

A Queueing System with Exceptional First Service, Feedback and Service Times of Phase Type

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Abstract

We analyse a special kind of $M/PH/1/r$ FCFS queue where the first customer who arrives in the system, at the beginning of a busy period, has a service time ruled by a different distribution function than customers getting service during the busy period; besides, after the customer is served completely, he will decide either to return to the queue again for another service with probability θ or to leave the system forever with probability $\bar{\theta} = 1 - \theta$, where $0 \leq \theta < 1$. An arriving customer who finds the system totally full is lost. We give an algorithm for calculating the steady-state probabilities of the Markov process underlying the considered queueing system. Some specific features about particular systems are also studied. Finally, diverse numerical results are presented and discussed.

Keywords: Queueing System, Phase Type Distributions, Bernoulli Feedback Scheme, Steady-State (Stationary) Distribution.