Computer Networks Laboratory
Part #3
Programming

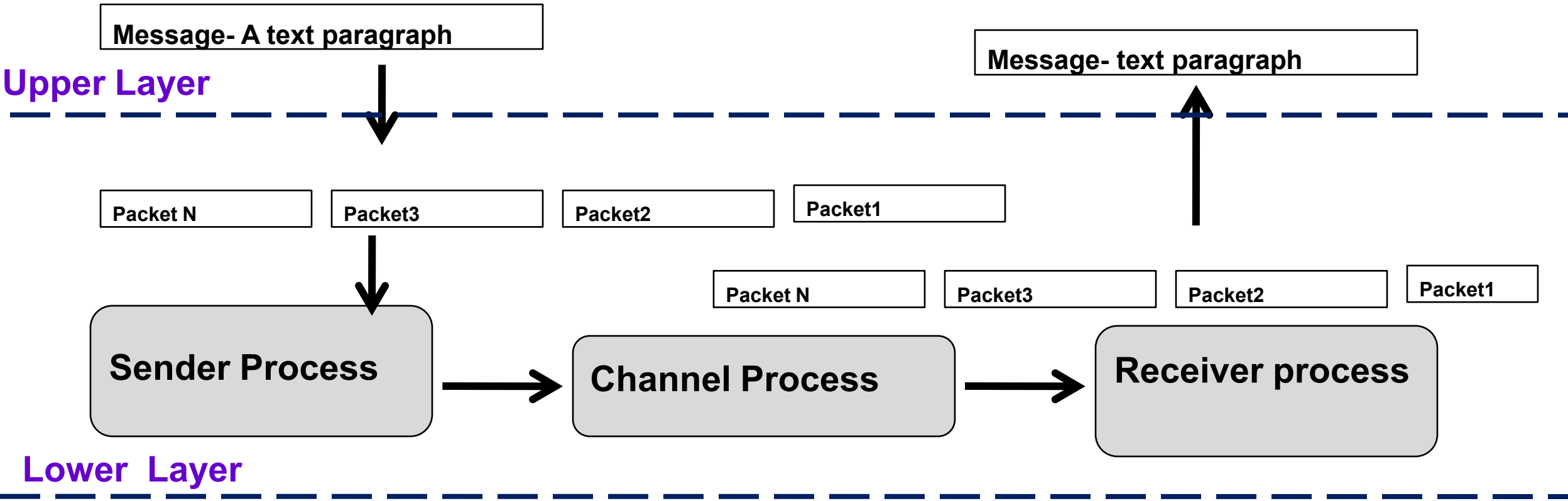
Learning objective:
Learn to use the programming skills to implement some of the key concepts of networking
You may use any language

Program#1

Write a program to illustrate (Simulate) a typical reliable data transfer protocol [Stop-And-Wait protocol]

Create 3 processes namely Sender, Receiver & Channel

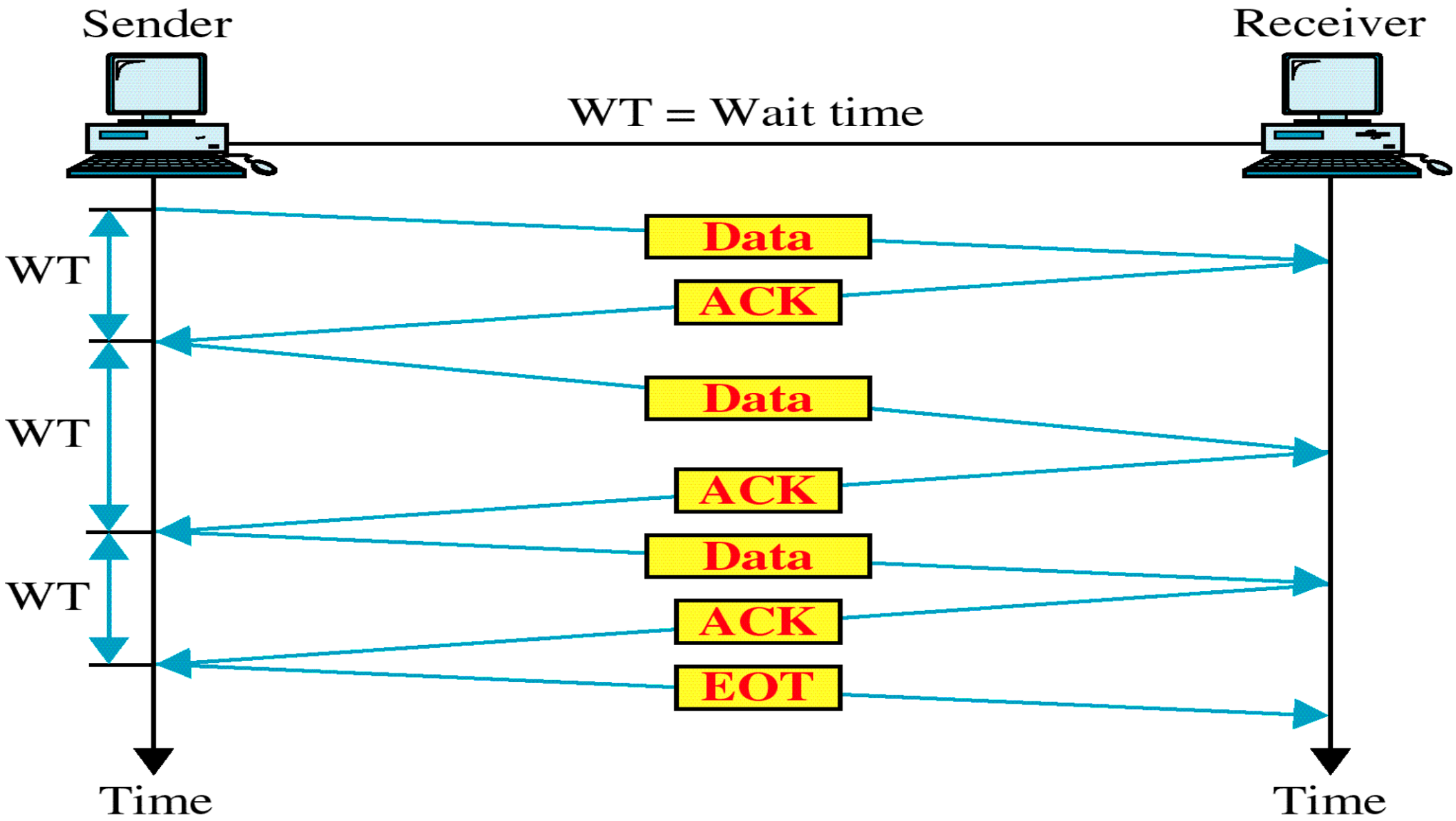
- **Role of the sender process**
  - Get the message from the upper layer (a text file)
  - Divide in to multiple packets.
  - Add headers and send to the receiver
  - Run Stop-N-wait protocol
- **Role of the Channel process**
  - Get the packet from sender
    - Simulate the channel behavior like
    - Introducing errors
    - Discarding the packet
    - Delaying the packet / Acknowledgements
  - Send to receiver process
- **Role of the receiver process**
  - Get the message from the Channel process
  - Run stop and wait protocol
  - Reassembple the packets in to message
  - Handover to upper layer / display message



Stop & Wait protocol Algorithm

Figure 10-10

Stop and Wait



4 Scenarios to be shown

1. Normal operation
2. Lost or damaged frames
3. Lost acknowledgement
4. Delayed acknowledgement

Stop-and-Wait ARQ-Features

Features

1.Sending device keeps a copy of the last frame transmitted

2. Data and acknowledgement (ACK) frames are numbered

For identification of data frames in case of duplicate transmission

3. A damaged or lost frame is treated in the same manner by the receiver

Stop-and-Wait ARQ-Features

Features

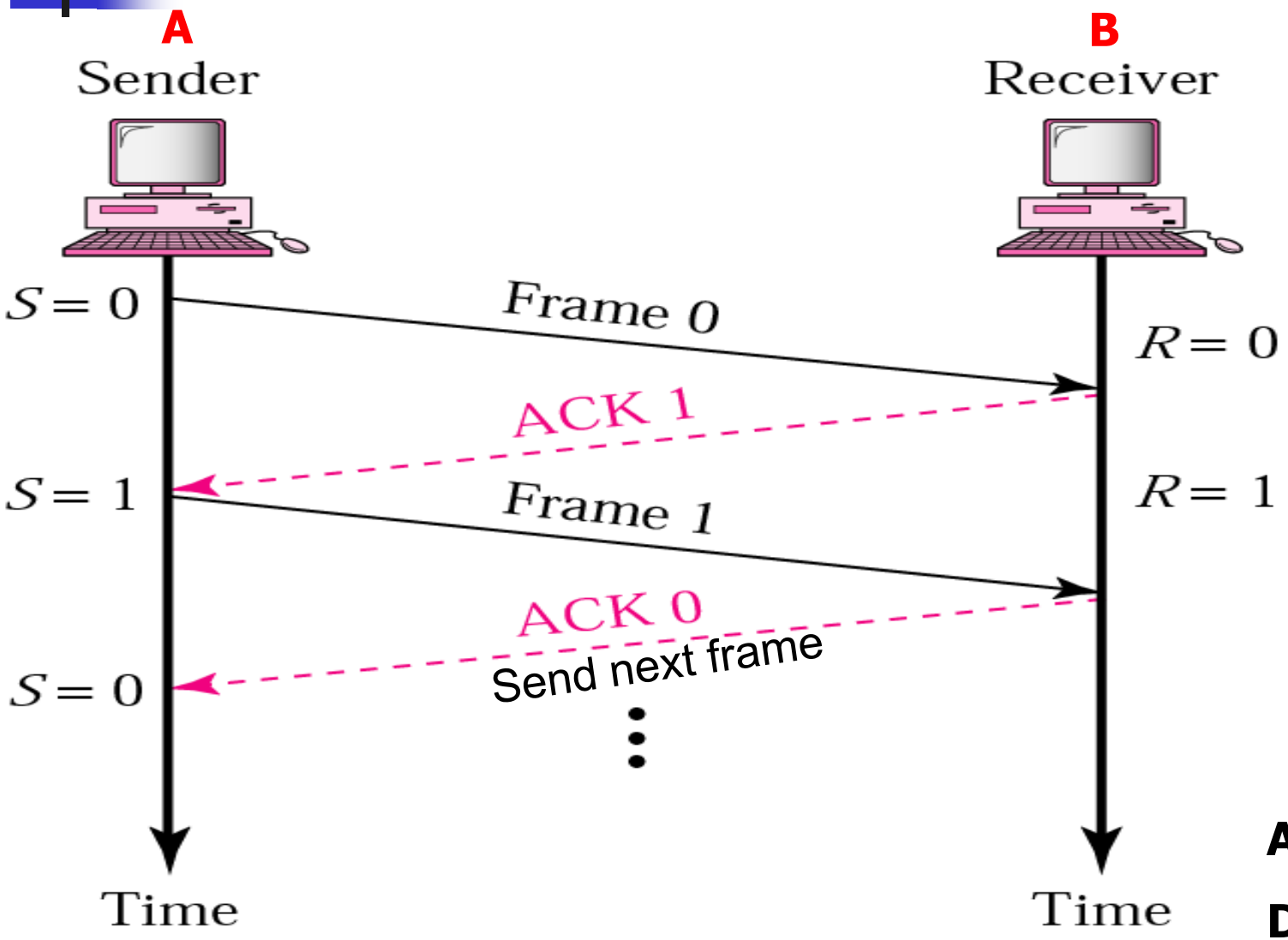
4. Sender has a control variable -S (0 or 1); Receiver has a control variable-R (0 or 1)

5. Receiver sends only positive acknowledgement; silent about damaged or lost frames

6. Acknowledgement number always defines the number of the next expected frame

7. There is a timer set after sending a frame

Scenario 1. Normal operation



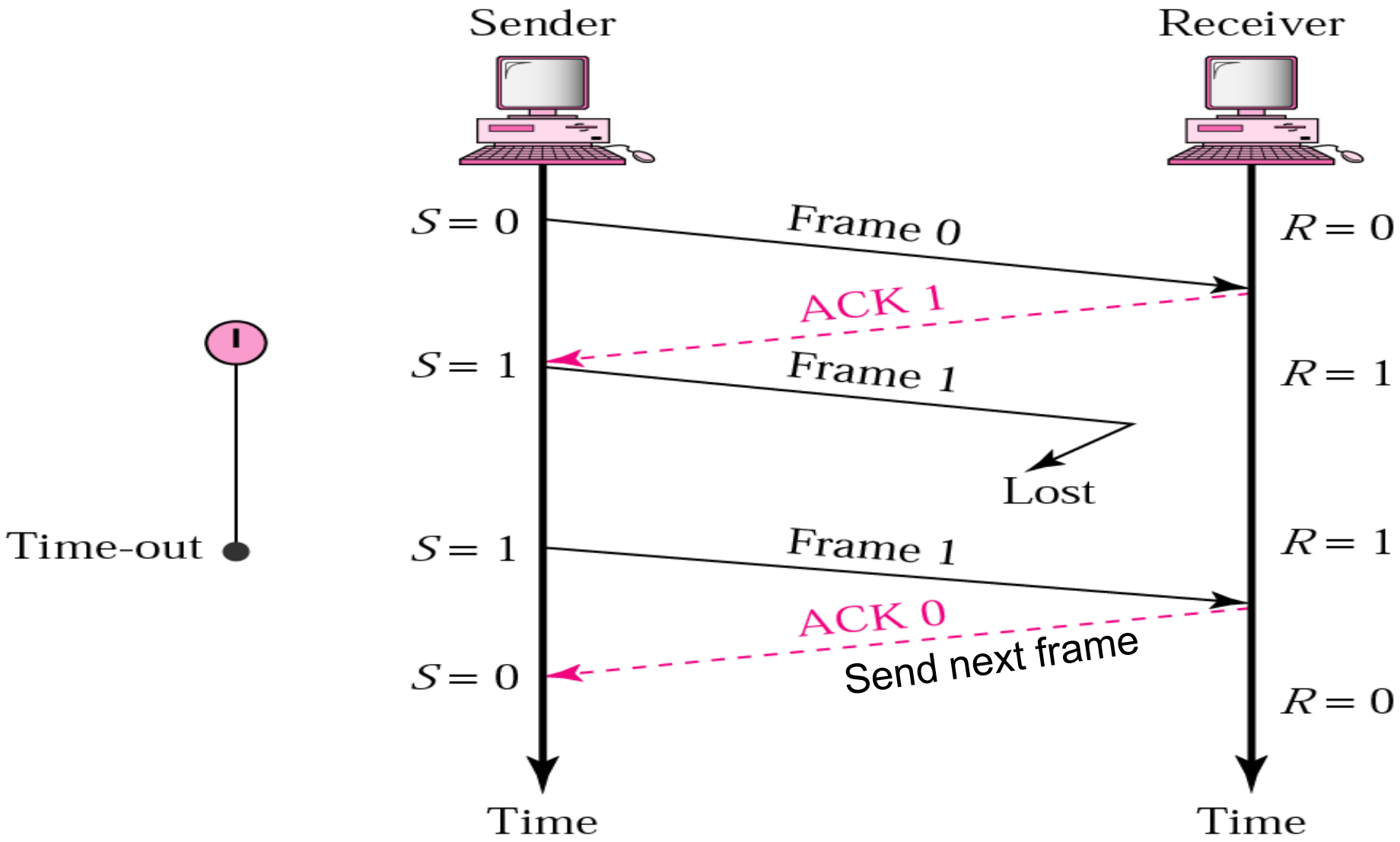
Meaning of ACK 1

I have received Frame 0; Please send Frame #1

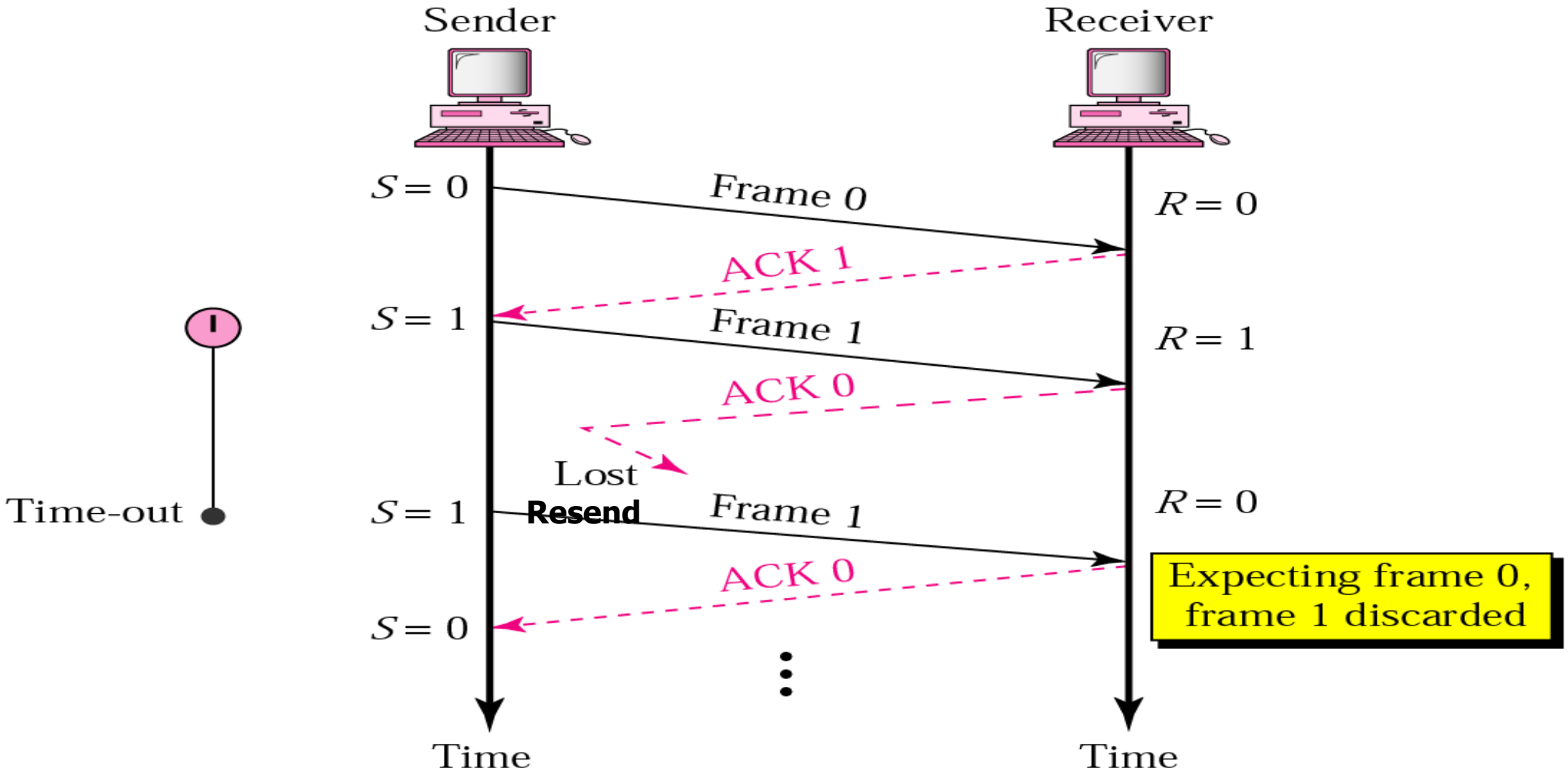
Assumption :

Data transfer unidirectional A to B

Scenario 2. Lost frame



Scenario 3. Lost Acknowledgement frame



Scenario 4. Delayed ACK frame