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# EXERCISE 14

**STUDY OF DIFFERENT TYPES OF NETWORK CABLES AND CRIMPING OF CABLE WITH RJ45 CONNECTOR**

**AIM:**

To study different types of network cables used in computer networks and to understand the process of crimping an RJ45 connector onto a cable for creating reliable physical connections between network devices.

**ALGORITHM:**

Identifying Different Network Cable Types**:**

1. Visually examine each cable to identify the type (twisted pair, coaxial, or fiber optic).
2. Check cable jackets for markings (Cat5e, Cat6, Cat6a).
3. For twisted pair cables, unstrip a small section to observe the four color-coded wire pairs.
4. Use a cable tester to verify signal transmission quality of each cable type.
5. Document bandwidth, speed, and typical applications of each cable**.**

**RJ45 Connector Wiring Standards:**

RJ45 Connector Overview:

- An RJ45 connector is an 8-pin (8P8C) modular connector that terminates Ethernet cables and connects network devices like computers, routers, and switches.
- It provides a physical interface for secure, high-speed data transmission in LANs.

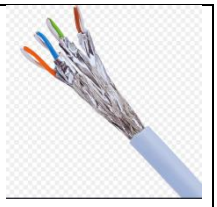
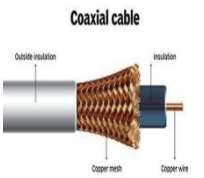
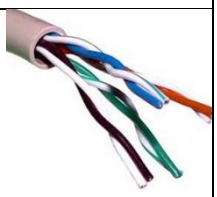
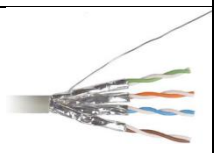
**Steps to Crimp an RJ45 Connector (Theoretical):**

1. Strip approximately 1 inch of the cable jacket using a wire stripper without damaging the inner wires.
2. Untwist the four colour-coded wire pairs completely.
3. Arrange the eight wires in the correct order according to either T568A or T568B standard.
4. Trim the wires evenly to ensure neat insertion into the connector.

5. Insert each wire fully into its corresponding pin slot in the RJ45 connector (verify wires reach the front).
6. Place the connector in a crimping tool and apply firm, even pressure until the contacts secure all wires.
7. Test the completed cable using a network cable tester to verify continuity and proper pin mapping.

**STUDY OF CABLES:**

| CABLE TYPE | PROS | CONS | USAGE | BANDWIDTH | SPEED | IMAGE |
|---|---|---|---|---|---|---|
| **Cat5 (Category5)** | - Low cost - Easy to install -Widely used | Lower speeds- Shorter maximum distance (100 meters) | Home networks- Small office setups | 100 Mbps | 10/100 Mbps (Fast Ethernet) |  Cat5 |
| **Cat5e (Category5e)** | Enhanced version of Cat5- Reduced crosstalk- More reliable | - Limited to 100 meters- Lower speeds than newer cables | - Ethernet Connections- Home/office networks | 1 Gbps | 1 Gbps (Gigabit Ethernet) |  Cat5e |
| **Cat6 (Category6)** | - Higher bandwidth than Cat5e- Reduced crosstalk- More reliable | - More expensive than Cat5e- Stiff and difficult to work with | - High-speed Networking - Large office buildings | 10 Gbps (up to 55 meters) | 1-10 Gbps (Gigabit Ethernet / 10 Gigabit Ethernet) |  Cat6 |
| **Cat6a (Category6a)** | Supports higher bandwidth Longer maximum distance | -Expensive- Bulky and hard to install | - Data centres- High-performance networking | 10 Gbps (up to 100 meters) | 10 Gbps (10 Gigabit Ethernet) |  |
| **Cat7 (Category7)** | - Shielded for high noise resistance- High-speed performance | -Expensive- Thick, less flexible cables | - Data centres- High-speed environments | 10 Gbps (up to 100 meters) | 10 Gbps (10 Gigabit Ethernet) |  Cat7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Cat8 (Category8)** | - Highest speed & performance- Supports high-frequency signals | Expensive- Shorter range- Heavy and rigid | - Data centres- Server rooms- High-performance applications | 25-40 Gbps (up to 30 meters) | 25-40 Gbps (High-Speed Data Centers) |  |
| **Coaxial Cable** | - Durable- Less susceptible to electro-magnetic interference | - Low bandwidth compared to twisted pair cables | - Cable TV- Broadband internet connections | 10 Mbps to 10 Gbps | 10 Mbps to 10 Gbps (depending on use) |  |
| **Fiber Optic** | -Extremely high bandwidth Very long Distance- Immune to EMI | Expensive- Fragile- Requires specialized installation | -Long-distance Networking- High-speed data transfer | 10 Gbps to 100 Gbps (or higher) | 10 Gbps to 100 Gbps (and beyond) |  |
| **Twisted Pair (Unshielded)** | -Cost-effective- Light weight- Easy to install | - Prone to interference without shielding | - Telephone lines- Home and office networking | 100 Mbps | 10/100 Mbps (Fast Ethernet) |  |
| **Twisted Pair (Shielded)** | - Higher resistance to interference- Better data integrity | - More Expensive- Less flexible and harder to install | - Industrial settings- Areas with high interference | 100 Mbps | 10/100 Mbps (Fast Ethernet) |  |

**RESULT:**

The experiment helped identify various network cables and demonstrated how to crimp RJ45 connectors correctly. This ensured secure connections for reliable data communication in LANs. Practical understanding of cable types and crimping standards was gained.