Master Thesis – End-to-End Simulation of the RBS Application in Interconnected Diversified Execution Environments

**Background**
The RAN is typically built up of hundreds of interconnected RBS:s (Radio Base Station), serving several hundreds of thousands of subscribers.

Initially in 4G the RBS application where hosted on a single HW unit, the base band unit (BBU). With the introduction of virtualized RAN (vRAN) (4G and 5G), the RBS application is decomposed into several smaller applications which is distributed across several diversified execution environments (EE), such as cloud, embedded, etc. The applications are interconnected and communicates with each other over network (TCP/IP, SCTP) and/or inter process signaling (Inside one OS instance).

The decomposition and distribution of the RBS application introduces a lot of deployment flexibility but introduce a lot of challenges in the characteristics domain. The RBS application is sensitive to latency, jitter as well as signaling load. The decomposition inherently leads to increment in all these areas.

The purpose of this thesis is to devise a model and setup a simulation framework for RBS application that can be used to predict the characteristics and detect bottlenecks of the RBS application when deployed in a distributed and diversified execution environment and with different amounts of load.

**Thesis Description**

- Devise a configurable model can capture the characteristics and behavior of different execution environments and methods of interconnect.
  - The configuration shall be able to capture such aspects as:
    - Latency, jitter, scheduling, capacity of inter connections, processes, etc.
    - Frequency of signaling between the different applications based on traffic model (i.e. procedures of a certain type per / second).
    - The type of signaling, cost of handling each type of signal, latency in signal processing, internal jitter, etc.
  - To verify that the model is correct, and simulator is correct, a model of the legacy system shall be developed and verified towards the legacy embedded system.
  - Develop at least one configuration for a diversified execution environment.
  - Evaluation of the model, what are strengths? Weaknesses?

**Qualifications**
This project aims at students in computer science, computer engineering or similar.

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