



**Task Description Master's Thesis**  
**for First and Last Name**

**Implementation of the Internet Protocol with HTTP3/QUIC on the ROMEO Satellite**  
**Implementierung des Internetprotokolls mit HTTP3/QUIC auf dem ROMEO Satelliten**

Motivation:

The internet protocol is the ubiquitous protocol used for data exchange between terrestrial systems. However, for space applications, CCSDS standards are still dominant. The potential benefits of having an IP connection to a satellite are increasing with operating systems like embedded Linux becoming more common. For example, a direct SSH session to the satellite during a pass might allow a more flexible and dynamic workflow than the classic command stack-based commanding. There are also new standards like QUIC coming up which aim to solve some of the issues with the established protocols like TCP. The standards also have significant potential for usage in space systems for various reasons.

Irrespective of high-level protocols used, the utilization of IP with systems using CCSDS protocols on various OSI layers requires tunneling the IP packets to the target systems using the existing CCSDS protocols and hardware and then injecting the packets into the target operating system. The primary goal of this task is the investigation and implementation of the internet protocol for the ROMEO satellite project.

Task Description:

- Investigation of available QUIC stacks, TCP and UDP, including a trade-off on their viability on embedded systems for space applications.
- Investigation of use-cases for IP connections to the satellite
- Implementation of a suitable QUIC stack on the target systems and connection tests
- Basic performance comparisons against TCP and UDP
- Implementation of tunneling and injection of IP protocols to an Embedded Linux based system using CCSDS standards.
- Investigation of IP stack behavior on increased round-trip times.

Internal advisor: Name of Internal Advisor

Start date: Choose Date

Submission deadline: Choose Date

**Acknowledgement of receipt:**

I hereby confirm that I read and understood the task of the master's thesis, the legal framework as well as the study and exam regulations.

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Prof. Dr.-Ing. Sabine Klinkner  
(Responsible Professor)

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Student

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