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Fixed Radio Systems - Multipoint Equipment and Antennas - Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for Digital Multipoint Radio Equipment

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# ETSI EN 302 326-2 V1.2.2 (2007-06)

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*Harmonized European Standard (Telecommunications series)*

**Fixed Radio Systems;  
Multipoint Equipment and Antennas;  
Part 2: Harmonized EN covering the essential requirements  
of article 3.2 of the R&TTE Directive  
for Digital Multipoint Radio Equipment**

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**ETSI**

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

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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  
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## Foreword

This 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 (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 [2] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive").

Technical specifications relevant to Directive 1999/5/EC [2] are given in annex A.

This multi-part deliverable covers characteristics and requirements for fixed multipoint radio equipment and antennas using a variety of access and duplex methods and operating at a variety of bit rates in frequency bands as specified in the present document.

The present document is part 2 of a multi-part deliverable covering the Fixed Radio Systems; Multipoint Equipment and Antennas, as identified below:

- Part 1: "Overview and Requirements for Digital Multipoint Radio Systems";
- Part 2: "Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for Digital Multipoint Radio Equipment";**
- Part 3: "Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for Multipoint Radio Antennas".

The present document and EN 302 326-3 [12] are Harmonized ENs and essential requirements are those requirements which are essential under article 3.2 of the R&TTE Directive [2].

In the above, "equipment" includes equipment with integral antennas, and "antennas" include requirements for antennas whether they are integral or non-integral.

Besides its previous version V1.1.1, the present document with EN 302 326-3 [12] replaces and supersedes the harmonized EN 301 753 (see bibliography) for all MP equipment and antennas under its scope.



National transposition dates	
Date of adoption of this EN:	1 June 2007
Date of latest announcement of this EN (doa):	30 September 2007
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2008
Date of withdrawal of any conflicting National Standard (dow):	31 March 2009

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## 0 Introduction

### 0.1 General

For the general background, rationale and structure of the present document see also the clause "Introduction" in EN 302 326-1 [11].

With respect to previous version of the present document, provisions for TS omnidirectional antennas for indoor NWA applications.

### 0.2 Relationship with the R&TTE essential requirements

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive [2]. The modular structure is described in EG 201 399 (see bibliography) and shown in figure 1.

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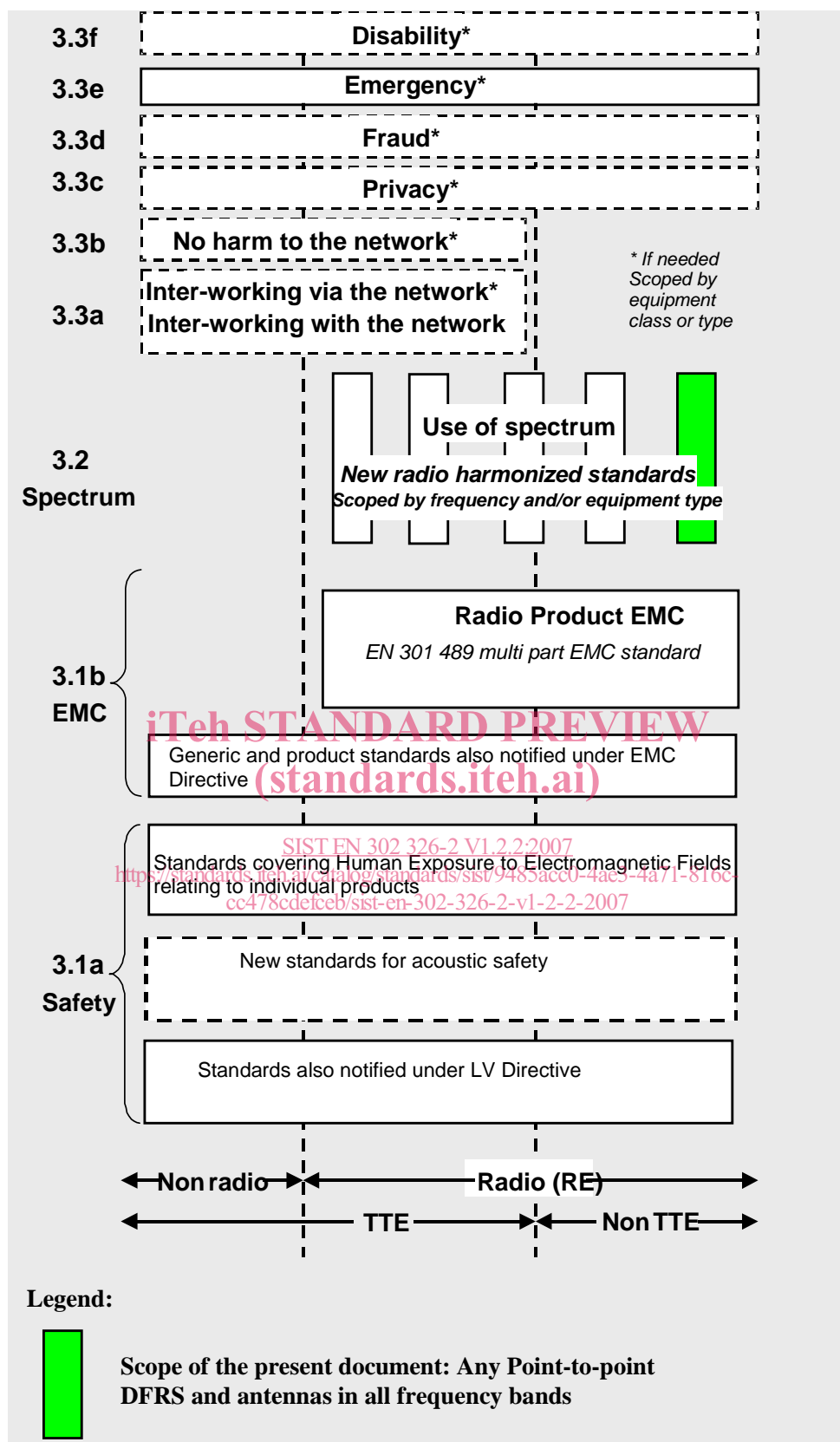


Figure 1: Modular structure for the various standards used under the R&TTE Directive [2]

NOTE: For article 3.1b the diagram shows EN 301 489 (see bibliography), the multi-part product EMC standard for radio used under the EMC Directive 89/336/EEC (see bibliography). For Fixed Radio Systems EN, EN 301 489-1 (see bibliography) and EN 301 489-4 (see bibliography) are relevant.

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# 1 Scope

## 1.1 General

The present document is intended to cover the provisions of the R&TTE Directive [2] regarding article 3.2, which states that "[...] radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

The present document is applicable to the essential requirements of equipment (including equipment with integral antennas) used in MultiPoint (MP) Digital Fixed Radio Systems (DFRS) (see note) intended for use in the frequency bands identified in EN 302 326-1 [11].

NOTE 1: Applications intended for offering in the bands 3,4 GHz to 3,8 GHz the option of Nomadic Wireless Access (NWA), according to the NWA definition in ITU-R Recommendation F.1399 (see bibliography), are also considered in the scope of this EN.

Besides its previous versions, The present document, together with EN 302 326-3 [12] replaces and supersedes, after a suitable transition period, the harmonized EN 301 753 (see bibliography) for all multipoint equipment and antennas under its scope.

The present document and EN 302 326-3 [12] introduce rationalization among systems conforming to previous EN 301 753 (see bibliography) referencing a number of ENs which, being developed at different times, might have specified slightly different requirements. However, care has been taken so that such variations will not affect any frequency planning assumption for already deployed networks. Therefore, unless specifically mentioned, these new requirements, whenever different from those single ENs, are considered completely "equivalent". Therefore mixed use of equipment conforming to the present document and to those previous ones will not change, in practice, any frequency planning rule in any network. (standards.iteh.ai)

Therefore, from a strictly technical point of view, in most cases it is expected that equipment already conforming to the previous versions of Harmonized EN 301 753 (see bibliography), would not need re-assessment of essential requirements according to the present document. The legal implications of the declaration of conformity and equipment labelling are, however, outside the scope of this whole multi-part deliverable. Cases, where additional conformance assessment is anyhow required, will be specifically mentioned in the present document and also EN 302 326-3 [12].

In addition to the present document, other ENs specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive [2] and which will apply to equipment within the scope of the present document.

NOTE 2: A list of such ENs is included on the web site <http://www.newapproach.org>.

In order to (technically) cover different market and network requirements, with an appropriate balance of performance to cost and effective and appropriate use of the radio spectrum, the present document, together with EN 302 326-3 [12], offers a number of system types and antennas alternatives, for selection by administrations, operators and manufacturers dependent on the desired use of the radio spectrum and network/market requirements; those options include:

- channel separation alternatives (as provided by the relevant CEPT Recommendation);
- spectral efficiency class alternatives (different modulation formats provided in radio equipment standards);
- antenna sectorization alternatives and directivity classes for CS;
- antenna directivity class alternatives for TS and/or RS, as well as omnidirectional alternative for TS intended for Nomadic Wireless Access (NWA);
- antenna basic polarization (linear or circular).

The applicability of this whole multi-part deliverable to MP equipment is governed by the definition of a number of system profiles that define the set of consistent requirements as described in EN 302 326-1 [11] to which equipment shall conform.



Table 1 shows the complete list of equipment profiles within the scope of this multi-part deliverable in terms of the allowed values (or ranges of values) of the various fields of EqC. The manufacturer shall indicate, in the Technical Construction File or elsewhere, the profile that the specific equipment shall comply with, by defining the values of those fields of EqC shown in table 1 that are applicable to the equipment. The equipment shall then comply with *all* requirements in EN 302 326-1 [11] and the present document relevant to that EqC.

In the case of asymmetric MP implementations (see clause 1.6 of EN 302 326-1 [11]), the supplier shall identify separately the profiles of the equipment in the two alternate directions in terms of the various EqC fields, and the present document shall apply independently to each direction.

**Table 1: Equipment Profiles within the scope of this multi-part deliverable defined by their Equipment Classification (see notes 1 and 2)**

EqC-FR Frequency Range (Basic ranges) (note 7)	EqC-PET Primary Equipment Type (note 3)	EqC-EMO Equivalent Modulation Order (note 4)	EqC-SET Secondary Equipment Type (note 5)	EqC-ChS Channel Separation (MHz) (Basic Ranges) (note 6)
< 1 GHz	T	2	QP, DQ, or GM	No restriction
	O	2, 4, 6	DM or MA	No restriction
	F (note 8)	2, 3, 4	Null	No restriction
	D	Not applicable	OR or PR	3,5 to 20
	H	Not applicable	Null	1 to 14
1 GHz to 3 GHz	T	1,2	Null	1,75 to 4
	O	2, 4, 6	DM or MA	1,75 to 14
	F (note 8)	2,3,4	Null	1 to 14
	D	Not applicable	OR or PR	3,5 to 14
3 GHz to 11 GHz	H	Not applicable	Null	1 to 14
	T	2	Null	0,025 to 30
	O	2, 4, 6	HC LC	1,75 to 30
	F (note 8)	2, 3, 4	Null	0,025 to < 2
	D	Not applicable	Null	0,025 to 30
	H	Not applicable	Null	1,75 to 30
	O	2, 4, 6	DM or MA	0,025 to 30
	F (note 8)	2, 3, 4	DM or MA	1,75 to 30
	D	Not applicable	OR or PR	1 to 30
	H	Not applicable	Null	1 to 30
24,25 GHz to 29,5 GHz	T	2 4,6	Null or HC Null	3,5 to 112 3,5 to 112
	M	2, 4, 6	Null	3,5 to 112
	F (note 8)	2, 3, 4, 6	Null	3,5 to 112
	D	Not applicable	OR or PR	3,5 to 112
	H	Not applicable	Null	3,5 to 112
31,0 GHz to 33,4 GHz	T	2, 4, 6	Null	3,5 to 56
	M	2, 4, 6	Null	3,5 to 56
	F (note 8)	2, 3, 4	Null	3,5 to 56
NOTE 1: A description of the fields of EqC appears in annex A of EN 302 326-1 [11], and the relationship between EqC fields and the previous equipment types described in the superseded ENs appears in annex B of EN 302 326-1 [11].				
NOTE 2: In the earlier standards a number of system types were defined (e.g. A, B, C, etc.). Annex B of EN 302 326-1 [11] indicates the relationship between the earlier system types and the present EqC.				
NOTE 3: Although EqC-PET historically has a relationship with a specific multiple access method, any access method, or combination of access methods, may be used provided that the entire set of requirements relevant to article 3.2 of the R&TTE Directive [2] in the present document and, if desired, also other complimentary requirements in EN 302 326-1 [11] are met for the stated EqC-PET value.				
NOTE 4: In the EqC-EMO column, the reference made to the modulation order is only indicative, and any equivalent modulation scheme is allowed provided that the whole set of requirements relevant to article 3.2 of the R&TTE Directive [2] in the present document and, if desired, also other complimentary requirements in EN 302 326-1 [11] are met for the manufacturer's stated EqC-EMO value. For mixed-mode systems EqC-EMO=1 might also be provided, among other more efficient EMO, within the same channel separations.				

NOTE 5:	For certain primary equipment types (EqC-PET) it has historically been necessary to sub-divide the equipments according to further characteristics which have different consistent sets of requirements. Although no longer tied to specific characteristics, this subdivision is reflected in Secondary Equipment Type (EqC-SET) classifications which are represented by various two-letter codes. (See annex A of EN 302 326-1 [11]).
NOTE 6:	The EqC-ChS column indicates range of ChS values for which the present document is applicable. Several parameters in the present document are given for discrete values of ChS only. For intermediate ChS values, methods are given for deriving the required characteristics with the default being by interpolation between the two nearest adjacent ChS values.
NOTE 7:	The EqC-FR column represents the basic frequency range for which the present document is applicable. For assessment purpose the specific frequency band of the equipment/antenna operation should be defined (e.g. EqC-FR = 3,5 or EqC - FR = 3,4 - 3,6) according to the assessment rules for wide band equipment and antennas defined in annex B of the present document.
NOTE 8:	Systems of EqC-PET = H, implementing an actual FH-CDMA access method with hopping period exceeding 400 ms, are not considered within the scope of the present document.

For defining the coherent set of essential test suites for conformity assessment, a number of declared EqC codes and other parameters are needed as declaration from the supplier. Standing the considerable number of possibilities under the scope of the present document summarized in table 1 and, for systems with integral antennas in table 3, it is recommended to consider the production of a summary table, such as table E.1 proposed in informative annex E, to be attached as header of the technical construction file and/or test documentation for aid the correct identification of the equipment/system profile by any interested third party.

### 1.3.3 Antenna profiles

According to their characteristics, multipoint systems use different types of antennas as indicated in clause 1.3.4. Table 2 outlines the multipoint antenna types described in EN 302 326-3 [12].

**Table 2: Antenna Types**  
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Frequency Range	Types	Polarization	Notes
1 GHz to 3 GHz	Directional Sectored single beam Omni directional	Linear	The sectored and omni directional antennas may have a symmetric or asymmetric radiation pattern in the elevation plane.
3 GHz to 11 GHz	Directional Sectored single beam Sectored multibeam (up to 5,9 GHz only) Omni directional	Linear	The sectored single and omni directional antennas may have a symmetric or asymmetric radiation pattern in the elevation plane. The sectored multi beam antennas have a symmetric radiation pattern only.
1 GHz to 11 GHz	Directional Sectored single beam Omni directional	Circular	The sectored and omni directional antennas may have a symmetric or asymmetric radiation pattern in the elevation plane.
24,25 GHz to 30 GHz	Directional Sectored single beam	Linear	
30 GHz to 40,5 GHz	Directional Sectored single beam Omni directional	Linear	The omni directional antennas may have a symmetric or asymmetric radiation pattern in the elevation plane.

The present document is applicable to multipoint radio system antennas of both linear (single or dual) polarization and circular (single or dual) polarization. Linear polarization antennas may support either or both of two mutually perpendicular planes of polarization. These planes are frequently, though not always, horizontal and vertical. Circular polarization antennas may support either right hand or left hand polarization or, for dual polarization, both.

The RPE directional characteristics and polarization characteristics (co-polar and cross-polar and for either linear or circular polarized antennas) impact the interference considerations in network planning. A number of antenna options are defined in EN 302 326-3 [12] to allow a trade-off between highly demanding RPE directivity and the cost/size/weight of the antennas. The antenna choice should take into account the constraints of present and future networks requirements and constraints.

Annex B of EN 302 326-3 [12] discusses Antenna Profiles for multipoint systems.

### 1.3.4 System profiles

This multi-part deliverable applies only to Multipoint systems using the following antenna type to station type combinations according to whether the network topology is P-MP or MP-MP (Mesh). Table 3 indicates which system profiles are within the scope of this multi-part deliverable.

**Table 3: System Profiles within the scope of this multi-part deliverable:  
Antenna types - Station types combinations**

Network topology	Station types	Antenna types		
		Omni directional	Sectored	Directional
P-MP	Central Station (CS)	Yes	Yes (see note 1)	No (see note 1)
	Repeater Station (RS)			
	Facing CS	No	No	Yes
	Facing TS or further RS	Yes	Yes	Yes
	Terminal Station (TS)	Yes (see note 2)	No	Yes
MP-MP	Repeater Station (RS)	No	No	Yes

NOTE 1: Sectored antennas with beamwidth < 15° shall conform to the specification otherwise applicable to a directional antenna.

NOTE 2: Omnidirectional TS antennas are limited to typically indoor deployment (e.g. desk antennas) for NWA applications in 3,4 GHz to 3,8 GHz bands. Nor outdoor deployable at fixed location, neither integral to handheld TS, are considered antennas within the scope of this multi-part deliverable.

## 1.4 Frequency ranges

The present document is applicable to multipoint radio systems operating in bands allocated to Fixed Service and assigned by national regulations to MP applications, at the date of publication of the present document, within the following frequency ranges:

- 30 MHz to 11,00 GHz.
- 24,25 GHz to 29,50 GHz.
- 31,00 GHz to 33,40 GHz.

NOTE: Attention is drawn to the fact that the specific operating bands are subject to CEPT or national licensing rules.

Currently applicable Fixed Service bands and channel plans are described in EN 302 326-1 [11], although the applicability of these Fixed Service bands is at the discretion of the national administrations and it is intended that this whole multi-part deliverable shall be applied only to frequency bands which are co-ordinated, whether such co-ordination is on a national or CEPT basis.

Antenna characteristics are not specified at frequencies below 1,0 GHz. Therefore, for either non-integral antennas below this limit or for equipment with integral antennas below this limit, the present document and EN 302 326-3 [12] are not sufficient for the Declaration of Conformity, according to article 3.2 of the R&TTE Directive [2], and additional essential test suites for antenna requirements shall be agreed with the Notified Body.

## 1.5 Access methods

The present document is applicable, in principle, to multipoint radio system equipment using any access method.

From the article 3.2 of R&TTE Directive [2] point of view, it is not required that any specific multiplexing or multiple access technique be declared.

However, it may be noted that a number of consistent system profiles are required to assess equipment of different technical characteristics. These profiles replace the technology dependent classification in earlier standards, but do not now imply any particular implementation. In general, the Equipment Classification Primary Equipment Type (EqC-PET) replaces the earlier concept of differentiation by access method.