CN Practical

---

1. Design a Network Topology for a Small Business

Objective: Create a simple network with 10 computers, a switch, and a router.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **10 PCs** from the "End Devices" section.

   - Drag and drop **1 switch** (e.g., 2960 switch) from the "Switches" section.

   - Drag and drop **1 router** (e.g., 1941 router) from the "Routers" section.

3. **Connect Devices:**

   - Use **copper straight-through cables** to connect each PC to the switch.

   - Connect the switch to the router using a straight-through cable.

4. **Assign IP Addresses:**

   - **Router Interface (G0/0):**

     - Click on the router, go to the CLI tab, and enter:

       ```
       enable
       configure terminal
       interface g0/0
       ip address 192.168.1.1 255.255.255.0
       no shutdown
       exit
       ```

   - **PCs:**

- Click on each PC, go to the Desktop tab, select IP Configuration, and assign the following IP addresses:
  - PC1: 192.168.1.2
  - PC2: 192.168.1.3
  - PC3: 192.168.1.4
  - PC4: 192.168.1.5
  - PC5: 192.168.1.6
  - PC6: 192.168.1.7
  - PC7: 192.168.1.8
  - PC8: 192.168.1.9
  - PC9: 192.168.1.10
  - PC10: 192.168.1.11
- Set the **Subnet Mask** to 255.255.255.0 for all PCs.
- Set the **Default Gateway** to 192.168.1.1 for all PCs.

5. **Test Connectivity:**

- Open the Command Prompt on any PC and use the `ping` command to test connectivity to the router (e.g., `ping 192.168.1.1`).

2. Create a Network with One Router, Two Switches, and Four PCs

Objective: Set up a network with one router, two switches, and four PCs.

Steps:

1. **Add Devices:**

- Drag and drop **1 router** (e.g., 1941).
- Drag and drop **2 switches** (e.g., 2960).
- Drag and drop **4 PCs**.

2. **Connect Devices:**

- Connect the router to **Switch 1** using a straight-through cable.

- Connect **Switch 1** to **Switch 2** using a straight-through cable.

- Connect each PC to **Switch 1** and **Switch 2** using straight-through cables.

3. **Assign IP Addresses:**

   - **Router Interface (G0/0):**

   ```
   enable
   configure terminal
   interface g0/0
   ip address 192.168.1.1 255.255.255.0
   no shutdown
   exit
   ```

   - **PCs:**
     - PC1: 192.168.1.2, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.1.1

     - PC2: 192.168.1.3, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.1.1

     - PC3: 192.168.1.4, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.1.1

     - PC4: 192.168.1.5, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.1.1

4. **Test Connectivity:**

   - Use the `ping` command from each PC to test connectivity to the router and other PCs.

3. Simulate Peer-to-Peer Communication Model with DHCP

Objective: Set up a DHCP server on a router to assign IP addresses to PCs.

Steps:

1. **Add Devices:**

   - Drag and drop **1 router** (e.g., 1941).

   - Drag and drop **2 PCs**.

2. **Connect Devices:**

- Connect the router to both PCs using straight-through cables.

1. **Configure the Router as a DHCP Server:**

   - Click on the router, go to the CLI tab, and enter the following commands:

     ```
     enable
     configure terminal
     ip dhcp pool LAN
     network 192.168.1.0 255.255.255.0
     default-router 192.168.1.1
     exit
     ```

   - Assign the router's interface an IP address:

     ```
     interface g0/0
     ip address 192.168.1.1 255.255.255.0
     no shutdown
     exit
     ```

2. **Set PCs to Obtain IP Addresses Automatically:**

   - Click on each PC, go to the Desktop tab, select IP Configuration, and choose "DHCP."

3. **Test Connectivity:**

   - Use the `ping` command from one PC to the other and to the router to ensure they received IP addresses and can communicate.

4. CRC Calculation

Objective: Calculate the CRC for the data bits 111010 with the divisor 1011.

Steps:

1. **Perform Polynomial Division:**

   - Append three zeros to the data bits (111010000).

   - Divide by the divisor (1011) using binary division.

   - The remainder will be the CRC bits.

2. **Transmitted Frame:**

   - Append the CRC bits to the original data bits to form the transmitted frame.

5. Subnetting for 3 Departments (10.0.0.0/8)

Objective: Create subnets for three departments.

Steps:

1. **Determine Subnet Mask:**

   - Use a /10 subnet mask to create 4 subnets.

2. **Subnets:**

   - Department 1: 10.0.0.0/10

   - Department 2: 10.64.0.0/10

   - Department 3: 10.128.0.0/10

3. **Assign IP Addresses:**

   - Assign IP addresses within each subnet as needed.

6. Subnetting for 6 Subnets (201.70.64.0/24)

Objective: Design six subnets.

Steps:

1. **Determine Subnet Mask:**

   - Use a /27 subnet mask to create 8 subnets.

2. **Subnets:**

- 201.70.64.0/27
- 201.70.64.32/27
- 201.70.64.64/27
- 201.70.64.96/27
- 201.70.64.128/27
- 201.70.64.160/27

3. **Assign IP Addresses:**

- Assign IP addresses within each subnet as needed.

7. Subnetting for 10 Subnets (192.168.10.0/24)

Objective: Create 10 subnets.

Steps:

1. **Determine Subnet Mask:**

- Use a /28 subnet mask to create 16 subnets.

2. **Subnets:**

- 192.168.10.0/28
- 192.168.10.16/28
- 192.168.10.32/28
- 192.168.10.48/28
- 192.168.10.64/28
- 192.168.10.80/28
- 192.168.10.96/28
- 192.168.10.112/28
- 192.168.10.128/28
- 192.168.10.144/28

3. **Assign IP Addresses:**

   - Assign IP addresses within each subnet as needed.

8. One's Complement Checksum Calculation

Objective: Calculate the checksum for the data blocks.

Steps:

1. **Data Blocks:**

   - 11001100, 10101010, 01110011

2. **Add the Binary Numbers:**

   - Perform binary addition and if there is a carry, add it back to the result.

3. **Take One's Complement:**

   - Invert the bits of the result to get the checksum.

9. 16-bit Checksum Calculation

Objective: Calculate the 16-bit checksum for the data blocks.

Steps:

1. **Data Blocks:**

   - 11001100, 10101010, 10000011

2. **Add the Blocks:**

   - Perform binary addition and handle any carry.

3. **Take One's Complement:**

   - Invert the bits of the result to get the checksum.

10. Design a Bus Topology

Objective: Create a bus topology using Cisco Packet Tracer.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **multiple PCs** (e.g., 5-10 PCs) from the "End Devices" section.

   - Drag and drop **1 hub** (or use a switch if a hub is not available).

3. **Connect Devices:**

   - Use **coaxial cables** to connect all PCs to the hub/switch in a linear fashion.

4. **Assign IP Addresses:**

   - Assign IP addresses to each PC in the same subnet (e.g., 192.168.1.2 to 192.168.1.6) with a subnet mask of 255.255.255.0.

5. **Test Connectivity:**

   - Use the `ping` command from one PC to another to ensure they can communicate.

11. Design a Ring Topology

Objective: Create a ring topology using Cisco Packet Tracer.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **multiple PCs** (e.g., 5-10 PCs).

   - Use **switches** to form the ring.

3. **Connect Devices:**

   - Connect each PC to a switch and connect the switches in a circular manner using straight-through cables.

4. **Assign IP Addresses:**

   - Assign IP addresses to each PC in the same subnet (e.g., 192.168.1.2 to 192.168.1.6) with a subnet mask of 255.255.255.0.

5. **Test Connectivity:**

- Use the `ping` command from one PC to another to ensure they can communicate.

12. Design a Star Topology

Objective: Create a star topology using Cisco Packet Tracer.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **multiple PCs** (e.g., 5-10 PCs).

   - Drag and drop **1 switch**.

3. **Connect Devices:**

   - Use **copper straight-through cables** to connect each PC to the switch.

4. **Assign IP Addresses:**

   - Assign IP addresses to each PC in the same subnet (e.g., 192.168.1.2 to 192.168.1.6) with a subnet mask of 255.255.255.0.

5. **Test Connectivity:**

   - Use the `ping` command from one PC to another to ensure they can communicate.

13. Design a Hierarchical Topology

Objective: Create a hierarchical topology using Cisco Packet Tracer.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **multiple PCs** (e.g., 10 PCs).

   - Add **2 switches** and **1 router**.

3. **Connect Devices:**

- Connect the PCs to the switches using straight-through cables.

- Connect the switches to the router.

4. **Assign IP Addresses:**

   - Assign IP addresses to the PCs (e.g., 192.168.1.2 to 192.168.1.11) with a subnet mask of 255.255.255.0.

   - Assign the router an IP address (e.g., 192.168.1.1).

5. **Test Connectivity:**

   - Use the `ping` command from one PC to another and to the router to ensure they can communicate.

14. Implement Static Routing Between Two Networks

Objective: Set up static routing between two networks.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **2 routers** and **2 PCs**.

3. **Connect Devices:**

   - Connect each PC to a router.

   - Connect the routers to each other.

4. **Assign IP Addresses:**

   - Router 1: 192.168.1.1/24

   - Router 2: 192.168.2.1/24

   - PC1: 192.168.1.2/24, Default Gateway: 192.168.1.1

   - PC2: 192.168.2.2/24, Default Gateway: 192.168.2.1

5. **Configure Static Routes:**

   - On Router 1:

```
enable
configure terminal
ip route 192.168.2.0 255.255.255.0 192.168.1.2
exit
```

- On Router 2:

```
configure terminal
ip route 192.168.1.0 255.255.255.0 192.168.2.2
exit
```

6. **Test Connectivity:**

   - Use the `ping` command from PC1 to PC2 and vice versa to ensure they can communicate through the routers.

15. Implement CSMA/CA and CSMA/CD

Objective: Simulate CSMA/CA and CSMA/CD protocols.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **multiple PCs** (e.g., 5 PCs) and **1 switch**.

3. **Connect Devices:**

   - Connect all PCs to the switch using straight-through cables.

4. **CSMA/CD Simulation:**

   - This is inherent in Ethernet networks. To simulate, generate traffic using the `ping` command from one PC to another while monitoring the network.

5. **CSMA/CA Simulation:**

   - For wireless networks, add a **wireless router** and **wireless PCs**.

- Connect the wireless PCs to the wireless router and generate traffic to observe how the protocol manages access.

16. Implement & Design Topology with RIP

Objective: Set up a network using RIP for routing.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **2 routers** and **4 PCs**.

3. **Connect Devices:**

   - Connect each PC to a router and connect the routers to each other.

4. **Assign IP Addresses:**

   - Router 1: 192.168.1.1/24

   - Router 2: 192.168.2.1/24

   - PC1: 192.168.1.2/24, Default Gateway: 192.168.1.1

   - PC2: 192.168.1.3/24, Default Gateway: 192.168.1.1

   - PC3: 192.168.2.2/24, Default Gateway: 192.168.2.1

   - PC4: 192.168.2.3/24, Default Gateway: 192.168.2.1

5. **Configure RIP:**

   - On Router 1:

     ```
     enable
     configure terminal
     router rip
     version 2
     network 192.168.1.0
     ```

```
network 192.168.2.0
exit
```

- On Router 2:

```
enable
configure terminal
router rip
version 2
network 192.168.2.0
network 192.168.1.0
exit
```

6. **Test Connectivity:**

   - Use the `ping` command from PCs in different networks to ensure they can communicate.

17. Implement & Design Topology with OSPF

Objective: Set up a network using OSPF for routing.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **2 routers** and **4 PCs**.

3. **Connect Devices:**

   - Connect each PC to a router and connect the routers to each other.

4. **Assign IP Addresses:**

   - Router 1: 192.168.1.1/24

   - Router 2: 192.168.2.1/24

   - PC1: 192.168.1.2/24, Default Gateway: 192.168.1.1

- PC2: 192.168.1.3/24, Default Gateway: 192.168.1.1

- PC3: 192.168.2.2/24, Default Gateway: 192.168.2.1

- PC4: 192.168.2.3/24, Default Gateway: 192.168.2.1

5. **Configure OSPF:**

   - On Router 1:

   ```
   enable
   configure terminal
   router ospf 1
   network 192.168.1.0 0.0.0.255 area 0
   network 192.168.2.0 0.0.0.255 area 0
   exit
   ```

   - On Router 2:

   ```
   enable
   configure terminal
   router ospf 1
   network 192.168.2.0 0.0.0.255 area 0
   network 192.168.1.0 0.0.0.255 area  0
   exit
   ```

6. **Test Connectivity:**

   - Use the `ping` command from PCs in different networks to ensure they can communicate.

18. Design & Implement Email & DNS Server

Objective: Set up an email and DNS server in the network.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **1 server** (for DNS and Email).

   - Drag and drop **multiple PCs**.

3. **Connect Devices:**

   - Connect the server to a switch using a straight-through cable.

   - Connect the PCs to the same switch.

4. **Configure the Server:**

   - Click on the server, go to the Config tab.

   - **DNS Configuration:**

     - Enable DNS service and add a DNS record (e.g., `www.example.com` -> `192.168.1.10`).

   - **Email Configuration:**

     - Enable the Email service and set up user accounts.

5. **Assign IP Addresses:**

   - Assign the server an IP address (e.g., 192.168.1.10) with a subnet mask of 255.255.255.0.

   - Assign IP addresses to the PCs (e.g., 192.168.1.2 to 192.168.1.6) with the same subnet mask.

6. **Test Connectivity:**

   - Use the `ping` command from PCs to the server.

   - Test DNS resolution by using the server's DNS name in a web browser on the PCs.

19. Design & Implement FTP & HTTP Server

Objective: Set up FTP and HTTP services on a server.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

- Drag and drop **1 server** (for FTP and HTTP).

- Drag and drop **multiple PCs**.

3. **Connect Devices:**

- Connect the server to a switch using a straight-through cable.

- Connect the PCs to the same switch.

4. **Configure the Server:**

- Click on the server, go to the Config tab.

- **HTTP Configuration:**

    - Enable the HTTP service and set up a simple web page.

- **FTP Configuration:**

    - Enable the FTP service and create user accounts for FTP access.

5. **Assign IP Addresses:**

- Assign the server an IP address (e.g., 192.168.1.10) with a subnet mask of 255.255.255.0.

- Assign IP addresses to the PCs (e.g., 192.168.1.2 to 192.168.1.6) with the same subnet mask.

6. **Test Connectivity:**

- Use the `ping` command from PCs to the server.

- Access the web page using a web browser on the PCs by entering the server's IP address.

- Test FTP access using an FTP client on the PCs.

20. Implement RIP

Objective: Set up RIP routing protocol in a network.

Steps:

1. **Open Cisco Packet Tracer.**

2. **Add Devices:**

   - Drag and drop **2 routers** and **4 PCs**.

3. **Connect Devices:**

   - Connect each PC to a router and connect the routers to each other.

4. **Assign IP Addresses:**

   - Router 1: 192.168.1.1/24

   - Router 2: 192.168.2.1/24

   - PC1: 192.168.1.2/24, Default Gateway: 192.168.1.1

   - PC2: 192.168.1.3/24, Default Gateway: 192.168.1.1

   - PC3: 192.168.2.2/24, Default Gateway: 192.168.2.1

   - PC4: 192.168.2.3/24, Default Gateway: 192.168.2.1

5. **Configure RIP:**

   - On Router 1:

     ```
     enable
     configure terminal
     router rip
     version 2
     network 192.168.1.0
     network 192.168.2.0
     exit
     ```

   - On Router 2:

     ```
     enable
     configure terminal
     router rip
     version 2
     network 192.168.2.0
     ```

```
network 192.168.1.0
exit
```

6. **Test Connectivity:**

- Use the `ping` command from PCs in different networks to ensure they can communicate through the routers.