

# Dynamic Routing :

- ▶ Two types of routing protocols are used in internetworks:
  1. Interior gateway protocols (IGPs)
  2. Exterior gateway protocols (EGPs)

# Interior gateway protocols (IGPs)

There are three classes of routing protocols:

1. **Distance vector**

Ex: RIP

2. **Link state**

EX: OSPF

3. **Hybrid**

EX: EIGRP



# Administrative Distances

**TABLE 8.1** Default administrative distances

| Route Source        | Default AD                           |
|---------------------|--------------------------------------|
| Connected interface | 0                                    |
| Static route        | 1                                    |
| EIGRP               | 90                                   |
| OSPF                | 110                                  |
| RIP                 | 120                                  |
| External EIGRP      | 170                                  |
| Unknown             | 255 (This route will never be used.) |

# Characteristics of RIP(Routing information protocols)

| Characteristic                   | RIPv2              | RIPv1              |
|----------------------------------|--------------------|--------------------|
| Type of protocol                 | Distance vector    | Distance vector    |
| Classless support                | Yes                | No                 |
| VLSM support                     | Yes                | No                 |
| Auto-summarization               | Yes                | Yes                |
| Manual summarization             | Yes                | No                 |
| Noncontiguous support            | Yes                | No                 |
| Route propagation                | Periodic multicast | Periodic broadcast |
| Path metric                      | Hops               | Hops               |
| Hop count limit                  | 15                 | 15                 |
| Convergence                      | Slow               | Slow               |
| Peer authentication              | Yes                | No                 |
| Hierarchical network requirement | No (flat only)     | No (flat only)     |
| Updates                          | Periodic           | Periodic           |
| Route computation                | Bellman-Ford       | Bellman-Ford       |

# RIP Configuration :

|        | Command  | Task   |
|--------|--|--|
| Step 1 | <b>router rip</b><br><br><b>Example:</b><br>Router> <b>configure terminal</b><br>Router(config)# <b>router rip</b><br>Router(config-router)#                                       | Enters router configuration mode, and enables RIP on the router.   |
| Step 2 | <b>version { 1   2 }</b><br><br><b>Example:</b><br>Router(config-router)# <b>version 2</b><br>Router(config-router)#   | Specifies use of RIP version 1 or 2.   |
| Step 3 | <b>network ip-address</b><br><br><b>Example:</b><br>Router(config-router)# <b>network 192.168.1.1</b><br>Router(config-router)# <b>network 10.10.7.1</b><br>Router(config-router)# | Specifies a list of networks on which RIP is to be applied, using the address of the network of directly connected networks.                                       |
| Step 4 | <b>no auto-summary</b><br><br><b>Example:</b><br>Router(config-router)# <b>no auto-summary</b><br>Router(config-router)#   | Disables automatic summarization of subnet routes into network-level routes. This allows subprefix routing information to pass across classful network boundaries. |

# Verifying RIP Configuration :

Router# **show ip route**

Codes: C - connected, S - static, 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

i - IS-IS, su - IS-IS summary, 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

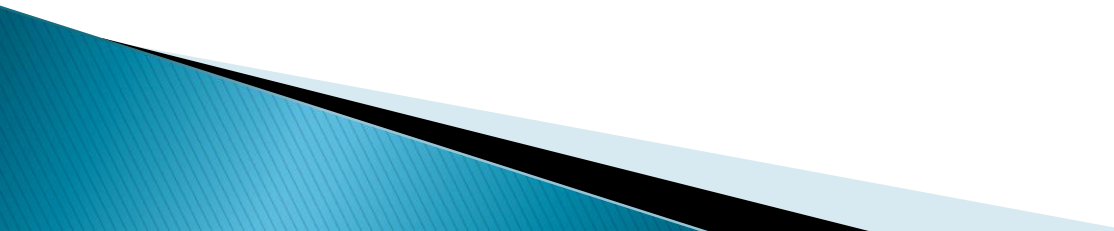
Gateway of last resort is not set

10.0.0.0/24 is subnetted, 1 subnets

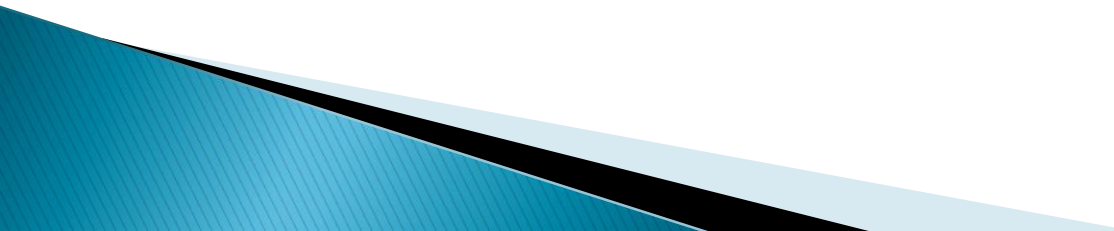
C 10.108.1.0 is directly connected, Loopback0

R 3.0.0.0/8 [120/1] via 2.2.2.1, 00:00:02, Ethernet0/0

# Characteristics of Eigrp :

- ▶ Metric value : 5k value
  - ▶ Convergence : very fast
  - ▶ AD value : 90
  - ▶ Classless & vlsm : Yes
  - ▶ Algorithm : DUAL (diffusing Algorithm)
  - ▶ Authentication : MD5
- 

# Neighbor ship conditions :

- ▶ Same AS Number
  - ▶ Same 5k value
  - ▶ Same Password (if configured)
- 



# Enhanced IGRP (EIGRP)

**TABLE 19.1** Metric association of K values

| Constant | Metric                     |
|----------|----------------------------|
| K1       | Bandwidth ( $B_e$ )        |
| K2       | Load (utilization on path) |
| K3       | Delay ( $D_e$ )            |
| K4       | Reliability ( $r$ )        |
| K5       | MTU                        |

# Cost Formula :

$$metric = [K_1 \times Bandwidth + (K_2 \times Bandwidth) / (256 - Load) + K_3 \times Delay] \times [K_5 / (Reliability + K_4)]$$

The formula's components break down like this:

- By default,  $K_1 = 1$ ,  $K_2 = 0$ ,  $K_3 = 1$ ,  $K_4 = 0$ ,  $K_5 = 0$ .

# Maintain 3 Tables :

- ▶ Routing table : # show ip route
- ▶ Topology table : # show ip eigrp topology
- ▶ Neighbors table : # show ip eigrp neighbors

# EIGRP Neighbors :

```
Corp#sh ip eigrp neighbors
```

```
IP-EIGRP neighbors for process 20
```

| H | Address     | Interface | Hold Uptime<br>(sec) | SRTT<br>(ms) | RT0 | Q<br>Cnt | Seq<br>Num |
|---|-------------|-----------|----------------------|--------------|-----|----------|------------|
| 1 | 172.16.10.2 | Se0/0     | 11 03:54:25          | 1            | 200 | 0        | 127        |
| 0 | 172.16.10.6 | Se0/1     | 11 04:14:47          | 1            | 200 | 0        | 2010       |

# Eigrp Topology :

```
Corp#sh ip eigrp topology
```

```
IP-EIGRP Topology Table for AS(20)/ID(10.10.11.1)
```

Codes: P - Passive, A - Active, U - Update, Q - Query, R -  
r - reply Status, s - sia Status

```
P 10.10.10.0/24, 1 successors, FD is 128256
  via Connected, GigabitEthernet0/0
P 10.10.11.0/24, 1 successors, FD is 128256
  via Connected, GigabitEthernet0/1
P 10.10.20.0/24, 1 successors, FD is 2297856
  via 172.16.10.2 (2297856/128256), Serial0/0
  via 172.16.10.6 (2300416/156160), Serial0/1
P 10.10.30.0/24, 1 successors, FD is 2297856
  via 172.16.10.2 (2297856/128256), Serial0/0
  via 172.16.10.6 (2300416/156160), Serial0/1
P 10.10.40.0/24, 1 successors, FD is 2297856
  via 172.16.10.6 (2297856/128256), Serial0/1
  via 172.16.10.2 (2300416/156160), Serial0/0
P 10.10.50.0/24, 1 successors, FD is 2297856
  via 172.16.10.6 (2297856/128256), Serial0/1
  via 172.16.10.2 (2300416/156160), Serial0/0
P 192.168.10.0/24, 2 successors, FD is 2172416
  via 172.16.10.2 (2172416/28160), Serial0/0
  via 172.16.10.6 (2172416/28160), Serial0/1
P 172.16.10.4/30, 1 successors, FD is 2169856
  via Connected, Serial0/1
P 172.16.10.0/30, 1 successors, FD is 2169856
  via Connected, Serial0/0
```