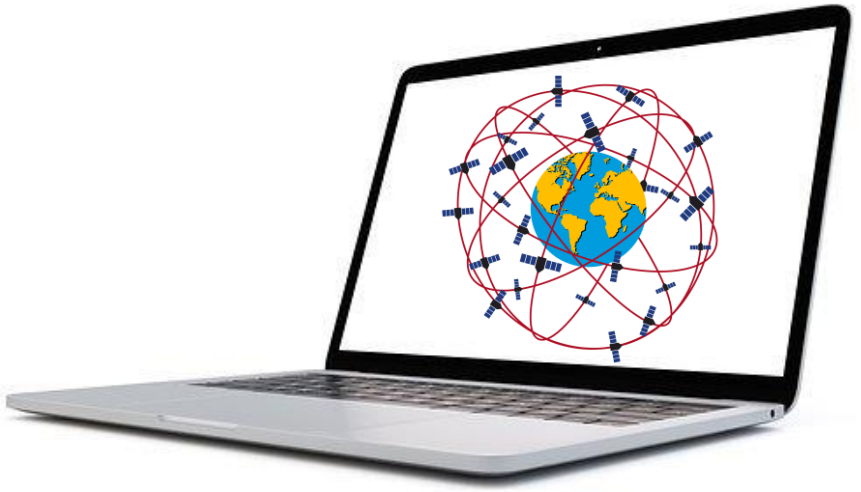
B.Sc./M.Sc. Thesis: Implementation of NGSO Satellite Constellations in SNS3

Background

Satellite communication systems play an increasingly important part in current wireless networks. Satellite operators like SpaceX and Amazon have planned and already started deploying non-geostationary-satellite orbit (NGSO) systems, in order to offer broadband communication services like Internet connectivity. In this context it is important to be able to simulate in detail such new satellite systems, in order to understand their capabilities before deploying even larger, expensive systems.

The goal of this thesis is to extend the Satellite Network Simulator 3 (SNS3) to incorporate NGSO satellite constellations. SNS3 is based on the ns-3 network simulator, which is an open-source tool that is being used extensively by researchers and can model in detail the entire communication protocol stack. SNS3 can currently model only one geostationary satellite, so it is crucial to extend this tool to capture emerging NGSO systems.



Tasks

You will first get familiar with SNS3 and implicitly ns-3. You will then extend the SNS3 model for a single geostationary satellite to incorporate multiple satellites, which can also be NGSO and thus have different altitudes, velocities, and mobility patterns. Finally, you will run some simulations for new satellite constellations (e.g. SpaceX), in order to show how your implementation captures the performance of these constellations.

Other Information

This research work is highly relevant to emerging commercial space-born systems and their capabilities. Basic programming skills in C/C++ and basic knowledge of radio propagation are desirable.

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