



**SLOVENSKI STANDARD**  
**SIST EN 302 186 V1.1.1:2004**

**01-julij-2004**

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Satellite Earth Stations and Systems (SES); Harmonized EN for satellite mobile Aircraft Earth Stations (AESs) operating in the 11/12/14 GHz frequency bands covering essential requirements under article 3.2 of the R&TTE Directive

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# ETSI EN 302 186 V1.1.1 (2004-01)

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*Candidate Harmonized European Standard (Telecommunications series)*

**Satellite Earth Stations and Systems (SES);  
Harmonized EN for satellite mobile  
Aircraft Earth Stations (AESs)  
operating in the 11/12/14 GHz frequency bands  
covering essential requirements  
under article 3.2 of the R&TTE Directive**

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## Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [1] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive").

Technical specifications relevant to Directive 1999/5/EC [1] are given in annex A.

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### National transposition dates

Date of adoption of this EN:	23 January 2004
Date of latest announcement of this EN (doa):	30 April 2004
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 October 2004
Date of withdrawal of any conflicting National Standard (dow):	31 October 2004



## Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive [1]. Each standard is a module in the structure. The modular structure is shown in figure 1a.

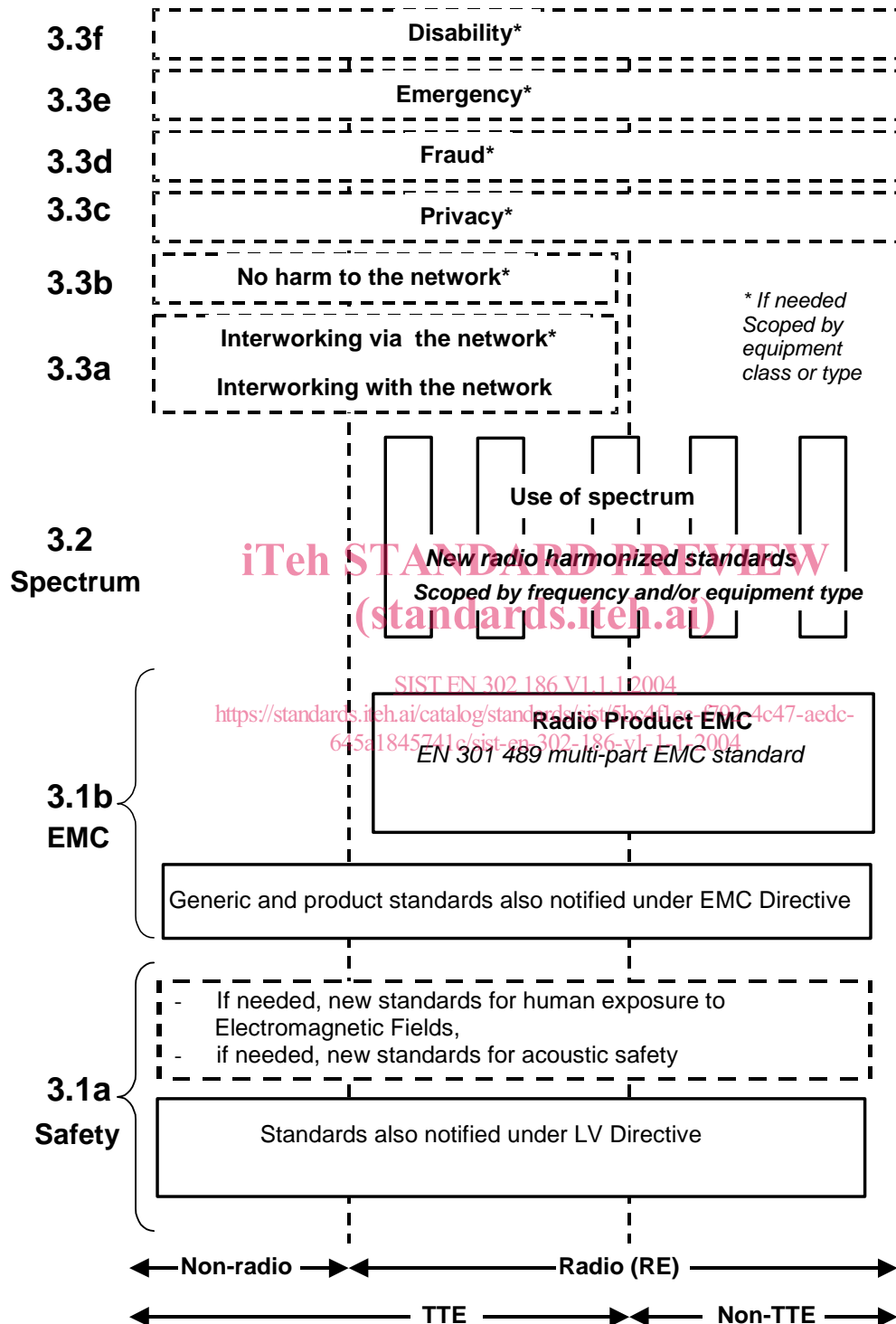


Figure 1a: Modular structure for the various standards used under the R&TTE Directive [1]

The left hand edge of the figure 1a shows the different clauses of article 3 of the R&TTE Directive [1].

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of the present document essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.1b the diagram shows EN 301 489, the multi-part product EMC standard for radio used under the EMC Directive (see bibliography).

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive (see bibliography) and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of the figure shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. A radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement under the R&TTE Directive [1] is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive [1] may be covered in a set of standards.

The modularity principle has been taken because:

- it minimizes the number of standards needed. Because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment;
- it provides scope for standards to be added:
  - under article 3.2 when new frequency bands are agreed; or
  - under article 3.3 should the Commission take the necessary decisions without requiring alteration of standards that are already published;
- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

The requirements have been selected to ensure an adequate level of compatibility with other radio services.

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 AES on aircraft.

The determination of the parameters of the AES using a given GeoStationary Orbiting (GSO) 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.

# 1 Scope

The present document specifies certain minimum technical performance requirements of Aircraft Earth Station (AES) equipment with both transmit and receive capabilities for provision of aeronautical mobile satellite service, in the frequency bands given in table 1.

**Table 1: Frequency bands for the AES equipment specified in the present document**

Mode of Operation	Frequency Band
AES transmit	14,00 GHz to 14,50 GHz
AES receive	10,70 GHz to 11,70 GHz
AES receive	12,50 GHz to 12,75 GHz
NOTE: The AESs are operating in one or more frequency ranges of the Fixed and Mobile-Satellite Services.	

The AES has the following characteristics:

- These AESs are equipment for installation on aircraft.
- The AES could consist of a number of modules from the antenna subsystem to the user interfaces.
- The AES uses linear polarization.
- The AES system uses digital modulation.
- The AES operates through a GSO satellite at least 3° away from any other geostationary satellite operating in the same frequency band and covering the same area.
- The antenna of the AES is directional, with means of tracking the satellites, which can be achieved by using either an active phase array or reflective type configuration.
- These AESs are operating as part of a satellite network used for the distribution and/or exchange of information between users.
- These AESs are controlled and monitored by a Network Control Facility (NCF). The NCF is outside the scope of the present document.
- When on the ground, the AES does not transmit at elevation angles below 7° with respect to the local horizontal plane, except at locations where transmissions below 7° are permitted by the local Administration; (the minimum elevation angle is also limited as per clause 4.2).

The technical requirements in the present document are in two major categories:

- **emission limits:** to protect other radio services and systems from harmful interference generated by the AES in normal use;
- **AES Control and Monitoring Functions (CMF):** to protect other radio services and systems from unwanted transmissions from the AES. The CMF in each AES is capable of answering to commands from the Network Control Facility (NCF) for its supporting satellite network.

The present document applies to the AESs with their ancillary equipment and its various ports, and when operated within the boundary limits of the operational environmental profile declared by the manufacturer.

The technical requirements for the AES in regard to the Power Flux Density (PFD) limits to protect Fixed Service (FS) and Radio Astronomy Service (RAS) are based on annexes B and C of ITU-R Recommendation M.1643 [5] and ECC Report 26 (see bibliography). Furthermore, in relation to the protection of the Fixed Satellite Service (FSS) the technical requirements of the AES take into account annex A of ITU-R Recommendation M.1643 [5].

The present document is intended to cover the provisions of Directive 1999/5/EC (R&TTE Directive) [1] article 3.2, which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as 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 R&TTE Directive [1] may apply to equipment within the scope of the present document.

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

The present document does not cover equipment compliance with relevant civil aviation regulations. In this respect, an AES, for its installation and operation on board an aircraft is subject to additional national or international civil aviation airworthiness certification requirements, for example to EUROCAE ED-14D [4].

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## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- 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.
- For a non-specific reference, the latest version applies.

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

- [1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [2] CISPR 16-1 (2003) (all sub-parts): "Specification for radio disturbance and immunity measuring apparatus and methods; Part 1: Radio disturbance and immunity measuring apparatus".
- [3] IEEE STD 149 (1979): "IEEE Standard Test Procedures for Antennas".
- [4] EUROCAE ED-14D (1997) Change 1 (2000), Change 2 (2001) and Change 3 (2002) (Equivalent to RTCA DO-160D): "Environmental Conditions and Test Procedures for Airborne Equipment".
- [5] ITU-R Recommendation M.1643 (2003): "Technical and operational requirements for aircraft earth stations of aeronautical mobile-satellite service including those using fixed-satellite service network transponders in the band 14-14.5 GHz (Earth-to-space)".

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [1] and the following apply:

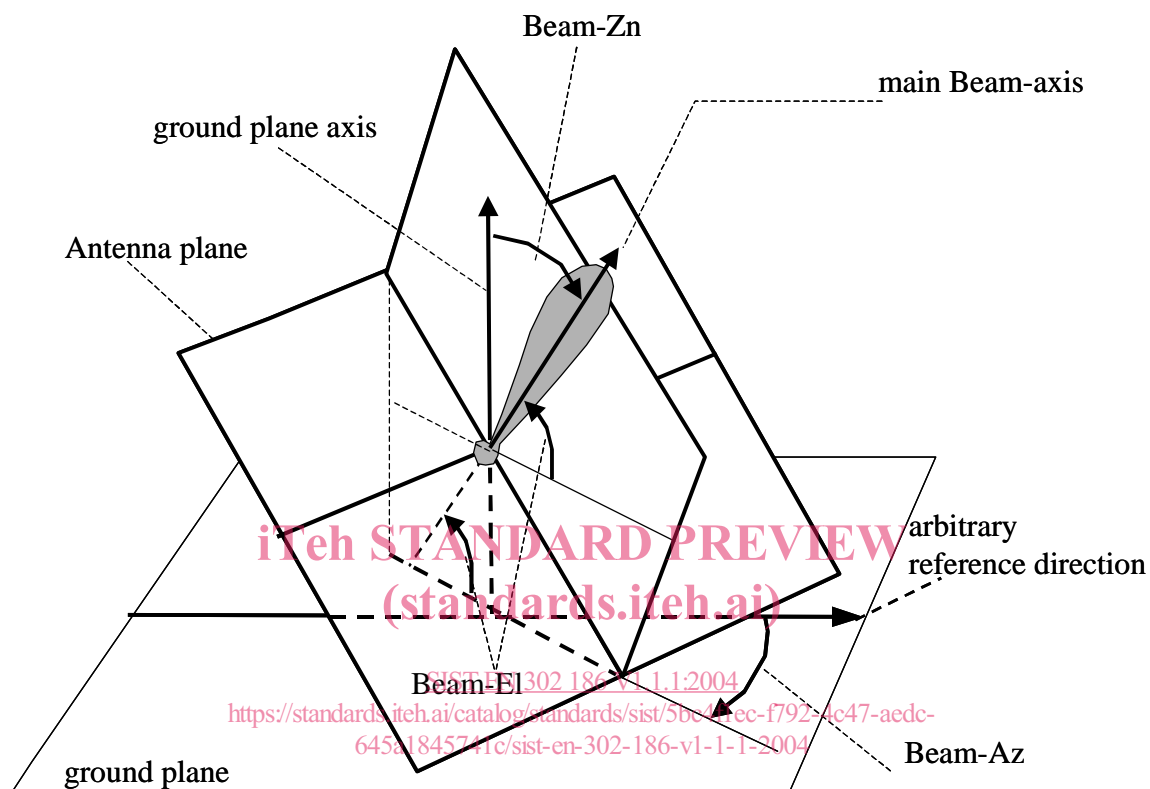


Figure 1b: Reference angles and planes for a passive (e.g. reflector) antenna

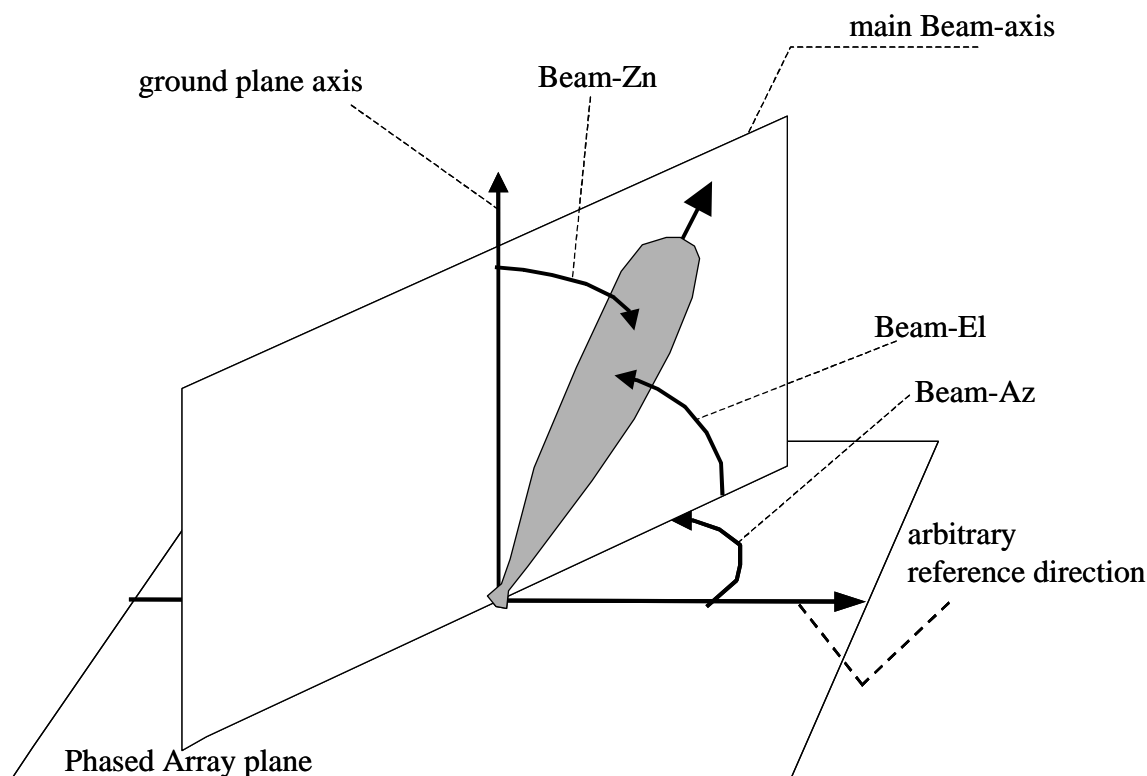


Figure 1c: Reference angles and planes for an active (e.g. phased array) antenna

**AMSS network:** comprises the AESs, geostationary satellite, LES and NCF

**ancillary equipment:** equipment used in connection with an AES is considered as ancillary if the three following conditions are met:

- the equipment is intended for use in conjunction with the AES to provide additional operational and/or control features (e.g. to extend control to another position or location); and
- the equipment cannot be used on a stand alone basis, to provide user functions independently of the AES; and
- the absence of the equipment does not inhibit the operation of the AES.

**antenna plane:** for a passive antenna, plane orthogonal to the main beam axis direction. For a phased array antenna, the antenna plane is the phase array plane

NOTE: See figure 1b.

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

**beam Az angle:** angle between an arbitrary reference direction (declared by the manufacturer) within the ground plane and the orthogonal projection of the main beam axis within that plane

NOTE 1: See figures 1b and 1c.

NOTE 2: In case of a rectangular phased array antenna such reference direction may be taken, for example, as the direction parallel to the longer of the two sides.

NOTE 3: When the ground plane axis is vertical and the reference direction oriented towards the north or the south, then the beam Az angle is the main beam azimuth angle.

**beam EI angle:** angle between the ground plane and the main beam axis

NOTE: See figures 1b and 1c.

**beam Zn angle:** angle between the ground plane axis and the antenna main beam axis

NOTE: See figures 1b and 1c.

**carrier-off state:** state in which AES is when either it is authorized by the Network Control Facility (NCF) to transmit but when it does not transmit any signal, or when it is not authorized by the NCF to transmit

**carrier-on state:** state in which AES is when it is authorized by the NCF to transmit and when it transmits a signal

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

NOTE: The CCs are not necessarily on separate RF channels from the RF channels carrying the user data streams.

**EIRP<sub>max</sub>:** maximum EIRP capability of the AES as declared by the applicant

**environmental profile:** range of environmental conditions

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

**ground plane:** for a passive antenna, the plane over which the antenna is mounted

NOTE: This plane can be specified by the manufacturer. For a phased array antenna, the ground plane is the phase array plane (see figure 1b).

**ground plane axis:** direction orthogonal to the ground plane

NOTE: See figures 1b and 1c.

**Installable Equipment (IE):** equipment which is intended to be fitted to an aircraft

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 manufacturer as EME are defined as IME <https://standards.iteh.ai/catalog/standards/sist/5bc4f1ec-f792-4c47-aedc-645a1845741c/sist-en-302-186-v1-1-1-2004>

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

**Land Earth Station (LES):** earth station in the FSS or, in some cases, in the MSS, located at a specified fixed point or within a specified area on land to provide a feeder-link for the MSS

**main beam axis:** direction where the antenna gain is maximum

NOTE: See figures 1b and 1c.

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

**nominated Bandwidth (Bn):** bandwidth of the AES radio frequency transmission nominated by the applicant

NOTE 1: The nominated bandwidth is centred on the transmit frequency and does not exceed 5 times the occupied Bandwidth (Bo). The nominated bandwidth is within the 14,00 GHz to 14,50 GHz transmit frequency band.

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 in-band density