Lab Practical #03: Study of Different Types of Network Cables & Connectors and Crimping a LAN

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Aim/Objective

Study of different types of network cables & connectors and crimping a LAN cable including understanding the difference between guided and unguided media, and learning cable wiring standards.

Theory

Network cables are the physical medium that carries data between network devices. Different types of cables have varying characteristics in terms of bandwidth, distance, cost, and interference immunity. Understanding cable types and wiring standards is essential for network installation and maintenance.

Procedure

1. Various Network Cables and Connectors

a) Twisted Pair Cable

Description: Pairs of insulated copper wires twisted together to reduce electromagnetic interference. Most common in LANs.

- **UTP (Unshielded Twisted Pair):** No shielding, most common
- **STP (Shielded Twisted Pair):** Has metallic shielding

- **Connector:** RJ45
- **Categories:** Cat5e (1 Gbps), Cat6 (10 Gbps), Cat6a (10 Gbps)

b) Coaxial Cable

Description: Central copper conductor surrounded by insulating layer, metallic shield, and outer jacket.

- **Types:** Thin Coax (10Base2), Thick Coax (10Base5)
- **Connector:** BNC, N-type
- **Applications:** Cable TV, internet, CCTV

c) Fiber Optic Cable

Description: Transmits data using light signals through glass/plastic fibers.

- **Single-mode:** Small core, long distances
- **Multi-mode:** Larger core, shorter distances
- **Connectors:** SC, LC, ST, FC
- **Advantages:** High bandwidth, immune to EMI

d) Ethernet Cable

Description: Twisted pair cable with RJ45 connectors for Ethernet networks.

- **Standards:** 10Base-T (10 Mbps), 100Base-TX (100 Mbps), 1000Base-T (1 Gbps)

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2. Difference Between Guided and Unguided Media

Aspect	Guided Media	Unguided Media
Definition	Physical medium guides signals	No physical medium, wireless
Examples	Twisted pair, Coaxial, Fiber optic	Radio waves, Microwaves, Infrared
Security	More secure	Less secure
Installation	Requires physical cables	No cables needed
Bandwidth	Higher bandwidth possible	Limited bandwidth

Aspect	Guided Media	Unguided Media
Interference	Less susceptible (especially fiber)	More susceptible

3. Cable Wiring Diagrams (Color Code)

a) Cross-wired Cable (Crossover)

Used to connect similar devices (computer to computer, switch to switch).

T568A (One End):

1. White/Green
2. Green
3. White/Orange
4. Blue
5. White/Blue
6. Orange
7. White/Brown
8. Brown

T568B (Other End):

1. White/Orange
2. Orange
3. White/Green
4. Blue
5. White/Blue
6. Green
7. White/Brown
8. Brown

b) Straight Through Cable

Used to connect different devices (computer to switch, computer to hub).
Both ends use the same standard (T568B).

T568B Standard:

1. White/Orange

2. Orange

3. White/Green

4. Blue

5. White/Blue

6. Green

7. White/Brown

8. Brown

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4. Cable Applications

Cable Type	Primary Use	Advantages	Disadvantages
Twisted Pair	LANs, telephone	Cost-effective, easy installation	Limited distance, interference
Coaxial	Cable TV, internet	Good bandwidth, less interference	More expensive, bulky
Fiber Optic	Long-distance, high-speed	High bandwidth, secure	Expensive equipment
Ethernet	Computer networks	Standardized, widely supported	Limited to Ethernet

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5. Crimping Procedure

Tools Required:

- RJ45 Crimping Tool
- Wire Stripper
- Cable Tester
- RJ45 Connectors
- Ethernet Cable

Steps:

1. Strip outer jacket (1 inch)
2. Untwist wire pairs
3. Arrange wires by color code
4. Trim wires to equal length
5. Insert into RJ45 connector
6. Crimp the connector
7. Test cable connectivity

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