

EE 6340 Introduction to Telecommunications Networks

Simulation Track # 1

This simulation track is designed to offer our students the opportunity to obtain simulation results for some queueing systems. The purpose of this track is twofold:

1. validate the assumption made in class when deriving some of the analytical expressions that relate to queueing systems, and
2. be exposed to even driven simulation environments and tools.

Team of two students are encouraged, but not enforced. You will need to inform the instructor of your preference. If you work in a team with a student colleague the scores will be given to the team collectively and not individually.

Guidelines :

Assignments should be returned by the deadline in order to be considered for full credit. Reports should have the full name and student ID (optional) of the author. In each report, a brief explanation of the formulas derived and used by the student should be included along with the requested plots. The plots should indicate clearly (e.g., with a legend) what the different curves represent. A short paragraph (2-3 sentences long) for each set of plots will be required to comment on the curves, describing the results found and proposing their intuitive explanation(s). *Readable hand-written reports are fine .*

• Assignment 1: [1 week]

- Read documentation about the even-driven simulator OMNET
- Install OMNET on your computer and familiarize with its features, especially those used to simulate queues
- Inform the Instructor of whether you want to work individually or with a team member, and the name of the other member in the latter case

• Assignment 2: [1 week]

- Report any problem that you are experiencing with the installation of OMNET to the Instructor
- Read and learn about *confidence interval and confidence level* when reporting results obtained from experimentation (e.g., what to do with the results obtained from simulating a queue)
- Simulate with OMNET the M/M/1 queue
- Create Plot 1: Expected waiting time (W) versus server utilization (ρ) for the M/M/1 queue, using both simulation and numerical solution of the M/M/1 analytical expression for $W(\rho)$

- Create Plot 2: Expected number of customers in the queue (N) versus server utilization (ρ) for the M/M/1 queue, using both simulation and numerical solution of the M/M/1 analytical expression for $N(\rho)$