

Multipath QUIC over SCION

Master's Thesis project
ETH Zürich

Student:

Supervisors: Jelte van Bommel, Tilmann Zäschke, Prof. Adrian Perrig

Project Duration:

Project Description

The IETF RFC for [multi-path QUIC](#) is close to being finalized. The SCION protocol is well suited for multi-path applications, so the next step is to integrate SCION into a multi-path QUIC library.

The goal of this project is to:

- integrate the SCION 'csnet' library into the multi-path enabled '[picoquic](#)' library (both written in C). 'csnet' is similar to "sys/socket.h" but with SCION support.
- Design, implement and evaluate new or improved algorithms for congestion control and path selection that take advantage of SCIONs multipath capabilities.

Tasks

Below are the tasks that the student is required to accomplish in the scope of this project. Based on the findings that the student makes and the issues he encounters during his work on the project, the goals of the project can later be changed and the tasks can be revised.

- Familiarization with SCION, QUIC and MP-QUIC, as well as 'picoquic' and 'csnet'.
- Integration of 'csnet' into 'picoquic'. Part of the integration task is to provide feedback to the 'csnet' developer(s). 'csnet' is under active development.
- Familiarization with (QUIC-) multi-path congestion control algorithms, see [RFC 9002](#)
- Familiarization with, and implementation of, multi-path route selection algorithms.
- Design new, and improve existing, algorithms for path selection and congestion control, tailored for the SCION protocol.
- Theoretical and experimental evaluation of the new or improved algorithms.

Optional Tasks

- Performance/benchmark in a simulator or on real-world SCION Internet.
- Adapt or implement an PoC application that uses the new multipath stack, e.g. tunneling, file sharing, ...

Technologies

SCION, QUIC, Multi-path QUIC, C programming language, congestion control

Organization

The student will hold weekly meetings with the thesis advisor(s). During each weekly meeting, the student will be expected to briefly describe the work completed during the week. The student should promptly discuss any complications that arise (e.g. difficulty in understanding concepts or in creating tools) such that the advisor can assist the student in identifying alternative project directions. The advisor will assist the student toward completing any agreed upon milestones, as well as laying out the following week's goals.

Grading Scheme

Grade	Description
6.00	Design and implementation, as well as thesis are candidates for submission to an academic conference or workshop.
5.50	Thesis quality significantly exceeds expectations.
5.00	Thesis meets expectations.
4.50	Thesis partially meets expectations and has minor deficits.
4.00	Thesis meets minimum quality requirements; but has major deficits and is clearly below expectations

Signatures

Student

Tilman Zäschke

Jelte van Bommel

Adrian Perrig