

# ETSI TS 138 201 V18.0.0 (2024-05)



**5G;  
NR;  
Physical layer;  
General description  
(3GPP TS 38.201 version 18.0.0 Release 18)**

[ETSI TS 138 201 V18.0.0 \(2024-05\)](https://standards.iteh.ai/etsi-ts-138-201-v18-0-0-2024-05)

<https://standards.iteh.ai/catalog/standards/etsi/db4e6efd-25a9-486e-a74e-d28ca9cfb22d/etsi-ts-138-201-v18-0-0-2024-05>



---

Reference

RTS/TSGR-0138201vi00

---

Keywords

5G

**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](https://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.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

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 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.

---

# 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.

---

## Legal Notice (<https://standards.iteh.ai>)

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables. (2024-05)

The cross reference between 3GPP and ETSI identities can be found under <https://webapp.etsi.org/key/queryform.asp>.

---

## 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.

---

## Contents

Intellectual Property Rights .....	2
Legal Notice .....	2
Modal verbs terminology.....	2
Foreword.....	4
1 Scope .....	5
2 References .....	5
3 Definitions of terms, symbols and abbreviations .....	5
3.1 Terms.....	5
3.2 Symbols.....	5
3.3 Abbreviations .....	5
4 General description of layer 1 .....	6
4.1 Relation to other layers.....	6
4.1.1 General protocol architecture.....	6
4.1.2 Service provided to higher layers .....	7
4.2 General description of layer 1 .....	7
4.2.1 Multiple access .....	7
4.2.2 Physical channels and modulation .....	7
4.2.3 Channel coding .....	8
4.2.4 Physical layer procedures .....	8
4.2.5 Physical layer measurements .....	8
5 Document structure of physical layer specification .....	8
5.1 Overview .....	8
5.2 TS 38.201: Physical layer; General description .....	9
5.3 TS 38.202: Physical layer services provided by the physical layer.....	9
5.4 TS 38.211: Physical channels and modulation .....	9
5.5 TS 38.212: Multiplexing and channel coding.....	10
5.6 TS 38.213: Physical layer procedures for control .....	10
5.7 TS 38.214: Physical layer procedures for data .....	10
5.8 TS 38.215: Physical layer measurements .....	10
5.9 TS 37.213: Physical layer procedures for shared spectrum channel access .....	10
Annex A (informative):      Preferred mathematical notations.....	12
Annex B (informative):      Change history .....	13
History .....	14

---

## Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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

[ETSI TS 138 201 V18.0.0 \(2024-05\)](#)

<https://standards.iteh.ai/catalog/standards/etsi/db4e6efd-25a9-486e-a74e-d28ca9cfb22d/etsi-ts-138-201-v18-0-0-2024-05>

## 1 Scope

The present document provides a general description of the physical layer of NR radio interface. The present document also describes the document structure of the 3GPP physical layer specifications, i.e. TS 38.200 series.

## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"
- [2] 3GPP TS 38.202: "NR; Services provided by the physical layer"
- [3] 3GPP TS 38.211: "NR; Physical channels and modulation"
- [4] 3GPP TS 38.212: "NR; Multiplexing and channel coding"
- [5] 3GPP TS 38.213: "NR; Physical layer procedures for control"
- [6] 3GPP TS 38.214: "NR; Physical layer procedures for data"
- [7] 3GPP TS 38.215: "NR; Physical layer measurements"

## iTeh Standards

## 3 Definitions of terms, symbols and abbreviations

### 3.1 Terms

### Document Preview

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

*Definition format*

**<defined term>: <definition>.**

**example:** text used to clarify abstract rules by applying them literally.

### 3.2 Symbols

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

*Symbol format*

<symbol>      <Explanation>

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

BPSK	Binary Phase Shift Keying
CP	Cyclic Prefix
DFT-s-OFDM	Discrete Fourier Transform-spread-Orthogonal Frequency Division Multiplexing
DU	Distributed Unit
E-UTRA	Evolved Universal Terrestrial Radio Access