



SLOVENSKI STANDARD
oSIST prEN 303 797 V2.1.1:2024
01-januar-2024

Inteligentni transportni sistemi (ITS) - Dostopovna plast ITS-G5 v frekvenčnem pasu 5 GHz, izdaja 2

Intelligent Transport Systems (ITS) - ITS-G5 Access layer in the 5 GHz frequency band, Release 2

iTeh Standards
(<https://standards.iteh.ai>)

Ta slovenski standard je istoveten z: ETSI EN 303 797 V2.1.1 (2023-11)

[oSIST prEN 303 797 V2.1.1:2024](https://standards.iteh.ai/catalog/standards/sist/98f2636a-ec2c-49b0-90da-d55a07ef48e4/osist-pren-303-797-v2-1-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/98f2636a-ec2c-49b0-90da-d55a07ef48e4/osist-pren-303-797-v2-1-1-2024>

ICS:

35.240.60 Uporabniške rešitve IT v IT applications in transport
 prometu

oSIST prEN 303 797 V2.1.1:2024 **en**

Draft ETSI EN 303 797 V2.1.1 (2023-11)



**Intelligent Transport Systems (ITS);
ITS-G5 Access layer in the 5 GHz frequency band;**

ETSI Release 2

(<https://standards.iteh.ai>)

Document Preview

[oSIST prEN 303 797 V2.1.1:2024](https://standards.iteh.ai/catalog/standards/sist/98f2636a-ec2c-49b0-90da-d55a07ef48e4/osist-pren-303-797-v2-1-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/98f2636a-ec2c-49b0-90da-d55a07ef48e4/osist-pren-303-797-v2-1-1-2024>

ReferenceDEN/ITS-00445

KeywordsITS, layer 1, layer 2, MAC, profile, radio

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:

<https://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

If you find a security vulnerability in the present document, please report it through our
Coordinated Vulnerability Disclosure Program:

<https://www.etsi.org/standards/coordinated-vulnerability-disclosure>

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2023.
All rights reserved.

Contents

Intellectual Property Rights	4
Foreword.....	4
Modal verbs terminology.....	4
Introduction	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	6
3 Definition of terms, symbols and abbreviations.....	7
3.1 Terms.....	7
3.2 Symbols.....	7
3.3 Abbreviations	8
4 Access layer requirements.....	9
4.1 Introduction	9
4.2 Access layer architecture.....	10
4.3 Physical layer	10
4.3.1 Introduction.....	10
4.3.2 Mandatory MCSs.....	10
4.3.3 Transmitter requirements.....	10
4.3.4 Receiver requirements	11
4.3.5 Physical Layer parameters	12
4.4 MAC.....	12
4.5 Logical link control	12
4.6 Decentralized Congestion Control (DCC).....	13
4.6.1 Introduction.....	13
4.6.2 Channel Busy Ratio	13
4.7 CEN DSRC and HDR DSRC protection.....	15
5 ITS-G5 radio tests	15
5.1 Radio tests defined in ETSI EN 302 571.....	15
5.2 Additional radio tests.....	16
5.2.1 Dynamic receiver sensitivity.....	16
Annex A (normative): Channel models for testing dynamic sensitivity values.	17
Annex B (informative): Data and management service	19
B.1 Introduction	19
B.2 Access layer data service.....	19
B.3 Access layer management service.....	20
Annex C (informative): Bibliography.....	22
History	23

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

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

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The present document outlines the two lowest OSI layers - physical layer and data link layer - for the Cooperative ITS (C-ITS) direct ITS-S to ITS-S wireless AdHoc Networking communication protocol stack used in the 5,9 GHz frequency band as allocated in Europe in compliance with Commission Decision 2008/671/EC [i.1], ECC/DEC/(08)01 [i.2] and ECC/REC/(08)01 [i.3] and specified in the COMMISSION IMPLEMENTING DECISION (EU) 2020/1426 of 7 October 2020 [i.1]. The two lowest layers together form the access layer. The technology specified in the present document is part of the so called ITS-G5 stack.

In the ITS-G5 access layer, the data link layer is divided into two sublayers: Medium Access Control (MAC) and Logical Link Control (LLC). The physical layer and the medium access control layer are specified in IEEE 802.11TM-2020 [1] and corresponding extension IEEE 802.11bdTM-2022 [2]. The logical link control is based on the IEEE/ISO/IEC 8802-2-1998 [3].

ITS-G5 realizes AdHoc peer-to-peer mode communication functionality as defined in IEEE 802.11TM-2020 [1] and corresponding extension IEEE 802.11bdTM-2022 [2]. Operating profiles requiring synchronization and authentication as specified in IEEE 802.11TM-2020 [1] or any other version of 802.11TM are not supported. To manage congestion, ITS-G5 provides Decentralized Congestion Control (DCC) mechanisms as specified in clause 4.6. How to ensure coexistence with other systems is handled in clause 4.7.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[oSIST prEN 303 797 V2.1.1:2024](https://standards.iteh.ai/catalog/standards/sist/98f2636a-ec2c-49b0-90da-d55a07ef48e4/osist-pren-303-797-v2-1-1-2024)

<https://standards.iteh.ai/catalog/standards/sist/98f2636a-ec2c-49b0-90da-d55a07ef48e4/osist-pren-303-797-v2-1-1-2024>

1 Scope

The present document defines the access layer for ITS-G5 consisting of the physical layer and the data link layer, as part of the ITS station architecture.

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] [IEEE 802.11TM-2020](#): "IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks-Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".
- [2] [IEEE 802.11bdTM-2022](#): "IEEE Standard for Information technology- Tele- communications and information exchange between systems Local and metropolitan area networks- Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 5: Enhancements for Next Generation V2X".
- [3] [IEEE/ISO/IEC 8802-2-1998](#): "Information technology -- Telecommunications and information exchange between systems -- Local and metropolitan area networks -- Specific requirements -- Part 2: Logical Link Control".
- [4] <https://standards.iteh.ai/c> [IEEE 802TM-2014](#): "IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture".
- [5] [ETSI EN 302 571](#): "Intelligent Transport Systems (ITS); Radiocommunications equipment operating in the 5 855 MHz to 5 925 MHz frequency band; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".
- [6] [ETSI TS 102 792](#): "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".

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] [Commission Implementing Decision \(EU\) 2020/1426](#) of 7 October 2020 on the harmonised use of radio spectrum in the 5 875-5 935 MHz frequency band for safety-related applications of intelligent transport systems (ITS) and repealing Decision 2008/671/EC.
- [i.2] ECC/DEC/(08)01: "[ECC Decision \(08\)01 on the harmonised use of the band 5875-5925 MHz for Intelligent Transport Systems \(ITS\)](#)".
- [i.3] ECC/REC/(08)01: "[ECC Recommendation \(08\)01 on the use of the band 5855-5875 MHz for Intelligent Transport Systems \(ITS\)](#)".
- [i.4] ETSI TS 103 695: "Intelligent Transport Systems (ITS); Access layer specification in the 5 GHz frequency band; Multi-Channel Operation (MCO) for Cooperative ITS (C-ITS); Release 2".
- [i.5] ETSI TS 102 687: "Intelligent Transport Systems (ITS); Decentralized Congestion Control Mechanisms for Intelligent Transport Systems operating in the 5 GHz range; Access layer part".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

basic service set: smallest building block of an IEEE 802.11™ network

channel: instance of a Wireless Medium (WM) use for the purpose of passing physical layer (PHY) Protocol Data Units (PDUs) between two or more ITS-S's

NOTE: Unless otherwise stated the channel refers to a 10 MHz bandwidth.

Channel Busy Ratio (CBR): ratio between the time a receiver perceives a radio channel as busy and the total time, expressed as a percentage

coexistence: situation in which one radio system operates in an environment where another radio system having potentially different characteristics may be using the same or different channels, and radio systems are able to operate with some tolerable impact to each other

data rate: number of user data bits which can be transmitted in a stream per unit of time (EG/Mbs)

duty cycle: ratio between the transmitter T_{on} time and the total time, expressed as a percentage

ethertype: identifier to the network protocol above the data link layer

ITS-G5 access layer: access layer technology to be used in frequency bands dedicated for European Intelligent Transport Systems (ITS)

spectrum band: specific range of frequencies in the electromagnetic frequency spectrum assigned to specific applications

3.2 Symbols

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

aCW_{max}	Maximum value of Contention Window
aCW_{min}	Minimum value of Contention Window
$AIFS$	Arbitration InterFrame Space
$AIFSN$	Arbitration InterFrame Space Number
$aSIFSTime$	Short InterFrame Space defined by the physical layer
$aSlotTime$	A slot time defined by the physical layer

CW	Contention Window
CW_{max}	Maximum value of Contention Window
CW_{min}	Minimum value of Contention Window
CBR_{CH}	Channel busy ratio for a specific channel used by the MAC
C_{th}	congestion threshold
G_{max}^+	control parameter
G_{max}^-	control parameter
$GCBR$	Channel busy ratio provided by upper layers derived from all ITS-Ss active in the AdHoc network
$GCBR_{CH}$	Channel busy ratio for a specific channel provided by upper layers derived from all ITS-Ss active in the AdHoc network
$LCBR$	Channel busy ratio measured by the ITS-S
$LCBR_{CH}$	Channel busy ratio for a specific channel measured by the ITS-S
T_{Lbusy}	period of time the channel is busy for a given ITS-S
T_{LCBR}	period of time for a given ITS-S
T_{on}	duration of a transmission
T_{on_pp}	duration of the previous transmission
T_{off}	minimum time between two transmissions
N_{ss}	Number of spatial streams
δ	$T_{on} / (T_{on} + T_{off})$
α	control parameter α
β	control parameter β
δ_{max}	maximum value of δ
δ_{min}	minimum value of δ
δ_{offset}	offset value of δ
t	current system time
t_{go}	time when gate keeper opens
t_{pg}	time when the gate keeper closes

3.3 Abbreviations <https://standards.iteh.ai>

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

BPSK	Binary Phase Shift Keying
BSS	Basic Service Set
CAM	Cooperative Awareness Message
CBR	Channel Busy Ratio
CEN	European Committee for Standardization
CH	Channel
C-ITS	Cooperative Intelligent Transport Systems
DC	Duty Cycle
DCC	Decentralized Congestion Control
DCM	Dual Sub-Carrier Modulation
DSRC	Dedicated Short-Range Communication
DUT	Device Under Test
ECC	Electronic Communication Committee
EN	European Norm
EPD	EtherType Protocol Discrimination
FiFo	First in First out
GCBR	Global CBR
HalfBT	Half Bathtub
HDR	High Data Rate
ID	IDentifier
IEEE	Institute of Electrical and Electronics Engineers
ITS	Intelligent Transport Systems
ITS-S	Intelligent Transport Systems Station
LCBR	Local CBR
LLC	Logical Link Control
LOS	Line-Of-Sight
LPD	Low Probability of Detection