

ETSI TS 138 108 V18.6.0 (2025-04)



5G;
NR;

**Satellite Access Node radio transmission and reception
(3GPP TS 38.108 version 18.6.0 Release 18)**

[ETSI TS 138 108 V18.6.0 \(2025-04\)](https://standards.iteh.ai/catalog/standards/etsi/ced142e0-8833-4104-be7f-84451bc8cbd5/etsi-ts-138-108-v18-6-0-2025-04)

<https://standards.iteh.ai/catalog/standards/etsi/ced142e0-8833-4104-be7f-84451bc8cbd5/etsi-ts-138-108-v18-6-0-2025-04>



ReferenceRTS/TSGR-0438108vi60

Keywords5G

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 the
[ETSI Search & Browse Standards application](#).

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 on [ETSI deliver repository](#).

Users should be aware that the present document may be revised or have its status changed,
this information is available in the [Milestones listing](#).

If you find errors in the present document, please send your comments to
the relevant service listed under [Committee Support Staff](#).

If you find a security vulnerability in the present document, please report it through our
[Coordinated Vulnerability Disclosure \(CVD\)](#) program.

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 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 2025.
All rights reserved.

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 IPR online database](#).

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™**, **LTE™** and **5G™** logo 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

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. (2025-04)

The cross reference between 3GPP and ETSI identities can be found at [3GPP to ETSI numbering cross-referencing](#).

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.....	10
1 Scope	12
2 References	12
3 Definitions, symbols and abbreviations	13
3.1 Definitions	13
3.2 Symbols.....	16
3.3 Abbreviations	17
4 General	18
4.1 Relationship with other core specifications.....	18
4.2 Relationship between minimum requirements and test requirements	18
4.3 Requirement reference points.....	18
4.3.1 SAN type 1-H	18
4.3.2 SAN type 1-O and SAN type 2-O.....	19
4.4 Satellite Access Node classes.....	20
4.5 Regional requirements.....	20
4.6 Applicability of minimum requirements	21
5 Operating bands and channel arrangement.....	22
5.1 General	22
5.2 Operating bands.....	23
5.3 Satellite Access Node channel bandwidth.....	23
5.3.1 General.....	23
5.3.2 Transmission bandwidth configuration.....	24
5.3.3 Minimum guardband and transmission bandwidth configuration.....	24
5.3.4 RB alignment	25
5.3.5 SAN channel bandwidth per operating band	26
5.4 Channel arrangement.....	26
5.4.1 Channel spacing.....	26
5.4.1.1 Channel spacing for adjacent carriers	26
5.4.2 Channel raster	27
5.4.2.1 NR-ARFCN and channel raster.....	27
5.4.2.1A NB-IoT carrier frequency numbering.....	27
5.4.2.2 Channel raster to resource element mapping.....	27
5.4.2.3 Channel raster entries for each <i>operating band</i>	28
5.4.3 Synchronization raster	29
5.4.3.1 Synchronization raster and numbering.....	29
5.4.3.2 Synchronization raster to synchronization block resource element mapping.....	29
5.4.3.3 Synchronization raster entries for each operating band.....	29
6 Conducted transmitter characteristics	30
6.1 General	30
6.2 Satellite Access Node output power	30
6.2.1 General.....	30
6.2.2 Minimum requirement for <i>SAN type 1-H</i>	30
6.3 Output power dynamics.....	30
6.3.1 General.....	30
6.3.2 RE power control dynamic range	31
6.3.2.1 General	31
6.3.2.2 Minimum requirement for <i>SAN type 1-H</i>	31
6.3.3 Total power dynamic range	31
6.3.3.1 General	31

6.3.3.2	Minimum requirement for <i>SAN type 1-H</i>	31
6.3.4	NB-IoT RB power dynamic range for NB-IoT operation in NTN NR in-band	32
6.3.4.1	General	32
6.3.4.2	Minimum Requirement	32
6.4	Transmit ON/OFF power	32
6.5	Transmitted signal quality	32
6.5.1	Frequency error	32
6.5.1.1	General	32
6.5.1.2	Minimum requirement for <i>SAN type 1-H</i>	32
6.5.2	Modulation quality	33
6.5.2.1	General	33
6.5.2.2	Minimum Requirement for <i>SAN type 1-H</i>	33
6.5.2.3	EVM frame structure for measurement	33
6.5.3	Time alignment error	33
6.6	Unwanted emissions	33
6.6.1	General	33
6.6.2	Occupied bandwidth	34
6.6.2.1	General	34
6.6.2.2	Minimum requirement for <i>SAN type 1-H</i>	34
6.6.3	Adjacent Channel Leakage Power Ratio	34
6.6.3.1	General	34
6.6.3.2	Minimum requirement for <i>SAN type 1-H</i>	34
6.6.4	Out-of-band emissions	35
6.6.4.1	General	35
6.6.4.2	<i>Basic limits</i>	35
6.6.4.3	Minimum requirements for <i>SAN type 1-H</i>	36
6.6.5	Transmitter spurious emissions	36
6.6.5.1	General	36
6.6.5.2	<i>Basic limits</i>	36
6.6.5.2.1	General transmitter spurious emissions requirements	36
6.6.5.2.2	Protection of the own Satellite Access Node receiver	37
6.6.5.2.3	Additional spurious emissions requirements	37
6.6.5.2.4	Co-location with other Satellite Access Nodes	37
6.6.5.3	Minimum requirements for <i>SAN type 1-H</i>	37
6.7	Transmitter intermodulation	37
7	Conducted receiver characteristics	37
7.1	General	37
7.2	Reference sensitivity level	38
7.2.1	General	38
7.2.2	Minimum requirements for <i>SAN type 1-H</i>	38
7.3	Dynamic range	39
7.3.1	General	39
7.3.2	Minimum requirements for <i>SAN type 1-H</i>	39
7.4	In-band selectivity and blocking	40
7.4.1	Adjacent Channel Selectivity (ACS)	40
7.4.1.1	General	40
7.4.1.2	Minimum requirements for <i>SAN type 1-H</i>	40
7.4.2	In-band blocking	41
7.5	Out-of-band blocking	41
7.5.1	General	41
7.5.2	Minimum requirements for <i>SAN type 1-H</i>	41
7.6	Receiver spurious emissions	42
7.6.1	Void	42
7.6.2	Void	42
7.7	Receiver intermodulation	42
7.8	In-channel selectivity	42
7.8.1	General	42
7.8.2	Minimum requirements for <i>SAN type 1-H</i>	43
8	Conducted performance requirements	44
8.1	General	44

8.2	Performance requirements for PUSCH	45
8.2.1	Requirements for PUSCH with transform precoding disabled	45
8.2.1.1	General	45
8.2.1.2	Minimum requirements	45
8.2.2	Requirements for PUSCH with transform precoding enabled	47
8.2.2.1	General	47
8.2.2.2	Minimum requirements	47
8.2.3	Requirements for UL timing adjustment	49
8.2.3.2	Minimum requirements	50
8.2.4	Requirements for PUSCH repetition Type A	51
8.2.4.1	General	51
8.2.4.2	Minimum requirements	51
8.2.5	Requirements for PUSCH with DM-RS bundling	52
8.2.5.1	General	52
8.2.5.2	Minimum requirements	53
8.3	Performance requirements for PUCCH	54
8.3.1	DTX to ACK probability	54
8.3.1.1	General	54
8.3.1.2	Minimum requirement	54
8.3.2	Performance requirements for PUCCH format 0	54
8.3.2.1	General	54
8.3.2.2	Minimum requirements	55
8.3.3	Performance requirements for PUCCH format 1	55
8.3.3.1	NACK to ACK requirements	55
8.3.3.1.1	General	55
8.3.3.1.2	Minimum requirements	56
8.3.3.2	ACK missed detection requirements	56
8.3.3.2.1	General	56
8.3.3.2.2	Minimum requirements	57
8.3.4	Performance requirements for PUCCH format 2	57
8.3.4.1	ACK missed detection requirements	57
8.3.4.1.1	General	57
8.3.4.1.2	Minimum requirements	57
8.3.4.2	UCI BLER performance requirements	58
8.3.4.2.1	General	58
8.3.4.2.2	Minimum requirements	58
8.3.5	Performance requirements for PUCCH format 3	59
8.3.5.1	General	59
8.3.5.2	Minimum requirements	59
8.3.6	Performance requirements for PUCCH format 4	60
8.3.6.1	General	60
8.3.6.2	Minimum requirement	60
8.3.7	Performance requirements for multi-slot PUCCH	61
8.3.7.1	General	61
8.3.7.2	Performance requirements for multi-slot PUCCH format 1	61
8.3.7.2.1	NACK to ACK requirements	61
8.3.7.2.2	ACK missed detection requirements	62
8.4	Performance requirements for PRACH	63
8.4.1	PRACH False alarm probability	63
8.4.1.1	General	63
8.4.1.2	Minimum requirement	63
8.4.2	PRACH detection requirements	63
8.4.2.1	General	63
8.4.2.2	Minimum requirements	63
9	Radiated transmitter characteristics	64
9.1	General	64
9.2	Radiated transmit power	64
9.2.1	General	64
9.2.2	Minimum requirement for <i>SAN type 1-H</i> and <i>SAN type 1-O</i>	65
9.2.3	Minimum requirement for <i>SAN type 2-O</i>	65
9.3	OTA Satellite Access Node output power	65

9.3.1	General.....	65
9.3.2	Minimum requirement for <i>SAN type 1-O</i>	65
9.3.3	Minimum requirement for <i>SAN type 2-O</i>	66
9.4	OTA output power dynamics	66
9.4.1	General.....	66
9.4.2	OTA RE power control dynamic range	66
9.4.2.1	General	66
9.4.2.2	Minimum requirement for <i>SAN type 1-O</i>	66
9.4.3	OTA total power dynamic range.....	66
9.4.3.1	General	66
9.4.3.2	Minimum requirement for <i>SAN type 1-O</i>	66
9.4.3.3	Minimum requirement for <i>SAN type 2-O</i>	66
9.4.4	NB-IoT RB power dynamic range for NB-IoT operation in NTN NR in-band	67
9.4.4.1	General	67
9.4.4.2	Minimum Requirement	67
9.5	OTA transmit ON/OFF power.....	67
9.6	OTA transmitted signal quality	67
9.6.1	OTA frequency error	67
9.6.1.1	General	67
9.6.1.2	Minimum requirement for <i>SAN type 1-O</i>	68
9.6.1.3	Minimum requirement for <i>SAN type 2-O</i>	68
9.6.2	OTA modulation quality	68
9.6.2.1	General	68
9.6.2.2	Minimum requirement for <i>SAN type 1-O</i>	68
9.6.2.3	Minimum requirement for <i>SAN type 2-O</i>	68
9.6.2.3.1	EVM frame structure for measurement	68
9.6.2.3.2	EVM frame structure for measurement	68
9.6.3	OTA time alignment error	68
9.7	OTA unwanted emissions	69
9.7.1	General.....	69
9.7.2	OTA occupied bandwidth.....	69
9.7.2.1	General	69
9.7.2.2	Minimum requirement for <i>SAN type 1-O</i> and <i>SAN type 2-O</i>	69
9.7.3	OTA Adjacent Channel Leakage Power Ratio (ACLR)	69
9.7.3.1	General	69
9.7.3.2	Minimum requirement for <i>SAN type 1-O</i>	69
9.7.3.3	Minimum requirement for <i>SAN type 2-O</i>	70
9.7.4	OTA out-of-band emissions.....	70
9.7.4.1	General	70
9.7.4.2	Minimum requirement for <i>SAN type 1-O</i>	70
9.7.4.3	Minimum requirement for <i>SAN type 2-O</i>	71
9.7.5	OTA transmitter spurious emissions.....	71
9.7.5.1	General	71
9.7.5.2	Minimum requirement for <i>SAN type 1-O</i>	71
9.7.5.2.1	General	71
9.7.5.2.2	General OTA transmitter spurious emissions requirements	71
9.7.5.2.3	Protection of the SAN receiver.....	72
9.7.5.2.4	Additional spurious emissions requirements	72
9.7.5.3	Minimum requirement for <i>SAN type 2-O</i>	72
9.7.5.3.1	General	72
9.7.5.3.2	General OTA transmitter spurious emissions requirements.....	72
9.7.5.3.3	Protection of the SAN receiver.....	72
9.7.5.3.4	Additional spurious emissions requirements	72
9.8	OTA transmitter intermodulation	72
10	Radiated receiver characteristics	73
10.1	General	73
10.2	OTA sensitivity	73
10.2.1	General	73
10.2.2	Minimum requirement for <i>SAN type 1-O</i>	74
10.3	OTA reference sensitivity level.....	74
10.3.1	General.....	74