



Thesis
B.Sc.



Thesis
M.Sc.

Quantum-Secure Communication Protocols in Time- Sensitive Networks

Motivation

Time-Sensitive Networking (TSN) has emerged as a crucial technology for enabling deterministic low-latency communication in modern networked systems. Classical networking protocols such as TCP, UDP, and the newer QUIC protocol play a crucial role in point-to-point communication, ensuring reliability and efficiency. However, the advent of quantum computing poses a significant threat to the cryptographic foundations of current secure communication protocols. Post-Quantum Cryptography (PQC) offers a promising solution by developing cryptographic algorithms that are resilient to quantum computers. This thesis aims to explore the integration of TSN with classical networking traffic while incorporating PQC, focusing on ensuring security, performance, and compatibility. The results will contribute to advancing secure, high-performance communication for critical applications in a quantum-resilient future.

Your Task

- Conduct a comprehensive literature review on Time-Sensitive Networking (TSN), security protocols, and post-quantum cryptography.
- Investigate classical networking protocols (TCP, UDP, QUIC) and their suitability for point-to-point connections in TSN environments.
- Design a network model integrating TSN with classical networking protocols for point-to-point communication. Incorporate post-quantum cryptographic algorithms into the network model to secure data transmission.
- Understand what is a fitting stack for TSN to achieve optimal performance and how classical protocols can interact with TSN.

Requirements

- Experience/strong interest in network architecture and quantum-secure systems.
- Critical thinking to compare and analyze various solutions
- Modify and assess the feasibility of such studies.

Contact

Dominik Marchsreiter dominik.marchsreiter@tum.de
Filip Rezabek frezabek@net.in.tum.de

