

DOCTORAL CANDIDATE: Simone Ferlin Oliveira
DEGREE: Philosophiae Doctor
FACULTY: Faculty of Mathematics and Natural Sciences
DEPARTMENT: Informatics
AREA OF EXPERTISE: Computer networks and distributed systems
SUPERVISORS: Dr. Ozgu Alay, Prof. Michael Welzl, Prof. Olav Lysne
DATE OF DISPUTATION: 23st of June 2017

DISSERTATION TITLE: Making Multipath TCP Work over Heterogeneous Wireless Networks

Multipath TCP (MPTCP) is the major standardised extension of the Transmission Control Protocol (TCP).

MPTCP enables a regular TCP connection to use multiple networks simultaneously, increasing both application's throughput and reliability. Although multipath transport promises are great, they come with challenges when the underlying networks are heterogeneous in terms of capacity, delay and loss. In this thesis, we focus on

MPTCP's performance in such heterogeneous scenarios, and how heterogeneity impacts MPTCP's operational goals.

Our main findings can be summarised as:

- We implement and evaluate a shared bottleneck detection with MPTCP's couple congestion control, which makes possible the separation of fairness aspects in MPTCP, unlocking its full potential when bottlenecks are not shared.
- We propose and implement a scheduling algorithm, which is able to improve performance, in terms of latency and throughput, in heterogeneous scenarios and reduce the amount of spurious retransmissions compared to default MPTCP.
- We propose a lightweight XOR Forward Error Correction (FEC) to aid MPTCP with subflows with heterogeneity in terms of loss, reducing loss detection and recovery time to o -RTT.