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Satellite Earth Stations and Systems (SES);
Harmonised Standard for NGSO Mobile Earth Stations (MESs) including handheld earth stations, for Satellite Personal Communications Networks (S-PCN) operating in the 1 980 MHz to 2 010 MHz (earth-to-space) and 2 170 MHz to 2 200 MHz (space-to-earth) frequency bands under the Mobile Satellite Service (MSS) covering the essential requirements of article 3.2 of the Directive 2014/53/EU

Reference
REN/SES-00384

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Foreword

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

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.2] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [7].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
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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 is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the Directive 2014/53/EU [7]. The modular structure is shown in ETSI EG 201 399 [i.1].

1 Scope

The present document applies to Mobile Earth Station (MES) radio equipment which have the following characteristics:

- these MES operate in a non-geostationary orbit (NGSO) mobile-satellite system;
- these MES have both transmit and receive capabilities and operate in a Satellite-Personal Communications Network (S-PCN). An S-PCN MES may be handheld, portable, vehicle-mounted, host connected, semi-fixed or fixed equipment, or may be an element in a multi-mode terminal. It may consist of a number of modules with associated connections and user interface, or may be a self-contained single unit;
- these LMESs are controlled and monitored by a Network Control Facility (NCF). The NCF is outside the scope of the present document;
- if the MES is an element in a multi-mode terminal, unless otherwise stated in the present document, its requirements apply only to the S-PCN MES element of the terminal operating in the MSS frequency bands given in table 1;
- these MES are capable in operating in all or part of the frequency bands shown in table 1.

Table 1: Mobile Satellite Service (MSS) frequency bands

MES	MSS frequency bands
Transmit (earth to space)	1 980 MHz to 2 010 MHz
Receive (space to earth)	2 170 MHz to 2 200 MHz

The present document is intended to cover the provisions of Directive 2014/53/EU [7] (RE Directive) article 3.2 which states that "….*radio equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference*".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of Article 3 of the Directive 2014/53/EU [7] may apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the ETSI web site.

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 http://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] Void.

[2] Recommendation ITU-T O.153 (1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".

[3] IEC 60068-2-1 (March 2007): "Environmental testing - Part 2-1: Tests - Test A: Cold".

[4] IEC 60068-2-2 (July 2007): "Environmental testing - Part 2-2: Tests - Test B: Dry heat".

[5] IEC 60068-2-64 (April 2008) Ed. 2.0: "Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance".

[6] Void.

[7] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

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.

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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] ETSI EG 201 399 (V3.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of Harmonized Standards for application under the Radio & Telecommunication Terminal Equipment Directive 1999/5/EC (R&TTE) and a first guide on the impact of the Radio Equipment Directive 2014/53/EU (RED) on Harmonized Standards".

[i.2] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the Directive 2014/53/EU [7] and the following apply:

applicant: manufacturer or his representative within the European Community or the person responsible for placing the apparatus on the market

carrier-off state (idle mode): state in which the MES is not transmitting a carrier

carrier-on state (allocated a channel): state in which the MES is transmitting a carrier

conducted measurement: measurement of emissions from an antenna port of the MES made by direct wired connection to the port

environmental profile: range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

Equivalent Isotropically Radiated Power (EIRP): product of transmitter power and maximum antenna gain, equivalent to an isotropic source radiating uniformly in all directions

handheld: state in which the MES is transmitting a carrier PE MES which is self-contained and is small enough and light enough to be carried and used during a call with one hand

host-connected: state in which the MES is transmitting a carrier MES for which connection to or integration with host equipment is necessary to offer functionality

host equipment: any equipment which has a complete user functionality when not connected to the MES, and to which the MES provides additional functionality, and to which connection is necessary for the MES to offer functionality

in-band signals: signals which are located in the operating band plus an offset of 10 MHz outside this operating band

Installable Equipment (IE), Internally Mounted Equipment (IME) and Externally Mounted Equipment (EME): Installable Equipment (IE) is an equipment which is intended to be installed in a vehicle

NOTE: An IE may consist of one or several interconnected modules. The IE is composed of modules intended to be externally mounted as declared by the applicant, and defined as Externally Mounted Equipment (EME) and the remaining modules(s) as Internally Mounted Equipment (IME).

Laboratory Test Equipment (LTE): logical grouping that contains the standard test equipment provided by a test laboratory

MSS band: continuous range of frequencies allocated by the ITU to the MSS

multi-mode: equipment that accommodates radio stations of different radio networks

narrow-band system: narrow band system is one in which the nominal carrier frequency spacing for MESs in the earth-to-space direction is less than 300 kHz

NCF control message: message, normally originating from a network, to a specified terminal or set of terminals of the network which indicates to the terminal or set of terminals that it/they should carry out some specific action or should enter or maintain some specific state

NOTE: For test purposes NCF control messages may originate from Special Test Equipment (STE).

network control channel: channel by which an MES receives general control information from the NCF of its S-PCN

nominated bandwidth (Bn): Bn of the Mobile Earth Station (MES) radio frequency transmission is wide enough to encompass all spectral elements of the transmission which have a level greater than the specified levels of unwanted emissions

NOTE 1: The Bn is defined relative to the MES actual carrier frequency f_c.

Bn is the width of the frequency interval (f_c -a, f_c +b), where a and b, which should be specified by the applicant, may vary with f_c.

The frequency interval (f_c -a, f_c +b) should not encompass more than either:

i) when a = b, 4 nominal carrier frequencies for narrow-band systems;

ii) when a ≠ b, 1 nominal carrier frequency for narrow-band systems; or

iii) 1 nominal carrier frequency for wide-band systems.

The frequency interval (f_c -a, f_c +b) should be within the operational band of the MES.

NOTE 2: Explanation of nominated bandwidth is presented in annex B.

operational band: sub-portion of the band 1 980 MHz to 2 010 MHz which has been assigned in the earth-to-space direction to the MSS network, within which the MES is operating

Portable Equipment (PE): Portable Equipment (PE) is generally intended to be self-contained, free standing and portable

NOTE: A PE would normally consist of a single module, but may consist of several interconnected modules.

radiated measurement: measurement of an actual radiated field

Special Test Equipment (STE): equipment which allows a test laboratory to control the MES so that the tests required by the present document can be performed

test laboratory: laboratory which performs the conformance testing of the MES against the present document. The test laboratory may be the applicant's laboratory

test load: test load is a substantially non-reactive, non-radiating power attenuator which is capable of safely dissipating the power from the transmitter(s)

unwanted emissions: unwanted emissions are those falling outside the nominated bandwidth in the carrier-on state and those generated in the carrier-off state

wide-band system: wide-band system is one in which the nominal carrier frequency spacing for MESs in the earth-to-space direction is equal or greater than 300 kHz

3.2 Abbreviations

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

ASD	Acceleration Spectral Density
BE_L	Lower Band Edge of the operating band
BE_U	Upper Band Edge of the operating band
Bn	nominated Bandwidth
BW	Bandwidth
CDMA	Code Division Multiple Access
CMF	Control and Monitoring Functions
CW	Continuous Wave
EFTA	European Free Trade Association
EIRP	Equivalent Isotropically Radiated Power
EMC	Electro-Magnetic Compatibility
EME	Externally Mounted Equipment
EU	European Union
EUT	Equipment Under Test
IE	Installable Equipment
IEC	International Electrotechnical Commission
IME	Internally Mounted Equipment
ITU	International Telecommunications Union
ITU-T	ITU Telecommunication Standardization Sector
LTE	Laboratory Test Equipment
LTE	Long Term Evolution
MES	Mobile Earth Station
MIC	MES unique Identification Code (within its S-PCN)
MSS	Mobile Satellite Service
NCF	Network Control Facility
NGSO	Non GeoStationary Orbit
PCN	Personal Communications Network
PE	Portable Equipment
R&TTE	Radio and Telecommunications Terminal Equipment
RE	Radio Equipment
RED	Radio Equipment Directive
RF	Radio Frequency
SNR	Signal to Noise Ratio
S-PCN	Satellite Personal Communications Network
STE	Special Test Equipment
TDMA	Time Division Multiple Access

4 Technical requirements specifications

4.1 Environmental profile

4.1.1 General

The technical requirements of the present document apply under the environmental profile specified below for operation of the equipment. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the specified operational environmental profile.

4.1.2 Temperature

The MES shall fulfil all the requirements in the full temperature ranges of:

- -10 °C to +55 °C;

Taken from IEC publications 60068-2-1 [3] and 60068-2-2 [4].

4.1.3 Voltage

The applicant shall declare the nominal, lower and the higher extreme voltages.

The MES shall fulfil all the requirements in the full voltage range between the extreme voltages.

4.1.4 Vibration

The MES shall fulfil all the requirements when vibrated at the frequency/amplitudes given in table 2.

Table 2: Vibration characteristics

Frequency range	ASD (Acceleration Spectral Density) random vibration
5 Hz to 20 Hz	0,96 m^2/s^3 (+0/-5 %)
20 Hz to 500 Hz	0,96 m^2/s^3 (+ 0/-5 %) at 20 Hz, thereafter -3 dB/Octave (+0/-5 %) (taken from IEC Publication 60068-2-64 [5])

4.2 Conformance requirements

4.2.1 Unwanted emissions outside the band 1 980,1 MHz to 2 009,9 MHz (carrier-on)

4.2.1.1 Justification

Protection of other radio services operating outside the band 1 980 MHz to 2 010 MHz from emissions caused by S-PCN MESs operating within the band 1 980,1 MHz to 2 009,9 MHz.

4.2.1.2 Technical Requirement

The maximum EIRP density of the unwanted emissions from the MES outside the band 1 980,1 MHz to 2 009,9 MHz shall not exceed the limits in table 3.

In table 3, whenever a change of limit between adjacent frequency bands occurs, the lower of the two limits shall apply at the transition frequency.

Table 3: Unwanted emissions outside the band 1 980,1 MHz to 2 009,9 MHz

Frequency (MHz)	Carrier - on		
	EIRP (dBW)	Measurement bandwidth	Measurement method
0,1 to 30	-66	10 kHz	Peak hold
30 to 1 000	-66	100 kHz	Peak hold
1 000 to 1 559	-60	3 MHz	Average
1 559 to 1 626,5	-70	1 MHz	Average (over 20 ms)
1 626,5 to 1 950	-60	3 MHz	Average
1 950 to 1 960	-60	1 MHz	Average
1 960 to 1 970	-60	300 kHz	Average
1 970 to 1 975	-60	100 kHz	Average
1 975 to 1 978,1	-60	30 kHz	Average
1 978,1 to 1 980,1	The levels in table 4 for the frequency offset 0 to 2 MHz shall apply from 1 980,1 MHz to 1 978,1 MHz		
1 980,1 to 2 009,9	Not applicable	Not applicable	Not applicable
2 009,9 to 2 011,9	The levels in table 4 for the frequency offset 0 to 2 MHz shall apply from 2 009,9 MHz to 2 011,9 MHz		
2 011,9 to 2 015	-60	30 kHz	Average
2 015 to 2 020	-60	100 kHz	Average
2 020 to 2 030	-60	300 kHz	Average
2 030 to 2 040	-60	1 MHz	Average
2 040 to 2 600	-60	3 MHz	Average
2 600 to 12 750	-60	3 MHz	Peak hold

The conformance requirements apply for the full range of environmental conditions corresponding to the type of equipment as specified in clause 4.1.

4.2.1.3 Conformance Test

Conformance tests shall be carried out in accordance with clause 5.2.2.

4.2.2 Unwanted emissions within the bands 1 980,1 MHz to 2 009,9 MHz, 1 978,1 MHz to 1 980,1 MHz and 2 009,9 MHz to 2 011,9 MHz (carrier-on)

4.2.2.1 Justification

Protection of radio services and systems operating within the frequency band 1 978,1 MHz to 2 011,9 MHz from unwanted emissions caused by S-PCN MESs operating in the band 1 980,1 MHz to 2 009,9 MHz.

4.2.2.2 Technical Requirement

The maximum EIRP spectral density of the unwanted emissions from the MES within the band 1 978,1 MHz to 2 011,9 MHz shall not exceed the limits in tables 4 or 5, as applicable.

In tables 4 and 5, whenever a change of limit between adjacent frequency bands occurs, the lower of the two limits shall apply at the transition frequency.

When conflicts between multiple requirements exist, the more stringent requirement applies.