



## Implementation and Evaluation of a Co-Simulation with SystemC and NS-3 for WLAN Networks

### *Description:*

Communication over IEEE 802.11 based Wireless LAN plays an important role for the design and development of embedded systems. Due to a constantly increasing communication capacity of devices and simultaneously shorter time-to-market of such systems, the use of model-based virtual prototypes of the developed systems becomes indispensable.

SystemC is a de facto standard for virtual prototypes and allows with its C++ basis a modern and flexible way for the development of system models. However, for the usage of describing complex distributed communication, the SystemC framework relies on third-party libraries, which are not broadly available.

NS-3 (<https://www.nsnam.org/>) is a widely-used open source network simulator for research and industry, which also incorporates many models for WLAN communication.

In this thesis, the integration of NS-3 as co-simulation into SystemC shall be designed, implemented and evaluated. Therefore, the NS-3 simulation kernel interface needs to be conceived and connected to a proper SystemC module. After a fundamental connection between the two frameworks, a SystemC module shall be created, which exploits NS-3 primitives for the examination of Wireless LAN systems. Furthermore, appropriate simulation experiments shall be designed to test functionality and performance of the proposed co-simulation system.

### *The following tasks have to be conducted:*

- Learn about the NS-3 and SystemC framework
- Design and implementation of a co-simulation framework
- Test and evaluation of the developed approach
- Discussion and documentation of the results

### *Mandatory skills for working on this topic:*

- Advanced C/C++ coding

### *Highly recommended skills:*

- Knowledge in SystemC and/or NS-3 Framework
- Advanced knowledge in radio communications and networking

### *Supervisors:*

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