

## Project Description

This project aims to investigate an effective network debugging approach for federated networks. Monitoring and debugging large-scale networks remains a challenge. Specifically, inter-domain networking limits the precise identification of which administrative domain is responsible for network problems; for participating ISPs, it is outside their jurisdiction to investigate other ISPs. Instead, we provide ISPs the ability to prove they are not responsible for observed network problems. In addition, to eliminate the potential denial of service caused by probing originating from other ISPs during inter-domain telemetry, payment methods for probing, computation, and storage need to be considered.

The main goals of this project are twofold: (i) design a new network diagnosis system that leverages programmable border routers and path-based routing infrastructure, enabling inter-domain telemetry collection, and (ii) design a new payment method leveraging the cryptocurrency concept for the probing process. This project can be considered a two-themed joint project, so we expect two students to participate (each topic can be performed independently). As this project is research-oriented, the participating students are expected to contribute to designing a path-aware network debugging architecture (or a cryptocurrency-based payment method for inter-domain network probing), implementing a prototype, and evaluating the feasibility of the suggested mechanism.

## Main Tasks

- Investigate practical challenges in inter-domain network debugging and monitoring
- Design an intelligent probing approach that leverages the notion of network programmability and path-awareness
- Design a cryptocurrency-based payment system working with heterogeneous network systems in an inter-ISP scope
- Implement a proof-of-concept system running on the SCION network
- Evaluate the feasibility of the suggested approach

## Preferred Qualifications

- Technical knowledge of SCION, network diagnosis, and telemetry
- Background on cryptocurrency and smart contract
- Implementation experience in Golang

## Contact

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