DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING

# Title: Configuration of Static and Dynamic Routing Protocols

COMPUTER NETWORKING LAB

CSE 312



GREEN UNIVERSITY OF BANGLADESH

# 1  Objective(s)

- To understand the static and dynamic routing.

- Configure static routes on each router to allow communication between all clients.

- Configure dynamic routes on each router to allow communication between all clients.

# 2  Problem analysis

Networking devices share data among themselves with the help of a router, a router is a device that learns which paths are available and which path is best to forward traffic to. The mechanism through which the router makes such a decision is known as routing. The term routing is used for taking a packet from one device and sending it through the network to another device on a different network. Routers do not really care about hosts - they only care about networks and the best path to each network. The logical network address of the destination host is used to get packets to a network through a routed network, and then the hardware address of the host is used to deliver the packet from a router to the correct destination host.If a network is not directly connected to the router, then the router must use one of two ways to learn how to get to the remote network: static routing, and dynamic routing.

Static routes are defined manually. The route consist of a destination prefix and a next-hop forwarding address. The static route is activated in the routing table and inserted into the forwarding table when the next-hop address is reachable. Traffic that matches the static route is forwarded to the specified next-hop address.

Dynamic routing is a technique in which a router learns about routing information without an administrator's help and adds the best route to its routing table. A router running a dynamic routing protocol adds the best route to its routing table and can also determine another path if the primary route goes down.

Routing Information Protocol (RIP) is a dynamic routing protocol which uses hop count as a routing metric to find the best path between the source and the destination network.

# 3  Procedure

1. Create a network topology by setting up all the necessary devices in Cisco Packet Tracer.

2. Configure static **IP addresses** on the PC, and other devices.

3. Configure the Fast Ethernet and Serial interfaces of all the Router.

4. For static routing, enable the static protocol from the router configuration mode. Then set the destination network address, subnet mask and next hop for all the network.

5. For dynamic routing, enable the RIP routing protocol from the router configuration mode. Then, add all the required network addresses for all of the routers.

# 4  Configuration

1. Build the network topology and add serial ports by using WIC-2T. (Figure 1).

2. Configure static **IP addresses** on the PC's.
   Click the device and go to the **Desktop tab** > **IP Configuration**.
   **For PC0:** Set 192.168.1.2 as IP address and 255.255.255.0 as Subnet Mask.
   **For PC1:** Set 192.168.2.2 as IP address and 255.255.255.0 as Subnet Mask.
   **For PC2:** Set 192.168.3.2 as IP address and 255.255.255.0 as Subnet Mask.

3. Configure the Fast Ethernet and serial interfaces of Router 0 (Figure 2).

   **For Fast Ethernet 0/0:** Set 192.168.1.1 as IP address and 255.255.255.0 as Subnet Mask.
   **For serial 0/0/0:** Set 10.0.0.1 as IP address and 255.0.0.0 as Subnet Mask.
   **For serial 0/0/1:** Set 12.0.0.1 as IP address and 255.0.0.0 as Subnet Mask.
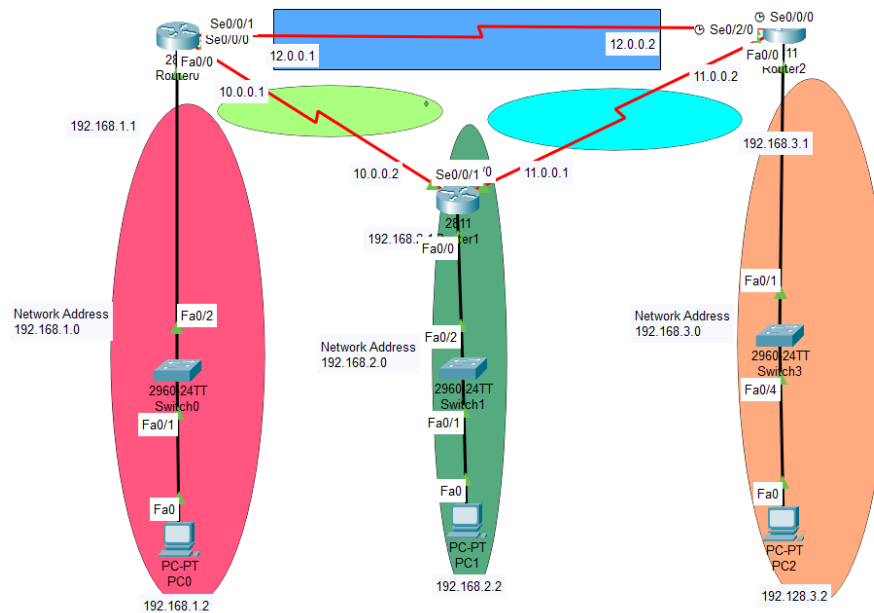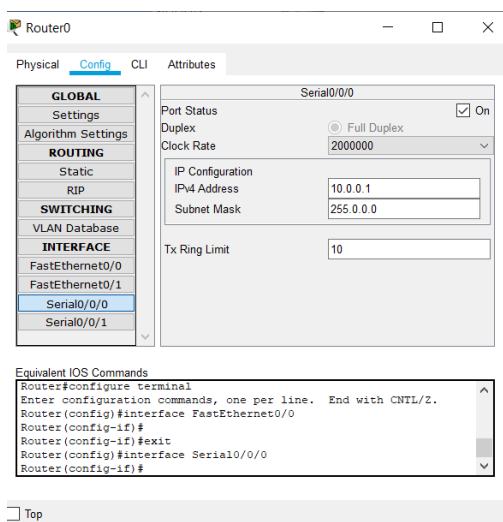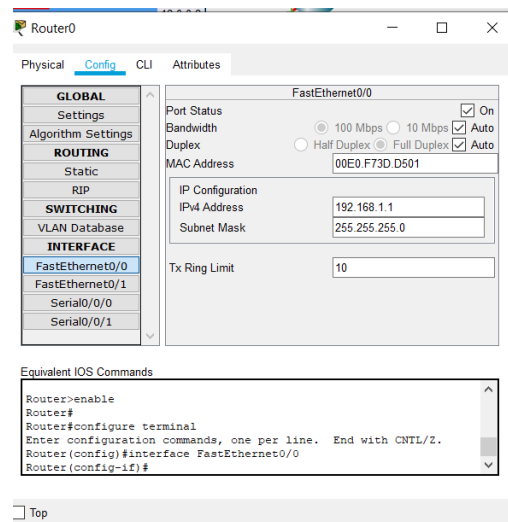
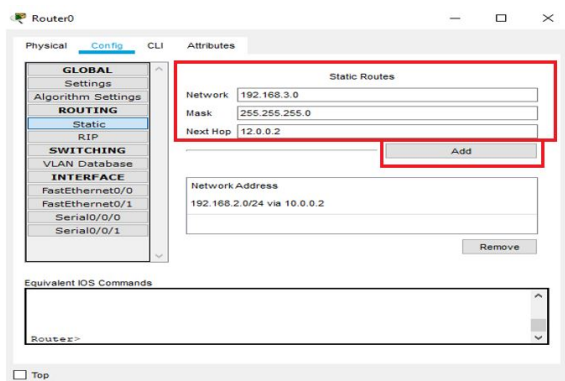Figure 1: Network Configuration



(a) IP Configuration of Serial 0/0/0 port of Router 0

(b) IP Configuration of fast-Ethernet 0/0 port of Router 0

Figure 2: IP Configuration of Router 0

4. In the same way, configure the Fast Ethernet and serial interfaces of Router 1 and Router 2.

5. For static routing, enable the static protocol from the router configuration mode and add the destination address, subnet mask and next hops (Figure 3). For transferring the message from network 1 to network 3, set 192.168.3.0 as the destination network address, 255.255.255.0 as subnet mask and 12.0.0.2 as next hop.

   For transferring the message from network 1 to network 2, set 192.168.2.0 as the destination network address, 255.255.255.0 as subnet mask and 10.0.0.2 as next hop.

   In the same way, set the destination address, subnet mask and next hop for network 2 and network 3.

6. For dynamic routing, enable the RIP routing protocol from router configuration mode and add the network addresses for all of the three routers. The network addresses are 192.168.1.0, 192.168.2.0, 192.168.3.0, 10.0.0.0, 11.0.0.0, 12.0.0.0 respectively (Figure 4).
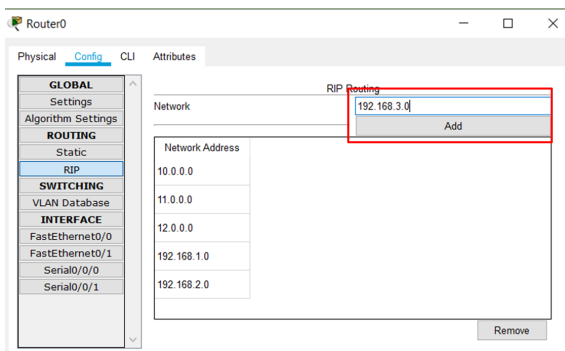
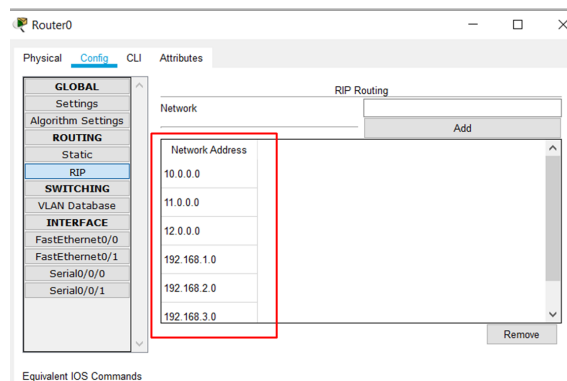(a) Adding IP address 192.168.3.0 in router 0
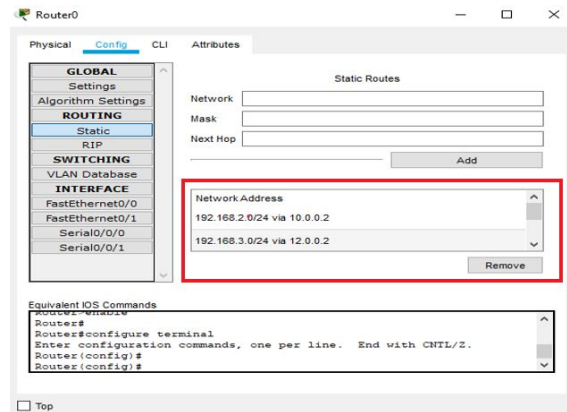


(b) Static Routes Configuration

Figure 3: Network Configuration of Static Protocol



(a) Adding IP address 192.168.3.0 in router 0



(b) Dynamic Routes Configuration by RIP Protocol

Figure 4: Network Configuration of RIP Protocol

# 5   Input/Output

**Part 1: Configuration of static routing**



Figure 5: Output of Static routing

**Part 2: Configuration of Dynamic Routing**

# 6   Discussion & Conclusion

Based on the focused objective(s) to learn the step-by-step configuration of static and dynamic routing. The term routing is used for taking a packet from one device and sending it through the network to another device on a different network. The task will help us to configure static and dynamic routes for taking a packet from one device to another device. The additional lab exercise will help us to be confident towards the fulfilment of the objectives(s).

| Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete |
|------|-------------|--------|-------------|------|-------|-----------|----------|-----|--------|--------|
| | Successful | PC0 | PC1 | ICMP | | 0.000 | N | 0 | (edit) | (delete) |
| | Successful | PC1 | PC2 | ICMP | | 0.000 | N | 1 | (edit) | (delete) |
| | Successful | PC2 | PC0 | ICMP | | 0.000 | N | 2 | (edit) | (delete) |

Figure 6: Output of RIP Protocol

# 7 Lab Task (Please implement yourself and show the output to the instructor)

1) Design the given network of Figure 7 using packet tracer and configure the Static routing on the network.
a) Show the message passing from PC0 to PC3 using the path-1 -> path-5
b) Show the message passing from PC0 to PC1 using the path-2
c) Show the message passing from PC2 to PC3 using the path-4 -> path-5
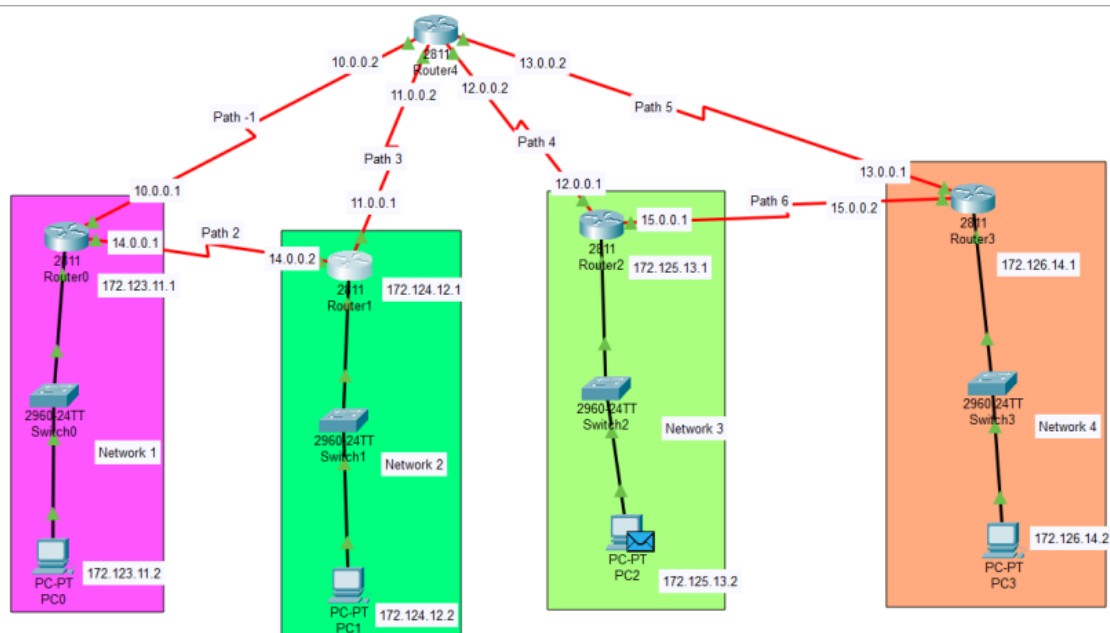d) Show the message passing from PC3 to PC1 using the path-6 -> path-4 -> path-3



Figure 7

## 7.1 Problem analysis

In the previous task, messages are transferred to only three networks. In the given task, there are 4 different networks. The networks are interconnected by five routers. The routers are interconnecting by serial ports. Then configure the static routes from the router configuration mode.
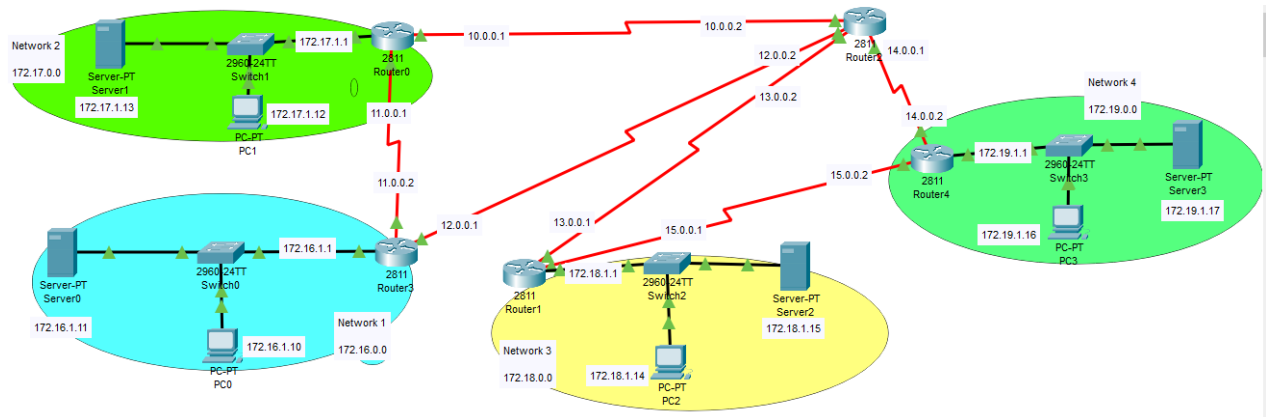
Figure 8

# 8 Lab Exercise (Submit as a report)

Configuration of static and dynamic routing using Cisco Packet Tracer for the above network of Figure 8.

# 9 Policy

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