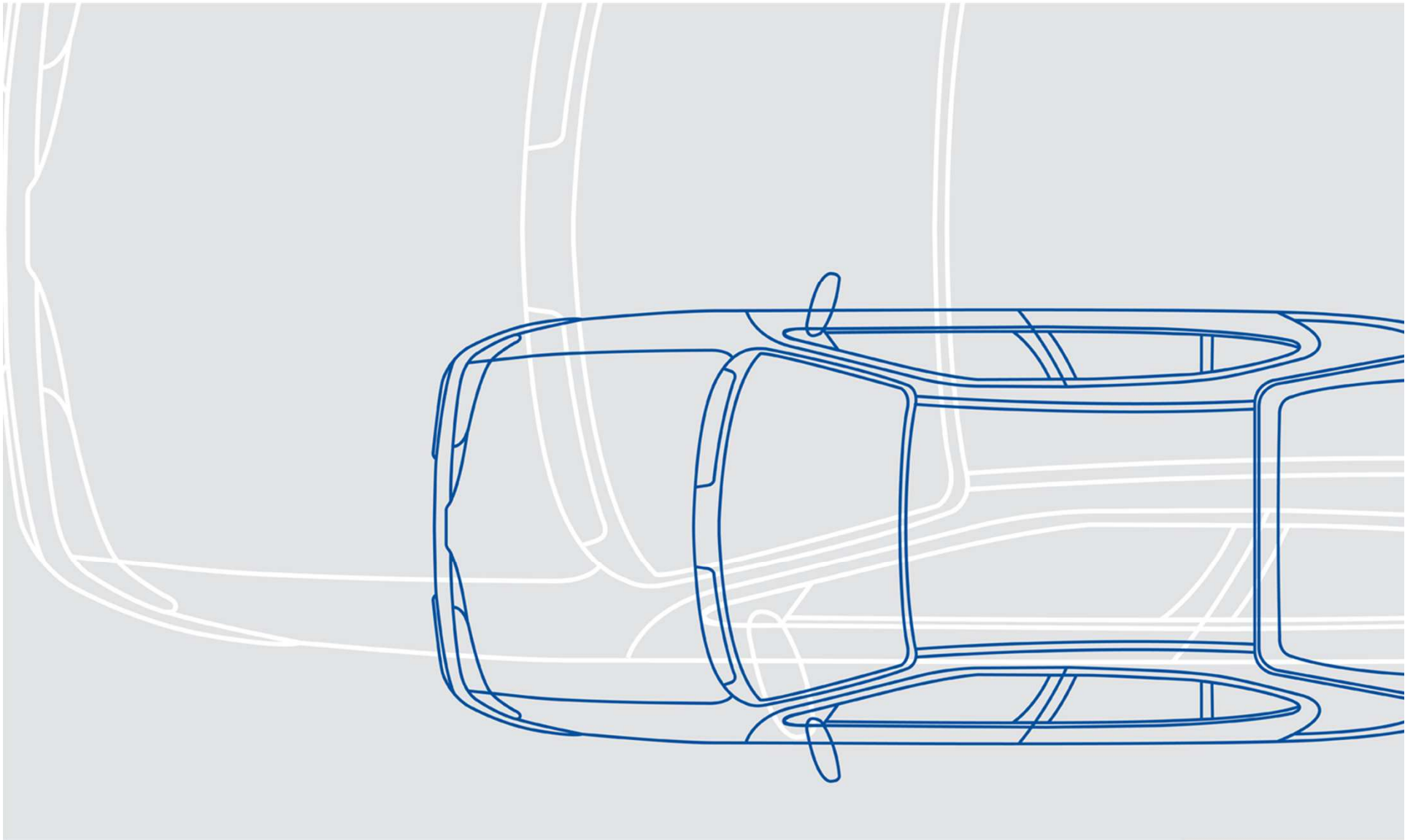


CAN-FD Tech Day – 2012-10-18

CAN FD – Automotive and Industrial Use Cases



Motivation for CAN FD

- Bit rate above 1 Mbit/s
- Data fields with up to 64 bytes

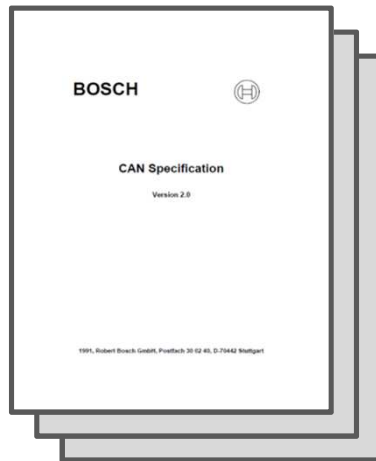
Use Cases

- Fast SW download during production and service
- Communication of ECUs with high data volume
- Accelerate communication on long bus lines
- Avoid splitting of long message

ETAS Portfolio for CAN FD

- Hardware portfolio
- Software portfolio

1991-09

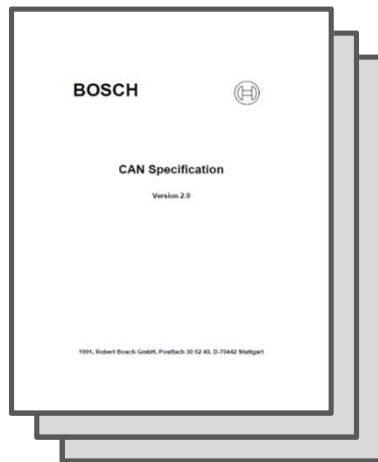


CAN
Specification
Version 2.0
(became ISO11898-1)

Limitations of current CAN

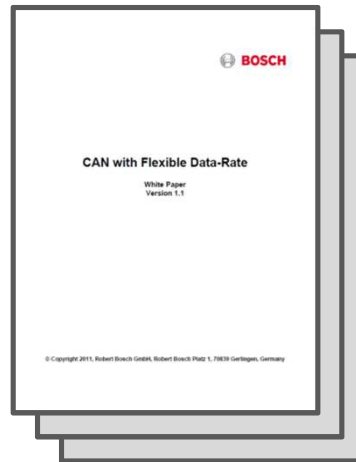
- Bit rate versus network dimension
 - Max. passenger cars: 800 kBit/s
 - Max. commercial vehicles: 250 kBit/s
- Data field limited to 8 bytes
 - Max. payload: 60% of CAN frame
 - Transport protocols necessary

1991-09



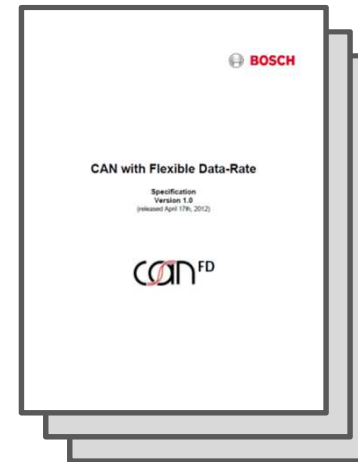
CAN Specification
Version 2.0
(became ISO11898-1)

2011-08



CAN with Flexible Data-Rate
White Paper
Version 1.1

2012-04



CAN with Flexible Data-Rate
Specification
Version 1.0
(becomes ISO11898-7)

CAN was sufficient for two decades. With CAN FD it's ready for the next!

Data fields with up to 64 Bytes. Bit rate above 1 Mbit/s

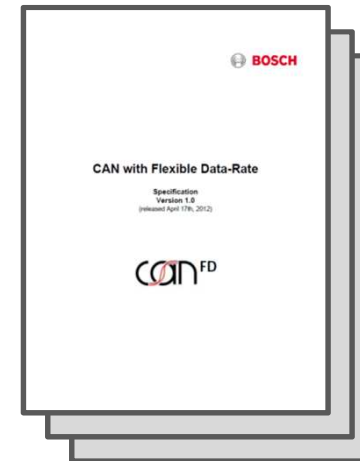
Bit rate above 1 Mbit/s

- Usable on larger network topologies

Data fields with up to 64 Bytes

- Max. payload increased: 90% of CAN frame
- Reduced usage of transport protocols
- Synchronous transmission of large data

2012-04



CAN with Flexible Data-Rate
Specification
Version 1.0
(becomes ISO11898-7)

- Doubling of the system complexity by every 18 months.
- Complete SW download takes several hours

	CAN	CAN FD
CAN payload	8 Byte (40% .. 58%)	64 Byte (71% .. 92%)
Transport Protocol	1 byte PID 7 byte DAQ (88%)	1 byte PID 63 byte DAQ (98%)
Example	10 minutes for SW download	5 minutes for SW download

- **50% reduction in SW download times, still with the same bit rate!**
- CAN FD will be supported in AUTOSAR 4.1.1 (March 2013)

- Average CAN Powertrain: 500 kBit/s, 50% bus utilization
 - Utilization mainly due to transmissions from motor control unit, and transmission control unit

	CAN	CAN FD
CAN payload	8 Byte (40% .. 58%)	32 Byte (64% .. 84%)
Bit rate	500 kBit/s	500 kBit/s + 4 Mbit/s → Comb. 1.41 Mbit/s
Example	50% bus utilization	11% bus utilization

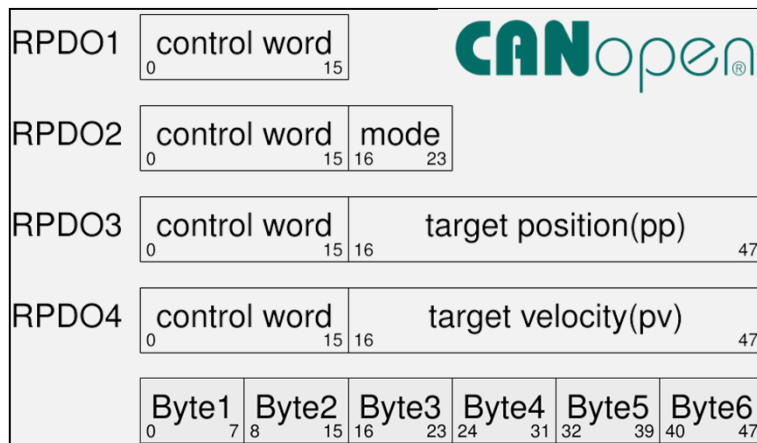
- **Add additional ECUs to existing CAN bus, no necessity for further CAN busses**

- Baudrate limited by network dimension

	SAE J1939-11	SAE J1939-15	SAE J1939-15
Issued	2006-09	2008-08	2011-10
Bit rate	250 kBit/s	250 kBit/s	500 kBit/s
Bus length (L)	40 m	40 m	56.4 m
Stub length (S)	1 m	3 m	1.67 m
Nodes (n)	10	30	30

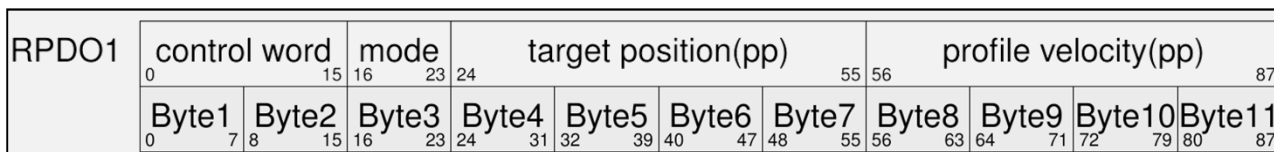
- SAE J1939-15 brings CAN technology to its limits
- CAN FD uses the same nominal bit rate as J1939 standard (250 kBit/s)
- The data bit rate can be increased independent of cable length
- **Example: 250 kBit/s + 4 Mbit/s → combined 810 kBit/s**

- Certain use cases require a time synchronous transmission of information
- CAN's limit to a data field size of 8 bytes often prevents this
- Example: CiA 402 – CANopen device profile for drives and motion control



← 4 messages only for one motion control

New PDO for CAN with 11 bytes



ES8xx Performance System

- ES850**
Analog In Module
- ES820**
Computing Module
- ES890**
ECU-Interface Module
- Power Plate



ES890 features

- Gigabit Ethernet FETK, ETK
- Fast Ethernet for legacy ETAS HW
- CAN (FD), FlexRay
- Compact housing with scalable func.
- Low latency and high speed comm. between modules

ES59x ECU and Bus Access Modules *



ES592

ES593-D

ES595

ES9xx Modular Rapid Prototyping HW *



ES910

* Prepared for CAN FD

Bus Analyser



- Support for complete CAN FD configuration
- Support for 64 Bytes payload
 - Message Window, Node Simulation
- First product with full CAN FD features available 10/2012
- Download at:
<http://rbei-etas.github.com/busmaster/>

Measurement, Calibration, and Diagnostics *



INCA

- Support for CAN FD configuration
- Support for 64 Bytes payload
- Message Window
- Node Simulation

* Prepared for CAN FD

Thank you for your attention!

Questions?



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