K. J. Somaiya College of Engineering, Mumbai-77
(A Constituent College of Somaiya Vidyavihar University)

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Course Name:	**Data Communication and Networking**	Semester:	**VI**
Date of Performance:	**04 / 02 / 2025**	Batch No.:	**B - 2**
Faculty Name:	**Dr. Sudha Gupta**	Roll No.:	16014022050
Faculty Sign & Date:		Grade/Marks:	___ / 25

Experiment No: 5
Title: To make an Ethernet LAN cable for connecting networking devices

Aim and Objective of the Experiment:

To build an Ethernet LAN cable for connecting networking devices and check network connectivity (Hardware).
- Understand Ethernet cabling standards.
- Test network connectivity between two PCs using Ethernet LAN cable.

COs to be achieved:

CO1: Understand concept of computer communication & Network models.
CO2: Describe different data link and transmission protocol for transmission and control.

Theory:

Ethernet cable connection:

Below is the link explaining how to connect RJ45 cable, it would be useful for the experiment.

https://www.youtube.com/watch?v=rFq0aYnZueo
https://www.youtube.com/watch?v=_NX99ad2FUA

There are two kinds of Ethernet cables: Straight Through and Crossover.

STRAIGHT THROUGH:
Ethernet cables are the standard cables used as connecting cables for connecting all networking devices, and are often called "patch cables". This configuration allows for longer wire runs. These cables have the pin assignments on each end of the cable. In other words Pin 1 connector A goes to Pin 1 on connector B, Pin 2 to Pin 2 etc. Straight-Through wired cables are most commonly used to connect a host to client. The Straight-Through wired cat5e patch cable is used to connect computers, printers and other network client devices to the router switch or hub (the host device in this instance).

CROSSOVER CABLES:

The purpose of a Crossover Ethernet cable is to directly connect one computer to another computer (or device) without going through a router, switch or hub. These cables are very much like Straight-Through cables with the exception that TX and RX lines are crossed (they are at opposite positions on either end of the cable. Using as an example below you will see that Pin 1 on connector A goes to Pin 3 on connector B. Pin 2 on connector A goes to Pin 6 on connector B etc. Crossover cables are most commonly used to connect two hosts directly. Examples would be connecting a computer directly to another computer, connecting a switch directly to another switch, or connecting a router to a router.

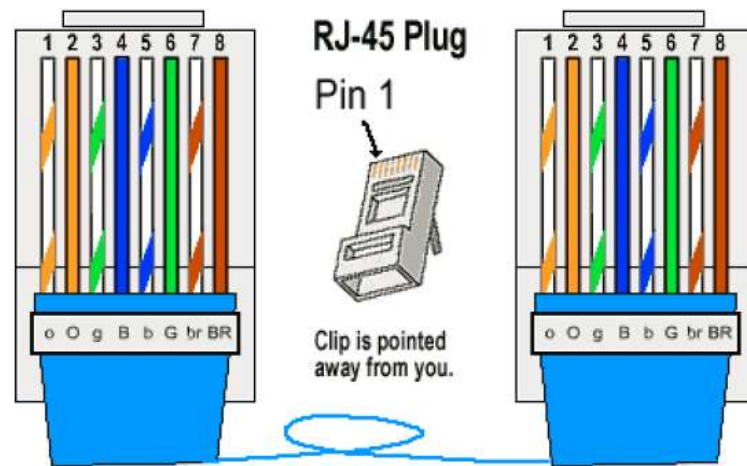**Circuit Diagram/ Block Diagram:**

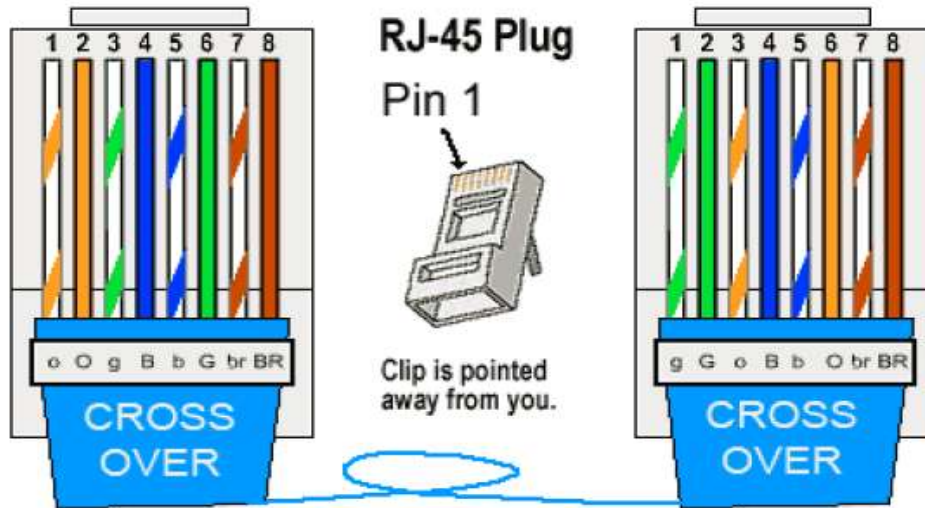**STRAIGHT THROUGH CABLE**

Fig. Straight through cable

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CROSSOVER CABLES:

Fig. Crossover cable

Stepwise-Procedure:
1. Cut into the plastic sheath about 1 inch (2.5 cm) from the end of the cut cable. Use the crimping tool which has a razor blade.
2. Unwind and pair the similar cables.
3. Pinch the wires between your fingers and straighten them out as shown. The color order is important.
4. Carefully push all 8 colored wires into the connector. Note the position of the blue plastic sleeve. Also note how the wires go all the way to the end.
5. CRIMPING THE CABLE: Carefully place the connector into the Ethernet Crimper and cinch down on the handles tightly. The copper splicing tabs on the connector will pierce into each of the eight wires. There is also a locking tab that holds the blue plastic sleeve in place for a tight compression fit.
6. Test the cable for its connectivity.

Observation Table:

Screen shots

Post Lab Subjective/Objective type Questions:

1. **What is Ethernet?**

   Ethernet is a wired networking technology used for local area networks (LANs), metropolitan area networks (MANs), and sometimes wide area networks (WANs). It defines the physical and data link layer standards for transmitting data packets between devices. Ethernet is widely used for high-speed, reliable communication in homes, offices, and industries.

   Key Features:
   - Uses packet switching for data transmission.
   - Supports full-duplex and half-duplex communication.
   - Operates on various speeds, including 10 Mbps, 100 Mbps (Fast Ethernet), 1 Gbps (Gigabit Ethernet), 10 Gbps, 40 Gbps, and beyond.
   - Utilizes MAC (Media Access Control) addressing for device identification.
   - Supports different physical media like twisted pair, fiber optic, and coaxial cables.

2. **What are the most popular types of Ethernet cables.**

   Ethernet cables are categorized based on their speed, bandwidth, and shielding. The most common types are:

   Twisted Pair Cables (Copper)
   - Cat5e (Category 5e)
     Speed: Up to 1 Gbps
     Bandwidth: 100 MHz
     Enhanced version of Cat5 with reduced interference (crosstalk).

   - Cat6 (Category 6)
     Speed: Up to 10 Gbps (for short distances, up to 55m)
     Bandwidth: 250 MHz
     Better shielding and reduced noise compared to Cat5e.

   - Cat6a (Augmented Category 6)
     Speed: 10 Gbps (up to 100m)
     Bandwidth: 500 MHz
     Improved shielding against electromagnetic interference (EMI).

   - Cat7
     Speed: 10 Gbps (up to 100m)
     Bandwidth: 600 MHz
     Fully shielded (each pair and overall) for minimal interference.

   - Cat8
     Speed: 25 Gbps - 40 Gbps
     Bandwidth: 2000 MHz
     Used in data centers and high-performance networking setups.

Fiber Optic Cables
- Single-Mode Fiber (SMF)
  Used for long-distance communication (up to 100 km).
  High-speed data transmission with minimal signal loss.

- Multi-Mode Fiber (MMF)
  Used for short to medium distances (up to a few kilometers).
  More affordable than SMF but has higher signal loss over long distances.

Conclusion:

We have successfully built an Ethernet cable for connecting networking devices and also checked network connectivity using Ethernet cable.

Signature of faculty in-charge with Date: