

Thesis
B.Sc.

Thesis
M.Sc.

IDP,
Guided
Research

One-Way-Delay Measurement using Synchronized Clocks

Introduction

One-way-delay (OWD) is the elapsed time from transmitting the packet at the sending node to receiving it at the destination node. A possible measurement approach, is to add the current timestamp at the sending node to the packet. The time difference to the receive timestamp is the desired measure of the OWD. Of course, a necessary requirement is clock synchronization between sender and receiver. IEEE 1588 defines the Precision Time Protocol (PTP) which relies on precise clocks implemented on the network hardware. It achieves sub- μ s synchronization in many cases. However, the possibility of OWD measurements based on PTP synchronized clocks and embedded timestamps has not been studied in depth yet.

Research Questions

- Which hardware and/or software architectures allow embedding synchronized timestamps to packets at line-rate?
- What is the obtainable OWD accuracy?

Possible Directions

- Identification of available and suitable hardware or software
- Reproducible measurements in testbed at our chair
- Data plane programming (e.g. using P4)
- Customization of existing C code

Note

Topic is quite broad: There will be an individual focus depending on thesis type, experience and interest.

Requirements

Motivation, interest and autonomy

Literature

- [1] D. Chefrou. One-way delay measurement from traditional networks to sdn: A survey. *ACM Comput. Surv.*, 54(7), jul 2021.
- [2] L. De Vito, S. Rapuano, and L. Tomaciello. One-way delay measurement: State of the art. *IEEE Transactions on Instrumentation and Measurement*, 57(12):2742–2750, 2008.
- [3] M. Shin, M. Park, D. Oh, B. Kim, and J. Lee. Clock synchronization for one-way delay measurement: A survey. In T.-h. Kim, H. Adeli, R. J. Robles, and M. Balitanas, editors, *Advanced Communication and Networking*, pages 1–10, Berlin, Heidelberg, 2011. Springer Berlin Heidelberg.

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