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Road transport and traffic telematics - Dedicated short-range communication - Physical layer using microwave at 5,8 GHz

Télématique des transports routiers - Communication à courte portée véhicule/infrastructure - Couche physique utilisant les micro-ondes à 5,8 GHz

Straßentransport- und Verkehrstelematik (RTTT) - Nahbereichskommunikation Fahrzeug-Bake (DSRC) - Bitübertragungsschicht für die Frequenz 5,8 GHz

This draft European Standard is submitted to CEN members for formal vote. It has been drawn up by the Technical Committee CEN/TC 278.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Foreword

This document (prEN 12253:2004) has been prepared by Technical Committee CEN/TC 278 “Road Transport and Traffic Telematics”, the secretariat of which is held by NEN.

This document is currently submitted to the Formal Vote.

This document will supersede ENV 12253:1997

Annex A is informative.

Introduction

This European Standard replaces ENV 12253. In order to facilitate migration from European Pre-standard (ENV) to European Standard, equipment procured and installed in accordance with ENV 12253 has been considered when drafting this European Standard.

This European Standard forms part of a series of European Standards defining the framework of a Dedicated Short Range Communication (DSRC) link in the Road Transport and Traffic Telematics (RTTT) environment.

The communication requirements of many RTTT applications can be fulfilled by DSRC. The DSRC Standards enable compliant communication systems to serve multiple RTTT applications in parallel.

The small service areas and severe real-time constraints require a specific protocol architecture leading to the reduced protocol stack shown in Figure 1, consisting of the Application Layer, the Data Link Layer, and the Physical Layer. Such an architecture is very common for real-time environments.

This European Standard deals with the physical layer of the DSRC protocol stack.

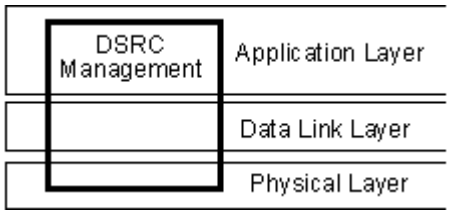

Figure 1 — DSRC protocol stack

The following set of European Standards for the DSRC link is issued by CEN:

prEN 12253 *Road transport and traffic telematics - Dedicated short-range communication - Physical layer using microwave at 5,8 GHz*

(This European Standard)

EN 12795 *Road transport and traffic telematics - Dedicated Short Range Communication (DSRC) - DSRC data link layer: medium access and logical link control*

EN 12834 *Road transport and traffic telematics - Dedicated Short Range Communication (DSRC) - DSRC application layer*

prEN 13372 *Road transport and traffic telematics (RTTT) - Dedicated short-range communication - Profiles for RTTT applications*

This European Standard comprises requirements for Open Systems Interconnection (OSI) Layer 1 at 5,8 GHz for DSRC. It does not include associated measurement procedures for verification of the requirements. Test methods for conformity are provided in ETSI EN 300674-1, ETSI EN 300674-2-1, ETSI EN 300674-2-2.

This European Standard caters for on-board units based on transponder technologies. Furthermore, it allows for mixed time, frequency and space division multiple access approaches.

This European Standard is conceived for the 10 MHz part, i.e. 5,795 GHz to 5,805 GHz, of the ISM band at 5,8 GHz which is recommended by ECC/DEC(01)01. An additional sub-band (5,805 GHz - 5,815 GHz) may be allocated on a national basis for RTTT. National restrictions on the usage of these frequency bands may apply according to CEPT/ERC REC 70-03.

1 Scope

The DSRC Standards EN 12253, EN 12795 and EN 12834, which together form a three-layered architecture for DSRC, are designed to encompass a wide range of services for different purposes in order to make the basic DSRC architecture suited for many different applications and for a wide range of possible products and systems.

This European Standard:

— Specifies a Physical Layer at 5,8 GHz for DSRC as applicable in the field of Road Transport and Traffic Telematics (RTTT).

— provides requirements for the communication medium to be used for exchange of information between road-side units (RSU) and on-board units (OBU).

— caters for a communication means to be used by several applications in the RTTT sector.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ETSI EN 300674-1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 1: General characteristics and test methods for Road Side Units (RSU) and On-Board Units (OBU)
ETSI EN 300674-2-1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 2-1: Harmonized EN for the roadside unit under article 3.2 of the R&TTE Directive
ETSI EN 300674-2-2	Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 2-2: Harmonized EN for the on board unit under article 3.2 of the R&TTE Directive

3 Terms and definitions

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

3.1 General definitions

3.1.1
Adjacent channel
refers to the use of a neighbouring DSRC channel by two or more emissions

Note: It is possible that a DSRC channel has either one or two adjacent channels.

3.1.2
Antenna bore sight direction
direction of maximum antenna gain

3.1.3
Bit error ratio
averaged number of erroneous bits relative to the total number of transmitted bits

3.1.4
Channel
for DSRC, a channel is indicated by reference to the downlink centre frequency of one of up to four frequency bands with 5 MHz width each.

3.1.5
Co-channel
refers to the use of the same DSRC channel by two or more emissions

3.1.6
Downlink communication
Communication from the RSU to the OBU

3.1.7
On Board Unit (OBU)
physical assembly that is located and operated in or on the vehicle to transmit and/or receive DSRC signals. It may be in a form that is removable from the vehicle, or mountable in or on any part of the vehicle structure, or bonded to a part of the vehicle, or an integral part of a vehicle component, such as a windscreen, bumper or licence plate. In this European Standard, parameters that refer to an OBU relate to the form that the OBU takes as it is supplied to the vehicle manufacturer or constructor.

3.1.8
Roadside Unit (RSU)
DSRC equipment usually residing by the side of the road or overhead the road

3.1.9
Uplink communication
communication from the OBU to the RSU

3.2 Downlink parameters

Downlink parameters (prefixed D) apply to transmission of data from RSU to OBU.

3.2.1
D1 — Carrier frequencies
number and values of the downlink carrier frequencies, which are equal to the frequencies of the CW, transmitted by the RSU and used by transponder OBUs for uplink communication. Each carrier frequency is the centre frequency of a downlink channel.

3.2.2
D1a — Tolerance of carrier frequencies
maximum deviation of the carrier frequency resulting from any cause. It is expressed in parts per million (ppm).

EXAMPLE: ±1 ppm of a 5,8 GHz carrier allows for the carrier frequency to be in the range of 5,8 GHz ± 5,8 kHz.

3.2.3
D2 — RSU transmitter spectrum mask
maximum allowed power within a defined frequency band emitted by the RSU transmitter

3.2.4
D3 — OBU minimum frequency range
minimum range of frequencies that has to be received by the OBU receiver.

3.2.5
D4 — Maximum E.I.R.P.
See ETSI EN 300674-1

3.2.6
D4a — Angular E.I.R.P. mask
E.I.R.P. as a function of the angle Θ, where Θ indicates the angle relative to a vector perpendicular to the road surface, pointing downwards

3.2.7
D5 — Polarisation
locus of the tip of the vector of the electrical field strength in a plane perpendicular to the transmission vector. Examples are horizontal and vertical linear polarisation and left and right hand circular polarisation.

3.2.8
D5a — Cross-polarisation (ellipticity of polarisation)
antenna designed to transmit left hand circular waves may transmit some right hand circular waves in addition. Cross-Polar Discrimination (XPD) is defined as the ratio between left and right hand circular power P_{LHC}/P_{RHC}, when the total power transmitted is $P_{LHC} + P_{RHC}$.

3.2.9
D6 — Modulation
keying of the carrier wave by coded data. Some examples are Amplitude Shift Keying (ASK), Phase Shift Keying (PSK), Frequency Shift Keying (FSK) and linear Amplitude Modulation (AM).

3.2.10
D6a — Modulation index
ratio of the variation of the modulation parameter (frequency, amplitude, phase) caused by the modulation signal (data signal)

For amplitude modulation the modulation index is

$$m = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}}$$

where V is the envelope amplitude of the modulated signal.

3.2.11
D7 — Data coding
base band signal presentation, i.e. a mapping of logical bits to physical signals. Examples are bi-phase schemes (Manchester, FM0, FM1, differential Manchester), NRZ and NRZI. NRZI: No transition at beginning of "1" bit, transition at beginning of "0" bit, no transition within bit.

3.2.12
D8 — Bit rate
number of bits per second, independent of the data coding

3.2.13
D8a — Tolerance of bit clock
maximum deviation of the bit clock resulting from any cause, expressed in ppm

EXAMPLE: 100 ppm of 500 kbit/s allows for the bit clock to be in the range of 500 kHz ± 50 Hz

3.2.14
D9 — Bit error ratio for communication
maximum allowed bit error ratio valid within the dynamic range of the receiver as defined by D11a and D11b

3.2.15
D10 — Wake-up trigger for OBU
signal which

a) indicates to the OBU that it is within a communication zone, i.e. that it may now communicate with an RSU;

b) switches the OBU main circuitry from sleep mode to the active mode

This is a feature to allow the OBU to save battery power. It is not mandatory for an OBU to use a wake-up process.

3.2.16
D10a — Maximum start time
maximum time between the reception of the wake-up trigger and the time when the OBU has switched to the active mode

3.2.17
D11 — Communication zone
spatial region within which the incident power of the OBU has a dynamic range as defined by D11a and D11b

3.2.18
D11a — Power limit for communication (upper)
upper level of incident power referred to a lossless isotropic antenna (0 dB) in front of the OBU. This is the level below which, but subject to D11b, communication is guaranteed with a specified bit error ratio. (Communication may take place above this limit, but is not guaranteed.) Together with D11b it also specifies the minimum dynamic range of the OBU receiver. Power values are measured without any additional losses due to rain or misalignment.

3.2.19
D11b — Power limit for communication (lower)
lower level of incident power referred to a lossless isotropic antenna (0 dB) in front of the OBU. This is the level above which, but subject to D11a, communication is guaranteed with a specified bit error ratio. (Communication may take place below this limit, but is not guaranteed.) Together with D11a it also specifies the minimum dynamic range of the OBU receiver. Power values are measured without any additional losses due to rain or misalignment.

3.2.20
D12 – Cut-off power level of OBU
incident power that is lower than the specified cut-off power level does not result in communication.

3.2.21
D13 — Preamble
Specific Layer 1 bit pattern. Preamble is the bit pattern transmitted immediately before a frame.

3.2.22
D13a — Preamble length
length of the preamble measured in number of bits

3.2.23
D13b — Preamble wave form
signal shape of the preamble

3.2.24
D13c — Trailing bits
sequence of bits transmitted after the end flag of the data link layer

3.3 Uplink parameters

uplink parameters (prefixed U) apply to transmission of data from OBU to RSU.

3.3.1
U1 — Sub-carrier frequencies
number and values of the uplink sub-carrier frequencies, i.e. the frequency separation from the centre of the uplink side band to the centre of the corresponding downlink band

3.3.2
U1a — Tolerance of sub-carrier frequencies
maximum deviation of the sub-carrier frequency resulting from any cause. Normally it is expressed in percentage or in parts per million (ppm) of the sub-carrier frequency.

EXAMPLE: 1 % of 1,5 MHz sub-carrier allows for the sub-carrier frequency to be in the range of 1,5 MHz ± 15 kHz.

3.3.3
U1b — Use of side bands
specification of the use of the uplink side bands. Data can be modulated on the upper side band only, or the lower side band only, or on both side bands. In principle, different data can be modulated on the two side bands.

3.3.4
U2 — OBU transmitter spectrum mask
maximum allowed power emitted by the OBU transmitter within a defined frequency band

3.3.5
U4 — Maximum single side band E.I.R.P.
maximum E.I.R.P. transmitted by the OBU within a single side band, measured at the maximum incident power defined by D11a

NOTE: For a non-isotropic OBU antenna the single side band E.I.R.P will vary with the direction of the incident power and the direction in which the emitted power is measured.

3.3.6
U4a — Maximum single side band E.I.R.P. (bore sight)
measured when the incident power is in bore sight and the emitted power is measured in bore sight

3.3.7
U4b — Maximum single side band E.I.R.P. (35°)
measured when the incident power is in bore sight and the emitted power is measured at any angle not less than 35° away from bore sight

3.3.8
U5 — Uplink polarisation
refer to D5

3.3.9
U5a — Cross-polarisation
refer to D5a

3.3.10
U6 — Sub-carrier modulation
keying of the sub-carrier wave by coded data. Some examples are Amplitude Shift Keying (ASK), Phase Shift Keying (PSK), and Frequency Shift Keying (FSK).

Note: U6a is not used

3.3.11
U6b — Duty cycle
ratio of the length of high or low pulses to the duration of a complete cycle

Note: In NRZI a sequence of zero bits results in a pulse of alternating high and low level sections. A low level section and the adjacent high level section constitute a cycle of the pulse. The nominal duration of such a single section is equal to the bit duration. The cycle duration is twice the bit duration. The duty cycle is the ratio of the duration of the high level section to the cycle duration.

3.3.12
U6c — Modulation on carrier
keying of the carrier wave by the modulated sub-carrier

3.3.13
U7 — Data coding
refer to D7

3.3.14
U8 — Bit rate
number of bits per second, independent of the data coding

3.3.15
U8a — Tolerance of symbol clock
refer to D8a

3.3.16
U9 — Bit error ratio for communication
maximum allowed bit error ratio valid within the dynamic range of the receiver

3.3.17
U11 — Communication zone
spatial region within which the OBU is situated such that its transmissions are received by the RSU with a bit error ratio of less than a specified value

3.3.18
U12 — Conversion gain
difference between OBU E.I.R.P. within one side band and the carrier incident power on OBU.

3.3.19
U13 — Preamble
refer to D13

3.3.20
U13a — Preamble length and pattern
preamble length is measured either in multiples of symbols or in seconds. The preamble pattern is a detailed specification of the shape of the preamble signal as it is on the channel after coding.

3.3.21
U13b — Trailing bits
sequence of bits transmitted after the end flag of the data link layer.

4 Abbreviations

For the purposes of this European Standard, the following abbreviations apply.

2-PSK	Binary Phase Shift Keying
AM	Amplitude Modulation
ASK	Amplitude Shift Keying
CW	Continuous Wave
CEN	European Committee for Standardisation
CEPT	European Conference of Postal and Telecommunications Administrations
DSRC	Dedicated Short-Range Communication
EC	European Commission
E.I.R.P.	Equivalent Isotropic Radiated Power
EN	European Standard
ENV	European pre-Standard
ERC	European Radiocommunications Committee
ERM	Electromagnetic compatibility and Radio spectrum Matters
ETSI	European Telecommunications Standards Institute
FM0 / FM1	Bi-phase coding scheme, bit inverse to FM1 / FM0
FSK	Frequency Shift Keying
ISM	Industrial, Scientific, Medical
Layer 1	Physical Layer of DSRC
NEN	Standards institute of The Netherlands
NRZ	Non Return to Zero
NRZI	Non Return to Zero Inverted
OBU	On Board Unit
OSI	Open Systems Interconnection
ppm	Parts per million (= 10^{-6})
PSK	Phase Shift Keying
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
RSU	Roadside Unit
RTTT	Road Transport and Traffic Telematics
TC	Technical Committee
UNI	Standards institute of Italy
XPD	Cross-Polar Discrimination (related to the ellipticity of polarisation)

5 DSRC link parameters

5.1 General

The tables contained in this clause define relevant downlink and uplink DSRC Layer 1 parameters. The values to be used in an RTTT realisation shall be set in accordance with profiles defined in EN 13372.

All DSRC Layer 1 parameters are measured for free space propagation. In the case of the OBU, attention is drawn to its definition in 3.1.7, which means that measurements are done in the absence of a windscreen or other obscuring material unless it forms part of the manufactured OBU assembly.

5.2 Downlink parameters

Table 1 — Downlink parameters

Item No.	Parameter	Value(s)	Remark
D1	Carrier Frequencies	Two downlink channels at: Downlink channel 1: 5,7975 GHz Downlink channel 2: 5,8025 GHz	Other 10 MHz band within the same ISM band allocated for RTTT on a national basis: Downlink channel 3: 5,8075 GHz Downlink channel 4: 5,8125 GHz These channels are defined in accordance with ECC/DEC(02)01. Selection of carrier frequencies is outside the scope of this European Standard.
D1a	Tolerance of Carrier Frequencies	within ± 5 ppm	—

Item No.	Parameter	Value(s)	Remark
D2	RSU Transmitter Spectrum Mask	1) Out band power: see ETSI EN 300674-1 2) In band power: ≤ +33 dBm 3) Unwanted emission for unmodulated carrier wave shall be less than: Co-channel uplink at 1,5 MHz: ≤ -27 dBm in 500 kHz. Co-channel uplink at 2,0 MHz: ≤ -27 dBm in 500 kHz. Adjacent channel uplinks: ≤ -47 dBm in 500 kHz. 4) For in-band unwanted emission with modulated carrier wave, three different requirement classes are defined: ***Class A:*** Co-channel uplink at 1,5 MHz: ≤ -7 dBm in 500 kHz. Co-channel uplink at 2,0 MHz: ≤ -27 dBm in 500 kHz. Adjacent channel uplinks: ≤ -30 dBm in 500 kHz. ***Class B:*** Co-channel uplink at 1,5 MHz: ≤ -17 dBm in 500 kHz. Co-channel uplink at 2,0 MHz: ≤ -27 dBm in 500 kHz. Adjacent channel uplinks: ≤ -37 dBm in 500 kHz. ***Class C:*** Co-channel uplink at 1,5 MHz: ≤ -27 dBm in 500 kHz. Co-channel uplink at 2,0 MHz: ≤ -27 dBm in 500 kHz. Adjacent channel uplinks: ≤ -47 dBm in 500 kHz.	Class A should not be used in new installations. Equipment complying with the different classes will result in different re-use distances. See ETSI EN 300674-1 for more details
D3	OBU Minimum Frequency Range	5,795 GHz – 5,815 GHz	—
D4	Maximum E.I.R.P.	+33 dBm	—
D4a	Angular E.I.R.P. mask	Θ ≤ 70°: ≤ +33 dBm Θ > 70°: ≤ +18 dBm	—
D5	Polarisation	Left hand circular	—

Item No.	Parameter	Value(s)	Remark
D5a	Cross-Polarisation	XPD: In bore sight: $RSU_t \geq 15$ dB $OBU_r \geq 10$ dB At -3 dB area: $RSU_t \geq 10$ dB $OBU_r \geq 6$ dB	—
D6	Modulation	Two level amplitude modulation.	—
D6a	Modulation Index	0,5 ... 0,9	—
D7	Data Coding	FM0 "1" bit has transitions only at the beginning and end of the bit interval. "0" bit has an additional transition in the middle of the bit interval compared to the "1" bit.	—
D8	Bit rate	500 kbit/s	—
D8a	Tolerance of Bit Clock	better than ± 100 ppm	—
D9	Bit error ratio for communication	$\leq 10^{-6}$ when incident power at OBU is in the range given by [D11a to D11b].	—
D10	Wake-up trigger for OBU	OBU shall wake up on receiving any frame with 11 or more octets (including preamble)	No special wake-up pattern is necessary. OBU may wake up on receiving a frame with less than 11 octets
D10a	Maximum Start Time	≤ 5 ms	—
D11	Communication zone	Spatial region within which a bit error ratio according to D9 is achieved	—
D11a	Power Limit for communication (upper).	Incident power: D11a-0: -24 dBm D11a-1: -17 dBm	Implemented values are subject to profiles and sets defined in EN 13372
D11b	Power Limit for communication (lower).	Incident power: -43 dBm	—
D12	Cut-off power level of OBU	-60 dBm	Applicability of this parameter is subject to profiles and sets defined in EN 13372
D13	Preamble	Preamble is mandatory.	—
D13a	Preamble Length	16 bits ± 1 bit	—
D13b	Preamble Wave form	An alternating sequence of low level and high level with pulse duration of 2 µs. The tolerance is given by D8a	—
D13c	Trailing Bits	The RSU is permitted to transmit a maximum of 8 bits after the end flag. An OBU is not required to take these additional bits into account.	—

5.3 Uplink parameters

Table 2 — Uplink parameters

Item No.	Parameter	Value(s)	Remark
U1	Sub-carrier Frequencies	An OBU shall support 1,5 MHz and 2,0 MHz An RSU shall support 1,5 MHz or 2,0 MHz or both. U1-0: 1,5 MHz U1-1: 2,0 MHz	Selection of sub-carrier frequency (1,5 MHz or 2,0 MHz) depends on profile indicated by the RSU. For interoperability with existing installations it is recommended that a 1,5 MHz sub-carrier frequency is used wherever possible.
U1a	Tolerance of Sub-carrier Frequencies	within ± 0,1%	—
U1b	Use of Side Bands	Same data on both sides	—
U2	OBU Transmitter Spectrum Mask	1) Out band power: see ETSI EN 300674-1 2) In band power: ≤ [U4a] dBm in 500 kHz 3) Emission in any other uplink channel: U2(3)-0 = -39 dBm in 500 kHz U2(3)-1 = -35 dBm in 500 kHz	Information on the choice of values can be found, for example, in EN 13372.
U4a	Maximum Single Side Band E.I.R.P. (bore sight)	U4a-0: -14 dBm U4a-1: -21 dBm	Information on the choice of values can be found, for example, in EN 13372.
U4b	Maximum Single Side Band E.I.R.P. (35^{o})	-17 dBm	Applicability of this parameter is subject to profiles and sets defined in EN 13372.
U5	Polarisation	Left hand circular transmitted when left hand circular received	—
U5a	Cross Polarisation	XPD: In bore sight: $RSU_r \geq 15$ dB $OBU_t \geq 10$ dB At -3 dB: $RSU_r \geq 10$ dB $OBU_t \geq 6$ dB	—
U6	Sub-carrier Modulation	2-PSK Encoded data synchronised with sub-carrier: Transitions of encoded data coincide with transitions of sub-carrier.	—
U6b	Duty Cycle	50% ± α, α ≤ 5%	—
U6c	Modulation on Carrier	Multiplication of modulated sub-carrier with carrier.	—
U7	Data Coding	NRZI	—
U8	Bit Rate	250 kbit/s	—

Item No.	Parameter	Value(s)	Remark
U8a	Tolerance of Bit Clock	Within ±1000 ppm	—
U9	Bit error ratio for comminication	$\leq 10^{-6}$	—
U11	Communication Zone	The spatial region within which the OBU is situated such that its transmissions are received by the RSU with a bit error ratio of less than that given by U9.	—
U12a	Conversion Gain (lower limit)	1 dB for each side band Range of angle: Circularly symmetric between bore sight and ± 35°	Greater or equal to the specified value for each side band within a circular cone around bore sight of ± 35° opening angle.
U12b	Conversion Gain (upper limit)	10 dB for each side band	Less than the specified value for each side band within a circular cone around bore sight of ± 35° opening angle. Applicability of this parameter is subject to sets and profiles defined in EN 13372.
U13	Preamble	Preamble is mandatory.	—
U13a	Preamble Length and Pattern	32 µs to 36 µs modulated with sub-carrier only, then 8 bits of NRZI coded “0” bits.	—
U13b	Trailing Bits	The OBU is permitted to transmit a maximum of 8 bits after the end flag. A RSU is not required to take these additional bits into account.	—

Annex A
(informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN member.

This European Standard does not fall under any Directive of the EC.

In the relevant CEN countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

Clause	Deviation
All	**Italy** (Decreto del Presidente della repubblica, 22 giugno 1999, n. 250; Regolamento recante norme per l'autorizzazione alla installazione e all'esercizio di impianti per la rilevazione degli accessi di veicoli ai centri storici e alle zone a traffico limitato, a norma dell'articolo 7, comma 133-*bis*, della legge 15 maggio 1997, n.127)

This Italian regulation prescribes the use of UNI 10607, which specifies a DSRC system that is incompatible with this European Standard.

Bibliography

- ECC/DEC(02)01: Electronic Communications Committee, CEPT, "ECC Decision of 15 March 2002 on the frequency bands to be designated for the coordinated introduction of Road Transport and Traffic Telematics Systems"

- CEPT/ERC Recommendation 70-03 (Tromsø 1997 and subsequent amendments) relating to the use of Short Range Devices (SRD)

- Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive), Official Journal of the European Communities, 7 April 1999