

ELEC3500: Limited Formula Sheet

(Will be updated time to time)

Transmission delay = Packet Length/Transmission Rate

Propagation delay = distance/Speed of light

Binomial Distribution:

$P(X = K) = \binom{n}{k} p^k (1 - p)^{n-k} = \frac{n!}{k!(n-k)!} (p)^k (1 - p)^{n-k}$ where n is the number of trials and k is number of success.

TDM Equations:

$n_f = T_f * R$ where n_f is the number of bits/frame, T_f is the frame duration in second and R is the transmission data rate.

$n_s = \frac{n_f}{N}$ where n_s is the number of bits/slot and N is the

Queuing Equations:

Shannon Channel Capacity:

$$C = B \log_2(1 + SNR)$$

Queuing Equations:

$E[T]$ is the packet delay, $E[N]$ is the number of packets in the queue and P_{loss} is the packet loss probability and $E[W_D]$ is the waiting time.

M/M/1 model:

$$E[T_M] = \left[\frac{\rho}{1 - \rho} \right] \frac{1}{\mu} + \frac{1}{\mu}$$

M/M/1/K model:

$$E[T] = \frac{E[N]}{\lambda(1 - P_{loss})}$$

$$E[N] = \frac{\rho}{1 - \rho} - \frac{(K + 1)\rho^{K+1}}{1 - \rho^{K+1}}$$

$$P_{loss} = \frac{(1 - \rho)\rho^K}{1 - \rho^{K+1}}$$

M/D/1 model:

$$E[T_D] = \left[\frac{\rho}{2(1 - \rho)} \right] \frac{1}{\mu} + \frac{1}{\mu}$$

$$E[W_D] = \left[\frac{\rho}{2(1 - \rho)} \right] \frac{1}{\mu}$$