SLOVENSKI STANDARD
SIST EN 301 443 V2.1.1:2016

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Satelitske zemeljske postaje in sistemi (SES) - Harmonizirani standard, ki zajema bistvene zahteve člena 3.2 direktive 2014/53/EU, za satelitske terminale z zelo majhno antensko odprtino (VSAT) - Oddajne, oddajno-sprejemne ali sprejemne satelitske zemeljske postaje, delujoče v frekvenčnih pasovih 4 GHz in 6 GHz

Satellite Earth Stations and Systems (SES) - Harmonized Standard for Very Small Aperture Terminal (VSAT) - Transmit-only, transmit-and-receive, receive-only satellite earth stations operating in the 4 GHz and 6 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU

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Satellite Earth Stations and Systems (SES); Harmonised Standard for Very Small Aperture Terminal (VSAT); Transmit-only, transmit-and-receive, receive-only satellite earth stations operating in the 4 GHz and 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.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 [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:	16 May 2016
Date of latest announcement of this EN (doa):	31 August 2016
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	28 February 2017
Date of withdrawal of any conflicting National Standard (dow):	28 February 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 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 equipment within the scope of the RE Directive [6]. The modular structure is shown in ETSI EG 201 399 [i.1].

Figure 1: Void

Remarks on the present document

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 operator or the satellite network operators. For this reason the requirement on the cross polarization discrimination which was in ETSI TBR 043 [i.3] has not been copied in the present document and inter-modulation limits inside the band 5,850 GHz to 7,075 GHz are to be determined by system design and are subject to satellite operator specifications.

The requirements 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 VSAT.

All parts of the indoor unit related to reception, processing and presentation of the received information except the control channel are not within the scope of the present document. The syntax of the control channel messages is outside the scope of the present document.

1 Scope

The present document applies to any Very Small Aperture Terminal (VSAT) which has the following characteristics:

- the VSAT is operating in one or more frequency ranges within the following bands allocated to the Fixed Satellite Service (FSS), shared with other services, e.g. the Fixed Service (FS) and the Mobile Service (MS):
  - 5,850 GHz to 7,075 GHz (earth-to-space);
  - 3,400 GHz to 4,200 GHz (space-to-earth);
- the VSAT uses linear or circular polarization;
- the VSAT operates through a geostationary satellite at least 3° away from any other geostationary satellite operating in the same frequency band and covering the same area;
- the VSAT antenna diameter does not exceed 7,3 m, or equivalent effective area;
- the VSAT is either:
  - a transmit-only VSAT: designed for transmission-only of radio-communications signals in the frequency band (earth-to-space) specified above; or
  - a transmit-and-receive VSAT: designed for transmission-and-reception of radio-communications signals in the frequency bands specified above; or
  - a receive-only VSAT: designed for reception-only of radio-communications signals in the frequency band (space-to-earth) specified above;
- the VSAT is designed usually for unattended operation;
- the VSAT is operating as part of a satellite network (e.g. star, mesh or point-to-point) used for the distribution and/or exchange of information between users;
- the transmit-only and transmit-and-receive VSAT is controlled and monitored by a Centralized Control and Monitoring Function (CCMF). The CCMF is outside the scope of the present document.

The present document applies to the VSAT with its ancillary equipment and its various terrestrial ports, and when operated within the boundary limits of the operational environmental profile declared by the applicant and when installed as required by the applicant by declaration or in the user documentation.

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

[3] CISPR 16-1-5 (2003): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-5: Radio disturbance and immunity measuring apparatus - Antenna calibration test sites for 30 MHz to 1 000 MHz".

[4] Void.

[5] Void.

[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).

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] ETSI EG 201 399: "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.

[i.3] ETSI TBR 043 (1998): "Satellite Earth Stations and Systems (SES); Very Small Aperture Terminal (VSAT) transmit-only, transmit-and-receive, receive-only satellite earth stations operating in the 4 GHz and 6 GHz frequency bands".

[i.4] ETSI TR 102 375: "Satellite Earth Stations and Systems (SES); Guidelines for determining the parts of satellite earth station antenna radiation patterns concerned by the geostationary satellite orbit protection".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

ancillary equipment: equipment used in connection with a VSAT is considered as ancillary if the three following conditions are met:

a) the equipment is intended for use in conjunction with the VSAT to provide additional operational and/or control features (e.g. to extend control to another position or location); and

b) the equipment cannot be used on a standalone basis, to provide user functions independently of the VSAT; and

c) the absence of the equipment does not inhibit the operation of the VSAT.

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

carrier-off radio state: radio state in which the VSAT may transmit and does not transmit any carrier

NOTE 1: The phrase "the VSAT may transmit" means that all the conditions for transmission are satisfied (e.g. in a state where transmissions are permitted and no failure detected).

NOTE 2: The existence of a "Carrier-off" radio state depends on the system of transmission used. For VSATs designed for continuous transmission mode there may be no "Carrier-off" radio state.

carrier-on radio state: radio state in which the VSAT may transmit and transmits a carrier

Centralized Control and Monitoring Functions (CCMF): set of functional entities that, at system level, monitor and control the correct operation of all transmit VSAT in a network

Control Channel (CC): channel or channels by which VSAT receive control information from the CCMF

$EIRP_{max}$: maximum e.i.r.p capability of the VSAT as declared by the applicant

NOTE: The applicant may declare different values of $EIRP_{max}$ for each combination of occupied bandwidth and transmission parameters (see clause 4.1.3).

emissions disabled radio state: radio state in which the VSAT does not transmit a carrier

NOTE: This radio state only applies in certain CMF states as defined in clause 4.1.4. (e.g. before system monitoring pass, before the control channel is received, when a failure is detected, when the VSAT is commanded to disable). The "Emissions disabled" radio state requires lower unwanted emissions than the "Carrier-off" radio state.

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

external control channel: control channel which is either:

(i) carried by the VSAT network via the same or another satellite, but not within the internal protocol of the VSAT system; or

(ii) carried by the PSTN or some other means.

external response channel: response channel which is either:

(i) carried by the VSAT network via the same or another satellite, but not within the internal protocol of the VSAT system; or

(ii) carried by the PSTN or some other means.

f_{min}: lower bound of the VSAT transmit frequency range declared by the applicant

f_{max}: upper bound of the VSAT transmit frequency range declared by the applicant

NOTE: In the case of equipment designed to operate over more than one contiguous frequency range a separate f_{min} and f_{max} may be defined to each range.

indoor unit: composed of that part of the VSAT which is not part of the outdoor unit

NOTE: It is generally installed inside a building and is connected to the outdoor unit. The connection cable between the outdoor and indoor unit is considered part of the indoor unit.

integral antenna: antenna which may not be removed during the tests according to the applicant's statement

internal control channel: control channel which is carried by the VSAT network via the same satellite as used for transmission of user data and within the internal protocol structure of the VSAT system

internal response channel: response channel which is carried by the VSAT network via the same satellite as used for transmission of user data and within the internal protocol structure of the VSAT system

Internally Mounted Equipment (IME): those of the modules of the internal equipment which are not declared by the manufacturer as externally mounted equipment are defined as IME

network: any network configuration including star, mesh and point-to-point configurations

nominal antenna diameter: antenna diameter declared by the manufacturer that is a parameter in performance characteristics and that allows reference to a certain performance

NOTE: An antenna with circular aperture of diameter equal to the nominal diameter does typically have the performance specified.

Network operators might request antennas of a certain diameter. Then an antenna that is compliant with the requirement for nominal antenna diameter equal to the requested antenna diameter can be used. Manufacturers can mark their equipment with antenna diameters used in the requirements during compliance test.

nominated bandwidth: bandwidth of the VSAT radio frequency transmission is nominated by the applicant

NOTE 1: The nominated bandwidth is centred on the transmit frequency and does not exceed 5 times the occupied bandwidth.

NOTE 2: The nominated bandwidth is wide enough to encompass all spectral elements of the transmission which have a level greater than the specified spurious radiation limits. The nominated bandwidth is wide enough to take account of the transmit carrier frequency stability. This definition is chosen to allow flexibility regarding adjacent channel interference levels which will be taken into account by operational procedures depending on the exact transponder carrier assignment situation.

occupied Bandwidth (Bo): for a digital modulation scheme - the width of the signal spectrum 10 dB below the maximum inband density, for an analogue modulation scheme - the width of a frequency band such that, below the lower and above the upper frequency limits, the mean power emitted is equal to 0,5 % of the total mean power of the emission

outdoor unit: part of the VSAT intended to be installed outdoor, as declared by the applicant, or as indicated in the user documentation

NOTE 1: The outdoor unit usually comprises three main parts:

a) the antenna sub-system which converts the incident radiation field into a guided wave and vice versa;

b) the Low Noise Block (LNB) down converter, which is a device that amplifies, with very low internal noise, the received signals in the Radio Frequency (RF) band and converts them to intermediate frequencies;

c) the upconverter and the power amplifier which convert from the intermediate frequency to RF and amplify the low level RF signals for transmission through the antenna subsystem.

NOTE 2: The installation equipment (means of attachment) is outside the scope of the present document. However, the antenna structures and other components directly mounted on the antenna and forming an integral part of it, are subject to the specifications of the present document.

removable antenna: antenna which may be removed during the tests according to the applicant's statement

Response Channel (RC): channel by which VSAT transmit monitoring information to the CCMF

spurious radiation: any radiation outside the nominated bandwidth

NOTE: For a receive-only VSAT there is no nominated bandwidth therefore any radiation is a spurious radiation.

transmission disabled state: VSAT is in this state when it is not authorized by the CCMF to transmit

transmit VSAT: VSAT capable of being used either for transmission only, or for transmission and reception

VSAT: complete VSAT equipment, comprising the outdoor unit and the indoor unit including the connection cable(s) between the units

3.2 Symbols

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

dBsd	Ratio expressed in decibels relative to the spectral density

3.3 Abbreviations

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

BDU	Below Deck Unit
BW	Wanted signal occupied Bandwidth
CC	Control Channel
CCF	Control Channel reception Failure
CCMF	Centralized Control and Monitoring Functions
CCR	Control Channel correctly Received
CISPR	(Comité International Spécial des Perturbations Radioélectriques) International Special Committee on Radio Interference
CMF	Control and Monitoring Function
CV	Control Variable
CW	Continuous Wave
EIRP, e.i.r.p	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
EN	European Standard
EUT	Equipment Under Test
FEC	Forward Error Correction
FS	Fixed Service
FSS	Fixed Satellite Service
GEUT	Gain of EUT
GSO	Geostationary Satellite Orbit
HPA	High Power Amplifier
IME	Internally Mounted Equipment
ITU	International Telecommunications Union
LNA	Low Noise Amplifier
LNB	Low Noise Block (low noise amplifier and down-converter)
LO	Local Oscillator
LV	Low Voltage
modem	MOdulator/DEModulator
MS	Mobile Service
PSTN	Public Switched Telephone Network
R&TTE	Radio and Telecommunications Terminal Equipment
RC	Response Channel
RE	Reset Event
RE	Radio Equipment
RED	Radio Equipment Directive
RF	Radio Frequency
SMF	System Monitoring Fail
SMP	System Monitoring Pass
SMV	Self-Monitoring Variable
STE	Special Test Equipment
TDMA	Time Division Multiple Access
TxD	Transmission Disable command
TxE	Transmission Enable command
VSAT	Very Small Aperture Terminal