On Gaussian priority queues

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A simple approach for studying queues with Gaussian input, based on the generalized Schilder theorem, was presented in Addie et al. (1999). A central role is played by the observation that the most probable paths that produce a queue of given size can be given in a simple way in terms of the covariance function. In this talk, the technique is extended to priority queues. Whereas knowing the most probable path is just interesting but does not help in evaluating the probability asymptotics in the case of a simple queue, the paths are of great value in the case of a priority queue. This is because studying the path reveals whether the “empty buffer approximation” by Berger and Whitt (1998) is accurate or not. An interesting observation is the following: in some rather general setups (at least), when the mean rate of lower priority traffic is high enough, then the empty buffer approximation holds if the cumulative variance function of high priority traffic is multiplied by any constant. Simulation results with fractional Brownian input are presented.

References