

Data Link Protocols

- **Asynchronous Protocols**
- **Synchronous Protocols**
- **Character-Oriented Protocols**
- **Bit-Oriented Protocols**

Figure 11-1

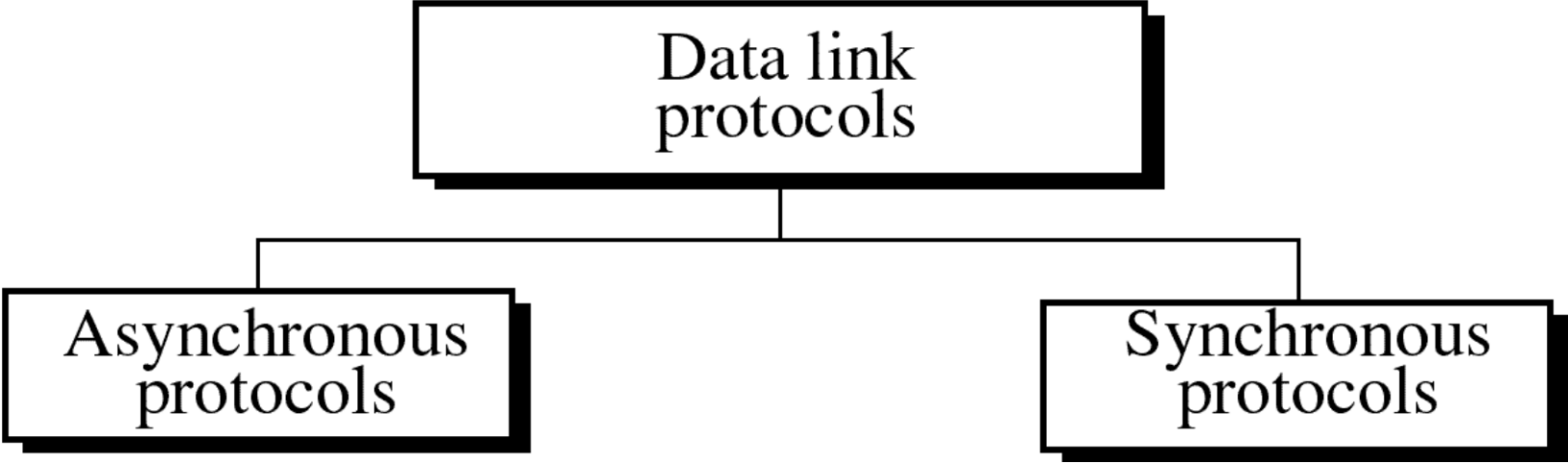


Figure 11-2

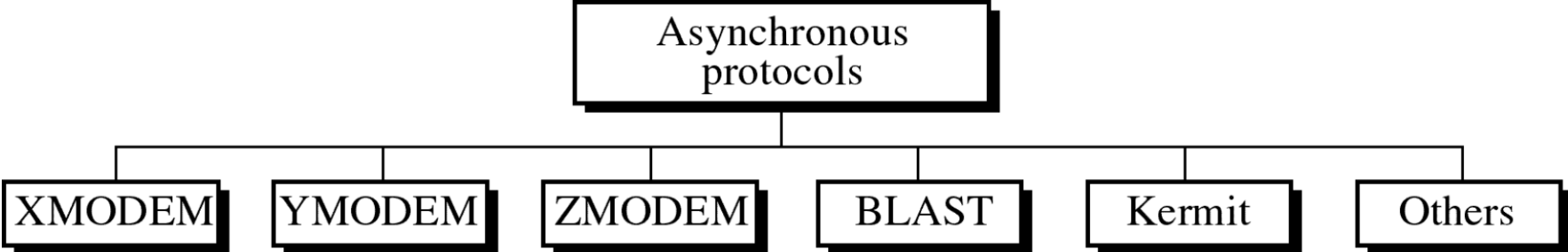


Figure 11-3

XMODEM

Each character contains start and stop bits (dark portion of the box). Characters are separated from each other by gaps. The header consists of two bytes: sequence number and its one's complement.

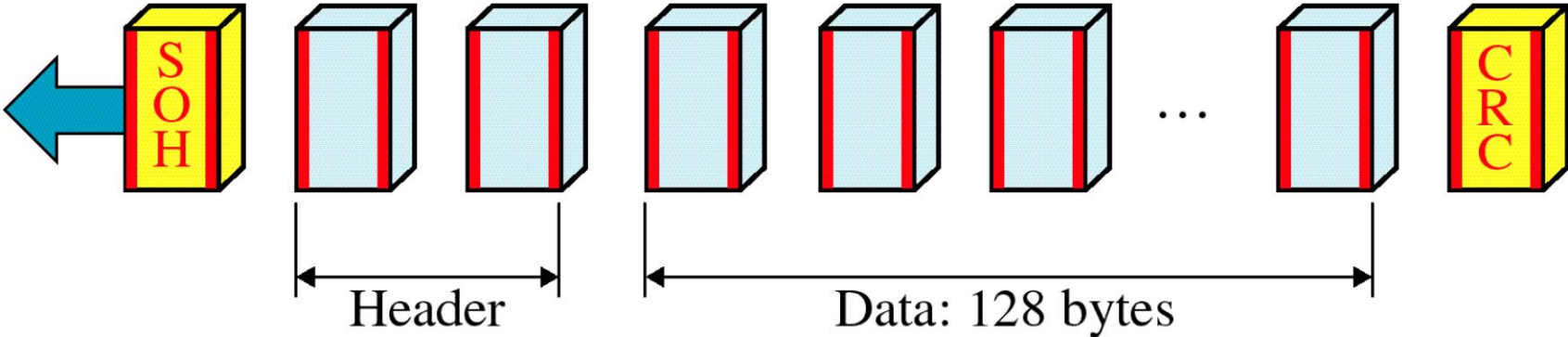


Figure 11-4

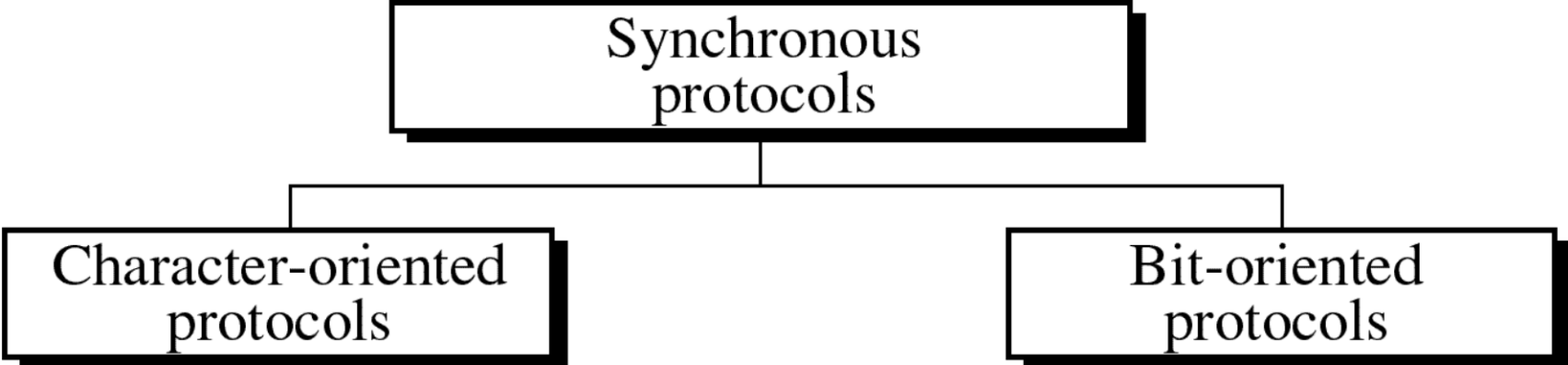


Figure 11-5

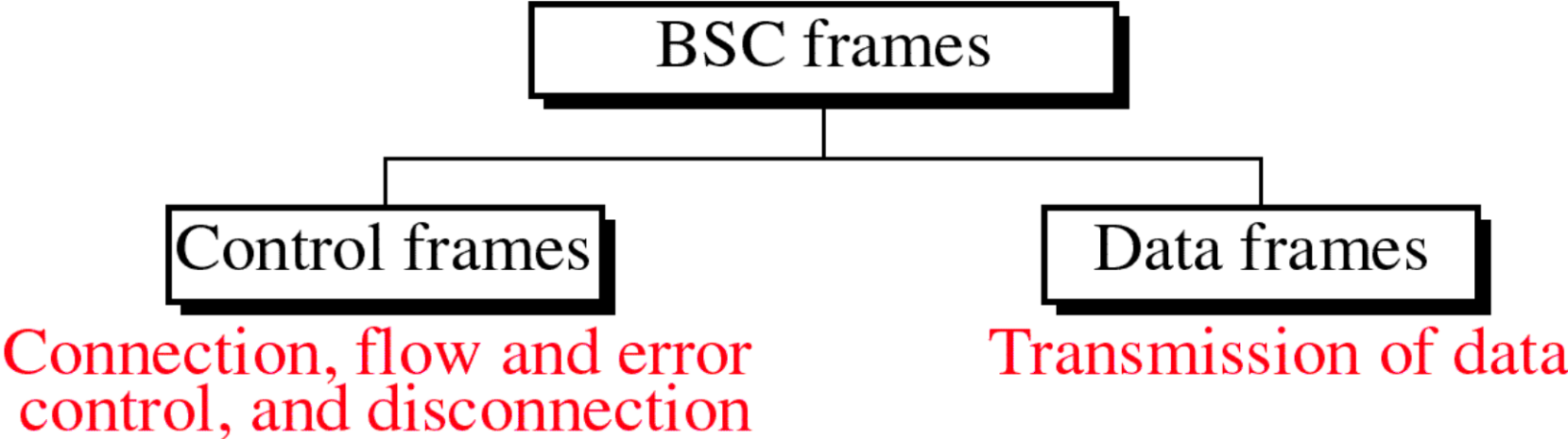


Figure 11-6

Simple Frame

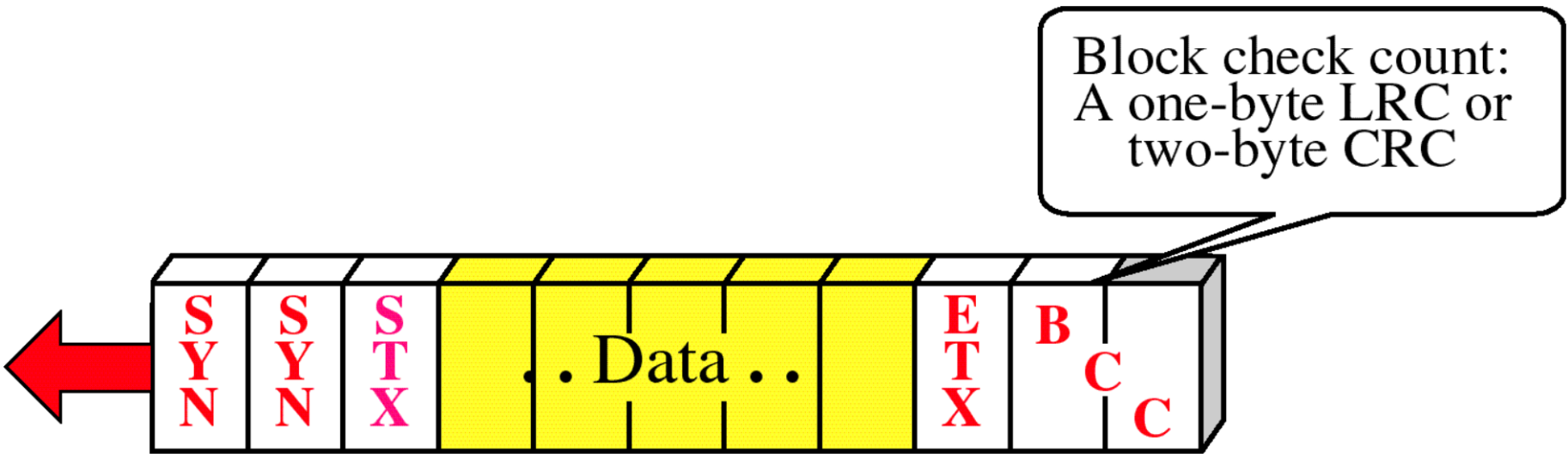


Figure 11-7

A Frame with Header

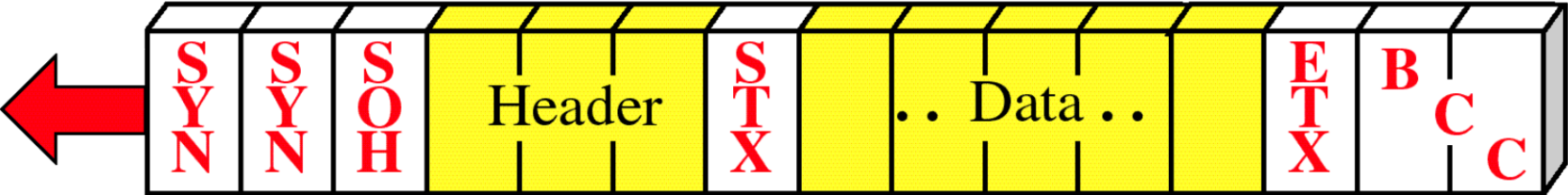


Figure 11-8

Multiblock Frame

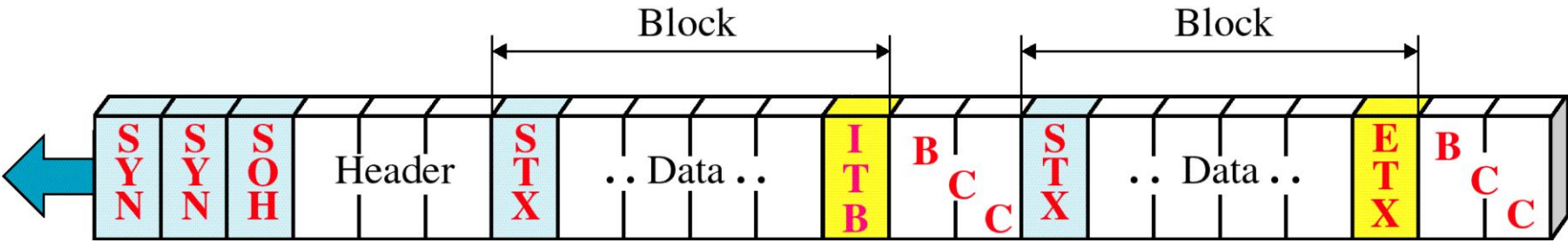


Figure 11-9

Multiframe Transmission

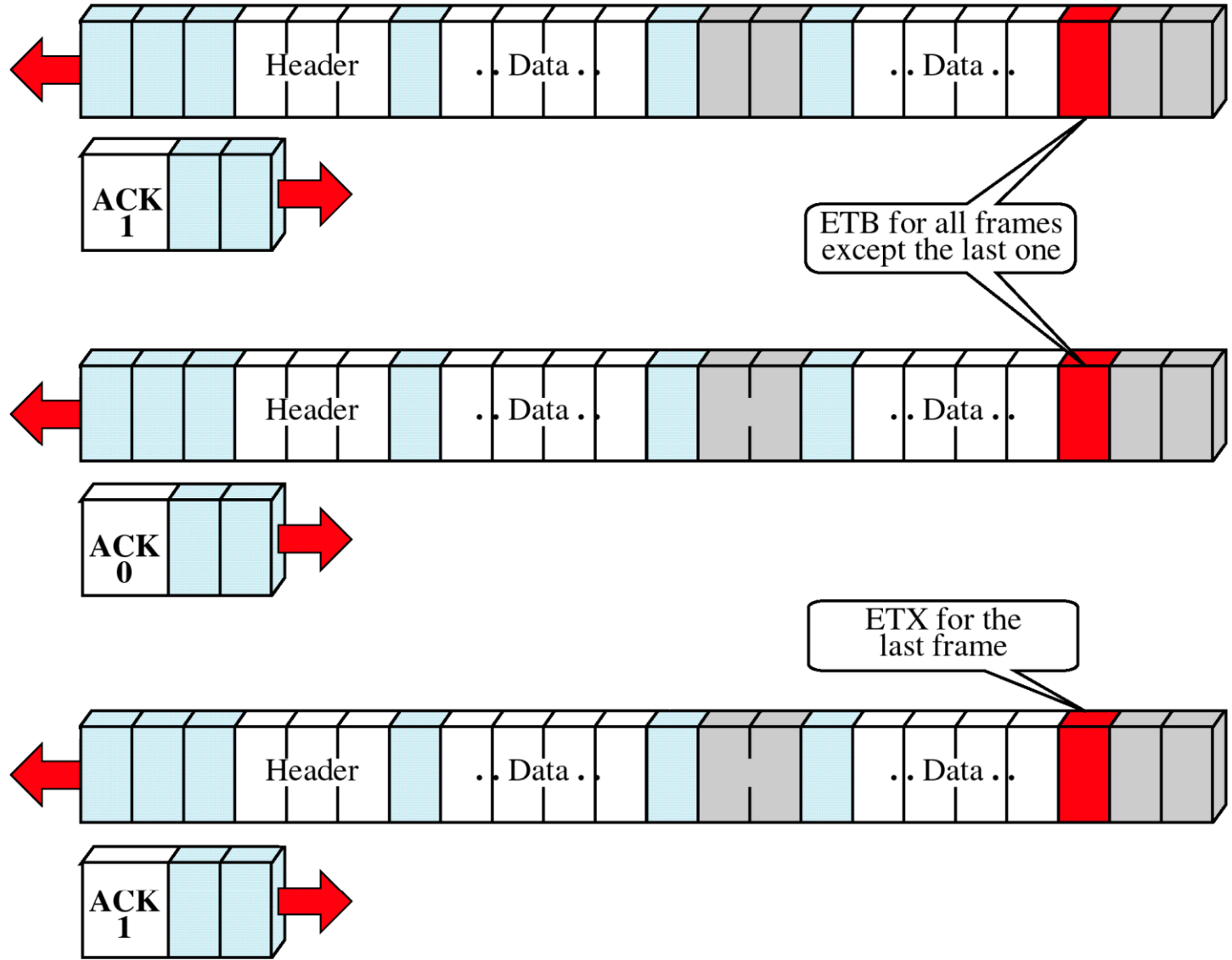


Figure 11-10

Control Frame

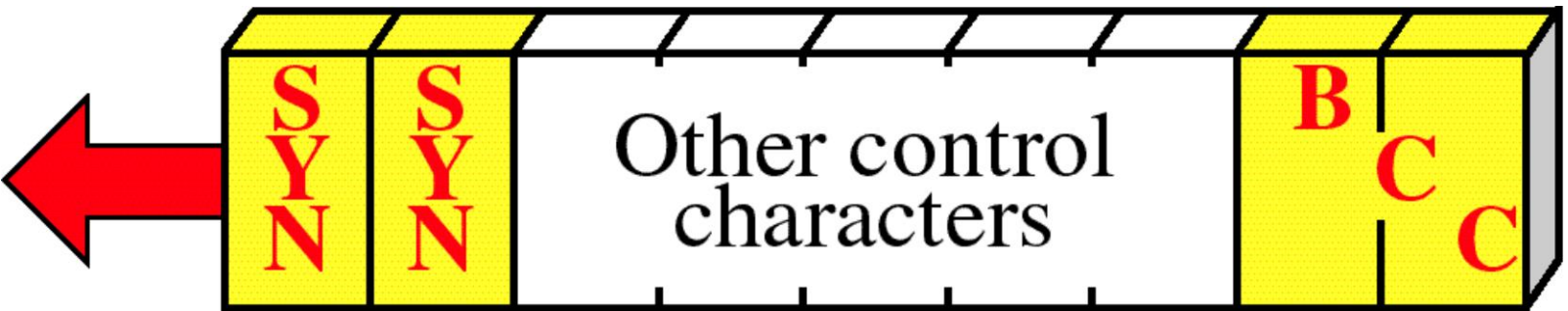
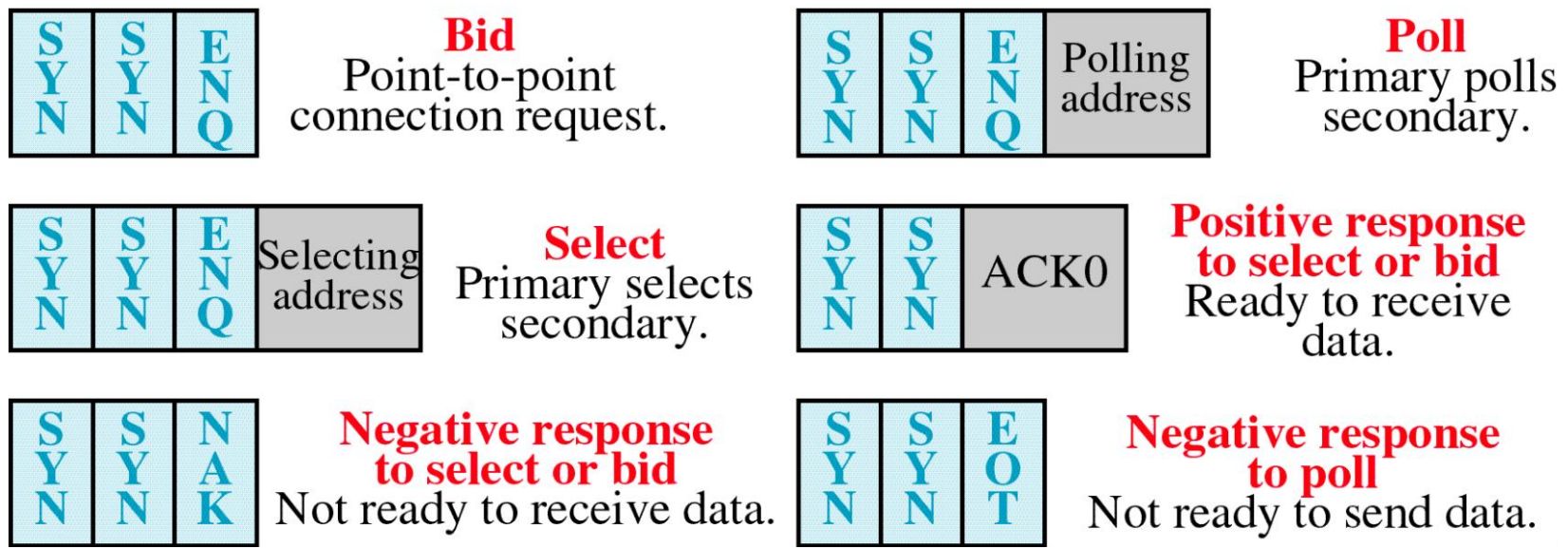


Figure 11-11

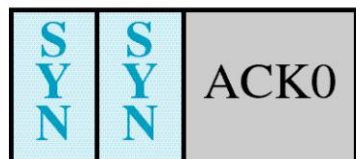
Control Frames

Connection establishment



Control Frames

Flow and error control



Positive ACK of even frames
 Frame number 0 received.



Positive ACK of odd frames
 Frame number 1 received.



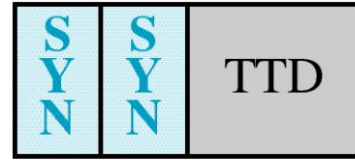
Negative ACK of frames
 Error in the frame received.



Wait & ACK
 ACK of previous frame, not ready to receive more.



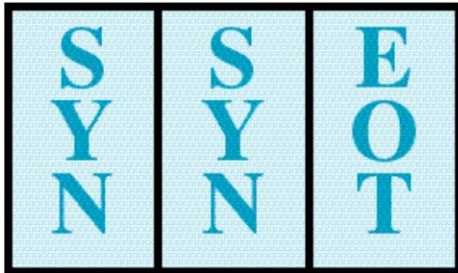
Reverse interrupt
 Request for interruption, urgent data to send.



Temporary delay
 Temporarily delayed but does not relinquish the line.

Control Frames

Connection termination

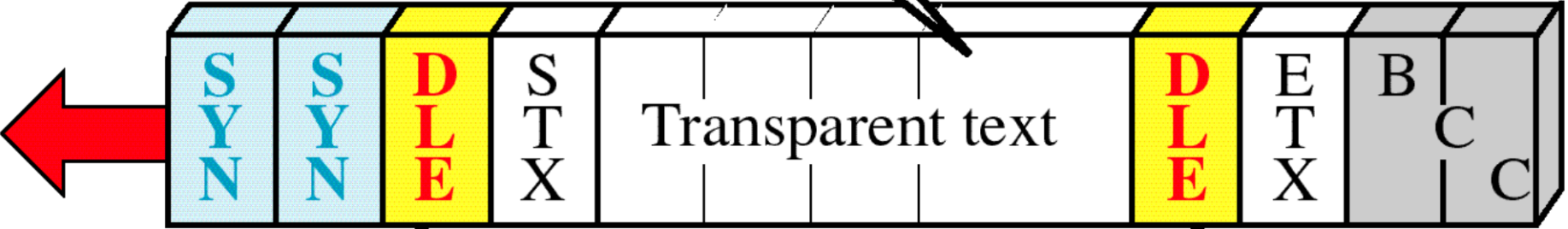


End of transmission
Station finished sending data.

Figure 11-12

Byte Stuffing

Control characters can be used as text in this region.



The DLEs start and end the transparent text.