

## CN LAB Detailed Procedures

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### Lab 1: Introduction to Packet Tracer, Peer-to-Peer Communication, Study of Cables and its Color Codes

- **Procedure:**

1. **Open Packet Tracer:**

- Launch Cisco Packet Tracer on your computer.
- Familiarize yourself with the interface, including the workspace, device selection, and tools.

2. **Create a Simple Network:**

- Drag two computers (PC-PT) onto the workspace.
- Drag a switch (Switch-PT) onto the workspace.
- Connect each computer to the switch using straight-through Ethernet cables.

3. **Configure IP Addresses:**

- Click on the first computer, go to the Desktop tab, and select IP Configuration.
- Assign an IP address (e.g., 192.168.1.1) and a subnet mask (e.g., 255.255.255.0).
- Click on the second computer, go to the Desktop tab, and select IP Configuration.
- Assign an IP address (e.g., 192.168.1.2) and a subnet mask (e.g., 255.255.255.0).

4. **Test Peer-to-Peer Communication:**

- On the first computer, open the Command Prompt from the Desktop tab.
- Use the `ping` command to test connectivity to the second computer (e.g., `ping 192.168.1.2`).
- Observe the response to ensure the computers can communicate.

5. **Study Cables and Color Codes:**

- Examine different types of network cables provided (Ethernet, crossover).
  - Note the color codes for each wire in the cables:
    - Straight-through cable (used to connect different devices like a computer to a switch).
    - Crossover cable (used to connect similar devices like computer to computer).
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## Lab 2: Implementation of Network Topologies

- **Procedure:**
    1. **Open Packet Tracer:**
      - Launch Cisco Packet Tracer on your computer.
    2. **Implement a Bus Topology:**
      - Drag three computers onto the workspace.
      - Connect them using a single backbone cable (Coaxial Cable).
    3. **Implement a Star Topology:**
      - Drag three computers and a switch onto the workspace.
      - Connect each computer to the switch using straight-through Ethernet cables.
    4. **Implement a Ring Topology:**
      - Drag three computers onto the workspace.
      - Connect them in a circular manner using crossover cables.
    5. **Implement a Mesh Topology:**
      - Drag three computers onto the workspace.
      - Connect each computer to every other computer using crossover cables.
    6. **Test Connectivity:**
      - For each topology, assign IP addresses to the computers.
      - Use the `ping` command to test connectivity between all computers.
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### Lab 3: Router Configuration (Creating Passwords, Configuring Interfaces)

- **Procedure:**

1. **Open Packet Tracer:**

- Launch Cisco Packet Tracer on your computer.

2. **Create a Simple Network:**

- Drag a router and two computers onto the workspace.
- Connect each computer to the router using straight-through Ethernet cables.

3. **Access Router CLI:**

- Click on the router, go to the CLI tab.

4. **Set Up Passwords:**

- Enter global configuration mode: `enable`, `configure terminal`.
- Set the console password: `line console 0,password cisco, login`.
- Set the enable password: `enable password cisco`.
- Set the VTY password: `line vty 0 4,password cisco, login`.

5. **Configure Router Interfaces:**

- Go to interface configuration mode for the first interface: `interface gig0/0`.
- Assign an IP address: `ip address 192.168.1.1 255.255.255.0`.
- Enable the interface: `no shutdown`.
- Repeat for the second interface: `interface gig0/1, ip address 192.168.2.1 255.255.255.0, no shutdown`.

6. **Configure IP Addresses on Computers:**

- Assign IP address 192.168.1.2 and 192.168.2.2 to the first and second computer, respectively.

7. **Test Connectivity:**

- Use the `ping` command to test connectivity between the computers through the router.
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## Lab 4: IP Addressing and Subnetting (VLSM)

- **Procedure:**

1. **Open Packet Tracer:**

- Launch Cisco Packet Tracer on your computer.

2. **Design Network Topology:**

- Create a network with three routers connected in a triangular fashion.

3. **Calculate Subnets Using VLSM:**

- Determine the number of required subnets and host addresses.
- Divide the network into subnets using VLSM.

4. **Assign IP Addresses:**

- Configure the interfaces of each router with the calculated IP addresses.
- Example:
  - Router 1 to Router 2: 192.168.1.0/30
  - Router 1 to Router 3: 192.168.1.4/30
  - Router 2 to Router 3: 192.168.1.8/30

5. **Configure Interfaces:**

- Access the CLI of each router.
- Configure the IP addresses on each interface.

6. **Test Connectivity:**

- Use the `ping` command to test connectivity between the routers.
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## Lab 5: Static and Default Routing

- **Procedure:**

1. **Open Packet Tracer:**

- Launch Cisco Packet Tracer on your computer.

2. **Create a Network:**

- Drag two routers and three computers onto the workspace.
- Connect the routers using a serial connection.
- Connect each computer to a router using Ethernet cables.

3. **Configure IP Addresses:**

- Assign IP addresses to each interface on the routers and computers.

4. **Configure Static Routes:**

- On Router 1: `ip route 192.168.2.0 255.255.255.0 <Router 2 Serial IP>`
- On Router 2: `ip route 192.168.1.0 255.255.255.0 <Router 1 Serial IP>`

5. **Configure Default Route:**

- On Router 1: `ip route 0.0.0.0 0.0.0.0 <Router 2 Serial IP>`
- On Router 2: `ip route 0.0.0.0 0.0.0.0 <Router 1 Serial IP>`

6. **Test Connectivity:**

- Use the `ping` command to test connectivity between the computers.
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## Lab 6: NAT Configuration

- **Procedure:**

1. **Open Packet Tracer:**

- Launch Cisco Packet Tracer on your computer.

2. **Create a Network:**

- Drag a router, a switch, and two computers onto the workspace.
- Connect the computers to the switch and the switch to the router.

3. **Configure IP Addresses:**

- Assign private IP addresses to the computers.
- Assign a public IP address to the router's external interface.

4. **Configure NAT:**

- Access the router's CLI.
- Define an access list to match the private IP addresses: `access-list 1 permit 192.168.1.0 0.0.0.255`.
- Configure NAT overload: `ip nat inside source list 1 interface <external interface> overload`.
- Designate interfaces as inside or outside: `interface <internal interface>, ip nat inside; interface <external interface>, ip nat outside`.

5. **Test Connectivity:**

- Use the `ping` command to test connectivity from the internal network to an external network.
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## Lab 7: Implementation of RIP Version 1

- **Procedure:**
    1. **Open Packet Tracer:**
      - Launch Cisco Packet Tracer on your computer.
    2. **Create a Network:**
      - Drag three routers onto the workspace and connect them in a linear topology.
      - Connect a computer to each router using Ethernet cables.
    3. **Configure IP Addresses:**
      - Assign IP addresses to each interface on the routers and computers.
    4. **Enable RIP Version 1:**
      - Access the CLI of each router.
      - Enable RIP routing: `router rip, version 1`.
      - Advertise connected networks: `network <network address>`.
    5. **Test Connectivity:**
      - Use the `ping` command to test connectivity between the computers.
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## Lab 8: Implementation of RIP Version 2

- **Procedure:**
    1. **Open Packet Tracer:**
      - Launch Cisco Packet Tracer on your computer.
    2. **Create a Network:**
      - Drag three routers onto the workspace and connect them in a linear topology.
      - Connect a computer to each router using Ethernet cables.
    3. **Configure IP Addresses:**
      - Assign IP addresses to each interface on the routers and computers.
    4. **Enable RIP Version 2:**
      - Access the CLI of each router.
      - Enable RIP routing: `router rip, version 2`.
      - Advertise connected networks: `network <network address>`.
    5. **Test Connectivity:**
      - Use the `ping` command to test connectivity between the computers.
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## Lab 9: Implementation of Single Area OSPF

- **Procedure:**
    1. **Open Packet Tracer:**
      - Launch Cisco Packet Tracer on your computer.
    2. **Create a Network:**
      - Drag three routers onto the workspace and connect them in a triangular topology.
      - Connect a computer to each router using Ethernet cables.
    3. **Configure IP Addresses:**
      - Assign IP addresses to each interface on the routers and computers.
    4. **Enable OSPF:**
      - Access the CLI of each router.
      - Enable OSPF: `router ospf 1`.
      - Advertise connected networks: `network <network address> area 0`.
    5. **Test Connectivity:**
      - Use the `ping` command to test connectivity between the computers.
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## Lab 10: Implementation of Multi Area OSPF

- **Procedure:**
    1. **Open Packet Tracer:**
      - Launch Cisco Packet Tracer on your computer.
    2. **Create a Network:**
      - Drag four routers onto the workspace and connect them to form two separate OSPF areas with an Area 0 backbone.
      - Connect a computer to each router using Ethernet cables.
    3. **Configure IP Addresses:**
      - Assign IP addresses to each interface on the routers and computers.
    4. **Enable OSPF:**
      - Access the CLI of each router.
      - Enable OSPF on Area 0 routers: `router ospf 1`.
      - Advertise connected networks: `network <network address> area 0`.
      - Enable OSPF on Area 1 routers: `router ospf 1`.
      - Advertise connected networks: `network <network address> area`
    5. **Test Connectivity:**
      - Use the `ping` command to test connectivity between the computers.
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## Lab 11: PPP Configuration

- **Procedure:**
    1. **Open Packet Tracer:**
      - Launch Cisco Packet Tracer on your computer.
    2. **Create a Network:**
      - Drag two routers onto the workspace and connect them using a serial connection.
      - Connect a computer to each router using Ethernet cables.
    3. **Configure IP Addresses:**
      - Assign IP addresses to each interface on the routers and computers.
    4. **Configure PPP:**
      - Access the CLI of each router.
      - Enter interface configuration mode for the serial interface: `interface serial 0/0/0`.
      - Enable PPP encapsulation: `encapsulation ppp`.
    5. **Test Connectivity:**
      - Use the `ping` command to test connectivity between the computers.
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## Lab 12: HDLC Configuration

- **Procedure:**
    1. **Open Packet Tracer:**
      - Launch Cisco Packet Tracer on your computer.
    2. **Create a Network:**
      - Drag two routers onto the workspace and connect them using a serial connection.
      - Connect a computer to each router using Ethernet cables.
    3. **Configure IP Addresses:**
      - Assign IP addresses to each interface on the routers and computers.
    4. **Configure HDLC:**
      - Access the CLI of each router.
      - Enter interface configuration mode for the serial interface: `interface serial 0/0/0`.
      - Enable HDLC encapsulation: `encapsulation hdlc`.
    5. **Test Connectivity:**
      - Use the `ping` command to test connectivity between the computers.
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## Lab 13: Implementation of BGP

- **Procedure:**
    1. **Open Packet Tracer:**
      - Launch Cisco Packet Tracer on your computer.
    2. **Create a Network:**
      - Drag two routers onto the workspace and connect them to form separate autonomous systems (AS).
      - Connect a computer to each router using Ethernet cables.
    3. **Configure IP Addresses:**
      - Assign IP addresses to each interface on the routers and computers.
    4. **Enable BGP:**
      - Access the CLI of each router.
      - Enable BGP on each router: `router bgp <AS number>`.
      - Establish BGP peering: `neighbor <IP address> remote-as <AS number>`.
      - Advertise connected networks: `network <network address>`.
    5. **Test Connectivity:**
      - Use the `ping` command to test connectivity between the computers.
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## Lab 14: Implementation of EIGRP

- **Procedure:**
    1. **Open Packet Tracer:**
      - Launch Cisco Packet Tracer on your computer.
    2. **Create a Network:**
      - Drag three routers onto the workspace and connect them in a triangular topology.
      - Connect a computer to each router using Ethernet cables.
    3. **Configure IP Addresses:**
      - Assign IP addresses to each interface on the routers and computers.
    4. **Enable EIGRP:**
      - Access the CLI of each router.
      - Enable EIGRP: `router eigrp 1`.
      - Advertise connected networks: `network <network address>`.
    5. **Test Connectivity:**
      - Use the `ping` command to test connectivity between the computers.
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## Lab 15: Telnet Configuration

- **Procedure:**
  1. **Open Packet Tracer:**
    - Launch Cisco Packet Tracer on your computer.
  2. **Create a Network:**
    - Drag a router and a computer onto the workspace.
    - Connect the computer to the router using an Ethernet cable.
  3. **Configure IP Addresses:**
    - Assign IP addresses to the router and computer.
  4. **Enable Telnet:**
    - Access the CLI of the router.
    - Enter global configuration mode: `enable, configure terminal`.
    - Enable Telnet: `line vty 0 4, password cisco, login`.
  5. **Test Telnet Connectivity:**
    - Use the Command Prompt on the computer to connect to the router using Telnet: `telnet <router IP address>`.