

UNIT-II

DATA LINK LAYER

1. 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

2. Mention the types of errors.

There are 2 types of errors

- a) Single-bit error.
- b) Burst-bit error.

3. Define the following terms.

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.

4. 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.

5. List out the available detection methods.

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

- a) Vertical redundancy checks (VRC).
- b) Longitudinal redundancy checks (LRC).
- c) Cyclic redundancy checks (CRC).
- d) Checksum.

6. 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.

7. 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.

8. 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.

9. Write short notes on CRC generator.

A CRC generator uses a modulo-2 division. In the first step, the 4-bit divisor is subtracted from the first 4 bit of the dividend. Each bit of the divisor is subtracted from the corresponding bit of the dividend without disturbing the next higher bit.

10. 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 is resent.

11. Give the essential properties for polynomial.

A polynomial should be selected to have at least the following properties.

a) It should not be

b) It should be divisible by $(x+1)$.

12. Define checksum.

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

13. 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.

14. List out the steps followed is checksum checker side.

The receiver must follow these steps

- a) The unit is divided into k section each of n bits.
- b) All sections are added together using 1's complement to get the sum.
- c) The sum is complemented.
- d) If the result is zero.

15. Write short notes on error correction.

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

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

16. Mention the types of error correcting methods.

There are 2 error-correcting methods.

- a) Single bit error correction
- b) Burst error correction.

17. 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.

18. 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.

19. What is a buffer?

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

20. 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.

16 Marks

1. a) What is the need for data encoding and explain the various data encoding schemes and compare their features.
(8)
b) Explain how hamming code can be used to correct burst errors. (8)
2. Explain the operation of the bit-oriented protocol HDLC with the required frames
3. Explain the various error detection and correction Mechanisms used in computer network.
4. Write short notes on:
 - a) Go back NARQ (8)
 - b) Selective repeat ARQ (8)
5. a) Discuss the major functions performed by the Presentation layer and Application layer of the ISO - OSI model.
(8)
b) Compare Connection oriented and connectionless service.

(4)

c) What are the major components of an optical communication system? Discuss. (4)

6. a) A block of 32 bits has to be transmitted. Discuss how the thirty two bit block is transmitted to the receiver using Longitudinal Redundancy Check.

(4)

b) Consider a 32 bit block of data 11100111 11011101 00111001 10101001 that has to be transmitted. If Longitudinal Redundancy Check is used what is the transmitted bit stream?(4)

c) In the Hamming code, for a data unit of 'm' bits how do you compute the number of redundant bits 'r' needed? (4)

d) What kinds of errors can Vertical Redundancy check determine? What kinds of errors it cannot determine? (4)

7. Discuss stop and wait protocol

8. Discuss sliding window protocol using Go back n.

9. How does a Token Ring LAN operate? Discuss.