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BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN ISO 14819-3:2013. It supersedes BS EN ISO 14819-3:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/278, Intelligent transport systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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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 (ISO 14819-3:2013)

Intelligente Transportsysteme - Verkehrs- und Reiseinformationen über Verkehrsmeldungskodierung - Teil 3: Ortsreferenzierung für den digitalen Radio für Verkehrsmeldungen (RDS-TMC) unter Nutzung von ALERT-C (ISO 14819-3:2013)

This European Standard was approved by CEN on 26 October 2013.

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Foreword

This document (EN ISO 14819-3:2013) has been prepared by Technical Committee ISO/TC 204 “Intelligent transport systems” in collaboration with Technical Committee CEN/TC 278 “Intelligent transport systems” 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of an identical text or by endorsement, at the latest by June 2014, and conflicting national standards shall be withdrawn at the latest by June 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 14819-3:2004.

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

Endorsement notice

The text of ISO 14819-3:2013 has been approved by CEN as EN ISO 14819-3:2013 without any modification.

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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. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

This second edition cancels and replaces the first edition (ISO 14819-3:2004), which has been technically revised.

ISO 14819 consists of the following parts, under the general title *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*

— *Part 2: Event and information codes for Radio Data System — Traffic Message Channel (RDS-TMC) using ALERT-C*

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

— *Part 6: Encryption and conditional access for the Radio Data System — Traffic Message Channel ALERT C coding*

Compared to previous releases, this version includes the following additions:

— Precise location referencing

— Tendencies of Traffic Queue Lengths (TTQL)

— Coding of parking POIs

— Coding of interrupted roads

— Coding of other isolated POIs (except parking POIs)

— Coding of parallel roads

— Version identification of TMC location tables

— Location Table Exchange Format

— North American Safety Events in TMC

— Explicit Location Table Country Code transmission in TMC

— Guidelines for Service Providers and Terminal Manufacturers for Implementation of explicit Location Table Country Code transmission

— Coding of link roads

— GB-English - List of Quantifiers

— Additional Event Codes identified by Germany

— Additional TMC Events from Danish proposal

— Additional TMC Supplementary Information: Unconfirmed Report

— RDS-TMC delivery of IVR Telephone Number

— Coding of link roads

Introduction

This part of ISO 14819 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 can 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.

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.

INTERNATIONAL STANDARD **ISO 14819-3:2013(E)**

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 part of ISO 14819 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 primarily addresses the needs of RDS-TMC ALERT-C messages which are already being implemented. However, the modular approach used here is intended to facilitate future extension of the location referencing rules to other traffic and travel messaging systems.

The location referencing rules defined in this part of ISO 14819 address the specific requirements of Traffic Message Channel (TMC) systems, which use abbreviated coding formats to provide TTI messages. In particular, the rules address the Radio Data System - Traffic Message Channel (RDS-TMC), a means of providing digitally-coded traffic and travel information to travellers using a silent data channel (RDS) on FM radio stations, based on the ALERT-C protocol.

2 Normative references

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

ISO/IEC 8859-15:1999, *Information technology — 8-bit single-byte coded graphic character sets — Part 15: Latin alphabet No. 9*

ISO/IEC 10646:2012, *Information technology — Universal Coded Character Set (UCS)*

ISO 14819-1:2013, *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 14825:2011, *Intelligent transport systems — Geographic Data Files (GDF) — GDF5.0*

IEC 62106:2009, *Specification of the radio data system (RDS) for VHF/FM sound broadcasting in the frequency range from 87,5 to 108,0 MHz*

NIMA Technical Report TR8350.2, US Department of Defense

3 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	**E**xtended **C**ountry **C**ode (an RDS feature)
EDIFACT	**E**lectronic **D**ata **I**nterchange **F**or **A**dministration **C**ommerce and **T**ransport
GDF	**G**eographic **D**ata **F**iles (ISO 14825 for modelling and exchange of geographic data for transport telematics applications.)
LC	Location Code
LTCC	Location Table Country Code
LTN	Location Table Number
NIMA	National Imagery and Mapping Agency (US)
POI	Point of Interest
RDS	**R**adio **D**ata **S**ystem (digital information channel on FM sub carrier)
TIC	**T**raffic **I**nformation **C**entre
TISA	Traveller Information Services Association
TMC	**T**raffic **M**essage **C**hannel
TTI	**T**raffic and **T**ravel **I**nformation
WGS 84	**W**orld **G**eodetic **S**ystem 19**84**

4 Location coding

4.1 General

Location references used by RDS-TMC are covered by the location referencing rules defined in this section. The ALERT-C coding protocol for RDS-TMC is defined in The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 8859-15:1999, *Information technology — 8-bit single-byte coded graphic character sets — Part 15: Latin alphabet No. 9*

ISO/IEC 10646:2012, *Information technology — Universal Coded Character Set (UCS)*

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.

NOTE In ALERT-C, a further 2048 numbers are reserved for INTER-ROAD (see The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 8859-15:1999, *Information technology — 8-bit single-byte coded graphic character sets — Part 15: Latin alphabet No. 9*

ISO/IEC 10646:2012, Information technology — Universal Coded Character Set (UCS)

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
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. This 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 must remain compatible with the previous versions of the same location table – the changes must 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 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 Annex 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 can 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 recognise 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 organisations 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.

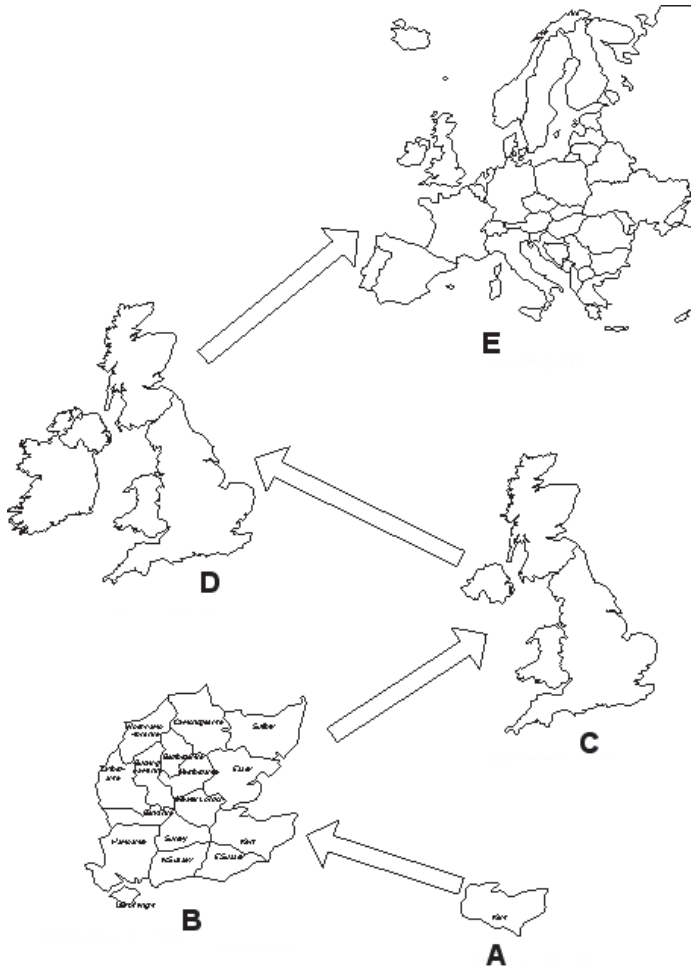
The Location Table Exchange Format specifies the information that must be provided as part of a location table, and the way in which it is to be presented. The Location Table Exchange Format aims to provide a complete and precise description of a TMC Location table, that is readable from software programs 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 predefined fields. The method for using the Location Table Exchange Format is defined in Annex 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 may be referenced up to the UK, then the British Isles, then Europe, etc. (Figure 1).



Key

A County of Kent
B South East England
C United Kingdom
D British Isles
E Europe

Figure 1 — Upward Area Referencing

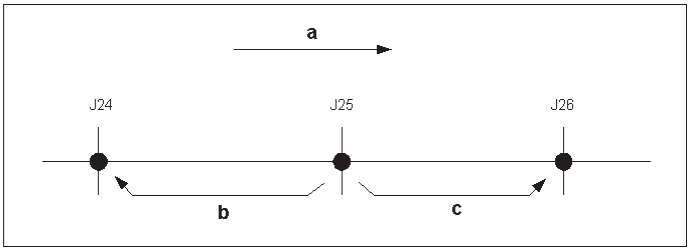
Junction 25 on the M1 motorway in UK would have a **linear reference** to a motorway segment, e.g. Leicester - Sheffield. This segment could then be referenced up to the whole road (the M1 Motorway).

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 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 may 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 (Figure 2).



Key

a positive direction

b negative offset

c positive offset

Figure 2 — Offsets

4.2.6 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.

4.2.7 Direction of the road

The predefined direction of the road (see 4.2.3) 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 positive.

In any case it is not allowed 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 RDS-TMC service and location tables are organised and defined on a country-by-country basis. Therefore each service and each location table is associated to a country code in the range 1-15 (hexadecimal 1-F) as described in IEC 62106. A service and the location table it uses shall

have the same country code. There can be more than 1 location table per country. They are distinguished by an additional location table number in the range 1-63. Country codes are not unique. The extended country code (ECC, see IEC 62106) is therefore available in addition. The combination of extended country code (8 bits), country code (4 bits), location table number (6 bits) and location code (16 bits) defines an extended location code, which is unique worldwide.

TISA has established an allocation of location table numbers for each country, given in Annex B. As far as possible, the allocated combinations of country code and location table number define a location table uniquely, regardless of extended country code. This ensures support for countries where, for historical reasons, the extended country code is not in use. As can be concluded from Annex B, a country like e.g. Austria can have at most 8 location tables.

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 standardised, and specified in Annex A. 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 not a subtype is 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) conforming to NIMA Technical Report TR8350.2.

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	inter-section refer-ence	WGS 84 co-ordinates	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 administrative 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 segment (m)	subsequent *n*th order segment (m)	-	-	-	-
	(M)	urban street	-	(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 administrative 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 administrative area or other area (M)	-	-	-	-	-	-	-

	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	inter-section refer-ence	WGS 84 co-ordinates	Interrupts Road
Point	(M)	junction	(m)[3]	(O)[3]	junction name (m)[3]	road number or name of intersecting road (O)[3]	lowest order administrative 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 administrative 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 administrative 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 pointjunction number	(m)	(O)	junction name (m)	-	lowest order administrative 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 administrative area or other area (M)	-	-	-	(M)	-	(M)[8]	(m)[9]
	(M)	other isolated POI[10]	-	(O)	name of the isolated POI	-	lowest order administrative area or other area (M)	-	-	-	(M)	-	(M)	-

Table 1 contains an overview of the content of a location table for RDS-TMC. Mandatory fields are shown by (M), while (m) means *mandatory where it exists*, and (O) means *optional*. Fields not present are shown by - (dash). The first column is for explanation only. The second column (*location code*) represents the key of the table, and therefore has the entry (M) for each record in the table. The sequence of the columns in the table is not significant. Non-empty fields in the columns *area reference*, *linear reference, negative offset*, *positive offset* contain the code of the location within the same location table to which the field references. For detailed descriptions of all location types and their codes see Annex A.

NOTE 1 *Other points* include motorway service areas, and prominent landmarks such as named, major bridges and tunnels.

NOTE 2 For roads, ring roads and nth order segments at least one of the two fields *road/junction number* and *road name* shall have a value.

NOTE 3 For junctions at least one of the four fields *road/junction number*, *road name*, *first name* and *second name* shall have a value.

NOTE 4 The column *code of location (sub)type* in this explanatory table contains descriptions of location types and subtypes. In a real location table this column contains location (sub)type codes.

NOTE 5 For link roads, the field *first name* shall be equal to the combination of the values of the field *road number*, and the field *first name* (negative end name) or the field *second name* (positive end name), of the lowest level of the road or segment to which the start (related to the driving direction) of the positively coded link road connects.

Of the first name and the second name, that one shall be selected that can be logically considered to be the negative end name of the link road. In case the first or second name of the relevant segment does not add useful information, then the respective value of a next higher level (segment or road) may be used. In case the first or second name of the highest level (road) does not provide meaningful information, it is recommended to use another entry as first name.

In case the link road originates from both directions of the road or segment, then the value of first name field shall only consist of the road number of the main road. Note that in this case the origin end name is not (M).

The field *second name* is constructed in the same way but referring to the destination road at the end of the link not the origin road at the start of the link.

NOTE 6 For link road points, the *intersection reference* is a cross reference to a location code referring to the same junction. If the junction is coded by three or more roads, cross-references are represented in the location table anti-clockwise in a circular way, such that each location code references only one other location code explicitly, and the other(s) implicitly.

NOTE 7 For link road points, the WGS84 co-ordinate value shall be the co-ordinate taken at the middle of the link road on the link road.

NOTE 8 For parking POI points P5, If a corresponding P3 type point is also coded as P5 type, for consistency the same name shall be used for the P3 and the P5 locations. If a corresponding P3 type location exists, the value shall be the same as for the P3 type location. Otherwise the coordinates of the approximate centre of the location shall be given.

NOTE 9 For points where the field 'InterruptsRoad' has a non-zero value (i.e. the road is interrupted adjacent to that point), the last point location before the interruption shall not have a positive offset (to the first point location after the interruption) and the first point location after the interruption shall not have a negative offset (to the last point location before the interruption). Segments as defined for the road shall always be refer to each other by positive and negative offsets, independent of the interruption of the road. (See section 4.4.10 for definition of Interrupted Roads)

NOTE 10 The same location shall not be coded both as a P3 location type and as a P6 location type.

NOTE 11 If there is no specific road number or road name for the parallel road, the road number or road name from the main road to which the parallel road runs parallel shall be filled in here.

NOTE 12 First name and second name indicate the direction of travel on the parallel road (the rule “west-east and south-north coding” shall not be applied here, see also section 4.2.7).

NOTE 13 The location code of category LINEAR to which the P1.16 and P1.17 refer are of type L8.0.

NOTE 14 P1.16 shall have a positive offset and no negative offset, P1.17 shall have a negative offset and no positive offset.

4.4.3 Road descriptions

4.4.3.1 Road numbers and road names

Road descriptions are normally road numbers. They shall be indicated at the highest level of the hierarchy (e.g. road/ring road) only. In addition to the road number (A1 – R0), a road name (e.g. *Autoroute du Nord*) or other road number (e.g. *E13* for *A1*) may be defined. If no road number exists, a road name is mandatory (e.g. *Boulevard Périphérique*).

Some segments of a road may carry additional numbers and/or names (e.g. *A6 - Autoroute du Soleil*, *A4 - Kölner Ring*). In the case that a road segment belongs to more than one road this shall lead to multiple entries in the location table. If the multiple numbers and/or names do not signify the fact that the segment is part of more than one road, they can be indicated at the segment level in the road-name field, where required. The higher-level road number still applies.

For vehicular links, the road name can be the name of a company, e.g. *Stena Sealink*; *Eurotunnel*; a geographic name, e.g. *Simplon Tunnel*, *Channel Tunnel*; or a marketing name, e.g. *Le Shuttle*.

4.4.3.2 Junction numbers

For junctions, the field road/junction number is used to describe junction numbers, where they exist.

4.4.4 Names

Names of locations shall normally be given in the language of the locality. However, it is also permissible to produce versions of location tables with (bi- or multi-lingual) place names translated into other languages.

The junction name may be a description as known by road users.

Negative and positive end-names may be precise (e.g. *Dover-Calais*), or approximate (e.g. *Köln - Frankfurt*). Approximate names refer to nearby places that the road (usually a motorway) does not pass directly through.

Point descriptor for intermediate points is mandatory. Where required, they can be given in terms of kilometre/milepost references.

4.4.5 Upward references

Two paths shall normally be provided for upward referencing in ALERT-C (see The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 8859-15:1999, *Information technology — 8-bit single-byte coded graphic character sets — Part 15: Latin alphabet No. 9*

ISO/IEC 10646:2012, *Information technology — Universal Coded Character Set (UCS)*

ISO 14819-1). The first is for area references, the second is for linear references. Additional upward referencing paths can be used, but this is not required as part of the minimum standard for exchange purposes.

Upward references shall normally point to the next defined higher level. For example, a second order area shall reference a first order area; a first order area shall reference a country; etc.

4.4.6 Offsets

Offsets may be defined for nth order segment locations, and for all types of point locations.

4.4.7 Urban

The values in this column indicate whether the traffic on the point location has a mainly urban character (1) or inter-urban character (0).

4.4.8 Intersection reference

The intersection reference is a cross reference to a location code, representing the same real world point location, but related to another road, if the locations are in the same table, or to the same road in another table. If the location belongs to three or more roads, cross-references are represented in the location table anti-clockwise in a circular way (see Table 2), such that each location code references only one other location code explicitly, and the other(s) implicitly. The intersection reference has to include country code and table number if it refers to another table.

The intersection reference may also be used as a cross reference of a link road point location to the location code of the intersection to which it belongs, i.e. the intersection code on the road from which the link road, taken in the positive direction, originates.

Table 2 — Intersection reference – coding example

Location code	Code of location (sub)type	...		linear reference	.....	intersection reference
1	L1.1					
2	L1.1					
3	L1.1					
4	P1.1			1		5
5	P1.1			2		6
6	P1.1			3		4

4.4.9 WGS 84 co-ordinates

For each point location the WGS 84 longitude and latitude of the (approximate) centre of the location shall be given (M), in decimal degrees with 5 micro degrees resolution, with a plus sign (+) for eastern longitude and northern latitude, and a minus sign (-) for western longitude and southern latitude. Degrees longitude are given in three digits (with leading zeros if needed), degrees latitude in two digits (with leading zeros if needed) without any separator between the entire part and the decimal part.

EXAMPLE +00435455 +5083940 represents 4°.35455 E 50°.83940 N

4.4.10 InterruptsRoad

An interrupted road is a road of which an intermediate part is not present. The following situation examples can be distinguished:

- two parts of a road (having the same name) are connected by a road having a different name;

- two parts of a road (having the same name) are connected by a (water or train) ferry;

- two parts of a road (having the same name) are disconnected, because the intermediate part has not (yet) been built.

The value of the field "InterruptsRoad" is numeric and shall be defined for each point location except for point type P6 'other isolated POI'. The following numeric values are defined for this field:

- If the point location is not the first or the last point location, respectively before or after the interruption, then the field "InterruptsRoad" shall have value 0.

- If the point location is the last point location before the interruption, as defined by the pre-defined direction of the road, the field "InterruptsRoad" shall contain the location code of the next point location (after the interruption). This provides a functionality which is similar to a normal offset and in addition indicates the situation of interruption of the road.

- If the point location is the first point location after the interruption, as defined by the pre-defined direction of the road, the field "InterruptsRoad" shall contain the location code of the previous point location (before the interruption). This provides a functionality which is similar to a normal offset and in addition indicates the situation of interruption of the road.

4.5 Detailed junction referencing

4.5.1 Conventional junctions

Lanes and slip roads are not individually numbered locations in ALERT-C. They are addressed within the structure of ALERT-C messages (e.g. first exit; second exit; or 'for traffic preceding towards <destination>'.)

4.5.2 Complex junctions

In more complex situations where coding of parallel access roads, link roads and slip roads is required, they shall all be referenced as point locations of the main highway, and shall be coded as separate records in the location table without positive or negative offset references to other point locations. Alternatively, link roads can optionally be coded in detail as described in section 4.5.3. Parallel access roads shall not be coded as normal chains or as isolated locations, but shall be coded in detail as described in Annex C.

4.5.3 Detailed coding of link roads

An optional method has been defined that allows the detailed coding of one-directional link roads connecting two different motorways. The method can be applied to any one-way traffic link road, however not to bi-directional link roads or to other parallel roads. The method can be applied to code link roads at any or all of the motorway intersections in a location table.

4.5.3.1 Approach

A link road coded using this optional method shall be considered to be a normal road and coded accordingly. Each link road that is thus referenced shall be coded as a separate linear location having one point location, represented by at least two records in the location table:

- link road as linear location of type link road

- link road as point location of type link road point

The linear location shall have no linear reference. The point location shall have a linear reference to the corresponding linear location.

4.6 Detailed situation locations

In addition to normal location referencing, detailed and precise location referencing methods are defined for use in ALERT-C. Detailed location referencing is an optional method that may be used where necessary.

4.6.1 Normal location referencing

In most TMC location tables, locations are pre-defined only at junctions and at other prominent landmarks such as service areas; prominent, named tunnels and bridges; etc.

Where necessary, the detailed location of an event (such as an accident or the start or end of roadworks) may be defined in the message by its distance from the pre-defined primary location, using the 'precise location referencing' method described in section 4.6.3.

4.6.2 Detailed location referencing

It is permissible to define intermediate points between junctions, at locations specified only in terms of a kilometre/milepost reference.

Such intermediate points can be used to give more detailed information about the location of an accident, or the start and end of roadworks, etc.

Intermediate locations can also be used to define traffic monitoring points, e.g. for use in systems where it is proposed to indicate monitored traffic speeds directly.

4.6.3 Precise location referencing

Precise location referencing is an optional method that may be used where it is desirable to indicate a precise location using a combination of a pre-defined location reference and a distance offset along the road. A method has been defined for describing the offset without ambiguity. The method is described in detail in Annex C.

4.7 One and two way locations

4.7.1 Basic principles

All TMC locations on two-way roads refer to both directions of travel. It is not permissible to code each direction of travel separately, unless the carriageways are physically separated to the extent that drivers perceive them as two separate roads.

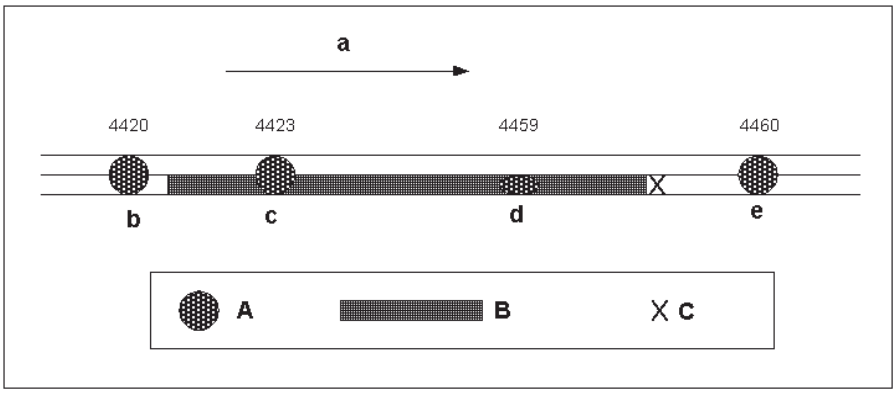
4.7.2 Junctions

Junctions are only coded once, not once in each direction. Also, the entry and exit points of slip roads and/or connecting roads in a junction shall only be separately coded if done as part of providing detailed coding of link roads according to section 4.5.3. However, where entry and/or exit points are very widely separated, it is permissible to code them as separate junctions, if desired. The criterion for deciding whether to do this shall be: do drivers perceive them as separate junctions? (i.e. are they differently named and/or numbered?).

4.7.3 Locations having only an exit or entry and locations occurring on one side only

4.7.3.1 General

Some locations only have an exit or an entry, on one or on both sides. Other locations appear only on one side of the motorway. Examples of the latter are locations like service stations, tunnels, bridges. For such locations the usage of extra attributes is strongly recommended. An example is presented in Figure 3 and Table 3.



Key

a positive direction
b bridge
c junction J1
d parking
e junction J2
A location
B traffic queue
X accident

Figure 3 — Service area on one carriageway only

4.7.3.2 Using extra attributes for each location code.

The specific possibilities of a point location are described by six extra attributes:

a) **In +**
Possibility to enter the road in positive direction
(0 = disabled / 1 = enabled)

b) **Out +**
Possibility to leave the road in positive direction
(0 = disabled / 1 = enabled)

c) **In -**
Possibility to enter the road in negative direction
(0 = disabled / 1 = enabled)

d) **Out -**
Possibility to leave the road in negative direction
(0 = disabled / 1 = enabled)

e) **Present +**
To indicate presence of location in positive direction
(0 = not present / 1 = present)

f) **Present -**
To indicate presence of location in negative direction
(0 = not present / 1 = present)

Table 3 — The use of extra attributes - example

loc. Code	code of loc. (sub) type	road/ junction number	first name	...	neg. offset -	pos. offset +	..	in +	out +	in -	out -	pre-sent +	pre-sent -
4420	P3.2		Bridge	...	4456	4423	..	0	0	0	0	1	1
4423	P1.3	J1	Junction J1	...	4420	4459	..	1	1	1	1	1	1
4459	P3.3		Parking	...	4423	4460	..	1	1	0	0	1	0
4460	P1.3	J2	Junction J2	...	4459	4461	..	1	1	1	1	1	1

Each point location, independent from its attributes, now is referenced in both directions, using offset (+) and offset (-). The attributes *in* +, *out* +, *in* -, *out* -, *present* + and *present* - limit the possibilities of the operator to choose specific offsets on transmitter side.

The major advantage of this method is the opportunity to easily change the referencing at changes of the real situation without the necessity to update the location tables of all receivers.

EXAMPLE If the parking in the example becomes available to traffic on both sides, simply enabling '*in* - and *out* -' and setting *present* - to *1* for location nr. 4459 is sufficient for adapting to the new situation.

The extra attributes may be ignored on the receiver side. The use of 'illegal' combinations of locations and offsets is not allowed to the operator of the transmitter system, so messages that are broadcasted always are valid.

Annex A
(normative)

TMC Location categories, types and subtypes

A.1 General

Location categories, location types and location subtypes are standardised, and specified in this annex. Each location is described by a code which is composed of:

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

— a number indicating the type,

— a dot,

— a number indicating a subtype.

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

If no subtype exists in a type, or if no subtype is available for a specific purpose, the number indicating a subtype should be set to 0 (zero).

EXAMPLE A3.0 - country

A.2 Area locations

Table A.1 — Area locations

Code	*Type/Subtype*	*Definition*
A1.0	Continent	One of the seven conventionally recognised, major geographic unbroken land masses of the world. Examples Europe, Asia, Africa, North America, South America, Australasia, or Antarctica.
A2.0	Country group	Recognised, named set of adjacent countries. Example 1 Benelux, British Isles, European Union. NOTE Not all countries belong to country groups. A country group may belong to another country group. Generally a country group belongs to one continent. Example 2 The Benelux belongs to the European Union.
A3.0	Country	Administrative area which is a sovereign state, indivisible from a political point of view, recognised by a large majority of other countries. Example UK, Ireland, France, Germany, Luxembourg, Switzerland, Serbia, Croatia.
A5.0	Water area	Named extent of water about which traffic and travel messages (e.g. weather information) may be given.

Code	*Type/Subtype*	*Definition*
Subtypes:		
A5.1	Sea	Named extent of water which is contiguous with the world's oceans. Example North Sea
A5.2	Lake	Named extent of water which is physically separated from the world's oceans. Example Lake Geneva
A6.0	Fuzzy area	Named extent of land (which is not a subdivision in the hierarchy below) about which messages may be given. The boundaries and shape of such areas need not be precisely defined, i.e. with a margin which is less than 10% of its size.
Subtypes:		
A6.1	Tourist area	Area with tourist character. Example Lake District; Ardennes
A6.2	Metropolitan area	Area with a metropolitan character. Example Greater Nottingham
A6.3	Industrial area	Area containing a significant concentration of industrial sites.
A6.4	Traffic area	Complex area involving one or more junctions or intersections between several roads or/and streets.
A6.5	Meteorological area	Area about which weather information may be given. NOTE Not all locations on land need to belong to fuzzy areas of the above mentioned types. These areas can partially overlap or can contain one another.
A6.6	Carpool area	Dedicated area where motorists can park and meet for ride-sharing.
A6.7	Park and ride site	Dedicated area where motorists can park and take public transport
A6.8	Car park area	Dedicated area where motorists can park.
A7.0	Order 1 area	Administrative area which belongs to the first level administrative subdivision of a Country, but which may not be the smallest unit in that country. Example *England* within the *UK*
A8.0	Order 2 area	Administrative area which belongs to the second level administrative subdivision of a Country, but which may not be the smallest unit in that country. Example East Midlands
A9.0	Order 3 area	Administrative area which belongs to the third level administrative subdivision of a Country, but which may not be the smallest unit in that country. Example Nottinghamshire

Code	*Type/Subtype*	*Definition*
Subtypes:		
A9.1	Rural order 3 area	3rd order administrative area of rural character.
A9.2	Urban order 3 area	3rd order administrative area of urban character.
A10.0	Order 4 area	Administrative area which belongs to the fourth level administrative subdivision of a Country, but which may not be the smallest unit in that country. Example Nottingham
A11.0	Order 5 area	Administrative area which belongs to the fifth level administrative subdivision of a country. If defined, the order 5 area is the lowest level subdivision. Subdivisions may not overlap or contain one another, except that any lower order (e.g. 2nd order) subdivision always refers to a higher order (e.g. 1st order) subdivision. The actual definition of 1st, 2nd, 3rd, etc., order areas is normally based on existing political entities within each country, and therefore differs from country to country. Authorities in each country are responsible for defining these areas. Not all countries will utilise all levels; e.g. a small country may only require the first three. Different numbers of levels may be present in different parts of a country; e.g. in towns and cities there may be more levels than in rural areas. It is also permissible to omit one or more intermediate levels in some parts of a country. For example, large provinces may be administratively subdivided at an intermediate level above towns and cities, and small provinces not.
A12.0	Application Region	Area which is the subdivision of an Administrative Area of any level or of an Application Area of higher level. Example The subdivision of *Scotland* into *North*, *Central* and the *Borders* (South).

A.3 Linear locations

Table A.2 — Linear locations

Code	*Type/Subtype*	*Definition*
L1.0	Road	One or more contiguous segments of roadway within a single national or regional/departmental road numbering area, bearing a particular national or regional/departmental road number, whose end points are in different places. NOTE 1 Where two or more separate segments of roadway in a given road numbering area share the same number, e.g. because an intermediate stretch has yet to be built, the separated stretches of roadway shall be treated as the same road. NOTE 2 A roadway includes both (or all) carriageways of a divided highway, even if built on physically separate alignments, and all connecting carriageways in complex junctions, which are perceived by drivers to share the same road number.

Code	*Type/Subtype*	*Definition*
		NOTE 3 European road numbers shall not be used to define roads except in countries which use these numbers in place of national numbers, e.g. for motorways.
		NOTE 4 Roads which coincidentally share the same regional/departmental number but are located in different regional or departmental numbering areas of a country shall not be treated as a single 'road'.
		Example 1 The M1 in Northern Ireland is separate from the M1 in Great Britain; the D1 in any department of France is separate from the D1 in another department; etc. However, the N1 in France is a single road, irrespective of which department it crosses, because it is numbered at national level.
		NOTE 5 Where a section of road carries more than one national and/or regional/departmental road number, it shall be considered part of the lowest numbered road of the highest category whose number it shares.
		Example 2 If a road is numbered as a motorway and as an all-purpose road, it shall be treated as part of the motorway. Or, if a stretch of road has more than one number of the highest standard which applies to that section of road (e.g. N1 and N15), it shall be treated as part of the lowest-numbered road (in this case, N1).
Subtypes:		
L1.1	Motorway	Road signed with the *white overpass across a divided highway* logo on a blue or green background.
L1.2	1st Class Road	Example National road.
L1.3	2nd Class Road	Example Regional road.
L1.4	3rd Class Road	Example Other road.
		The actual definition of 1st, 2nd, and 3rd Class roads is normally based on existing classification within each country, and therefore differs from country to country. Authorities in each country are responsible for defining these levels.
L2.0	Ring road	Road without end points, forming a continuous ring, with a single road number and/or name throughout.
		NOTE Motorway (or other) rings which do not have a single number all the way round (e.g. Kölner Ring) shall not be treated as ring roads. Typically, each side of these rings has a different number, which is part of a longer, national highway passing the city tangentially.
Subtypes:		
L2.1	Ring motorway	Ring road which is a motorway.
L2.2	Other ring road	Ring road which is not designated a motorway.
L3.0	Order 1 segment	Higher level subdivision of a road/ring road/vehicular link, which is defined in terms of the locations that it joins.
L4.0	Order 2 segment	Lower level subdivision of a road/ring road/vehicular link. An Order 2 segment wholly belongs to an Order 1 segment, which is defined in terms of the locations that it joins.
		Not all roads/ring roads (and very few vehicular links) need be divided into segments; therefore, inclusion of segments is optional. Where only one level of

Code	*Type/Subtype*	*Definition*
		subdivision of a road/vehicular link is required, it shall be considered as Order 1. No more than two levels of segments shall be utilised.
L5.0	Urban street	One or more contiguous sections of roadway in a particular town or city which are commonly known by a specific street name, rather than by a road number Example Oxford Street
L6.0	Vehicular link	Network segment, not part of a road, for transport by boat or rail. NOTE Normally, one ferry/rail link describes a two-way service. Example Dover-Calais and return
Subtypes:		
L6.1	Ferry	Specific operator's service which uses roll-on, roll-off vessels to carry road vehicles between two points. Example Ferries across a river, an estuary or the sea.
L6.2	Vehicular rail link	Specific operator's service which uses rail to carry road vehicles between two points. Example Alpine rail tunnels, the *Channel Tunnel*.
L7.0	Link road	A one-directional road connecting two different motorways, occurring at an intersection of two or more motorways. Example The roads linking the United Kingdom's M5 and M4 motorways where they intersect.
L8.0	Parallel road	A road that starts and ends on the same limited access road (highway/motorway) and runs parallel along that road, and having one-way travel direction. Examples Elbtunnel (A7) in Hamburg, the E19 between Antwerp and Brussels near Kontich and the M25 in the UK

A.4 Point locations

Note: When viewed in close-up, typical points such as motorway junctions may spread over many hundreds of meters, and are not single points in a strict geometric sense.

Table A.3 — Point locations

Code	*Type/Subtype*	*Definition*
P1.0	Junction	Point on a road or ring road where other road(s) and/or ring road(s) connect.
Subtypes:		
P1.1	Motorway intersection	Grade-separated junction where two or more limited-access motorway-designated highways cross, and where some (or all) turning movements are permitted.

Code	*Type/Subtype*	*Definition*
P1.2	Motorway triangle	Grade-separated junction where one limited-access motorway-designated highway joins a through limited-access motorway-designated highway, where some (or all) turning movements are permitted.
P1.3	Motorway junction	Grade-separated junction where traffic can enter and/or leave a limited-access motorway-designated highway from the all-purpose road system.
P1.4	Motorway exit	Grade-separated junction where traffic can only leave a limited-access motorway-designated highway to the all-purpose road system.
P1.5	Motorway entrance	Grade-separated junction where traffic can only join a limited-access motorway-designated highway from the all-purpose road system. NOTE In the definitions of the junction subtypes 1 to 5 motorway may also be interpreted as grade separated dual carriageway (the layout of which is very much like that of a motorway, but which has not the legal status of a motorway).
P1.6	Overpass	Grade-separated junction where through lanes on one road pass over a junction with other road(s).
P1.7	Underpass	Grade-separated junction where through lanes on one road pass under a junction with other road(s).
P1.8	Roundabout	At-grade rotary junction, where traffic passes around a central traffic island.
P1.9	Gyratory	At-grade rotary junction, where traffic passes around a very large central island, which is typically occupied by buildings, monuments, etc. Access to the gyratory may be signal-controlled, priority-controlled, or uncontrolled. Examples Hyde Park Corner, Place de l'Etoile.
P1.10	Traffic lights	At-grade junction between two or more roads, where traffic is signal-controlled.
P1.11	Cross-roads	At-grade junction where two or more roads cross, where traffic is priority-controlled or uncontrolled.
P1.12	T-junction	At-grade junction where one road joins a through road, where traffic is priority-controlled or uncontrolled.
P1.13	Intermediate node	Point on a route where a major road attribute changes (road number, road name or administrative status).
P1.14	Connection	Single carriageway of limited length, connecting two roads.
P1.15	Exit	Generic exit for any purpose
P1.16	Start of Parallel Road	Location where a parallel road starts off from the main road
P1.17	End of Parallel Road	Location where a parallel road joins the main road again.
P2.0	Intermediate point	Point between two junctions which is referenced in traffic and travel messaging.

Subtypes:

Code	*Type/Subtype*	*Definition*
P2.1	Distance marker	Any pre-defined intermediate point between junctions whose sole purpose is to give higher resolution to location references. Such points are usually described in terms of a distance marker (kilometre/milepost) reference, and apply to both directions of travel.
P2.2	Traffic monitoring station	Place where traffic data are measured, in one or both directions.
P3.0	Other landmark point	Point of interest in traffic and travel messages.
Subtypes:		
P3.1	Tunnel	Prominent, named location where the road is covered over for a significant distance.
P3.2	Bridge	Prominent, named location where the road is carried on an elevated structure.
P3.3	Service area	Dedicated location where motorists can stop to use a range of facilities. Examples Parking, fuel, food, toilets, shopping, accommodation.
P3.4	Rest area	Dedicated location where motorists can stop, with only limited facilities. Example Parking and toilets.
P3.5	View point	Dedicated location where motorists can stop to look at the scenery.
P3.6	Carpool point	Dedicated location where motorists can park and meet for ride-sharing.
P3.7	Park and ride site	Dedicated location where motorists can park and take public transport.
P3.8	car park	Dedicated location where motorists can park.
P3.9	Kiosk	Dedicated location where motorists can access a limited range of shopping services.
P3.10	Kiosk with WC	Dedicated location where motorists can access a limited range of facilities. Example Shopping, toilets.
P3.11	Petrol station	Dedicated location where motorists may purchase fuel.
P3.12	Petrol station with kiosk	Dedicated location offering a limited range of facilities. Example Fuel, shopping.
P3.13	Motel	Dedicated location offering accommodation to motorists.
P3.14	Border/frontier	Location where the boundary of an administrative area crosses a network segment.
P3.15	Customs post	Dedicated location where custom officials operate. NOTE Customs posts are often located close to national borders.

Code	*Type/Subtype*	*Definition*
P3.16	Toll plaza	Dedicated area where motorists pay for the use of toll roads.
P3.17	Ferry terminal	Dedicated location where vehicles gain access for loading onto/unloading from ferry services.
P3.18	Harbour	Dedicated location where a range of waterborne facilities may operate. Examples Ferry terminal services, recreational uses
P3.19	Square	Open area often located close to the centre of towns and cities which may be used for a variety of uses. Examples Recreational, as the site of markets or fairs, as a public meeting place.
P3.20	Fair	Location which is the site of a periodic (e.g. annual), often traditional, gathering for entertainment or trade promotion.
P3.21	Garage	Dedicated location where motorists can gain a limited range of facilities. Examples Fuel, car maintenance and breakdown repair.
P3.22	Underground garage	Dedicated location situated beneath ground level where motorists can obtain a limited range of facilities. Examples Fuel, car maintenance and breakdown repair.
P3.23	Retail park	Dedicated location where motorists can access a wide range of shopping facilities.
P3.24	Theme park	Dedicated location for entertainment purposes. Example Euro Disney
P3.25	Tourist attraction	Dedicated location where motorists can stop to look at a natural, commercial, social or historical tourist attraction.
P3.26	University	Dedicated location of an educational establishment instructing students in advanced learning.
P3.27	Airport	Airfield with facilities for passengers and goods.
P3.28	Station	Dedicated location which is a regular stopping place for public transport services. Examples Train, bus, etc.
P3.29	Hospital	Dedicated location which is an institution providing medical or surgical treatment.
P3.30	Church	Dedicated location for public worship.
P3.31	Stadium	Dedicated location for public entertainment. Examples Sports meetings, athletic events, public concerts.
P3.32	Palace	Dedicated location which is an official state or church residence or public state building.

Code	*Type/Subtype*	*Definition*
P3.33	Castle	Dedicated location which is a fortified building, often with towers and battlements.
P3.34	Town hall	Dedicated location which is a public building often containing the seat of local government.
P3.35	Exhibition/convention centre	Dedicated location for the promotion of trade, congresses, exhibitions or conventions.
P3.36	Community	Locations of inhabited settlements that does not rest on the normal traffic network.
P3.37	Place name	Location on a road, named in accordance with the road signs (community, city).
P3.38	Dam	Road located on solid ground (bank), separating two water areas.
P3.39	Dike	Road located on solid ground (bank), separating a water area and land area.
P3.40	Aqueduct	Waterway or water feature over a road.
P3.41	Lock	River lock
P3.42	Mountain crossing/pass	Road crossing a mountain. NOTE This subtype is intended to be used in those mountain passes which usually present weather problems (mainly snow or ice) in winter.
P3.43	Railroad crossing	Railway level crossing
P3.44	Ford	Road bank across a river or to an island which is permanently or regularly flooded.
P3.45	Ferry	Short ferry connection to cross a river canal (instead of or to be replaced by bridge).
P3.46	Industrial area	Commonly known area that is mainly used for industry.
P3.47	Viaduct	Bridge that leads a highly situated road over a lower situated road, valley or estuary.
P4.0	Link road point	Point referring to a link road
P5.0	Parking POI	Stand-alone point of interest representing a parking facility.
Subtypes:		
P5.1	underground parking garage	Dedicated location situated beneath ground level where motorists can park (one- or multi-storey underground construction).
P5.2	car park	Dedicated location situated at ground level in the open air where motorists can park.
P5.3	parking garage	Dedicated location where motorists can park (one- or multi-storey building, possibly partly underground).

Code	*Type/Subtype*	*Definition*
P5.4	carpool point	Dedicated location where motorists can park and meet for ride-sharing.
P5.5	park and ride site	Dedicated location where motorists can park and take public transport.
P5.6	rest area parking	Dedicated location where motorists can park, at a rest area along a road.
P5.7	campground	Dedicated location where motorists can park and stay overnight in caravans or tents.
P6.0	other isolated POI	Isolated point of interest.
Subtypes:		
P6.1	airport	Airfield with facilities for passengers and goods
P6.2	station	Dedicated location which is a regular stopping place for public transport services
P6.3	harbour	Dedicated location where a range of waterborne facilities may operate
P6.4	tunnel	Prominent, named location where the road is covered over for a significant distance (both directions)
P6.5	bridge	Prominent, named location where the road is carried on an elevated structure (both directions)
P6.6	ferry	Short ferry connection to cross a river canal (instead of or to be replaced by bridge)
P6.7	square	Open area often located close to the centre of towns and cities which may be used for a variety of uses
P6.8	fair	Location which is the site of a periodic (e.g. annual), often traditional, gathering for entertainment or trade promotion
P6.9	retail park	Dedicated location where motorists can access a wide range of shopping facilities
P6.10	theme park	Dedicated location for entertainment purposes
P6.11	tourist attraction	Dedicated location where motorists can stop to look at a natural, commercial, social or historical tourist attraction
P6.12	stadium	Dedicated location for public entertainment
P6.13	Exhibition / convention centre	Dedicated location for the promotion of trade, congresses, exhibitions or conventions
P6.14	place name	Location on a road that is not in the location table, which is therefore seen as isolated; named in accordance with the road signs (community, city) only in the meaning of location subtype P3.37

Annex B
(normative)

Location table numbers

The Country Code shall always be checked in IEC 62106. For assigning new Table numbers refer to the ranges allocated in this Annex and check with TISA which numbers are available.

Country	Country Code	ECC	Tables	Country	Country Code	ECC	Tables
Afghanistan	A	F0	35 - 38	Canada	C	A1	01 - 52
Albania	9	E0	01 - 02	Canaries	E	E2	41 - 42
Algeria	2	E0	01 - 04	Cape Verde	6	D1	49 - 52
Andorra	3	E0	01 - 02	Cayman Islands	7	A2	11 - 14
Angola	6	D0	09 - 12	Central African Republic	2	D0	33 - 36
Anguilla	1	A2	38 - 39	Chad	9	D2	47 - 50
Antigua And Barbuda	2	A2	49 - 50	Chile	C	A3	50 - 53
Argentina	A	A2	47 - 50	China	C	F0	01 - 60
Armenia	A	E4	13 - 16	Colombia	2	A3	05 - 09
Aruba	3	A4	58 - 59	Comoros	C	D1	41 - 42
Australia - Capital Territory	1	F0	53	Congo	C	D0	45 - 47
Australia - New South Wales	2	F0	54	Congo, Democratic Republic	B	D2	57 - 60
Australia - Northern Territory	8	F0	60	Costa Rica	8	A2	25 - 28
Australia - Queensland	4	F0	56	Côte D'ivoire	C	D2	01 - 04
Australia - South Australia	5	F0	57	Croatia	C	E3	33 - 34
Australia - Tasmania	7	F0	59	Cuba	9	A2	21 - 22
Australia - Victoria	3	F0	01	Cyprus	2	E1	17 - 18
Australia - Western Australia	6	F0	58	Czech Republic	2	E2	25 - 28
Austria	A	E0	01 - 08	Denmark	9	E1	09 - 16
Azerbaijan	B	E3	49 - 52	Djibouti	3	D0	52 - 55
Azores	8	E4	37 - 40	Dominica	A	A3	39 - 40
Bahamas	F	A2	59 - 60	Dominican Republic	B	A3	40 - 43
Bahrain	E	F0	57 - 58	Ecuador	3	A2	17 - 20
Bangladesh	3	F1	45 - 48	Egypt	F	E0	09 - 12
Barbados	5	A2	27 - 28	El Salvador	C	A4	35 - 36
Belarus	F	E3	01 - 04	Equatorial Guinea	7	D0	09 - 10
Belgium	6	E0	01 - 08	Eritrea	F	D2	39 - 40
Belize	6	A2	47 - 48	Estonia	2	E4	59 - 60
Benin	E	D0	09 - 12	Ethiopia	E	D1	51 - 54
Bermuda	C	A2	48 - 49	Falkland Islands (Malvinas)	4	A2	45 - 46
Bhutan	2	F1	14 - 15	Faroe	9	E1	23 - 24
Bolivia	1	A3	09 - 12	Fiji	5	F1	23 - 26
Bosnia And Herzegovina	F	E4	43 - 44	Finland	6	E1	17 - 24
Botswana	B	D1	35 - 38	France	F	E1	17 - 32
Brazil	B	A2	13 - 16	French Guiana	5	A3	21 - 22
Brunei Darussalam	B	F1	21 - 24	Gabon	8	D0	49 - 52
Bulgaria	8	E1	01 - 04	Gambia	8	D1	58 - 59
Burkina Faso	B	D0	53 - 56	Georgia	C	E4	29 - 30
Burundi	9	D1	05 - 06	Germany	1	E0	01 - 08
Cambodia	3	F2	13 - 16	Germany	D	E0	01 - 08
Cameroon	1	D0	40 - 43	Ghana	3	D1	09 - 12

Country	Country Code	ECC	Tables
Gibraltar	A	E1	33 - 34
Greece	1	E1	17 - 24
Greenland	F	A1	37 - 38
Grenada	D	A3	49 - 50
Guadeloupe	E	A2	55 - 56
Guatemala	1	A4	13 - 16
Guinea	9	D0	03 - 04
Guinea-Bissau	A	D2	25 - 28
Guyana	F	A3	13 - 14
Haiti	D	A4	46 - 48
Honduras	2	A4	10 - 13
Hong Kong	F	F1	07 - 08
Hungary	B	E0	01 - 04
Iceland	A	E2	21 - 24
India	5	F2	01 - 60
Indonesia	C	F2	21 - 28
Iran, Islamic Republic Of	8	F1	09 - 12
Iraq	B	E1	17 - 20
Ireland	2	E3	41 - 48
Israel	4	E0	33 - 36
Italy	5	E0	01 - 16
Jamaica	3	A3	41 - 44
Japan	9	F2	17 - 20
Jordan	5	E1	33 - 36
Kazakhstan	D	E3	53 - 59
Kenya	6	D2	29 - 32
Kiribati	1	F1	55 - 56
Korea, Democr. People's Rep.	D	F0	41 - 45
Korea, Republic Of	E	F1	25 - 28
Kosovo	7	E4	49 - 52
Kuwait	1	F2	29 - 30
Kyrgyzstan	3	E4	23 - 26
Lao, People's Democratic Rep.	1	F3	25 - 28
Latvia	9	E3	51 - 52
Lebanon	A	E3	53 - 56
Lesotho	6	D3	15 - 16
Liberia	2	D1	37 - 40
Libyan Arab Jamahiriya	D	E1	33 - 36
Liechtenstein	9	E2	59 - 60
Lithuania	C	E2	43 - 44
Luxembourg	7	E1	01 - 04
Macao	6	F2	45 - 46
Macedonia	4	E3	01 - 02
Madagascar	4	D0	04 - 07
Madeira	8	E4	56 - 57
Malawi	F	D0	57 - 58
Malaysia	F	F0	05 - 06
Maldives	B	F2	25 - 28
Mali	5	D0	47 - 50
Malta	C	E0	59 - 60
Martinique	4	A3	37 - 40
Mauritania	4	D1	41 - 44
Mauritius	A	D3	45 - 46
Mexico	F	A5	35 - 36
Micronesia	E	F3	31 - 32
Moldova, Republic Of	1	E4	51 - 52
Monaco	B	E2	33 - 34
Mongolia	F	F3	41 - 42
Montenegro	1	E3	59 - 60
Montserrat	5	A4	29 - 30
Morocco	1	E2	33 - 36
Mozambique	3	D2	27 - 32
Myanmar	B	F0	05 - 08
Namibia	1	D1	44 - 47
Nauru	7	F1	41 - 42
Nepal	E	F2	43 - 46
Netherlands	8	E3	17 - 24
Netherlands Antilles	D	A2	22 - 23
New Zealand	9	F1	39 - 46
Nicaragua	7	A3	05 - 08
Niger	8	D2	13 - 16
Nigeria	F	D1	15 - 16
Norway	F	E2	49 - 56
Oman	6	F1	25 - 28
Pakistan	4	F1	27 - 32
Palestinian Territory, Occupied	8	E0	05 - 08
Panama	9	A3	37 - 38
Papua New Guinea	9	F3	07 - 08
Paraguay	6	A3	41 - 44
Peru	7	A4	37 - 40
Philippines	8	F2	33 - 36
Poland	3	E2	05 - 08
Portugal	8	E4	41 - 48
Puerto Rico	8	A0	32
Qatar	2	F2	51 - 52
Romania	E	E1	01 - 04
Russian Federation	7	E0	01 - 60
Rwanda	5	D3	37 - 38
Saint Kitts And Nevis	A	A4	51 - 52
Saint Lucia	B	A4	44 - 45
Saint Pierre And Miquelon	F	A6	33 - 34
Saint Vincent & Grenadines	C	A5	57 - 58
Samoa	4	F2	47 - 50
San Marino	3	E1	21 - 22
Sao Tome And Principe	5	D1	31 - 32
Saudi Arabia	9	F0	25 - 28
Senegal	7	D1	15 - 18
Serbia	D	E2	51 - 52
Seychelles	8	D3	53 - 55
Sierra Leone	1	D2	48 - 49
Singapore	A	F2	01, 09
Slovakia	5	E2	51 - 54

Country	Country Code	ECC	Tables	Country	Country Code	ECC	Tables
Slovenia	9	E4	33 - 36	Turkey	3	E3	33 - 40
Solomon Islands	A	F1	41 - 44	Turkmenistan	E	E4	05 - 08
Somalia	7	D2	19 - 22	Turks And Caicos Islands	E	A3	29 - 30
South Africa	A	D0	17 - 20	Uganda	4	D2	51 - 55
Spain	E	E0	17 - 24	Ukraine	6	E4	33 - 40
Sri Lanka	C	F1	54 - 56	United Arab Emirates	D	F2	17 - 19
Sudan	C	D3	37 - 40	United Kingdom	C	E1	05 - 20
Suriname	8	A4	29 - 30	United States of America	1	A0	01 - 52
Swaziland	5	D2	17 - 20	Uruguay	9	A4	29 - 32
Sweden	E	E3	33 - 40	Uzbekistan	B	E4	09 - 12
Switzerland	4	E1	09 - 16	Vanuatu	F	F2	45 - 46
Syrian Arab Republic	6	E2	53 - 56	Vatican City State	4	E2	25 - 26
Taiwan	D	F1	09 - 16	Venezuela	E	A4	47 - 50
Tajikistan	5	E3	43 - 46	Viet Nam	7	F2	31 - 34
Tanzania, United Republic Of	D	D1	26 - 32	Virgin Islands, British	F	A5	47 - 48
Thailand	2	F3	19 - 23	Virgin Islands, U.S.	1	A0	57 - 58
Togo	D	D0	20 - 21	Western Sahara	3	D3	56 - 57
Tonga	3	F3	03 - 04	Yemen	B	F3	29 - 32
Trinidad And Tobago	6	A4	13 - 14	Zambia	E	D2	13 - 16
Tunisia	7	E2	53 - 56	Zimbabwe	2	D2	29 - 32

1

Annex C
(normative)

Detailed methods for the usage of location tables

This Annex describes in detail the methods for achieving several location referencing tasks.

C.1 Methods for referencing affected road sections

C.1.1 General

This section summarises several methods of referencing affected road sections (see Figure C.1) in traffic and travel messages. Not all methods can be used in all types of messages.

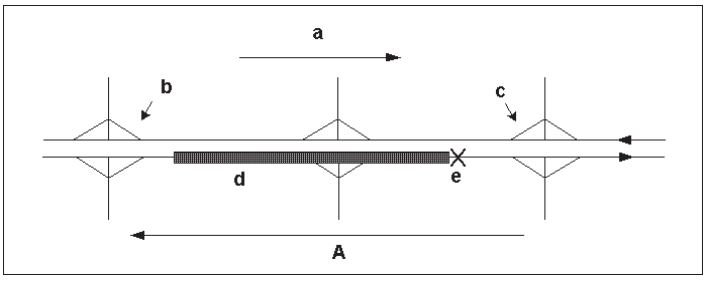
To avoid ambiguity, both primary and secondary location shall lie on the same road, i.e. can be connected by 'stepping through' the offsets in the location table (see C.1.2, C.1.8).

C.1.2 Pre-defined primary location + extent

This method requires a pre-defined hierarchical database of locations, including positive and negative offsets. These databases or tables can contain lists of text location names, distance marker references (i.e. road number and kilometre post), latitude/longitude references, and/or any other desired system of location referencing.

The primary location is indicated using the pre-defined location code of the nearest defined downstream location, measured in the direction of travel. The pre-defined secondary location is often indicated relative to the pre-defined primary location by means of an extent. Extent measures how far the situation spreads.

Extent is the number of steps along the road, from the pre-defined primary location, through other pre-defined locations, to reach the pre-defined secondary location. Extent data comprise a sign (+ or -) and a number of steps (Figure C.1).



Key

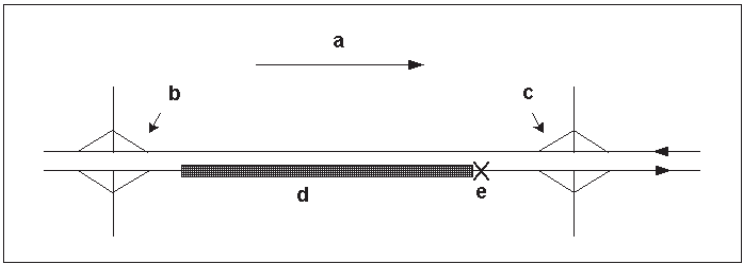
a positive direction
b pre-defined secondary location
c pre-defined primary location
d traffic queue
e accident
A extent = -2

Figure C.1 — Pre-defined primary location + extent

In distance marker (kilometre/milepost reference) systems, extent can be used in a similar way, except that in this case, it is measured in kilometres, to any required degree of precision.

C.1.3 Pre-defined primary and secondary locations

A variant of method C.1.2 uses primary and secondary location codes directly, instead of indicating the secondary location by means of extent (Figure C.2).



Key

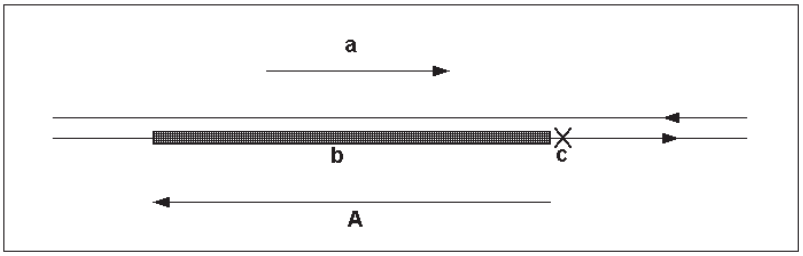
a positive direction
b pre-defined secondary location
c pre-defined primary location
d traffic queue
e accident

Figure C.2 — Pre-defined primary and secondary locations

Where pre-defined locations are used in the ways as described in C.1.2 and C.1.3, situations may not occur exactly between pre-defined points. In this case, the pre-defined primary location is at the nearest pre-defined location downstream from the origin of the situation (measured in the direction of travel). The pre-defined secondary location lies beyond the furthest extent of the situation (e.g. the back of the queue). These pre-defined points entirely bracket (i.e. straddle; enclose) the actual situation on the ground (Figures C.1 and C.2).

C.1.4 Distance markers (primary location + extent)

In this method, the primary location is given by a road number and kilometre reference. The secondary location lies on the same road, at the kilometre reference of the primary location, plus or minus the extent in kilometres (Figure C.3).



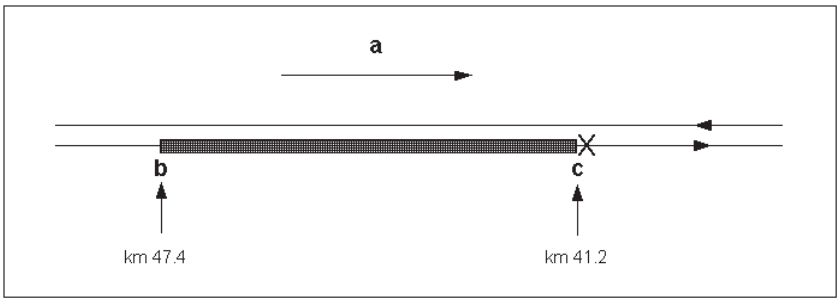
Key

a positive direction
b traffic queue
c accident
A extent = -6.2 km

Figure C.3 — Distance markers – primary + extent

C.1.5 Distance markers (primary + secondary location)

A variant of method C.1.4 uses kilometre references directly to specify secondary as well as primary location, instead of using primary location plus or minus extent (Figure C.4).



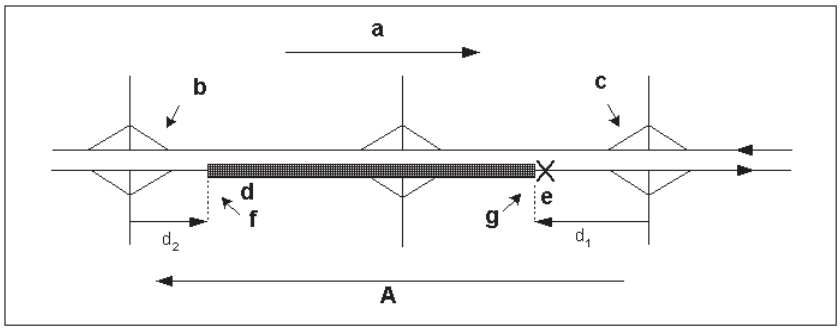
Key

a positive direction
b traffic queue
c accident

Figure C.4 — Distance markers – primary + secondary locations

C.1.6 Primary and secondary locations using pre-defined location, extent and distances

In this method, the pre-defined primary location is the nearest defined downstream location, the pre-defined secondary location is indicated in terms of extent. The predefined points entirely bracket the actual situation on the ground (Figure C.5). The primary and secondary locations are each given by the pre-defined location and a distance. For the primary location, the distance is measured from the pre-defined location in upstream direction. For the secondary location, the distance is measured from the pre-defined location in downstream direction.



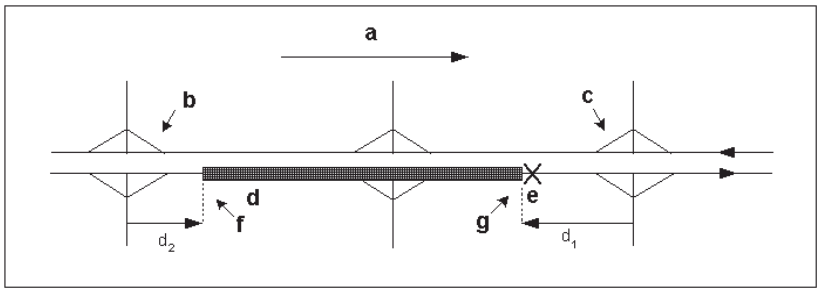
Key

a positive direction
b pre-defined secondary location
c pre-defined primary location
d traffic queue
e accident
f secondary location
g primary location
A extent = -2

Figure C.5 — Pre-defined location, extent and distances

C.1.7 Primary and secondary locations using pre-defined locations + distances

This method is a variant of method C.1.6 in which the pre-defined secondary location is given directly, instead of indicating it by means of extent. The pre-defined secondary location is the nearest pre-defined location upstream of the situation (Figure C.6).



Key

a positive direction
b pre-defined secondary location
c pre-defined primary location
d traffic queue
e accident
f secondary location
g primary location

Figure C.6 — Pre-defined locations and distances

C.1.8 Describing the extent of an event in ALERT-C

In many cases events affecting road traffic cover a number of locations, such as where an accident results in long tailbacks. The ALERT-C protocol defines such occurrences by the method described in section C.1.2, using the direction and extent fields of the standard ALERT-C message.

These fields consist of four bits of information: 1 direction bit and 3 extent bits. The direction bit indicates the direction of queue growth, not the direction of traffic flow affected by the event. The interpretation of the direction bit is as follows:

Direction bit = 0 (positive) Direction of queue growth is in the positive road direction, traffic driving in the negative road direction is affected, the positive offset column is to be used to execute the number of steps indicated by the extent.

Direction bit = 1 (negative) Direction of queue growth is in the negative road direction, traffic driving in the positive road direction is affected, the negative offset column is to be used to execute the number of steps indicated by the extent.

The extent bits identify the number of locations along the road that are affected by the problem with a maximum of 8 (primary location and 7 related locations). An extent of 1 would identify the secondary location (the end of the event's extent) as being the next location along the road from the primary location. An extent of 3 would force the receiver to search the database for the third location along the road from the primary location. This is illustrated in Table C.1 and Figure C.7.

In case of extents larger than 7, a control code within an ALERT-C message can be used to enlarge the offset:

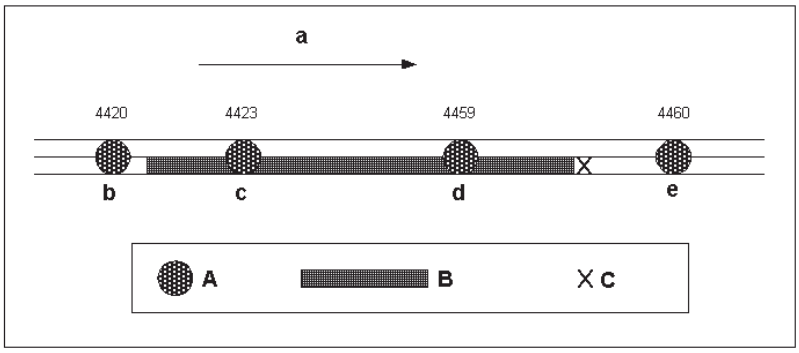
Control code 6 Increase number of steps in problem extent by 8.

Control code 7 Increase number of steps in problem extent by 16.

By using this method, a maximum extent of 31 (7+8+16) can be used. It is recommended to avoid the use of these control codes, as they always use multi group messages for transmission. Wherever feasible, it is recommended to transmit a segment location code and (if necessary) an extent which refers to other segments. With this technique the transmission of single group messages for events affecting long distances becomes possible.

Table C.1 — Coding example

location code	code of location (sub) type	road/ junction number	first name	second name	area ref.	linear ref.	negative offset	positive offset
2009	A6.2		Greater Neighbourhood		1			
949	L3.0	E1	X-town	Y-Town	2009		948	950
4420	P3.2		Bridge		2009	949	4456	4423
4423	P1.3	J1	Junction J1	N207	2009	949	4420	4459
4459	P3.3		Parking		2009	949	4423	4460
4460	P1.3	J2	Junction J2		2009	949	4459	4461



Key

a positive direction
b bridge
c junction J1
d parking
e junction J2
A location
B traffic queue
C accident

Figure C.7 — Accident on E1 showing extent

An accident occurring on the E1 between *Parking* and *Junction J2* on the eastbound carriageway stops traffic in the positive road direction. The resulting queue of traffic therefore extends in the negative direction. The full description of the incident would be: *E1, X-Town direction Y-Town, between Bridge* (the first location which motorists will reach) *and Junction J2* (the source of the problem), *accident*, *stationary traffic*. This would be coded as:

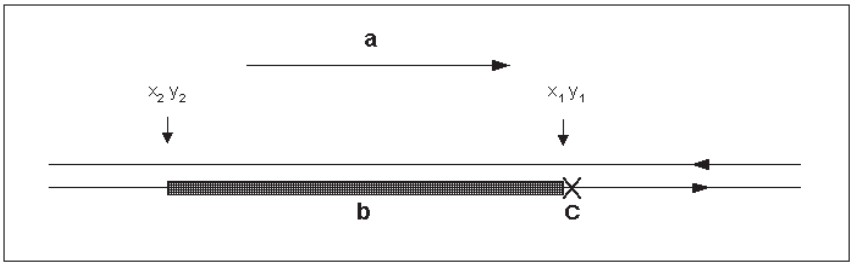
— Primary location 4460 (Junction J2)

— Direction bit 1 (negative)

— Extent 3 (3 steps to location 4420 - Bridge)

C.1.9 Co-ordinates (primary + secondary locations)

In some types of messages, co-ordinates can also be used to specify primary and secondary locations directly (Figure C.8).



Key

a positive direction

b traffic queue

c accident

Figure C.8 — Co-ordinates of primary and secondary locations

C.1.10 Proprietary referencing systems, e.g. GDF

Some traffic and travel information applications utilise digital maps. Digital map references are not optimised for messaging, and referencing systems may not be the same in different proprietary map databases. However, it is permissible in some types of traffic and travel messages (where necessary) to utilise proprietary reference numbers directly to indicate primary and secondary locations.

C.1.11 Text location naming

It is also permissible (in some types of messages) to utilise text location names directly to indicate primary and secondary locations.

C.1.12 Precise location referencing

For precise location referencing the start of a traffic problem with non-zero length (the hazard location) shall be referenced in the message by its distance from the TMC primary location (D1 in Figure C.9), and the end of the traffic problem by its distance from the start of the problem (L in Figure C.9). This implies that D2 is actually referenced as (D1 - L). The reason for this approach is that the hazard location may need to be known more accurately than the end of the traffic problem. In a traffic message addressing precise location referencing therefore D1 will be included in high resolution, while L can be included in high or low resolution as desired. For traffic problems with zero-length the use of only D1 is sufficient. Distance D1 shall be named hazard distance.

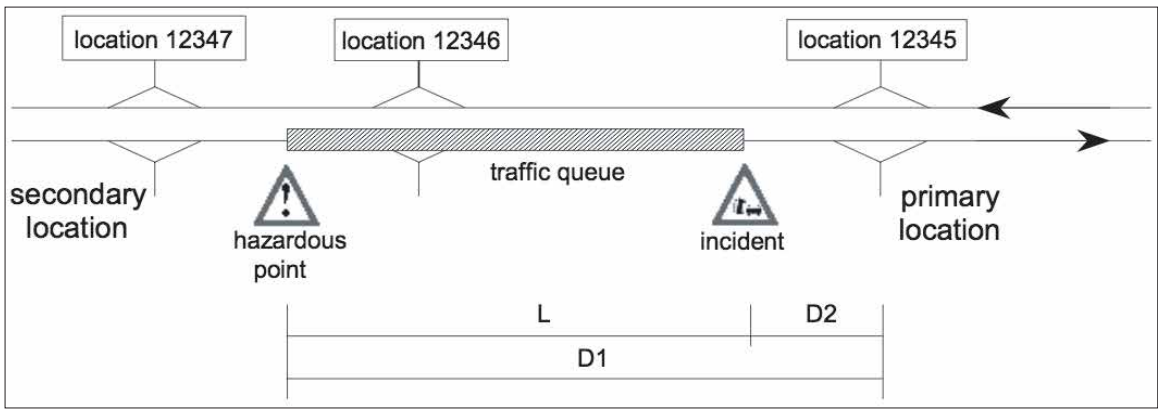


Figure C.9 — Definition of terms for precise location referencing

In normal location referencing the pre-defined primary location is the nearest defined downstream location and the pre-defined secondary location is indicated in terms of extent.

In Figure C.9 the predefined ALERT-C problem locations (primary location 12345, secondary location 12347) entirely bracket the actual situation on the ground.

The actual secondary location of the traffic event (the start, i.e. the location of the hazardous point) shall be given by the pre-defined primary location in the TMC location table and an offset distance D1. This distance shall be measured from the reference point of the predefined primary location in upstream direction.

The actual primary location of the traffic event (the incident location) shall be determined by the actual secondary location of the traffic event (the hazard point location) and an event length L, measured from the actual secondary location (the hazard point location) in upstream direction.

Note that traffic flow directions and carriageway locations are shown for right-hand side driving countries (e.g. mainland Europe). For left-hand side driving countries, the traffic flow direction of carriageways and carriageway reference point locations shall be reversed correspondingly.

The coding of these parameters D1 and L is defined in The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 8859-15:1999, *Information technology — 8-bit single-byte coded graphic character sets — Part 15: Latin alphabet No. 9*

ISO/IEC 10646:2012, *Information technology — Universal Coded Character Set (UCS)*

ISO 14819-1:2013.

C.1.12.1 Definition of distance D1 and reference points of the location

Section 4.4.9 defines that for each point location the co-ordinates in WGS 84 of the approximate centre of the location (further called (location) centre point) constitute a mandatory attribute. This centre point shall be taken as the basic reference point for the primary location.

The distance D1 shall be measured from the reference point of the predefined primary location in upstream direction along the road network (i.e. as network travel distance). The location centre point is not necessarily located on the road network. Thus from this centre point, the reference points on the road network need to be constructed.

Two reference points on the road network are needed, one for each direction. These shall be defined as follows:

R+ denotes the precise location reference point for TMC messages with positive direction (of queue growth), i.e. where the secondary location is found by following the positive offsets in the location table, starting at the primary location.

On roads with separated carriageways, the reference point R+ is located on the carriageway with traffic flow direction towards the previous location (i.e. traffic flow direction opposite of TMC-direction of queue growth).

R- denotes the precise location reference point for TMC messages with negative direction (of queue growth), i.e. where the secondary location is found by following the negative offsets in the location table, starting at the primary location.

On roads with separated carriageways, the reference point R- is located on the carriageway with traffic flow direction towards the next location (i.e. traffic flow direction opposite of TMC-direction of queue growth).

Once defined, such reference points can be stored with their road distance value (e.g. hectometre sign 60.9) such that an actual report like '*Traffic jam due to accident on A2, hazard point at hectometre sign 57.3*' can be immediately translated into an offset distance D1 = 3.6.

Figure C.10 shows how the reference points for both directions are constructed from the location centre point, for the case that the minimal distance between the position of the centre point and the carriageways of the road to which the location belongs is less than 50 m. The minimal distance projection of the centre point on the road network gives for each direction a reference point. For these reference points then the hm readings can be determined once.

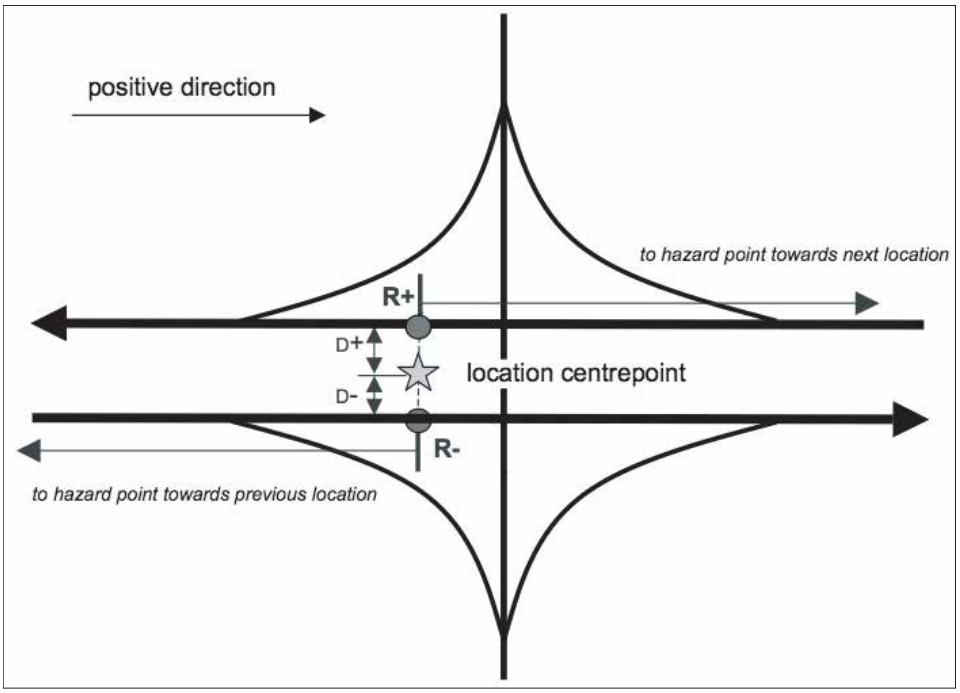


Figure C.10 — Definition of reference points R+ and R- for precise location referencing where projection distances D+ and D- are both less than 50m

When the projection distances become large, reference points determined in this way may become imprecise. The projection is unduly influenced then by differences in digitisation and curvature. Consequently the resulting positioning of the reference points R- and R+ can differ significantly, and the determination of the hazard point becomes inexact. Two options are provided to overcome this problem:

- Specification of WGS84 coordinates for R+ and R- using a table
- Algorithmic determination of R+ and R-

Specification of WGS84 coordinates for R+ and R- using a table is the preferred method. When however the location table owner initially determines R+ and R- algorithmically and changes to specification of WGS84 coordinates for R+ and R- using a table at a later time, then this owner shall specify the R+ and R- points as closely as possible to those resulting from algorithmic specification. This preserves backward compatibility for systems already in the market using algorithmic specification.

C.1.12.2 Specification of WGS84 coordinates for R+ and R- using a table

The table owner shall specify in a table the WGS-84 co-ordinate for both points R+ and R-, with optionally also the hectometre sign for R+ and R, as shown in Table C.2.

Table C.2 — Precise Location Referencing: specifying WGS84 coordinates for R+ and R- using a table

Location	WGS-84 co-ordinate of R+	WGS-84 co-ordinate of R-	Hm sign at R+ (optional)	Hm sign at R- (optional)
(RDS location code up to 5 digit integer, e.g. 12345)	*(Same format as co-ordinate of location in location table)*	*(Same format as co-ordinate of location in location table)*	*(Fixed point decimal format, e.g. 50.7)*	*(Fixed point decimal format, e.g. 50.7)*

C.1.12.3 Algorithmic determination of R+ and R-

When projection distances are larger than 50 m and the provider has not chosen to explicitly specify the points R+/R- for a particular location, algorithmic determination of R+ and R- can be done, and shall use the method defined here.

Isosceles triangles with opening angle of 30 degrees shall be constructed symmetrically along the straight lines to the centre points of the next and previous locations respectively. The small opening angle of the triangle ensures that differences in road network digitisation have only little influence on the reference point and the determination of the location of the hazard point.

The intersection points X- and X+ with the carriageways of the road towards the location in respectively negative and positive direction, with distances D(R+) and D(R-) to the location, shall be determined.

The reference points R- and R+ shall then be constructed by measuring back along the carriageways from X- and X+ the distances D(R-) and D(R+) respectively.

This method is illustrated in Figure C.11.

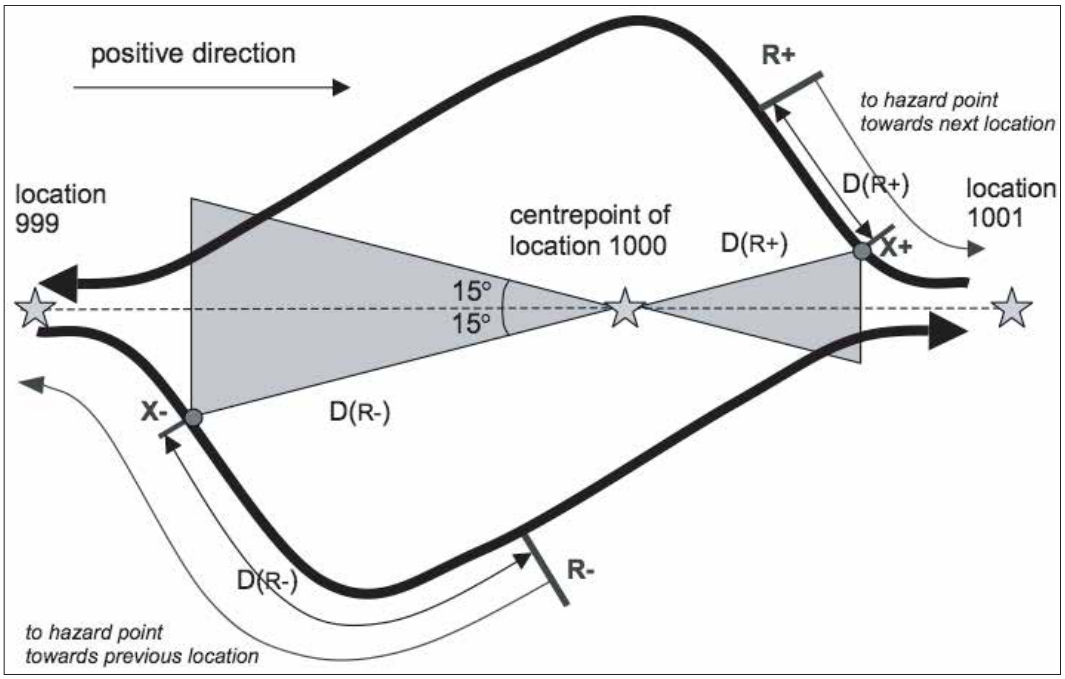


Figure C.11 — Algorithmic determination of reference points R+ and R- for precise location referencing where projection distances are more than 50m

C.2 Methods for referencing specific features

Some of the location types that can be referenced must be implemented in a specific way to achieve unambiguous referencing of locations of those types, independent of any message content requirements. This section describes the methods to be used.

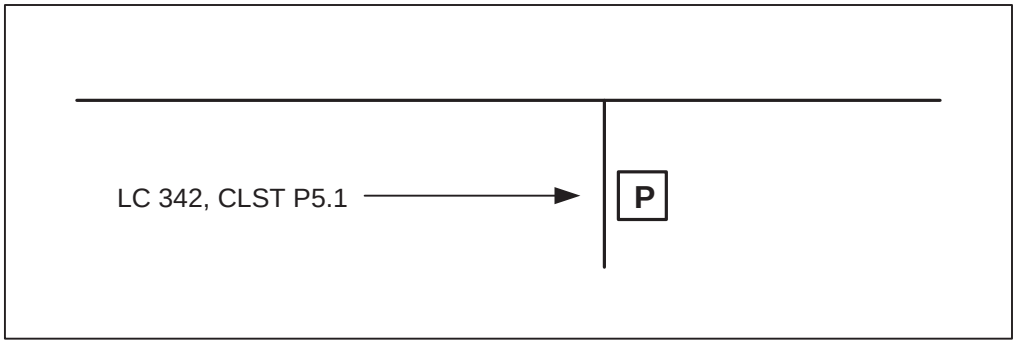
C.2.1 Parking facilities

Location type P5 and its subtypes, defined in Annex A.4, allow TMC messages to refer to parking Points of Interest (POIs), for example concerning availability of free parking places in urban controlled parking facilities.

Urban parking facilities are often stand-alone and not directly related to a road for which a TMC chain of point locations is defined. Location type P5 provides a method to code parking facilities as a point location without a linear reference. It may also occasionally be used for coding parking facilities located along a road for which a TMC chain of point locations is defined (especially along motorways, but possibly sometimes in cities as well), however, it is advised to only do this if there is explicitly no reason to code the concerning facility in the chain.

C.2.1.1 Examples

The first example, depicted in Figure C.12, concerns a parking POI in an urban area.



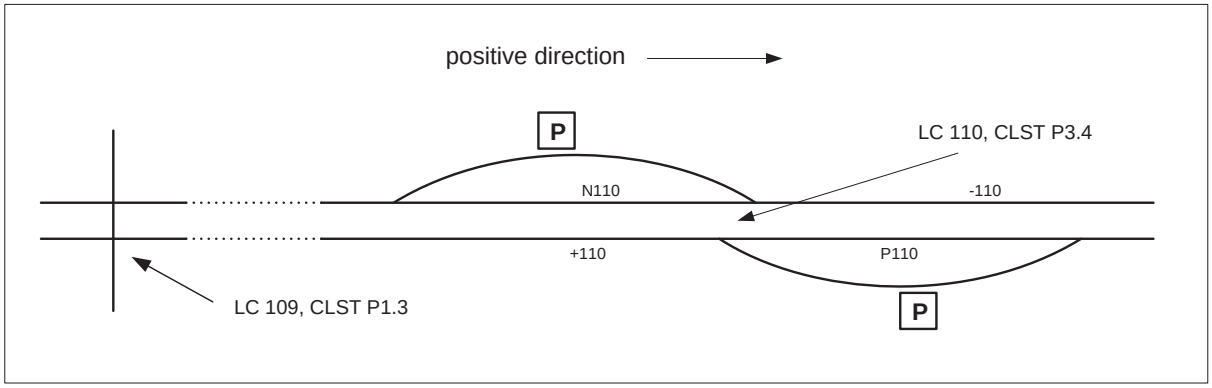
Key

LC Location Code

CLST Code of Location Subtype

Figure C.12 — A parking facility in an urban area

The second example, depicted in Figure C.13, concerns two corresponding parking POIs at opposite rest areas along a motorway. In the figure, LC means *location code*, and CLST means *code of location (sub-)type*. For this example two messages are provided, one concerning parking information at the referenced, and one concerning traffic congestion on the main road up to the referenced location.



Key

LC Location Code

CLST Code of Location Subtype

Figure C.13 — Rest area parking facilities on both sides along the motorway

Table C.3 shows how these parking facilities could be encoded in a location table.

Table C.3 — Location table coding for the examples of Figures C.12 and C.13

Location code	Code of location (sub-)type	Road / junction number	First name	Second name	Linear reference	Negative offset	Positive offset
109	P1.3		De Hocht		1211	108	110
110	P3.4		Silverpoint		1211	109	111
342	P5.1		La Vie				

1211	L1.1	A2	Den Bosch	Eindhoven	1250	1210	1212

For each of the two examples a possible textual traffic message is provided, based on the above sample location table, and as seen by the customer, together with the elements that need to be provided by the service provider to enable the message.

Possible textual traffic message for example 1

For a traffic event of type "parking", e.g. "less than 10 parking spaces available" (event code 1897), based on location code 342, the resulting message would be:

underground parking	<location type>
La Vie	<first name of point>
less than 10 parking spaces available	<event (1897)>

Possible textual traffic messages for example 2

For a traffic event of type "parking", e.g. "no parking spaces available" (event code 1926), based on location code 110 and extent 0 in the negative direction of the road, the resulting message would be:

rest area parking on the A2	<location subtype (P3.4) / road number of linear>
Eindhoven to Den Bosch	<second / first name of linear >
Silverpoint	<first name of point >
no parking spaces available	<event (1926)>

For a traffic event of type "level of service", e.g. "stationary traffic" (event code 101), based on location code 110 and extent 1 in the negative direction of the road, the resulting message would be:

on the A2	<road number of linear>
Eindhoven to Den Bosch	<second / first name of linear >
between De Hocht and Silverpoint	<secondary location / primary location>
stationary traffic	<event (101)>

C.2.2 Other isolated POIs

Location type P6 and its subtypes, defined in Annex A.4, allow TMC messages to refer to isolated Points of Interest (POIs) other than the parking facilities referred to by P5 and its subtypes.

Examples of such POIs are:

- airports, harbours, and train terminals
- administrational, cultural, sportive, recreational and commercial centres
- tunnels, ferries, and bridges

These POIs shall be coded as P3 where they have a linear reference, and as P6 where they are located away from the referenced road network.

In order to distinguish between these POIs and the parking facilities represented by point type P6, it is important to understand that the general purpose of subtypes is to specify the kind of location. The proper usage of the subtypes enables foreign drivers to identify the location without necessarily understanding or knowing the proper name (e.g.: subtype: stadium / first name: AllianzArena). The choice of a subtype should be independent from the most likely used event code for a certain location (e.g. subtype: Car Park / first name: AllianzArena doesn't give any hint for unfamiliar drivers that AllianzArena is a stadium). By taking this procedure into account while referencing locations the language independence – one primary benefit of Alert-C – is ensured.

C.2.2.1 Example

An isolated POI of subtype P6.2 - station representing Munich Main Station in Germany could be used as the location for event code 1580 “closed due to security alert”.

Table C.4 — Example in Munich for subtype P6.2

field	description
road / junction number	
road name	
first name	Hauptbahnhof München
second name	-
area reference	5480
linear reference	-
negative offset	-
positive offset	-
urban	1
intersection reference	-
WGS84 co-ordinates	11.56065, 48.14050

C.2.3 Parallel Roads

Linear location type L8 and point location subtypes P1.16 and P1.17, defined in Annex A.4, allow TMC messages to explicitly refer to points situated on parallel roads.

The following characteristics are identified for parallel roads:

- parallel roads can be present at only one side of the main road,
- if a counter part for a parallel road exists, start and end of both parallel roads are not necessarily situated at similar locations, the parallel roads can have a different extent,
- if a counter part for a parallel road exists, they can have less or more exits or entries or other landmarks.

Each parallel road shall therefore be treated separately, which means that parallel roads situated alongside each carriageway of the main road are not treated as one unit for coding. Each parallel road shall be treated as an independent linear chain using linear location type L8. Parallel roads shall have the same positive direction which is the positive direction of travel on the main road.

The start and end location of the parallel road shall be defined by point location subtypes P1.16 (start of parallel road) and P1.17 (end of parallel road). Possible location codes coded in between start and end

location code of the parallel road shall be coded with the appropriate point location subtypes P1.x, P2.x, or P3.x.

The location codes of category POINT that refer to a parallel road shall be connected to each other by means of positive and negative offset. As the location code P1.16 is the start of the path of the parallel road, it will not have a negative offset. As the location code P1.17 is the end of the path of the parallel road, it will not have positive offset. The WGS 84 Co-ordinates of those points should be positioned on the parallel road on which they are identified.

C.2.3.1 Example

A parallel road runs alongside part of the motorway from Brussels to Antwerp. Another parallel road runs alongside a nearby part of the motorway in the opposite direction as shown in Figure C.14.

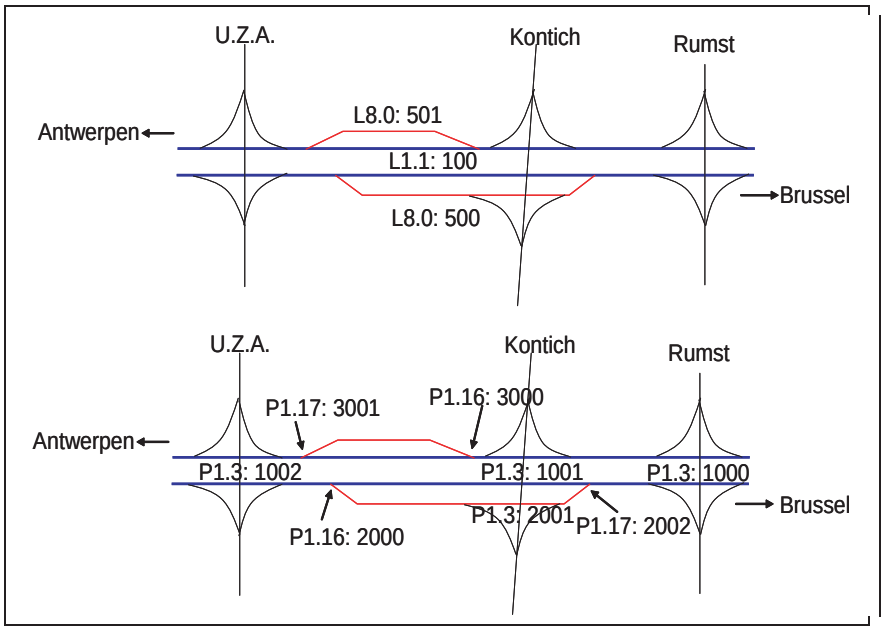


Figure C.14 — Parallel road example

The location table entries for these parallel roads shall be coded as shown in Table C.5.

Table C.5 — Location coding for the example of Figure C.14

Location code	code of location (sub-)type	road / junction number	first name	second name	linear reference	negative offset	positive offset	intersection reference
500	L8.0	E19	Antwerpen	Brussel				
2000	P1.16				500		2001	
2001	P1.3	7	Kontich		500	2000	2002	
2002	P1.17				500	2001		
501	L8.0	E19	Brussel	Antwerpen				
3000	P1.16				501		3001	
3001	P1.17				501	3000		
100	L1.1	E19	Brussel	Antwerpen				
…					100		1000	

1000	P1.3	8	Rumst		100	…	1001	
1001	P1.3	7	Kontich		100	1000	1002	
1002	P1.3	6a	U.Z.A.		100	1001	…	
…					100	1002		

C.2.4 Interrupted Roads

The attribute InterruptsRoad is given for point locations where a road is interrupted, as defined in Section 4.4.10.

This section illustrates an example for the coding of interrupted roads. Figure C.15 describes a road which has an interruption between point locations. The road has three linear layers.

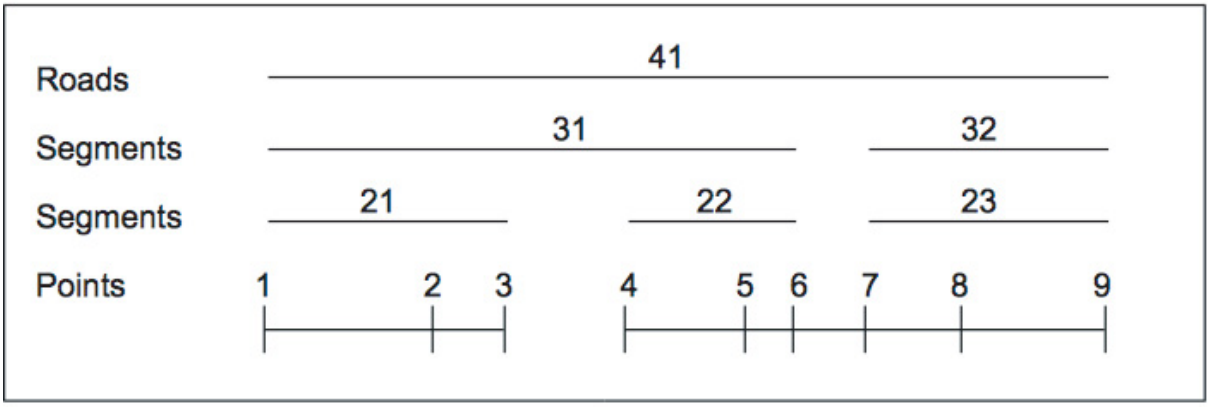


Figure C.15 — Coding of an interrupted road

Table C.6 describes the location table of the situation as represented in Figure C.15. For simplicity, the table only contains the columns of interest. The field "InterruptsRoad" is only defined for point locations, as indicated in Table C.6. Point location 3 does not have a positive offset, because it is the last point location before the interruption; instead, it has value 4 in the field "InterruptsRoad", which is the location code of the first point location of the connected segment. Similarly, point location 4 does not have a negative offset, because it is the first point location after the interruption; instead it has value 3 in the field "InterruptsRoad", which is the location code of the last point location of the connected segment. Segment 21 has a positive offset to segment 22 and visa versa, i.e. the interruption does not affect the offsets for linears.

Table C.6 — Location table of example in Figure C.15

Location code	Category	Location Reference	Negative Offset	Positive Offset	Interrupts Road
1	P	21	…	2	0
2	P	21	1	3	0
3	P	21	2		4
4	P	22		5	3
5	P	22	4	6	0
6	P	22	5	7	0
7	P	23	6	8	0

8	P	23	7	9	0
9	P	23	8	…	0
21	L	31		22	
22	L	31	21	23	
23	L	32	22		
31	L	41		32	
32	L	41	31		
41	L				

C.3 Methods for identifying and exchanging location tables

C.3.1 Identifying versions of a location table

The following method shall be used to allocate version numbers to location tables:

1. Every update of a Location table shall own a unique version number.

2. The version number shall be made up of the Major Version number, a decimal point and the Minor Version number, e.g. 1.3 or 4.0. Both the Major Version number and the Minor Version number shall be a natural number (zero and positive integers).

3. For each update the major or the minor number shall be incremented.

4. If the major number is incremented, the minor number shall be reset to zero.

5. A complete renumbering of all location codes shall lead to a new Location Table Number (LTN). Any change of Location Table Country Code (LTCC) and LTN shall be co-ordinated with and agreed by TISA.

6. The major number shall be incremented, if a new linear location is added. This includes cases in which an existing linear location is replaced by a new one.

7. The major number shall be incremented, if an existing linear location is split up into two or more linear locations.

8. The minor number shall be incremented for all other changes, for example changes in a path because of addition and/or deletion of locations.

This version numbering shall be specified in the metadata distributed with the location table, as defined in Table C.15.

C.3.2 Exchanging location tables – the Location Table Exchange Format

The Location Table Exchange Format provides a method for exchanging location tables, for example between device provider and receiver manufacturer, or as the recommened input format for Tisa's location certification process.

C.3.2.1 Overview of the Location Table Exchange Format

Figure C.16 gives an overview of the methodology used for defining the exchange format.

Header Information (mandatory)	Location table contents (tables and attributes)	Additional nationally defined contents (tables

	(mandatory)	and attributes) (optional)

Figure C.16 — Methodology used for defining the Location Table Exchange Format

The exchange format describes the minimum information which is needed to define a TMC location table. The header information and location table contents shall be defined in accordance with this part of ISO 14819 and are mandatory.

Additional contents can optionally be added. If for instance kilometre sign posts for point locations are to be added, then this information should be placed in an new table which refers to the points table. This information is completely optional and e.g. is not relevant for the certification process. None of the essential parts of a TMC location table must be coded in these supplementary tables.

The exchange format consists of:

1 text file, which contains the meta information, and

23 text files, which represent a normalised version of a TMC location table.

C.3.2.2 Specification of the Location Table Exchange Format

To achieve the objective to be readable from software programs without any changes or adaptations, each of the 23 tables are stored in a separate file and not in a proprietary format. This avoids for example problems with the character set. The character set used for the exchange format, is specified in the meta information file (for details see section C.3.2.4). The ISO/IEC 10646:2012 defined UTF8 character set is used as the default character set. The character set ISO 8859-15 (Latin 9) covers the requirements for most European countries.

An example of a file of table COUNTRIES is given in Table C.3.

Table C.7 — Example export file of table countries (COUNTRIES.DAT)

CID;ECC;CCD;CNAME	36;E2;B;Monaco	998;F2;D;United Arab Emirates
17;E0;1;Germany	37;E1;1;Montenegro	60;F0;5;Australia – South Australia
1;E0;9;Albania	38;E2;1;Morocco	61;F0;3;Australia – Victoria
10;E1;2;Cyprus	39;E3;8;Netherlands	62;F0;1;Australia – Capital Territory
11;E2;2;Czech Rep.	4;E0;A;Austria	63;F0;2;Australia – New South Wales
12;E1;9;Denmark	40;E2;F;Norway	64;F0;4;Australia – Queensland
13;E0;F;Egypt	41;E2;3;Poland	65;F0;6;Australia – Western Australia
14;E4;2;Estonia	42;E4;8;Portugal	66;F0;7;Australia – Tasmania
15;E1;6;Finland	43;E1;E;Romania	67;F0;8Australia – Northern Territory
16;E1;F;France	44;E0;7;Russia	997;F2;A;Singapore
18;E1;A;Gibraltar	45;E1;3;San Marino	996;A1;C;Canada
19;E1;1;Greece	46;E2;D;Serbia	59;F0;C,China
2;E0;2;Algeria	47;E2;5;Slovak Republic	999;A0;1;United States of America
20;E0;B;Hungary	48;E4;9;Slovania	
21;E2;A;Iceland	49;E2;E;Spain	
22;E1;B;Iraq	5;E3;F;Belarus	
23;E3;2;Ireland	50;E3;E;Sweden	
24;E0;4;Israel	51;E1;4;Switzerland	
25;E0;5;Italy	52;E2;6;Syria	
26;E1;5;Jordan	53;E2;7;Tunisia	
27;E3;9;Latvia	54;E3;3;Turkey	
28;E3;A;Lebanon	55;E1;C;UK	
29;E1;D;Libya	56;E4;6;Ukraine	
3;E0;3;Andorra	57;E2;4;Vatican	
30;E2;9;Liechtenstein	58;E0;D;Germany	
31;E2;C;Lithuania	6;E0;6;Belgium	

32;E1;7;Luxembourg 33;E3;4;Macedonia 34;E0;C;Malta 35;E4;1;Moldova	7;E4;F;Bosnia Herz. 8;E1;8;Bulgaria 9;E3;C;Croatia	

The first line “CID;ECC;CCD;CNAME” specifies the columns of the table. Each column is separated by a semicolon. All lines are separated by a carriage return and a line feed.

Table C.3 is an example how the contents could look. For a specific location table the file shall contain at least one entry for the country to which the location table refers.

Table C.4 defines all files that have to be exported, their file names and the order in which the export files have to be imported. The import order is necessary due to the primary and foreign key relationships in the dataset.

The name of each export file is defined by the code name of the respective tables and the extension .DAT (see Table C.4: Export file name). If the operating system does not support file names longer than eight characters, the name of the export file is the import order number combined with the extension .DAT (for example instead of "OTHERAREAS.DAT" the export file name is "14.DAT").

All columns of the tables in Table C.4 must be exported whether they are mandatory or optional, filled or left empty.

Table C.8 — Overview of export files in location table exchange format

Import order	Logical name	Code	Export file name
13th	AdministrativeAreas	ADMINISTRATIVEAREA	ADMINISTRATIVEAREA.DAT
4th	Classes	CLASSES	CLASSES.DAT
1st	Countries	COUNTRIES	COUNTRIES.DAT
12th	ERNo_belongs_to_country	ERNO_BELONGS_TO_CO	ERNO_BELONGS_TO_CO.DAT
8th	EuroRoadNo	EUROROADNO	EUROROADNO.DAT
22nd	Intersections	INTERSECTIONS	INTERSECTIONS.DAT
7th	Languages	LANGUAGES	LANGUAGES.DAT
3rd	Locationcodes	LOCATIONCODES	LOCATIONCODES.DAT
2nd	LocationDataSets	LOCATIONDATASETS	LOCATIONDATASETS.DAT
9th	Names	NAMES	NAMES.DAT
10th	NameTranslations	NAMETRANSLATIONS	NAMETRANSLATIONS.DAT
14th	OtherAreas	OTHERAREAS	OTHERAREAS.DAT
21st	Poffsets	POFFSETS	POFFSETS.DAT
20th	Points	POINTS	POINTS.DAT
15th	Roads	ROADS	ROADS.DAT
19th	Seg_has_ERNo	SEG_HAS_ERNO	SEG_HAS_ERNO.DAT
17th	Segments	SEGMENTS	SEGMENTS.DAT
18th	Soffsets	SOFFSETS	SOFFSETS.DAT
6th	Subtypes	SUBTYPES	SUBTYPES.DAT
11th	SubtypeTranslations	SUBTYPETRANSLATION	SUBTYPETRANSLATION.DAT
5th	Types	TYPES	TYPES.DAT
16th	Road_network_level_types	ROAD_NETWORK_LEVEL_TYPES	ROAD_NETWORK_LEVEL_TYPES.DAT
-	Meta information	README	README.DAT

Each column of a table has to be exported separated by the field-delimiter semicolon (;). Strings can be optionally embedded in double quotes. If double quotes are part of the string they should be quoted by double quotes.

(example: ..;"This is a String ";" This ; also";..).

Lines are separated by the sequence of the two white space characters CR (carriage return) and LF (line feed) - hex: 0D0A.

The first line (header-line) of each export file contains the column names. The column names are the column codes defined in this document. They are separated by a field-delimiter (;) semicolon. The end-of-line sequence of the header-line is CR+LF. The order of the columns are defined by the header line.

An empty field is represented by two successive field-delimiters without any space.

The order of columns of each export file is described by the sort column of the column list of the respective tables.

For the tables ADMINISTRATIVEAREAS and SEGMENTS (see Table C.4) a row sorting order is necessary due to the relationship of primary and foreign keys. E.g. a country refers to a continent which has to be defined. The sorting order is described in the specific table/export file descriptions.

The order in which tables are exported in their export files is absolutely not important. The import order is necessary due to the primary and foreign key relationships in the dataset (see Import order of Table C.4).

C.3.2.3 Versions of the Location Table Exchange Format

To allow for future developments, the location table exchange format itself is identified by a unique version number. The version described here is version 2.1 of the format.

C.3.2.4 Meta information in the Location Table Exchange Format

The meta information file contains information about the dataset, such as identification of the location dataset and the character set used in all other files. To enable a broad number of systems to read and display this file it is recommended to use only the ASCII character set for this file.

The file name for the meta information is ‘README.DAT’. Although it is redundant, it is strongly recommended to also include the meta information in the column “Version Description” of table LOCATIONDATASETS with, as a minimum, the data shown in Table C.15 (this table also defines the meta information file):

Table C.9 — Meta information in Location Table Exchange Format

Content	Type	Format
ALERT Level of Location Data set	INT(1)	
Major Version number of the location table	NUMERIC(2)	
Minor Version number of the location table	NUMERIC(2)	
Release date	CHAR(10)	dd/mm/yyyy
Certification date	CHAR(10)	dd/mm/yyyy
Certification number	CHAR(15)	yyyy-nn
Owner or administrator code	CHAR(15)	
Major version of the Location Table Exchange Format	NUMERIC	
Minor version of the Location Table Exchange Format	NUMERIC	
Used character set	CHAR(15)	

The Release date is the date on which this version of the location table is first made public by the owner or administrator of the location table.

The Certification date is the date on which this version of the location table has been certified by TISA or the TMC Forum.

The Certification number is the number that was given to the table upon certification by TISA or the TMC Forum.

C.3.2.5 Table specifications for the location table exchange format

This section describes the exact structure and format of each of the 23 tables which are stored in the corresponding export files. The specification itself is presented in tables with a common structure as shown in Table C.6.

Table C.10 — Common structure of the definition tables

Sort	Logical name	Code	Type	Optional

The first column named “Sort” defines in which order the field of the table occur in the export file form left to right.

The second column named “Logical name” is a descriptive name for the field. These names are derived either from the standard documents or where defined during the FORCE-ECORTIS project.

The third column name “Code” defines the code for this field which is used to identify the column and are part of the first line of the specific export file.

The forth column defines the type of the field. Two types are possible: CHAR for characters and NUMERIC for unsigned numbers. The width of a field is given in parenthesis. E.g. CHAR(1) specifies a character field for one character.

The 5th column of each table named ‘Optional’ contains either ‘yes’ or ‘no’. The Location Referencing Rules standard has additional levels, such as ‘mandatory if exists’. For example, in Table C.22 ROADS, the entries ‘Road name’ and ‘Road number’ are optional; this does not mean that they may both stay empty. In the Location Referencing Rules it is stated that a Road shall have a ‘Road name’ AND/OR a ‘Road number’ if it exists.

C.3.2.5.1 Table / export file AdministrativeAreas

This table contains all administrative areas of the dataset.

The sorting order of all rows in the export file ADMINISTRATIVEAREA.DAT is:

Table C.11 — Sorting Order of administrative areas

Sort	**Description**	**Type code**	**Subtype code**
1st	Continent	1	0
2nd	Country Group	2	0
3rd	Country	3	0
4th	Order1Area	7	0
5th	Order2Area	8	0
6th	Order3Area	9	0
7th	Order4Area	10	0
8th	Order5Area	11	0

Table C.12 — Column List AdministrativeAreas

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	Type class	CLASS	CHAR(1)	No
5th	Type code	TCD	NUMERIC(3)	No
6th	Subtype code	STCD	NUMERIC(3)	No
7th	Name	NID	NUMERIC	No
8th	Upward area reference	POL_LCD	NUMERIC(5)	Yes

C.3.2.5.2 Table / export file Classes

This table defines the categories (A: Area location, L: line location, P: point location) used in the dataset.

Table C.13 — Column list Classes

Sort	Logical name	Code	Type	Optional
1st	Type class	CLASS	CHAR(1)	No

C.3.2.5.3 Table / export file Countries

This table contains the country codes used in the dataset. Usually there is only one country code for each dataset. Country Code is given as hexadecimal value: range “1” to “F”

Table C.14 — Column List Countries

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Extended Country Code	ECC	CHAR(2)	No
3rd	Country code	CCD	CHAR(1)	No
4th	Name	CNAME	CHAR(50)	No

C.3.2.5.4 Table / export file ERNo_belongs_to_country

This table contains all European road numbers which belong to the country described in the export file of table countries (COUNTRIES.DAT), of which Table C.3 gives an example.

Table C.15 — Column List ERNo_belongs_to_country

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	European road number	ENO	CHAR(10)	No

C.3.2.5.5 Table / export file EuroRoadNo

This table contains all European road numbers used in the dataset.

Table C.16 — Column List EuroRoadNo

Sort	Logical name	Code	Type	Optional
1st	European road number	ENO	CHAR(10)	No
2nd	Comment	ECOMMENT	CHAR(100)	Yes

C.3.2.5.6 Table / export file Intersections

This table contains the relation between two or more locations which describes the same intersection for different segments or roads. If there are more the two the location the first is related to the second, the second to the third, ... and the last points again to the first.

Table C.17 — Column List Intersections

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	Intersection country ID	INT_CID	NUMERIC(5)	No
5th	Intersection table code	INT_TABCD	NUMERIC(2)	No
6th	Intersection location code	INT_LCD	NUMERIC(5)	No

C.3.2.5.7 Table / export file Languages

This table describes the languages used e.g. for location name. There is one entry for each language used in the dataset.

Table C.18 — Column List Languages

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Language ID	LID	NUMERIC(2)	No
3rd	Language	LANGUAGE	CHAR(25)	No

C.3.2.5.8 Table / export file Locationcodes

Contains all allowed location codes and marks those with “1” which used in the dataset.

Table C.19 — Column List Locationcodes

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	Allocated	ALLOCATED	NUMERIC(1)	No

C.3.2.5.9 Table / export file LocationDataSets

This table describes the table number and the version of the dataset.

Table C.20 — Column List LocationDataSets

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Comment	DCOMMENT	CHAR(100)	Yes
4th	Version	VERSION	CHAR(7)	No
5th	Version Description	VERSIONDESCRIPTION	CHAR(100)	Yes

The content of fourth field name “Version” consists of a major and a minor number separated by a dot, e.g. “1.0”. For details refer to C.3.1 (Identifying versions of a location table).The intention is to define a reference for a TMC location table in the dataset itself which could be included for example during a conversion process to identify the dataset later.

C.3.2.5.10 Table / export file Names

This table contains all the string of the dataset e.g. name of the road, road numbers, location names, etc. It is a good practice that each name is unique. The language ID specifies the language used in this table. It will be one of the official languages of the country where the TMC location table is meant for.

Table C.21 — Column List Names

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Language ID	LID	NUMERIC(2)	No
3rd	Name ID	NID	NUMERIC	No
4th	Name	NAME	CHAR(100)	No
5th	Comment	NCOMMENT	CHAR(100)	Yes

C.3.2.5.11 Table / export file NameTranslations

This table contains the translation of the names table for each languages used in the dataset.

Table C.22 — Column List NameTranslations

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Language ID	LID	NUMERIC(2)	No
3rd	Name ID	NID	NUMERIC	No
4th	Translation	NTRANSLATION	CHAR(100)	No

C.3.2.5.12 Table / export file OtherAreas

This table contains the other areas of the dataset.

Table C.23 — Column List OtherAreas

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	Type class	CLASS	CHAR(1)	No
5th	Type code	TCD	NUMERIC(3)	No
6th	Subtype code	STCD	NUMERIC(3)	No
7th	Name1	NID	NUMERIC	No
8th	Admin area reference	POL_LCD	NUMERIC(5)	No

C.3.2.5.13 Table / export file Poffsets

This table contains the positive and negative offsets for all point locations used in the dataset.

Table C.24 — Column List Poffsets

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	Negative offset	NEG_OFF_LCD	NUMERIC(5)	Yes
5th	Positive offset	POS_OFF_LCD	NUMERIC(5)	Yes

C.3.2.5.14 Table / export file Points

This table contains all the point locations of the dataset as WGS 84 ordered co-ordinates (e.g. longitude and latitude) as described in 4.4.9.

Example +00435455 (Longitude) +5083940 (Latitude) represents 4°.35455 E 50°.83940 N.

Table C.25 — Column List Points

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	Type class	CLASS	CHAR(1)	No
5th	Type code	TCD	NUMERIC(3)	No
6th	Subtype code	STCD	NUMERIC(3)	No
7th	Junction number	JUNCTIONNUMBER	CHAR(10)	Yes
8th	Road name	RNID	NUMERIC	Yes
9th	Name1	N1ID	NUMERIC	Yes
10th	Name2	N2ID	NUMERIC	Yes
11th	Admin area reference	POL_LCD	NUMERIC(5)	Yes
12th	Other area reference	OTH_LCD	NUMERIC(5)	Yes
13th	Segment reference	SEG_LCD	NUMERIC(5)	Yes
14th	Road reference	ROA_LCD	NUMERIC(5)	Yes
15th	InPos	INPOS	NUMERIC(1)	No
16th	InNeg	INNEG	NUMERIC(1)	No
17th	OutPos	OUTPOS	NUMERIC(1)	No
18	OutNeg	OUTNEG	NUMERIC(1)	No
19th	PresentPos	PRESENTPOS	NUMERIC(1)	No
20th	PresentNeg	PRESENTNEG	NUMERIC(1)	No
21st	DiversionPos	DIVERSIONPOS	CHAR(10)	Yes
22nd	DiversionNeg	DIVERSIONNEG	CHAR(10)	Yes
23rd	Xcoord (Longitude)	XCOORD	CHAR(9)	No
24th	Ycoord (Latitude)	YCOORD	CHAR(8)	No
25th	InterruptsRoad	INTERRUPTSROAD	NUMERIC(5)	No
26th	Urban	URBAN	NUMERIC(1)	No

C.3.2.5.15 Table / export file Roads

This table contains the road description of the dataset.

Table C.26 — Column List Roads

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	Type class	CLASS	CHAR(1)	No
5th	Type code	TCD	NUMERIC(3)	No
6th	Subtype code	STCD	NUMERIC(3)	No
7th	Road number	ROAD NUMBER	CHAR(10)	Yes
8th	Road name	RNID	NUMERIC	Yes
9th	Name1	N1ID	NUMERIC	Yes
10th	Name2	N2ID	NUMERIC	Yes
11th	Admin area reference	POL_LCD	NUMERIC(5)	Yes
12th	Road network level	PES_LEV	NUMERIC(1)	No

C.3.2.5.16 Table / export file Seg_has_ERNo

This table relates the segments and the European road numbers.

Table C.27 — Column List Seg_has_ERNo

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	European road number	ENO	CHAR(10)	No

C.3.2.5.17 Table / export file Segments

This table defines the 1st and 2nd order segments of the dataset.

The sorting order of all rows in the export file SEGMENTS.DAT is:

Table C.28 — Sorting order of Column List Segments

Sort	Description	Type code	Subtype code
1st	Order 1 Segment	3	x
2nd	Order 2 Segment	4	x

Table C.29 — Column List Segments

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	Type class	CLASS	CHAR(1)	No
5th	Type code	TCD	NUMERIC(3)	No
6th	Subtype code	STCD	NUMERIC(3)	No
7th	Road number	ROADNUMBER	CHAR(10)	Yes
8th	Road name	RNID	NUMERIC	Yes
9th	Name1	N1ID	NUMERIC	No
10th	Name2	N2ID	NUMERIC	No
11th	Road reference	ROA_LCD	NUMERIC(5)	Yes
12th	Order1 segment reference	SEG_LCD	NUMERIC(5)	Yes
13th	Admin area reference	POL_LCD	NUMERIC(5)	Yes

C.3.2.5.18 Table / export file Soffsets

This table describes the positive and negative offsets for the segments.

Table C.30 — Column List Soffsets

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Table code	TABCD	NUMERIC(2)	No
3rd	Location code	LCD	NUMERIC(5)	No
4th	Negative offset	NEG_OFF_LCD	NUMERIC(5)	Yes
5th	Positive offset	POS_OFF_LCD	NUMERIC(5)	Yes

C.3.2.5.19 Table / export file Subtypes

This table defines the subtypes used in this dataset.

Table C.31 — Column List Subtypes

Sort	Logical name	Code	Type	Optional
1st	Type class	CLASS	CHAR(1)	No
2nd	Type code	TCD	NUMERIC(3)	No
3rd	Subtype code	STCD	NUMERIC(3)	No
4th	Subtype description	SDESC	CHAR(50)	Yes
5th	National subtype code	SNATCODE	CHAR(5)	Yes
6th	National subtype description	SNATDESC	CHAR(50)	Yes

C.3.2.5.20 Table / export file SubtypeTranslations

This table contains the translations of the subtypes for each language used in the dataset.

Table C.32 — Column List SubtypeTranslations

Sort	Logical name	Code	Type	Optional
1st	Country ID	CID	NUMERIC(5)	No
2nd	Language ID	LID	NUMERIC(2)	No
3rd	Type class	CLASS	CHAR(1)	No
4th	Type code	TCD	NUMERIC(3)	No
5th	Subtype code	STCD	NUMERIC(3)	No
6th	Translation	STRANSLATION	CHAR(100)	No

C.3.2.5.21 Table / export file Types

Table C.33 — Column List Types

Sort	Logical name	Code	Type	Optional
1st	Type class	CLASS	CHAR(1)	No
2nd	Type code	TCD	NUMERIC(3)	No
3rd	Type description	TDESC	CHAR(50)	Yes
4th	National type code	TNATCD	CHAR(5)	Yes
5th	National type description	TNATDESC	CHAR(50)	Yes

C.3.2.5.22 Table / export file Road Network Level Types

Table C.34 — Column list Road_network_level_types

Sort	Logical name	Code	Type	Optional
1st	Road network level	PES_LEV	NUMERIC(1)	No
2nd	Road network level description	PES_LEV_DESC	CHAR(5)	Yes
3rd	National road network level description	TDESC	CHAR(50)	Yes

C.3.2.6 Division of tables and attributes

The following gives an overview of every table and attribute, showing from which source it is derived. There are two different sources:

Location referencing standard: the table or attribute is derived from this standard, indicated with ‘Standard’. This includes tables or attributes originally developed within the FORCE-ECORTIS projects, that have been absorbed into this standard.

National: the table or attribute is open for setting at a national level, indicated with ‘National’.

Table C.35 — Division of attributes

Table	Derived from
Classes	Standard
Countries	Standard
ERNo_belongs_to_country	Standard
EuroRoadNo	Standard
Intersections	Standard
Languages	Standard
Locationcodes	Standard
LocationDataSets	Standard
Names	Standard
NameTranslations	Standard
OtherAreas	Standard

Table	Derived from
Poffsets	Standard
Points	Standard
AdministrativeAreas	Standard
Roads	Standard
Seg_has_ERNo	Standard
Segments	Standard
Soffsets	Standard
Subtypes	Standard
SubtypeTranslation	Standard
Types	Standard
Road network level types	Standard

Table C.36 — Division of Tables

Attribute	Origin
Country ID	Standard
Type Code	Standard
Location Code	Standard
Type class	Standard
Table Code	Standard
Subtype Code	Standard
Upward area reference	Standard
Country code	Standard
European road number	Standard
Intersection country ID	Standard
Intersection table code	Standard
Intersection location code	Standard
Language ID	Standard
Language	Standard
Allocated	Standard
Version	Standard
VersionDescription	Standard
Translation	Standard
Admin area reference	Standard
Negative offset	Standard
Positive offset	Standard
Junction number	Standard
Road name	Standard

Attribute	Origin
Other area reference	Standard
Segment reference	Standard
Road reference	Standard
InPos	Standard
InNeg	Standard
OutPos	Standard
OutNeg	Standard
PresentPos	Standard
PresentNeg	Standard
DiversionPos	Standard
DiversionNeg	Standard
Xcoord	Standard
Ycoord	Standard
InterruptsRoad	Standard
Urban	Standard
Road number	Standard
National subtype code	National
National subtype description	National
Type description	Standard
Road network level	Standard
Road network level description	Standard
National road network level description	Standard
Extended Country Code	Standard

Table C.37 lists the attributes, their origin and usage.

A primary key is a unique identifier of a row in each table. A foreign key refers (points) to a primary key.

Table C.37 — Tables and Attributes

Attribute	Origin	Code	For definition refer to	Primary key value in table	Foreign key in table(s)	Attribute in table
Admin area reference	Standard	POL_LCD	ISO 14819-3, 4.4.5		AdministrativeAreas, OtherAreas, Points, Roads	
Allocated	Standard	ALLOCATED				Locationcodes
Country code	Standard	CCD	ISO 14819-3, 4.2.8			Countries
Country ID	Standard	CID	Internal reference for the country code	Countries	AdministrativeAreas, ERNo_belongs_ to_country, Intersections, Languages, Locationcodes, LocationDataSets, Names, NameTranslations, OtherAreas, Poffsets, Points, Seg_has_ERNo, Segments, Soffsets, SubtypeTranslations	
DiversionNeg	Standard	DIVERSIONNEG				Points
DiversionPos	Standard	PRESENTNEG				Points
Europeanroad number	Standard	ENO				ERNo_belongs_to_country
Extended Country Code	Standard	ECC	ISO 14819-1, 3.1.11 ISO 14819-3, 4.2.8			Countries
InNeg	Standard	INNEG	ISO 14819-3, 4.7.3.2			Points
InPos	Standard	INPOS	ISO 14819-3, 4.7.3.2			Points
InterruptsRoad	Standard	INTERRUPTSROAD				Points

Attribute	Origin	Code	For definition refer to	Primary key value in table	Foreign key in table(s)	Attribute in table
Intersection country ID	Standard	INT_CID				Intersections
Intersection location code	Standard	INT_LCD				Intersections
Intersection table code	Standard	INT_TABCD				Intersections
JunctionNumber	Standard	JUNCTIONNUMBER	ISO 14819-3, 4.4.3.2			Points
Language	Standard	LANGUAGE	ISO 14819-3, 4.4.4			Languages
Language ID	Standard	LID	internal reference for used languages	Languages	NameTranslations, SubtypeTranslations	
Location Code	Standard	LCD	ISO 14819-3, 4.1	AdministrativeAreas, OtherAreas, Points, Roads, Segments	Intersections, Locationcodes, Seg_has_ERNo, Soffsets, Poffsets	
Name Id	Standard	NID	internal reference for names	Names	AdministrativeAreas, NameTranslations, OtherAreas, Points, Roads, Segments	
National road network level description	Standard	TDESC				Road_ network_ level_types
National subtype code	National	SNATCODE				Subtypes
National subtype descripiton	National	SNATDESC				Subtypes
Negative offset	Standard	NEG_OFF_LCD	ISO 14819-3, 4.4.6			Poffsets, Soffsets
Other area reference	Standard	OTH_LCD				Points
OutNeg	Standard	OUTNEG	ISO 14819-3, 4.73.2			Points

Attribute	Origin	Code	For definition refer to	Primary key value in table	Foreign key in table(s)	Attribute in table
OutPos	Standard	OUTPOS	ISO 14819-3, 4.7.3.2			Points
Positive offset	Standard	POS_OFF_LCD	ISO 14819-3, 4.7.3.2			Poffsets, Soffsets
PresentNeg	Standard	PRESENTNEG	ISO 14819-3, 4.7.3.2			Points
PresentPos	Standard	PRESENTPOS	ISO 14819-3, 4.7.3.2			Points
Road network level	Standard	PES_LEV		Road_network_ level_types	Roads	
Road network level description	Standard	PES_LEV_DESC		Road_network_ level_types		
Road reference	Standard	ROA_LCD	ISO 14819-3, 4.7.3.2		Points, Segments	
Roadname	Standard	RNID	ISO 14819-3, 4.4.3.1		Points, Roads, Segments	
Roadnumber	Standard	ROADNUMBER	ISO 14819-3, 4.4.3.1			Roads
Segment reference	Standard	SEG_LCD	ISO 14819-3, 4.4.2		Points, Segments	
Subtype Code	Standard	STCD	ISO 14819-3, 4.2	Subtypes	AdministrativeAreas, OtherAreas, Points, Roads, Segments, SubtypeTranslations	
Table Code	Standard	TABCD	ISO 14819-3, 4.2.8 (table number)	AdministrativeAreas, OtherAreas, Points, Roads, Segments	Intersections, Locationcodes, Seg_has_ERNo, Soffsets, Poffsets	
Translation	Standard	STRANSLATION				SubtypeTranslations

Attribute	Origin	Code	For definition refer to	Primary key value in table	Foreign key in table(s)	Attribute in table
Type class	Standard	CLASS	ISO 14819-3, 4.2 (categories)	Classes	AdministrativeAreas, OtherAreas, Points, Roads, Segments, SubtypeTranslations, Types	
Type Code	Standard	TCD	ISO 14819-3, 4.2	Types	AdministrativeAreas, OtherAreas, Points, Roads, Segments, Subtype, SubtypeTranslations	
Type description	Standard	TDESC	ISO 14819-3, Annex A			Types
Upward area reference	Standard	POL_LCD	ISO 14819-3, 4.4.5			
Urban	Standard	URBAN	ISO 14819-3, 4.4.7			Points
Version	Standard	VERSION				LocationDataSets
Version Description	Standard	VERSIONDESCRIPTION				LocationDataSets
Xcoord (Longitude)	Standard	XCOORD	ISO 14819-3, 4.4.9			Points
Ycoord (Latitude)	Standard	YCOORD	ISO 14819-3, 4.4.9			Points

Annex D
(informative)

Background information

D.1 Overall approach

D.1.1 General

Most traffic and travel messages contain location references. Typically, these indicate:

— location of a traffic and travel situation described in the message;

— location of a route guidance link about which data are given;

— location of a public transport stop in a timetable;

Traffic and travel messages support a wide variety of location referencing methods. This informative annex explains a variety of possible approaches. Not all of these are currently used or possible in ALERT-C.

A location in traffic telematics terminology may be defined as a real world object that has a geographical position. Examples of locations are parts of the road network (e.g. a road crossing, a road section), landmarks (e.g. a bridge) and points of interest (e.g. a petrol station). The technique to reference locations is called location referencing. Several approaches to location referencing exist. Locations may be referenced by:

— **location names**
Descriptive identifiers;
Examples: names of cities, towns, and villages; street names; road numbers; public transport route numbers; junction names and numbers;

— **distance marker systems**
Kilometre post or milepost systems along transport routes;

— **co-ordinates**
Longitude/latitude references, such as WGS 84, or rectangular grid references, such as UTM co-ordinates (Universal Transverse Mercator);

— **hybrid references**
Use a combination of co-ordinates and (parts of) descriptive identifiers;

— **pre-defined codes**
In this approach locations are pre-defined and pre-coded. This approach is used in ALERT-C, and described in more detail in section D.1.2 below.

D.1.2 Pre-defined locations

In many TTI applications, locations are pre-defined prior to use. Their details (i.e. location names, kilometre references, and/or co-ordinates) are stored in reference tables. Pre-defined locations are referenced by their location code, which is the tabular address of the pre-stored location details. Pre-defined locations are normally defined by the responsible agency in a country and standardised across all users. However, proprietary location tables can also be used (see C.2.10).

Each table of stored locations should be given a location table number by the responsible agency in each country or state (see 4.1.6).

D.1.3 GDF features

GDF (Geographic Data File) is an international standard (ISO 14825) for representing geographic information in digital form. It provides an exchange format for proprietary digital maps. In principle, each geographic feature on a map has an equivalent representation in GDF format.

Many traffic and travel locations can be specified in terms of GDF features. However, traffic and travel messaging locations can be functionally distinct from GDF features.

Example 1: each traffic and travel location may have a unique reference code within a particular database, which is common to all users.

Example 2: messaging typically requires a GDF feature such as the intersection of two roads to be viewed as two distinct locations, one on Road A, and one on Road B. This is because an incident can have very different effects on each road.

Example 3: messaging may include reports on positions (e.g. A10, km 71.2; or 53^{o} 17' 45"N, 44^{o} 08' 11"W) at which no geographic feature is located.

Example 4: messaging often requires compact coding, using as few characters or bits as possible. Locations used in messaging therefore exclude large numbers of geographic features not of interest for referencing traffic and travel information.

These distinctions cannot be avoided, as they result from the different functional requirements of GDF and traffic and travel messaging. Therefore the GDF format is not further discussed here.

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