SP scheduler

- A two-priorities SP scheduler is offered
  - In priority 1
    - N_1 traffic flows with
    - r_1 = 64 (kbit/s)
    - b_1 = 128 (kbit)
    - d_1 = 0.01 (s)
    - p_1 = 0.00001
  - In priority 2
    - N_2 traffic flows with
    - r_2 = 128 (kbit/s)
    - b_2 = 256 (kbit)
    - d_2 = 0.01 (s)
    - p_2 = 0.001
  - The line capacity of the scheduler is C = 10 (Mbit/s)
  - Calculate the admission curve of the scheduler

SP scheduler

- The maximum number of priority-1 flows is

$$N_{1,\max} = \frac{2d_1C^2}{2d_1r_1C - r_1b_1\ln(p_1)} = 18.67$$

- The n^*_1 value is

$$N_1^* = \frac{\left(Cd_2 - b_1\ln(p_2) - \sqrt{-\ln(p_2)\left(2d_2b_1C - b_1^2\ln(p_2)\right)}\right)}{r_1d_2} = 7.95$$

- Thus:

$$\min\left(N_1^*, N_{1,\max}\right) = \min(7.95, 18.67) = 7.95$$

SP scheduler

- Then:

$$N_2 \leq \begin{cases} \dfrac{\left(\dfrac{B_1}{b_2}\right)^2 - \left(2C - 2A_1 + \dfrac{B_1}{b_2}\right)^2 - \dfrac{4B_1 \ln(p_2)}{d_2} - 4\left(C - A_1 + \dfrac{B_1}{b_2}\right)\sqrt{(C-A_1)^2 + \dfrac{2B_1 \ln(p_2)}{d_2}}}{-4r_2\left(2\left(C - A_1 + \dfrac{B_1}{b_2}\right) - \dfrac{b_2 \ln(p_2)}{d_2}\right)} & N_1 \leq \min\left(N_1^*, N_{1,\max}\right) \\ 0 & \textit{otherwise} \end{cases}$$

SP scheduler

- Therefore:

$$N_2 \le \begin{cases} \dfrac{\left(\dfrac{N_1 r_1 b_1}{b_2}\right)^2 - \left(2C - 2N_1 r_1 + \dfrac{N_1 r_1 b_1}{b_2}\right)^2 - \dfrac{4N_1 r_1 b_1 \ln(p_2)}{d_2} - 4\left(C - N_1 r_1 + \dfrac{N_1 r_1 b_1}{b_2}\right)\sqrt{(C - N_1 r_1)^2 + \dfrac{2N_1 r_1 b_1 \ln(p_2)}{d_2}}}{-4r_2\left(2\left(C - N_1 r_1 + \dfrac{N_1 r_1 b_1}{b_2}\right) - \dfrac{b_2 \ln(p_2)}{d_2}\right)} & N_1 \le \min\left(N_1^*, N_{1,\max}\right) \\ 0 & \textit{otherwise} \end{cases}$$

SP scheduler

- Numerically:

$$N_2 \leq \begin{cases} \dfrac{7.8125\times10^8 + 5\times10^6\sqrt{(N_1-3067.64)(N_1-7.95)} + \left(-5.17096\times10^7 - 16000\sqrt{(N_1-3067.64)(N_1-7.95)}\right)N_1 + 16000N_1}{1.96893\times10^8 - 64000N_1} & N_1 \leq 7.95 \\ 0 & \textit{otherwise} \end{cases}$$

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