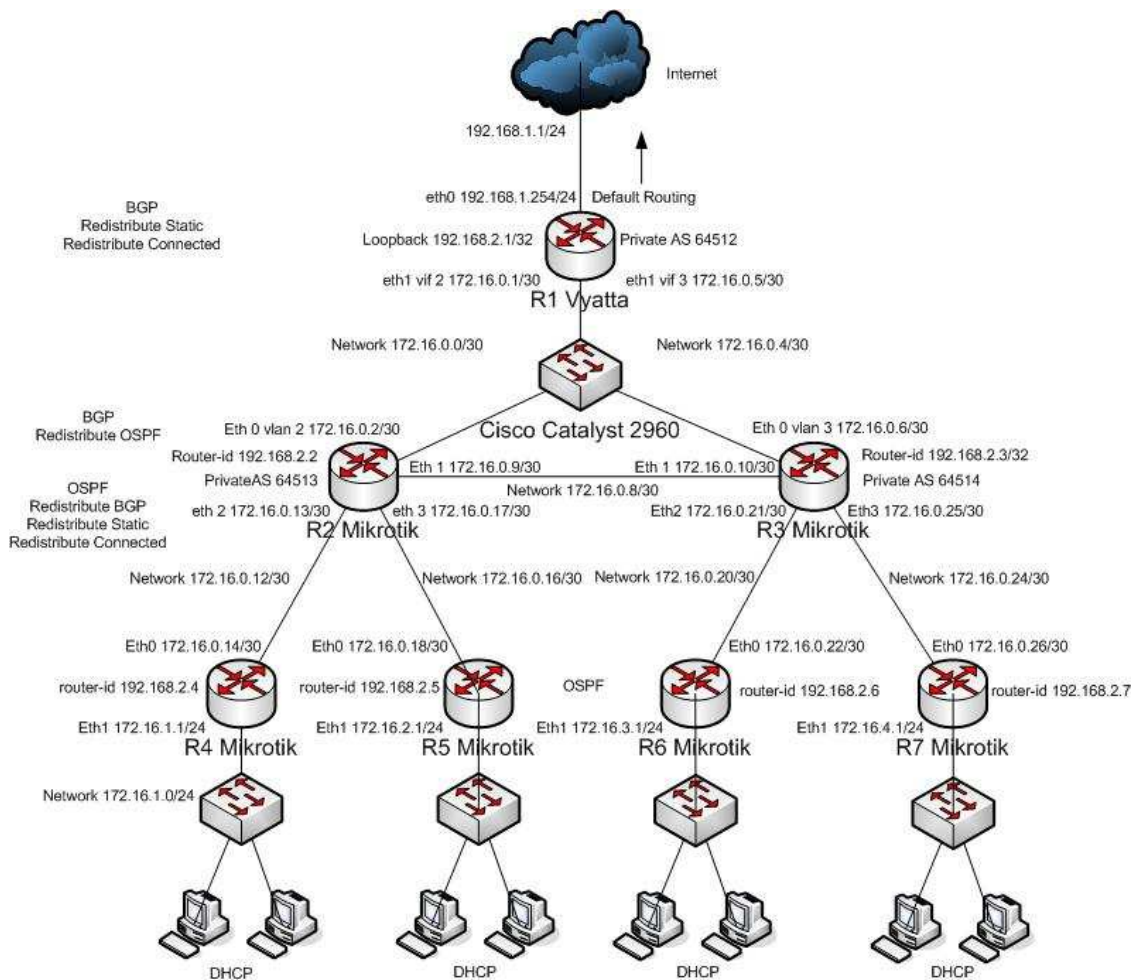


Permodelan routing BGP sederhana menggunakan Vyatta dan Mikrotik dengan Private AS pada Jaringan Intranet

BGP atau Border Gateway Protocol routing Protocol yang menghubungkan antar AS (autonomous System) yang sama IBGP (Interior Border Gateway Protocol) atau antar AS yang berbeda EBGP (Exterior Border Gateway Protocol). BGP telah terbukti scalable, stabil dan menyediakan mekanisme yang diperlukan untuk mendukung routing yang kompleks. Pada permodelan kali ini kita akan menggunakan BGP dengan redistribute OSPF dan untuk Autonomous System Number yang dipergunakan maka kita akan menggunakan Private AS 64512 sampai 65534 yang dapat digunakan untuk tujuan pribadi seperti halnya Private IP address.

TOPOLOGI



SKEMA PENGALAMATAN

Router	AS	Router-id	Interface			
			Eth0	Eth1	Eth2	Eth3
R1	64512	192.168.2.1	192.168.1.254/24	vif 2 172.16.0.1/30 vif 3 172.16.0.5/30	-	-
R2	64513	192.168.2.2	vlan 2 172.16.0.1/30	172.16.0.9/30	172.16.0.13/30	172.16.0.17/30
R3	64514	192.168.2.3	vlan 3 172.16.0.5/30	172.16.0.10/30	172.16.0.21/30	172.16.0.25/30
R4	-	192.168.2.4	172.16.0.14/30	172.16.1.1/24	-	-
R5	-	192.168.2.5	172.16.0.18/30	172.16.2.1/24	-	-
R6	-	192.168.2.6	172.16.0.22/30	172.16.3.1/24	-	-
R7	-	192.168.2.7	172.16.0.26/30	172.16.4.1/24		

KONFIGURASI

R1 Vyatta

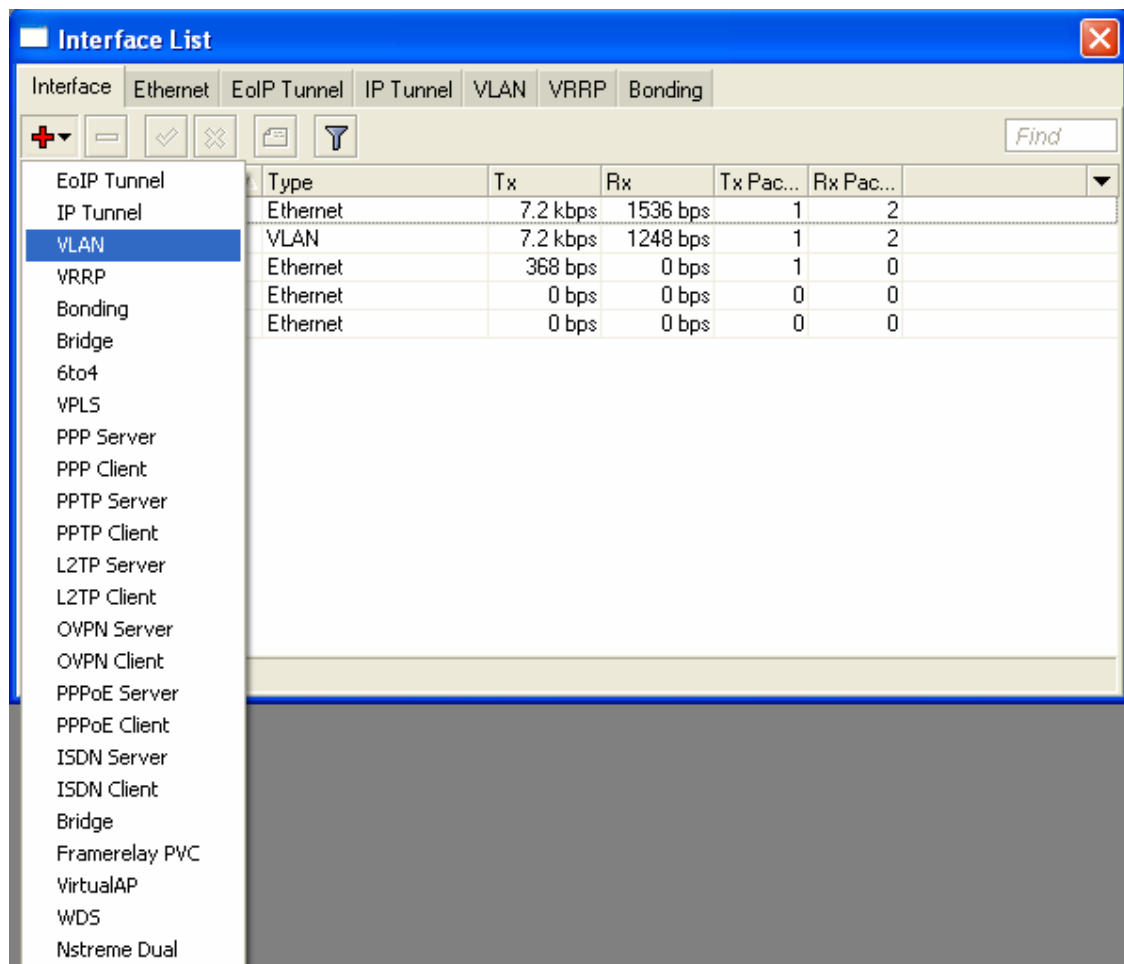
Pada R1 Vyatta, masuk ke console, set interface, NAT, BGP, redistribute connected dan redistribute static.

```
vyatta@vyatta:~$ configure
[edit]
vyatta@vyatta# set interfaces ethernet eth0 address 192.168.1.254/24
[edit]
vyatta@vyatta# set interfaces ethernet eth1 vif 2 address 172.16.0.1/30
[edit]
vyatta@vyatta# set interfaces ethernet eth1 vif 3 address 172.16.0.5/30
[edit]
vyatta@vyatta# set interfaces loopback lo address 192.168.2.1/32
[edit]
vyatta@vyatta# set protocols static route 0.0.0.0/0 next-hop 192.168.1.1
[edit]
vyatta@vyatta# set service nat rule 1 outbound-interface eth0
[edit]
vyatta@vyatta# set service nat rule 1 type masquerade
[edit]
vyatta@vyatta# set protocols bgp 64512 parameters router-id 192.168.2.1
[edit]
vyatta@vyatta# set protocols bgp 64512 network 172.16.0.0/30
[edit]
vyatta@vyatta# set protocols bgp 64512 network 172.16.0.4/30
[edit]
vyatta@vyatta# set protocols bgp 64512 neighbor 172.16.0.2 remote-as 64513
[edit]
vyatta@vyatta# set protocols bgp 64512 neighbor 172.16.0.6 remote-as 64514
[edit]
vyatta@vyatta# set protocols bgp 64512 redistribute connected
[edit]
```

```
vyatta@vyatta# set protocols bgp 64512 redistribute static
[edit]
vyatta@vyatta# commit
[edit]
vyatta@vyatta# save
Saving configuration to '/opt/vyatta/etc/config/config.boot'...
Done
[edit]
vyatta@vyatta#
```

R2 Mikrotik

Masuk melalui Winbox atau SSH, untuk memudahkan saya sarankan menggunakan winbox. Buat Interface VLAN



Untuk nama anda bisa menggunakan sembarang nama yang anda sukai, tetapi untuk VLAN ID kita beri No. 2 karena kita akan membuat interface ini bisa terhubung dengan vif 2 pada Vyatta, ini ada kaitannya dengan dengan masalah encapsulation dot1q atau tagging frame vlan.

New Interface

General Traffic

Name:

Type:

MTU:

MAC Address:

ARP:

VLAN ID:

Interface:

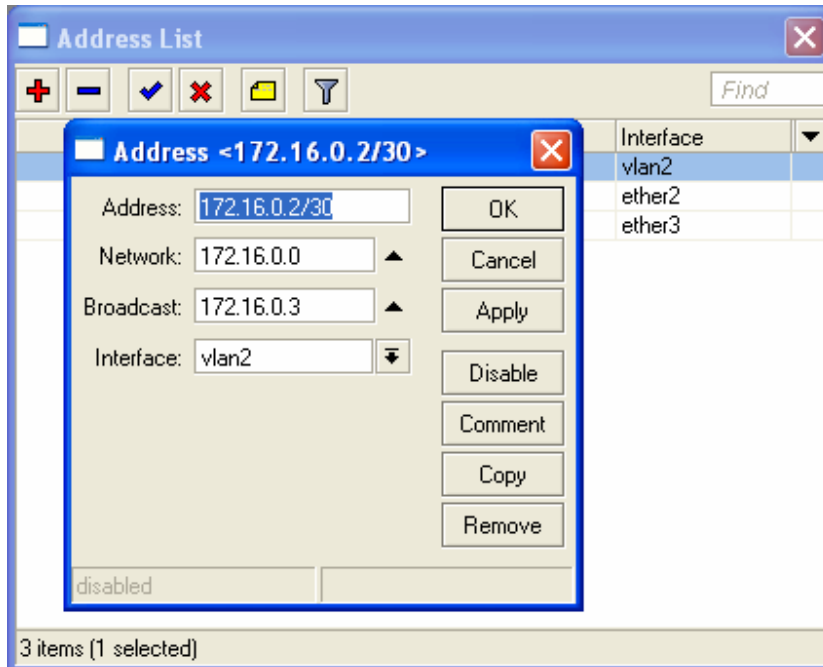
OK Cancel Apply Disable Comment Copy Remove Torch

disabled running slave

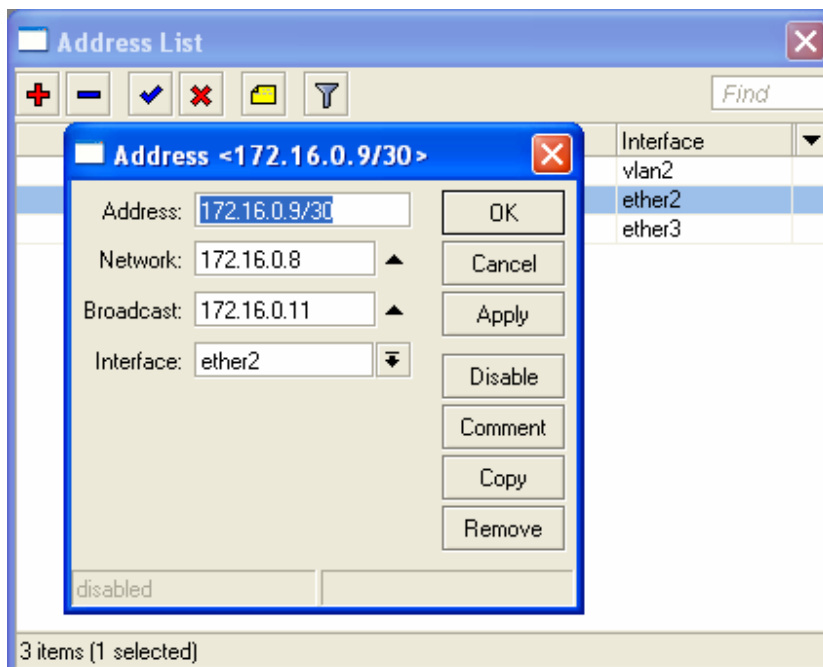
Langkah berikutnya berikan IP address sesuai dengan skema pengalamatan pada tabel diatas.

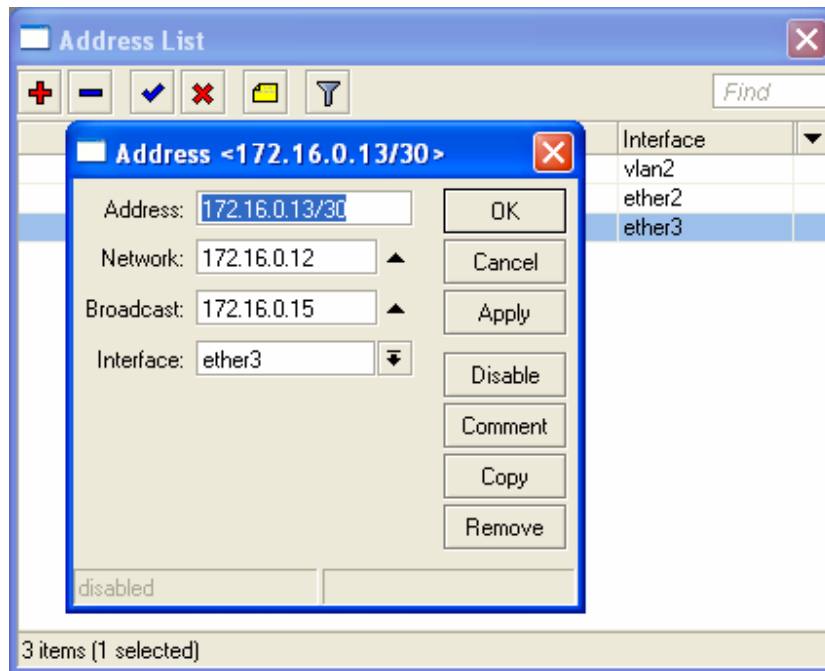
Interfaces	
Wireless	
Bridge	
PPP	
Bridge	
IP ▾	Addresses
IPv6 ▾	Routes
MPLS	Pool
VPLS	ARP
Routing ▾	Firewall
Ports	Socks
Queues	UPnP
Drivers	Traffic Flow
System ▾	Accounting
Files	Services
Log	Packing
SNMP	Neighbors
Users	DNS
Radius	Web Proxy
Tools ▾	DHCP Client
New Terminal	DHCP Server
Telnet	DHCP Relay
Password	Hotspot
Certificates	IPsec

Perhatikan IP Address tersebut kita berikan pada interface apa.

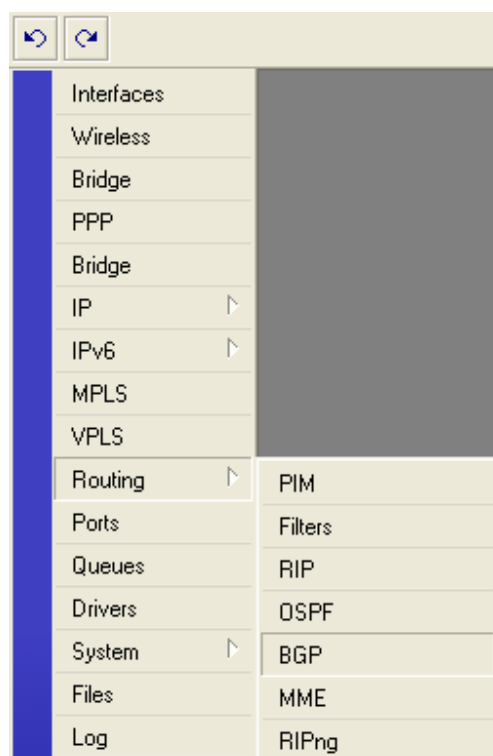


Ulangi langkah sebelumnya untuk ether2 dan ether3

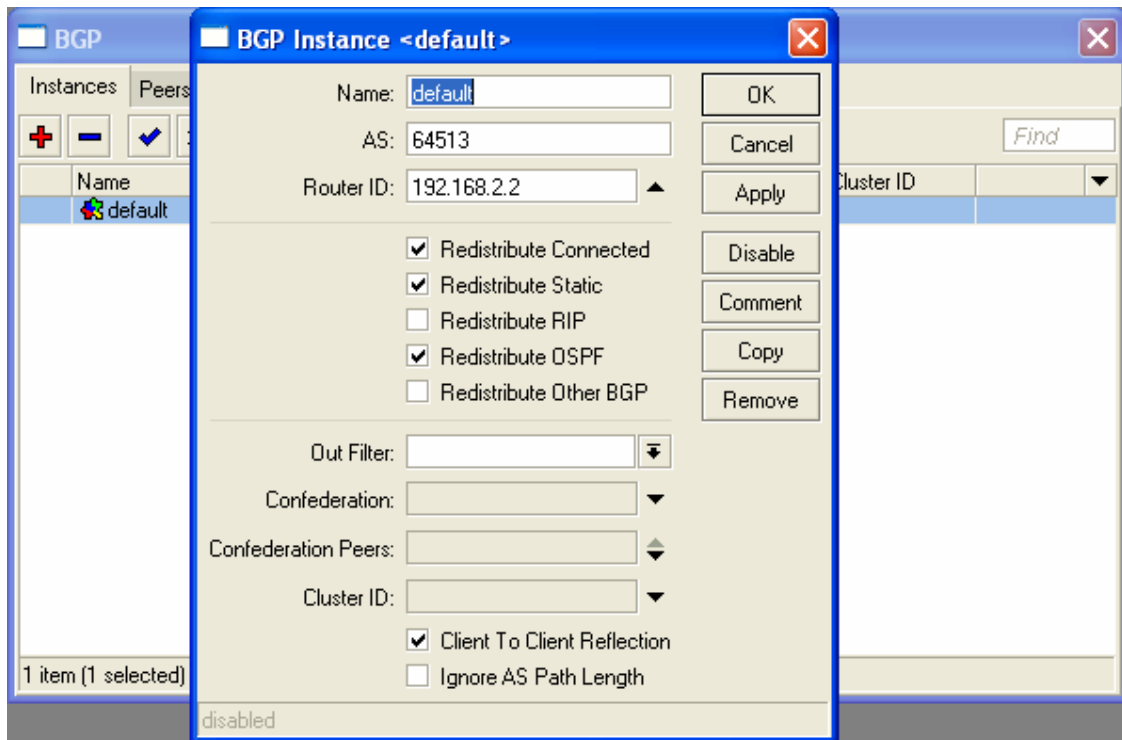




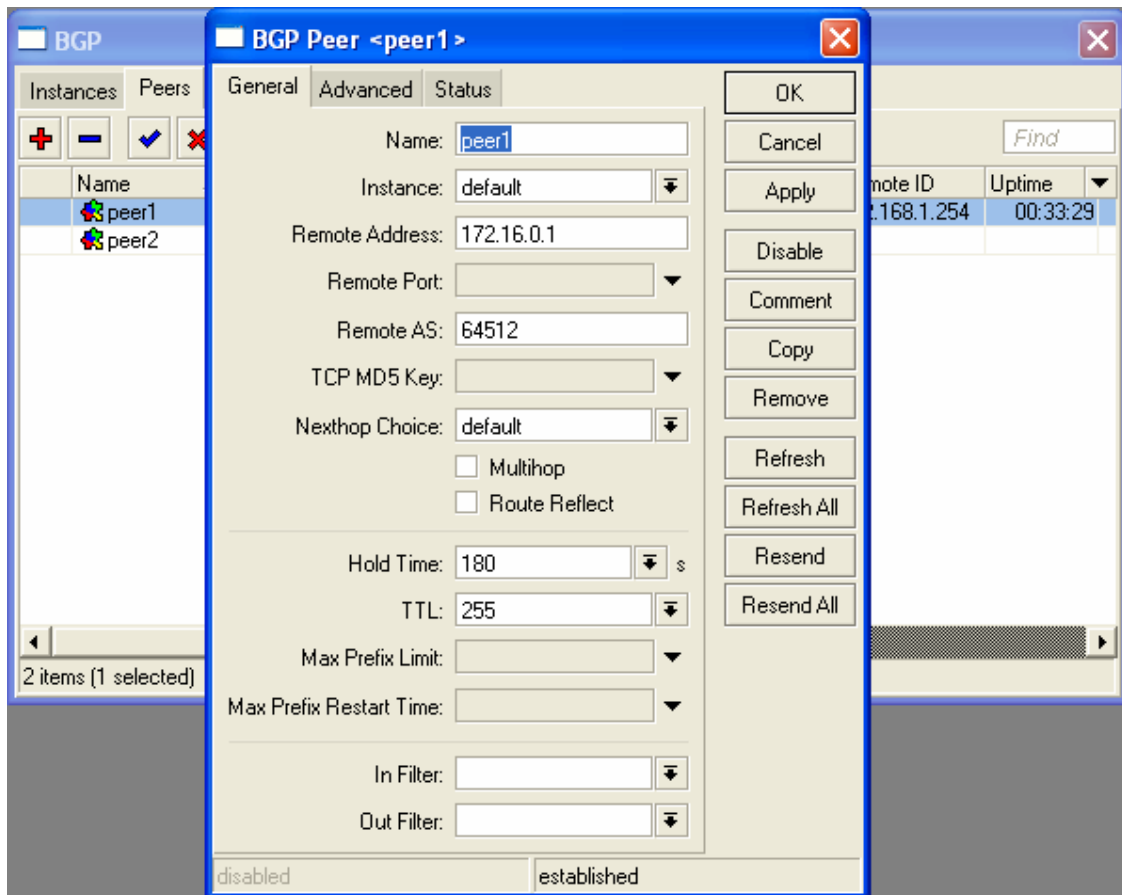
Set routing BGP

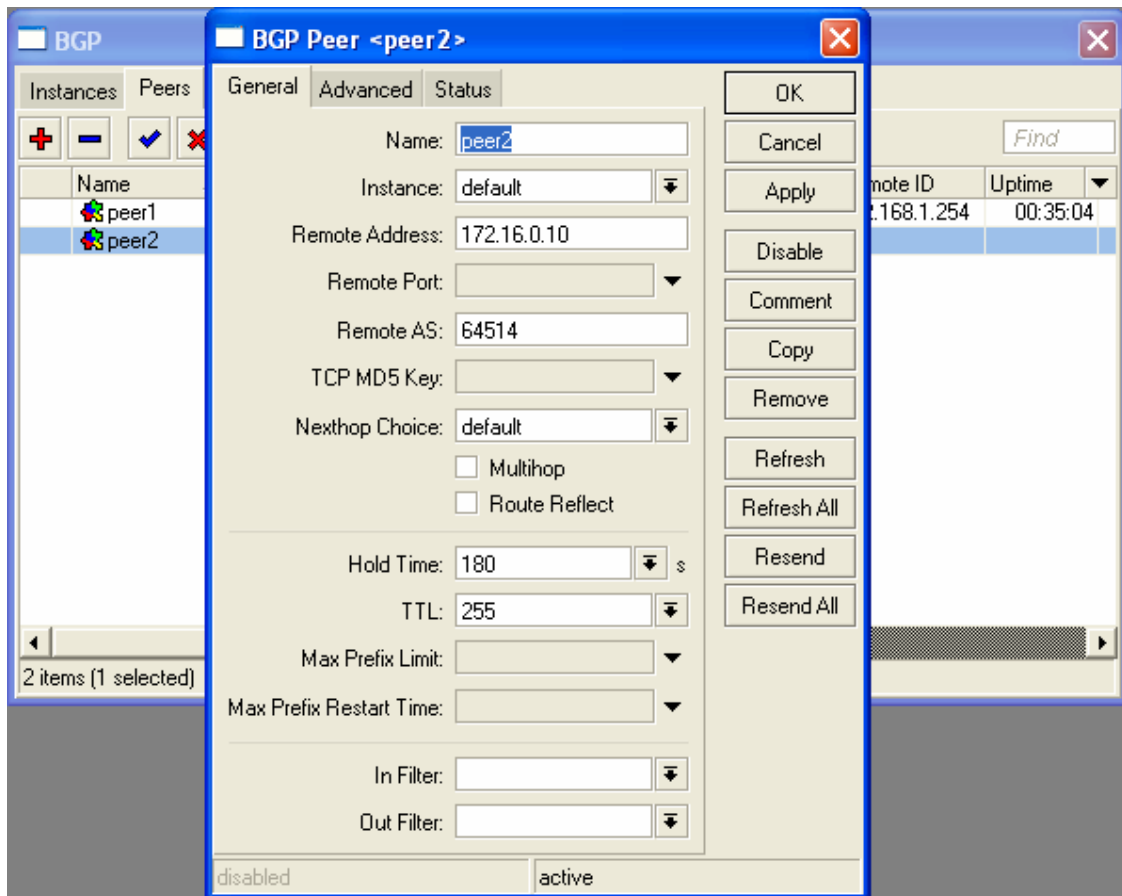


Berikan AS, router-id dan tandai redistribute seperti gambar dibawah

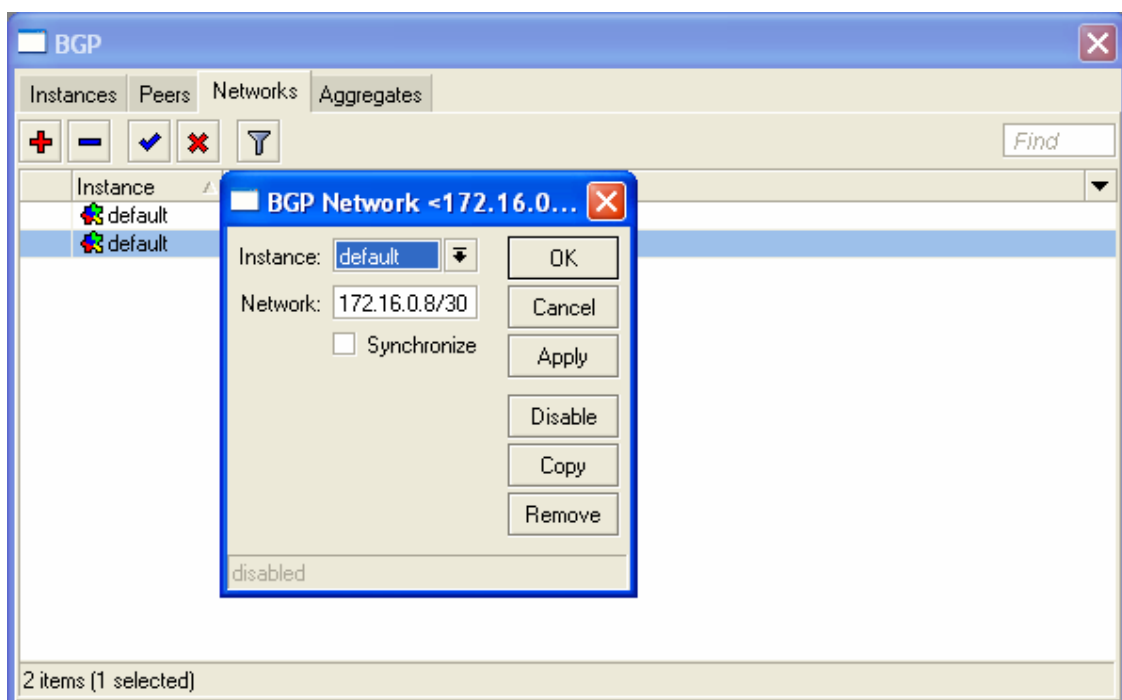
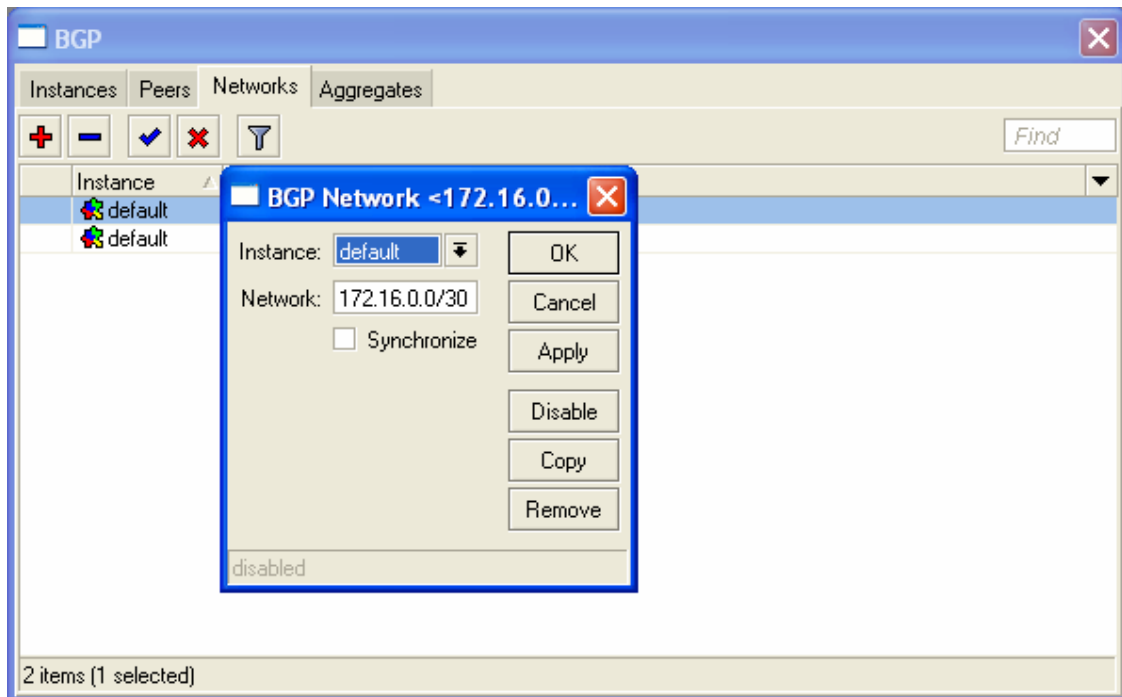


Buat BGP peer sesuai dengan IP address dan AS pada router neighbor.

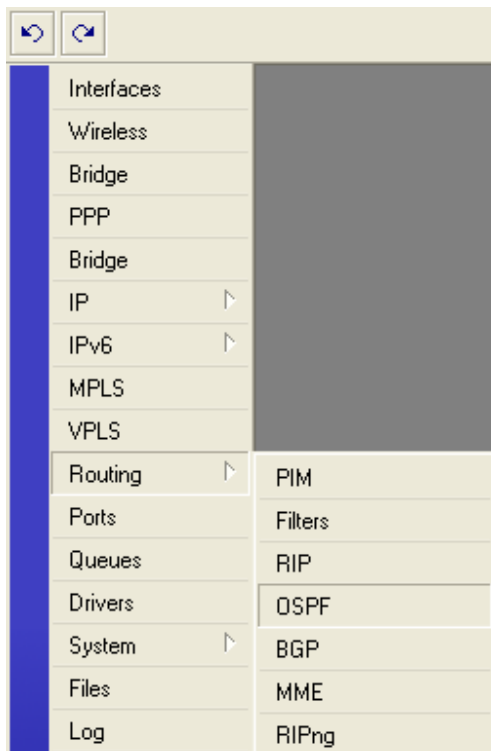




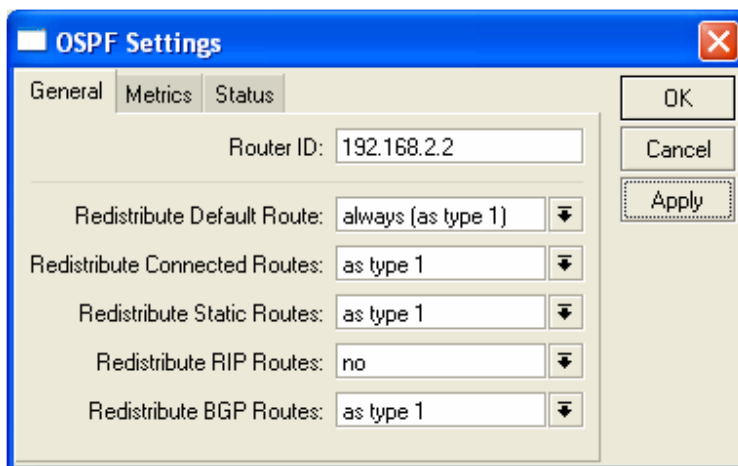
Buat Alamat Network yang menggunakan BGP



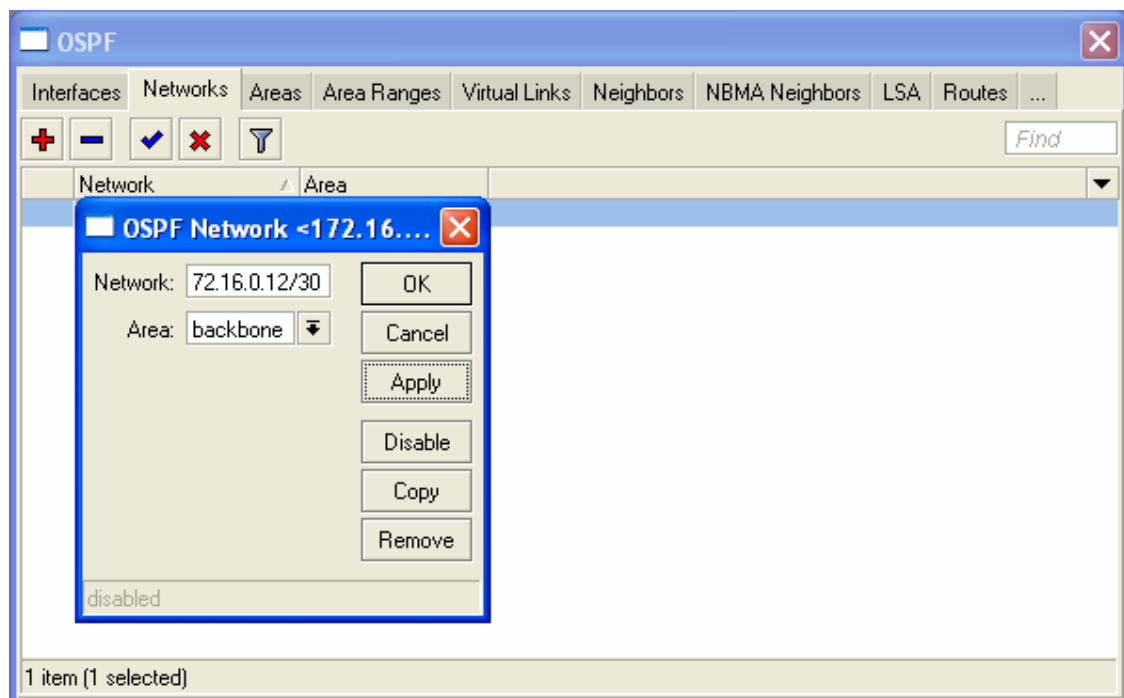
Set routing OSPF untuk interface berikutnya



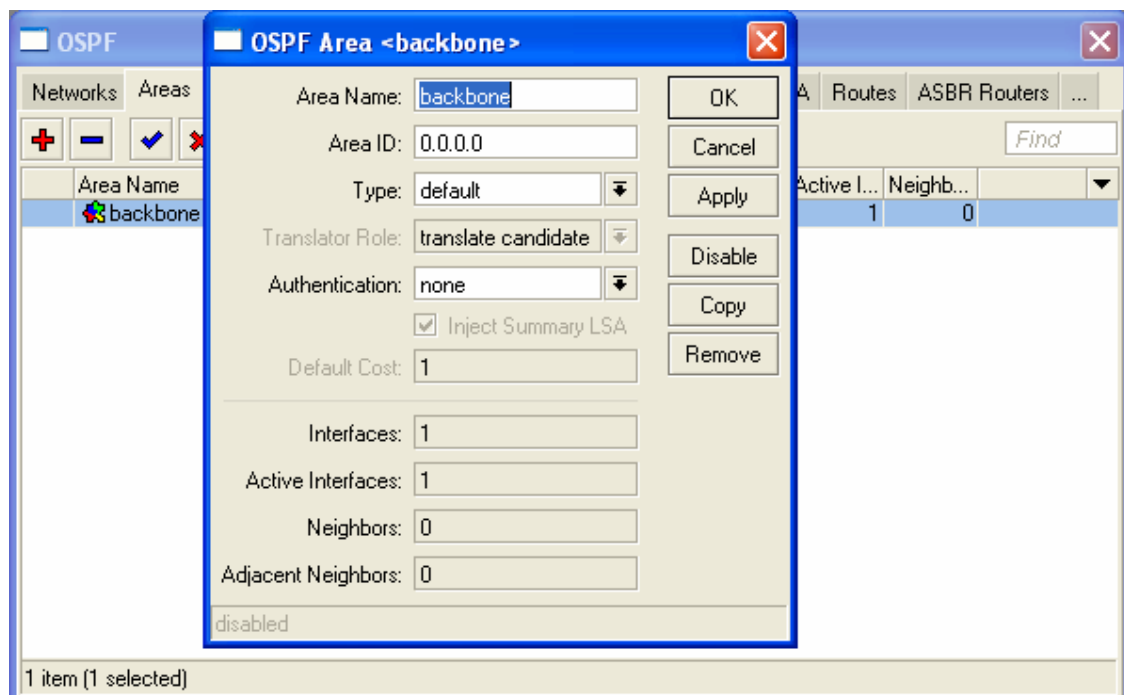
Berikan router-id dan tandai redistribute seperti pada gambar dibawah.



Set Alamat Network yang akan menggunakan OSPF.

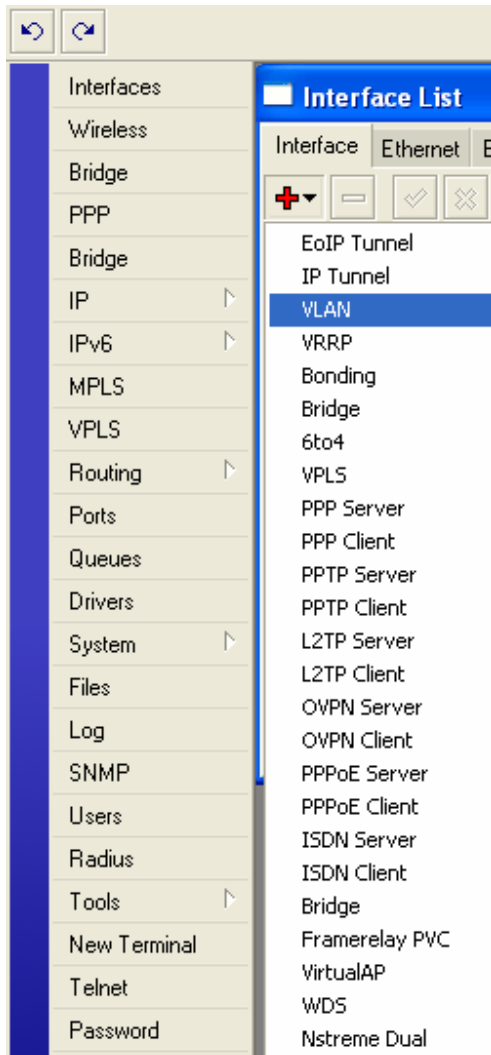


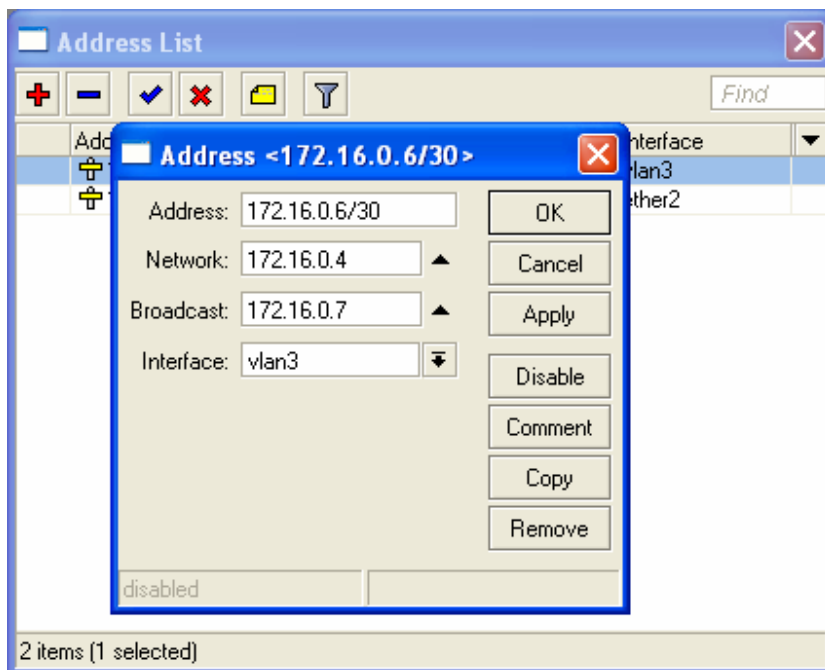
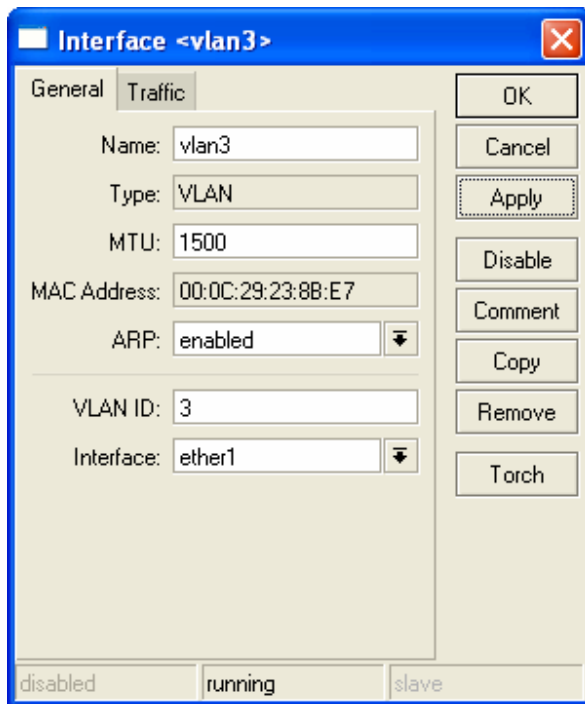
Untuk OSPF area kita bisa menggunakan area default yaitu dengan nama backbone dan Area ID 0.0.0.0, kecuali anda ingin membuat area baru, mungkin nanti bisa anda lakukan sebagai pengembangan atau routing OSPF dengan area yang berbeda.

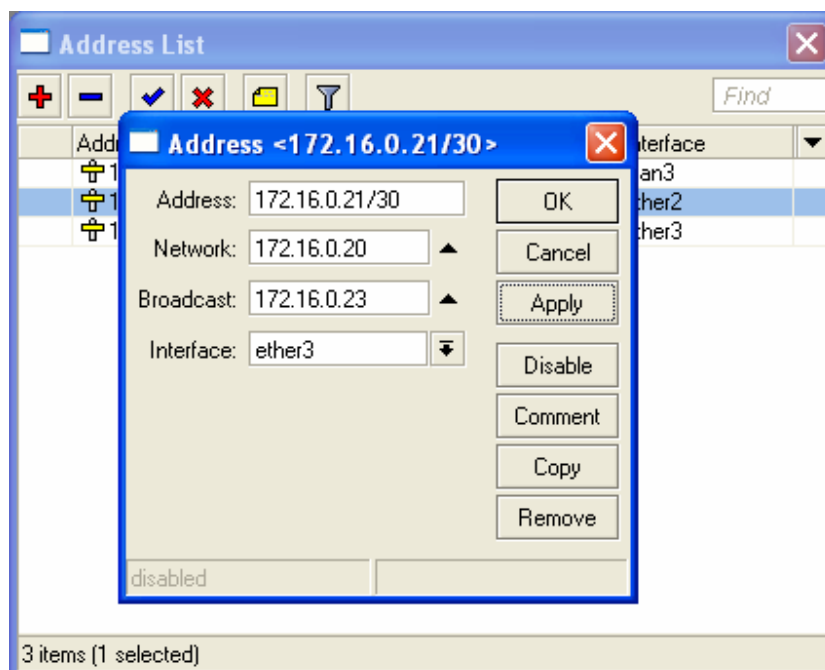
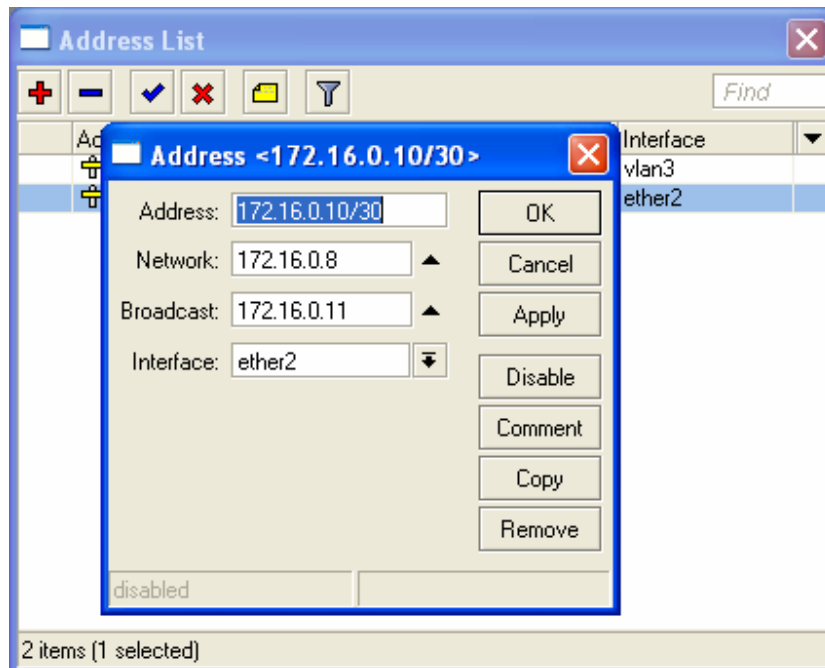


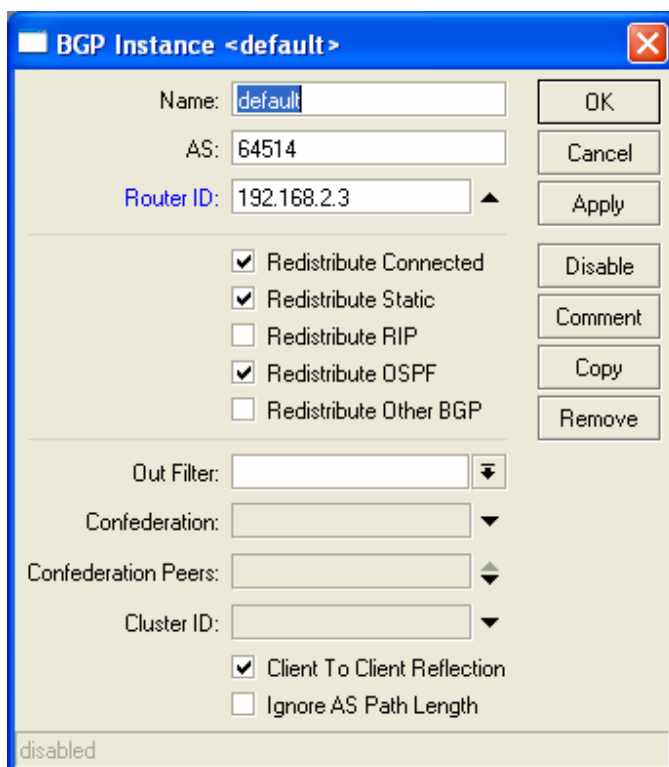
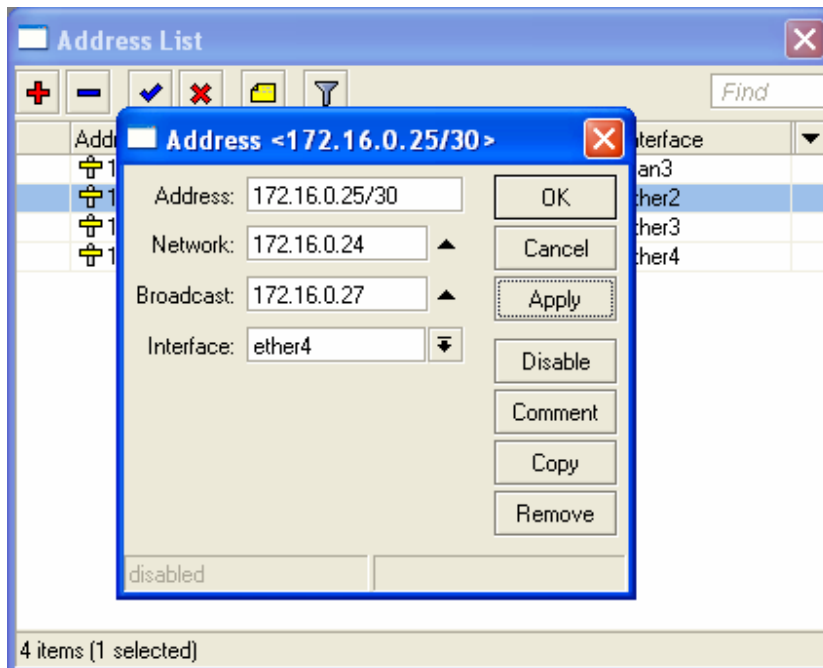
R3 Mikrotik

Langkah ini sama persis dengan R2, tinggal menyesuaikan No Vlan, IP address, BGP









The image shows a configuration window titled "BGP Peer <peer1>". It has three tabs: "General", "Advanced", and "Status". The "General" tab is selected. The window contains several input fields and buttons. On the right side, there is a vertical column of buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove, Refresh, Refresh All, Resend, and Resend All. At the bottom, there are two radio buttons: "disabled" and "established", with "established" being selected.

BGP Peer <peer1>

General | Advanced | Status

Name: peer1

Instance: default

Remote Address: 172.16.0.5

Remote Port:

Remote AS: 64512

TCP MD5 Key:

Nexthop Choice: default

☐ Multihop

☐ Route Reflect

Hold Time: 180 s

TTL: 255

Max Prefix Limit:

Max Prefix Restart Time:

In Filter:

Out Filter:

disabled | established

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Refresh
Refresh All
Resend
Resend All

The image shows a 'BGP Peer <peer2>' configuration window. It has three tabs: 'General', 'Advanced', and 'Status'. The 'General' tab is active. The window contains various input fields and buttons. On the right side, there is a vertical column of buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove, Refresh, Refresh All, Resend, and Resend All. At the bottom, there are two radio buttons: 'disabled' and 'established', with 'established' being selected.

BGP Peer <peer2>

General | Advanced | Status

Name: peer2

Instance: default

Remote Address: 172.16.0.9

Remote Port: [dropdown]

Remote AS: 64513

TCP MD5 Key: [dropdown]

Nexthop Choice: default

☐ Multihop

☐ Route Reflect

Hold Time: 180 s

TTL: 255

Max Prefix Limit: [dropdown]

Max Prefix Restart Time: [dropdown]

In Filter: [dropdown]

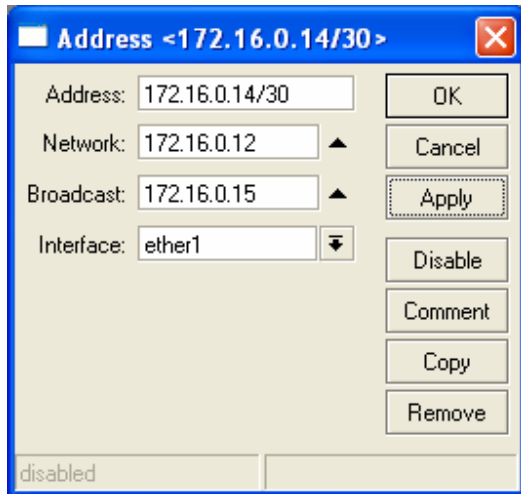
Out Filter: [dropdown]

disabled | **established**

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Refresh
Refresh All
Resend
Resend All

R4 Mikrotik

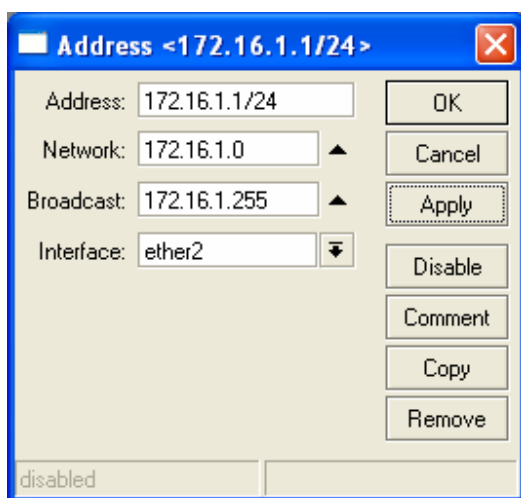
Setting IP address pada masing-masing interface.



The screenshot shows the 'Address' configuration window in Mikrotik WinBox. The title bar reads 'Address <172.16.0.14/30>'. The window contains the following fields and controls:

- Address:** 172.16.0.14/30
- Network:** 172.16.0.12 (with an up arrow icon)
- Broadcast:** 172.16.0.15 (with an up arrow icon)
- Interface:** ether1 (with a dropdown arrow icon)

On the right side, there are several buttons: OK, Cancel, Apply (bordered), Disable, Comment, Copy, and Remove. At the bottom left, there is a 'disabled' checkbox which is currently unchecked.

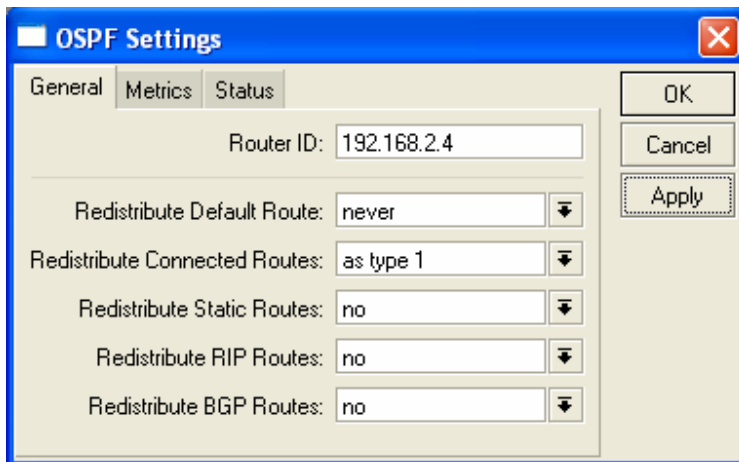


The screenshot shows the 'Address' configuration window in Mikrotik WinBox. The title bar reads 'Address <172.16.1.1/24>'. The window contains the following fields and controls:

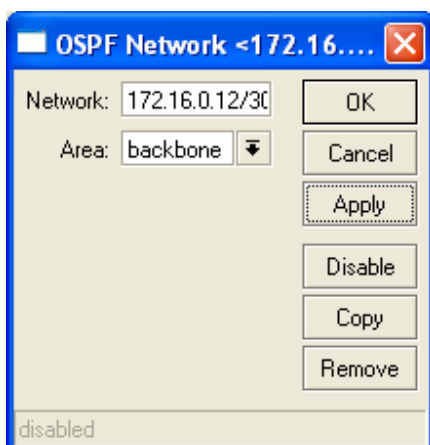
- Address:** 172.16.1.1/24
- Network:** 172.16.1.0 (with an up arrow icon)
- Broadcast:** 172.16.1.255 (with an up arrow icon)
- Interface:** ether2 (with a dropdown arrow icon)

On the right side, there are several buttons: OK, Cancel, Apply (bordered), Disable, Comment, Copy, and Remove. At the bottom left, there is a 'disabled' checkbox which is currently unchecked.

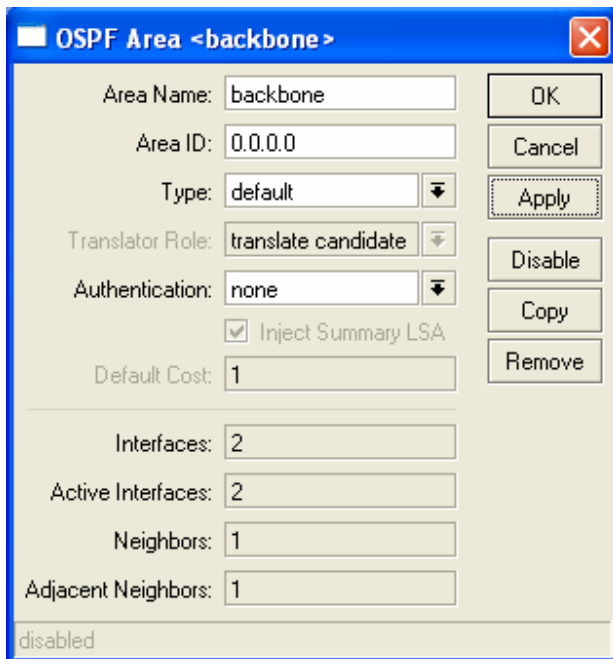
Pilih routing OSPF pada menu, set router-id dan redistribute seperti gambar dibawah.



Set alamat network yang akan menggunakan OSPF.



Untuk OSPF area gunakan default.

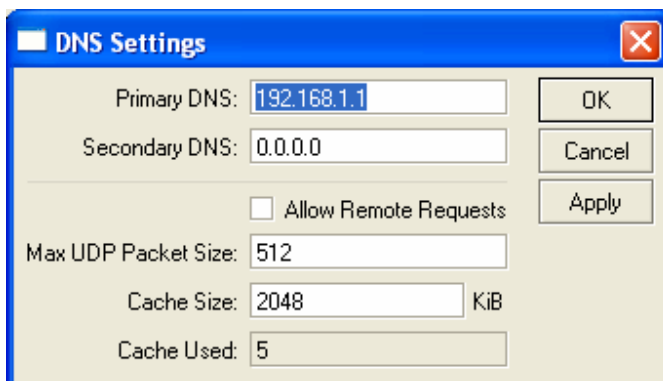


The image shows the 'OSPF Area <backbone>' configuration window. It contains the following fields and controls:

- Area Name: backbone
- Area ID: 0.0.0.0
- Type: default (dropdown menu)
- Translator Role: translate candidate (dropdown menu)
- Authentication: none (dropdown menu)
- ☒ Inject Summary LSA
- Default Cost: 1
- Interfaces: 2
- Active Interfaces: 2
- Neighbors: 1
- Adjacent Neighbors: 1

Buttons on the right: OK, Cancel, Apply, Disable, Copy, Remove. A 'disabled' status bar is at the bottom.

Set DNS yang nanti akan dipergunakan oleh client yang menggunakan DHCP

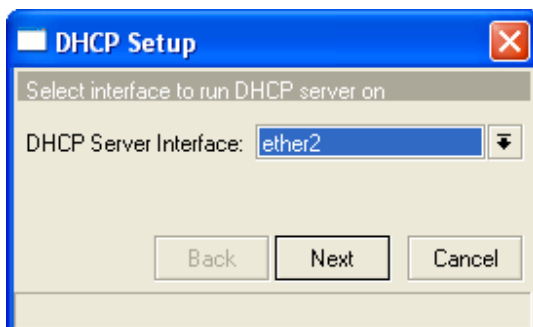


The image shows the 'DNS Settings' window. It contains the following fields and controls:

- Primary DNS: 192.168.1.1
- Secondary DNS: 0.0.0.0
- ☐ Allow Remote Requests
- Max UDP Packet Size: 512
- Cache Size: 2048 KiB
- Cache Used: 5

Buttons on the right: OK, Cancel, Apply.

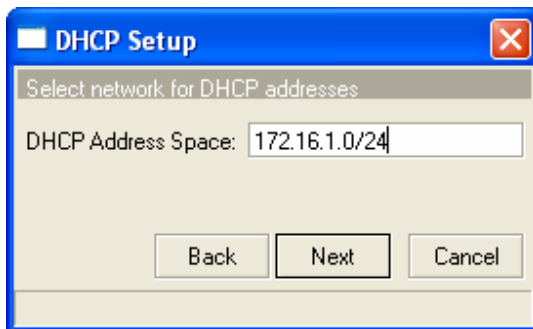
Set DHCP



The image shows the 'DHCP Setup' window. It contains the following fields and controls:

- Select interface to run DHCP server on
- DHCP Server Interface: ether2 (dropdown menu)

Buttons at the bottom: Back, Next, Cancel.

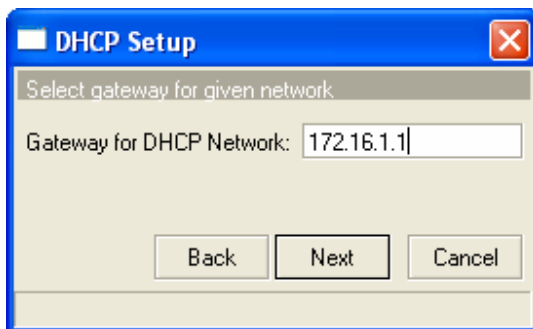


DHCP Setup

Select network for DHCP addresses

DHCP Address Space: 172.16.1.0/24

Back Next Cancel

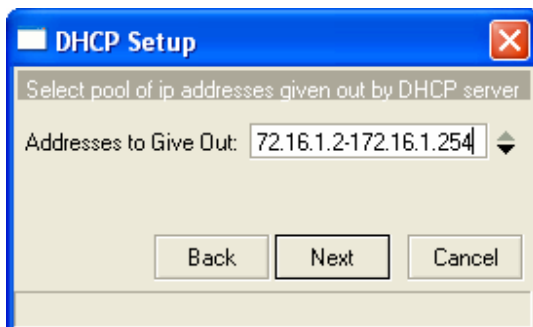


DHCP Setup

Select gateway for given network

Gateway for DHCP Network: 172.16.1.1

Back Next Cancel

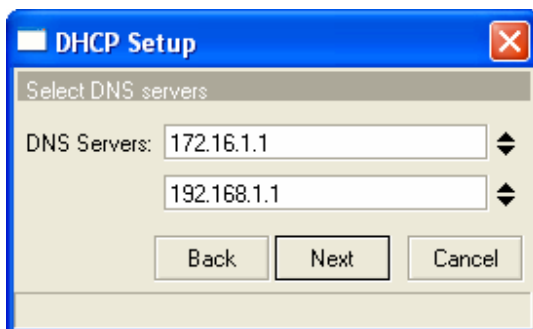


DHCP Setup

Select pool of ip addresses given out by DHCP server

Addresses to Give Out: 172.16.1.2-172.16.1.254

Back Next Cancel

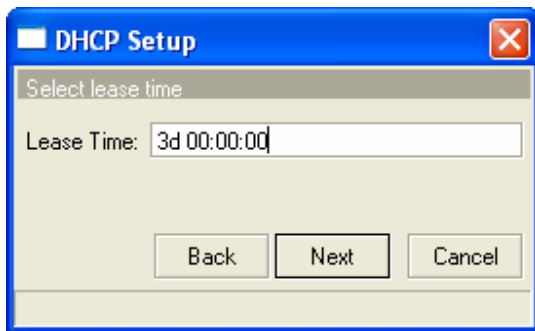


DHCP Setup

Select DNS servers

DNS Servers: 172.16.1.1
192.168.1.1

Back Next Cancel



R2 Mikrotik

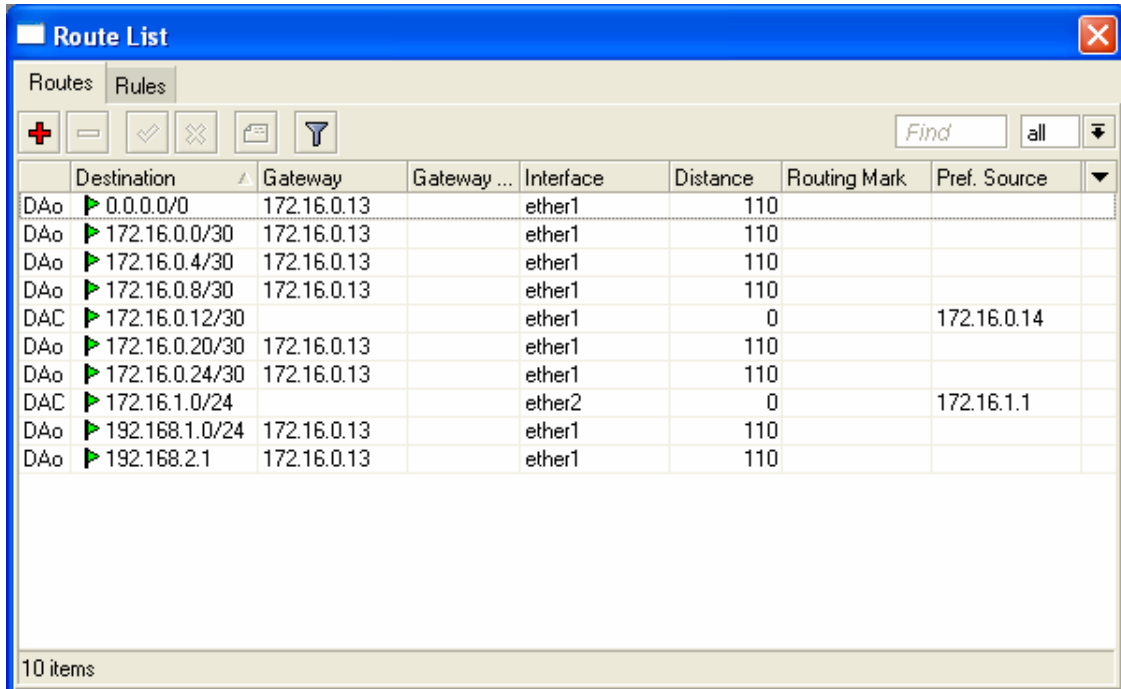
Pilih IP route, maka akan terlihat routing tabel yang terbentuk baik melalui BGP maupun OSPF

The screenshot shows a 'Route List' window with a table of routes. The table has columns: Destination, Gateway, Gateway ..., Interface, Distance, Routing Mark, Pref. Source. The table contains 20 items.

Destination	Gateway	Gateway ...	Interface	Distance	Routing Mark	Pref. Source
DAb 0.0.0.0/0	172.16.0.1		vlan2	20		
Db 0.0.0.0/0	172.16.0.10		ether2	20		
DAC 172.16.0.0/30			vlan2	0		172.16.0.2
Db 172.16.0.0/30	172.16.0.1		vlan2	20		
Db 172.16.0.0/30	172.16.0.10		ether2	20		
DAb 172.16.0.4/30	172.16.0.1		vlan2	20		
Db 172.16.0.4/30	172.16.0.10		ether2	20		
DAC 172.16.0.8/30			ether2	0		172.16.0.9
Db 172.16.0.8/30	172.16.0.10		ether2	20		
Db 172.16.0.8/30	172.16.0.1		vlan2	20		
DAC 172.16.0.12/30			ether3	0		172.16.0.13
DAb 172.16.0.20/30	172.16.0.10		ether2	20		
Db 172.16.0.20/30	172.16.0.1		vlan2	20		
Db 172.16.0.24/30	172.16.0.1		vlan2	20		
DAb 172.16.0.24/30	172.16.0.10		ether2	20		
DAo 172.16.1.0/24	172.16.0.14		ether3	110		
DAb 192.168.1.0/24	172.16.0.1		vlan2	20		
Db 192.168.1.0/24	172.16.0.10		ether2	20		
DAb 192.168.2.1	172.16.0.1		vlan2	20		
Db 192.168.2.1	172.16.0.10		ether2	20		

R4 Mikrotik

Pilih IP route, maka akan terlihat routing tabel yang terbentuk oleh OSPF termasuk yang di-redistribute oleh BGP



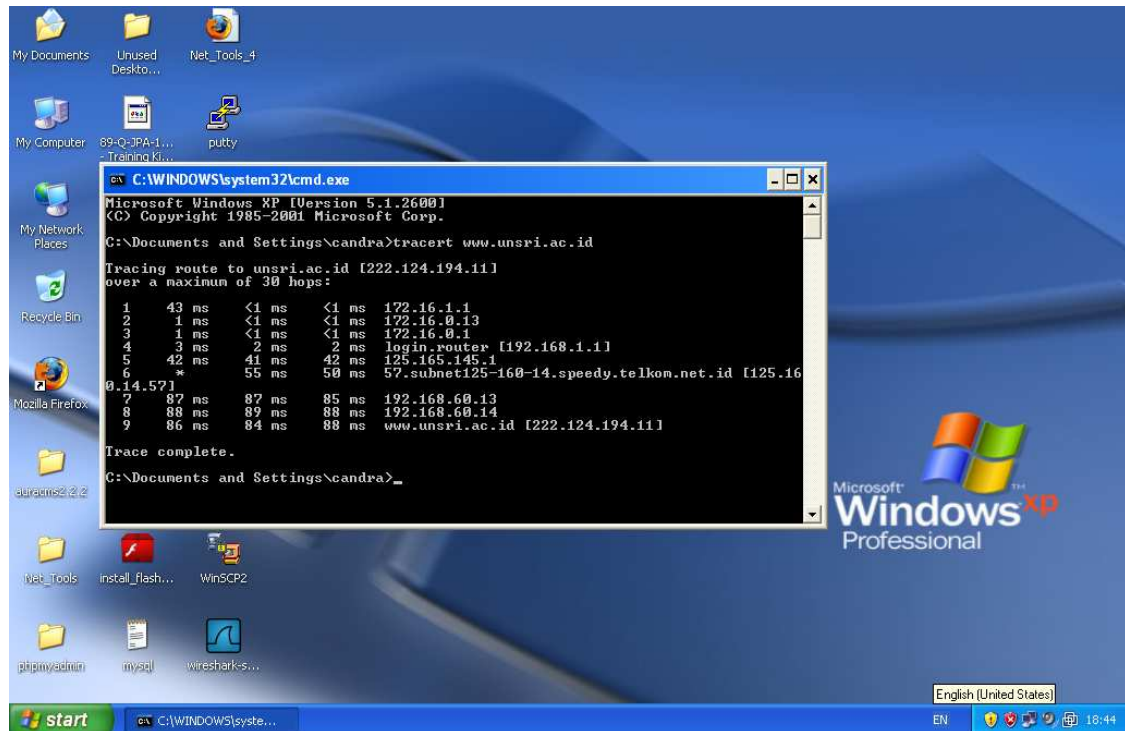
The screenshot shows the 'Route List' window in Mikrotik WinBox. It displays a table of routes with columns: Destination, Gateway, Gateway ..., Interface, Distance, Routing Mark, Pref., and Source. The routes listed include static routes (DAo) and redistributed routes (DAC) for various IP networks. The status of each route is indicated by a green arrow (valid) or a red X (invalid).

	Destination	Gateway	Gateway ...	Interface	Distance	Routing Mark	Pref.	Source
DAo	0.0.0.0/0	172.16.0.13		ether1	110			
DAo	172.16.0.0/30	172.16.0.13		ether1	110			
DAo	172.16.0.4/30	172.16.0.13		ether1	110			
DAo	172.16.0.8/30	172.16.0.13		ether1	110			
DAC	172.16.0.12/30			ether1	0		172.16.0.14	
DAo	172.16.0.20/30	172.16.0.13		ether1	110			
DAo	172.16.0.24/30	172.16.0.13		ether1	110			
DAC	172.16.1.0/24			ether2	0		172.16.1.1	
DAo	192.168.1.0/24	172.16.0.13		ether1	110			
DAo	192.168.2.1	172.16.0.13		ether1	110			

10 items

Client

Pada client, set interface untuk mendapatkan IP dari DHCP server pada R4 Mikrotik, lakukan tracer untuk melihat route yang ditempuh oleh packet dalam mencapai destination, misal: tracer www.unsri.ac.id.



Buka web browser dan akses ke salah satu web, misalnya <http://www.unsri.ac.id>



Untuk router yang lain bisa anda lakukan sendiri dengan cara yang sama.

<http://candra.unsri.ac.id>