

Abstract

In modern vehicles *electronic control units* (ECUs), which are responsible for different advanced features, are not operating separately, but are involved in distributed systems. Their communication is realized via *vehicle buses*, like CAN, LIN or FlexRay. The distributed systems of ECUs are designed by automotive OEMs. Suppliers are expected to implement ECUs according to the relevant parts of the system description separately, but satisfying the requirements of the later integration ability. Their interest is to be able to test the communication related capabilities of the ECUs at the very early stage of the development. In these cases, when the entire system is not available to test the ECU, it is necessary to simulate the functionality and communication of missing ECUs. *Vehicle bus simulation* (also called rest bus simulation) is a widely applied simulation method supporting the development process of such ECUs.

AUTOSAR is a standardized automotive software architecture, developed by automobile manufacturers and suppliers. The high level design of the AUTOSAR-based software is implemented according to the System Template. The information about certain ECUs can be found in the so-called *ECU Extracts* extracted from the System Template.

The Eclipse-based, highly configurable PC-side *vehicle bus simulator* provides the simulation environment for ECUs with AUTOSAR software architecture. The input of the simulator is the ECU Extract, this way the embedded and the simulation side can be handled in a consistent way. For processing the ECU Extract and also its own configuration descriptors, the simulator uses model based software technologies implemented in the Eclipse Modeling Framework environment. Different scenarios describing simulation sequences can be specified in the custom Xtext-based *domain specific language* of the simulator tool, thus various test cases can be implemented in an intuitive and comfortable way. The communication between the PC and the ECU under test is established by the *fieldbus gateway*, which is a multipurpose communication system ensuring access to vehicle buses for PC applications via Ethernet connection. The rest bus simulator also provides a *configurable user interface*, this way the implemented test and simulation sequences can be analyzed using tables or graphical visualization tools.