

**Aim ⇨ To understand the various LAN cables and connector [RJ45].**

**Objectives ⇨**

- To use the crimping tool for the formation of LAN cable patch.
- To verify the connectivity of the prepared patch cable using cable testing tool.
- To understand the difference between straight-through cable and crossover LAN cable.

**Software Required ⇨ Cisco Packet Tracer**

**Theory ⇨**

LAN cables are essential components in wired networking, enabling data transmission between devices like computers, routers, and switches. The most commonly used LAN cables are Ethernet cables with RJ45 [Registered Jack 45] connectors, an 8-pin modular connector designed for network communications. RJ45 connectors are used to terminate the twisted pair cables, ensuring a reliable and high-speed connection.

**Types of LAN Cables ↴**

- i. **Straight-Through Cable:** Used to connect different types of devices, such as a computer to a switch or router. The wire order at both ends of the cable is the same (e.g., T568B at both ends), ensuring identical pin configurations for a direct, one-to-one signal path. This configuration is ideal for linking devices with different roles in a network.
- ii. **Crossover Cable:** Used to connect similar devices, such as two computers or two switches. The wire order differs at each end (e.g., T568A at one end and T568B at the other), crossing the transmit and receive pairs to enable direct communication between similar devices.

Straight-Through cables have the same configuration at both ends, while Crossover cables swap transmit and receive pairs. This allows Straight-Through cables to connect dissimilar devices and Crossover cables to connect similar ones, optimizing network connectivity based on device roles.

**Color Codes for Wiring Standards ↴**

- **T568A Standard:** Green/White, Green, Orange/White, Blue, Blue/White, Orange, Brown/White, Brown.

- **T568B Standard:** Orange/White, Orange, Green/White, Blue, Blue/White, Green, Brown/White, Brown.

A crimping tool is used to attach RJ45 connectors to the cable's ends, ensuring a secure and reliable connection. Proper crimping ensures that the metal pins inside the RJ45 connector make correct contact with the wire conductors.

#### Steps for Crimping a LAN Cable ↴

1. **Strip the Cable:** Remove about 1-2 inches of the outer jacket of the cable to expose the inner wires.
2. **Arrange the Wires:** Arrange the exposed wires according to the T568A or T568B wiring standard.
3. **Insert into RJ45 Connector:** Insert the arranged wires into the RJ45 connector, ensuring each wire is fully seated.
4. **Crimp the Connector:** Use the crimping tool to press the connector onto the cable firmly, securing the connection.
5. **Test the Cable:** Use a cable testing tool to check the continuity and correctness of the connections.

After crimping a LAN cable, use a cable tester to ensure proper connectivity and check for any breaks or shorts. Power on the tester and connect each end of the cable to the main and remote units. Press the "Test" button to begin the test. The tester will display the results: "Pass" indicates correct wiring, while "Fail" signals issues that need correction. Confirming a successful test ensures the cable is functional for network communication.

#### Simulation ⇄

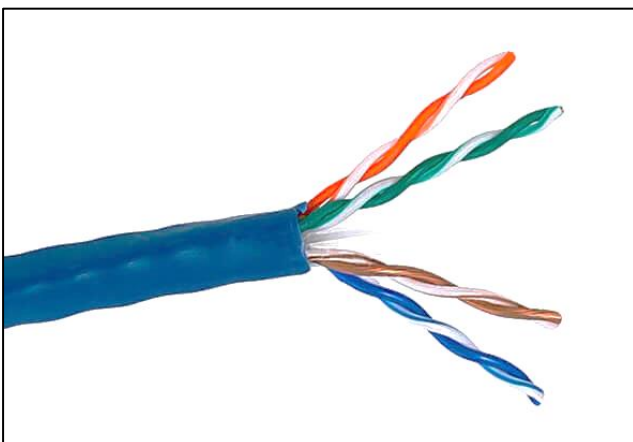


Fig. i) Cable Inside View

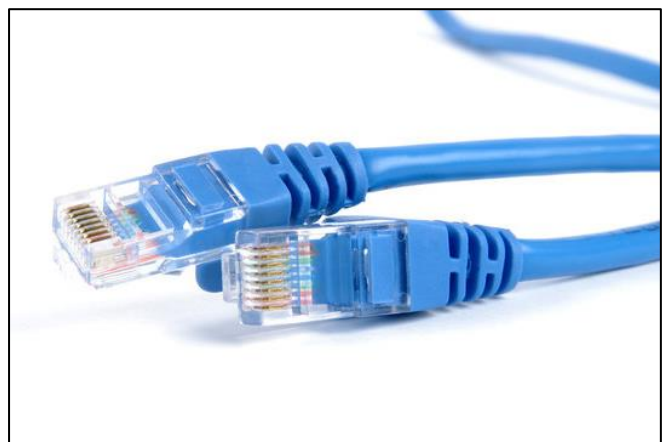


Fig. ii) Functional LAN Cable

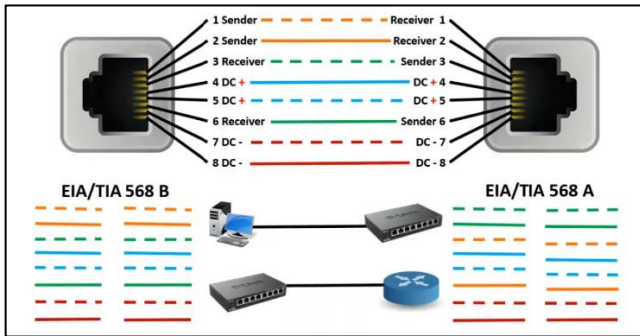


Fig. iii) Straight-Through Cable Color Coding

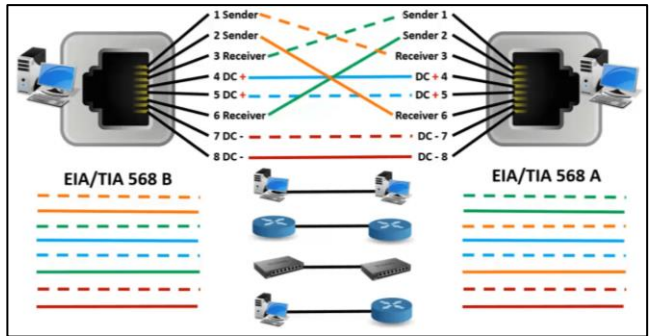


Fig. iv) Crossover Cable Color Coding

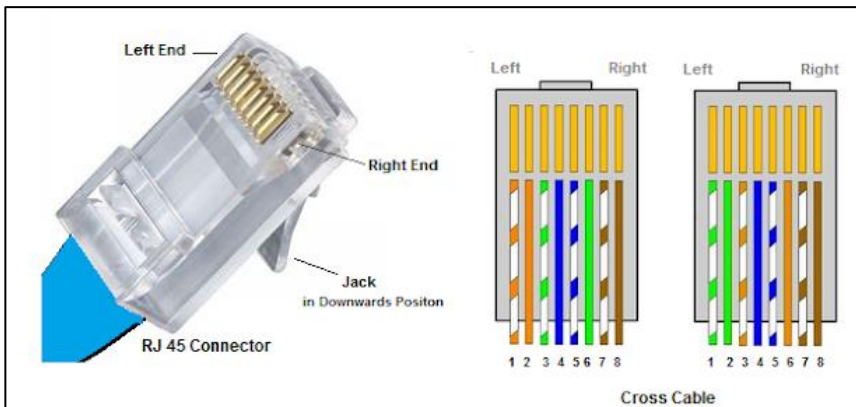


Fig. v) Cross-section of LAN Cable

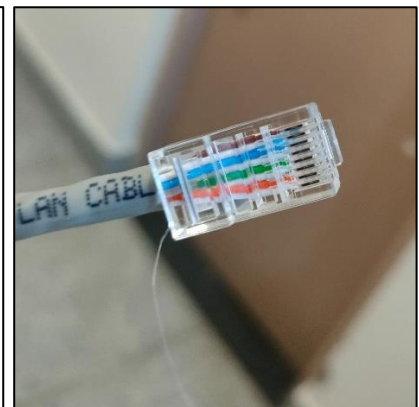


Fig. vi) Formed in experiment



Fig. vii) Crimper



Fig. viii) Cable Tester

## Result ⇄

Successfully crimped and tested LAN cables using RJ45 connectors, ensuring correct configurations for both Straight-Through and Crossover cables. Verified connectivity with a cable testing tool and confirmed proper wiring. Simulated various network topologies in Cisco Packet Tracer, demonstrating effective device communication across different configurations.

## **Conclusion ↗**

The experiment enhanced understanding of LAN cable preparation, testing, and the use of different cable types. Simulations reinforced correct cabling practices and device connectivity in networking.

## **Precautions ↗**

- Ensure correct wiring standards (T568A or T568B) are followed during cable preparation.
- Verify all connections using a cable tester to detect any miswiring or connectivity issues.
- Use appropriate cable types for specific device connections (Straight-Through for different devices, Crossover for similar devices).
- Handle crimping tools carefully to avoid damaging connectors or wires.