Exercice - Analysis

Problem

A router is sending packets through a 64 kbps link. The length of the packets is an exponential random variable with mean 400 bytes. The interval between arrival of packets is an exponential random variable with mean 15 packets per second. During a packet transmission, the router bufferizes the other arriving packets in a FIFO queue.

1. Formulate the problem as M/M/1 queue.
2. What is the stability condition ?
3. Compute the following in the stationary regime:
   - Average number of packets in the system
   - Average latency of the system

Exercice - Simulation 1

Problem

A router is sending packets through a 64 kbps link. The length of the packets is an exponential random variable with mean 400 bytes. The interval between arrival of packets is an exponential random variable with mean 15 packets per second. During a packet transmission, the router bufferizes the arriving packets in a FIFO queue.

1. Using SimPy, simulate the corresponding Poisson process packet generator (use random.expovariate)
2. What is the average number of generated packets per time unit ?

Exercice - Simulation 2

Problem

A router is sending packets through a 64 kbps link. The length of the packets is an exponential random variable with mean 400 bytes. The interval between arrival of packets is an exponential random variable with mean 15 packets per second. During a packet transmission, the router bufferizes the arriving packets in a FIFO queue.

1. Using SimPy, model the queue/server system corresponding to the router/link
2. Using SimPy, simulate the M/M/1 queue
3. Compute the following in the stationary regime:
   - Average number of packets in the system
   - Average latency of the system

References

1. SimPy official page: https://simpy.readthedocs.io/en/latest/contents.html
2. Git reposit: https://gricad-gitlab.univ-grenoble-alpes.fr/mendilm/tp_perf2018.git
3. Introduction to simulation: Sanchez, Paul J. "As simple as possible, but no simpler: a gentle introduction to simulation modeling." In Simulation Conference, 2006. WSC 06. Proceedings of the Winter, pp. 2-10. IEEE, 2006.