

Routing Dinamik



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Dinamik routing protokol

- Mikrotik Router OS mendukung
 - Open Shortest Path First (OSPF)
 - Routing information Protokol (RIP)
 - Border Gateway Protokol (BGP)
- Mikrotik router OS tidak mendukung
 - Interior gateway routing protokol (IGRP)
 - Enhanced interior gateway routing protokol (EIGRP)

Fungsi Dinamik Routing

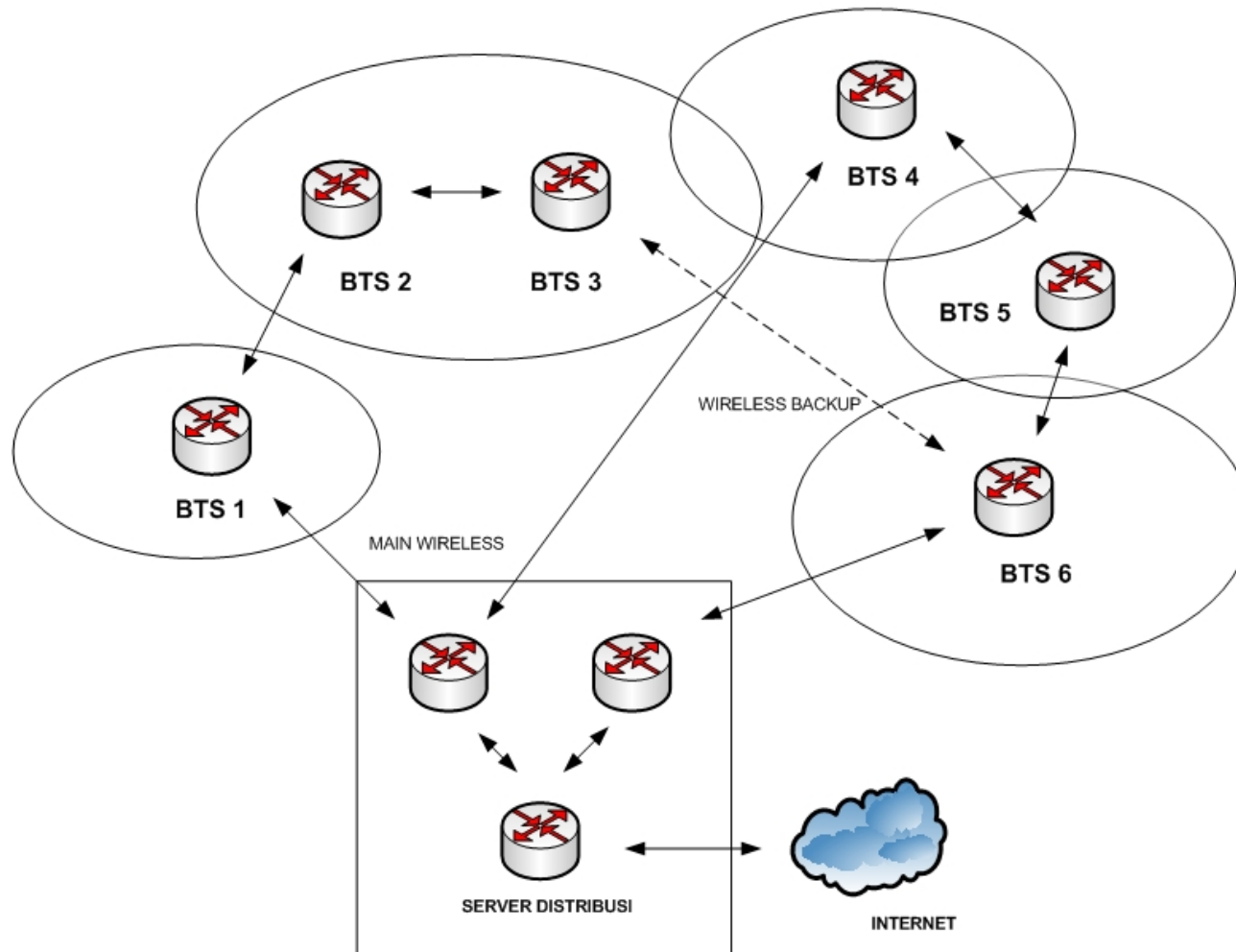
- Digunakan untuk :
 - Secara otomatis membentuk informasi routing
 - Membuat fail over connection
 - Load balancing

Dimana menggunakan Dinamik routing

- RIP dan OSPF menggunakan autonomous system (AS)
- BGP menggunakan beberapa autonomous systems (antar AS number / eBGP atau antar router dalam AS number /iBGP)

Contoh Routing dinamik

ROUTING DINAMIK



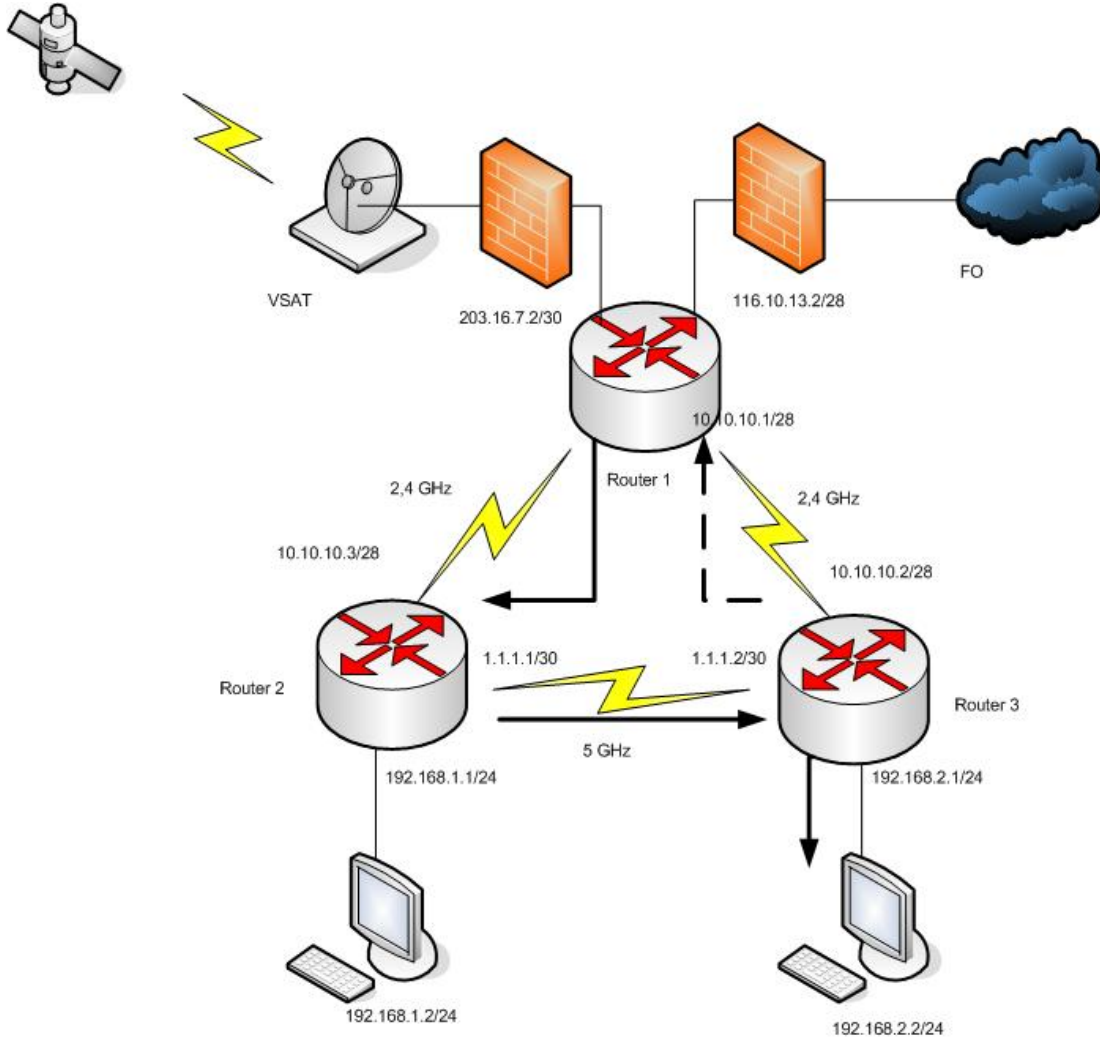
OSPF

- OSPF adalah linkstate protokol dimana dapat memelihara rute dalam dinamik network struktur dan dapat dibangun beberapa bagian dari subnetwork.
- OSPF lebih efisien daripada RIP
- Antara RIP dan OSPF menggunakan didalam Autonomous System (AS)
- Menggunakan protokol Broadcast

Kapan menggunakan OSPF

- Mendistribusi ulang rute dan memasukkan default rute ke dalam area
- Untuk membuat backups link
- MPLS

OSPF Area dan Routers



Tipe router OSPF

- Internal routers (di dalam area)
- Backbone router (di dalam area 0)
- Area Border router (ABR)
 - Berada antara 2 atau lebih area dan harus menyentuh area 0
- Autonomous system boundary routers (ASBR)
 - Mendistribusi ulang informasi routing dan routing protokol yang lain

OSPF dalam routerOS

- Mikrotik router OS diimplementasikan dalam OSPF version 2 (RFC 2328)
- Routing package harus diinstall
- OSPF menggunakan protokol 89 untuk komunikasi dengan tetangga (neighbour) dan jangan di filter di firewall
- Tracking connection harus dienable .(ip firewall connection tracking)

Tipe metric

- Tipe 1
 - Eksternal metrik yang diekspresikan dalam beberapa unit sebagai harga ospf interface
- Tipe 2
 - Eksternal metrik untuk mencapai harga ospf interface yang lebih besar kepada AS number.

OSPF router ID

- Router ID harus unik diantara AS number
- Router ID dapat default sebagai 0.0.0.0
- Tanda lebih besar untuk router dapat digunakan

OSPF default Route

- Tinggalkan distribute default route untuk tidak lebih rendah sebagai ASBR
- /routing ospf
- Set distribute-default=as-type-1

OSPF route redistribution

- Set redistribute connected routes (dan statik route)
 - /routing ospf
 - set-redistribute-connected=as-type-1
 - set-redistributed-static=as-type-1
- Jika menggunakan RIP atau BGP boleh digunakan redistribute routes untuk mempelajari protokol routing

Area Number

- Area didefinisikan dengan 32 bit nomer dalam format alamat ip
- 0.0.0.0 disiapkan untuk backbone area
- Semua area harus konek ke area 0.0.0.0
- Konfigurasi
 - /routing ospf area pr
 - Add name=internal1 area-id=0.0.0.1

Jaringan 1 OSPF

- Tambahkan network secara spesifik interface dimana dibutuhkan OSPF berjalan dalam area
- Alamat jaringan seharusnya termasuk alamat interface
 - /routing ospf network
 - Add network=10.10.10.0/24 area=backbone
 - Untuk point to point alamat network harus /32

- Jika dibutuhkan set interface cost :
 - /routing ospf interface
 - Add interface=wlan1 cost=10
- Untuk lebih cepat respon maka diset hello interval 7 , router dead interval=10 untuk semua router

OSPF neighbor States

- Neighbor status dapat dijelaskan sbb :
- Full = link state database komplet terjalin
- 2-way = komunikasi 2 arah telah terjadi
- Down, Attempt, Init, loading, extart = tidak lengkap berjalan

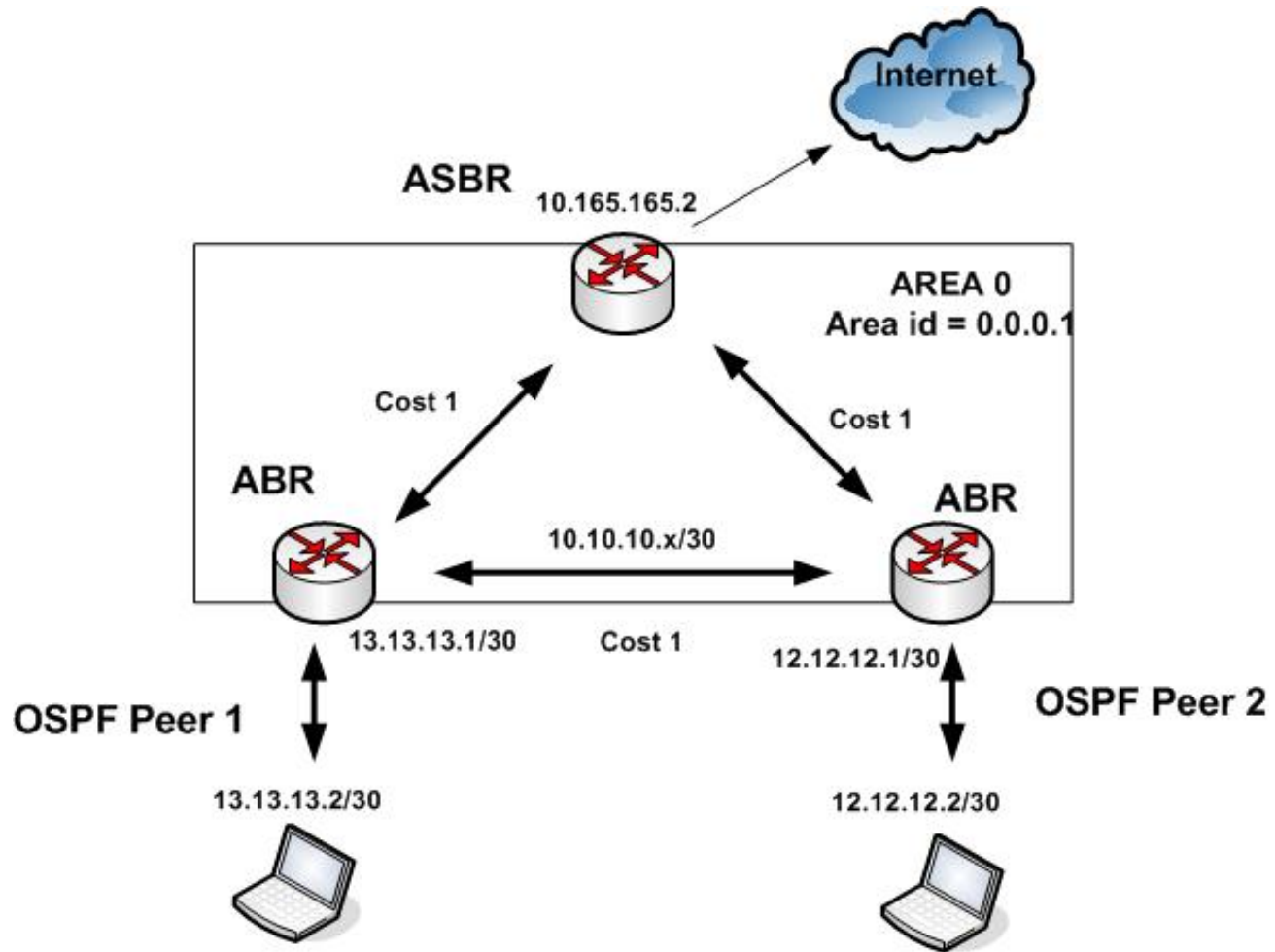
OSPF Table Route

- `/ip route print`
- DIO = invalid connected route ditambahkan oleh OSPF bahwa OSPF telah jalan pada sebuah interface
- Equal Cost multipath route mempunyai tujuan address dan gateway dipisahkan oleh ,

OSPF trouble shooting

- Cek mikrotik neighbor
 - /ip neighbor print
- Cek ospf neighbor
 - /routing ospf neighbor print
- Cek route
 - /ip route pr
- Cek logs
 - /system logging
 - Add topics=ospf info action=memory

OSPF redundant Link



Konfigurasi Main Router OSPF

The screenshot displays the RouterOS WinBox interface with three configuration windows open:

- Address List:** A table showing IP addresses assigned to various interfaces.
- OSPF:** The main configuration window for the OSPF process, currently showing the 'Settings' tab.
- OSPF Settings:** A sub-window for configuring OSPF metrics and redistribution options.

Address	Network	Broadcast	Interface
10.55.66.2/30	10.55.66.0	10.55.66.3	Net
12.12.12.1/24	12.12.12.0	12.12.12.255	unknown
12.12.12.1/30	12.12.12.0	12.12.12.3	ospf peer2
13.13.13.1/30	13.13.13.0	13.13.13.3	ospf peer1
172.16.32.1/24	172.16.32.0	172.16.32.255	wlan1

Option	Value
Router ID	0.0.0.0
Redistribute Default Routes	always (as type 1)
Redistribute Connected Routes	as type 1
Redistribute Static Routes	as type 1
Redistribute RIP Routes	no
Redistribute BGP Routes	no

Set OSPF Areas

172.16.32.1/24 172.16.32.0 172.16.32.255 wlan1

OSPF

Interfaces Networks **Areas** Area Ranges Virtual Links Neighbors NBMA Neighbors

+ - ✓ ✗

Area Name	Area ID	Type	Auth.	Default C...	Active Ne...
area1	0.0.0.1	default	none	1	2
backbone	0.0.0.0	default	none	1	0

OSPF Area <area1 >

Name: area1 OK

Area ID: 0.0.0.1 Cancel

Type: default Apply

Translator Role: translate never Disable

Authentication: none Copy

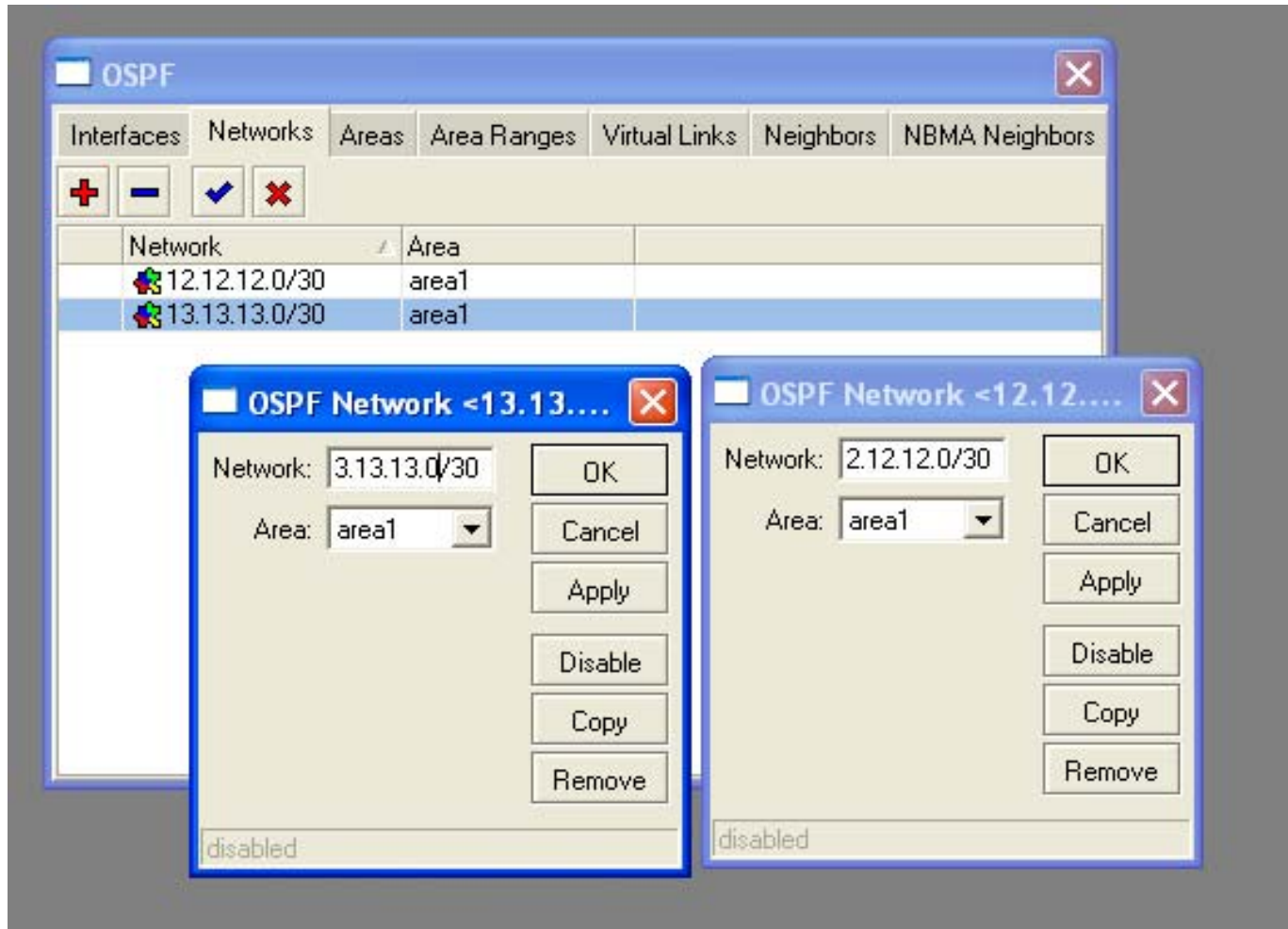
Allow Summary LSA Remove

Default Cost: 1

Active Neighbors: 2

disabled

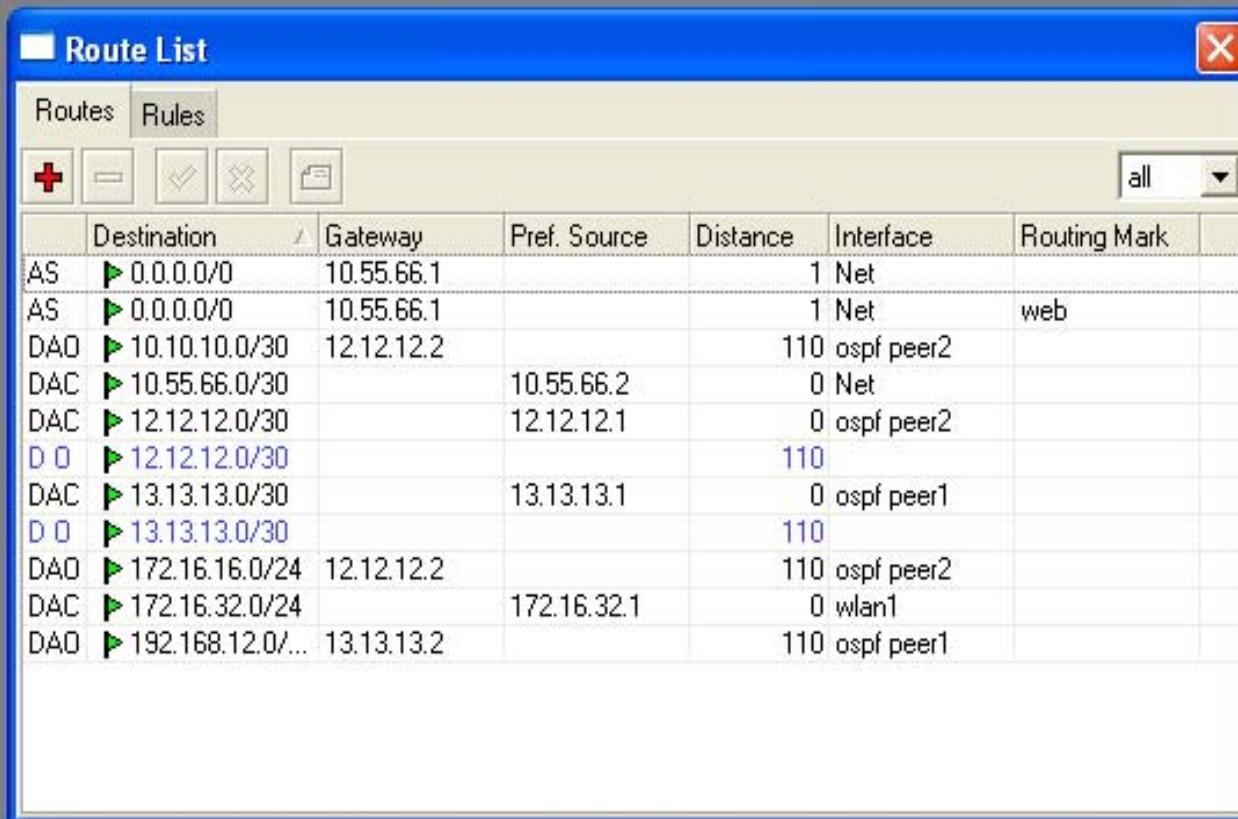
OSPF Network



OSPF Neighbors

Router ID	Address	State	State Changes
10.55.66.2	13.13.13.1	2-Way	0
13.13.13.2	13.13.13.2	Full	4
172.16.16.2	12.12.12.2	Full	12

Table Route



The screenshot shows a window titled "Route List" with a blue header bar. Below the header, there are tabs for "Routes" and "Rules", with "Routes" selected. A toolbar contains icons for adding (+), deleting (-), checking (✓), unchecking (✗), and saving (floppy disk). A dropdown menu on the right shows "all". The main area is a table with the following columns: Destination, Gateway, Pref. Source, Distance, Interface, and Routing Mark. The table contains 11 rows of route information.

	Destination	Gateway	Pref. Source	Distance	Interface	Routing Mark
AS	0.0.0.0/0	10.55.66.1		1	Net	
AS	0.0.0.0/0	10.55.66.1		1	Net	web
DAO	10.10.10.0/30	12.12.12.2		110	ospf peer2	
DAC	10.55.66.0/30		10.55.66.2	0	Net	
DAC	12.12.12.0/30		12.12.12.1	0	ospf peer2	
D O	12.12.12.0/30			110		
DAC	13.13.13.0/30		13.13.13.1	0	ospf peer1	
D O	13.13.13.0/30			110		
DAO	172.16.16.0/24	12.12.12.2		110	ospf peer2	
DAC	172.16.32.0/24		172.16.32.1	0	wlan1	
DAO	192.168.12.0/...	13.13.13.2		110	ospf peer1	

Konfigurasi OSPF peer 1

The image shows a screenshot of a network configuration interface with three overlapping windows:

- Address List:** A table listing network addresses and their associated interfaces.
- OSPF:** A main configuration window with tabs for Interfaces, Networks, Areas, Virtual Links, and Neighbors. The 'Settings' tab is active.
- OSPF Settings:** A sub-window for configuring OSPF parameters.

Address	Network	Broadcast	Interface
10.10.10.1/30	10.10.10.0	10.10.10.3	ether3
12.12.12.2/30	12.12.12.0	12.12.12.3	ether1
172.16.16.1/24	172.16.16.0	172.16.16.255	ether2

Interface	Cost	Priority	Auth. Key	Network Type
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OSPF Settings

General Metrics

Router ID: 0.0.0.0

Redistribute Default Route: never

Redistribute Connected Routes: as type 1

Redistribute Static Routes: no

Redistribute RIP Routes: no

Redistribute BGP Routes: no

Buttons: OK, Cancel, Apply

OSPF Area

The image shows a software interface for configuring OSPF. The main window, titled 'OSPF', has tabs for 'Interfaces', 'Networks', 'Areas', 'Virtual Links', and 'Neighbors'. The 'Areas' tab is active, displaying a table with the following data:

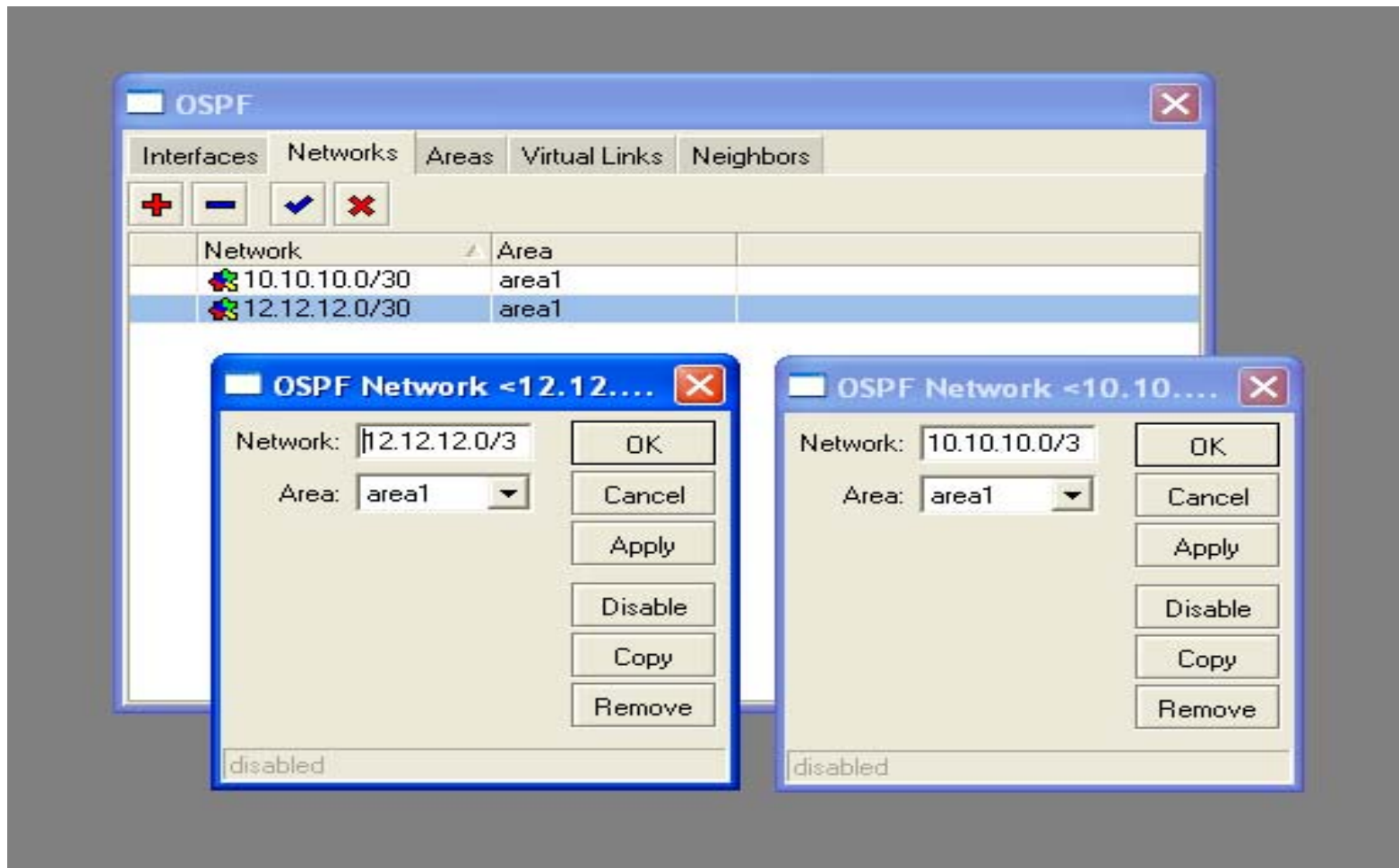
Area Name	Area ID	Type	Auth.	Default C...	Active Ne...
area1	0.0.0.1	default	none	10	1
backbone	0.0.0.0	default	none	1	0

A secondary dialog box, titled 'OSPF Area <area1 >', is overlaid on the main window. It contains the following configuration fields:

- Name: area1
- Area ID: 0.0.0.1
- Type: default
- Translator Role: translate never
- Authentication: none
- Allow Summary LSA
- Default Cost: 10
- Active Neighbors: 1

Buttons for 'OK', 'Cancel', 'Apply', 'Copy', and 'Remove' are located on the right side of the dialog box.

OSPF Network



OSPF Neighbors and Route

The image shows two windows from a network configuration application. The top window, titled "Route List", displays a table of routes. The bottom window, titled "OSPF", displays a table of OSPF neighbors.

Route List

	Destination	Gateway	Pref. Source	Distance	Interface	Routing Mark
DAO	0.0.0.0/0	12.12.12.1			ether1	
DAC	10.10.10.0/30		10.10.10.1		ether3	
DI O	10.10.10.0/30					
DAO	10.55.66.0/30	12.12.12.1			ether1	
DAC	12.12.12.0/30		12.12.12.2		ether1	
DI O	12.12.12.0/30					
DAO	13.13.13.0/30	12.12.12.1			ether1	
DAC	172.16.16.0/24		172.16.16.1		ether2	
DAO	172.16.32.0/24	12.12.12.1			ether1	
DAO	192.168.12.0/...	12.12.12.1			ether1	

OSPF

Router ID	Address	State	State Changes
10.55.66.2	12.12.12.1	Full	5
172.16.16.2	10.10.10.1	2-Way	0

Konfigurasi OSPF peer 2

The image displays three overlapping windows from a network configuration application:

- Address List:** A table listing IP addresses, networks, broadcast addresses, and interfaces.
- OSPF:** A main configuration window with tabs for Interfaces, Networks, Areas, Virtual Links, and Neighbors. The Settings tab is active.
- OSPF Settings:** A sub-window for configuring OSPF parameters.

Address	Network	Broadcast	Interface
10.10.10.2/30	10.10.10.0	10.10.10.3	backup
13.13.13.2/30	13.13.13.0	13.13.13.3	Main
192.168.12.1/...	192.168.12.0	192.168.12.255	LAN
192.168.165.1/...	192.168.165.0	192.168.165.255	Main

Interface	Cost	Priority	Auth. Key	Network Type
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OSPF Settings - Metrics

Router ID: 0.0.0.0

Redistribute Default Route: never

Redistribute Connected Routes: as type 1

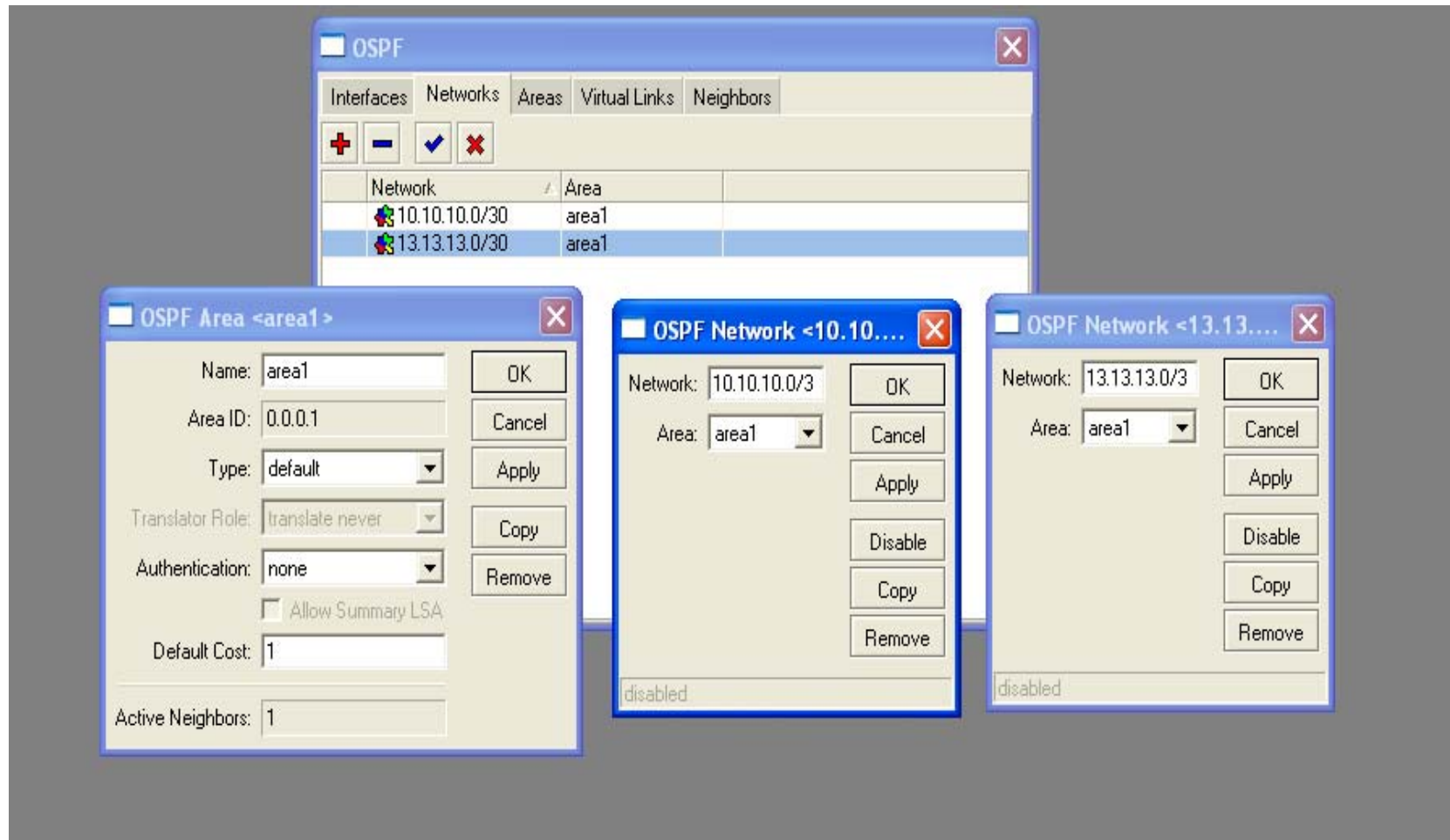
Redistribute Static Routes: as type 1

Redistribute RIP Routes: no

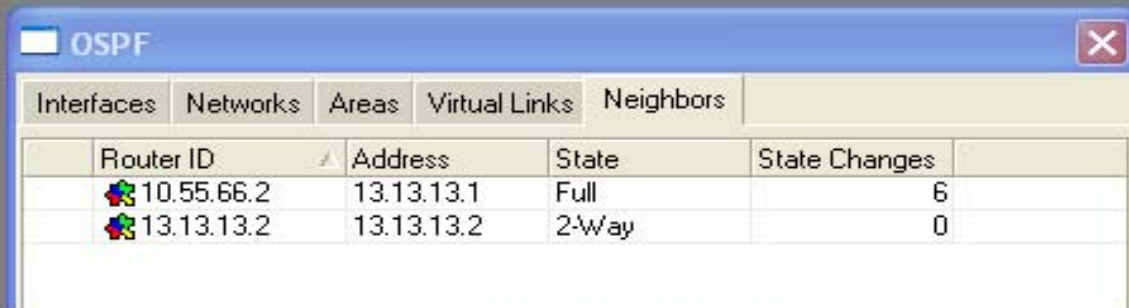
Redistribute BGP Routes: no

Buttons: OK, Cancel, Apply

OSPF Area dan Networks

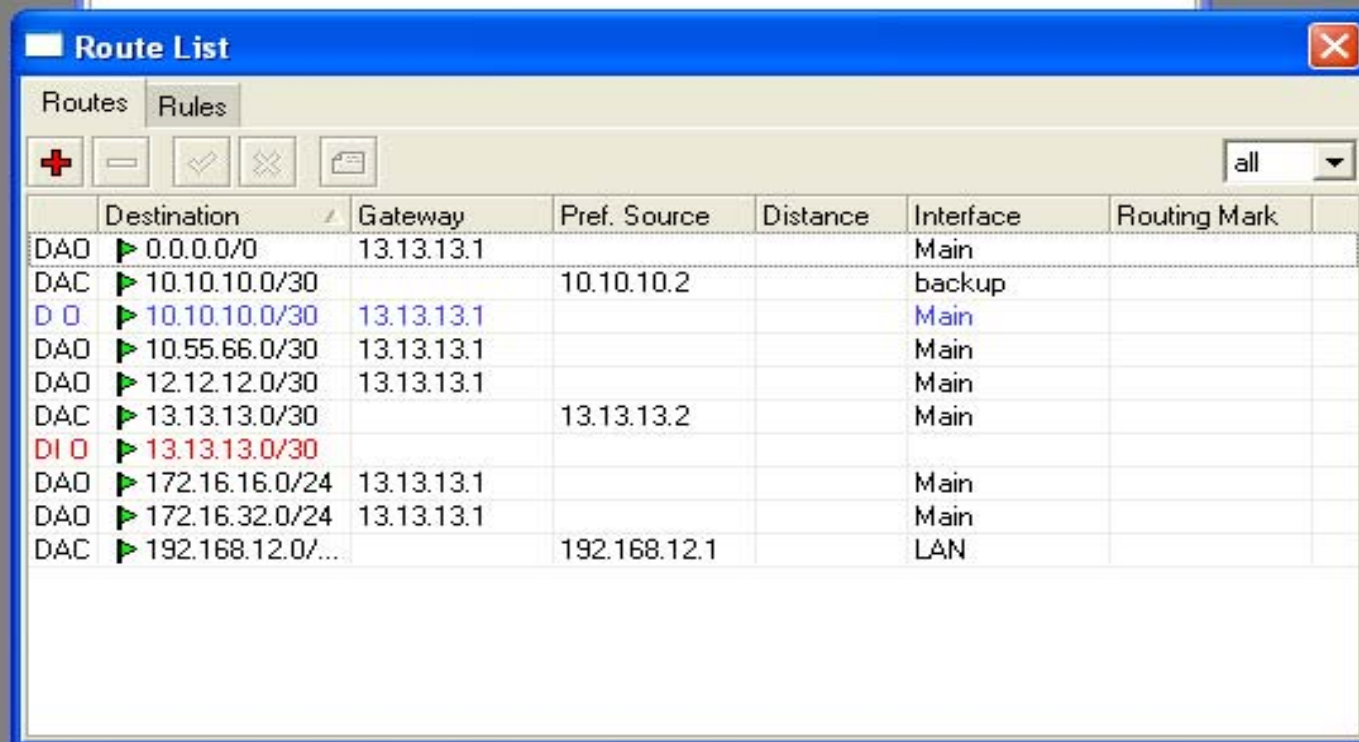


OSPF Neigh dan Tabel Route



OSPF Neighbors window showing a table of neighbor relationships. The table has columns for Router ID, Address, State, and State Changes.

Router ID	Address	State	State Changes
10.55.66.2	13.13.13.1	Full	6
13.13.13.2	13.13.13.2	2-Way	0



Route List window showing a table of routing entries. The table has columns for Destination, Gateway, Pref. Source, Distance, Interface, and Routing Mark.

Destination	Gateway	Pref. Source	Distance	Interface	Routing Mark
0.0.0.0/0	13.13.13.1			Main	
10.10.10.0/30		10.10.10.2		backup	
10.10.10.0/30	13.13.13.1			Main	
10.55.66.0/30	13.13.13.1			Main	
12.12.12.0/30	13.13.13.1			Main	
13.13.13.0/30		13.13.13.2		Main	
13.13.13.0/30					
172.16.16.0/24	13.13.13.1			Main	
172.16.32.0/24	13.13.13.1			Main	
192.168.12.0/...		192.168.12.1		LAN	

Alternative to ospf backup

- Gunakan netwatch untuk menjalankan script untuk merubah routing
- Bridging menggunakan EoIP tunnel atau WDS
- Untuk bridging :
 - Set spanning tree protokol
 - Gunakan port cost argument untuk path yang digunakan