

# Development Tools and Techniques for Mobile Telecommunications

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A vast majority of the current research on telecommunication networks relies on computational tools and computer-based experiments, among which the simulation techniques and tools take a prominent place. This special issue aims at presenting a selected number of papers that illustrate and emphasize this importance of such software tools and techniques.

This is also an invitation for the readers to shift focus from the research results to the research process itself. Indeed, telecom research extensively relies on experimental techniques and tools. Therefore, and despite its strong theoretical foundations, this research should also be considered as a highly experimental exercise. As such, and similar to other “older” experimental sciences, we believe that particular attention should be paid also to the experimental process, and to the techniques and tools used to produce research results.

Therefore, we are pleased to present this special issue featuring three papers describing new methodologies and tools relevant to the development of Mobile Network technologies. These papers are extensions of the best papers presented at the SIMUTools conference held in Marseille in 2008. SIMUTools is an international confer-

ence that brings together researchers and practitioners to address the latest developments in simulation research, methodology, models and practice.

The first paper, “Automated Development of Cooperative MAC Protocols: A Compiler-Assisted Approach”, Hermann S. Lichte et al., describes new software tools for code generation, and compiler-based implementation of cooperative MAC protocols. The authors present a protocol specification language and, through compiler techniques, provide the means for automated validation and performance analysis. Additionally, the compiler is used to translate the specified protocols into program code for simulation and also into code for prototype development. The tools described in the paper present a largely automated development process for generating a practical implementation of cooperative MAC protocols.

In the second paper, “Simulation of Ad Hoc Routing Protocols using OMNeT++, A Case Study for the DYMO Protocol”, Christoph Sommer et al. discuss the application of OMNeT++ for simulation and performance evaluation of mobile ad hoc network (MANET) routing protocols. More specifically, the authors present guidelines for simulating ad hoc routing protocols using OMNeT++, describing set up procedures, control techniques, appropriate metrics, and evaluation procedures. Application of the guidelines are demonstrated with a simulation model, using OMNeT++, and performance evaluation of a specific ad hoc routing network protocol, DYMO. Model calibration and validation “best practice” methods are also demonstrated through their application in this case study.

In the third, and final, paper, “An Efficient Mechanism of UMTS Multicast Routing”, Antonios Alexiou et al. present a new multicast packet transmission scheme for Universal Mobile Telecommunication System (UMTS) networks. The authors explain the performance benefits of

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this scheme and its efficient utilization of network resources. An ns-2 simulation software module implementing the scheme is described, and ns-2 simulations are used to validate the scheme and evaluate its performance. The authors demonstrate the general usefulness of the ns-2 module for UTMS studies by implementing and analyzing two multicast control methods for UTMS networks.

We hope that you find the papers in this special issue stimulating and informative.

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**John Heath** received Ph.D. and M.Sc. degrees in Computer and Information Science from the University of Minnesota, Minneapolis, B.A. and M.A. degrees in Mathematics from the University of Maine, Orono. Heath has extensive experience in simulation modeling at Sun Microsystems, and, before that, at Digital Equipment Corporation. At Sun, he contributed to the development of multi-threaded, multi-core

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