1

(a) Define physical and logical address?

Ans:- The physical address, also known as the link address, is the address of a node as defined by its LAN or WAN. It is included in the frame used by the data link layer. It is the lowest-level address. The physical address have authority over the network. The size and format of these addresses vary depending on the network.

Logical addresses are necessary for universal communications that are independent of underlying physical networks. Physical addresses are not adequate in an internet work environment.

P.T.O.

where different networks can have different address formats. A universal addressing system is needed in which each host can be identified uniquely, regardless of the underlying physical network.

(b) Define physical layer? When data is sent over physical medium which signals it is converted into?

Ans:- Physical layer in the OSI model plays the role of interacting with actual hardware and signalling mechanism.

Physical layer is the only layer of OSI network model which actually deals with the physical connectivity of two different stations. This layer defines the hardware equipment, cabling, wiring, frequencies used to represent binary signals etc. Physical layer provides it services to Data-link layer. Data-link layer hands over frames to physical layer. Physical layer converts them to electrical pulses, which represents binary data, the binary data is then sent over the wired or wireless media. When data is sent over physical medium, it needs to be first converted into electromagnetic signals. Data itself can be analog such as human voice, or digital such as file on the disk. Both analog and

Digital data can be represented in digital or analog signals.

① Digital signal :- Digital signals are discrete in nature and represent sequence of voltage pulses. Digital signals are used within the circuitry of a computer system.

② Analog signal :- Analog signals are in continuous wave form in nature and represented by continuous electromagnetic waves.

(c) what are the possible reasons for data to deteriorate? Explain.

Ans:- when signals travel through the medium they tend to deteriorate. This may have many reasons as given:

(1) Attenuation:- For the receiver to interpret the data accurately, the signal must be sufficiently strong when the signal pass through the medium, it tends to get weak As it covers distance it loses strength

(2) Dispersion:- As signal travels through media it tends to spread and overlap the amount of dispersion depends up

P.T.O.

the frequency need.

③ Delay distortion: Signals are sent over media with pre-defined speed and frequency. If the signal speed and frequency do not match. There are possibilities that signal reaches destination in arbitrary fashion. In digital media this is very critical that some bits reach earlier than the previously sent ones.

④ Noise: Random disturbance or fluctuation in analog or digital signal is said to be noise in signal, which may distort the actual information being carried.

2

(a) Define channel capacity. Which factors it depend on?

Ans: The speed of transmission of information is said to be the channel capacity. We count it as data rate in digital world. It depends on numerous factors such as:

(i) Bandwidth: The physical limitation of underlying media.

(ii) Error rate: Incorrect reception of information because of noise.

(iii) Encoding: The number of levels used for signaling.

(b) Explain multiplexing and switching.

Ans:-

(i) ~~Mux~~

(ii) Multiplexing:- Multiplexing is a technique to mix and send multiple data streams over a single medium. The technique requires system hardware called multiplexer for multiplexing the streams and sending them on a medium and a de-multiplexer which taken information from the medium and distributes to different destination. The 3 types of multiplexing techniques is given below:

(i) Frequency Division Multiplexing
(ii) Wavelength Division multiplexing
(iii) Time Division multiplexing.

(m) Switching:- Switching is a mechanism by which data sent from source to destination which are not directly connected. Networks have interconnecting devices, which receive data from directly connected sources. Switching can be categorized by;

1. circuit switching
2. message switching
3. Packet switching

(e) Explain different types of cables used in transmission.

Ans:- cables that are used in transmission of data is given below.

P.T.O.

(i) Twisted pair cable:- A twisted pair cable is made of two plastic insulated copper wires twisted together to form a single media. Out of these two wires only one carries actual signal and another is used for ground reference.

(ii) Coaxial cable:- Coaxial cable has two wires of copper. The core wire lies in the center and it is made of solid conductor. The core is enclosed in an insulating sheath. The second wire is wrapped around over the sheath and that too in turn encased by insulator sheath.

(iii) Power lines: Power line communication (PLC) is layer-1 (Physical Layer) technology which uses power cables to transmit data signals. In PLC, modulated data is sent over the cables. The receiver on the other end demodulates and interprets the data.

(iv) Fiber optics: Fiberoptics works on the properties of light. When light ray hits at critical angle in it tends to refracts. 90 degree. This property has been used in fiber optic. The core fiber of optic cable is made of high quality glass or plastic.

3

(a) How many ways to convert digital data into digital signals? what is line coding and block coding?

Ans: There are two ways to convert digital data into signals. They are:-

(i) Line coding.

(ii) Block coding.

(i) Line coding: A line code is the code that is used for data transmission of a digital signal over a transmission line.

Following are the properties of line coding.

(i) As the coding is done to make more bits transmit on a single signal the bandwidth used is much reduced.

(ii) The probability of error is much reduced.

(iii) Power density is much favourable.

(iv) The timing content is adequate.

(v) Block coding: It helps in error detection and retransmission of the signal. It is normally referred to as mB/nB coding as it replaces each m-bit data group with an n-bit data group. Thus, it adds extra bits which helps in synchronization.

(b) Classify line coding with example?

Ans:- There are three types of line coding.

(i) Unipolar:- In this

(i) Unipolar non-Return to zero:- In this type a high in data is represented by a positive pulse called as mark, which has a duration. A low in data input has no pulse.

(ii) Unipolar return to zero:- In this type of unipolar signaling, a high in data, though represented by a mark pulse, its duration is less than the symbol bit duration.

(iii) ~~Polar :- In this~~

(iv) Polar NRZ :- In this type of polar signal, a high in data is represented by a positive pulse, while a low in data is represented by a negative pulse.

(v) Polar RZ :- In this type of polar signaling a high in data, though represented by a mark pulse - Half of the bit duration remains high but it immediately returns to zero, and shows the absence of pulse during the remaining half of the bit duration.

4

(a) Explain different transmission mode.

Ans:- The transmission mode decides how data is transmitted between two computers. The binary data in the form of 1s and 0s can be sent in two different modes.

(i) Parallel:- The binary bits are organized into groups of fixed length. Both sender and receiver are connected in parallel with the equal number of data lines.

(ii) Serial:- In serial transmission, bits are sent one after another in a queue manner.

serial transmission can be either asynchronous or synchronous.

(i) Synchronous transmission:- Data bits are sent in burst mode without maintaining gap between bytes.

(ii) Asynchronous transmission:- It is named so because there is no importance in timing.

(b) Classify Digital to analog conversion?

Ans:- When data from one computer is sent to another via some analogue carrier it is first converted into analog signal.

Analog signals are modified to reflect digital data. An analog signal is characterized by its amplitude, frequency and phase. There are three kinds of digital to analog conversions.

(i) Amplitude shift keying: In this conversion techniques the amplitude of analog carrier signal is modified to reflect binary data.

(ii) Frequency shift keying: In this conversion technique the frequency of the analog carrier signal is modified to reflect binary data.

(iii) Phase shift keying:- In this conversion technique the phase of the original carrier signal is altered to reflect the binary data.

(iv) Quadrature phase shift keying:- QPSK alters the phase to reflect two binary digits at once. This is done in two different phases.

5

(a) Define wireless transmission/communication

Ans:- Wireless transmission is a form of unguided media. Wireless communication involves no physical link established between two or more devices, communicating wirelessly. Wireless signals are

spread over in the air and received and interpeted by appropriate antennas.

(b) Briefly explain different types of wireless transmissions

Ans: Different types of wireless transmission is given below:

(1) Radio transmission: Radio frequency is easier to generate and because of its large wavelength it can penetrate through walls and structures. Radio waves at lower frequencies can travel through walls whereas higher RF can travel in straight line.

(iii) microwave transmission:- Electromagnetic waves above 100 MHz tend to travel in a straight line and signals over them can be sent by beaming those waves towards one particular station because microwave travels in straight lines.

(iv) Infrared transmission:- Infrared wave lies in between visible light spectrum and microwaves. It has wavelength of 700 nm to 1 mm and frequency ranges from 300 GHz to 430 THz

(v) Light transmission:- Highest most electromagnetic spectrum which can be used

for data transmission is light or optical signaling. This is achieved by means of LASER. Because of frequency light, when it tends to travel strictly in straightly line.

(6)

(a) What is switching?

Ans: Switching is process to forward packets coming in from one port to a port leading towards the destination when data comes on a port it is called ingress, and when data leaves a port or goes out it is called egress. A communication system may include

number of switches and nodes; At broad level, switching can be divided into two major categories.

① connectionless:- The data is forwarded on behalf of forwarding tables. No previous handshaking is required and acknowledgements are optional.

② connection oriented:- Before switching data to be forwarded to destination, there is a need to pre-established circuit among the path between both end points.

(b) Briefly explain different type of switching?

Ans:- When two nodes communicate with each other over a dedicated communication path, it is called circuit switching. circuit switching may have to go through phases:

(i) Establish a circuit
(ii) Transfer the data
(iii) Disconnect the circuit

(b2) Message switching:- In message switching the whole message in treated as a data unit and is switching/ transferred in its entirety. This technique was considered substitute to

circuit switching. As in circuit switching the whole path is blocked for two entities only.

(3) Packet switching :- Shortcomings of message switching gave birth to an idea of packet switching. The entire message is broken down into smaller chunks called packets.

7

(a) Define transport layer.

Ans:- Transport layer offers peer-to-peer and end-to-end connection between two processes on remote hosts. Transport layer takes data from upper layer and then breaks it into smaller size segments, numbers each byte, and hands over to lower layer for delivery.

(b) Write down the functions of transport layer.

Ans:- The functions of transport layer is given below:-

(i) The layer is the first one which breaks the information data, supplied by application layer into smaller units called segment and maintains their accounting.

(ii) This layer ensures that data must be received in the same sequence in which it was sent.

(iii) This layer provides end-to-end delivery of data between hosts which may or may not belong to the same subnet.

(iv) All server process intend to communicate over the network are equipped with well-known transport service access points.

also known as port numbers.

8

(a) Define Tcp. write down the features of TCP.

Ans: The transmission control protocol (TCP) is one of the most important protocols of internet protocols suite. It is most widely used protocol for data transmission in communication network such as internet.

Features:

(i) TCP is reliable protocol: That in the receiver, always sends either positive or negative acknowledgement about the data packet to the sender.

(ii) TCP ensures that the data reaches intended destination in the same order it was sent.

(iii) TCP provides error checking and recovery mechanism.

(iv) TCP provides end-to-end communication.

(v) TCP provides in client/server point-to-point mode.

(b) Define UDP. Write down the features of UDP?

Ans: The user datagram protocol (UDP) is simplest transport layer communication protocol available of the TCP/IP protocol suite. It involves minimum amount of communication machine.

Features:

(i) UDP is used when acknowledgment of data does not hold any significance.

(II) UDP is good protocol for data flowing in one direction

(III) UDP is simple and suitable for query based communications.

(IV) UDP is not connection oriented.

(V) UDP does not guarantee ordered delivery of data