

MARTINGALE APPROACH FOR TAIL ASYMPTOTIC PROBLEMS IN THE
GENERALIZED JACKSON NETWORK

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Abstract: We study the tail asymptotic of the stationary joint queue length distribution for a generalized Jackson network (GJN for short), assuming its stability. For the two-station case, this problem has recently been solved in the logarithmic sense for the marginal stationary distributions under the setting that arrival processes and service times are of phase-type. In this paper, we study similar tail asymptotic problems on the stationary distribution, but problems and assumptions are different. First, the asymptotics are studied not only for the marginal distribution but also the stationary probabilities of state sets of small volumes. Second, the interarrival and service times are generally distributed and light tailed, but of phase-type in some cases. Third, we also study the case that there are more than two stations, although the asymptotic results are less complete. For them, we develop a martingale method, which has been recently applied to a single queue with many servers by the author.

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