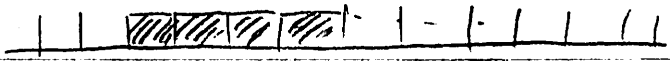
Slotted Aloha



N nodes, Pr(n nodes collide for a consecutive of M slots)

$$\prod_{i=1}^{M} Pr(n \text{ nodes collide in } i\text{th slot})$$

$$= \prod_{i=1}^{M} \left[1 - Pr(\text{no collision in slot } i)\right] = \left[1 - \underbrace{np(1-p)^{n-1}}_{\substack{\text{Prob of no collision} \\ \text{Max it?}}}\right]^{M}$$

$M \uparrow$ $Pr \downarrow$

Given N stations in a mth collision, what is the probability that no collision happens for retransmission for a particular station?

$$\text{Prob} = Pr(\text{no other station choose the same } k)$$

$$= \left[\frac{1}{2^m}\left(1 - \frac{1}{2^m}\right)^{N-1}\right] \times 2^m = \left(1 - \frac{1}{2^m}\right)^{N-1}$$

if m is big, Prob is small.
N is big, Prob is high

bit time: $\frac{1}{10 \times 10^6} \times \overset{k}{1023} \times 512 \doteq \frac{5 \times 10^5}{10^7} = 0.05\,s = 50ms$

$$\underline{r=3}$$

$$\underset{D}{\underline{11010001}}\ \underset{R}{\underline{101}}^{R} = 11010001\underline{000} = D\cdot 2^{r}$$

$$\boxed{0000000}0101 \text{ XOR}$$

$$11010001101 \rightarrow R$$

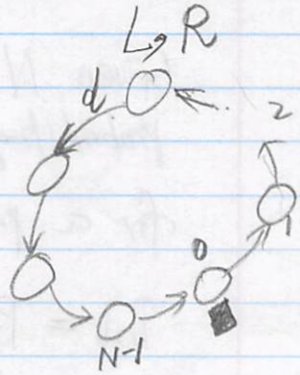
$$= (D\cdot 2^{r}) \text{ XOR } R$$

$$(D\cdot 2^{r}) \text{ XOR } R = nG$$

$$\text{XOR } R \quad = nG \text{ XOR } R$$

$$D\cdot 2^{r} \quad = nG \text{ XOR } R$$

$$R = (D\cdot 2^{r}) \% G$$



<u>Token ring performance</u>

throughput:

"1-node only": $\dfrac{L}{\frac{L}{R}+N\cdot d} = R\cdot\dfrac{L}{R(\frac{L}{R}+N\cdot d)} = R\cdot\dfrac{L}{L+N\cdot d\cdot R}$

$$= R\cdot\frac{1}{1+\frac{N\cdot d\cdot R}{L}} < R$$

"M-node" total: $\dfrac{M\cdot L}{M\cdot\frac{L}{R}+N\cdot d} = R\cdot\dfrac{ML}{R(M\cdot\frac{L}{R}+N\cdot d)} = R\cdot\dfrac{ML}{ML+N\cdot d\cdot R}$

$$= R\cdot\frac{1}{1+\frac{N\cdot d\cdot R}{ML}}$$

individual: $\dfrac{L}{M\cdot\frac{L}{R}+N\cdot d} = \dfrac{R}{M}\cdot\dfrac{1}{1+\frac{N\cdot d\cdot R}{ML}} < \dfrac{R}{M}$