

## **Experiment No. 7**

**To learn concept of routing and basic router operating commands.**

### **LEARNING OBJECTIVE:**

**Upon completion of this lab, you will be able to:**

- **To learn concept of routing**
- **To learn basic router operating commands.**

### **OVERVIEW OF ROUTING:**

#### **Primary functions and features of routers:**

Routing refers to establishing the routes that data packets take on their way to a particular destination. This term can be applied to data traveling on the Internet, over 3G or 4G networks, or over similar networks used for telecom and other digital communications setups. Routing can also take place within proprietary networks.

Routers send and receive information from networks they recognize. The routing table is a very important tool to supply the network administrator with information about how a network delivers data from source to destination between networks. This modeling activity focuses students' thoughts on how routing is mapped and documented.

In general, routing involves the network topology, or the setup of hardware, that can effectively relay data. Standard protocols help to identify the best routes for data and to ensure quality transmission. Individual pieces of hardware such as routers are referred to as "nodes" in the network. Different algorithms and protocols can be used to figure out how to best route data packets, and which nodes should be used.

Data packets are also made to give networks information. Headers on packets provide details about origin and destination. Standards for data packets allow for conventional design, which can help with future routing methodologies. As the world of digital technology evolves, routing will also evolve according to the needs and utility of a particular network.

## **Scenario:**

Using the Internet and Google Maps, located at <http://maps.google.com>, find a route between the capital city of your country and some other distant town, or between two places within your own city. Pay close attention to the driving or walking directions Google Maps suggests.

Notice that in many cases, Google Maps suggests more than one route between the two locations you chose. It also allows you to put additional constraints on the route, such as avoiding highways or tolls.

- Copy at least two route instructions supplied by Google Maps for this activity. Place your copies into a word processing document and save it for to use with the next step.
- Open the .pdf accompanying this modeling activity and complete it with a fellow student. Discuss the reflection questions listed on the .pdf and record your answers.

**What do the individual driving, or walking based on your criteria you input, and non-highway directions look like? What exact information do they contain? How do they relate to IP routing?**

Each suggested route has its overall length and duration indicated. The two sets of directions consist of detailed step-by-step instructions to reach the other destination. At each significant crossing, you are advised of the very next direction to take and of the distance to the next crossroad.

These instructions closely resemble information in routing tables of IP-based routers. Each crossing can be likened to a router on which the next path selection takes place. The overall length and duration of the route correspond to the route metric, or a measure of its usefulness, from the source to the destination. The advice on which next direction to take from a particular crossing resembles an entry in the particular router's routing table that contains information about the nearest next hop router on the path towards the destination. The distance to the next crossroad is similar to the so-called cost of an interface that is used by routing protocols to compute the resulting metric of a route.

**If Google Maps offered a set of different routes, what makes this route different from the first? Why would you choose one route over another?**

Multiple routes traverse different paths to them same destination. These paths may differ in various characteristics, as some take longer to complete from source to destination and others are physically longer.

**What criteria can be used to evaluate the usefulness of a route?**

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**Static Routing Vs. Dynamic Routing:**

Static routing is a form of routing that occurs when a router uses a manually-configured routing entry, rather than information from a dynamic routing traffic. Unlike dynamic routing, static routes are fixed and do not change if the network is changed or reconfigured and do not change if the network is changed or reconfigured.

Static routing and dynamic routing are not mutually exclusive. Both dynamic routing and static routing are usually used on a router to maximize routing efficiency and to provide backups in the event that dynamic routing information fails to be exchanged. Static routing can also be used in stub networks, or to provide a gateway of last resort.

**Uses of Static Routing:**

- Static routing can be used to define an exit point from a router when no other routes are available or necessary. This is called a default route.
- Static routing can be used for small networks that require only one or two routes. This is often more efficient since a link is not being wasted by exchanging dynamic routing information.
- Static routing is often used as a complement to dynamic routing to provide a failsafe backup in the event that a dynamic route is unavailable.
- Static routing is often used to help transfer routing information from one routing protocol to another (routing redistribution).

**Uses of Dynamic Routing:**

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**Advantages and Disadvantages of Static and Dynamic Routing:**



**Examples of Routing Protocols:**

1. Routing Information Protocol Version 1 (RIPv1)
2. Routing Information Protocol Version 2 (RIPv2)
3. Open Shortest Path First (OSPF)
4. Enhanced Interior Gateway Routing Protocol (EIGRP)
5. Interior Gateway Routing Protocol (IGRP)

## TOPOLOGY:



## PROCEDURE AND COMMANDS:

Firstly, I launched packet tracer simulator and designed a net-map consisting of two routers and made a serial connection between them keeping router 1 as DCE. Then, I loaded the net-map in to the simulator. After that I logged on to router 1 and pressed enter to get in to user prompt:

**Router>**

The symbol (>) indicates that we are in the user mode. Now type (?) to see the list of commands in the user mode:

**Router>?**

Type “enable” to get in to the privileged mode. The symbol (#) indicates that we are in the privileged mode:

**Router>enable**

**Router#**

Now type (?) to see the list of commands in the user mode. Notice that there are more commands in the privileged mode than the user mode.

**Router#?**

Now, go in to the configure mode by the “configure terminal” command.

**Router# configure terminal**

**Router (config)#**

Here, you can change the name of your of your router through the “hostname” command:

**Router (config)# hostname R1**

**R1(config)#**

Type (?) to see the list of commands in the configuration mode.

To exit from configuration mode to privilege mode type “exit”.

**R1 (config)# exit**

**R1#**

To exit from privileged mode to user mode type “disable”.

**R1# disable**

**R1>**

## **RESULTS:**

The basic router configuration commands were successfully run.

## **CONCLUSION & COMMENTS:**