Lab no: 1 ***Date: 2024/09/18***

Title: Understanding of Network Equipment, Wiring in Details

Objectives:

- Learn the functions and roles of various network devices in a computer network.
- Gain an in-depth understanding of network equipment and wiring configurations.

Background Theory:

A. Network Equipment

1. Repeaters

- Amplify and regenerate weak signals.
- Extend the range of a network.
- Prevent signal degradation over long distances.

2. Hubs

- Connect multiple devices in a network.
- Broadcast data to all connected devices.
- Operate at the physical layer and share bandwidth.

3. Switches

- Connect devices and direct data to the intended recipient.
- Operate at the data link layer for efficient communication.
- Reduce network collisions and improve performance.

4. Bridges

- Connect two or more network segments.
- Filter and forward data based on MAC addresses.
- Reduce traffic and collisions within a network.

5. Routers

- Connect different networks (LANs/WANs).
- Use IP addresses to route data packets.

- Enable internet access and manage network traffic.

6. Gateways

- Act as a translator between different network protocols.
- Enable communication between incompatible networks.
- Often used in enterprise and hybrid networking environments.

B. Wiring of Cables

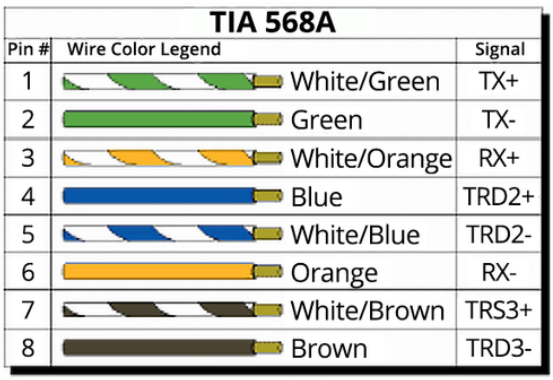
UTP cables contain four pairs of twisted wires (8 wires in total), each pair distinguished by specific color codes. These wires must be arranged according to the ***EIA/TIA 568A*** or ***568B*** standards to ensure proper network operation.

T568A Standard:

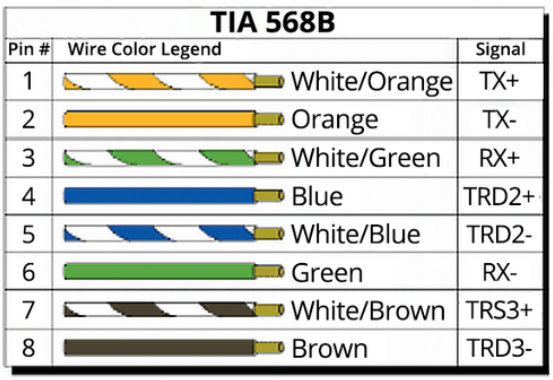
- **Pin 1:** Green – White
- **Pin 2:** Green
- **Pin 3:** Orange-White
- **Pin 4:** Blue
- **Pin 5:** Blue-White
- **Pin 6:** Orange
- **Pin 7:** Brown-White
- **Pin 8:** Brown

T568B Standard:

- **Pin 1:** Orange-White
- **Pin 2:** Orange
- **Pin 3:** Green-White
- **Pin 4:** Blue
- **Pin 5:** Blue-White
- **Pin 6:** Green
- **Pin 7:** Brown-White
- **Pin 8:** Brown



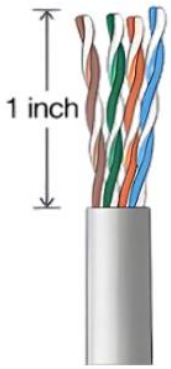
TIA 568A		
Pin #	Wire Color Legend	Signal
1	White/Green	TX+
2	Green	TX-
3	White/Orange	RX+
4	Blue	TRD2+
5	White/Blue	TRD2-
6	Orange	RX-
7	White/Brown	TRS3+
8	Brown	TRD3-



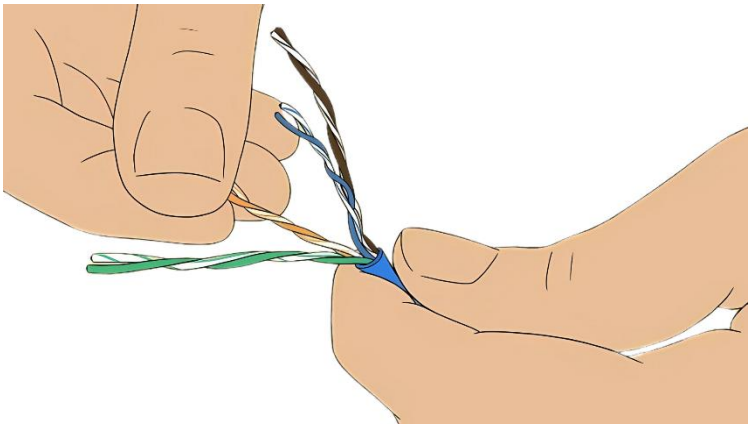
TIA 568B		
Pin #	Wire Color Legend	Signal
1	White/Orange	TX+
2	Orange	TX-
3	White/Green	RX+
4	Blue	TRD2+
5	White/Blue	TRD2-
6	Green	RX-
7	White/Brown	TRS3+
8	Brown	TRD3-

Procedure:

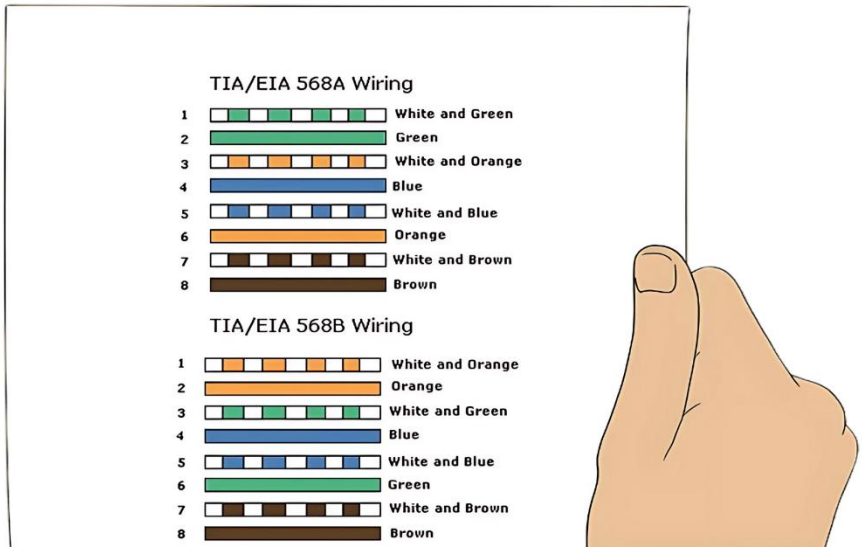
1. Strip your Cable: Remove about 1-2 inches of the outer jacket from the UTP cable using a cable stripper or a sharp tool, taking care not to damage the inner wires.



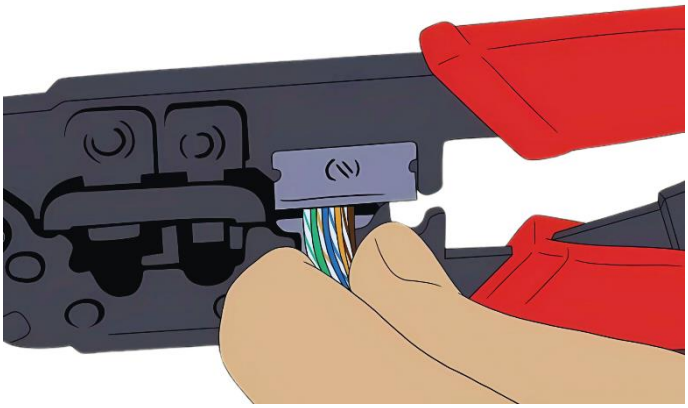
2. Untwist the cable: Separate the twisted wire pairs and untwist them gently. Straighten each wire for easier handling.



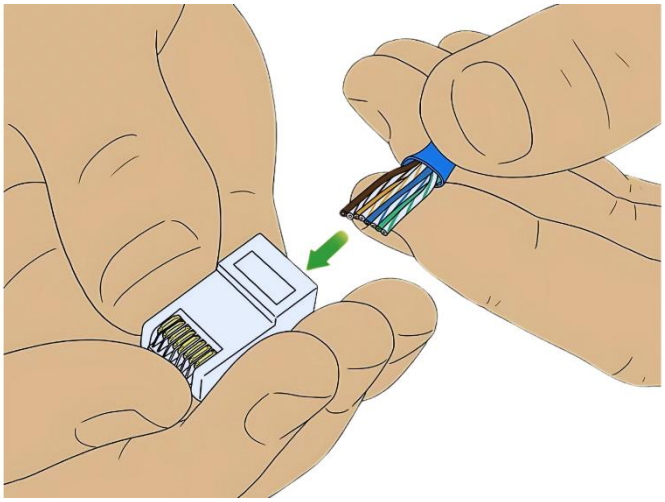
3. Color Coding: Arrange the wires according to the chosen wiring standard (**T568A** or **T568B**). Ensure the order is correct before proceeding.



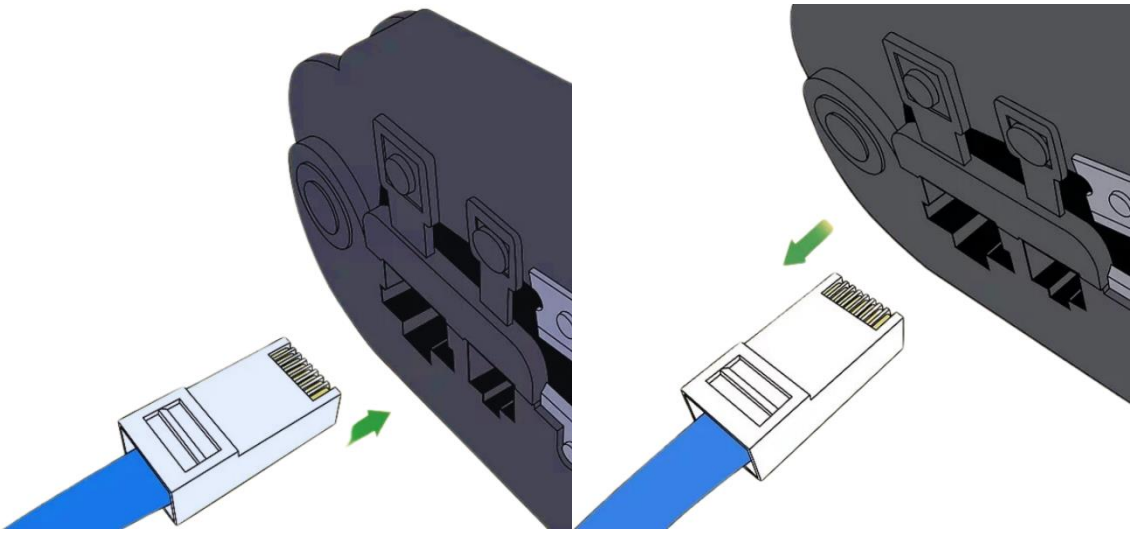
4. Trimming the wires: Cut the wires evenly using a wire cutter, leaving about 1/2 inch of straightened wire exposed from the cable jacket.



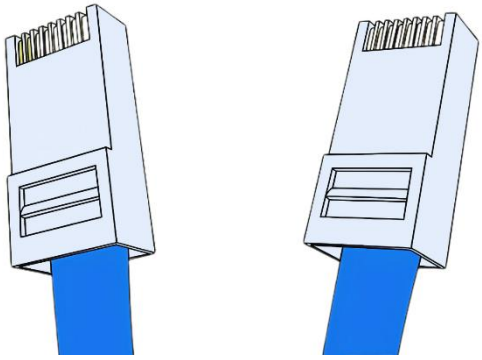
5. Insert Wires into the RJ-45 Connector: Align the wires with the connector's slots, ensuring each wire is fully seated and in the correct order. The cable jacket should also enter the connector slightly to provide support.



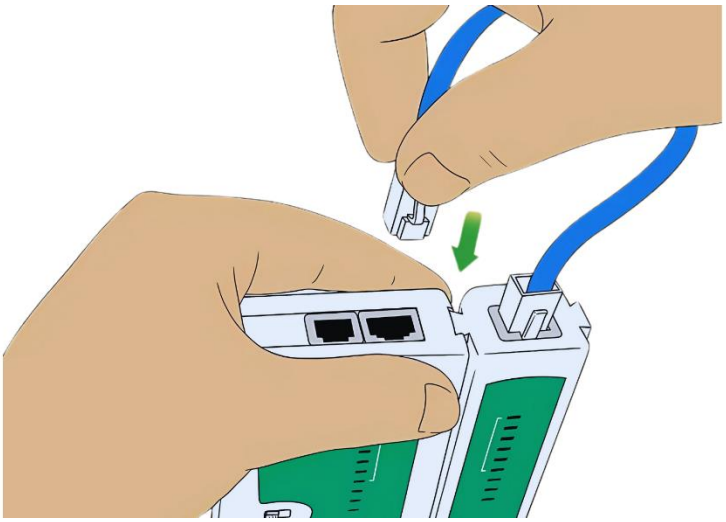
6. Clamping: Use a crimping tool to firmly clamp the RJ-45 connector onto the wires. This secures the connection and ensures proper contact with the metal pins.



7. Repeat for other end: Follow the same steps to attach a connector to the other end of the cable. Confirm both ends follow the same wiring standard.



8. Test The cable: Use a cable tester to check connectivity and verify that the cable functions correctly without wiring issues.



Conclusion:

Using the above steps for creating an Ethernet cable ensured the successful assembly and testing of a functional network cable. The process demonstrated the importance of proper wire arrangement, secure clamping, and adherence to wiring standards, providing a practical understanding of cable-making techniques and their role in reliable network connectivity.