(Ethernet)CSMA/CD

CSMA

- With CSMA, a station wishing to transmit first listens to the medium to determine if another transmission is in progress (carrier sense).

- If the medium is in use, the station must wait. If the medium is idle, the station may transmit.

- It may happen that two or more stations attempt to transmit at about the same time.

- If this happens, there will be a collision; the data from both transmissions will be garbled and not received successfully.

- To account for this, a station waits a reasonable amount of time, after transmitting, for an acknowledgment, taking into account the maximum round-trip propagation delay, and the fact that the acknowledging station must also contend for the channel in order to respond.

- If there is no acknowledgment, the station assumes that a collision has occurred and retransmits.

CSMA/CD

1. If the medium is idle, transmit; otherwise, go to step 2.

2. If the medium is busy, continue to listen until the channel is idle, then transmit immediately.

3. If a collision is detected during transmission, transmit a brief jamming signal to assure that all stations know that there has been a collision and then cease transmission.

4. After transmitting the jamming signal, wait a random amount of time, then attempt to transmit again. (Repeat from step 1.)
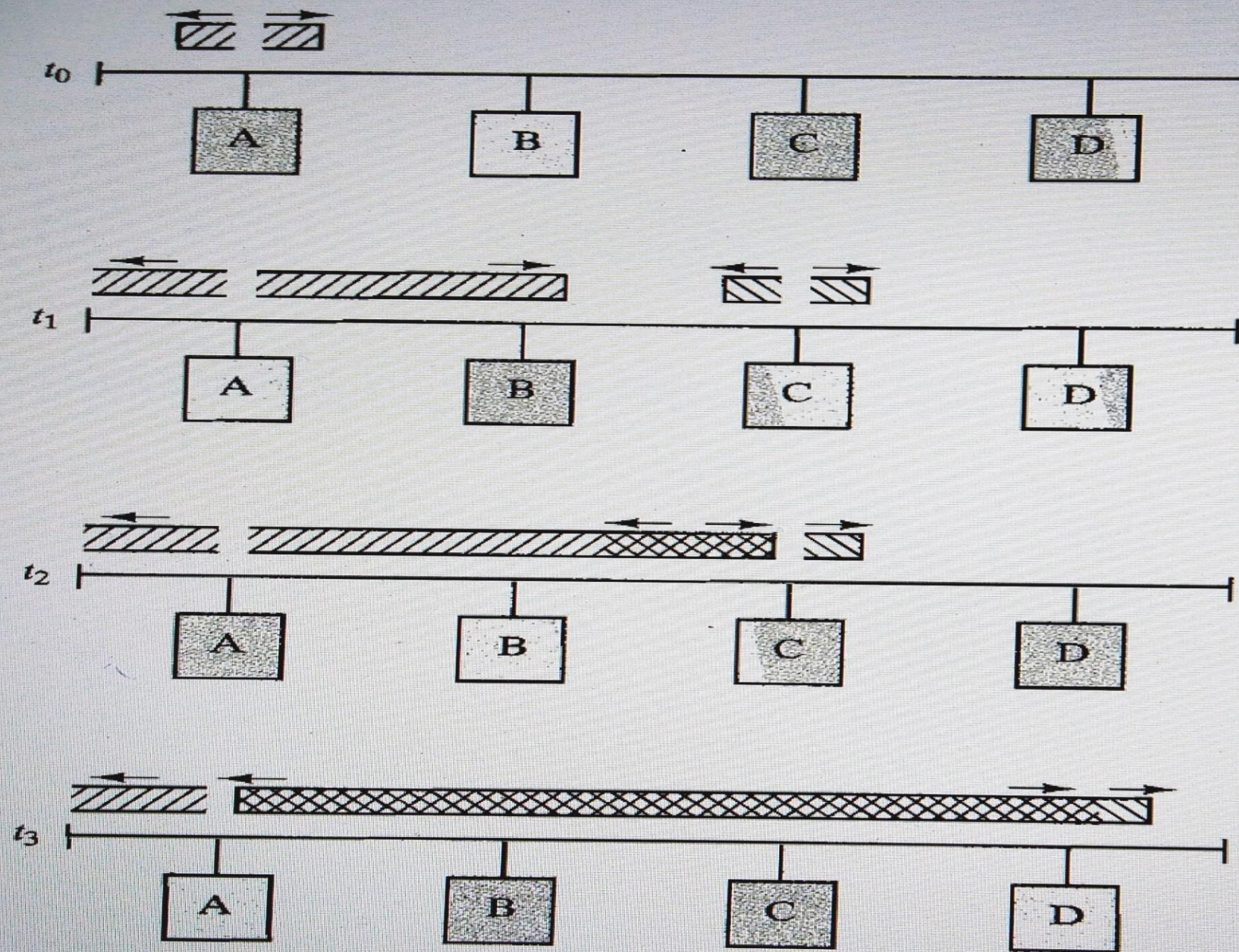
FIGURE 13.1 CSMA/CD operation.

- suppose that station A begins a transmission and that just before that transmission reaches D, D is ready to transmit.

- Because D is not yet aware of A's transmission, it begins to transmit.

- A collision occurs almost immediately and is recognized by D.

- However, the collision must propagate all the way back to A before A is aware of the collision.

- By this line of reasoning, we conclude that the amount of time that it takes to detect a collision is no greater than twice the end-to-end propagation delay

- An important rule followed in most CSMA/CD systems, including the IEEE standard, is that frames should be long enough to allow collision detection prior to the end of transmission.
- If shorter frames are used, then collision detection does not occur, and CSMA/CD exhibits the same performance as the less efficient CSMA protocol