ISO 20794-4:2020-02 (E)

Road vehicles - Clock extension peripheral interface (CXPI) - Part 4: Data link layer and physical layer

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Symbols and abbreviated terms **2**
4.1 Symbols 2
4.2 Abbreviated terms 3

5 Conventions **4**

6 Introduction to data link layer and physical layer **5**
6.1 Frames 5
6.2 Frame collision avoidance 5
6.3 Error detection and indication 5
6.4 Clock transmission and detection 5

7 Service interface parameters (SIP) **5**
7.1 SIP — General 5
7.2 SIP — Data type definitions 5
7.3 SIP — Ftype, frame type 6
7.4 SIP — ReqId, request identifier 6
7.5 SIP — ReqTypeId, request type identifier 6
7.6 SIP — PDU, protocol data unit 6
7.7 SIP — Length, length of PDU 7
7.8 SIP — ev_wakeup_ind, event wake-up indication (optional) 7
7.9 SIP — cmd_wakeup_req, command wake-up request 7
7.10 SIP — NMInfo, network management information 8
7.11 SIP — SCT, sequence count 8
7.12 SIP — Result, result 8

8 Data link layer (DLL) **8**
8.1 SI — L_Data.req and L_Data.ind service interface 8
8.2 SI — L_Data.req and L_Data.ind service interface parameter mapping 9
8.3 DLL — Service interface with L_Ftype parameter mapping 10
8.3.1 DLL — L_Data.req and L_Data.ind with L_Ftype = NormalCom (L_Length = NULL) 10
8.3.2 DLL — L_Data.req and L_Data.ind with L_Ftype = NormalCom (L_Length ≥ 0016) 11
8.3.3 DLL — L_Data.req and L_Data.ind interface with L_Ftype = DiagNodeCfg 12
8.4 DLL — Frame fields 13
8.4.1 DLL — Frame field definition 13
8.4.2 DLL — Request type identifier and request identifier fields 14
8.4.3 DLL — L_FI (frame information) field 15
8.4.4 DLL — L_DATA (data field) 16
8.4.5 DLL — L_CRC field 17
8.5 DLL — Internal operation 19
8.6 DLL — Timing parameters 20
8.6.1 DLL — IBS timing handling 20
8.6.2 DLL — IFS timing handling 20

8.6.3 DLL — Beginning condition of frame 21
8.6.4 DLL — Start of frame 22
8.6.5 DLL — Frame transmission time 22
8.7 DLL — Completion of frame 23
8.7.1 DLL — General 23
8.7.2 DLL — Completing condition of L_PTYPE field 23
8.7.3 DLL — Completing condition of L_PID field 23
8.7.4 DLL — Completing condition of frame 24
8.8 DLL — Byte arbitration 24
8.9 DLL — Function models 24
8.9.1 DLL — Transmission logic 24
8.9.2 DLL — Reception logic 25
8.10 DLL — Error detection 26
8.10.1 DLL — General 26
8.10.2 DLL — Byte error (Err_DLL_Byte) 26
8.10.3 DLL — CRC error (Err_DLL_CRC) 27
8.10.4 DLL — Parity error (Err_DLL_Parity) 27
8.10.5 DLL — Data length code error (Err_DLL_DLC) 27
8.10.6 DLL — Data length code extension error (Err_DLL_DLCext) 27
8.10.7 DLL — Framing error (Err_DLL_Framing) 28
8.10.8 DLL — Exception handling for L_FI_DLC = '1111_2' detection 28

9 Physical layer (PHY) 28
9.1 PHY — Overview 28
9.2 PHY — Concept of waveform generation 29
9.3 PHY — Physical signalling (PS) requirements 30
9.3.1 PHY — PS general 30
9.3.2 PHY — PS physical interface configuration 31
9.3.3 PHY — PS bit rate 31
9.3.4 PHY — PS bit sample timing 31
9.3.5 PHY — PS encoding and decoding logic 32
9.3.6 PHY — PS clock generation 35
9.3.7 PHY — PS node clock synchronization and bit synchronization 36
9.3.8 PHY — PS detection of clock existence 36
9.3.9 PHY — PS bit-wise collision resolution 37
9.3.10 PHY — PS AC parameters 37
9.3.11 PHY — PS node transmission of wake-up pulse 38
9.4 PHY — Physical medium attachment (PMA) requirements 39
9.4.1 PHY — PMA general 39
9.4.2 PHY — PMA electrical parameters 40
9.4.3 PHY — PMA AC parameters 42
9.4.4 PHY — PMA wake-up pulse and dominant pulse filter time 50
9.5 PHY — Physical media dependent (PMD) sub-layer requirements 53
9.5.1 PHY — PMD entity requirements 53
9.5.2 PHY — PMD device interface requirements 53
9.6 PHY — Physical media (PM) sub-layer requirements 54
9.7 PHY — Control and event services 54
9.7.1 PHY — Control and event service interface 54
9.7.2 PHY — Wake-up request 55
9.7.3 PHY — Wake-up event 55

Bibliography 56