SLOVENSKI STANDARD
SIST EN 12795:2003

01-oktober-2003

Cestna transportna in prometna telematika ï Posebna komunikacija kratkega dosega (DSRC) ï Podatkovna povezovalna plast DSRC: srednji dostop in krmiljenje logiļ ne povezave

Road transport and traffic telematics - Dedicated Short Range Communication (DSRC) - DSRC data link layer: medium access and logical link control

Télématique de la circulation et du Transport routier - Communication a courte portée - Couche de liaison de contrôle d'acces au média et de contrôle logique de liaison

Ta slovenski standard je istoveten z: **EN 12795:2003**

ICS:

35.100.20	Podatkovni povezovalni sloj	Data link layer
35.240.60	Uporabniške rešitve IT v transportu in trgovini	IT applications in transport and trade

SIST EN 12795:2003 **en**

EUROPEAN STANDARD

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English version

Road transport and traffic telematics - Dedicated Short Range Communication (DSRC) - DSRC data link layer: medium access and logical link control

Télématique de la circulation et du Transport routier - Communication à courte portée - Couche de liaison de contrôle d'accès au média et de contrôle logique de liaison

This European Standard was approved by CEN on 4 December 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document (EN 12795:2003) has been prepared by Technical Committee CEN TC 278 “Road Transport and Traffic Telematics”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

This document supersedes ENV 12795:1997.

The development of this standard was carried out under European Commission Mandate M/018.

This European Standard forms part of a series of European Standards defining the framework of a Dedicated Short Range Communication (DSRC) link in the Road Transport and Traffic Telematics (RTTT) environment.

The communication requirements of many RTTT applications can be fulfilled by DSRC. The DSRC standards enable compliant communication systems to serve multiple RTTT applications in parallel.

The small service areas and severe real-time constraints require a specific protocol architecture leading to the reduced protocol stack shown in Figure A, consisting of the Application Layer, the Data Link Layer, and the Physical Layer. Such architecture is very common for real-time environments.

This European Standard gives the architecture and services offered by the DSRC Data Link Layer.

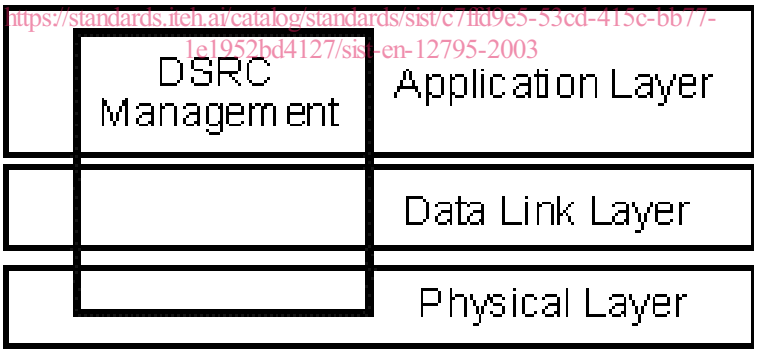

Figure A — DSRC protocol stack

The following set of European Standards for the DSRC link is issued by CEN:

— EN 12253 "DSRC Physical Layer using Microwave at 5.8 GHz”;

— **EN 12795 “DSRC Data Link Layer: MAC and LLC” (this European Standard);**

— EN 12834 "DSRC Application Layer" ;

— EN 13372 "DSRC Profiles for RTTT Applications".

Annex A is normative. Annexes B, C, D and E are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard:

— defines the Data Link Layer of DSRC;

— is positioned with respect to other related standards by the layers defined in OSI Basic Reference Model [EN ISO/IEC 7498-1] as adopted for DSRC;

— supports broadcast and half-duplex transmission modes;

— supports a variety of fixed equipment configurations. It supports configurations where one fixed equipment communicates with one mobile equipment unit, as well as configurations where one fixed equipment can communicate with several mobile equipment units;

— takes into account that the mobile equipment communicates with the fixed equipment while passing through a limited communication zone;

— defines neither any specific configuration nor the layout of the communication zone;

— does not define to what extent different instances of fixed equipment, operating in the vicinity of each other, need to be synchronised with each other;

— defines parameters to be used in negotiation procedures taking place between fixed equipment and mobile equipment.

By defining two distinct sublayers, namely the medium access control sublayer and the logical link control sublayer, this standard defines:

a) medium access control procedures for the shared physical medium;

b) addressing rules and conventions;

c) data flow control procedures;

d) acknowledgement procedures;

e) error control procedures;

f) services provided to application layer.

The MAC sublayer is specific to the DSRC. The LLC services offered are unacknowledged and acknowledged connectionless services based on [ISO/IEC 8802-2].

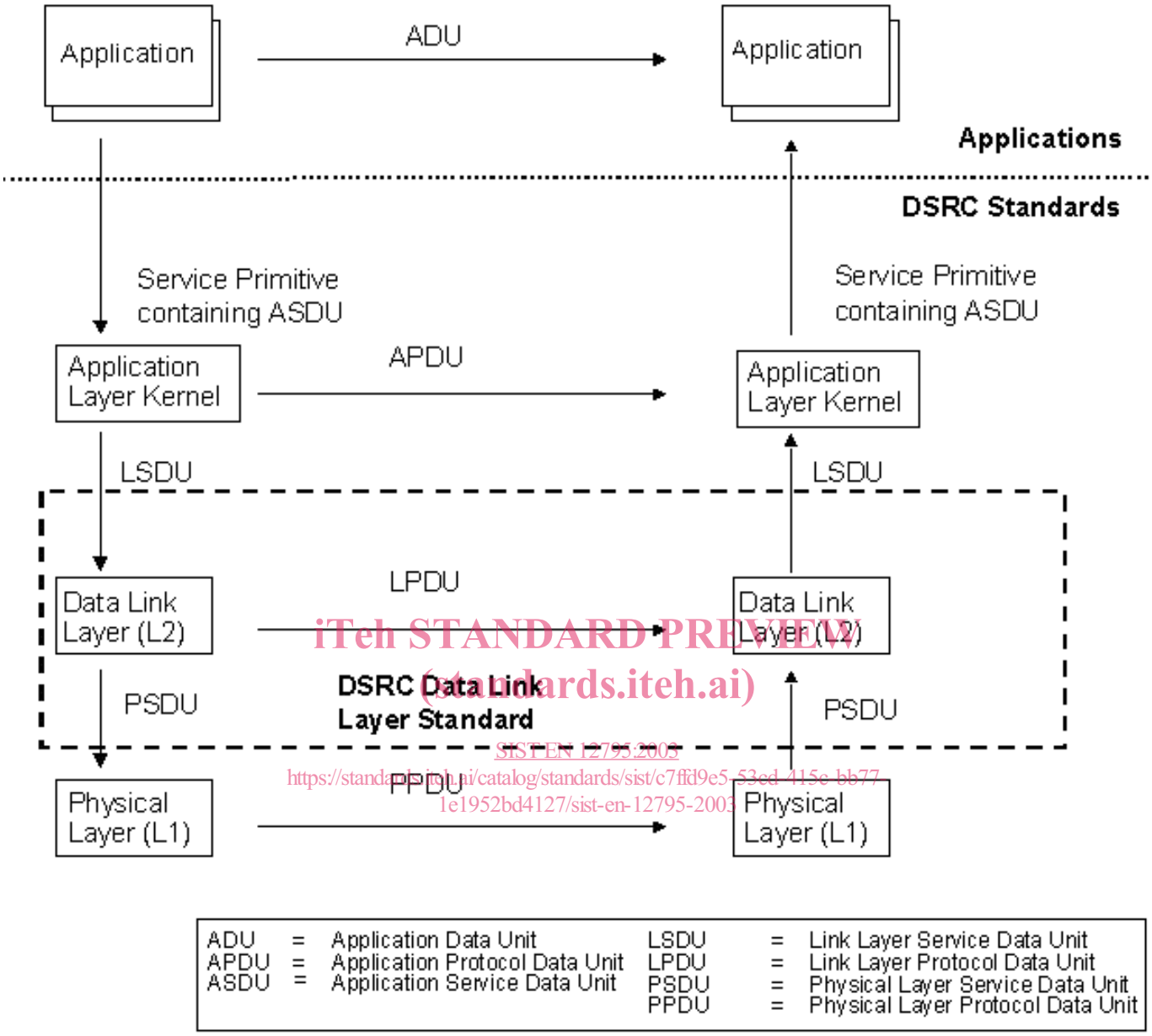

Figure 1 — Architecture and data flow of the DSRC stack

Figure 1 illustrates the global data flow between the elements of the DSRC stack, (Physical, Data Link and Application Layers) and the application.

NOTE For definitions of the terms used in Figure 1 see [EN ISO/IEC 7498-1].

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO/IEC 7498-1:1995, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model (ISO/IEC 7498-1:1994).*

ISO/IEC 8802-2, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 2: Logical link control.*

ISO/IEC 3309, *Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures – Frame structure.*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
beacon service table
data structure transmitted by the fixed equipment indicating available services

3.2
downlink
communication channel on which the fixed equipment transmits its information

3.3
fixed equipment
fixed communication facility with one or more downlink channels and, optionally, one or more uplink channels

NOTE Normally the fixed equipment is installed at a fixed location, but it may be installed on a mobile platform.

3.4
link identifier
unique address used for addressing the mobile equipment

3.5
mobile equipment
mobile communication facility capable of receiving information from the fixed equipment on the downlink and, optionally, also capable of transmitting information to the fixed equipment on the uplink

NOTE The mobile equipment normally corresponds to the vehicle's communication unit.

3.6
profile
unique set of parameter values controlling the behaviour of the DSRC

3.7
service access point
interface point between data link layer and application layer, that has a unique Link Identifier and that allows layers to communicate

[EN ISO/IEC 7498-1:1995]

3.8
uplink
communication channel on which mobile equipment transmits its information

3.9
window
period of time during which the physical medium is allocated either to the fixed equipment or to the mobile equipment

4 Abbreviations and variables

For the purposes of this European Standard, the following abbreviations and variables apply.

4.1 Abbreviations

4.1.1
ACK
ACKnowledge

4.1.2
Can
ACKnowledged command / response

4.1.3
BST
Beacon Service Table

4.1.4
C/R
Command/Response

4.1.5
F
Final

4.1.6
FCS
Frame Check Sequence

4.1.7
FE
Fixed Equipment

4.1.8
HDLC
High-level Data Link Control

4.1.9
LID
Link Identifier

4.1.10
LPDU
Link layer Protocol Data Unit

4.1.11
LLC
Logic Link Control

4.1.12
LSB
Least Significant Bit

4.1.13
LSDU
Link layer Service Data Unit

4.1.14
L1
Layer 1 of DSRC (Physical Layer)

4.1.15
L2
Layer 2 of DSRC (Data Link Layer)

4.1.16
L7
Application Layer Core of DSRC

4.1.17
M
Modifier function bit

4.1.18
MAC
Medium Access Control

4.1.19
ME
Mobile Equipment

4.1.20
MSB
Most Significant Bit

4.1.21
OBU
On-Board Unit, an alternative descriptor to Mobile Equipment

4.1.22
OSI
Open Systems Interconnection

4.1.23
P
Poll

4.1.24
PDU
Protocol Data Unit

4.1.25
P/F
Poll/Final

4.1.26
R
Response

4.1.27
RR
Response Request

4.1.28
RSU
Road Side Unit, an alternative descriptor to Fixed Equipment

4.1.29
SAP
Service Access Point

4.1.30
UI
Unnumbered Information

4.2 Variables

4.2.1
V(RI)
receive state variable (LLC)

4.2.2
V(SI)
transmit state variable (LLC)

5 Frame format

All DSRC transmissions are in frames, and each frame conforms to the structure shown in Figure 2.

Flag	Link Address Field	MAC Control Field	LPDU	Frame Check Sequence	Flag

Figure 2 — Frame structure

Frames containing no LPDU form a special case, see Figure 3.

Flag	Link Address Field	MAC Control Field	Frame Check Sequence	Flag

Figure 3 — Frame structure, no LPDU

NOTE The physical bit stream can also comprise a preamble and / or a trailing bits, see Figure 4.

Preamble	Layer 2 frame (including flags and zero bit insertion between flags)	Optional trailing bits

Figure 4 — Physical layer bit stream

5.1 Flags

All frames shall start and end with a flag. A flag is a zero bit followed by six one bits followed by a zero bit (*0111 1110*). When in receiving state, all stations shall continuously check on a bit-by-bit basis for this sequence. A transmitter shall send only complete eight bit flags.

The flag which ends a frame shall not be used as the start flag for the next frame.

In order to achieve transparency the flag is prevented from accidentally occurring in the link address field, MAC control field, LPDU and frame check sequence via a zero bit insertion procedure described in 5.7.

5.2 Link address field

The link address field carries the Link Identifier (LID). The link address field shall contain either a private LID (contained in 4 octets), a multicast LID (contained in one octet) or a broadcast LID (contained in one octet). The LSB of each octet in the link address field is an extension bit.

5.2.1 Private LID

The private LID is a number in the range of 0 to 268435455. Thus the private LID consists of 28 bits. The private LID is encoded into the link address field as shown in Figure 5.

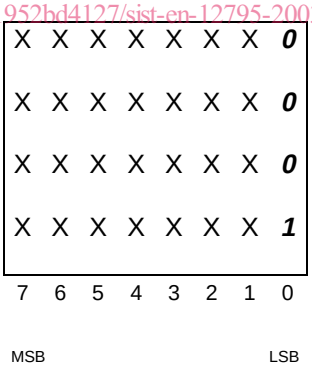

Figure 5 — Private link address field format

The LSB of the first three octets are set to 0 indicating that a further octet of the link address field follows. The LSB of the fourth octet is set to 1 indicating that this is the last octet of the link address field.

5.2.2 Broadcast LID

The broadcast LID equals 127. Thus the broadcast LID consists of 7 bits. The broadcast LID is encoded into the link address field as in Figure 6.