LAB 5

ROUTING:

As the first part of the lab, we will do some routing for the routers. Routing refers to determining the path between source and destination. Routers route a packet following a routing table. This routing table is going to be populated with the routing instances that will be configured by use. Like most things, routing can be done both manually and dynamically. Manual routing is known as static routing whereas dynamic routing just goes by its name.

Static Routing:

In case of static routing, the administrator decides which path a packet should take upon arriving at the router. So, the administrator sets the exit option by him/herself. Static routing is done only for remote networks. The command for static routing is,

ip route [Target Network] [Target Network's Subnet Mask] [Exit Option]

Here [Target Network], and [Target Network's Subnet Mask] fields are pretty self-explanatory. We can write the [Exit Option] field in 3 ways.

1. Exit interface: We can directly put the interface name, through which the router will forward any packet for the target network. This type of routing is known as directly attached routing.
2. Next Hop IP: When the router forwards the packet, the packet will reach the immediate next router X. The interface of router X through which the packet will arrive at router X is known as the next hop. We will put the ip address of this interface as the next hop ip. This type of routing is known as recursive routing.
3. Fully specified: Here, we will provide both the exit interface and the next hop ip that's why it is known as fully specified routing.

Types of Routing:

- Standard Static Routing: When we create a route only for a stab network that is known as a standard static routing. For standard static routing, the value of AD is by default 1. That's why we don't write the value of AD in the standard routing command.
- Default Static Routing: It is quite impossible for a router to know each and every network of the internet. Also, it is quite troublesome to set static routing for all these networks. That's why each router has a default route where it passes a packet

if it's unaware of how to reach that destination. If there is a default route configured in a router, the router will initially check all the routing instances and if it doesn't find any instance that matches with the destination, it follows the last instance of the routing table which is the default route. The command for default routing is,
ip route 0.0.0.0 0.0.0.0 [Exit Option]
Try to find out why the values of the Target network and the target network's subnet mask are kept as such.

- Floating Static Routing: Sometimes we need to create some backup routes in case the primary route is down. This type of routing is known as floating static routing. The command for floating static routing is,
ip route [Target Network] [Target Network's Subnet Mask] [Exit Option] [AD>1]
You can see that the command is the same as other types of routing except there is a new field called AD. If we don't set a value for AD, by default it will be 1. The lower the value, the more trustworthy the path is. For standard routing, the value is 1 by default that's why we didn't write it. However, if we want to create a route as a backup, we make that route to be less trustworthy to the router. So, we set a value of AD which is greater than 1. Also, we can create a backup route for both standard route and default route.

Dynamic Routing:

In case of dynamic routing, the routers exchange information among themselves and get to know about the topology. The administrator just sets some rules/protocols for how the routers should communicate with each other. There are different types of dynamic routing protocols and we will cover Routing Information Protocol (RIP) version 2. In case of RIP, each router shares the information of its directly connected networks with other routers. Details of this process will be discussed in class.