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CANopen FD

The art of embedded networking



For IIoT and Industry 4.0 based on well-proven CANopen
Real-time capable, robust, and reliable
Ready for advanced safety and security
Real second sources and interoperable devices
Low-cost hardware, software, and tools

Five facts

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— *For IIoT and Industry 4.0 based on well-proven CANopen* —



CANopen FD is well-suited for adding embedded networks to IIoT applications. The high communication flexibility, thanks to the powerful Universal Service Data Object (USDO), enables a simple access from any CANopen FD device to any other CANopen FD device during run-time. Furthermore, the higher data throughput offered by CANopen FD supports comprehensive condition monitoring and big data applications. In order to integrate CANopen FD networks into Industry 4.0 environments, CiA specifies the mapping of CANopen FD services and profiles to OPC UA.

-  Increased data throughput derived from CAN FD
-  Network-wide cross communication via new USDO
-  Simplified embedding CANopen in the world of IIoT by USDO
-  Support of emerging CANopen/OPC UA companion specification
-  Lengthened data field allowing for data integrity check and security features

— *Real-time capable, robust and reliable* —



CANopen FD is based on the established CAN and CANopen technology. CAN as well as CAN FD are designed for automotive applications and meet therefore very strict requirements with regard to reliability, robustness, and power-consumption. CANopen FD re-utilizes the advantages of the well-proven CANopen. In addition, CANopen FD was designed with special regard to simplicity. The event-driven behaviour of CAN FD, the higher bit-rates, and the improved protocol efficiency allow very short latency times.

-  Short latency times by using event-driven short frames and real network topology
-  Faster than Classical CAN
-  Residual error probability even better than in Classical CAN
-  Hardware designed for harsh environmental conditions
-  Low energy consumption

Ready for advanced safety and security

Embedded networks are faced with increasing functional safety and security requirements. Authentication of the correct network players is one typical aspect. In other applications even encryption of data or data frames is required. Due to the increased length of the CAN FD payload, the CANopen FD functional safety protocol can be included in a single frame. Optionally, these safety messages can be secured.

-  Transfer of signatures authenticating the source of the data, together with the data
-  Transmission of encryption keys in a single PDO
-  Enabler for mission-critical and high-available systems
-  Adaptation of system-wide functional safety concepts
-  Compound data sets in 64-byte frames



Real second sources and interoperable devices

Several companies implement the CANopen FD specification. First CANopen FD prototypes demonstrated interoperability in a real multi-vendor system on occasion of CANopen FD plugfests. CAN FD controllers and transceivers are available from several semiconductor manufacturers. Various suppliers provide interface-boards and tools. Conformity of CANopen FD devices is proved by mandatory CANopen FD assessments of CiA. In addition, CANopen FD profile specifications enable device interoperability.

-  CANopen FD protocol stacks by independent software houses
-  Configuration and diagnostic tools from different sources
-  CAN FD hardware long-term availability by various suppliers
-  Verification of interoperability on CANopen FD plugfests
-  Improved quality by mandatory CiA conformance testing



Low-cost hardware, software, and tools



CANopen FD software and hardware units as well as tools are available for reasonable prices from several suppliers. CAN FD and CANopen FD implementations are very scalable. Taking this into account, CANopen FD users are in a comfortable position. They are enabled to select the best-suited products with regard to implemented functionality and price. Reusing knowledge, tools, and network topologies simplify migration from existing CANopen to CANopen FD solutions.



CANopen FD stacks scalable to hardware resources



Devices adaptable to application or system requirements



Reasonable prices by several suppliers



No dependence on single source



Low-cost hardware due to high volumes



CAN in Automation (CiA) e. V.
Kontumazgarten 3
DE-90429 Nuremberg
Phone: +49-911-928819-0
Fax: +49-911-928819-79
headquarters@can-cia.org
www.can-cia.org