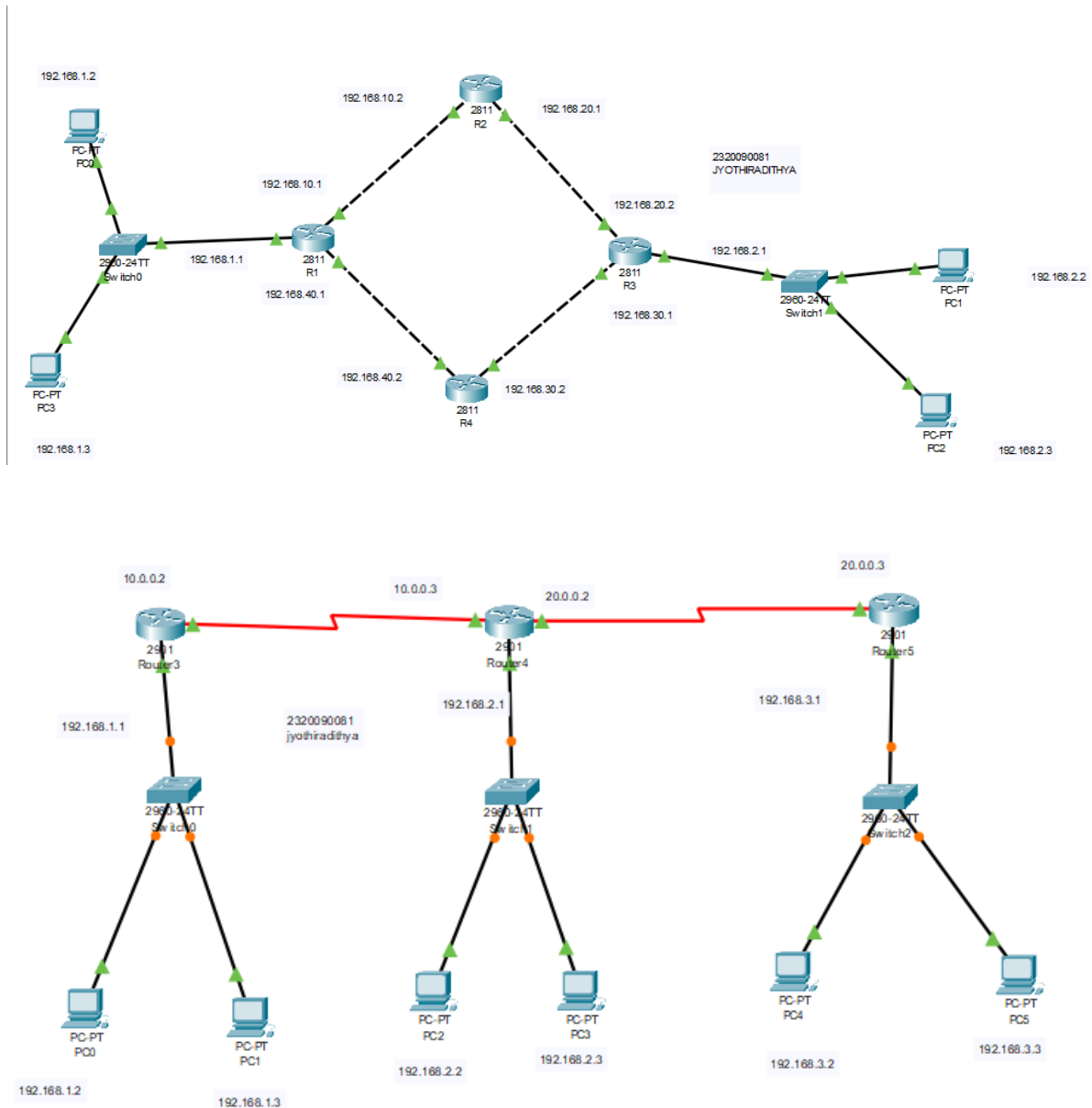


NPS LAB EXPERIMENTS

EXP-8



Components and Connections

1. Routers:

- The topology includes three main routers (Router3, Router4, and Router5) labeled with IP addresses from two networks: 10.0.0.0/8 and 20.0.0.0/8.
- These routers act as gateways between the subnetworks, connecting different IP address ranges and enabling communication across different subnets.

2. Subnetworks:

- **Subnetwork 1 (192.168.1.0/24):**

- Connected to Router3.
- Contains two computers (PC0 and PC1) with IP addresses 192.168.1.2 and 192.168.1.3.
- Each PC is connected through Switch0, which is directly linked to Router3.
- **Subnetwork 2 (192.168.2.0/24):**
 - Connected to Router4.
 - Contains two computers (PC2 and PC3) with IP addresses 192.168.2.2 and 192.168.2.3.
 - These devices are connected through Switch1, which connects to Router4.
- **Subnetwork 3 (192.168.3.0/24):**
 - Connected to Router5.
 - Contains two computers (PC4 and PC5) with IP addresses 192.168.3.2 and 192.168.3.3.
 - The PCs are connected via Switch2, which connects to Router5.

3. Inter-Router Links:

- Router3 and Router4 are connected via the 10.0.0.0/8 network, using IP addresses 10.0.0.2 and 10.0.0.3, respectively.
- Router4 and Router5 are connected via the 20.0.0.0/8 network, using IP addresses 20.0.0.2 and 20.0.0.3, respectively.
- These connections enable data to be routed between the subnetworks through intermediary routers.

Network Configuration Theory

1. Subnetting and IP Addressing:

- The network uses private IP address ranges (192.168.x.x/24) for the subnetworks. Each subnet is identified with a unique IP range, ensuring isolation and minimizing IP conflicts.
- The 10.0.0.0/8 and 20.0.0.0/8 networks are used for inter-router communication, which helps in routing data between the different subnetworks.

2. Routing:

- Each router is configured with routes to forward packets between subnetworks. Static routing or a dynamic routing protocol (like RIP, OSPF, or EIGRP) could be used to manage paths.
- For devices in one subnet to reach devices in another subnet, routers must be configured to recognize routes to each network.

3. Switches:

- Switches in each subnetwork allow multiple devices to connect to the router within the same IP range, effectively creating a local area network (LAN) for each subnetwork.
- They operate at Layer 2 (Data Link Layer) and forward data frames within the subnet.

4. **PC Configuration:**

- Each PC is assigned a unique IP address within its subnet's range and should be configured with the appropriate default gateway (the IP of the router in that subnet).
- Proper IP configuration ensures that each PC can communicate with others in the same network and, through the routers, with PCs in other subnetworks.

5. **Function of the Topology:**

- This topology is designed to illustrate routing between multiple subnetworks, allowing devices in different IP ranges to communicate.
- It can be used for educational purposes to demonstrate subnetting, IP addressing, static or dynamic routing, and network troubleshooting.

Example Use Cases

- **Network Simulation for Training:** The topology could be used to train network engineers on configuring routers and troubleshooting inter-network connections.
- **Testing Network Configurations:** Useful for testing configurations of static or dynamic routing protocols.
- **Understanding Data Flow:** By analyzing packet flow in this topology, one can understand how data is routed across different networks.

This configuration demonstrates fundamental networking concepts, including subnetting, routing, and network device connectivity.