Approximation of
discrete-time polling systems
via structured Markov chains

P. Beekhuizen†
J.A.C. Resing‡

November 17, 2009

Abstract: We devise an approximation of the marginal queue length distribution in discrete-time polling systems with batch arrivals and fixed packet sizes. The polling server uses the Bernoulli service discipline and Markovian routing. The 1-limited and exhaustive service disciplines are special cases of the Bernoulli service discipline, and traditional cyclic routing is a special case of Markovian routing. The key step of our approximation is the translation of the polling system to a structured Markov chain, while truncating all but one queue. Numerical experiments show that the approximation is very accurate in general. Our study is motivated by networks on chips with multiple masters (e.g., processors) sharing a single slave (e.g., memory).

Keywords: Polling, Bernoulli scheduling, Markovian routing, Networks on chips

†Philips Research and EURANDOM
‡Eindhoven University of Technology