

Mathcad sheet for derivation of ARQ SAW Nr

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$$N_r := \sum_{k=1}^{\infty} [k \cdot p^{k-1} \cdot (1-p)]$$

Expression for Nr

$$N_r \rightarrow \frac{1}{p-1}$$

Use Mathcad symbolic solver to solve for Nr

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Some scratch work needed for ARQ SW with errors case...

$$N_r := \frac{(1-p + K \cdot p)}{1-p}$$

$$K := \frac{2 \cdot t_{pr} + t_{fr}}{t_{fr}}$$

$$N_r := \frac{\left(1-p + \frac{2 \cdot t_{pr} + t_{fr}}{t_{fr}} \cdot p\right)}{1-p}$$

$$N_r := \frac{t_{fr} + 2 \cdot p \cdot t_{pr}}{t_{fr} \cdot (p-1)}$$

Mathcad simplify here

$$\frac{t_{fr} + 2 \cdot p \cdot t_{pr}}{t_{fr} \cdot (1-p)}$$

This is Nr "cleaned-up"

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