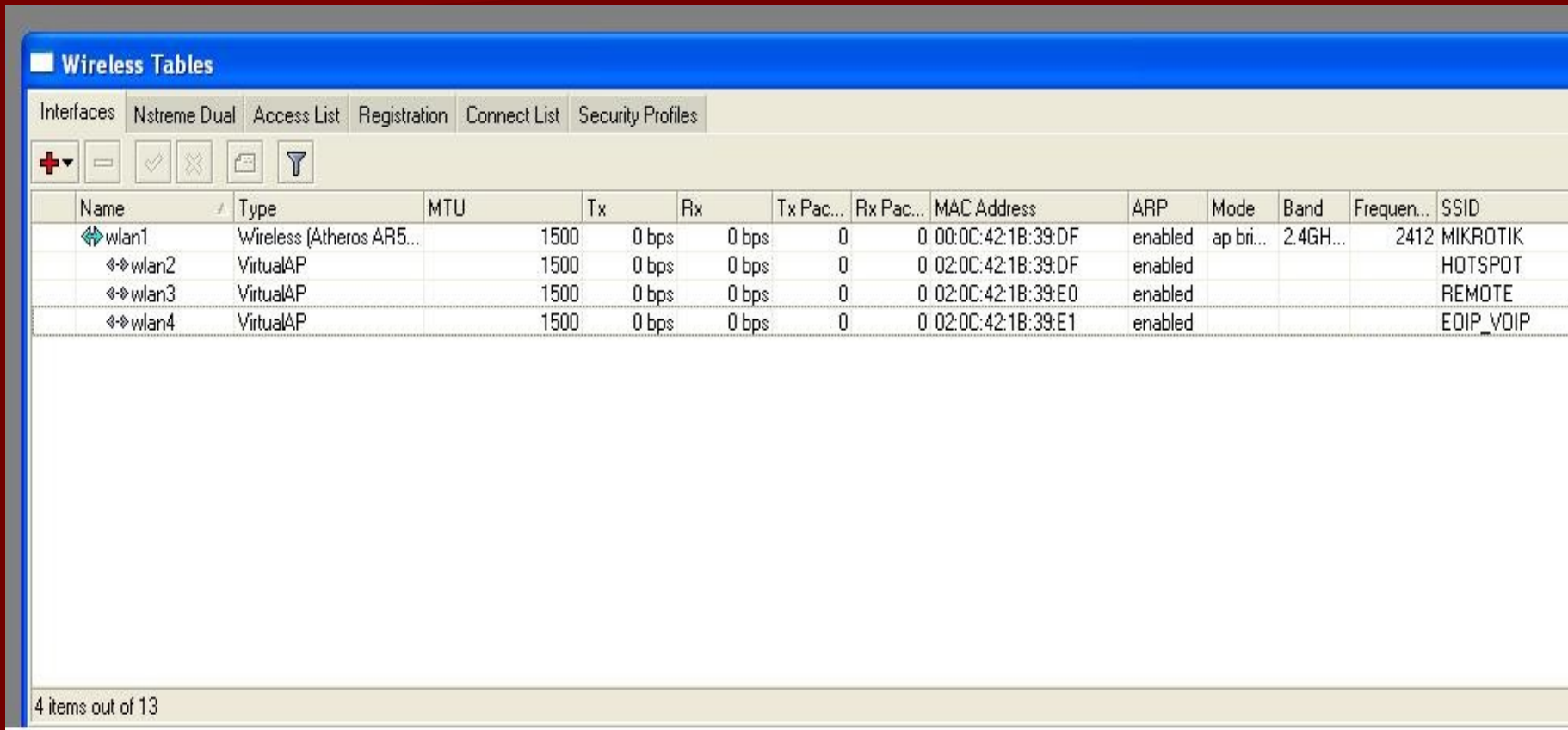
- Create AP as Master Interface at Building B



2. Create 3 VAP in Wlan1



New Interface has been created !!

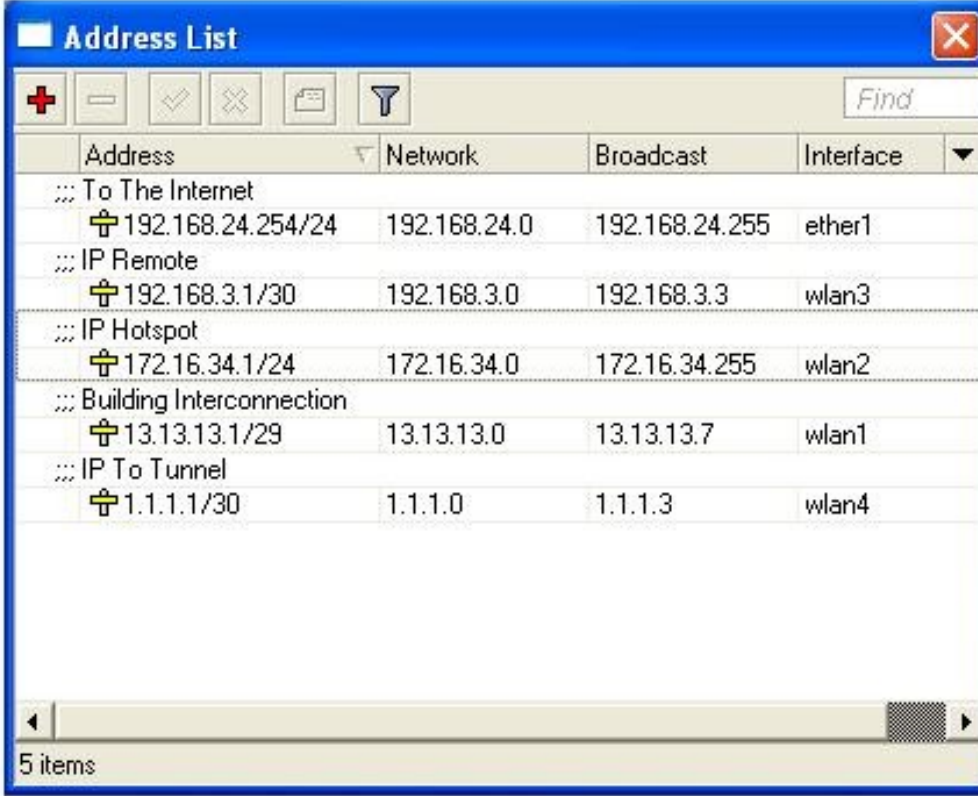


The screenshot shows the Mikrotik WinBox interface for managing wireless tables. The title bar reads "Wireless Tables". Below the title bar, there are several tabs: "Interfaces", "Nstreme Dual", "Access List", "Registration", "Connect List", and "Security Profiles". The "Interfaces" tab is currently selected. Below the tabs, there is a toolbar with icons for adding (+), deleting (-), checking (✓), unchecking (✗), saving (floppy disk), and filtering (funnel). The main area contains a table with the following columns: Name, Type, MTU, Tx, Rx, Tx Pac..., Rx Pac..., MAC Address, ARP, Mode, Band, Frequen..., and SSID. The table lists four wireless interfaces: wlan1 (Wireless (Atheros AR5...)), wlan2 (VirtualAP), wlan3 (VirtualAP), and wlan4 (VirtualAP). All interfaces have an MTU of 1500 and are currently disabled (Tx and Rx rates are 0 bps). The MAC addresses are 00:0C:42:1B:39:DF for wlan1, 02:0C:42:1B:39:DF for wlan2, 02:0C:42:1B:39:E0 for wlan3, and 02:0C:42:1B:39:E1 for wlan4. The ARP column shows "enabled" for all. The Mode column shows "ap bri..." for wlan1 and is empty for the others. The Band column shows "2.4GH..." for wlan1 and is empty for the others. The Frequen... column shows "2412" for wlan1 and is empty for the others. The SSID column shows "MIKROTIK" for wlan1, "HOTSPOT" for wlan2, "REMOTE" for wlan3, and "EOIP_VOIP" for wlan4.

Name	Type	MTU	Tx	Rx	Tx Pac...	Rx Pac...	MAC Address	ARP	Mode	Band	Frequen...	SSID
wlan1	Wireless (Atheros AR5...	1500	0 bps	0 bps	0	0	00:0C:42:1B:39:DF	enabled	ap bri...	2.4GH...	2412	MIKROTIK
wlan2	VirtualAP	1500	0 bps	0 bps	0	0	02:0C:42:1B:39:DF	enabled				HOTSPOT
wlan3	VirtualAP	1500	0 bps	0 bps	0	0	02:0C:42:1B:39:E0	enabled				REMOTE
wlan4	VirtualAP	1500	0 bps	0 bps	0	0	02:0C:42:1B:39:E1	enabled				EOIP_VOIP

4 items out of 13

3. Add IP Address for new Interface (wlan2,wlan3,wlan4)

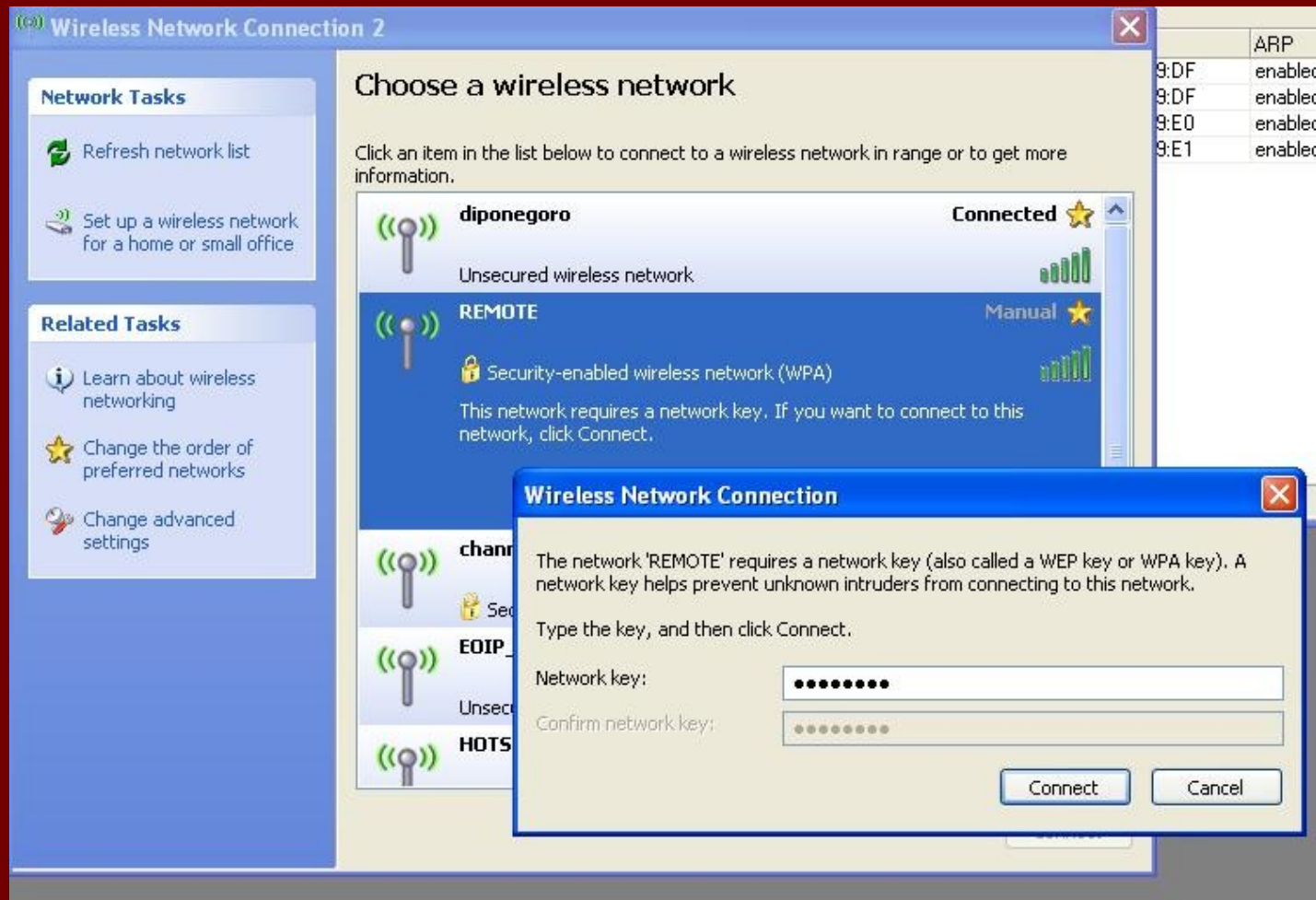


The screenshot shows the 'Address List' window in Mikrotik WinBox. The window contains a table with the following data:

Address	Network	Broadcast	Interface
::: To The Internet			
192.168.24.254/24	192.168.24.0	192.168.24.255	ether1
::: IP Remote			
192.168.3.1/30	192.168.3.0	192.168.3.3	wlan3
::: IP Hotspot			
172.16.34.1/24	172.16.34.0	172.16.34.255	wlan2
::: Building Interconnection			
13.13.13.1/29	13.13.13.0	13.13.13.7	wlan1
::: IP To Tunnel			
1.1.1.1/30	1.1.1.0	1.1.1.3	wlan4

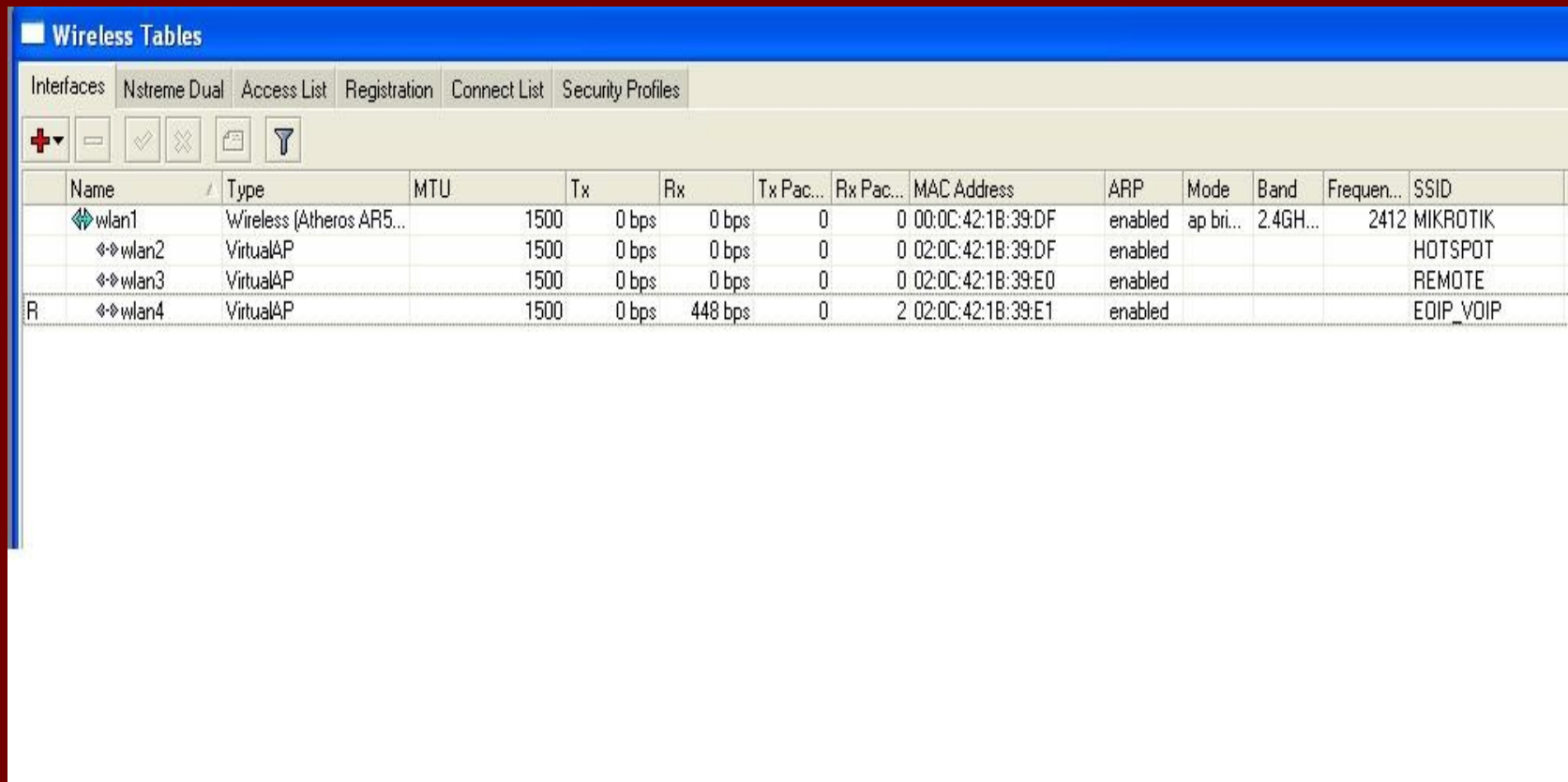
At the bottom of the window, it indicates '5 items'.

Scenario 1: Try Connect with SSID “ REMOTE “ for Maintenance services



Scenario 2 :

Results Connect to VAP 3 (wlan4) between Router for Tunnel function



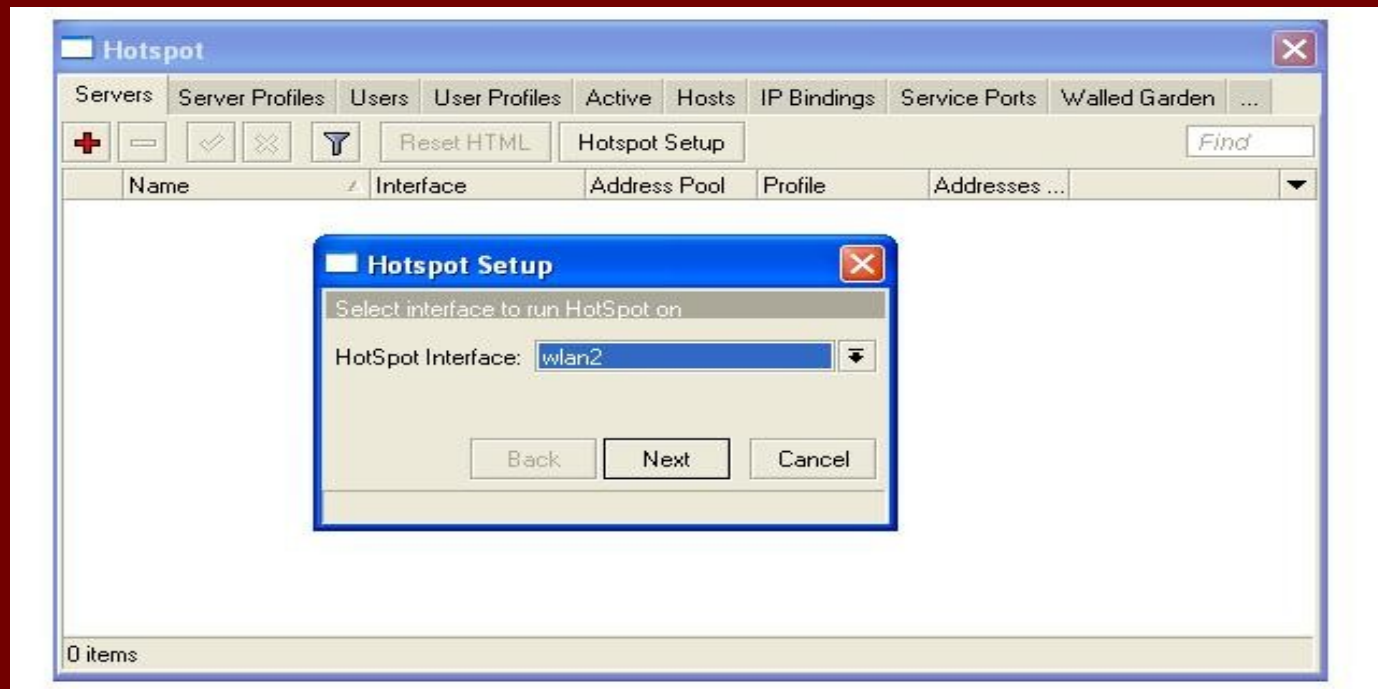
The screenshot shows the Mikrotik WinBox interface for the 'Wireless Tables' section. The 'Interfaces' tab is selected, displaying a table of wireless interfaces. The table has columns for Name, Type, MTU, Tx, Rx, Tx Pac..., Rx Pac..., MAC Address, ARP, Mode, Band, Frequen..., and SSID. The wlan4 interface is highlighted with a red background, indicating it is selected. The wlan4 interface is a VirtualAP with an MTU of 1500, and it shows 448 bps of Rx traffic. The MAC address is 02:0C:42:1B:39:E1 and the SSID is EQIP_VOIP.

Name	Type	MTU	Tx	Rx	Tx Pac...	Rx Pac...	MAC Address	ARP	Mode	Band	Frequen...	SSID
wlan1	Wireless (Atheros AR5...	1500	0 bps	0 bps	0	0	00:0C:42:1B:39:DF	enabled	ap bri...	2.4GH...	2412	MIKROTIK
wlan2	VirtualAP	1500	0 bps	0 bps	0	0	02:0C:42:1B:39:DF	enabled				HOTSPOT
wlan3	VirtualAP	1500	0 bps	0 bps	0	0	02:0C:42:1B:39:E0	enabled				REMOTE
R wlan4	VirtualAP	1500	0 bps	448 bps	0	2	02:0C:42:1B:39:E1	enabled				EQIP_VOIP

Scenario 3

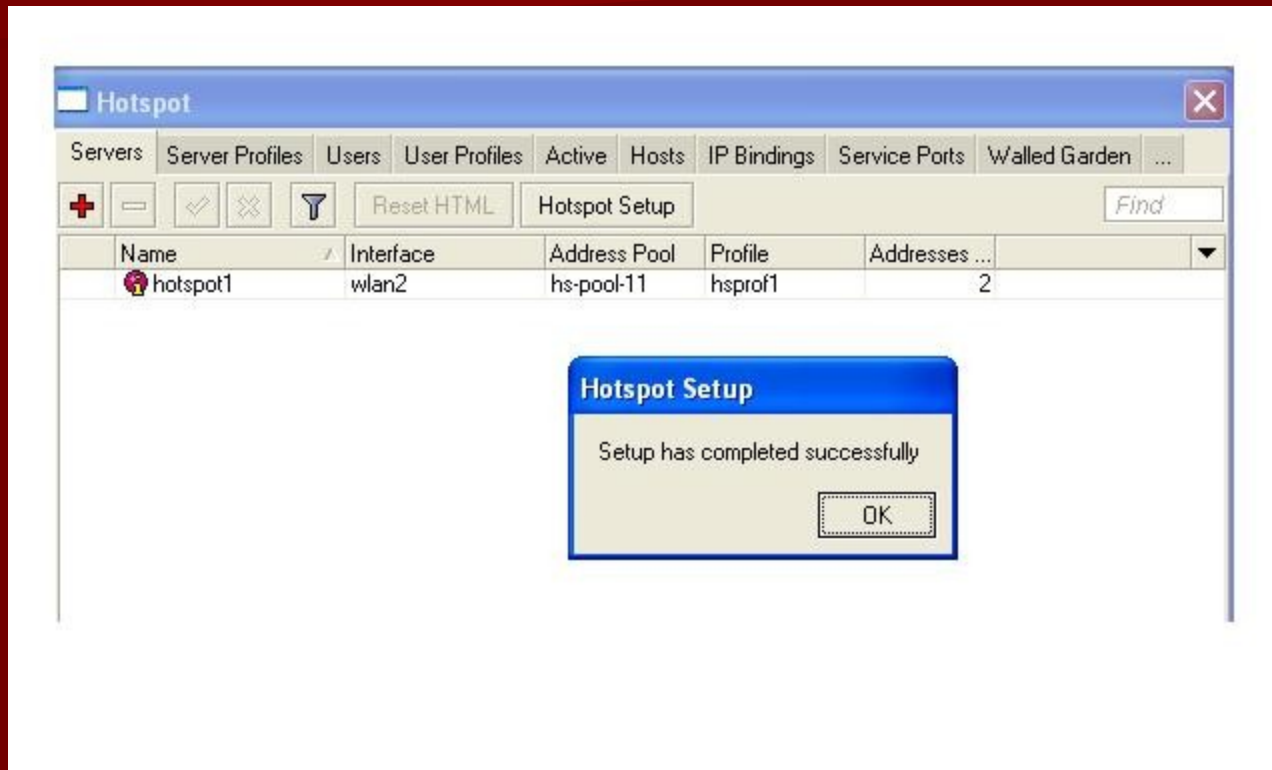
Setup VAP 2 (Wlan2) For Hotspot Services

- IP Hotspot
- Setup hotspot in interface wlan 2



- Just next step..... <http://www.ufoakses.co.id>

..8 step for build hotspot



- Hotspot will be ready to use !!

Scenario 4

Connected building using Wifi

- 2 routerboard at another building is set as follow mode station and connected to SSID MIKROTIK (Wlan1)
- Wlan1 is set as follow :
 - Mode Ap-Bridge
 - Band 2,4 GHz B/G
 - Hidden SSID
 - Access list
 - And Enable WMM

Wireless Access List

The screenshot displays a network configuration window titled "Wireless Tables" with a tabbed interface. The "Access List" tab is active, showing a table with two entries. The first entry is selected. A dialog box titled "AP Access Rule <00:0C:42:0C:0A:ED>" is open, showing the configuration for the selected rule.

MAC Address	Interface	Signal Str...	Authentication	Forwarding
00:0C:42:0C:0A:ED	wlan1	-120..120	no	
00:0C:42:0C:0A:ED	wlan1	-120..120	yes	

2 items (1 selected)

AP Access Rule <00:0C:42:0C:0A:ED>

MAC Address: 00:0C:42:0C:0A:ED

Interface: wlan1

Signal Strength Range: -120..120

AP Tx Limit: [dropdown]

Client Tx Limit: [dropdown]

Authentication

Forwarding

Private Key: none [dropdown] 0x [input]

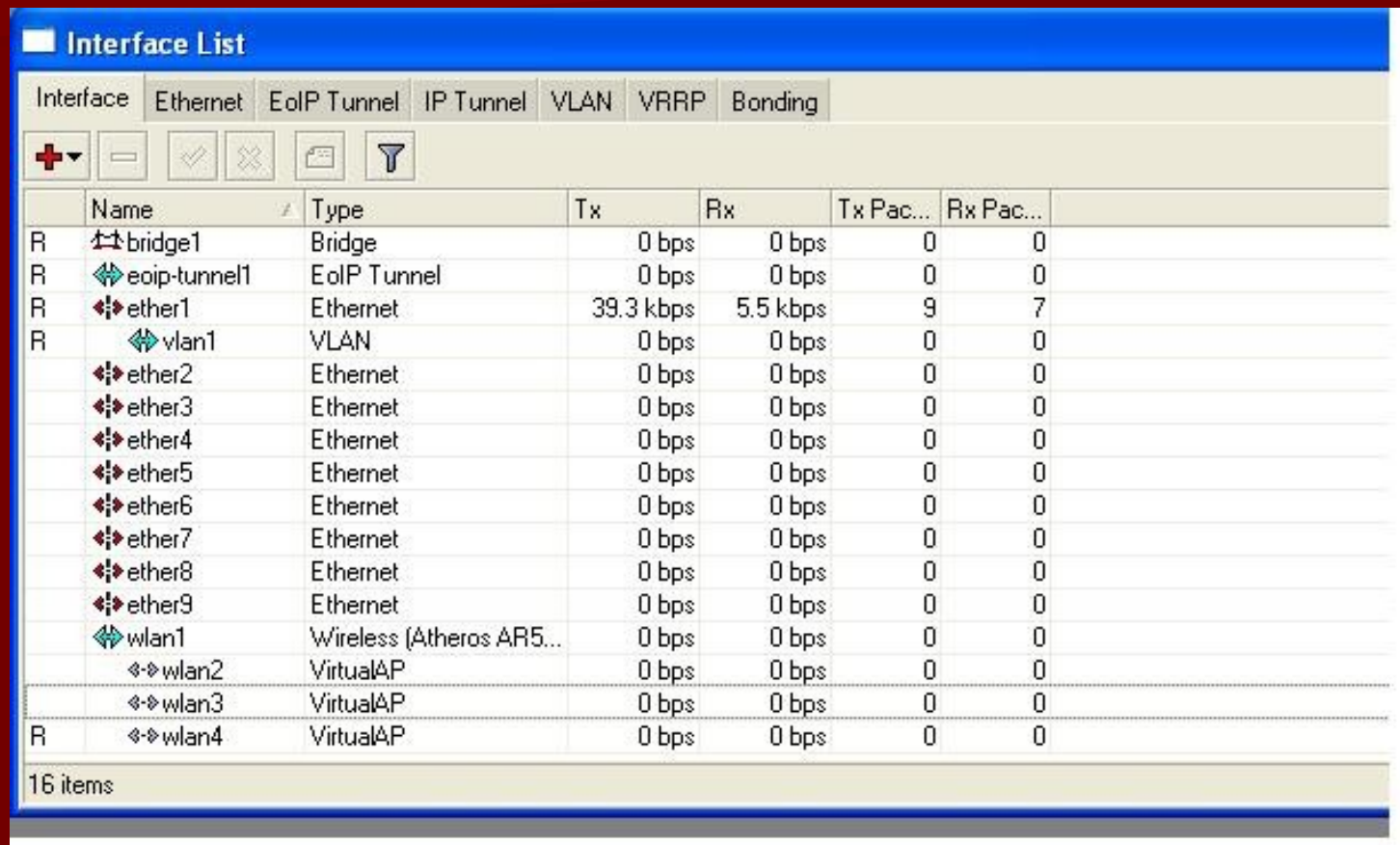
Private Pre Shared Key: [input]

Time: 08:00:00 - 18:00:00

sun mon tue wed thu fri sat

disabled

Created Interfaces has been shown below :



The screenshot shows a window titled "Interface List" with a blue header. Below the header is a tabbed interface with tabs for "Interface", "Ethernet", "EoIP Tunnel", "IP Tunnel", "VLAN", "VRRP", and "Bonding". The "Interface" tab is selected. Below the tabs are several icons: a plus sign, a minus sign, a checkmark, an X, a folder, and a funnel. The main area contains a table with the following columns: Name, Type, Tx, Rx, Tx Pac..., and Rx Pac... The table lists 16 items, including bridge1, eoip-tunnel1, ether1, vlan1, ether2 through ether9, wlan1, wlan2, wlan3, and wlan4. The status "R" is shown in the left margin for several rows. At the bottom of the window, it says "16 items".

	Name	Type	Tx	Rx	Tx Pac...	Rx Pac...
R	bridge1	Bridge	0 bps	0 bps	0	0
R	eoip-tunnel1	EoIP Tunnel	0 bps	0 bps	0	0
R	ether1	Ethernet	39.3 kbps	5.5 kbps	9	7
R	vlan1	VLAN	0 bps	0 bps	0	0
	ether2	Ethernet	0 bps	0 bps	0	0
	ether3	Ethernet	0 bps	0 bps	0	0
	ether4	Ethernet	0 bps	0 bps	0	0
	ether5	Ethernet	0 bps	0 bps	0	0
	ether6	Ethernet	0 bps	0 bps	0	0
	ether7	Ethernet	0 bps	0 bps	0	0
	ether8	Ethernet	0 bps	0 bps	0	0
	ether9	Ethernet	0 bps	0 bps	0	0
	wlan1	Wireless (Atheros AR5...	0 bps	0 bps	0	0
	wlan2	VirtualAP	0 bps	0 bps	0	0
	wlan3	VirtualAP	0 bps	0 bps	0	0
R	wlan4	VirtualAP	0 bps	0 bps	0	0

16 items

Quizz

- How many maximum virtual AP that you can create in a single physical interface ?
- Anyone with the correct answer will be rewarded a brand new RB 411 router + Adaptor, Free!!

THANKS !