SLOVENSKI STANDARD
SIST ENV 12313-4:2003

01-oktober-2003

Prometne in potovalne informacije (TTI) - Sporoļ ila TTI prek kodiranih prometnih sporoļ il ï 4. del: Kodirni protokol za radijski podatkovni sistem (RDS) ï Prometni sporoļ ilni kanal (RDS-TMC) - RDS-TMC, ki uporablja sistem ALERT Plus skupaj s sistemom ALERT C

Traffic and Traveller Information (TTI) - TTI Messages via Traffic Message Coding - Part 4: Coding Protocol for Radio Data System - Traffic Message Channel (RDS-TMC) - RDS -TMC using ALERT Plus with ALERT C

Ta slovenski standard je istoveten z: **ENV 12313-4:2000**

ICS:

35.240.60	Uporabniške rešitve IT v transportu in trgovini	IT applications in transport and trade

SIST ENV 12313-4:2003 **en**

EUROPEAN PRESTANDARD

PRÉNORME EUROPÉENNE

EUROPÄISCHE VORNORM

ENV 12313-4

April 2000

ICS 35.240.60

English version

Traffic and Traveller Information (TTI) - TTI Messages via Traffic Message Coding - Part 4: Coding Protocol for Radio Data System - Traffic Message Channel (RDS-TMC) - RDS-TMC using ALERT Plus with ALERT C

This European Prestandard (ENV) was approved by CEN on 26 April 1999 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. ENV 12313-4:2000 E

CONTENTS LIST

FOREWORD

This European Prestandard has been prepared by FORCE/ECORTIS WP 13.6 expert team on ALERT Plus coding protocol and location referencing and by Technical Committee CEN/TC 278 "Road transport and traffic telematics", the secretariat of which is held by NNI.

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

INTRODUCTION

The ALERT Plus function is a compatible extension of the ALERT C function and makes it possible to use RDS-TMC broadcast status-orientated information. This information is related to:

- the road traffic, such as level of service or travel time,
- the car park occupancy,
- the public transport, such as travel time, frequency or headway.

Other status-orientated information have still to be considered, such as the information about snow on the road, water height, wind force, pollution, « time delay » lost due to traffic condition... The coding mechanisms are the same.

This function constitutes an additional response to the information needs of road users, particularly in dense urban areas, by taking into account the constraints which affect the road network or the public transport operators.

The ALERT Plus broadcasting protocol provides an information coding technique which allows the recipient to recover the broadcast information in its entirety. The transmitted messages contain dynamic data (statuses) which can only be interpreted with reference to static data (locations...). To facilitate broadcasting, locations are grouped together in addresses called collections. Both transmitter and receiver must be aware of all elements.

There are many functional responsibilities associated with the provision of an RDS-TMC service, ranging from road based data collection, to message compilation and finally transmission. Because it was noted that the functional responsibilities and their names were not commonly understood, the key functions are defined in the ENV 12313-1, ALERT C Protocol, *date*. These definitions are also useful to understand the standard described in this document. However they have to be completed by the following definition which characterises a functional responsibility of importance for the ALERT Plus function:

Road Network Operator:

A public or private authority responsible for part of the road network of a country.

Without making assumptions regarding the agreements which data service provider may enter into with road network operators, the standard allows information to be broadcast in unscrambled or scrambled form using either the public collections which belong to road network operators, if such collections exist, or private collections.

The present pre-standard describes the broadcasting of dynamic data. All parts referring to location referencing are dealt separately by CEN TC278 SWG7.3 and are not included in this document.

Two approaches are generally distinguished in the RDS-TMC world:

The first approach is based on the idea of an « universal » ALERT C service. This is possible if a continuous and inter-operable network of ALERT C free-access services is in place in a country or around a continent. A good example could be the RDS-TMC Pan-European Service « ALERT ».

The second approach gives a more important role to the data service provider and is suitable for operating added value, generally paid-for, services. In that case, ALERT C protocol is used to transmit event-orientated messages and ALERT Plus protocol to transmit status-orientated messages.

For historical reasons, two RDS-TMC Open Data Applications (ODA) have been defined. With the first one, you are limited to the first kind of service since only ALERT C is specified. The «ALERT» service can be operated using this first ODA. The second ODA takes into account both approaches (ALERT C and ALERT Plus), allowing to operate the «ALERT» service as well as an added value TMC service on the same transmitter. A service provider is thus able to offer the «ALERT» service, and to propose in parallel to his clients a more sophisticated information such as travel times. This additional service may be paid-for and encrypted while the basic ALERT C service may remain free-access. Finally this second solution has the advantages of being backward compatible with the existing implementation using the 1A/8A ALERT C, as well as ALERT Plus format.

This two ODA's are fully compatible, since the ALERT C part of the mixed ALERT C/ALERT Plus ODA is exactly the same as the protocol of the pure ALERT C ODA. For instance a service provider may operate the «ALERT» service using indifferently one of both ODA. Only the transmitted Application IDentifier (AID) is different. A RDS-TMC receiver must be aware of the two different AID's and that is all. The user messages, as well as the system messages are the same.

This document describes the mixed ALERT C/ALERT Plus ODA, but systematically refers to the pure ALERT C ODA (RDS - TMC ALERT C Protocol, CEN ENV 12313-1, June 1997) when dealing with the ALERT C protocol. The 1A/5A/8A format is also standardised in order to take into account existing implementations. However in the future all RDS-TMC services should migrate into the ODA format.

1. SCOPE

1.1 APPLICATION

The ALERT Plus function is an extension of the ALERT C function. While ALERT C covers event-orientated information to be conveyed by the RDS medium, ALERT Plus deals with status-orientated information to be conveyed by the same medium.

The ALERT Plus function informs motorists about the changes affecting the status of traffic at pre-defined locations. Different **status types** are defined such as level of service on road sections or areas, travel times on road sections, car park occupancy, status of public transport traffic...

A location can be a road section, a pole, a car park, ..., referenced in the **location table**. Location referencing is however dealt separately by CEN TC278 SWG7.3 and is not included in this document.

A part of the document is valid for other data transmission media such as AM or SWIFT broadcast data systems, the digital cellular radio system (GSM), and the digital audio broadcasting (DAB). At least the user messages content is medium independent.

1.2 PRESENTATION

This document deals with the coding protocol for the multiplex broadcasting of event-orientated and status-orientated information, but it essentially describes the content of status-orientated messages. The event-orientated messages are described in the ENV 12313-1, ALERT C Protocol, *date*.

The presentation section describes the way in which messages are coded for broadcasting.

The main coding principle for status-orientated messages is to gather together the information which relates to several locations in the same message, and to transmit a so called collection number instead of transmitting directly location numbers like in the ALERT C protocol. Each collection identifies a set of locations according to the **collection table**.

Status-orientated messages contain three fields:

- message format,
- collection number,
- statuses of the locations identified by the collection.

The transmitted **message format** makes it possible to differentiate between two types of messages, those which give information about five different locations and those which give information about seven different locations. This difference in the format allows more flexibility according to the status type and the location type.

The transmitted **collection** is a number which represents a set of five or seven locations. A collection is also associated with a particular status type. This mechanism has the advantage of limiting the information transmitted since only one collection number is transmitted instead of the five or seven corresponding locations numbers. According to the message format, the collection identifies five or seven locations.

The transmitted five or seven **statuses** are information about the five or seven locations_identified by the transmitted collection number. All the statuses in a particular message have the same format set by the transmitted message format. The statuses are coded according to the **code conversion tables**.

The following tables must be installed in the terminal and in the encoding system to enable them to process TMC-messages:

- location tables,
- collection tables,
- code conversion tables,

1.3 SERVICE MANAGEMENT

A distinction is made between user messages and service management messages. User messages are those potentially made known to the driver, as defined in the presentation section. The service management messages consist of system messages and ALERT C message management functions. They are of use only to the TMC decoder for service management purposes.

ALERT C message management functions, concerning message insertion, updating and deletion of event-orientated messages, are considered in the ENV 12313-1, ALERT C Protocol, *date*.

As regards user status-orientated messages, agreement must be set up among data service providers and road network operators on the life duration of statuses. Agreement must also be set up among data service providers and receiver manufacturers regarding the updating of statuses. As example, whenever any updating has not been made for 30 minutes, a status is automatically shifted into not informed status.

As regards system messages, two approaches can be distinguished using these messages in different ways. This section deal with these messages.

1.4 TRANSMISSION

The transmission section conveys the message over-air. TMC (ALERT C and ALERT Plus) information is at the present time conveyed in type 1A/5A/8A RDS groups. In the future, it is recommended to transmit RDS-TMC in the Open Data Channel, as well defined in this document.

ALERT Plus messages are only single group messages.

In the 1A/8A format, ALERT C and ALERT Plus messages are differentiated by the X4 switch bit which is set to 1 when transmitting ALERT Plus information.

2. NORMATIVE REFERENCES

- prEN 50067 Specification of the radio data system (RDS) for VHF/FM sound broadcasting in the frequency range from 87,5 to 108,0 Mhz
- prEN ISO 14819-1 Traffic and Travel Information (TTI) - TTI Messages via traffic message coding - Part 1: Coding protocol for Radio Data System - Traffic Message Channel (RDS-TMC) - RDS-TMC using ALERT-C
- prENV ISO 14819-3 Traffic and Travel Information (TTI) - TTI Messages via traffic message coding - Part 3: Location referencing for ALERT- C
- prENV 12313-5 Traffic and Travel Information (TTI) - TTI Messages via traffic message coding - Part 5: Location referencing for ALERT-Plus
- ENV 13106-1 Traffic and travel data dictionary - Part 1: General definitions, entities, attributes

3. APPLICATION

Currently the broadcasting of traffic spoken messages on FM radio stations informs motorists about traffic conditions and road or weather related events which have occurred. New techniques of digital data broadcasting using the Radio Data System (RDS) permit a considerable improvement in this service by providing the terminal with messages which do not systematically interrupt the radio programme.

The ALERT C protocol specifies the coding of messages which inform motorists about various types of traffic, road and weather events.

The ALERT Plus protocol, which is described in this document, in addition informs motorists about the changes affecting the status of traffic at pre-defined locations. Different **status types** are defined such as level of service on road sections or areas, travel times on road sections, car park occupancy, status of public transport traffic...

A part of the document is valid for other data transmission media such as AM or SWIFT broadcast data systems, the digital cellular radio system (GSM), and the digital audio broadcasting (DAB). At least the user messages content is medium independent.

3.1 CONTENT OF THE TMC "TRAVEL SERVICE"

The TMC service (ALERT C and ALERT Plus) uses the RDS channel of one or more FM transmitters to provide information about:

- nature, severity and expected duration of problems affecting roads (event-orientated information),
- level of service on road sections or areas covered by the service (status-orientated information),
- travel times on road sections (status- orientated information),

- the occupancy level of the car parks areas covered by the service (status-orientated information),
- level of service on either sections of public transport routes (for example between two rail stations, between two bus or tram stops...) or on an entire public transport route (status-orientated information).

This service should satisfy the new expectations of drivers. Developments in transportation and the spread of new communications technologies will increase demand for the availability of information of all types within vehicles. Today drivers wish to know in real time the problems which may occur on the road in order to be able to modify their behaviour accordingly, for example by changing route or mode of transport.

3.2 TMC TERMINAL

The TMC messages (ALERT C and ALERT Plus) broadcast by using RDS groups are stored in a RDS-TMC terminal. They are then interpreted and presented to the user in a spoken, text or graphical form depending on the capabilities of the terminal.

The sophistication of terminals can vary depending on the services which they will provide to the user. There are thus speech synthesis terminals, terminals which display messages in alphanumeric or graphic form and terminals which perform processing of varying degrees of complexity, i.e. those which are capable of guiding a motorist to a requested destination.

3.3 EVENT-ORIENTATED INFORMATION (ALERT C)

This part is separately defined in the ENV ISO 14819-1.

3.4 STATUS-ORIENTATED INFORMATION (ALERT PLUS)

Status-orientated information can change quite rapidly. It is generally collected by automatic sensors or other systems owned by the road network operators or private companies, the public transport authorities or the car parks societies.

The statuses are associated with locations such as road section, area, car park, section of public transport route... These **location types** are defined separately in ENV ISO 14819-3.

The level of service on pre-defined road sections or in areas is an example of status-orientated information. At a given instant a road section has a status which describes level of service: freely flowing, heavy, slowed, congested, blocked traffic... The coding system keeps the terminal informed of changes in the status of traffic at each road section: the statuses of statuses at all the road sections are repeatedly described by a set of RDS-TMC messages.

3.5 STRATEGIC AND TACTICAL INFORMATION

The TMC information (ALERT C and ALERT Plus) which reaches drivers may be strategic or tactical. Strategic information enables drivers to select a route in the

medium term or adopt behaviour which is consistent with their initial need. Tactical information permits them to react immediately, for example to a traffic problem.

3.6 GEOGRAPHIC RELEVANCE

This will be defined in ENV ISO 14819-3.

Both events-orientated and status-orientated messages require a location process in order to position the phenomenon.

As regards events-orientated messages, the ALERT C protocol specifies the transmission of an index (or location number) referenced in a hierarchical **location table**. This location table describes in unambiguous terms all locations (points, linear locations or areas) which are likely to be covered by the RDS-TMC system. The location table must be known by the encoding system and by the terminal.

As regards status-orientated messages, the ALERT Plus protocol specifies the transmission of a collection number. This collection simultaneously identifies an ordered set of locations referenced in an ALERT Plus location table whose structure is different from an ALERT C location table.

The ALERT Plus service is able to transmit the statuses related to the **location types** defined in ENV ISO 14819-3.

3.7 TRANSMITTED MESSAGE PRIORITY

This is particularly relevant for ALERT C messages, and is treated in ENV ISO 14819-1.

4. PRESENTATION

The level of presentation describes the way in which messages are coded for broadcasting.

This document on coding for the multiplex broadcasting of event-orientated and status-orientated information essentially describes the content of status-orientated messages. The event-orientated messages are identical to those described in the ENV ISO 14819-1.

4.1 EVENT-ORIENTATED MESSAGES

This part is separately defined in the ENV ISO 14819-1.

4.2 STATUS-ORIENTATED MESSAGES

In ALERT Plus a lot of information have to be broadcast continuously and it is necessary to aggregate as much as is possible the information because the RDS-TMC channel is narrow.

Therefore the general coding principle for status-orientated messages is to gather together the information which relates to several locations in the same message, and to transmit a so called collection number instead of transmitting directly location numbers like in the ALERT C protocol. Each collection identifies a set of locations according to the **collection table**.

The following tables must be installed in the terminal and in the encoding system to enable them to process TMC-messages:

- collection tables,
- location tables,
- code conversion tables,

Status-orientated messages contain three fields:

- field 1: message format (variant),
- field 2: collection number,
- field 3: statuses of the locations identified by the collection.

4.2.1 MESSAGE FORMAT (VARIANT : 4 BITS)

There are two categories of message format (variant):

- standardised message formats which are known by all terminals and which can be used in all countries,
- private message formats which are specific to each service and allows the transmission of scrambled information.

The processing of scrambled messages is outside the scope of this document.

The standardised message format makes it possible to differentiate between the two types of status-orientated messages as described in the Figure 1.

VARIANTS	FORMAT
0	Reserved
1	Status-orientated messages using: • a 12-bits collection number, • a 4-bits code for the statuses. Used to transmit travel times
2	Status-orientated messages using: • an 11-bits collection number, • a 3-bits code for the statuses. Used to transmit level of service, car park occupancy...
3 to 11	Reserved
12 to 15	Scrambled messages (private variants)

Figure 1: message format