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BSIT – IT2R11

1. **Network Topology:**
   * **Bus Topology:** All devices share a common communication line. In the bus network topology, every node is connected in series along a single cable. This arrangement is found today primarily in cable broadband distribution networks.
   * **Star Topology:** All devices connect to a central hub or switch. In the star network topology, a central device connects to all other nodes through a central hub. Switched local area networks based on Ethernet switches and most wired home and office networks have a physical star topology.
   * **Ring Topology:** Each device is connected to exactly two other devices, forming a ring. In the ring network topology, the nodes are connected in a closed-loop configuration. Some rings pass data in one direction only, while others are capable of transmission in both directions. These bidirectional ring networks are more resilient than bus networks since traffic can reach a node by moving in either direction. Metro networks based on Synchronous Optical Network technology are the primary example of ring networks.
   * **Mesh Topology:** Devices are interconnected, providing multiple paths between them. The [mesh network](https://internetofthingsagenda.techtarget.com/definition/mesh-network-topology-mesh-network) topology links nodes with connections so that multiple paths between at least some points of the network are available. A network is considered to be *fully meshed* if all nodes are directly connected to all other nodes and *partially meshed* if only some nodes have multiple connections to others. Meshing multiple paths increases resiliency but also increases cost. However, more space is needed for dedicated links.
   * **Tree Topology:** Hierarchical structure with a main backbone and sub-branches. The tree network topology consists of one root node, and all other nodes are connected in a hierarchy. The topology itself is connected in a star configuration. Many larger Ethernet switch networks, including data center networks, are configured as trees.
   * **Hybrid Topology:** Combination of two or more different topologies. The hybrid network topology is any combination of two or more topologies. Hybrid topologies typically provide exceptional flexibility, as they can accommodate a number of setups. For example, different departments in the same organization may opt for personalized network topologies that are more adaptable to their network needs.

1. **Intermediary Network Devices:**
   * **Router:** Connects different networks and routes data between them. A router is a gateway that passes data between one or more local area networks (LANs). Routers use the Internet Protocol (IP) to send IP packets containing data and IP addresses of sending and destination devices located on separate local area networks.
   * **Switch:** Connects devices within a local network, forwarding data based on MAC addresses. A network switch connects devices in a network to each other, enabling them to talk by exchanging data packets. Switches can be hardware devices that manage physical networks or software-based virtual devices.
   * **Hub:** Basic networking device that connects multiple devices in a LAN, operating at the physical layer. a device that links multiple computers and devices together. Hubs can also be referred to as repeaters or concentrators, and they serve as the center of a local area network (LAN). In a hub, each connected device is on the same subnet and receives all data sent to the hub.
   * **Bridge:** Connects and filters traffic between two network segments at the data link layer. A computer networking device that creates a single, aggregate network from multiple communication networks or network segments. This function is called network bridging. Bridging is distinct from routing.
   * **Gateway:** Connects different networks with different communication protocols. A gateway is a network node used in telecommunications that connects two networks with different transmission protocols together. Gateways serve as an entry and exit point for a network as all data must pass through or communicate with the gateway prior to being routed.
   * **Firewall:** Monitors and controls incoming and outgoing network traffic based on predetermined security rules. a network security device that monitors and filters incoming and outgoing network traffic based on an organization's previously established security policies. At its most basic, a firewall is essentially the barrier that sits between a private internal network and the public Internet.
2. **Network Components:**
   * **Server:** Hosts and provides services or resources to other devices on the network. A server is a computer or system that provides resources, data, services, or programs to other computers, known as clients, over a network. In theory, whenever computers share resources with client machines they are considered servers.
   * **Client:** Device that requests services or resources from a server. a client is any computer hardware or software device that requests access to a service provided by a server. Clients are typically seen as the requesting program or user in a client-server architecture.
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   * **Access Point:** Allows wireless devices to connect to a wired network using Wi-Fi. An access point is a device that creates a wireless local area network, or WLAN, usually in an office or large building. An access point connects to a wired router, switch, or hub via an Ethernet cable, and projects a WiFi signal to a designated area.
   * **Modem:** Converts digital data from a computer into a signal suitable for transmission over a communication channel. a network device that both modulates and demodulates analog carrier signals (called sine waves) for encoding and decoding digital information for processing. Modems accomplish both of these tasks simultaneously and, for this reason, the term modem is a combination of “modulate” and “demodulate.”
3. **Types of Networks:**
   * **LAN (Local Area Network):** Limited to a small geographic area, such as a single building or campus.  A collection of devices connected together in one physical location, such as a building, office, or home. A LAN can be small or large, ranging from a home network with one user to an enterprise network with thousands of users and devices in an office or school.
   * **WAN (Wide Area Network):** Spans a large geographic area, connecting LANs over long distances. Technology that connects your offices, data centers, cloud applications, and cloud storage together. It is called a wide-area network because it spans beyond a single building or large campus to include multiple locations spread across a specific geographic area, or even the world.
   * **MAN (Metropolitan Area Network):** Covers a larger geographic area than a LAN but smaller than a WAN, usually within a city. computer network that connects computers within a metropolitan area, which could be a single large city, multiple cities and towns, or any given large area with multiple buildings. A MAN is larger than a local area network (LAN) but smaller than a wide area network (WAN).
   * **CAN (Campus Area Network):** Covers multiple buildings within a specific campus or site. Computer network that spans a limited geographic area. CANs interconnect multiple local area networks (LAN) within an educational or corporate campus.
   * **PAN (Personal Area Network):** Connects devices within the personal space of an individual, typically using technologies like Bluetooth. It is an interconnection of personal technology devices to communicate over a short distance, which is less than 33 feet or 10 meters or within the range of an individual person, typically using some form of wireless technologies.
   * **VPN (Virtual Private Network):** Utilizes a public network (usually the internet) to create a secure, encrypted connection for remote access or private communication. which stands for virtual private network, establishes a digital connection between your computer and a remote server owned by a VPN provider, creating a point-to-point tunnel that encrypts your personal data, masks your IP address, and lets you sidestep website blocks and firewalls on the internet.