

**Lab #02**

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BS-CS 6

**Question 1:**

**Write down the advantages and disadvantages of RJ45 connectors.**

The advantages and disadvantages of the RJ45 port are listed below:

**Advantages:**

1. High transmission quality: The transmission rate of up to 100Mbps, with good transmission quality and stability.

2. Easy to install: The RJ45 port is a standard 8-pin, 8-wire connector, which is very easy and convenient to install.

3. Reliable connection: Because its internal pins are made of carbon copper material, the reliability of its connection is very high.

4. Wide range of adaptability: the RJ45 port can be used to connect telephones, local area networks (LANs), wide area networks (WANs), and various data transmission networks.

**Disadvantages:**

1. Limited transmission speed: Although the RJ45 port theoretically supports high transmission speeds, but in practice by the wire, production process, environmental factors, etc., its actual transmission speed often fails to achieve the desired results.

2. Need for proper maintenance environment: If the working environment is poor, such as excessive humidity, high temperature, etc., it may cause oxidation of the RJ45 port, thus affecting the transmission effect.

**Question 2:**

**Briefly explain how the data is transmitted in wireless medium.**

* **Data Encoding**: Data is first encoded into a signal. This involves converting digital information (such as binary data) into a format suitable for transmission over the air.
* **Transmission**: The encoded signal is transmitted by a wireless transmitter (such as a Wi-Fi router or a cellular tower). This device generates electromagnetic waves that carry the encoded data. These waves travel through the air as radio frequency (RF) signals.
* **Propagation**: The electromagnetic waves propagate through the air. They may travel directly or bounce off surfaces, such as walls or buildings. Factors like distance, obstacles, and interference can affect signal strength and quality.
* **Reception**: A wireless receiver (such as a smartphone or a computer's wireless card) picks up the electromagnetic waves using an antenna. The receiver captures the signal and converts it back into an electrical signal.
* **Data Decoding**: The electrical signal is then decoded to retrieve the original data. This involves reversing the encoding process to convert the received signal back into a format that can be understood by the receiving device.
* **Data Processing**: The decoded data is processed by the receiving device to perform the desired action, such as displaying a webpage or playing a video.

**Question 3:**

**Briefly explain all type of network topologies.**

1. **Bus Topology**

* **Description**: In a bus topology, all devices are connected to a single central cable, known as the bus or backbone.
* **Advantages**:
  + Easy to install and configure.
  + Requires less cable than other topologies.
* **Disadvantages**:
  + If the central cable fails, the entire network goes down.
  + Performance degrades as more devices are added due to signal collisions.
  + Difficult to troubleshoot.

**2. Star Topology**

* **Description**: In a star topology, all devices are connected to a central hub or switch. Each device has a dedicated connection to the central hub.
* **Advantages**:
  + Easy to install and manage.
  + Failure of one cable or device does not affect others (unless the central hub fails).
  + Simplified troubleshooting and network expansion.
* **Disadvantages**:
  + Requires more cable than bus topology.
  + The central hub is a single point of failure; if it fails, the entire network is affected.

**3. Ring Topology**

* **Description**: In a ring topology, each device is connected to two other devices, forming a circular data path.
* **Advantages**:
  + Data packets travel in one direction, reducing the chance of collisions.
  + Can offer high performance and predictable data transfer rates
* **Disadvantages**:
  + If one connection breaks, it can disrupt the entire network.
  + More complex to install and manage compared to star topology.
  + Troubleshooting can be difficult.

**4. Mesh Topology**

* **Description**: In a mesh topology, every device is connected to every other device in the network.
* **Advantages**:
  + High redundancy and reliability; if one connection fails, data can be rerouted through other connections.
  + Provides high fault tolerance and excellent performance.
* **Disadvantages**:
  + Expensive and complex to install and manage due to the high number of cables and connections.
  + Difficult to scale.

**5. Tree Topology**

* **Description**: A tree topology is a hybrid of star and bus topologies. It features a central root node connected to multiple star-configured networks. Each star network connects to a central bus.
* **Advantages**:
  + Scalable and easy to expand by adding new branches.
  + Each branch is independent, making it easier to isolate and troubleshoot issues.
* **Disadvantages**:
  + If the main bus or root node fails, it can affect the entire network.
  + Requires more cable and infrastructure compared to simpler topologies.