CAN Newsletter Online

CAN FD LIGHT RELEASED

Simplified CAN FD data link layer

CAN in Automation (CiA) has released the CiA 604-1 CAN FD Light specification as Draft Specification Proposal (DSP). It is intended for use in deeply embedded, price-sensitive sensor/actuator networks.

The CAN FD Light commander node synchronizes the responder nodes with hundreds of LEDs (Source: Adobe Stock)

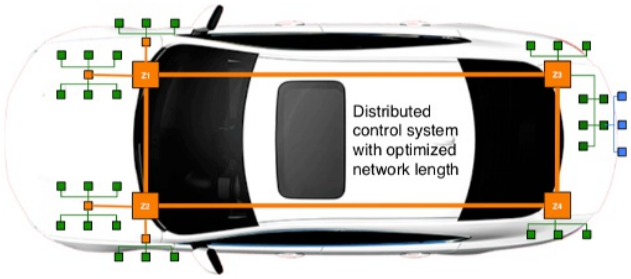
The 16-page document specifies CAN FD Light responder nodes, which only act on CAN FD data frames received from commander nodes. As the communication follows the commander/responder scheme, the responder nodes do not support arbitration. This avoids the need of costly add-on circuitry (e.g. oscillators) for the responder nodes. The transmitted CAN FD data frames (ISO 11898-1:2015) provide payloads of up to 64 byte. The sophisticated error detection features as specified in ISO 11898-1:2015 are supported, but error and remote frames are not transmitted to simplify the implementation of nodes. Therefore, the data frame scheduling is periodical and no network-wide data consistency is guaranteed. If desired, this should be solved in the application.

CAN FD Light is suitable for low-cost applications such as smart headlights for road vehicles. The connected LED clusters can be controlled individually from one commander node. Other potential applications include heating, ventilation, and air-conditioning (HVAC) systems. The specification does not support bit-rate switching. Therefore, the maximum bit-rate is 1 Mbit/s, which is fast enough for such applications. The approach is similar to LIN (local interconnect network) communication, but faster and with more available payload.

The CiA 604-1 document will be accompanied by other CiA 604 series guidelines and application notes, which are under development. This open specification enables semiconductor suppliers to implement CAN FD Light responder nodes in their micro-controllers or in FPGAs (field programmable gate arrays). “CiA regards the CAN FD Light approach as a mayor step to improve price-sensitive deeply embedded networks,” said Holger Zeltwanger, CiA Managing Director. “Besides automotive applications, there is a huge potential for industrial sub-networks due to the robustness and reliability of the CAN FD communication.”

Smart LED headlights application

In a modern, zonal in-vehicle architecture, sensors or actuators are not directly connected with the central high-performance computer. They are connected in conventional networks such as CAN (FD), Flexray, or LIN. CAN FD Light is the recent approach for such a sub-zone network. The networked sensors or actuators are controlled by a zonal controller/gateway (also acts as CAN FD Light commander), which communicates via a back bone with a central high-performance computer. The commander node synchronizes the responder nodes with hundreds of LEDs. With the bit-rate of 1 Mbit/s, up to 4000 individual dynamic light sources can be achieved.



Zonal in-vehicle architecture (Source: CAN in Automation)

The responder nodes transmit only the CAN FD data frames on request of the CAN FD Light commander and support only the 11-bit identifier. As the bit-rate is set to a fixed value, the control field bits in the frames are fixed. With no need for arbitration, an accurate clock source at each node is not required. The single monolithic devices without crystal oscillators could be used. This lowers costs and improves the implementation reliability, as crystal oscillators are sensitive to vibration and temperature.

CAN FD Light nodes implement a subset of the CAN FD data link layer i.e. no additional network has to be added in the car. Existing CAN FD network topologies can be used without any hardware changing. Available CAN FD transceivers (ISO 11898-2:2016) or CAN SIC transceivers (CiA 601-4) can be deployed. Off-the-shelf CAN FD tools can be used as well.

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