5.1.5.

~~Repeat~~ N stations share a 56 kbps pure Aloha channel, with 1000 b ~~average~~ frames sent every 100 s on average by each one, even if the previous one hasn't been sent yet (outgoing frame buffer). What is the max N?

$\lambda_{node} = \frac{1\,frame}{100\,s}$; $\lambda = N\lambda_{node} = N \cdot \frac{1\,frame}{100\,s}$

$T_{tx} = \frac{S_f}{R} = \frac{1000\,b}{56\,kbps} = 17.86\,ms$

$\Big\} \Rightarrow G = \lambda T_{tx} = N\lambda_{node} T_{tx} \Rightarrow N = \frac{G}{\lambda_{node} T_{tx}}$

Pure Aloha: $G_{optimum} = \frac{1}{2} \Rightarrow N_{opt} = \frac{G_{optim.}}{\lambda_{node} T_{tx}} = \frac{1}{2 \cdot \frac{1}{100\,s} \cdot \frac{1000\,b}{56\,kbps}} = \boxed{2800}$ [nodes]

5.1.6.

10 000 stations compete for the usage of a slotted Aloha channel with an average of 18 requests/hour per station and 125 μs slots. What is the approximate channel load?

Load $G = \lambda T = n\lambda_{node} \cdot T = 10^4 \cdot \frac{18\,req}{3600\,s} \cdot \frac{125 \cdot 10^{-6}\,s}{1\,req} = 6.25 \cdot 10^{-3}$

$\mu = G e^{-G} = 6.25 \cdot 10^{-3} \cdot e^{-6.25 \cdot 10^{-3}} = \boxed{6.211 \cdot 10^{-3}}$