

CANbedded Gateway

Embedded Software Component for CAN-CAN Routing in Vehicles

Electronic control units are being used increasingly in modern vehicles. Besides resulting in differences in bus physics and growth in lengths of wiring, this situation can also lead to excessive bus loading. Some relief can be achieved by subdividing a vehicle electronic system into multiple CAN networks. Data is exchanged between these CAN networks via an interconnecting element – a gateway. The purpose of this gateway is to transfer to the other CAN network only those messages or signals that are of interest for that network. The Vector CANbedded Gateway is a software component for handling CAN messages and signals between different CAN networks. The CAN messages and signals are received in their entirety on one network and are then sent onto the other CAN network while observing filtering and conversion rules. Since the gateway utilizes standard components for underlying layers, it is independent of the specific bus physics. Therefore it is readily adaptable to other bus systems (LIN, MOST, FlexRay, etc.).

Features and Advantages

The gateway component is ideal for software developers of electronic control units in motor vehicle applications. It allows them to perform complex handling of multiple CAN networks using a standard implementation that is easy to integrate. The gateway component, supplied in the form of C source code, permits data exchange between the networks on two different routing levels:

- > Signal routing
- > Message routing (with data queue/without data queue)

The required routing algorithm and the signals and messages to be routed are automatically selected based on database attributes in the communication matrix (dbc file). The specifications of motor vehicle OEMs are considered in the process. It is also possible to perform manual configuration on the signal or message level in the generation tool.

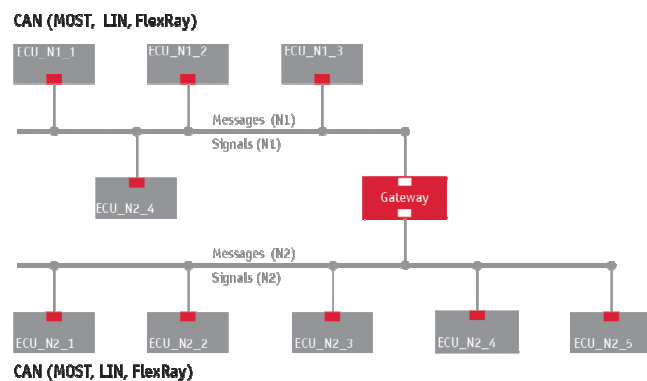
Signal Routing

Signal routing enables the exchange of individual CAN signals – e.g. the momentary vehicle speed – between the networks, regardless of the message in which the signal is embedded. In the target network the Send Cycle, Send Type, and signal position within the CAN message can be modified relative to the original network. The value of the signal to be transferred is not changed here. An exception to this is the value substitution strategy. Timeout handling required for the signal is also performed by the CANbedded Gateway component. If a timeout occurs, a predefined signal value (default value or special substitute value) is entered and routed.

In the case of non-resolvable routing relationships, e.g. when the various CAN networks have different signal value representations, C Callback functions allow the application program to execute suitable conversions.

Message Routing

In message routing the entire CAN message is routed. Depending on how messages are defined in the communication database, the



Application
Embedded Software Components

Gateway ECU between two CAN Networks

Training

As part of our training program we offer courses and workshops on standard CANbedded software components and the gateway component at our own classrooms as well as at customer sites. You will find more detailed information on individual training courses and schedules on the Internet at: www.vector-academy.com

Message-ID, send cycles and even, to a limited extent, the send types may differ between the two buses. These represent different cases that are handled by a various queuing algorithms. Two different algorithms are available for this purpose. A request queue ensures that only current messages are routed. For example, this is applied to functional messages where "old" values are suppressed thereby preventing unnecessary bus load. In contrast, transport protocol messages, for example, are buffered in a data queue and are routed then.

Mapping of signals within the message and the values of signals remain unchanged after the routing process.

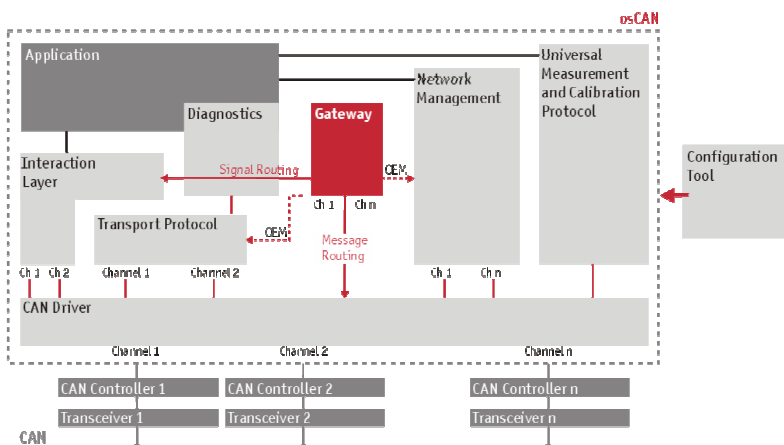
Special Functions

Two different transport protocol (TP) routing schemes are possible:

- > Low-level routing
Low-level routing enables transparent transfer of the TP message to the target network.
- > High-level routing
With high-level routing the transport protocol layer, implemented in the gateway component, participates in the TP message communication with other modules.

Application Areas

Use of the CANbedded Gateway software component enables simple and quick integration of various routing mechanisms for interconnecting CAN networks of electronic control units in the automotive environment. A precondition for the use of the gateway software component is the Vector Interaction Layer (when Signal Routing is being used) and the Vector CAN Driver. The CANbedded Gateway is already capable of adapting itself to the specific requirements of different motor vehicle manufacturers.



Gateway Software Component in the ECU