Ethernet

Standard Ethernet	Fast Ethernet	Gigabit Ethernet	Ten-Gigabit Ethernet
Hl l\Ibps	100 Mbps	1 Gbps	10 Gbps

Ethernet evolution

Preamble: 56 bits of alternating 1s and as.

SFD: Start frame delimiter, flag (10101011)

| Preamble	SFD	Destination address	Source address	Length or type	Data and padding	CRC
7 bytes	1 byte. 1	6 bytes	6 bytes	2 bytes		4 bytes
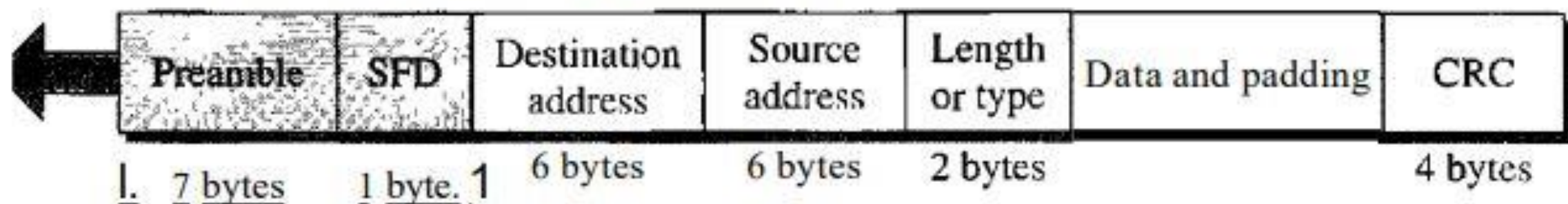
Physical layer header

Minimum payload length: 46 bytes

|- Maximum payload length: 1500 bytes -|

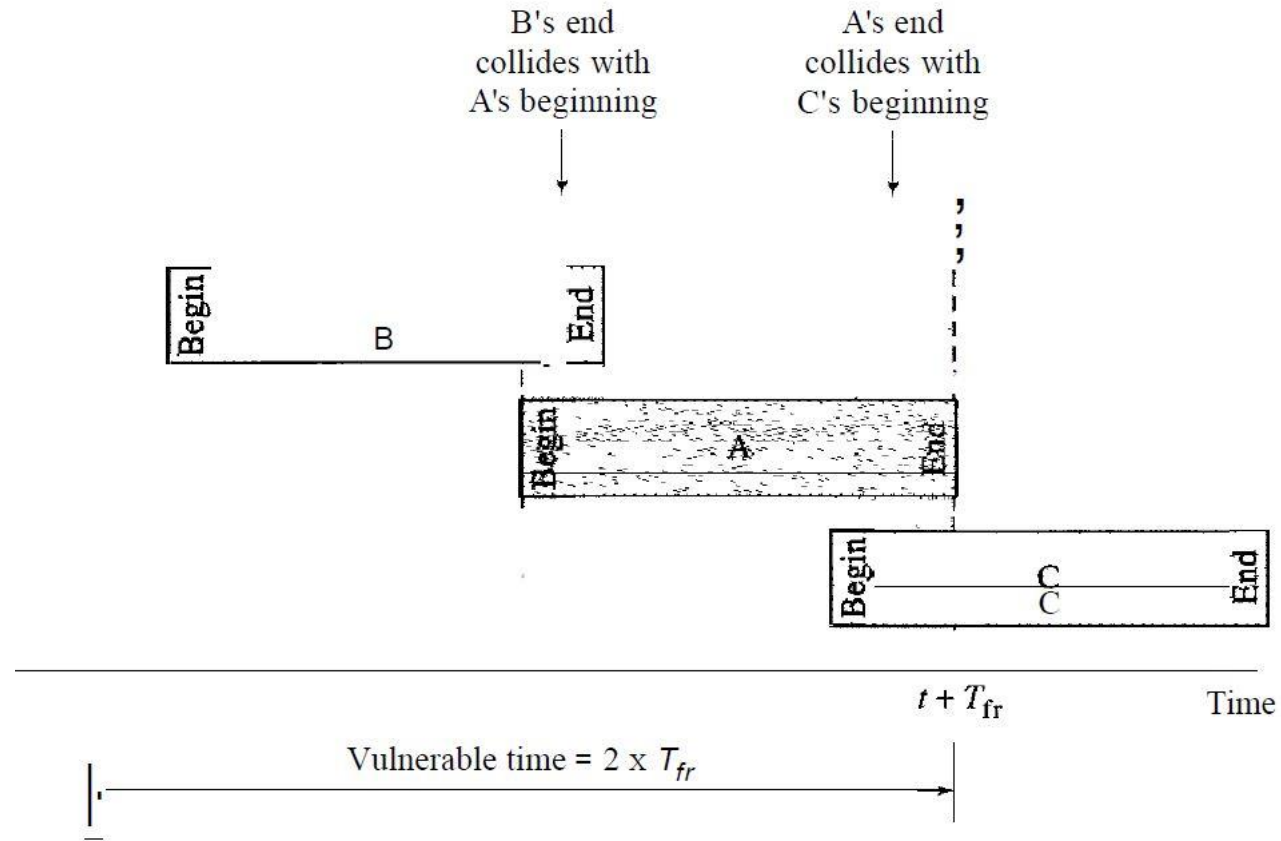| Destination address	Source address	Length PDU	Data and padding	CRC
6 bytes	6 bytes	2 bytes		4 bytes
Minimum frame length: 512 bits or 64 bytes				

MaXImum frame length. 12,144 bIts or 1518 bytes

ALOHA
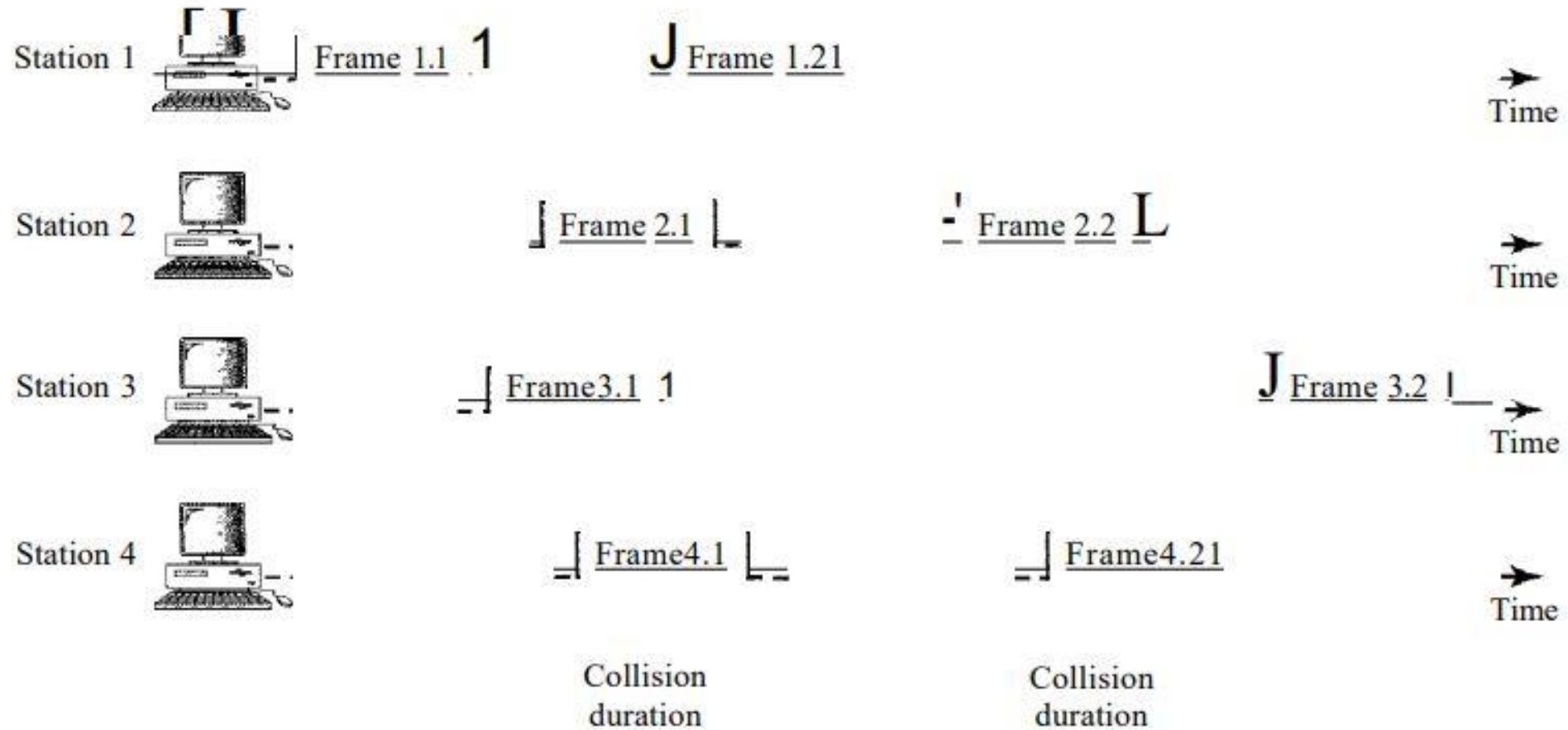
K: Number of attempts

T_p: Maximum propagation time

T_{fr}: Average transmission time for a frame

T_B: Back-off time

Start — Station has a frame to send

$K = 0$

Send the frame

WaitTBtime
$(Ta = Rx\ Tpor\ R \times T_{fr})$

Wait time-Qut time
$(2 \times T_p)$

Choose a random number R between O and $2^K - 1$

No

K_{max} is normally 15

$K > K_{max}$

ACK received?

No — $K = K + 1$

Yes

Yes

Abort

Success
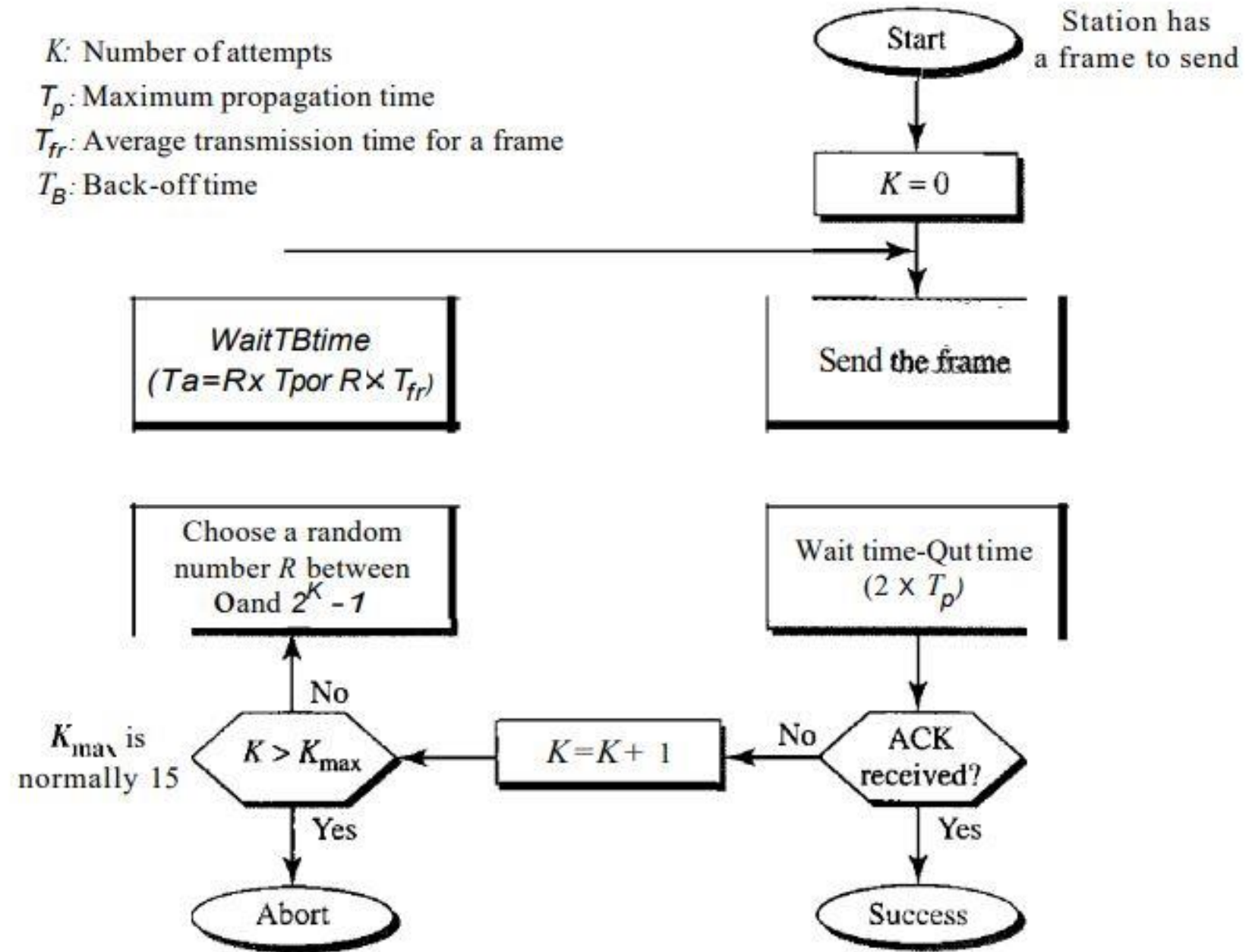
Terminologies for Pure Aloha

- Vulnerable Time: $2 * T_{fr}$

Terminologies for Pure Aloha

- G = Avg number of frame generated by system during one frame time

- Throughput $S = G * e^{-2G}$

- $S_{max} = 0.184$ for $G = \frac{1}{2}$

- We can say if one half of the frame is generated during one frame transmission time then 18.4% of these frames reach their destination successfully.
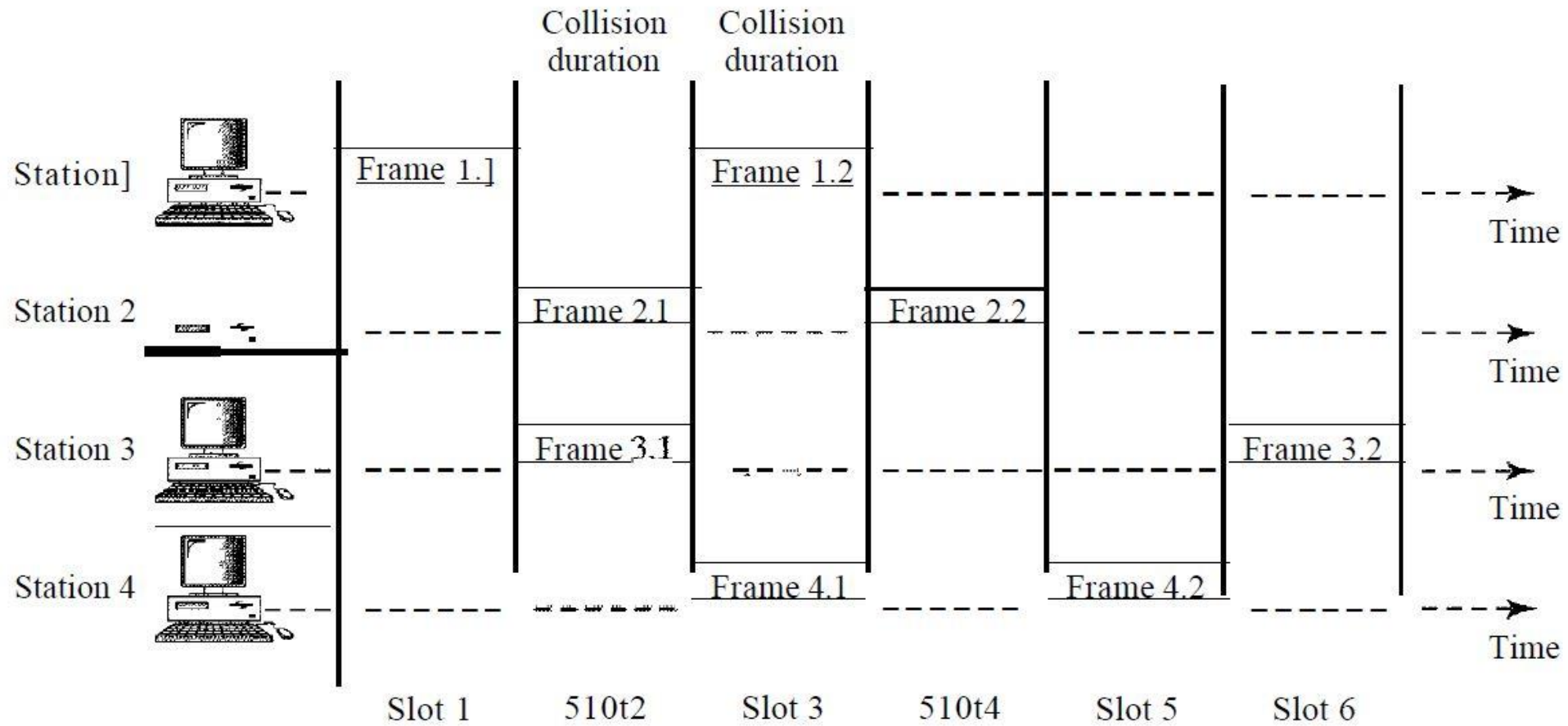
Pure Aloha Questions

A pure ALOHA network transmits 200-bit frames on a shared channel of 200 kbps. What is the throughput if the system (all stations together) produces
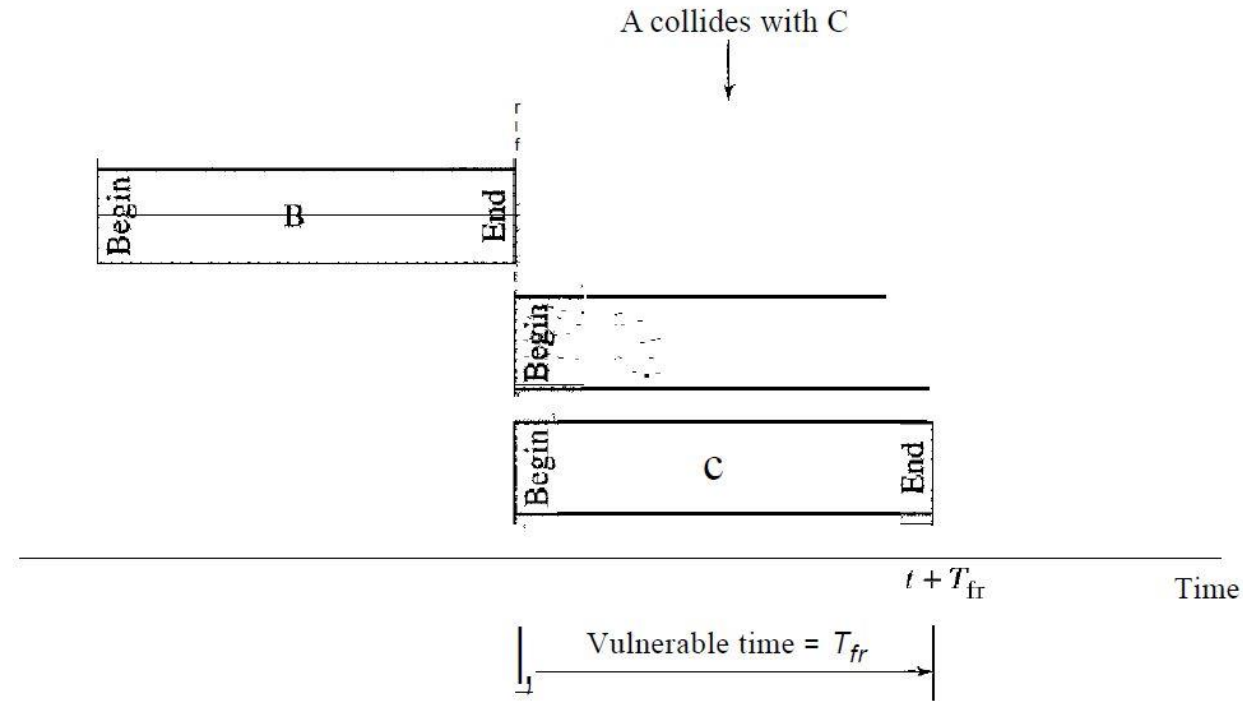
    a. 1000 frames per second

    b. 500 frames per second

    c. 250 frames per second

Slotted Aloha

Station] — Frame 1.1 — Frame 1.2 — Time

Station 2 — Frame 2.1 — Frame 2.2 — Time

Station 3 — Frame 3.1 — Frame 3.2 — Time

Station 4 — Frame 4.1 — Frame 4.2 — Time

Collision duration   Collision duration

Slot 1   510t2   Slot 3   510t4   Slot 5   Slot 6

Terminologies for Slotted Aloha

- Vulnerable Time: T_{fr}

Terminologies for Slotted Aloha

- G = Avg number of frame generated by system during one frame time
- Throughput $S = G * e^{-G}$
- $S_{max} = 0.368$ for G = 1
- We can say if no frames generated by the other station during frame time then these frames reach their destination successfully.

Slotted Aloha Question

A slotted ALOHA network transmits 200-bit frames using a shared channel with a 200-kbps bandwidth. Find the throughput if the system (all stations together) produces

   a.   1000 frames per second

   b.   500 frames per second

   c.   250 frames per second