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Computer Networking

Q1) The topology of a network is key to determine its performance. Network topology is the way a network is arranged, including the physical or logical description of how links and nodes are set up to relate to each other.

There are numerous ways a network can be arranged, all with different pros and cons, and some are more useful in certain circumstance than others. Admins have a range of options when it comes to choosing a network topology. and this diesision must account for the size and scale of their management, including configuration management, visual mapping, and general performance monitoring. The key is to understand your objectives and requirements to create and manage the network topology in the right way for your business.

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* Types of network topology.

→ There are several different logical and physical network topologies from which administrators can choose to build a secure, robust and easily maintainable topology. The most popular configurations include:

- Bus network topology:-
Also known as backbone network topology, this configuration connects all devices to a main cable via drop line. The advantages of bus network topology lie in its simplicity, as there is less cable required than in alternatives topologies, which makes for easy installation.

- Mesh network topology:-
A dedicated point-to-point link connects each device on the network, only carrying data between two devices.

- Ring network topology:- Two dedicated point-to-point links connect a device to the two devices located on either side of it, creating a ring of devices through which data is forwarded via repeaters until it reaches the target device.

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- Star network topology :—
  The most common network topology, star topology connects each device in the networks to a central hub. Devices can only communicate with each other indirectly through the central hub.
- Hybrid network topology :—
  Any combination of two or mor topologies connects each devices is a hybrid topology.
- Tree network topology.
  This topology consists of two or more topology, of a parent-child hierarchy in which star network are interconnected via bus ~~mate~~ network. Nodes branch out linearly from one root node, and two connected nodes only share one mutual connection.

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Q2) Types of multiplexers.

There are mainly two types of multiplexers, namely analog and digital. They are further divided into four parts. are following:-

1) Analog multiplexing

The analog multiplexing techniques involves signals which are analog in nature. The analog signals are multiplexed according to their frequency (FDM) or wavelength (WDM).

(I) => Frequency Divisim Multiplexing (FDM). This technique is frequency division multiplexing FDM. This technique uses various frequencies to combine streams of data, for sending them on a communication medium, as a single signal.

(II) => Wavelength Division Multiplexing (WDM)

Wavelength Division Multiplexing is an analog technique, in which many data streams of different wavelength are transmitted in the light spectrum. If the wavelength increases, the frequency of the signal decreases.

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II) Digital Multiplexing :-

The term digital represents the discrete bits of information. Hence the available data is in the form of frames or packets, which are discrete.

I) Time Division Multiplexing (TDM)

In TDM, the time frame is divided into slots. This technique is used to transmit a signal over a single communication channel, with alloting one slot for each message. of all the types of TDM. the main ones are synchronous and Asynchronous TDM.

II) Synchronous TDM

In synchronous TDM, the input is connected to a frame. If there are 'n' number of connections. then the frames is divided into 'n' time slots. One slot is allocated for each input line. In this technique, the sampling rate is common to all signals and hence same clock input is given. The mux allocates the same slot to each device device at all times.

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III) Asynchronous TDM:—

In asynchronous TDM, the sampling rate is different for each of the signals and the clock signal is also not in common. If the allotted device, for a time slot, transmits nothing and sits idle, then that slot is allotted to another device, unlike synchronous.

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Q3. Types of transmission Media:—

→ Basically transmission media is classified into two types:—

i) Wired also reffered as Guided media.

ii) Wireless also reffered as Unguided media.

A) Guided media:—

There are 3 major types:-

i) Twisted pair Cable:-

It consists of 2 separately insulated conductor wires wround about each other. Generally, several such pairs are bundled together in a protective sheath. They are also the most widely used Transmission Media.

ii) Coaxial Cable:-

It has an outer plastic covering containing an insulation layer made of PVC or Teflon and 2 parallel conductors each having a separate insulted protection over. Cable TVs and analog television networks widely use Coaxial cables.

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iii) Optical fiber Cable

It uses the concept of reflection of light through a core made up of glass or plastic. The core is surrounded by a less dense glass or plastic covering called the cladding. It is used for the transmission of large volumes of data.

B) Unguided media:-

There are 3 types of signals transmitted through unguided media.

i) Radio waves

These are easy to generate and can penetrate through buildings. The sending and receiving antennas need not be aligned. Frequency Range: 3KHz - 1GHz. Used in AM and FM radios.

ii) Microwaves:-

It is line of sight transmission i.e the sending and receiving antennas need to be properly aligned with each other. The distance covered by the signal is directly proportional to the height of the antenna.

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iii) Infrared:—

Infrared waves are used for very short distance communication. They cannot penetrate through obstacles. Range :— 300GHz - 400THz.

4) Errors:—

A condition when the receiver's information does not match with the sender's information. During transmition, digital signals suffer from noise that can introduces errors in the binary bits travelling from senders to reciever. That means a 0 bit may change to 1 or a 1 bit may change to 0.

Some popular technique for error detection are:

a) Simple Parity check.
b) Two-dimensional Parity check.
c) Checksum
d) Cyclic redundancy check.

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Q 5.) Piggybacking:—

Piggybacking is a method of attaching acknowledgment to the outgoing data packet.

Consider a two-way transmission between host A with and host B. When host A sends a data frame to B does not send the acknowledgment of the frame sent immediately. The acknowledgment is delayed util the next data frame of host B is available for transmission. The delayed acknowledgment is then attached to the outgoing data frame of B. This process of delaying acknowledgment so that it can be attached to the outgoing frame is called piggybacking.

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(Q6) Purpose of a DNS server :—

Some DNS servers can provide faster access times than others. This is often a function of how close you are to those servers. If your ISP's DNS servers are closer to you than Google's for example, you example, you may find domain names are resolved quicker using the default servers from your ISP than with an external server.

If anyone experiance connection problems where it seems no websites will load, it's possible there's an error with the DNS server. If the DNS server i: