UNISIG

ERTMS/ETCS
ERTMS EuroRadio Conformance Requirements
REF : SUBSET-092-1 ISSUE : 4.0.0 DATE : 05 July 2023

Company	Technical Approval	Management approval
ALSTOM		
AZD		
CAF		
HITACHI RAIL STS		
MERMEC		
SIEMENS		
THALES		

© This document has been developed and released by UNISIG

1. MODIFICATION HISTORY

Issue Number Date	Section Number	Modification / Description	Author
0.0.1 :: 3-Apr-02	first draft		J Harmer
0.0.2 :: 8-Apr-02	all	corrections	J Harmer
0.0.3 :: 15-Apr-02	all	corrections	J Harmer
0.0.4 :: 18-Apr-02	Section 2	Corrections to due handling of former "reserved" field, check of internal links	T Streich
0.0.5 :: 3-May-02	all	corrections after comments at sixth meeting	J Harmer
0.1.0 :: 10-May-02	none	clean version	J Harmer
2.2.1 :: 28-Jun-02	table 4.47	correction (TS) and issue	J Harmer
2.2.2. 31-03-03		Version number raised for release to the Users Group.	WLH
2.2.3 19-06-03	1.1,1.3, 3, Annex A, Annex B	Corrections for DB comments KMS deleted Reference updating	R Bertolini
2.2.4+ 25-06-03	2.5, Annex A, Annex B	Max DT/RQ/RP SaPDU length corrected; clarification on application of conformance requirements in Annex A and B	R.Bertolini
2.2.4++	editorial	For draft release to Users Group	JH
2.2.5	-	Formal release	JH
2.2.5.revA 31-08-2005		Update to changes in ER FIS issue 2.2.5.refF	TS
2.2.5.revB 15-09-2005		Changes during Zuerich meeting	TS
2.2.5.revC 21-10-2005		Comments from Bombardier added	TS
2.2.5.revD 09-11-2005		corrections after comments at Berlin meeting	VP
2.2.5.revE		corrections after comments	VP

25-01-2006		from Alcatel	
2.2.5.revF 02-02-2006		corrections after comments from Alcatel	VP
2.3.0 06-02-2006	-	Formal release	VP
2.3.0 30-03-2009	all sections renumbered	Template updated	JH
2.3.1 15-09-2011		Changed references to SS-037 and other docs	FZ
2.4.0-3 4-10-2011	all; 6.3.11-14	Editorial check; numbering; CR1018; final wg review	JH
2.4.4 12-12-2011	-	release for review	ER WG
2.4.5 23-02-2012	Cover, § 4.3	CR1135	XM
3.0.0 01-03-2012	-	Baseline 3 release version	ER WG
3.0.1 15-12-2015	All	CR1284 (Cover CR): Ref 28 and Sa 105 added. Chapter 6.5&6.6 added. Chapter 6.10 added. added MA1b-1l, correction of MA1, MA2-MA4. Error corrections, Sa 10, 11, 18, 27, 28, 31, 37, 52, 57, 85, 87, 94, 102, 106-109. Chapters 5.4.8 and 5.4.9 deleted (Sa 63-76). Error correction T2F18-19, OT11-13, N3. Error corrections of chapter references to SS-037. Error corrections in Annex A and B. Annex C added. Changed figure in annex A1. Extend headline 6.4.	J Mattisson (author = UNISIG)

© This document has been developed and released by UNISIG

SUBSET-092-1
4.0.0

ERTMS EuroRadio
Conformance Requirements

Page 3/59

3.1.0 18-12-2015	-	Baseline 3 2nd release version	ER WG
3.2.0 29-01-2016	6.5	Include conformance tests for ALE layer (CR 1322)	ER WG
3.2.1 07-03-2016	6.5 5.5, 5.6	Corrected references of chapter 6.5 (CR 1322) Reverted item numbering of 5.5 and 5.6 (CR1307)	ER WG
3.2.2 01-06-2016	6.5.2 6.7 A.3.1 C.2	More detailed requirement references for ALE Pakets (CR1322) Added Network Protocol Conformance Requirements Subchapter for PS mode (CR1371) (NOTE: reuired to update all Table indices after that)	ER WG (RR)
3.3.0 18-08-2016	C.2	Fixed item numbering	ER WG (RR)
3.3.1 08-03-2017	all	corrections after comments (CR1371)	ER WG (JiS)
3.3.2	all	Updated reference of SS-037 after the split.	ER WG (IKE)
3.3.3 21-09-2022	4.4.1, 4.4.3, 5.1, 5.2, 5.3, 5.4.7 (Removed), 6.1, 6.2, 6.3.7 (Removed), 6.3.8 (Removed), 6.4.4, 6.5.1, 6.8.1, 6.8.2, 6.8.3, 6.9 A.3.1 (Table A.2)	CR1307, CR1309, CR1310, CR1423, CR5049, CR1405	ER WG (JiS)
3.9.2		Formal update for the B4R1 pre-release version	J. Mattisson + S. Fritzsche
3.9.3 05-04-2023		Updated according to TSI 2022 3rd review Reference to SS-037-1 corrected. CR1417 added.	J. Mattisson
3.9.4 25-06-2023		Updated according to TSI 2023 4th review.	J. Mattisson

4.0.0 05-07-2023	-	Baseline 4 1st release version	ER WG

SUBSET-092-1
4.0.0   ERTMS EuroRadio
Conformance Requirements   Page 5/59

2. TABLE OF CONTENTS

3. TABLES

© This document has been developed and released by UNISIG

© This document has been developed and released by UNISIG

4. INTRODUCTION

The objective of EuroRadio conformance testing is to establish whether the EuroRadio sub-system implementation being tested conforms to the EuroRadio Specification. The purpose of conformance testing is to provide assurance that different EuroRadio sub-system implementations are able to interwork.

To evaluate the conformance of a EuroRadio implementation with the EuroRadio Specification, it is necessary to have a statement of the conforming capabilities and implemented options. Such a statement is called an Implementation Conformance Statement (ICS). It has to be based on the conformance requirements contained in this specification.

Test cases are also required (see Subset-092-2 [22]); they cover the safety layer only, as industry experience exists for the testing of the communications layer.

4.1 Scope of the EuroRadio Conformance Specification

This document consists of five technical sections:

4. Introduction

5. Safety Protocol

This section provides the conformance requirements for the safety protocol specified in the EuroRadio Specification [29].

6. Communication Services and Protocols

This section provides the conformance requirements for the communication services and protocols specified in the EuroRadio Specification [20].

Annex A: Interface to the Mobile Network

The requirements for this interface are optional. That is, this interface may be closed, using a manufacturer-specific interface, or open, when the requirements of the EuroRadio specification must be complied with. This section covers the conformance requirements for connecting an on-board EuroRadio sub-system equipment to a GSM mobile terminal.

Annex B: Interface to the Fixed Network (CS Mode)

This section provides requirements for trackside EuroRadio sub-system equipment to connect to an ISDN using ISDN primary rate access.

Annex C: Interface to the Fixed Network (PS mode)

This section provides requirements for trackside EuroRadio sub-system equipment to connect to a packet switched network.

Note that performance requirements on EuroRadio are currently excluded from this conformance specification, as they are specified at the system level.

4.2 General Notes on Conformance Requirements

4.2.1 Questions

The conformance requirements are specified in the form of a questionnaire. Each question in the conformance chapters refers to a feature of the service or protocol which requires an answer by conformance testing.

Answering 'YES' to a particular question states that the implementation supports the features defined in the referenced sections of the EuroRadio Specification. Answering 'NO' to a particular question states that the implementation does not support that feature. For some questions a value, a range of values, or an action shall be provided by the implementer.

Some of the items are optional and in some cases the option is dependent on the implementation of other items. In these cases, if the invoking capability is supported, the ability to support the item is mandatory. These conditions are made clear in the text of each item.

4.2.2 Conventions

The questions are presented in the form of tables. Table 4.1 contains examples.

Item	Function	References	Status	Supported
CoS1	Connection set up	[20] 6.2.2	M	Yes
CoSP1	T-CONNECT.request	[20] B.1	O	Yes No
CoCRQ1	Called address	[20] B.1	CoSP1: M	Yes

Table 4.1 – Example of conformance requirements

The following conventions apply:

Item   a unique reference for the requirement

Function   an abbreviation of the requirement; for more details see the reference

Reference   the specification reference as [x], followed by the section.

Status

    M   For supported functions:
        It is *mandatory* that the function is implemented and always used. The function shall be tested.
        For supported parameters:
        It is mandatory that the parameter is implemented. For transmission the parameter shall always be sent and for reception the parameter shall be correctly processed and acted upon. The parameter shall be tested. Where more than one value of the parameter is allowed, all must be supported.

    O   For supported functions:
        It is *optional* whether the function is implemented. If implemented the feature may or may not be used. The function shall be tested.
        For supported parameters:

It is optional whether the parameter is implemented. For transmission, if the parameter is implemented, then it may sometimes be sent. The parameter shall be tested.

N/A   The function is *not applicable* and shall not be tested.

For supported parameters:
For transmission the parameter shall never be sent. For reception the parameter shall be ignored or a protocol error shall be generated.

O.<n>   Optional but support of at least one or only one of the groups of options labelled by the same numeral <n> in this PICS proforma is required.

<item>:   This predicate symbol means that the status following it applies only when the PICS states that the feature identified by the index is supported. In the simplest case, <item> is the identifying tag of a single PICS item. <item> may also be a Boolean expression composed of several indices.

<index>::   When this group predicate is true the associated clause should be completed. Possible groups are RBC (true for all radio block centres) or OBU (true for all onboard units).

Supported   the implementer must answer 'Yes' or 'No' in the supported column

4.2.3   General Statement of Conformance

The general statement of conformance to be answered by implementation suppliers is:

Are all mandatory features of EuroRadio Specification implemented?

NOTE – Answering "No" to this question indicates non-conformance to the EuroRadio Specification.

4.3   References

This specification references to dated standards and specifications. Subsequent amendments to or revisions of any these specifications apply to this specification only when incorporated in it by amendment or revision.

[1]   ISO/IEC 10173
Information Technology Integrated Services Digital Network (ISDN Primary Access Connector at Reference Point S and T).

[2]   ETS 300 011 (April 92) and Amendment A2 (March 1996)
ISDN; Primary rate user-network interface; Layer 1 Specification and test principles

[3]   ETS 300 046 (August 92)
ISDN; Primary rate access; Safety and protection
Part 1: General
Part 2: Interface I_a; Safety
Part 3: Interface I_a; Protection

[4]   ETS 300 102-1 (December 1990), Amendment A1 (April 1993) and Amendment A2 (October 1993): ISDN; User-network interface layer 3; Specifications for basic call control

[5]   ETS 300 125 (September 1991): ISDN; User-network interface data link layer specification; Application of CCITT Recommendations Q.920/I.440 and Q.921/I.441

[6]   ETS 300 156 (September 92) and Amendment A1 (March 1995) ISDN; Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access

[7]   ETS 300 306 (December 1994) ISDN; Digital Subscriber Signalling System No. 1 (DSS1); Protocol Implementation Conformance Statement (PICS) proforma specification for data link layer protocol for general application (primary rate access, user)

[8]   ETS 300 310 (May 1995) ISDN; Digital Subscriber Signalling System No. 1 (DSS1); Partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for data link layer protocol for general application (primary rate access, user)

[9]   ETS 300 315 (December 1994) ISDN; Digital Subscriber Signalling System No. 1 (DSS1); Protocol Implementation Conformance Statement (PICS) proforma specification for signalling network layer protocol for circuit-mode basic call control (primary rate access, user)

[10]   ETS 300 319 (May 1995) ISDN; Digital Subscriber Signalling System No. 1 (DSS1); Partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for signalling network layer protocol for circuit-mode basic call control (primary and basic rate access, user)

[11]   ISO 3309(12.93) HDLC procedures; Frame structure

[12]   ISO 4335(12.93) HDLC procedures; Elements of Procedures

[13]   ISO 7776(07.95) Description of the X.25 LAPB-compatible DTE data link procedure

[14]   ISO 7809(12.93) HDLC procedures; Classes of Procedures

[15]   ITU-T Rec. I.431 (03/93) ISDN; Primary rate user-network interface; Layer 1 Specification

[16]   ITU-T Rec. T.70 (03/93) Network independent basic transport service for telematic services

[17]   ITU-T Rec. X.224 (11/93); Information technology- Open System Interconnection- Protocol for providing the OSI Connection-mode Transport service

[18]   ITU-T Rec. X.290 (January 1992): OSI conformance testing methodology and framework for protocol recommendations for CCITT applications - General concepts

[19]   TS 27.001 General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)

[20]   ERTMS/ETCS: Subset-037-1, EuroRadio FIS – GSM-R CS/PS Communication Functional Module and Coordinating Function FRMCS/GSM-R

[21]   ERTMS/ETCS: Subset-026, System Requirements Specification

[22]   ERTMS/ETCS: Subset 092-2, ERTMS EuroRadio Test cases Safety Layer

[23]   UIC/UNISIG EURORADIO INTERFACE GROUP: Radio Transmission FFFIS A11T6001 version referenced by TSI

[24]   TS 27.002 Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities

[25]   TS 27.003 Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities

[26]   TS 27.007 AT command set for User Equipment (UE)

[27]   ETS 300403-1 (November 1995): Integrated Services Digital Network (ISDN) - Digital Subscriber Signalling System No. one (DSS1) protocol - Signalling network layer for circuit-mode basic call control - Part 1

[28]   ERTMS/ETCS: Subset-098, RBC-RBC Safe Communication Interface

[29]   ERTMS/ETCS : Subset-037-2, EuroRadio FIS – Safety layer

4.4 Abbreviations and Definitions

For the purposes of this specification the abbreviations and definitions of [20] and [29] apply.

4.4.1 General

ATS	Abstract Test Suite
CNTR	CoNTRol
CS	Circuit Switched
IUT	Implementation Under Test
ME	Mobile Equipment
PCO	Point of Controls and Observations
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PS	Packed Switched
QoS	Quality of Service
TA	Terminal Equipment

Additionally, some layer specific terms and abbreviations apply.

4.4.2 Layer 4

AK	Acknowledgement
CC	Connect Confirmation
CONS	Connection Oriented Network Service
CR	Connect Request
DC	Disconnect Confirmation
DR	Disconnect Request
DT	Data
EA	Expedited Acknowledgement

© This document has been developed and released by UNISIG

ED	Expedited Data
ER	Error
HP	High Priority
SAP	Service Access Point
TPDU	Transport Protocol Data Unit
TSAP-ID	Transport Service Access Point IDentifier

4.4.3 Layer 2

DISC	Disconnect
DM	Disconnect Mode
FCS	Frame Check Sequence
FRMR	Frame Reject
LAPB	Link Access Procedure - Balanced
REJ	Reject
SABME	Set Asynchronous Balanced Mode Extended
UA	Unnumbered Acknowledgement
XID	eXchange IDentification

4.4.4 Definitions

Term	Definition
Protocol Implementation Conformance Statement	A statement made by the supplier of an implementation or system, stating which capabilities have been implemented (refer to X.290)
Protocol Implementation extra information for testing	A statement made by the supplier or implementer of an implementation under test (IUT), which contains or references all of the information (in addition to that given in the PICS) related to the IUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the IUT.
Abstract Test Suite	as defined in X.290.
Compatibility testing	The task to provide a level of confidence that two implementations of the protocol are compatible.
Conformance clause (Conformance requirement)	An elementary piece of a specification stating what an implementation is required to do or not to do.
Conformance Statement	The statement which services or protocols are claimed to be implemented and to which implementation options are supported.
Conformance testing standard	ITU-T Recommendation or International Standard that contains a standardised abstract test suite.
Implementation Under Test	as defined in X.290.
PICS proforma	A document, in the form of a questionnaire, designed by the protocol specifier or the conformance test suite specifier, which when completed for an implementation or system becomes the PICS.
PIXIT proforma	A document, in the form of a questionnaire, provided by the test laboratory, which when completed during the preparation for testing becomes the PIXIT.
Point of Controls and Observations	as defined in X.290.

5. SAFETY PROTOCOL

The following tables include the PICS for the safe functional module according to the EuroRadio FIS. The reference column refers to the corresponding section of this FIS [29].

Status shows the requirement for realisation of the feature; support indicates the behaviour of external requests.

The following figure shows the EuroRadio safety layer (implementation under test) and the position of the interfaces which are recommended points of control and observation.
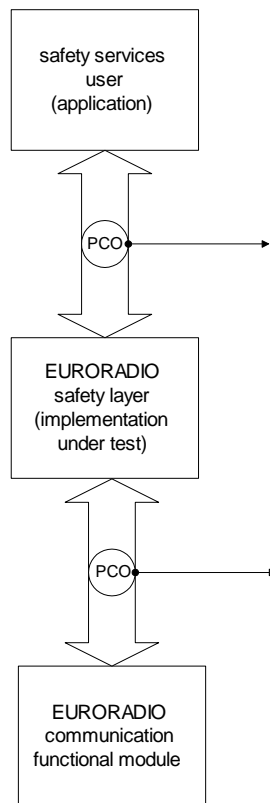
PCO = Point of control and observation

Figure 1   Points of control and observation for the EuroRadio safety layer

5.1   Supported service primitives

The following services are required at the point of control and observation between the EuroRadio and the application (safety services user). The services are required at a functional level only; conformance of the interface is not required.

Item	Service	Reference	Status	Support
Sa 1	Establish a safe connection	[29] 5.2	M	Yes

© This document has been developed and released by UNISIG

Item	Service	Reference	Status	Support
Sa 2	Indication of safe connection establishment	[29] 5.2	M	Yes
Sa 3	Response to indicated connection establishment	[29] 5.2	M	Yes
Sa 4	Confirmation of safe connection establishment	[29] 5.2	M	Yes
Sa 5	Safe data transfer (send)	[29] 5.3	M	Yes
Sa 6	Safe data transfer (receive)	[29] 5.3	M	Yes
Sa 7	Release a safe connection	[29] 5.4	M	Yes
Sa 8	Indication of safe connection release	[29] 5.4	M	Yes
Sa 9	Error indication	[29] 5.5	O	Yes No
Sa106	Initiate network registration	[29] 5.6	OBU:: M RBC:: N/A RIU:: N/A	Yes No No
Sa107	Receive a network registration status	[29] 5.6	OBU:: M RBC:: N/A RIU:: N/A	Yes No No
Sa 108	Request permitted network list	[29] 5.7	OBU:: M RBC:: N/A RIU:: N/A	Yes No No
Sa 109	Receive permitted network list	[29] 5.7	OBU:: M RBC:: N/A RIU:: N/A	Yes No No

Table 5.1 – Service Primitives

5.2 Features of the safety layer

Item	Feature	Reference	Status	Support
Sa 10	evaluation of the parameter safety features	[29] 6.2.4.2.6	M	Yes

Item	Feature	Reference	Status	Support
Sa 11	calculation of a 168 bit long session key (KSMAC) from Authentication key (KMAC) and random numbers	[29] 6.2.3.2.3.10	M	Yes
Sa 12	Message Origin Authentication on Transmission[1]	[29] 6.2.3.2.1	M	Yes
Sa 13	Message Origin Authentication on Reception[2]	[29] 6.2.3.2.1	M	Yes
Sa 14	padding (done during MAC calculation)[3]	[29] 6.2.3.2.1	M	Yes
Sa 15	Addressing (network address) during safe connection set-up	[29] 6.1.3.2	M	Yes
Sa 16	QoS-handling during safe connection set-up	[29] 6.1.3.2	OBU:: M RBC:: N/A	Yes No
Sa 110	Network Registration request and indication are forwarded	[29] 5.6.1.3	OBU:: M RBC:: N/A	Yes No
Sa 111	Permitted network list request and indication are forwarded	[29] 5.3.1.5	OBU:: M RBC:: N/A	Yes No
Sa 105	Check that a valid key is used	[29] 6.2.3.2.3.5	M	Yes

Table 5.2 – Safety layer features

Note: Peer entity identification is realised by the following items:

- Successful procedure (outgoing request): Sa 17, Sa 18

- Successful procedure (incoming request): Sa 20, Sa 21

- Error case (incoming request): Sa 82

- Error case (outgoing request): Sa 81

5.3 Dynamic behaviour

This section describes several protocol features which are related to the internal behaviour of the safety protocol. The description of the feature is related to the EuroRadio FIS – Safety Layer [29], section 6.2.6.

---

[1] Test of this feature can be combined with Items Sa 39, Sa 43, Sa 47 and Sa 52 (also **Error! Reference source not found.** and **Error! Reference source not found.** if used).

[2] Test of this feature can be combined with Items Sa 39, Sa 43, Sa 47 and Sa 52 (also **Error! Reference source not found.** and **Error! Reference source not found.** if used).

[3] Test of this feature can be combined with Items Sa 39, Sa 43, Sa 47 and Sa 52 (also **Error! Reference source not found.** and **Error! Reference source not found.** if used).

© This document has been developed and released by UNISIG

SUBSET-092-1
4.0.0

ERTMS EuroRadio
Conformance Requirements

Page 19/59

Each of the following protocol features assumes that the protocol is in a certain internal state. According to the FIS state table (table 22 of [29]), incoming events require a certain reaction. This reaction shall be shown by the IUT.

The following item description therefore starts with the initial internal state, and describes the succeeding event; sometimes limiting conditions (constraints) are added. The action performed by the IUT should be checked and compared with the defined action according to the EuroRadio FIS [20], stated preconditions should be fulfilled. Agreement between the defined action and the behaviour of the IUT is required.

The error treatment and handling of main errors related to peer entity identification is included in section 5.5.

Item	Feature	Reference	Status	Support
Sa 17	T-CONN.req with AU1 SaPDU, when in state IDLE an event Sa-Conn.Req occurs (correct KMAC for requested ETCS-ID is available).	[29] 6.2.6.3	M	Yes
Sa 18	AU3 SaPDU, when in state WFTC an event AU2 SaPDU (received by T-Conn.conf, correct KMAC for requested ETCS-ID is available) occurs.	[29] 6.2.6.3	M	Yes
Sa 19	Sa-CONN.conf, when in state WFAR an event AR SaPDU occurs.	[29] 6.2.6.3	M	Yes
Sa 20	T-CONN.resp with AU2 SaPDU, when in state IDLE an event AU1 SaPDU (received by T-Conn.ind, KMAC for requested ETCS-ID is available) occurs.	[29] 6.2.6.3	M	Yes
Sa 21	Sa-CONN.ind, when in state WFAU3 an event AU3 SaPDU occurs.	[29] 6.2.6.3	M	Yes
Sa 22	AR SaPDU, when in state WFRESP an event Sa-Conn.resp occurs.	[29] 6.2.6.3	M	Yes
Sa 23	Sa-Data.ind, when in state DATA an event DT SaPDU occurs.	[29] 6.2.6.3	M	Yes
Sa 24	DT SaPDU, when in state DATA an event Sa-DATA.req occurs.	[29] 6.2.6.3	M	Yes
Sa 25	Sa-DISC.ind, when in state DATA an event DI SaPDU(received by T-Disc.ind) occurs.	[29] 6.2.6.3	M	Yes
Sa 26	T-DISC.req with DI SaPDU, when in state DATA an event Sa-Disc.req occurs.	[29] 6.2.6.3	M	Yes

Table 5.3 – Dynamic features

5.4 Format and Data Fields

All the following data fields (DF) have to be compliant to the following tables during sending and receiving of the corresponding SaPDU.

5.4.1 AU1 SaPDU

Item	Data Field	Reference	Allowed values (bit)	Status	Support
Sa 27 A	sub-field ETY	[29] 6.2.5.2.2	010	OBU:: M	Yes
B			001	RBC:: M	Yes
C			101	O	Yes No
D			110	O	Yes No
Sa 28	sub-field MTI	[29] 6.2.5.2.2	0001	M	Yes
Sa 29	sub-field direction flag	[29] 6.2.5.1.7.1, 6.2.5.2.2	0	M	Yes
Sa 30	sub-field calling ETCS-ID	[29] 6.2.5.2.2	4	M	Yes
Sa 31	sub-field safety feature	[29] 6.2.5.2.2	0000 0001	M	Yes
Sa 32	sub-field random number R_B	[29] 6.2.5.2.2	64 bit	M	Yes

Table 5.4 – AU1 data fields

5.4.2 AU2 SaPDU

Item	Data Field	Reference	Allowed values (bit)	Status	Support
Sa 33 A	sub-field ETY	[29] 6.2.5.2.3	010	OBU:: M	Yes
B			001	RBC:: M	Yes
C			101	O	Yes No
D			110	O	Yes No
E			000	O	Yes No
Sa 34	sub-field MTI	[29]	0010	M	Yes

---

[4] according to NID_ENGINE or RBC ETCS identity (given by NID_C+NID_RBC) of [21]

© This document has been developed and released by UNISIG

SUBSET-092-1
4.0.0

ERTMS EuroRadio
Conformance Requirements

Page 21/59

Item	Data Field	Reference	Allowed values (bit)	Status	Support
		6.2.5.2.3			
Sa 35	sub-field direction flag	[29] 6.2.5.1.7.1, 6.2.5.2.3	1	M	Yes
Sa 36	sub-field Responding ETCS-ID	[29] 6.2.5.2.3	5	M	Yes
Sa 37	sub-field safety feature	[29] 6.2.5.2.3	0000 0001	M	Yes
Sa 38	sub-field random number R_A	[29] 6.2.5.2.3	64 bit	M	Yes
Sa 39	MAC field	[29] 6.2.3.2.1 6.2.5.2.3	64 bit	M	Yes

Table 5.5 – AU2 data fields

5.4.3 AU3 SaPDU

Item	Data Field	Reference	Allowed values (bit)	Status	Support
Sa 40	Bit 8,7,6 of the first octet	[29] 6.2.5.2.4	000	M	Yes
Sa 41	sub-field MTI	[29] 6.2.5.2.4	0011	M	Yes
Sa 42	sub-field direction flag	[29] 6.2.5.1.7.1, 6.2.5.2.4	0	M	Yes
Sa 43	MAC field	[29] 6.2.3.2.1 6.2.5.2.4	64 bit	M	Yes

Table 5.6 – AU3 data fields

5.4.4 AR SaPDU

Item	Data Field	Reference	Allowed values (bit)	Status	Support

---

[5] according to NID_ENGINE or RBC ETCS identity (given by NID_C+NID_RBC) of [21]

Item	Data Field	Reference	Allowed values (bit)	Status	Support
Sa 44	Bit 8,7,6 of the first octet	[29] 6.2.5.2.5	000	M	Yes
Sa 45	Sub-field MTI	[29] 6.2.5.2.5	1001	M	Yes
Sa 46	Sub-field direction flag	[29] 6.2.5.1.7.1, 6.2.5.2.5	1	M	Yes
Sa 47	MAC field	[29] 6.2.3.2.1 6.2.5.2.5	64 bit	M	Yes

Table 5.7 – AR data fields

5.4.5 DT SaPDU

Item	Data Field	Reference	Allowed values (bit)	Status	Support
Sa 48	Bit 8,7,6 of the first octet (sender only)	[29] 6.2.5.3.1	000	M	Yes
Sa 49	sub-field MTI	[29] 6.2.5.3.1	0101	M	Yes
Sa 50 A B	sub-field direction flag	[29] 6.2.5.1.7.1, 6.2.5.3.1	0 (initiator) 1 (responder)	M M	Yes Yes
Sa 51	user data	[29] 6.2.5.3.1	1...1023 octet	M	Yes
Sa 52	MAC field	[29] 6.2.3.2.1 6.2.5.3.1	64 bit	M	Yes

Table 5.8 – DT data fields

5.4.6 DI SaPDU

Item	Data Field	Reference	Allowed values (bit)	Status	Support
Sa 53	Bit 8,7,6 of the first octet (sender only)	[29] 6.2.5.4.1	000	M	Yes
Sa 54	sub-field MTI	[29] 6.2.5.4.1	1000	M	Yes

© This document has been developed and released by UNISIG

SUBSET-092-1
4.0.0

ERTMS EuroRadio
Conformance Requirements

Page 23/59

Item	Data Field	Reference	Allowed values (bit)	Status	Support

Sa 55
    A
    B
	sub-field direction flag	[29]
		6.2.5.1.7.1,
		6.2.5.4.1
			0 (initiator)
			1 (responder)
				M
				M
					Yes
					Yes

Sa 56	sub-field reason	[29] 6.2.5.4.1	8 bit	M	Yes
Sa 57	sub-field sub-reason	[29] 6.2.5.4.1	8 bit	M	Yes

Table 5.9 – DI data fields

5.4.7 Intentionally deleted

5.4.8 RQ SaPDU

Intentionally deleted.

5.4.9 RP SaPDU

Intentionally deleted

5.5 Error Treatment

The compliance of treatment of transport protocol errors is detailed in section 6.4.4 and data link protocol errors in section 6.8.4.

Item	Required treatment / error event	Reference	Status	Support
Sa 77A	Sa-Disc.ind, when Sa-Conn.req from application contains a wrong application type	[29] 6.2.6.3	M	Yes
Sa 77B	T-DISC.req, when T-Conn.ind from network contains a wrong application type	[29] 6.2.6.3	M	Yes
Sa 78	T-DISC.req, when in state IDLE an event T-Conn.ind (incl. correct AU1 SaPDU, no KMAC for calling ETCS-ID available) occurs.	[29] 6.2.6.3	M	Yes
Sa 79	Sa-DISC.ind & T-DISC.req, when the receiving ETCS-ID (in the AU2) is not the requested ETCS-ID (requested ETCS-ID different from unknown)	[29] 6.3.3.5	M	Yes
Sa 80	Sa-DISCONNECT.indication if no	[29] 6.3.3.5	M	Yes

Item	Required treatment / error event	Reference	Status	Support
	transport service available			
Sa 81	Sa-DISC.ind & T-DISC.req, when in state WFTC an event T-Conn.conf (incl. wrong MAC of AU2 SaPDU) occurs.	[29] 6.3.3.5 6.2.6.3	M	Yes
Sa 82	T-DISC.req, when in state WFAU3 an event T-Data.ind (incl. wrong MAC of AU3 SaPDU) occurs.	[29] 6.3.3.5 6.2.6.3	M	Yes
Sa 83	Sa-DISC.ind & T-DISC.req in case of failure in the verification of the CBC_MAC of a AR SaPDU	[29] 6.3.3.5 6.2.6.3	M	Yes
Sa 84	Sa-REPORT.ind in case of failure in the verification of the CBC_MAC of a DT SaPDU	[29] 6.3.3.5	M	Yes
Sa 85	T-DISC.req in case of failure in the direction flag of a AU1 SaPDU	[29] 6.3.3.5	M	Yes
Sa 86	Sa_DISC.ind in case of failure in the direction flag of DI SaPDU	[29] 6.3.3.5	M	Yes
Sa 87	Sa_DISC.ind in case of failure in the direction flag of	[29] 6.3.3.5		
A	AU2 SaPDU		M	Yes
C	AR SaPDU		M	Yes
D	DT SaPDU		M	Yes
Sa 88	Correct response to invalid value inside field "bit 8,7,6 of the first octet" in	[29] 6.3.3.5		
A	AU3 SaPDU,		M	Yes
B	AR SaPDU,		M	Yes
C	DT SaPDU,		M	Yes
D	DI SaPDU		M	Yes
Sa 89	T-DISC.req in case of invalid SaPDU field: wrong ETY field in AU1 SaPDU	[29] 6.2.6.3 6.3.3.5	M	Yes
Sa 90	Sa-DISC.ind & T-DISC.req in case of invalid SaPDU field: wrong ETY field in AU2 SaPDU	[29] 6.2.6.3 6.3.3.5	M	Yes
Sa 91	Correct response to invalid SaPDU	[29] 6.2.6.3	M	Yes

Item	Required treatment / error event	Reference	Status	Support
	field: wrong MTI field	6.3.3.5		
Sa 92	T-DISC.req in case of invalid SaPDU field: wrong safety feature field in AU1 SaPDU	[29] 6.2.6.3 6.3.3.5	M	Yes
Sa 93	Sa-DISC. ind & T-DISC.req in case of invalid SaPDU field: wrong safety feature field in AU2 SaPDU	[29] 6.2.6.3 6.3.3.5	M	Yes
Sa 94	Correct response to failure in the sequence of SaPDUs during connection set up, respectively	[29] 6.2.6.3, 6.3.3.5		
A	first message inside T_Conn.ind is not AU1		M	Yes
B	T-Conn.ind does not contain user data		M	Yes
C	Message after AU1 isn't AU2		M	Yes
D	T-Conn.conf does not contain user data		M	Yes
E	Message after AU2 isn't AU3		M	Yes
F	Message after AU3 isn't AR		M	Yes
Sa 95	Correct response to SaPDU too short, i.e. fields are missing	[29] 6.3.3.5		
A	AU1 SaPDU too short		M	Yes
B	AU2 SaPDU too short		M	Yes
C	AU3 SaPDU too short		M	Yes
D	AR SaPDU too short		M	Yes
E	DT SaPDU shorter than 10 bytes		M	Yes
Sa 96	Correct response to SaPDU too long	[29] 6.3.3.5		
A	AU1 SaPDU too long		M	Yes
B	AU2 SaPDU too long		M	Yes
C	AU3 SaPDU too long		M	Yes
D	AR SaPDU too long		M	Yes
E	DT SaPDU longer than 1032 bytes		M	Yes
Sa 97	Sa-DISC.ind & T-DISC.req if an event timeout T_{estab} in state WFTC occur.	[29] 6.2.6.3	M	Yes

Item	Required treatment / error event	Reference	Status	Support
Sa 98	Sa-DISC.ind & T-DISC.req if an event timeout T$_{estab}$ in state WFAR occur.	[29] 6.2.6.3	M	Yes
Sa 99	Correct response to failure in key calculation	[29] 6.2.6.3 6.3.3.5	M	Yes

Table 5.10 – Error treatment

Note: not all error cases are included:

- no sub-reasons to reason code 1 (only Sa 80)

- no check of a wrong application type of a T-Conn.ind included

- T-DISC.ind (Indication of connection loss) and Sa-DISC.req (Cancelation of establishment by user) during Peer Entity Identification

5.6 Configuration Parameters

Required Configuration Parameters (CP) are:

Item	Parameter	Reference	Allowed Values	Support
Sa 100	Configuration of own ETCS-Identity	[29] 6.2.5.2, 6.3.2.2		Yes
Sa 101A B C	Configuration of own ETCS-ID type	[29] 6.2.5.2, 6.3.2.2	{RBC} {Engine} {Key manage- ment entity}	Yes Yes Yes No
Sa 102	Configuration of KMACs (excluding parity bits)	[29] 6.2.3.2.3.4	168 Bit length	Yes
Sa 103	Configuration of timer T$_{estab}$	[29] 6.3.2.3	40s	Yes
Sa 104	Configuration of safety feature	[29] 6.2.4.2.6, 6.2.5.2	{1}	Yes

Table 5.11 – Configuration parameters

6. COMMUNICATION SERVICES AND PROTOCOLS

6.1 Communications Services Conformance Requirements

Item	Service	References	Status	Support
CoS1	Connection set up	[20] 6.2.2	M	Yes
CoS2	Data transfer	[20] 6.2.3	M	Yes
CoS3	Connection release	[20] 6.2.4	M	Yes

Table 6.1 – Communication services conformance requirements

6.2 Supported Service Primitives

Testing of this non mandatory interface is optional

Item	Service Primitives	References	Status	Support
CoSP1	T-CONNECT.request	[20] B.2	O	Yes No
CoSP2	T-CONNECT.indication	[20] B.2	O	Yes No
CoSP3	T-CONNECT.response	[20] B.2	O	Yes No
CoSP4	T-CONNECT.confirm	[20] B.2	O	Yes No
CoSP5	T-DATA.request	[20] B.3	O	Yes No
CoSP6	T-DATA.indication	[20] B.3	O	Yes No
CoSP9	T-DISCONNECT.request	[20] B.4	O	Yes No
CoSP10	T-DISCONNECT.indication	[20] B.4	O	Yes No
CoSP11	T-REGISTRATION.request	[20] B.5	O	Yes No
CoSP12	T-REGISTRATION.indication	[20] B.5	O	Yes No
CoSP13	T-PERMISSION request	[20] B.6	O	Yes No
CoSP14	T-PERMISSION indication	[20] B.6	O	Yes No

Table 6.2 – Supported services primitives

6.3 Supported Parameters of Service Primitives

Testing of this non mandatory interface is optional

This section describes the parameters of the different service primitives of the Euroradio communications layer.

6.3.1 Connection Request

Item	Parameters	References	Status	Support
CoCRQ1	Called address:	[20] B.2	CoSP1:M	Yes

© This document has been developed and released by UNISIG

	Address type			
	Network address			
	Mobile Network ID			
	Called ETCS-ID and ETCS-ID type			
CoCRQ2	Calling address:	[20] B.2	CoSP1:M	Yes
	Calling ETCS-ID and ETCS-ID type			
CoCRQ3	Application Type	[20] B.2	CoSP1:M	Yes
CoCRQ4	QoS	[20] B.2	CoSP1:M	Yes
CoCRQ5	User data	[20] B.2	CoSP1:M	Yes

Table 6.3 – Connection request

6.3.2 Connection Indication

Item	Parameters	References	Status	Support
CoCI1	Called address:	[20] B.2	CoSP2:M	Yes
	Called ETCS-ID and ETCS-ID type			
CoCI2	Calling address:	[20] B.2	CoSP2:M	Yes
	Calling ETCS-ID and ETCS-ID type			
CoCI3	Application Type	[20] B.2	CoSP2:M	Yes
CoCI5	User data	[20] B.2	CoSP2:M	Yes

Table 6.4 – Connection Indication

6.3.3 Connection Response

Item	Parameters	References	Status	Support
CoCRP1	Responding address	[20] B.2	CoSP3:M	Yes
CoCRP2	User data	[20] B.2	CoSP3:M	Yes

Table 6.5 – Connection Response

6.3.4 Connection Confirmation

Item	Parameters	References	Status	Support
CoCC1	Responding address	[20] B.2	CoSP4:M	Yes
CoCC2	User data	[20] B.2	CoSP4:M	Yes

Table 6.6 – Connection Confirmation

6.3.5 Data Request

Item	Parameters	References	Status	Support

Item	Parameters	References	Status	Support
CoDTR1	User data	[20] B.3	CoSP5:M	Yes

Table 6.7 – Data Request

6.3.6 Data Indication

Item	Parameters	References	Status	Support
CoDTI1	User data	[20] B.3	CoSP6:M	Yes

Table 6.8 – Data Indication

6.3.7 Intentionally deleted

6.3.8 Intentionally deleted

6.3.9 Disconnection Request

Item	Parameters	References	Status	Support
CoDISR1	User data	[20] B.4	CoSP9:M	Yes

Table 6.9 – Disconnection Request

6.3.10 Disconnection Indication

Item	Parameters	References	Status	Support
CoDISI1	Reason	[20] B.4	CoSP10: M	Yes
CoDISI3	User data	[20] B.4	CoSP10: M	Yes

Table 6.10 – Disconnection Indication

6.3.11 Registration request

Item	Parameters	References	Status	Support
CoREGR 1	MNID list	[20] B.5	CoSP11: M	Yes

Table 6.11 – Registration request

6.3.12 Registration indication

Item	Parameters	References	Status	Support
CoREGI1	MNID list	[20] B.5	CoSP12: M	Yes

Table 6.12 – Registration indication

6.3.13   Permission request

Item	Parameters	References	Status	Support
CoPERR 1	empty	[20] B.6	CoSP13: M	Yes

Table 6.13 – Permission request

6.3.14   Permission indication

Item	Parameters	References	Status	Support
CoPERI1	MNID list	[20] B.6	CoSP14: M	Yes

Table 6.14 – Permission indication

6.4   Transport Protocol Conformance Requirements for CS mode

Note that the conformance requirements of the transport protocol are a subset of X.224 [17].

6.4.1   Protocol capabilities

Each question in this section refers to a major function of the protocol or the special cases of procedures elements which require clarification.

Item	Function	References	Status	Support
C2	Class 2	[17] 14	M	Yes

Table 6.15 – Classes implemented

Item	Function	References	Status	Support
IR1	Initiating CR TPDU	[17] 14.4 a)	M	Yes
IR2	Responding to CR TPDU	[17] 14.4 a)	M	Yes

Table 6.16 – Initiator/responder capability

Item	Function	References	Status	Support
T2F1	Assignment to network connection when operating over CONS	[17] 6.1.1	M	Yes
T2F2	TPDU transfer	[17] 6.2	M	Yes
T2F3	Segmenting	[17] 6.3	M	Yes
T2F4	Reassembling	[17] 6.3	M	Yes
T2F5	Concatenation	[17] 6.4	N/A	No

© This document has been developed and released by UNISIG

Item	Function	References	Status	Support
T2F6	Separation	[17] 6.4	N/A	No
T2F7	Connection establishment	[17] 6.5	M	Yes
T2F8	Connection refusal	[17] 6.6	M	Yes
T2F9	Normal release when operating over CONS (explicit)	[17] 6.7.1	M	Yes
T2F10	Error release when operating over CONS	[17] 6.8	M	Yes
T2F11	Association of TPDUs with Transport connections when operating over CONS	[17] 6.9.1	M	Yes
T2F12	Data TPDU numbering (normal)	[17] 6.10	M	Yes
T2F13	Data TPDU numbering (extended)	[17] 6.10	N/A	No
T2F14	Expedited data transfer when operating over CONS (Network normal)	[17] 6.11.1	N/A	No
T2F15	Reassignment after failure	[17] 6.12	N/A	No
T2F16	Retention and acknowledge TPDU	[17] 6.13	N/A	No
T2F17	Re-synchronization	[17] 6.14	N/A	No
T2F18	Multiplexing when operating over CONS	[17] 6.15	O	Yes No
T2F19	De-multiplexing when operating over CONS	[17] 6.15	O	Yes No
T2F20	Explicit flow control	[17] 6.16	M	Yes
T2F21	Checksum	[17] 6.17	N/A	No
T2F22	Frozen references	[17] 6.18	N/A	No
T2F23	Re transmission on time out	[17] 6.19	N/A	No
T2F24	Re-sequencing	[17] 6.20	N/A	No
T2F25	Inactivity control	[17] 6.21	N/A	No
T2F26	Treatment of protocol errors when operating over CONS	[17] 6.22.1	M	Yes
T2F27	Splitting	[17] 6.23	N/A	No
T2F28	Recombining	[17] 6.23	N/A	No

Table 6.17 – Supported functions

6.4.2 Protocol data units

Indicating support for an item in this section states that the implementation has the capability to support the Protocol Data Units (PDUs).

The following TPDUs and the parameters which constitute their fixed parts are mandatory if a corresponding predicate in the status column is true.

Item	TPDUs	References	Status	Support

© This document has been developed and released by UNISIG

SUBSET-092-1
4.0.0

ERTMS EuroRadio
Conformance Requirements

Page 32/59

Item	TPDUs		References	Status	Support
ST1	CR	supported on transmission	[17] 13.1	M	Yes
ST2	CR	supported on receipt	[17] 13.1	M	Yes
ST3	CC	supported on transmission	[17] 13.1	M	Yes
ST4	CC	supported on receipt	[17] 13.1	M	Yes
ST5	DR	supported on transmission	[17] 13.1	M	Yes
ST6	DR	supported on receipt	[17] 13.1	M	Yes
ST7	DC	supported on transmission	[17] 13.1	M	Yes
ST8	DC	supported on receipt	[17] 13.1	M	Yes
ST9	DT	supported on transmission	[17] 13.1	M	Yes
ST10	DT	supported on receipt	[17] 13.1	M	Yes
ST11	AK	supported on transmission	[17] 13.1	M	Yes
ST12	AK	supported on receipt	[17] 13.1	M	Yes
ST13	ER	supported on receipt	[17] 13.1	M	Yes
ST14	ER	supported on transmission	[17] 13.1	O	Yes No

Table 6.18 – Supported TPDUs

Supported parameters of issued TPDUs (variable part)

Item	Supported parameters	References	Status	Support
I2CR6	Called Transport-Selector	[17] 13.3.4a)	M	Yes
		[20] 6.3.4.6	M	Yes
I2CR7	Calling Transport-Selector	[17] 13.3.4a)	M	Yes
		[20] 6.3.4.6	M	Yes
I2CR8	TPDU size	[17] 13.3.4b)	O	Yes No
I2CR17	Preferred maximum TPDU size	[17] 13.3.4c)	O	Yes No
I2CR12	Throughput	[17] 13.3.4 j)	O	Yes No
I2CR13	Priority	[17] 13.3.4 l)	M	Yes
I2CR14	Transit delay	[17]13.3.4m)	O	Yes No

Table 6.19 – Supported parameters of issued CR TPDU (ST1:)

Item	Supported parameters	References	Status	Support
I2CC6	Responding Transport-Selector	[17] 13.4.4	M	Yes
		[20] 6.3.4.6	M	Yes
I2CC7	Calling Transport-Selector	[17] 13.4.4	M	Yes
		[20] 6.3.4.6	M	Yes
I2CC8	TPDU size	[17] 13.4.4	O	Yes No
I2CC9	Throughput	[17] 13.4.4	O	Yes No

Item	Supported parameters	References	Status	Support
I2CC10	Priority	[17] 13.4.4	O	Yes No
I2CC11	Transit delay	[17] 13.4.4	O	Yes No
I2CC12	Preferred maximum TPDU size	[17] 13.4.4 [17] 6.5.4 k)	O	Yes No

Table 6.20 – Supported parameters of issued CC TPDU (ST3:)

Item	Supported parameter	References	Status	Support
I2DR4	Additional information	[17]13.5.4 a)	O	Yes No

Table 6.21 – Supported parameters of issued DR TPDU (ST5:)

Item	Supported parameter	References	Status	Support
I2ER3	Invalid TPDU	[17]13.12.4 a)	O	Yes No

Table 6.22 – Supported parameters of issued ER TPDU (ST14:)

Supported parameters for received TPDUs

Implementers should be aware that implementations shall be capable of receiving and processing all possible parameters for all possible TPDUs, dependent upon the class and optional functions implemented.

User data in issued TPDUs

Item	User data	References	Status	Support
D2ICR	User data of up to 32 octets in a CR with preferred class 2	[17] 13.3.5	M	Yes
D2ICC	User data of up to 32 octets in a CC	[17] 13.4.5	M	Yes
D2IDR	User data of up to 64 octets in a DR	[17] 13.5.5	M	Yes

Table 6.23 – User data in issued TPDUs

User data in received TPDUs

Item	User data	References	Status	Support
DRCC	Up to 32 octets of user data in a CC TPDU	[17] 13.4.5	M	Yes
DRDR	Up to 64 octets of user data in a DR TPDU	[17] 13.5.5	M	Yes
DRCR	Up to 32 octets of user data in a CR TPDU	[17] 13.3.5	M	Yes

Table 6.24 – User data in received TPDUs

6.4.3   Negotiation

Item	Preferred class	References	Allowed values	Supported values

Item	Preferred class	References	Allowed values	Supported values
NAC2	Alternative class parameter if the preferred class is Class 2	[17] 6.5.4 h)	None	
RC2	What classes can you respond with if CR proposes only class 2?	[17] 6.5.4 h) Table 3	2 or connection refused	

Table 6.25 – Class negotiation

Item	TPDU size	References	Status	Support
TS1	If maximum TPDU size is proposed in a CR TPDU then the initiator shall support all TPDU sizes from 128 octets to the maximum proposed.	[17] 14.5	I2CR8:M	Yes

Note that the TPDU size is fixed at the minimum size of 128 octets.

Table 6.26 – TPDU size negotiation

Item	TPDU size	References	Allowed values	Supported values
T2S1	What is the largest value of the maximum TPDU size parameter which may be sent in a CR TPDU with preferred class 2?	[17] 14.5 e)	128	
T2S2	What is the largest value of the maximum TPDU size parameter which may be sent in a CC TPDU when class 2 is selected?	[17] 14.5 e)	128	

Table 6.27 – TPDU size value

Item	Extended format	References	Allowed values	Supported values
NEF1	What formats can you propose in the CR TPDU in class 2?	[17] 6.5.4 l)	normal	
NEF4	What formats can you select in CC when extended has been proposed in CR in class 2?	[17] 6.5.4 l)	normal	

Table 6.28 – Use of extended format

Item	Explicit flow control	References	Allowed values	Supported values
NUF1	What proposals can you make in the CR?	[17] 6.5.4 o)	use	

Item	Explicit flow control	References	Allowed values	Supported values
NUF2	What proposals can you make in CC when non-use of explicit flow control has been proposed in CR?	[17] 6.5.4 o)	use	

Table 6.29 – Explicit flow control

6.4.4   Error handling

Item	Function	References	Allowed values	Supported values
PE2	Class 2 Error handling	[17] 6.22.1.3	ER, DR	

Table 6.30 – Action on receipt of a protocol error

Note: the release of the network connection is requested only if the transport connection is the only one using this network connection.

Item	Event	References	Status	Support
RR1	A parameter not defined in [17] or [20] section 8.2.4 & 8.2.5 shall be ignored	[17] 13.2.3	M	Yes
RR2	An invalid value in the alternative protocol class parameter shall be treated as a protocol error	[17] 13.2.3	M	Yes
RR3	An invalid value in the class and option parameter shall be treated as a protocol error	[17] 13.2.3	M	Yes
RR4	On receipt of the additional option selection parameter bits 8 to 5, and bits 4 to 1 if not meaningful for the proposed class shall be ignored.	[17] 13.3.4	M	Yes
RR6	On receipt of the class and option parameter bits 4 to 1 if not meaningful for the proposed class shall be ignored	[17] 13.3.3	M	Yes

Table 6.31 – Action on receipt of an invalid or undefined parameter in a CR TPDU

Item	Event	References	Allowed actions	Supported actions
RR7	A parameter defined in [17] or [20] section 8.2.4 & 8.2.5 (other than those covered above) and have an invalid value	[17] 13.2.3	Ignore, protocol error	

Table 6.32 – Action on receipt of a CR TPDU parameter with invalid value

Item	Event	References	Status	Support

© *This document has been developed and released by UNISIG*

SUBSET-092-1
4.0.0

ERTMS EuroRadio
Conformance Requirements

Page 36/59

Item	Event	References	Status	Support
UI1	A parameter not defined in [17] or [20] section 8.2.4 8.2.5 shall be treated as a protocol error	[17] 13.2.3	M	Yes
UI2	A parameter which has an invalid value as defined in [17]	[20] section 8.2.4 & 8.2.5 shall be treated as a protocol error	[17] 13.2.3	M	Yes

Table 6.33 – Actions on receipt of an invalid or undefined parameter in another TPDUs

6.4.5   Configuration parameters

Item	Event	References	Status	Support
OT3	IUT support of optional timer *TS1* when operating in class 2	[17] 6.5.4	O	Yes No
OT7	IUT support of optional timer *TS2* when operating in class 2	[17] 6.7.1.5	O	Yes No

Table 6.34 – Optional timers

Item	Event	References	Allowed values	Supported values
OT11	Standard TPDU length N_{TPDU}	[20] 6.5	128 octets	
OT12	Initial credit of ATP TPDUs	[20] 6.5	15	
OT13	Initial credit of Other Application Type TPDUs	[20] 6.5	1	
OT14	Timer TS1	[17] 6.5.4	OT3:Tunable	
OT15	Timer TS2	[17] 6.5.4	OT7:Tunable	

Table 6.35 – Configuration parameter values

6.5   Adaptation Layer Entity (for PS mode only)

Note that the conformance requirements of the transport protocol are a subset of Subset-98 [28].

6.5.1   Protocol capabilities

Item	Function	References	Status	Support
ALE1	Support of class D service with only one physical link	[20] 6.4.2.1 [28] 6.3.2.1.2, 6.3.2.1.4, 6.3.2.1.6	M	Yes

ALE2	An on-board request for a Class D shall result in the Adaptation Layer attempting to make a single TCP connection to the remote Adaptation Layer entity. This connection shall be used to transfer all data and control messages. The safe connection shall operate only on this link.	[20] 6.4.2.1	M	Yes

Table 6.36 – Classes implemented

Item	Function	References	Status	Support
ALE3	Adaptation between EuroRadio Safety Layer and TCP layer (mapping of X.214 service to TCP)	[20] 6.4.2.1 [28] 6.4.3, 6.5.1.3	O	Yes No
ALE4	Generate string for the DNS query based on ETCS ID for the peer RBC and send DNS query	[20] 6.4.2.1, 6.4.2.3.3, 6.4.2.3.4, 6.4.2.3.5	OBU: M	Yes
ALE5	Process the ETCS DNS response with one single IP address for contacting the RBC	[20] 6.4.2.2	OBU: M	Yes
ALE6	DNS feature shall be implemented according to RFC 1034 and RFC 1035	[20] 6.4.2.3.6	OBU: M	Yes
ALE6.1	Correct handling of DNS TXT Field content.	[20] 6.4.3.3, 6.5.1.13	OBU: M	Yes
ALE6.2	Request for IP address and TXT field in two separate ETCS DNS queries	[20] 6.4.2.3.7	OBU: M	Yes
ALE6.3	Correct handling of two or more TXT records in ETCS DNS response	[20] 6.4.2.3.8	OBU: M	Yes
ALE7	Establishment of the TCP connection using the correct TCP port.	[20] 6.4.2.1, 6.4.2.4 [28] 6.5.2.6	M	Yes
ALE7.1	Activation of TCP keep alive (sending and answering).	[28] 6.6.2.4	M	Yes
ALE8	Data Transfer	[28] 6.5.3	M	Yes
ALE8.1	Missing ALE packet behaviour: Ignore or Disconnect TCP connection	[28] 6.6.2.2	M	Yes
ALE9	Non-Disruptive Disconnection: On user request (DI SaPDU), transmit all remaining data (including SaPDU) and close the TCP connection subsequently.	[28] 6.5.4.2, 6.5.4.6	M	Yes

| ALE10 | Disruptive Disconnection:

An ALE protocol error (e.g. ALEH6.1) results in close of TCP connection and reporting to TS-User. | [28] 6.5.4.3 | M | Yes |
| ALE11 | Connection is closed and reported to TS-User on errors on lower layers, e.g.:

Network errors

TCP keep alive timeout

TCP transmit timeout

TCP connection establishment timeout | [28] 6.6.2.4, 6.5.4.3.1

[20] 6.4.3.4 | M | Yes |
| ALE12 | Error Handling as local implementation matter | [28] 6.7.1.1 | O | Yes   No |

Table 6.37 – ALE functions

6.5.2   Protocol data units

Indicating support for an item in this section states that the implementation has the capability to support the Protocol Data Units (PDUs).

Item	PDUs		References	Status	Support
AP1	AU1	supported on transmission, AU1 ALEPKT contains AU1 SaPDU	[28] 6.5.2.4.2, 6.5.2.4.5	OBU: M	Yes
AP2	AU1	supported on receipt	[28] 6.5.2.4.2	Track: M	Yes
AP3	AU2	supported on transmission, AU2 ALEPKT contains AU2 SaPDU	[28] 6.5.2.4.7	Track: M	Yes
AP4	AU2	supported on receipt	[28] 6.5.2.4.7	OBU: M	Yes
AP5	DT	supported on transmission	[28] 6.5.2.4.9, 6.5.3.2.2	M	Yes
AP6	DT	supported on receipt	[28] 6.5.2.4.9, 6.5.3.2.2	M	Yes
AP7	DI	supported on transmission	[28] 6.5.4.4.2	M	Yes
AP8	DI	supported on receipt	[28] 6.5.4.4.2	M	Yes

Table 6.38 – Supported PDUs

6.5.3 ALE Header

Item	Field Name	Handling	References	Status	Support
ALEH1	Packet Length	packets with length inside [8..1040] shall be transmitted and received	[28] 6.4.5.1.5, 6.5.3.1.3	M	Yes
ALEH3	T-Sequence Number	T-Sequence Number is correctly sent by calling entity: Starting at 0 with AU1 Counted up by one with every newly sent ALE packet Wrapping around at 65535	[28] 6.4.5.1.5 6.5.2.6.2 6.5.2.6.3 6.5.2.6.4	M	Yes
ALEH4	N/R flag	Set to 1 always.	[28] 6.4.5.1.5 6.6.2.1.3	M	Yes
ALEH5	Packet Type	Reception of Packet Type not specified for Class D over one link should result in discard of this packet. Closure of the connection may also happen.	[28] 6.4.5.1.5	M	Yes
ALEH6	Checksum	Correct checksum is transmitted.	[28] 6.4.5.1.5	M	Yes
ALEH6.1	Checksum	Incorrect checksum reception results in close of TCP connection on receiver side and closure is reported to TS-User.	[28] 6.4.5.1.5	M	Yes
ALEH7	Endianness baseline	Big Endian	[28] 6.4.5.1.4	M	Yes

Table 6.39 – ALE Header

6.6 Transport Protocol Conformance Requirements for PS mode

6.6.1 TCP features and parameters

6.6.1.1 The transport layer protocol is specified in RFC 793 (TCP). The TCP features and parameters listed in the table below shall be implemented.

Item	Function	References	Status	Support
TCP1	Listening port	[20] 6.4.2.4	M	Yes
TCP2	Initial RTO (RFC 793, 1122)	[20] 6.4.3.4	M	Yes
TCP3	Minimum Retransmission Timeout (RFC 793, 1122)	[20] 6.4.3.4	M	Yes
TCP4	Maximum Retransmission Timeout (RFC 793, 1122)	[20] 6.4.3.4	M	Yes
TCP5	Karn and Jacobson's algorithm, with exponential back-off (RFC 1122) shall be used	[20] 6.4.3.4	M	Yes
TCP6	TcpMaxConnectRetransmissions (RFC 793, 1122)	[20] 6.4.3.4	M	Yes
TCP7	TcpMaxDataRetransmissions (RFC 793, 1122)	[20] 6.4.3.4	M	Yes
TCP8	TcpKeepAliveTime (RFC 793, 1122)	[20] 6.4.3.4	M	Yes
TCP9	TcpKeepAliveInterval (RFC 793, 1122)	[20] 6.4.3.4	M	Yes
TCP10	TcpKeepAliveProbes (RFC 793, 1122)	[20] 6.4.3.4	M	Yes
TCP11	TcpUserTimeout (RFC 5482)	[20] 6.4.3.4	O	Yes No
TCP12	TcpSack (RFC 2018, 2883) shall be enabled	[20] 6.4.3.4	M	Yes
TCP13	TcpTimestamps (RFC 1323) shall be disabled	[20] 6.4.3.4	M	Yes
TCP14	TcpNoDelay (RFC 896) shall be enabled	[20] 6.4.3.4	M	Yes
TCP15	TCP Push Bit (RFC 793) shall be enabled	[20] 6.4.3.4	M	Yes
TCP16	Max TCP segment size	[20] 6.4.3.4	M	Yes
TCP17	TcpEarlyRetrans	[20] 6.4.3.4	M	Yes

Table 6.40 – Supported TCP parameters and features

6.6.2   ETCS DNS query Configuration Parameters

Item	Parameter	References	Status	Allowed values	Supported values
DPAR1	dns_lookup_timeout	[20] 6.5.2.3.2.1	M	5 s	

Table 6.41 – ETCS DNS query Configuration Parameters

6.7 Network Protocol Conformance Requirements

6.7.1 Co-ordinating Function

Item	Function	References	Status	Support
CO1	Initiating B/B_m channel establishment (outgoing calls)	[20] 6.3.3.1	M	Yes
CO2	Initiating B/B_m channel establishment with eMLPP priority	[20] 6.3.3.1	O	Yes No
CO3	Responding to B/B_m channel establishment (incoming calls)	[20] 6.3.3.1	M	Yes
CO4	Mapping of D/D_m channel signalling causes into network service disconnect reasons	[20] 6.3.3.1	M	Yes
CO5	Request the disconnection of the data link of the B/B_m channel before disconnecting the B/B_m channel	[20] 6.3.3.1	M	Yes
CO6	Mapping of QoS parameters into bearer capability parameters	[20] 6.3.3.1	M	Yes
CO7	Indication of network originated of B/B_m channel disconnection	[20] 6.3.3.1	M	Yes
CO8	Disconnect of data link layer followed by release of physical connection in case of disconnect phase	[20] 6.3.3.1	M	Yes

Table 6.42 – Co-ordinating function

The D/D_m channel protocol conformance requirements are specified in Annex A and section 5, respectively.

6.7.2 B/Bm channel network layer

Item	Function	References	Status	Support
N1	Segmenting	[20] 6.3.3.2	M	Yes
N2	Reassembling	[20] 6.3.3.2	M	Yes

Table 6.43 – Protocol capabilities

Item	Parameter	References	Allowed values	Supported values
N3	Segment length N_{L3seg}	[20] 6.5.2.2.4	$N_{L3seg}=(N1/8)-5$	

Note: N_{L3seg} is related to the layer 2 frame length N1

Table 6.44 – Configuration parameter values

6.7.3 PS Mode network layer

Item	Function	References	Status	Support
N4	Use of Internet Protocol version 4 (IPv4)	[20] 6.4.4	M	Yes

Table 6.45 – Protocol capabilities

6.8 Data Link Protocol Conformance Requirements

6.8.1 Protocol capabilities

Each question in this section refers to a major function of the data link protocol HDLC.

Item	Function	References	Status	Support
Ls	Single link procedure	[13] 1 [20] 6.3.2.7a)	M	Yes
Lc	DTE/DCE Operation	[20] 6.3.2	N/A	No
Lt	DTE/DTE Operation	[20] 6.3.2.2	M	Yes
Lta	Assignment of A/B addresses as specified for a DCE	[20] 6.3.2.7i)	M	Yes
Lf	Frames structure	[11]	M	Yes

Table 6.46 – Major capabilities

Item	Function	References	Status	Support
PC1	Asynchronous balanced mode (ABM)	[12] 5.1.3	M	Yes
PC2	Does the IUT support automatic negotiation of data link layer parameters?	[12]	N/A	No
PC3	Does the IUT support internal parameter initialisation?	[12]	N/A	No

Table 6.47 – Supported functions

Item	Option	References	Status	Support
OP1	Exchange identification (XID)	[14] Table1	N/A	No
OP2	Reject (REJ)	[14] Table1	N/A	No
OP3.1	Selective reject (SREJ)	[14] Table1 [20] 6.3.2	N/A	No
OP3.2	Multi-selective reject (SREJ)	[14] Table1 [20] 6.3.2	M	Yes
OP5	Initialisation of remote data station (SIM|RIM)	[14] Table1	N/A	No
OP6	Unnumbered polling (UP)	[14] Table1	N/A	No

Item	Option	References	Status	Support
OP7	Extended addresses	[14] Table1	N/A	No
OP8	I frames as command only	[14] Table1	N/A	No
OP9	I frames as response only	[14] Table1	N/A	No
OP10 (M128)	Extended (modulo 128) operation (SABME)	[14] Table1 [20] 6.3.2	M	Yes
OP11	Reset of state variables (RSET)	[14] Table1	N/A	No
OP12	Data link test (TEST)	[14] Table1	N/A	No
OP13	Request of disconnection (RD)	[14] Table1	N/A	No
OP14a	32 bit frame check sequence (FCS32)	[14] Table1	N/A	No
OP14b	16 bit frame check sequence (FCS16)	[14] Table1	M	Yes
OP15.1	Start/stop transmission	[14] Table1 [20] 6.3.2	M	Yes

Table 6.48 – Options

Item	Function	References	Status	Support
LSI1	Initiation of link setup	[13] 5.3.1	M	Yes
LSI2	If initiation of link setup is supported, does the DTE initiate link disconnection before initiating link setup	[13] 5.3.1	LSI1:O	Yes No
LSI3	Initiation of link setup on receiving an unsolicited DM response	[13] 4.3.8, [13] 5.5	N/A	No
LSA	Response to link setup attempts by acceptance, and entry into the information transfer phase	[13] 5.3.1	M	Yes
LSD	Denial of link setup attempts by the DCE/remote DTE, i.e by transmission of DM response)	[13] 5.3.1	O	Yes No
LSR	Transmission of unsolicited DM response to request the remote DTE to initiate link setup	[20] 6.3.2.7.c	N/A	No
LS	Initiation of link setup by the DCE	[20] 6.3.2.7.h	N/A	No
LSM	Allowing additional attempts to perform link setup by the DCE	[20] 6.3.2.7.n	M	Yes

Table 6.49 – Link setup

Item	Function	References	Status	Support
LD1	Initiation of link disconnection	[13] 5.3.3	M	Yes
LD2	Response to link disconnection by the DCE/remote DTE	[13] 5.3.3	M	Yes

© This document has been developed and released by UNISIG

SUBSET-092-1
4.0.0

ERTMS EuroRadio
Conformance Requirements

Page 44/59

LD3	Link disconnection because out of service condition	[13] 5.3.3	M	Yes
LDP	Response to DISC commands, and to other commands with P=1, received during the disconnected phase	[13] 5.3.3	M	Yes

Table 6.50 – Link disconnection

6.8.2   Frames/Protocol data units

Indicating support for an item in this section states that the implementation has the capability to support the frames that may be exist. The support of a received frame implies the parsing of all fields of the frame.

Item	Frame type		References	Status	Support
FT1	I	supported as command	[13] 4.3.1	M	Yes
FT2a	I	supported as response with F=1	[13] 4.3.1 [20] 6.3.2.9	M	Yes
FT2b	I	supported as response with F=0	[20] 6.3.2.9	N/A	No
FT3	RR	supported as command	[13] 4.3.2	M	Yes
FT4	RR	supported as response	[13] 4.3.2	M	Yes
FT5	RNR	supported as command	[13] 4.3.3	M	Yes
FT6	RNR	supported as response	[13] 4.3.3	M	Yes
FT7	SABME	supported as command	[13] 4.3.5	M	Yes
FT8	DM	supported as response	[13] 4.3.8	M	Yes
FT9	DISC	supported as command	[13] 4.3.6	M	Yes
FT10	FRMR	supported as response	[13] 4.3.9	M	Yes
FT11	UA	supported as response	[13] 4.3.7	M	Yes
FT12	SREJ	supported as command	[12] 7.2.4 [20] 6.3.2.10	N/A	No
FT13	SREJ	supported as response	[12] 7.2.4	M	Yes

Table 6.51 – Supported frame types

Item	Supported fields	References	Status	Support
F1a	Sending of non-octet aligned frames	[13] 3.4	N/A	No

Item	Supported fields	References	Status	Support
	Support of the specific frame structure	[13] 3, table 2		
F2a	- Opening flag		M	Yes
F2b	- Address		M	Yes
F2c	- Control		M	Yes
F2d	- FCS		M	Yes
F2e	- Closing flag		M	Yes
F3	Acceptance of a single flag as both the closing flag for one frame and the opening flag of the next frame	[13] 3.1	M	Yes
F4	Generation of a single flag as above	[13] 3.1	O	Yes No
FA	Frame abortion for transmitted frames	[13] 3.9	O	Yes No
F6	One octet address field	[13] 3.2	M	Yes
F7	Two octet control field	[13] 4.1	FT1 to FT6: M FT 12 and FT 13: M	Yes
F8	One octet control field of unnumbered frames	[13] 4.1	FT7 to FT 11: M FT14 and FT15: M	Yes
F9	Ascending numerical order of bit transmission?	[13] 3.7	M	Yes
F10	User data field	[13]	FT1, FT2, FT14, FT 15: M FT12, FT 13: O	Yes

Table 6.52 – Frame structure

Item	Supported fields	References	Status	Support
F5	Interframe time fill (start/stop transmission)	[12] 4.1.3.2		
	- by flags	[20] 6.3.2.7 k)	N/A	No
	- by mark condition (logical „1")		M	Yes

Table 6.53 – Interframe fill

6.8.3   Information transfer

Item	Protocol feature	References	Status	Support

Item	Protocol feature	References	Status	Support
IT	Transmission of I frames	[13] 5.4.1, [13] 5.4.5	M	Yes
ITs	Processing of send sequence numbers in transmitted N(S) and received N(R) values	[13]	M	Yes
	Checkpoint recovery, initiated by transmitting:	[13] 4.4.2.1		
ITCi	- I frames with P=1		O.6	Yes No
ITCs	- Supervisory frames with P=1		O.6	Yes No
ITB	Stopping transmission of I frames on receipt of RNR frames	[13] 4.4.1, [13] 5.4.7	M	Yes
IR	Reception of I frames	[13] 5.4.2	M	Yes
IRs	Processing of receive sequence numbers in received N(S) and transmitted N(R) values	[13]	M	Yes
IRRJ	Initiation of REJ recovery on receipt of out-of-sequence I frames	[13] 4.4.2.2, [13] 5.4.4	N/A	No
IRSRJ	Initiation of SREJ recovery on receipt of out-of-sequence I frames	[12] 8.2.3	M	Yes
IRB	DTE busy condition	[13] 4.4.1, [13] 5.4.8	M	Yes

Table 6.54 – Information transfer

6.8.4 Error handling

Item	Protocol feature	References	Status	Support
	Initiation of link reset	[13] 5.6.1		
LRIa	- on receipt of FRMR	[20] 6.3.2	N/A	No
LRIb	- on receipt of unsolicited UA	[20] 6.3.2, [13] 5.5, [13] 5.6.1	N/A	No
LRIc	- on receipt of unsolicited F=1	[13] 5.5, [13] 5.6.1	O	Yes No
LRId	- otherwise	[13] 5.6.1	O	Yes No

Item	Protocol feature	References	Status	Support
	Initiation of remote link reset, by transmission of DM response during information transfer phase			
LRRa	- on receipt of FRMR	[20] 6.3.2	N/A	No
LRRb	- on receipt of unsolicited UA	[20] 6.3.2 [13] 5.5, [13] 5.6.1	N/A	No
LRRc	- on receipt of unsolicited F=1	[13] 5.5, [13] 5.6.1 [20] AnnexD	N/A	No
LRRd	- otherwise	[13] 5.6.1 [20] AnnexD	N/A	No
LRA	Acceptance of link reset attempts by the DCE/remote DTE	[13] 5.6.1 [20] AnnexD	N/A	No
LRD	Denial of link reset attempts by the DCE/remote DTE (i.e. by transmission of DM response)	[13] 5.6.1 [20] AnnexD	N/A	No
	Resolution of collision of unnumbered commands that are the same by entering the indicated phase	[13] 5.3.5		
LCRa	- after receiving the UA_RSP		O.5	Yes No
LCRb	- after sending the UA_RSP		O.5	Yes No
LCRc	- after timing out waiting for UA_RSP having sent UA_RSP		O.5	Yes No
LCRd	Resolution of collision of different unnumbered commands	[13] 5.3.5	M	Yes

Table 6.55 – Action on receipt of a protocol error

Item	Protocol feature	References	Status	Support
FR1	Entry to frame rejection condition on receipt, during information transfer phase, of a frame containing one of the error conditions: - On receiving an undefined frame - On receiving a supervisory or unnumbered frame with incorrect length - On receiving an invalid sequential number N(R) - On receiving a frame with an information field exceeding N1 (maximum number of bits)	[13] 4.4.4, [13] 4.3.9, [13] 5.5	M	Yes
FR2	Full support of the frame rejection condition	[13] 5.6.2	M	Yes

Item	Protocol feature	References	Status	Support
F1b	Discard of non-octet aligned frames as invalid	[13] 3.8, [13] 5.4.3	M	Yes
FD	Recognition and discarding of all invalid frames	[13] 3.8, [13] 4.4.3	M	Yes
FR3	The two octet sequence 'control-escape - closing flag' interpreted as abort and the associated frame ignored	[13] 3.9	M	Yes

Table 6.56 – Actions on receipt of an invalid frame

Item	Protocol timer function	References	Status	Support
	Does the DTE support timer T1 recovery for the following frames sent:			
T1a	- I frames	[13] 5.4.1, [13] 5.4.5, [13] 5.4.9	M	Yes
T1b	- SABME	[13] 5.3.1	M	Yes
T1c	- DISC	[13] 5.3.3	O	Yes No
T1d	- FRMR	[13] 5.6.2	O	Yes No
T1e	- Supervisory frame with P=1	[13] 5.4.9	M	Yes
T1f	- unsolicited DM with F=0	[13] 5.3.4	N/A	No
N2a	Does the DTE indicate failure to a higher layer after N2 attempts to send DISC?	[13] 5.3.4	M	Yes
N2b	Does the DTE indicate failure to a higher layer after N2 attempts to send SABM/SABME?	[13] 5.3.1, [13] 5.6.1	M	Yes
	Does the DTE support the following timer procedures:			
T3	- Timer T3 procedure	[13] 3.11.2, [13] 5.7.1.3	O	Yes No
T4	- Timer T4 procedure	[13] 5.3.2, [13] 5.6.1	O	Yes No

Table 6.57 – Actions on timing out

6.8.5   Configuration Management

Item	Parameter	References	Status	Allowed values	Supported values
SPT1	Acknowledge time (T1)	[13] 5.7.1.1	M	0.8 – 2 s	
SPT2	Local processing delay time (T2)	[13] 5.7.1.2	M	< 80 ms	
SPT3	Out of service time (T3)	[13] 5.7.1.3	T3:M		

© This document has been developed and released by UNISIG

Item	Parameter	References	Status	Allowed values	Supported values
SPT4	Inactivity time (T4)	[13] 5.7.1.4, [13] 5.3.2	T4:M		
SPN1	Maximum number of bits in a I frame (N1)	[13] 5.7.3	M	240 – 1024	
SPN2	Maximum number of attempts to complete transmission (N2)	[13] 5.7.2	M	3 – 6	
SPk	Maximum number of outstanding I frames (k)	[13] 5.7.4	M	1 – 61	
SPA	Address (according to DTE/DCE role)	[13] 1.5.1	M	A,B	

Table 6.58 – Configuration parameters

6.9 Management conformance requirements

Item	Function	References	Status	Support
MA1a	Mapping ETCS-ID <-> TSAP address	[20] 6.5.1	M	Yes
MA1b	Following Network registration, GPRS attach (on all mobiles) and PDP context activation (on one mobile)	[20] 6.4.6.3	OBU:: M RBC:: N/A	Yes
MA1c	Polling task for GPRS attachment and/or PDP context activation	[20] 6.4.6.4	OBU:: M RBC:: N/A	Yes
MA1d	If PDP context is active, perform DNS query using ETCS ID type and ETCS ID contained in T-CONNECT.request	[20] 6.5.1	OBU:: M RBC:: N/A	Yes
MA1e	Store in table the transmission mode (PS or CS) received in the DNS Record TXT field contained in ETCS DNS response	[20] 6.5.1	OBU:: M RBC:: N/A	Yes
MA1f	If no transmission mode or IP address are received from ETCS DNS, store in table the transmission mode CS	[20] 6.5.1	OBU:: M RBC:: N/A	Yes
MA1g	If CS mode is stored in the table, use address contained in T-CONNECT.request for physical connection establishment	[20] 6.5.1	OBU:: M RBC:: N/A	Yes
MA1h	If CS mode is stored in the table and no address is contained in T-CONNECT.request, use short dialing code [EIRENE SRS] for physical connection establishment	[20] 6.5.1	OBU:: M RBC:: N/A	Yes
MA1j	If CS connection has been established, perform a DNS query on an available MT and update transmission mode table according ETCS DNS response	[20] 6.5.1	OBU:: M RBC:: N/A	Yes
MA1k	If PS mode is stored in the table, use IP address contained in the A field of the ETCS DNS response for connection establishment	[20] 6.5.1	OBU:: M RBC:: N/A	Yes
MA1l	Use suggested transmission protocol parameters contained in the DNS Record TXT field of the ETCS DNS response	[20] 6.5.1	OBU:: O RBC:: N/A	Yes No
MA2	Configuration management	[20] 6.5.2	O	Yes No
MA2a	Different sets of configuration parameters	[20] 6.5.2	MA2: O	Yes No
MA2c	Changing configuration parameters	[20] 6.5.2	MA2: O	Yes No

© This document has been developed and released by UNISIG

Item	Function	References	Status	Support
MA3	Error logging	[20] 6.5.3.1	O	Yes No
MA4	Error reporting by T-DISC.ind primitive	[20] 6.5.3.2	M	Yes

Table 6.59 – Communication management

6.10 Resource Management for On-Board IP communication applications

6.10.1 Resource Management Conformance Requirements

Item	Service	Reference	Status	Support
RM1	Resource Request	[20] 6.6.1.6	M	Yes
RM2	Resource Release	[20] 6.6.1.9	M	Yes
RM3	Resource Revocation	[20] 6.6.1.10	M	Yes

Table 6.60 – Resource Management

6.10.2 Supported Service Primitives

The services are required at a functional level only; conformance of the interface is not required.

Item	Service Primitive	Reference	Status	Support
RMP1	Rm-SERVICE.request	[20] 6.6.1.4 [20] 6.6.1.6	M	Yes
RMP2	Rm-SERVICE.release	[20] 6.6.1.9 [20] 6.6.1.10	M	Yes
RMP3	Rm-SERVICE.indication	[20] 6.6.1.7	M	Yes

Table 6.61 – Supported Service Primitives

6.10.3 Supported Parameters of Service Primitives

This section describes the parameters of the different service primitives for resource management.

6.10.3.1 Service Request

Item	Parameter	Reference	Status	Support
RMRRq1	Application Type	[20] 6.6.1.4 [20] 6.6.1.5	RMP1: M	Yes

Table 6.62 – Service Request

6.10.3.2 Service Release

Item	Parameter	Reference	Status	Support
RMRRI1	Service ID	[20] 6.6.1.8	RMP2: M	Yes

Table 6.63 – Service Release

6.10.3.3   Service Indication

Item	Parameter	Reference	Status	Support
RMRI1	Service ID	[20] 6.6.1.8	RMP3: M	Yes
RMRI2	Reason	[20] 6.6.1.7	RMP3: M	Yes
RMRI3	Sub-reason	[20] 6.6.1.7	RMP3: M	Yes

Table 6.64 – Service Indication

ANNEX A: INTERFACE TO MOBILE TERMINAL

A.1 Introduction

This section includes the PICS for the interface to Mobile Terminal. The reference column refers to the corresponding section of [Radio Transmission FFFIS A11T6001].

[Radio Transmission FFFIS A11T6001] provides a specification of the interface between the GSM-R Mobile Terminal and the on-board Terminal Equipment.

The use of MT2 Mobile Terminal is recommended when interchangeability at the interface is required.

MT2 Mobile Terminal type and interface are defined in TS 27.001 [19] together with the physical properties in TS 27.002 [24] / TS 27.003 [25] and the functional properties in TS 27.007 [26]. This fixes the so-called V-interface at the R reference point.

The following conformance requirements in this Annex A have to be applied on the V-interface at R reference point, for the Terminal Equipment.
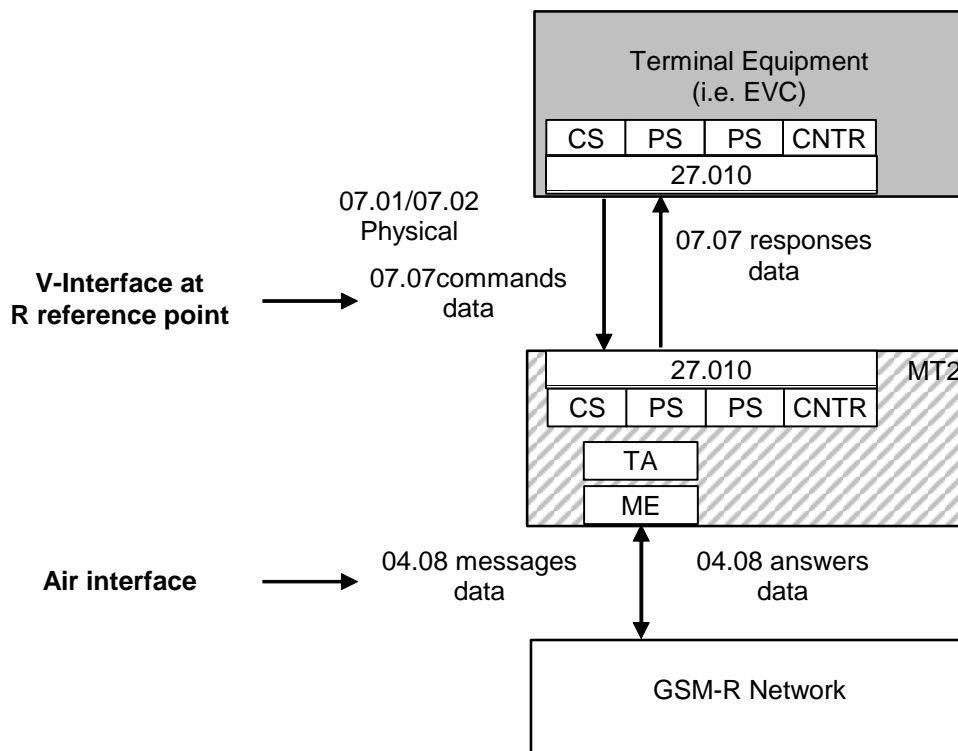

Figure A1: Interface between on-board Terminal and MT2 mobile Terminal

A.2   Physical Interface Conformance Requirements

Note: references to paragraph numbers in [Radio Transmission FFFIS A11T6001] are for version 12.

A.2.1 Supported signals

Item	Function	References	Status	Support
MC1	Circuit 102 (Common Return)	[23] 4.2.1	M	Yes
MC2	Circuit 103 (TxD – Transmitted Data)	[23] 4.2.1	M	Yes
MC3	Circuit 104 (RxD – Received Data)	[23] 4.2.1	M	Yes
MC4	Circuit 105 (RTS – Request to Send)	[23] 4.2.1	M	Yes
MC5	Circuit 106 (CTS – Clear to Send)	[23] 4.2.1	M	Yes
MC9	Circuit 107 (DSR – Data Set Ready)	[23] 4.2.1	O	Yes No
MC6	Circuit 108/2 (DTR – Data Terminal Ready)	[23] 4.2.1	M	Yes
MC7	Circuit 109 (DCD – Data Carrier Detect)	[23] 4.2.1	M	Yes
MC8	Circuit 125 (RI – Ring Indicator)	[23] 4.2.1	O	Yes No

Table A1 – Supported signals

A.3 Functional Interface Conformance Requirements

A.3.1 Supported functional properties

Item	Function	References	Status	Support
MC11	Compliance with ITU-T V.25ter (sections 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7)	[23] 4.4.2	M	Yes
MC12	Result codes	[23] 4.4.4	M	Yes
MC13	(Enable/disable manufacturer-specific escape sequence)	[23] 4.4.3	M	Yes
MC14	Select Bearer Service Type	[23] 4.4.5.1	M	Yes
MC15	Dial Command	[23] 4.4.5.2	M	Yes
MC16	Select priority level	[23] 4.4.5.3	M	Yes
MC18	Call Clearing	[23] 4.4.7	M	Yes
MC20	Echo de(activation)	[23] 4.4.8.1	M	Yes
MC21	Reset to default configuration	[23] 4.4.9.1	M	Yes
MC22	Set to factory-defined configuration	[23] 4.4.9.2	O	Yes No
MC23	Operator selection	[23] 4.4.10.3	M	Yes
MC24	Phone activity status	[23] 4.4.11.1	O	Yes No
MC26	Signal quality	[23] 4.4.11.2	O	Yes No
MC29	Circuit 109 behaviour	[23] 4.4.3.	M	Yes
MC30	Circuit 108/2 behaviour	[23] 4.4.3.	M	Yes

Item	Function	References	Status	Support
MC31	Multiplexing according to 27.010	[23] 4.6.4.16	M	Yes
MC32	Support of at least 2 ports for PS-mode	[23] 4.6.4.17	M	Yes
MC33	Support of 1 port for CS-mode	[23] 4.6.4.17	M	Yes
MC34	Support of 1 port for MT control	[23] 4.6.4.17	O	Yes No
MC35	Control of multiplex mode of serial interface	[23] 4.6.4.18	M	Yes
MC36	Multiplexer working in "Advanced without error recovery" mode using UI frames	[23] 4.6.4.19	M	Yes
MC37	Max. frame size	[23] 4.6.4.19	≥64	Yes
MC38	DLC in UIH mode	[23] 4.6.4.19	M	Yes
MC40	Convergence Layer Type 2	[23] 4.6.4.19	M	Yes
MC41	Priority Support	[23] 4.6.4.19	M	Yes
MC42	Power saving mode deactivated	[23] 4.6.4.21	M	Yes
MC43	QoS parameter setting	[23] 4.6.2.4	M	Yes
MC44	GPRS Context Activation	[23] 4.6.3.5	M	Yes
MC45	PDP Context parameter setting	[23] 4.6.3.8	M	Yes
MC46	PDP Context activation	[23] 4.6.3.11	M	Yes
MC47	PPP protocol support	[23] 4.6.4.2	M	Yes
MC48	PPP authentication	[23] 4.6.4.3	M	Yes
MC49	No encryption	[23] 4.6.4.4	M	Yes
MC50	No compression	[23] 4.6.4.5	M	Yes
MC51	Maximum-Receive-Unit (MRU) 1500 octets	[23] 4.6.4.7	M	Yes
MC52	PPP protocol activation	[23] 4.6.4.15	M	Yes
MC53	Use of Internet Protocol version 4 (IPv4)	[23] 4.6.4.9	M	Yes

Table A2 – Supported functional properties

ANNEX B: INTERFACE TO FIXED NETWORK (CS MODE)

B.1 Introduction

Radio Transmission FFFIS for EuroRadio [23] provides a specification of the requirements for the interface between the fixed network and the trackside RBC.

This section includes the PICS for the interface to the fixed network in CS mode, when ISDN PRI (S_{2M}) is used. The reference column refers to the corresponding section of FFFIS for EuroRadio [23].

According to this specification the use of ISDN PRI (Primary Rate Interface) is recommended.

The following conformance requirements in this Annex have to be applied on the I_{FIX_CS} interface, for the trackside Terminal Equipment.

B.2 ISDN conformance requirements

Item	Access	Reference	Status	Support
FC1	Layer 1 access protocol conform to ETS 300 011 for primary rate interface	[23] 3.3	M	Yes
FC2	Layer 2 access protocol conform to ETS 300 125	[23] 3.3	M	Yes
FC3	Layer 3 access protocol conform to ETS 300 102-1 or ETS 300 403-1	[23] 3.3	M	Yes
FC4	Bearer Capability attribute (UDI, circuit, 64 kbit/s)	[23] 3.3.4.2.1	M	Yes
FC5	Low Layer Compatibility	[23] 3.3.4.2.1	M	Yes

Table B1 – ISDN conformance requirements

ETS 300 156 [6] specifies the requirements which ISDN terminal equipment shall meet for attachment to the public ISDN primary rate user-network interface at the T, or coincident S and T, reference points. It specifies:

- Layer 1 shall be in accordance to ETS 300 011 [2];

- Layer 2 of the control plane shall be in accordance to ETS 300 125 [5];

- Layer 3 of the control plane shall be in accordance to ETS 300 102-1 [4] or ETS 300 403-1 [27];

- The EMC, electrical safety and protection shall be in accordance to ETS 300 046 [3].

ITU-T Rec. I.431 [15] is concerned with the layer 1 electrical, format and channel usage characteristics of the primary rate user-network interface at the S and T reference points.

ETS 300 011 [2] is based on ITU-T Rec. I.431 and gives further requirements or modifications to that Recommendation. It identifies for each clause of I.431 whether it is regarded as normative, informative or as not relevant in the sense of an ETS (e.g. the interface at 1544 kbit/s is not applied).

The conformance clause is contained in Annex C: Conformance test principles for the user and the network side of the interface. The SCS, PICS, and PIXIT proformas are contained in Annex F: System Conformance Statement (SCS), Protocol implementation Conformance Statement (PICS) and Protocol implementation eXtra Information for Testing (PIXIT) for interface Reference point I_a and I_b.

ISDN user-network layer 2, signalling protocols and associated conformance testing specifications are specified in ETS 300 125 [5]. ISDN user-network layer 3, signalling protocols and associated conformance testing specifications are specified in ETS 300 102 [4] or ETS 300 403-1 [27]. The corresponding proformas are specified in ETS 300 306 [7], ETS 300 310 [8], ETS 300 315 [9], and ETS 300 319 [10].

The connector is specified in ENV 41 001 [1].

B.3 Additional conformance requirements

Item	Access	Reference	Status	Support
FC6	V.110 rate adaptation in user channel	[23] 3.2.2	M	Yes

Table B2 – Additional conformance requirements

ANNEX C: INTERFACE TO FIXED NETWORK (PS MODE)

C.1 Introduction

Radio Transmission FFFIS for EuroRadio [23] provides a specification of the requirements for the interface between the fixed network and the trackside RBC.

This section includes the PICS for the interface to the fixed network for PS mode. The reference column refers to the corresponding section of FFFIS for EuroRadio [23].

The following conformance requirements in this Annex have to be applied on the I_{FIS_PS} interface, for the trackside Terminal Equipment.

C.2 PS conformance requirements

Item	Access	Reference	Status	Support
FP1	Interface conform to IEEE802.3 standard	[23] 3.3.5.1	M	Yes
FP2	Support of auto-negotiation function	[23] 3.3.5.1	M	Yes
FP4	Maximum transmission unit (MTU) ≤ 1500 octets	[23] 3.3.5.2	M	Yes

Table C3 – PS conformance requirements