

ETSI EN 301 753 V1.1.1 (2001-03)

Candidate Harmonized European Standard (Telecommunications series)

**Fixed Radio Systems;
Point-to-Multipoint equipments and antennas;
Generic harmonized standard
for Point-to-Multipoint digital fixed radio systems
and antennas covering the essential requirements
under Article 3.2 of the Directive 1999/5/EC**



Reference

DEN/TM-04091

Keywords

DRRS, multipoint, radio, regulation, RLL, terminal

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at <http://www.etsi.org/tb/status/>

If you find errors in the present document, send your comment to:
editor@etsi.fr

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2000.
All rights reserved.

Contents

Intellectual Property Rights	4
Foreword	4
Introduction	4
1 Scope	10
2 References	13
3 Definitions, symbols and abbreviations	16
3.1 Definitions	16
3.2 Symbols	17
3.3 Abbreviations	17
4 Essential requirements	18
4.1 Phenomena description	18
4.2 Environmental specifications and tests	18
4.3 Wide radio-frequency band covering units specification and tests	19
4.3.1 Radio equipment	19
4.3.2 Antennas for FDRS	21
4.4 Multirate covering equipment specification and tests	21
4.5 Transmitting phenomena	21
4.5.1 Frequency error / stability (Radio frequency tolerance)	21
4.5.2 Transmitter power	22
4.5.3 Adjacent channel power (Spectrum mask)	23
4.5.3.1 Spectrum mask	23
4.5.3.2 Remote Transmit Power Control (RTPC)	25
4.5.4 Spurious emissions	25
4.5.5 Transient behaviour of the transmitter (ATPC and RFC)	26
4.5.5.1 Automatic Transmit Power Control (ATPC)	26
4.5.5.2 Remote Frequency Control (RFC)	26
4.6 Directional phenomena	26
4.6.1 Off-axis EIRP density (Radiation Pattern Envelope)	26
4.6.2 Antenna gain	30
4.6.3 Antenna cross-polar discrimination	33
4.7 Receiving phenomena	34
4.7.1 Maximum usable sensitivity including duplex (BER as a function of receiver input signal level)	34
4.7.2 Co-channel interference sensitivity (Co-channel rejection)	35
4.7.3 Adjacent channel selectivity (Adjacent channel interference sensitivity)	36
4.7.4 Blocking or desensitisation including duplex (CW Spurious Interference)	37
4.7.5 Spurious emissions	38
4.8 Control and Monitoring Functions	39
4.8.1 Sharing protocols (Interference avoidance requirement)	39
Annex A (normative): The EN Requirements Table (EN-RT)	40
A.1 Tables of essential requirements under Article 3.2 of the 1999/5/EC Directive	40
History	43

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://www.etsi.org/ipr>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

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] 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").

National transposition dates	
Date of adoption of this EN:	22 September 2000
Date of latest announcement of this EN (doa):	31 December 2000
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2001
Date of withdrawal of any conflicting National Standard (dow):	30 June 2001

Introduction

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 (OJEC) referencing the Directive 1999/5/EC of the European Parliament and of the Council of 9th March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (the R&TTE Directive [1]).

Fixed Service 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 point-to-multipoint systems.

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

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

Coverage of Fixed digital radio systems through ETSI standards	
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><u>POINT-TO-POINT (P-P) CONNECTIONS:</u> long haul (trunk), rural and urban links applying low/medium and high capacity FDRS</p> <p><u>POINT-TO-MULTIPOINT (P-MP) CONNECTIONS:</u> rural or urban for narrow-band and /or wide-band links for fixed wireless access (FWA) and infrastructure support</p> <p><u>STAND ALONE ANTENNAS:</u> for all the above applications where integral antennas are not used.</p>
Basic P-MP access methods	DS-; FH-CDMA; FDMA, TDMA. A combination thereof is also used

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 scenario 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/ERC. 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, they differ in the "required numerical values".

Point-to-multipoint systems and their related equipment as defined in ETSI TM4 follow the general system architecture shown in Figure 1 below.

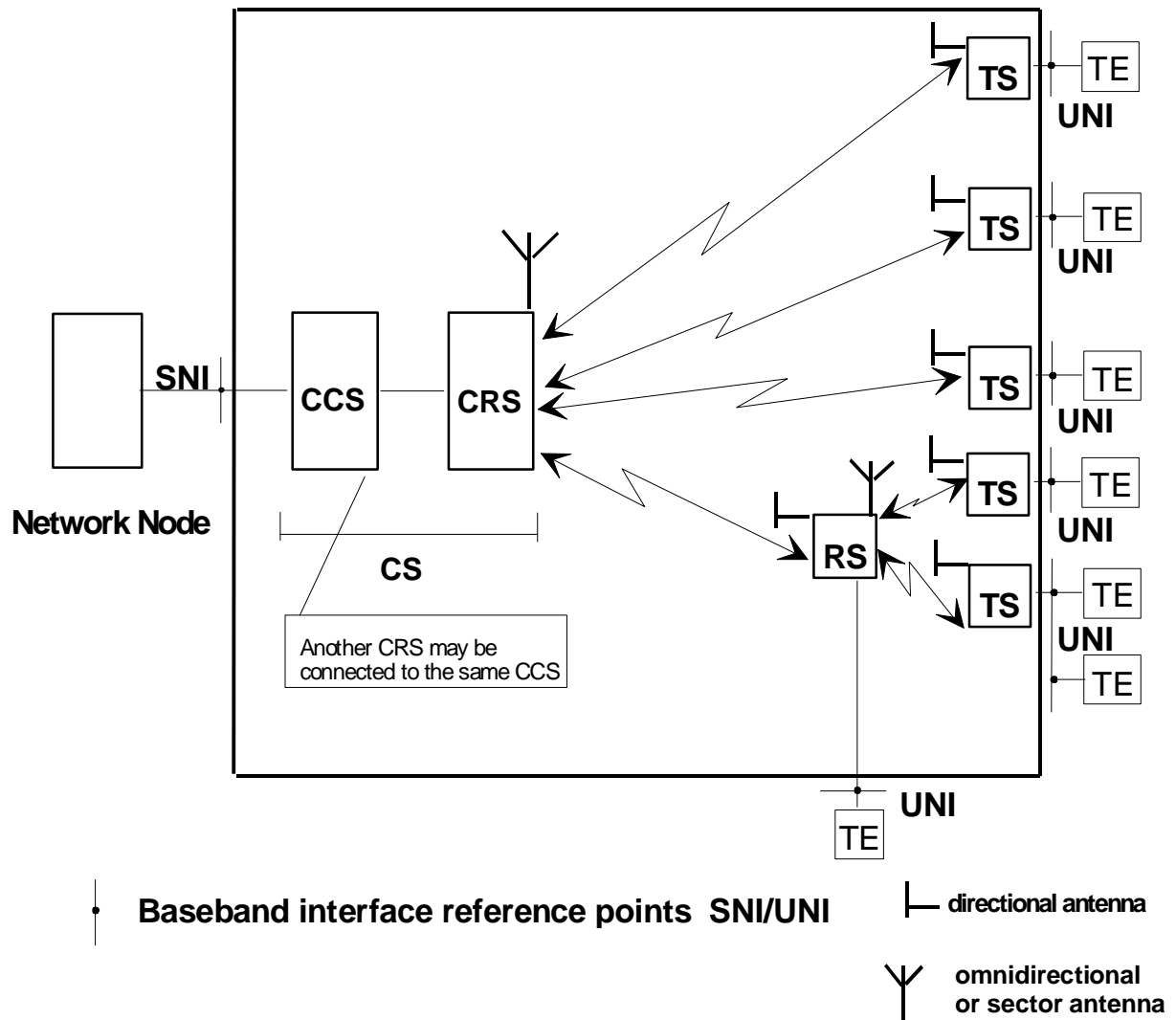


Figure 1: General system architecture

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.
- SNI** Service Node Interface (EG 202 306 [38])
- UNI** User Network Interface (EG 202 306 [38])
- TE** Terminal equipment

The central station performs the interconnection with the network node carrying out a concentration function by sharing the total number of available channels in the system. The CS is linked by microwave transmission paths to each TS either directly or via one or more RS.

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.

This generic harmonized standard for point-to-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] applicable for the different access methods of point-to-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.

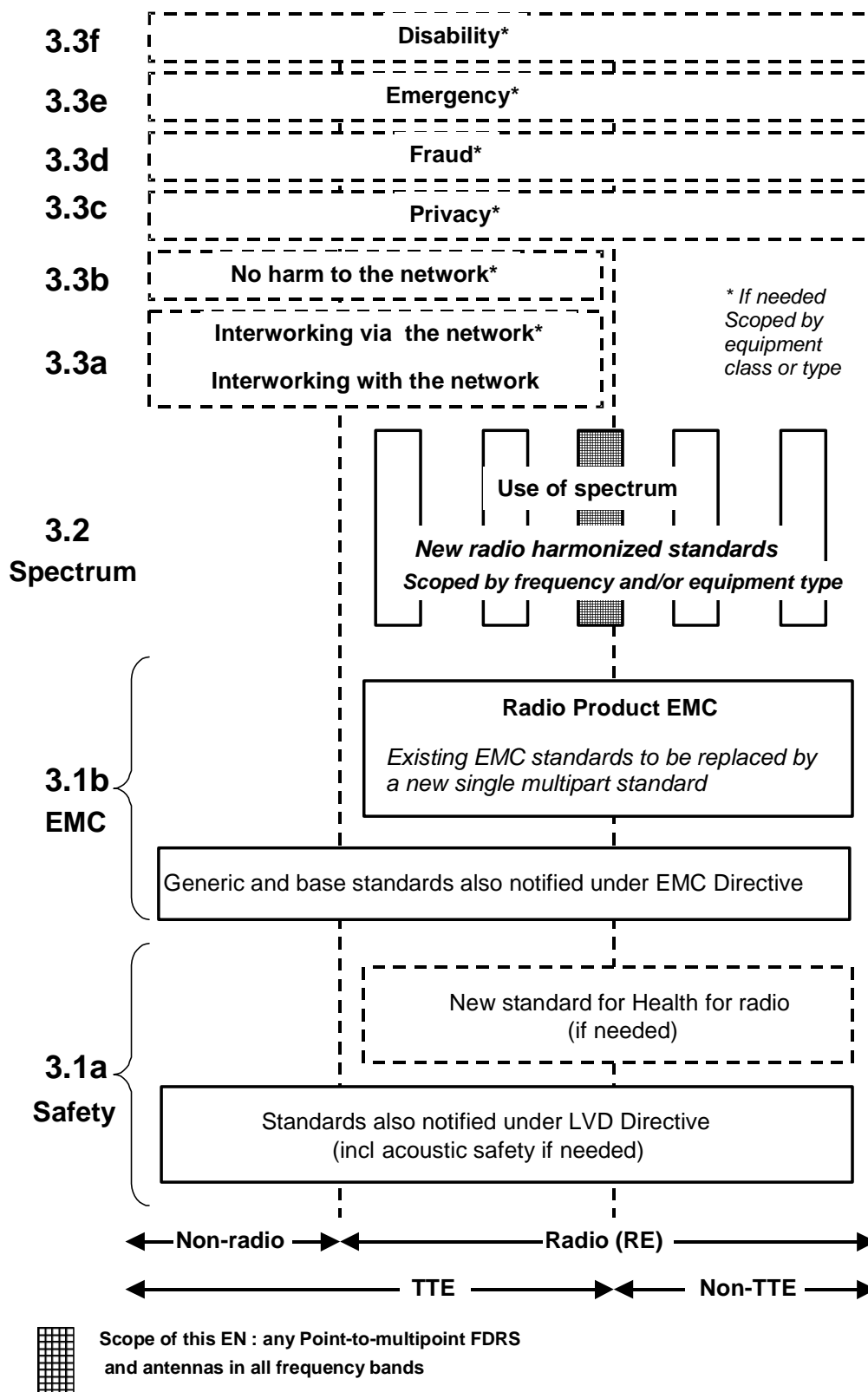


Figure 2: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure 1 shows the different subclauses of Article 3 of the R&TTE Directive [1].

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

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

For article 3.1b the diagram shows the new single multipart product EMC standard for radio, and the existing collection of generic and product standards currently used under the EMC Directive [1]. The parts of this new standard will become available in the second half of 2000, and the existing separate product EMC standards will be used until it is available.

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive [1] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

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

The modularity principle has been taken because:

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

1 Scope

The present document applies to the following fixed digital radio systems (FDRS) types:

- 1) Point-to-multipoint FDRS intended for operation in frequency bands that require co-ordination;
- 2) Antennas for point-to-multipoint FDRS and antennas for point-to-point FDRS used at the terminal and / or repeater station of point-to-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 (RPE), antenna gain and cross-polar discrimination as well as their test methods may be defined by the notified body according to the Directive 1999/5/EC [1] (R&TTE Directive) due to lack of a Harmonized Standard.

The present document is intended to cover the provisions of Article 3.2 of the Directive 1999/5/EC [1] (R&TTE Directive) 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 be applied to equipment within the scope of the present document.

NOTE 1: A list of such ENs is included on the ETSI web site.

Table 1 summarizes the ETSI standards applicable to point-to-multipoint FDRS referenced in Mandate M/284 [34] from which the essential requirements within this standard have been extracted.

Those ETS/ENs contain also 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 1: 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 note 1	Title	Frequency range (GHz) of Fixed Service frequency bands note 2	Channel separation (MHz)
EN 300 631 [3]	V 1.2.b	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 GHz	NA
EN 300 636 [4]	V 1.2.b	Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Time Division Multiple Access (TDMA); Point-to-multipoint DRRS in the frequency bands in the range 1 to 3 GHz	1 to 3	1,75 to 4
EN 300 833 [5]	V 1.2.b	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]	V 1.3.b	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 note 1	Title	Frequency range (GHz) of Fixed Service frequency bands note 2	Channel separation (MHz)
EN 301 055 [7]	V 1.3.b	Fixed Radio Systems; Point-to-multipoint equipment; Direct Sequence Code Division Multiple Access (DS-CDMA); Point-to-multipoint DRRS in frequency bands in the range 1 GHz to 3 GHz	1 to 3	3,5 to 14
EN 301 080 [8]	V 1.2.b	Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Frequency Division Multiple Access (FDMA); Point-to-multipoint DRRS in frequency bands in the range 3 GHz to 11 GHz	3 to 11	1 to 30
EN 301 124 [9]	V 1.1.b	Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Direct Sequence Code Division Multiple Access (DS-CDMA) point-to-multipoint DRRS in frequency bands in the range 3 GHz to 11 GHz	3 to 11	5 to 20
EN 301 179 [10]	V 1.1.b	Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Frequency Hopping Code Division Multiple Access (FH-CDMA); Point-to-multipoint DRRS in frequency bands within the range 1 GHz to 3 GHz	1 to 3	1 to 14
EN 301 213-1 [11]	V 1.1.b	Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint 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]	V 1.2.b	Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint 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]	V 1.2.b	Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint 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 301 215-1 [14]	V 1.1.b	Fixed Radio Systems; Point-to-multipoint Antennas; Antennas for point-to-multipoint radio systems in the 11 to 60 GHz band. Part 1: General aspects	11 to 60	NA
EN 301 215-2 [15]	V.1.2.b	Fixed Radio Systems; Point-to-multipoint Antennas; Antennas for point-to-multipoint radio systems in the 11 to 60 GHz band. Part 2: 24 GHz to 30 GHz	11 to 60	NA
EN 301 253 [16]	V 1.1.b	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

Equipment standards				
ETSI Reference number	Version note 1	Title	Frequency range (GHz) of Fixed Service frequency bands note 2	Channel separation (MHz)
EN 301 373 [17]	V 1.1.b	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]	V 1.1.b	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]	V 1.1.b	Fixed Radio Systems; Point-to-multipoint equipment; Part 2: Point-to-multipoint DRRS below 1 GHz - Additional Parameters for TDMA Systems	< 1	to be agreed on national basis
EN 301 460-3 [20]	V 1.1.b	Fixed Radio Systems; Point-to-multipoint equipment; Part 3: Point-to-multipoint DRRS below 1 GHz – Additional Parameters for FH-CDMA Systems	< 1	to be agreed on national basis
EN 301 460-4 [21]	V 1.1.b	Fixed Radio Systems; Point-to-multipoint equipment; Part 4: Point-to-multipoint DRRS systems below 1 GHz - Additional Parameters for FDMA Systems	< 1	to be agreed on national basis
EN 301 460-5 [22]	V 1.1.b	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]	V 1.1.b	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]	V 1.1.b	Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Direct Sequence Code Division/Time Division Multiple Access (DS-CD/TDMA); Point-to-multipoint DRRS in the frequency bands in the range 3 to 11 GHz	3 to 11	24
EN 302 085 [25]	V 1.1.b	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 301 126-2-1 [26]	V 1.1.b	Fixed Radio Systems; Conformance testing; Part 2-1: Point-to-Multipoint equipment - Definitions and general requirements		
EN 301 126-2-2 [27]	V 1.1.b	Fixed Radio Systems; Conformance testing; Part 2-2: Point-to-Multipoint equipment – Test procedures for FDMA systems		
EN 301 126-2-3 [28]	V 1.1.b	Fixed Radio Systems; Conformance testing; Part 2-3: Point-to-Multipoint equipment – Test procedures for TDMA systems		
EN 301 126-2-4 [29]	V 1.1.b	Fixed Radio Systems; Conformance testing; Part 2-4; Point-to-Multipoint equipment – Test procedures for FH-CDMA systems		
EN 301 126-2-5 [30]	V 1.1.b	Fixed Radio Systems; Conformance testing; Part 2-5: Point-to-Multipoint equipment – Test procedures for DS-CDMA systems		
EN 301 126-3-1 [31]	V.1.1.b	Fixed Radio Systems; Conformance testing; Part 3-1: Point-to-Point antennas – Definitions, general requirements and test procedures		

Equipment standards				
ETSI Reference number	Version note 1	Title	Frequency range (GHz) of Fixed Service frequency bands note 2	Channel separation (MHz)
EN 301 126-3-2 [32]	V.1.1.b	Fixed Radio Systems; Conformance testing; Part 3-2: Point-to-Multipoint antennas - Definitions, general requirements and test procedures		
EN 301 390 [33]	V.1.1.b	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 1: For the definition of the third digit of ENs version, see 2.1 "Normative references".				
NOTE 2: The frequency ranges stated are those for which the relevant ETS/EN is applicable. The exact frequency bands of operation for the point-to-multipoint FDRS are mentioned in the relevant standards listed above. The identification of that frequency bands of operation is taken from the approximate centre frequency as commonly used in Fixed Service ITU-R F. Recommendations it also includes 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 point-to-multipoint (P-MP) FDRS and related antennas also in the scope of the relevant ETSI standards summarized in table 1.

The present document is considered applicable to fixed radio systems products with integral antennas for which all the technical requirements included in the present document apply. It also applies to fixed radio equipment without integral antennas and to separate antenna products to which only the relevant technical requirements (antenna standard) apply. Therefore the above mentioned equipment will be subject to separate declarations of conformity to the essential requirements of the R&TTE Directive [1].

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

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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [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."
- [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) (12/1999): "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 (V1.2) (03/2000): "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 (V1.2) (08/2000): "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 (V1.3) (10/2000): "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 (V1.3) (09/2000): "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 (V1.2) (02/2000): "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 (V1.1) (11/1998): "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Direct Sequence Code Division Multiple Access (DS-CDMA) point-to-multipoint DRRS in frequency bands in the range 3 GHz to 11 GHz".
- [10] ETSI EN 301 179 (V1.1) (09/1999): "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Frequency Hopping Code Division Multiple Access (FH-CDMA); Point-to-multipoint DRRS in the bands within the range 1 GHz to 3 GHz".
- [11] ETSI EN 301 213-1 (V1.1) (11/1999): "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 (V1.2) (09/2000): "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 (V1.2) (09/2000): "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 (V1.1) (06/2000): "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 (V1.2) (11/2000): "Fixed Radio Systems; Point-to-multipoint Antennas; Antennas for point-to-multipoint radio systems in the 11 to 60 GHz band. Part 2: 24 GHz to 30 GHz".
- [16] ETSI EN 301 253 (V1.1) (11/1999): "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 (V1.1) (01/2000): "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) (10/2000): "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) (10/2000): "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) (10/2000): "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) (10/2000): "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) (10/2000): "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) (06/2000): "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 (V1.1) (10/2000): "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) (06/2000): "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) (11/2000): "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) (11/2000): "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) (11/2000): "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) (11/2000): "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) (04/2000): "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 (V1.1): "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 (V1.1) (01/2000): "A guide to the production of Harmonized standards for application under the R&TTE Directive".
- [36] ETSI TR 101 506 (V1.1) (01/2000): "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: "Radio-frequency channel arrangements for radio-relay systems."
- [38] ETSI EG 202 306 (V1.2) (06/1998): "Transmission and Multiplexing (TM); Access networks for residential customers".

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.

This term shall also be applied to the frequency band concerned (RR Article 1, No. 17).

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 in CDMA P-MP as required facilities for the appropriate working. In TDMA and FDMA P-MP systems it may be used to reduce the interference.

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

- Maximum available power (delivered only in a condition of deep fading).
- 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 are usually made with the highest "available power".
- Maximum nominal power (useable on permanent base when ATPC is disabled); it should be noted that this power is "nominal for the equipment" and has not to be confused with the "nominal level set link by link" by the frequency co-ordination body, eventually achieved through passive RF attenuators or RTPC function.
- Minimum power (delivered in unfaded condition).

Conformity assessment procedure: see Directive 1999/5/EC [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 Directive 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/ERC allocates to a specific service through a CEPT/ERC Decision (proper definition is currently under study by CEPT/ERC).

It should be noted that presently radio frequency bands allocated to Fixed Service are not harmonized.

Recommended radio frequency channel arrangement: predefined centre frequencies raster for a number of radio frequency channels, covered by a CEPT/ERC Recommendation in a not 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.

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 not 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 HW 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 [1]).

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

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).

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 variation 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 co-ordinator 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 variation is static and usually made at the activation or re-commissioning of links in order to easily obtain the EIRP required by the frequency co-ordination body for that link to control co-channel and adjacent channel interference in the same geographical area. In principle, this function is equivalent to the requirement of power regulation capability (e.g. by fixed attenuators) commonly required in fixed systems.

3.2 Symbols

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

dBm decibel ratio relative to 1 milli Watt

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
CRS	Central Radio Station
CS	Central Station
DS-CDMA	Direct Sequence Code Division Multiple Access
DS-CD/TDMA	Direct Sequence Code Division /Time Division Multiple Access
EIRP	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatability
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
LVD	Low Voltage Directive
NA	Not Applicable
OJEC	Official Journal of the European Community
P-MP	Point-to-MultiPoint
P-P	Point-to-Point
R&TTE	Radio equipment and telecommunications terminal equipment Directive
RBER	Residual Bit Error Rate
RE	Radio Equipment
RF	Radio Frequency
RFC	Remote Frequency Control
RS	Repeater Station
RSL	Receiver input Signal Level

RTPC	Remote Transmit Power Control
TDMA	Time Division Multiple Access
TE	Terminal Equipment
TS	Terminal Station
T _x	Transmitter
R _x	Receiver
XPD	Cross-polar Discrimination

4 Essential requirements

With reference to Article 3.2 of 99/5/EC Directive [1] the phenomena in this section have been identified as relevant to the essential requirements.

The tables stated in the following sections 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 1.

NOTE: 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.

Test methods referenced in the tables below are only those considered essential for the assessment of conformity to Article 3.2 (i.e. for the reproducibility of the results).

4.1 Phenomena description

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].

4.2 Environmental specifications and tests

The environmental profile for operation of the equipment shall be declared by the manufacturer. The test procedure shall be according to subclause 4.4 of EN 301 126-2-1 [26].

The equipment 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 Directive 1999/5/EC [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 any clauses of 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 (Directive 1999/5/EC [1]) for integral or stand-alone FDRS antennas (directional phenomena of clause 4.6 of the present document) test shall be carried out at reference environmental condition of the test field 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 Directive 1999/5/EC [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 required (Directive 1999/5/EC [1]):

- 1) in case 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 case 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 case the equipment covering 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 case of the equipment 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 arrangements. 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 and Figure 4).

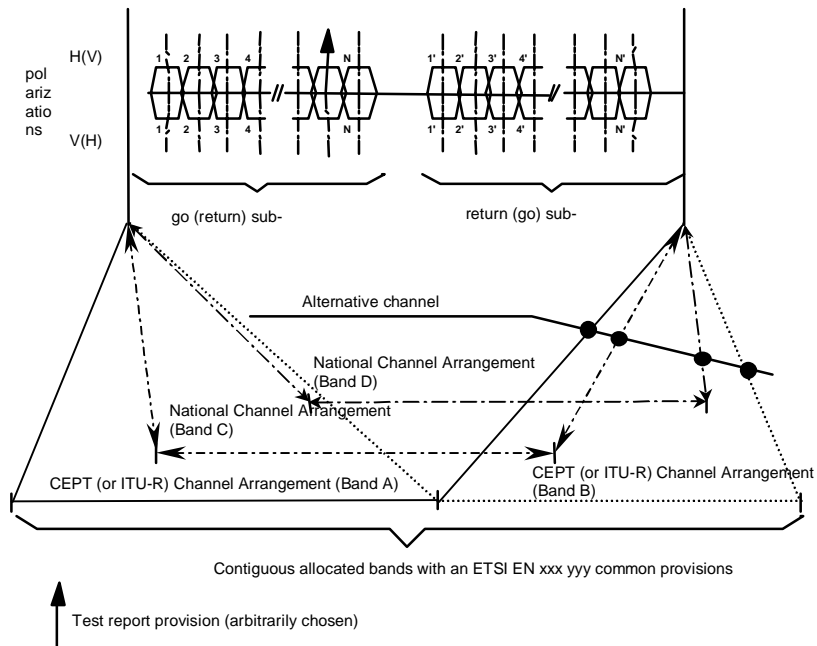


Figure 3: Test report frequency requirement for equipment intended for single channel operation

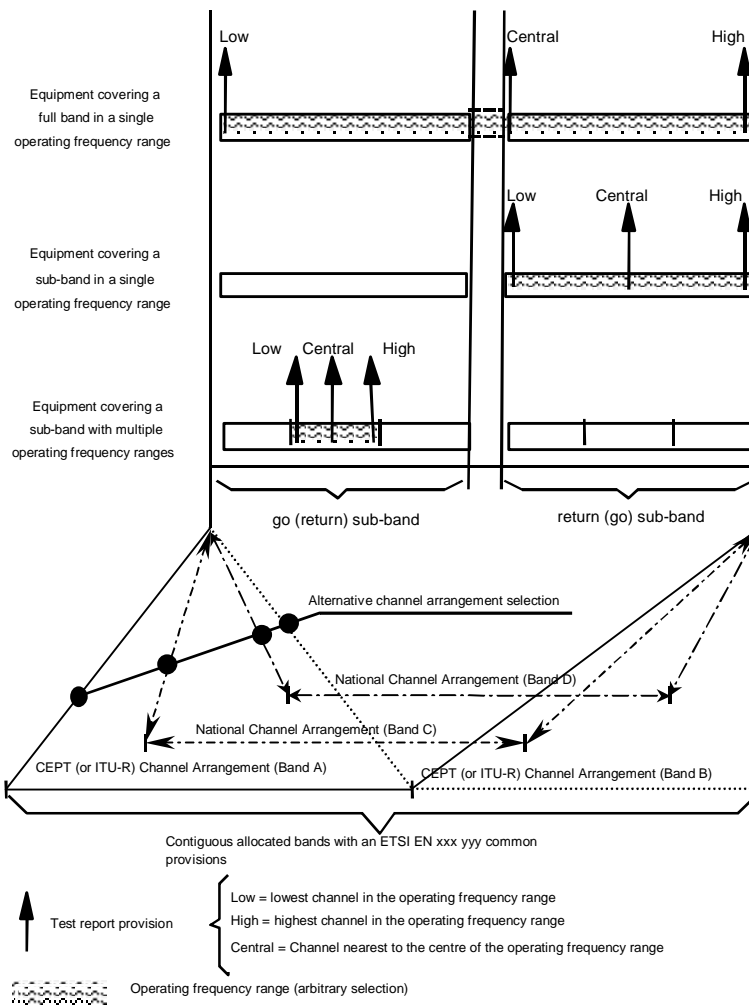


Figure 4: Test report frequency requirements for equipment intended for covering an operating frequency range

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 for point-to-multipoint systems application.

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). Point-to-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 may be sufficient.

4.3.2 Antennas for FDRS

Commonly FDRS antennas covers 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 (Directive 1999/5/EC [1]).

4.4 Multirate covering equipment specification and tests

FDRS equipment can cover a number of different payload-rate through software setting.

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

The tests shall be carried out for the transmitting phenomena (see clause 4.5) at any intended bit rate operation, while the 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 to produce the test report and/or declaration of conformity required (Directive 1999/5/EC [1]).

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 2.

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 (Directive 1999/5/EC [1]).

Table 2: Relevant ETS/ENs clause(s)

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V 1.2.b	5.3.4	RF tolerance	EN 301 126-2-3 [28] Clause 4.2.5	
EN 301 021 [6]	V 1.3.b	5.3.5	Radio frequency tolerance	EN 301 126-2-3 [28] Clause 4.2.5	
EN 301 055 [7]	V 1.3.b	5.3.4	RF tolerance	EN 301 126-2-5 [30] Clause 4.2.5	
EN 301 080 [8]	V 1.2.b	5.5.5	RF tolerance	EN 301 126-2-2 [27] Clause 4.2.5	
EN 301 124 [9]	V 1.1.b	5.3.4	Radio frequency tolerance	EN 301 126-2-5 [30] Clause 4.2.5	
EN 301 179 [10]	V 1.1.b	5.4.5	Radio frequency tolerance	EN 301 126-2-4 [29] Clause 4.2.5	

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 301 213-1 [11]	V 1.1.b	5.5.7	Radio frequency tolerance	NA	Basic parameters
EN 301 213-2 [12]	V 1.2.b	5.5.7	Radio frequency tolerance	EN 301 126-2-2 [27] Clause 4.2.5	
EN 301 213-3 [13]	V 1.2.b	5.5.7	Radio frequency tolerance	EN 301 126-2-3 [28] Clause 4.2.5	
EN 301 253 [16]	V 1.1.b	5.4.5	Radio frequency tolerance	EN 301 126-2-4 [29] Clause 4.2.5	
EN 301 373 [17]	V 1.1.b	5.3.4	RF frequency tolerance	EN 301 126-2-2 [27] Clause 4.2.5	
EN 301 460-1 [18]	V 1.1.b	5.5.5	Radio frequency tolerance	See the relevant part for each access method EN 301 126-2-...	Common parameters
EN 301 460-2 [19]	V 1.1.b	5.5.5	Radio frequency tolerance	EN 301 126-2-3 [28] Clause 4.2.5	
EN 301 460-3 [20]	V 1.1.b	5.5.5	Radio frequency tolerance	EN 301 126-2-4 [29] Clause 4.2.5	
EN 301 460-4 [21]	V 1.1.b	5.5.5	Radio frequency tolerance	EN 301 126-2-2 [27] Clause 4.2.5	
EN 301 460-5 [22]	V 1.1.b	5.5.5	Radio frequency tolerance	EN 301 126-2-5 [30] Clause 4.2.5	
EN 301 744 [24]	V 1.1.b	5.3.4	Radio frequency tolerance	EN 301 126-2-3 [28] Clause 4.2.5	

4.5.2 Transmitter power

The clauses that give the limits of the essential phenomenon transmitter power 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 (Directive 1999/5/EC [1]).

Table 3: Relevant ETS/ENs clause(s)

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V 1.2.b	5.3.1	T _x power range	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	
EN 301 021 [6]	V 1.3.b	5.3.1	T _x power range	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	
EN 301 055 [7]	V 1.3.b	5.3.1	Transmitter power range	EN 301 126-2-5 [30] Clause 4.2.1 / 4.2.2	
EN 301 080 [8]	V 1.2.b	5.5.1	Transmitter 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 301 124 [9]	V 1.1.b	5.3.1	T _x power range	EN 301 126-2-5 [30] Clause 4.2.1 / 4.2.2	
EN 301 179 [10]	V 1.1.b	5.4.1	T _x power range	EN 301 126-2-4 [29] Clause 4.2.1 / 4.2.2	
EN 301 213-1 [11]	V 1.1.b	5.5.2	Transmitter nominal output power	NA	Basic parameters
EN 301 213-2 [12]	V 1.2.b	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]	V 1.2.b	5.5.2	Transmitter nominal output power	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	
EN 301 253 [16]	V 1.1.b	5.4.1	T _x power range	EN 301 126-2-4 [29] Clause 4.2.1 / 4.2.2	
EN 301 373 [17]	V 1.1.b	5.3.1	T _x power range	EN 301 126-2-2 [27] Clause 4.2.1 / 4.2.2	
EN 301 460-1 [18]	V 1.1.b	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]	V 1.1.b	5.5.1	Transmitter output power	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	
EN 301 460-3 [20]	V 1.1.b	5.5.1	Transmitter output power	EN 301 126-2-4 [29] Clause 4.2.1 / 4.2.2	
EN 301 460-4 [21]	V 1.1.b	5.5.1	Transmitter output power	EN 301 126-2-2 [27] Clause 4.2.1 / 4.2.2	
EN 301 460-5 [22]	V 1.1.b	5.5.1	Transmitter output power	EN 301 126-2-5 [30] Clause 4.2.1 / 4.2.2	
EN 301 744 [24]	V 1.1.b	5.3.1	T _x power range	EN 301 126-2-3 [28] Clause 4.2.1 / 4.2.2	

4.5.3 Adjacent channel power (Spectrum mask)

4.5.3.1 Spectrum mask

The spectrum masks reported in the relevant clauses of table 4 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 its test methods are reported in table 4.

The maximum attenuation of the spectrum mask relevant to Article 3.2 of the Directive is ≥ 45 dB.

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 (Directive 1999/5/EC [1]). Further more the test shall be carried out according to 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] applicable to the different access methods.

Table 4: Relevant ETS/ENs clause(s)

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V 1.2.b	5.3.2	Spectrum mask	EN 301 126-2-3 [28] Clause 4.2.6	
EN 301 021 [6]	V 1.3.b	5.3.3	Spectrum masks	EN 301 126-2-3 [28] Clause 4.2.6	
EN 301 055 [7]	V 1.3.b	5.3.4	Spectrum masks	EN 301 126-2-5 [30] Clause 4.2.6	
EN 301 080 [8]	V 1.2.b	5.5.4	RF spectrum mask	EN 301 126-2-2 [27] Clause 4.2.6	
EN 301 124 [9]	V 1.1.b	5.3.2	Spectrum mask	EN 301 126-2-5 [30] Clause 4.2.6	
EN 301 179 [10]	V 1.1.b	5.4.3	Spectrum mask	EN 301 126-2-4 [29] Clause 4.2.6	
EN 301 213-1 [11]	V 1.1.b	5.5.4	RF spectrum mask	NA	Basic parameters
EN 301 213-2 [12]	V 1.2.b	5.5.4	RF spectrum mask	EN 301 126-2-2 [27] Clause 4.2.6	
EN 301 213-3 [13]	V 1.2.b	5.5.4	RF spectrum mask	EN 301 126-2-3 [28] Clause 4.2.6	
EN 301 253 [16]	V 1.1.b	5.4.3	Spectrum mask	EN 301 126-2-4 [29] Clause 4.2.6	
EN 301 373 [17]	V 1.1.b	5.3.2	Spectrum mask	EN 301 126-2-2 [27] Clause 4.2.6	
EN 301 460-1 [18]	V 1.1.b	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]	V 1.1.b	5.5.4	RF spectrum mask	EN 301 126-2-3 [28] Clause 4.2.6	
EN 301 460-3 [20]	V 1.1.b	5.5.4	RF spectrum mask	EN 301 126-2-4 [29] Clause 4.2.6	
EN 301 460-4 [21]	V 1.1.b	5.5.4	RF spectrum mask	EN 301 126-2-2 [27] Clause 4.2.6	
EN 301 460-5 [22]	V 1.1.b	5.5.4	RF spectrum mask	EN 301 126-2-5 [30] Clause 4.2.6	
EN 301 744 [24]	V 1.1.b	5.3.2	Spectrum mask	EN 301 126-2-3 [28] Clause 4.2.6	

4.5.3.2 Remote Transmit Power Control (RTPC)

This functionality 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 or at RF level or at both level) 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 complying 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 RTPC will be subject to manufacturer declaration of RTPC range(s) and related tolerance(s).

The equipment shall comply with the requirements of spectrum masks of the above table 4 along all RTPC range.

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 (Directive 1999/5/EC [1]). Furthermore, the test shall be carried out according to 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] applicable to the different access methods.

Even if all the procedure provided by the 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] 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 any.

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

The tests shall be carried out to produce the test report and/or declaration of conformity required (Directive 1999/5/EC [1]) with ATPC if any, set to maximum available power. The RTPC, if any, 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 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 Transient behaviour of the transmitter (ATPC and RFC)

4.5.5.1 Automatic Transmit Power Control (ATPC)

This functionality 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 or at RF level or at both level) 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 complying both functions with different command functions (either HW or SW) 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 the supplier declaration shall be tested according the test method 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] applicable to the different access methods.

The equipment shall comply with the requirements of spectrum masks of the above table 4 with ATPC operating in the range between maximum nominal power and minimum nominal power including the attenuation introduced by RTPC function (if any).

The tests shall be carried out to produce the test report and/or declaration of conformity required (Directive 1999/5/EC [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 of the change frequency.

RFC setting procedure shall not produce emissions outside the previous and final centre frequencies spectrum mask required in table 4.

The tests shall be carried out to produce the test report and/or declaration of conformity required (Directive 1999/5/EC [1]) applying 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 1 (see Scope) 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) of the relevant antenna standard. Furthermore the applicable Conformance test standard for point-to-multipoint antennas is also stated. The antenna standards for point-to-multipoint antennas are stated as well containing the limit of the essential phenomenon off-axis EIRP density (Radiation Pattern Envelope).

Table 5: Void

Table 6: Relevant ETS/ENs clause(s)

ETSI equipment standard	Version	Clause(s) N In the relevant antenna standard ^o	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V 1.2.b	6.1.1 (Terminal Stations) 6.2.1 (Central Stations) 6.4 or 6.3 of EN 301 525 [23]	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	note 1
EN 301 021 [6]	V 1.3.b	6.1.1 (Terminal Stations) 6.2.1 (Central Stations) 6.4 or 6.3 of EN 302 085 [25]	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	note 1
EN 301 055 [7]	V 1.3.b	6.1.1 (Terminal Station) 6.2.1 (Central Station); 6.4 or 6.3 of EN 301 525 [23]	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	note 1
EN 301 080 [8]	V 1.2.b	6.1.1 (Terminal Station) 6.2.1 (Central Station); 6.4 or 6.3 of EN 302 085 [25]	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	note 1

ETSI equipment standard	Version	Clause(s) N In the relevant antenna standard ^o	relevant clause(s) title	test method (if essential)	Notes
EN 301 124 [9]	V 1.1.b	6.1.1 (Terminal Station) 6.2.1 (Central Station); 6.4 or 6.3 of EN 302 085 [25]	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	note 1
EN 301 179 [10]	V 1.1.b	6.1.1 (Terminal Station) 6.2.1 (Central Station); 6.4 or 6.3 of EN 301 525 [23]	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	note 1
EN 301 213-1 [11]	V 1.1.b	NA	NA	NA	Basic parameters
EN 301 213-2 [12]	V 1.2.b	4.1.1 (Terminal Station); 4.2.1 (Central Station); or 4.3 (note 4) 4.4 (Central Station); of EN 301 215-2 [15]	TS radiation pattern envelope; CS azimuth radiation pattern envelopes; sectored; Central Station omni-directional antennas Central Station elevation sectored RPE,	EN 301 126-3-2 [32] Clause 6.1	note 1
EN 301 213-3 [13]	V 1.2.b	4.1.1 (Terminal Station); 4.2.1 (Central Station); or 4.3 (note 4) 4.4 (Central Station); of EN 301 215-2 [15]	TS radiation pattern envelope; Central Station azimuth radiation pattern envelopes; sectored; Central Station omni-directional antennas Central Station elevation sectored RPE,	EN 301 126-3-2 [32] Clause 6.1	note 1
EN 301 215-1 [14]	V 1.1.b	Na	NA	NA	General aspects of Point-to-multipoint antenna standard

ETSI equipment standard	Version	Clause(s) N In the relevant antenna standard ^o	relevant clause(s) title	test method (if essential)	Notes
EN 301 215-2 [15]	V.1.2.b	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 omnidirectional 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 301 253 [16]	V 1.1.b	6.1.1 (Terminal Station) 6.2.1 (Central Station); 6.4 or 6.3 of EN 302 085 [25]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omnidirectional Antennas	EN 301 126-3-2 [32] Clause 6.1	note 1
EN 301 373 [17]	V 1.1.b	6.1.1 (Terminal Stations) 6.2.1 (Central Stations); 6.4 or 6.3 of EN 301 525 [23]	TS Radiation Pattern Envelope (RPE) CS Azimuth Radiation Pattern Envelope (RPE), Sectored Central Station Omni and Sectored Elevation RPEs: Central Station Omnidirectional Antennas	EN 301 126-3-2 [32] Clause 6.1	note 1
EN 301 460-1 [18]	V 1.1.b	NA	NA	NA	Common parameters
EN 301 460-2 [19]	V 1.1.b	note 3	note 3	Tbd	
EN 301 460-3 [20]	V 1.1.b	note 3	note 3	Tbd	
EN 301 460-4 [21]	V 1.1.b	note 3	note 3	Tbd	
EN 301 460-5 [22]	V 1.1.b	note 3	note 3	Tbd	
EN 301 525 [23]	V 1.1.1	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 Omnidirectional 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

ETSI equipment standard	Version	Clause(s) N In the relevant antenna standard ^o	relevant clause(s) title	test method (if essential)	Notes
EN 301 744 [24]	V 1.1.b	6.1.1 (Terminal Station) 6.2.1 (Central Station); 6.4 or 6.3 of EN 302 085 [25]	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	note 1
EN 302 085 [25]	V 1.1.1	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

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 are used as repeater station they 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. (Directive 1999/5/EC [1]).

NOTE 4: 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. (Directive 1999/5/EC [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 that case the EN 300 631 [3] clause 6.1 (Radiation Pattern Envelope) apply for the frequency range 1 GHz to 3 GHz and the EN 300 833 [5] clause 6.1 (Radiation Pattern Envelope) apply for the frequency range 3 GHz to 60 GHz respectively. 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 1 (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. The antenna standards for point-to-multipoint antennas are stated as well containing the limit of the essential phenomenon antenna gain.

Table 7: Relevant ETS/ENs clause(s)

ETSI standard	Version	Clause(s) N° in the relevant antenna standard	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V 1.2.b	6.1.2 (Terminal Stations) 6.2.2 (Central Stations); or 6.3 of EN 301 525 [23]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 301 021 [6]	V 1.3.b	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 085 [25]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 301 055 [7]	V 1.3.b	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 301 525 [23]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 301 080 [8]	V 1.2.b	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 085 [25]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 301 124 [9]	V 1.1.b	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 302 085 [25]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 301 179 [10]	V 1.1.b	6.1.2 (Terminal Stations) 6.2.2 (Central Stations) or 6.3 of EN 301 525 [23]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 301 213-1 [11]	V 1.1.b	NA	NA	NA	Basic parameters
EN 301 213-2 [12]	V 1.2.b	4.1.2 (Terminal Station); 4.2.2 (Central Station); 4.3 (note 4) of EN 301 215-2 [15]	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored; Central Station omnidirectional antennas	EN 301 126-3-2 [32] Clause 6.2	note 1

ETSI standard	Version	Clause(s) N° in the relevant antenna standard	relevant clause(s) title	test method (if essential)	Notes
EN 301 213-3 [13]	V 1.2.b	4.1.2 (Terminal Station); 4.2.2 (Central Station); 4.3(note 4) of EN 301 215-2 [15]	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored; Central Station omnidirectional antennas	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 301 215-1 [14]	V 1.1.b	Na	NA	NA	General aspects of Point-to-multipoint antenna standard
EN 301 215-2 [15]	V.1.2.b	4.1.2 (Terminal Station); 4.2.2 (Central Station); 4.3 (Central Station; note 4)	TS minimum antenna boresight gain; CS minimum antenna boresight gain, sectored; Central Station omnidirectional antennas	EN 301 126-3-2 [32] Clause 6.2	Point-to-multipoint antenna standard
EN 301 253 [16]	V 1.1.b	6.1.2 (Terminal Station) 6.2.2 (Central Station); 6.3 of EN 302 085 [25]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 301 373 [17]	V 1.1.b	6.1.2 (Terminal Station) 6.2.2 (Central Station); 6.3 of EN 301 525 [23]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 301 460-1 [18]	V 1.1.b	NA	NA	NA	Common parameters
EN 301 460-2 [19]	V 1.1.b	note 3	note 3	Tbd	.
EN 301 460-3 [20]	V 1.1.b	note 3	note 3	Tbd	
EN 301 460-4 [21]	V 1.1.b	note 3	note 3	Tbd	
EN 301 460-5 [22]	V 1.1.b	note 3	note 3	Tbd	
EN 301 525 [23]	V 1.1.1	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

ETSI standard	Version	Clause(s) N° in the relevant antenna standard	relevant clause(s) title	test method (if essential)	Notes
EN 301 744 [24]	V 1.1.b	6.1.2 (Terminal Station) 6.2.2 (Central Station); 6.3 of EN 302 085 [25]	TS Minimum Boresight Gain; CS Minimum Boresight Gain, Sectored; Central Station Omni-Directional Antenna	EN 301 126-3-2 [32] Clause 6.2	note 1
EN 302 085 [25]	V 1.1.1	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

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 are used as repeater station they 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 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. (Directive 1999/5/EC [1]).

NOTE 4: 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. (Directive 1999/5/EC [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 that case the EN 300 631 [3] clause 6.3 (antenna gain) shall apply for the frequency range 1 GHz to 3 GHz and the EN 300 833 [5] clause 6.3 (antenna gain) shall apply for the frequency range 3 GHz to 60 GHz respectively. The test methods shall comply with EN 301 126-3-1 [31] clause 6.3.

4.6.3 Antenna cross-polar discrimination

The limits of the essential phenomenon antenna cross-polar discrimination and its test methods is contained in the off-axis density phenomenon at boresight (see 4.6.1).

The antenna cross-polar discrimination can be taken from the boresight values as the difference between the co-polar and the cross-polar of axis density phenomenon (radiation pattern envelope).

Where omni directional antennas are used at the Central station and / or repeater station the limit values of the essential phenomenon antenna cross-polar discrimination shall comply with that stated in clause 6.3 of EN 301 525 [23] for the frequency range 1 GHz to 3 GHz or EN 302 085 [25] for the frequency range 3 GHz to 11 GHz and the relevant part of EN 301 215 for the frequency range 11 GHz to 60 GHz, according to the frequency subrange.

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 are used as repeater station they 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 section 4.6.1 table 6.

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. (Directive 1999/5/EC [1]).

Where standalone point-to-multipoint antennas are applied the limit of the essential phenomenon antenna cross-polar discrimination shall comply taking the limit values from clause 4.6.1 and calculating the antenna cross-polar discrimination as mentioned above.

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 stand alone part. In that case the EN 300 631 [3] clause 6.2 (Cross polar discrimination) apply for the frequency range 1 GHz to 3 GHz and the EN 300 833 [5] clause 6.3 (Cross polar discrimination) apply for the frequency range 3 GHz to 60 GHz respectively. The test methods shall comply with EN 301 126-3-1 [31] clause 6.2.

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 (Directive 1999/5/EC [1]) with ATPC if any set to either automatic or the maximum nominal output power and RTPC if any set to an arbitrarily value to be chosen by the supplier. The test shall be in accordance to 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] 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 (Directive 1999/5/EC [1]).

Table 8: Relevant ETS/ENs clause(s)

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V 1.2.b	5.4.3	BER performance	EN 301 126-2-3 [28] Clause 4.4.2	
EN 301 021 [6]	V 1.3.b	5.4.3	BER performance	EN 301 126-2-3 [28] Clause 4.4.2	
EN 301 055 [7]	V 1.3.b	5.4.3	BER performance	EN 301 126-2-5 [30] Clause 4.3.3.2	
EN 301 080 [8]	V 1.2.b	5.7.2	BER as function of receiver signal input level	EN 301 126-2-2 [27] Clause 4.4.2	
EN 301 124 [9]	V 1.1.b	5.4.4	BER performance	EN 301 126-2-5 [30] Clause 4.3.3.2	
EN 301 179 [10]	V 1.1.b	5.5.3	BER performance	EN 301 126-2-4 [29] Clause 4.4.2	
EN 301 213-1 [11]	V 1.1.b	5.7.2	BER as function of receiver signal input level	NA	Basic parameters

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 301 213-2 [12]	V 1.2.b	5.7.2	BER as function of receiver signal input level	EN 301 126-2-2 [27] Clause 4.4.2	
EN 301 213-3 [13]	V 1.2.b	5.7.2	BER as function of receiver signal input level	EN 301 126-2-3 [28] Clause 4.4.2	
EN 301 253 [16]	V 1.1.b	5.5.3	BER performance	EN 301 126-2-4 [29] Clause 4.4.2	
EN 301 373 [17]	V 1.1.b	5.4.3	BER as function of receiver signal input level	EN 301 126-2-2 [27] Clause 4.2.6	
EN 301 460-1 [18]	V 1.1.b	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]	V 1.1.b	5.7.2		EN 301 126-2-3 [28] Clause 4.4.2	
EN 301 460-3 [20]	V 1.1.b	5.7.2		EN 301 126-2-4 [29] Clause 4.4.2.	
EN 301 460-4 [21]	V 1.1.b	5.7.2		EN 301 126-2-2 [27] Clause 4.4.2	
EN 301 460-5 [22]	V 1.1.b	5.7.2		EN 301 126-2-5 [30] Clause 4.3.3.2	
EN 301 744 [24]	V 1.1.b	5.4.4	BER performance	EN 301 126-2-3 [28] 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 (Directive 1999/5/EC [1]).

Table 9: Relevant ETS/ENs clause(s)

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V 1.2.b	5.4.4.2	Co-channel rejection	EN 301 126-2-3 [28] Clause 4.4.4.1	
EN 301 021 [6]	V 1.3.b	5.4.4.2	Co-channel interference	EN 301 126-2-3 [28] Clause 4.4.4.1	
EN 301 055 [7]	V 1.3.b	5.4.4.1	Co-channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.3.4.1	
EN 301 080 [8]	V 1.2.b	5.7.4.1	Co-channel interference	EN 301 126-2-2 [27] Clause 4.4.4.1	
EN 301 124 [9]	V 1.1.b	5.4.5.1	Co-channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.3.4.1	
EN 301 179 [10]	V 1.1.b	5.5.4.1	Co-channel interference sensitivity	EN 301 126-2-4 [29] Clause 4.4.4.1	

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 301 213-1 [11]	V 1.1.b	5.7.4.1	Co-channel interference sensitivity	NA	Basic parameters
EN 301 213-2 [12]	V 1.2.b	5.7.4.1	Co-channel interference sensitivity	EN 301 126-2-2 [27] Clause 4.4.4.1	
EN 301 213-3 [13]	V 1.2.b	5.7.4.1	Co-channel interference sensitivity	EN 301 126-2-3 [28] Clause 4.4.4.1	
EN 301 253 [16]	V 1.1.b	5.5.4.1	Co-channel interference sensitivity	EN 301 126-2-4 [29] Clause 4.4.4.1	
EN 301 373 [17]	V 1.1.b	5.4.4.2	Co-channel interference	EN 301 126-2-2 [27] Clause 4.4.4.1	
EN 301 460-1 [18]	V 1.1.b	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]	V 1.1.b	5.7.3.1	Co-channel interference	EN 301 126-2-3 [28] Clause 4.4.4.1	
EN 301 460-3 [20]	V 1.1.b	5.7.3.1	Co-channel interference	EN 301 126-2-4 [29] Clause 4.4.4.1	
EN 301 460-4 [21]	V 1.1.b	5.7.3.1	Co-channel interference	EN 301 126-2-2 [27] Clause 4.4.4.1	
EN 301 460-5 [22]	V 1.1.b	5.7.3.1	Co-channel interference	EN 301 126-2-5 [30] Clause 4.3.4.1	
EN 301 744 [24]	V 1.1.b	5.4.5.1	Co-channel interference sensitivity	EN 301 126-2-3 [28] 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 (Directive 1999/5/EC [1]).

Table 10: Relevant ETS/ENs clause(s)

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V 1.2.b	5.4.4.1	Adjacent channel rejection	EN 301 126-2-3 [28] Clause 4.4.4.2	
EN 301 021 [6]	V 1.3.b	5.4.4.1	Adjacent channel interference	EN 301 126-2-3 [28] Clause 4.4.4.2	
EN 301 055 [7]	V 1.3.b	5.4.4.2	Adjacent channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.3.4.2	
EN 301 080 [8]	V 1.2.b	5.7.4.2	Adjacent channel interference	EN 301 126-2-2 [27] Clause 4.4.4.2	
EN 301 124 [9]	V 1.1.b	5.4.5.2	Adjacent channel interference sensitivity	EN 301 126-2-5 [30] Clause 4.3.4.2	

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 301 179 [10]	V 1.1.b	5.5.4.2	Adjacent channel interference sensitivity	EN 301 126-2-4 [29] Clause 4.4.4.2	
EN 301 213-1 [11]	V 1.1.b	5.7.4.2	Adjacent channel interference	NA	Basic parameters
EN 301 213-2 [12]	V 1.2.b	5.7.4.2	Adjacent channel interference	EN 301 126-2-2 [27] Clause 4.4.4.2	
EN 301 213-3 [13]	V 1.2.b	5.7.4.2	Adjacent channel interference	EN 301 126-2-3 [28] Clause 4.4.4.2	
EN 301 253 [16]	V 1.1.b	5.5.4.2	Adjacent channel interference sensitivity	EN 301 126-2-4 [29] Clause 4.4.4.2	
EN 301 373 [17]	V 1.1.b	5.4.4.1	Adjacent channel interference	EN 301 126-2-2 [27] Clause 4.4.4.2	
EN 301 460-1 [18]	V 1.1.b	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]	V 1.1.b	5.7.3.2	Adjacent channel interference	EN 301 126-2-3 [28] Clause 4.4.4.2	
EN 301 460-3 [20]	V 1.1.b	5.7.3.2	Adjacent channel interference	EN 301 126-2-4 [29] Clause 4.4.4.2	
EN 301 460-4 [21]	V 1.1.b	5.7.3.2	Adjacent channel interference	EN 301 126-2-2 [27] Clause 4.4.4.2	
EN 301 460-5 [22]	V 1.1.b	5.7.3.2	Adjacent channel interference	EN 301 126-2-5 [30] Clause 4.3.4.2	
EN 301 744 [24]	V 1.1.b	5.4.5.4	Adjacent channel interference sensitivity	EN 301 126-2-3 [28] Clause 4.4.4.2	

4.7.4 Blocking or desensitisation including duplex (CW Spurious Interference)

The clauses that give the limits of the essential phenomenon blocking or desensitisation 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 (Directive 1999/5/EC [1]).

Table 11: Relevant ETS/ENS clause(s)

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 300 636 [4]	V 1.2.b	NA	NA	NA	No parameter defined
EN 301 021 [6]	V 1.3.b	5.4.4.3	CW interference	EN 301 126-2-3 [28] Clause 4.4.4.3	
EN 301 055 [7]	V 1.3.b	5.4.4.3	CW interference	EN 301 126-2-5 [30] Clause 4.3.4.3	
EN 301 080 [8]	V 1.2.b	5.7.4.3	CW spurious interference	EN 301 126-2-2 [27] Clause 4.4.4.3	

ETSI standard	Version	Clause(s) N°	relevant clause(s) title	test method (if essential)	Notes
EN 301 124 [9]	V 1.1.b	5.4.2	Broadband Carrier Wave (CW) interference rejection capability	EN 301 126-2-5 [30] Clause 4.3.4.3	
EN 301 179 [10]	V 1.1.b	5.5.4.3	Broadband Carrier Wave (CW) interference rejection capability	EN 301 126-2-4 [29] Clause 4.4.4.3	
EN 301 213-1 [11]	V 1.1.b	5.7.4.3	CW interference	NA	Basic parameters
EN 301 213-2 [12]	V 1.2.b	5.7.4.3	CW interference	EN 301 126-2-2 [27] Clause 4.4.4.3	
EN 301 213-3 [13]	V 1.2.b	5.7.4.3	CW interference	EN 301 126-2-3 [28] Clause 4.4.4.3	
EN 301 253 [16]	V 1.1.b	5.5.4.3	Broadband Carrier Wave (CW) interference rejection capability	EN 301 126-2-4 [29] Clause 4.4.4.3	
EN 301 373 [17]	V 1.1.b	5.4.4.1	CW spurious interference	EN 301 126-2-2 [27] Clause 4.4.4.3	
EN 301 460-1 [18]	V 1.1.b	5.7.6	CW interference	See the relevant part for each access method EN 301 126-2-...	Common parameters
EN 301 460-2 [19]	V 1.1.b	5.7.6	CW interference	EN 301 126-2-3 [28] Clause 4.4.4.3	
EN 301 460-3 [20]	V 1.1.b	5.7.6	CW interference	EN 301 126-2-4 [29] Clause 4.4.4.3	
EN 301 460-4 [21]	V 1.1.b	5.7.6	CW interference	EN 301 126-2-2 [27] Clause 4.4.4.3	
EN 301 460-5 [22]	V 1.1.b	5.7.6	CW interference	EN 301 126-2-5 [30] Clause 4.3.4.3	
EN 301 744 [24]	V 1.1.b	5.4.2	Broadband Carrier Wave (CW) interference rejection capability	EN 301 126-2-3 [28] 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 (99/05/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 its test methods required (Directive 1999/5/EC [1]) will be reported in the following clause where ENs for Point-to-multipoint equipment are requiring this essential phenomenon. Presently no such phenomenon is applicable to the standards reported in the scope of the present document.

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.
--

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 Point-to-multipoint FDRS
(including integral antennas) in frequency bands that require co-ordination**

EN Reference		EN 301 753 Requirements for equipment also under the scope of ETS/EN (select from table 1 as appropriate)			
Transmitting phenomena					
No.	Reference	EN-R (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	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		
Directional phenomena					
No.	Reference	EN-R (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	
8	4.6.3	Antenna cross-polar discrimination See also 4.6.1	M	Applicable only to equipment with integral antennas	
Receiving phenomena					
No.	Reference	EN-R (note)	Status	Note	Supplier Comment for declaration
9	4.7.1	BER as a function of receiver input signal level	M		
10	4.7.2	Co-channel interference sensitivity	M		
11	4.7.3	Adjacent channel interference sensitivity	M		
12	4.7.4	Blocking or desensitization including duplex (CW Spurious Interference)	M		
13	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 Point-to-multipoint FDRS stand-alone antennas

EN Reference		EN 301 753 Requirements for equipment also under the scope of ETS/EN (select from table 1 as appropriate)			
Directional phenomena					
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	
8	4.6.3	Antenna cross-polar discrimination See also 4.6.1	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:**No** Table entry number;**Reference** Clause reference number of conformance requirement within the present document;**EN-R** Title of conformance requirement within the present document;**Status** Status of the entry as follows:**M** Mandatory, shall be implemented under all circumstances;**O** Optional, may be provided, but if provided shall be implemented in accordance with the requirements;**Supplier Comment for declaration** To be completed as required.

History

Document history		
V1.1.1	May 2000	One-step Approval Procedure OAP 20000922: 2000-05-24 to 2000-09-22
V1.1.1	March 2001	Publication