Dynamic Routing with RIP

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Introduction

Dynamic routing is essential for ensuring efficient, reliable, and adaptable communication between different segments of a wide area network. This configuration demonstrates the practical implementation of the RIP protocol in a network with three routers and two PCs.

Objectives

The objectives of this RIP configuration are:

- Establish communication between two distinct networks (192.168.1.0/24 and 172.18.1.0/24)

- Demonstrate RIP version 2 protocol configuration

- Ensure path redundancy through three routers

- Enable automatic adaptation to topology changes

Network Topology

The following diagram illustrates the network topology used in this RIP configuration.
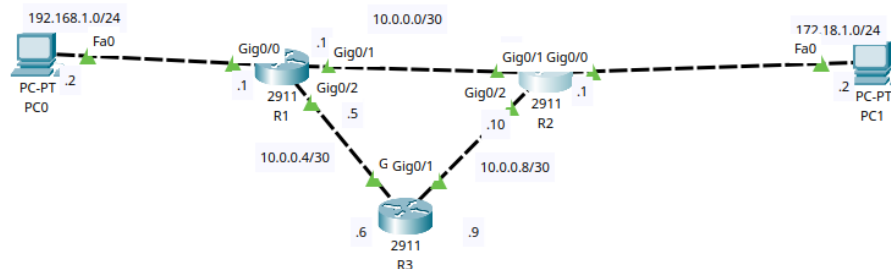

Figure 1: Network Topology Diagram

Router Configuration

Router R1

IP addresses and interface configuration:

Destination	Mask	Interface
192.168.1.0	255.255.255.0	g0/0
10.0.0.0	255.255.255.252	g0/1
10.0.0.4	255.255.255.252	g0/2

Table 1: R1 Routing Table

Configuration commands for Router R1:

```
Router(config)#hostname R1
R1(config)#interface g0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#interface g0/1
R1(config-if)#ip address 10.0.0.1 255.255.255.252
R1(config-if)#no shutdown
R1(config-if)#interface g0/2
R1(config-if)#ip address 10.0.0.5 255.255.255.252
R1(config-if)#no shutdown
```

Router R2

Destination	Mask	Interface
172.18.1.0	255.255.255.0	g0/0
10.0.0.0	255.255.255.252	g0/1
10.0.0.8	255.255.255.252	g0/2

Table 2: R2 Routing Table

Configuration commands for Router R2:

```
Router(config)#hostname R2
R2(config)#interface g0/0
R2(config-if)#ip address 172.18.1.1 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#interface g0/1
R2(config-if)#ip address 10.0.0.2 255.255.255.252
R2(config-if)#no shutdown
R2(config-if)#interface g0/2
```

```
R2(config-if)#ip address 10.0.0.10 255.255.255.252
R2(config-if)#no shutdown
```

Router R3

Destination	Mask	Interface
10.0.0.4	255.255.255.252	g0/0
10.0.0.8	255.255.255.252	g0/1

Table 3: R3 Routing Table

Configuration commands for Router R3:

```
Router(config)#hostname R3
R3(config)#interface g0/0
R3(config-if)#ip address 10.0.0.6 255.255.255.252
R3(config-if)#no shutdown
R3(config)#interface g0/1
R3(config-if)#ip address 10.0.0.9 255.255.255.252
R3(config-if)#no shutdown
```

RIP Protocol Configuration

RIP Configuration on R1

```
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#no auto-summary
R1(config-router)#network 10.0.0.0
R1(config-router)#network 192.168.1.0
```

Explanation of commands:

- `router rip`: Activates the RIP protocol.

- `version 2`: Uses RIPv2 for VLSM support.

- `no auto-summary`: Disables automatic route summarization.

- `network`: Advertises directly connected networks.

RIP Configuration on R2

```
R2(config)#router rip
R2(config-router)#version 2
R2(config-router)#no auto-summary
R2(config-router)#network 10.0.0.0
R2(config-router)#network 172.18.1.0
```

RIP Configuration on R3

```
R3(config)#router rip
R3(config-router)#version 2
R3(config-router)#no auto-summary
R3(config-router)#network 10.0.0.0
```

PC Configuration

- **PC1**:
  - IP: 192.168.1.2
  - Mask: 255.255.255.0
  - Gateway: 192.168.1.1

- **PC2**:
  - IP: 172.18.1.2
  - Mask: 255.255.255.0
  - Gateway: 172.18.1.1

Advantages and Disadvantages

Advantages

- Simplicity of configuration: Easy to configure for small networks.

- Automatic updates: Adapts quickly to network changes.

- Low resource consumption: Uses minimal memory and processing power.

Disadvantages

- Limited in scale and speed: Limited to 15 hops and has slower convergence.

- Bandwidth consumption: Regular updates consume network bandwidth.

- Basic metric: Path selection based solely on hop count.