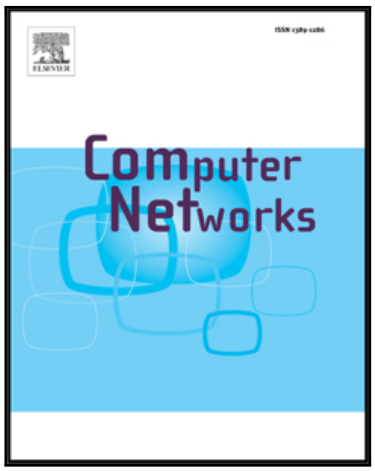

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Thomas Zinner, Stefan Geissler, Stanislav Lange, Steffen Gebert, Michael Seufert, Phuoc Tran-Gia

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Thomas Zinner, Stefan Geissler, Stanislav Lange, Steffen Gebert, Michael Seufert, Phuoc Tran-Gia

Julius-Maximilians-Universität Würzburg, Chair of Communication Networks

Abstract

The softwarization of networks promises cost savings and better scalability of network functions by moving functionality from specialized devices into commercial off-the-shelf hardware. Generalized computing hardware offers many degrees of adjustment and tuning, which can affect performance and resource utilization. One of these adjustments are interrupt moderation techniques implemented by modern network interface cards and operating systems. Using these, an administrator can optimize either for low latencies or low CPU overhead for processing of network traffic. In this work, an analytical model that allows the computation of relevant performance metrics like packet processing time and packet loss for generic virtualized network functions running on commodity hardware is presented. Based on this model, impact factors like average packet interarrival time, interarrival time distribution, and duration of the interrupt aggregation interval are studied. Furthermore, we significantly improve the computational tractability of this discrete-time model by proving and leveraging a property regarding its limit behavior. We also demonstrate that using this property does not affect the accuracy of the model in the context of realistic parameter combinations. Finally, the improved runtime for numerical evaluations allows administrators to dynamically adapt their interrupt mitigation settings to changing network conditions by recalculating optimal parameters.

Keywords: Discrete-Time Analysis, Performance Modeling, NFV, VNF, Queueing Theory.

Email addresses: zinner@informatik.uni-wuerzburg.de (Thomas Zinner), stefan.geissler@informatik.uni-wuerzburg.de (Stefan Geissler), stanislav.lange@informatik.uni-wuerzburg.de (Stanislav Lange), steffen.gebert@informatik.uni-wuerzburg.de (Steffen Gebert), seufert@informatik.uni-wuerzburg.de (Michael Seufert), trangia@informatik.uni-wuerzburg.de (Phuoc Tran-Gia)