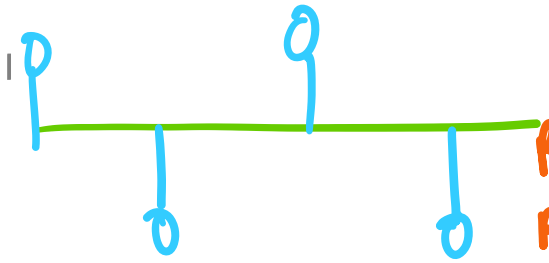
4. Data Link Layer 4

Tuesday, February 23, 2021 11:15 AM

$R \rightarrow \{0 \text{ to } 2^k - 1\}$

$T_B = R \times T_t$ or $R \times T_p$



$R_A = \{0, 1, 2, 3\}$

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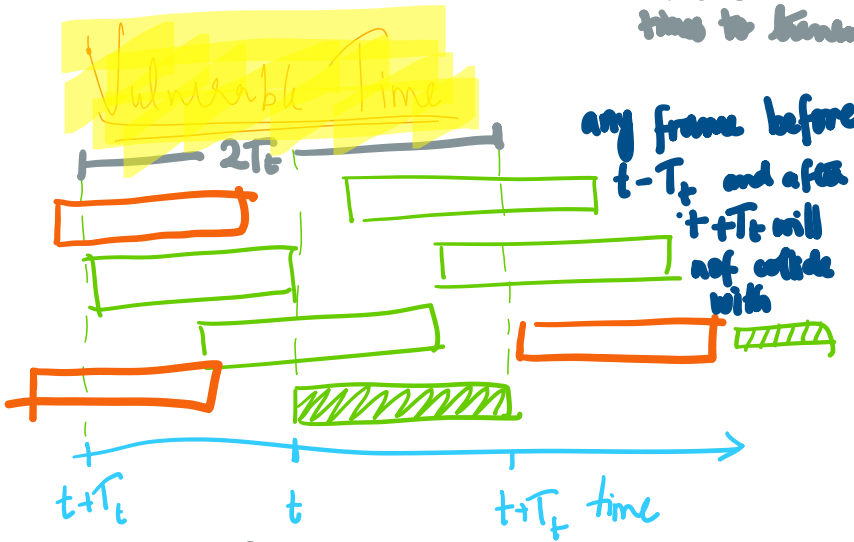
both stations wait different times to transmit the data



We need multiple access if there is one channel shared by multiple stations

time over which if only one station transmits data, there will be no collision. If another station transmits data, there will be a collision.

Throughput

$\eta = G \cdot e^{-2G}$ ← probability of success

G: no. of frames transmitted during T_t

$\frac{d\eta}{dG} = 0$

$G \times -2e^{-2G} + e^{-2G} - 2Ge^{-2G} = -2^{-2G}$

$G = \frac{1}{2}$

$\eta = \frac{1}{2}e^{-2 \times \frac{1}{2}}$

$\approx 18\%$ → throughput

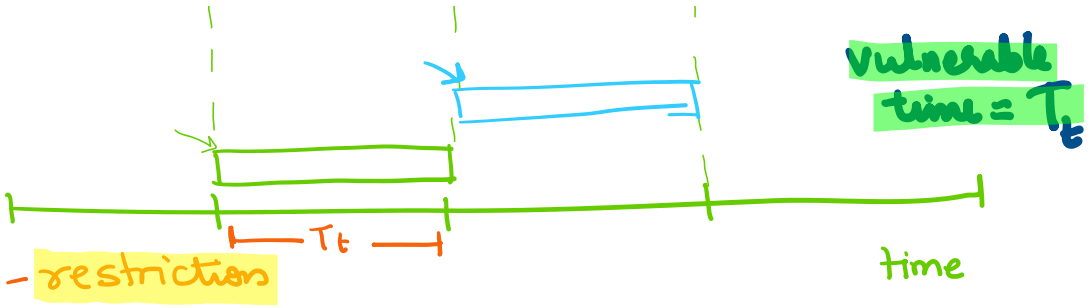
↳ 18 frames/100 successfully delivered

82 frames collided

For ALOHA

SLOTTED ALOHA

Vulnerable



- restriction

transmission allowed only at beginning of the time slot

Slotted ALOHA better in terms of throughput

Throughput:

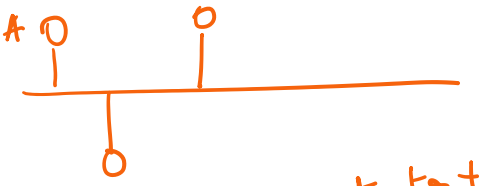
$S = Ge^{-G}$ $(G=1)$

$S = 0.367$

$= 36.7\%$ (36/100 frames successfully delivered)

is → 36%.

CSMA : carrier-sense multiple access



Whenever A wants to transmit data, it senses data [in the channel]