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**Transport information and control  
systems — In-vehicle navigation  
systems — Communications message  
set requirements**

*Systèmes de commande et d'information des transports — Systèmes  
de navigation dans les véhicules — Exigences relatives à l'ensemble  
des messages des communications*

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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# Transport information and control systems — In-vehicle navigation systems — Communications message set requirements

## 1 Scope

This International Standard specifies message content and format utilized by in-vehicle navigation systems. Its emphasis is on messages that are required to generate or enhance routing instructions. There is a particular focus on messages that would not necessarily be included in a more general traffic management message list.

Although this International Standard emphasizes requirements for Locally Determined Route Guidance (LDRG) systems that utilize on-vehicle map databases, it also includes messages that would be utilized primarily by Centrally Determined Route Guidance (CDRG) systems and certain value-added messages.

## 2 Terms and definitions

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

### 2.1

#### Locally Determined Route Guidance System

##### LDRG

system which provides a driver with step-by-step driving instructions that are determined by an on-vehicle system

NOTE The system typically consists of a display screen, a computer, routing and guidance software, a navigable map database, and positioning equipment to track the vehicle's location as it proceeds along its path.

### 2.2

#### Centrally Determined Route Guidance System

##### CDRG

system which provides a driver with step-by-step driving instructions that are similar to those offered by a LDRG

NOTE With a centrally determined system, the routing instructions are determined at an off-vehicle location and transmitted to the vehicle.

### 2.3

#### message

data element which is formatted for transmission and broadcast by means of electromagnetic field propagation

**2.4**  
**standard location references**

standardized method for referencing geographic locations including points, links between points and geographic areas<sup>1)</sup>

**2.5**  
**traffic message centre**  
**TMC**

centre that transmits (receives) messages to (from) the vehicle by any communication means other than short range, vehicle-to-roadside communications (beacons)

NOTE The bulk of these messages are expected to be traffic related.

**2.6**  
**roadside beacon**  
**RS**

short-range vehicle-to-roadside communication device with the inherent location feature that if the vehicle is receiving the signal, then the vehicle has to be positioned in a specific, localized area

**3 Message set: Contents and format**

The messages in this International Standard are divided into three categories, as follows.

- Messages that are required by route guidance systems to determine their recommended routes on-board the vehicle (LOCALLY DETERMINED). These address a wide range of information such as traffic conditions, tolls, road construction and availability of parking.
- Messages that are required by route guidance systems for which routes are determined off-board the vehicle (CENTRALLY DETERMINED). These primarily focus on requesting and transmitting routing information.
- VALUE-ADDED messages that could be displayed by an in-vehicle navigation system, routed through a system, or utilized by a system in providing guidance. These include messages for communicating information regarding items such as emergencies, toll and fee payments, and ridesharing.

Tables 1, 2 and 3 consist of message contents and formats for locally determined route guidance systems, centrally determined route guidance systems, and value-added messages. The structure of the tables is as follows.

**Item number:** The alphanumeric number assigned to a message by ISO/TC 204. This signifies the message's relative position in the list and its classification:

L = LDRG; C = CDRG; V = value added

**Message:** A brief description of the message.

**Data flow:** IN means flow into the vehicle (navigation system) from the infrastructure (communication device); OUT means flow to the infrastructure (communication device) from the vehicle (navigation system). See Figure 1.

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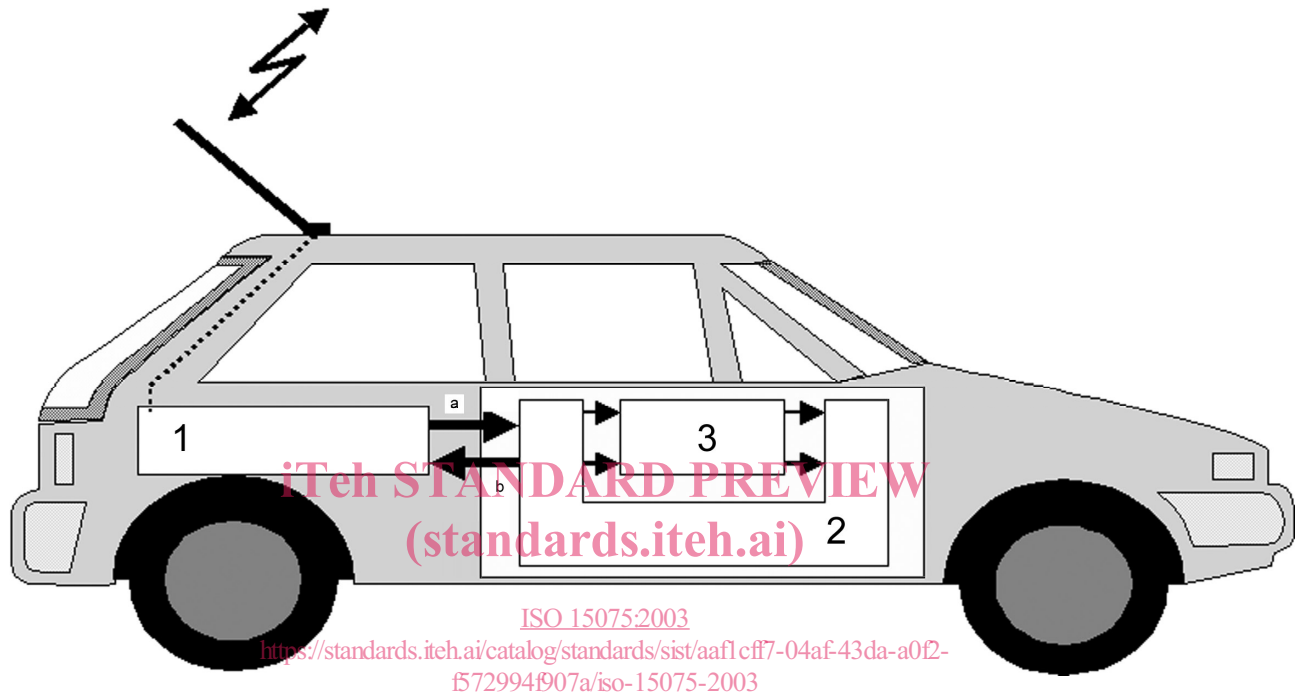
1) ITS standards for location referencing are being developed within both CEN/TC 278, SWG 7.3, and ISO/TC 204, SWG 3.3. Oak Ridge National Laboratories in the US are working on a standard location message protocol. Japan utilizes a standard referencing system devised by the Japan Kokudo-Chiri-In. The field size estimates for location references in this International Standard are based on preliminary drafts from these efforts.

**Data fields comprising the message:** Description of the specific data fields required for the message. Note that this International Standard uses the same data fields in a modular way to create different messages.

**Field type:** A = alphanumeric; F = floating point; I = integer; V = variable

**Required field size:** Specified in bits.

**Field format:** F = fixed length; V = variable length



**Key**

- 1 communication device
- 2 in-vehicle application
- 3 navigation system
- a In
- b Out

**Figure 1**

Table 1 — Messages used by locally determined route guidance systems

Item No.	Message	Data flow	Data fields comprising the message	Field type	Required field size	Field format
1L	Dynamic link times from traffic message centre (TMC)	IN	Message code [general use by TMC or roadside (RS) beacon] Sequence number Message time stamp (1 s resolution) Data format code [congestion levels, link travel times, travel time deltas, or time/speed factors (ratios)]. Number (L) of 5 min time segments per link ( $L \leq 6$ ) (1st = current; 2nd = predicted 5 min later; etc.) Standard location reference for a geographic area (1) Number (N) of links being reported in the message {repeated group: N times} — standard location reference for the link (1) — cause code type (2 bits: 00 = not specified) — cause code (optional) {repeated group: L times} Travel information for 5 min interval	I I I I I I I I I I	16 6 17 3 3 64 8 64 2 6 V	F F F F F F F F F F V
2L	Dynamic link times from roadside beacons (RS)  (Applicable to beacons only)	IN from RS	Message code (for use by RS beacons) Sequence number Message time stamp (1 s resolution) Beacon pair identification ISO 15075:2003 — controller number — first beacon (location) ID number — second beacon's ID (for information supplied in pairs) Data format code [congestion levels, link travel times, travel time deltas, or time/speed factors (ratios)] Number (L) of 5 min time segments per link ( $L \leq 6$ ) Number (N) of links being reported in the message {repeated group: N times} — standard location reference for the link (1) — cause code type (2 bits: 00 = not specified) — cause code (optional) {repeated group: L times} Travel information for 5 min interval	I I I I I I I I I I I I I I I	16 6 17 (40) 8 16 16 3 3 8 64 2 6 V	F F F  F F F F F F F F F F V
3L	Request for temporary vehicle ID	OUT	Message code (from vehicle to TMC or RS beacon) Transaction number (random) chosen by vehicle	I I	16 16	F F



Table 1 (continued)

Item No.	Message	Data flow	Data fields comprising the message	Field type	Required field size	Field format
4L	Assignment of temporary vehicle ID	IN	Message code (from TMC or RS beacon to vehicle) Transaction number sent by the vehicle Temporary vehicle ID assigned by TMC or RS beacon — flag indicating ID was assigned by TMC (0) or RS beacon (1) — assigned vehicle ID NOTE Japan uses the transaction number as the first 16 bits and then adds 23 bits as a beacon assigned ID.	I I I I	16 16 (40) 1 39	F F F F
5L	Vehicle probe reports (database link travel times)	OUT	Message code (general use to TMC or RS beacon) Assigned vehicle ID Link database version Number (N) of links being reported in the message {repeated group: N times} — standard location reference for the link (1) — cause code type (2 bits: 00 = not specified) — cause code [optional: "time-out" while on link, ignition off while on link, traffic patterns (TBD codes)] — travel time (in s) — waiting (stopped) time (in s); FFF means no data are available — end-of-link travel time stamp (1 s resolution)	I I I I I I I I I	16 40 4 8 64 2 5 12 12 17	F F F F F F F F F
6L	Vehicle probe reports (beacon-to-beacon travel times)	OUT	Message code (general use to TMC or RS beacon) Assigned vehicle ID Vehicle measured travelling time (from previous location (beacon) — beacon number (site Identification) for previously passed beacon — beacon controller number — beacon (location) ID number — vehicle determined elapsed travel time (in s) between beacon	I I I I I I	16 40 (40) (24) 8 16 16	F F F F F F

Table 1 (continued)

Item No.	Message	Data flow	Data fields comprising the message	Field type	Required field size	Field format
7L	Probe exception reporting rules (may vary by roadway type, zones, links, etc.)	IN	Message code Number (N) of exception rules reported in this message {repeated group: N times} — exception rule code (1, 2, 3 or 4) IF 1 (roadway type): — roadway type code — threshold value IF 2 (zone): — zone code ID — threshold value IF 3 (links): — Number (n) of links in the message {repeated group: n times} — standard location reference for the link (1) — threshold values IF 4 (global): — thresholds for the whole system	I I I I I I I I I I I I I	16 5 2 4 6 11 6 6 64 6 6	F F F F F F F F F F F F
8L	Request for origin, destination and route	IN	Message code Assigned vehicle ID	I I	16 40	F F
9L	Reporting origin, destination and route	IN	Message code Assigned vehicle ID Origin — standard location reference (1) Destination — standard location reference (1) Number (N) of en route links being reported (00 = No route reported) {repeated group: N times} — standard location references for the links (1) NOTE This message can be used to report origin-destination pair and (optional) planned route for either locally or centrally determined systems.	I I I I I I	16 49 64 64 16 N*64	F F F F F F
10L	Report of trip completion	OUT	Message code Assigned vehicle ID Origin — standard location reference (1) Destination — standard location reference (1) Travel time (1 min resolution)	I I I I I	16 40 64 64 16	F F F F F

Table 1 (continued)

Item No.	Message	Data flow	Data fields comprising the message	Field type	Required field size	Field format
11L	Request for vehicle's current position	IN	Message code Assigned vehicle ID	I I	16 40	F F
12L	Reporting current vehicle position	OUT	Message code Assigned vehicle ID — standard location reference for current vehicle position (1)	I I I	16 40 64	F F F
13L	Position report from RS beacon (standard location reference) (Applicable to beacons only)	IN from RS	Message code Beacon pair identification (site identification) — controller number — first beacon's (location) ID number — second beacon's ID (supplied in pairs) Beacon location — standard location reference (1) — offset from reference point (1 m resolution)	I I I I I I	16 (40) 8 16 16 64 16	F F F F F F
14L	Position report from RS beacon (verbal references) (Applicable to beacons only)	IN from RS	Message code Beacon pair identification (site identification) — controller number — first beacon's (location) ID number — second beacon's ID (supplied in pairs) Beacon number (site identification) — beacon controller number — extension number (0 = end of repetition) — beacon (location) ID number Beacon location — map version — standard location reference for the beacon (1) — road type — link number — road name — number of characters for display: o — number of characters for phonetic output: p — road name for display — road name for phonetic output — point name: — number of characters for display: q — number of characters for phonetic output: r — point name for display — point name for phonetic output	I A A	16 (40) 8 16 16 (1 or 24) 8 1 15 16 64 2 12 8 8 8*o 8*p 8 8 8*q 8*r	F F F F V F F F F F F F F F F F F F F V V F F V V

Table 1 (continued)

Item No.	Message	Data flow	Data fields comprising the message	Field type	Required field size	Field format
15L	Differential GPS position correction factors	IN	Message code Use results of ISO GPS interface standards efforts	I —	16 —	F —
16L	General text messages	IN or OUT	Message code Message priority code Message time stamp (1 s resolution) Code for type of information Message character type (1 or 2 bytes) — to accommodate oriental characters Number (N) of characters in the text message. Limit $N \leq 120$ (60 for oriental) Text message	I I I I I I	16 4 17 16 1 7 N* (8 or 16)	F F F F F F F
17L	Advisory messages (traffic, safety, weather)	IN	Message code Sequence number Message time stamp (1 s resolution) Number (N) of advisory codes being reported in the message {repeated group: N times} — code for type of advisory (such as RDS-TMC) — codes for clarifying advisory information (such as Alert C or Alert + protocol) — duration — severity — region — other  NOTE The vehicle must have a message code database in order to translate the codes.	I I I I I I I I I I I I	16 11 17 5 5 V	F F F F F V V
18L	Request for advisory messages (traffic, safety, weather)	OUT	Message code Assigned vehicle ID Billing ID Region ID (standard referencing) (1) Type of information being requested	I I I I I	16 40 40 32 5	F F F F F
19L	Vehicle transportation information (such as car train or car ferry)	IN	Message code Number (N) of transports being reported in the message {repeated group: N times} — standard location reference for departure point (1) — standard location reference for arrival point (1) — travel time (1 min resolution) — cost — currency code — currency units (hundredths) — carrier ID Number (n) of departure times being reported {second repeated group: n times} — departure times (1 min resolution) — capacity/availability	I I I I I I I I I I I I	16 5 64 64 16 5 12 30 4 16 6	F F F F F F F F F F F