ETSI TS 101 851-5-1 V2.1.1 (2008-01)

Technical Specification

Satellite Earth Stations and Systems (SES);
Satellite Component of UMTS/IMT-2000;
Part 5: UE Radio Transmission and Reception;
Sub-part 1: G-family (S-UMTS-G 25.101)

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce7a0d7-c91d-4a5c-bc6c-8c48ca123fc6/etsi-ts-101-851-5-1-v2.1.1-2008-01

Reference
DTS/SES-00256-5

Keywords
FDD, IMT-2000, radio, satellite, transmission, UMTS, WCDMA

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 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce7a0d7-9f1f-4a5c-b6c-8c8ca123fc6/etsi-ts-101-851-5-1-v2.1.1-2008-01

Important notice

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

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
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, please send your comment to one of the following services:
http://portal.etsi.org/chaircor/ETSI_support.asp

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2008.
All rights reserved.

DECT™, **PLUGTESTS**™, **UMTS**™, **TIPHON**™, the TIPHON logo and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

Contents

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce7a0d7-c91d-4a5c-be6c-8c48ca123fc6/etsi-ts-101-851-5-1-v2.1.1-2008-01

iTeh STANDARD PREVIEW
(standards.iteh.ai)
https://standards.iteh.ai/catalog/standards/sist/2ce7a0d7-c911-4a5c-be6c-8c49e3123fc6/etsi-ts-101-851-5-1-v2.1.1-2008-01

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce7a0d7-c91d-4a5c-be6c-8c48ca123fc6/etsi-ts-101-851-5-1-v2.1.1-2008-01

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is 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 (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, 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.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The present document is specifying the Satellite Radio Interface referenced as SRI Family G at ITU-R, in the frame of the modification of ITU-R Recommendation M.1457-5 [10]. This modification has been approved at ITU-R SG8 meeting in November 2005.

The present document is part 5, sub-part 1 of a multi-part deliverable covering Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; G-family, as identified below:

Part 1: "Physical channels and mapping of transport channels into physical channels";

Part 2: "Multiplexing and channel coding";

Part 3: "Spreading and modulation";

Part 4: "Physical layer procedures";

Part 5: "UE Radio Transmission and Reception";

Sub-part 1: "G-family (S-UMTS-G 25.101)";

Part 6: "Ground stations and space segment radio transmission and reception".

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce7a0b7-c9e1-4a5c-bc6c-8c48ca123fc6/etsi-ts-101-851-5-1-v2.1.1-2008-01

Introduction

S-UMTS stands for the Satellite component of the Universal Mobile Telecommunication System. S-UMTS systems will complement the terrestrial UMTS (T-UMTS) and inter-work with other IMT-2000 family members through the UMTS core network. S-UMTS will be used to deliver 3rd generation mobile satellite services (MSS) utilizing either low (LEO) or medium (MEO) earth orbiting, or geostationary (GEO) satellite(s). S-UMTS systems are based on terrestrial 3GPP specifications and will support access to GSM/UMTS core networks.

NOTE 1: The term T-UMTS will be used in the present document to further differentiate the Terrestrial UMTS component.

Due to the differences between terrestrial and satellite channel characteristics, some modifications to the terrestrial UMTS (T-UMTS) standards are necessary. Some specifications are directly applicable, whereas others are applicable with modifications. Similarly, some T-UMTS specifications do not apply, whilst some S-UMTS specifications have no corresponding T-UMTS specification.

Since S-UMTS is derived from T-UMTS, the organization of the S-UMTS specifications closely follows the original 3rd Generation Partnership Project (3GPP) structure. The S-UMTS numbers have been designed to correspond to the 3GPP terrestrial UMTS numbering system. All S-UMTS specifications are allocated a unique S-UMTS number as follows:

S-UMTS-n xx.yyy

Where:

- The numbers xx and yyy correspond to the 3GPP-numbering scheme.
- n (n=A, B, C, …) denotes the family of S-UMTS specifications.

An S-UMTS system is defined by the combination of a family of S-UMTS specifications and 3GPP specifications, as follows:

- If an S-UMTS specification exists it takes precedence over the corresponding 3GPP specification (if any). This precedence rule applies to any references in the corresponding 3GPP specifications.

NOTE 2: Any references to 3GPP specifications within the S-UMTS specifications are not subject to this precedence rule. For example, an S-UMTS specification may contain specific references to the corresponding 3GPP specification.

- If an S-UMTS specification does not exist, the corresponding 3GPP specification may or may not apply. The exact applicability of the complete list of 3GPP specifications shall be defined at a later stage.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce...-c91d-4a5c-bc6c-8c48ca123fc6/etsi-ts-101-851-5-1-v2.1.1-2008-01

1 Scope

The present document is to establish the minimum RF characteristics for the User Equipment (UE).

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

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

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce7a0d7-c91c-45c-bc6c-8c48ca123556/etsi-ts-101-851-5-1-v2.1.1-2008-01

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI TS 101 851-1-1: "Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Part 1: Physical channels and mapping of transport channels into physical channels; Sub-part 1: G-family (S-UMTS-G 25.211)".

[2] ETSI TS 101 851-2-1: "Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Part 2: Multiplexing and channel coding; Sub-part 1: G-family (S-UMTS-G 25.212)".

[3] ETSI TS 101 851-3-1: "Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Part 3: Spreading and modulation; Sub-part 1: G-family (S-UMTS-G 25.213)".

[4] ETSI TS 101 851-4-1: "Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Part 4: Physical layer procedures; Sub-part 1: G-family (S-UMTS-G 25.214)".

[5] ETSI TR 121 905: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Vocabulary for 3GPP Specifications (3GPP TR 21.905)".

[6] ETSI TS 125 101: "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (FDD) (3GPP TS 25.101)".

[7] ETSI TS 125 306: "Universal Mobile Telecommunications System (UMTS); UE Radio Access capabilities (3GPP TS 25.306)".

[8] ETSI TBR 042: "Satellite Personal Communications Networks (S-PCN); Mobile Earth Stations (MES), including handheld earth stations, for S-PCN in the 2,0 GHz bands under the Mobile Satellite Service (MSS); Terminal essential requirements".

[9] ETSI TS 145 004: "Digital cellular telecommunications system (Phase 2+); Modulation (3GPP TS 45.004)".

2.2 Informative references

[10] ITU-R Recommendation M.1457-5: "Detailed specifications of the radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)".

[11] ETSI TR 102 058: "Satellite Earth Stations and Systems (SES); Satellite Component of UMTS/IMT-2000; Evaluation of the W-CDMA UTRA FDD as a Satellite Radio Interface".

[12] ETSI TR 102 277: "Satellite Earth Stations and Systems (SES);Satellite Component of UMTS/IMT-2000;W-CDMA Radio Interface for Multimedia Broadcast/Multicast Service (MBMS)".

[13] ITU-R Recommendation SM.329: "Unwanted emissions in the spurious domain".

[14] IEC publications 68-2-1: "Environmental testing - Part 2-1: Tests - Test A: Cold".

[15] IEC publications 68-2-2: "Environmental testing - Part 2-2: Tests - Test B: Dry heat".

3 Definitions symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 101 851-2-1 [2] and the following apply:

Adjacent Channel Leakage power Ratio (ACLR): ratio of the RRC filtered mean power centred on the assigned channel frequency to the RRC filtered mean power centred on an adjacent channel frequency

Adjacent Channel Selectivity (ACS): measure of a receiver's ability to receive a W-CDMA signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s)

Block Error Rate (BLER): error rate of the transport (data) blocks passed by the physical layer to MAC layer for a given transport channel (i.e. physical layer error rate)

Complementary Ground Component (CGC): ground-based infrastructure at fixed locations used to enhance satellite coverage in zones where communications with one or several space stations cannot be ensured with the required quality

Enhanced performance requirements type 1: performance requirements which are optional for the UE. The requirements are based on UEs which utilize receiver diversity

Transmission Time Interval: interval of time over which a transport block is transmitted; multiple transport blocks may be transmitted in a transmission time interval per transport channel

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce7a0d7-d10d-4a5c-bcc5-8c48ca123fc6/etsi-ts-101-851-5-1-v2.1.1-2008-01

3.2 Symbols

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

α	Roll-off factor
β	Beta factor
$DPCH\_E_c$	Average energy per PN chip for DPCH
$\frac{DPCH\_E_c}{I_{or}}$	The ratio of the transmit energy per PN chip of the DPCH to the total transmit power spectral density at the Node B antenna connector
E_c	Average energy per PN chip
$\frac{E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for different fields or physical channels to the total transmit power spectral density
F_{uw}	Frequency of unwanted signal. This is specified in bracket in terms of an absolute frequency(s) or a frequency offset from the assigned channel frequency
I_o	The total received power spectral density, including signal and interference, as measured at the UE antenna connector
I_{oc}	The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited white noise source (simulating interference from cells, which are not defined in a test procedure) as measured at the UE antenna connector
I_{or}	The total transmit power spectral density (integrated in a bandwidth of (1+α) times the chip rate and normalized to the chip rate) of the downlink signal at the Node B antenna connector
$\hat{I}_{or}$	The received power spectral density (integrated in a bandwidth of (1+α) times the chip rate and normalized to the chip rate) of the downlink signal as measured at the UE antenna connector
$P-CCPCH\ \frac{E_c}{I_o}$	The ratio of the received P-CCPCH energy per chip to the total received power spectral density at the UE antenna connector
$\frac{P-CCPCH\_E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for the P-CCPCH to the total transmit power spectral density
<REFSENS>	Reference sensitivity
$<REF\ \hat{I}_{or}>$	Reference $\hat{I}_{or}$
$S-CCPCH\_E_c$	Average energy per PN chip for S-CCPCH

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2e57f0d7-91d-4a5c-bc6c-8c8ca1231c/etsi-ts-101-851-5-1-v2.1.1-2008-01

3.3 Abbreviations

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

ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
AICH	Acquisition Indication CHannel
AWGN	Additive White Gaussian Noise
BCH	Broadcast CHannel
BER	Bit Error Ratio
BLER	BLock Error Ratio
CDP	Code Domain Power
CGC	Complementary Ground Component
CW	Continuous Wave (un-modulated signal)
DCCH	Dedicated Control CHannel
DCH	Dedicated Channel
DL	Down Link (forward link)
DPCCH	Dedicated Physical Control CHannel
DPCH	Dedicated Physical CHannel
DPDCH	Dedicated Physical Data CHannel

DTCH	Dedicated Traffic CHannel
DTX	Discontinuous Transmission
ECDP	Effective Code Domain Power
EVM	Error Vector Magnitude
LEO	Low Earth Orbit
LOS	Line Of Sight
MBMS	Multimedia Broadcast Multicast Service
NLOS	No Line Of Sight
OCNS	Orthogonal Channel Noise Simulator

NOTE: A mechanism used to simulate the users or control signals on the other orthogonal channels of a downlink link.

P-CCPCH	Primary Common Control Physical CHannel
PCH	Paging Channel
P-CPICH	Primary Common PIlot CHannel
PICH	Paging Indicator CHannel
PPM	Parts Per Million
PRACH	Physical Random Access CHannel
RACH	Random Access CHannel
RF	Radio Frequency
RRC	Root-Raised Cosine
S-CCPCH	Secondary Common Control Physical CHannel
SCH	Synchronization CHannel

NOTE: Consisting of Primary and Secondary synchronization channels.

TFC	Transport Format Combination
TFCI	Transport Format Combination Indicator
Tol	Tolerance
TPC	Transmit Power Control
UARFCN	USRA Absolute Radio Frequency Channel Number
UE	User Equipment
UL	Up Link (reverse link)
USRA	UMTS Satellite Radio Access
TFCS	Transport Format Combination Set

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce7a0d7-c91d-4a5c-bc6c-8c48ca123fc/etsi-ts-101-851-5-1-v2.1.1-2008-01

4 General

4.1 Introduction

In the event of conflict between the present specification and any applicable ETSI harmonized standard for UE operating in the 2 170 MHz to 2 200 MHz (space-to-earth) and 1 980 MHz to 2 010 MHz (earth-to-space) frequency bands, the Harmonized Standard takes precedence.

4.2 Relationship between Minimum Requirements and Test Requirements

Void.

4.3 Control and monitoring functions

This requirement verifies that the control and monitoring functions of the UE prevent it from transmitting if no acceptable spot/CGC cell can be found by the UE.

4.3.1 Minimum requirement

The power of the UE, as measured with a thermal detector, shall not exceed -30 dBm if no acceptable spot/CGC cell can be found by the UE.

5 Frequency bands and channel arrangement

5.1 General

The information presented in this clause is based on a chip rate of 3,84 Mcps.

5.2 Frequency bands

S-UMTS is designed to operate in either of the following paired bands:

Table 5.1: Frequency bands

Operating Band	UL Frequencies UE transmit, satellite receive	DL frequencies UE receive, satellite transmit
I	1 980 MHz to 2 010 MHz	2 170 - 2 200 MHz

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2cc1e8a3-c91d-4a5c-bc6c-3c3aa124fc6/etsi-ts-101-851-5-1-v2.1.1-2008-01

5.3 TX-RX frequency separation

S-UMTS is designed to operate with the following TX-RX frequency separation:

Table 5.2: Tx-Rx frequency separation

Operating Band	TX-RX frequency separation
I	190 MHz To be checked if we could reduce to 160 MHz

S-UMTS can support both fixed and variable transmit to receive frequency separation.

5.4 Channel arrangement

5.4.1 Channel spacing

The nominal channel spacing is 5 MHz, but this can be adjusted to optimize performance in a particular deployment scenario.

5.4.2 Channel raster

The channel raster is 200 kHz, which means that the centre frequency must be an integer multiple of 200 kHz.

5.4.3 Channel number

The carrier frequency is designated by the USRA Absolute Radio Frequency Channel Number (UARFCN).

The UARFCN values are defined as follows:

Table 5.3: UARFCN definition

	UARFCN	Carrier frequency [MHz]
Uplink	$N_u = 5 * F_{uplink}$	1 982,5 MHz ≤ F_{uplink} ≤ 2 007,5 MHz where F_{uplink} is the uplink frequency in MHz
Downlink	$N_d = 5 * F_{downlink}$	2 172,5 MHz ≤ $F_{downlink}$ ≤ 2 197,5 MHz where $F_{downlink}$ is the downlink frequency in MHz

5.4.4 UARFCN

The following UARFCN range shall be supported for each paired band.

Table 5.4: UTRA Absolute Radio Frequency Channel Number

Operating Band	Uplink UE transmit, satellite receive	Downlink UE receive, satellite transmit
I	9 912 to 10 038	10 862 to 10 988

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/2ce7a0d7-c6cd-4a5c-ce6c-8c4bca123ce6/ets-ts-101-851-5-1-v2.1.1-2008-01

6 Transmitter Characteristics

6.1 General

Unless otherwise stated the transmitter characteristic are specified at the antenna connector of the UE. For UE with integral antenna only, a reference antenna with a gain of 0 dBi is assumed.

The UE antenna performance has a significant impact on system performance, and minimum requirements on the antenna efficiency are therefore intended to be included in future versions of the present document. It is recognized that different requirements and test methods are likely to be required for the different types of UE.

All the parameters in clause 6 are defined using the UL reference measurement channel (4,75 kbit/s) specified in clause A.2.1 and unless stated with the UL power control ON.

6.2 Transmission power

6.2.1 UE Maximum output power

The following Power Classes define the nominal maximum output power. The nominal power defined is the broadband transmit power of the UE, i.e. the power in a bandwidth of at least (1 + α) times the chip rate of the radio access mode (α : roll off factor). The period of measurement shall be at least one timeslot.

Table 6.1: UE Power Classes

Operating Band	Power Class 1		Power Class 2		Power Class 3		Power Class 4	
	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)
Band I	+33	+1/-3	+27	+1/-3	+24	+1/-3	+39	+1/-3

6.2.2 UE Relative code domain power accuracy

The UE Relative code domain power accuracy is a measure of the ability of the UE to correctly set the level of individual code powers relative to the total power of all active codes. The measure of accuracy is the difference between two dB ratios:

UE Relative CDP accuracy = (Measured CDP ratio) - (Nominal CDP ratio)