



DATA COMMUNICATION AND NETWORK



2 MARKS QUESTIONS AND ANSWERS

UNIT I

DATA COMMUNICATION NETWORK

1. What are the three criteria necessary for an effective and efficient network?

The most important criteria are performance, reliability and security.

Performance of the network depends on number of users, type of transmission medium, and the capabilities of the connected h/w and the efficiency of the s/w.

Reliability is measured by frequency of failure, the time it takes a link to recover from the failure and the network's robustness in a catastrophe.

Security issues include protecting data from unauthorized access and viruses.

2. Group the OSI layers by function?

The seven layers of the OSI model belonging to three subgroups.

Physical, data link and network layers are the **network support layers**; they deal with the physical aspects of moving data from one device to another.

Session, presentation and application layers are the **user support layers**; they allow interoperability among unrelated software systems.

The transport layer ensures **end-to-end reliable data transmission**.

3. What are header and trailers and how do they get added and removed?

Each layer in the sending machine adds its own information to the message it receives from the layer just above it and passes the whole package to the layer just below it. This information is added in the form of headers or trailers. Headers are added to the message at the layers 6,5,4,3, and 2. A trailer is added at layer 2. At the receiving machine, the headers or trailers attached to the data unit at the corresponding sending layers are removed, and actions appropriate to that layer are taken.

4. What are the features provided by layering?

Two nice features:

- It decomposes the problem of building a network into more manageable components.
- It provides a more modular design.

5. Why are protocols needed?

In networks, communication occurs between the entities in different systems. Two entities cannot just send bit streams to each other and expect to be understood. For communication, the entities must agree on a protocol. A protocol is a set of rules that govern data communication.

6. What are the two interfaces provided by protocols?

- Service interface
- Peer interface

Service interface - defines the operations that local objects can perform on the protocol.

Peer interface - defines the form and meaning of messages exchanged between protocol peers to implement the communication service.

7. Mention the different physical media?

- Twisted pair(the wire that your phone connects to)
- Coaxial cable(the wire that your TV connects to)
- Optical fiber(the medium most commonly used for high-bandwidth, long-distance links)
- Space(the stuff that radio waves, microwaves and infra red beams propagate through)

8. Define Signals?

Signals are actually electromagnetic waves traveling at the speed of light. The speed of light is, however, medium dependent-electromagnetic waves traveling through copper and fiber do so at about two-thirds the speed of light in vacuum.

9. What is wave's wavelength?

The distance between a pair of adjacent maxima or minima of a wave, typically measured in meters, is called wave's wavelength.

10. Define Modulation?

Modulation -varying the frequency, amplitude or phase of the signal to effect the transmission of information. A simple example of modulation is to vary the power (amplitude) of a single wavelength.

11. Explain the two types of duplex?

- *Full duplex*-two bit streams can be simultaneously transmitted over the links at the same time, one going in each direction.
- *Half duplex*-it supports data flowing in only one direction at a time.

12. What is CODEC?

A device that encodes analog voice into a digital ISDN link is called a CODEC, for *coder/decoder*.

13. What is spread spectrum and explain the two types of spread spectrum?

Spread spectrum is to spread the signal over a wider frequency band than normal in such a way as to minimize the impact of interference from other devices.

- Frequency Hopping
- Direct sequence

14. What are the different encoding techniques?

- NRZ
- NRZI
- Manchester
- 4B/5B

15. How does NRZ-L differ from NRZ-I?

In the NRZ-L sequence, positive and negative voltages have specific meanings: positive for 0 and negative for 1. In the NRZ-I sequence, the voltages are meaningless. Instead, the receiver looks for changes from one level to another as its basis for recognition of 1s.

16. What are the responsibilities of data link layer?

Specific responsibilities of data link layer include the following. a) Framing b) Physical addressing c) Flow control d) Error control e) Access control.

17. What are the ways to address the framing problem?

- Byte-Oriented Protocols(PPP)
- Bit-Oriented Protocols(HDLC)
- Clock-Based Framing(SONET)

18. Distinguish between peer-to-peer relationship and a primary-secondary relationship. peer -to- peer relationship?

All the devices share the link equally.

Primary-secondary relationship: One device controls traffic and the others must transmit through it.

19. Mention the types of errors and define the terms?

There are 2 types of errors

- Single-bit error.
- Burst-bit error.

Single bit error: The term single bit error means that only one bit of a given data unit (such as byte character/data unit or packet) is changed from 1 to 0 or from 0 to 1.

Burst error: Means that 2 or more bits in the data unit have changed from 1 to 0 from 0 to 1.

20. List out the available detection methods.

There are 4 types of redundancy checks are used in data communication.

- Vertical redundancy checks (VRC).
- Longitudinal redundancy checks (LRC).
- Cyclic redundancy checks (CRC).
- Checksum.

21. Write short notes on VRC.

The most common and least expensive mechanism for error detection is the vertical redundancy check (VRC) often called a parity check. In this technique a redundant bit called a parity bit, is appended to every data unit so, that the total number of 0's in the unit (including the parity bit) becomes even.

22. Write short notes on LRC.

In longitudinal redundancy check (LRC), a block of bits is divided into rows and a redundant row of bits is added to the whole block.

23. Write short notes on CRC.

The third and most powerful of the redundancy checking techniques is the cyclic redundancy checks (CRC) CRC is based on binary division. Here a sequence of redundant bits, called the CRC remainder is appended to the end of data unit.

24. Write short notes on CRC checker.

A CRC checker functions exactly like a generator. After receiving the data appended with the CRC it does the same modulo-2 division. If the remainder is all 0's the CRC is dropped and the data accepted. Otherwise, the received stream of bits is discarded and the data are resent.

25. Define checksum.

The error detection method used by the higher layer protocol is called checksum. Checksum is based on the concept of redundancy.

26. What are the steps followed in checksum generator?

The sender follows these steps a) the units are divided into k sections each of n bits. b) All sections are added together using 2's complement to get the sum. c) The sum is complemented and become the checksum. d) The checksum is sent with the data.

27. Mention the types of error correcting methods.

There are 2 error-correcting methods.

- Single bit error correction
- Burst error correction.

28. Write short notes on error correction?

It is the mechanism to correct the errors and it can be handled in 2 ways.

- When an error is discovered, the receiver can have the sender retransmit the entire data unit.
- A receiver can use an error correcting coder, which automatically corrects certain errors.

29. What is the purpose of hamming code?

A hamming code can be designed to correct burst errors of certain lengths. So the simple strategy used by the hamming code to correct single bit errors must be redesigned to be applicable for multiple bit correction.

30. What is redundancy?

It is the error detecting mechanism, which means a shorter group of bits or extra bits may be appended at the destination of each unit.

31. Define flow control?

Flow control refers to a set of procedures used to restrict the amount of data. The sender can send before waiting for acknowledgment.

32. Mention the categories of flow control?

There are 2 methods have been developed to control flow of data across communication links. a) Stop and wait- send one from at a time. b) Sliding window- send several frames at a time.

33. What is a buffer?

Each receiving device has a block of memory called a buffer, reserved for storing incoming data until they are processed.

1. What are the functions of MAC?

MAC sub layer resolves the contention for the shared media. It contains synchronization, flag, flow and error control specifications necessary to move information from one place to another, as well as the physical address of the next station to receive and route a packet.

2. What are the functions of LLC?

The IEEE project 802 models take the structure of an HDLC frame and divides it into 2 sets of functions. One set contains the end user portion of the HDLC frame – the logical address, control information, and data. These functions are handled by the IEEE 802.2 logical link control (LLC) protocol.

3. What is Ethernet?

Ethernet is a multiple-access network, meaning that a set of nodes send and receive frames over a shared link.

4. Define the term carrier sense in CSMA/CD?

All the nodes can distinguish between idle and a busy-link and “collision detect” means that a node listens as it transmits and can therefore detect when a frame it is transmitting has interfered (collided) with a frame transmitted by another node.

5. Define Repeater?

A repeater is a device that forwards digital signals, much like an amplifier forwards analog signals. However, no more than four repeaters may be positioned between any pairs of hosts, meaning that an Ethernet has a total reach of only 2,500m.

6. Define collision detection?

In Ethernet, all these hosts are competing for access to the same link, and as a consequence, they are said to be in the same collision detection.

7. Why Ethernet is said to be a I-persistent protocol?

An adaptor with a frame to send transmits with probability ‘1 ‘whenever a busy line goes idle.

8. What is exponential back off?

Once an adaptor has detected a collision and stopped its transmission, it waits a certain amount of time and tries again. Each time it tries to transmit but fails, the adaptor doubles the amount of time it waits before trying again. This strategy of doubling the delay interval between each transmission attempt is a general technique known as exponential back off.

9. What is token holding time (THT)?

It defines that how much data a given node is allowed to transmit each time it possesses the token or equivalently, how long a given node is allowed to hold the token.

10. What are the two classes of traffic in FDDI?

- Synchronous
- Asynchronous

11. What are the four prominent wireless technologies?

- Bluetooth
- Wi-Fi(formally known as 802.11)
- WiMAX(802.16)
- Third generation or 3G cellular wireless.

12. Define Bluetooth?

Bluetooth fills the niche of very short-range communication between mobile phones, PDAs, notebook computers, and other personal or peripheral devices. For example, Bluetooth can be used to connect mobile phones to a headset, or a notebook computer to a printer.

13. What are the four steps involves in scanning?

1. The node sends a Probe frame.
2. All APs within reach reply with a Probe Response frame.
3. The node selects one of the access points, and sends that AP an Association Request frame.
4. The AP replies with an Association Response frame.

14. Explain the term handoff?

If the phone is involved in a call at the time , the call must be transferred to the new base station in what is called a hand off.

15. Define satphones?

Satphones use communication satellites as base stations, communicating on frequency bands that have been reserved internationally for satellite use.

16. How to mediate access to a shared link?

Ethernet,token ring, and several wireless protocols. Ethernet and token ring media access protocols have no central arbitrator of access. Media access in wireless networks is made more complicated by the fact that some nodes may be hidden from each other due to range limitations of radio transmission.