SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME :19IT401 COMPUTER NETWORKS

II YEAR /IV SEMESTER

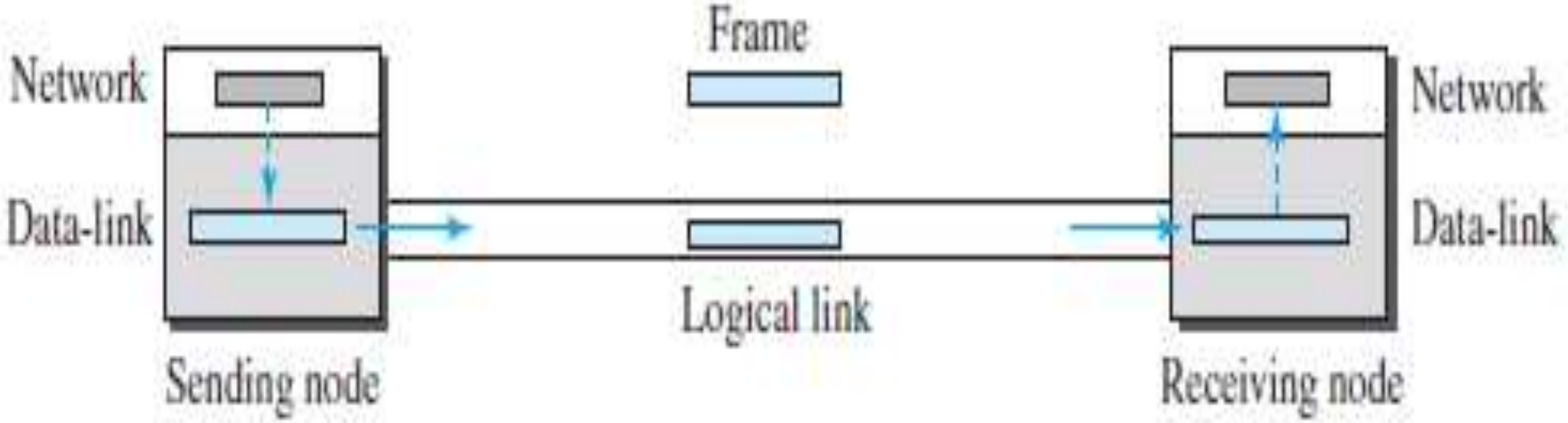
Unit 2-**LINK LAYER**

Topic 3 : DLC protocols

DLC Protocols

Let us first assume we have an ideal channel in which no frames are lost, duplicated, or corrupted. We introduce two protocols for this type of channel

- ✓ Simplest Protocol
- ✓ Stop-and-Wait Protocol



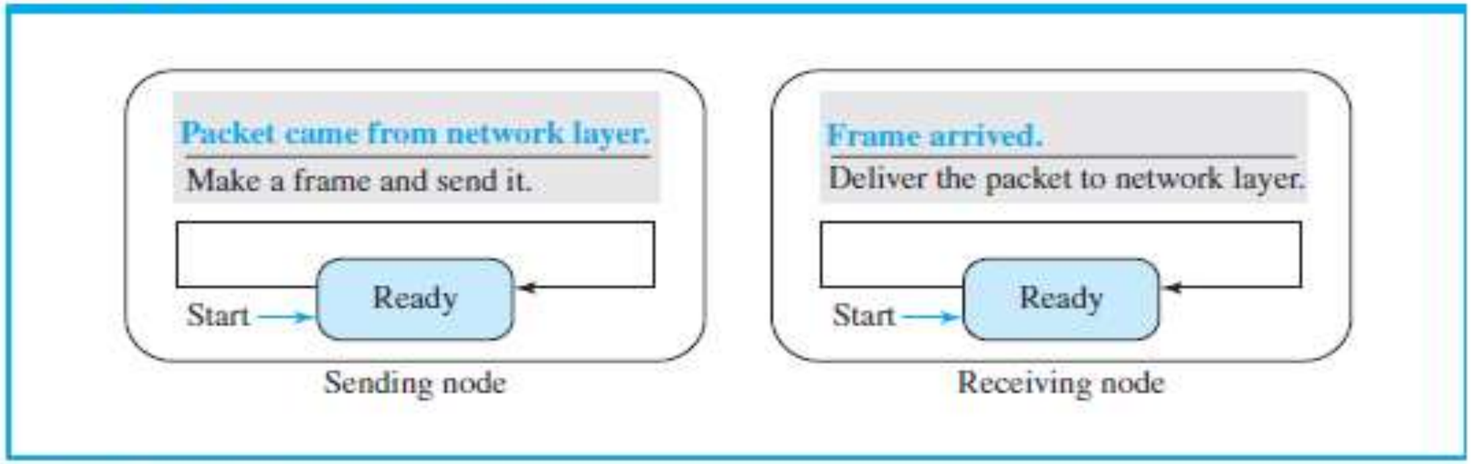
DLC Protocols

✓The behavior of a data-link-layer protocol can be better shown as a finite state machine (FSM).

✓ An FSM is thought of as a machine with a finite number of states.

✓ We have used rounded-corner rectangles to show states, colored text to show events, and regular black text to show actions. A horizontal line is used to separate the event from the actions, although later we replace the horizontal line with a slash. The arrow shows the movement to the next state.

Figure 11.8 *FSMs for the simple protocol*

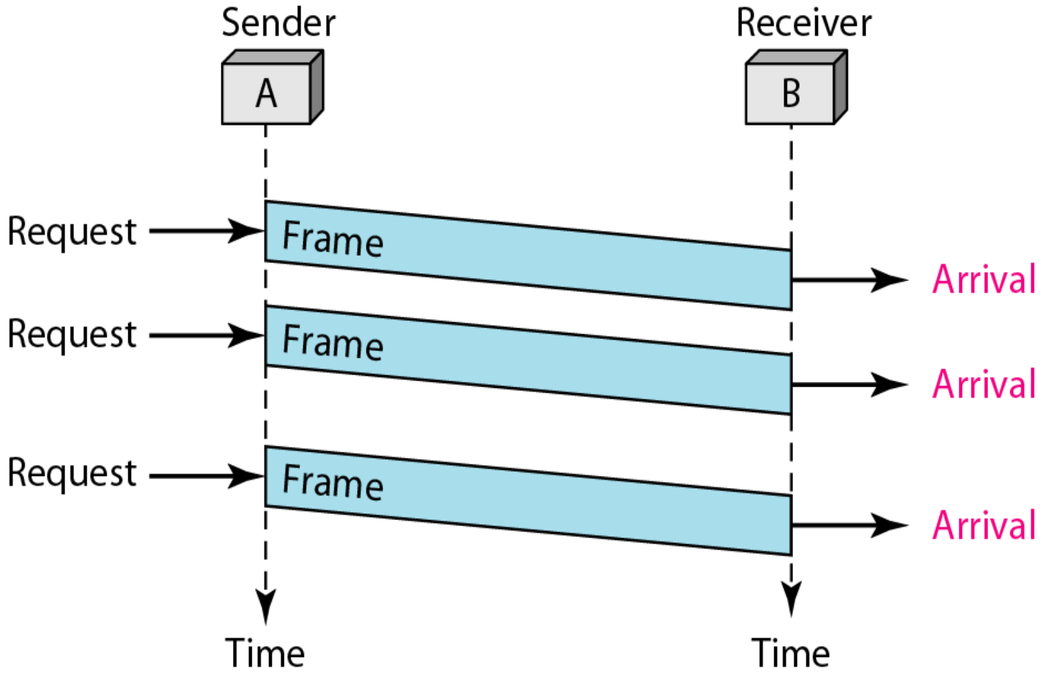


DLC Protocols – Flow diagram

✓The sender sends a sequence of frames without even thinking about the receiver.

✓ To send three frames, three events occur at the sender site and three events at the receiver site.

✓Note that the data frames are shown by tilted boxes; the height of the box defines the transmission time difference between the first bit and the last bit in the frame.



DLC Protocols- *Stop-and-Wait Protocol*

Sender States

The sender is initially in the ready state, but it can move between the ready and blocking state.

Ready State. When the sender is in this state, it is only waiting for a packet from the network layer. If a packet comes from the network layer, the sender creates a frame, saves a copy of the frame, starts the only timer and sends the frame.

The sender then moves to the blocking state.

Blocking State. When the sender is in this state, three events can occur:

a. If a time-out occurs, the sender resends the saved copy of the frame and restarts the timer.

b. If a corrupted ACK arrives, it is discarded.

c. If an error-free ACK arrives, the sender stops the timer and discards the saved copy of the frame. It then moves to the ready state.

Receiver states

The receiver is always in the *ready state. Two events may occur:*

a. If an error-free frame arrives, the message in the frame is delivered to the network layer and an ACK is sent.

b. If a corrupted frame arrives, the frame is discarded.

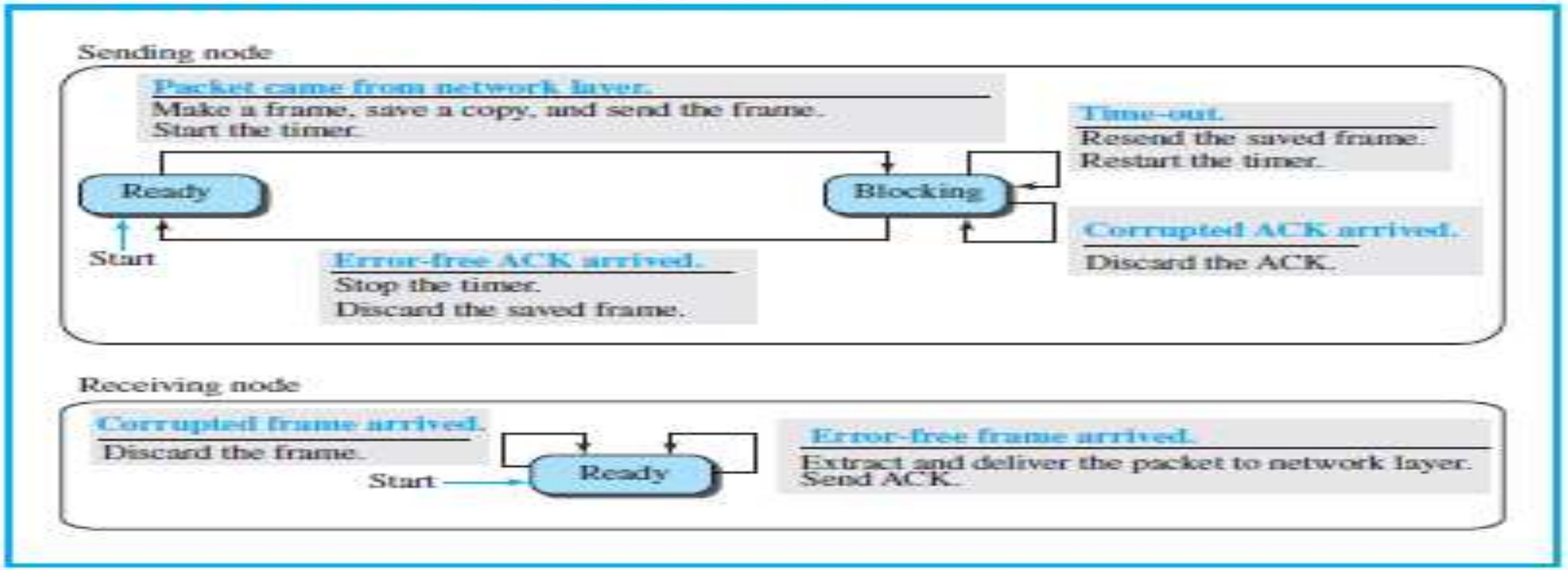
DLC Protocols- *Stop-and-Wait Protocol*

Figure 11.10 *Stop-and-Wait protocol*

FSMs

Figure 11.11 shows the FSMs for our primitive Stop-and-Wait protocol.

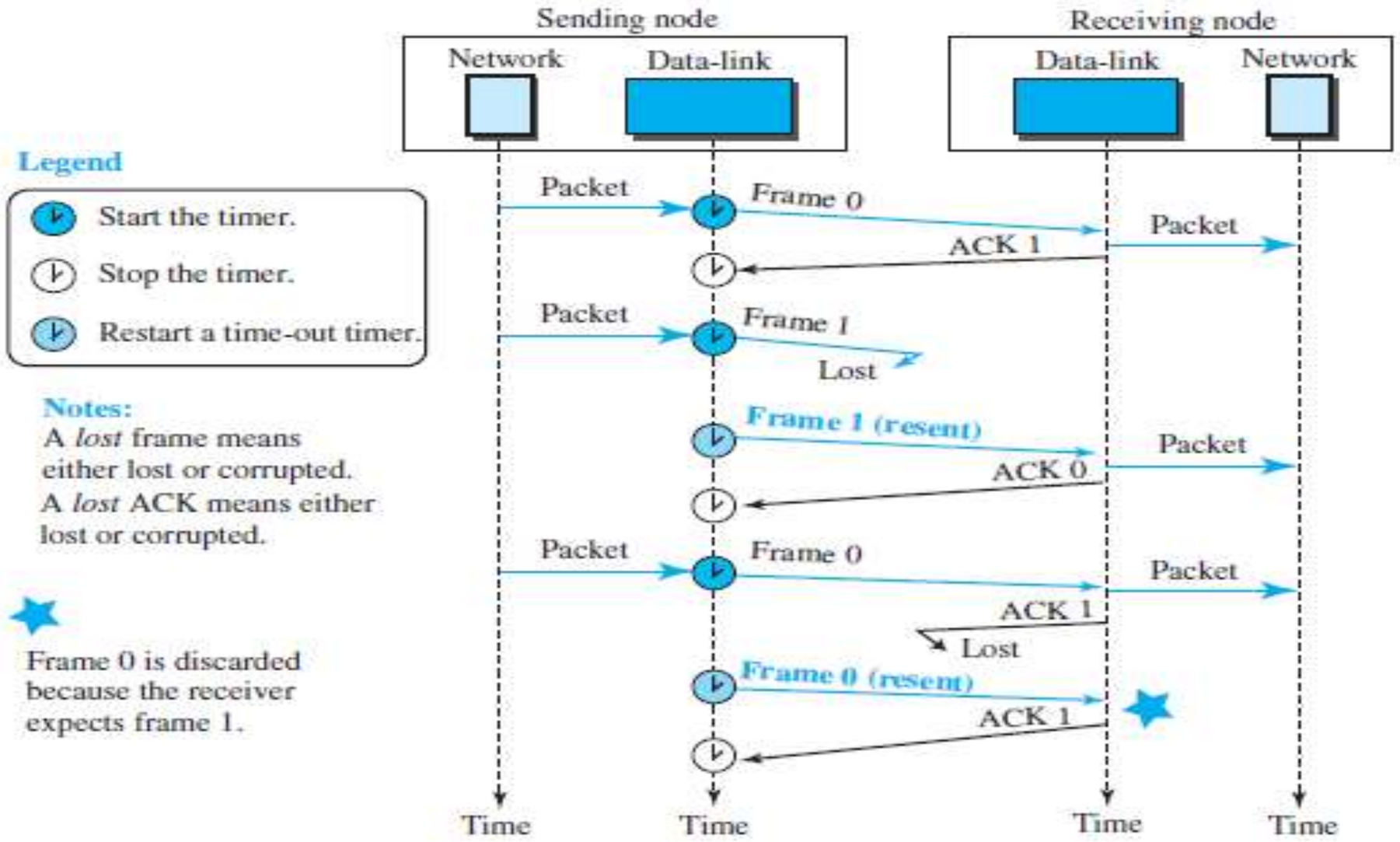
Figure 11.11 *FSM for the Stop-and-Wait protocol*



DLC Protocols- *Stop-and-Wait Protocol*

✓To correct duplicate packets we need to add sequence numbers to the data frames and acknowledgment numbers to the ACK frames.
✓Numbering in this case is very simple. Sequence numbers are 0, 1, 0, 1, 0, 1, . . . ; the acknowledgment numbers can also be 1, 0, 1, 0, 1, 0, …
✓ In other words, the sequence numbers start with 0, the acknowledgment numbers start with 1.
✓ An acknowledgment number always defines the sequence number of the next frame to receive.
✓Figure shows how adding sequence numbers and acknowledgment numbers can prevent duplicates. The first frame is sent and acknowledged. The second frame is sent, but lost. After time-out, it is resent. The third frame is sent and acknowledged, but the acknowledgment is lost. The frame is resent.

DLC Protocols- *Stop-and-Wait Protocol-Flow diagram*



Assessment

a).List DLC protocols
b) What is simple protocol?
c) What is stop and wait protocol?
d) Compare simple and stop and wait protocol.

Reference

TEXT BOOKS

Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

REFERENCES

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2. Andrew Tanenbaum, Computer Networks, Fifth Edition, Pearson (5th Edition) Education, 2013.
3. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.
4. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.