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Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 2-2: Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for digital systems operating in frequency bands where frequency co-ordination is applied

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ETSI EN 302 217-2-2 V1.1.3 (2004-12)

Candidate Harmonized European Standard (Telecommunications series)

**Fixed Radio Systems;
Characteristics and requirements for
point-to-point equipment and antennas;
Part 2-2: Harmonized EN covering essential requirements of
Article 3.2 of R&TTE Directive for digital systems operating in
frequency bands where frequency co-ordination is applied**

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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
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Foreword

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

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

The present document is part 2-2 of a multi-part deliverable covering the Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas, as identified below:

- Part 1: "Overview and system-independent common characteristics";
- Part 2-1: "System-dependent requirements for digital systems operating in frequency bands where frequency co-ordination is applied";
- Part 2-2 "Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for digital systems operating in frequency bands where frequency co-ordination is applied";**
- Part 3: "Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for equipment operating in frequency bands where no frequency co-ordination is applied";
- Part 4-1: "System-dependent requirements for antennas";
- Part 4-2: "Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for antennas".

The present document with other EN 302 217-3 (see bibliography) and EN 302 217-4-2 [7] will replace and supersede the harmonized EN 301 751 (see bibliography) for all P-P equipment and antennas.

The date of cessation of presumption of conformity to R&TTE Directive [1] with reference to EN 301 751 (latest version published) (see bibliography) is proposed to be kept two years after the date of publication in the OJ EC of the present document.

National transposition dates	
Date of adoption of this EN:	19 November 2004
Date of latest announcement of this EN (doa):	28 February 2005
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2005
Date of withdrawal of any conflicting National Standard (dow):	28 February 2007

Introduction

The EN 302 217 series has been produced in order to rationalize a large number of previous ETSI ENs dealing with equipment and antennas for Point-to-Point (P-P) Fixed Service applications. For more details, see Foreword in the EN 302 217-1 [6].

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

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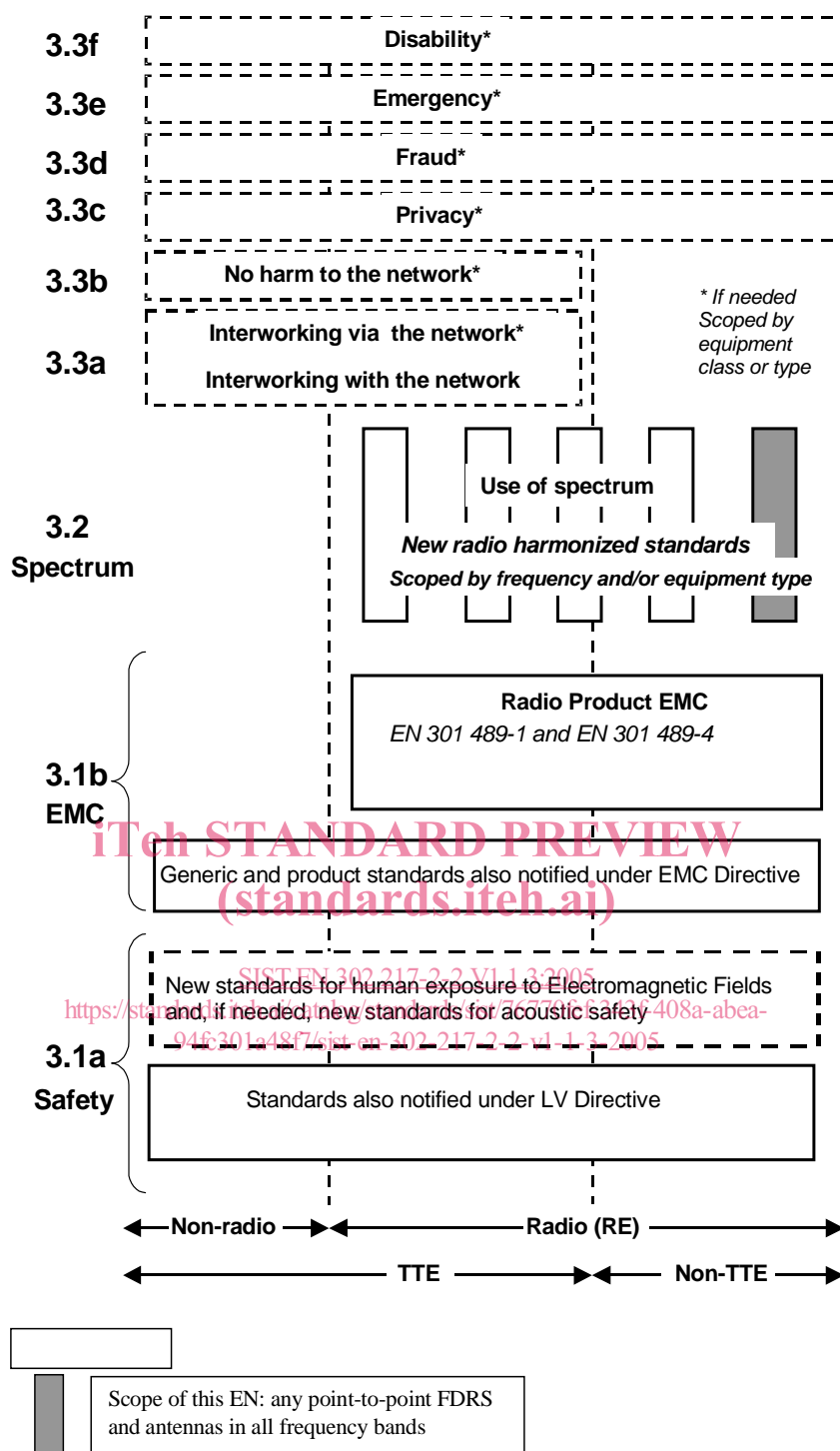


Figure 1: Modular structure for the various standards used under the R&TTE Directive

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

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

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

For article 3.1b the diagram shows EN 301 489 (see bibliography), the multi-part product EMC standard for radio used under the EMC Directive 89/336/EEC (see bibliography).

NOTE: For Fixed Radio Systems EN, EN 301 489-1 (see bibliography) and EN 301 489-4 (see bibliography) are relevant.

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive 73/23/EEC (see bibliography) and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of the figure 1 shows the relationship of the standards to radio equipment and telecommunications terminal equipment. 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 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.

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1 Scope

The present document specifies the essential requirements for Digital Fixed Radio Systems (DFRS) operating in frequency bands, which require co-ordinated frequency planning. It is intended to cover the provisions of the R&TTE Directive [1] 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 with other parts EN 302 217-3 (see bibliography) and EN 302 217-4-2 [7] will replace and supersede, after a suitable transition period, the harmonized EN 301 751 (see bibliography) for all P-P equipment and antennas.

This EN 302 217 series introduces, for systems (equipment and antennas) already covered by EN 301 751 (see bibliography), only technically equivalent or less stringent requirements (see note 1). Care has been taken so that such variations will not affect any frequency planning assumption for already deployed networks. Therefore, from a strictly technical point of view, it is expected that equipment already conforming to EN 301 751 (see bibliography), would not need a new test report for re-assessment of essential requirements according this EN 302 217-2-2 (see note 1). However, legal implications with respect to declaration of conformity and equipment labelling are outside the scope of the present document.

NOTE 1: The only exception is with respect to class 5A equipments for system D.7 (see annex D) and for systems E.1, E.2 and E.3 (see annex E) for which a previous design objective has here been transformed into a more stringent RSL versus BER. In this case a supplementary test report might be required (e.g. in case the technical construction file, made for declaration of conformity to EN 301 751 (see bibliography), does not give evidence of enough margin to fulfil the requirements of the present document).

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], 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 302 217-4-2 [7], 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 or ITU-R Recommendation);
- spectral efficiency class alternatives (different modulation formats provided in radio equipment standards) as defined in the Scope of EN 302 217-2-1 (see bibliography);
- antenna directivity class alternatives (for different network requirements).

The present document is mainly intended to cover fixed radio equipment without integral antennas. However, it also applies to fixed radio systems products with integral antennas, for which all the technical requirements included in the present document and in EN 302 217-4-2 [7] apply. For more background information on the equipment and antenna parameters here identified as relevant to Article 3.2 of R&TTE Directive see EG 201 399 (see Bibliography) and TR 101 156.

For simplicity, the point-to-point systems are split into separate annexes, with respect to ranges of frequency bands and channel separations, into the following families which may include a range of corresponding payload rates for covering various applications requested by the market:

- ANNEX A: Frequency bands from 1,4 GHz to 2,7 GHz:

Systems with channel separations ranging from 0,025 MHz to 14 MHz for indicative payload rates ranging from 0,0096 Mbit/s to 34 Mbit/s. See detailed summary in table A.2.

- ANNEX B: Frequency bands from 3 GHz to 11 GHz (channel separation up to 30 MHz):
Systems with channel separations ranging from 1,75 MHz to 30 MHz for indicative payload rates ranging from 2 Mbit/s to $2 \times \text{STM-1}$ Mbit/s. See detailed summary in table B.2.
- ANNEX C: Frequency bands from 3 GHz to 11 GHz (channel separation 40 MHz):
Systems with channel separations 40 MHz or 2×40 MHz for indicative payload rates from STM-1 Mbit/s to $\text{STM-4/4} \times \text{STM-1}$ Mbit/s. See detailed summary in table C.2.
- ANNEX D: Frequency bands 13 GHz, 15GHz and 18 GHz:
Systems with channel separations ranging from 1,75 MHz to 55/56 MHz or $2 \times 55/56$ MHz for indicative payload rates ranging from 2 Mbit/s to $\text{STM-4/4} \times \text{STM-1}$ Mbit/s. See detailed summary in table D.2.
- ANNEX E: Frequency bands from 23 GHz to 55 GHz:
Systems with channel separations ranging from 3,5 MHz to 56 MHz or 2×56 MHz for indicative payload rates ranging from 2 Mbit/s to $\text{STM-4/4} \times \text{STM-1}$ Mbit/s. See detailed summary in table E.2.

In those annexes further subdivision in sub-annexes is made, as appropriate, according to frequency bands, capacities and/or channel separation (see table 3 of EN 302 217-1 [6]).

From the point of view of the transmission capacity, these systems are defined, in the relevant annexes, on the basis of their minimum Channel Separation (CS) on the same route, for a given spectrum efficiency class, taken into account by the system design. The possible channel arrangements may be:

- Adjacent Channel Alternate-Polarized (ACAP);
- Adjacent Channel Co-Polarized (ACCP);
- Co-Channel Dual-Polarization (CCDP).

These possible applications and their channel arrangements are shown in figure 2.

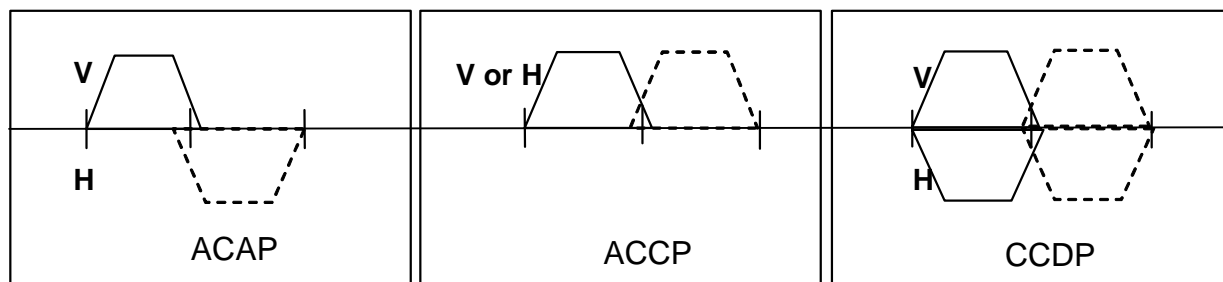


Figure 2: Examples of channel arrangements on the same route

The capacities in tables X.2 (where X = B...E represents the relevant annex) are commonly tailored on typical PDH and SDH base band interfaces, identified for simplicity with 2 Mbit/s, 2×2 Mbit/s, 8 Mbit/s, 2×8 Mbit/s, 34 Mbit/s, 2×34 Mbit/s, STM-0 (51 Mbit/s), $2 \times \text{STM-0}$ (2×51 Mbit/s), STM-1 (155 Mbit/s), $N \times \text{STM-1}$ ($N \times 155$ Mbit/s), STM-N. Systems in annex A, due to the smaller channel separation provided, are (exceptionally) labelled with typical capacity rate without specific reference to PDH/SDH rates.

Provided that they meet all requirements of the relevant annex, equivalent PDH or SDH transport rates may be used where appropriate. Such equivalence transport rates may be:

- $N \times 2$ Mbit/s or other PDH rates in place of equivalent higher PDH rates;
- 140 Mbit/s in place of STM-1 (including 4×34 Mbit/s pre-mapping into the 140 Mbit/s frame);
- any PDH mapping into STM-0 or STM-1 frames, as defined in the basic multiplexing schemes;

- $N \times 2$ Mbit/s mapped into SDH VC12 or VC2 transport bit rates (sub-STM-0 defined, as sSTM-1k or sSTM-2n capacities, by ITU-T Recommendation G.708 (see bibliography)) in place of a PDH rate (e.g. $4 \times$ VC12/sSTM14 or $1 \times$ VC2/sSTM21 in place of 8 Mbit/s) (see note);
- any other signal (e.g. IP frames or ATM cells, even possibly mixed with PDH capacities) mapping into PDH or SDH frames, according present or future basic ITU-T or ETSI multiplexing schemes;

NOTE 3: In addition to this general principle, annex D (system D.2) presents specific characteristics for sub-STM-0 systems in the 18 GHz band.

The present document is also applicable to other base band interfaces (e.g. packet data interfaces or mixed interfaces) even if multiplexed (including compression algorithms if any) into proprietary frames; for such cases annex F gives the basic rules for applying the conventional PDH/SDH set of parameters to those equipment assessment.

The requirements of the present document apply separately to each transmitter/receiver or single transmitters or receivers used for combining complex or simple (e.g. space diversity receivers or single transmitters and receivers used for unidirectional links) fixed radio systems. Systems labelled with $N \times$ STM-1 ($N = 1,2$) capacity might actually be aggregated for carrying STM-4 in more than one radio frequency channel, provided that each equipment for each channel meets the channel requirements. When frequency reuse (e.g. dual polarization reuse or other frequency reuse techniques) is applied, the requirements apply independently to each transmitter/receiver; the different interference potential of frequency reuse will be dealt with in the frequency planning associated with the licensing process.

2 References

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

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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

NOTE: With regard to ETSI ENs, the third digit of the version number is not considered essential for dated reference purposes because the ETSI Technical Working Procedures reserves this digit for editorially changed versions, thereby not affecting the technical parameters within versions with the same two initial digits. Here is reported the third digit of the latest version available at the time of the publication of the present document.

- [1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [2] CEPT/ERC/REC 74-01 (2002): "Spurious Emissions".
- [3] ETSI EN 301 126-1 (V1.1.2): "Fixed Radio Systems; Conformance testing; Part 1: Point-to-point equipment - Definitions, general requirements and test procedures".
- [4] ETSI EN 301 126-3-1 (V1.1.2): "Fixed Radio Systems; Conformance testing; Part 3-1: Point-to-Point antennas; Definitions, general requirements and test procedures".
- [5] ETSI EN 301 390 (V1.2.1): "Fixed Radio Systems; Point-to-point and Multipoint Systems; Spurious emissions and receiver immunity limits at equipment/antenna port of Digital Fixed Radio Systems".
- [6] ETSI EN 302 217-1 (V1.1.2): "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 1: Overview and system-independent common characteristics".