

# ETSI EN 301 444 V2.1.2 (2016-11)



**Satellite Earth Stations and Systems (SES);  
Harmonised Standard for Land Mobile Earth Stations (LMES)  
providing voice and/or data communications,  
operating in the 1,5 GHz and 1,6 GHz frequency bands  
covering the essential requirements of article 3.2  
of the Directive 2014/53/EU**

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## Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.3] 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 [i.6].

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.

National transposition dates	
Date of adoption of this EN:	12 September 2016
Date of latest announcement of this EN (doa):	31 December 2016
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2017
Date of withdrawal of any conflicting National Standard (dow):	30 June 2018

## 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).

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## Introduction

The requirements defined in the present document have been selected to ensure an adequate level of compatibility with other radio services. The levels, however, do not cover extreme cases, which may occur in any location but with a low probability of occurrence.

The present document may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena or a continuous phenomenon is present, e.g. a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference, or the interfered part or both.

The present document does not contain any requirement, recommendation or information about the installation of the LMES.

The determination of the parameters of the user earth stations using a given geo-stationary satellite for the protection of the spectrum allocated to that satellite, is considered to be under the responsibility of the satellite operators or the satellite network operators. Applicants for LMESs operating in satellite networks which provide radio navigation service and/or other safety services should note that such satellite network operators may require testing in addition to the present document to prove correct interworking in order to avoid the LMES causing harmful interference which endangers the functioning of these services.

Following the WRC-03 decision [i.4] to allocate to MSS the bands 1 518 MHz to 1 525 MHz (space to Earth) and 1 668 MHz to 1 675 MHz (Earth to space) and the conclusions of WRC-07 [i.5], a new set of emission requirements for LMESs that are capable of transmitting in the frequency band from 1 668,0 MHz to 1 675,0 MHz is specified.

The two parts of the L-band frequency allocations are treated as two sub-bands which may be used separately or in any combination. The standard L-band allocation is referenced in the present document as "sub-band 1" and the extended L-band is referenced as "sub-band 2".

Table 2c is applicable for LMESs that are capable of transmitting in any combination of either or both of these sub-bands. Table 2c is recommended for all new LMESs including LMES that can only operate in sub-band 1.

The applicant may choose between tables 2b and 2c for new LMESs that are capable of transmitting in only the sub-band 1. The applicant has to declare which alternative is used.

The present document specifies a new set of receiver performance requirements for LMESs under the new Radio Equipment Directive 2014/53/EU [i.6].

### Figure 1: Void

The present document is intended to cover the provisions of Directive 2014/53/EU [i.6] (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".

Recital 10 of Directive 2014/53/EU [i.6] states that "*in order to ensure that radio equipment uses the radio spectrum effectively and supports the efficient use of radio spectrum, radio equipment should be constructed so that: in the case of a transmitter, when the transmitter is properly installed, maintained and used for its intended purpose it generates radio waves emissions that do not create harmful interference, while unwanted radio waves emissions generated by the transmitter (e.g. in adjacent channels) with a potential negative impact on the goals of radio spectrum policy should be limited to such a level that, according to the state of the art, harmful interference is avoided; and, in the case of a receiver, it has a level of performance that allows it to operate as intended and protects it against the risk of harmful interference, in particular from shared or adjacent channels, and, in so doing, supports improvements in the efficient use of shared or adjacent channels*".

Recital 11 of Directive 2014/53/EU [i.6] states that "*although receivers do not themselves cause harmful interference, reception capabilities are an increasingly important factor in ensuring the efficient use of radio spectrum by way of an increased resilience of receivers against harmful interference and unwanted signals on the basis of the relevant essential requirements of Union harmonisation legislation*".

As a consequence, the present document includes both transmitting and receiving parameters aiming to maximize the efficient use of radio spectrum.

# 1 Scope

The present document applies to Land Mobile Earth Stations (LMESs) radio equipment with an EIRP less than or equal to 33 dBW and which have the following characteristics:

- the LMES could be either vehicle mounted or portable equipment;
- these LMESs are controlled and monitored by a Network Control Facility (NCF). The NCF is outside the scope of the present document;
- the LMES operate through geostationary satellites as part of a network providing voice and/or data communications;
- the LMES is capable of operating in any combination of all or any part of the frequency ranges sub-band 1 and sub-band 2 defined in table 1a.

**Table 1a: Land Mobile Satellite Service frequency bands**

Sub-Band	Direction of transmission	LMSS frequency bands
1	Transmit 1 (Earth to space)	1 626,5 MHz to 1 660,5 MHz
	Receive 1 (space to Earth)	1 525,0 MHz to 1 559,0 MHz
2	Transmit 2 (Earth to space)	1 668,0 MHz to 1 675,0 MHz
	Receive 2 (space to Earth)	1 518,0 MHz to 1 525,0 MHz

The present document is intended to cover the provisions of Directive 2014/53/EU [i.6] (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/UE [i.6] may apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the web site <http://www.newapproach.org>.

## 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] CISPR 16-1-4 (2010): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Antennas and test sites for radiated disturbance measurements".
- [3] Void.
- [4] Void.



- [5] Void.
- [6] ETSI EN 301 444 (V1.2.2) (06-2013): "Satellite Earth Stations and Systems (SES); Harmonized EN for Land Mobile Earth Stations (LMES) operating in the 1,5 GHz and 1,6 GHz bands providing voice and/or data communications covering essential requirements of article 3.2 of the R&TTE directive".

## 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] Void.
- [i.2] Void.
- [i.3] 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.
- [i.4] World Radiocommunication Conference 2003 (WRC-03) Final Acts.
- [i.5] World Radiocommunication Conference 2007 (WRC-07) Final Acts.
- [i.6] 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 (RE Directive).

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in Directive 2014/53/EU [i.6] and the following apply:

**antenna transmit gain:** ratio, expressed in decibels, of the power that would have to be supplied to an isotropic radiator to the power supplied to the antenna being considered, so that they produce the same field strength at the same distance in the same direction

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

**carrier-off state:** state in which the LMES is not transmitting a carrier

**carrier-on state:** state in which the LMES is transmitting a carrier

**Control Channel (CC):** channel or channels by which LMES receive control information from the NCF for their network

**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



**Externally Mounted Equipment (EME):** equipment consisting of those of the modules of the Installable Equipment (IE) which are intended to be mounted externally to the vehicle as stated by the manufacturer

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

**Installable Equipment (IE):** equipment which is intended to be fitted to a vehicle

NOTE: An IE may consist of one or several interconnected modules.

**Internally Mounted Equipment (IME):** those of the modules of the IE which are not declared by the applicant as EME are defined as Internally Mounted Equipment (IME)

**nominated bandwidth:** bandwidth of the LMES radio frequency transmission nominated by the manufacturer

NOTE: The nominated bandwidth is wide enough to encompass all spectral elements of the transmission which have a level greater than the specified unwanted emissions limits. The nominated bandwidth is wide enough to take account of the transmit carrier frequency stability. The nominated bandwidth is within the transmit frequency band within which the LMES operates.

**Portable Equipment (PE):** equipment 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.

**sub-band:** contiguous portion of the operating band

NOTE: Two sub-bands are defined (see table 1a).

**unwanted emissions:** emissions falling outside the nominated bandwidth

## 3.2 Abbreviations

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

BW	BandWith
CC	Control Channel
CISPR	International Special Committee on Radio Interference
CMF	Control and Monitoring Functions
CW	Continuous Wave
EIRP	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
EME	Externally Mounted Equipment
ETS	European Telecommunication Standard
EUT	Equipment Under Test
IE	Installable Equipment
IME	Internally Mounted Equipment
LMES	Land Mobile Earth Station
LMSS	Land Mobile Satellite Service
LTE	Long Term Evolution
MES	Mobile Earth Station
MSS	Mobile Satellite Service
NCF	Network Control Facility
PE	Portable Equipment
R&TTE	Radio and Telecommunications Terminal Equipment
RA	Radio Astronomy
RE	Radio Equipment
RED	Radio Equipment Directive
RF	Radio Frequency
SNR	Signal to Noise Ratio
STE	Special Test Equipment
TBR	Technical Basis for Regulation
TTE	Telecommunications Terminal Equipment
WRC	World Radiocommunication Conference

## 4 Technical requirement specifications

### 4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the applicant. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile. The environmental profile for operation of the equipment shall include the ranges of humidity, temperature and supply voltage.

### 4.2 Conformance requirements

#### 4.2.0 Maximum EIRP

##### 4.2.0.1 Justification

Not needed.

##### 4.2.0.2 Specification

The maximum EIRP of the LMES shall not exceed 33 dBW.

##### 4.2.0.3 Conformance test

Declaration of maximum EIRP by the applicant.

NOTE: No conformance test is defined for this requirement.

#### 4.2.1 Unwanted emissions outside the band 1 625,8 MHz to 1 661,2 MHz and outside the band 1 667,3 MHz to 1 675,7 MHz

##### 4.2.1.1 Justification

The technical requirements presented in this clause shall apply to all LMESs that are capable of transmitting either in sub-band 1 or sub-band 2, or in both sub-bands as defined in table 1a for the purpose of:

- protection of terrestrial and satellite services from emissions caused by LMES outside the band 1 625,8 MHz to 1 661,2 MHz; and
- protection of terrestrial and satellite services from emissions caused by LMES outside the band 1 667,3 MHz to 1 675,7 MHz.

##### 4.2.1.2 Specification

Unwanted emissions from Land Mobile Earth Stations (LMESs) outside the band 1 625,8 MHz to 1 661,2 MHz and outside the band 1 667,3 MHz to 1 675,7 MHz shall be below the following limits.

Unless otherwise stated the specification in this clause shall apply to all types of LMESs notwithstanding their transmitting capabilities within the frequency bands as defined in table 1a.

The lower limit shall apply at the transition frequency.

- 1) The unwanted emissions over the frequency range 30 MHz to 1 000 MHz shall not exceed the limits in table 1b.

**Table 1b: Limits of unwanted emissions up to 1 000 MHz at a measuring distance of 10 m**

Frequency (MHz)	Quasi-peak limits (dB(µV/m))
30 to 230	30
230 to 1 000	37

- 2) For LMES that are capable of transmitting within only the sub-band 1 frequency band as defined in table 1a, the unwanted emissions Equivalent Isotropically Radiated Power (EIRP) above 1 000 MHz in the measurement bandwidth and in all directions shall not exceed limits of either tables 2b or 2c. The applicant shall declare which alternative shall be used.
- 3) For LMES that are capable of transmitting within only the sub-band 2 frequency band or within both sub-band 1 and sub-band 2 frequency bands as defined in table 1a, the unwanted emissions Equivalent Isotropically Radiated Power (EIRP) above 1 000 MHz in the measurement bandwidth and in all directions shall not exceed the limits in table 2c.

**Table 2a: Void****Table 2b: Limits of unwanted emissions above 1 000 MHz and outside the band 1 625,8 MHz to 1 661,2 MHz, applicable from 1 June 2002**

Frequency range (MHz)	Carrier-on		Carrier-off	
	EIRP limit (dBpW)	Measurement bandwidth (kHz)	EIRP limit (dBpW)	Measurement bandwidth (kHz)
1 000,0 to 1 525,0	49	100	48	100
1 525,0 to 1 559,0	49	100	17	3
<b>1 559,0 to 1 580,42</b>	<b>50</b>	<b>1 000</b>	<b>50</b>	<b>1 000</b>
<b>1 580,42 to 1 605,0</b>	<b>50</b>	<b>1 000</b>	<b>50</b>	<b>1 000</b>
<b>1 605,0 to 1 610,0</b>	<b>(note 5)</b>	<b>100</b>	<b>(note 6)</b>	<b>100</b>
1 610,0 to 1 625,8	74	100	48	100
1 625,8 to 1 661,2	(note 1)	(note 1)	(note 1)	(note 1)
1 661,2 to 1 690,0	74	100	48	100
1 690,0 to 3 400,0	49 (note 2)	100	48	100
3 400 to 10 700	55 (notes 3 & 4)	100	48	100
10 700 to 21 200	61	100	54	100
21 200 to 40 000	67	100	60	100

NOTE 1: The unwanted emissions in the band 1 625,8 MHz to 1 661,2 MHz are limited by clause 4.2.2.

NOTE 2: In the band 3 253,0 MHz to 3 321,0 MHz the maximum EIRP in one, and only one, 100 kHz measurement bandwidth shall not exceed 82 dBpW. Elsewhere in this band the power limit in table 2b shall be applied.

NOTE 3: In each of the bands 4 879,5 MHz to 4 981,5 MHz, 6 506,0 MHz to 6 642,0 MHz and 8 132,5 MHz to 8 302,5 MHz the maximum EIRP in one, and only one, 100 kHz measurement bandwidth shall not exceed 72 dBpW. Elsewhere in this band the power limit in table 2b shall be applied.

NOTE 4: In the band 9 759,0 MHz to 9 963,0 MHz the maximum EIRP in one, and only one, 100 kHz measurement bandwidth shall not exceed 61 dBpW. Elsewhere in this band the power limit in table 2b shall be applied.

NOTE 5: Linearly interpolated from 40 dBpW in 100 kHz at 1 605,0 MHz to 74 dBpW in 100 kHz at 1 610,0 MHz.

NOTE 6: Linearly interpolated from 40 dBpW in 100 kHz at 1 605,0 MHz to 48 dBpW in 100 kHz at 1 610,0 MHz.

**Table 2c: Limits of unwanted emissions above 1 000 MHz and outside the band 1 625,8 MHz to 1 661,2 MHz and the band 1 667,3 MHz to 1 675,7 MHz**

Frequency range (MHz)	Carrier-on		Carrier-off	
	EIRP limit (dBpW)	Measurement bandwidth (kHz)	EIRP limit (dBpW)	Measurement bandwidth (kHz)
1 000,0 to 1 518	60	1 000	48 (note 7)	100
1 518,0 to 1 525,0	60	1 000	17	3
1 525,0 to 1 559,0	49	100	17	3
1 559,0 to 1 580,42	50	1 000	50	1 000
1 580,42 to 1 605,0	50	1 000	50	1 000
1 605,0 to 1 610,0	(note 5)	100	(note 6)	100
1 610,0 to 1 625,8	74	100	48	100
1 625,8 to 1 661,2	(note 1)	(note 1)	(note 1)	(note 1)
1 661,2 to 1 661,7	(note 8)	100	48	100