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Cestna transportna in prometna telematika (RTTT) – Posebna komunikacija kratkega dosega (DSRC) – Profili DRSC za uporabo RTTT

Road Transport and Traffic Telematics (RTTT) - Dedicated short-range communication - Profiles for RTTT applications

Straßentransport- und Verkehrstelematik (RTTT) - Nahberiechskommunikation Fahrzeug -Bake (DSRC)-DSRC-Profile für RTTT-Anwendungen

Télématique des transports routiers - Communication a courte portée véhicule/infrastructure - Profils pour les applications de télématique routiere

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Road Transport and Traffic Telematics (RTTT) - Dedicated short-range communication - Profiles for RTTT applications

Télématique des transports routiers - Communication à courte portée véhicule/infrastructure - Profils pour les applications de télématique routière

Straßentransport- und Verkehrstelematik (RTTT) - Nahberiechskommunikation Fahrzeug-Bake (DSRC) - DSRC-Profile für RTTT-Anwendungen

This European Standard was approved by CEN on 23 April 2004.

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Contents

Foreword

This document (EN 13372:2004) 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of an identical text or by endorsement, at the latest by January 2005, and conflicting national standards shall be withdrawn at the latest by January 2005.

This document supersedes ENV 13372:1999.

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

Introduction

This document replaces ENV 13372. In order to facilitate migration from European Pre-standard (ENV) to European Standard, equipment procured and installed in accordance with ENV 13372 has been considered when drafting this European Standard. Operation of such equipment and procurement of additional equipment for systems based on such equipment can continue with reference to Directive 93/36/EEG Article 8 item 3c.

This document 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 1, consisting of the Application Layer, the Data Link Layer, and the Physical Layer. Such an architecture is very common for real-time environments.

This document deals with the interlayer management of the DSRC protocol stack.

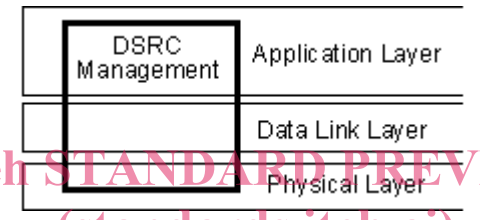

Figure 1 — DSRC protocol stack

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

EN 12253 Road transport and traffic telematics - Dedicated short-range communication - Physical layer using microwave at 5,8 GHz

EN 12795 Road transport and traffic telematics - Dedicated ShortRange Communication (DSRC) – DSRC data link layer - medium access and logical link control

EN 12834 Road transport and traffic telematics - Dedicated Short Range Communication (DSRC) – DSRC application layer

EN 13372 Road Transport and Traffic Telematics (RTTT) – Dedicated short-range communication - Profiles for RTTT applications

1 Scope

This document specifies DSRC profiles which provide coherent sets of communication tools for applications based on DSRC. These sets consist of subsets of functionality described in EN 12253, EN 12795 and EN 12834, out of which a minimum subset is mandatory.

The DSRC Standards EN 12253, EN 12795 and EN 12834, which together form a three-layered architecture for DSRC, are designed to encompass a wide range of services for different purposes in order to make the basic DSRC architecture suited for many different applications and for a wide range of possible products and systems.

DSRC systems can be built using one-way (downlink) or two-way (interactive) communication. The DSRC profiles described in this document are intended for interactive DSRC systems based on two-way communication and DSRC systems using one-way communication (broadcast services).

While EN 12253 contains very little variation, EN 12795 and especially EN 12834 describe a wide range of communication services. It has not been considered feasible to assume that any one piece of equipment is designed to implement all of these services. It is often the case that the functionality of the on board unit is more limited than the functionality of the roadside unit.

This document covers

— Physical Layer parameter values

— Data Link Layer subsets

— Application Layer subsets

— Initialisation procedures

— Late response procedures

— Termination procedures

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12253	*Road transport and traffic telematics - Dedicated short-range communication - Physical layer using microwave at 5,8 GHz*
EN 12795	*Road transport and traffic telematics - Dedicated Short Range Communication (DSRC) - DSRC data link layer: medium access and logical link control*
EN 12834	*Road transport and traffic telematics - Dedicated Short Range Communication (DSRC) - DSRC application layer*
prEN ISO 14906	*Road transport and traffic telematics - Electronic fee collection - Application interface definition for dedicated short-range communication (ISO/DIS 14906:2004)*

3 Terms and definitions

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

3.1
Application
set of processes including related functions and structured data that uses the services offered by the DSRC communication stack

3.2
Beacon service table
data structure transmitted by the RSU to indicate available services

3.3
Communication initialisation
procedure used to establish communication between an RSU and a newly arrived OBU

3.4
Downlink communication
communication from the RSU to the OBU

3.5
DSRC profile
consistent and standardised set of cross layer parameters in a specific DSRC implementation. Identified by a unique number.

3.6
Interlayer management
assembly of communication parameters of all protocol layers such that a consistent communication protocol is provided

3.7
On Board Unit (OBU)
physical assembly that is located and operated in or on the vehicle to transmit and/or receive DSRC signals. It may be in a form that is removable from the vehicle, or mountable in or on any part of the vehicle structure, or bonded to a part of the vehicle, or an integral part of a vehicle component, such as a windscreen, bumper or licence plate. In this document, parameters that refer to an OBU relate to the form that the OBU takes as it is supplied to the vehicle manufacturer or constructor.

3.8
Roadside Unit (RSU)
DSRC equipment usually residing by the side of the road or overhead the road

3.9
Termination
the procedure used to terminate communication between a RSU and an OBU

3.10
Uplink communication
communication from the OBU to the RSU

3.11
Vehicle service table
data structure transmitted by the OBU to indicate available services

4 Abbreviation

ACn	Acknowledged Command with sequence bit n
APDU	Application Protocol Data Unit
BST	Beacon Service Table
CEN	European Committee for Standardisation
DSRC	Dedicated Short-Range Communication
EC	European Commission
E.I.R.P.	Equivalent Isotropic Radiated Power
EFC	Electronic Fee Collection
EN	European Standard
ENV	European pre-Standard
L1	Layer 1 of DSRC (Physical Layer)
L2	Layer 2 of DSRC (Data Link Layer)
L7	Layer 7 of DSRC (Application Layer)

LID	Link ID
LLC	Logical Link Control
MAC	Medium Access Control
NEN	Standards institute of The Netherlands
OBU	On Board Unit
RSU	RoadSide Unit
RTTT	Road Transport and Traffic Telematics
TC	Technical Committee
UI	Unnumbered Information
UNI	Standards institute of Italy
VST	Vehicle Service Table

5 DSRC profiles overview

In the European DSRC Standards each consistent and standardised set of communication protocol parameter values is called a DSRC profile and is assigned a unique identifier number. The word *profile* is a reserved word in EN 12834 and is used in the definition of the BST and VST.

Each profile is made up of a set of parameter values and/or functionality from each layer.

Profiles are not registered but defined by this document. Future extension of the number of profiles defined by this document, made necessary by the introduction of new application and/or configurations, will be undertaken by means of revision of this standard.

When OBUs arrive at the DSRC communication zone, the use of one profile is negotiated between the RSU and the OBU. The initialisation and negotiation procedure is described in EN 12834.

Each DSRC profile is identified by a unique number of ASN.1 type "Profile". One or more DSRC profile numbers are broadcasted by the RSU in the BST according to site-specific rules. Only OBUs being able to use at least one of the DSRC profiles offered by the RSU are allowed to answer, see clause 7.1.2 and EN 12834.This issue of EN 13372 defines two closely related profiles differing only in one parameter of EN 12253 (i.e. the Sub-carrier Frequency on uplink) while using the same subsets of functionality from EN 12795 and EN 12834. Future revisions of this document may introduce additional profiles using other subsets of functionality from EN 12253, EN 12795 and EN 12834. This document also allows for private profiles enabling system implementers to realise additional functionality not provided by profile content defined in this document or a subsequent revision of this document.

6 DSRC parameters and subsets

6.1 Physical layer

6.1.1 Overview

EN 12253 specifies the physical layer parameters for uplink and for downlink. For some parameters there are alternative values. Wherever the exact choice of one value among its alternatives needs to be made known to the communication partner, profiling is used to define which of the alternative values is chosen and the profile number indicates the choice to the communication partner. The alternative values are listed in Table 1.