INTERNATIONAL STANDARD

ISO 14819-3

Third edition

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

Part 3: Location referencing for Radio Data System — Traffic Message Channel (RDS-TMC) using ALERT-C

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

Partie 3: Références de localisants pour le système de radiodiffusion de données (RDS) — Canal de messages d'informations sur le trafic (RDS-TMC) avec ALERT-C

PROOF/ÉPREUVE

Reference number
ISO 14819-3:2020(E)

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Published in Switzerland

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
3.1 Abbreviated terms 1
4 Location coding **2**
4.1 General 2
4.2 Location tables 2
4.2.1 General 2
4.2.2 Versions and versioning of location tables 3
4.2.3 Exchanging location tables 3
4.2.4 Hierarchical structure 4
4.2.5 Location types 5
4.2.6 Offsets 5
4.2.7 Direction of the road 5
4.2.8 Country codes and location table numbers 6
4.2.9 Constraints 6
4.3 TMC location categories, types and subtypes 6
4.4 Location table content 6
4.4.1 General 6
4.4.2 Nominal record content 7
4.4.3 Road descriptions 11
4.4.4 Names 12
4.4.5 Upward references 12
4.4.6 Offsets 12
4.4.7 Urban 12
4.4.8 Intersection reference 12
4.4.9 WGS 84 co-ordinates 13
4.4.10 InterruptsRoad 13
4.5 Detailed junction referencing 14
4.5.1 Conventional junctions 14
4.5.2 Complex junctions 14
4.5.3 Detailed coding of link roads 14
4.6 Detailed situation locations 14
4.6.1 Introduction 14
4.6.2 Normal location referencing 14
4.6.3 Detailed location referencing 15
4.6.4 Precise location referencing 15
4.7 One- and two-way locations 15
4.7.1 Basic principles 15
4.7.2 Junctions 15
4.7.3 Locations with only an exit or entry and locations occurring on one side only 15
4.7.4 DiversionPos / DiversionNeg 17
Annex A (normative) **TMC location categories, types and subtypes** **18**
Annex B (informative) **Location table identification** **26**
Annex C (normative) **Detailed methods for the usage of location tables** **32**
Annex D (informative) **Background information** **67**
Bibliography **69**

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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).

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

This third edition cancels and replaces the second edition (ISO 14819-3:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

The following TISA specifications were integrated:

— Location Table Exchange Format 24

— Reuse-of-location-codes

— Roads-and-Junction-number-translation

— Coding of isolated areas

— Language identifiers

— Backward compatibility

— Coding of name translations and languages in TMC tables

— DLR methods for locations in TMC Location

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

This document primarily addresses the needs of RDS-TMC ALERT-C messages which are in widespread worldwide use. The modular approach used here is intended to facilitate future extension of the location referencing rules to other traffic and travel messaging systems.

This document sets out ways of specifying places and positions in traffic and travel information messages, including RDS-TMC messages (the Radio Data System-Traffic Message Channel).

It defines the structure and semantics of location tables for Traffic Information Centres (TICs) and receivers.

a) Traffic and travel messages:

   1) Traffic and travel information is created and updated in an originating database, by human operators or automated systems. Information is transferred to one or more remote systems by means of messages.

   2) In this context, a message is a collection of data which is exchanged to convey information for an agreed purpose between two or more parties. Traffic and travel messages are digitally-coded sets of data exchanged by interested parties, which convey information about traffic, travel and/or transport networks. Digital coding may be alphanumeric, as in EDIFACT, or binary, as in RDS-TMC.

   3) The traffic and travel messages developed in programmes of the European Union are open, non-proprietary proposals for standards intended to serve the public interest by facilitating interconnection and interoperability of the relevant information systems.

b) Location referencing.

Location references provide the means of saying *where* in traffic and travel messages.

The location referencing component of a traffic and travel message enables a service provider to indicate the physical location of the event being described. The management of TMC location databases requires on-going maintenance. It is necessary to both manage location database ID allocation for countries implementing TMC services and to validate new and updated location databases when ground features change. These activities are led by service providers who also need to ensure that their end-users are kept up-to-date. The Traveller Information Services Association (www.tisa.org) manages the ID allocation on a worldwide basis. TISA provides location database validation for service providers who generally arrange location database updates on a bi-annual cycle. This certification procedure extends the basic rules mentioned in this standard and also applies a best-practice validation. TISA grants a stamp of quality to those location tables that pass a set of tests.

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

Part 3: Location referencing for Radio Data System — Traffic Message Channel (RDS-TMC) using ALERT-C

1 Scope

This document specifies location referencing rules to address the specific requirements of Traffic Message Channel (TMC) systems, which use abbreviated coding formats to provide traffic and travel information (TTI) messages over mobile bearers (e.g. GMS, DAB) or via exchange protocols like DATEX II. In particular, the rules address the Radio Data System-Traffic Message Channel (RDS-TMC), a means of providing digitally-coded TTI to travellers using a silent data channel on FM radio stations, based on the ALERT-C protocol.

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 14819-1, *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*

ISO 639-1, *Codes for the representation of names of languages — Part 1: Alpha-2 code*

ISO 15924, *Information and documentation — Codes for the representation of names of scripts*

3 Terms and definitions

No terms and definitions are listed in this document.

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 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply:

ALERT-C	Advice and Problem Location for European Road Traffic, Version C
ASCII	American Standard Code for Information Interchange
CCD	country code
CID	country identifier
CLST	code of location subtype
CNAME	country name

ECC	extended country code
EDIFACT	Electronic data interchange for administration commerce and transport
GDF	geographic data files (for modelling and exchange of geographic data for transport telematics applications)
LC	location code
LTCC	location table country code
LTN	location table number
POI	point of interest
RDS	radio data system (digital information channel on FM sub carrier)
TIC	traffic information centre
TISA	Traveller Information Services Association
TMC	traffic message channel
TTI	traffic and travel information
WGS 84	World Geodetic System 1984

4 Location coding

4.1 General

Location references used by RDS-TMC are covered by the location referencing rules defined in this subclause. The ALERT-C coding protocol for RDS-TMC is defined in ISO 14819-1.

ALERT-C supports a digital, silent data broadcast service for motorists, providing information about many kinds of traffic situations. This includes roadwork, weather and traffic incident information relating to major national and international roads, regional roads and local or urban roads.

4.2 Location tables

4.2.1 General

Within RDS-TMC, locations are identified and referenced by their location code. A given RDS-TMC service uses a pre-defined location table, containing the pre-stored details of the locations that can be referenced in messages from that service.

A location code in such a message refers and serves as a tabular 'address' of the pre-stored location details in the location table used by the service. A real-world location may have more than one location code within the same location table. However, within a given location table, each location code refers to one and only one location. A location code has a number in the range 1 to 63 487.

In ALERT-C, a further 2048 numbers shall be reserved for INTER-ROAD (see ISO 14819-1) and other forms of referencing.

A table may contain a maximum number of 65 536 codes allocated in the following way:

Location code	Use
0	reserved
1 - 63,487	free for normal location coding
63,488 - 64,511	for special purposes
64,512 - 65,532	for INTER-ROAD

Location code	**Use**
64,533 - 65,535	special functions

NOTE INTER-ROAD is a coding mechanism within ALERT-C to reference in a specific type of ALERT-C message (the INTER-ROAD message) a location belonging to a different location table. The INTER-ROAD location can be a table in the same country as well as a table in another country.

4.2.2 Versions and versioning of location tables

Once a location has been allocated, it cannot easily be re-allocated (in an RDS-TMC/ALERT-C environment). Therefore, all existing locations and their associated location codes in a given location table should be regarded as fixed. However, other attributes of a location may, within certain constraints, sometimes change (e.g. name, positive offset, negative offset).

Within each location table, space (unallocated location codes) shall be left to accommodate future requirements for additional locations (to deal with new construction and location referencing requirements not originally foreseen).

Whenever new locations are added to, or removed from, a location table (for example to extend coverage or to reflect changes to the road network), the resulting table shall be treated as a new version. The creation and tracking of versions of a location table allows the evolution of a location table to be understood and supports the successful use of the table and associated TMC service. A new version of an existing location table shall remain compatible with the previous versions of the same location table – the changes shall not be such that the location of a TMC message could be wrongly interpreted by a receiver. For example, location codes which are deleted should not be re-used for a long period. Also, changing the attributes class and type of a location might cause an incompatible version of the table. It is part of TISA's location certification process to judge if a table is backwards compatible.

The method for identifying and labelling different versions of a location table is shown in C.3.1.

TISA has established an allocation of location tables to show which are in use or available for use in each country. The responsible agency in a country may apply for additional location table numbers in future, to support further applications or more detailed, regional location tables. New tables can also be issued occasionally to allow for complete updates to existing tables. Such major changes will, however, be very disruptive for users, as existing receivers will not recognize TMC messages relating to the new location table unless the same location table is also installed in the receiver. Switches from one location table to a different one (rather than a new version of the same table) should therefore be avoided as far as possible, especially in established markets.

4.2.3 Exchanging location tables

For TMC services to work well, the different organizations involved need to be able to understand the location table number, version and contents. To achieve this, a location table exchange format has been defined.

This format will be used for the exchange of TMC location tables between the various functional areas, e.g. receiver manufactures, map providers, certification of TMC location tables, traffic information centres and service providers.

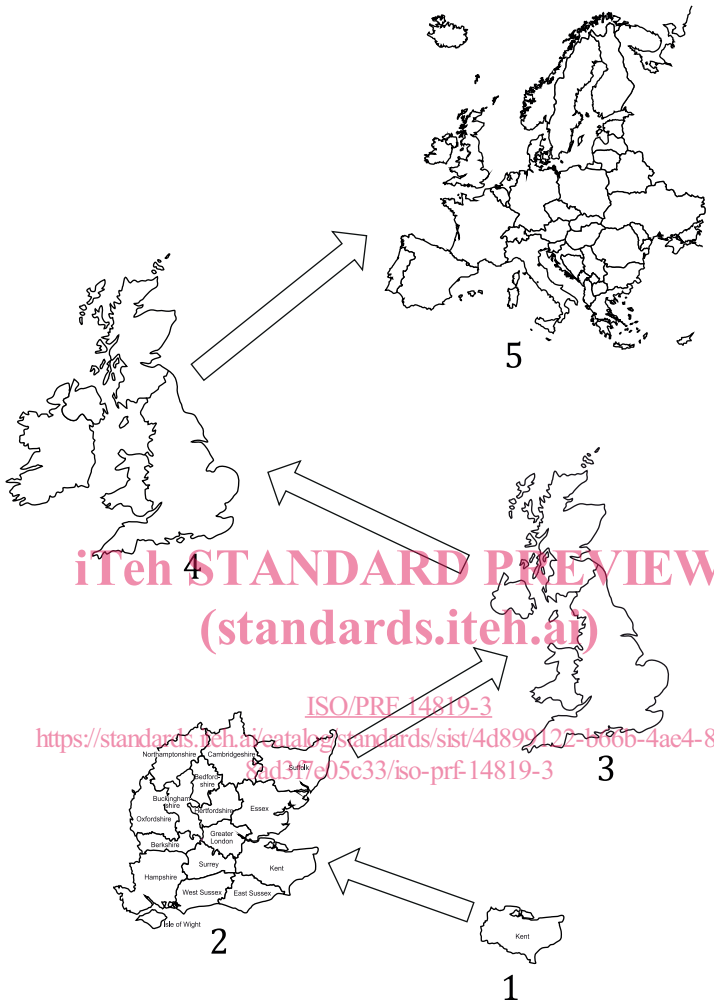
The location table exchange format specifies the information that shall be provided as part of a location table, and the way in which it is to be presented. The location table exchange format aims to provide a complete and precise description of a TMC location table, that is readable from software programmes without any changes or adaptations.

A location table defined using the location table exchange format consists of a series of text files, each containing a set of records made up of pre-defined fields. The method for using the location table exchange format is defined in C.3.2.

4.2.4 Hierarchical structure

RDS-TMC location tables use a hierarchical structure of pre-defined locations. A system of pointers provides upward references to higher-level locations of which the specified location forms a part.

EXAMPLE Kent would have an upward area reference to South-East England. South-East England can be referenced up to the UK, then the British Isles, then Europe, etc. (see Figure 1).



Key

1 County of Kent
2 South East England
3 United Kingdom
4 British Isles
5 Europe

Figure 1 — Upward area referencing

Junction 25 on the M1 motorway in UK would have a linear reference to a motorway segment, e.g. Leicester - Sheffield. This segment could then be referenced up to the whole road (the M1 Motorway).

Hierarchical tables help to make location referencing simple and unambiguous. A major benefit of hierarchical tables is that they facilitate automated sorting and selection of information for users. However, both hierarchical and unstructured tables are currently used in various applications.

4.2.5 Location types

Location types and subtypes are required for language independence of the information given, and to tell the receiving system what data fields to expect.

At the highest level, locations fall into three categories:

a) area locations;

b) linear locations;

c) point locations.

Within each category, location types are distinguished (in principle) whenever a location is functionally distinct in the way it shall be handled by the message recipient. Therefore, a set of predefined location types and subtypes is set out in Annex A.

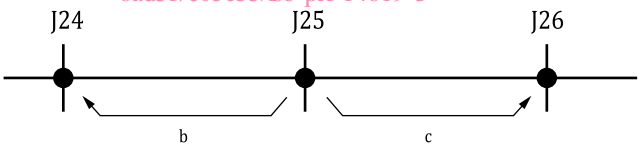
Subtypes can be used to give further details of (for example) facilities available at a particular location, such as a service area. The current list, in Annex A, will be added to as further needs are agreed.

Official translations of the language-independent terms that describe location types and subtypes should be agreed on a national level.

4.2.6 Offsets

Most point locations and certain linear locations point to previous and next locations of the same type. This is indicated by negative and positive offsets.

EXAMPLE Junction 25 on a motorway can be offset to junction 26 in the positive direction, and to Junction 24 in the negative direction. A sign convention adopted at the time of coding locations specifies the positive direction of travel along each road (see Figure 2).



Key

a positive direction

b negative offset

c positive offset

Figure 2 — Offsets

4.2.7 Direction of the road

The pre-defined direction of the road (see 4.2.6) is reflected in the positive and negative offsets in the location table and in the order of the names of the end points of a road or road segment (see Table 1).

When newly specifying positive directions along roads within pre-defined tables, it is recommended to use geographic positive directions relative to the co-ordinate system, i.e. on the Northern Hemisphere from south to north and from west to east.

For ring roads, the clockwise travel direction is recommended as positive.

It is not permitted in any case to reverse the direction along continuous and/or connecting segments of a road, e.g. at administrative borders.

4.2.8 Country codes and location table numbers

With ALERT-C, it is assumed that the RDS-TMC service and location tables are organized and defined on a country-by-country basis.

Each service will by default use a location table uniquely identified by a combination of a location table number (LTN), a location table country code (LTCC) and a location table extended country code (LTECC).

The LTN is a decimal value in the range 1…63. The LTCC is in the range 1…15 (hexadecimal 1…F) and the LTECC comprises two hexadecimal characters. The combination of LTCC, LTECC, LTN and the location code within the table defines an extended location code, which is unique worldwide.

A country may use several location tables, and a transmission, although having a 'default' location table, may include messages from adjacent areas with different location tables, using the INTER-ROAD feature, described in ISO 14819-1.

TISA has established an allocation of LTNs for each country, given in Annex B. As far as possible, the allocated combinations of LTCC and LTN define a location table uniquely, regardless of the LTECC. This ensures support for countries where, for historical reasons, the LTECC has not been transmitted.

4.2.9 Constraints

Constraints on location coding may in future be agreed, modelled and documented. At present, however, national authorities and/or service providers are free to allocate location codes within a location table as they wish, to locations specified in accordance with these rules.

4.3 TMC location categories, types and subtypes

Location categories, types and location subtypes are standardized and specified in Annex A. Exceptionally, new subtypes may be proposed to ISO/TC 204 and CEN/TC 278 for approval, registration and publication. Each location is described by a code, which is composed of:

— a character (A, L or P), indicating the location category (area, linear or point),

— a number indicating the type,

— a dot,

— a number indicating a subtype.

EXAMPLE 1 *P1.8 - roundabout* (P = point, P1 = junction)

For types for which a subtype is not defined, the subtype code 0 (zero) has to be used to define the type as a subtype.

EXAMPLE 2 A3.0 – country

4.4 Location table content

4.4.1 General

The location table content is fixed only for the purposes of definition and exchange. The information used within specific applications or by individual manufacturers is not fixed, and is not within the scope of these specifications.

For international consistency, one single location table content shall be adhered to for definition and exchange purposes. In this structure, some items are mandatory, some items are mandatory where they exist, and some items are optional.

4.4.2 Nominal record content

The nominal content of each record in the location table is as follows:

— location code, code of location (sub) type,

— road/junction number,

— road name,

— first name,

— second name,

— area reference,

— linear reference,

— negative offset,

— positive offset,

— urban,

— intersection reference,

— WGS 84 co-ordinates (longitude and latitude).

Not all of these items shall be present in every record. Table 1 indicates which references are required and/or allowed, according to location type.

Table 1 — Content of location table for ALERT-C

	Loc-ation code	Code of location (sub) type[4]	Road/ junction number	Road name	First name	Second name	Area reference	Linear reference	Negative offset	Positive offset	Urban	In-ter-sec-tion re-fer-ence	WGS 84 co-ordi-nates	Interrupts road
Area	(M)	continent	-	-	name (M)	-	-	-	-	-	-	-	-	-
	(M)	country group	-	-	name (M)	-	country group or continent (M)	-	-	-	-	-	-	-
	(M)	country	-	-	name (M)	-	country group or continent (M)	-	-	-	-	-	-	-
	(M)	other area (water area, fuzzy area, application region)	-	-	name (M)	-	lowest order ad-ministrative area or other area (m)	-	-	-	-	-	-	-
	(M)	*n*th order area (n = 1 to 5)	-	-	name (M)	-	*n*th order area (M)	-	-	-	-	-	-	-
Linear	(M)	road	(m)[2]	(m)[2]	negative end name (M)	positive end name (M)	*n*th order area or country (M)	-	-	-	-	-	-	-
	(M)	ring road	(m)[2]	(m)[2]	name (O)	-	*n*th order area or country (M)	-	-	-	-	-	-	-
	(M)	*n*th order segment (n = 1, 2)	(m)[2]	(m)[2]	negative end name (M)	positive end name (M)	*n*th order area or country or other area (O)	first order segment, road or ring road (M)	preceding *n*th order seg-ment (m)	subsequent *n*th order segment (m)	-	-	-	-
	(M)	urban street	(m)[2]	(M)	name (O)	name (O)	*n*th order area or other area (M)	-	-	-	-	-	-	-
	(M)	vehicular link	-	(m)	negative end name (M)	positive end name (M)	*n*th order area or other area (O)	-	-	-	-	-	-	-
	(M)	link road	-	-	origin road number and origin end name (M)[5]	destination road number and destination end name (M)[5]	lowest order ad-ministrative area or other area of the intersection to which the link road belongs (m)	-	-	-	-	-	-	-
	(M)	parallel road	(m)[11]	(m)[11]	negative end name (M)[12]	positive end name (M)[12]	lowest order ad-ministrative area or other area (M)	-	-	-	-	-	-	-

Table 1 *(continued)*

	Loc-ation code	Code of location (sub) type[4]	Road/ junction number	Road name	First name	Second name	Area reference	Linear reference	Negative offset	Positive offset	Urban	In-ter-sec-tion re-fer-ence	WGS 84 co-ordi-nates	Interrupts road
Point	(M)	junction	(m) [3]	(O) [3]	junction name (m) [3]	road number or name of intersecting road (O)[3]	lowest order ad-ministrative area or other area (M)	lowest order segment, road or ring road (M)	preceding point (m)	subsequent point (m)	(M)	(m)	(M)	(m)[9]
	(M)	intermediate point	-	-	point descriptor (M)	-	lowest order ad-ministrative area or other area (M)	lowest order segment, road or ring road (M)	preceding point (m)	subsequent point (m)	(M)	-	(M)	(m)[9]
	(M)	other landmark point[1, 10]	-	-	point name (M)	-	lowest order ad-ministrative area or other area (M)	lowest order segment, road or ring road (M)	preceding point (m)	subsequent point (m)	(M)	(O)	(M)	(m)[9]
	(M)	link road point junction number	(m)	(O)	junction name (m)	-	lowest order ad-ministrative area or other area (M)	link road (M)	-	-	(M)	(M)[6]	(M)[7]	(m)[9]
	(M)	parking POI	-	(O)	name of the parking POI[8]	-	lowest order ad-ministrative area or other area (M)	-	-	-	(M)	-	(M)[8]	(m)[9]
	(M)	other isolated POI[10]	-	(O)	name of the isolated POI	-	lowest order ad-ministrative area or other area (M)	-	-	-	(M)	-	(M)	-