

THE IMPACT OF DELAY ANNOUNCEMENTS IN MANY-SERVER QUEUES WITH ABANDONMENT

by

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Abstract

This paper studies the performance impact of making delay announcements to arriving customers who must wait before starting service in a many-server queue with customer abandonment. The queue is assumed to be invisible to waiting customers, as in most customer contact centers, when contact is made by telephone, email or instant messaging. Customers who must wait are told upon arrival either the delay of the last customer to enter service or an appropriate average delay. Models for the customer response are proposed. For a rough-cut performance analysis, prior to detailed simulation, two approximations are proposed: (1) the equilibrium delay in a deterministic fluid model and (2) the equilibrium steady-state delay in a stochastic model with fixed delay announcements. These approximations are shown to be effective in overloaded regimes, where delay announcements are important, by making comparisons with simulations. Within the fluid-model framework, conditions are established for the existence and uniqueness of an equilibrium delay, where the actual delay coincides with the announced delay. Multiple equilibria can occur if a key monotonicity condition is violated.

Subject classifications: queues, balking and renegeing: delay announcements; queues, multi-channel: performance impact of delay announcements; queues, approximations: fluid models for many-server queues with delay announcements.

Area of Review: Stochastic Models

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