# Zero-Automatic Networks

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**Abstract**

We continue the study of zero-automatic queues first introduced in *Zero-Automatic Queues and Product Form*, T.-H. Dao-Thi and J. Mairesse, Adv. Appl. Probab., 2007. These queues are characterized by a special buffering mechanism evolving like a random walk on some infinite group or monoid. The simple *M/M/1* queue and Gelenbe's $G$-queue with positive and negative customers are the two simplest 0-automatic queues. All stable 0-automatic queues have an explicit "multiplicative" stationary distribution and a Poisson departure process. In this paper, we introduce and study networks of 0-automatic queues. We consider two types of networks, with either a Jackson-like or a Kelly-like routing mechanism. In both cases, and under the stability condition, we prove that the stationary distribution of the buffer contents has a "product-form" and can be explicitly determined. Furthermore, the departure process out of the network is Poisson.

**Keywords:** Queueing theory, Jackson network, Kelly network, product form, zero-automatic.

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