

Master Thesis

Narrowband-IoT Module Development for 5G Cellular Networks

In the context of Industry 4.0, Narrowband-IoT (NB-IoT) has gained much importance as a low cost and low energy consuming communication technology for 5G wireless networks. As standardized in Release 13 by 3rd Generation Partnership project (3GPP), NB-IoT can work along with other wideband technologies within the same network. Therefore, it is important to investigate and improve the possibility of coexistence of NB-IoT with other technologies (for example, Cat-M).

Network Simulator - 3 (NS3) offers the full stack implementation for wideband technologies for 4G-LTE networks including the access and core network. Since NB-IoT is based on 180 kHz network bandwidth, it is not possible to simulate and investigate NB-IoT as the control plane messages of NB-IoT differ from legacy wideband control messages. The work proposed in this thesis will mainly focus on development of Random Access (RA) procedure for NB-IoT in NS3. The tasks will include:

- Study and understand the RA procedure for NB-IoT
- Understanding the RA procedure for wideband technologies already implemented in NS3
- Development of NB-IoT RA procedure to investigate 5G networks through simulations

What you can expect:

- An interesting research question with practical relevance
- A good balance between theoretical and implementation work
- You will learn in detail how modern wireless cellular networks work

What you should bring:

- Experience in programming, preferably using C/C++
- Basic knowledge of 4G-LTE/5G cellular networks
- Basic knowledge of Linux-based software development

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