

Accepted Manuscript

A Discrete-Time Model for Optimizing the Processing Time of Virtualized Network Functions

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

PII: S1389-1286(17)30180-9
DOI: [10.1016/j.comnet.2017.04.049](https://doi.org/10.1016/j.comnet.2017.04.049)
Reference: COMPNW 6188



To appear in: *Computer Networks*

Received date: 2 November 2016
Revised date: 3 March 2017
Accepted date: 19 April 2017

Please cite this article as: Thomas Zinner, Stefan Geissler, Stanislav Lange, Steffen Gebert, Michael Seufert, Phuoc Tran-Gia, A Discrete-Time Model for Optimizing the Processing Time of Virtualized Network Functions, *Computer Networks* (2017), doi: [10.1016/j.comnet.2017.04.049](https://doi.org/10.1016/j.comnet.2017.04.049)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A Discrete-Time Model for Optimizing the Processing Time of Virtualized Network Functions

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)

Download English Version:

<https://daneshyari.com/en/article/4954647>

Download Persian Version:

<https://daneshyari.com/article/4954647>

[Daneshyari.com](https://daneshyari.com)