

The Markov-modulated Erlang Loss System

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Abstract

Since it was first proposed by Erlang in 1917, the *Erlang Loss model* has arguably been the most successful contribution by queueing theory to the dimensioning of telecommunication systems. In this talk we shall discuss a generalisation of this model loss in which both the arrival rate and the per-customer service rate vary according to the state of an underlying finite-state, continuous-time Markov chain. We can think of such a system as a Markov-modulated version of the Erlang Loss model.

We obtain a closed-form matrix expression for the stationary distribution of this queue. This, in particular, provides us with an explicit expression for the stationary probability that the queue is full, which can be regarded as the Markov-modulated counterpart of the famous Erlang loss formula. We can use this expression to compute a number of performance measures of interest, in particular the the probability that an arbitrary arriving customer is blocked.

Keywords

Erlang Loss System, Markov Modulated process.