Network simulator for 5G Cellular Networks

Introduction

Nowadays, much research is conducted for introducing and implementing the desired advancements in future cellular networks, commonly known as fifth generation (5G) cellular networks. Several channel models have also been proposed that define the wireless channel characteristics for 5G cellular networks. Using those proposed models, network simulators are designed to test the performance of the channel models in a realistic scenario and the results are then used for refining the proposed models.

The design of wireless network simulators is also of importance; the availability of limited computing resources requires the concept of 'parallelization' to be incorporated in the designed network simulator in order to ensure optimum performance of the overall system. Furthermore, the simulator also needs to be adaptive, such that only a few changes in the parameter settings will produce the simulation results for the desired scenario in a cellular network.

Thesis Outline

The aim of the thesis is to develop a network simulator for 5G cellular networks. For this, some modifications can be done in an already functioning wireless network simulator by incorporating the above-mentioned features in it. Detailed study of the working of the simulator will help in improving it by incorporating the adaptability feature, such that none of the core parameters use hard-coded values for simulating the desired scenario. Since 5G cellular systems focus on medium-to-high mobility scenarios with large data-rate requirements, the simulator will primarily be made adaptive for implementation of the METIS channel model [1]. An important task will be the 'parallelization' of the network simulator and testing its performance for large cellular setup using high-speed computers (KTH computer cloud can be used for this purpose where different experiments can be setup for testing some simulation models). The parallelization feature will be tested for different number of core processors in combination with different adaptability features, such that an optimal performance is obtained for the network simulator. The simulator will be further improved by introducing more adaptability features, such as use of different channel models within a cellular network, different beamformers, different antenna types, etc.

Eligibility Requirements

The student is expected to have some background knowledge about wireless channel models and should be proficient in programming languages like C++ and python. Moreover, he/she should be familiar with working in Linux environment and have some knowledge about the basics of distributed computing and OMNeT++ software. The student should be extremely motivated to study and understand the working of the simulator, for which daily supervision will be provided and group discussions will be done frequently.

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References:

[1] Jamsa, T. et. al., "Deliverable D1.2: initial channel models based on measurements. *"METIS project Deliverable* (2014).