Certainly! Here's a detailed lab report for **"Square Static Routing Between PCs"** using Cisco Packet Tracer and the GUI (without CLI commands):

Title:

Square Static Routing Between PCs in Cisco Packet Tracer (GUI Method)

Objective:

To configure static routing between four PCs connected in a square topology using four routers and verify connectivity between the PCs using the ping command in Cisco Packet Tracer.

Equipment:

- Cisco Packet Tracer software
- 4 PCs (PC1, PC2, PC3, PC4)
- 4 Routers (Router1, Router2, Router3, Router4)
- 4 Switches (Switch1, Switch2, Switch3, Switch4)
- 8 Straight-through Ethernet cables (to connect PCs and Routers)
- 4 Serial DCE cables (for router-to-router connections)

Theory:

Static routing is a method where routes are manually configured on routers, allowing them to forward packets between different networks. In this square topology, four routers are connected to form a square, with one PC attached to each router. Static routes must be configured on each router to allow communication between the PCs, which are located in separate networks.

Each router will be configured with static routes to forward packets to the other routers in the network. These static routes allow the routers to determine the best path for sending packets between the PCs.

Procedure:

1. Set Up the Devices:

- **Open Cisco Packet Tracer** and create a new project.
- **Add 4 PCs (PC1, PC2, PC3, and PC4):**
  - From the **End Devices** section, drag and drop four PCs into the workspace. Label them as **PC1**, **PC2**, **PC3**, and **PC4**.
- **Add 4 Routers (Router1, Router2, Router3, Router4):**
  - From the **Network Devices** section, choose **Routers** and place four routers into the workspace, labeling them **Router1**, **Router2**, **Router3**, and **Router4**.
- **Add 4 Switches (Switch1, Switch2, Switch3, and Switch4):**
  - From the **Switches** section, drag and drop four switches into the workspace. Label them as **Switch1**, **Switch2**, **Switch3**, and **Switch4**.

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2. Connect the Devices:

PCs to Routers (via Switches):

- Use **Straight-through Ethernet cables** to connect each PC to its respective switch and router:
  - **PC1 → Switch1 → Router1 (GigabitEthernet0/0)**
  - **PC2 → Switch2 → Router2 (GigabitEthernet0/0)**
  - **PC3 → Switch3 → Router3 (GigabitEthernet0/0)**
  - **PC4 → Switch4 → Router4 (GigabitEthernet0/0)**

Router Connections (Square Topology):

- Use **Serial DCE cables** to connect the routers in a square pattern:
  - **Router1 (Serial0/0/0) → Router2 (Serial0/0/0)**
  - **Router2 (Serial0/0/1) → Router3 (Serial0/0/0)**
  - **Router3 (Serial0/0/1) → Router4 (Serial0/0/0)**
  - **Router4 (Serial0/0/1) → Router1 (Serial0/0/1)**

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3. Configure IP Addresses:

PC1, PC2, PC3, and PC4 Configuration:

- **PC1:**
  - Click on **PC1**, go to the **Desktop** tab, and open **IP Configuration**.

  - Assign the following settings:
    * IP Address: **192.168.1.2**
    * Subnet Mask: **255.255.255.0**
    * Default Gateway: **192.168.1.1** (Router1's LAN interface).
- **PC2:**
  - Click on **PC2**, go to the **Desktop** tab, and open **IP Configuration**.
  - Assign the following settings:
    * IP Address: **192.168.2.2**
    * Subnet Mask: **255.255.255.0**
    * Default Gateway: **192.168.2.1** (Router2's LAN interface).
- **PC3:**
  - Click on **PC3**, go to the **Desktop** tab, and open **IP Configuration**.
  - Assign the following settings:
    * IP Address: **192.168.3.2**
    * Subnet Mask: **255.255.255.0**
    * Default Gateway: **192.168.3.1** (Router3's LAN interface).
- **PC4:**
  - Click on **PC4**, go to the **Desktop** tab, and open **IP Configuration**.
  - Assign the following settings:
    * IP Address: **192.168.4.2**
    * Subnet Mask: **255.255.255.0**
    * Default Gateway: **192.168.4.1** (Router4's LAN interface).

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4. Router Configuration:

Router1 Configuration:

- **GigabitEthernet0/0 (LAN):**
  - Click on **Router1**, go to the **Config** tab, and select **GigabitEthernet0/0**.
  - Set the **IP Address** to **192.168.1.1** with a **Subnet Mask** of **255.255.255.0**.
  - Turn **On** the interface.
- **Serial0/0/0 (WAN to Router2):**
  - Go to **Serial0/0/0**.
  - Set the **IP Address** to **10.0.0.1** with a **Subnet Mask** of **255.255.255.252**.
  - Set **Clock Rate** to **64000** (since Router1 is the DCE side).
  - Turn **On** the interface.
- **Serial0/0/1 (WAN to Router4):**
  - Go to **Serial0/0/1**.
  - Set the **IP Address** to **10.0.3.1** with a **Subnet Mask** of **255.255.255.252**.
  - Turn **On** the interface.

Router2 Configuration:

- **GigabitEthernet0/0 (LAN):**
  - Click on **Router2**, go to the **Config** tab, and select **GigabitEthernet0/0**.
  - Set the **IP Address** to **192.168.2.1** with a **Subnet Mask** of **255.255.255.0**.
  - Turn **On** the interface.
- **Serial0/0/0 (WAN to Router1):**
  - Go to **Serial0/0/0**.
  - Set the **IP Address** to **10.0.0.2** with a **Subnet Mask** of **255.255.255.252**.
  - Turn **On** the interface.
- **Serial0/0/1 (WAN to Router3):**
  - Go to **Serial0/0/1**.
  - Set the **IP Address** to **10.0.1.1** with a **Subnet Mask** of **255.255.255.252**.
  - Turn **On** the interface.

Router3 Configuration:

- **GigabitEthernet0/0 (LAN):**
  - Click on **Router3**, go to the **Config** tab, and select **GigabitEthernet0/0**.
  - Set the **IP Address** to **192.168.3.1** with a **Subnet Mask** of **255.255.255.0**.
  - Turn **On** the interface.
- **Serial0/0/0 (WAN to Router2):**
  - Go to **Serial0/0/0**.
  - Set the **IP Address** to **10.0.1.2** with a **Subnet Mask** of **255.255.255.252**.
  - Turn **On** the interface.
- **Serial0/0/1 (WAN to Router4):**
  - Go to **Serial0/0/1**.
  - Set the **IP Address** to **10.0.2.1** with a **Subnet Mask** of **255.255.255.252**.
  - Turn **On** the interface.

Router4 Configuration:

- **GigabitEthernet0/0 (LAN):**
  - Click on **Router4**, go to the **Config** tab, and select **GigabitEthernet0/0**.
  - Set the **IP Address** to **192.168.4.1** with a **Subnet Mask** of **255.255.255.0**.
  - Turn **On** the interface.
- **Serial0/0/0 (WAN to Router3):**

  - Go to **Serial0/0/0**.
  - Set the **IP

Address** to **10.0.2.2** with a **Subnet Mask** of **255.255.255.252**. - Turn **On** the interface.

- **Serial0/0/1 (WAN to Router1):**
  - Go to **Serial0/0/1**.
  - Set the **IP Address** to **10.0.3.2** with a **Subnet Mask** of **255.255.255.252**.
  - Turn **On** the interface.

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5. Configure Static Routing (Using GUI):

Router1 Static Routes:

- Go to **Router1**, open the **Config** tab, and select **Static** under the **Routing** section.
- Add three static routes:
  - **To Network 192.168.2.0/24 (PC2's network):**
    - **Network Address: 192.168.2.0**
    - **Subnet Mask: 255.255.255.0**
    - **Next Hop: 10.0.0.2** (Router2's Serial0/0/0 IP address).
  - **To Network 192.168.3.0/24 (PC3's network):**
    - **Network Address: 192.168.3.0**
    - **Subnet Mask: 255.255.255.0**
    - **Next Hop: 10.0.3.2** (Router4's Serial0/0/1 IP address).
  - **To Network 192.168.4.0/24 (PC4's network):**
    - **Network Address: 192.168.4.0**
    - **Subnet Mask: 255.255.255.0**
    - **Next Hop: 10.0.3.2** (Router4's Serial0/0/1 IP address).

Router2 Static Routes:

- Go to **Router2**, open the **Config** tab, and select **Static** under the **Routing** section.
- Add three static routes:
  - **To Network 192.168.1.0/24 (PC1's network):**
    - **Network Address: 192.168.1.0**
    - **Subnet Mask: 255.255.255.0**
    - **Next Hop: 10.0.0.1** (Router1's Serial0/0/0 IP address).
  - **To Network 192.168.3.0/24 (PC3's network):**
    - **Network Address: 192.168.3.0**
    - **Subnet Mask: 255.255.255.0**
    - **Next Hop: 10.0.1.2** (Router3's Serial0/0/0 IP address).
  - **To Network 192.168.4.0/24 (PC4's network):**

        * **Network Address: 192.168.4.0**
        * **Subnet Mask: 255.255.255.0**
        * **Next Hop: 10.0.3.2** (Router4's Serial0/0/1 IP address).

Router3 Static Routes:

- Go to **Router3**, open the **Config** tab, and select **Static** under the **Routing** section.
- Add three static routes:
  - **To Network 192.168.1.0/24 (PC1's network):**
    * **Network Address: 192.168.1.0**
    * **Subnet Mask: 255.255.255.0**
    * **Next Hop: 10.0.1.1** (Router2's Serial0/0/1 IP address).
  - **To Network 192.168.2.0/24 (PC2's network):**
    * **Network Address: 192.168.2.0**
    * **Subnet Mask: 255.255.255.0**
    * **Next Hop: 10.0.1.1** (Router2's Serial0/0/1 IP address).
  - **To Network 192.168.4.0/24 (PC4's network):**
    * **Network Address: 192.168.4.0**
    * **Subnet Mask: 255.255.255.0**
    * **Next Hop: 10.0.2.2** (Router4's Serial0/0/0 IP address).

Router4 Static Routes:

- Go to **Router4**, open the **Config** tab, and select **Static** under the **Routing** section.
- Add three static routes:
  - **To Network 192.168.1.0/24 (PC1's network):**
    * **Network Address: 192.168.1.0**
    * **Subnet Mask: 255.255.255.0**
    * **Next Hop: 10.0.3.1** (Router1's Serial0/0/1 IP address).
  - **To Network 192.168.2.0/24 (PC2's network):**
    * **Network Address: 192.168.2.0**
    * **Subnet Mask: 255.255.255.0**
    * **Next Hop: 10.0.3.1** (Router1's Serial0/0/1 IP address).
  - **To Network 192.168.3.0/24 (PC3's network):**
    * **Network Address: 192.168.3.0**
    * **Subnet Mask: 255.255.255.0**
    * **Next Hop: 10.0.2.1** (Router3's Serial0/0/1 IP address).

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6. Test the Network:

- On **PC1**, open the **Command Prompt** from the **Desktop** tab.
- Type the command: `ping 192.168.2.2`, `ping 192.168.3.2`, and `ping 192.168.4.2` to test connectivity to PC2, PC3, and PC4.

- Similarly, test the network by pinging **PC1** from **PC2**, **PC3**, and **PC4**.

Results:

- The ping between **PC1**, **PC2**, **PC3**, and **PC4** was successful, confirming that the static routing configuration was correct and allowed communication between the PCs in different networks.
- The routers successfully routed packets between the networks using the manually configured static routes.

Conclusion:

In this lab, we successfully configured static routing in a square topology using Cisco Packet Tracer's GUI. By manually configuring the static routes on each router, the network allowed communication between four PCs located in different networks. This lab demonstrated the fundamental principles of static routing and showed how routers forward packets based on static routes to reach remote networks.

Let me know if you need any further clarification or additional details!