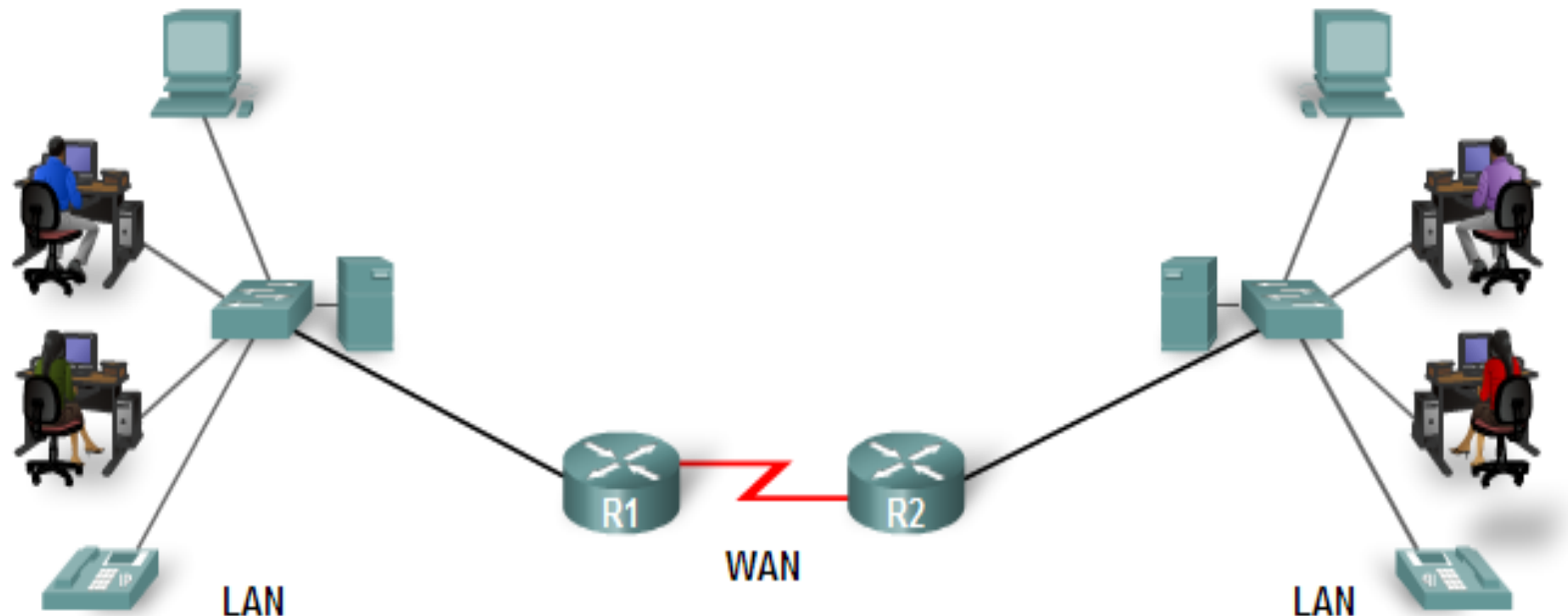**ROUTING DINAMIK**

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 Dimanis (Dinamic 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 smua router

METRICS

Digunakan oleh algoritma routing untuk menentukan/memilih rute yang terbaik

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

Hop count vs. Bandwidth

172.16.1.0/24

PC2

R2

56kbps

T1

172.16.3.0/24

PC1

R1

T1

R3
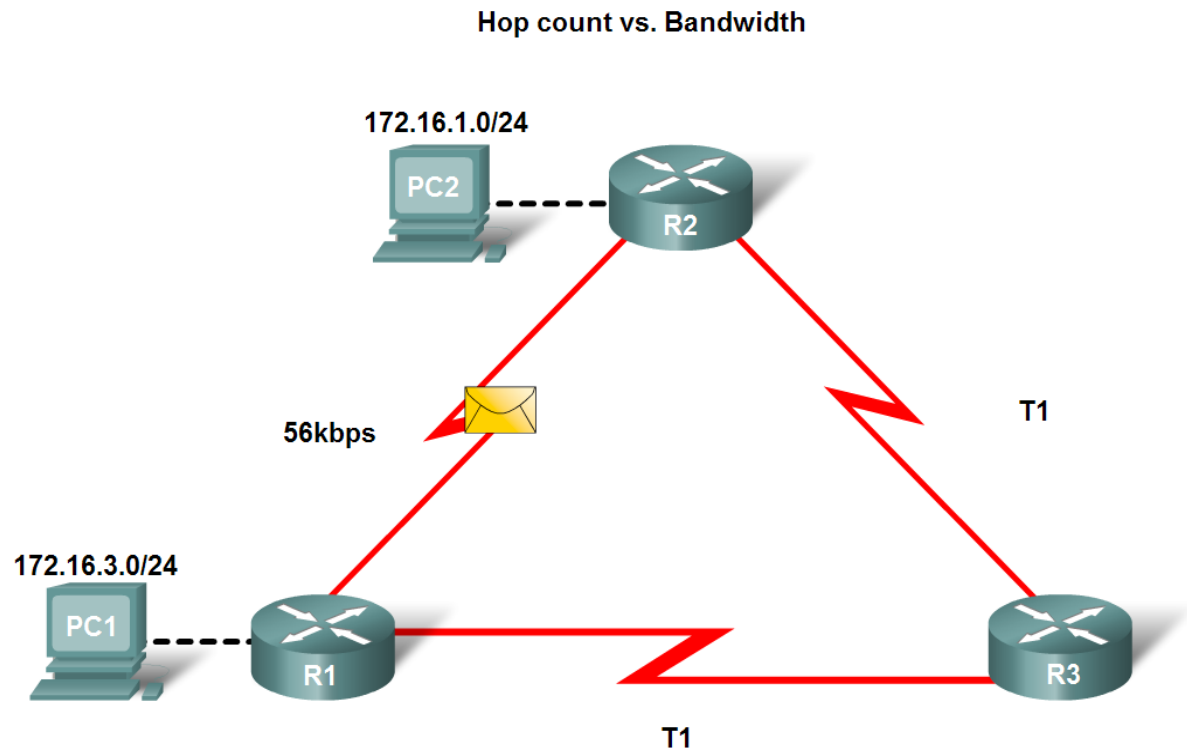
RIP chooses shortest path based on hop count.
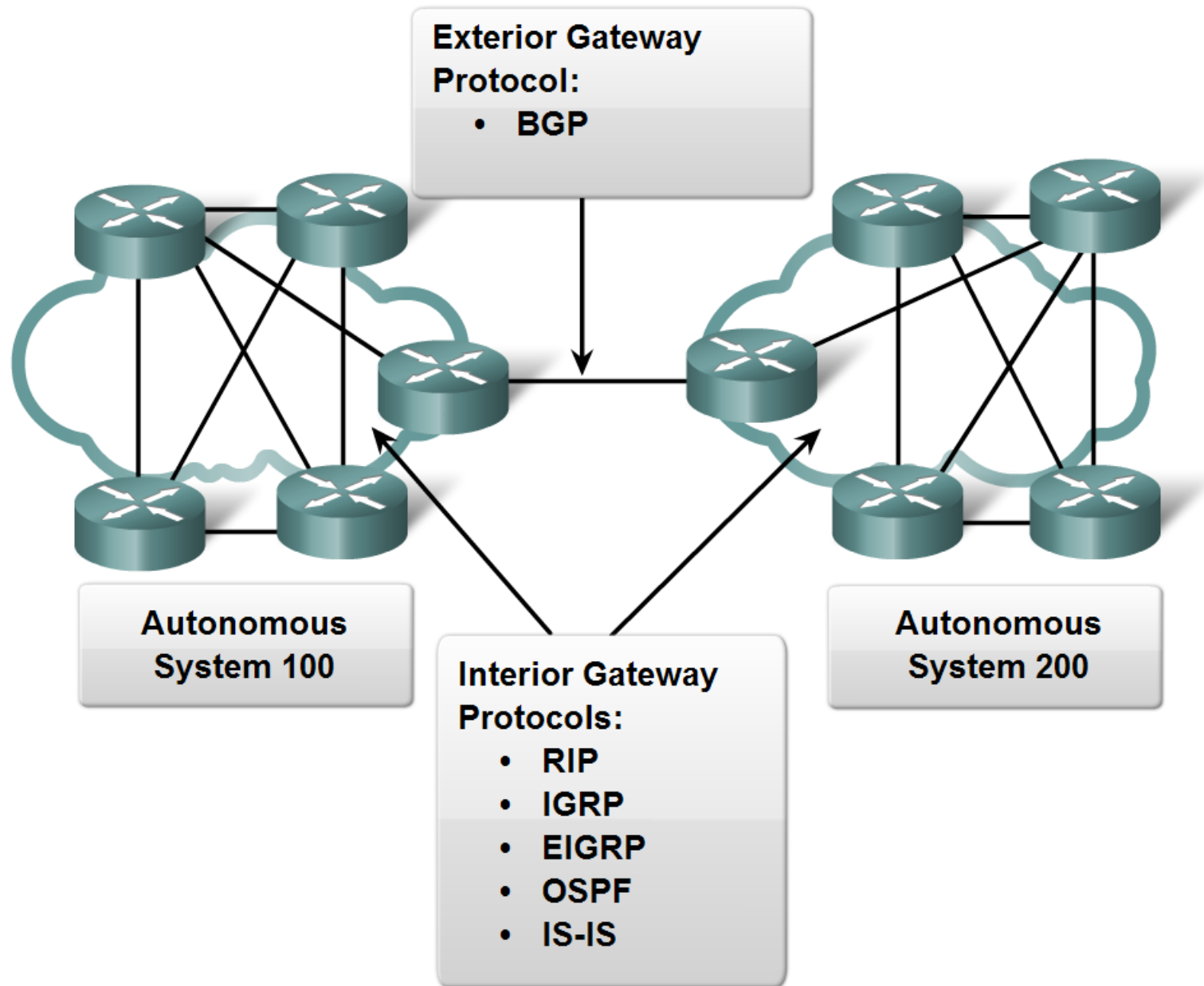**OSPF chooses shortest path based on bandwidth.**

Algoritma Routing

- Advantages of **static routing**
  - -It can backup multiple interfaces/networks on a router
  - -Easy to configure
  - -No extra resources are needed
  - -More secure
- Disadvantages of **static routing**
  - -Network changes require manual reconfiguration
  - -Does not scale well in large topologies

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 pertukana 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

Exterior Gateway Protocol:
- **BGP**

Autonomous System 100

Autonomous System 200

Interior Gateway Protocols:
- **RIP**
- **IGRP**
- **EIGRP**
- **OSPF**
- **IS-IS**

Protocol Dinamic Routing

- 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)
- 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
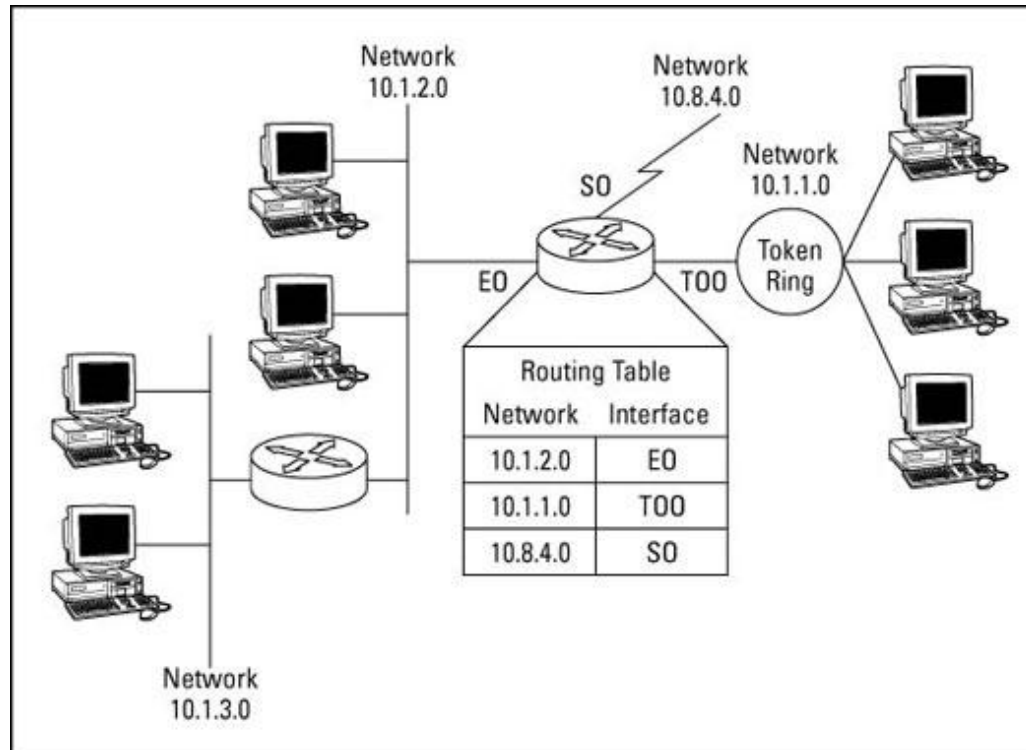
Administrative Distance

- AD atau penentuan tingkat keberhasilan (kepercayaan) routing protocol berbeda-beda Semakin kecil angka maka semakin besar tingkat kepercayaan protocol tersebut.

| Routing Protocol	Besaran
Connecting Interfaces	0
Static Routing	1
EIGRP	5
External BGP	20
Internal EIGRP	90
IGRP	100
OSPF	110
RIP	120
External EIGRP	170
Internal BGP	200
Anknown Network	255-tak terhngga

Protocol Routing Dinamis IGP

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

Dinamic Route

- **Function(s) of Dynamic Routing Protocols:**
  - Dynamically share information between routers.
  - Automatically update routing table when topology changes.
  - Determine best path to a destination.
- The **purpose of a dynamic routing protocol** is to:
  - -Discover remote networks
  - -Maintaining up-to-date routing information
  - -Choosing the best path to destination networks
  - -Ability to find a new best path if the current path is no longer available

Routers Dynamically Pass Updates
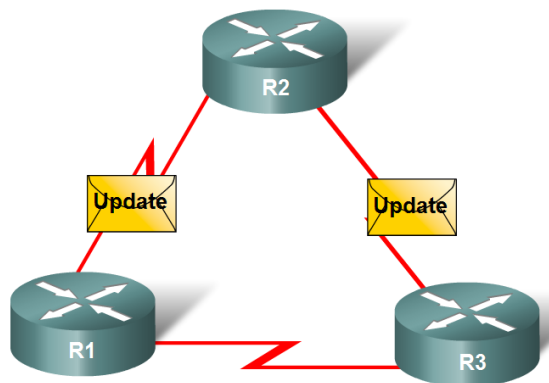
RIP

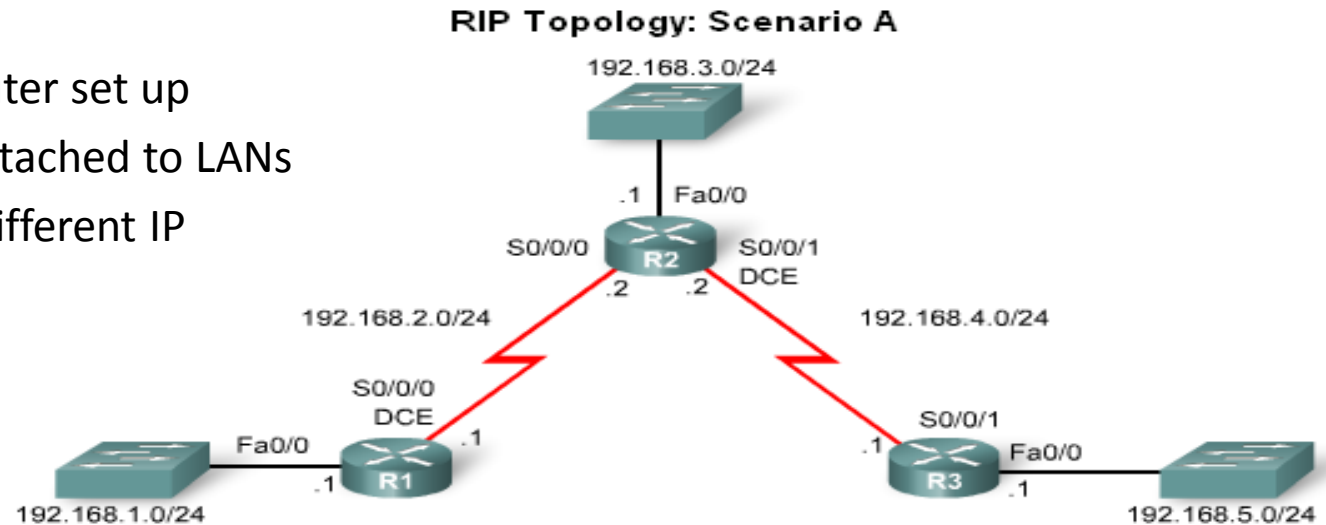- Proses Algoritma RIP
  - Pembaharuan (update)
    - Peridik 30 detik router mengirim pesan pembaruan tabel routing ke router yang terkoneksi secara langsung
      - Update timer = 30 detik
      - Invalid timer = 90 detik
      - Holdown timer = 180 detik
      - Flush timer = 240 detik
- Maksimum HOP 15
- Metric HOP
- Tidak ada pengamanan
- Cara bekerja hanya dapat dengan satu saluran setiap pengiriman

Basic RIPv1 Configuration

- **A typical topology suitable for use by RIPv1 includes:**

  - -Three router set up

  - -No PCs attached to LANs

  - Use of 5 different IP subnets

    -

RIP Topology: Scenario A

192.168.3.0/24

.1 Fa0/0

S0/0/0   R2   S0/0/1
                  DCE
        .2   .2

192.168.2.0/24   192.168.4.0/24

S0/0/0
DCE
Fa0/0   .1   S0/0/1
         .1   .1   Fa0/0
         R1   R3   .1

192.168.1.0/24   192.168.5.0/24

Addressing Table: Scenario A

Device	Inferface	IP Address	Subnet Mask
R1	Fa0/0	192.168.1.1	255.255.255.0
	S0/0/0	192.168.2.1	255.255.255.0
R2	Fa0/0	192.168.3.1	255.255.255.0
	S0/0/0	192.168.2.2	255.255.255.0
	S0/0/1	192.168.4.2	255.255.255.0
R3	Fa0/0	192.168.5.1	255.255.255.0
	S0/0/1	192.168.4.1	255.255.255.0

Basic RIPv1 Configuration

- ## Router RIP Command
  - To enable RIP enter:
  - —   -*Router rip* at the global configuration prompt
  - —   -Prompt will look like **R1(config-router)#**

```
R1#conf t
Enter configuration commands, one per line. End with CTRL/Z.
R1(config)#router ?
  bgp        Border Gateway Protocol (BGP)
  egp        Exterior Gateway Protocol (EGP)
  eigrp      Enhanced Interior Gateway Protocol (EIRGP)
  igrp       Interior Gateway Routing Protocol (IGRP)
  isis       ISO IS-IS
  iso-igrp   IGRP for OSI networks
  mobile     Mobile routes
  odr        On Demand stub Routes
  ospf       Open Shortest Path First (OSPF)
  rip        Routing Information Protocol (RIP)

R1(config)#router rip
R1(config-router)#
```

Basic RIPv1 Configuration

- Specifying Networks
  - Use the *network* command to:

  - Enable RIP on all interfaces that belong to this network

  - -Advertise this network in RIP updates

  - sent to other routers every 30 seconds
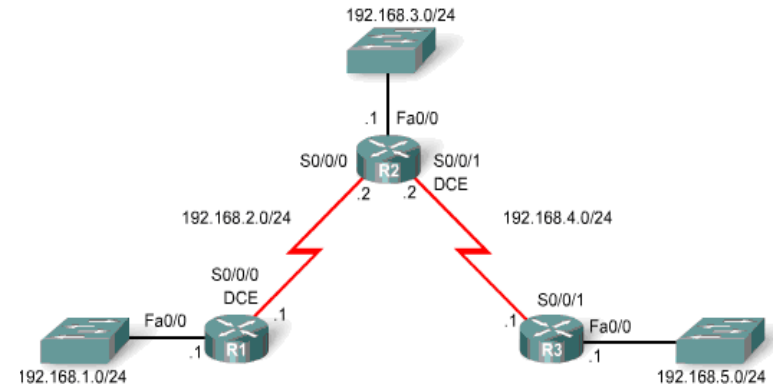

```
R1(config)#router rip
R1(config-router)#network 192.168.1.0
R1(config-router)#network 192.168.2.0
```

```
R2(config)#router rip
R2(config-router)#network 192.168.2.0
R2(config-router)#network 192.168.3.0
R2(config-router)#network 192.168.4.0
```

```
R3(config)#router rip
R3(config-router)#network 192.168.4.0
R3(config-router)#network 192.168.5.0
```
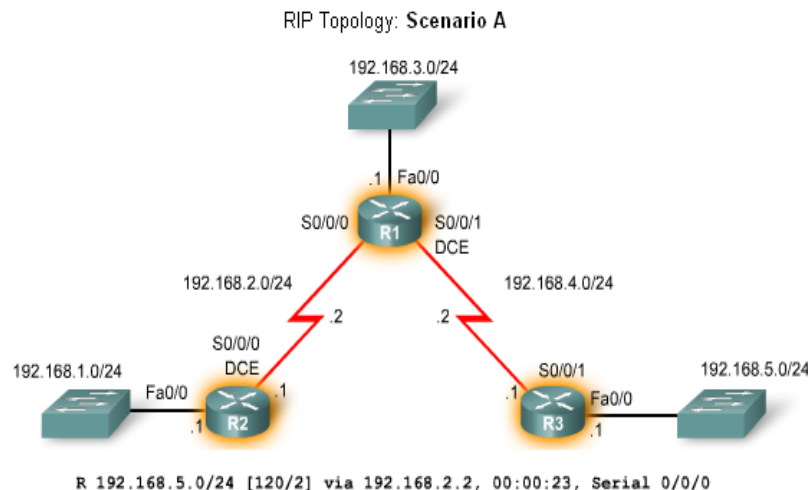
Verification and Troubleshooting

- Show ip Route
- To verify and troubleshoot routing

  - Use the following

  commands:

    - show ip route
    - show ip protocols

    - debug ip rip

RIP Topology: **Scenario A**

192.168.3.0/24

.1 Fa0/0

S0/0/0   S0/0/1
R1   DCE

192.168.2.0/24   192.168.4.0/24

.2   .2

S0/0/0
DCE   S0/0/1   192.168.5.0/24
192.168.1.0/24
Fa0/0   .1   .1   Fa0/0
R2   R3   .1
.1

R 192.168.5.0/24 [120/2] via 192.168.2.2, 00:00:23, Serial 0/0/0

Interpreting a RIP Route in the Routing Table	
R	Identifies the source of the route as RIP.
192.168.5.0	Indicates the address of the remote network.
/24	The subnet mask used for this network
[120/2]	The administrative distance (120) and the metric (2 hops)
via 192.168.2.2	Specifies the address of the next-hop router (R2) to send traffic to for the remote network.
00:00:23	Specifies the amount of time since the route was updated (here, 23 seconds). Another update is due in 7 seconds.
Serial0/0/0	192.168.4.2

Verification and Troubleshooting

- *show ip protocols* command

    -Displays routing protocol configured on router

```
R2#show ip protocols
Routing Protocol is "rip"
   Sending updates every 30 seconds, next due in 23 seconds
   Invalid after 180 seconds, hold down 180, flushed after 240
   Outgoing update filter list for all interfaces is not set
   Incoming update filter list for all interfaces is not set
   Redistributing: rip
   Default version control: send version 1, receive any version
      Interface              Send  Recv  Triggered RIP  Key-chain
      FastEthernet0/0          1    1 2
      Serial0/0/0              1    1 2
      Serial0/0/1              1    1 2
   Automatic network summarization is in effect
   Maximum path: 4
   Routing for Networks:
      192.168.2.0
      192.168.3.0
      192.168.4.0
   Routing Information Sources:
      Gateway          Distance        Last Update
      192.168.2.1         120           00:00:18
      192.168.4.1         120           00:00:22
   Distance: (default is 120)
```

Shows which routing processes are enabled

Timers currently in use including when the next update will be sent out by this router (23 seconds)

CCNP-level topics include:
- Filtering what updates this router will send and receive
- Redistributing: rip means that this router is sending and receiving only RIP.

Shows which interfaces are currently sending and receiving RIP updates as well as which RIP version.

- Automatic summarization in effect means this router is summarizing to the classful network boundary.
- Maximum paths specifies how many equal-cost routes RIP will use to send traffic to the same destination.

Routing for Networks displays the classful network address configured in RIP router configuration mode.

- Routing Information Sources are the RIP neighbors this router is currently receiving updates from.
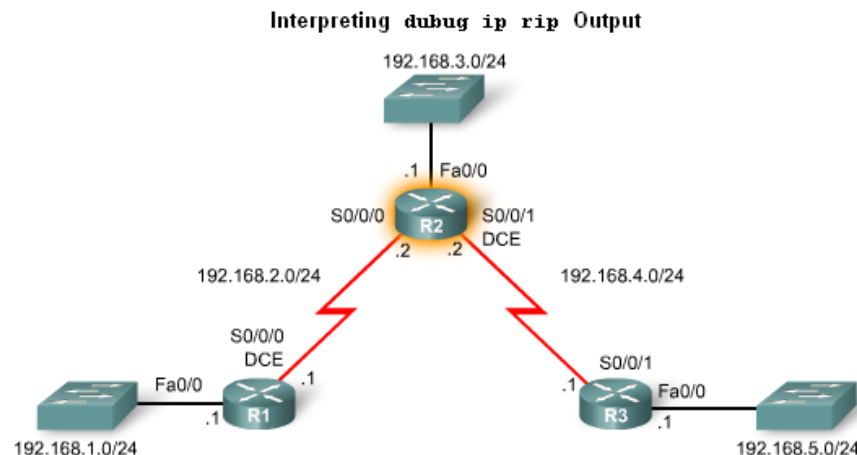- Includes next-hop IP address, the AD, and when the last update was received.
- Last line shows the AD for this router.

Verification and Troubleshooting

- **Debug ip rip** command

  -Used to display RIP routing updates as they are   happening

Interpreting debug ip rip Output

```
R2#debug ip rip
RIP protocol debugging is on
RIP: received v1 update from 192.168.2.1 on Serial0/0/0    - R2 receives an update from R1 advertising the R1's directly connected LAN.
      192.168.1.0 in 1 hops
RIP: received v1 update from 192.168.4.1 on Serial0/0/1    - R2 receives an update from R3 advertising the R3's directly connected LAN.
      192.168.5.0 in 1 hops
RIP: sending  v1 update to 255.255.255.255 via FastEthernet0/0 (192.168.3.1)
RIP: build update entries                          - R2 sends an update out Fa0/0 to all networks in the routing table except the network attached
      network 192.168.1.0 metric 2                    to Fa0/0.
      network 192.168.2.0 metric 1
      network 192.168.4.0 metric 1
      network 192.168.5.0 metric 2
RIP: sending  v1 update to 255.255.255.255 via Serial0/0/1 (192.168.4.2)
RIP: build update entries                          - R2 sends an update out S0/0/1 to R3. Included in the update are R1's LAN, the WAN between R1
      network 192.168.1.0 metric 2                    and R2, and R2's LAN.
      network 192.168.2.0 metric 1                  - Note that split horizon is in effect. R2 does not advertise the R3 LAN back to R3.
      network 192.168.3.0 metric 1
RIP: sending  v1 update to 255.255.255.255 via Serial0/0/0 (192.168.2.2)
RIP: build update entries
```

Verification and Troubleshooting

- **Passive interface** command

    -Used to prevent a router from sending updates through an interface

    -Example:

    Router(config-router)#passive-interface interface-type interface-number

Verification and Troubleshooting

■ **Passive interfaces**

```
R2(config)#router rip
R2(config-router)#passive-interface FastEthernet 0/0
R2(config-router)#end
R2#show ip protocols
Routing Protocol is "rip"
    Sending updates every 30 seconds, next due in 14 seconds
    Invalid after 180 seconds, hold down 180, flushed after 240
    Outgoing update filter list for all interfaces is
    Incoming update filter list for all interfaces is
    Redistributing: rip
    Default version control: send version 1, receive any version
        Interface            Send  Recv  Triggered RIP  Key-chain
        Serial0/0/0            1     1 2
        Serial0/0/1            1     1 2
    Automatic network summarization is in effect
    Routing for Networks:
        192.168.2.0
        192.168.3.0
        192.168.3.0
        192.168.4.0
    Passive Interface(s):
        FastEthernet0/0
    Routing Information Sources:
    Gateway         Distance      Last Update
        192.168.2.1        120        00:00:27
        192.168.4.1        120        00:00:23
Distance: (default is 120)
```

Notice FastEthernet 0/0 is no longer listed under "Default version contol:"
However, R2 is still routing for 192.168.3.0 and now lists FastEthernet under "Passive Interfaces:"

Automatic Summarization

- **Configuration Details**

  -To remove the RIP routing   process use the following   command

  No router rip

  -To check the configuration   use the following command

  Show run

```
R2(config)#interface S0/0/0
R2(config-if)#ip address 172.30.2.2 255.255.255.0
R2(config-if)#interface fa0/0
R2(config-if)#ip address 172.30.3.1 255.255.255.0
R2(config-if)#interface S0/0/1
R2(config-if)#ip address 192.168.4.9 255.255.255.252
R2(config-if)#no router rip
R2(config)#router rip
R2(config-router)#network 172.30.0.0
R2(config-router)#netowrk 192.168.4.8
R2(config-router)#passive-interface FastEthernet 0/0
R2(config-router)#end
R2#show run
<output omitted>
!
router rip
 passive-interface FastEthernet0/0
```

Terima kasih