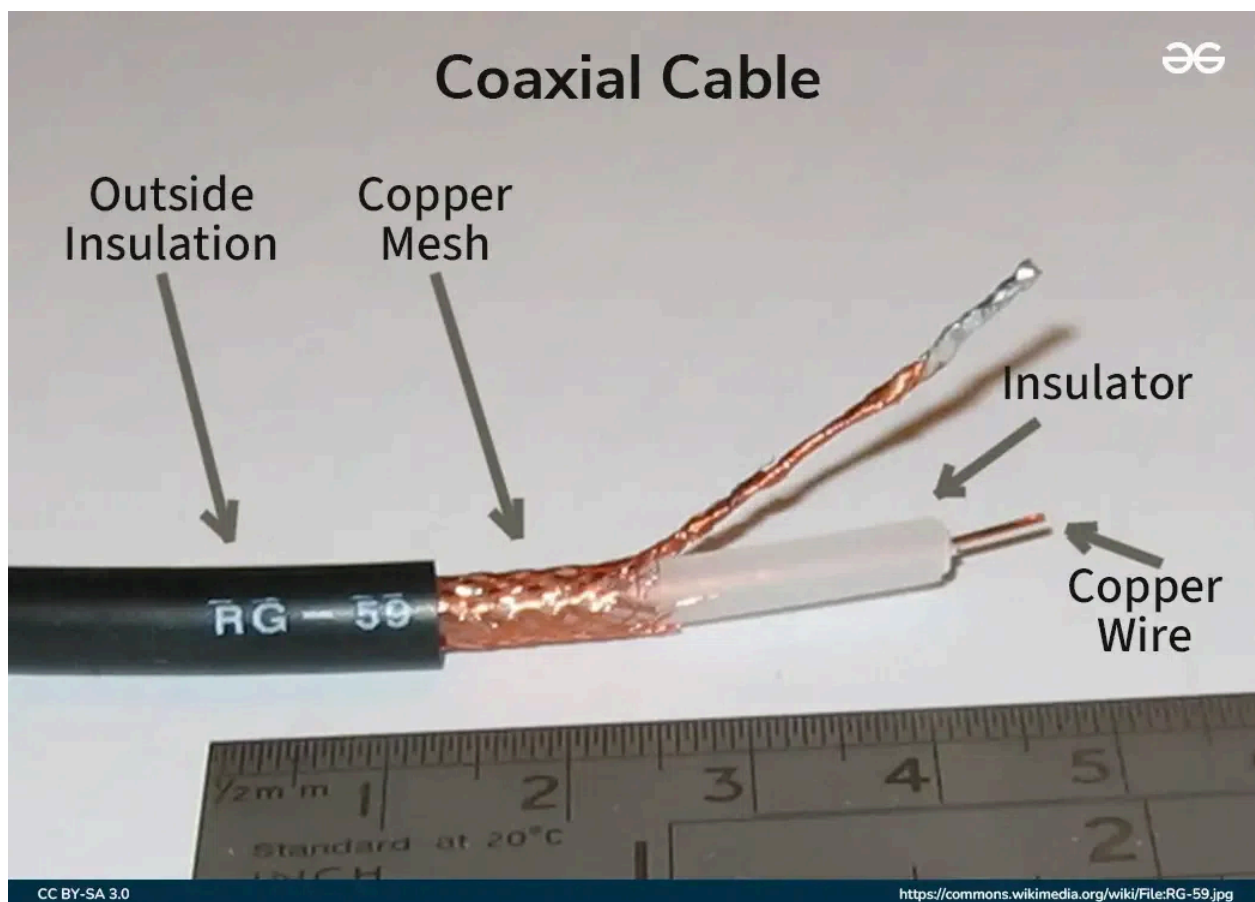# Assignment 2

Objective 1 : Understa0nd the cable structure

Types of Ethernet Cables

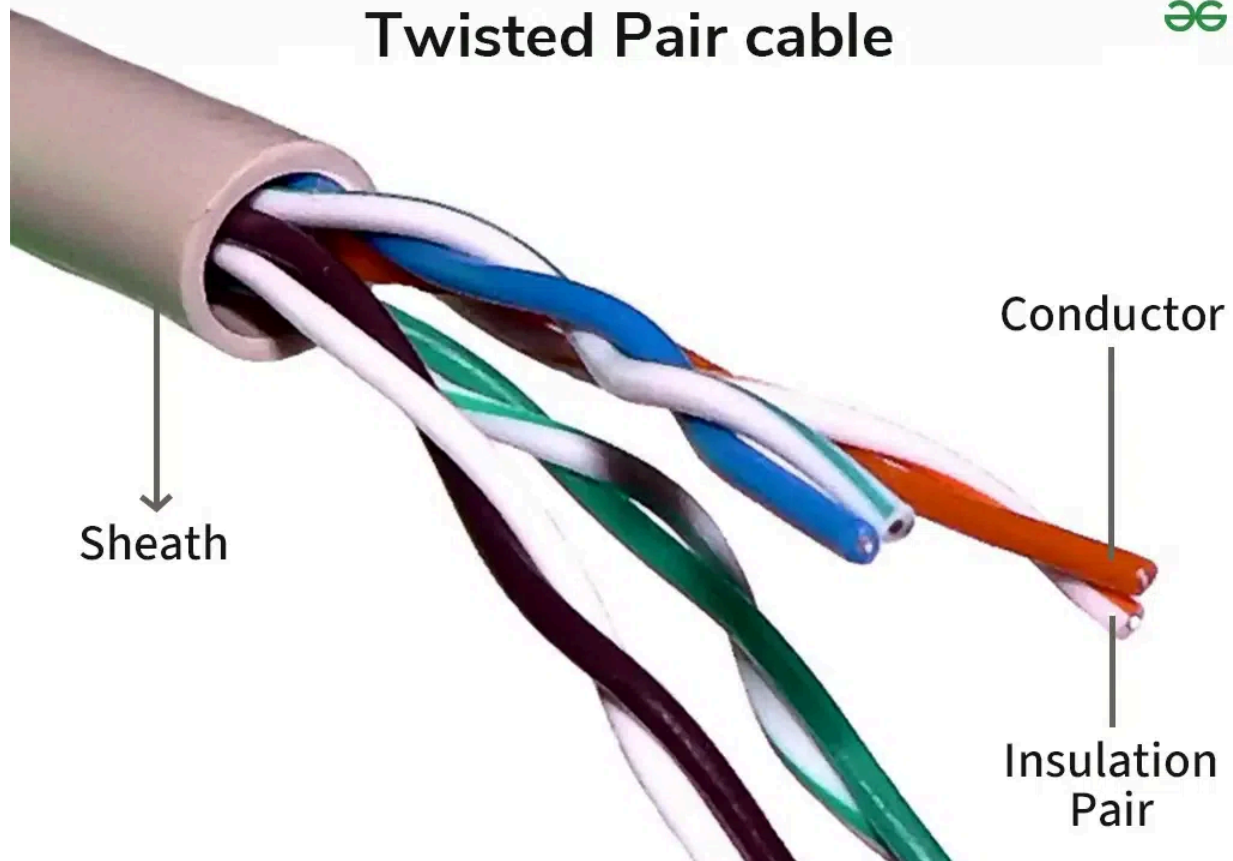Mainly there are three types of ethernet cables used in LANs
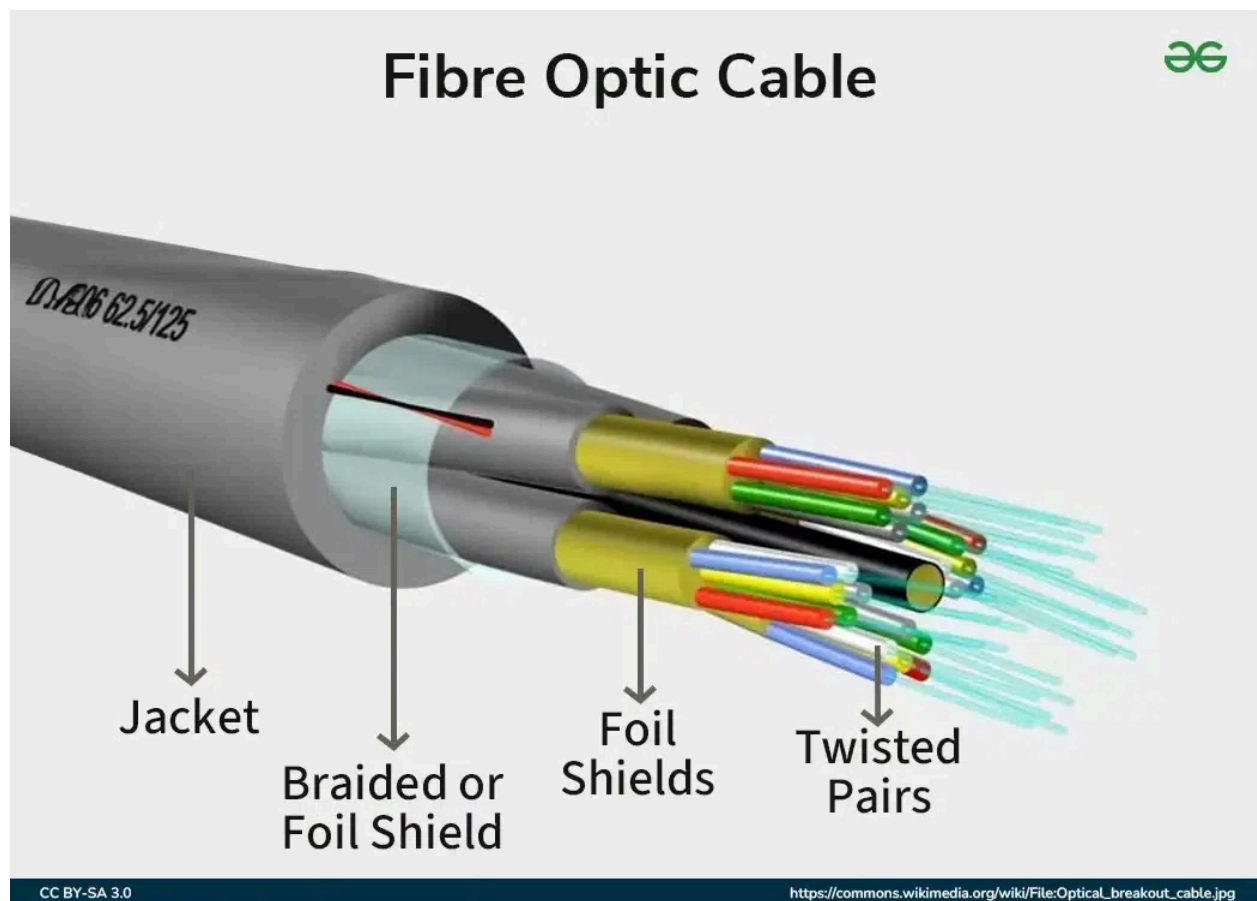
- **Coaxial Cables**

- **Twisted Pair Cables**

It uses RJ-45 connectors

Twisted Pair cable

- **Shielded Twisted Pair (STP) Cable:** In STP the wires are covered by a copper braid covering or a foil shield

- **Unshielded Twisted Pair (UTP) Cable:** Unshielded twisted pair cable is one of the most commonly used cables in computer networks at present time.

- **Fiber optic Cables**

Objective 2 : Crimping Ethernet Cable

RJ45 Pinout Ethernet Cables (Cat 5e, 6 & 7)

How to Crimp an RJ45 Ethernet Cable

Follow these steps to make sure you make the perfectly crimped RJ45 connector:

1. Trim the outer sheath back about 10mm to expose the inner conductors.
2. Trim off any nylon strands or wire guides.
3. Straighten the wires.
4. Sort them out to the correct color codes for the pinout.
5. Snip the wires so they are all the same length.
6. Push the wires into the connector.
7. Make sure the outer sheath is inside the RJ45 crimp.
8. Crimp the connector.
9. Test the Ethernet cable.

RJ45 Pinout for a straight throughLAN Cable=>(For different type of devices)

- **Pin 1 → White and Green (Transmit +) wire**
- **Pin 2 → Green (Transmit -) wire**
- **Pin 3 → White and Orange (Receive +) wire**
- **Pin 4 → Blue wire**
- **Pin 5 → White and Blue wire**
- **Pin 6 → Orange (Receive -) wire**
- **Pin 7 → White and Brown wire**
- **Pin 8 → Brown wire**

RJ45 Pinout for a Crossover LAN Cable (For same type of device)

- **Pin 1 ← White and Green wire → Pin 3**
- **Pin 2 ← Green wire → Pin 6**
- **Pin 3 ← White and Orange wire → Pin 1**
- **Pin 4 ← Blue wire → Pin 4**
- **Pin 5 ← White and blue wire → Pin 5**
- **Pin 6 ← Orange wire → Pin 2**
- **Pin 7 ← White and Brown wire → Pin 7**
- **Pin 8 ← Brown wire → Pin 8**

Objective 3 : Testing Ethernet Cable

1. Plug one end of the cable into the transmit jack.
2. Plug the other end of the cable into the receiver jack.The receiver jack may be labeled "RX" on the device.
3. Check the lights on the tester.

Objective 4 : Make Lan of three pc and communicate

Three pc and switch lan cable

1. Connect the PCs to the Switch

2. **Configure IP Addresses:**

PC 1:

- **IP Address: 192.168.1.10**
- **Subnet Mask: 255.255.255.0**

PC 2:

- **IP Address: 192.168.1.20**
- **Subnet Mask: 255.255.255.0**

PC 3:

- **IP Address: 192.168.1.30**
- **Subnet Mask: 255.255.255.0**

<u>How to do ?</u>

To connect and configure two PCs on the same switch and enable them to communicate with each other using ping, follow these steps:

1. Connect the PCs to the Switch:

- **Physical Connection:**
  - Use straight-through Ethernet cables to connect each PC to the switch. Plug one end of each cable into the network port of each PC and the other end into an available port on the switch.

2. Configure IP Addresses:

Each PC needs a unique IP address within the same subnet. For example:

- PC 1:
  - IP Address: 192.168.1.101
  - Subnet Mask: 255.255.255.0
  - Default Gateway: (Optional) This can be left blank for a simple network without routing.
- PC 2:
  - IP Address: 192.168.1.20
  - Subnet Mask: 255.255.255.0

- Default Gateway: (Optional) This can be left blank for a simple network without routing.

Windows:

1. Open Network Settings:
   - Go to `Control Panel` > `Network and Sharing Center` > `Change adapter settings`.
2. Select Network Adapter:
   - Right-click on your active network connection (usually named "Ethernet") and select `Properties`.
3. Configure IPv4:
   - In the Properties window, select `Internet Protocol Version 4 (TCP/IPv4)` and click `Properties`.
   - Choose `Use the following IP address` and enter the IP address and subnet mask as specified above.
   - Click `OK` to apply the settings.

3. Test Connectivity with Ping:

1. Open Command Prompt (Windows):
   - Press `Win + R`, type `cmd`, and press `Enter`.
2. Open Terminal (macOS):

- ○ Press `Cmd + Space`, type `Terminal`, and press `Enter`.

3. **Ping the Other PC:**

  - ○ To ping PC 2 from PC 1, type `ping 192.168.1.20` and press `Enter`.

  - ○ To ping PC 1 from PC 2, type `ping 192.168.1.10` and press `Enter`.

  - ○ To ping PC 2 from PC 3, type `ping 192.168.1.20` and press `Enter`

Must things to do 👍

Check Firewall Settings:

- ● **Windows Firewall:**

  - ○ Go to `Control Panel` > `System and Security` > `Windows Defender Firewall`.

  - ○ Click on `Allow an app or feature through Windows Defender Firewall`.

  - ○ Ensure that `File and Printer Sharing` is allowed through both `Private` and `Public` networks.

Check Network Discovery Settings:

- **Windows Network Discovery:**

  - **Go to `Control Panel` > `Network and Sharing Center` > `Advanced sharing settings`.**

  - **Ensure `Network discovery` and `File and printer sharing` are turned on.**

Ipv6 protocol :

PC 1:

IPv6 Address: 2001:db8:abcd:1234::1

Subnet Prefix Length: 64

PC 2:

IPv6 Address: 2001:db8:abcd:1234::2

Subnet Prefix Length: 64

PC 3:

IPv6 Address:

Subnet Prefix Length: 64

Using linux connection

(three ways to do)

1. Using Network Manager (Graphical Method)

Network Manager is commonly used in desktop environments for managing network settings.

1. Open Network Settings:
   - Click on the network icon in the system tray and select "Settings" or "Network Settings."
2. Select Your Network Interface:
   - Choose the network interface (e.g., `Wired` or `Wi-Fi`).
3. Edit IP Settings:
   - Click on the settings gear icon next to the interface.
   - Go to the "IPv4" or "IPv6" tab.
   - Set "Method" to "Manual" and enter your IP address, netmask,
4. Apply the Changes:
   - Click "Apply" or "Save" to apply the settings.

2. Using ip Command (Temporary Change)

List out the ethernet first

`ip a`

Change the IP Address:

`sudo ip addr add 192.168.1.100/24 dev {ethernet name}`

To remove an existing IP address:

`sudo ip addr del 192.168.1.50/24 dev {ethernet name}`

Verify the Change:

`ip a`

3. Permanent change (optionaL ONLY FOR LEARNING)

Identify Your Network Interface:

```
ip a
```

Backup the Current Netplan Configuration:

 1 Netplan configuration files are located in **/etc/netplan/**. To back up:

```
sudo cp /etc/netplan/{network file name}
/etc/netplan/{network file name}.bak
```

2. Change to Static IP:

Edit the Netplan configuration file:

```
sudo nano /etc/netplan/{network file name}
```

3. Modify it for static IP configuration:

```
network:

  version: 2

  ethernets:

    eth0:

      addresses:
```

```
        - YOUR_NEW_IP_ADDRESS/24
```

4.Apply the Changes:

```
sudo netplan apply
```

5. Revert Back to DHCP:

Restore the original DHCP configuration:

```
sudo cp /etc/netplan/{network file name}.bak
/etc/netplan/{network file name}
```

6. Apply the Changes:

```
sudo netplan apply
```

Commands for PInging

Format for Pinging from One Linux PC to Another

1. On the Destination PC (the PC you want to ping), open the Terminal.

Check the IP Address:

```
ip a
```

2. Look for the `inet` address under the relevant network interface (e.g., `eth0`, `wlan0`).

1. On the Source PC (the PC you are pinging from), open the Terminal.

Execute the Ping Command:

```
ping <IP_ADDRESS>
```

⇒Replace **<IP_ADDRESS>** with the actual IP address of the destination PC.

NET CAT

Format for Sending Messages Using Netcat on a LAN

1. Verify that both PCs are connected to the same LAN.

2. Find the IP Address:

Step 1: Set Up the Listening PC (Receiver)

1. Open Terminal on the PC that will receive messages (let's call it PC1).

2. Start Netcat in Listening Mode:

Choose a port number (e.g., 12345) and start listening:

`nc -l 3333`

This command tells Netcat to listen for incoming connections on port 3333.

Step 2: Send a Message from the Sending PC (Sender)

1. Open Terminal on the PC that will send messages (let's call it PC2).

2. Use Netcat to Send a Message:

Use the following command to send a message to PC1:

nc <IP_ADDRESS_OF_PC1> 3333

Replace <IP_ADDRESS_OF_PC1> with the actual IP address of PC1.

Now Communicate

- Bidirectional Communication:
  - To allow bidirectional communication, use -l -k on the listening PC to keep the connection open for multiple messages.

(optional firewall command =>sudo ufw allow 3333)

File Transfer using FTP protocol:

1. Set Up an FTP Server on the Receiving PC

1. Install vsftpd:

   ```
   sudo apt update
   ```

   ```
   sudo apt install vsftpd
   ```

2. **Launch vsftpd**

   ```
   sudo systemctl start vsftpd
   ```

   ```
   sudo systemctl enable vsftpd
   ```

3. Back up configuration file

   ```
   sudo cp /etc/vsftpd.conf /etc/vsftpd.conf_default
   ```

4. **Configure Firewall to Allow FTP Traffic**
   ```
   sudo ufw allow 21/tcp
   sudo ufw allow 20/tcp
   ```

5. **Connect to the FTP server**

   sudo ftp [system_name]

6. **Configure vsftpd: Edit the configuration file (`/etc/vsftpd.conf`) to ensure the server allows connections and is configured correctly:**

   bash

   `sudo nano /etc/vsftpd.conf`

7. **Change Default Directory**

   Follow the steps below:

   1. Use this syntax to create a new directory:

   ```
   sudo mkdir /srv/ftp/[new_location]
   ```

   Replace `[new_location]` with the directory you want to create.

   2. Use the following syntax to change the default directory where the `ftp` user will be placed upon login:

   ```
   sudo usermod -d /srv/ftp/[new_location] ftp
   ```

   3. Restart the `vsftpd` service to apply the changes:

   ```
   sudo systemctl restart vsftpd.service
   ```

   Now, you can put any files you want to share via FTP into the *srv/ftp* directory (if you left it as the default) or the *srv/ftp/[new_location]* directory (if you changed it).

8. Ensure these settings are present and uncommented:

makefile

`write_enable=YES`

Save and exit (**Ctrl+X**, **Y**, **Enter**).

9. Restart vsftpd Service:

`sudo systemctl restart vsftpd`

Must Check :-->Ensure Firewall Allows FTP: Allow FTP traffic through the firewall (if applicable):

`sudo ufw allow 21/tcp`

Can do :-Create FTP User (if needed): Create a user who will access the FTP server:

`sudo adduser ftpuser`

2. Transfer Files Using FTP

From the Sending PC:

1.Connect to the FTP Server:

```
ftp [receiving-PC-IP]
```

Example:

```
ftp 192.168.1.2
```

2.Login: Enter the username and password for the FTP account on the receiving PC.(if)

3.Upload a File: To upload a file from the sending PC to the FTP server,

```
put [local-file] [remote-file]
```

Example:

```
put myfile.txt /remote/path/myfile.txt
```

4.Download a File: If you want to download a file from the FTP server to

```
get [remote-file] [local-file]
```

Example:

```
get /remote/path/myfile.txt myfile.txt
```

5.Exit the FTP Session: After transferring the files, close the FTP connection:

```
Bye
```

3. Verify the Transfer

1. Check File on Receiving PC: Verify that the file has been successfully uploaded to the FTP server directory.
2. Test Download: If you downloaded a file, check the location on the sending PC to ensure the file was downloaded correctly.