Information Sheet

- **Discrete Uniform** (k, l)

$$P_X(x) = \begin{cases} \frac{1}{l-k+1} & x = k, k+1, k+2, \dots, l \\ 0 & \text{otherwise} \end{cases}$$

$$E[X] = \frac{k+l}{2}, Var[X] = \frac{(l-k)(l-k+2)}{12}$$

- **Geometric** (p)

$$P_X(x) = \begin{cases} p(1-p)^{x-1} & x = 1, 2, \dots \\ 0 & \text{otherwise} \end{cases}$$

$$E[X] = \frac{1}{p}, Var[X] = \frac{(1-p)}{p^2}$$

- **Binomial** (n, p)

$$P_X(x) = \begin{cases} \binom{n}{x} p^x (1-p)^{n-x} & x = 0, 1, \dots, n \\ 0 & \text{otherwise} \end{cases}$$

$$E[X] = np, Var[X] = np(1-p)$$

- **Poisson** (α)

$$P_X(x) = \begin{cases} \frac{\alpha^x e^{-\alpha}}{x!} & x = 0, 1, 2, \dots \\ 0 & \text{otherwise} \end{cases}$$

$$E[X] = \alpha, Var[X] = \alpha$$

- **Exponential** (λ)

$$F_X(x) = \begin{cases} 1 - e^{-\lambda x} & x > 0 \\ 0 & \text{otherwise.} \end{cases}$$

$$E[X] = 1/\lambda, Var[X] = 1/\lambda^2$$

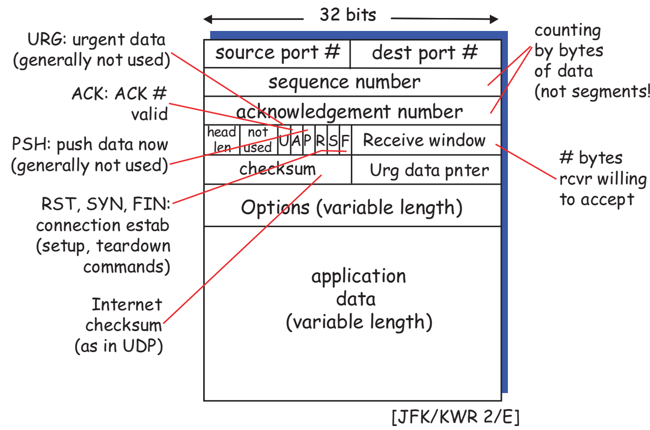
- **Little's Theorem:** $N = \lambda T$
- **M/M/1 Queue:** Avg. pkt delay in system $= \frac{1}{\mu - \lambda}$

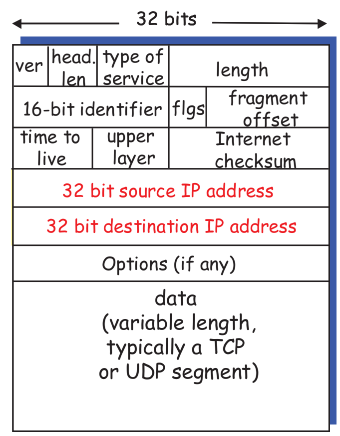
Assuming:

- $T_{pkt} = 1$ unit,
- $a = \frac{\text{Propagation time}}{\text{Pkt transmission time}}$
- K = the number of pkts sent every $1 + 2a$ time units, and
- $\overline{N}_x$ = the average number of transmitted pkts to transmit one *original* pkt successfully,

then for **Go-Back-N:**

$$\overline{Thr} = \frac{K}{\overline{N}_x(1+2a)}$$

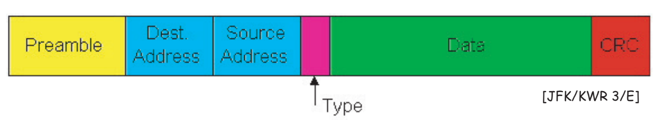




IPV4 segment format

[JFK/KWR 2/E]

Ethernet Frame: Preamble (8 bytes), Addresses (6+6 bytes), Data + Pad: (minimum 46 bytes, maximum 1500 bytes), Type (2 bytes), CRC (4 Bytes)



Ethernet Efficiency: Assuming

- $a = \frac{\text{maximum propagation time between any two adapters}}{\text{time to transmit a maximum-size Ethernet frame}}$
- Efficiency = The long-run fraction of time during which frames are being successfully transmitted

then

$$\text{Ethernet Efficiency} \approx \frac{1}{1 + 5a}$$