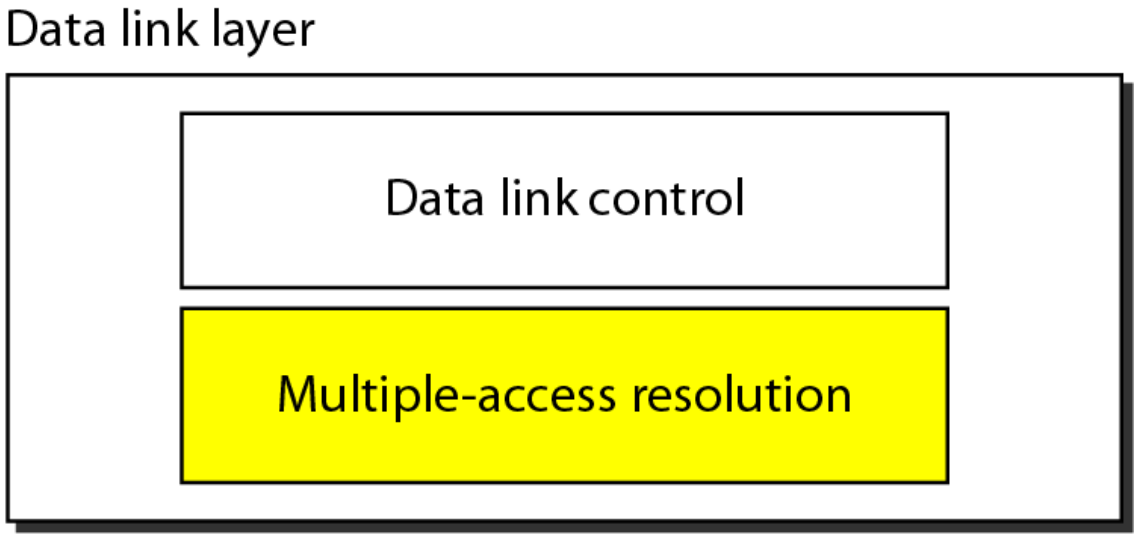
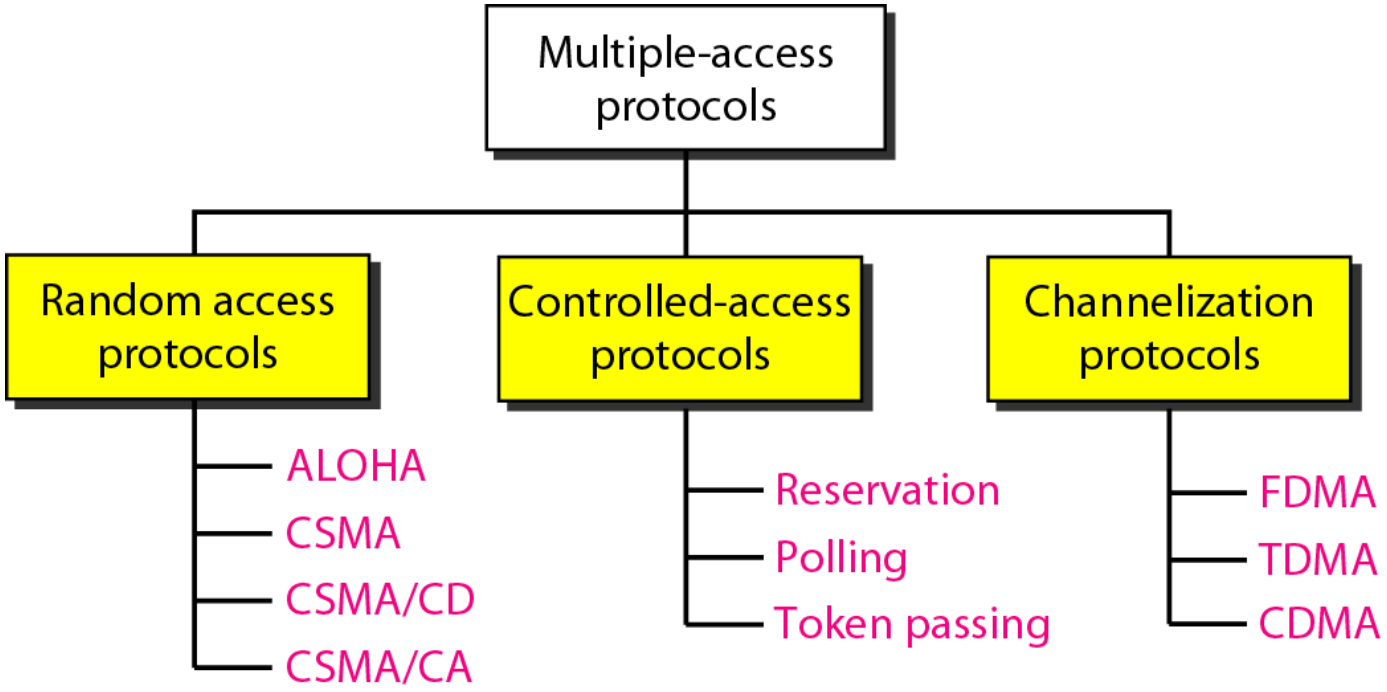
Multiple Access

Data link layer divided into two functionality-oriented sublayers



Taxonomy of multiple-access protocols discussed in this chapter



RANDOM ACCESS

In random access or contention methods, no station is superior to another station and none is assigned the control over another. No station permits, or does not permit, another station to send. At each instance, a station that has data to send uses a procedure defined by the protocol to make a decision on whether or not to send.

Topics discussed in this section:

ALOHA
Carrier Sense Multiple Access
Carrier Sense Multiple Access with Collision Detection
Carrier Sense Multiple Access with Collision Avoidance

To avoid access conflict or to resolve it when it happens, each station follows a procedure that answer the following questions:

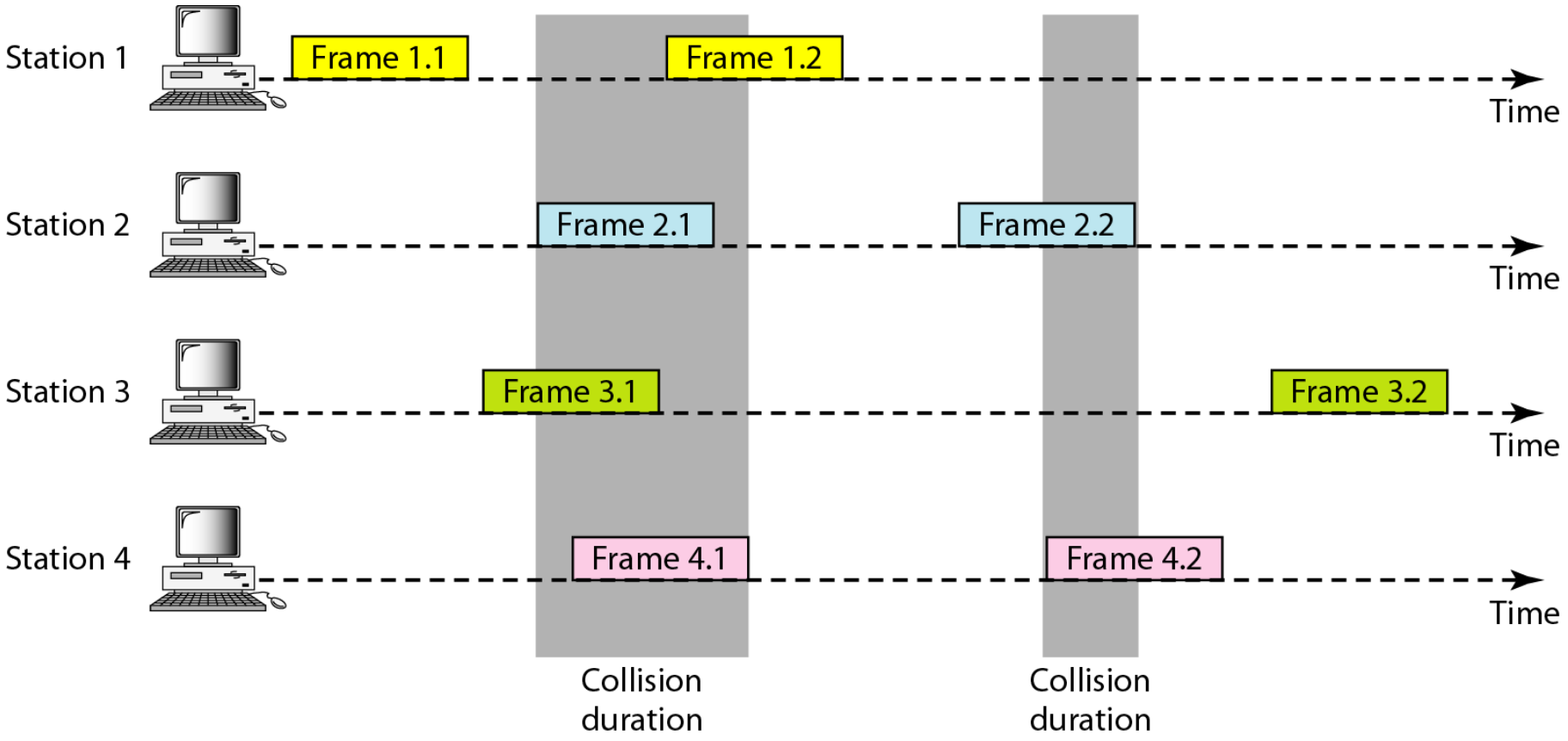
- ***When can the station access the medium.***
- ***What can the station do if the medium is busy.***
- ***How can the station determine the success or failure of the transmission.***
- ***What can the station do if there is an access conflict.***

ALOHA

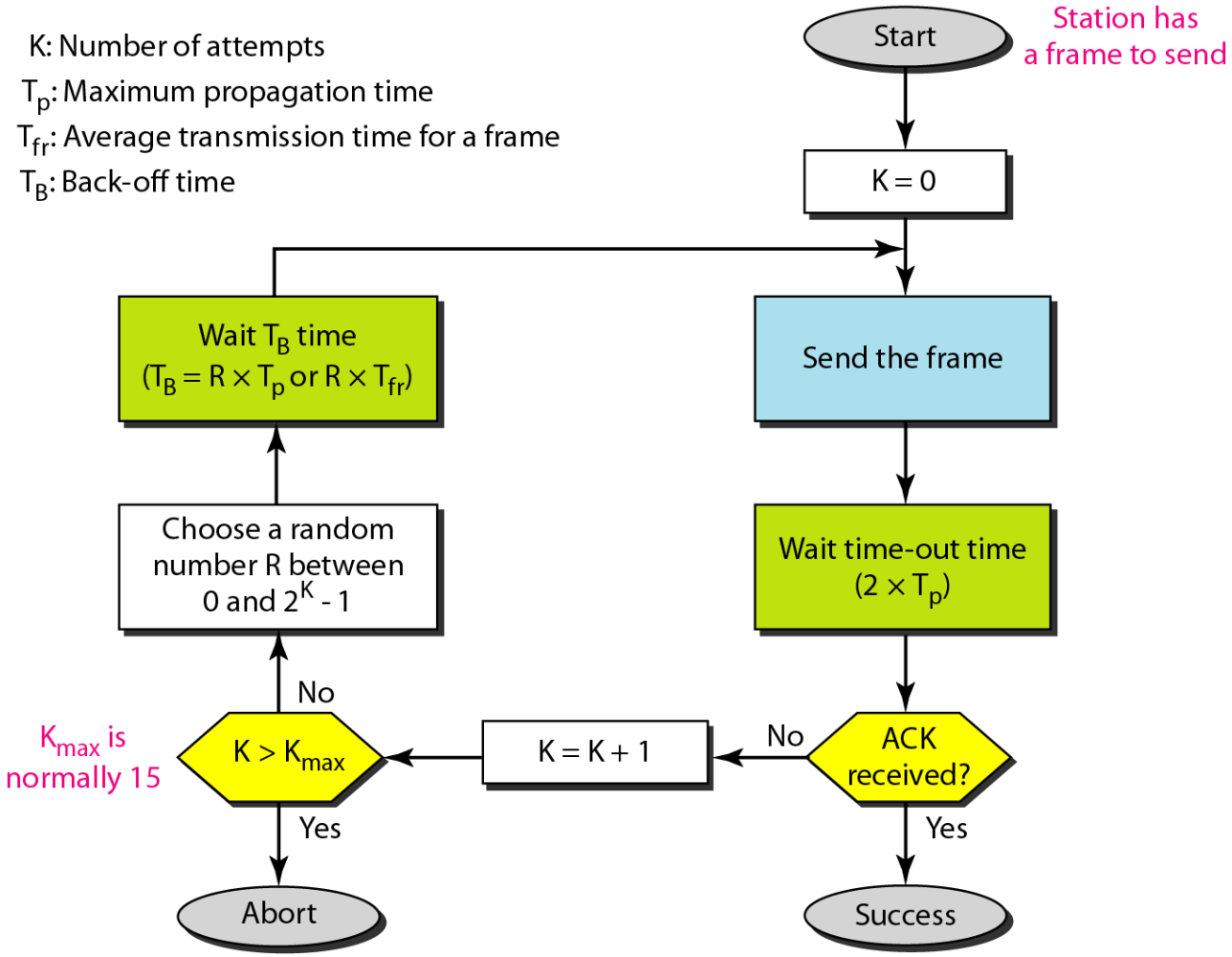
ALOHA, the earliest random access method, was developed at the University of Hawaii in early 1970. It was designed for a radio (wireless) LAN, but it can be used on any shared medium.

Pure ALOHA
Slotted ALOHA

Frames in a pure ALOHA network

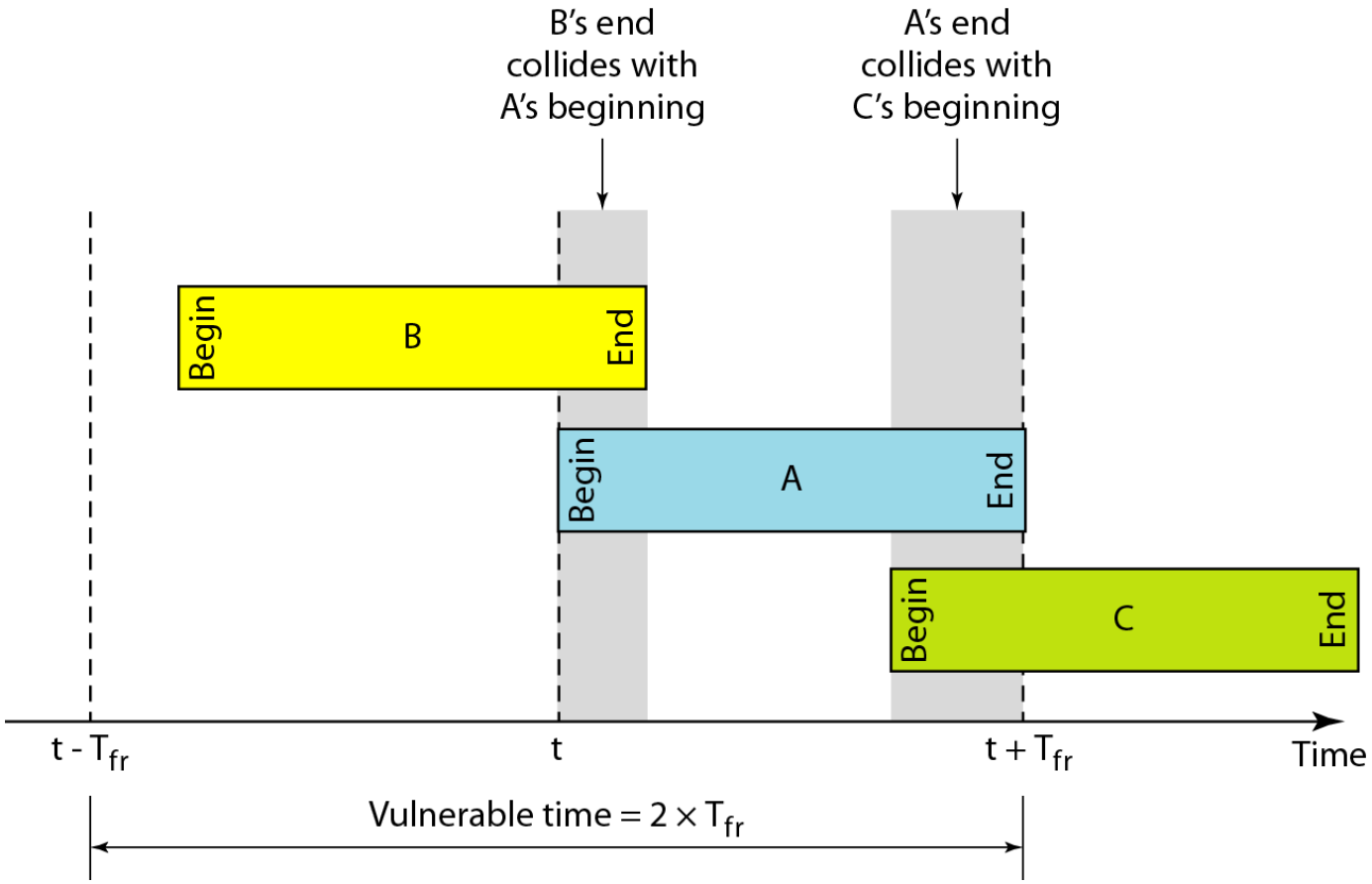


Procedure for pure ALOHA protocol



Vulnerable time for pure ALOHA protocol

The Vulnerable time, in which there is possibility of collision



Slotted ALOHA

Frames in a slotted ALOHA network

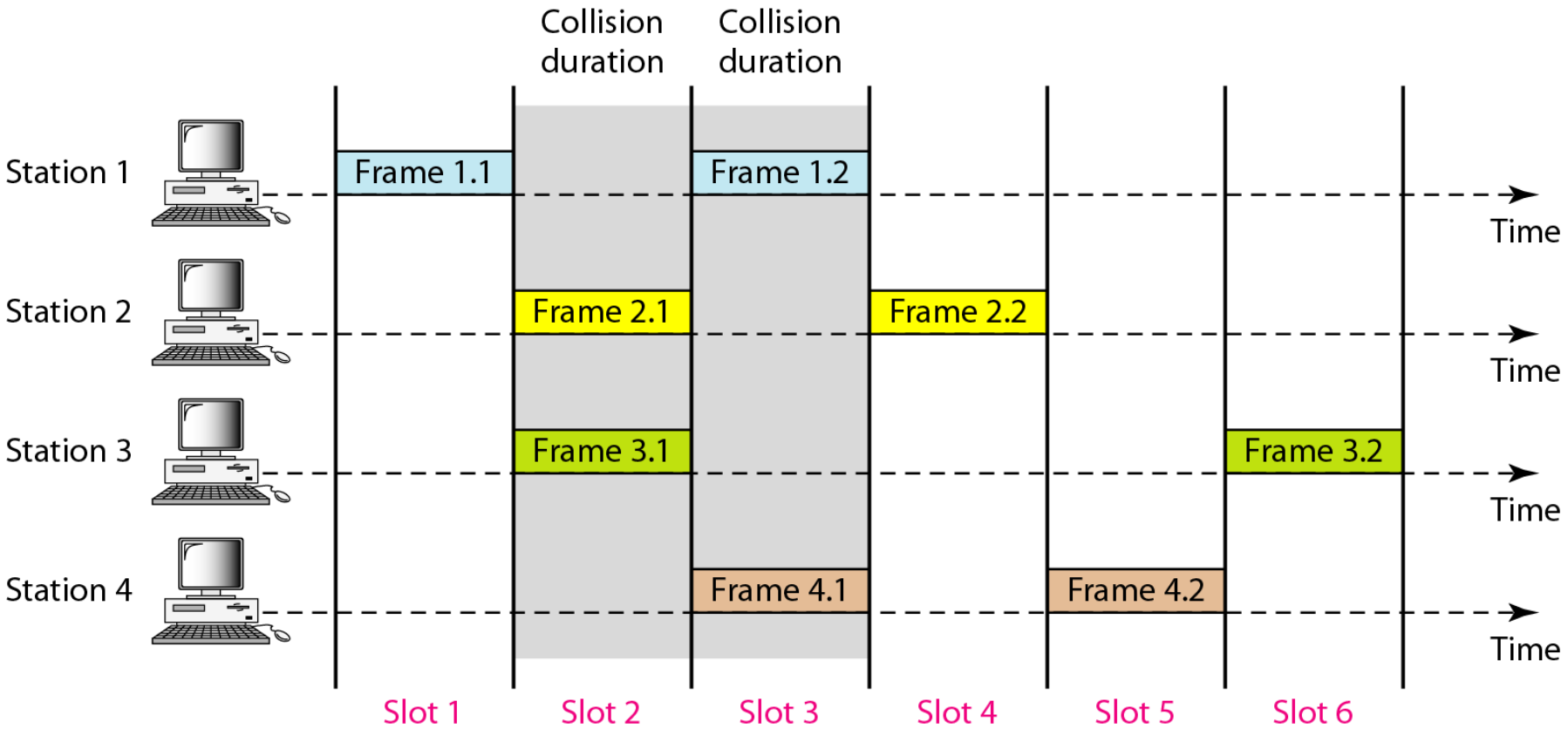
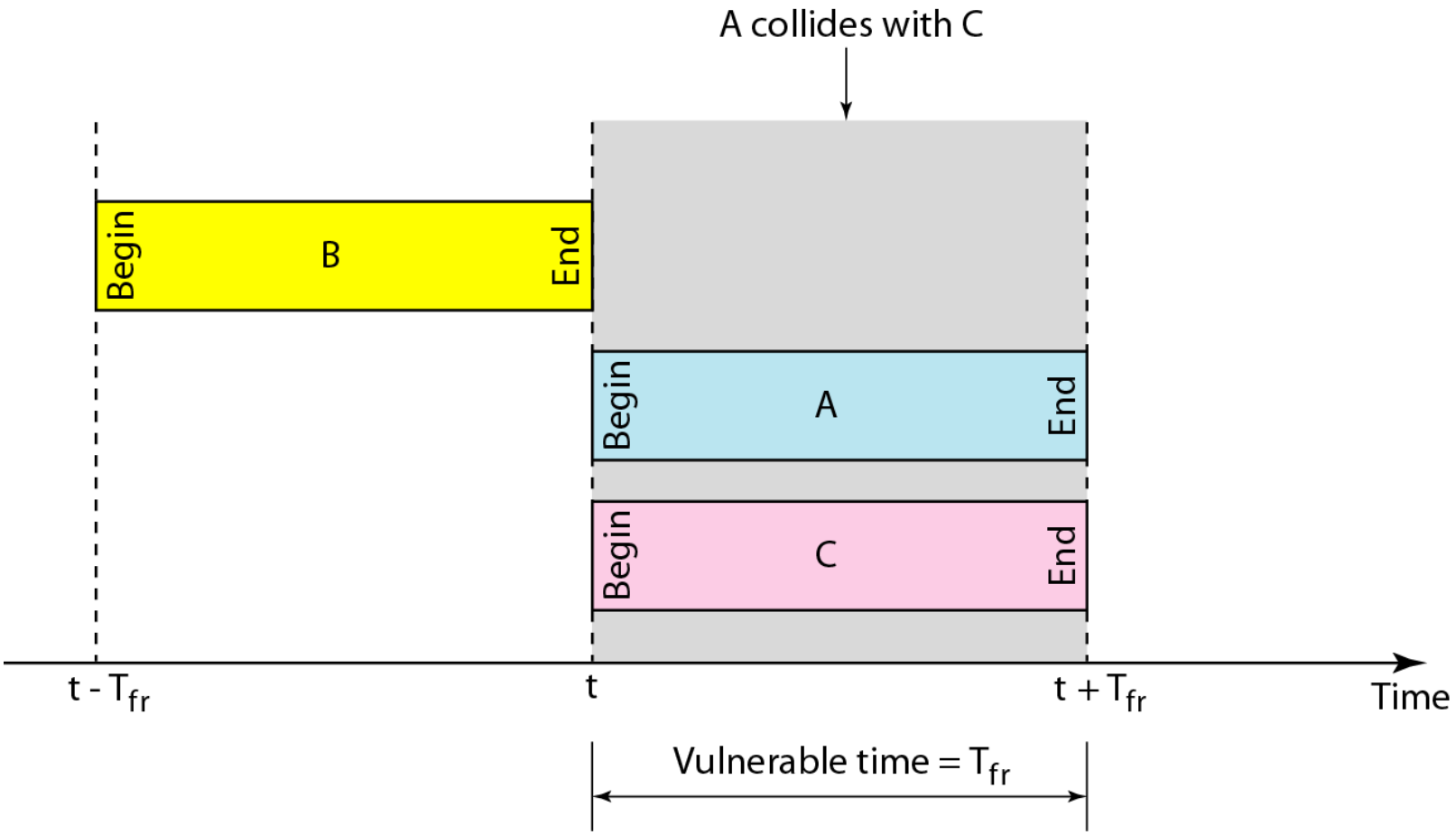
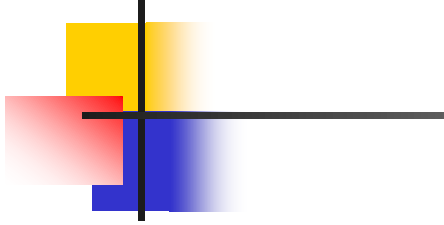


Figure 12.7 *Vulnerable time for slotted ALOHA protocol*





CSMA
Carrier Sense Multiple Access

Space/time model of the collision in CSMA

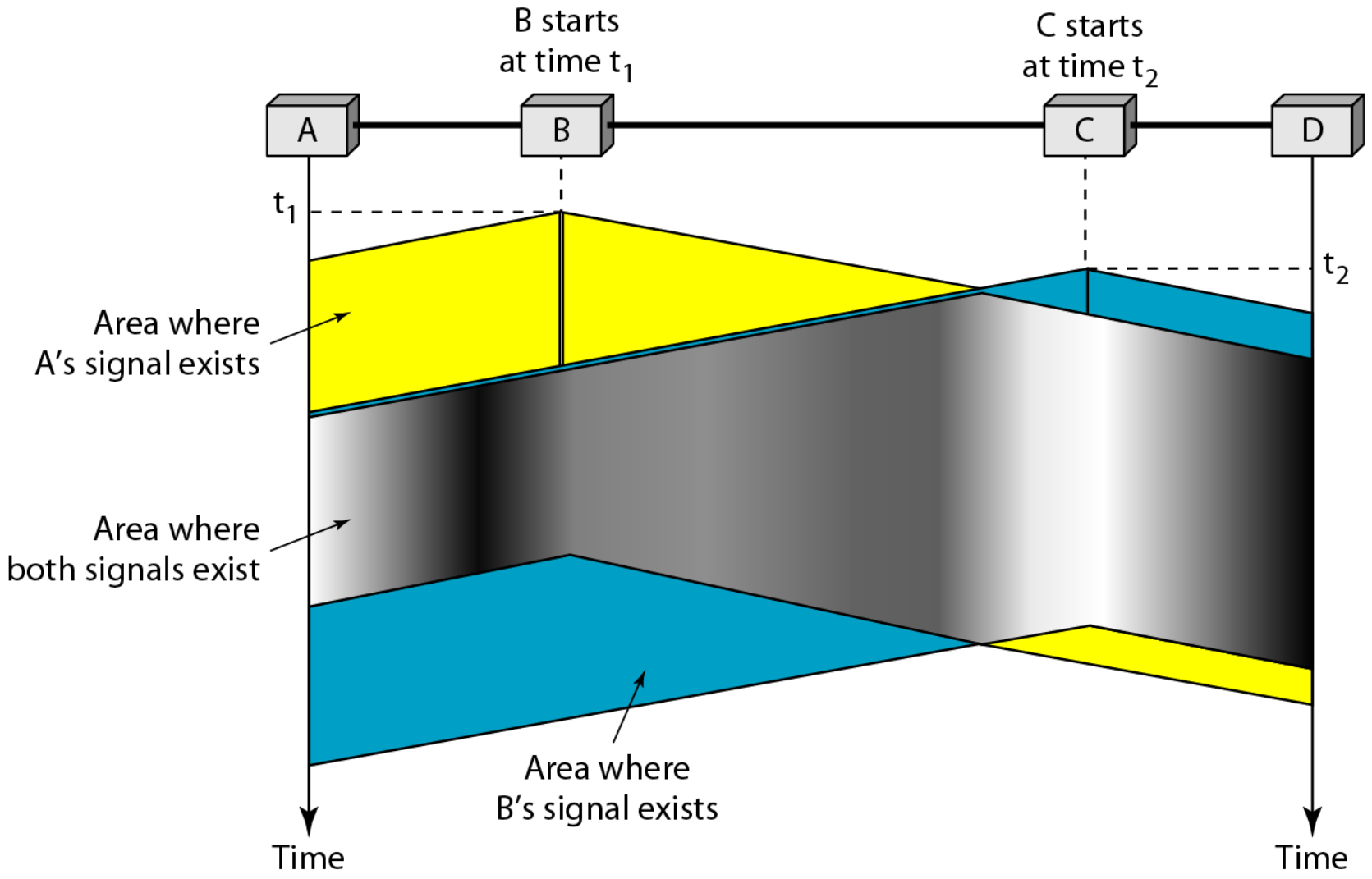
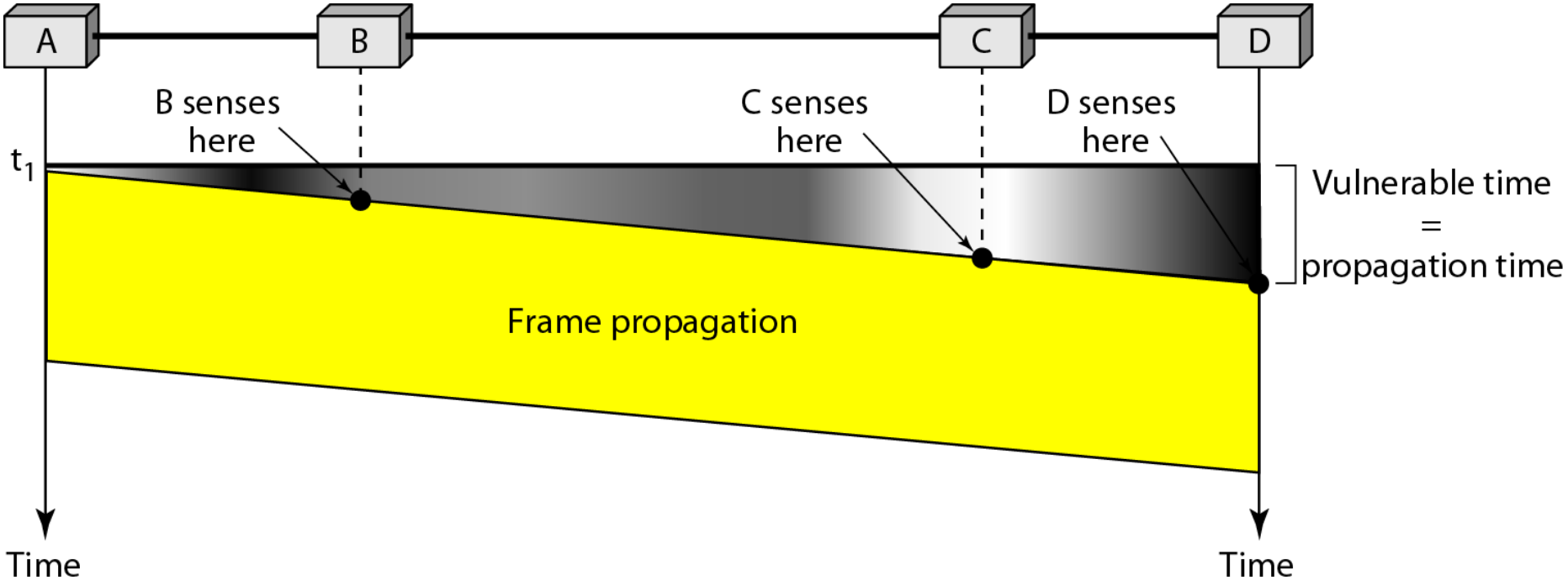


Figure 12.9 *Vulnerable time in CSMA*

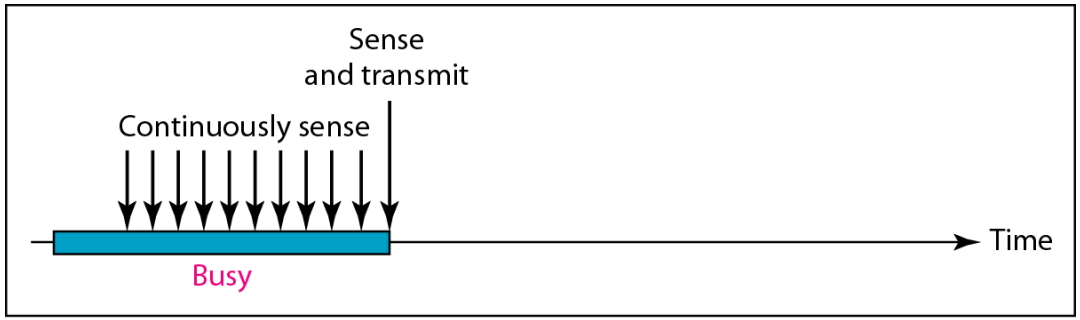


Persistence Method

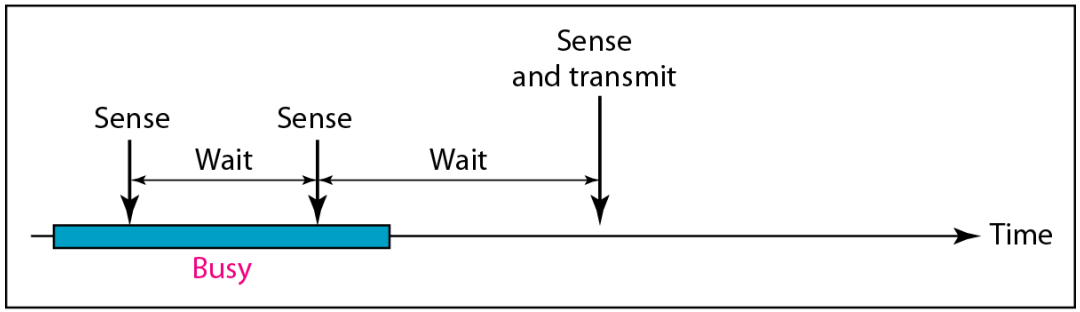
- ***What Should a station do if the channel is busy.***
- ***What should a station do if the channel is idle.***

1-Persistence Method
Non Persistence Method
p-Persistence Method

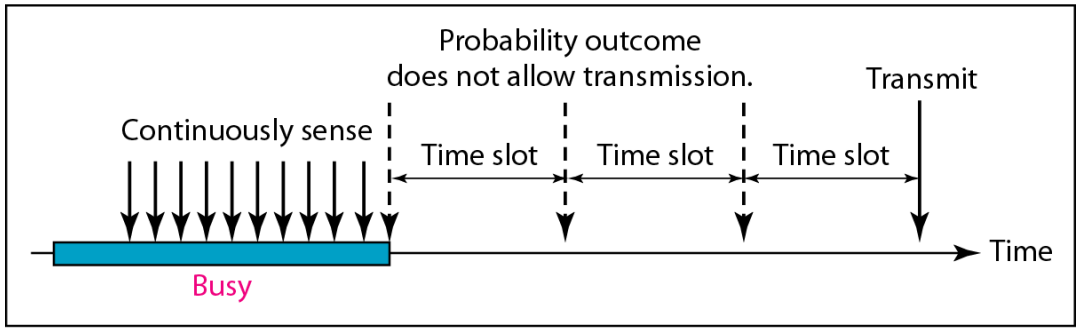
Behavior of three persistence methods



a. 1-persistent

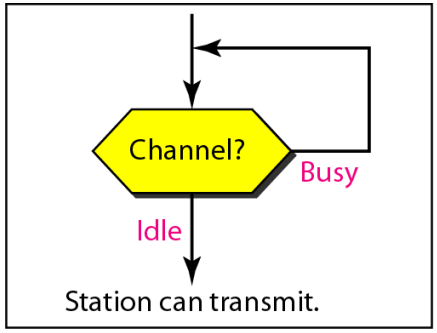


b. Nonpersistent

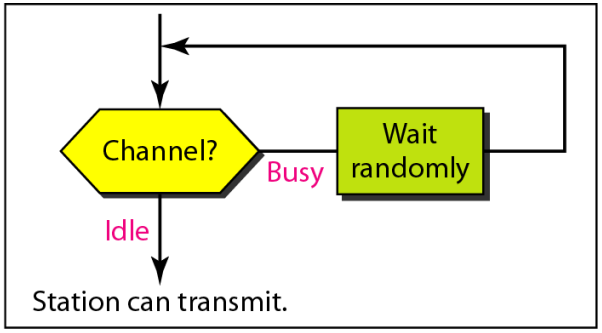


c. p-persistent

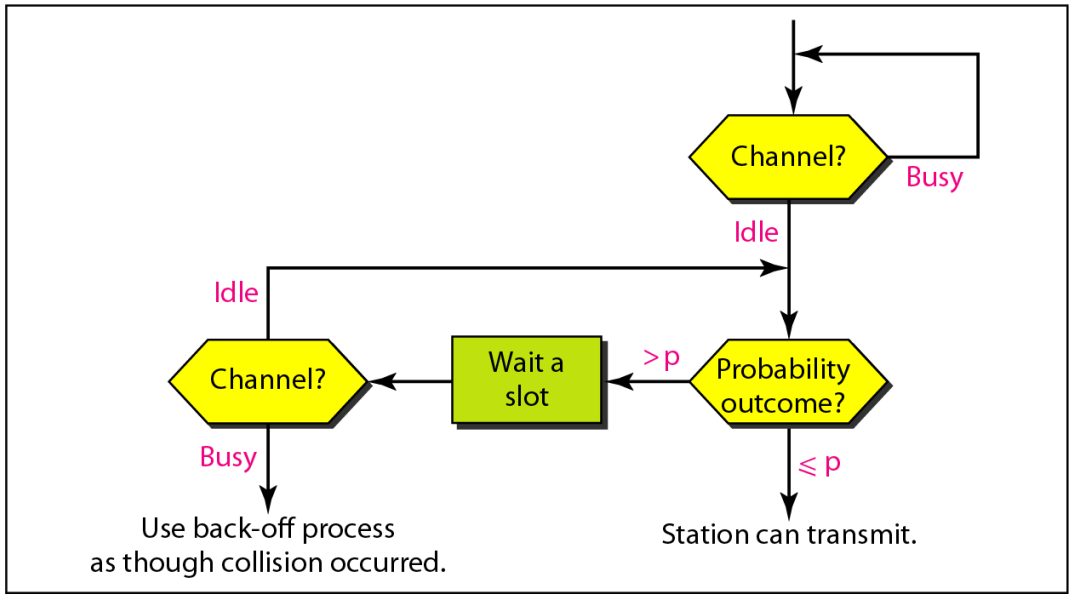
Flow diagram for three persistence methods



a. 1-persistent

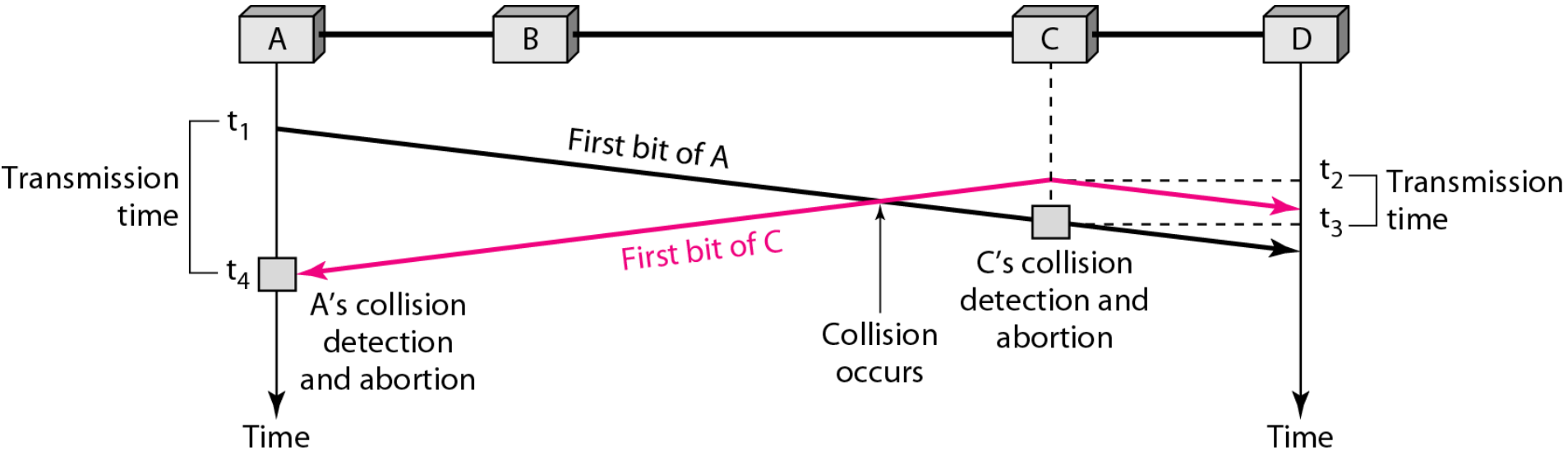


b. Nonpersistent

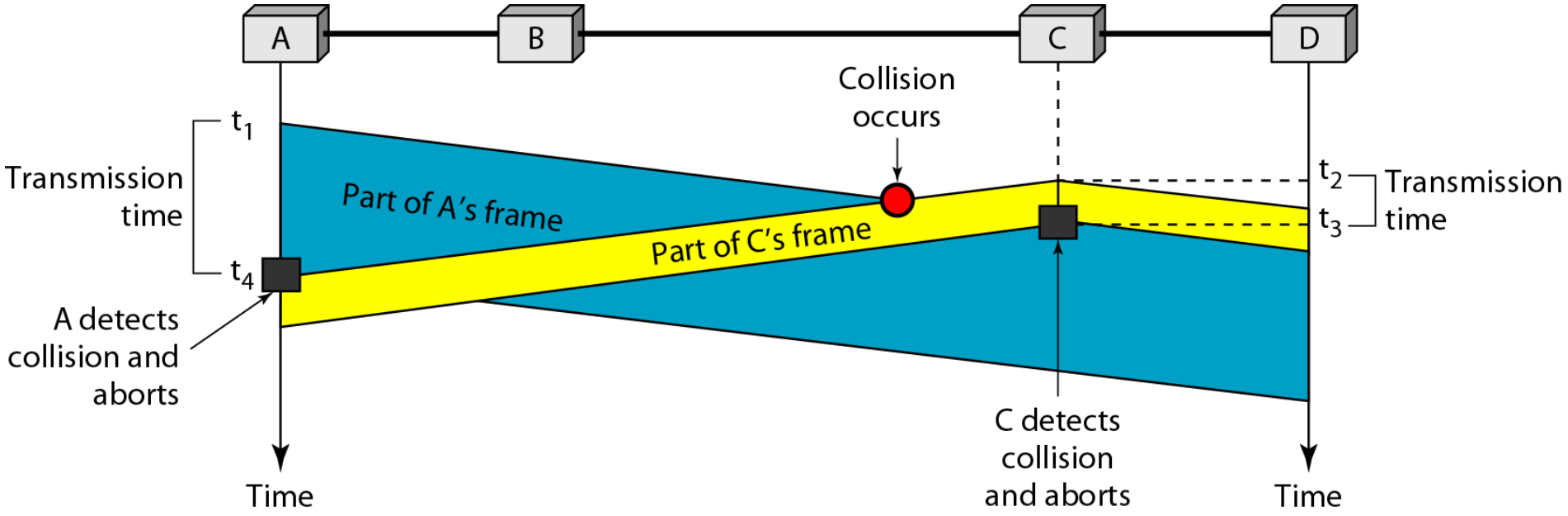


c. p-persistent

Collision of the first bit in CSMA/CD



Collision and abortion in CSMA/CD



Flow diagram for the CSMA/CD

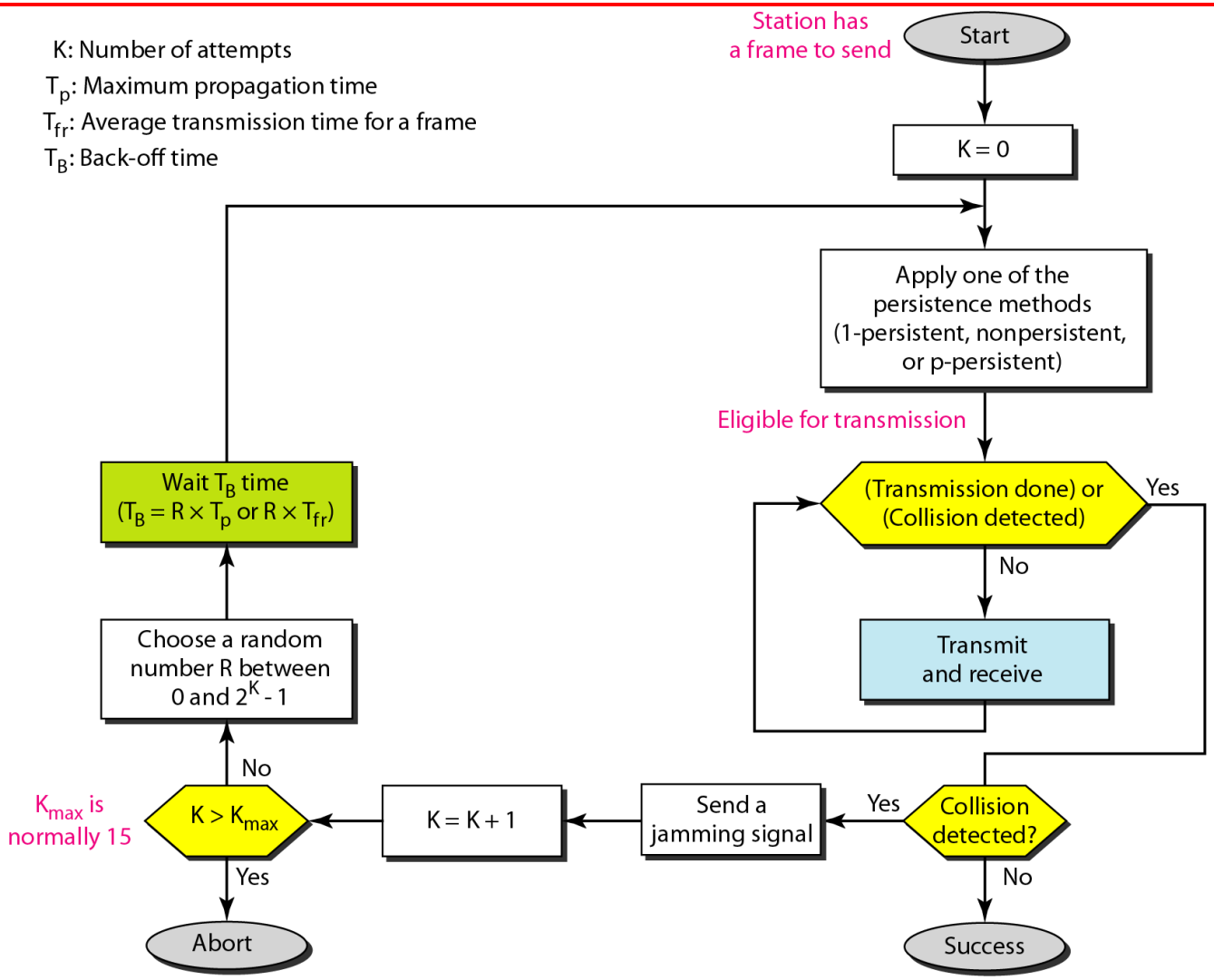


Figure 12.15 *Energy level during transmission, idleness, or collision*

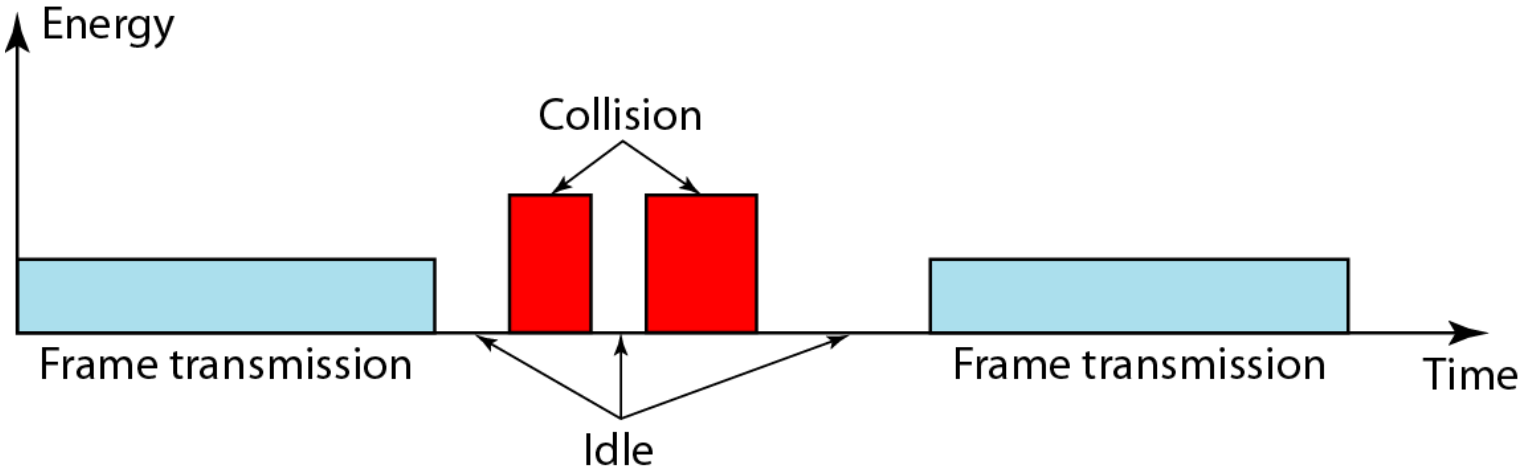
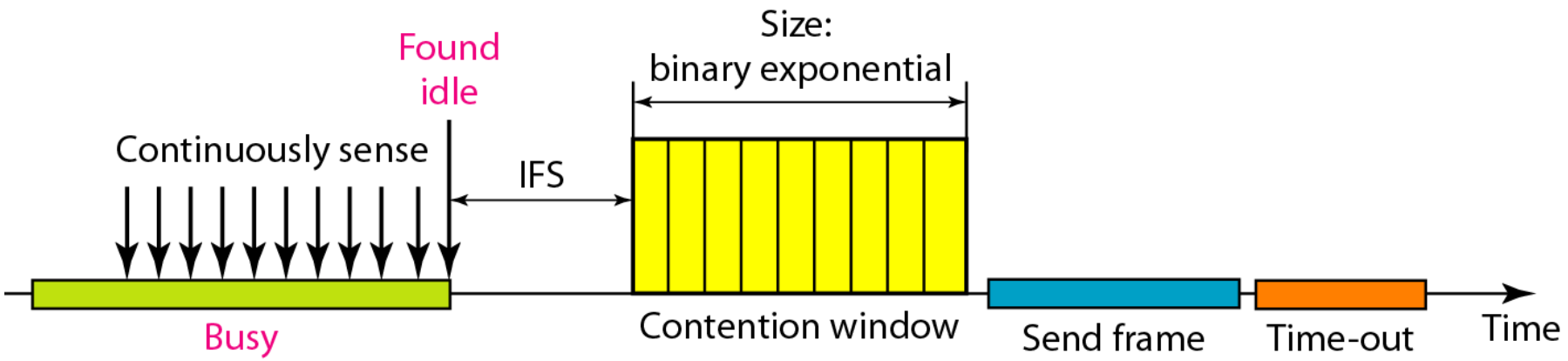


Figure 12.16 *Timing in CSMA/CA*



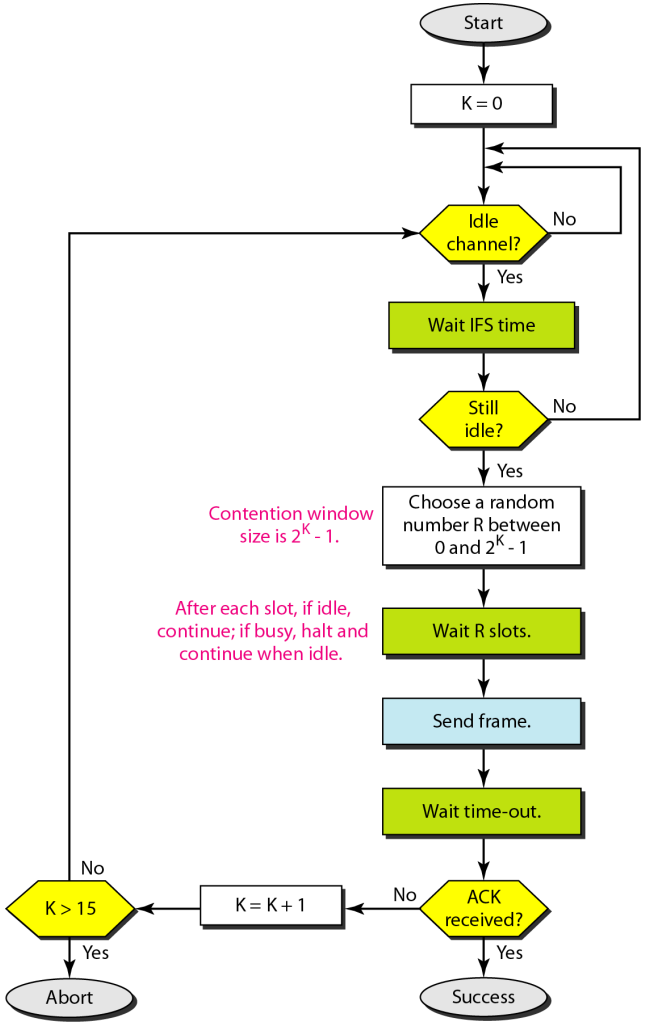
Note

In CSMA/CA, the IFS can also be used to define the priority of a station or a frame.

Note

In CSMA/CA, if the station finds the channel busy, it does not restart the timer of the contention window; it stops the timer and restarts it when the channel becomes idle.

Figure 12.17 *Flow diagram for CSMA/CA*



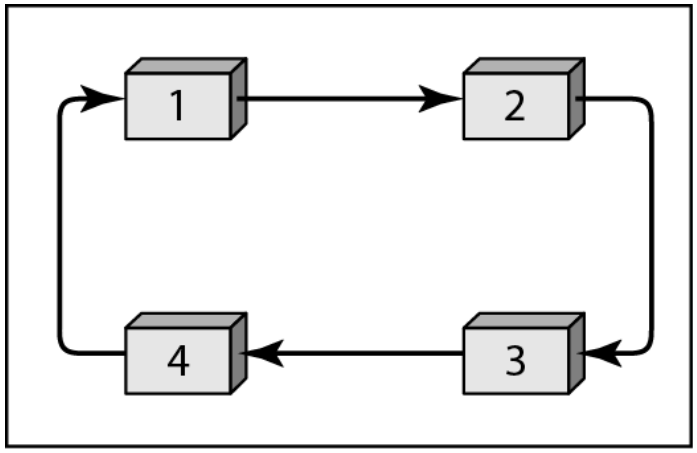
CONTROLLED ACCESS

In controlled access, the stations consult one another to find which station has the right to send. A station cannot send unless it has been authorized by other stations. We discuss three popular controlled-access methods.

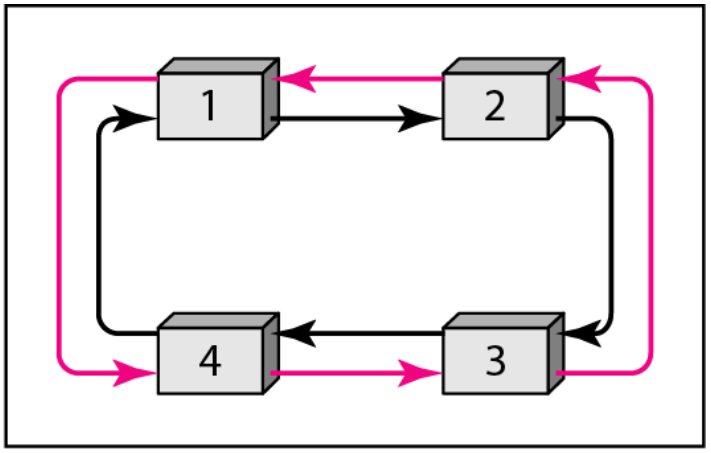
Topics discussed in this section:

Reservation
Polling
Token Passing

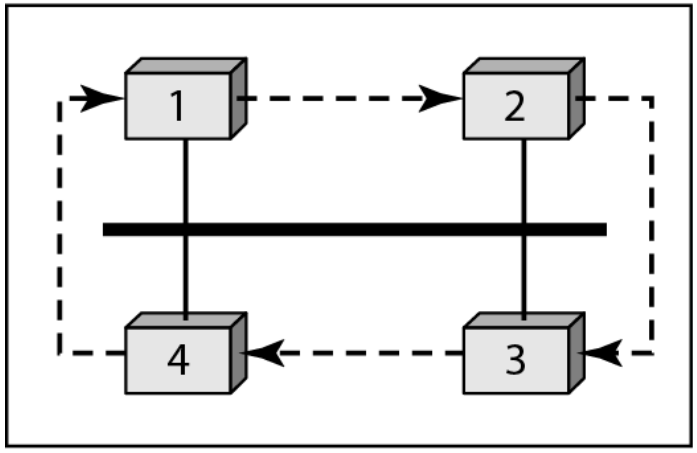
Logical ring and physical topology in token-passing access method



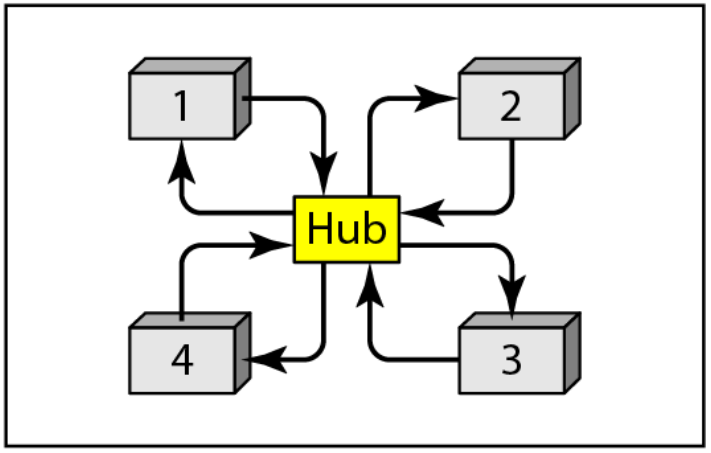
a. Physical ring



b. Dual ring



c. Bus ring



d. Star ring

Computer Science & Engineering

Assignment

Q:1 Explain Lacal Area Network.

Q:2 Explain IEEE 802 standards in Detail.