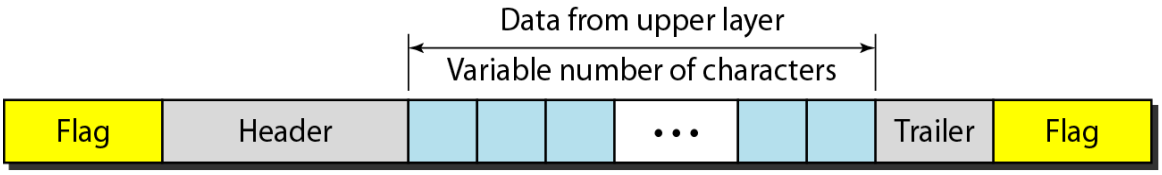
Course Name: A Level (2nd Sem) Subject: DCN

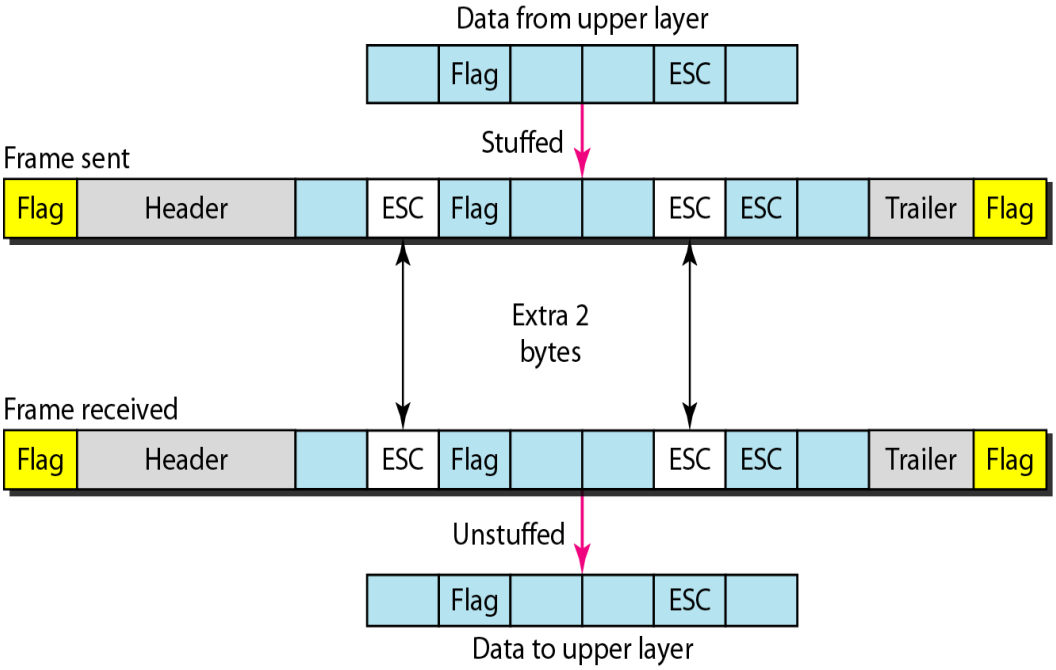
Topic: Character-Oriented Protocol Date: 30-03-20

Character-Oriented Protocol :

- In a character-oriented protocol, data to be carried are 8-bit characters from a coding system such as ASCII.
- The header, which normally carries the source and destination addresses and other control information, and the trailer, which carries error detection or error correction redundant bits, are also multiples of 8 bits.
- To separate one frame from the next, an 8-bit (1 byte) flag is added at the beginning and the end of a frame. The flag, composed of protocol dependent special characters, signals the start or end of a frame. Figure shows the format of a frame in a character-oriented protocol.



- Any pattern used for the flag could also be part of the information. If this happens, the receiver, when it encounters this pattern in the middle of the data, thinks it has reached the end of the frame.
- To fix this problem, a byte-stuffing (or character stuffing) strategy is added to character-oriented framing in which a special byte is added (stuffed) to the data section of the frame when there is a character with the same pattern as the flag.
- This special extra byte is usually called the escape character (ESC), which has a predefined bit pattern. Whenever the receiver encounters the ESC character, it removes it from the data section and treats the next character as data, not a delimiting flag.
- Byte stuffing by the escape character allows the presence of the flag in the data section of the frame, but it creates another problem that if the text contains one or more escape characters followed by a flag then the receiver removes the escape character, but keeps the flag, which is incorrectly interpreted as the end of the frame.
- To solve this problem, the escape characters that are part of the text must also be marked by another escape character. In other words, if the escape character is part of the text, an extra one is added to show that the second one is part of the text. Figure shows the situation.



Limitations of Character-Oriented Protocol:

- Character-oriented framing is suitable when only text exchanged by the data link layers. It is not useful for sending other types of information such as graphs, images audio, and video or other multimedia data.
- Character-oriented protocols present another problem in data communications. The universal coding systems in use today, such as Unicode, have 16-bit and 32-bit characters that conflict with 8-bit characters.
  Thus, we can say that in general, the tendency is moving toward the bit-oriented protocols.

Exercises:

A. **Define Character-Oriented Protocol. How byte stuffing strategy is used in Character-Oriented Protocol?**

B. **Which type of data can be sent by character oriented protocol and why?**