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Best regards,
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To whom it may concern,

We are happy to inform that the paper submitted by Carlos Martínez-Rodríguez, Raúl Montes-de-Oca and Patricia Saavedra to ICORES 2017 with number 37, entitled “Network of $M/M/1$ Cyclic Polling Systems”, has been accepted as a Short Paper, to be presented February (23 - 25) at Porto, Portugal.

All papers accepted to ICORES 2017 were peer reviewed by at least two experts from the international program committee, in a double-blind review process. The paper will be published in the conference proceedings with up to 8 pages, and after being presented at ICORES 2017 it will be included in the SCITEPRESS Digital Library under a specific DOI to be specified after the proceedings are published, and submitted for indexation to Thomson Reuters Conference Proceedings Index, Engineering Index, DBLP, INSPEC and Scopus.

Best Regards,

Greg H. Parlier  
(ICORES Program Chair)
Network of $M/M/1$ Cyclic Polling Systems

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Keywords: Networks of Cyclic Polling System, Exhaustive Policy, Exponential Inter-arrivals Times.

Abstract: This paper presents a Network of Cyclic Polling Systems that consists of two cyclic polling systems with two queues each when transfer of users from one system to the other is imposed. This system is modelled in discrete time. It is assumed that each system has exponential inter-arrival times and the servers apply an exhaustive policy. Closed form expressions are obtained for the first and second moments of the queue’s lengths for any time.

1 INTRODUCTION

A Cyclic Polling System (CPS) consists of multiple queues that are attended by a single server in cyclic order. Users arrive at each queue according to independent processes which are independent of the service times. The server attends each queue according to a service policy previously established. When the server finishes, it moves to the next queue incurring in a switchover time. It will be assumed that the switchover times form a sequence of independent and identically distributed random variables. A thorough analysis has been made on this subject. For an overview of the literature on polling systems, their applications and standard results, the authors refer to such surveys as: (Boon et al., 2011; Levy and Sidi, 1990), and (Vishnevskii and Semenova, 2006).

Here a Network of Cyclic Polling System (NCPS) is considered. It consists of two cyclic polling systems, each of them with two queues that are attended, according to an exhaustive policy. The exhaustive policy service consists in attending all users until the queue is emptied. The system is observed at fixed times where the length of the slot is proportional to the time service. The arrivals to each queue are assumed to be Poisson processes with independent identical distributed (i.i.d.) inter-arrival exponential times. When the servers finish, they move to the next queue incurring a switchover time. It will be assumed that the switchover times form a sequence of independent and identically distributed random variables. The novelty in this work is that the two systems are connected in the following way: the users enter the system through one of the queues. After being served instead of leaving the system, they transfer to one of the queues of the other system, see Figure 1. All the users leave the network after being attended by the two servers. This network requires considering two kinds of arrival processes at each queue. One of them corresponds to the arrival process of the users that enter the system for the first time through that queue, and the other one corresponds to the arrival of the transfer users. Specifically, in this article the authors are looking for explicit formulae for the first and second order moments at any time. The buffer occupancy method is applied. It uses the Probability Generating Function (PGF) of the joint distribution function of the queues lengths at the moment the server arrives to the queue to start its service, which is called a polling instant. For an overview of this method, see (Takagi, 1986; Cooper and Murray, 1969; Cooper, 1970).

This work was motivated by the subway system, where each line can be considered as a cyclic polling system and the transfer station allows the users to transfer from one line to the other. Networks of polling systems is a rather new topic with few references, and a variety of possible applications, see (Boon et al., 2011; Levy and Sidi, 1990; Vishnevskii and Semenova, 2006; Beekhuizen, 2010). Recent publications about networks of polling stations are: (Beekhuizen et al., 2008b; Beekhuizen et al., 2008a; Aoun et al., 2010; Beekhuizen and Resing, 2009; van den Bos and Boon, 2013). The problem of in-