**Chapter1**

Define the following:

**Firewalls** - A firewall is designed to either allow or deny network traffic based upon a set of defined criteria. This criteria could be a predefined set of default rules or could be user-created, or even a combination of the two.

**DMZ** - A DMZ, or a perimeter network, is a means of allowing the public to access certain network services while still maintaining the security of your internal devices.

**VPN** - A virtual private network can be defined as a means of transmitting private data securely from one network across an unsecured network to a third network. (Generally speaking, the unsecured network is the Internet)

**Hostnames** - A hostname is a label that is assigned to a device connected to a computer network and that is used to identify the device in various forms of electronic communication, such as the World Wide Web. For example, en.wikipedia.org

**IP Addresses** - An IP address is a unique identifier for a computer or network, which allows users to send and receive data.

**MAC Addresses** - A MAC (Media Access Control) addres is a unique, 12-character alphanumeric attribute that is used to identify individual electronic devices on a network.

Identify and give a scenario where the following Considerations for a business structure would be addressed:

**Budget**

When a business noticed that their networks are not keeping up with demand and they need to be upgraded or expanded, the company must discuss how much money they are willing to/ can spend on upgrading the system. A budget is very important to consider whenever a business will spend more money than usual, because going over the budget can lead to a loss for the company.

**Skill set**

When changing or upgrading a system within a business, the company has to be sure that the employees wil be able to use the newer system. If they are unable to use the new system, it could lead to a serious decline in the companys productivity. The company must send their employees for training and properly communicate to them about their skill set before implementing any changes that will affect them.

**Existing infrastructure**

A business needs to look at their existing infrastructure regularly to see if any changes are necessary. Sometimes a company will have a big flaw in their systems that can cause security flaws, slow speed, connectivity issues, etc. Or in some cases a company might upgrade their infrastructure completely when it is only necessary to upgrade a certian section of it.

**Hardware**

The hardware of a network can greatly impact the speed/ productivity of a business. Hardware must be looked at if the speed of of a network is not up to standard or sometimes if the network is down, it could be a hardware issue. A business must always be prepared to deal with hardware problems, because they can lead to days without business if serious enough.

Give examples of the following NetworkModels and explain how they work:

**peer-to-peer (P2P) networks**

Using a universal serial bus (USB) to create a basic P2P network between two computer systems.

A peer-to-peer network is an information technology (IT) infrastructure allowing two or more computer systems to connect and share resources without requiring a separate server or server software.

**Client-server networks**

The client-server architecture is also used in online multiplayer games (Blizzard's Battle.net service).

A client-server network is a form of internet network that consists of a single central computer functioning as a server and directing several other computers, referred to as clients.

**Wired networks**

Example: Telephone networks, The internet, Fiber optic communication.

A wired network employs wires to link devices to the Internet or another network, such as laptops or desktop PCs.

What Is a network HUB

A network hub is a node that broadcasts data to every computer or Ethernet-based device connected to it. A hub is less sophisticated than a switch, the latter of which can isolate data transmissions to specific devices.

Network hubs are best suited for small, simple local area network environments.

What is a network bridge

The bridge is a networking device in a computer network that is used to connect multiple LANs to a larger LAN. or multiple smaller lans

What is a network Switch

A network switch is equipment that allows two or more IT devices, such as computers, to communicate with one another. Compute, print, server, file storage, Internet access, and other IT resources can be shared across the network.

What is Internet Service Providers (ISPs)

An ISP provides direct access from your home or office to the Internet through a fixed-line or wireless network. Some ISPs provide popular software, including a Web browser and email client.

Explain VLAN

A virtual local area network (VLAN) is a virtualized connection that connects multiple devices and network nodes from different LANs into one logical network.

What is the difference between Circuit Switching and Packet Switching

A circuit-switched network relies on a physical connection between two nodes, which requires the link to be set up before the nodes can communicate.

In contrast, a packet-switched network is a digital network that manages data transfer in the form of small and optimized packets.

What are some Understanding carrier standards, elaborate their functions

**CE**: Carrier Ethernet

**CEN**: Carrier Ethernet Network

**UNI**: User Network Interface

**ENNI**: External Network-to-Network Interface

**EVC**: Ethernet Virtual Connection

**OVC**: Operator Virtual Connection

Explain the following:

**Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA)**

Carrier-sense multiple access with collision avoidance, is a network multiple access method in which carrier sensing is used, but nodes attempt to avoid collisions by beginning transmission only after the channel is sensed to be "idle".

**Radio waves**

Radio waves are a type of electromagnetic radiation. A radio wave has a much longer wavelength than visible light. Humans use radio waves extensively for communications.

**Frequency**

Frequency is the number of waves that pass a certain point in one second. The unit for frequency is the hertz (Hz).

**Modulation**

Modulation is the technique for impressing information (voice, music, pictures, or data) on a radio-frequency carrier wave by varying one or more characteristics of the wave in accordance with the information signal.

**Encryption**

Encryption is a form of data security in which information is converted to ciphertext. Only authorized people who have the key can decipher the code and access the original plaintext information.

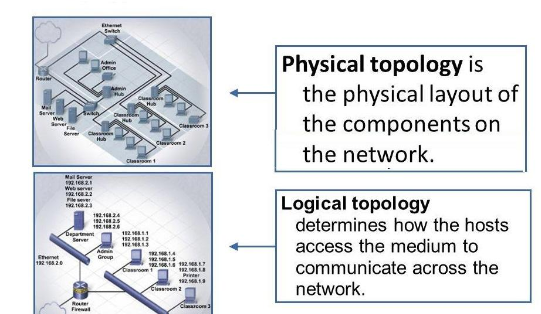
**MAC filtering**

Mac filtering, also known as MAC-based restriction, is a network security method that controls access to a network by filtering devices based on their unique Media Access Control (MAC) addresses. Each network-connected device, such as computers, smartphones, or routers, has a distinct MAC address as a hardware identifier.

Visually present the structure of these types of Network Topologies

**Logical topologies versus physical topologies**

A physical topology describes how the devices are connected together, whereas a logical topology describes how the data travels from device to device.



**Bus topology**

A diagram of computer network

Description automatically generated

**Ring topology**

A diagram of a computer network

Description automatically generated

**Star topology**

A diagram of a computer network

Description automatically generated

**Mesh topology**

A diagram of a router

Description automatically generated

**Hybrid topology**

A diagram of a network

Description automatically generated