A logo of a graduation cap

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Title: Creating a LAN and testing the connectivity using Packet

**Theory**

**Local Area Network**

A Local Area Network (LAN) is a type of computer network that links multiple devices within a limited physical space like a house, office, or school building. It is mainly used for sharing resources such as files, printers, and internet access among connected devices. Since LANs cover small areas, they tend to offer faster data transfer speeds and reduced delays compared to larger networks like Wide Area Networks (WANs).

**Key Features of LAN**

1. LANs are privately managed and not regulated by any external authority.
2. They usually provide higher data speeds than most WAN systems.
3. LANs use different media access control techniques like Ethernet and Token Ring.
4. They are limited to a specific area such as a single room, building, or campus.

**LAN Architecture**

LAN architecture refers to how a LAN is structured, including its hardware, design, and communication rules. It consists of several essential parts:

**Key Components**

**Switches and Hubs:** Switches send data only to the intended device, while hubs send it to all connected devices.

**Ethernet Cables:** Common cable types include Cat5e, Cat6, and Fiber optics, which connect the network devices.

**Network Interface Cards (NICs):** These are hardware cards installed in devices to connect them to the network.

**Topologies**

The way devices are arranged in a LAN is called its topology. Common types include:

1. Star Topology
2. Bus Topology
3. Ring Topology
4. Mesh Topology etc.

**Protocols**

Protocols are essential for proper communication between devices in a LAN. They define the rules for how data is transmitted and received across the network. Some commonly used protocols in LAN environments include:

* **Ethernet:** The most widely used protocol for wired LAN connections.
* **Wi-Fi:** Used for establishing wireless LAN connections.
* **TCP/IP:** A collection of communication protocols that manage how data is sent and received over the network.

**Component Used**

**Hardware:**

* 1 Switch
* Ethernet cables
* 4 End devices (like PCs or laptops)

**Software:**

* Cisco Packet Tracer (used to create and test the LAN setup virtually)

**Network Diagram**

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Fig: Network Diagram of LAN

**Procedure**

The procedure for creating the LAN network is shown in the image using Cisco Packet Tracer:

**Step 1: Launch Cisco Packet Tracer**

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Fig: Working for Network Design

**Step 2: Add the network devices to the workspace**

* 1. From the Device-type Selection box, choose the following devices and add them to the workspace:

One 2960-24TT Switch

Four PCs (Labelled PC0, PC1, PC2, and PC3)

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Fig: Switches and PCs for LAN creation

**Step 3: Connect the devices**

* 1. Use the copper straight-through cable to connect each PC to one of the available ports on the switch.
  2. Ensure that each connection is made properly.

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Fig: Connection Between Switch and PC's

**Step 4: Configure IP addresses**

* 1. Right-click on each PC and select “IP Configuration”.
  2. In the IP configuration window, enter the IP as (172.20.0.17, 172.25.0.10, 172.25.0.27, 172.20.0.14), subnet mask, and default gateway for each PC.

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Fig: IP Configuration

**Step 5: Testing and Validation**

* 1. To test whether the network is working, you can ping other devices on the network from each PC.
  2. To ping another device, open a command prompt on the PC and type "ping <IP address of the other device>."
  3. If the ping is successful, you should see replies from the other device.

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Fig: Connectivity test between network Ritu and PC0

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Fig: Connectivity test between PC1 and PC2

**Conclusion**

In this lab, we created a Local Area Network (LAN) using Cisco Packet Tracer to gain practical knowledge of how devices are connected and communicate within a network. The activity involved designing and configuring the LAN by placing and connecting essential components such as routers, switches, and end devices. Connectivity testing in the simulated environment confirmed that the network was correctly set up, allowing smooth and reliable data flow between all devices.