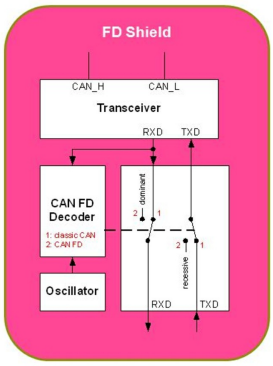
CAN Newsletter Online

TRANSCEIVER

Filters CAN FD messages

NXP has presented an idea on how to run Classic CAN controllers in a CAN FD network. It is based on a transceiver able to filter CAN FD messages and also the Error frames caused by the Classic CAN chip.

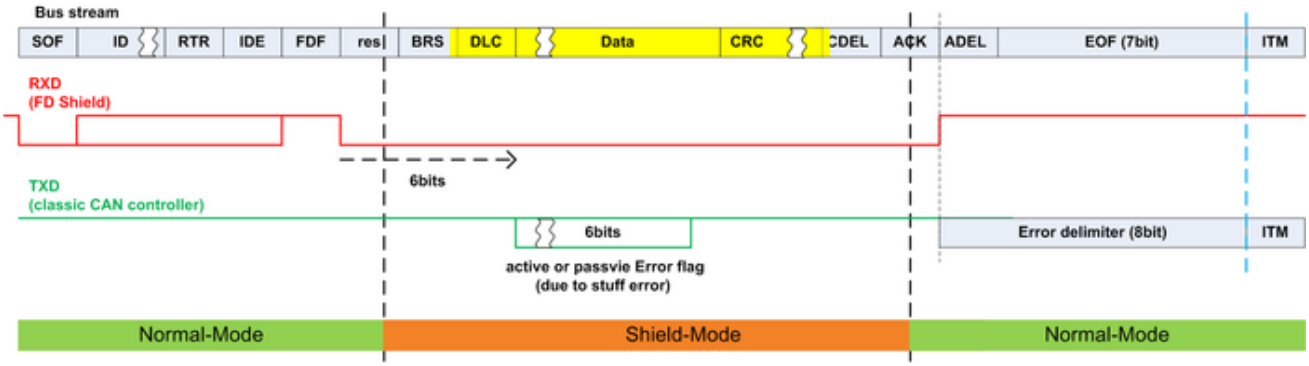
WHEN CAN FD AND CLASSIC CAN CONTROLLERS are in the very same network, the communication is limited to classic CAN frames. Receiving a CAN FD frame would cause an Error frame transmission by the Classic CAN controllers. Several migration paths from Classical CAN to CAN FD have been discussed at the last two international CAN Conferences (iCC) organized by CAN in Automation (CiA).



Block diagram of the CAN FD Shield transceiver (Photo: NXP)

At the CAN FD Tech Day in Tokyo attended by Japanese carmakers and their suppliers, NXP introduced the idea of a transceiver which filters CAN FD messages. The filtering starts with the FDF bit, if it is recessive. The transceiver's RXD signal starts to be dominant until the end of the CRC delimiter bit. The Classic CAN controller sends six dominant bits of an Error frame, but the transceiver does not forward them. The Error delimiter is received via RXD after the bus is recessive again (represented by the end of frame (EOF) field of the CAN FD frame).

The only trade-off is the increase of the Receiver Error Counter (REC) in the Classic CAN controller with the reception of CAN FD frames. But the next correctly received Classic CAN frame makes the CAN chip Error Active again. Nevertheless, there can be a short time, in which the network-wide data consistency is not guaranteed. If worst comes to worst, the Classic CAN controller, which is in Error Passive state, might not able to indicate a detected fault, because the Passive Error flag is overwritten by CAN data or remote frames.



Block diagram of the CAN FD Shield transceiver (Photo: NXP)

The proposed CAN FD Shield transceiver provides three operation modes. In normal mode, it behaves as specified in ISO 11898-2. The RXD signal represents the bus lines and the TXD signal controls the transmission caused by the connected CAN controller. In stand-by/sleep mode the RXD signal is high (recessive) as long as no wake-up event has been detected. Upon wake-up, the stand-by state is entered. The RXD signal is switched to low (dominant) until the transceiver leaves the stand-by state by request of the attached micro-controller. In shield mode, the RXD signal is low during the data-phase of any CAN FD message. The TXD input is disabled; this means the transmitter is not active. Shield mode cannot be requested by the micro-controller. It is entered automatically from normal mode, while a CAN FD message is on the bus.