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# Praktikum Kommunikationssysteme im SS07

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*http://www.ibr.cs.tu-bs.de/courses/ss07/pks/*

## 1. Background

Simulators are a crucial part of research, and particularly in networks area a major part of research is analyzed through simulators before actual implementation. Simulators are designed to give a virtual view of the actual real life scenario (not always exactly the same), so that the research outcomes can be evaluated and analyzed beforehand.

Another aspect of this story is that most of the time, a researcher is working on a relatively small component in the network domain but the performance of this component is dependent on many other components or can cause effects to many other components. Hence, for the true analysis of this component, the whole picture should be painted. For example, a change in the functionality of MAC layer can affect the behavior of layers above and below it. On the other hand, the performance of this change is also largely dependent on the behavior of other layers. Thus, during the analysis of this change in MAC layer, we require a complete implementation of all the layers rather than just the component which is being changed.

It is not a simple and easy job to design an application which simulates all the components of Network domain. One important aspect to keep in view while designing such simulators is to give the users adequate facilities to put in their components for analysis purpose. Research groups did joint efforts over the years to come up with some solutions which can help the fellow researchers in their work. NS (Network Simulator) is the most popular and widely used open source and free-license simulator designed with the collaborative effort of some US based agencies, research organizations and universities. OPNET is another example. It contains a complete family of quality network R&D tools but unfortunately unlike NS it is a commercial product.

## 2. Objective

In addition to the socket programming, this year we are offering a task about network simulator programming. The objective of this task is to give the students an experience of working with simulators. The major task in implementing some component into an existing full scale simulator (like NS or OPNET) for analysis purpose is, to understand the structure of simulator, identify the

right location to place your own component and then make the integration of this component with the simulator functional. This task offered in this praktikum will target these aspects of simulation programming.

We have designed a limited feature OSPF simulator for this purpose which simulates the OSPF operations performed by a router. We eliminated some of the functions from this simulator and students are required to re-write those functions so that the simulator eventually works according to the OSPF specifications.

## 3.    Pre-Requisites

- The first important pre-requisite is the clear understanding of the basic concepts of networking. Although, students have to study the whole OSPF RFC but it would be better if they already have some basic understanding about the protocol.

- The simulator provided in this assignment is mainly written in C++ and have a complete class based structure. Therefore, the basic understanding of Object Oriented Programming is also essential.

## 4.    Reading Material helpful

- The main reading source for this assignment is OSPF version 2 RFC 2328. A copy of this RFC is provided on the course website. Sections required for this task are already marked for convenience. Few sections are beyond the scope of this task but are highlighted so that the student's can have enough background knowledge about it.

- Many major books on networking provide brief introduction on OSPF's working. That can also be helpful to have a basic understanding about it. One good option can be "Routing in Internet" by Christian Huitema.