SLOVENSKI STANDARD

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Inteligentni transportni sistemi (ITS) - Specifikacija LTE-V2X dostopovne plasti pri inteligentnih transportnih sistemih, ki delujejo v frekvenčnem pasu 5 GHz

Intelligent Transport Systems (ITS) - LTE-V2X Access layer specification for Intelligent Transport Systems operating in the 5 GHz frequency band

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**Intelligent Transport Systems (ITS);
LTE-V2X Access layer specification for Intelligent Transport
Systems operating in the 5 GHz frequency band**

Reference

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Keywords

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Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee Intelligent Transport Systems (ITS), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

Modal verbs terminology

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Introduction

The present document outlines the access layer of the Sidelink (PC5 interface) of Long Term Evolution based Vehicle to Everything (LTE-V2X) communication technology ETSI TS 136 300 [2], which can be operated at the 5,9 GHz frequency band allocated in Europe. LTE-V2X access layer consists of RRC layer, PDCP layer, RLC layer, MAC layer and Physical layer. NAS layer is also introduced as part of access layer in the present document for the provision of control. The LTE-V2X standard also adds features for congestion control to avoid unstable behaviour and for CEN DSRC protection. The LTE-V2X standards are defined in ETSI TS 136 331 [1] and ETSI TS 136 414 [17].

Pedestrian is not defined in the present document.

1 Scope

The present document defines the physical layer and the data link layer and radio resource configuration, grouped into the access layer of the ITS station reference architecture ETSI EN 302 665 [i.2]. The access layer technology that is specified in the present document refers to what is known as the sidelink or PC5 interface of LTE Vehicle to everything (LTE-V2X) for the following frequency bands:

- Operation in frequency band dedicated to ITS for safety related applications in the frequency range 5,875 GHz to 5,925 GHz.

- Operation in frequency bands dedicated to ITS non-safety applications in the frequency range 5,855 GHz to 5,875 GHz.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 136 331 (V14.6.2): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification (3GPP TS 36.331 version 14.6.2 Release 14)".

[2] ETSI TS 136 300 (V14.7.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2 (3GPP TS 36.300 version 14.7.0 Release 14)".

[3] ETSI TS 136 321 (V14.7.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification (3GPP TS 36.321 version 14.7.0 Release 14)".

[4] ETSI TS 136 322 (V14.1.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Link Control (RLC) protocol specification (3GPP TS 36.322 version 14.1.0 Release 14)".

[5] ETSI TS 136 323 (V14.5.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Packet Data Convergence Protocol (PDCP) specification (3GPP TS 36.323 version 14.5.0 Release 14)".

[6] ETSI TS 136 211 (V14.7.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation (3GPP TS 36.211 version 14.7.0 Release 14)".

[7] ETSI TS 136 212 (V14.6.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding (3GPP TS 36.212 version 14.6.0 Release 14)".

[8] ETSI TS 136 213 (V14.6.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures (3GPP TS 36.213 version 14.6.0 Release 14)".

[9] ETSI TS 136 214 (V14.4.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer; Measurements (3GPP TS 36.214 version 14.4.0 Release 14)".

[10] ETSI TS 123 285 (V14.7.0): "Universal Mobile Telecommunications System (UMTS); LTE; Architecture enhancements for V2X services (3GPP TS 23.285 version 14.7.0 Release 14)".

[11]　　　　　ETSI TS 124 385 (V14.4.0): "LTE; V2X services Management Object (MO) (3GPP TS 24.385 version 14.4.0 Release 14)".

[12]　　　　　ETSI TS 124 386 (V14.3.0): "LTE; User Equipment (UE) to V2X control function; protocol aspects; Stage 3 (3GPP TS 24.386 version 14.3.0 Release 14)".

[13]　　　　　ETSI TS 136 101 (V14.7.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101 version 14.7.0 Release 14)".

[14]　　　　　ETSI TS 136 133 (V14.8.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management (3GPP TS 36.133 version 14.8.0 Release 14)".

[15]　　　　　ETSI TS 124 301 (V14.9.0): "Universal Mobile Telecommunications System (UMTS); LTE; 5G; Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3 (3GPP TS 24.301 version 14.9.0 Release 14)".

[16]　　　　　ETSI TS 136 413 (V14.7.0): "LTE; Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP) (3GPP TS 36.413 version 14.7.0 Release 14)".

[17]　　　　　ETSI TS 136 414 (V14.1.0): "LTE; Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 data transport (3GPP TS 36.414 version 14.1.0 Release 14)".

[18]　　　　　ETSI TS 102 792 (V1.2.1): "Intelligent Transport Systems (ITS); Mitigation techniques to avoid interference between European CEN Dedicated Short Range Communication (CEN DSRC) equipment and Intelligent Transport Systems (ITS) operating in the 5 GHz frequency range".

[19]　　　　　ETSI TS 103 574 (V1.1.1): "Intelligent Transport Systems (ITS); Congestion Control Mechanisms for C-V2X PC5 interface; Access layer part".

2.2　　　Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE:　　　While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1]　　　　Rafael Molina-Masegosa and Javier Gozalvez: "A New 5G Technology for Short-Range Vehicle-to-Everything Communications", IEEE vehicular technology magazine, December 2017.

[i.2]　　　　ETSI EN 302 665 (V1.1.1): "Intelligent Transport Systems (ITS); Communications Architecture".

[i.3]　　　　ETSI.EN 302 636-4-1 (V1.4.1): "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 4: Geographical addressing and forwarding for point-to-point and point-to-multipoint communications; Sub-part 1: Media-Independent Functionality".

[i.4]　　　　ETSI TS 124 334 (V14.1.0): "Universal Mobile Telecommunications System (UMTS); LTE; Proximity-services (ProSe) User Equipment (UE) to ProSe function protocol aspects; Stage 3 (3GPP TS 24.334 version 14.1.0 Release 14)".

3   Definition of terms, symbols and abbreviations

3.1   Terms

For the purposes of the present document, the terms given in ETSI EN 302 665 [i.2] and the following apply:

channel busy ratio: portion of sub-channels in the resource pool whose S-RSSI measured by the ITS station exceed a (pre-)configured threshold sensed over last 100 ms

> NOTE: This definition is access layer dependant and is specified in ETSI TS 136 214 [9].

channel occupancy ratio: fraction of the total number of sub-channels *used* by the ITS station for its transmissions out of the total number of *configured* (granted) sub-channels over a measurement period of 1 000 ms

> NOTE: This definition is access layer dependant and is specified in ETSI TS 136 214 [9].

PC5: interface between the ITS stations used for V2X sidelink communication

Resource Block (RB): 7 consecutive symbols in the time domain and 12 consecutive subcarriers in the frequency domain

resource pool: set of resources that can be used for PSCCH and PSSCH

> NOTE: Resource pool is defined with the help of start RB, number of sub-channels, size of sub-channel, and available subframes.

sidelink: radio link between the ITS stations for direct communication

sub-channel: set of contiguous physical resource blocks

3.2   Symbols

Void.

3.3   Abbreviations

For the purposes of the present document, the following abbreviations apply:

3GPP	3rd Generation Partnership Project
ASN.1	Abstract Syntax Notation One
CAM	Cooperative Awareness Message
CBR	Channel Busy Ratio
CEN	Comité Européen de Normalisation
CN	Core Network
CR	Channel Occupancy Ratio
DENM	Decentralized Environmental Notification Message
DSRC	Dedicated Short Range Communications
E-UTRA	Evolved Universal Terrestrial Radio Access
EUTRAN	Evolved Universal Terrestrial Radio Access Network
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
IP	Internet Protocol
ITS	Intelligent Transport Systems
LTE-V2X	Long Term Evolution based Vehicle-to-Everything
MAC	Medium Access Control
MCS	Modulation and Coding Scheme
MCS-RB	Modulation and Coding Scheme - Resource Blocks
MID	Medium Access Control IDentity
NAS	Non-Access Stratum
NS	Network Signalling value
PC5	Proximity-based Communication (Interface) 5

PDCP	Packet Data Convergence Protocol
PPPP	ProSe Per-Packet Priority
ProSe	Proximity-based Service
PSCCH	Physical Sidelink Control CHannel
PSSCH	Physical Sidelink Shared CHannel
QoS	Quality of Service
RAN	Radio Access Network
RB	Resource Block
RLC	Radio Link Control
RRC	Radio Resource Control
RSSI	Received Signal Strength Indication
RSU	Road Side Unit
SDU	Service Data Unit
TC	Traffic Class
TDD	Time Division Duplex
UE	User Equipment
V2X	Vehicle-to-Everything

4 General requirements

4.1 Architecture

The ITS station architecture specified in ETSI EN 302 665 [i.2] is in figure 4.1-1. LTE-V2X as defined in ETSI TS 136 300 [2] is one of the access layer technologies of the ITS station architecture.
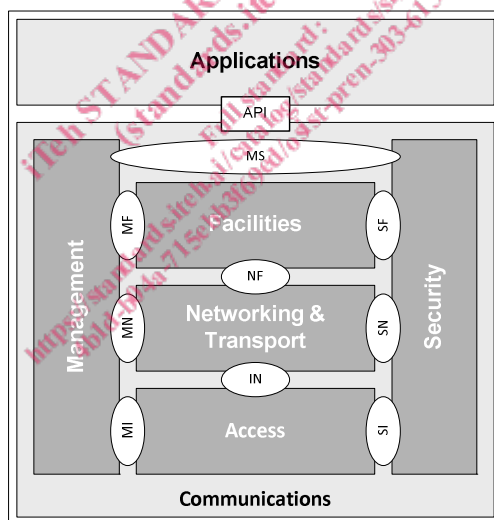

Figure 4.1-1: ITS station architecture