



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35



DEPARTMENT OF INFORMATION TECHNOLOGY

19CSB302- COMPUTER NETWORKS

III YEAR V SEM

UNIT 2 – DATA LINK LAYER AND MEDIA ACCESS

TOPIC – LINK LAYER SERVICES,FRAMING

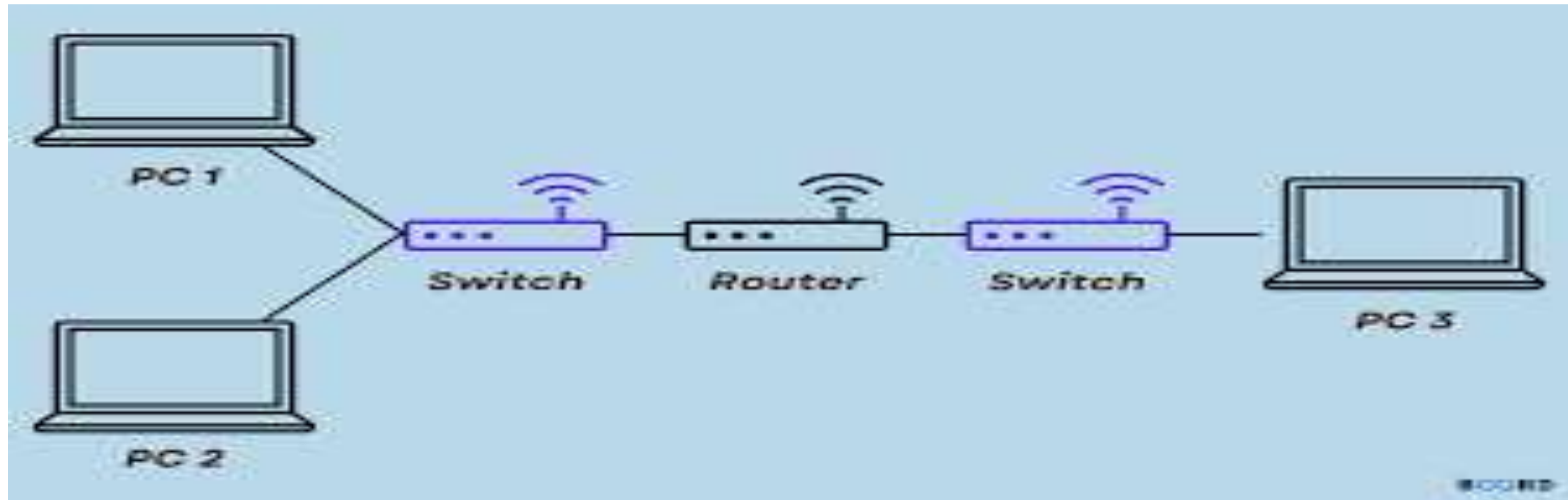


DATA LINK LAYER

Communication-Node to Node

End host,routers-Nodes

Networks in between-Links





SERVICES



- Receives service from physical layer
- Provide service to Network layer
- Responsible for node-to-node data transfer and error detection/correction.
- It packages data/datagram(self contained independent unit) into frames and handles MAC (Media Access Control) addresses.
- Framing
- Flow Control
- Error Control
- Congestion Control



Framing

- Packet at data link layer-frame

Types of Framing

- 1.Fixed Size-Asynchronous Transfer Mode,ATM high speed used in WAN,LAN over optical fiber and operates upto gigabit speed.
- 2.Variable Size

Two Types of Approach

1. Byte oriented
2. Bit Oriented



Byte Oriented Approach

- Also known as Character Oriented Approach
- View each frame as collection of bytes
- Two Types of Approach

Sentinel based approach

Byte Counting Approach

BISYNC

DDCMP

PPP



SENTINEL BASED APPROACH

- **Sentinel**-Guarding kind of Behaviour
- Sentinel characters to indicate frame starting and ending



BISYNC-Binary Synchronous Communication

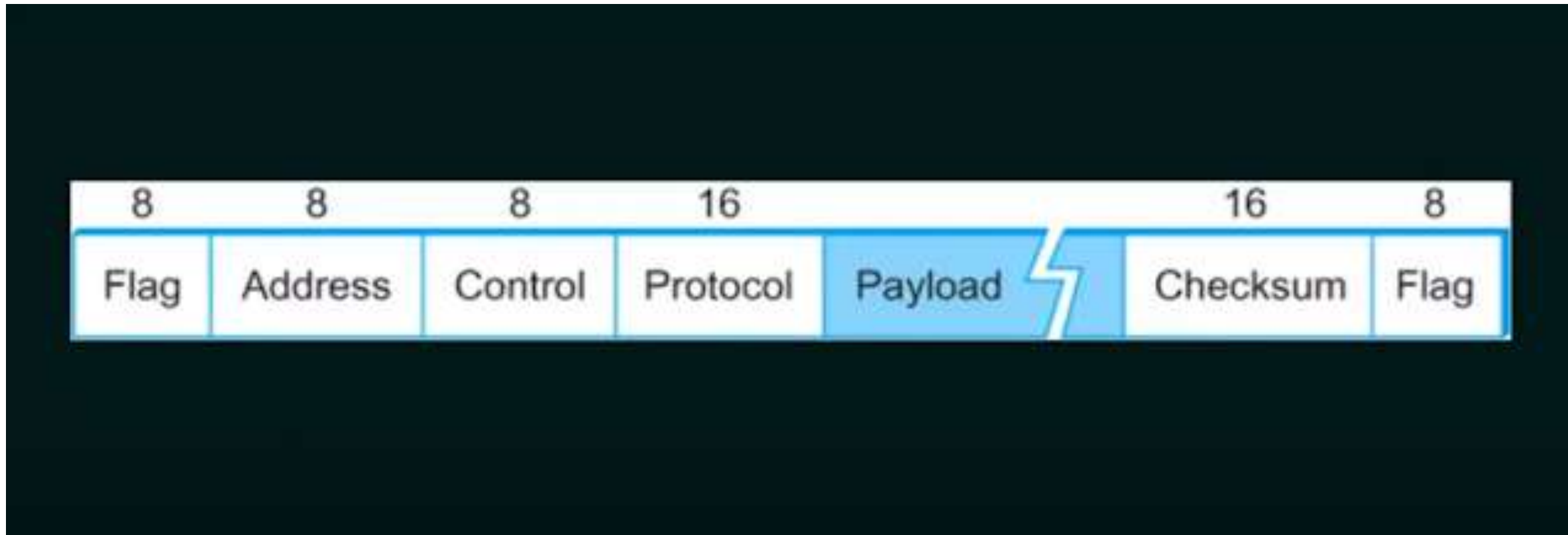




- ETX character might appear in data portion of the frame
- Escapes the ETX character by preceding it with a DLE(data link escape) character.
- **Character Stuffing**-Extra character (one extra byte)
- CRC(Cyclic Redundancy Check)-Detect Transmission Errors
- Additional Header Fields-Link Level Reliable Delivery Algorithm



PPP(Point -to Point) Protocol





- Similar to BISYNC
- Uses Sentinels and Character Stuffing
- WAN Protocol-run over internet links
- Special start of text character denoted by flag field-01111110
- Address and Control fields are fixed.
- 1111111 in case of broadcast and 11000000



- Checksum-Internet Checksum -Error Detection
- 2 bytes default or 4 bytes
- Protocol-Define the type of data contained in payload field
- Protocol-Demultiplexing,identifies high-level protocol such as IP or IPX(IP like protocol developed by Novell)
- Negotiation conducted by Protocol called(LCP)-Link Control Protocol
- PPP and LCP work in tandem
 - LCP sends control messages encapsulated in PPP frames
 - LCP establishes communication between two peers if communication is possible.
 - Such Messages denoted by LCP identifier in PPP Protocol field
 - Turns around and changes PPP's frame format based on Information contained in Control Messages

PPP used in broadband communications having heavy loads and high speeds

Used to transmit multiprotocol data between two directly connected (point to point) computers.



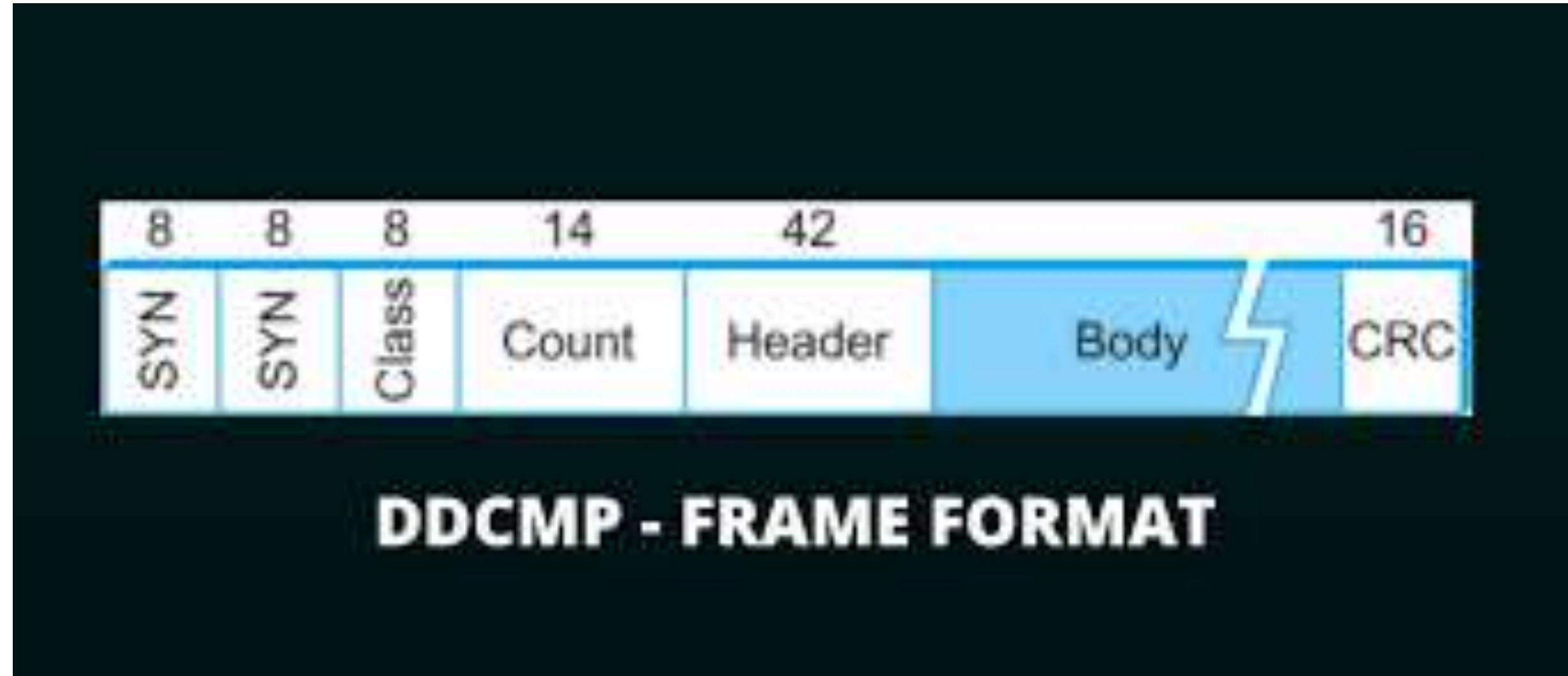
BYTE-COUNTING APPROACH

- Include the number of items in the file at the beginning of the file instead of adding a sentinel value
- No. of bytes contained in a frame can be included as a field in the frame header
- DDCMP



DDCMP

- Digital Data Communication Message Protocol(DDCMP) used in Digital Equipment Corporation's DECNET





- COUNT-How many bytes are contained in a frame's body
- Class is like protocol field in PPP
- Disadvantages
- Transmission error could corrupt count field-**Framing Error**
- Framing error causes back-to back frames to be incorrectly received



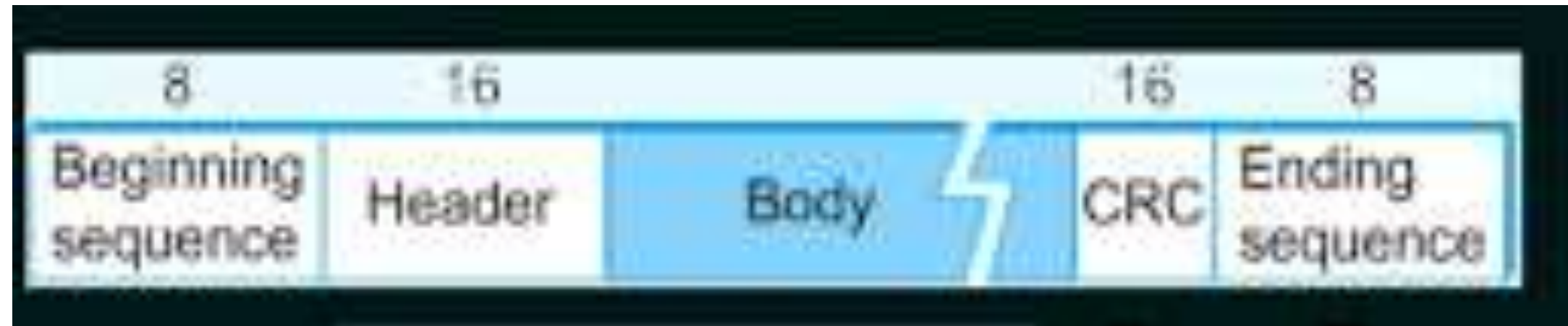
BIT ORIENTED PROTOCOLS



- HDLC-High Level Data Link Control
- Developed by IBM as SDLC(Synchronous)and Standardized by ISO as HDLC
- HDLC-Beginning and end of frame distinguished bit sequence -**01111110**
- Transmitted any times in ideal links to keep their frame synchronized
- Both Protocols use sentinel approach



- **Bit Stuffing**
- Five consecutive 1's from sending side ,insert a 0 before transmitting next bit
- Bit Stuffing and Character Stuffing-size of frame varies depending upon the data being send





REFERENCES



- <https://www.boardinfinity.com/blog/routing-table-in-computer-networks/>
- <https://www.thecode11.com/>



THANK YOU