

Multi-server batch-service systems

Citation for published version (APA):

Adan, I. J. B. F., & Resing, J. A. C. (2000). *Multi-server batch-service systems*. (SPOR-Report : reports in statistics, probability and operations research; Vol. 200012). Technische Universiteit Eindhoven.

Document status and date:

Published: 01/01/2000

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.tue.nl/taverne

Take down policy

If you believe that this document breaches copyright please contact us at:

openaccess@tue.nl

providing details and we will investigate your claim.

Multi-server batch-service systems

Ivo Adan and Jacques Resing*

Department of Mathematics and Computing Science
Eindhoven University of Technology
P.O. Box 513, 5600 MB Eindhoven, The Netherlands

Abstract

In this paper we analyse a multi-server batch-service queueing model. Customers arrive one by one according to a Poisson process. They are served in batches under the following threshold policy: when a server becomes available a new batch of waiting customers is taken into service as soon as their number reaches a threshold a . The maximum allowable batch size is equal to b . Two classes of batch service time distributions are considered: Coxian-2 and Erlang- r distributions. In both cases the queueing model can be described by a Markov process. For this process it is shown that the equilibrium probabilities for states with all servers busy can be expressed as a finite sum of geometric terms. This form is used to derive a closed form expression for the waiting time distribution.

Keywords and phrases: queueing model, Coxian and Erlang service time distribution, Markov process on semi-infinite strip, geometric equilibrium probabilities

*email:j.a.c.resing@tue.nl