Course Name: A Level (2nd Sem) Subject: DCN

Topic: HDLC Date: 09-04-20

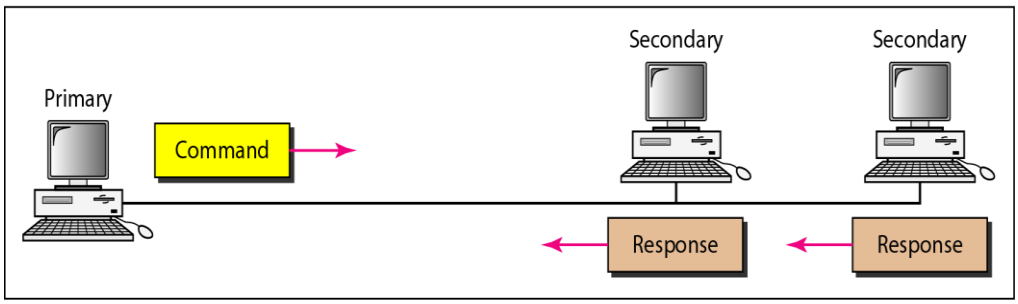
**High-level Data Link Control (HDLC)** is a **bit-oriented** protocol for communication over point-to-point and multipoint links that implements the ARQ mechanisms.

## Configurations and Transfer Modes:

HDLC provides two common transfer modes that can be used in different configurations: **Normal Response Mode (NRM)** and **Asynchronous Balanced Mode (ABM)**.

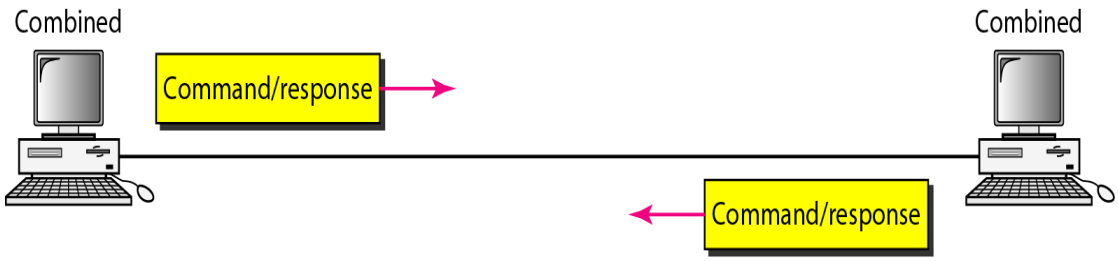
- **Normal Response Mode:** In normal response mode (NRM), the station configuration is unbalanced. We have one primary station and multiple secondary stations. A primary station can send commands; a secondary station can only respond. The NRM is used for both point-to-point and multiple-point links, as shown in Figure.


a. Point-to-point




b. Multipoint

- **Asynchronous Balanced Mode:** In asynchronous balanced mode (ABM), the configuration is balanced. The link is point-to-point, and each station can function as a primary and a secondary (acting as peers), as shown in Figure. This is the common mode today.



## HDLC Frames:

HDLC defines **three** types of frames:

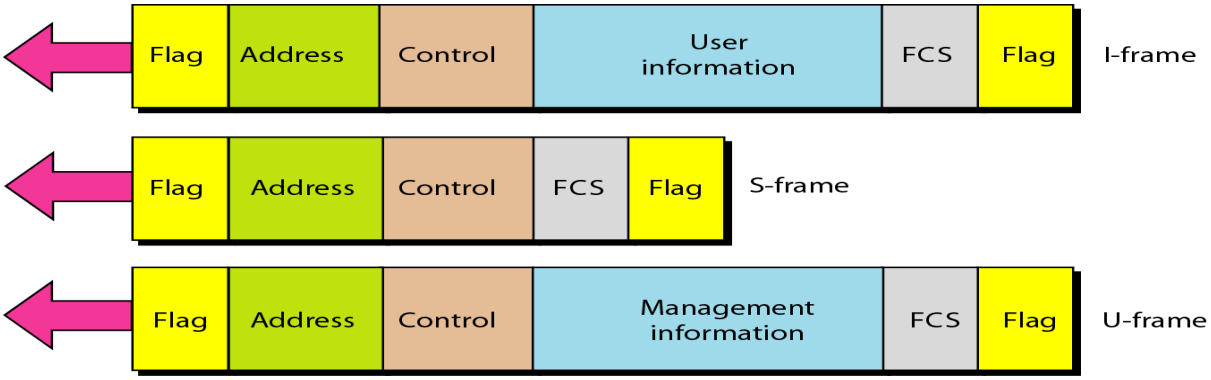
1) Information frames (I-frames)
2) Supervisory frames (S-frames)
3) Unnumbered frames (U-frames).

Each type of frame serves as an envelope for the transmission of a different type of message:

- **I-frames** are used to transport user data and control information relating to user data (piggybacking).
- **S-frames** are used only to transport control information.
- **U-frames** are reserved for system management. Information carried by U-frames is intended for managing the link itself.

## Frame Format:

Each frame in HDLC may contain up to six fields, as shown in figure:




## Fields:

- **Flag field**: The flag field of an HDLC frame is an 8-bit sequence with the bit pattern 01111110 that identifies both the beginning and the end of a frame and serves as a synchronization pattern for the receiver.
- **Address field**: The second field of an HDLC frame contains the address of the secondary station. If a primary station created the frame, it contains a 'to' address. If a secondary creates the frame, it contains a 'from' address. An address field can be 1 byte or several bytes long, depending on the needs of the network. One byte can identify up to 128 stations. Larger networks require multiple-byte address fields. If the address field is only 1 byte, the last bit is always a 1. If the address is more than 1 byte, all bytes but the last one will end with 0; only the last will end with 1. Ending

each intermediate byte with 0 indicates to the receiver that there are more address bytes to come.

- **Control field**: The control field is a 1- or 2-byte segment of the frame used for flow and error control. The interpretation of bits in this field depends on the frame type.
- **Information field**: The information field contains the user's data from the network layer or management information. Its length can vary from one network to another.
- **FCS field**: The frame check sequence (FCS) is the HDLC error detection field. It can contain either a 2- or 4-byte ITU-T CRC.

## Exercises:

A. **What is HDLC? What do you understand by NRM and ABM?**

B. **What are the three types of frames in HDLC? Define them.**