

# CAN bus

**The Controller Area Network (CAN bus)** is the most common bus standard designed for vehicle and automotive applications that require fast communication between microcontrollers and devices. In a CAN bus network, many short messages are broadcast to the entire network and a priority mechanism is used to manage data delivery between nodes. It is known to be an affordable, high performance and flexible solution to exchange data within a network comprised of multiple nodes. Because of its interesting list of characteristics, the protocol has been applied to building automation, medical and manufacturing industries.

## OPAL-RT'S SOLUTION

OPAL-RT provides a versatile CAN bus solution to interconnect automotive and industrial microcontrollers to real-time simulators for hardware-in-the-loop (HIL) and rapid control prototyping applications. Its interface facilitates the independent configuration of up to 4 channels and provides fast transmission of messages between 10 kb/s to 1000 kb/s. Two hardware configurations are available, offering different levels of capability and software functionalities.

The first entry level solution is based on Kvaser technology and offers the perfect option for customers developing simple automation and manufacturing applications. It offers up to 4 channels per board and message configuration is done from an embedded GUI. Because of the small form factor of the Kvaser board, it can be integrated into smaller simulators such as the OP4510.

The second solution is based on the Softing technology and is perfectly suited for automotive applications that require more advanced functionalities, such as CAN-DB. This feature allows the user to easily configure a high number of CAN messages from a database file (.dbc) and automatically generate the required set of Simulink blocks to be added to the model.

Both solutions provide advanced bus monitoring functionalities and mechanisms to handle errors on the CAN bus.

## KEY FEATURES

- Automatic model generation/configuration based on CanDB (DBC file support)
- Monitoring mode of all messages transmitted and received (promiscuous mode)
- Full control on transmission flags to simulate errors
- Reception flags and error counters returned to the model
- Easy to configure, schedule and manipulate CAN bus messages
- Seamless integration in the Simulink® environment
- Each CAN bus channel and identifier configurable independently
- Retrieve timestamp, DLC and engineering value
- Clear transmission and reception buffers through triggers

| SPECIFICATION                    | SUPPORTED   |   |
|----------------------------------|---|---|
| <b>Standards</b>                 | CAN 2.0A and CAN 2.0B   |   |
| <b>Channel mode</b>              | <ul style="list-style-type: none"> <li>• Active</li> <li>• Silent (monitoring)</li> </ul>   |   |
| <b>Data packing (endianness)</b> | <ul style="list-style-type: none"> <li>• Little-endian (Intel)</li> <li>• Big-endian (Motorola)</li> </ul>  |   |
| <b>Identifier format</b>         | <ul style="list-style-type: none"> <li>• Standard 11-bit (CAN 2.0A)</li> <li>• Extended 29-bit (CAN 2.0B)</li> </ul>  |   |
| <b>Monitoring features</b>       | <ul style="list-style-type: none"> <li>• Error frame detection, error frame count</li> <li>• Chip reset on command, chip reset on error frames</li> <li>• Bus load: number of packets per second on the bus</li> <li>• Bus state: Error passive, error active, bus off</li> <li>• Purge transmission FIFO on error frame</li> </ul> |   |
|                                  | <b>Softing</b>  | <b>Kvaser</b>                                 |
| <b>Number of channels</b>        | 2 channels  | up to 4 channels                              |
| <b>Transmission rate</b>         | 10, 100, 125, 250, 500, 800, 1000 kb/s and custom.  | 50, 62, 83, 100, 125, 250, 500 and 1000 kb/s. |
| <b>Connector type</b>            | DB9   | Custom connector with DB9 breakout cable      |
| <b>System interface</b>          | PCI   | PCIexpress                                    |

## OPAL-RT SOFTWARE COMPATIBILITY

| SOFTWARE   | CAN bus                             |
|--|-------------------------------------|
|  RT-LAB   | <input checked="" type="checkbox"/> |
|  HYPERSIM | <input type="checkbox"/>            |

## THIRD-PARTY HARDWARE<sup>†</sup>

| NAME                             | REQUIRED                            | SKU                    | DESCRIPTION              |
|----------------------------------|-------------------------------------|------------------------|--------------------------|
| Softing CAN-PCI-AC2, 2 x CAN-BUS | <input type="checkbox"/>            | CAN-AC2-PCI N          | CAN board (PCI) – 2 ch.  |
| Kvaser PCIEcan 4xHS              | <input checked="" type="checkbox"/> | EAN : 73-30130-00683-6 | CAN board (PCIe) – 4 ch. |

<sup>†</sup>Your OPAL-RT simulator may or may not have enough/suitable PCI/PCIe slots available for the board(s). Also, both boards are specific to particular OPAL-RT simulators. Please contact your local OPAL-RT representative to ensure compatibility with your current simulator.

## ABOUT OPAL-RT TECHNOLOGIES

OPAL-RT is the world leader in the development of PC/FPGA Based Real-Time Digital Simulator, Hardware-In-the-Loop (HIL) testing equipment and Rapid Control Prototyping (RCP) systems to design, test and optimize control and protection systems used in power grids, power electronics, motor drives, automotive industry, trains, aircraft and various industries, as well as R&D centers and universities.



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