Create Virtual AP for Network Campus with Mikrotik

Mikrotik User Meeting
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Introduction

- Name: Nicholaus Ola Malun, S.Si
- Nick Name: Nico
- Country: Jakarta, Indonesia
- 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

MAC sublayer

Logical link control

Upper layers

Data link layer

Physical layer

802.11 Infrared
802.11 FHSS
802.11 DSSS
802.11a OFDM
802.11b HR-DSSS
802.11g OFDM
Wireless Topology

Peer-to-Peer / Ad-Hoc

WDS / Mesh

Point to Multi Point
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

VIRTUAL AP INTERFACE
Or Create in Wireless table
How to Create New Virtual AP?
Wireless Tab
WDS Mode In VAP
Look at the new Interfaces !!!

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Tx</th>
<th>Rk</th>
<th>Tx Pac</th>
<th>Rx Pac</th>
<th>MAC Address</th>
<th>ARP</th>
<th>Mode</th>
<th>Band</th>
<th>Frequent</th>
<th>SSID</th>
</tr>
</thead>
<tbody>
<tr>
<td>wlan1</td>
<td>Wireless</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>00:0C:42:19:3E:2F</td>
<td>enabled</td>
<td></td>
<td></td>
<td>2.4G</td>
<td>MIKROTIK</td>
</tr>
<tr>
<td>wian2</td>
<td>VirtualAP</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:18:3E:2F</td>
<td>enabled</td>
<td></td>
<td></td>
<td></td>
<td>VAF1</td>
</tr>
<tr>
<td>wian3</td>
<td>VirtualAP</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:18:3E:E0</td>
<td>enabled</td>
<td></td>
<td>2.4G</td>
<td>VAF2</td>
<td></td>
</tr>
<tr>
<td>wian4</td>
<td>VirtualAP</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:18:3E:1F</td>
<td>enabled</td>
<td></td>
<td></td>
<td></td>
<td>VAF3</td>
</tr>
<tr>
<td>wian5</td>
<td>VirtualAP</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:18:3E:2E</td>
<td>enabled</td>
<td></td>
<td></td>
<td></td>
<td>VAF4</td>
</tr>
<tr>
<td>wian6</td>
<td>VirtualAP</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:18:3E:3E</td>
<td>enabled</td>
<td></td>
<td></td>
<td></td>
<td>VAF6</td>
</tr>
</tbody>
</table>

6 items out of 15
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 antena omnni 9 dBi
    - 2 RB 411 for station with panel antena 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!!

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>MTU</th>
<th>Tx</th>
<th>Rx</th>
<th>Tx Pac</th>
<th>Rx Pac</th>
<th>MAC Address</th>
<th>ARP</th>
<th>Mode</th>
<th>Band</th>
<th>Frequency</th>
<th>SSID</th>
</tr>
</thead>
<tbody>
<tr>
<td>wlan1</td>
<td>Wireless (Atheros AR5...</td>
<td>1500</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>00:0C:42:18:39:DF</td>
<td>enabled</td>
<td>ap bri...</td>
<td>2.4GHz...</td>
<td>2412</td>
<td>MIKROTIK</td>
</tr>
<tr>
<td>wlan2</td>
<td>VirtualAP</td>
<td>1500</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:18:39:DF</td>
<td>enabled</td>
<td>HOTSPOT</td>
<td>REMOTE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wlan3</td>
<td>VirtualAP</td>
<td>1500</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:18:39:E0</td>
<td>enabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wlan4</td>
<td>VirtualAP</td>
<td>1500</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:18:39:E1</td>
<td>enabled</td>
<td></td>
<td></td>
<td></td>
<td>E0IP VOIP</td>
</tr>
</tbody>
</table>

4 items out of 13
3. Add IP Address for new Interface (Wlan2,wlan3,wlan4)
Scenario 1:
Try Connect with SSID “REMOTE” for Maintenance services
Scenario 2: Results Connect to VAP 3 (wlan4) between Router for Tunnel function

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>MTU</th>
<th>Tx</th>
<th>Rx</th>
<th>Tx Pkt</th>
<th>Rx Pkt</th>
<th>MAC Address</th>
<th>ARP</th>
<th>Mode</th>
<th>Band</th>
<th>Frequency</th>
<th>SSID</th>
</tr>
</thead>
<tbody>
<tr>
<td>wlan1</td>
<td>Wireless (Atheros AR5318)</td>
<td>1500</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>00:0C:42:1B:39:DF</td>
<td>enabled</td>
<td>2.4GHz</td>
<td></td>
<td>MIKROTIK</td>
<td></td>
</tr>
<tr>
<td>wlan2</td>
<td>VirtualAP</td>
<td>1500</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:1B:39:DF</td>
<td>enabled</td>
<td></td>
<td></td>
<td>HOTSPOT</td>
<td></td>
</tr>
<tr>
<td>wlan3</td>
<td>VirtualAP</td>
<td>1500</td>
<td>0 bps</td>
<td>0 bps</td>
<td>0</td>
<td>0</td>
<td>02:0C:42:1B:39:E1</td>
<td>enabled</td>
<td></td>
<td></td>
<td>REMOTE</td>
<td></td>
</tr>
<tr>
<td>wlan4</td>
<td>VirtualAP</td>
<td>1500</td>
<td>0 bps</td>
<td>448 bps</td>
<td>0</td>
<td>2.02:0C:42:1B:39:E1</td>
<td>enabled</td>
<td></td>
<td></td>
<td>EDP_VOIP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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

[Image of a computer screen showing a window titled "Wireless Tables" with columns for MAC Address, Interface, Signal Strength Range, Authentication, and Forwarding. A smaller window titled "AP Access Rule" with input fields for MAC Address, Interface, Signal Strength Range, Device Transmit Limit, Client Transmit Limit, Authentication, Forwarding, Private Key, Pre Shared Key, Time, and Day Selections.]
Created Interfaces has been shown bellow:
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!