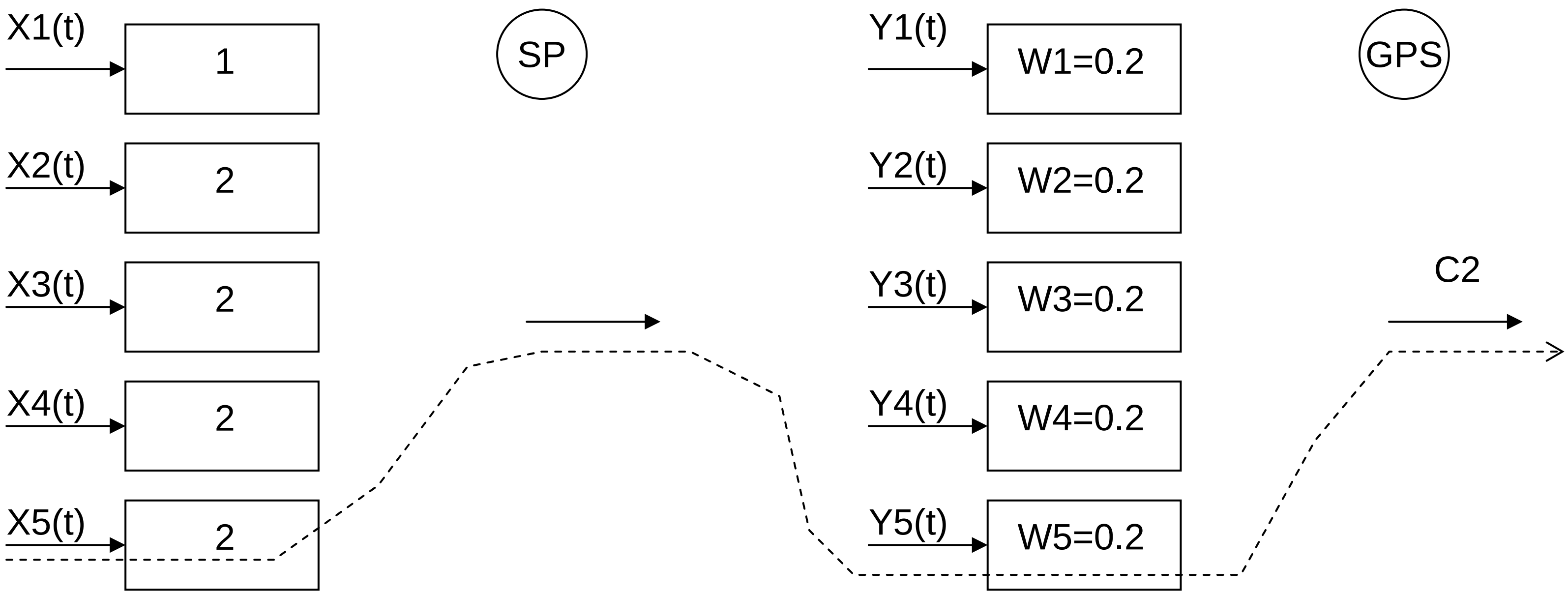
A multihop case



{mX1 → 1000000, mX2 → 1000000, mX3 → 1000000, mX4 → 1000000, mX5 → 1000000, bX1 → 1000000, bX2 → 1000000, bX3 → 1000000, bX4 → 1000000, bX5 → 1000000, mY1 → 1000000, mY2 → 1000000, mY3 → 1000000, mY4 → 1000000, bY1 → 1000000, bY2 → 1000000, bY3 → 1000000, bY4 → 1000000, w1 → 0.2, w2 → 0.2, w3 → 0.2, w4 → 0.2, w5 → 0.2, C2 → 25000000, d → 0.05, HX1 → 0.85, HX2 → 0.85, HX3 → 0.85, HX4 → 0.85, HX5 → 0.85, HY1 → 0.85, HY2 → 0.85, HY3 → 0.85, HY4 → 0.85}

Calculate the probability that the delay of flow Y5(t) exceeds 0.05 s in the GPS scheduler

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$$E\left(X_1(t)\right)=m_{X_1}t \quad \mathrm{var}\left(X_1(t)\right)=m_{X_1}b_{X_1}t^{2H_{X_1}} \quad E\left(Y_1(t)\right)=m_{Y_1}t \quad \mathrm{var}\left(Y_1(t)\right)=m_{Y_1}b_{Y_1}t^{2H_{Y_1}}$$

$$E\left(X_2(t)\right)=m_{X_2}t \quad \mathrm{var}\left(X_2(t)\right)=m_{X_2}b_{X_2}t^{2H_{X_2}} \quad E\left(Y_2(t)\right)=m_{Y_2}t \quad \mathrm{var}\left(Y_2(t)\right)=m_{Y_2}b_{Y_2}t^{2H_{Y_2}}$$

$$E\left(X_3(t)\right)=m_{X_3}t \quad \mathrm{var}\left(X_3(t)\right)=m_{X_3}b_{X_3}t^{2H_{X_3}} \quad E\left(Y_3(t)\right)=m_{Y_3}t \quad \mathrm{var}\left(Y_3(t)\right)=m_{Y_3}b_{Y_3}t^{2H_{Y_3}}$$

$$E\left(X_4(t)\right)=m_{X_4}t \quad \mathrm{var}\left(X_4(t)\right)=m_{X_4}b_{X_4}t^{2H_{X_4}} \quad E\left(Y_4(t)\right)=m_{Y_4}t \quad \mathrm{var}\left(Y_4(t)\right)=m_{Y_4}b_{Y_4}t^{2H_{Y_4}}$$

$$E\left(X_5(t)\right)=m_{X_5}t \quad \mathrm{var}\left(X_5(t)\right)=m_{X_5}b_{X_5}t^{2H_{X_5}}$$

A multihop case

$$\mathrm{var}\left(S_{X_5}(t)\right) = \mathrm{var}\left(X_1(t)\right) + \mathrm{var}\left(X_2(t)\right) + \mathrm{var}\left(X_3(t)\right) + \mathrm{var}\left(X_4(t)\right)$$

$$\mathrm{var}\left(Y_5(t)\right) = \max\left(\mathrm{var}\left(X_5(t)\right), \mathrm{var}\left(S_{X_5}(t)\right)\right)$$

$$E\left(Y_5(t)\right) = E\left(X_5(t)\right)$$

$$E\left(S_{Y_5}(t)\right) = w_5 C_2 t + \sum_{j=1}^{4} \frac{w_5}{\sum_{k=1\cdots 5, k\neq j} w_k} \left(w_j C_2 t - E\left(X_j(t)\right)\right)$$

A multihop case

$$\operatorname{var}\left(S_{Y_5}(t)\right)=\sum_{j=1}^{4}\left(\frac{w_5}{\sum_{k\neq j} w_k}\right)^2 \operatorname{var}\left(X_j(t)\right)$$

$$\alpha(t)=-\frac{E\left(Y_5(t)\right)-E\left(S_{Y_5}(t+d)\right)}{\sqrt{\operatorname{var}\left(Y_5(t)\right)+\operatorname{var}\left(S_{Y_5}(t+d)\right)}}$$

$$\alpha(t)=\frac{-1\times10^6 t+9\times10^6(t+0.05)}{\sqrt{2.5\times10^{11}(t+0.05)^{1.7}+4\times10^{12}t^{1.7}}}$$

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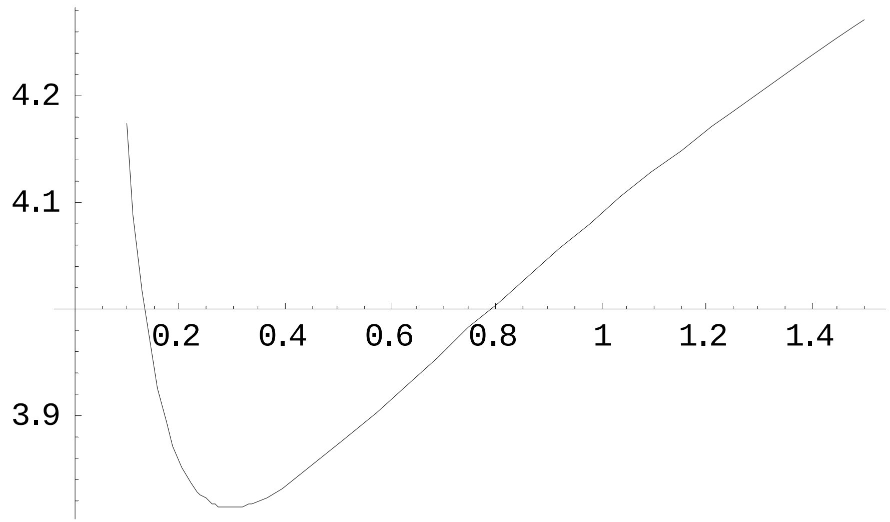

$$\Pr\left(D > 0.05\right) = e^{-\frac{\alpha_{\min}^2}{2}} = 6.9 \times 10^{-4}$$