

ECE Communication Networks 1
Computer Project 1, Due Date: Nov 16th, 2006
Fall 2006

Overview

In this project you will form a team of 2 students (you may choose your team member). Your task is to explore the behavior of the Poisson process.

Project Description

In class we have used two properties of the Poisson process: the superposition property and the decomposition property. In this project, you are to experimentally validate each of these two properties.

- *Superposition Property:* Consider m independent Poisson sources with rates λ_k . If we combine these streams into a single stream then we have a Poisson process with rate $\lambda = \sum \lambda_k$. Confirm this observation through simulation.
- *Decomposition Property:* Consider a Poisson stream of rate λ that is broken out into m separate streams. Each arrival is assigned to one of the m streams with probability p_k . Show, via simulations, that the k -th output stream is Poisson with rate $p_k\lambda$. Further, show via simulations, that these streams are statistically independent.

What to Turn In

In order to do this project correctly, you need to implement a method to generate a Poisson process, and then come up with an appropriate technique to validate the claim that the superpositions/decompositions are Poisson, and another method to validate the independence of the decompositions.

Your report should discuss how you implemented the Poisson source, and what techniques you used to validate the above hypotheses.

Note: You may use whatever language you like, though MATLAB might be the most natural for this assignment.