Experiment No: 1
Experiment Name: Practical Implementation of Crossover and Straight-Through Ethernet Cables Using a Crimping Tool, and Construction of a Local Area Network (LAN).

Learning Objectives:

By the end of this session, students will be able to:

- Understand the differences between straight-through and crossover cables.
- Create both types of Ethernet cables using a crimping tool and UTP cable.
- Verify the cable functionality using a LAN cable tester.
- Set up a basic Local Area Network using the constructed cables.

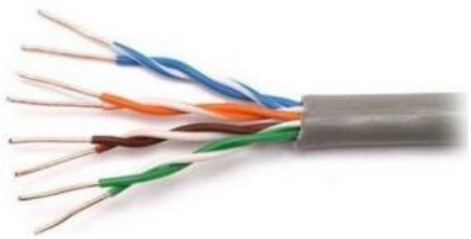
1. Introduction to Ethernet Cables and LAN Setup

- **Ethernet cable**: A network cable used to connect devices within a LAN.
- **UTP (Unshielded Twisted Pair)**: Commonly used for Ethernet networks (Cat5e/Cat6).
- **RJ-45 connector**: An 8-pin modular plug used at each end of the cable.
- **Crimping**: The process of attaching RJ-45 connectors to cable ends.

2. Tools and Materials Needed

Item	Quantity
UTP Cable (Cat5e/6)	As needed
RJ-45 Connectors	2 per cable
Crimping Tool	1
Wire Stripper/Cutter	1
LAN Cable Tester	1
Switch (for LAN setup)	1
Two or more PCs	2+

UTP Cable (Cat5e/6):



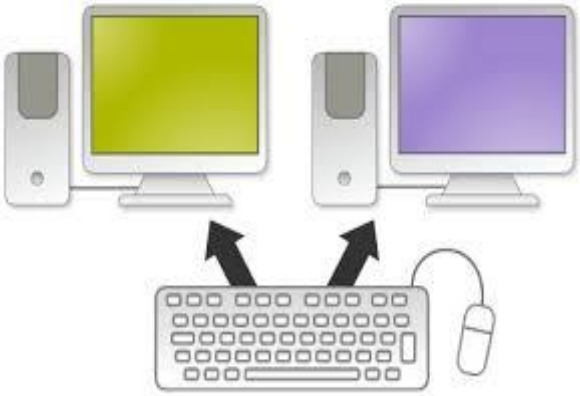
RJ-45 Connectors:

Crimping Tool:

Switch:

LAN Cable Tester:

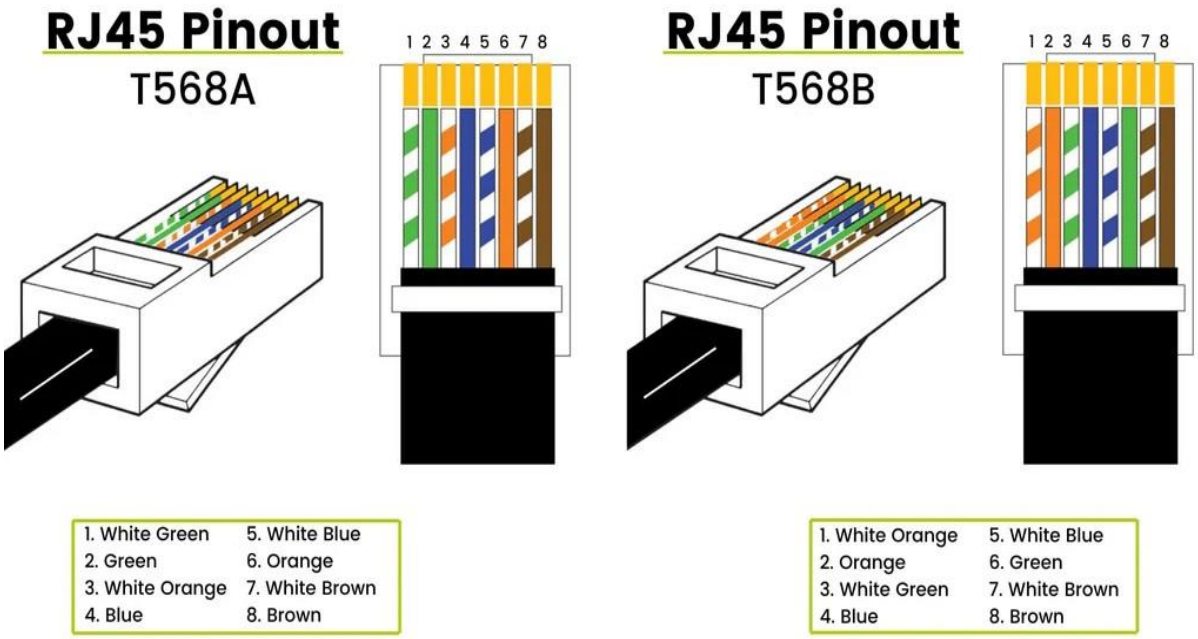
Two or more PCs:



3. Understanding Cable Standards

T568A and T568B Standards:

Pin	**T568A**	**T568B** (Most Common)
1	White/Green	White/Orange
2	Green	Orange
3	White/Orange	White/Green
4	Blue	Blue
5	White/Blue	White/Blue
6	Orange	Green
7	White/Brown	White/Brown
8	Brown	Brown



Cable Type Summary:

Cable Type	When to Use
Straight-Through	PC ↔ Switch / Router ↔ Switch
Crossover	PC ↔ PC / Switch ↔ Switch

4. Making a Straight-Through Cable (T568B - T568B)

Step-by-Step:

1. **Cut** the UTP cable to the desired length.
2. **Strip** about 1 inch of the outer sheath using a cable stripper.
3. **Untwist** the pairs and arrange wires in **T568B order**.
4. **Trim** wires evenly to about 0.5 inch length.
5. **Insert** the wires into the RJ-45 connector (clip facing down).
6. **Crimp** the connector using the crimping tool.
7. Repeat for the **other end** using the same T568B order.
8. **Test** the cable using a LAN tester (each LED should light up 1–8).

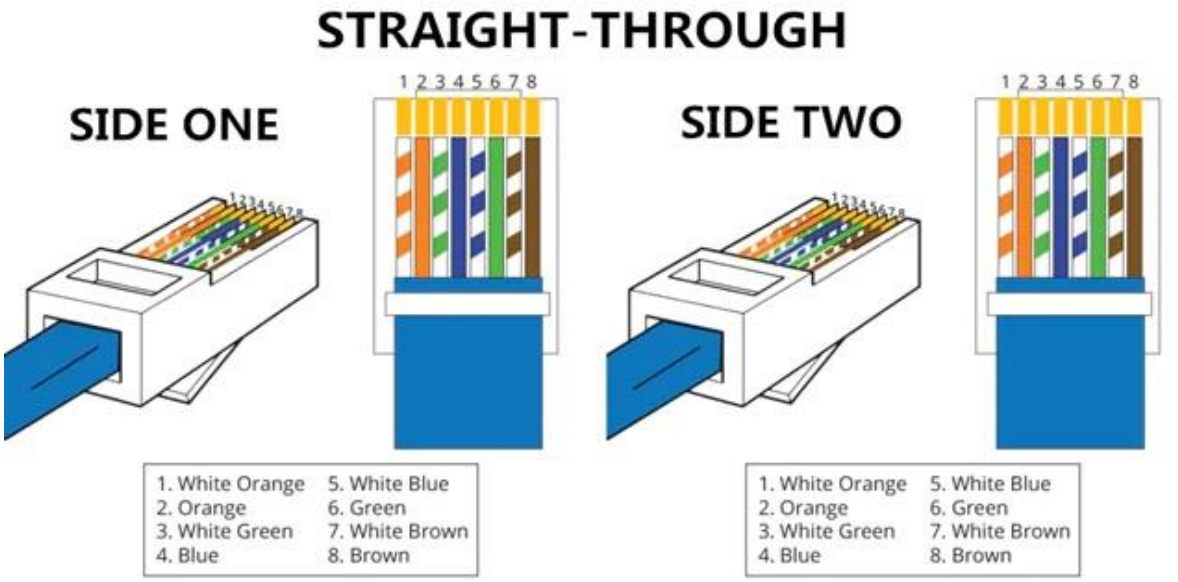
5. Making a Crossover Cable (T568A - T568B)

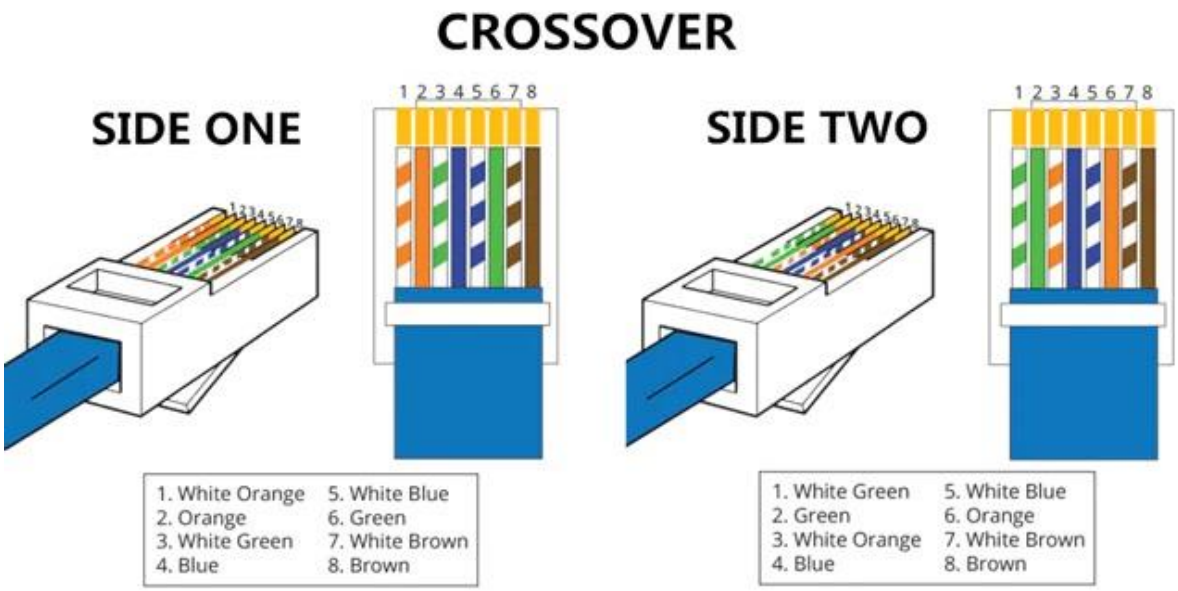
Step-by-Step:

1. Cut the UTP cable to desired length.
2. Strip the outer sheath from both ends.
3. Arrange wires:
    - One end in **T568A**

- Other end in **T568B**

4. Trim and insert wires into RJ-45 connectors.
5. Crimp both ends with the crimping tool.
6. Test the cable with a LAN tester.





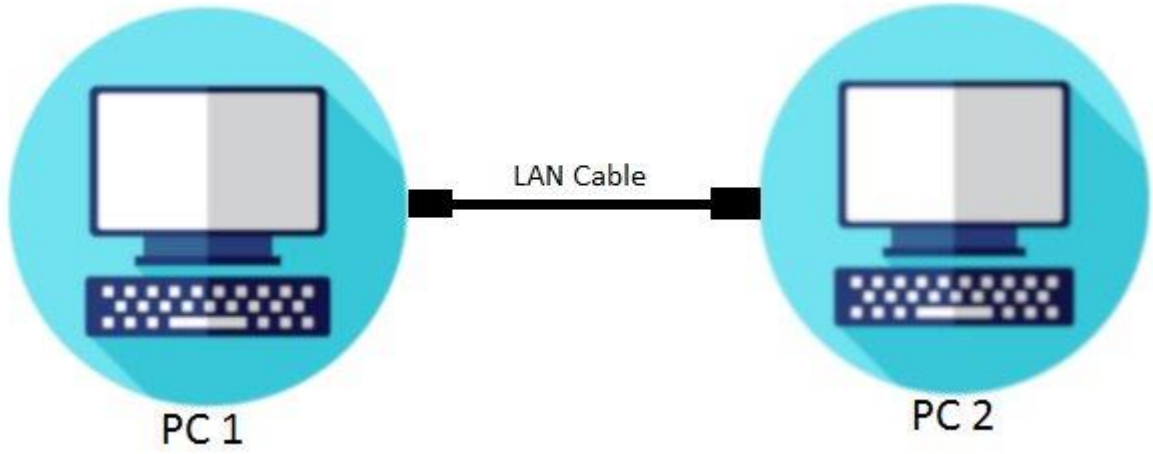
6. Building a Basic Local Area Network (LAN)

Option A: LAN with a Switch (Using Straight-Through Cables)

1. Connect each PC to the switch using the straight-through cable.
2. Assign IP addresses manually (e.g., 192.168.1.10, 192.168.1.11).
3. Ensure subnet masks are the same (e.g., 255.255.255.0).
4. Test connectivity using:
5. ping <other_PC's_IP>

Option B: PC-to-PC LAN (Using Crossover Cable)

1. Connect two PCs directly using the crossover cable.
2. Manually assign IP addresses (e.g., 192.168.1.1 and 192.168.1.2).
3. Test the connection via ping.



Different Types of LAN Devices

Device	Function
Switch	Connects multiple devices in a LAN; forwards data to the correct device based on MAC address.
Hub	Basic version of a switch; sends data to all connected devices (not used much now).
Router	Connects different networks (e.g., LAN to the Internet); assigns IP addresses.
Modem	Modulates and demodulates signals for Internet over telephone or cable lines.
Access Point (AP)	Provides wireless connectivity within a LAN.

Device	Function
NIC (Network Interface Card)	Hardware in computers for network connection.

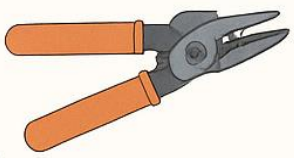
7. Troubleshooting Tips

Problem	Solution
No LED on LAN port	Check cable ends and crimping quality
Ping request timed out	Check IP settings and subnet configuration
Cable tester fails	Recrimp both ends with correct order

Practical Implementation of Crossover and Straight-Through Ethernet Cables Using a Crimping Tool, and Construction of a Local Area Network (LAN)

Making a Straight-Through Cable

1. Cut



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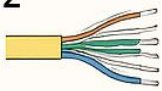

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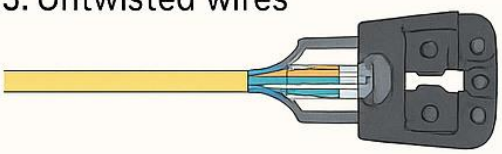
3. Untwisted wires



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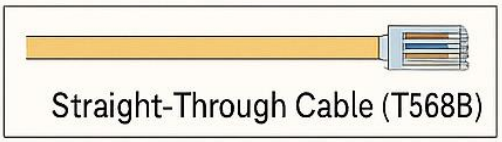
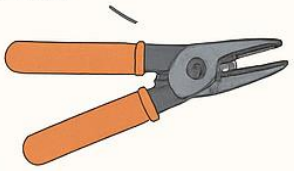


Making a Crossover Cable

1. Cut



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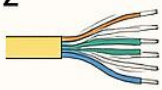

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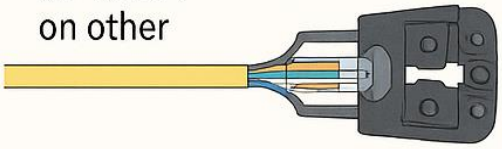
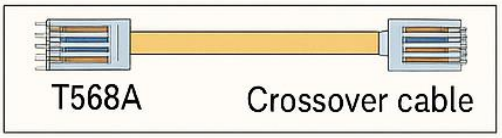
3 Untwisted wires arranged an T568A on other



4 Crossover cable



Building a Simple LAN

- Connect computers to a Swiitch using straight-through cables
- Assign IP addresses within same subnet

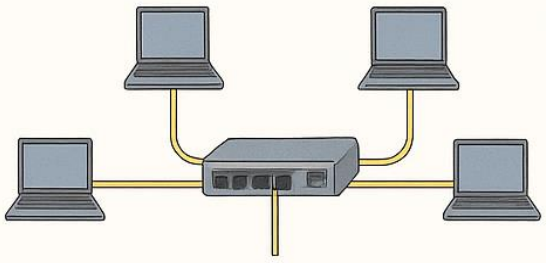


Figure 3 Simple

Building a Simple LAN

- Connect computers to a switch using straight-through cables
- Assign IP addresses in a same subnet