

## \* Computer Network and Security (CNS) - Assignment Number - 2

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1) Write short notes on VRC, LRC, CRC, CRC generator, CRC checker.

→ Vertical Redundancy Check (VRC) -

Vertical Redundancy Check is also known as Parity Check. In this method, a redundant bit also called parity bit is added to each data unit. This method includes even parity and odd parity. Even parity means the total numbers of 1s in data is to be even and odd parity means the total numbers of 1s in data is to be odd.

Longitudinal Redundancy Check (LRC) -

Longitudinal Redundancy Check is also known as 2-D parity check. In this method, data which the user want to send is organised into tables of rows and columns. A block of bit is divided into table or matrix of rows and column. In order to detect an error, a redundant bit is added to the whole block and this block is transmitted to receiver. The receiver uses this redundant row to detect error.

Cyclic Redundancy Check (CRC) -

Cyclic Redundancy Check is a method of detecting



accidental changes/errors in the communication channel. CRC uses generator Polynomial which is available on both sender and receiver side.

2) Write short notes on error correction. Mention the types of error correcting methods.

→ Error correction -

① Error correcting code is to include enough redundant information along with each block of data sent to enable the receiver to deduce what the transmitted character must have been.

② Error correction must be handled in two ways:

i) When an error is discovered, the receiver can have the sender retransmit the entire data unit. (Backward error correction).

ii) Receiver can use an error correcting code, which automatically corrects certain errors. (Forward error correction)

③ A single additional bit can detect the error, but cannot correct it.

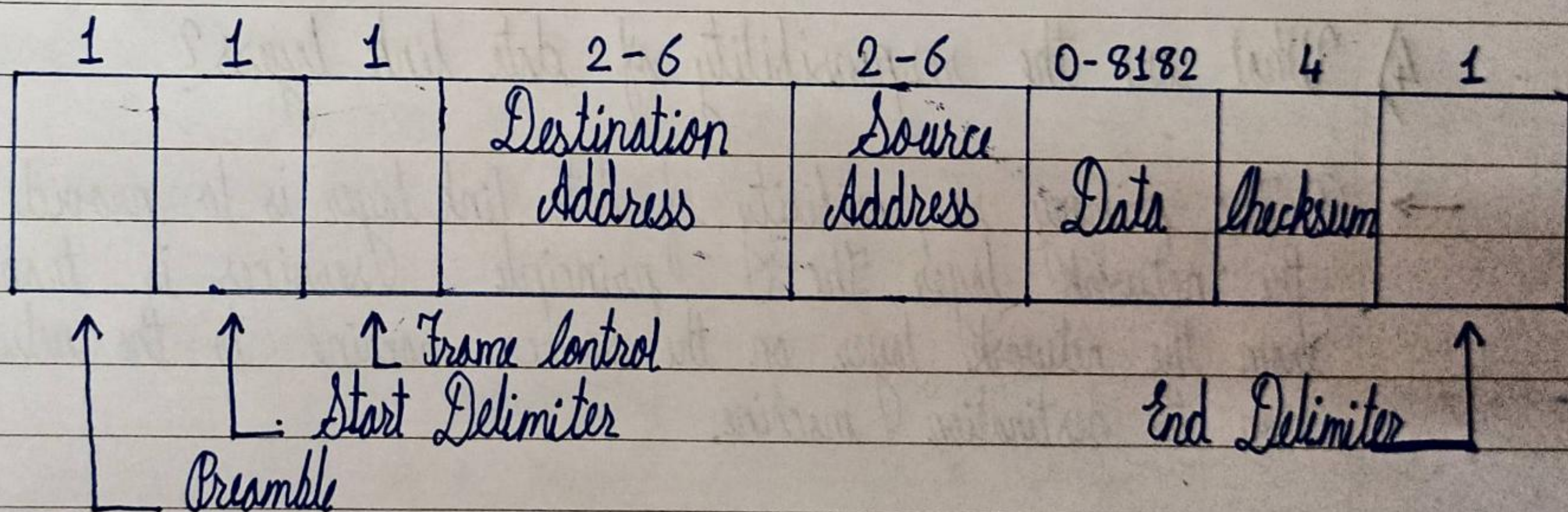
④ For correcting the errors, one has to know the exact position of the error.

⑤ To determine the position of the bit which is in error, a technique developed by R. W Hamming is Hamming code which can be applied to any length of the data unit and uses the relationship between data units and redundant units.



3) What is IEEE 802.4 standard?

→ IEEE 802.4 (Token Bus) is a popular standard for token passing LANs. In a token bus LAN, the physical media is a bus or a tree, and a logical ring is created using coaxial cable. The token is passed from one user to another in a sequence (clockwise or anticlockwise). Each station knows the address of the station to its "left" and "right" as per the sequence in the logical ring. A station can only transmit data when it has the token.



1. Preamble - It is used for bit synchronization. It is 1-byte field.

2. Start Delimiter - These bits marks the beginning of the frame. It is 1-byte field.

3. Frame Control - This field specifies the type of frame - data frame and control frames. It is 1-byte field.

4. Destination Address - This field contains the destination address. It is 2-6 byte field.



5. Source Address - This field contains the source address. It is 2-6 byte field.
6. Data - If 2-byte addresses are used to detect then the field may be up to 8182 bytes and 8174 bytes in case of 6-byte address.
7. Checksum - This field contains the checksum bits which are used to detect errors in the transmitted data. It is 4 bytes field.
8. End Delimiter - This field marks the end of a frame. It is 1-byte field.

4) What are the responsibility of data link layers?

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- ① The primary responsibility of data link layer is to provide services to the network layer. The principle services is transferring data from the network layer on the source machine to the network layer on the destination machine.
  - ② The two data link layer communicates with each other by data link control protocol.
  - ③ Follow are important services provided by data link layer to the network.
    - i) Unacknowledged connectionless service.
    - ii) Acknowledged connectionless Service.
    - iii) Acknowledged connection-oriented service.



5) Mention the types of errors. Define physical addressing.

→ Two general types of errors can occur:

- i) Single bit error
- ii) Burst error.

i) Single Bit Error:-

It means that only 1 bit of a given data unit is changed from 1 to 0 or from 0 to 1.

ii) Burst Error:-

The term burst error means that 2 or more bits in the data unit have changed from 1 to 0 or from 0 to 1.

Physical Addressing-

In networking physical address refers to a computer's MAC address, which is a unique identifier associated with a network adaptor that is used for identifying a computer in a network.

6) What is redundancy? List out the available detection methods.

→ Redundancy is a form of error detection where each data unit is set multiple times, i.e. twice. At the receiver side, the two units are compared and if they are same it is assumed that no transmission errors have occurred.

Redundancy is a character redundancy and message redundancy. When the data unit is a single character it is called character redundancy. When the data is entire message, it is called message redundancy.



## Detection Methods-

- i) Single Parity Check.
- ii) Two-dimensional Parity Check.
- iii) Checksum
- iv) Cyclic redundancy check.