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SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS, NEXT-GENERATION NETWORKS, INTERNET OF THINGS AND SMART CITIES

Internet of things and smart cities and communities – Identification and security

Unified Internet of things identifiers for intelligent transport systems

Recommendation ITU-T Y.4809

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Recommendation ITU-T Y.4809

Unified Internet of things identifiers for intelligent transport systems

Summary

Recommendation ITU-T Y.4809 defines field formats for identifying road signs and signals, and identifies specific values for identifiers of such signs and signals.

History

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

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Recommendation ITU-T Y.4809

Unified Internet of things identifiers for intelligent transport systems

1 Scope

This Recommendation unifies the field formats for identifiers of road signs and signals, and standardizes specific values of such identifiers for every sign or signal.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T Y.4000] Recommendation ITU-T Y.4000/Y.2600 (2012), *Overview of the Internet of Things.*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 device [b-ITU-T Y.4050]: In the Internet of things, a piece of equipment with the mandatory capabilities of communication and the optional capabilities of sensing, actuation, data capture, data storage and data processing.

3.1.2 identifier [b-ITU-T Y. 4050]: An identifier is a series of digits, characters and symbols or any other form of data used to identify subscriber(s), user(s), network element(s), function(s), network entity(ies) providing services/applications, or other entities (e.g., physical or logical objects). Identifiers can be used for registration or authorization. They can be either public to all networks, shared between a limited number of networks or private to a specific network (private IDs are normally not disclosed to third parties).

3.1.3 Internet of things (IoT) [b-ITU-T Y. 4050]: A global infrastructure for the information society enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving, interoperable information and communication technologies.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 road sign internet of things identifier: A (variable) number of decimal digits and letters that identifies a specific road sign or signal and the characteristics of its use/action (time of action, distance to which its action extends, etc.).

3.2.2 IoT-ITS-ID identification start mark: The symbol "!" (One exclamation mark, code 21 for ASCII-7).

3.2.3 IoT-ITS-ID country code: A combination of three digits that identify a specific country or countries in terms of identification or belonging to a specific agreement on road signs and signals. The country code for individual country, groups of countries or specific international agreements is defined in the relevant Annexes.

3.2.4 road sign identification: Combination of digits identifying a road sign or signal. The identification can be either basic (4 digits), uniquely identifying a road sign or signal, or basic with addition(s) consisting of a number of elements/fields that additionally determine the characteristics of its use/action (time of action, distance covered by its actions etc.).

3.2.5 road sign installation place: Combination of the two geographic coordinates of the installation or the start of a road sign or signal action with an accuracy of 0.1 second (accuracy about ±3 meters) (two/three digits/signs per degree, two per minutes, three per seconds with decimals, one per one sign per indication of the hemisphere - N, E, S, W), a total of 17 decimal digits.

3.2.6 road sign direction: Clockwise angle between the direction of the geographic north pole, the place of installation or the beginning of the action of a road sign or signal, and the direction of its action with an accuracy of 1 degree, it means 360 values total of direction(s) of action (3 digits).

3.2.7 IoT-ITS-ID identification end mark: the symbols "%%" (two percent signs, code 25 for ASCII-7).

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

CC Country Code

ID Identification

IoT Internet of Things

ITS Intelligent Transport System

5 Conventions

This Recommendation uses the following conventions:

IoT-ITS-ID CC Road sign or signal country code

IdITS Road sign or signal identification code

IdITSpoint Place of installation or the start of a traffic sign or signal action code

IdITSdirect Direction of action of a road sign or signal code

6 Introduction

Intelligent transport systems (ITS) are developing everywhere. Automated partially or completely, manned and unmanned trains, buses, cars gradually become more noticeable on the roads of all continents. The Internet of things (IoT) technology gives the opportunity to make safer and more predictable the behaviour of both traditional and unmanned moving vehicles of ITS by including such technologies in duplication (at least at the first stage) of traditional visual road signals and signs. Such duplication will significantly increase road safety in conditions of insufficient or limited visibility, and will make smart cities even smarter.

IoT technologies, operating at a limited distance (up to several hundred meters), will facilitate the identification of various road signs by intelligent vehicles. The principles proposed in this Recommendation may also be helpful in the development of identifiers for use in railway transport, airports, etc.

The movement of vehicles must take place in accordance with the regulations of the various road signs and signals. It is proposed to define the format of IoT digital identifiers of road signs and signals, to establish specific digital identifiers of IoT road signs and signals, with a view to their harmonization and global standardization for use in road traffic all around the world.

Considering the differences in road signs between countries, the set of identifiers pertaining to different countries or group of countries must be identified (for example, the set of identifiers used by individual countries or groups of countries that comply with the Vienna Convention on Road Signs and Signals).

National and international road signs and signals look widely similar all round the world.

Both the Vienna Convention and the Geneva Protocol reflect a general agreement on road signs and signals, which was developed mainly in Europe in the middle of the 20th century. Most jurisdictions outside of Europe have not accepted any international agreements, and maintain their own traffic signalling systems. For example, the United States Unified Motion Control Devices Guide (MUTCD) does not comply with the character policy supported by the Vienna Convention. In this case, signs such as speed limit signs and prohibited parking signs are some of the most noticeable differences. To make it accepted in as many countries as possible, the convention allows for some options. For example, warning signs may have a triangular or square diamond shape, and road markings may be white or yellow.

An alternative convention called SADC-RTSM, provided by the Southern African Development Community, is used by 10 countries in southern Africa. Many of the rules and principles of the SADC-RTSM are similar to the principles of the Vienna Convention.

This Recommendation is in no way limited to the countries that have signed the Vienna Convention, but is aimed at the widest possible coverage of all interested participants. Additional annexes are available for other regions/agreements as well as for individual countries.

The codes of road signs and signals in Annex A are in accordance with the European Agreement [b-European Ag] supplementing the Vienna Convention, Part 1 Annex 3 as of 2007.

There are other codes of road signs and signals such as [b-MUTCD], approved by the Federal Highway Administrator as the National Standard in accordance with Title 23 U.S. Code, Sections 109(d), 114(a), 217, 315, and 402(a), 23 CFR 655, and 49 CFR 1.48(b)(8), 1.48(b)(33), and 1.48(c)(2), that, possibly, will be developed in this Recommendation in future annexes.

[ITU-T Y.4000] provides an overview of the Internet of things (IoT) with the main objective of highlighting this important area for future standardization. Its reference model is composed of four layers as well as management capabilities and security capabilities that are associated with the four layers.

The four layers are as follows:

– application layer
– service support and application support layer
– network layer
– device layer.

This Recommendation defines field formats for identifying road signs and signals, and identifies specific values for identifiers of such signs and signals for any layer bottom-up direction, starting from device layer, and further it could be processed at higher levels.

7 Types of road signs and signals

The types of road signs and signals defined at the national or international regulation level and are outside the scope of this Recommendation.

Road sign and signal identification codes, IdITS, for every general type of road sign uses a four-digit format as follows (see Annexes):

A: Danger warning signs	1xxx
B: Priority signs	2xxx

C: Prohibitory or restrictive signs 3xxx
D: Mandatory signs 4xxx
E: Special regulation signs 5xxx
F: Information, facilities or service signs 6xxx
G: Direction, position or indication signs 7xxx
H: Additional panels 8xxx

8 Principles for identifier formats

Format identifiers should take into consideration the types and number of identifiers fields (for example – place of installation, direction of action, distance of action, time, day of the week, etc.)

– Identifiers of Country code
– Identifier IdITS (number). The identification can be either basic (4 digits), uniquely identifying a road sign or signal, or basic with addition(s) consisting of a number of elements/fields that additionally determine the characteristics of its use/action (time of action, distance covered by its actions etc.)
– Place of installation (satellite positioning)
– Direction of action
– End point of action (satellite positioning)
– Period of action (time/day)
– Time to switching on/off (for traffic light)
– Indication of the hemisphere

The following codes are used to represent the cardinal directions:

N: 1

E: 2

S: 3

W: 4

9 Basic format for IoT identifiers for road signs and signals

IoT identifiers of a road signs and signals consist of a (variable) number of decimal digits/letters/symbols that identify a specific road sign or signal and the characteristics of its use or action (time of action, distance to which its action extends, etc.) placed in a specific position. It consists of the following mandatory fields: IoT-ITS-ID identification mark, IoT-ITS-ID country code, road sign or signal identification, place of installation or the start of a road sign or signal action, direction of a road sign or signal action, end of an international road sign identifier or signal action mark. See Table 1 and Appendix I.

Table 1 – Basic format for IoT identifiers of road signs or signals

!	IoT-ITS-ID CC	IdITS	IdITSpoint	IdITSdirect	%%
2 digits	3 digits	4 digits	17 digits	3 digits	4 digits

10 Extended format for IoT identifiers for road signs and signals

To define complex road signs or signals consisting of two or more signs or signals, concatenations of extension(s) with end marks are added to the basic format. Allowed extensions and their formats are given in Annex A. It is possible to add extensions for the period of action (day and time) to any sign by using the following formats:

- Day of the week – the name of the day
- Time – two 4-digit fields as follows: One 4-digit field for the beginning in 24-hour format, and the other 4-digit field for the end, where two of the digits are used for the hours and the other two digits for the minutes.

This is illustrated in Table 2. See also Appendix II for examples.

Table 2 – Extended format for IoT identifiers of road signs and signals

!	**IoT-ITS-ID CC**	**IdITS**	**IdITSpoint**	**IdITSdirect**	**%%**	**Ext 1**	**%%**	**…**	**Ext N**	**%%**
2 digits	3 digits	4 digits	17 digits	3 digits	4 digits		4 digits	…		4 digits

11 Use cases of technical implementations

All road signs or signals can be conditionally divided into two main types - dynamic signs (such as traffic lights or temporary road works), which change their state over time, and to which permanent power sources are connected, and static signs (such as for a bicycle path) that do not change their state over time, and to which permanent sources of power are usually not connected.

There are three main scenarios or use cases for using an identification system:

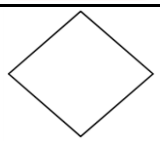
- **Case 1**: Pure and independent, as for example edge computing, where IoT devices are implemented in every road sign and signal, and their state is broadcast by radio communication platforms (these platforms are outside of the scope of this Recommendation). This case is optimal for dynamic road signs and signals, but its implementation for static road signs and signals is very complicated and expensive due to the necessity to provide power supply for every sign or signal.
- **Case 2**: Signs and signals are stored somewhere in the cloud or in a separate application. This case is optimal for static signs and signals, but cannot the status of the dynamic sign or signal cannot be verified in a real time.
- **Case 3**: Combination of cases 1 and 2. All dynamic signs and signals have an IoT device (radio transmitter) that broadcasts its state. All static signs and signals placed in the cloud or application may be subject to national regulations, which is outside the scope of this Recommendation.

Annex A

Road signs and signals for European Agreement supplementing the Vienna Convention and its additional Protocol ECE/TRANS/196

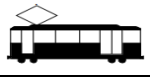
(This annex forms an integral part of this Recommendation.)

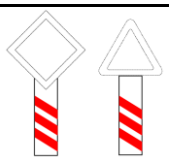
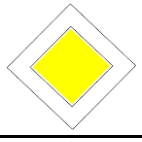
Country code – 001

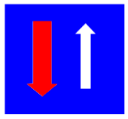
Road sign/signal	European Agreement identification	IdITS	Extensions
	Aa	1001	
	Ab	1002	
	A1a	1011	
	A1b	1012	
	A1c	1013	
	A1d	1014	
	A2a	1021	Ext 1 – angle in degrees
	A2b	1022	Ext 1 – angle in degrees
	A2c	1023	
	A2d	1024	
	A3a	1031	Ext 1 – angle in degrees
	A3b	1032	Ext 1 – angle in degrees
	A3c	1033	
	A3d	1034	

Road sign/signal	European Agreement identification	IdITS	Extensions
	A4a	1041	
	A4b	1042	
	A5	1050	
	A6	1060	
	A7a	1071	
	A7b	1072	
	A7c	1073	
	A8	1080	
	A9	1090	
	A10a	1101	
	A10b	1102	
	A11a	1111	
	A11b	1112	
	A12a	1121	
	A12b	1122	
	A13	1130	
	A14	1140	

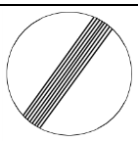
Road sign/signal	European Agreement identification	IdITS	Extensions
	A15a	1151	
	A15b	1152	
	A16	1160	
	A17a	1171	Ext 1 – light 1 – red 2 – yellow 3 – green 4 – out of service (yellow flashed) Ext 2 – duration before switching in seconds
	A17b	1172	Ext 1 – light 1 – red 2 – yellow 3 – green 4 – out of service (yellow flashed) Ext 2 – duration before switching in seconds
	A17c	1173	Ext 1 – light 1 – red 2 – yellow 3 – green 4 – out of service (yellow flashed) Ext 2 – duration before switching in seconds
	A18a	1181	
	A18b	1182	
	A18c	1183	Ext 1 – side 1 – left 2 – right
	A18d	1184	Ext 1 – side 1 – left 2 – right

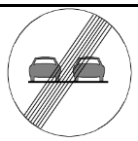
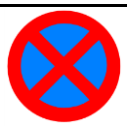
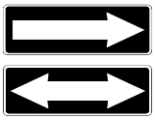
Road sign/signal	European Agreement identification	IdITS	Extensions
	A18e	1185	
	A18f	1186	
	A18g	1187	Ext 1 – side 1 – left, right 2 – right, left
	A19a	1191	
	A19b	1192	Ext 1 – side Left – 1, Right – 2
	A19c	1193	Ext 1 – side Left – 1, Right – 2
	A20	1200	
	A21a	1211	
	A21b	1212	
	A22	1220	
	A23	1230	
	A24	1240	
	A25	1250	
	A26a	1261	
	A26b	1262	
	A27	1270	
	A28a	1281	

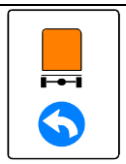
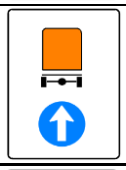
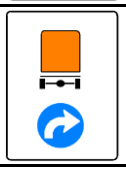
Road sign/signal	European Agreement identification	IdITS	Extensions
	A28b	1282	
	A28c	1283	
	A29a	1291	
	A29b	1292	
	A29c	1293	
	A30	1300	
	A31	1310	
	A32	1320	
	B1	2010	
	B2a	2021	
	B2b	2022	
	B3	2030	
	B4	2040	

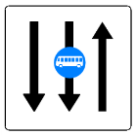
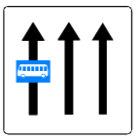
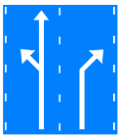
Road sign/signal	European Agreement identification	IdITS	Extensions
	B5	2050	
	B6	2060	
	C1a	3011	
	C1b	3012	
	C2	3020	
	C3a	3031	
	C3b	3032	
	C3c	3033	
	C3d	3034	
	C3e	3035	
	C3f	3036	
	C3g	3037	
	C3h	3038	

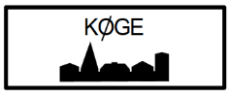
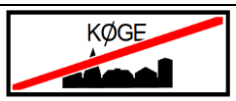
Road sign/signal	European Agreement identification	IdITS	Extensions
	C3i	3039	
	C3j	3301	
	C3k	3302	
	C3l	3303	
	C3m	3304	
	C3n	3305	
	C4a	3041	
	C4b	3042	
	C5	3050	Ext 1 – Width in meters
	C6	3060	Ext 1 – High in meters
	C7	3070	Ext 1 – Weight in tons
	C8	3080	Ext 1 – Mass for one axle, in tons
	C9	3090	Ext 1 – Length, in meters

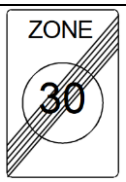
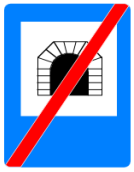
Road sign/signal	European Agreement identification	IdITS	Extensions
	C10	3100	Ext 1 – Distance, in meters
	C11a	3111	
	C11b	3112	
	C12	3120	
	C13aa	3131	
	C13ab	3132	
	C13ba	3133	
	C13bb	3134	
	C14	3140	Ext 1 – Speed limit, km/h
	C15	3150	
	C16	3160	
	C17a	3171	
	C17b	3172	Ext 1 – End of speed limit, km/h

Road sign/signal	European Agreement identification	IdITS	Extensions
	C17c	3173	
	C17d	3174	
	C18	3180	
	C19	3190	
	C20a	3201	
	C20b	3202	
	D1a	4011	Ext 1 – direction 1 – left 2 – right
	D1a	4012	
	D1a	4013	Ext 1 – direction 1 – left 2 – right
	D1a	4014	Ext 1 – direction 1 – forward/left 2 – forward/right
	D1b	4020	Ext 1 – direction 1 – left 2 – right
	D2	4030	Ext 1 – direction 1 – left 2 – right
	D3	4040	Ext 1 – direction 1 – counterclock-wise 2 – clock-wise

Road sign/signal	European Agreement identification	IdITS	Extensions
	D4	4050	
	D5	4060	
	D6	4070	
	D7	4080	Ext 1 – Minimum speed, km/h
	D8	4090	Ext 1 – End of minimum speed, km/h
	D9	4101	
	D10a	4102	
	D10b	4103	
	D10c	4111	
	D11a	4112	
	D11b	4113	
	E1a	5011	Minimum speed for different lines, from left to right, km/h Ext 1 – number of line from left to right Ext 2 – speed

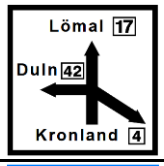
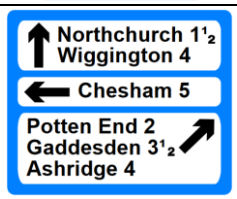
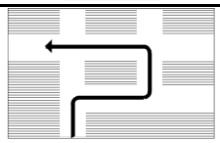
Road sign/signal	European Agreement identification	IdITS	Extensions
	E1b	5012	Minimum speed for one line, from left to right, km/h Ext 1 – number of line from left to right Ext 2 – speed
	E1c	5013	Speed limit for different lines, from left to right, km/h Ext 1 – number of line from left to right Ext 2 – speed
	E2a	5021	IdITS for different lines reservation, from left to right Ext 1 – number of line from left to right Ext 2 – IdITS
	E2b	5022	IdITS for different lines reservation, from left to right Ext 1 – number of line from left to right Ext 2 – IdITS
	E3a	5031	
	E3b	5032	Ext 1 – direction 1 – Left 2 – Right
	E4	5040	IdITS for different lines Ext 1 – number of line from left to right Ext 2 – IdITS
	E5a	5051	

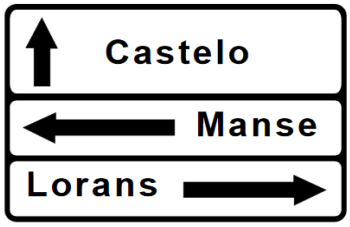
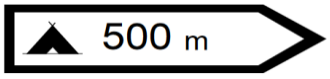
Road sign/signal	European Agreement identification	IdITS	Extensions
	E5b	5052	
	E6a	5061	
	E6b	5062	
	E7a	5071	Ext 1 – Name of the city
	E7b	5072	
	E7c	5073	Ext 1 – Name of the city
	E7d	5074	Ext 1 – Name of the city
	E8a	5081	Ext 1 – Name of the city
	E8b	5082	
	E8c	5083	Ext 1 – Name of the city
	E8d	5084	Ext 1 – Name of the city
	E9a	5091	
	E9b	5092	Time in 24 h format, for beginning (4 digits) and for ending (4 digits)

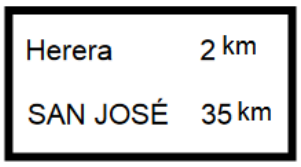
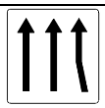
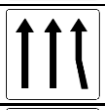
Road sign/signal	European Agreement identification	IdITS	Extensions
			Ext 1 – start time Ext 2 – end time
	E9c	5093	
	E9d	5094	Speed limit zone, maximum speed, km/h Ext 1 – speed
	E10a	5101	
	E10b	5102	Time in 24 h format, for beginning (4 digits) and for ending (4 digits) Ext 1 – start time Ext 2 – end time
	E10c	5103	
	E10d	5104	End of Speed limit zone, maximum speed, km/h Ext 1 – speed
	E11a	5111	
	E11b	5112	
	E12a	5121	

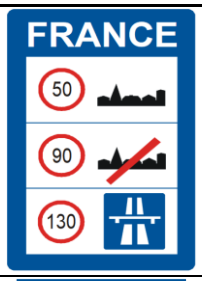
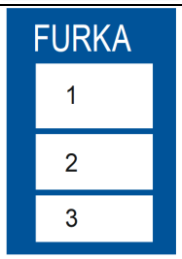
Road sign/signal	European Agreement identification	IdITS	Extensions
	E12b	5122	
	E12c	5123	
	E13a	5131	
	E13b	5132	
	E14a	5141	
	E14b	5142	
	E14c	5143	
	E15	5150	
	E16	5160	
	E17a	5171	
	E17b	5172	
	E18a	5181	Side of a pocket Ext 1 1 – left 2 – right
	E18b	5182	Side of a pocket Ext 1 1 – left 2 – right

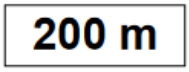
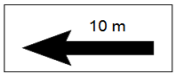
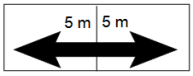
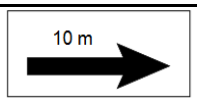
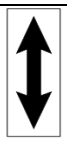
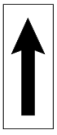
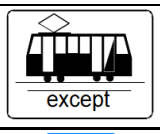
Road sign/signal	European Agreement identification	IdITS	Extensions
	F	6000	Ext 1 – IdITS
	F1a	6011	
	F1b	6012	
	F1c	6013	
	F2	6020	
	F3	6030	
	F4	6040	
	F5	6050	
	F6	6060	
	F7	6070	
	F8	6080	
	F9	6090	
	F10	6100	
	F11	6110	
	F12	6120	
	F13	6130	
	F14	6140	Ext 1 – name of the radio station Ext 2 – frequency in MHz, 6 digits

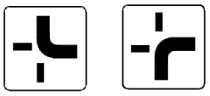
Road sign/signal	European Agreement identification	IdITS	Extensions
	F15	6150	
	F16	6160	
	F17	6170	
	F18	6180	
	G1a	7011	Ext 1 – name of the place Ext 2 – ID of the road Ext 3 - IdITSdirect
	G1b	7012	Ext 1 – name of the place Ext 2 – IdITSdirect
	G1c	7013	Ext 1 – name of the city Ext 2 – distance in km Ext 3 – IdITSdirect
	G2a	7021	Ext 1 – IdITSdirect
	G2b	7022	Ext 1 – IdITSdirect
	G3	7030	*For further study*
	G4a	7041	Ext 1 – name of the place Ext 2 – ID of the road Ext 3 – distance in km Ext 4 – side 1 – left

Road sign/signal	European Agreement identification	IdITS	Extensions
			2 – right
	G4b	7042	Ext 1 – name of the place Ext 2 – distance in km Ext 3 – direction 1 – left 2 – right
	G4c	7043	Ext 1 – name of the place Ext 2 – distance in km Ext 3 – direction 1 – left 2 – right
	G5	7050	Ext 1 – name of the place Ext 2 – direction 1 – left 2 – right 3 – forward
	G6a	7061	Ext 1 – name of the place Ext 2 – direction 1 – left 2 – right
	G6b	7062	Ext 1 – name of the place Ext 2 – direction 1 – left 2 – right
	G6c	7063	Ext 1 – name of the place Ext 2 – direction 1 – left 2 – right
	G7	7070	Ext 1 – IdITS Ext 2 - Distance in km Ext 3 – direction 1 – left 2 – right

Road sign/signal	European Agreement identification	IdITS	Extensions
	G8	7080	Ext 1 – IdITS Ext 2 - Distance in km Ext 3 – direction 1 – left 2 – right
	G9a	7091	Ext 1 – IdITS Ext 2 - Distance in km Ext 3 – direction 1 – left 2 – right
	G9b	7092	Ext 1 – IdITS Ext 2 - Distance in km Ext 3 – direction 1 – left 2 – right
	G10	7100	Ext 1 – name of the place Ext 2 – distance in km
	G11a	7111	
	G11b	7112	
	G11c	7113	
	G12a	7121	
	G12b	7122	
	G13	7130	

Road sign/signal	European Agreement identification	IdITS	Extensions
	G14	7140	Ext 1 – Place Ext 2 – IdITS Ext 3 – Speed limit km/h
	G15	7150	
	G16	7160	
	G17	7170	Ext 1 – Speed limit km/h
	G18	7180	
	G19	7190	
	G20	7200	
	G21	7210	
	G22a	7221	
	G22b	7222	
	G22c	7223	
	G23a	7231	

Road sign/signal	European Agreement identification	IdITS	Extensions
	G23b	7232	
	G24a	7241	
	G24b	7242	
	G24c	7243	
	H1	8010	Ext 1 – Distance, meters, 8 digits
	H2	8020	Ext 1 – Distance, meters, 8 digits
	H3a	8031	Ext 1 – Distance, meters, 8 digits
	H3b	8032	Ext 1 – Distance left, meters, 8 digits Ext 2 – Distance right, meters, 8 digits
	H3c	8033	Ext 1 – Distance, meters, 8 digits
	H4a	8041	
	H4b	8042	
	H4c	8043	
	H5a	8051	
	H5b	8052	
	H6	8060	
	H7	8070	

Road sign/signal	European Agreement identification	IdITS	Extensions
	H8	8080	Ext 1 – direction of main road 1 – forward and left 2 – forward and right 3 – left and back 4 – right and back
	H9	8090	

Appendix I

Basic road sign format

(This appendix does not form an integral part of this Recommendation.)

The following are examples of the ASCII and digital formats for road sign (Aa) from Annex A of [b-European Ag], considering the location on the street, and the direction of action to the West.

In ASCII format: !001100155°45'11.9"N037°37'19.7"E270%%

!	**IoT-ITS-ID CC**	**IdITS**	**IdITSpoint**	**IdITSdirect**	**%%**
!	001	1001	55°45'11.9"N 037°37'19.7"E	270	%%

In digital format: 2100110015545119103737197227025 25

!	**IoT-ITS-ID CC**	**IdITS**	**IdITSpoint**	**IdITSdirect**	**%%**
21	001	1001	55°45'11.9"N 037°37'19.7"E	270	2525

Appendix II

Extended road sign format

(This appendix does not form an integral part of this Recommendation)

II.1 The following are examples of the ASCII and digital formats for road sign (C14) from Annex A of [b-European Ag], considering the location on the street, and the direction of action to the West, setting up a speed limit of 50 km/h on Sundays, from 9 am to 5 pm.

In ASCII format: !001314055°45'11.9"N037°37'19.7"E270%%50%%

!	**IoT-ITS-ID CC**	**IdITS**	**IdITSpoint**	**IdITS direct**	**%%**	**Ext 1**	**%%**
!	001	3140	55°45'11.9"N 037°37'19.7"E	270	%%	50	%%

II.2 The following are examples of the ASCII and digital formats for road sign (E7a) from Annex A of [b-European Ag], considering the location on certain street, from the west, and the direction of action to the East

In ASCII format: !001507155°42'45.9"N037°22'51.9"E090%%Moscow%%

!	**IoT-ITS-ID CC**	**IdITS**	**IdITSpoint**	**IdITS direct**	**%%**	**Ext 1**	**%%**
!	001	5071	55°42'45.9"N 037°22'51.9"E	90	%%	Moscow	%%

II.3 The following are examples of the ASCII and digital formats for road sign (A17a) from Annex A of [b-European Ag], considering the location on the street, from the west, and the direction of action to the East, keeping Red Light 10 seconds more

In ASCII format: !001117155°42'45.9"N037°22'51.9"E090%%Moscow%%

!	**IoT-ITS-ID CC**	**IdITS**	**IdITSpoint**	**IdITS direct**	**%%**	**Ext 1**	**%%**	**Ext 2**	**%%**
!	001	1171	55°42'45.9"N 037°22'51.9"E	90	%%	1	%%	10	%%

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[b-ITU-T Y.4050] Recommendation ITU-T Y.4050/Y.2069 (2012), *Terms and Definitions for Internet of Things*.

[b-Convention] Vienna Convention on Road Signs and Signals, 8.11.1968. *Available at:* <https://treaties.un.org/pages/ViewDetailsIII.aspx?src=TREATY&mtdsg_no=XI-B-20&chapter=11&Temp=mtdsg3&clang=_en>

[b-European Ag] European Agreement supplementing the Convention and its additional Protocol ECE/TRANS/196. *Available at:* <https://unece.org/transport/publications/convention-road-signs-and-signals-1968-european-agreement-supplementing>

[b-MUTCD] Federal Highway Administrator as the National Standard (2009. 2012), *Manual on Uniform Traffic Control Devices (MUTCD). Available at:* <https://mutcd.fhwa.dot.gov/>

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