

ISO 11898-1:2024-05 (E)

Road vehicles - Controller area network (CAN) - Part 1: Data link layer and physical coding sublayer

Contents		Page
Foreword		v
Introduction		vi
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Symbols and abbreviated terms	6
5	Basic concepts of CAN	8
5.1	CAN properties	8
5.2	Frame transmissions	9
5.3	Bus access method	11
5.4	Information routing	11
5.5	Network flexibility	11
5.6	Remote data request	11
5.7	Error detection	11
5.8	Error signalling and recovery time	11
5.9	Fault confinement	12
5.10	Error-active	12
5.11	Error-passive	12
5.12	Bus-off	12
5.13	ACK	12
5.14	Repetition of transmission attempts	12
5.15	Network-wide data consistency	12
5.16	Switchable operating modes of the PMA	13
5.17	Bus states and MAC sub-layer phases	13
6	CANDLL specification	14
6.1	General	14
6.2	Time stamping	14
6.3	DLL protocol	14
6.4	LLC sub-layer	15
6.4.1	Overview	15
6.4.2	Notifications	16
6.4.3	Structure of LLC frames	16
6.4.4	Limited LLC frames	17
6.4.5	Services of LLC sub-layer	17
6.5	Functions of the LLC sub-layer	21
6.5.1	General	21
6.5.2	Flow control on re-arbitration	21
6.5.3	Flow control on retransmission	21
6.5.4	Frame acceptance filtering	22
6.5.5	Overload notification	22
6.5.6	Recovery management	22
6.5.7	Time stamping	22
6.6	MAC sub-layer	23
6.6.1	Functions and rules	23
6.6.2	Services of the MAC sub-layer	23

6.6.3	Time reference points	23
6.6.4	Functional model of MAC sub-layer architecture	23
6.6.5	Specification of EF	27
6.6.6	Specification of OF	28
6.6.7	Inter-frame space specification	28
6.6.8	SOF	30
6.6.9	Elements of the MAC frame	30
6.6.10	MAC frame in CBFF and CEFF	31
6.6.11	MAC frame in FBFF and FEFF	33
6.6.12	MAC frame in XLFF	37
6.6.13	MAC frame coding	42
6.6.14	Data frame acknowledgement	43
6.6.15	Frame validation	43
6.6.16	Order of bit transmission	43
6.6.17	Medium access method	43
6.6.18	MAC data consistency	45
6.6.19	Restricted operation	45
6.6.20	Bus monitoring	45
6.6.21	Error handling and overload handling	45
7	PLspecifications	49
7.1	General and functional modelling	49
7.2	Services of the PCS interface	50
7.2.1	Requirements	50
7.2.2	PCS_Data.Request	50
7.2.3	PCS_Data.Indicate	50
7.2.4	PCS_Mode.Request	50
7.2.5	PCS_Status.Transmitter	51
7.2.6	PCS_Status.Receiver	51
7.3	PCS	51
7.3.1	Bit encoding/decoding	51
7.3.2	Bit time	51
7.3.3	Configuration of the bit time parameters	55
7.3.4	Transmitter delay compensation	56
7.3.5	Synchronization	58
7.3.6	Tolerance range of the oscillator frequencies	60
7.4	Attachment unit interface	61
7.4.1	General	61
7.4.2	PCS to PMA symbols	61
7.4.3	PMA to PCS symbol	62
7.5	PWM encoding	62
7.5.1	General function and definitions	62
7.5.2	PCS without PWM encoding	63
7.5.3	PCS sub-layer with PWM encoding	63
8	Description of supervisor FCE	66
8.1	Fault confinement	66
8.1.1	Objectives	66
8.1.2	Strategies	66
8.1.3	Fault confinement interface specification	66
8.1.4	Rules of fault confinement	69
8.1.5	Node start-up	71
8.2	Bus failure management	71
Annex A (normative)	CAN FD light -- Data link layer and physical coding sub-layer requirements of responder nodes	72
Annex B (informative)	Configuration interface	80
Annex C (informative)	Additional information	81
Bibliography	82