A multimedia scenario

- Three audio/video streams are transported on a fixed network link
- The streams are
  - The silence of the innocent
    - r=146.64 kbit/s
    - b=174.577 kbit
    - H=0.9134
  - Star Wars Episode IV
    - r=156.48 kbit/s
    - b=55.214 kbit
    - H=0.8988
  - NBC sport sequence
    - r=440.16 kbit/s
    - b=218.102 kbit
    - H=0.8968
- Calculate the probability that delay exceeds the threshold 0.15 s as a function of the link capacity $C=1x10^6$, $C=2x10^6$

A multimedia scenario

$$X(t) = X_1(t) + X_2(t) + X_3(t)$$

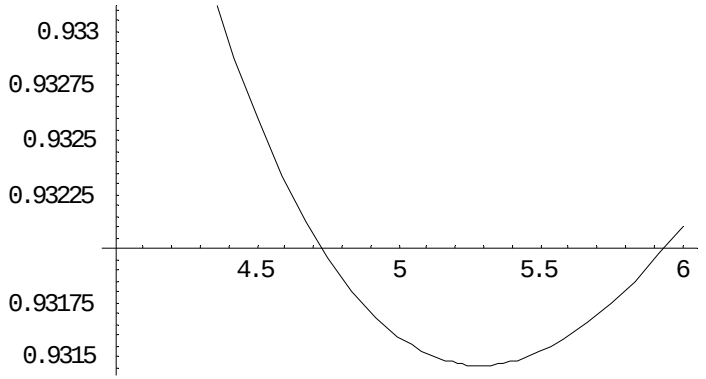
$$E(X(t)) = 0.14664 \times 10^6 t + 0.15649 \times 10^6 t + 0.44016 \times 10^6 t = 0.7437 \times 10^6 t$$

$$\text{var}(X(t)) = 0.14664 \times 10^6 \times 0.174577 \times 10^6 t^{1.8268} + 0.15649 \times 10^6 \times 0.055214 \times 10^6 t^{1.7976} + 0.44016 \times 10^6 \times 0.218102 \times 10^6 t^{1.7936} =$$

$$= 0.0256 \times 10^{12} t^{1.8268} + 0.00864 \times 10^{12} t^{1.7976} + 0.09596 \times 10^{12} t^{1.7936}$$

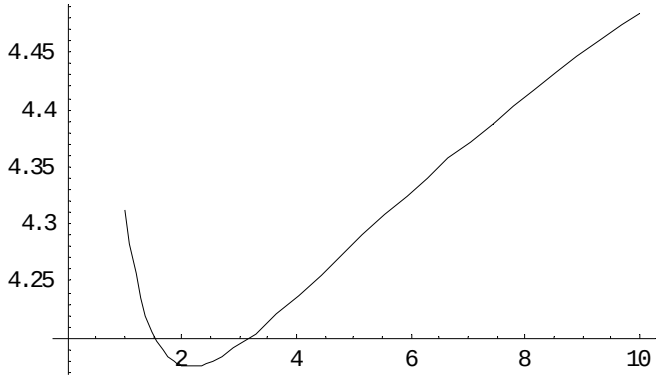
$$\alpha(t) = -\frac{0.7437 \times 10^6 t - C(t + 0.15)}{\sqrt{0.0256 \times 10^{12} t^{1.8268} + 0.00864 \times 10^{12} t^{1.7976} + 0.09596 \times 10^{12} t^{1.7936}}}$$

A multimedia scenario ($C=1x10^6$)



$\alpha_{min}=0.931426$, $p=0.64$

A multimedia scenario ($C=2x10^6$)



$\alpha_{min}=4.17538$, $p=1.6x10^{-4}$