

Practical 2: Router-to-Router Routing

Practical Title: Connect multiple routers and configure routing tables.

Aim: To connect two different networks using two routers and configure static routing to enable communication between devices on different networks.

Objective:

- To understand how to connect multiple routers in a network.
- To configure static routes on routers to enable inter-network communication. •
To verify connectivity between devices on different networks.

Theory: A **router** is a Layer 3 device that connects multiple networks. For a router to forward a packet to a different network, it must have a route to that network in its **routing table**. The routing table stores information about the paths to various destinations. In **static routing**, an administrator manually configures these routes.

Steps:

1. Create the Network Topology:

- Open Cisco Packet Tracer.
- Drag and drop two LANs from Practical 1, each with a PC, a switch, and a router.
- Connect Router0 and Router1 using a serial cable. You will need to add a HWIC2T module to each router. Turn off the router, drag the module, then turn it back on.
- The topology should look like this:

2. Assign IP Addresses:

- **LAN 1 (Network 192.168.1.0/24):**
 - PC0: 192.168.1.2, Subnet Mask 255.255.255.0, Default Gateway 192.168.1.1
 - Router0 (FastEthernet0/0): 192.168.1.1, Subnet Mask 255.255.255.0
- **LAN 2 (Network 192.168.2.0/24):**
 - PC1: 192.168.2.2, Subnet Mask 255.255.255.0, Default Gateway 192.168.2.1
 - Router1 (FastEthernet0/0): 192.168.2.1, Subnet Mask 255.255.255.0
- **Router-to-Router Link (Network 10.0.0.0/24):**
 - Router0 (Serial0/0/0): 10.0.0.1, Subnet Mask 255.255.255.0
 - Router1 (Serial0/0/0): 10.0.0.2, Subnet Mask 255.255.255.0

3. Configure Static Routes:

- **On Router0 (to reach Network 192.168.2.0):**
 - Click on Router0 > CLI tab.
 - Enter the command: Router(config)#ip route 192.168.2.0
255.255.255.0 10.0.0.2

- **On Router1 (to reach Network 192.168.1.0):**
 - Click on Router1 > CLI tab.
- Enter the command: Router(config)#ip route 192.168.1.0
255.255.255.0 10.0.0.1
- 4. **Verify Connectivity:**
 - On PC0, open the **Command Prompt**.
 - Type **ping 192.168.2.2** to verify connectivity to PC1. The ping should be successful after the static routes are configured.

Conclusion: By manually configuring static routes on both routers, communication was established between two separate networks. This practical demonstrated how routing tables enable packets to be forwarded between different network segments.

Viva / Oral Questions:

1. What is the purpose of a routing table?
2. What is the difference between static and dynamic routing?
3. Why can't PC0 ping PC1 without the static route configuration?
4. What is the next-hop address in a static route?
5. How does a router determine the best path for a packet?

CLI COMMANDS

On Router 1:

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#ip route 192.168.10.1 255.255.255.0 10.0.0.2

On Router 2:

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#ip route 192.168.20.1 255.255.255.0 10.0.0.1

VERIFY CONNECTIVITY

C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=10ms TTL=128

Reply from 192.168.10.2: bytes=32 time=7ms TTL=128

Reply from 192.168.10.2: bytes=32 time=11ms TTL=128

Reply from 192.168.10.2: bytes=32 time=7ms TTL=128

Ping statistics for 192.168.10.2:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 7ms, Maximum = 11ms, Average = 8ms

