CSE 4512 [Computer Networks Lab]

Lab # 06

1. Objectives:

- Describe the concept of dynamic routing
- Explain disadvantages of RIPv1 and improvement in RIPv2
- Configure Routing Information Protocol (RIP) in a network topology following given specifications

2. Theory:

As with other labs, this lab will also build up on the concepts and techniques of previous labs. So, make sure you've properly understood the previous lab contents.

Dynamic Routing:

In the previous lab you learnt the concept of static routing and how to configure static routing in a network. You also saw that static routing has some serious disadvantages when it comes to configure large-scale networks. Network administrator needs to know about the whole topology and the network changes have to be reflected manually in the configuration. In this lab, you'll learn about dynamic routing which overcomes all these issues but at the cost of bandwidth overhead. Still, its better to use extra bandwidth than to configure everything manually.

Basically, dynamic routing lets routers to select routes based on the real-time network condition. Always there will be packets travelling around the networks to keep the routers up-to-date about the present network condition. Then the routers will select an optimal route to a given destination based on some set of metrics. The dynamic routing protocols perform this basic function. As you know by now, there are different types of dynamic routing protocols following different algorithms. Two most common ones are **Routing Information Protocol** (RIP) following distance-vector algorithm and **Open Shortest Path First** (OSPF) protocol following link state routing algorithm. We'll not look at how these algorithms work. This is covered in your theory class. In this lab, we'll look at RIP only. OSPF will be covered in next lab.

Routing Information Protocol (RIP)

Before starting, know that RIP is somewhat an obsolete protocol due to its limitations and the advent of more modern and sophisticated protocols like OSPF, EIGRP etc. Still, as this was one of the pioneering dynamic routing protocols and dominated the networking world for quite some time, you need to understand this. This will help you in turn to understand the improvements made in newer protocols.

There are two versions of RIP namely RIPv1 and RIPv2. **RIPv2** is the dominant one and is used almost in all cases where RIP is used. So, we'll focus on RIPv2 only for our lab. Major problem of RIPv1 was that it used to broadcast routing table updates every 30 seconds. You can imagine the flood of packets every 30 seconds that would take place where millions of networks are now interconnected, even if they

are configured to send updates at random times. RIPv2 was designed to overcome this issue along with other improvements. You can learn more on these two versions here.

RIP uses hop count as the metric for routes. Paths with lower metric are selected always for a given destination. The max hop count is 15 for both versions of RIP to prevent loops. Any route further than 15 hops away are considered unreachable. To configure RIP, three steps are followed:

I. Enable RIP by using the *router rip* global configuration command.

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

II. Tell router to use the RIPv2 by the *version 2* command.

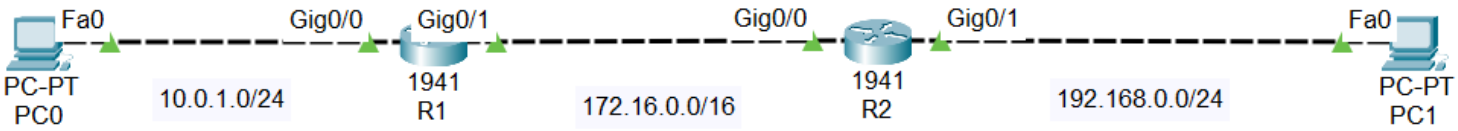
```
R1(config-router)#version 2
```

III. Tell RIP which networks to advertise by using one or more *network* commands.

```
R1(config-router)#network 10.0.0.0
```

In the 3rd step, you don't need to specify any subnet mask when using the network command. The network command takes a classful address as the parameter. As any address beginning with `10` belongs to class A, RIP will be enabled on *all the interfaces* that has IP address that begins with `10`.

3. Configure RIP:



I. **Configure R1 Interfaces**

```
R1(config)# int g0/0
R1(config-if)# ip address 10.0.1.1 255.255.255.0
R1(config-if)# no shutdown
R1(config-if)# exit

R1(config)# int g0/1
R1(config-if)# ip address 172.16.0.1 255.255.0.0
R1(config-if)# no shutdown
R1(config-if)# exit

R1# copy running-config startup-config
```

II. **Configure R2 Interfaces**

```
R2(config)# int g0/1
R2(config-if)# ip address 192.168.0.1 255.255.255.0
R2(config-if)# no shutdown
R2(config-if)# exit

R2(config)# int g0/0
R2(config-if)# ip address 172.16.0.2 255.255.0.0
R2(config-if)# no shutdown
R2(config-if)# exit

R2# copy running-config startup-config
```

III. Configure PC0

```
IP: 10.0.1.10
Mask: 255.255.255.0
Gateway: 10.0.1.1
```

IV. Configure PC1

```
IP: 192.168.0.10
Mask: 255.255.255.0
Gateway: 192.168.0.1
```

V. Configure RIP in R1

```
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#network 10.0.0.0
R1(config-router)#network 172.16.0.0
```

VI. Configure RIP in R2

```
R2(config)#router rip
R2(config-router)#version 2
R2(config-router)#network 192.168.0.0
R2(config-router)#network 172.16.0.0
```

VII. Verify

```
R1# show ip route rip

Ping PC1 from PC0
```

4. Tasks:

I. You will implement **RIP** following the address configurations and answer the given questions in this task. The task description for this task is provided in the pdf ***Task-1_RIP***. You're ***not*** provided a .pka file for this task. You need to create the topology on your own.