

# ETSI EN 301 753 V1.2.1 (2003-12)

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*Candidate Harmonized European Standard (Telecommunications series)*

**Fixed Radio Systems;  
Multipoint equipment and antennas;  
Generic harmonized standard  
for multipoint digital fixed radio systems  
and antennas covering the essential requirements  
under article 3.2 of the Directive 1999/5/EC**

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Reference

REN/TM-04127

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Keywords

access, DRRS, DFRS, FWA, multipoint, radio,  
regulation, RLL, terminal

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## Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [2] (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").

The previous V1.1.1 the present document has become a Harmonized Standard, the reference of which has been published in the Official Journal of the European Communities (OJEC) 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").

The present document intends to endorse, within the scope and applicability under the R&TTE Directive [1], some new product standards and revisions of existing product standards. These have been produced by TC-TM, following the market demand, after the publication in the OJEC of the V1.1.1 of the present document.

For systems already covered by V1.1.1 of the present document, only technically equivalent requirements have been introduced by V1.2.1. Therefore, from a technical point of view only, it is expected that equipment already conforming to V1.1.1, would not need re-assessment of the essential requirements for V1.2.1; however, legal implications on the actual declaration of conformity and equipment labelling are outside the scope of the present document.

In addition, justification has been introduced in order to support clarification of issues relating to antennas and receiver parameters, commonly shared in the Fixed Service community, in their application and relationship to R&TTE Directive [1] implementation. This is with the intention of preserving a common understanding of those issues, in the spirit of maintaining market competition on equitable level.

In the present document the references to antenna cross-polar discrimination have been deleted because it is not considered an essential requirement for multipoint systems.

NOTE: The date of cessation of presumption of conformity to R&TTE Directive [1] shall be two years after the date of publication in the OJEC of V1.2.1.

<b>National transposition dates</b>	
Date of adoption of this EN:	28 November 2003
Date of latest announcement of this EN (doa):	29 February 2004
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2004
Date of withdrawal of any conflicting National Standard (dow):	28 February 2006

## Introduction

Fixed Digital Radio Systems (FDRS), used in European countries, are presently referred to in a relatively large number of specific ETSI standards dealing with either point-to-point or multipoint systems.

For both types of systems the corresponding antennas are covered in separate standards.

FDRS cover very wide range of frequency bands, transport capacities, channel separations, modulation formats and access methods summarized in table 1:

**Table 1: Coverage of fixed digital radio systems through ETSI standards**

<b>Parameter</b>	<b>Range/Type</b>
Frequency bands	below 1 GHz to 58 GHz
Traffic capacities	from 9,6 kbit/s to 622 Mbit/s
Channel separations	from 25 kHz to 112 MHz
Modulation formats	from 2 to 512 states (amplitude and/or phase and/or frequency states)
Typical applications	<p><b>POINT-TO-POINT (P-P) CONNECTIONS:</b> long haul (trunk), rural and urban links applying low/medium and high capacity FDRS.</p> <p><b>POINT-TO-MULTIPOINT (P-MP) AND/OR MULTIPOINT-TO-MULTIPOINT (MP-MP) CONNECTIONS:</b> rural or urban for narrow-band and /or wide-band links for fixed wireless access (FWA) and infrastructure support.</p> <p><b>STAND ALONE ANTENNAS:</b> for all the above applications where integral antennas are not used.</p>
Basic MultiPoint access method	DS-CDMA; FH-CDMA; FDMA, TDMA; MC-TDMA. A combination of the above may also be used.

In order to address different market and network requirements, with appropriate balance of cost/benefit, the ETSI standards summarized in table 2 offer a number of system types and antenna alternatives, for different network/market requirements.

Under the provision of R&TTE Directive [1] article 7.2, national regulatory bodies may restrict the putting into service of particular system and antenna alternatives summarized in table 2, e.g.:

- channel separation alternatives (as provided by the relevant CEPT Recommendation)
- spectral efficiency class alternatives (different complexity of modulation formats provided in radio equipment standards)
- antenna directivity class alternatives (for different network density requirement) for TS and/or RS
- antenna sectorization alternatives for CS

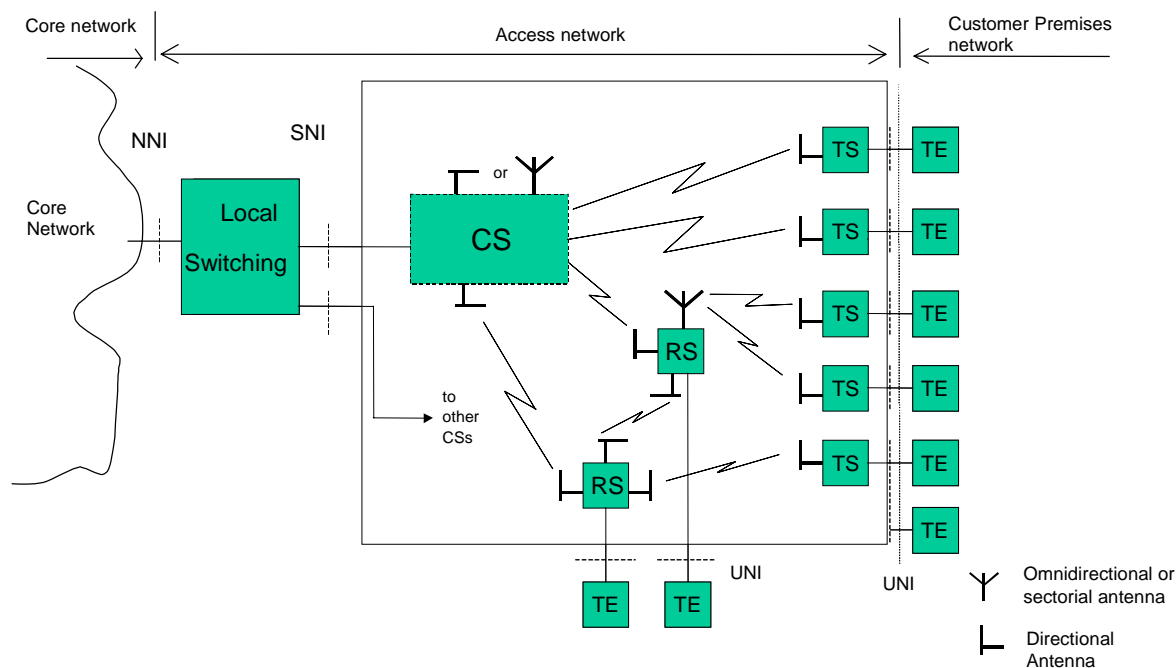
Therefore, it should be noted that national regulatory bodies may have notified "national interface specifications" under the provision of R&TTE Directive [1] Article 4.1.

The standards also contain other requirements that even if not considered essential for the R&TTE Directive [1], are nevertheless applicable to guarantee good performance and operability of FDRS.

This wide range of parameters has led to a large number of different ETS/ENs (presently the subject of EC Standardization Mandate M/284 [34]). Many of the standards are produced for similar systems but having different capacity and spectrum efficiency parameters for applications in the various radio frequency channel arrangements recommended by CEPT/ECC. It is also expected that other standards will be developed in the future to cover emerging technologies and/or new frequency bands.

From the point of view of essential requirements under the R&TTE Directive [1] all these systems are very similar in the "principles of parameters" but, besides few common horizontal parameters (e.g. spurious emissions), they differ in the "required numerical values".

Multipoint systems and their related equipment as defined by ETSI TC-TM TM4 follow the general system architecture shown in figure 1.



**Figure 1: General system architecture**

Where:

**CS:** The Central Station, which interfaces the network. It can be integrated or divided into two units:

- i) the Central Controller Station (CCS) also called the exchange unit which is the interface to the local switch;
- ii) the Central Radio Station (CRS) also called the radio unit which is the central base band / radio transceiver equipment. More than one CRS may be controlled by one CCS.

**TS:** The Terminal Station (outstations with subscriber interfaces). A TS may serve more than one Terminal Equipment (TE).

**RS:** The Repeater Station (radio repeater outstations with or without subscriber interfaces). An RS may serve one or more TS or be connected to another RS.

**NNI:** Network Node Interface

**SNI:** Service Node Interface (EG 202 306 [38])

**UNI:** User Network Interface (EG 202 306 [38])

**TE:** Terminal equipment

Figure 1 shows the most common and standardized approach for access network application; however when broadcast or private networks are concerned, different architectures are possible. For example the CS may be directly connected to the Core Network by means of a NNI interface and the switching functionality may be implemented within the CS (e.g. CS is an ATM switching into an ATM network) and, for private networks, the UNI interfaces may be substituted by custom interfaces.

Whenever an existing digital transmission link is available, the network implementation can be optimized by separating the CCS, installed at the network node site, and the CRS.

Figure 1 includes the system elements and interfaces for different types of Multipoint system (both P-MP and MP-MP). Not all system elements are necessarily deployed in any particular network.

The numbers of each type of station in a real deployment can vary considerably. Figure 1 shows only each possible type of station and each possible type of connection between stations that may occur. While in P-MP applications there are typically few CS and RS connecting large number of TS, in a typical MP-MP system, there are many RS stations and a smaller number of TS stations associated with each CS.

Although a single CS is possible, as shown, a typical system will deploy several CS, each with connection to the SNI of the local switching centre or directly to the NNI of the core network(s). These interconnections may be by means of radio links, optical fibre or other means.

The route from the SNI to the UNI interface may be via a single radio path (typical for P-MP systems) or via one or more radio repeaters (typical for MP-MP systems).

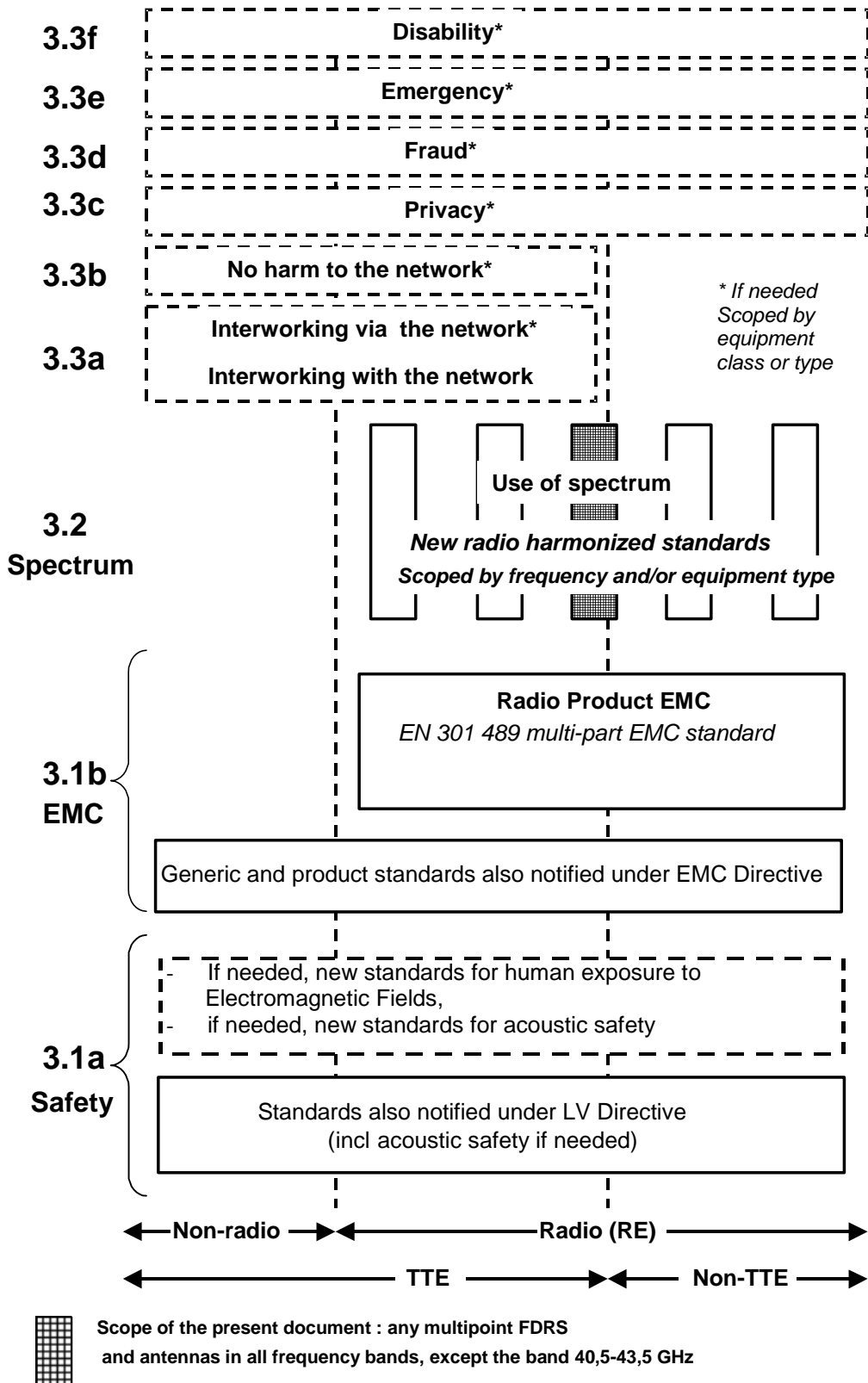
Subscriber to subscriber connections may also be provided in some networks, not routed via an external core network.

The present document for multipoint systems contains only the phenomena relevant to the essential requirements according to article 3.2 of the R&TTE Directive [1], giving the reference of the relevant clauses of the ETSI standards under the Mandate M/284 [34] which contain the actual numerical values. The relevant test methods for the declaration of conformity to the essential requirements (R&TTE Directive [1]) are described in the ENs 301 126-2-1 [26], 301 126-2-2 [27], 301 126-2-3 [28], 301 126-2-4 [29], 301 126-2-5 [30] and 301 126-2-6 [39] applicable for the different access methods of multipoint systems.

Where appropriate some horizontal requirements are directly reported.

The selection of the phenomena relevant to the essential requirements has been done on the base of the guidance given by EG 201 399 [35] and by the further specific analysis applied to FDRS given in TR 101 506 [36].

ETSI has designed a modular structure for the standards. Each standard is a module in the structure. The modular structure is shown in figure 2.



**Figure 2: Modular structure for the various standards used under the R&TTE Directive**

The left hand edge of the figure 2 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 European 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 [40].

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive [41] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of figure 2 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 European 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 European 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.

# 1 Scope

The present document applies to the following FDRS types:

- 1) Multipoint FDRS intended for operation in frequency bands that require co-ordination; this includes both Point-to-MultiPoint and MultiPoint-to-MultiPoint FDRS;
- 2) Antennas for multipoint FDRS and antennas for point-to-point FDRS used at the terminal and/or repeater station of multipoint FDRS systems. These antennas may be either an integral part or may be used as a standalone part of the equipment (outdoor unit).  
For point-to-multipoint equipment operating in the frequency range below 1 GHz the limits of the essential phenomena off-axis EIRP density, antenna gain and cross-polar discrimination as well as their test methods may be defined by the notified body according to the R&TTE Directive [1] due to lack of a Harmonized Standard.

The present document is intended to cover the provisions of Article 3.2 of the R&TTE Directive [1] which states that "...radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radiocommunications 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 1: A list of such ENs is included on the ETSI web site ([www.etsi.org](http://www.etsi.org)).

Table 2 summarizes the ETSI standards applicable to multipoint FDRS referenced in Mandate M/284 [34] from which the essential requirements within this standard have been extracted.

Those ENs also contain other requirements that even if not considered essential for the R&TTE, are nevertheless applicable on the ETSI commonly understood voluntary base to guarantee network performance objectives, as defined by international standardizing bodies, and operability of FDRS.

NOTE 2: The third digit of the EN version number is not considered essential for dated reference purposes because the ETSI Technical Working Procedures reserve this digit for editorially changed versions thereby not affecting the essential requirements within that version.

**Table 2: Applicability of the present document to the equipment in the scope of ETSI standards covered by Mandate M/284**

Equipment standards				
ETSI Reference number	Version	Title	Frequency range (GHz) of Fixed Service frequency bands (see note)	Channel separation (MHz)
EN 300 631 [3]	V1.2.x	Fixed Radio Systems; Point-to-Point Antennas; Antennas for Point to point fixed radio systems in the 1 GHz to 3 GHz band.	1 to 3	NA
EN 300 636 [4]	V1.3.x	Fixed Radio Systems; Point-to-multipoint equipment; Time Division Multiple Access (TDMA); Point-to-multipoint digital radio systems in frequency bands in the range 1 GHz to 3 GHz	1 to 3	1,75 to 4
EN 300 833 [5]	V1.4.x	Fixed Radio Systems; Point-to-point Antennas; Antennas for point-to-point fixed radio systems operating in the frequency band 3 to 60 GHz	3 to 60	NA
EN 301 021 [6]	V1.6.x	Fixed Radio Systems; Point-to-multipoint equipment; Time Division Multiple Access (TDMA); Point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz	3 to 11	< 1,75 to 30

Equipment standards				
ETSI Reference number	Version	Title	Frequency range (GHz) of Fixed Service frequency bands (see note)	Channel separation (MHz)
EN 301 055 [7]	V1.4.x	Fixed Radio Systems; Point-to-multipoint equipment; Direct Sequence Code Division Multiple Access (DS-CDMA); Point-to-multipoint digital radio systems in frequency bands in the range 1 GHz to 3 GHz	1 to 3	3,5 to 14
EN 301 080 [8]	V1.3.x	Fixed Radio Systems; Point-to-multipoint equipment; Frequency Division Multiple Access (FDMA); Point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz	3 to 11	1 to 30
EN 301 124 [9]	V1.2.x	Fixed Radio Systems; Point-to-multipoint equipment; Direct Sequence Code Division Multiple Access (DS-CDMA) point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz	3 to 11	5 to 20
EN 301 179 [10]	V1.2.x	Fixed Radio Systems; Point-to-multipoint equipment; Frequency Hopping Code Division Multiple Access (FH-CDMA); Point-to-multipoint Digital Radio Relay Systems (DRRS) in the bands within the range 1 GHz to 3 GHz	1 to 3	1 to 14
EN 301 213-1 [11]	V1.1.x	Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 1: Basic parameters	24,5 to 29,5	3,5 to 112
EN 301 213-2 [12]	V1.3.x	Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 2: Frequency Division Multiple Access (FDMA) methods	24,5 to 29,5	3,5 to 112
EN 301 213-3 [13]	V1.4.x	Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 3: Time Division Multiple Access (TDMA) methods	24,5 to 29,5	3,5 to 112
EN 301 213-4 [42]	V1.1.x	Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 4: Direct Sequence Code Division Multiple Access (DS-CDMA) methods	24,5 to 29,5	3,5 to 112
EN 301 213-5 [43]	V1.1.x	Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 5: Multi-Carrier Time Division Multiple Access (MC-TDMA) methods	24,5 to 29,5	3,5 to 112
EN 301 215-1 [14]	V1.2.x	Fixed Radio Systems; Point to Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 11 GHz to 60 GHz band; Part 1: General aspects	11 to 60	NA
EN 301 215-2 [15]	V1.3.x	Fixed Radio Systems; Point-to-Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 11 GHz to 60 GHz band; Part 2: 24 GHz to 30 GHz	24 to 30	NA

Equipment standards				
ETSI Reference number	Version	Title	Frequency range (GHz) of Fixed Service frequency bands (see note)	Channel separation (MHz)
EN 301 215-4 [46]	V1.1.x	Fixed Radio Systems; Point to Multipoint Antennas; Antennas for multipoint fixed radio systems in the 11 GHz to 60 GHz band; Part 4: 30 GHz to 40,5 GHz	30 to 40,5	NA
EN 301 253 [16]	V1.2.x	Fixed Radio Systems; Point-to-multipoint equipment; Frequency Hopping Code Division Multiple Access (FH-CDMA); Point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz	3 to 11	1 to 14
EN 301 373 [17]	V1.2.x	Fixed Radio Systems; Point-to-multipoint equipment; Frequency Division Multiple Access (FDMA); Point-to-multipoint digital radio systems in frequency bands in the range 1 GHz to 3 GHz	1 to 3	0,5 to 14
EN 301 460-1 [18]	V1.1.x	Fixed Radio Systems; Point-to-multipoint equipment; Part 1: Point-to-multipoint digital radio systems below 1 GHz - Common parameters	< 1	to be agreed on national basis
EN 301 460-2 [19]	V1.1.x	Fixed Radio Systems; Point-to-multipoint equipment; Part 2: Point-to-multipoint digital radio systems below 1 GHz - Additional parameters for TDMA systems	< 1	to be agreed on national basis
EN 301 460-3 [20]	V1.1.x	Fixed Radio Systems; Point-to-multipoint equipment; Part 3: Point-to-multipoint digital radio systems below 1 GHz - Additional parameters for FH-CDMA systems	< 1	to be agreed on national basis
EN 301 460-4 [21]	V1.1.x	Fixed Radio Systems; Point-to-multipoint equipment; Part 4: Point-to-multipoint digital radio systems below 1 GHz - Additional parameters for FDMA systems	< 1	to be agreed on national basis
EN 301 460-5 [22]	V1.1.x	Fixed Radio Systems; Point-to-multipoint equipment; Part 5: Point-to-multipoint digital radio systems below 1 GHz - Additional Parameters for DS-CDMA Systems	< 1	to be agreed on national basis
EN 301 525 [23]	V1.1.x	Fixed Radio Systems; Point-to-Multipoint Antennas; Antennas for Point-to-Multipoint fixed radio systems in the 1 GHz to 3 GHz band	1 to 3	NA
EN 301 744 [24]	V1.2.x	Fixed Radio Systems; Point-to-multipoint equipment; Direct Sequence Code Division/Time Division Multiple Access (DS-CD/TDMA); Point-to-multipoint digital packet radio systems in frequency bands in the range 3 GHz to 11 GHz	3 to 11	24
EN 302 085 [25]	V1.1.x	Fixed Radio Systems; Point-to-Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 3 GHz to 11 GHz band	3 to 11	NA
EN 302 063 [44]	V1.1.x	Fixed Radio Systems; Multipoint equipment; Multipoint digital radio systems operating in the 31,0 GHz to 33,4 GHz (32 GHz) frequency range	31,0 to 33,4	3,5 to 112

<b>Equipment standards</b>				
<b>ETSI Reference number</b>	<b>Version</b>	<b>Title</b>	<b>Frequency range (GHz) of Fixed Service frequency bands (see note)</b>	<b>Channel separation (MHz)</b>
EN 302 078 [45]	V1.1.x	Fixed Radio Systems; Multipoint Antennas; Circularly polarized antennas for multipoint fixed radio systems in the 1 GHz to 11 GHz band	1 to 11	NA
<b>Test methods for spurious emissions and receiver immunity standards that are relevant for the test and definition of essential requirements</b>				
<b>ETSI Reference number</b>	<b>Version</b>	<b>Title</b>		
EN 301 126-2-1 [26]	V1.1.x	Fixed Radio Systems; Conformance testing; Part 2-1: Point-to-Multipoint equipment; Definitions and general requirements		
EN 301 126-2-2 [27]	V1.1.x	Fixed Radio Systems; Conformance testing; Part 2-2: Point-to-Multipoint equipment; Test procedures for FDMA systems		
EN 301 126-2-3 [28]	V1.1.x	Fixed Radio Systems; Conformance testing; Part 2-3: Point-to-Multipoint equipment; Test procedures for TDMA systems		
EN 301 126-2-4 [29]	V1.1.x	Fixed Radio Systems; Conformance testing; Part 2-4: Point-to-Multipoint equipment; Test procedures for FH-CDMA systems		
EN 301 126-2-5 [30]	V1.1.x	Fixed Radio Systems; Conformance testing; Part 2-5: Point-to-Multipoint equipment; Test procedures for DS-SS systems		
EN 301 126-2-6 [39]	V1.1.x	Fixed Radio Systems; Conformance testing; Part 2-6: Point-to-Multipoint equipment; Test procedures for Multi Carrier Time Division Multiple Access (MC-TDMA) systems		
EN 301 126-3-1 [31]	V1.1.x	Fixed Radio Systems; Conformance testing; Part 3-1: Point-to-Point antennas; Definitions, general requirements and test procedures		
EN 301 126-3-2 [32]	V1.2.x	Fixed Radio Systems; Conformance testing; Part 3-2: Point-to-Multipoint antennas; Definitions, general requirements and test procedures		
EN 301 390 [33]	V1.1.x	Fixed Radio Systems; Point-to-point and Point-to-Multipoint Systems; Spurious emissions and receiver immunity at equipment/antenna port of Digital Fixed Radio Systems		
NOTE: The frequency ranges stated are those for which the relevant EN is applicable. The exact frequency bands of operation for the multipoint FDRS are detailed in the ENs. The identification of those frequency bands of operation is taken from the approximate centre frequency as commonly used in Fixed Service ITU-R F series Recommendations. The ENs may give provision for national frequency bands of operation that may slightly differ from each other but are commonly referred to by the same term.				

The provisions of the present document are valid for all multipoint FDRS and related antennas identified in the scope of the relevant ETSI standards summarized in table 2.

The present document is considered applicable to FDRS products with integral antennas for which all the technical requirements included in the present document apply. It also applies to FDRS equipment without integral antennas and to separate FDRS antenna products to which only the relevant technical requirements apply, and which would be therefore subject to separate declarations of conformity to the essential requirements of the R&TTE Directive [1].

In particular, it has to be noted that TCAM, while recognizing the "essentiality" of antenna directional requirements for some applications, including the Fixed Service, has deliberated that there should be no obligation for separate declaration of conformity for stand alone antennas and that the conformity to the relevant essential requirements should be the responsibility of the final system integrator.

However, it has also been recognized that the assessment of Article 3.2 requirements on the radio-sites is technically impractical. Therefore, it should not be forbidden to a supplier of FDRS antennas, who decides, under his responsibility, to declare compliance to the relevant harmonized standard (or part thereof, in this case), to affix the CE label to a stand-alone Fixed Radio antenna product, fulfilling all other obligations foreseen by R&TTE [1]; in particular, providing information for the user on the intended use of the apparatus. The final system integrator might benefit of such declaration of conformity for any final radio-site assessment obligations.

Furthermore, the antenna manufacturer is recommended to keep a technical construction file (according annex II of R&TTE) to be supplied, on request, to the radio system vendor or to the final system integrator.

Technical specifications relevant to the R&TTE Directive [1] are summarized in annex A.

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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>.

NOTE: EN revision numbering see note 2 in Scope.

- [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] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.
- [3] ETSI EN 300 631 (V1.2): "Fixed Radio Systems; Point-to-Point Antennas; Antennas for Point-to-Point fixed radio systems in the 1 GHz to 3 GHz band".
- [4] ETSI EN 300 636 (V1.3): "Fixed Radio Systems; Point-to-multipoint equipment; Time Division Multiple Access (TDMA); Point-to-multipoint digital radio systems in frequency bands in the range 1 GHz to 3 GHz".
- [5] ETSI EN 300 833 (V1.4): "Fixed Radio Systems; Point-to-point antennas; Antennas for point-to-point fixed radio systems operating in the frequency band 3 GHz to 60 GHz".
- [6] ETSI EN 301 021 (V1.6): "Fixed Radio Systems; Point-to-multipoint equipment; Time Division Multiple Access (TDMA); Point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz".
- [7] ETSI EN 301 055 (V1.4): "Fixed Radio Systems; Point-to-multipoint equipment; Direct Sequence Code Division Multiple Access (DS-CDMA); Point-to-multipoint digital radio systems in frequency bands in the range 1 GHz to 3 GHz".
- [8] ETSI EN 301 080 (V1.3): "Fixed Radio Systems; Point-to-multipoint equipment; Frequency Division Multiple Access (FDMA); Point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz".
- [9] ETSI EN 301 124 (V1.2): "Fixed Radio Systems; Point-to-multipoint equipment; Direct Sequence Code Division Multiple Access (DS-CDMA) point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz".

- [10] ETSI EN 301 179 (V1.2): "Fixed Radio Systems; Point-to-multipoint equipment; Frequency Hopping Code Division Multiple Access (FH-CDMA); Point-to-multipoint Digital Radio Relay Systems (DRRS) in the bands within the range 1 GHz to 3 GHz".
- [11] ETSI EN 301 213-1 (V1.1): "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 1: Basic parameters".
- [12] ETSI EN 301 213-2 (V1.3): "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 2: Frequency Division Multiple Access (FDMA) methods".
- [13] ETSI EN 301 213-3 (V1.4): "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 3: Time Division Multiple Access (TDMA) methods".
- [14] ETSI EN 301 215-1 (V1.2): "Fixed Radio Systems; Point to Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 11 GHz to 60 GHz band; Part 1: General aspects".
- [15] ETSI EN 301 215-2 (V1.3): "Fixed Radio Systems; Point-to-Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 11 GHz to 60 GHz band; Part 2: 24 GHz to 30 GHz".
- [16] ETSI EN 301 253 (V1.2): "Fixed Radio Systems; Point-to-multipoint equipment; Frequency Hopping Code Division Multiple Access (FH-CDMA); Point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz".
- [17] ETSI EN 301 373 (V1.2): "Fixed Radio Systems; Point-to-multipoint equipment; Frequency Division Multiple Access (FDMA); Point-to-multipoint digital radio systems in frequency bands in the range 1 GHz to 3 GHz".
- [18] ETSI EN 301 460-1 (V1.1): "Fixed Radio Systems; Point-to-multipoint equipment; Part 1: Point-to-multipoint digital radio systems below 1 GHz - Common parameters".
- [19] ETSI EN 301 460-2 (V1.1): "Fixed Radio Systems; Point-to-multipoint equipment; Part 2: Point-to-multipoint digital radio systems below 1 GHz - Additional parameters for TDMA systems".
- [20] ETSI EN 301 460-3 (V1.1): "Fixed Radio Systems; Point-to-multipoint equipment; Part 3: Point-to-multipoint digital radio systems below 1 GHz - Additional parameters for FH-CDMA systems".
- [21] ETSI EN 301 460-4 (V1.1): "Fixed Radio Systems; Point-to-multipoint equipment; Part 4: Point-to-multipoint digital radio systems below 1 GHz - Additional parameters for FDMA systems".
- [22] ETSI EN 301 460-5 (V1.1): "Fixed Radio Systems; Point-to-multipoint equipment; Part 5: Point-to-multipoint digital radio systems below 1 GHz - Additional Parameters for DS-CDMA Systems".
- [23] ETSI EN 301 525 (V1.1): "Fixed Radio Systems; Point-to-Multipoint Antennas; Antennas for Point-to-Multipoint fixed radio systems in the 1 GHz to 3 GHz band".
- [24] ETSI EN 301 744 (V1.2): "Fixed Radio Systems; Point-to-multipoint equipment; Direct Sequence Code Division/Time Division Multiple Access (DS-CD/TDMA); Point-to-multipoint digital packet radio systems in frequency bands in the range 3 GHz to 11 GHz".
- [25] ETSI EN 302 085 (V1.1): "Fixed Radio Systems; Point-to-Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 3 GHz to 11 GHz band".
- [26] ETSI EN 301 126-2-1 (V1.1): "Fixed Radio Systems; Conformance testing; Part 2-1: Point-to-Multipoint equipment; Definitions and general requirements".
- [27] ETSI EN 301 126-2-2 (V1.1): "Fixed Radio Systems; Conformance testing; Part 2-2: Point-to-Multipoint equipment; Test procedures for FDMA systems".

- [28] ETSI EN 301 126-2-3 (V1.1): "Fixed Radio Systems; Conformance testing; Part 2-3: Point-to-Multipoint equipment; Test procedures for TDMA systems".
- [29] ETSI EN 301 126-2-4 (V1.1): "Fixed Radio Systems; Conformance testing; Part 2-4: Point-to-Multipoint equipment; Test procedures for FH-CDMA systems".
- [30] ETSI EN 301 126-2-5 (V1.1): "Fixed Radio Systems; Conformance testing; Part 2-5: Point-to-Multipoint equipment; Test procedures for DS-CDMA systems".
- [31] ETSI EN 301 126-3-1 (V1.1): "Fixed Radio Systems; Conformance testing; Part 3-1: Point-to-Point antennas; Definitions, general requirements and test procedures".
- [32] ETSI EN 301 126-3-2 (V1.2): "Fixed Radio Systems; Conformance testing; Part 3-2: Point-to-Multipoint antennas - Definitions, general requirements and test procedures".
- [33] ETSI EN 301 390 (V1.1): "Fixed Radio Systems; Point-to-point and Point-to-Multipoint Systems; Spurious emissions and receiver immunity at equipment/antenna port of Digital Fixed Radio Systems".
- [34] EC Standardization Mandate M/284: "Harmonized standards for the R&TTE Directive".
- [35] ETSI EG 201 399 (V1.3): "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive".
- [36] ETSI TR 101 506 (V1.1): "Fixed Radio Systems; Generic definitions, terminology and applicability of essential requirements under the article 3.2 of 99/05/EC Directive to Fixed Radio Systems".
- [37] ITU-R Recommendation F.746-7: "Radio-frequency arrangements for fixed service systems".
- [38] ETSI EG 202 306 (V1.2): "Transmission and Multiplexing (TM); Access networks for residential customers".
- [39] ETSI EN 301 126-2-6 (V1.1): "Fixed Radio Systems; Conformance testing; Part 2-6: Point-to-Multipoint equipment; Test procedures for Multi Carrier Time Division Multiple Access (MC-TDMA) systems".
- [40] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).
- [41] Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).
- [42] ETSI EN 301 213-4 (V1.1): "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 4: Direct Sequence Code Division Multiple Access (DS-CDMA) methods".
- [43] ETSI EN 301 213-5 (V1.1): "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 5: Multi-Carrier Time Division Multiple Access (MC-TDMA) methods".
- [44] ETSI EN 302 063 (V1.1): "Fixed Radio Systems; Multipoint equipment; Multipoint digital radio systems operating in the 31,0 GHz to 33,4 GHz (32 GHz) frequency range".
- [45] ETSI EN 302 078 (V1.1): "Fixed Radio Systems; Multipoint antennas; Circularly polarized antennas for multipoint fixed radio systems in the 1 GHz to 11 GHz band".
- [46] ETSI EN 301 215-4 (V1.1) "Fixed Radio Systems; Point to Multipoint Antennas; Antennas for multipoint fixed radio systems in the 11 GHz to 60 GHz band; Part 4: 30 GHz to 40,5 GHz".



## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**allocated radio frequency band:** entry in the table of frequency allocations of a given frequency band for the purpose of its use by one or more terrestrial or space radiocommunication services or the radioastronomy service under specific conditions

NOTE: This term shall also be applied to the frequency band concerned (Radio Regulations, Geneva 1998 Article S1.16).

**Automatic Transmit Power Control (ATPC):** Function to offer a dynamic power control that delivers the maximum power only during deep fading activity

In this way for most of the time the interference is reduced and the transmitter operates in a higher linearity mode. A dynamic power control is also used for the appropriate working of some systems.

When this function is used the transmit power is dynamically changed and follows the propagation condition. In principle when ATPC is implemented three different levels of power may be identified:

- **Maximum available power** (delivered only in a condition of deep fading).
- **Maximum nominal power** (useable on permanent base when ATPC is disabled); it should be noted that this power is "nominal for the equipment" and should not to be confused with the nominal level set for regulatory purposes, eventually achieved through passive RF attenuators or RTPC function.
- **Minimum power** (delivered in unfaded condition).

NOTE: Maximum nominal and maximum available power levels may be coincident or in case of multi-state modulation formats the maximum available power may be used to overdrive the transmitter (losing linearity but gaining fade margin when the fade conditions have already impaired the expected RBER). Performance prediction is usually made with the highest "available power".

**conformity assessment procedure:** See R&TTE Directive [1] Annexes II, III, IV and V.

**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.

**essential phenomenon:** radio frequency phenomenon related to the essential requirements under article 3.2 of the R&TTE Directive [1] that is capable of expression in terms of quantifiable technical parameters

**harmonized radio frequency band:** commonly referred as a portion of the frequency spectrum that CEPT/ECC allocates to a specific service through a CEPT/ECC Decision (proper definition is currently under study by CEPT/ECC)

NOTE: Presently radio frequency bands allocated to Fixed Service are not harmonized.

**maximum available power:** See **Automatic Transmit Power Control (ATPC)**.

**maximum nominal power:** See **Automatic Transmit Power Control (ATPC)**.

**national radio frequency channel arrangement:** predefined centre frequencies raster for a number of radio frequency channels covered by a national regulation in a non-harmonized frequency band used in a country (it may all or in part overlap with other national or recommended radio frequency channel arrangements).

**operating frequency range:** range(s) of radio frequency channels covered by the Equipment Under Test (EUT) without any change of units.

**radio equipment:** radio equipment means a product or relevant component thereof capable of communication by means of the emission and/or reception of radio waves utilizing the spectrum allocated to terrestrial/space radio communication (see Article 2 of 1999/5/EC Directive)

**radio frequency channel:** portion of a radio frequency band, where a radio frequency channel arrangement has been established, dedicated to one fixed radio link (or a P-MP system sector)

**radio frequency channel arrangement:** predefined centre frequencies raster for a number of radio frequency channels as defined by ITU-R Recommendation F.746-7 [37] used by administrations for co-ordination in the same geographical area

**recommended radio frequency channel arrangement:** predefined centre frequencies raster for a number of radio frequency channels, covered by a CEPT/ECC Recommendation in a non-harmonized frequency band (not used for the same purpose by all administrations) that is recommended to the member countries in the case they use the relevant frequency band for Fixed Service

**Remote Frequency Control (RFC):** Function allowing to change and control the transmit / receive centre frequency/channel either by a local monitoring terminal connected to the system or a by a remote network management terminal.

The frequency setting is static and usually made to adapt the frequency of the link to the interference scenario in the same geographical area. It is also used at the activation or re-commissioning of links in order to easily obtain the licensed frequency assigned by the regulatory body to the network operator for that link.

**Remote Transmit Power Control (RTPC):** Function allowing to change and control the transmitter output power either by a local monitoring terminal connected to the system or a by a remote network management terminal. The transmitter power setting is static and usually made at the activation or re-commissioning of links. RTPC might be used for two different purposes:

- 1) For inter-operator interference balancing (CSs in particular, but not limited to). In this application it is similar to the P-P scenario, therefore the spectrum mask shall be met.
- 2) For intra-system power balancing of TS closest to the CS, or for the shortest hops in Mesh architectures. In this case the spectrum mask does not need to be met because it is an internal issue of the system (interference balancing with other operators is achieved considering the power of the most distant TSs, i.e. those with the highest power).

## 3.2 Symbols

For the purposes of the present document, the following symbol applies:

dB	decibel
GHz	gigahertz
kbit/s	kilobits per second
kHz	kilohertz
Mbit/s	megabits per second
MHz	megahertz

## 3.3 Abbreviations

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

ATPC	Automatic Transmit Power Control
BER	Bit Error Rate
CCS	Central Controller Station
CDMA	Code Division Multiple Access
CEPT	European Conference of Post and Telecommunications
CRS	Central Radio Station
CS	Central Station
CW	Continuous Wave
DRRS	Digital Radio Relay Systems
DS-CD/TDMA	Direct Sequence Code Division /Time Division Multiple Access
DS-CDMA	Direct Sequence Code Division Multiple Access
EC	European Commission
ECC	Electronic Communications Committee
EIRP	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
ERM/TG	EMC and Radio Spectrum Matters/Task Group
FDMA	Frequency Division Multiple Access

FDRS	Fixed Digital Radio Systems
FH-CDMA	Frequency Hopping Code Division Multiple Access
FWA	Fixed Wireless Access
IF	Intermediate Frequency
ITU-R	International Telecommunications Union - Radiocommunications
ITU-T	International Telecommunications Union - Telecommunications
MC-TDMA	Multi-Carrier Time Division Multiple Access
MP-MP	MultiPoint-to-MultiPoint
NA	Not Applicable
NNI	Network Node Interface
OAP	One-step Approval Procedure
OJEC	Official Journal of the European Community
P-MP	Point-to-MultiPoint
P-P	Point-to-Point
PSTN	Public Switched Telephone Network
R&TTE	Radio and Telecommunications Terminal Equipment
RBER	Residual Bit Error Rate
RF	Radio Frequency
RFC	Remote Frequency Control
RPE	Radiation Pattern Envelope
RS	Repeater Station
RSL	Receiver input Signal Level
RTPC	Remote Transmit Power Control
SNI	Service Node Interface
TBD	To Be Decided
TCAM	Telecommunication Conformity Assessment Matters committee
TC-TM	Technical Committee Transmission and Multiplexing
TDMA	Time Division Multiple Access
TE	Terminal Equipment
TS	Terminal Station
T <sub>X</sub>	Transmitter
UNI	User Network Interface

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## 4 Essential requirements

### 4.1 General

With reference to Article 3.2 of 1999/5/EC Directive [1] the technical phenomena in this clause have been identified as relevant to the essential requirements.

Guidance and description of the phenomena is given by EG 201 399 [35] and specific applications and descriptions for FDRS is given by TR 101 506 [36].

Multipoint equipment can be used in the fixed infrastructure by Operators of Public Telecommunication Networks. It is generally understood that, when used in Public Communication Networks, FDRS, as all fixed network equipment, shall meet a number of ITU-T availability recommendations, which are essential for national and international communications that may commonly include any kind of high priority government, business and emergency communications. Poor receiver parameters may endanger these kinds of communications.

In all cases, standardized receiver parameters ensure that equipment will operate on the transmitter side with characteristics optimized in terms of transmission characteristics, thus reducing its interference potential to the strict minimum. In several but not all cases, this is also ensured by a functional feedback link between receiver and transmitter operations.

Therefore, also in the light of the conclusion expressed by TCAM 7 endorsing ERM/TG 18 proposal, it is considered that, for Multipoint equipment used in the "public core and access networks" offering "high service availability radio links (e.g. requirements to meet PSTN performance objectives and safety of life considerations), all receiver parameters, referred in the present document, are to be considered relevant to the essential requirements under article 3.2 of the R&TTE Directive [1].

The tables stated in the following clauses identify these essential requirements with reference to the applicable clauses of the specific ETSI standards reported in the scope of this harmonized standard in table 2.

Test methods referenced in the tables below are only those considered essential *for the assessment of conformity to Article 3.2 of the R&TTE Directive [1]* (i.e. for the reproducibility of the results).

## 4.2 Environmental specifications and tests

The technical requirements of the present document apply under the environmental profile, for intended operation of the equipment and antennas, declared by the manufacturer.

The environmental profile may be determined by the environmental class of the equipment according to the guidance given in clause 4.4 of EN 301 126-2-1 [26].

The equipment and antennas shall comply with all the requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

Any test shall be carried out with the same principles and procedures for extreme and/or reference conditions reported in clause 4.4 of EN 301 126-2-1 [26] to produce the test report and/or declaration of conformity required to fulfil any Conformity assessment procedure foreseen by the R&TTE Directive [1] for radio equipment.

The requirement for test at extreme and/or reference conditions is reported in table 1 of clause 4.2 of EN 301 126-2-1 [26]. This requirement shall be applied to clauses 4.5 and 4.7 of the present document according to the principles for similar requirements in EN 301 126-2-1 [26].

To produce the test report and/or declaration of conformity (R&TTE Directive [1]) for integral or stand-alone FDRS antennas, to satisfy the directional phenomena of clause 4.6 of the present document, tests shall be carried out at reference environmental conditions according to clause 4.1 of EN 301 126-3-1 [31] and EN 301 126-3-2 [32].

The test report shall be produced according to the procedure foreseen by Article 10 of the R&TTE Directive [1].

## 4.3 Wide radio-frequency band covering units specification and tests

### 4.3.1 Radio equipment

Even if radio frequency front-ends for FDRS are commonly designed for covering all or part(s) of the possible operating channels within a specific radio frequency channel arrangement, equipment can provide single radio frequency channel operation (e.g. when the RF duplexer filters is tuned to a specific channel) or offer a wider operating frequency range (e.g. wide-band RF duplexer and frequency agility by the RFC function). Figures 3 and 4 show how real operating channels of radio equipment may be mapped onto existing channel arrangements or parts thereof.

The equipment shall comply with all the requirements of the present document at any possible operating frequency.

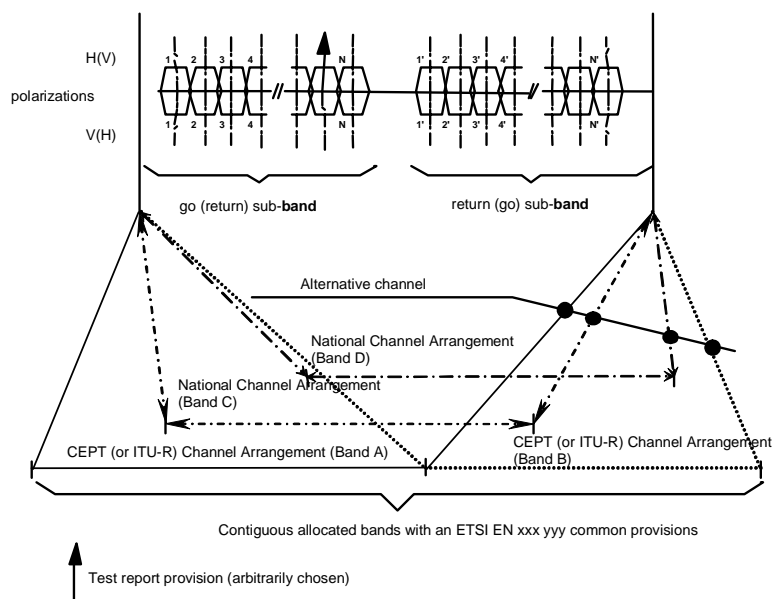
The tests shall be carried-out in the following way to produce the test report and/or declaration of conformity (R&TTE Directive [1]):

- 1) in the case where the equipment is intended for single channel operation the test report shall be produced for one radio frequency channel arbitrarily chosen by the supplier (see figure 3);
- 2) in the case where the equipment is intended for covering an operating frequency range the test report shall be produced for the lowest, intermediate and highest possible radio frequency channel within that operating frequency range (see figure 4).

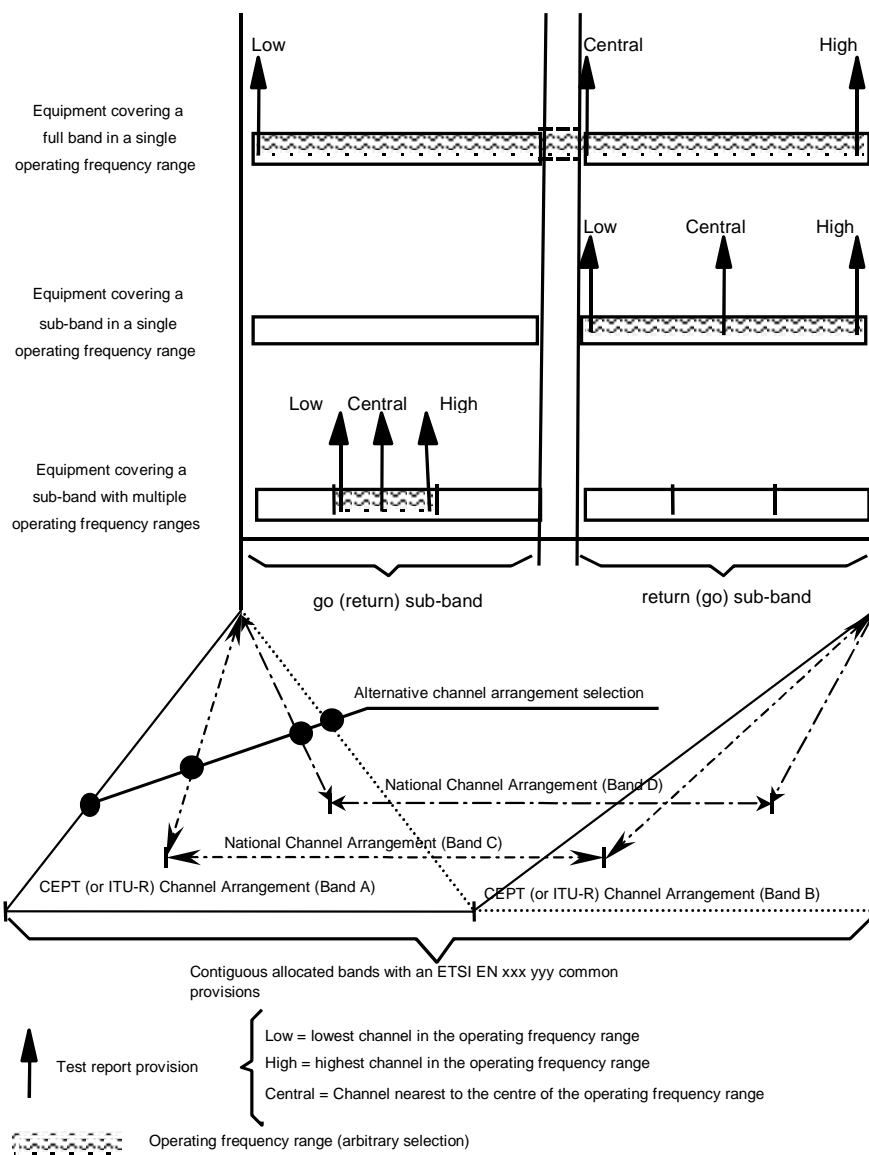
It is not required that all the tests necessary for the test report be done on the same sample of equipment and at the same time provided that the test report includes all the tests required by the present document. Each test may be performed on different samples of the same equipment at different channel frequencies or frequency ranges and at different times.

Where applicable the following additional provisions shall also apply to the production of the test report:

- in the case where the equipment covers a radio frequency channel arrangement with more than one operating frequency range the test report shall be produced for one of the operating frequency ranges. This range may be arbitrarily chosen by the supplier using the above procedures for equipment intended for single channel operation or for covering an operating frequency range (see figure 3).
- in the case where the equipment is designed to cover, with the same requirements under the same ETSI standard, a number of fully or partially overlapping recommended and/or national radio frequency channel arrangements, similarly established across contiguous radio frequency bands allocated to Fixed Service, the test report shall be produced for one radio frequency channel arrangement. This range may be arbitrarily chosen by the supplier using the above procedures for equipment intended for single channel operation or for covering an operating frequency range (see figures 3 and 4).



**Figure 3: Test report frequency requirement for equipment intended for single channel operation**



**Figure 4: Test report frequency requirements for equipment intended for covering an operating frequency range**

NOTE 1: The go (return) channels in figures 3 and 4 are often referred to as down-link (up-link) or as outbound (inbound) channels when used in multipoint systems.

NOTE 2: The above example of a frequency arrangement showing go and return channels is related to point-to-multipoint systems applying Frequency Division Duplex (FDD). Multipoint systems applying Time Division Duplex (TDD) transmit and receive at the same frequency channel in time sequence thus only one frequency channel, either a go or a return channel, is sufficient.

### 4.3.2 Antennas for FDRS

Commonly FDRS antennas cover an operating frequency range declared by the supplier. The antenna parameters shall comply with all the requirements of the present document within the declared operating frequency range.

The tests shall be carried out at the lowest, middle and highest frequency of the relevant frequency range to produce the test report and/or declaration of conformity required (R&TTE Directive [1]).

## 4.4 Specification and testing of multi-rate/multi-format equipment

FDRS equipment can cover a number of different payload-rates or different modulation formats through software pre-setting.

In such cases the equipment shall comply with all the requirements of the present document at any possible payload operation.

The tests, requested to generate the test report and/or declaration of conformity in order to fulfil any conformity assessment procedure foreseen by the Directive 1999/5/EC [1], shall be carried-out:

- a) for transmitting phenomena (see clause 4.5) at any possible bit rate and modulation format operation;
- b) for receiving phenomena (see clause 4.7) and control and monitoring functions (see clause 4.8) shall be tested only at the lowest and the highest bit rate for any modulation format.

## 4.5 Transmitting phenomena

### 4.5.1 Frequency error/stability (radio frequency tolerance)

The clauses that give the limits of the essential phenomenon frequency error/stability (radio frequency tolerance) and its test methods are reported in table 3.

The tests shall be carried out at reference and extreme climatic conditions according to EN 301 126-2-1 [26] clause 4.2 table 1 to produce the test report and/or declaration of conformity required (R&TTE Directive [1]).

**Table 3: Relevant ENs clause(s)**

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V1.3.x	5.3.4	RF tolerance	EN 301 126-2-3 [28] Clause 4.2.5	
EN 301 021 [6]	V1.6.x	5.3.5	RF tolerance	EN 301 126-2-3 [28] Clause 4.2.5	
EN 301 055 [7]	V1.4.x	5.3.4	RF tolerance	EN 301 126-2-5 [30] Clause 4.2.5	
EN 301 080 [8]	V1.3.x	5.5.5	RF tolerance	EN 301 126-2-2 [27] Clause 4.2.5	
EN 301 124 [9]	V1.2.x	5.3.4	RF tolerance	EN 301 126-2-5 [30] Clause 4.2.5	
EN 301 179 [10]	V1.2.x	5.4.5	RF tolerance	EN 301 126-2-4 [29] Clause 4.2.5	
EN 301 213-1 [11]	V1.1.x	5.5.7	RF tolerance	NA	Basic parameters
EN 301 213-2 [12]	V1.3.x	5.5.7	RF tolerance	EN 301 126-2-2 [27] Clause 4.2.5	
EN 301 213-3 [13]	V1.4.x	5.5.7	RF tolerance	EN 301 126-2-3 [28] Clause 4.2.5	
EN 301 213-4 [42]	V1.1.x	5.5.7	RF tolerance	EN 301 126-2-5 [30] Clause 4.2.5	
EN 301 213-5 [43]	V1.1.x	5.5.7	RF tolerance	EN 301 126-2-6 [39] Clause 4.2.5	
EN 301 253 [16]	V1.2.x	5.4.5	RF tolerance	EN 301 126-2-4 [29] Clause 4.2.5	
EN 301 373 [17]	V1.2.x	5.3.4	RF frequency tolerance	EN 301 126-2-2 [27] Clause 4.2.5	
EN 301 460-1 [18]	V1.1.x	5.5.5	RF tolerance	See the relevant part for each access method EN 301 126-2	Common parameters
EN 301 460-2 [19]	V1.1.x	5.5.5	RF tolerance	EN 301 126-2-3 [28] Clause 4.2.5	

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 301 460-3 [20]	V1.1.x	5.5.5	RF tolerance	EN 301 126-2-4 [29] Clause 4.2.5	
EN 301 460-4 [21]	V1.1.x	5.5.5	RF tolerance	EN 301 126-2-2 [27] Clause 4.2.5	
EN 301 460-5 [22]	V1.1.x	5.5.5	RF tolerance	EN 301 126-2-5 [30] Clause 4.2.5	
EN 301 744 [24]	V1.2.x	5.3.4	RF tolerance	EN 301 126-2-3 [28] Clause 4.2.5	
EN 302 063 [44]	V1.1.x	5.5.7	RF tolerance	See the relevant part for each access method EN 301 126-2:  EN 301 126-2-3 [28] Clause 4.2.5  EN 301 126-2-2 [27] Clause 4.2.5  EN 301 126-2-6 [39] Clause 4.2.5	

## 4.5.2 Transmitter power

The clauses that give the limits of the essential phenomenon transmitter power and appropriate test methods are reported in table 4.

The tests shall be carried out at reference and extreme climatic conditions according to EN 301 126-2-1 [26] clause 4.2 table 1 to produce the test report and/or declaration of conformity required (R&TTE Directive [1]).

**Table 4: Relevant ENs clause(s)**

ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V1.3.x	5.3.1	T <sub>x</sub> power range	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	
EN 301 021 [6]	V1.6.x	5.3.1	T <sub>x</sub> power range	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	
EN 301 055 [7]	V1.4.x	5.3.1	Transmitter power range	EN 301 126-2-5 [30] Clause 4.2.1 / 4.2.2	
EN 301 080 [8]	V1.3.x	5.5.1	Transmitter power range	EN 301 126-2-2 [27] Clause 4.2.1 / 4.2.2	
EN 301 124 [9]	V1.2.x	5.3.1	T <sub>x</sub> power range	EN 301 126-2-5 [30] Clause 4.2.1 / 4.2.2	
EN 301 179 [10]	V1.2.x	5.4.1	T <sub>x</sub> power range	EN 301 126-2-4 [29] Clause 4.2.1 / 4.2.2	
EN 301 213-1 [11]	V1.1.x	5.5.2	Transmitter nominal output power	NA	Basic parameters
EN 301 213-2 [12]	V1.3.x	5.5.2	Transmitter nominal output power	EN 301 126-2-2 [27] Clause 4.2.1 / 4.2.2	
EN 301 213-3 [13]	V1.4.x	5.5.2	Transmitter nominal output power	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	
EN 301 213-4 [42]	V1.1.x	5.5.2	Transmitter nominal power	EN 301 126-2-5 [30] Clause 4.2.1 / 4.2.2	
EN 301 213-5 [43]	V1.1.x	5.5.2	Transmitter nominal output power	EN 301 126-2-6 [39] Clause 4.2.1 / 4.2.2	
EN 301 253 [16]	V1.2.x	5.4.1	T <sub>x</sub> power range	EN 301 126-2-4 [29] Clause 4.2.1 / 4.2.2	
EN 301 373 [17]	V1.2.x	5.3.1	T <sub>x</sub> power range	EN 301 126-2-2 [27] Clause 4.2.1 / 4.2.2	



ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	test method (if essential)	Notes
EN 301 460-1 [18]	V1.1.x	5.5.1	Transmitter output power	See the relevant part for each access method EN 301 126-2	Common parameters
EN 301 460-2 [19]	V1.1.x	5.5.1	Transmitter output power	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	
EN 301 460-3 [20]	V1.1.x	5.5.1	Transmitter output power	EN 301 126-2-4 [29] Clause 4.2.1 / 4.2.2	
EN 301 460-4 [21]	V1.1.x	5.5.1	Transmitter output power	EN 301 126-2-2 [27] Clause 4.2.1 / 4.2.2	
EN 301 460-5 [22]	V1.1.x	5.5.1	Transmitter output power	EN 301 126-2-5 [30] Clause 4.2.1 / 4.2.2	
EN 301 744 [24]	V1.2.x	5.3.1	T <sub>x</sub> power range	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	
EN 302 063 [44]	V1.1.x	5.5.3	Transmitter nominal output power	See the relevant part for each access method EN 301 126-2:  EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2  EN 301 126-2-2 [27] Clause 4.2.1 / 4.2.2  EN 301 126-2-6 [39] Clause 4.2.1 / 4.2.2	

### 4.5.3 Adjacent channel power (Spectrum mask)

#### 4.5.3.1 Spectrum mask and discrete CW lines

The spectrum masks and discrete CW lines reported in the relevant clauses of table 5 are necessary for a number of intra-system and inter-system regulatory and performance requirements.

The clauses that give the limits of the essential phenomenon adjacent channel power (spectrum mask) and appropriate test methods are reported in table 5.

Spectrum mask attenuation beyond 45 dB, even if reported in some of the Clauses in the ENs in table 5, is considered not relevant to essential requirements of article 3.2 of R&TTE Directive [1].

The tests shall be carried out at reference and extreme climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1 to produce the test report and/or declaration of conformity required (R&TTE Directive [1]). Furthermore, for different access methods, the tests shall be carried in accordance with ENs 301 126-2-1 [26], 301 126-2-2 [27], 301 126-2-3 [28], 301 126-2-4 [29], 301 126-2-5 [30] or 301 126-6 [39] as applicable.

Table 5: Relevant ENs clause(s)

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	Test method (if essential)	Notes
EN 300 636 [4]	V1.3.x	5.3.2.1	Spectrum density mask	EN 301 126-2-3 [28] Clause 4.2.6	
		5.3.2.2	Discrete CW lines exceeding the spectrum mask limit	EN 301 126-2-3 [28] Clause 4.2.8	
EN 301 021 [6]	V1.6.x	5.3.3.1	Spectrum density masks	EN 301 126-2-3 [28] Clause 4.2.6	
		5.3.3.2	Discrete CW components exceeding the spectrum mask limit (all stations)	EN 301 126-2-3 [28] Clause 4.2.8	
EN 301 055 [7]	V1.4.x	5.3.3.1	Spectrum density masks	EN 301 126-2-5 [30] Clause 4.2.6	
		5.3.3.2	Discrete CW components exceeding the spectrum mask limit (all stations)	EN 301 126-2-5 [30] Clause 4.2.8	
EN 301 080 [8]	V1.3.x	5.5.4.1	RF spectrum mask for the central radio station	EN 301 126-2-2 [27] Clause 4.2.6	
		5.5.4.2	RF spectrum mask for the terminal station and the repeater station	EN 301 126-2-2 [27] Clause 4.2.6	
		5.5.4.3	Discrete CW components exceeding the spectrum mask limit (all stations)	EN 301 126-2-2 [27] Clause 4.2.8	
EN 301 124 [9]	V1.2.x	5.3.2.1	Spectrum density mask	EN 301 126-2-5 [30] Clause 4.2.6	
		5.3.2.2	Discrete CW components exceeding the spectrum mask limit (all stations)	EN 301 126-2-5 [30] Clause 4.2.8	
EN 301 179 [10]	V1.2.x	5.4.3.1	Spectrum density mask	EN 301 126-2-4 [29] Clause 4.2.6	
		5.4.3.2	Discrete CW components exceeding the spectrum mask limit (all stations)	EN 301 126-2-4 [29] Clause 4.2.8	
EN 301 213-1 [11]	V1.1.x	5.5.4	RF spectrum mask	NA	Basic parameters

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	Test method (if essential)	Notes
EN 301 213-2 [12]	V1.3.x	5.5.4.1	RF spectrum density mask for the central radio station	EN 301 126-2-2 [27] Clause 4.2.6	
		5.5.4.2	RF spectrum density mask for the terminal station and the repeater station	EN 301 126-2-2 [27] Clause 4.2.6	
		5.5.4.3	Discrete CW components exceeding the spectrum mask limit (all stations)	EN 301 126-2-2 [27] Clause 4.2.8	
EN 301 213-3 [13]	V1.4.x	5.5.4.1	RF spectrum density mask for the central radio station	EN 301 126-2-3 [28] Clause 4.2.6	
		5.5.4.2	RF spectrum density mask for the terminal station and the repeater station	EN 301 126-2-3 [28] Clause 4.2.6	
		5.5.4.3	Discrete CW components exceeding the spectrum mask limit (all stations)	EN 301 126-2-3 [28] Clause 4.2.8	
EN 301 213-4 [42]	V1.1.x	5.5.4.1	RF spectrum density mask (all stations)	EN 301 126-2-5 [30] Clause 4.2.6	
		5.5.4.2	Discrete CW components exceeding the spectrum mask (all stations)	EN 301 126-2-5 [30] Clause 4.2.8	
EN 301 213-5 [43]	V1.1.x	5.5.4.1	RF spectrum density mask for the central radio station	EN 301 126-2-6 [39] Clause 4.2.6	
		5.5.4.2	RF spectrum density mask for the terminal station	EN 301 126-2-6 [39] Clause 4.2.6	
		5.5.4.3	RF spectrum density mask for the repeater station	EN 301 126-2-6 [39] Clause 4.2.6	
		5.5.4.4	Discrete CW components exceeding the spectrum density mask (all stations)	EN 301 126-2-6 [39] Clause 4.2.8	
EN 301 253 [16]	V1.2.x	5.4.3.1	Spectrum density mask	EN 301 126-2-4 [29] Clause 4.2.6	
		5.4.3.2	Discrete CW components exceeding the spectrum density mask (all stations)	EN 301 126-2-4 [29] Clause 4.2.8	
EN 301 373 [17]	V1.2.x	5.3.2.1	Spectrum density mask	EN 301 126-2-2 [27] Clause 4.2.6	
		5.3.2.2	Discrete CW components exceeding the spectrum density mask (all stations)	EN 301 126-2-4 [29] Clause 4.2.8	

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	Test method (if essential)	Notes
EN 301 460-1 [18]	V1.1.x	5.5.4	RF spectrum mask	See the relevant part for each access method EN 301 126-2	Common parameters
EN 301 460-2 [19]	V1.1.x	5.5.4	RF spectrum mask	EN 301 126-2-3 [28] Clause 4.2.6	
EN 301 460-3 [20]	V1.1.x	5.5.4	RF spectrum mask	EN 301 126-2-4 [29] Clause 4.2.6	
EN 301 460-4 [21]	V1.1.x	5.5.4	RF spectrum mask	EN 301 126-2-2 [27] Clause 4.2.6	
EN 301 460-5 [22]	V1.1.x	5.5.4	RF spectrum mask	EN 301 126-2-5 [30] Clause 4.2.6	
EN 301 744 [24]	V1.2.x	5.3.2.1	Spectrum density mask	EN 301 126-2-3 [28] Clause 4.2.6	
		5.3.2.2	Discrete CW components exceeding the spectrum density mask (all stations)	EN 301 126-2-4 [29] Clause 4.2.8	
EN 302 063 [44]	V1.1.x	5.5.5	RF Spectrum mask	See the relevant part for each access method EN 301 126-2:	
		A.2	RF spectrum mask	EN 301 126-2-3 [28] Clause 4.2.6	
		B.2	RF spectrum mask	EN 301 126-2-2 [27] Clause 4.2.6	
		C.3.1.1 C.3.1.2 C.3.1.3	RF spectrum masks	EN 301 126-2-6 [39] Clause 4.2.6	
		C.3.1.4	Discrete CW components exceeding the spectrum density mask limit (all stations)	See the relevant part for each access method EN 301 126-2:  EN 301 126-2-3 [28] Clause 4.2.8  EN 301 126-2-2 [27] Clause 4.2.8  EN 301 126-2-6 [39] Clause 4.2.8	

#### 4.5.3.2 Remote Transmit Power Control (RTPC)

RTPC and ATPC (see clause 4.5.5.1) are commonly optional features. From the point of view of hardware implementation, both these functions are made by an electronic attenuator implemented along the transmitting chain (e.g. at IF level, RF level or both levels) and can be realized in a mixed configuration, e.g.:

- ATPC is implemented only;
- RTPC is implemented only;
- ATPC + RTPC are implemented with separate attenuator functions;
- ATPC + RTPC are implemented with a single attenuator comprising both functions, with different command functions (either hardware or software), and the ranges of both may be traded-off from a maximum available attenuation.

RTPC (if any) might be used for two different purposes:

- 1) For inter-operator interference balancing (CSs in particular, but not limited to). In this application it is similar to the P-P scenario, therefore the spectrum mask shall be met.
- 2) For intra-system power balancing of TS closest to the CS, or for the shortest hops in Mesh architectures. In this case the spectrum mask does not need to be met because it is an internal issue of the system (interference balancing with other operators is achieved considering the power of the most distant TSs, i.e. those with the highest power).

Equipment with RTPC will be subject to manufacturer declaration of RTPC range(s) and related tolerance(s). RTPC should be subdivided in the manufacturer declaration in two different ranges (points 1 and 2). The spectrum mask shall be met only in the range defined by point 1.

The tests shall be carried out at reference and extreme climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1 to produce the test report and/or declaration of conformity required (R&TTE Directive [1]). Furthermore, for different access methods, the tests shall be carried out in accordance with ENs 301 126-2-1 [26], 301 126-2-2 [27], 301 126-2-3 [28], 301 126-2-4 [29], 301 126-2-5 [30] or 301 126-2-6 [39] as applicable.

Even if all the procedures provided by clause 4.2.4 of the different parts of the ENs 301 126-2-1 [26], 301 126-2-2 [27], 301 126-2-3 [28], 301 126-2-4 [29], 301 126-2-5 [30] and 301 126-2-6 [39] are followed, the actual tests might fall outside the available sensitivity of test instruments currently available on the market. In this event the supplier shall produce an attachment to the test report containing:

- the calculated evidence that the noise floor of the actual test bed is higher than the requirement;
- the calculated evidence that the actual noise floor, generated by the transmitter according its noise figure and its implemented amplification/attenuation chain, is lower than the requirement.

#### 4.5.4 Spurious emissions

The equipment shall comply with the requirements of clauses 4.1 and 4.1.1 of EN 301 390 [33] in any setting conditions of ATPC and RTPC, if applicable.

Test methods shall be in accordance with clause 4.2.9 of EN 301 126-2-2 [27], EN 301 126-2-3 [28], EN 301 126-2-4 [29], EN 301 126-2-5 [30] and EN 301 126-2-6 [39] applicable to the different access methods.

The tests shall be carried out to produce the test report and/or declaration of conformity required (R&TTE Directive [1]) with ATPC, if applicable, set to maximum available power. The RTPC, if applicable, shall be set at minimum attenuation. The actual test shall be limited to the practical frequency ranges foreseen by clause A.1 of EN 301 390 [33].

The tests shall be carried out at reference climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1.

#### 4.5.5 Transient behaviour of the transmitter (ATPC and RFC)

##### 4.5.5.1 Automatic Transmit Power Control (ATPC)

ATPC and RTPC (see clause 4.5.3.2) are commonly optional features. From the point of view of hardware implementation both these functions are made by an electronic attenuator implemented along the transmitting chain (e.g. at IF level, RF level or both levels) and can be realized in a mixed configuration, e.g.:

- ATPC is implemented only;
- RTPC is implemented only;
- ATPC + RTPC are implemented with separate attenuator functions;
- ATPC + RTPC are implemented with a single attenuator comprising both functions, with different command functions (either hardware or software), and the ranges of both may be traded-off from a maximum available attenuation.

Equipment with ATPC will be subject to manufacturer declaration of ATPC ranges and related tolerances.

The correct operation of ATPC function according to the supplier declaration shall be tested in accordance with the test methods described in clause 4.2.3 of the ENs 301 126-2-2 [27], 301 126-2-3 [28], 301 126-2-4 [29], 301 126-2-5 [30] and 301 126-2-6 [39] applicable to the different access methods.

The equipment shall comply with the requirements of spectrum masks of table 5 above with ATPC operating in the range between maximum available power and maximum nominal power including the attenuation introduced by RTPC function (if applicable).

The tests shall be carried out to produce the test report and/or declaration of conformity required (R&TTE Directive [1]) with ATPC set at the maximum nominal output power of the equipment.

The test shall be carried-out at reference climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1.

#### 4.5.5.2 Remote Frequency Control (RFC)

This functionality is commonly an optional feature.

Equipment with RFC will be subject to manufacturer declaration of RFC ranges and related procedure for the change frequency.

RFC setting procedure shall not produce emissions outside the requirements of the appropriate previous and final centre frequencies spectrum masks of table 5.

The tests shall be carried out to produce the test report and/or declaration of conformity required (R&TTE Directive [1]) applying the RFC setting procedure for three frequencies (i.e. frequencies settings from lower to centre, centre to higher and back in the covered range).

The test shall be carried-out at reference climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1.

## 4.6 Directional phenomena

### 4.6.1 Off-axis EIRP density (Radiation Pattern Envelope)

For each equipment standard mentioned in table 2 the applicable antenna standard is referenced in table 6 together with the clause for the limit of the essential phenomenon off-axis EIRP density (Radiation Pattern Envelope). Furthermore, the applicable Conformance test standard for point-to-multipoint antennas is also stated along with the antenna standards for point-to-multipoint antennas which contain the limits of the essential phenomenon off-axis EIRP density (Radiation Pattern Envelope).

Table 6: Relevant ENs clause(s) [see notes 2 and 5]

ETSI equipment standard	Version	Clause(s) N° In the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 300 636 [4]	V1.3.x	6.1.1 (Terminal Stations) 6.2.1 (Central Stations)  6.4 or 6.3 of EN 301 525 [23] or (see note 4)  6.1.1 (Terminal Stations) 6.2.1 (Central Stations) or 6.3 of EN 302 078 [45]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas  TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 021 [6]	V1.6.x	6.1.1 (Terminal Stations) 6.2.1 (Central Stations)  6.4 or 6.3 of EN 302 085 [25] or (see note 4)  6.1.1 (Terminal Stations) 6.2.1 (Central Stations) or 6.3 of EN 302 078 [45]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas  TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 055 [7]	V1.4.x	6.1.1 (Terminal Station) 6.2.1 (Central Station);  6.4 or 6.3 of EN 301 525 [23] or (see note 4)  6.1.1 (Terminal Stations) 6.2.1 (Central Stations) or 6.3 of EN 302 078 [45]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas  TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.1	see note 1

ETSI equipment standard	Version	Clause(s) N° In the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 080 [8]	V1.3.x	6.1.1 (Terminal Station) 6.2.1 (Central Station);  6.4 or 6.3 of EN 302 085 [25]  or (see note 4)  6.1.1 (Terminal Stations) 6.2.1 (Central Stations) or 6.3 of EN 302 078 [45]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas  TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 124 [9]	V1.2.x	6.1.1 (Terminal Station) 6.2.1 (Central Station);  6.4 or 6.3 of EN 302 085 [25]  or (see note 4)  6.1.1 (Terminal Stations) 6.2.1 (Central Stations) or 6.3 of EN 302 078 [45]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas  TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 179 [10]	V1.2.x	6.1.1 (Terminal Station) 6.2.1 (Central Station);  6.4 or 6.3 of EN 301 525 [23]  or (see note 4)  6.1.1 (Terminal Stations) 6.2.1 (Central Stations) or 6.3 of EN 302 078 [45]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE) Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas  TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 213-1 [11]	V1.1.x	NA	NA	NA	Basic parameters



ETSI equipment standard	Version	Clause(s) N° In the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 213-2 [12]	V1.3.x	4.1.1 (Terminal Station); 4.2.1 (Central Station); or 4.3 (see note 6)  4.4 (Central Station) of EN 301 215-2 [15]	TS radiation pattern envelope; CS azimuth radiation pattern envelopes; sectorized; Central Station Omni-directional antennas  Central Station elevation sectorized RPE.	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 213-3 [13]	V1.4.x	4.1.1 (Terminal Station); 4.2.1 (Central Station); or 4.3 (see note 6)  4.4 (Central Station) of EN 301 215-2 [15]	TS radiation pattern envelope; Central Station azimuth radiation pattern envelopes; sectorized; Central Station Omni-directional antennas  Central Station elevation sectorized RPE.	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 213-4 [42]	V1.1.x	4.1.1 (Terminal Station); 4.2.1 (Central Station); or 4.3 (see note 6)  4.4 (Central Station) of EN 301 215-2 [15]	TS radiation pattern envelope; Central Station azimuth radiation pattern envelopes; sectorized; Central Station Omni-directional antennas  Central Station elevation sectorized RPE.	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 213-5 [43]	V1.1.x	4.1.1 (Terminal Station); 4.2.1 (Central Station); or 4.3 (see note 6)  4.4 (Central Station) of EN 301 215-2 [15]	TS radiation pattern envelope; Central Station azimuth radiation pattern envelopes; sectorized; Central Station Omni-directional antennas  Central Station elevation sectorized RPE.	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 215-1 [14]	V1.2.x	NA	NA	NA	General aspects of Point-to-multipoint antenna standard

ETSI equipment standard	Version	Clause(s) N° In the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 215-2 [15] see note 6	V1.3.x	4.1.1 (Terminal Station); 4.2.1 (Central Station); 4.3 or 4.4 (Central Station)	TS radiation pattern envelope; Central Station azimuth radiation pattern envelopes; sectored; Central Station Omni-directional antennas or Central Station elevation sectored RPE	EN 301 126-3-2 [32] Clause 6.1	Point-to-multipoint antenna standard for the frequency range 24 GHz to 30 GHz to be applied where standalone antennas are installed
EN 301 215-4 [46]	V1.1.x	4.1.1 (Terminal Station); 4.2.1 (Central Station); 4.3 or 4.4 (Central Station)	TS radiation pattern envelope; Central Station azimuth radiation pattern envelopes; sectored; Central Station Omni-directional antennas or Central Station elevation sectored RPE	EN 301 126-3-2 [32] Clause 6.1	Point-to-multipoint antenna standard for the frequency range 30 GHz to 40,5 GHz to be applied where standalone antennas are installed
EN 301 253 [16]	V1.2.x	6.1.1 (Terminal Station) 6.2.1 (Central Station);  6.4 or 6.3 of EN 302 085 [25]  or (see note 4)  6.1.1 (Terminal Stations) 6.2.1 (Central Stations) or 6.3 of EN 302 078 [45]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas  TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-Directional Antennas	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 301 373 [17]	V1.2.x	6.1.1 (Terminal Stations) 6.2.1 (Central Stations);  6.4 or 6.3 of EN 301 525 [23]  or (see note 4)  6.1.1 (Terminal Stations) 6.2.1 (Central Stations) or 6.3 of EN 302 078 [45]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas  TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.1	see note 1

ETSI equipment standard	Version	Clause(s) N° In the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 460-1 [18]	V1.1.x	NA	NA	NA	Common parameters
EN 301 460-2 [19]	V1.1.x	see note 3	see note 3	TBD	
EN 301 460-3 [20]	V1.1.x	see note 3	see note 3	TBD	
EN 301 460-4 [21]	V1.1.x	see note 3	see note 3	TBD	
EN 301 460-5 [22]	V1.1.x	see note 3	see note 3	TBD	
EN 301 525 [23]	V1.1.x	6.1.1 (Terminal Stations) 6.2.1 (Central Stations);  6.4 or 6.3	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas	EN 301 126-3-2 [32] Clause 6.1	Point-to-multipoint antenna standard for the frequency range 1 GHz to 3 GHz to be applied where standalone antennas are installed
EN 301 744 [24]	V1.2.x	6.1.1 (Terminal Station) 6.2.1 (Central Station);  6.4 or 6.3 of EN 302 085 [25]  or (see note 4)  6.1.1 (Terminal Stations) 6.2.1 (Central Stations) or 6.3 of EN 302 078 [45]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas  TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.1	see note 1
EN 302 085 [25]	V1.1.x	6.1.1 (Terminal Station) 6.2.1 (Central Station);  6.4  or 6.3	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omni-Directional Antennas	EN 301 126-3-2 [32] Clause 6.1	Point-to-multipoint antenna standard for the frequency band 3 GHz to 11 GHz to be applied where standalone antennas are installed
EN 302 063 [44]	V1.1.x	4.1.1 (Terminal Station); 4.2.1 (Central Station); 4.3 or 4.4 (Central Station) of EN 301 215-4 [46]	TS radiation pattern envelope; Central Station azimuth radiation pattern envelopes; sectored; Central Station Omni-directional antennas or Central Station elevation sectored RPE	EN 301 126-3-2 [32] Clause 6.1	see note 1

ETSI equipment standard	Version	Clause(s) N° In the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 302 078 [45]	V1.1.x	6.1.1 (Terminal Stations) 6.2.1 (Central Stations)  or 6.3	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.1	Multipoint circularly polarized antenna standard for the frequency band 1 GHz to 11 GHz to be applied where standalone antennas are installed
NOTE 1: Applicable only to point-to-multipoint equipment with integral antennas according to type of antennas installed.					
NOTE 2: Where point-to-multipoint equipment is used as repeater station it may apply either antennas used at Central Stations and/or Terminal stations. These antennas and their test methods shall comply with the relevant clauses of the antenna standards in the corresponding frequency bands mentioned in table 6 above.					
NOTE 3: For point-to-multipoint equipment operating below 1 GHz an antenna standard is not available yet. Thus the limit value and its test methods shall be agreed between the notified body and the supplier concerned. (R&TTE Directive [1]).					
NOTE 4: This second set of requirements is relevant to circular polarized antennas, while the first one is relevant to linear polarized antennas.					
NOTE 5: For fixed multibeam antennas, an antenna standard and a conformance test standard are under preparation but are not available yet. Thus the limit value and its test methods shall be agreed between the notified body and the supplier concerned (R&TTE Directive [1]).					
NOTE 6: Where omni directional antennas are applied in the frequency range 24 GHz to 30 GHz (see EN 301 215-2 [15]) the limit value for the essential phenomenon off-axis EIRP density (RPE) shall be agreed between the notified body and the supplier concerned. (R&TTE Directive [1]).					

Where standalone point-to-multipoint antennas are applied the limit of the essential phenomenon off-axis EIRP density (Radiation Pattern Envelope) shall comply with the clause of the relevant antenna standard mentioned in table 6. Point-to-multipoint systems used for terminal station and/or repeater station may also apply antennas complying with the antenna standards for point-to-point systems either as integral part or as standalone part. In this case the EN 300 631 [3] clause 6.1 (Radiation Pattern Envelope) applies for the frequency range 1 GHz to 3 GHz and the EN 300 833 [5] clause 6.1 (Radiation Pattern Envelope) applies for the frequency range 3 GHz to 60 GHz respectively, noting that the subrange 40,5 GHz to 43,5 GHz is outside of the scope of this Harmonized Standard. The test methods shall comply with EN 301 126-3-1 [31] clause 6.1.

## 4.6.2 Antenna gain

For each equipment standard mentioned in table 2 (see Scope) the applicable antenna standard is referenced in table 7 together with the clause for the limit of the essential phenomenon antenna gain. Furthermore, the applicable Conformance test standard for point-to-multipoint antennas is also stated along with the antenna standards for point-to-multipoint antennas which contain the limit of the essential phenomenon antenna gain.

Table 7: Relevant ENs clause(s) [see notes 2 and 5]

ETSI standard	Version	Clause(s) N° in the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 300 636 [4]	V1.3.x	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 301 525 [23] or (see note 4)  6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 078 [45]	TS Minimum Boresight Gain's Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna  TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 021 [6]	V1.6.x	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 085 [25] or (see note 4)  6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 078 [45]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna  TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 055 [7]	V1.4.x	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 301 525 [23] or (see note 4)  6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 078 [45]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna  TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 080 [8]	V1.3.x	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 085 [25] or (see note 4)  6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 078 [45]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna  TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1

ETSI standard	Version	Clause(s) N° in the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 124 [9]	V1.2.x	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 085 [25] or (see note 4)  6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 078 [45]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna  TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 179 [10]	V1.2.x	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 301 525 [23] or (see note 4)  6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 078 [45]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna  TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 213-1 [11]	V1.1.x	NA	NA	NA	Basic parameters
EN 301 213-2 [12]	V1.3.x	4.1.2 (Terminal Station); 4.2.2 (Central Station);  4.3 (see note 6) of EN 301 215-2 [15]	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored; Central Station omni-directional antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 213-3 [13]	V1.4.x	4.1.2 (Terminal Station); 4.2.2 (Central Station);  4.3 (see note 6) of EN 301 215-2 [15]	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored; Central Station omni-directional antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 213-4 [42]	V1.1.x	4.1.2 (Terminal Station); 4.2.2 (Central Station);  4.3 (see note 6) of EN 301 215-2 [15]	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored; Central Station omni-directional antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 213-5 [43]	V1.1.x	4.1.2 (Terminal Station); 4.2.2 (Central Station);  4.3 (see note 6) of EN 301 215-2 [15]	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored; Central Station omni-directional antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1

ETSI standard	Version	Clause(s) N° in the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 215-1 [14]	V1.2.x	NA	NA	NA	General aspects of Point-to-multipoint antenna standard
EN 301 215-2 [15] see note 6	V1.3.x	4.1.2 (Terminal Station); 4.2.2 (Central Station);  4.3 (Central Station; see note 4)	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored;  Central Station omni-directional antennas	EN 301 126-3-2 [32] Clause 6.2	Point-to-multipoint antenna standard
EN 301 215-4 [46]	V1.1.x	4.1.2 (Terminal Station); 4.2.2 (Central Station);  4.3 (Central Station; see note 6)	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored;  Central Station omni-directional antennas	EN 301 126-3-2 [32] Clause 6.2	Point-to-multipoint antenna standard
EN 301 253 [16]	V1.2.x	6.1.2 (Terminal Station) 6.2.2 (Central Station); 6.3 of EN 302 085 [25] or (see note 4)  6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 078 [45]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna  TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 373 [17]	V1.2.x	6.1.2 (Terminal Station) 6.2.2 (Central Station); 6.3 of EN 301 525 [23] or (see note 4)  6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 078 [45]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna  TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 301 460-1 [18]	V1.1.x	NA	NA	NA	Common parameters
EN 301 460-2 [19]	V1.1.x	see note 3	see note 3	TBD	
EN 301 460-3 [20]	V1.1.x	see note 3	see note 3	TBD	
EN 301 460-4 [21]	V1.1.x	see note 3	see note 3	TBD	
EN 301 460-5 [22]	V1.1.x	see note 3	see note 3	TBD	

ETSI standard	Version	Clause(s) N° in the relevant antenna standard	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 525 [23]	V1.1.x	6.1.2 (Terminal Stations) 6.2.2 (Central Stations);  6.3	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored;  Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	Point-to-multipoint antenna standard for the frequency band 3 GHz to 11 GHz to be applied where standalone antennas are installed
EN 301 744 [24]	V1.2.x	6.1.2 (Terminal Station) 6.2.2 (Central Station);  6.3 of EN 302 085 [25] or (see note 4)  6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 078 [45]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored;  Central Station Omni-Directional Antenna  TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 302 085 [25]	V1.1.x	6.1.2 (Terminal Station) 6.2.2 (Central Station);  6.3	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored;  Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	Point-to-multipoint antenna standard
EN 302 063 [44]	V1.1.x	4.1.2 (Terminal Station); 4.2.2 (Central Station);  4.3 (Central Station) of EN 301 215-4 [46]	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored;  Central Station omni-directional antennas	EN 301 126-3-2 [32] Clause 6.2	see note 1
EN 302 078 [45]	V1.1.x	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3	TS minimum antenna boresight gain Minimum Boresight Gain, Sectored CS Omni-directional Antennas	EN 301 126-3-2 [32] Clause 6.2	Point-to-Multipoint antenna standard

NOTE 1: Applicable only to point-to-multipoint equipment with integral antennas according to type of antennas installed

NOTE 2: Where point-to-multipoint equipment is used as repeater station it may apply either antennas used at Central Stations and/or at Terminal stations. These antennas and their test methods shall comply with the relevant clauses of the antenna standards in the corresponding frequency bands mentioned in table 7.

NOTE 3: For point-to-multipoint equipment operating below 1 GHz an antenna standard is not available yet. Thus the limit value and its test methods shall be agreed between the notified body and the supplier concerned. (R&TTE Directive [1]).

NOTE 4: This second set of requirements is relevant to circular polarized antennas, while the first one is relevant to linear polarized antennas.

NOTE 5: For fixed multibeam antennas, an antenna standard and a conformance testing standard are under preparation but are not available yet. Thus the limit value and its test methods shall be agreed between the notified body and the supplier concerned (R&TTE Directive [1]).

NOTE 6: Where omni directional antennas are applied in the frequency range 24 GHz to 30 GHz (see EN 301 215-2 [15]) the essential phenomenon antenna gain shall be agreed between the notified body and the supplier concerned (R&TTE Directive [1]).



Where standalone point-to-multipoint antennas are applied the limit of the essential phenomenon antenna gain shall comply with the clause of the relevant antenna standard mentioned in table 7.

Point-to-multipoint systems used for terminal station and/or repeater station may also apply antennas complying with antenna standards for point-to-point systems either as integral part or as stand alone part. In this case the EN 300 631 [3] clause 6.3 (antenna gain) applies for the frequency range 1 GHz to 3 GHz and the EN 300 833 [5] clause 6.3 (antenna gain) applies for the frequency range 3 GHz to 60 GHz respectively, noting that the subrange 40.5 GHz to 43.5 GHz is outside of the scope of this Harmonized Standard. The test methods shall comply with EN 301 126-3-1 [31] clause 6.3.

## 4.7 Receiving phenomena

The tests for the receiving phenomenon shall be carried out to produce the test report and/or declaration of conformity required (R&TTE Directive [1]) with ATPC, if applicable, set to either automatic or the maximum nominal output power and RTPC, if applicable, set to an arbitrarily value to be chosen by the supplier. The tests shall be in accordance with the test methods described in clauses 4.3 or 4.4 of the ENs 301 126-2-2 [27], 301 126-2-3 [28], 301 126-2-4 [29], 301 126-2-5 [30], 301 126-2-6 [39] applicable to the different access methods.

### 4.7.1 Maximum usable sensitivity including duplex (BER as a function of receiver input signal level)

The clauses that give the limits of the essential phenomenon maximum usable sensitivity including duplex (BER as a function of receiver input signal level) and its test methods are reported in table 8.

The tests shall be carried out at reference and extreme climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1 to produce the test report and/or declaration of conformity required (R&TTE Directive [1]).

**Table 8: Relevant ENs clause(s)**

ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	Test method (if essential)	Notes
EN 300 636 [4]	V1.3.x	5.4.3	BER performance	EN 301 126-2-3 [28] Clause 4.4.2	
EN 301 021 [6]	V1.6.x	5.4.3	BER performance	EN 301 126-2-3 [28] Clause 4.4.2	
EN 301 055 [7]	V1.4.x	5.4.3	BER performance	EN 301 126-2-5 [30] Clause 4.3.3.2	
EN 301 080 [8]	V1.3.x	5.7.2	BER as function of RSL	EN 301 126-2-2 [27] Clause 4.4.2	
EN 301 124 [9]	V1.2.x	5.4.4	BER performance	EN 301 126-2-5 [30] Clause 4.3.3.2	
EN 301 179 [10]	V1.2.x	5.5.3	BER performance	EN 301 126-2-4 [29] Clause 4.4.2	
EN 301 213-1 [11]	V1.1.x	5.7.2	BER as function of RSL	NA	Basic parameters
EN 301 213-2 [12]	V1.3.x	5.7.2	BER as function of RSL	EN 301 126-2-2 [27] Clause 4.4.2	
EN 301 213-3 [13]	V1.4.x	5.7.2	BER as function of RSL	EN 301 126-2-3 [28] Clause 4.4.2	
EN 301 213-4 [42]	V1.1.x	5.7.2	BER as function of RSL	EN 301 126-2-5 [30] Clause 4.4.2	
EN 301 213-5 [43]	V1.1.x	5.7.2	BER as function of RSL	EN 301 126-2-6 [39] Clause 4.4.2	
EN 301 253 [16]	V1.2.x	5.5.3	BER performance	EN 301 126-2-4 [29] Clause 4.4.2	
EN 301 373 [17]	V1.2.x	5.4.3	BER as function of RSL	EN 301 126-2-2 [27] Clause 4.2.6	
EN 301 460-1 [18]	V1.1.x	5.7.2	BER as function of RSL	See the relevant part for each access method EN 301 126-2	Common parameters
EN 301 460-2 [19]	V1.1.x	5.7.2		EN 301 126-2-3 [28] Clause 4.4.2	

ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 460-3 [20]	V1.1.x	5.7.2		EN 301 126-2-4 [29] Clause 4.4.2.	
EN 301 460-4 [21]	V1.1.x	5.7.2		EN 301 126-2-2 [27] Clause 4.4.2	
EN 301 460-5 [22]	V1.1.x	5.7.2		EN 301 126-2-5 [30] Clause 4.3.3.2	
EN 301 744 [24]	V1.2.x	5.4.4	BER performance	EN 301 126-2-3 [28] Clause 4.4.2	
EN 302 063 [44]	V1.1.x	5.7.2	BER as function of RSL	See the relevant part for each access method EN 301 126-2:	
		A3	BER as function of RSL	EN 301 126-2-3 [28] Clause 4.4.2	
		B3	BER as function of RSL	EN 301 126-2-2 [27] Clause 4.4.2	
		C4.1	BER as function of RSL	EN 301 126-2-6 [39] Clause 4.4.2	

## 4.7.2 Co-channel interference sensitivity (Co-channel rejection)

The clauses that give the limits of the essential phenomenon co-channel interference sensitivity (co-channel rejection) and its test methods are reported in table 9.

The tests shall be carried out at reference climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1 to produce the test report and/or declaration of conformity required (R&TTE Directive [1]).

**Table 9: Relevant ENs clause(s)**

ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	Test method (if essential)	Notes
EN 300 636 [4]	V1.3.x	5.4.4.2	Co-channel rejection	EN 301 126-2-3 [28] Clause 4.4.4.1	
EN 301 021 [6]	V1.6.x	5.4.4.2	Co-channel interference	EN 301 126-2-3 [28] Clause 4.4.4.1	
EN 301 055 [7]	V1.4.x	5.4.4.1	Co-channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.3.4.1	
EN 301 080 [8]	V1.3.x	5.7.4.1	Co-channel interference	EN 301 126-2-2 [27] Clause 4.4.4.1	
EN 301 124 [9]	V1.2.x	5.4.5.1	Co-channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.3.4.1	
EN 301 179 [10]	V1.2.x	5.5.4.1	Co-channel interference sensitivity	EN 301 126-2-4 [29] Clause 4.4.4.1	
EN 301 213-1 [11]	V1.1.x	5.7.4.1	Co-channel interference sensitivity	NA	Basic parameters
EN 301 213-2 [12]	V1.3.x	5.7.4.1	Co-channel interference sensitivity	EN 301 126-2-2 [27] Clause 4.4.4.1	
EN 301 213-3 [13]	V1.4.x	5.7.4.1	Co-channel interference sensitivity	EN 301 126-2-3 [28] Clause 4.4.4.1	
EN 301 213-4 [42]	V1.1.x	5.7.4.1	Co-channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.4.4.1	
EN 301 213-5 [43]	V1.1.x	5.7.4.1	Co-channel interference sensitivity	EN 301 126-2-6 [39] Clause 4.4.4.1	
EN 301 253 [16]	V1.2.x	5.5.4.1	Co-channel interference sensitivity	EN 301 126-2-4 [29] Clause 4.4.4.1	
EN 301 373 [17]	V1.2.x	5.4.4.2	Co-channel interference	EN 301 126-2-2 [27] Clause 4.4.4.1	

ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 460-1 [18]	V1.1.x	5.7.3.1	Co-channel interference	See the relevant part for each access method EN 301 126-2	Common parameters
EN 301 460-2 [19]	V1.1.x	5.7.3.1	Co-channel interference	EN 301 126-2-3 [28] Clause 4.4.4.1	
EN 301 460-3 [20]	V1.1.x	5.7.3.1	Co-channel interference	EN 301 126-2-4 [29] Clause 4.4.4.1	
EN 301 460-4 [21]	V1.1.x	5.7.3.1	Co-channel interference	EN 301 126-2-2 [27] Clause 4.4.4.1	
EN 301 460-5 [22]	V1.1.x	5.7.3.1	Co-channel interference	EN 301 126-2-5 [30] Clause 4.3.4.1	
EN 301 744 [24]	V1.2.x	5.4.5.1	Co-channel interference sensitivity	EN 301 126-2-3 [28] Clause 4.4.4.1	
EN 302 063 [44]	V1.1.x	5.7.4	Interference sensitivity	See the relevant part for each access method EN 301 126-2:	
		A.4.1	Co-channel interference sensitivity (external)	EN 301 126-2-3 [28] Clause 4.4.4.1	
		B.4.1	Co-channel interference (external)	EN 301 126-2-2 [27] Clause 4.4.4.1	
		C4.3.1	Co-channel interference (external)	EN 301 126-2-6 [39] Clause 4.4.4.1	

### 4.7.3 Adjacent channel selectivity (Adjacent channel interference sensitivity)

The clauses that give the limits of the essential phenomenon adjacent channel selectivity (Adjacent channel interference sensitivity) and its test methods are reported in table 10.

The tests shall be carried out at reference climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1 to produce the test report and/or declaration of conformity required (R&TTE Directive [1]).

**Table 10: Relevant ENs clause(s)**

ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	Test method (if essential)	Notes
EN 300 636 [4]	V1.3.x	5.4.4.1	Adjacent channel rejection	EN 301 126-2-3 [28] Clause 4.4.4.2	
EN 301 021 [6]	V1.6.x	5.4.4.1	Adjacent channel interference	EN 301 126-2-3 [28] Clause 4.4.4.2	
EN 301 055 [7]	V1.4.x	5.4.4.2	Adjacent channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.3.4.2	
EN 301 080 [8]	V1.3.x	5.7.4.2	Adjacent channel interference	EN 301 126-2-2 [27] Clause 4.4.4.2	
EN 301 124 [9]	V1.2.x	5.4.5.2	Adjacent channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.3.4.2	
EN 301 179 [10]	V1.2.x	5.5.4.2	Adjacent channel interference sensitivity	EN 301 126-2-4 [29] Clause 4.4.4.2	
EN 301 213-1 [11]	V1.1.x	5.7.4.2	Adjacent channel interference	NA	Basic parameters
EN 301 213-2 [12]	V1.3.x	5.7.4.2	Adjacent channel interference	EN 301 126-2-2 [27] Clause 4.4.4.2	
EN 301 213-3 [13]	V1.4.x	5.7.4.2	Adjacent channel interference	EN 301 126-2-3 [28] Clause 4.4.4.2	
EN 301 253 [16]	V1.2.x	5.5.4.2	Adjacent channel interference sensitivity	EN 301 126-2-4 [29] Clause 4.4.4.2	

ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 213-4 [42]	V1.1.x	5.5.4.2	Adjacent channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.4.4.2	
EN 301 213-5 [43]	V1.1.x	5.5.4.2	Adjacent channel interference sensitivity	EN 301 126-2-6 [39] Clause 4.4.4.2	
EN 301 373 [17]	V1.2.x	5.4.4.1	Adjacent channel interference	EN 301 126-2-2 [27] Clause 4.4.4.2	
EN 301 460-1 [18]	V1.1.x	5.7.3.2	Adjacent channel interference	See the relevant part for each access method EN 301 126-2	Common parameters
EN 301 460-2 [19]	V1.1.x	5.7.3.2	Adjacent channel interference	EN 301 126-2-3 [28] Clause 4.4.4.2	
EN 301 460-3 [20]	V1.1.x	5.7.3.2	Adjacent channel interference	EN 301 126-2-4 [29] Clause 4.4.4.2	
EN 301 460-4 [21]	V1.1.x	5.7.3.2	Adjacent channel interference	EN 301 126-2-2 [27] Clause 4.4.4.2	
EN 301 460-5 [22]	V1.1.x	5.7.3.2	Adjacent channel interference	EN 301 126-2-5 [30] Clause 4.3.4.2	
EN 301 744 [24]	V1.2.x	5.4.5.4	Adjacent channel interference sensitivity	EN 301 126-2-3 [28] Clause 4.4.4.2	
EN 302 063 [44]	V1.1.x	5.7.5	Interference sensitivity	See the relevant part for each access method EN 301 126-2	
		A4.2	Adjacent channel interference sensitivity (external)	EN 301 126-2-3 [28] Clause 4.4.4.2	
		B4.2	Adjacent channel interference (external)	EN 301 126-2-2 [27] Clause 4.4.4.2	
		C4.3.2	Adjacent channel interference (external)	EN 301 126-2-6 [39] Clause 4.4.4.2	

#### 4.7.4 Blocking or desensitization including duplex (CW Spurious Interference)

The clauses that give the limits of the essential phenomenon blocking or desensitization including duplex (CW Spurious Interference) and its test methods are reported in table 11.

The tests shall be carried out at reference climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1 to produce the test report and/or declaration of conformity required (R&TTE Directive [1]).

**Table 11: Relevant ENs clause(s)**

ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	Test method (if essential)	Notes
EN 300 636 [4]	V1.3.x	NA	NA	NA	No parameter defined
EN 301 021 [6]	V1.6.x	5.4.4.3	CW interference	EN 301 126-2-3 [28] Clause 4.4.4.3	
EN 301 055 [7]	V1.4.x	NA	NA	NA	No parameter defined
EN 301 080 [8]	V1.3.x	5.7.4.3	CW spurious interference	EN 301 126-2-2 [27] Clause 4.4.4.3	
EN 301 124 [9]	V1.2.x	5.4.2	Broadband CW interference rejection capability	EN 301 126-2-5 [30] Clause 4.3.4.3	
EN 301 179 [10]	V1.2.x	5.5.4.3	Broadband CW interference rejection capability	EN 301 126-2-4 [29] Clause 4.4.4.3	

ETSI standard	Version	Clause(s) N°	Relevant clause(s) title	Test method (if essential)	Notes
EN 301 213-1 [11]	V1.1.x	5.7.4.3	CW interference	NA	Basic parameters
EN 301 213-2 [12]	V1.3.x	5.7.4.3	CW interference	EN 301 126-2-2 [27] Clause 4.4.4.3	
EN 301 213-3 [13]	V1.4.x	5.7.4.3	CW interference	EN 301 126-2-3 [28] Clause 4.4.4.3	
EN 301 213-4 [42]	V1.1.x	5.7.4.3	CW interference	EN 301 126-2-5 [30] Clause 4.4.4.3	
EN 301 213-5 [43]	V1.1.x	5.7.4.3	CW interference	EN 301 126-2-6 [39] Clause 4.4.4.3	
EN 301 253 [16]	V1.2.x	5.5.4.3	Broadband CW interference rejection capability	EN 301 126-2-4 [29] Clause 4.4.4.3	
EN 301 373 [17]	V1.2.x	5.4.4.1	CW spurious interference	EN 301 126-2-2 [27] Clause 4.4.4.3	
EN 301 460-1 [18]	V1.1.x	5.7.6	CW interference	See the relevant part for each access method EN 301 126-2	Common parameters
EN 301 460-2 [19]	V1.1.x	5.7.6	CW interference	EN 301 126-2-3 [28] Clause 4.4.4.3	
EN 301 460-3 [20]	V1.1.x	5.7.6	CW interference	EN 301 126-2-4 [29] Clause 4.4.4.3	
EN 301 460-4 [21]	V1.1.x	5.7.6	CW interference	EN 301 126-2-2 [27] Clause 4.4.4.3	
EN 301 460-5 [22]	V1.1.x	5.7.6	CW interference	EN 301 126-2-5 [30] Clause 4.3.4.3	
EN 301 744 [24]	V1.2.x	5.4.2	Broadband CW interference rejection capability	EN 301 126-2-3 [28] Clause 4.4.4.3	
EN 302 063 [44]	V1.1.x	5.7.5	Interference sensitivity	See the relevant part for each access method EN 301 126-2	
		A4.3	CW interference	EN 301 126-2-3 [28] Clause 4.4.4.3	
		B4.3	CW interference	EN 301 126-2-2 [27] Clause 4.4.4.3	
		C4.3.1	CW interference	EN 301 126-2-6 [39] Clause 4.4.4.3	

#### 4.7.5 Spurious emissions

The clauses that give the limits of the essential phenomenon spurious emission and its test methods are reported in clause 5 of EN 301 390 [33]. The equipment shall comply with the requirements of clause 5.

The test shall be carried out to produce the test report and/or declaration of conformity required (1999/5/EC Directive [1]). The test shall be limited to the practical frequency ranges foreseen by clause A.1 of EN 301 390 [33] and be carried out at reference climatic conditions according to EN 301 126-2-1 [26] clause 4.2, table 1.

Test methods shall be in accordance with clause 5.3.2 of EN 301 126-2-1 [26].

## 4.8 Control and monitoring functions

### 4.8.1 Sharing protocols (Interference avoidance requirement)

The clauses that give the limits of the essential phenomenon sharing protocols (Interference avoidance requirement) and their required test methods (R&TTE Directive [1]) will be reported in this clause. Presently no such phenomenon is applicable to the standards reported in the scope of the present document.

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## Annex A (normative): The EN Requirements Table (EN-RT)

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the EN-RT proforma in this annex so that it can be used for its intended purposes and may further publish the completed EN-RT.
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### A.1 Tables of essential requirements under article 3.2 of the 1999/5/EC Directive

The EN Requirements Table (EN-RT) serves a number of purposes, as follows:

- it provides a tabular summary of all the requirements;
- it shows the status of each EN-R, whether it is essential to implement in all circumstances (Mandatory), or whether the requirement is dependent on the supplier having chosen to implement a particular optional service or functionality (Optional). In particular it enables the EN-Rs associated with a particular optional service or functionality to be grouped and identified;
- when completed in respect of a particular equipment it provides a means to undertake the static assessment of conformity with the EN.

The following tables A.1 and A.2 are intended for declaration of conformity of point-to-multipoint FDRS in frequency bands that require co-ordination and FDRS antennas respectively. They may be reproduced and used as a proforma for conformance declaration.

NOTE: Point-to-multipoint FDRS in frequency bands that do not require co-ordination are presently not subject of the standards reported in the scope of the present document.

**Table A.1: EN Requirements Table (EN-RT) for Multipoint FDRS  
(including integral antennas) in frequency bands that require co-ordination**

EN Reference		Requirements for equipment also under the scope of EN 301 753 (select from table 2 as appropriate)			
<b>Transmitting phenomena</b>					
No.	Reference	EN-R (see note)	Status	Note	Supplier Comment for declaration
1	4.5.1	Frequency error / stability	M		
2	4.5.2	Transmitter power	M		
3	4.5.3.1	Adjacent channel power - Spectrum mask and CW lines	M		
	4.5.3.2	Adjacent channel power - Remote Transmit Power Control (RTPC)	O		
4	4.5.4	Spurious emissions	M		
5	4.5.5.1	Transient behaviour of the transmitter - Automatic Transmit Power Control (ATPC)	O		
	4.5.5.2	Transient behaviour of the transmitter - Remote Frequency Control (RFC)	O		
<b>Directional phenomena</b>					
No.	Reference	EN-R (see note)	Status	Note	Supplier Comment for declaration
6	4.6.1	Off-axis EIRP density - Radiation pattern envelope (RPE)	M	Applicable only to equipment with integral antennas	
7	4.6.2	Antenna Gain	M	Applicable only to equipment with integral antennas	
<b>Receiving phenomena</b>					
No.	Reference	EN-R (see note)	Status	Note	Supplier Comment for declaration
8	4.7.1	BER as a function of receiver input signal level	M		
9	4.7.2	Co-channel interference sensitivity	M		
10	4.7.3	Adjacent channel interference sensitivity	M		
11	4.7.4	Blocking or desensitization including duplex (CW Spurious Interference)	M		
12	4.7.5	Spurious emissions	M		
NOTE: The present document-R is justified under article 3.2 of the R&TTE Directive.					

**Table A.2: EN Requirements Table (EN-RT) for Multipoint FDRS stand-alone antennas**

EN Reference		Requirements for equipment also under the scope of EN 301 753 (select from table 2 as appropriate)			
<b>Directional phenomena</b>					
No.	Reference	EN-R	Status	Note	Supplier Comment for declaration
6	4.6.1	Off-axis EIRP density - Radiation pattern envelope (RPE)	M		
7	4.6.2	Antenna Gain	M	Only for frequency bands that require co-ordination	
NOTE: The present document-R is justified under article 3.2 of the R&TTE Directive.					



**Key to columns in table A.1 and A.2:**

<b>No</b>	Table entry number;
<b>Reference</b>	Clause reference number of conformance requirement within the present document;
<b>EN-R</b>	Title of conformance requirement within the present document;
<b>Status</b>	Status of the entry as follows: <b>M</b> Mandatory, shall be implemented under all circumstances; <b>O</b> Optional, may be provided, but if provided shall be implemented in accordance with the requirements;

**Supplier Comment for declaration** To be completed as required.

## Annex B (informative): The EN title in the official languages

Language	EN title
Czech	
Danish	
Dutch	
English	Fixed Radio Systems; Multipoint equipment and antennas; Generic harmonized standard for multipoint digital fixed radio systems and antennas covering the essential requirements under article 3.2 of the Directive 1999/5/EC
Estonian	
Finnish	
French	
German	
Greek	
Hungarian	
Icelandic	
Italian	
Latvian	
Lithuanian	
Maltese	
Polish	
Portuguese	
Slovak	
Slovenian	
Spanish	
Swedish	

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## History

<b>Document history</b>		
V1.1.1	March 2001	Publication
V1.2.1	July 2003	One-step Approval Procedure OAP 20031128: 2003-07-30 to 2003-11-28
V1.2.1	December 2003	Publication