LAB 1: Study and Demonstration of Ethernet Cabling

Straight Through and Crossover Connections

OBJECTIVES:

- To study the basics of Ethernet cabling used in computer networks.
- To identify end devices (Category A) and networking devices (Category B) based on their transmit (TX) and receive (RX) pins.
- To gain knowledge of network cable termination and connectivity principles.

THEORY

Ethernet is one of the most widely used technologies for Local Area Networks (LANs). It provides a standardized method for connecting computers and networking devices using twisted-pair cables such as Category 5 (Cat5) and Category 6 (Cat6). Ethernet communication relies on electrical signals that travel through specific pairs of wires within the cable.

An Ethernet cable consists of eight copper wires arranged as four twisted pairs and is terminated using an RJ-45 connector. Each wire follows a specific color code defined by international standards such as TIA/EIA-568A or TIA/EIA-568B. Correct color coding is essential to ensure accurate data transmission and reception between devices.

In Ethernet communication, devices are broadly classified into two categories based on their pin configuration:

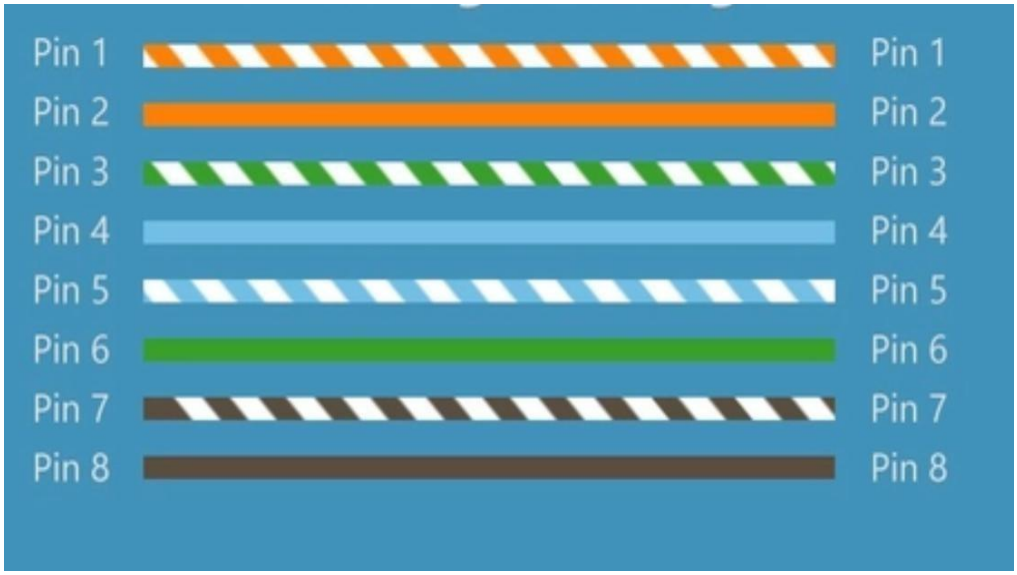
- **Category A (End Devices):** These include devices such as personal computers, laptops, and printers. End devices transmit data through pins 1 and 2 (TX) and receive data through pins 3 and 6 (RX).
- **Category B (Networking Devices):** These include switches and hubs. Networking devices transmit data through pins 3 and 6 (TX) and receive data through pins 1 and 2 (RX).

Demonstration of Ethernet Casting

Straight-Through Connection

A straight-through Ethernet cable is used to connect different types of devices, such as a PC to a switch or a router to a hub. In this type of cable, the pin numbers and color codes are identical on both ends of the cable (either TIA/EIA-568A on both ends or TIA/EIA-568B on both ends). This configuration allows proper communication between the transmitting and receiving pins of different device type.

Connections of Straight Through



Connection of Crossover:

A crossover Ethernet cable is used to connect similar types of devices, such as PC to PC or switch to switch. In this cable, the transmit and receive wire pairs are crossed, meaning pins 1 and 2 on one end are connected to pins 3 and 6 on the other end, and vice versa. This crossing enables direct communication between devices with the same pin configuration.

DISCUSSION

In this lab, Ethernet cabling techniques were studied with an emphasis on straight-through and crossover connections. The functional differences between end devices and networking devices were analyzed based on their transmit and receive pin arrangements. It was observed that straight-through cables are suitable for connecting dissimilar devices, while crossover cables are required for connecting similar devices by interchanging the transmit and receive pairs.

CONCLUSION

Hence, ethernet casting was studied and demonstroted using straight through cabling and crossover cabling connections.