

Easy Handling for CAN Networks

- **Simulating complex CAN networks**
- **Flexible manipulation at message and signal levels**
- **Restbus simulation for testing individual ECUs**

With the extent of networking between electronic control units (ECUs) in today's vehicles, simulating the bus communication in hardware-in-the-loop (HIL) systems is indispensable. Simulation of a CAN network bus can be configured centrally in Database for CAN (DBC) files via the RTI CAN MultiMessage Blockset. This makes the complexity of bus communication, and the frequency with which it is modified, much easier to handle.

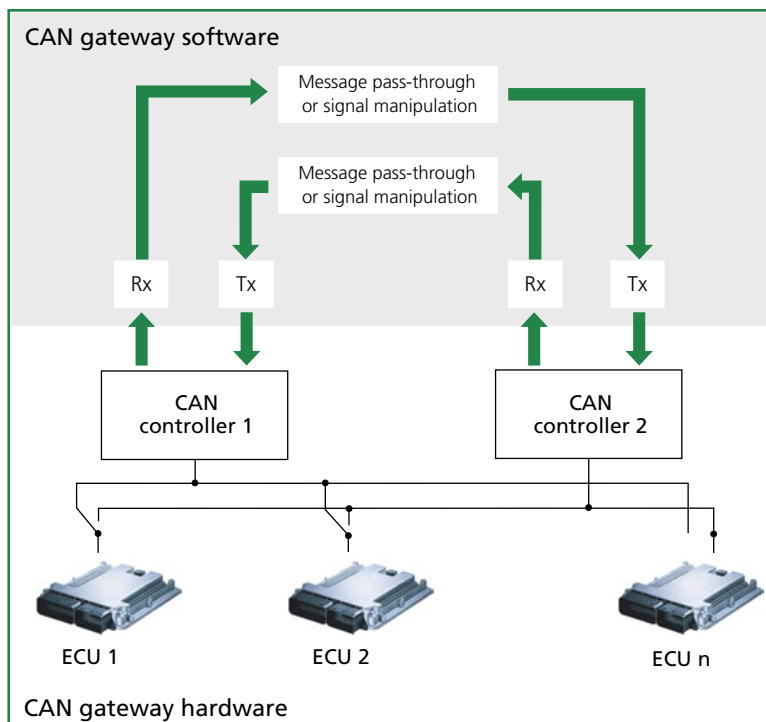
The RTI CAN MultiMessage Blockset lets you configure and manage more than 200 CAN messages with a single Simulink® block. This reduces the model size of HIL systems via complex CAN setups, and speeds up both code generation and compilation.

Restbus Simulation

Tests can be run to simulate errors and check whether an ECU detects them, using the blockset to generate messages containing special signals such as:

- Counter or mode signals for detecting faulty nodes in the CAN network
- Checksums or parity bits for detecting transmission errors and unauthorized transmitters

For plausibility checks in the ECU on other variables with model relevance, the messages also consist of synthetic signals or of signals from the real-time model.



▲ The gateway concept: dSPACE Simulator functions as an error gateway between the ECUs.

The Gateway Concept

Error gateways have proved a useful method of signal manipulation in a HIL simulator with several bus nodes. The bus lines of an ECU are switched to an "error bus" in the simulator, which manipulates messages as required and transmits them via the original CAN bus or the "error bus". Changes to individual CAN signals (such as checksums), entire messages (absence, wrong timing), and even the complete failure of an ECU can be simulated, and their effect on the rest of the network investigated. Messages from ECUs that are not present in reality can also be generated.

Online Manipulation

The blockset provides a wide range of options for targeted manipulation of bus communication online. This makes it easy to create widely varying test cases. For example, the value for each signal in the messages to be transmitted can be specified methodically. Special signal generation can also be corrupted for a specific number of transmission times for one message. Entire messages can be suppressed for a defined number of transmission times, and additional messages can be sent. These options are also available for automated tests on the ECUs.