Data Link Protocols

- **Asynchronous Protocols**

- **Synchronous Protocols**

- **Character-Oriented Protocols**

- **Bit-Oriented Protocols**

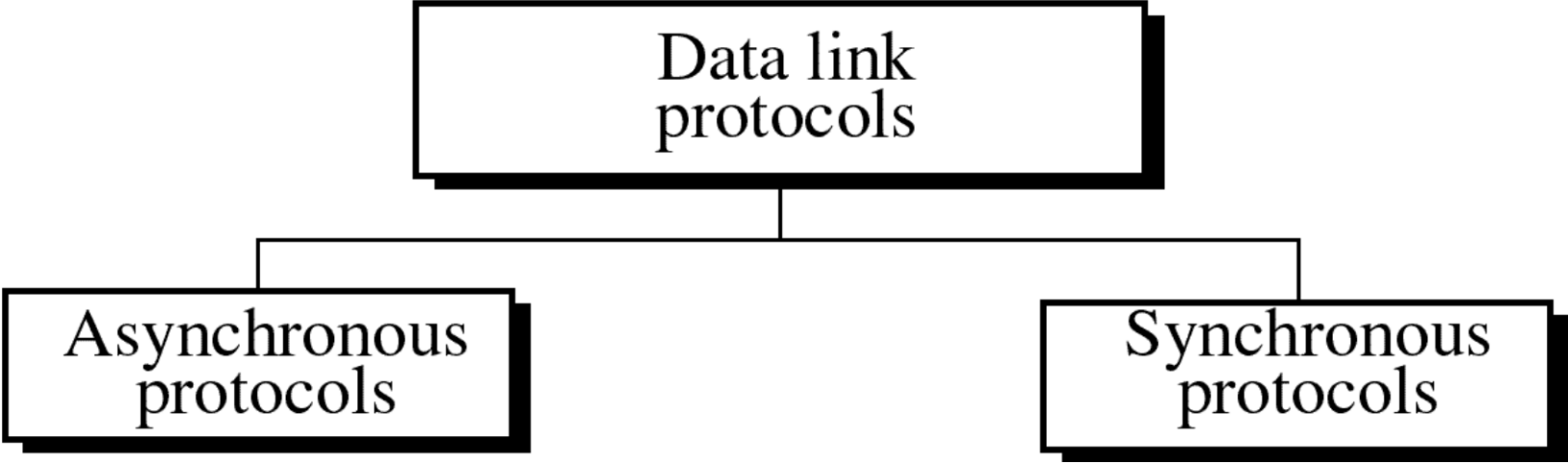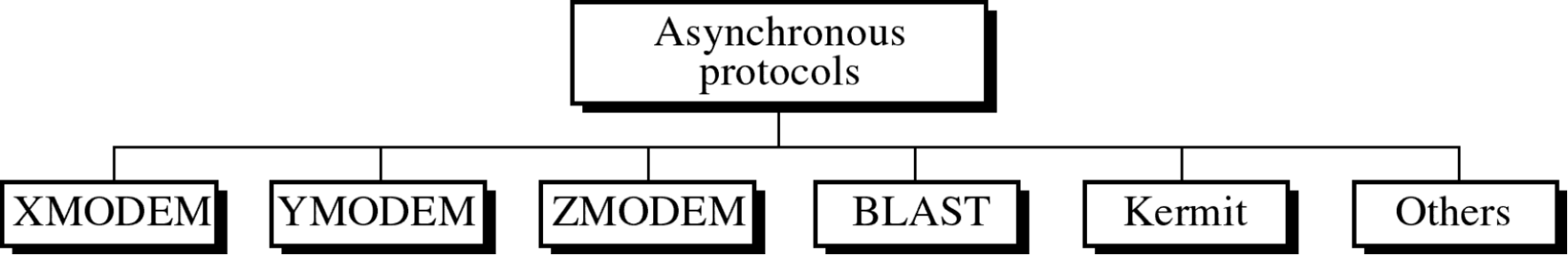Figure 11-1

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.
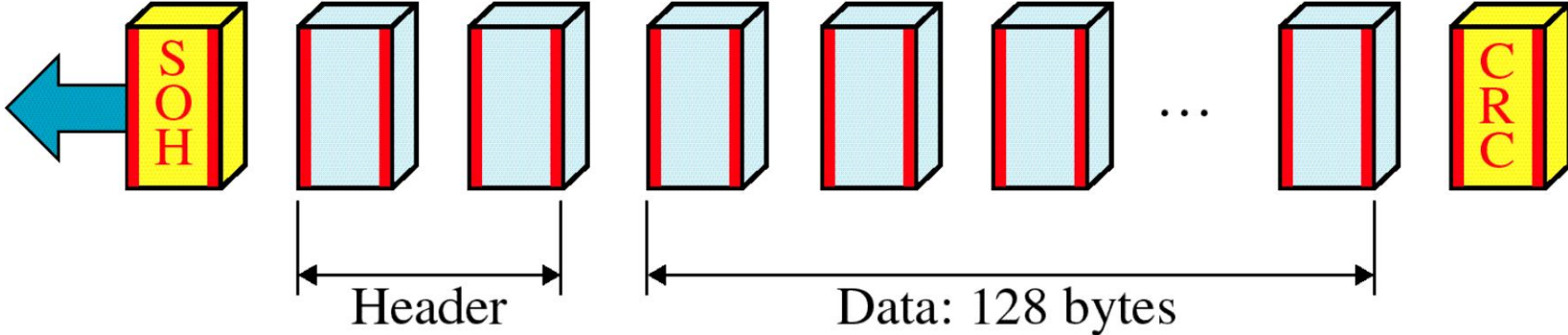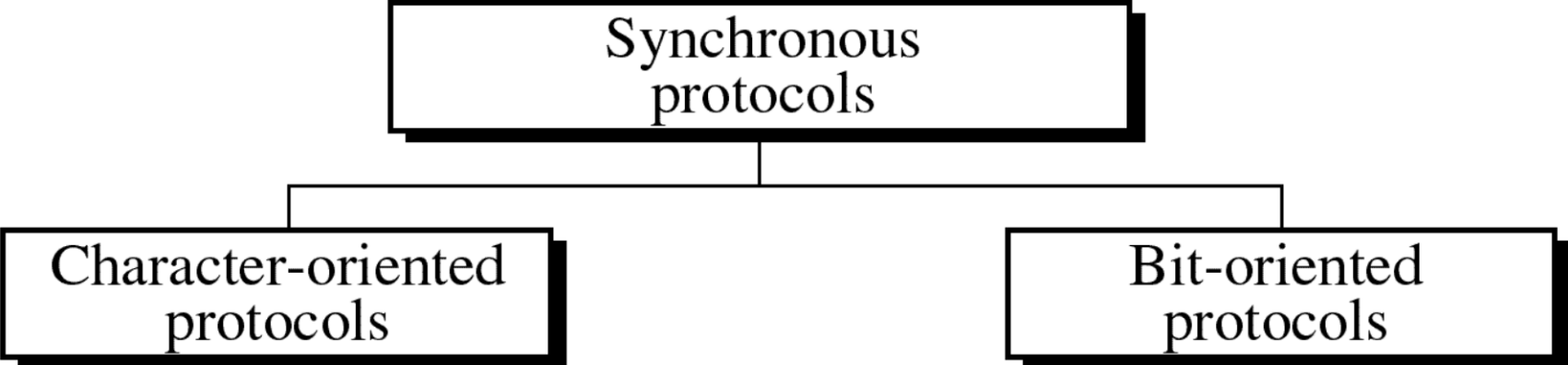
SOH

...

CRC

Header
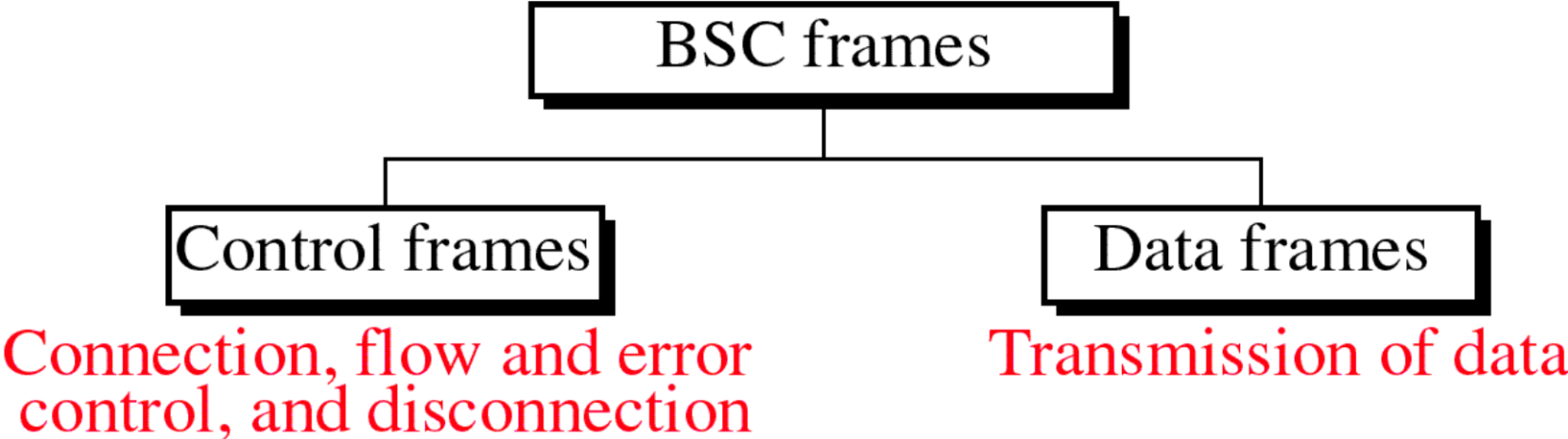
Data: 128 bytes

Figure 11-4

Figure 11-5

Figure 11-6

Simple Frame

Block check count:
A one-byte LRC or
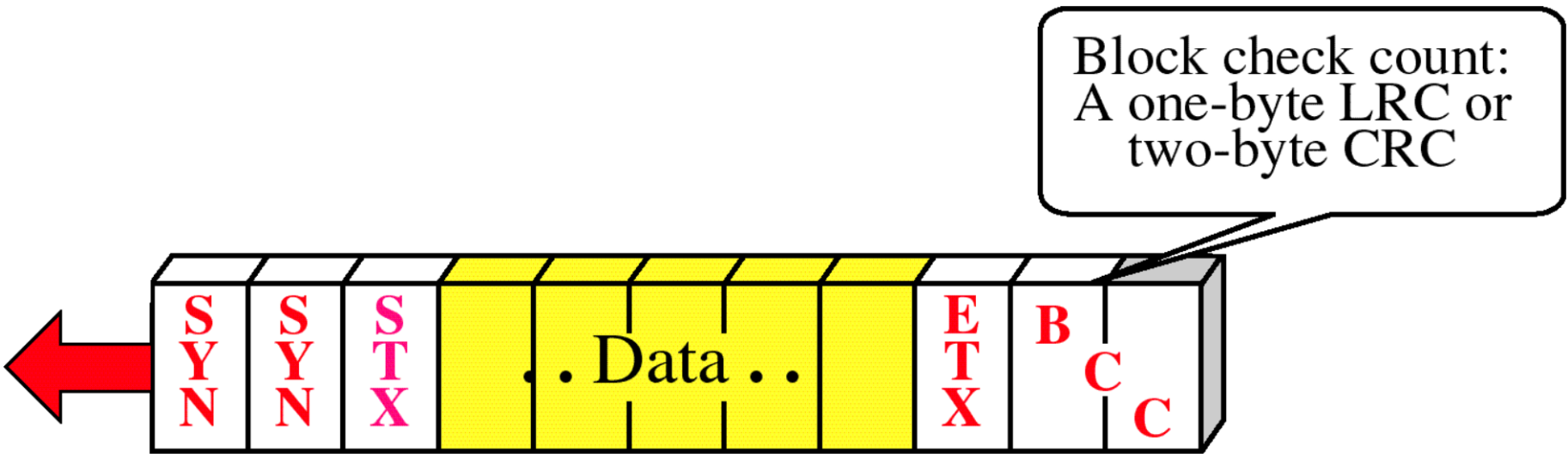two-byte CRC

SYN SYN STX ...Data... ETX BCC

Figure 11-7

A Frame with Header
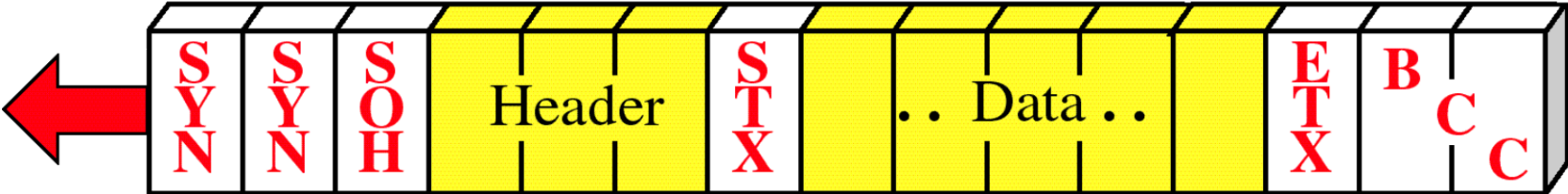
Figure 11-8

Multiblock Frame
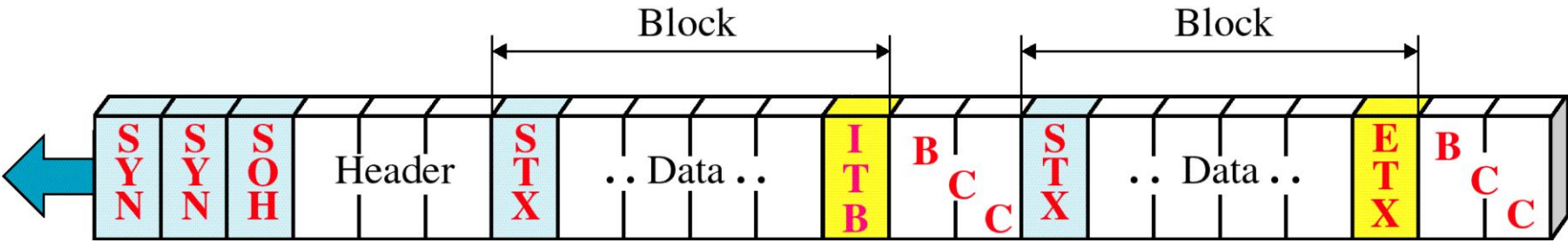
Figure 11-9

Multiframe Transmission

Header .. Data .. .. Data ..

ACK 1

ETB for all frames
except the last one

Header .. Data .. .. Data ..
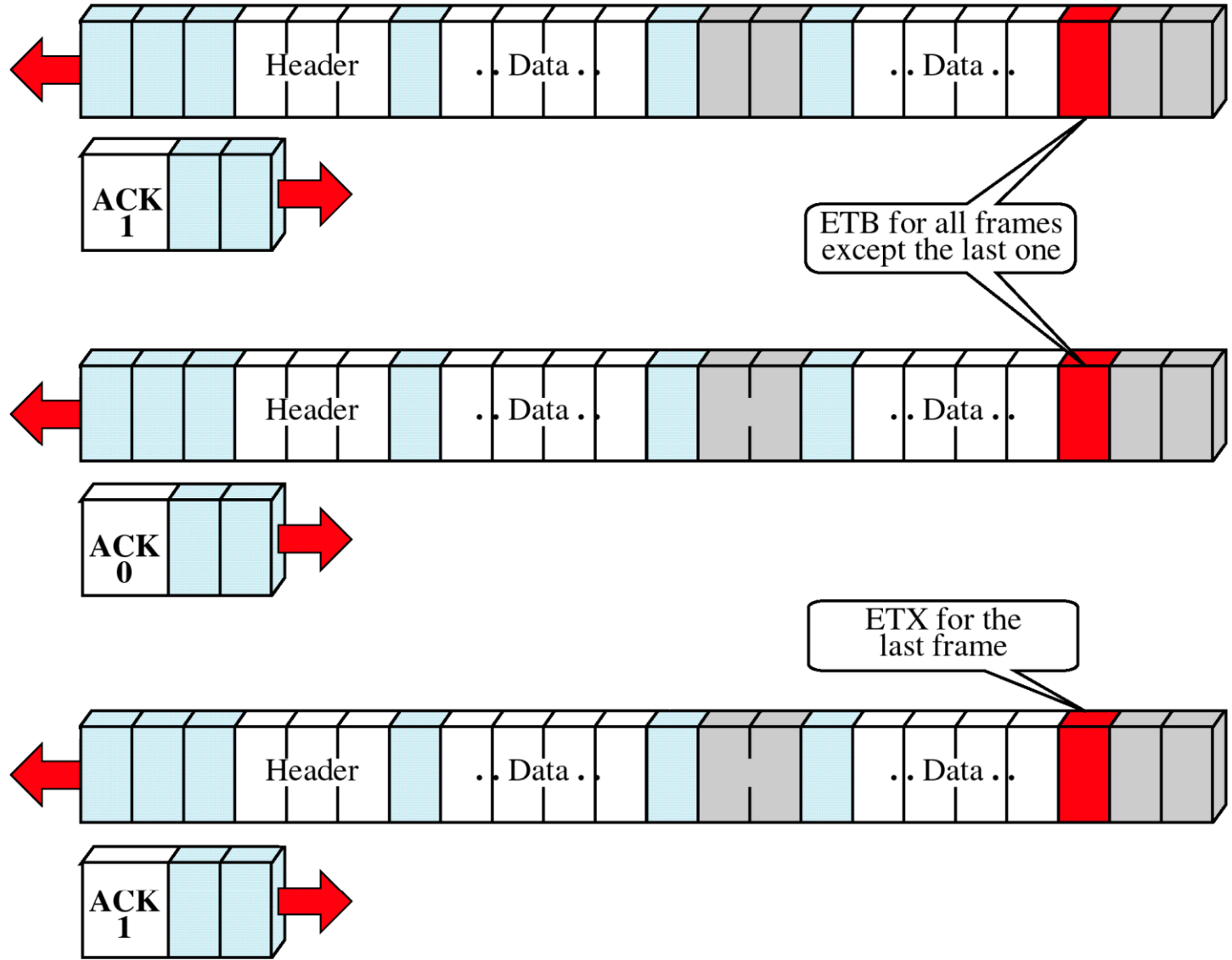
ACK 0

ETX for the
last frame

Header .. Data .. .. Data ..

ACK 1

Figure 11-10

Control Frame
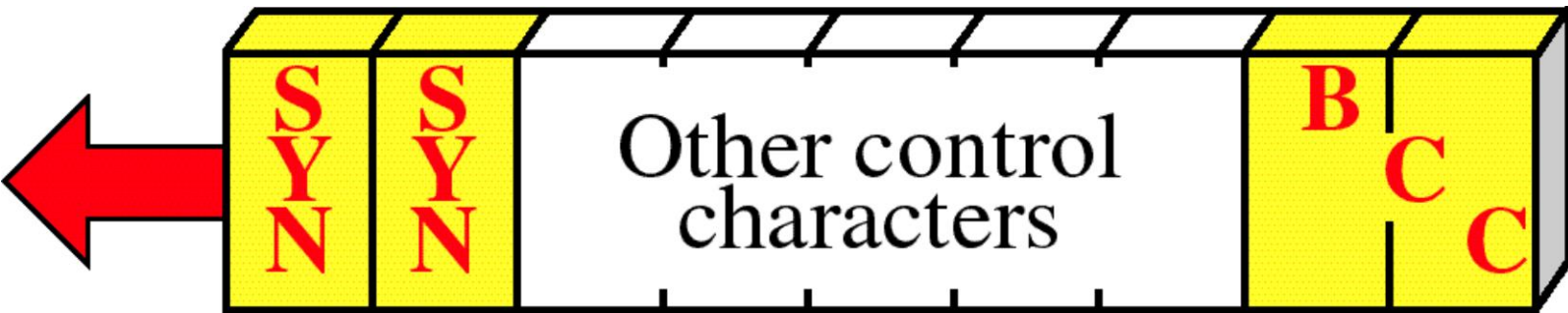
Figure 11-11

Control Frames

Connection establishment
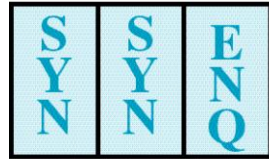
			Bid Point-to-point connection request.
S Y N	S Y N	E N Q	
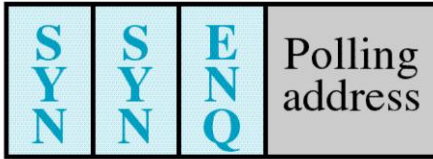
				Poll Primary polls secondary.
S Y N	S Y N	E N Q	Polling address	

				Select Primary selects secondary.
S Y N	S Y N	E N Q	Selecting address	

			Positive response to select or bid Ready to receive data.
S Y N	S Y N	ACK0	

			Negative response to select or bid Not ready to receive data.
S Y N	S Y N	N A K	

			Negative response to poll Not ready to send data.
S Y N	S Y N	E O T	

Figure 11-11-continued
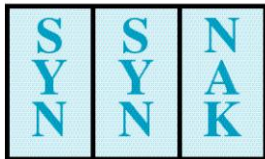
Control Frames

Flow and error control
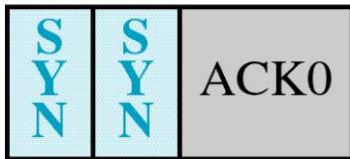
| SYN SYN ACK0	**Positive ACK of even frames** Frame number 0 received.	SYN SYN ACK1	**Positive ACK of odd frames** Frame number 1 received.
SYN SYN NAK	**Negative ACK of frames** Error in the frame received.	SYN SYN WACK	**Wait & ACK** ACK of previous frame, not ready to receive more.
SYN SYN RV1	**Reverse interrupt** Request for interruption, urgent data to send.	SYN SYN TTD	**Temporary delay** Temporarily delayed but does not relinquish the line.
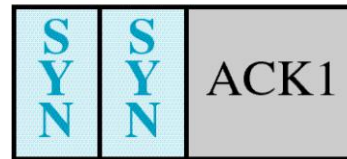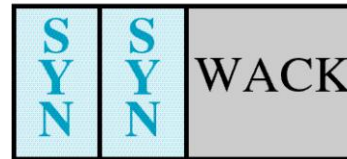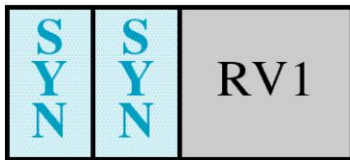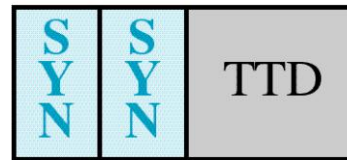
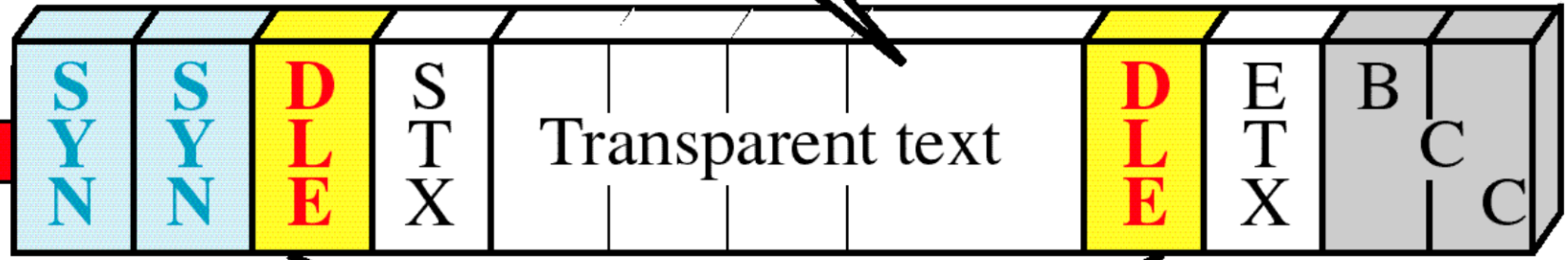Figure 11-11-continued

Control Frames

Connection termination
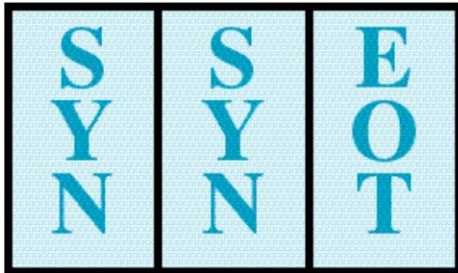
End of transmission
Station finished sending data.

Figure 11-12

Byte Stuffing

Control characters can be
used as text in this region.

SYN	SYN	DLE	STX	Transparent text					DLE	ETX	BCC	

The DLEs start and end
the transparent text.