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Intelligent transport systems — Traffic and travel information messages via traffic message coding —

Part 1: Coding protocol for Radio Data System-Traffic Message Channel (RDS-TMC) using ALERT-C

Systèmes de transport intelligents — Informations sur le trafic et les déplacements via le codage de messages sur le trafic —

Partie 1: Protocole de codage pour le système de radiodiffusion de données - canal de messages d'informations sur le trafic (RDS-TMC) avec Alert-C

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Intelligent transport systems,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 14819-1:2013), which has been technically revised. The main changes compared to the previous edition are as follows:

— Additional tuning variants have been added to allow referencing of TMC services using the 64 MHz to 88 MHz band.

— The method of encrypting an RDS-TMC service, previously separately specified in ISO 14819-6, has been merged into this document as Clause 8. Consequently, some renumbering of sections has occurred and encryption-specific terms, definitions and abbreviated terms have been added in Clause 3.

— In some places the text has been improved and/or rearranged for greater clarity. Several typographical and grammatical errors have been corrected.

A list of all parts in the ISO 14819 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 General

Traffic and traveller information (TTI) can be disseminated through a number of services and means of communication to the end user, including static displays (e.g. variable message signs), broadcast audio to car radios, broadcast data services to in-vehicle equipment (e.g. installed navigation systems) and to nomadic device terminals (e.g. portable navigation device).

For all such services, the data to be disseminated and the message structure involved in the various interfaces require clear definition and standard formats, in order to allow competitive products to operate with any received data.

This document describes the data specification for TTI messages, together with their network layer and their service layer, which shall be conveyed by the RDS-TMC feature, specified in the IEC 62106 series.

The TTI information chain, from event to end-user, is quite complex and the Traveller Information Services Association (TISA) value chain shown in Figure 1 helps to explain the key components.

Figure 1 — Traveller Information Services Association TTI value chain

Several entities (e.g. companies, businesses) take part in one or more activities to complete the activities shown in the value chain. These are described below for improved understanding:

Service provider: An organization that constructs a data service, by gathering data, processing data and supplying the data service. A service provider negotiates for the use of the necessary data bandwidth with a Broadcaster and/or Transmission Operator. A service provider is responsible for the "quality" of the data to its customers and should provide suitable customer support.

Broadcaster: A traditionally incorporated organization responsible for a continuous strand of audio programmes and their quality. A broadcaster may also be responsible for the overall co-ordination of "broadcast transmissions" (often a Broadcaster is the licensee of a national regulator). A Broadcaster may also be a service provider.

TTI services for travellers, using spoken radio reports and in-vision reports, occupy broadcast air-time and whilst valuable to some, they are considered less useful by others. Furthermore, only some are useful for travellers on the move. Due to the widespread adoption of the Radio Data System, in VHF/FM broadcasting on Band II there is the possibility of transmitting coded TTI messages digitally and "silently" using the RDS-TMC feature, which avoids the interruption of planned programmes. This TTI delivery method has several advantages: TTI messages can be decoded into the language of the end user, regardless of location, more messages can be made available and planned broadcast programme interruption is avoided. Thus, using RDS-TMC makes the delivery of TTI messages more timely and topical.

0.2 ALERT-C protocol

The ALERT-C protocol defined in this document supports a data broadcasting service for travellers, providing information about many kinds of traffic and travel events. Messages include traffic incident information relating to national and regional routes and some urban roads and other information required by a traveller, such as roadworks and weather information.

The ALERT-C protocol utilizes a standardized Event List of event messages with their code values, which also includes general traffic problems and weather situations. Being transmitted as a series of codes, RDS-TMC messages are language-independent and are presented in the language of the user's choice.

ALERT-C defines two categories of information within messages: basic and optional items. In principle, basic information is present in all messages. Optional information is added to messages where necessary.

Standard RDS-TMC user messages provide the following five basic items of explicit, broadcast information:

1. **Event description**, giving details of road event situation, general traffic problems and weather situations (e.g. congestion caused by an accident) and where appropriate its severity (e.g. resulting queue length).

2. **Location**, indicating the area, road segment or point location where the source of the problem is situated.

3. **Direction and extent**, identifying the adjacent segments or specific point locations also affected by the incident, and where appropriate the direction of traffic affected.

4. **Duration**, giving an indication of how long the problem is expected to last.

5. **Diversion advice**, showing whether end-users are recommended to find and follow an alternative route.

Optional information may be added to any message using one or more additional RDS data groups. This optional addition may give greater detail or deal with unusual situations. Any number of additional fields can in principle be added to each basic message, subject only to a maximum message length of five RDS data groups.

0.3 Document development and RDS groups

This document is based on the ALERT-C traffic message coding protocol, which was a product of DRIVE Project V1029, "RDS Advice and Problem Location for European Road Traffic". The RDS-ALERT project aimed to define standards for RDS-TMC, working in conjunction with the European Broadcasting Union (EBU) and the European Conference of Ministers of Transport (ECMT).

The document has been implemented in many countries worldwide and, after very extensive implementation experience, it has matured with many changes compared to the earliest version of the ALERT-C proposal of 1990. At that time, CEN TC 278 Working Groups developed the coding protocol described in this document, the Event List described in ISO 14819-2 and the location referencing method described in ISO 14819-3. Subsequently the TMC Forum was responsible for collecting specific additions and improvements intended for inclusion in this document. In 2008, TISA took over all responsibility (including TMC Forum legacy) for maintenance of this document, which now includes an up to date set of industry supported enhancements to RDS-TMC.

The RDS is fully described in IEC 62106 and it contains the 'hooks' to RDS-TMC detailed in this document[1)]; it employs a group-structured data protocol. Terminal Device manufacturers should be aware that service providers broadcast the following RDS groups:

a) type 3A groups, which carry the TMC Open Data Application (ODA) identification and service and network layer information, identifying TMC services uniquely worldwide;

b) type 8A groups, which carry RDS-TMC messages and location information, together with TMC service tuning information; and

c) type 4A groups, which contain the Clock Time (CT) information that is used as the time reference within TMC.

1) In this document, many "hooks" have been left for future development and indeed a few status-orientated road end-user information messages are included.

Additionally, where necessary, the following group may also be transmitted:

d) type 0A groups, which contain Alternative Frequency (AF) information, that is used as an alternative to, or in addition to, tuning information carried in the type 8A group.

It is noted that although the 'message' information carried within the 8A group will be transmitted once with either one or two 'immediate' repeats (see 7.3), the encryption administration information and the tuning information, both also transmitted in type 8A groups, usually will not be transmitted with an 'immediate' repeat: this information is largely 'static' and repeated periodically only every several seconds or minutes. Terminal Devices therefore process every RDS group received that passes their CRC and use the data contained within once it has been verified by the reception of a second identical group, regardless of whether received 'immediately' or after several seconds or minutes.

Broadly speaking, two types of RDS-TMC services are in use: one that is broadcast without access control, and one that is broadcast with access control. The method of 'access control' was designed in 2000 and was published separately in ISO 14819-6. It described how a service provider encrypted their service and the complementary process to be adopted by terminals to decrypt the service by arrangement with the service provider. It also indicated a strategy to be followed to introduce encrypted services between 2001 and 2003, when encryption was expected to become widespread. As encrypted RDS-TMC services are now widespread, the details in ISO 14819-6 have now been merged within this document and consequently ISO 14819-6 has been withdrawn.

Intelligent transport systems — Traffic and travel information messages via traffic message coding —

Part 1: Coding protocol for Radio Data System-Traffic Message Channel (RDS-TMC) using ALERT-C

1 Scope

The ALERT-C protocol is designed to provide mostly event-oriented road end-user information messages.

This document specifies the messages which are presented to the user in accordance with a set of general requirements. It defines the message structure and content and its presentation to the end-user.

The message management component of this document describes the message management functions of RDS-TMC. The ALERT-C protocol distinguishes between user messages and system messages. User messages are those potentially made known to the end-user, as defined in Clause 5. System messages are of use only to the RDS-TMC terminal, for message management purposes.

RDS-TMC information comprises both 'system information' and 'user messages'. System information relates to the TMC service and details the parameters that the terminal needs to be able to find, identify and decode the TMC information. System information is transmitted in type 3A groups and in type 8A groups.

User messages contain the details of the traffic events; these may use one or more type 8A groups. Most messages may be transmitted using a single type 8A group, however messages with more detail (e.g. diversion advice) may use up to a total of five, type 8A groups.

The transmission component of this document conveys the messages over-air. The ALERT-C protocol, used by RDS-TMC, has the fundamental approach of aiming to code most messages entirely within a single RDS group.

The ALERT-C Event List, which contains all event descriptions, is described in ISO 14819-2.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 4217, *Codes for the representation of currencies*

IEC 62106 (all parts), *Radio data system (RDS) — VHF/FM sound broadcasting in the frequency range from 64,0 MHz to 108,0 MHz*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
access profile
ACP
unique description of a particular RDS-TMC service and subscription period

3.1.2
alternative frequency
AF
frequency used by a transmitter in an immediately adjacent area that carries the same audio programme service as the tuned programme

Note 1 to entry: Several AFs are transmitted together in a list. Where the TMC service uses the same Network as an audio service, this AF list is also used for following the TMC service.

3.1.3
application identification
AID
identification that signals the specific group type used by the *open data application* (3.1.23)

3.1.4
continuity index field
field that helps to distinguish between different multi-group messages

Note 1 to entry: All groups within any particular multi-group message contain the same value of this continuity index.

3.1.5
country code
CC
non-zero integer transmitted as the *location table country code (LTCC)* (3.1.21), or if that value is zero, the *programme identification country code (PICC)* (3.1.27)

3.1.6
direction and extent
identifier for adjacent segments or specific point *locations* (3.1.17) also affected by the incident, and where appropriate the direction of traffic affected

3.1.7
diversion advice
advice showing whether end-users are recommended to find and follow an alternative route

3.1.8
duration
indication of how long the problem is expected to last

3.1.9
encryption identifier
ENCID
value indicating which line in the *service key* (3.1.30) table of parameters the service provider is using in the encryption process that day

Note 1 to entry: The encryption identifier is transmitted in type 8A group variant 0.

3.1.10
end-user
all possible *terminal* (3.1.33) clients

EXAMPLE a vehicle driver, a user of a portable or fixed TMC receiver or an intelligent client that processes the information such as in a navigation system.

3.1.11
event description
description giving details of the traffic problem (e.g. congestion caused by an accident) and where appropriate its severity (e.g. resulting queue length) or weather situation

3.1.12
Event List
agreed table of *event descriptions* (3.1.11) and parameters, assigned an event code value giving details of traffic problem (e.g. congestion caused by accident) and where appropriate its severity (e.g. resulting queue length) or the weather situation

Note 1 to entry: The Event List is found in ISO 14918-2.

3.1.13
expiry date
date determined by the service provider on which a particular *terminal's* (3.1.33) ability to decrypt an encrypted service should cease (i.e. the end of the paid subscription period)

3.1.14
extended country code
ECC
non-zero 8-bit code transmitted as the location extended table country code (LTECC), or if that value is zero, or not transmitted, the extended country code (ECC), transmitted in RDS type 1A group

3.1.15
foreign location table
location table (3.1.18) which is different from the default location table used by the transmitter

3.1.16
INTER-ROAD
messaging system for referencing *locations* (3.1.17) from other *location tables* (3.1.18) via special multi-group messages

Note 1 to entry: These messages are used to inform *end-users* (3.1.10) about problems in other areas, particularly in neighbouring countries or regions.

3.1.17
location
indication of the area, road segment or point location where the source of the problem is situated

3.1.18
location table
agreed location table for each service which contains information to indicate the area, road segment or point *location* (3.1.17) where the source of the problem is situated

3.1.19
location table number
LTN
integer number 1…63 used to identify the *location table* (3.1.18)

Note 1 to entry: The LTN is transmitted in type 3A groups.

3.1.20
location table number before encryption
LTNBE
integer number 1…63 used to identify the *location table* (3.1.18) used by the service provider prior to the codes within the table being encrypted for transmission

Note 1 to entry: The LTNBE is transmitted in type 8A groups.

3.1.21
location table country code
LTCC
code (in the range 1..F [hex]) assigned to each *location* (3.1.17) database, based on the country/countries the TMC service covers

3.1.22
location table extended country code
LTECC
code (in the range 10..F [hex]) assigned to each *location* (3.1.17) database, based on the country/countries the TMC service covers

Note 1 to entry: Together the LTECC, LTCC and LTN identify a location database uniquely.

3.1.23
open data application
ODA
application which provides the means for adding applications to an RDS transmission

3.1.24
other network
ON
RDS feature

3.1.25
PIN code
numeric or alphanumeric code required to be entered into a *terminal* (3.1.33) before that terminal is permitted to present decrypted RDS-TMC messages

Note 1 to entry: The value of the PIN code is calculated by the terminal manufacturer from an algorithm using terminal *serial number* (3.1.28) and one or more *access profiles* (3.1.1) as factors.

3.1.26
programme identification
PI
identification which assigns a code to each audio programme source

3.1.27
programme identification country code
PICC
first four bits of the 16-bit *programme identification* (3.1.26) code

Note 1 to entry: Usually the programme identification country code and the *location table country code* (3.1.21) on an RDS-TMC transmission have the same value, but not always nor necessarily.

3.1.28
serial number
alphanumeric identifier, unique to a *terminal* (3.1.33) (or group of terminals), determined by the manufacturer

3.1.29
service-ID
SID
ID that is used to uniquely identify a TMC service from a service provider

3.1.30
service key
SVK
number given in confidence by a service provider to a *terminal* (3.1.33) manufacturer, identifying which one of eight possible encryption tables the service is using for encryption

Note 1 to entry: The service key is not transmitted.

3.1.31
silent cancellation message
description which is used to delete messages from the *end-user* (3.1.10) *terminal* (3.1.33)

3.1.32
system information
information that enables an RDS-TMC *terminal* (3.1.33) to decode and evaluate essential data, which describes the transmission being received

Note 1 to entry: System information indicates an RDS-TMC service and comprises some service characteristics needed to select the RDS-TMC service.

3.1.33
terminal
device that provides the user interfaces with the TMC service

Note 1 to entry: The functionality of the terminal covers a range of functions from simple terminals with a limited message repertoire and restricted *location* (3.1.17) database to more sophisticated terminals offering full TMC message features and/or a wide range of strategic and tactical location databases.

3.1.34
tuning information
information that enables an RDS-TMC *terminal* (3.1.33) to change from one transmitter to another at boundaries of a transmitter's coverage

3.1.35
user message
message that is potentially made known to the *end-user* (3.1.10)

Note 1 to entry: User messages contain descriptions of event, *location* (3.1.17), *direction and extent* (3.1.6), *duration* (3.1.8), etc.

3.1.36
Traveller Information Services Association
TISA
not-for-profit membership organization established under Belgian law aimed at developing and maintaining worldwide traffic and traveller information standards such as TMC and TPEG

3.2 Abbreviated terms

AFI	alternative frequency indicator
ALERT-C	Advice and Problem Location for European Road Traffic, Version C
BCD	binary coded decimal
CT	clock time