ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

SCION Traffic Simulator with Beacon Meta-data

Project Proposal

Introduction

This project is suited for students with an interest in networking, network simulation and inter-domain networking.

You will learn about event based network simulation and network emulation.

The project leverages the path discovery, the multipath and path-aware property of the SCION network architecture [1]. Multiple SCION simulation and emulation frameworks exist already, either based on NS-3 or on the SEED Emulator.

Project description

SCION traffic simulator with beacon meta-data.

The simulator will be used for evaluating new control plane algorithms and the value of different path metrics. It will also help with defining novel approaches for the inclusion of meta-data in the beacons and the deployment of such metrics on the actual network.

The main task will consist in the implementation of a network traffic simulator including link property meta-data in SCION beacons. The simulator provides both control plane and data plane packet level simulation. It supports easy configuration of custom topologies. For the data plane, simulation of endhosts sending traffic according to a traffic matrix is supported.

Work packages

The following tasks have to be completed in this thesis.

Phase 0: Register project and setup environment, familiarize yourself with the SCION architecture, and write the “Background” chapter of the thesis, literature review.

Phase 1: Implement the beaconing including link meta-data on the control plane

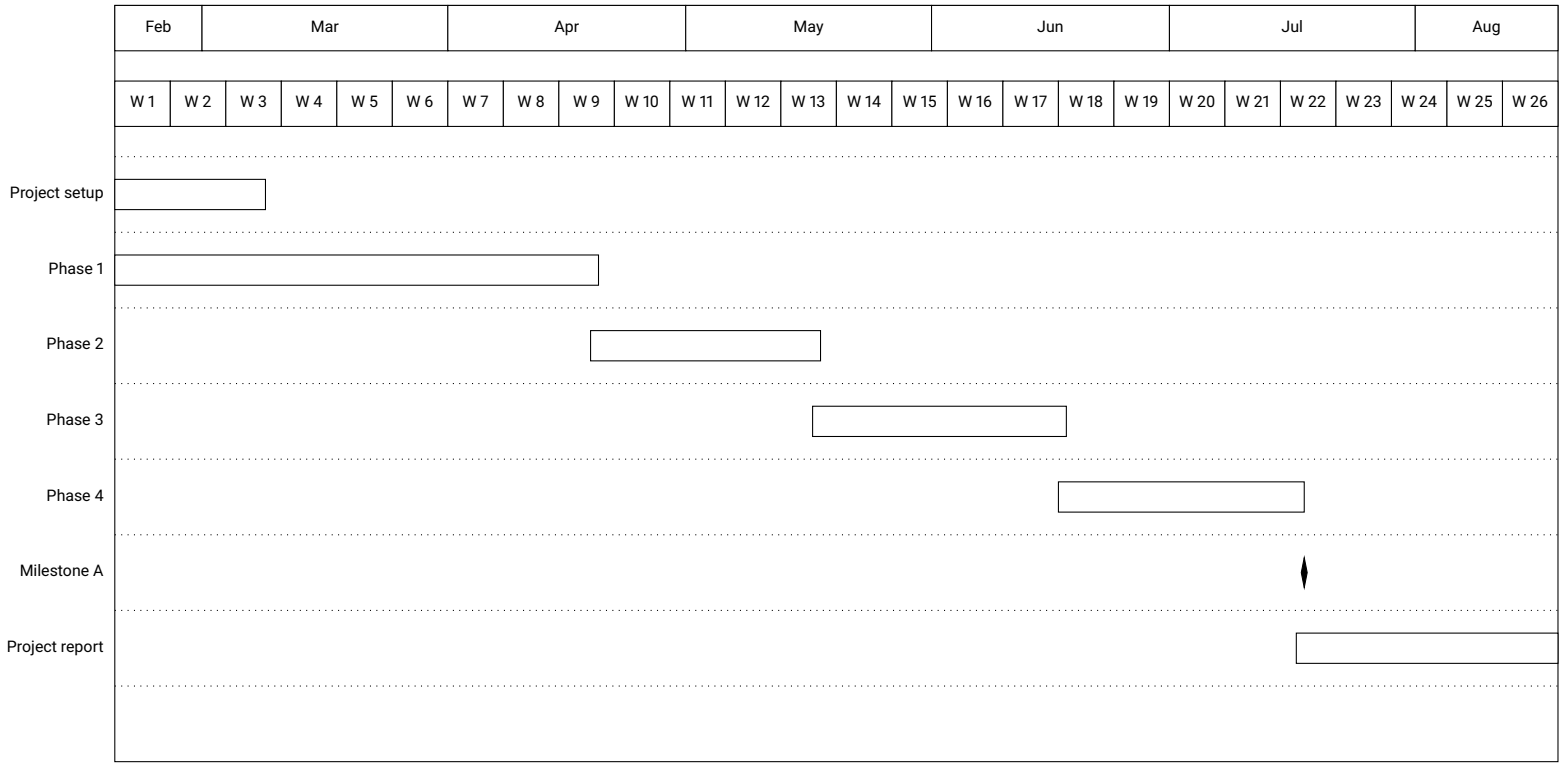
Phase 2: Implement a topology editor for easily setting or generating the link meta-data

Phase 3: Implement the dataplane simulating the link properties

Phase 4: Implement the endhost traffic simulation corresponding to a configurable traffic matrix

Phase 5: Document the implemented additions, finalize and hand in project report

Timeline



Requirements

- Foundations in networking
- Experience in C++ or Python programming
- Experience with NS-3 or the SEED Emulator is desirable but not mandatory

Contact

Advisor Name: François Wirz (wirzf@inf.ethz.ch), Jordi Subirà Nieto (jonieto@inf.ethz.ch)

Organization

The student and the advisor will hold weekly meetings. During each weekly meeting, the student will briefly describe the work completed during the week and outline the work to be completed during the next week. The advisor will, if necessary, assist the student in identifying potential future issues and discuss current issues. Pressing complications arising between two meetings will be promptly discussed. The advisor will assist the student towards completing any agreed-upon milestones.

Grading Scheme

Grade	Description
6.0	Design and implementation, as well as thesis are candidates for submission to an academic conference or workshop.
5.5	Project quality significantly exceeds expectations.
5.0	Project meets expectations.
4.5	Project partially meets expectations and has minor deficits.
4.0	Project meets minimum quality requirements but has major deficits and is clearly below expectations.

References

[1] L. Chuat, M. Legner, D. Basin, D. Hausheer, S. Hitz, P. Müller, and A. Perrig. *The Complete Guide to SCION. From Design Principles to Formal Verification*. Springer International Publishing AG, 2022.