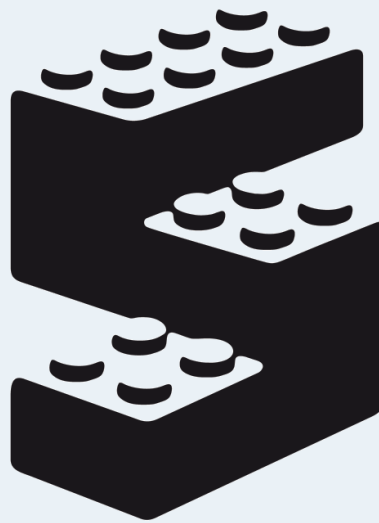


Tools for Distributed Embedded Systems



SIMTOOLS

MIT UNTERSTÜTZUNG VON LAND UND EUROPÄISCHER UNION



Europäischer Landwirtschaftsfonds
für die Entwicklung des ländlichen
Raums: Hier investiert Europa in
die ländlichen Gebiete.

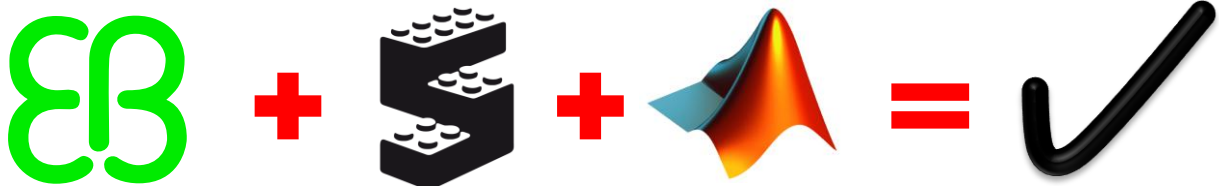
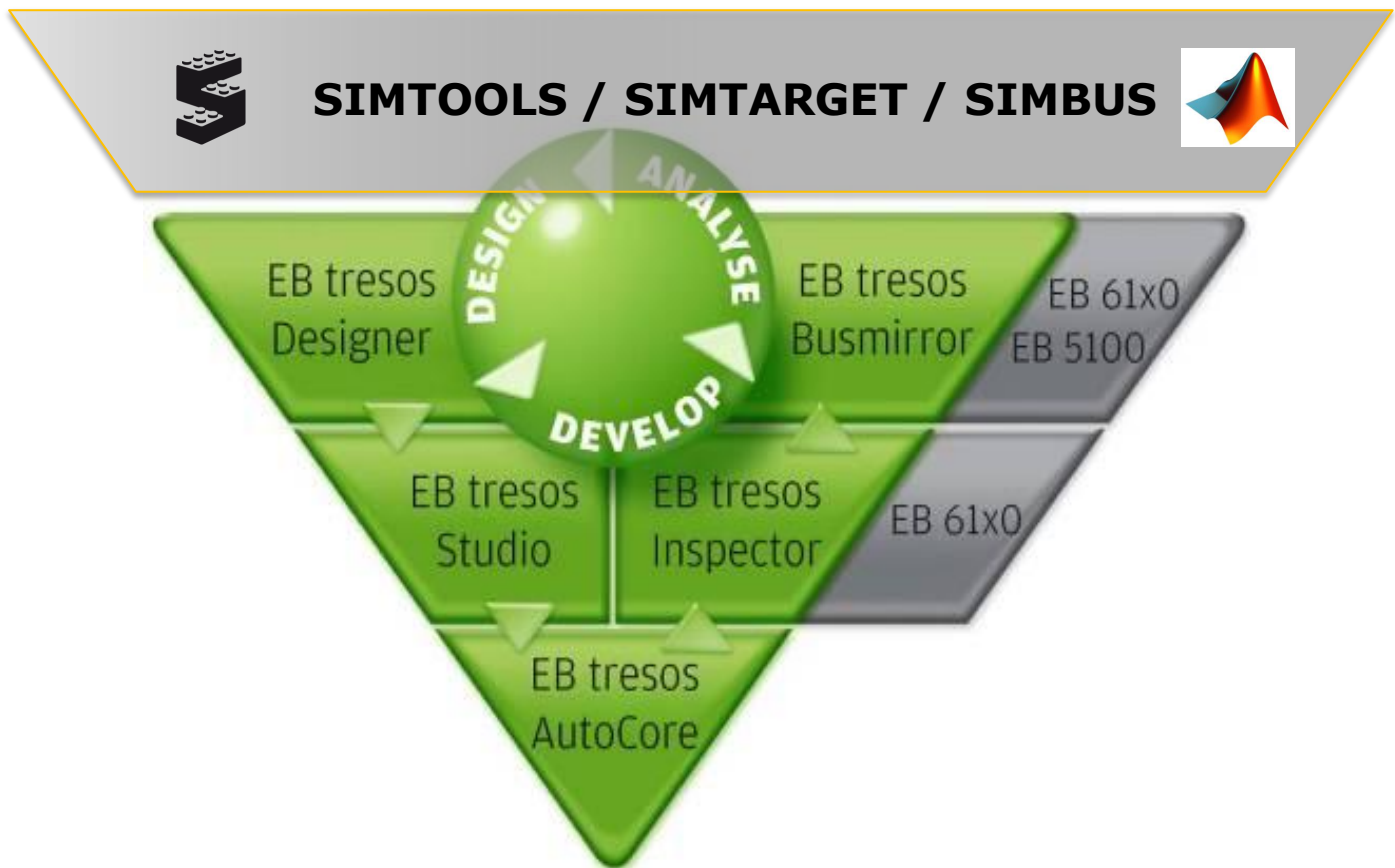


V-Model Overview



SIMTOOLS

- **for ...** development and test engineers,
- **building ...** distributed embedded systems,
- **based on...** FlexRay and CAN communication standards,
- **integrated with ...** MATLAB/Simulink,
- **using ...** EB software and hardware platforms.



SIMTOOLS

SIMTOOLS extend the advantages of MATLAB/Simulink in reducing complexity by a specific block-set for the design of FlexRay-based applications. SIMTOOLS enable you to cover the whole development process for building a virtual prototype on your PC. The development steps consist of :

- system-level modelling activities
- as well as single ECU-level design and configuration.

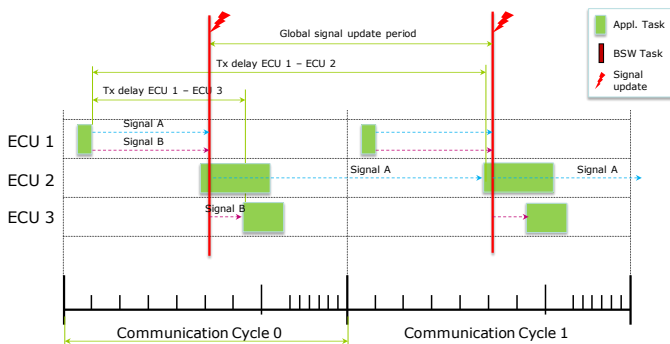
At the System-Level,

all FlexRay network aspects can be modelled, designed, configured and simulated at various levels of detail, including application and communication system timing information.

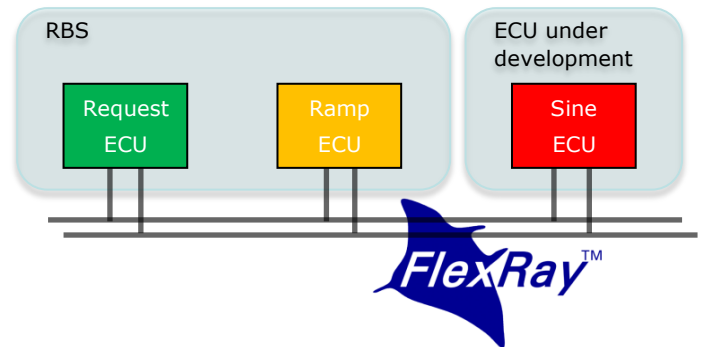
A standard .xml (FIBEX) and an additional .csv interface provide connectivity to tools from other vendors for the transfer of FlexRay bus configuration data.

Starting with simulation level-1 where all signals share a global signal update period a first version of the virtual prototype can be validated.

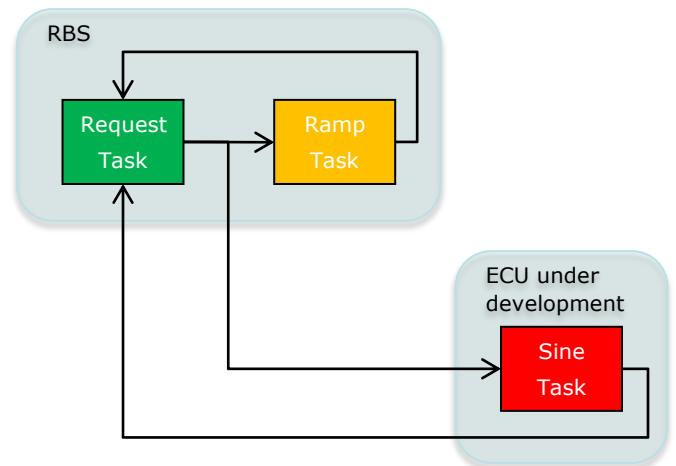
Simulation Level-1



Hardware Model



Software Model



At the ECU-Level,

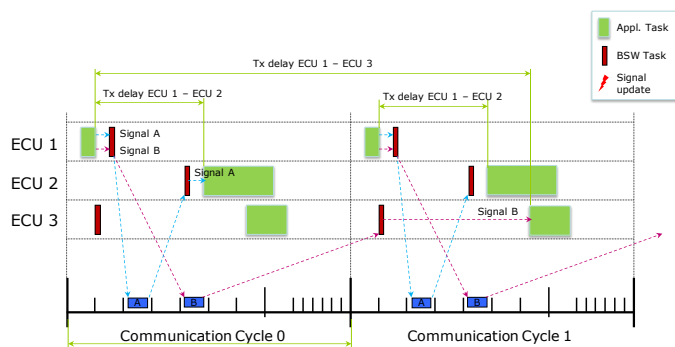
a FIBEX import interface, e.g., for the import of OEM-defined system-level configuration data, supports the design of functions for this specific ECU. This also includes capabilities for defining, configuring and code generation of a rest-bus (cluster) simulation.

During this development phase more detailed information on the communication system and the application software timing becomes available, which can be validated in some more detailed simulation levels until the 4th and final level before code generation.

Code generation is done with the companion SIMTARGET product.



Simulation Level-4



Hardware & Software Requirements

Software

- The MathWorks
 - ▶ MATLAB/Simulink (at least R2007b)
- SIMTOOLS GmbH
 - ▶ SIMTOOLS

Hardware

- PC/Laptop

Highlights

- Virtual prototyping of FlexRay-based applications
- Model, design, configure and simulate FlexRay networks
- System-Design support for distributed embedded applications
- ECU-Design of individual nodes
- Design and configuration of FlexRay rest-bus (cluster) simulation
- Full tool support for all parameters of all available FlexRay controllers

Generate C Code from SIMTOOLS Models for CAN, FlexRay and I/O

SIMTARGET is responsible for the code generation for a specific hardware platform.

- It generates tasks for Simulink subsystems.
- The application is synchronized to FlexRay bus.
- SIMTARGET also compiles the signal access blocks for the basic software layer(s).
- Target support is available for the Elektrobit hardware platforms including the code generation of CAN and ADIO access, FlexRay rest-bus simulation and PWM functions.
- Various consistency checks are performed, e.g., solver, model consistency, code generation settings.
- It supports triggering the execution of subsystems via external interrupts.
- Various debugging capabilities are available, e.g., Simulink external mode, console messages and status information.
- A Target Adaptation Layer (TAL) supports fast migration to other hardware platforms.

Hardware & Software Requirements

Software

- The MathWorks
 - ▶ MATLAB/Simulink (at least R2007b)
 - ▶ Real-Time Workshop Embedded Coder
- SIMTOOLS GmbH
 - ▶ SIMTOOLS/SIMTARGET

Hardware

- PC/Laptop
- Elektrobit
 - ▶ EB 61x0, EB 21x0



Highlights

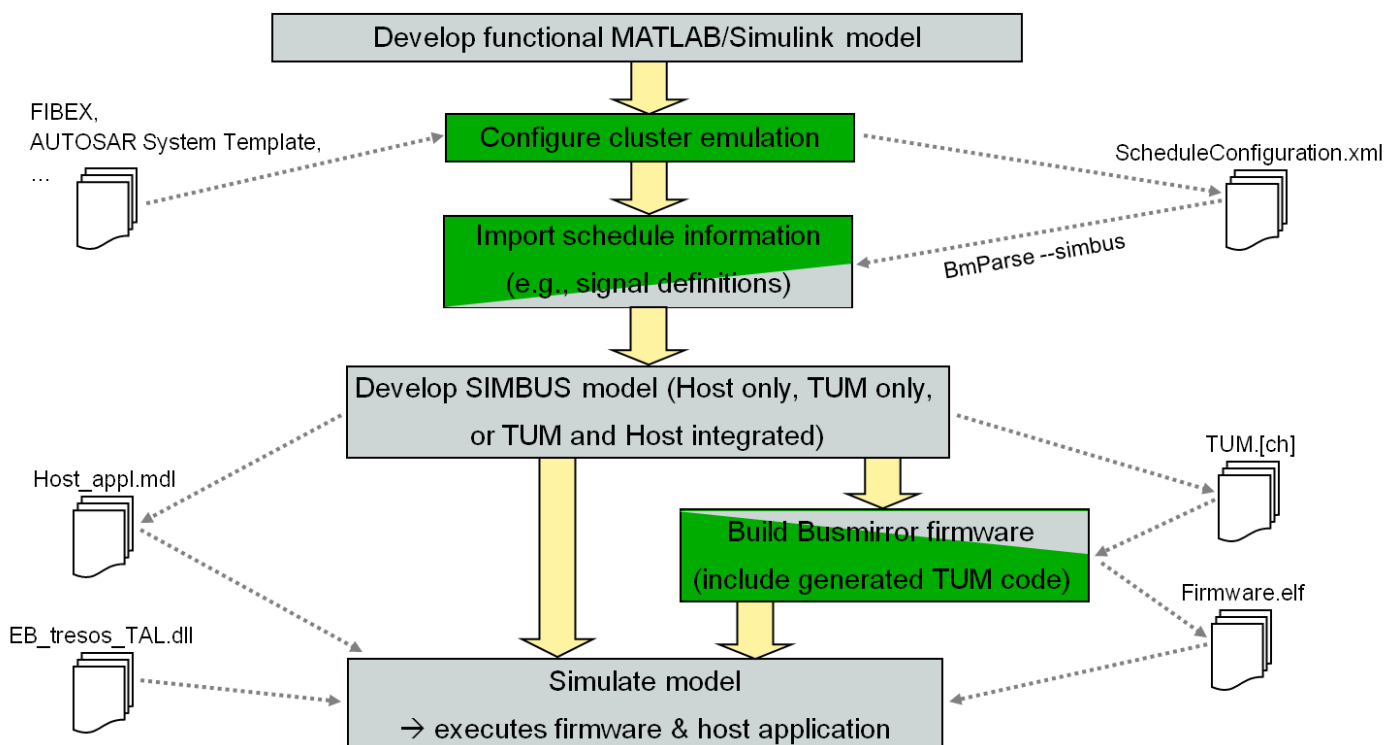
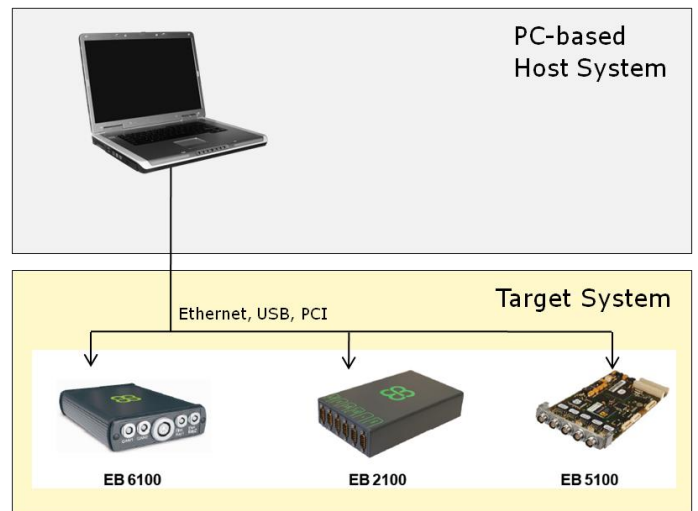
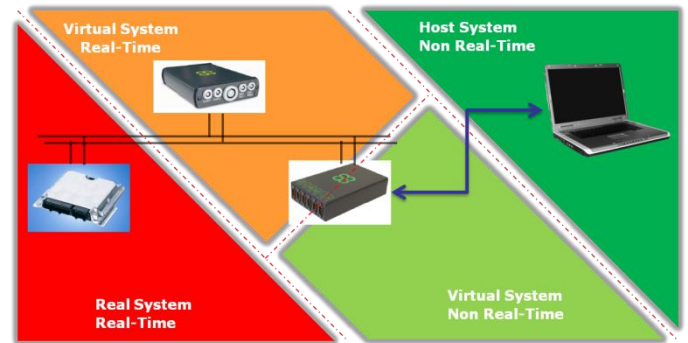
- Code generation of FlexRay and CAN signal access
- Code generation of ADIO access and PWM functions
- Synchronises application with communication subsystem
- Access to target hardware via Simulink external mode
- Target build support for Elektrobit prototyping hardware platforms
- Target Adaptation Layer (TAL) for fast migration to other hardware platforms

SIMBUS



SIMBUS is a toolbox for use with MATLAB/Simulink for rapid control prototyping and validation/testing. For those purposes it integrates and utilizes the EB tresos Busmirror.

- Supporting the development of application functions in Simulink based on signal, PDU and frame access blocks.
- This is especially helpful for engineers developing functions for signal modifications, fault injection, alive counter, gateway, CRC, etc. or for integrating existing OEM-specific functions directly in Simulink.
- Code generation of these application functions can be done for the Host and Target part.
- During execution of the rest-bus system SIMBUS provides live access to FlexRay directly from the MATLAB/Simulink environment, i.e., there is no need to compile the Simulink model into an executable.



SIMBUS



- The toolbox contains auto-update mechanisms for model blocks in case of configuration changes and updates the indices and names at the source code level upon code generation.
- For the Elektrobit hardware platforms, modelling and code-generation of Target User Modules (TUMs) is supported.
- The tight integration with Real-Time Workshop Embedded Coder provides a very powerful development environment as you can seamlessly transition your application developed as Simulink block diagram to the supported hardware platforms.

Hardware & Software Requirements

Software

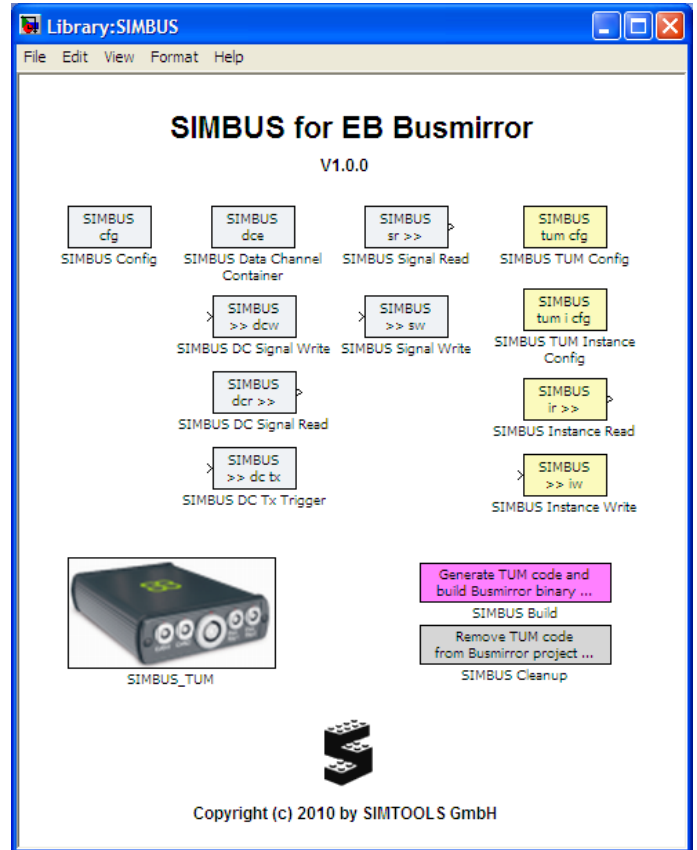
- The MathWorks
 - ▶ MATLAB/Simulink (at least R2008b)
 - ▶ Real-Time Workshop Embedded Coder¹
- SIMTOOLS GmbH
 - ▶ SIMBUS
- Elektrobit
 - ▶ EB tresos Busmirror (at least 2010.a.1)²

Hardware

- PC/Laptop
- Elektrobit
 - ▶ EB 61x0, EB 21x0 or EB 5100¹

¹ (for closed loop simulation)

² (for creating and modifying the restbus configuration)



Highlights

- Live CAN, FlexRay access from MATLAB/Simulink models
- Import of signal, PDU, and frame information to configure access blocks
- Code generation of FlexRay and CAN signal access
- Auto-update support for model blocks in case of configuration changes
- Modelling and code-generation support for Elektrobit Target User Modules (TUMs)
- Target build support for Elektrobit hardware platforms

Contact Information



SIMTOOLS

Contact Information

SIMTOOLS GmbH
Werner von Siemens Strasse 1
A-7343 Neutal
Austria

Tel: +43 (0) 5 9010 29330
Fax: +43 (0) 5 9010 29331
Internet: www.simtools.at
eMail: info@simtools.at

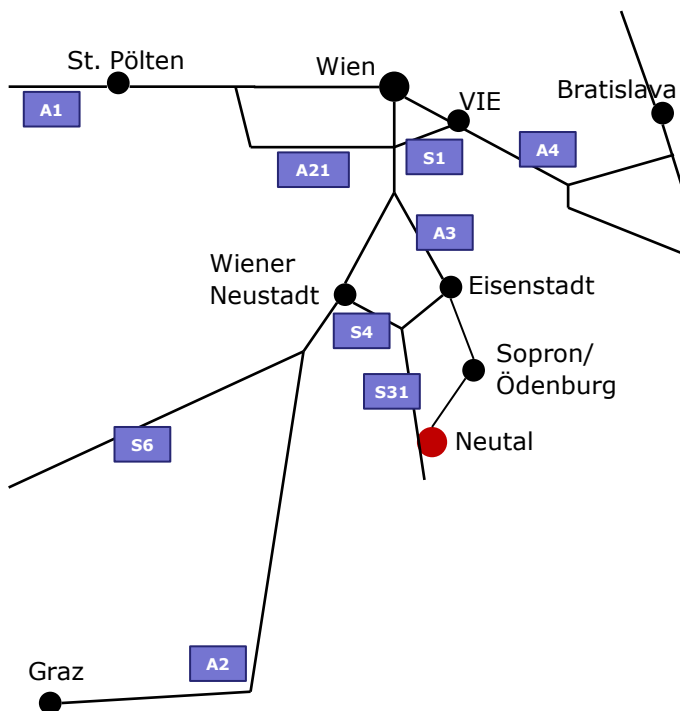
VAT No: ATU65287316
Commercial Register Eisenstadt
No. FN335928m

Management

Dr. Emmerich Fuchs
Tel: +43 (0) 5 9010 29330
Mobile: +43 (0) 664 820 83 76
eMail: ef@simtools.at

Development

Dipl.-Ing. Gerald Freiberger
Tel: +43 (0) 5 9010 29332
Mobile: +43 (0) 664 432 31 18
eMail: gf@simtools.at



The „Technologiezentrum Mittelburgenland“ is located directly at the highway S31 providing the following connections:

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- 30 Minutes from Eisenstadt
- 30 Minutes from Wr. Neustadt
- 50 Minutes from Vienna
- 55 Minutes from the Vienna International Airport (VIE)
- 80 Minutes from Graz
- 90 Minutes from Bratislava