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**Subject: Computer Networks**

**Lab 2**

Q1:Write down the advantages and disadvantages of RJ45 connectors?

**Advantages:**

**Standardization:** RJ45 connectors are the industry standard for network cabling, ensuring compatibility across various devices, including computers, routers, switches, and other networking equipment.

**Ease of Installation**: RJ45 connectors are relatively easy to install, allowing for quick and efficient cable terminations with minimal tools.

**High Speed and Bandwidth**: RJ45 connectors support high-speed data transfer, making them suitable for Ethernet networks, including Gigabit and 10 Gigabit Ethernet.

**Durability:** They are designed to be robust and durable, with a locking tab that secures the connector in place and reduces the risk of accidental disconnection.

**Versatility:** RJ45 connectors can be used for various types of networking cables, including Cat5e, Cat6, and Cat6a, supporting a wide range of network speeds and applications.

**Cost-Effective:** They are widely available and inexpensive, making them a cost-effective solution for networking needs**.**

**Disadvantages:**

**Size and Bulkiness**: RJ45 connectors are relatively large compared to other types of connectors, which can be an issue in space-constrained environments or for portable devices.

**Susceptibility to Damage:** The plastic locking tab can break easily if not handled carefully, leading to connection issues or the need for replacement.

**Limited Cable Length:** Ethernet cables using RJ45 connectors have a maximum recommended length of 100 meters (328 feet). Beyond this, signal degradation can occur, requiring the use of repeaters or switches.

**Electrical Interference:** Although twisted-pair cables help reduce electromagnetic interference, RJ45 connectors themselves do not have shielding, making them susceptible to interference in environments with high electrical noise.

**Manual Assembly:** Properly assembling an RJ45 connector requires precision and attention to detail. Poorly crimped connectors can lead to unreliable connections and network issues.

**Physical Compatibility**: RJ45 connectors are designed specifically for twisted-pair cables and Ethernet networking, limiting their use in other types of network setups (e.g., fiber optic or coaxial cables).

Q2: **Briefly explain how the data is transmitted in wireless medium?**

In a wireless medium, data is sent through the air using radio waves, similar to how your phone receives signals.

**Modulation:** Modulation can be done using various techniques like amplitude modulationData (such as voice, video, or text) is first converted into an electrical signal. This signal is then modulated onto a carrier wave, which is an electromagnetic wave with a specific frequency.

**Transmission:** The modulated carrier wave is then transmitted into the air by an antenna. The antenna radiates the signal in the form of radio waves, which propagate through the atmosphere.

**Propagation:** The transmitted radio waves travel through the air, potentially reflecting, refracting, or diffracting depending on the environment (e.g., buildings, trees, and terrain). These waves can travel long distances and penetrate through walls and other obstacles, though they may weaken or become distorted depending on the medium they pass through.

**Reception**: A receiving antenna picks up the transmitted radio waves. The received signal is typically weaker and may contain noise or interference.

**Demodulation:** The received signal is then demodulated to extract the original data from the carrier wave. The demodulated signal is processed and converted back into its original form, such as sound, images, or text.

**Error Correction**: To ensure data integrity, error correction techniques are often applied to detect and correct any errors that may have occurred during transmission.

**Q3: Briefly explain all type of network topologies.?**

There are 5 types of Topologies

* Bus Topology
* Star Topology
* Ring Topology
* Mesh Topology
* Tree Topology

1. **Bus Topology**

* **Definition**: All devices are connected to a single central cable, called the bus.
* **Advantages**: Simple and cost-effective; easy to add new devices.
* **Disadvantages**: If the central cable fails, the entire network goes down.

1. **Star Topology**

* **Definition**: All devices are connected to a central hub or switch.
* **Advantages**: Easy to manage and expand; if one device fails, the rest of the network remains unaffected.
* **Disadvantages**: If the central hub or switch fails, the entire network is affected; more cable is required compared to bus topology.

1. **Ring Topology**

* **Definition**: Devices are connected in a circular fashion, with each device connected to two others, forming a ring.
* **Advantages**: Data travels in one direction, reducing the chance of packet collisions; easy to identify where a fault occurs.
* **Disadvantages**: If one device or connection fails, it can disrupt the entire network unless there is a backup ring (dual ring).

1. **Mesh Topology**

* **Definition**: Every device is connected to every other device in the network.
* **Advantages**: Very reliable because multiple connections provide redundancy; if one connection fails, data can take another path.
* **Disadvantages**: Expensive and complex to install and maintain due to the large number of cables and connections.

1. **Tree Topology**

* **Definition**: A combination of star and bus topologies, with groups of star-configured devices connected to a central bus.
* **Advantages**: Scalable and easy to expand; central hub controls data flow, making it easier to manage.
* **Disadvantages**: If the central bus fails, the entire network can be affected; more cabling required than bus topology.