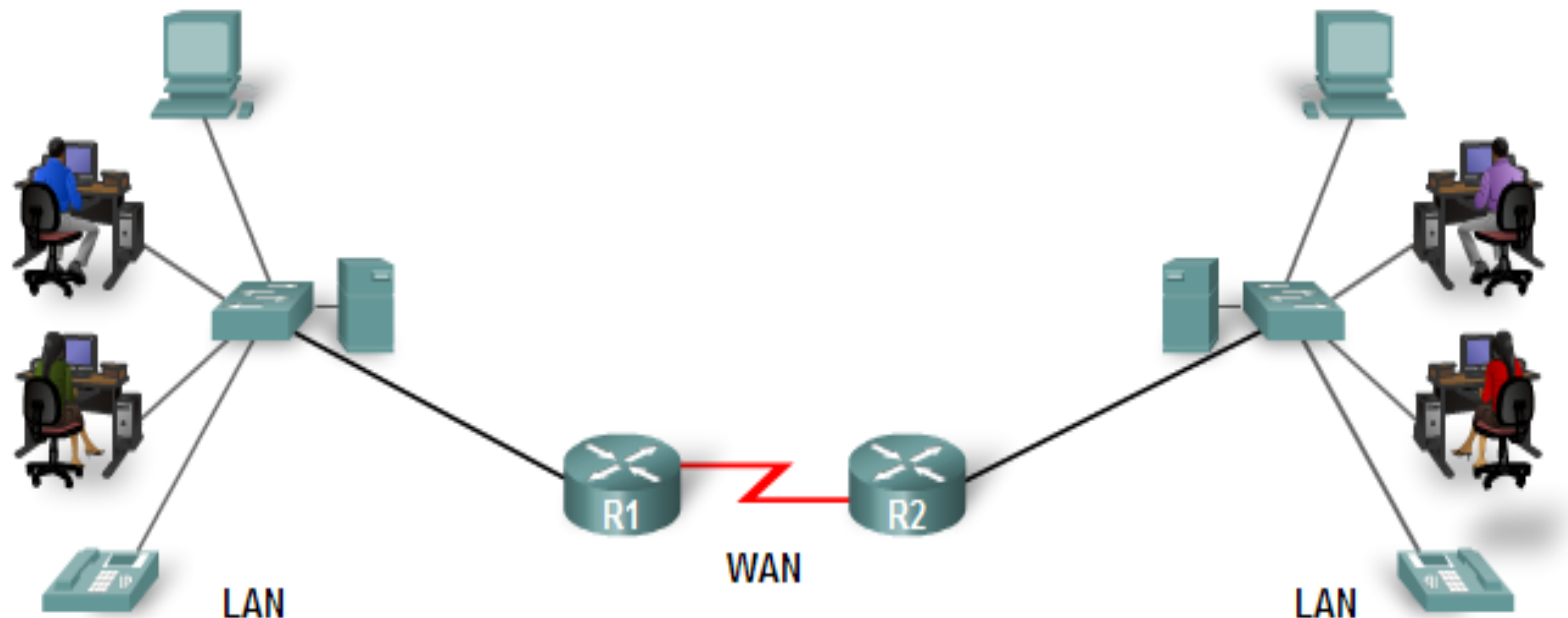


ROUTING STATIK dan DINAMIK

Definition

- ROUTING :

Routing is process offorwarding packets from one network to another, this is sometimes referred to as a relay system



Jenis-Jenis Routing

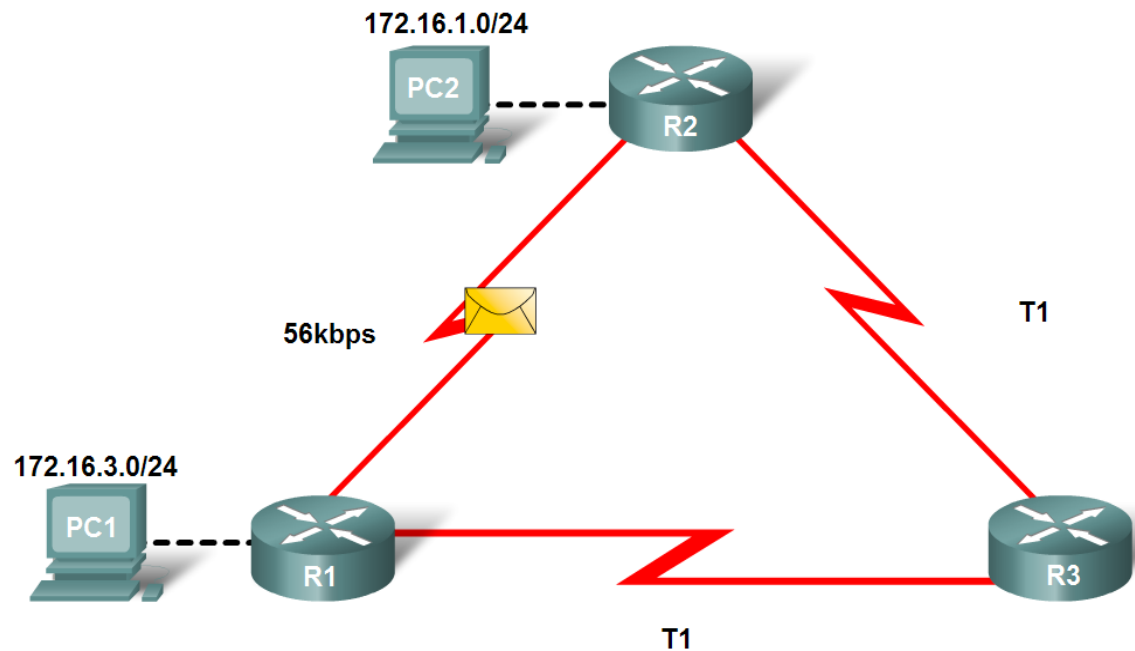
- Routing Statik (Static Routing)
 - Cara pembuatan tabel routing secara manual
 - Jalur-jalur ke tujuan ditentukan oleh administrator secara manual
 - Default route sama dengan statik, digunakan pada saat alamat sumber ke tujuan tidak diketahui atau pada waktu tabel routing tidak bisa menyimpan informasi ke dalam tabelnya lagi.
- Routing Dinamis (Dynamic Routing)
 - Cara membuat tabel routing secara dinamis berubah-ubah secara otomatis jika topologi jaringan berubah
 - Bersifat adaptif algoritma
 - Pemilihan jalur ditentukan oleh protocol secara otomatis pada saat jaringan berubah ini semua tergantung pada pengetahuan tabel dan penjadwalan waktu distribusi informasi ke semua router

METRICS

Digunakan oleh algoritma routing untuk menentukan/memilih rute yang terbaik

- Bandwidth
- Cost
- Delay
- Hop count
- Load
- Reliability

Hop count vs. Bandwidth



RIP chooses shortest path based on hop count.
OSPF chooses shortest path based on bandwidth.

Algoritma Routing

Routing Static

- Pohon Turunan (Sink Tree)
- Routing Lintasan Jarak Terpendek
- Algoritma Flooding
- Algoritma aliran beban

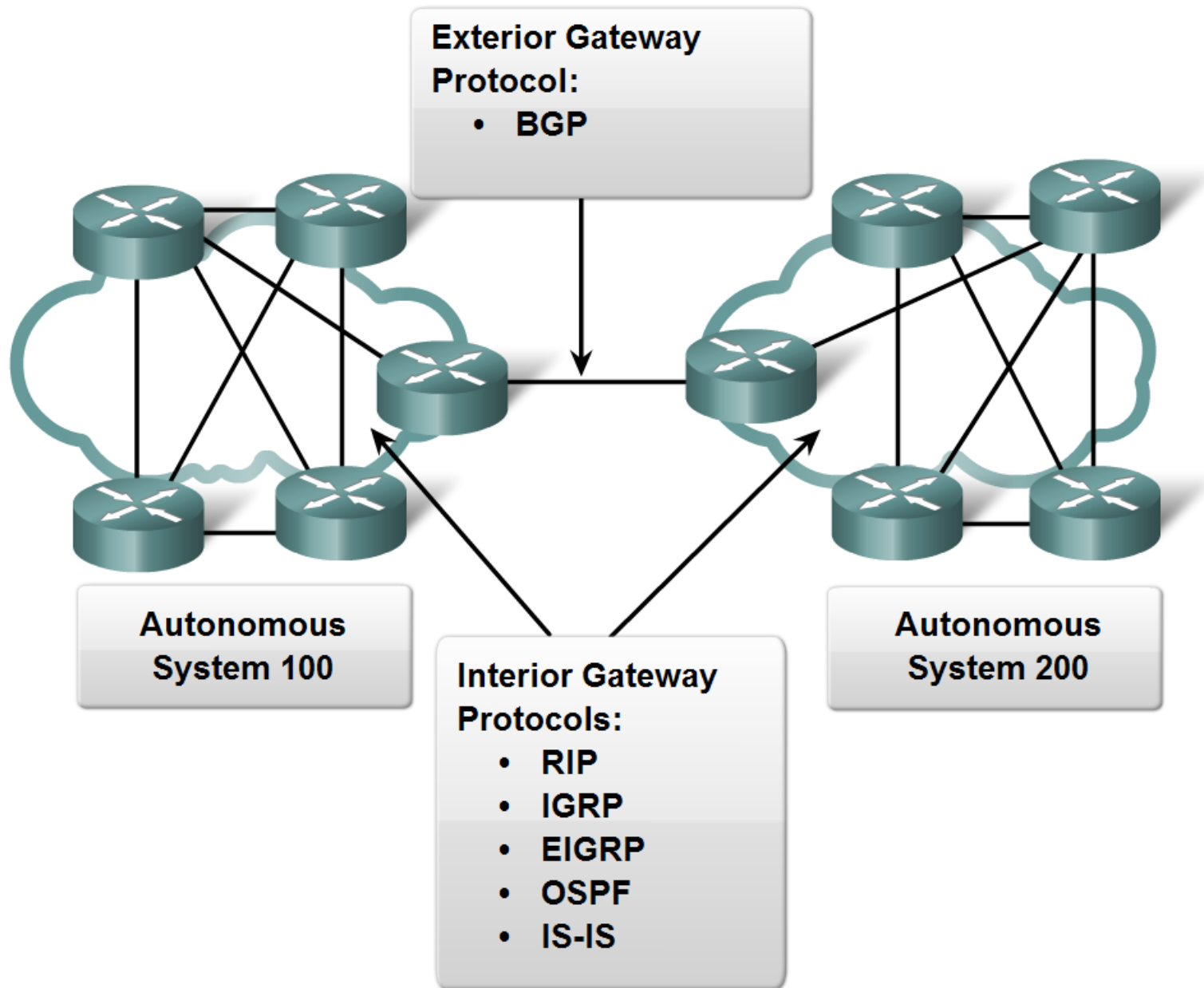
Routing Dinamic

- Algoritma Vektor Jarak (Distance Vector Algorithm)
- Algoritma Keadaan Link (Link State Algorithm)
- Routing Host Bergerak (Mobile Host Routing)

Routing Protocols

- IGP (Interior Gateway Protocol)
 - Alat komunikasi pada sebuah kumpulan jaringan ditempatkan untuk menghasilkan jalur-jalur optimal serta dapat menanggapi dengan cepat tentang perubahan topologi jaringannya
 - IGP melakukan pertukaran informasi routing pada sebuah SA jaringan yang terhubung dan diketahui informasinya sehingga menjadi seperti jaringannya sendiri
- EGP (Eksterior Gateway Protocol)
 - Pertukaran informasi jalur-jalur pengiriman data antar dua buah SA atau lebih pada jaringan internet atau yang lebih luas

IGP vs. EGP Routing Protocols



Protocol IGP

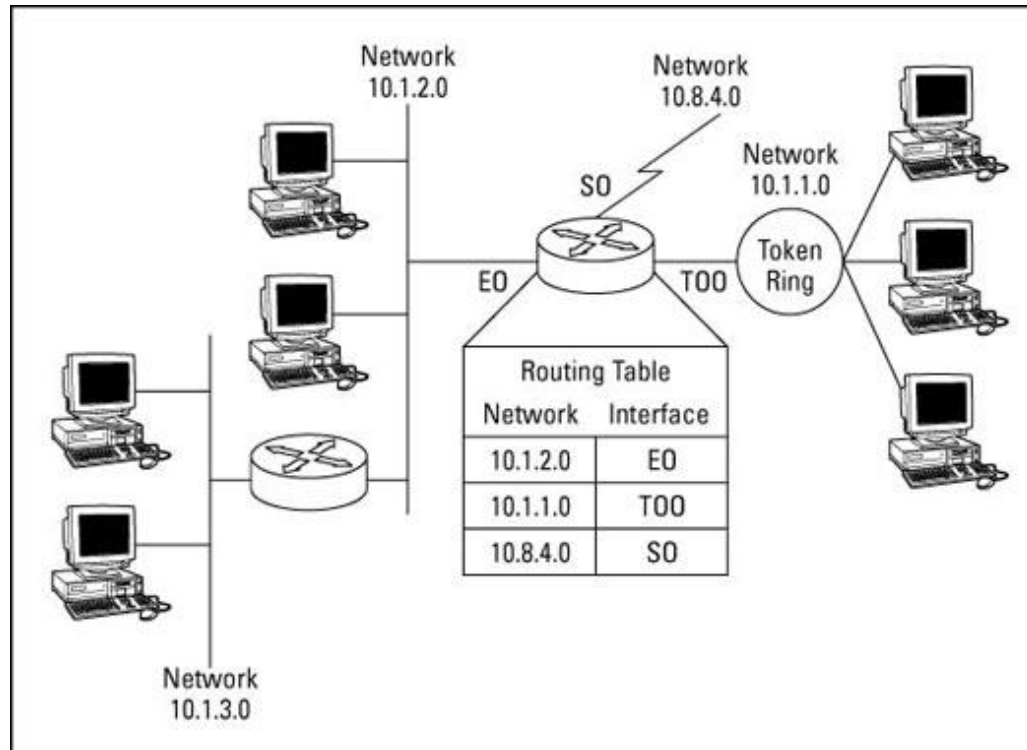
- IGP (Interior Gateway Protocol)
 - Distance Vektor : berdasar vektor jarak : RIP (Routing Internet Protocol), IGRP (interior Gateway Protocol)
 - Link State Berdasar keadaan Link : OSPF (Open Shortest Path First)
 - Hybrid (Gabungan dua protokol diatas) : EIGRP (Enhanced Interior Gateway Routing Protocol)

Protocol EGP

- EGP (Exterior Gateway Protocol)
 - Routing untuk pertukaran informasi jalur-jalur pengiriman data antar dua buah SA atau lebih
 - BGP (Boerder gateway Protocol)
 - EEIGRP (Exterior Enhanced Interior Gateway Rouitng Protocol)

Tabel Routing

- Tabel yang berisi informasi yang digunakan untuk meneruskan paket ke tujuan dan tersimpan dalam router



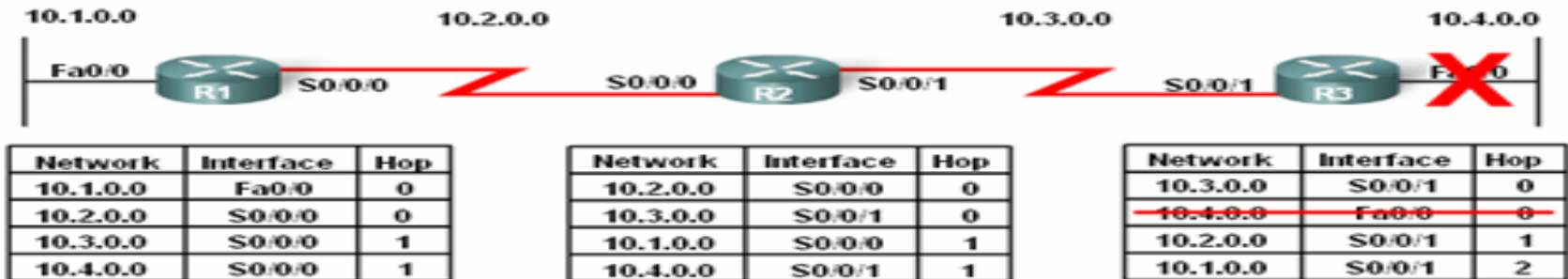
Tabel Routing

- Fungsi Utama Tabel Routing
 - Pengetahuan-pengetahuan apa yang harus dimasukkan ke dalam tabel
 - Informasi dalam tabel untuk efisiensi dan mempercepat pencarian jalur
 - Memperbanyak jalur-jalur ke tujuan yang bisa ditulis
- Protocol pada routing dinamis sangat bergantung pada algoritma routing yang menghasilkan suatu tabel routing pada setiap router secara otomatis walaupun terjadi perubahan kondisi jalur atau perubahan topologi.

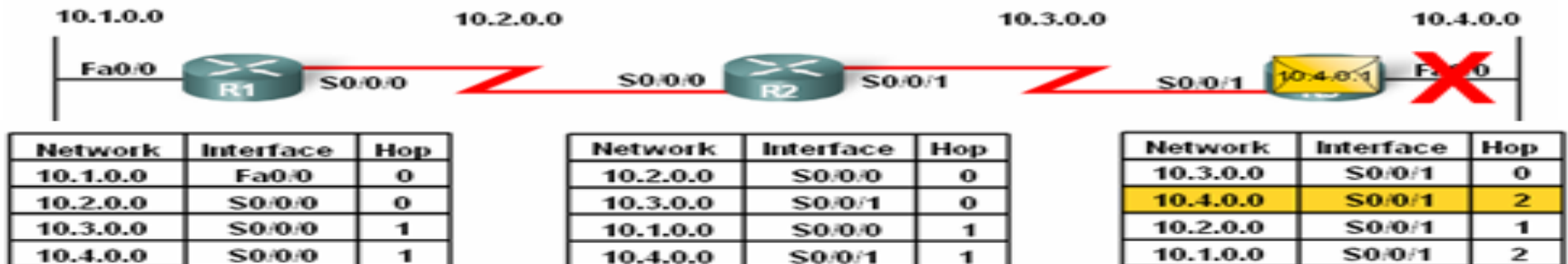
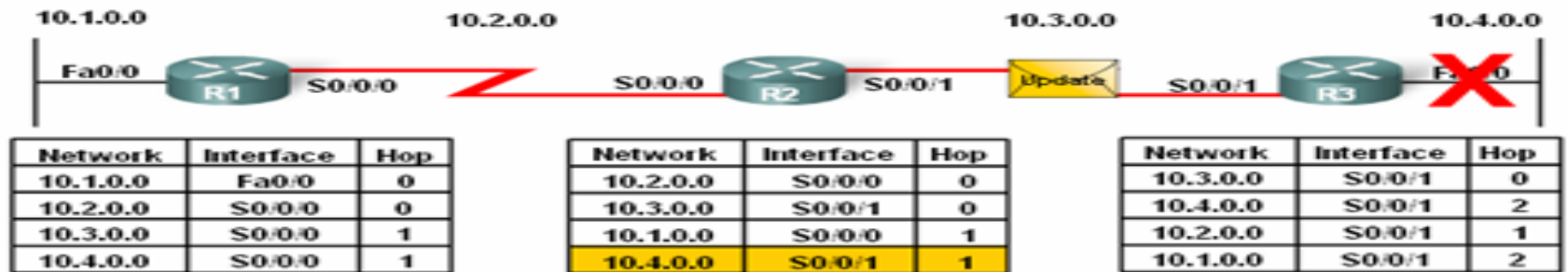
ROUTING LOOP CONDITION

Routing Loop

10.4.0.0 Network goes down.



Before R3 can send an update, R2 sends an update.



Solusi Routing Loop

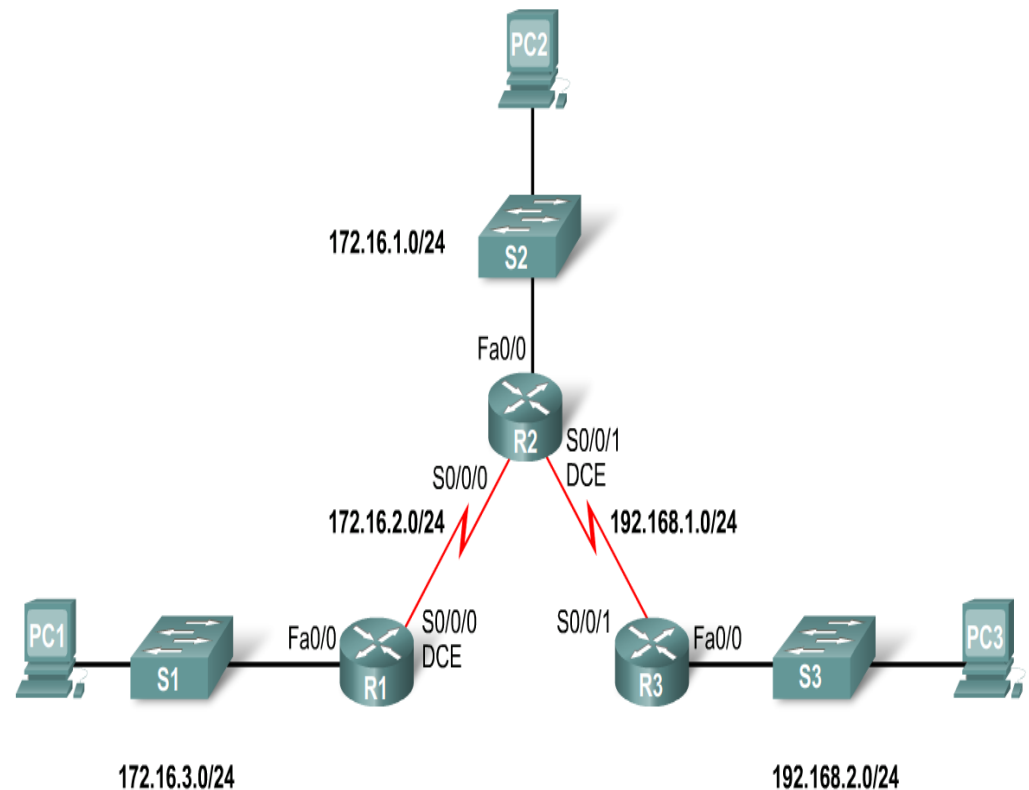
- Holdown Timer
 - Waktu untuk menghindari pengiriman berita pembaruan paket yang tidak mencapai tujuan
- Route Poisoning
 - Menandai paket yang tidak tercapai tujuannya sebagai tanda jumlah lompatan tidak tercapai
- Split Horizon
 - Menghindari pengiriman data kembali ke alamat pengirim
- Triggered Update
 - Memperbaharui perubahan dalam jaringan dengan cepat saat terjadinya perubahan

Protocol Routing Dinamis IGP

- RIP (Routing Internet Protocol)
- IGRP (Interior Gateway Routing Protocol)
- OSPF (Open shortest Path First)

STATIC ROUTING

- Interface Serial
 - S0/0/0 dsb
 - DCE dan DTE
 - Untuk Interface serial DCE harus diberi CLOCK



STATIC ROUTING

Konfigurasi Interface

Device	Interface	IP address	Subnet Mask	Def. Gateway	Status
R1	Fa0/0	172.16.3.1	255.255.255.0	n/a	
	S0/0/0	172.16.2.1	255.255.255.0	n/a	DCE
R2	Fa0/0	172.16.1.1	255.255.255.0	n/a	
	S0/0/0	172.16.2.2	255.255.255.0	n/a	
	S0/0/1	192.168.1.1	255.255.255.0	n/a	DCE
R3	Fa0/0	192.168.2.1	255.255.255.0	n/a	
	S0/0/1	192.168.1.2	255.255.255.0	n/a	
PC1	NIC/Fa	172.16.3.10	255.255.255.0	172.16.3.1	
PC2	NIC/Fa	172.16.1.10	255.255.255.0	172.16.1.1	
PC3	NIC/Fa	192.168.2.10	255.255.255.0	192.168.2.1	

Konfigurasi Interface

Routing table has no routes

Summary of interface status with show ip interface brief

R1#show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	unassigned	YES	manual	administratively down	down
Serial0/0/0	unassigned	YES	unset	administratively down	down
FastEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/0/1	unassigned	YES	unset	administratively down	down

R1#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

R1#

R1#show running-config

```
!  
version 12.3  
!  
hostname R1  
!  
enable secret 5 $1$.3R0$VLU0dBF2OqNBn0EjQBvR./  
!  
!  
interface FastEthernet0/0  
  mac-address 000c.3010.9260  
  no ip address  
  duplex auto  
  speed auto  
  shutdown  
!  
interface FastEthernet0/1
```

R2(config)#interface serial 0/0/1

R2(config-if)#ip address 192.168.1.2 255.255.255.0

R2(config-if)#clock rate 64000

R2(config-if)#no shutdown

Hanya Untuk Serial Yang DCE !

R3(config)#interface fastethernet 0/0

R3(config-if)#ip address 192.168.2.1 255.255.255.0

R3(config-if)#no shutdown

R3(config-if)#interface serial 0/0/1

R3(config-if)#ip address 192.168.1.1 255.255.255.0

R3(config-if)#no shutdown

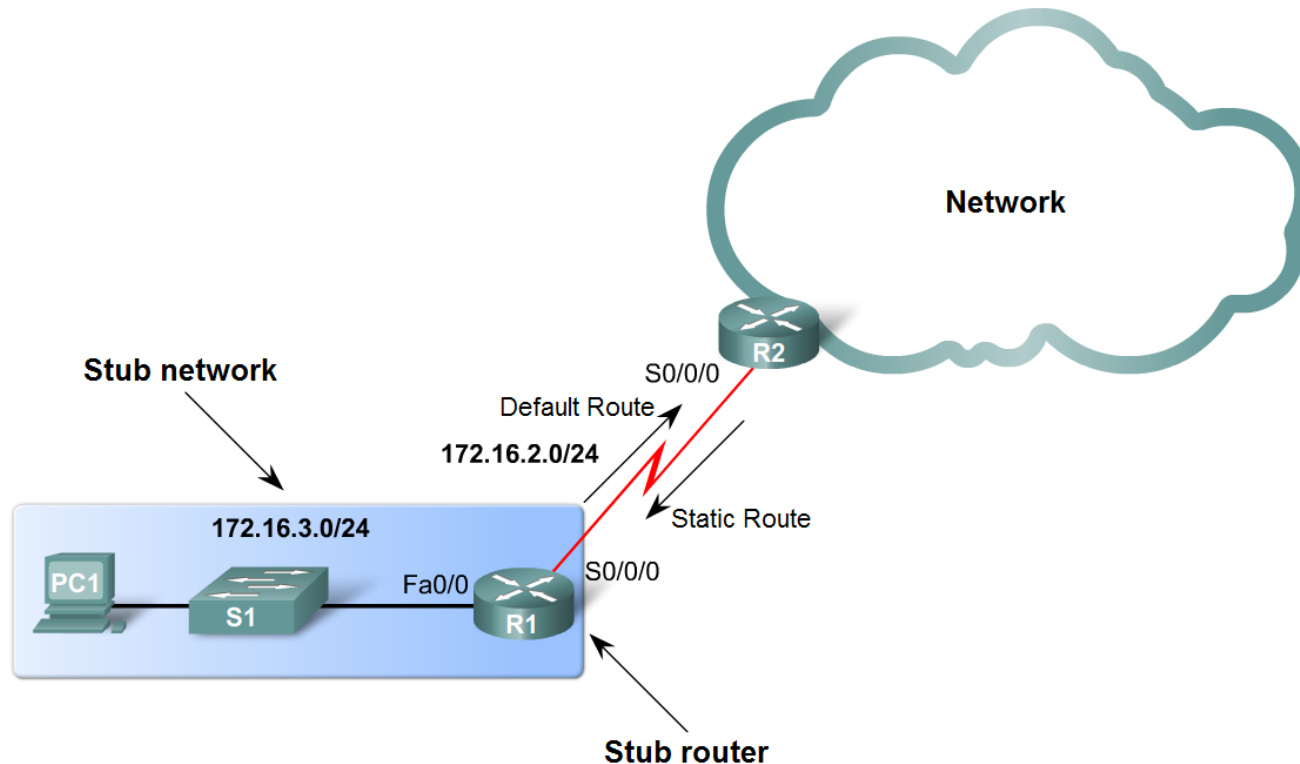
Perintah Dasar Router

Basic router configuration command syntax

Naming the router	Router(config)# hostname name
Setting Passwords	Router(config)# enable secret password
	Router(config)# line console 0
	Router(config-line)# password password
	Router(config-line)# login
	Router(config)# line vty 0 4
Configuring an interface	Router(config-line)# password password
	Router(config-line)# login
	Router(config)# interface type number
	Router(config-if)# ip address address mask
	Router(config-if)# description description
Configuring a message-of-the-day banner	Router(config-if)# no shutdown
	Router(config)# banner motd # message #
Saving changes on a router	Router# copy running-config startup-config
Examining the output of show commands	Router# show running-config
	Router# show ip route
	Router# ip interface brief
	Router# interfaces

Membuat Static Route

- **Purpose of a static route**
 - A manually configured route used when routing from a network to a stub network



Membuat Static Route

- **Perintah IP route**

- To configure a static route use the following command: **ip route**

- Example:

- -Router(config)# **ip route** **network-address** **subnet-mask** {ip-address | exit-interface }

```
Router(config)# ip route network-address subnet-mask  
{ip-address | exit-interface }
```

Parameter	Description
network-address	Destination network address of the remote network to be added to the routing table.
subnet-mask	Subnet mask of the remote network to be added to the routing table. The subnet mask can be modified to summarize a group of networks.
ip-address	Commonly referred to as the next-hop router's IP address.
exit-interface	Outgoing interface that is used to forward packets to the destination network.

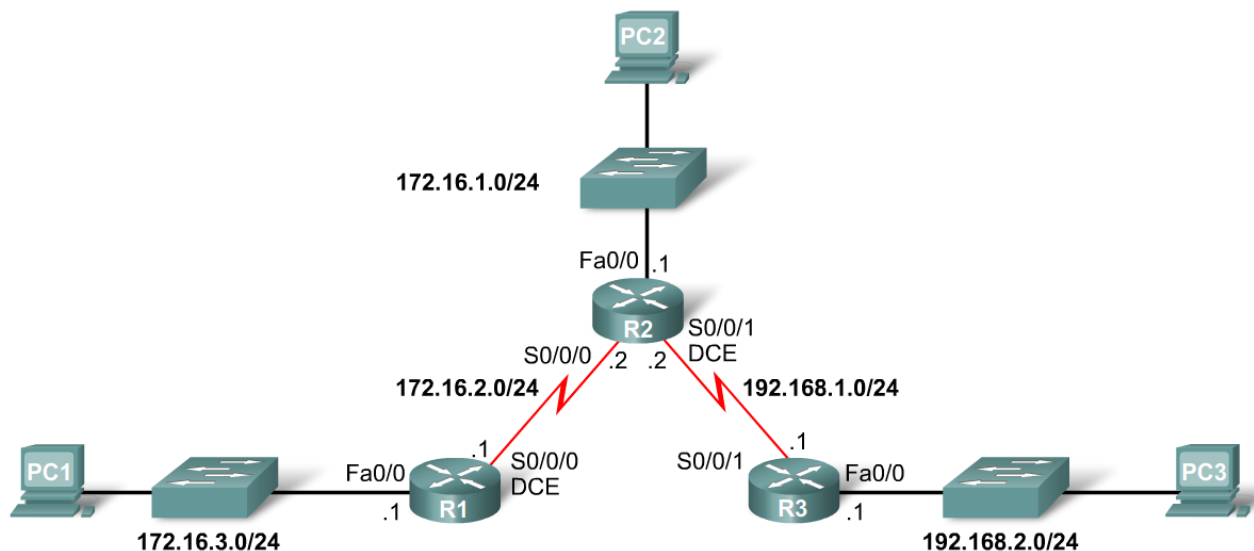
Membuat Static Route

- **Configuring routes to 2 or more remote networks**

—Perintah Static Route Pada R1

- -R1(config)#ip route 192.168.1.0 255.255.255.0 172.16.2.2 atau S0/0/0
- -R1(config)#ip route 192.168.2.0 255.255.255.0 172.16.2.2 atau s0/0/0
- -R1(config)#ip route 172.16.1.0 255.255.255.0 172.16.2.2 atau s0/0/0

R1 static route to R2's LAN



Membuat Static Route

- **Modifying Static routes**

- Existing static routes **cannot** be modified. The old static route must be deleted by placing **no** in front of the **ip route**

- Example:

- no ip route 192.168.2.0 255.255.255.0 172.16.2.2

- A new static route must be rewritten in the configuration

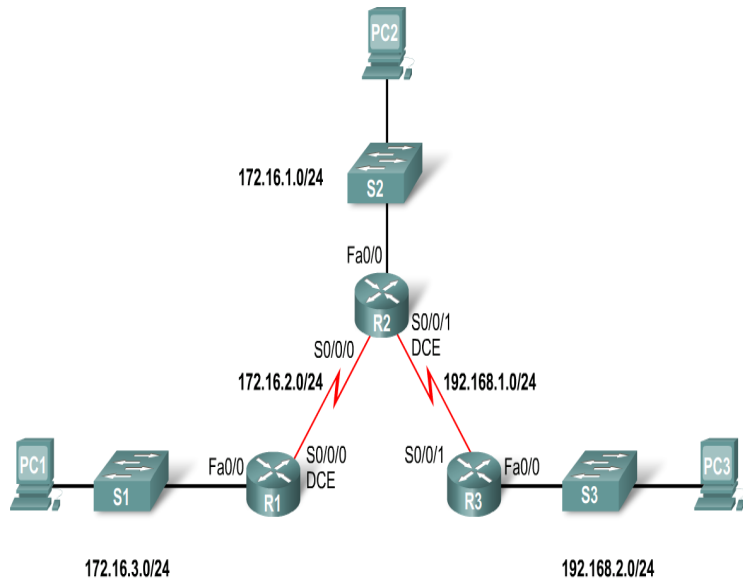
```
R1(config)#no ip route 172.16.1.0 255.255.255.0 172.16.2.2
R1(config)#ip route 172.16.1.0 255.255.255.0 serial 0/0/0
R1(config)#no ip route 192.168.1.0 255.255.255.0 172.16.2.2
R1(config)#ip route 192.168.1.0 255.255.255.0 serial 0/0/0
```

```
R2(config)#no ip route 172.16.3.0 255.255.255.0 172.16.2.1
R2(config)#ip route 172.16.3.0 255.255.255.0 serial 0/0/0
R2(config)#no ip route 192.168.2.0 255.255.255.0 192.168.1.1
R2(config)#ip route 192.168.2.0 255.255.255.0 serial 0/0/1
```

```
R3(config)#no ip route 172.16.1.0 255.255.255.0 192.168.1.2
R3(config)#ip route 172.16.1.0 255.255.255.0 serial 0/0/1
R3(config)#no ip route 172.16.2.0 255.255.255.0 192.168.1.2
R3(config)#ip route 172.16.2.0 255.255.255.0 serial 0/0/1
R3(config)#no ip route 172.16.3.0 255.255.255.0 192.168.1.2
R3(config)#ip route 172.16.3.0 255.255.255.0 serial 0/0/1
```

Membuat Static Route

- Kerjakan topologi Contoh Hingga Semua Router dan komputer dapat terkoneksi Menggunakan static Route



Konfigurasi Interface

Device	Interface	IP address	Subnet Mask	Def. Gateway	Status
R1	Fa0/0	172.16.3.1	255.255.255.0	n/a	
	S0/0/0	172.16.2.1	255.255.255.0	n/a	DCE
R2	Fa0/0	172.16.1.1	255.255.255.0	n/a	
	S0/0/0	172.16.2.2	255.255.255.0	n/a	
	S0/0/1	192.168.1.1	255.255.255.0	n/a	DCE
R3	Fa0/0	192.168.2.1	255.255.255.0	n/a	
	S0/0/1	192.168.1.2	255.255.255.0	n/a	
PC1	NIC/ <u>Fa</u>	172.16.3.10	255.255.255.0	172.16.3.1	
PC2	NIC/ <u>Fa</u>	172.16.1.10	255.255.255.0	172.16.1.1	
PC3	NIC/ <u>Fa</u>	192.168.2.10	255.255.255.0	192.168.2.1	