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This regular column provides some hints and kinks about CAN-related protocol (including higher-layer protocol) functionality and physical layer topics.

Correction

In the article Intermission: The "unknown field", there was the statement: "If there is a pending transmission request, a CAN node is allowed to send a dominant bit in the third bit of intermission (this represents the SOF (start of frame) bit.)." This is incorrect! The ISO 11898-1:2024 standard clearly specifies: "A node shall send an SOF only when the bus is idle. A node sampling a dominant bit during its suspend transmission time or at the third bit of intermission shall accept it as SOF." Florian Hartwich, project leader of ISO 11898-1, clarified that this can happen, when another CAN node is "faster" and sends already its SOF bit. In this case, the "slower" node, sampling a dominant bit in its third bit of intermission and having a pending transmission request, shall transmit in the next bit, the highest prior bit of its CAN identifier field. Another reason that the last bit of intermission is dominant, can be caused by an external corruption of this bit, e.g., by means of cross-talking. *hz*

CiA 510 specifies J1939 parameter groups for SDO and EMCY

Several companies support J1939-based and CANopen connectivity for a dedicated device family, for example rotary encoders or inclinometers. In order to simplify device design regarding the supported process data and configuration parameters, CiA members have developed the CiA 510 specification. This document specifies two J1939 parameter groups (PG), mapping the content of SDO (service data object) messages (request and response) as given in the CiA 301 specification. Of course, these PGs use dedicated PGNs (parameter group numbers) assigned by SAE International. This allows to apply SDO-based configuration, as known in CANopen networks, also in J1939-based networks. Of course, such devices need to implement a CANopen object dictionary.

In addition, the CiA 510 document specifies a PG mapping the content of a CANopen EMCY (emergency) message. For this PG, SAE has also assigned a PGN, which is mapped into the 29-bit CAN identifier of a CAN data frame in CEFF (classic extended frame format). Of course, this PG should be transmitted with a higher priority as the SDO-PGs.

By the way, SAE has assigned PGNs for different PDOs (process data objects) specified in CiA profiles, such as for encoders (CiA 406) or inclinometers (CiA 410). Other CiA profiles, specifying a J1939 mapping, are in development. One of the next is the CiA 462 profile (item detection).

The benefit of these PGs is that the CANopen profile functionality is also available in J1939-connectable devices. The CANopen engineering tools and software can be adapted to J1939 ecosystems. J1939-based devices, implementing CiA profiles, can be configured as CANopen devices. *hz*

SDO block transfer clarification

Gateways and routers are typically utilized in case of an access to deeply embedded devices (e.g., for the purpose of a firmware update). Usually, these gateways are transparent. Delay times, limitations in processing power and memory may cause that these gateways get somehow visible; e.g., as they could modify the order of CAN frames in case of CAN frame tunneling. Among others, this can cause problems in the handling of an SDO block transfer. Thus, on the sideline of IG CANopen FD meetings, protocol stack providers reached an agreement regarding ambiguities about error handling in a CANopen CC SDO block transfer. Different interpretations have arisen concerning how to continue the transfer of remaining data after the receiver of data has indicated that not all segments of a block were received correctly. The question was whether the retransmission of the not (or not correctly) received segments should resume with the last successfully received segment number plus one, or whether the next SDO block, transferring the not-yet-transmitted data, should start with segment number one (1).

The experts agreed on the latter scenario, which seems to be consistent with all currently available implementations. Segments of a block, which were not received correctly, can therefore be retransmitted in the following block, starting again with segment number one.

The experts of the IG CANopen FD will prepare a proposal for a CiA 311 SDO block transfer test case, so that protocol stack vendors can test this scenario in the future.

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