

Data Link Protocols

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

Figure 11-1

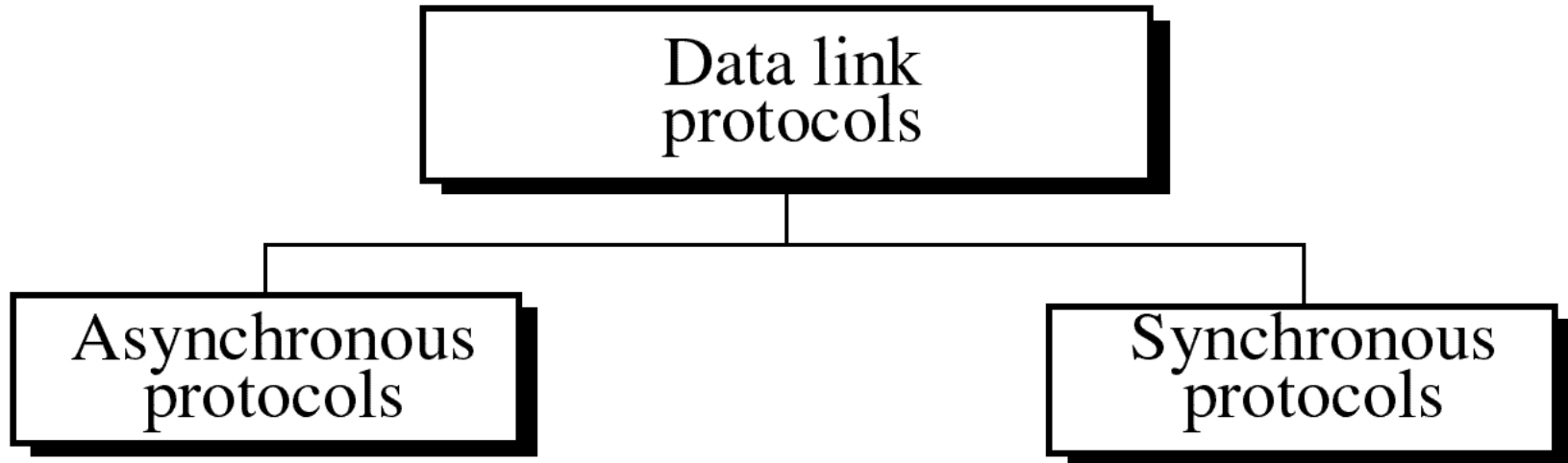


Figure 11-2

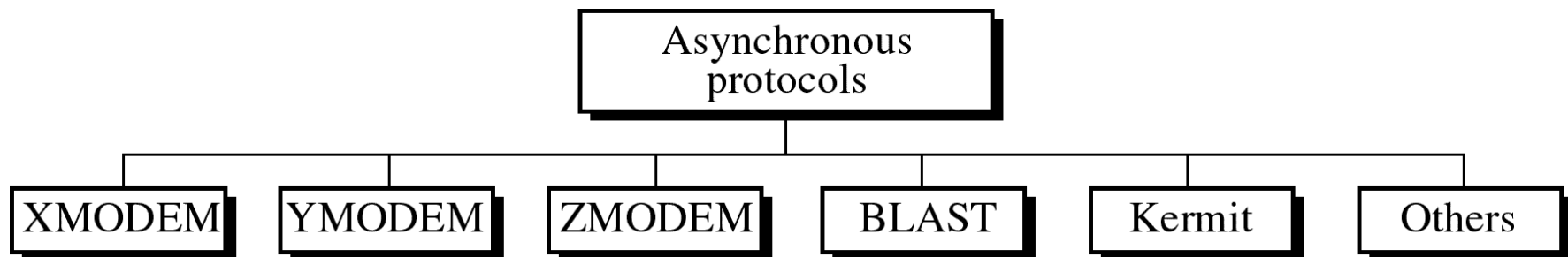


Figure 11-3

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.

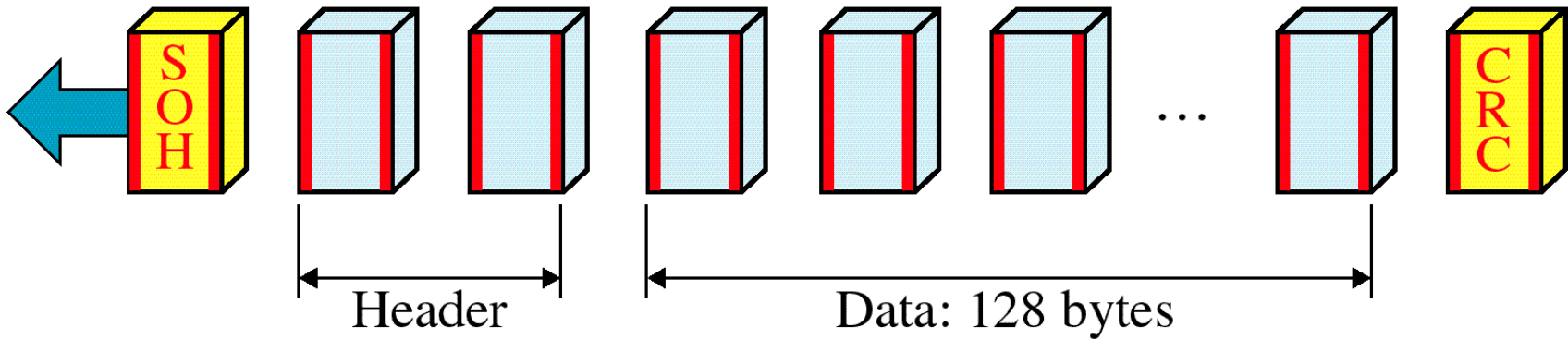


Figure 11-4

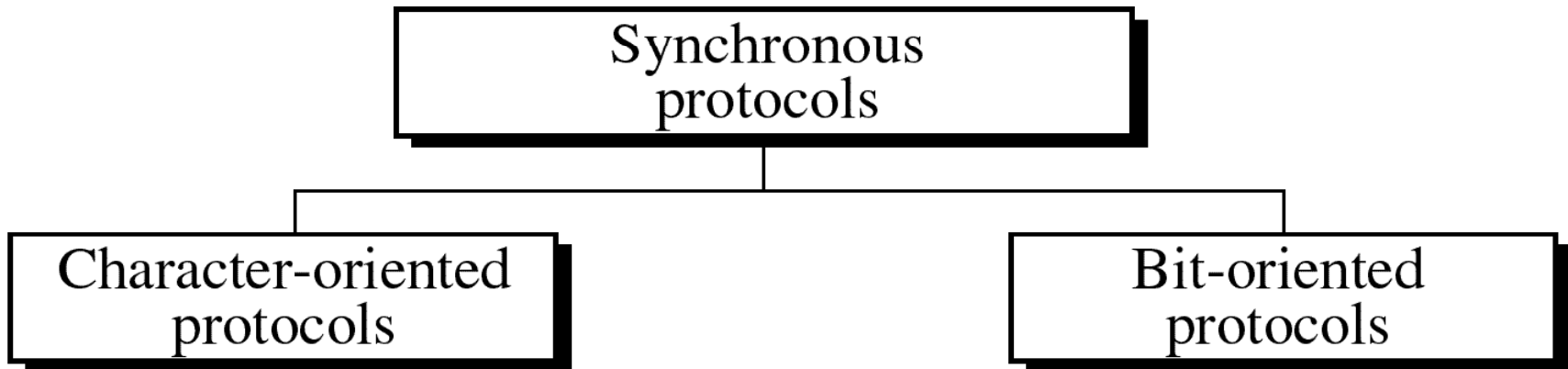


Figure 11-5

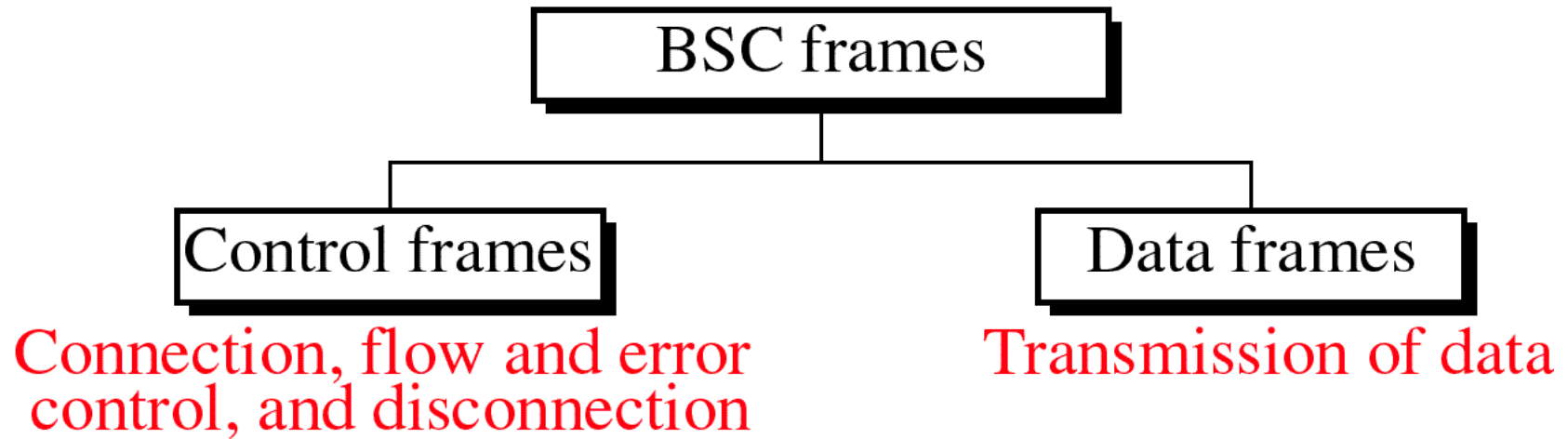


Figure 11-6

Simple Frame

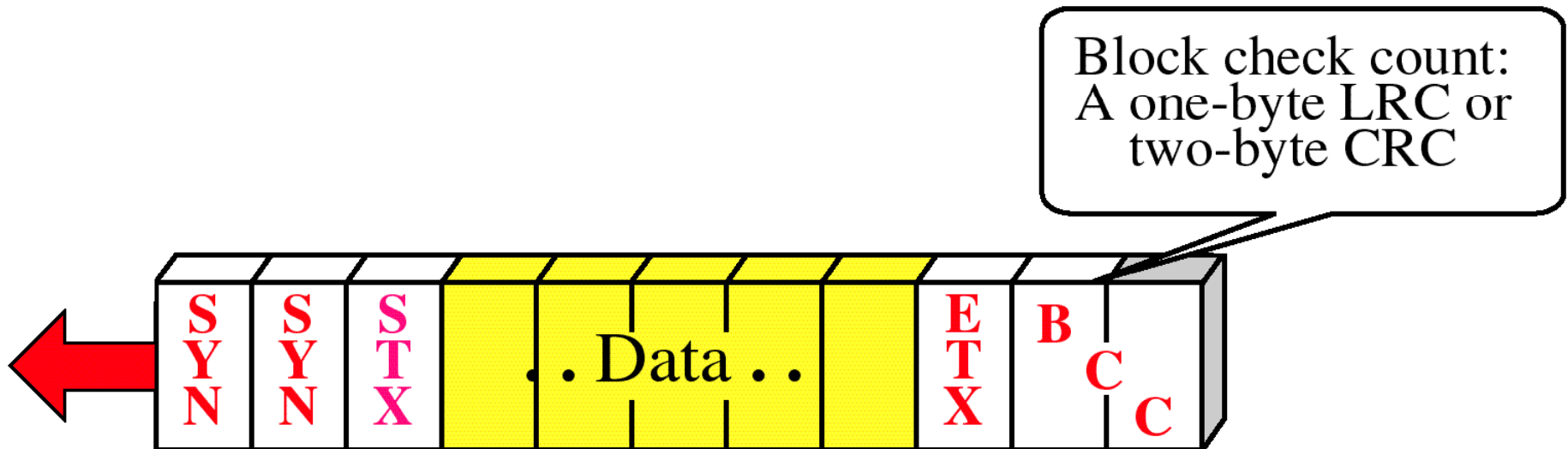


Figure 11-7

A Frame with Header

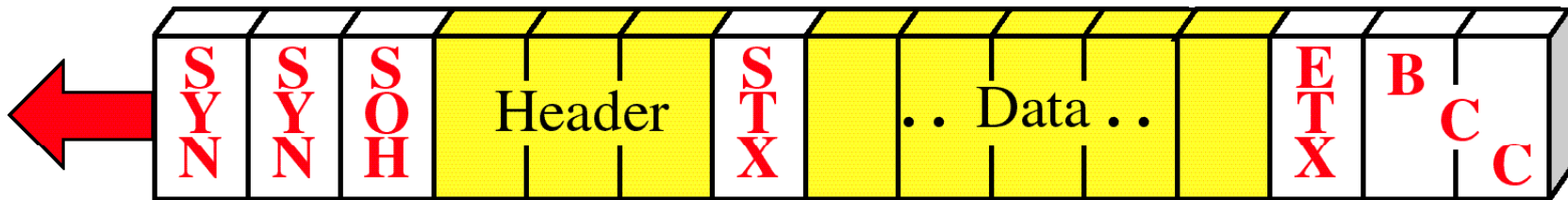


Figure 11-8

Multiblock Frame

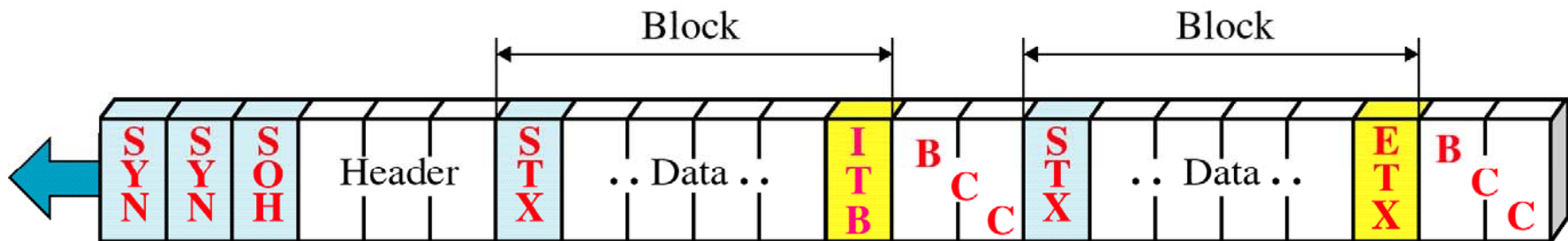


Figure 11-9

Multiframe Transmission

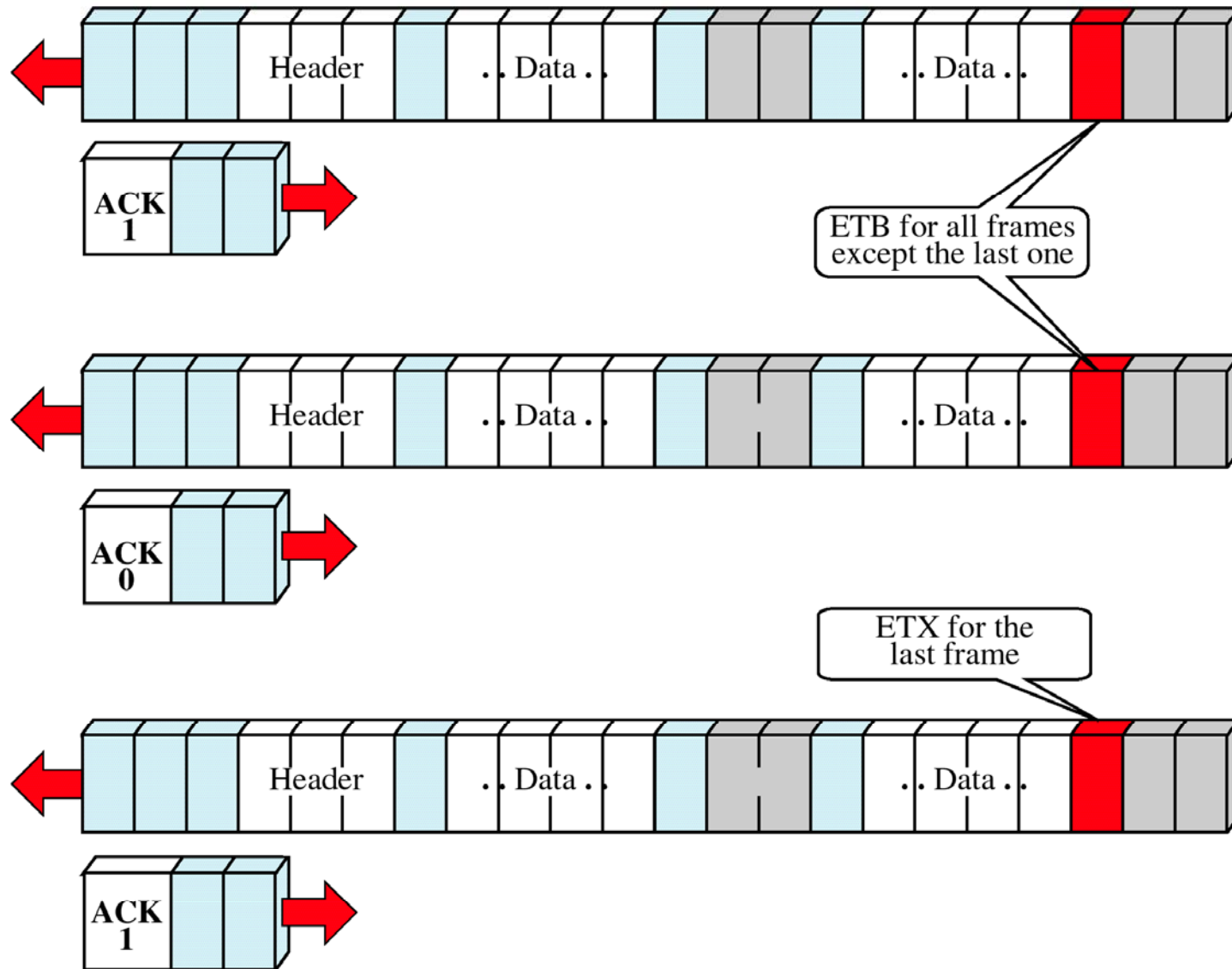


Figure 11-10

Control Frame

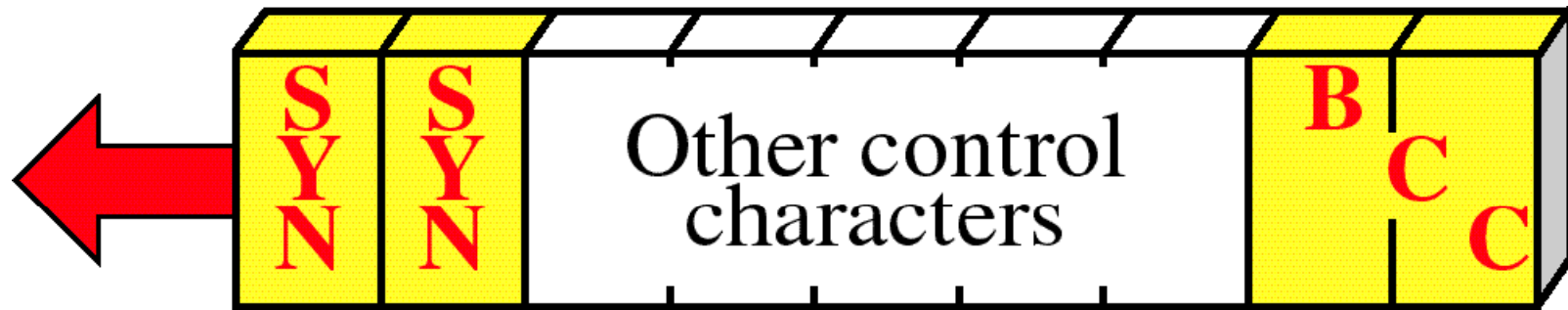
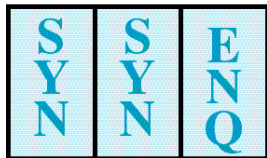


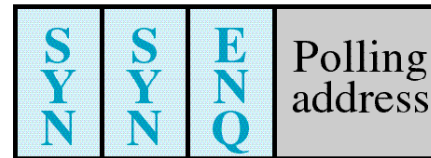
Figure 11-11

Control Frames

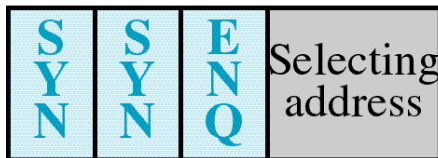
Connection establishment



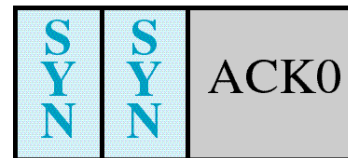
Bid
Point-to-point
connection request.



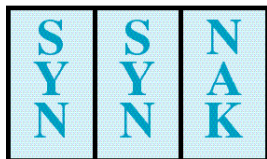
Poll
Primary polls
secondary.



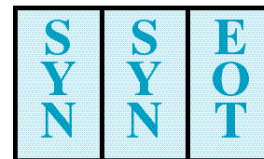
Select
Primary selects
secondary.



**Positive response
to select or bid**
Ready to receive
data.



**Negative response
to select or bid**
Not ready to receive data.



**Negative response
to poll**
Not ready to send data.

Figure 11-11-continued

Control Frames

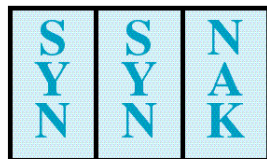
Flow and error control



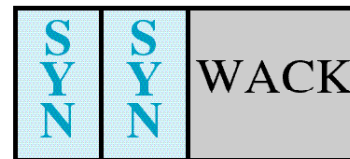
**Positive ACK
of even frames**
Frame number
0 received.



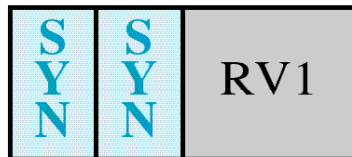
**Positive ACK
of odd frames**
Frame number
1 received.



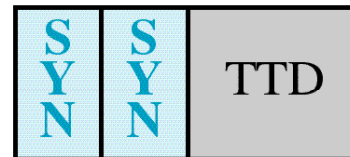
**Negative ACK
of frames**
Error in the
frame received.



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



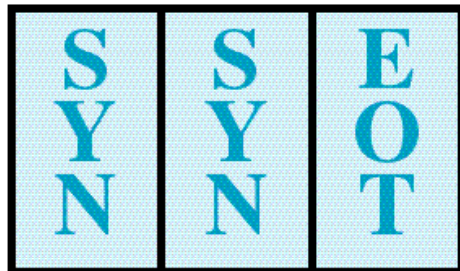
Reverse interrupt
Request for
interruption,
urgent data to send.



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

