

Bachelor/Master Thesis Work

Entwicklung einer digitalen Radio Frequency Special Checkout Equipment (RF SCOE) Lösung für Kleinsatelliten

Development of a digital Radio Frequency Special Checkout Equipment (RF SCOE) solution for small satellites

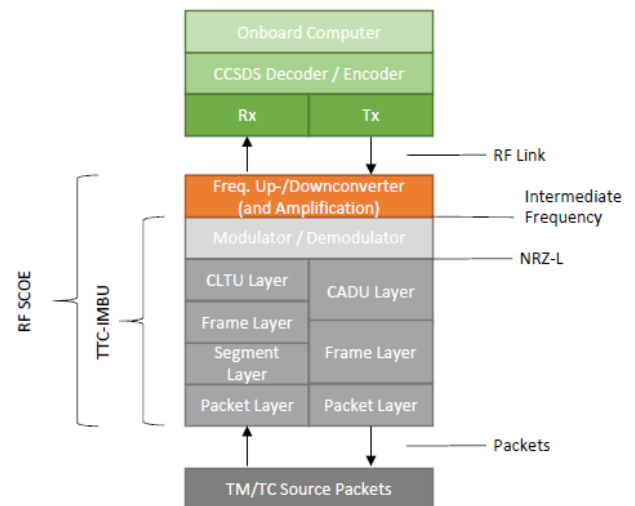
Motivation:

An RF SCOE (Radio Frequency Special Checkout Equipment) is the standard equipment for testing the high-frequency subsystem as well as the communication protocols (e.g. from the CCSDS protocol family) of a satellite. The RF SCOE handles all the CCSDS protocol layers and converts the packets up to the Command Link Transmission Units (CLTU) modulated onto an RF carrier and in the downlink path from the RF carrier modulated Channel Acquisition Data Units (CADU) down to packet level. The cost of the RF SCOE is mostly driven by expensive measurement equipment integrated into the appliance. Apart from the high costs, the integration of these instruments is a very complex task and costs a lot of integration time and rack space.

To counteract these disadvantages, it is planned to implement a consistent standard framework based on reconfigurable and reprogrammable radio systems (digital RF SCOE).

The digital RF SCOE achieves a high reduction in functional complexity compared to conventional measuring devices. For the implementation of functional blocks, the digital RF SCOE will use SDR (software-defined radio) technology. It is planned to utilize the SDR technology on inexpensive RF boards such as the USRP B200 mini.

The main objective of this study is to develop a digital RF-SCOE solution. First, detailed requirements shall be elaborated. Then, the high-level architecture of the digital RF-SCOE shall be defined and be implemented on the SDR. The concept and design shall be validated by practical investigations and evaluations.



Task description of the Master thesis work:

- Familiarization with the subjects of RF SCOE and SDR
- Identification of key design drivers, boundary conditions and requirements
- Development of the RF SCOE on the SDR
- Test and verification
- Documentation

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