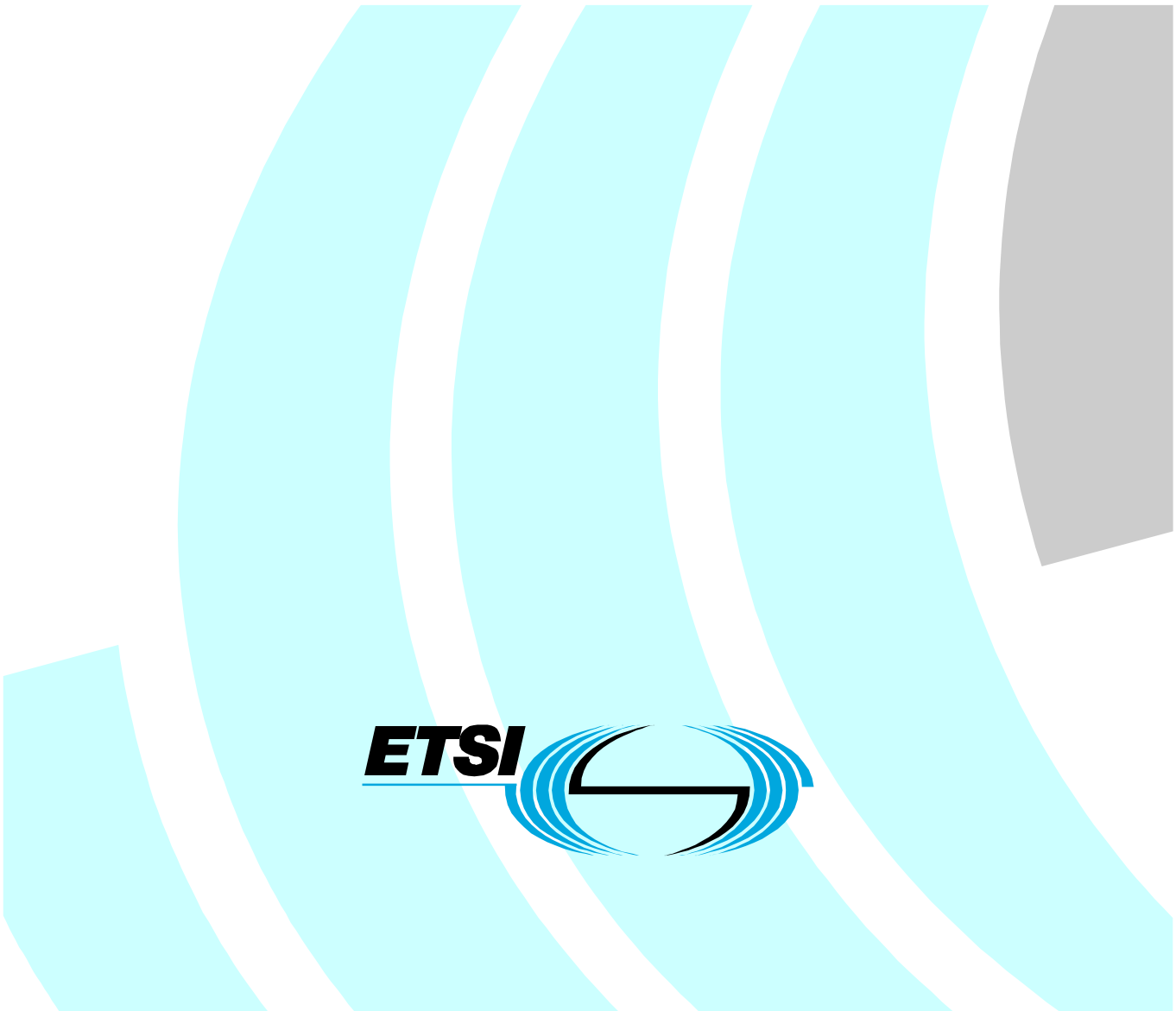
Draft ETSI EN 302 217-4-2 V1.1.1 (2003-08)

Candidate Harmonized European Standard (Telecommunications series)

Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 4-2: Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for antennas



Reference
DEN/TM-04131-4-2

Keywords
antenna, DFRS, DRRS, FWA, point-to-point,
radio, regulation, transmission

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

Contents

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://webapp.etsi.org/IPR/home.asp).

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), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

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 ("the R&TTE Directive").

The present document is part 4, sub-part 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 EN 302 217-2-2 [4] and EN 302 217-3 [5] intend to replace and supersede the harmonized EN 301 751 (see bibliography) for all P-P equipment and antennas.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	24 months after doa

Introduction

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

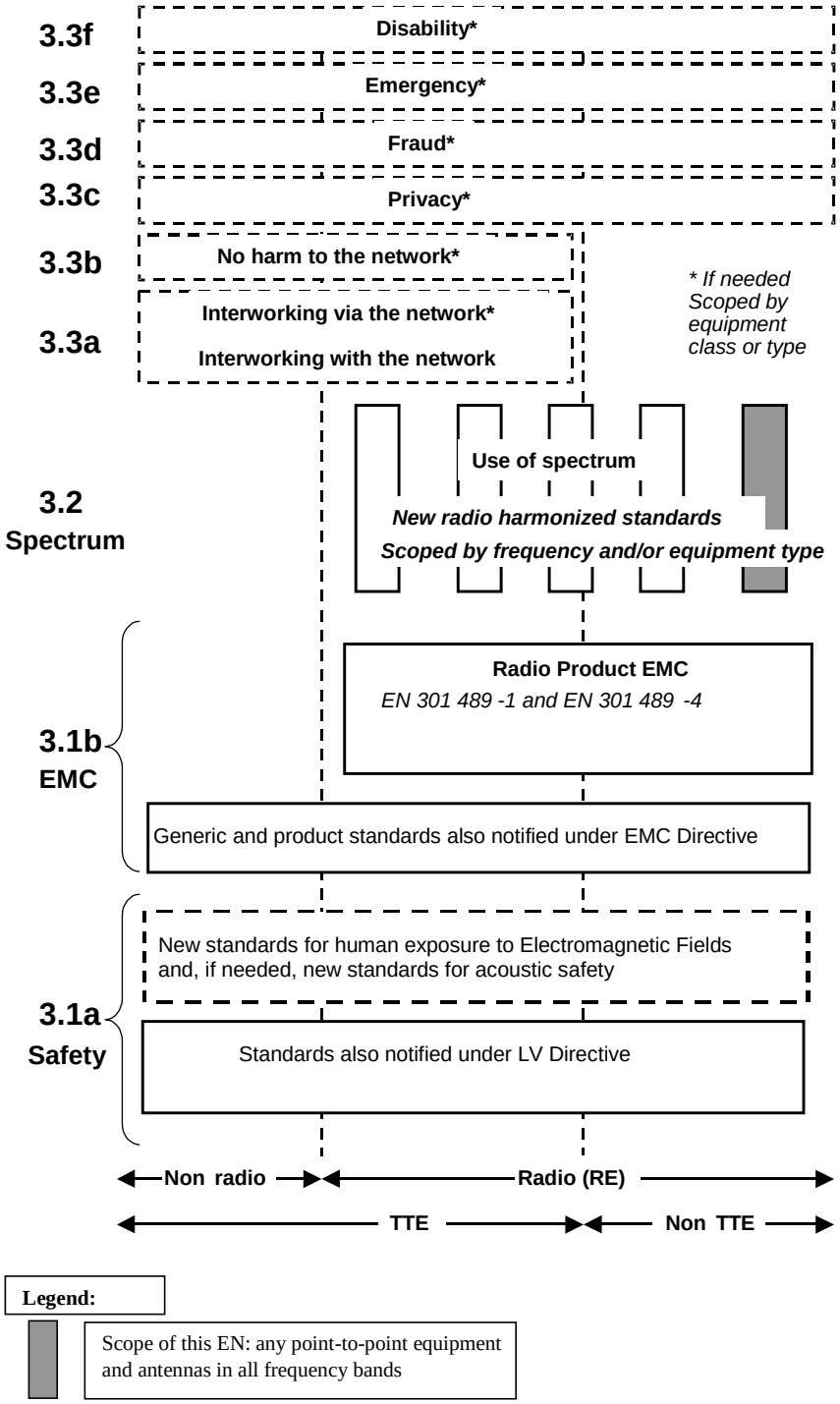


Figure 1: Modular structure for the various standards used under the R&TTE Directive [1]

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. If such essential requirements are adopted and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

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

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

NOTE: For EN 302 217 for Fixed Radio Systems, EN 301 489-1 and EN 301 489-4 (see bibliography) are relevant.

For article 3.1a, figure 1 shows the existing safety standards currently used under the LV Directive (see bibliography) and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

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

1 Scope

The present document is intended to cover the provisions of Directive 1999/5/EC [1] (R&TTE Directive) 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 EN 302 217-2-2 [4] and EN 302 217-3 [5] intend to replace and supersede, after a suitable transition period, the harmonized EN 301 751 (see bibliography) for all P-P equipment and antennas.

Those documents introduces, for systems (equipment and antennas) already covered by EN 301 751 (see bibliography), equal, technically equivalent or less stringent requirements. Therefore, from a strictly technical point of view, it is expected that antennas, covered in the present document and already conforming to the previous EN 301 751 (see bibliography), would not need a new test report for re-assessment of essential requirements according this new multipart EN (see notes); however, legal implications with respect to the declaration of conformity have not been considered, not being in the scope of the present document.

NOTE 1: Few antenna types of the lower classes, covered by EN 301 751, based on EN 300 631 and EN 300 833 (see bibliography), have not been carried over into EN 302 217 because no longer considered appropriate, from the system point of view, with the increasing demand of spectrum in ETSI Countries. Nevertheless they are still found in those ENs.

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 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 appropriate balance of cost/benefit, the present document, together with EN 302 217-2-2 [4], offers a number of system types and antennas alternatives, for different network/market requirements, including:

- channel separation alternatives (as provided by the relevant CEPT Recommendation);
- spectral efficiency class alternatives (different complexity of modulation formats provided in radio equipment standards);
- antenna directivity class alternatives (for different network density requirement).

As the Fixed Service generally operates in non harmonized bands, National Regulatory Bodies can limit the licensing only to some selected alternatives according to the provision of R&TTE Directive [1], article 7.2 that reads: "National Regulatory Bodies may restrict the putting into service of radio equipment only for reasons related to the effective and appropriate use of the radio spectrum, avoidance of harmful interference or matters relating to public health".

The permitted alternatives should be included within the "national radio interface notification" under the provisions of the R&TTE Directive [1], article 4.1 so that the covered alternatives could be mentioned in the "notification of the intention to place a DFRS on the national market" under the provision of R&TTE Directive [1], article 6.4.

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, EN 302 217-2-2 [4] and EN 302 217-3 [5] apply and to separate antenna products, to which only the relevant technical requirements apply, and which might therefore be subject to separate declarations of conformity with respect to the essential requirements of the R&TTE Directive [1].

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

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

In any case, the antenna manufacturer is expected to keep a technical construction file (according to annex II of R&TTE Directive [1]) to be supplied, on request, to the radio system vendor or to the final system integrator.

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 (see note).
- 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 reserve this digit for editorially changed versions, thereby not affecting the technical parameters within versions with the same two initials 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] 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".

[3] 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".

[4] ETSI EN 302 217-2-2 (V1.1.1): "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".

[5] ETSI EN 302 217-3 (V1.1.1): "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; 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".

[6] ETSI EN 302 217-1 (V1.1.1): "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 1: Overview and system-independent common characteristics".

[7] ETSI EN 302 217-4-1 (V1.1.1): "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 4-1: System-dependent requirements for antennas".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 302 217-1 [6] apply.

3.2 Symbols

For the purposes of the present document, the symbols defined in EN 302 217-1 [6] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations defined in EN 302 217-1 [6] apply.

4 Technical requirements specifications

In the following clauses, electrical characteristics are given as function of specific classification of the antennas according to the principles referred to in EN 302 217-4-1 [7].

The antenna manufacturer shall state, for each antenna type, the frequency band of operation and antenna gain at least at the frequency band edges and at mid-band. An antenna, which employs a radome, shall meet the requirements of the present document with the radome in place. The antenna system shall radiate a linear (single or dual) polarized wave. In bands where frequency co-ordination is applied, single polarized antennas shall meet cross-polar RPE and XPD requirements also.

NOTE: In bands where frequency co-ordination is not applied, cross-polar RPE and XPD are not considered as essential requirements for R&TTE Directive [1] conformance, even if the antenna is actually dual polarized. Values given in the present document should be considered for reference purposes only. For definition of co-ordination in frequency bands, refer to definitions in EN 302 217-1 [6].

4.1 Environmental profile

The technical requirements of the present document apply with respect to the environmental profile for operation of the antenna or the equipment-antenna assembly (in case of systems with integral antenna), which shall be declared by the supplier. The antenna shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile. For testing the compliance to technical requirements refer also to EN 301 126-3-1 [3] and clause 5.

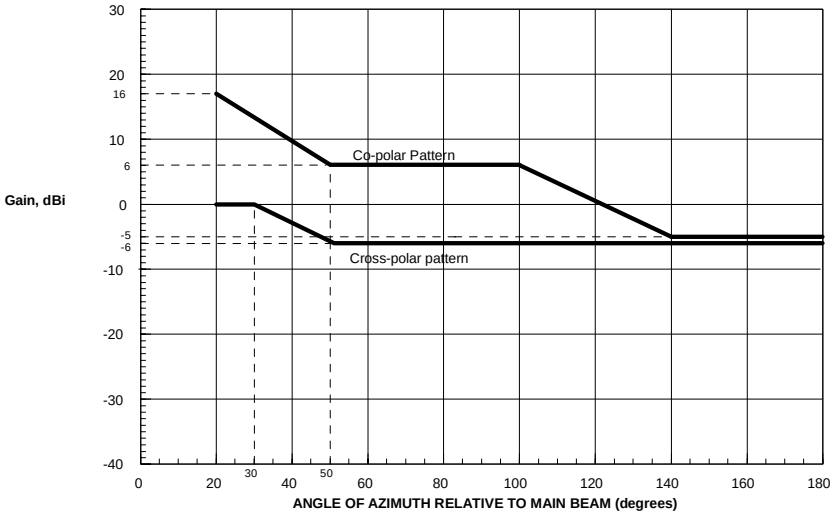
4.2 Radiation Pattern Envelope (RPE)

The present document defines only RPE which characteristics are considered suitable, within the European Community, and relevant to essential requirements under article 3.2 of the R&TTE Directive [1]; however, it is recognized that ETSI ENs have worldwide relevance and therefore, in other countries, there might be applications and low density radio networks that justify a different trade-off in terms of performance, size and cost. Therefore in EN 302 217-4-1 other Class 1 antenna RPE are standardized for such purpose.

Not all classes of antennas defined in EN 302 217-4-1 are presently represented by specific RPEs in the present document; missing RPEs are intended for future inclusion whenever the market might possibly require them.

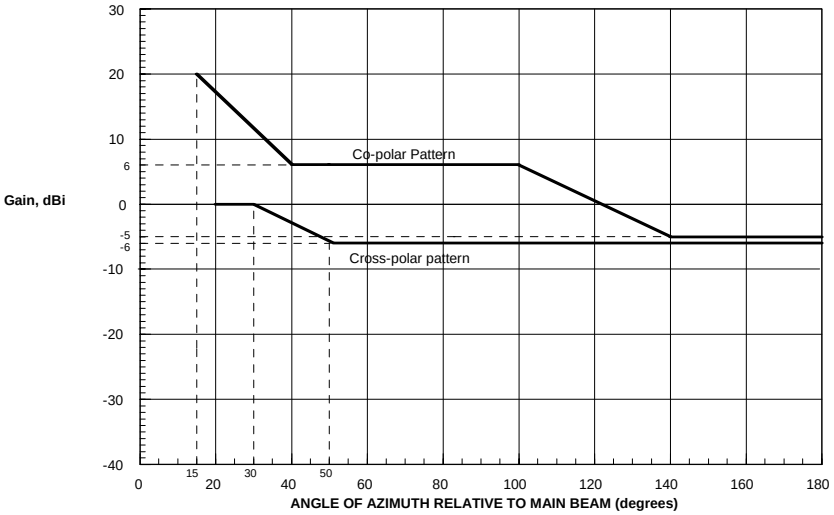
4.2.1 Frequency range 0: 1 GHz to 3 GHz

The choice of antenna depends on the application planned for this band, requirements of the operators and the responsible administration. Figures from figure 2 to figure 7 give the RPEs for antenna classes 1, 2 and 3.



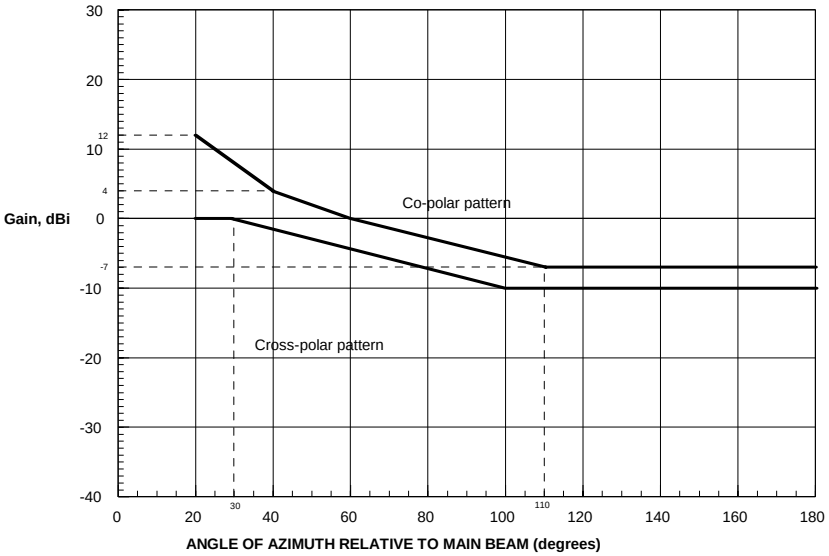
Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
20	16	20	0
50	6	30	0
100	6	50	-6
140	-5	180	-6
180	-5		

Figure 2: Class 1A antenna RPE



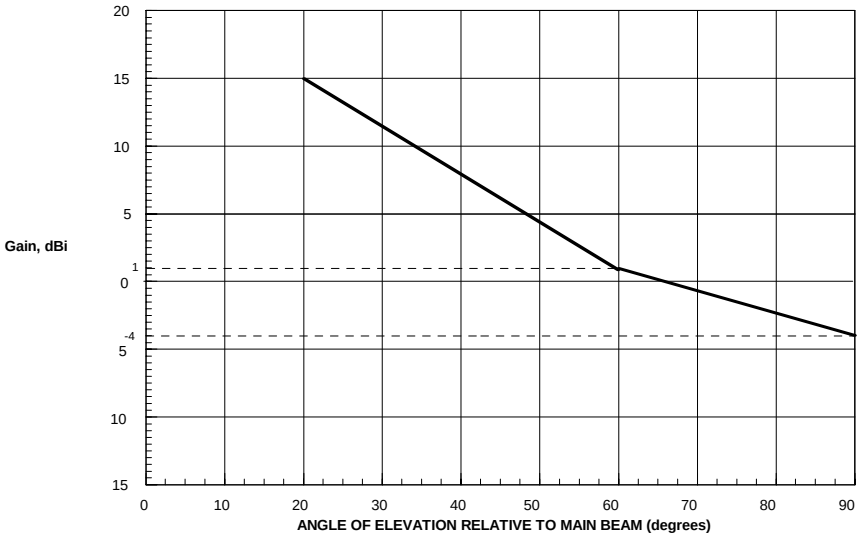
Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
15	20	20	0
40	6	30	0
100	6	50	-6
140	-5	180	-6
180	-5		

Figure 3: Class 1B antenna RPE



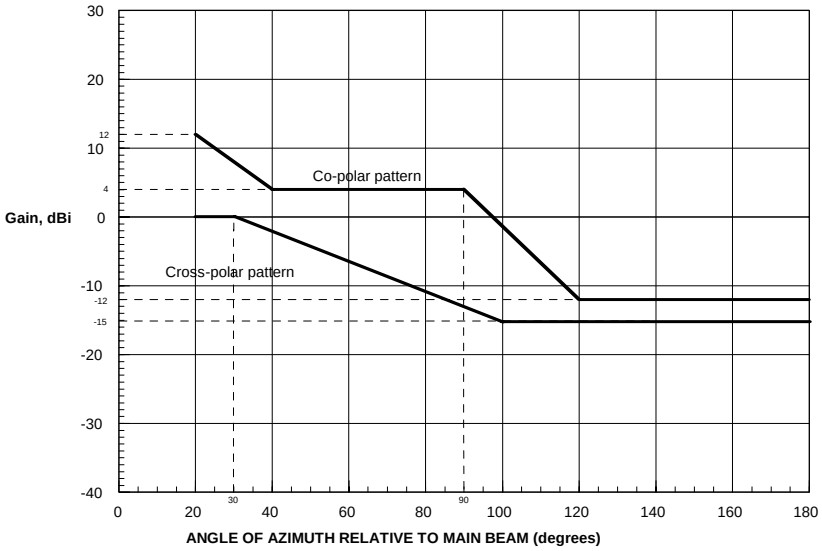
Azimuth Angle (°)	Co-polar (dBi)	Azimuth Angle (°)	Cross-polar (dBi)
20	12	20	0
40	4	30	0
110	-7	100	-10
180	-7	180	-10

Figure 4: Class 1C antenna RPE (Azimuth plane)



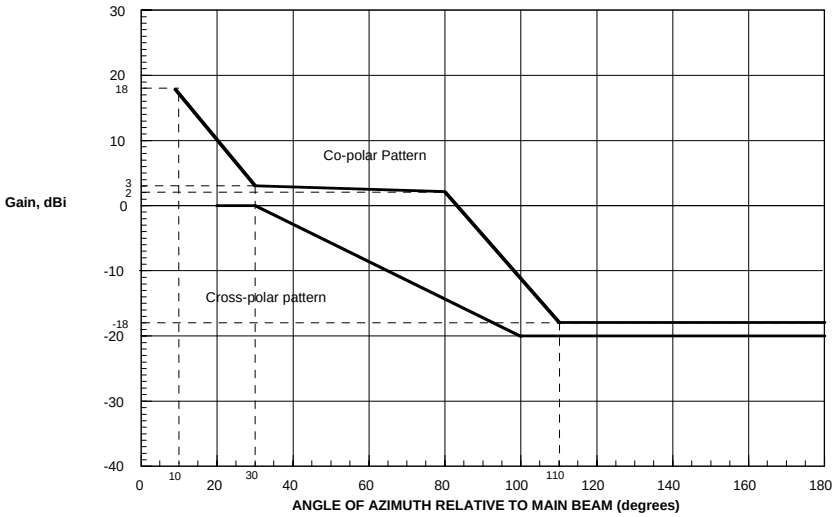
Angle (°)	dBi
20	15
60	1
90	-4

Figure 5: Class 1C antennas RPE (Elevation plane)



Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
20	12	20	0
40	4	30	0
90	4	100	-15
120	-12	180	-15
180	-12		

Figure 6: Class 2 antenna RPE

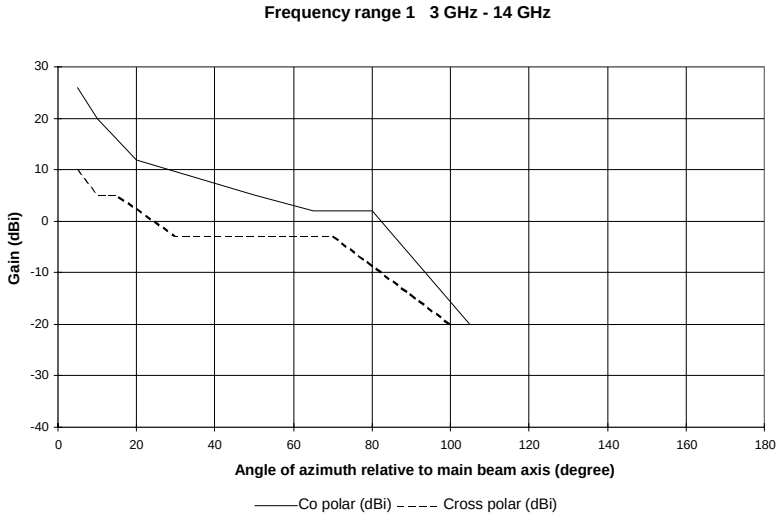


Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
10	18	20	0
30	3	30	0
80	2	100	-20
110	-18	180	-20
180	-18		

Figure 7: Class 3 antenna RPE

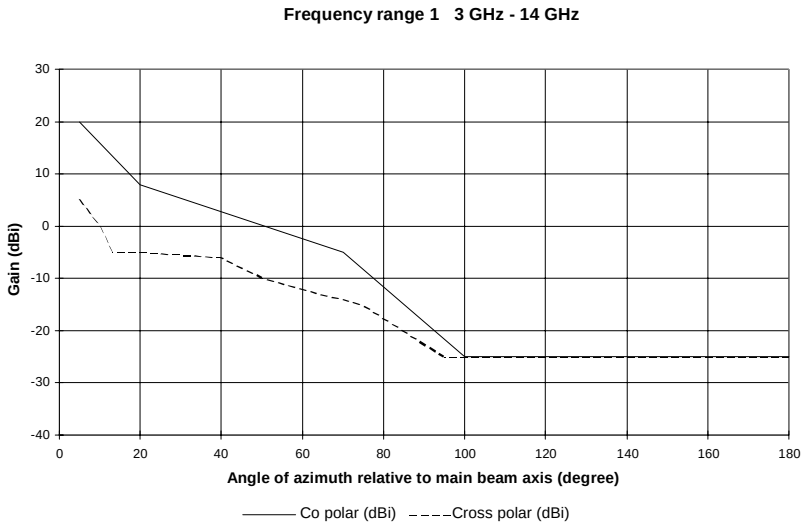
4.2.2 Frequency range 1: 3 GHz to 14 GHz

The choice of antenna depends on the application planned for this band, requirements of the operators and the responsible administration. Figures from figure 8 to figure 10 give the RPEs for antenna classes 2, 3 and 4.



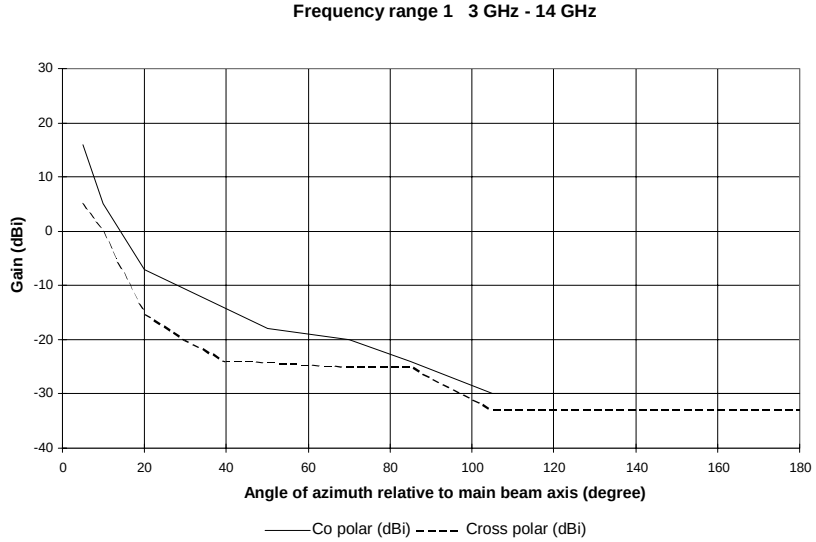
Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	26	5	10
10	20	10	5
20	12	15	5
50	5	30	-3
65	2	70	-3
80	2	100	-20
105	-20	180	-20
180	-20		

Figure 8: Class 2 antennas RPE



Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	20	5	5
20	8	10	0
70	-5	13	-5
100	-25	20	-5
180	-25	40	-6
		50	-10
		75	-15
		95	-25
		180	-25

Figure 9: Class 3 antennas RPE

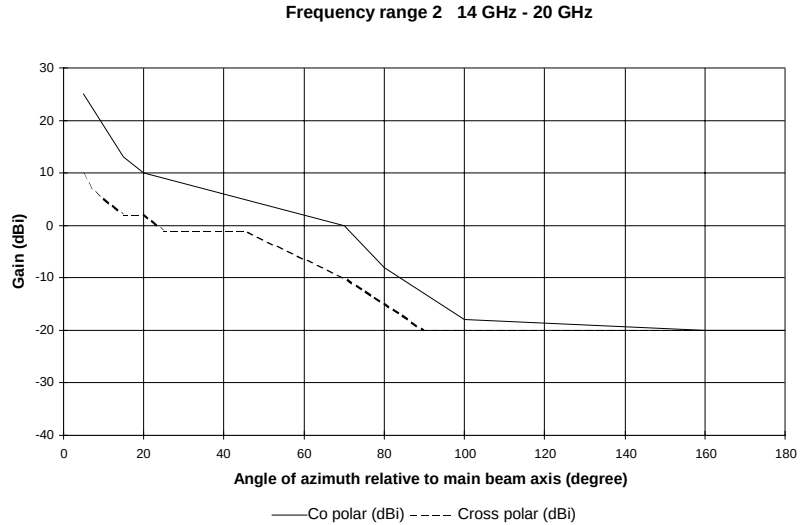


Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	16	5	5
10	5	10	0
20	-7	13	-5
50	-18	20	-15
70	-20	30	-20
85	-24	40	-24
105	-30	45	-24
180	-30	70	-25
		85	-25
		105	-33
		180	-33

Figure 10: Class 4 antennas RPEs

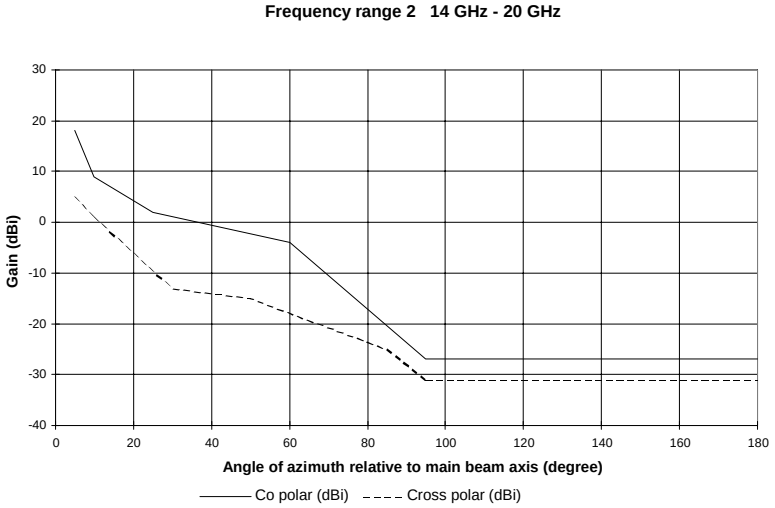
4.2.3 Frequency range 2: 14 GHz to 20 GHz

The choice of antenna depends on the application planned for this band, requirements of the operators and the responsible administration. Figure 11 and figure 12 give the RPEs for antenna classes 2 and 3.



Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	25	5	10
15	13	7	7
20	10	15	2
70	0	20	2
80	-8	25	-1
100	-18	45	-1
160	-20	70	-10
180	-20	90	-20
		180	-20

Figure 11: Class 2 antennas RPEs

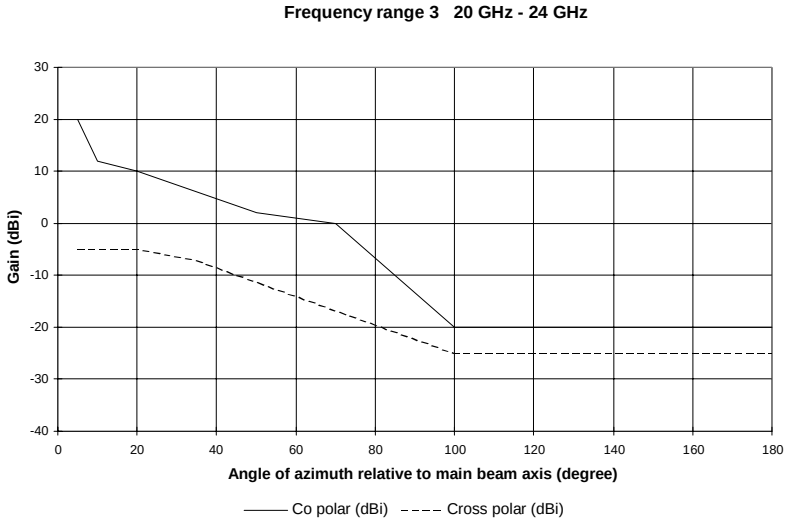


Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	18	5	5
10	9	10	1
25	2	30	-13
60	-4	50	-15
95	-27	85	-25
180	-27	95	-31
		180	-31

Figure 12: Class 3 antennas RPEs

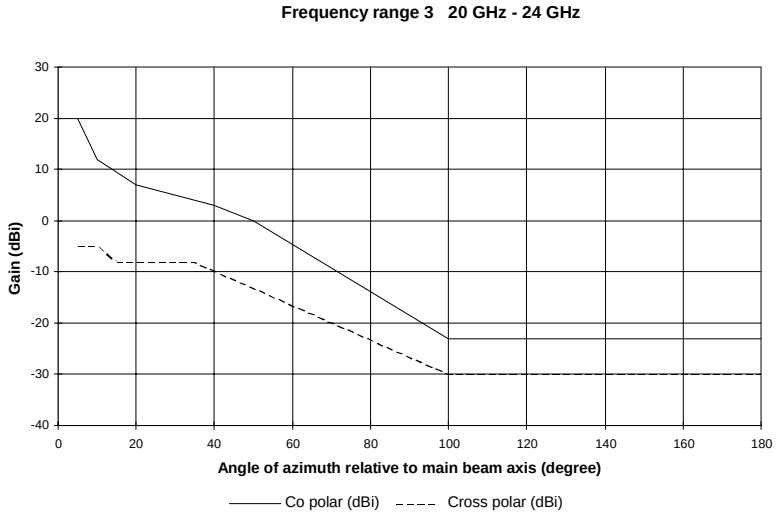
4.2.4 Frequency range 3: 20 GHz to 24 GHz

The choice of antenna depends on the application planned for this band, requirements of the operators and the responsible administration. Figure 13 and figure 14 give the RPEs for antenna classes 2 and 3.



Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	20	5	-5
10	12	20	-5
20	10	35	-7
50	2	100	-25
70	0	180	-25
100	-20		
180	-20		

Figure 13: Class 2 antennas RPEs

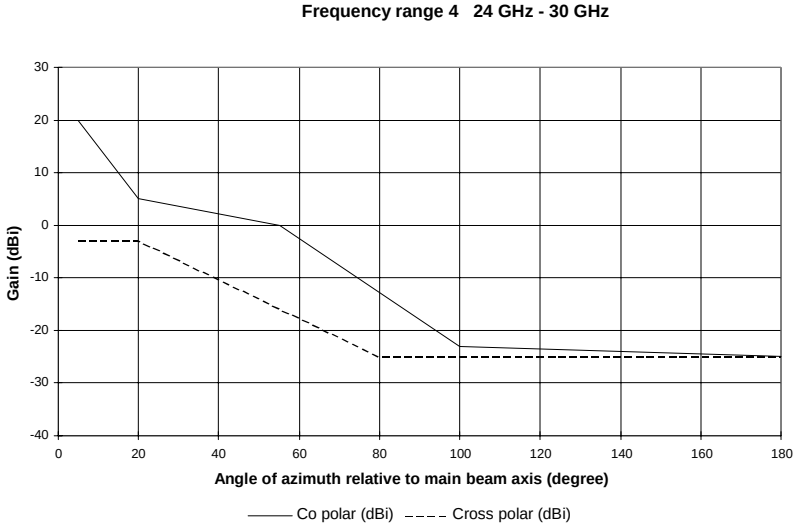


Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	20	5	-5
10	12	10	-5
20	7	15	-8
40	3	35	-8
50	0	100	-30
100	-23	180	-30
180	-23		

Figure 14: Class 3 antennas RPEs

4.2.5 Frequency range 4: 24 GHz to 30 GHz

The choice of antenna depends on the application planned for this band, requirements of the operators and the responsible administration. Figure 15 gives the RPEs for antenna class 3. Antennas of other classes are not presently considered.

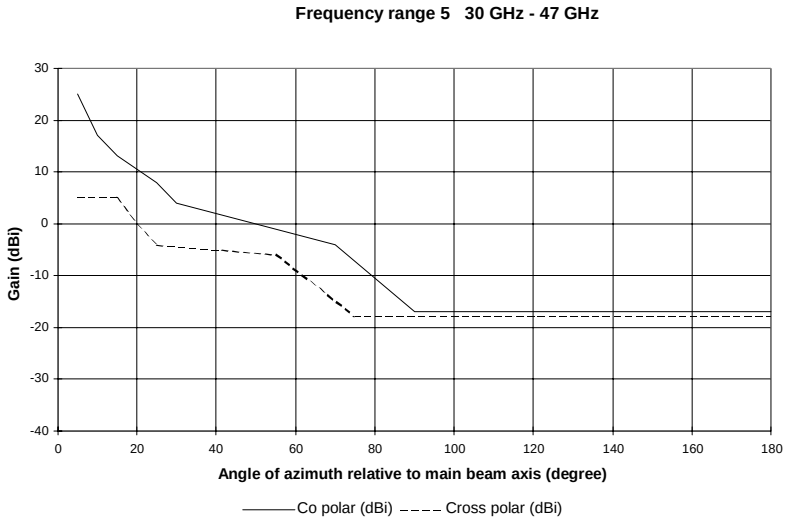


Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	20	5	-3
20	5	20	-3
55	0	80	-25
100	-23	180	-25
180	-25		

Figure 15: Class 3 antennas RPEs

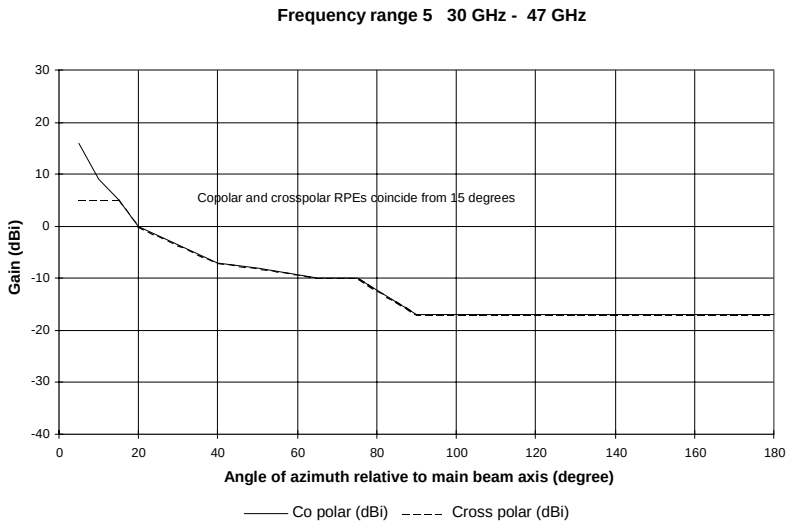
4.2.6 Frequency range 5: 30 GHz to 47 GHz

The choice of antenna depends on the application planned for this band, requirements of the operators and the responsible administration. Figures from figure 16 to figure 19 give the RPEs for antenna classes 2 and 3.



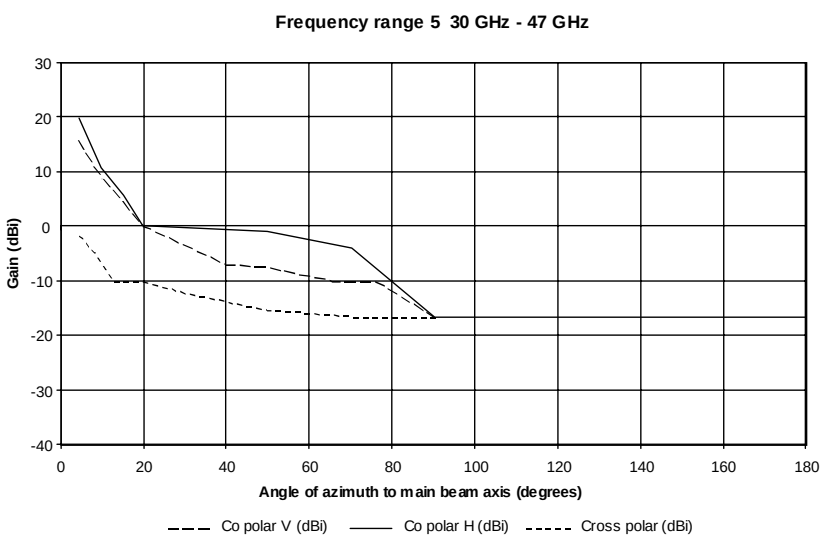
Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	25	5	5
10	17	15	5
15	13	20	0
25	8	25	-4
30	4	55	-6
70	-4	75	-18
90	-17	180	-18
180	-17		

Figure 16: Class 2 antennas RPEs



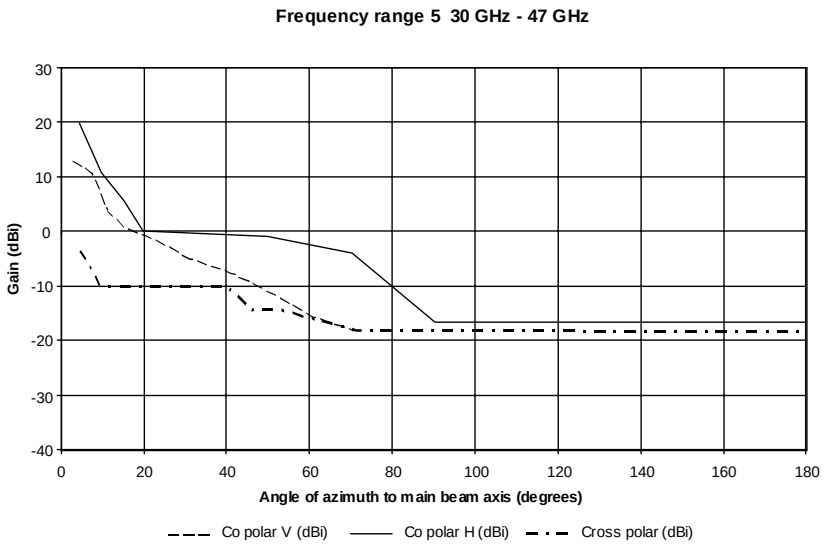
Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	16	5	5
10	9	15	5
15	5	20	0
20	0	40	-7
40	-7	50	-8
50	-8	65	-10
65	-10	75	-10
75	-10	90	-17
90	-17	180	-17
180	-17		

Figure 17: Class 3 A antennas RPEs (applicable to single vertical polarized antennas only)



Angle (°)	Co-polar H (dBi)	Angle (°)	Co-polar V (dBi)	Angle (°)	Cross-polar (dBi)
5	20	5	16	5	-2
10	11	10	9	8	-5
15	6	15	5	12	-10
20	0	20	0	20	-10
50	-1	40	-7	30	-12
70	-4	50	-8	50	-15
90	-17	65	-10	70	-17
180	-17	75	-10	180	-17
		90	-17		
		180	-17		

Figure 18: Class 3B antennas RPEs



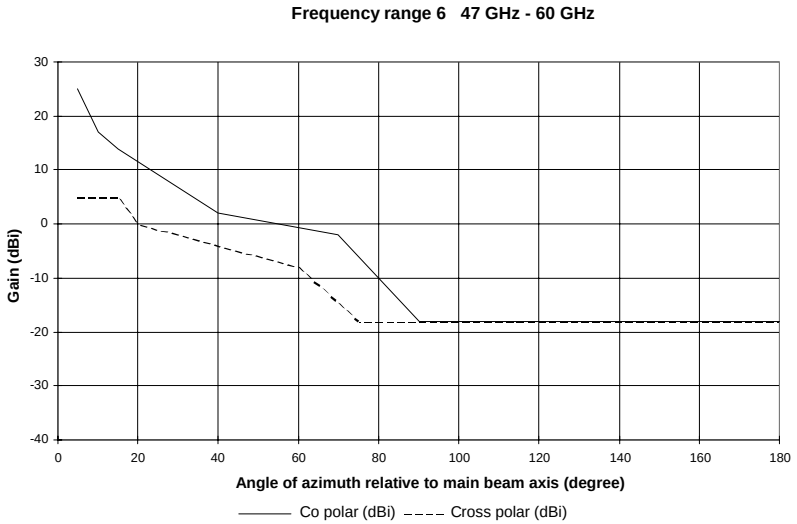
Angle (°)	Co-polar H (dBi)	Angle (°)	Co-polar V (dBi)	Angle (°)	Cross-polar (dBi)
5	20	5	12	5	-4
10	11	9	9	9	-8
15	6	10	6	10	-10
20	0	15	2	15	-10
50	-1	20	0	20	-10
70	-4	30	-4	30	-10
90	-17	40	-7	40	-10
180	-17	45	-9	45	-13
		60	-14	55	-13
		70	-18	70	-18
		180	-18	180	-18

Figure 19: Class 3C antennas RPEs

4.2.7 Frequency range 6: 47 GHz to 60 GHz

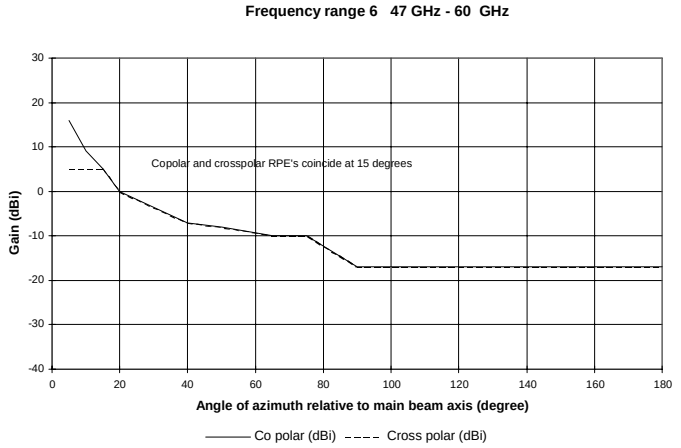
The choice of antenna depends on the application planned for this band, requirements of the operators and the responsible administration. Figures from figure 20 to figure 21 give the RPEs for antenna classes 2 and 3.

NOTE: In the 58 GHz band, where frequency co-ordination is not applied, cross-polar RPE is not considered as essential requirements for R&TTE Directive [1] conformance, even if the antenna is actually dual polarized. Values given below, for completeness, should be considered for reference purposes only.



Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	25	5	5
10	17	15	5
15	14	20	0
40	2	60	-8
70	-2	75	-18
90	-18	180	-18
180	-18		

Figure 20: Class 2 antennas RPEs



Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	16	5	5
10	9	15	5
15	5	20	0
20	0	40	-7
40	-7	50	-8
50	-8	65	-10
65	-10	75	-10
75	-10	90	-17
90	-17	180	-17
180	-17		

Figure 21: Class 3 antennas RPEs (vertically polarized only)

4.3 Cross-Polar Discrimination (XPD)

4.3.1 Frequency range 1 GHz to 3 GHz

Two XPD categories are applicable to this frequency range:

- Category 1: Standards XPD with 20 dB minimum requirement
- Category 2: High XPD with 25 dB minimum requirement

The XPDs corresponding to the RPEs classes referenced in clause 4.2 shall be equal to or higher than those values defined in table 1.

Table 1: Minimum XPD for each antenna class

Class	Minimum XPD (dB)
1C	20 (XPD Category 1)
1A and 1B	25 (XPD Category 2)
2	25 (XPD Category 2)
3	25 (XPD Category 2)
NOTE: XPD values are intended to be met with respect to the azimuth plane only and within an angle twice the half power beamwidth of the co-polarized main beam	

4.3.2 Frequency range 3 GHz to 60 GHz

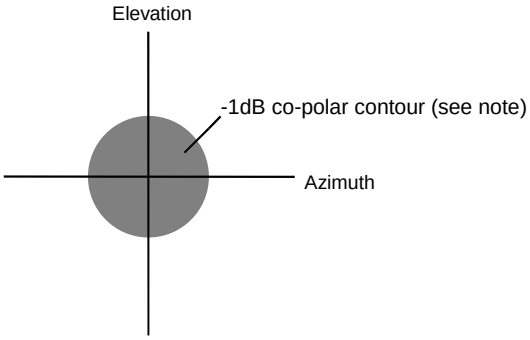
In this frequency range three categories are defined according sub-ranges of frequency and minimum requirements as defined in table 2. The supplier shall declare which XPD Category the antenna refers to.

The XPDs shall be equal to or higher than those values defined in table 2.

In figure 22 and figure 23, masks are given for XPD measurements around the main beam axis.

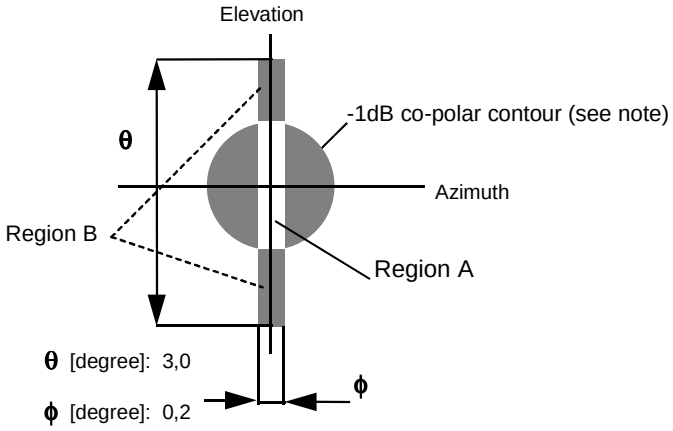
Table 2: Minimum XPD requirement per frequency range and category

	Standard XPD	High XPD	
Frequency ranges	**Category 1 (see note 1) (dB)**	**Category 2 (see note 2) (dB)**	**Category 3 (see note 3) (dB)**
Range 1 (3 to 14 GHz)	27	35	35 40 (see note 4)
Range 2 (14 to 20 GHz)	27	34	34
Range 3 (20 to 24 GHz)	27	34	34
Range 4 (24 to 30 GHz)	27	34	34
Range 5 (30 to 47 GHz)	27	30	30
Range 6 (47 to 60 GHz)	27 (see note 5)	Not applicable	Not applicable
NOTE 1: XPD values intended to be met with respect to the azimuth plane only and within the 1 dB beamwidth of the co-polarized main beam. NOTE 2: XPD values intended to be met within the 1 dB co-polar contour referred in figure 22. NOTE 3: XPD values intended to be met within the 1 dB co-polar contour and the region B referred in figure 23. NOTE 4: Additional XPD values intended to be met within region A referred in figure 23. NOTE 5: In 58 GHz band, where frequency co-ordination is not applied, XPD is not considered as essential requirements for R&TTE Directive [1] conformance, even if the antenna is actually dual polarized. Values given in the present document should be considered for reference purposes only.			



NOTE: For the dual band antennas -1 dB contour for the highest frequency band shall be used.

Figure 22: Category 2 Mask for XPD measurements around the main beam axis



NOTE: For the dual band antennas the -1 dB and other contours for the highest frequency band shall be used.

Figure 23: Category 3 Mask for XPD measurements around the main beam axis

4.4 Antenna gain

The actual antenna gain will contribute to the EIRP value, which is the basic parameter that must be taken account of in order to control interference on the network. Therefore, the antenna supplier shall declare the nominal gain and its tolerance. Those values will be used for the test report eventually required for fulfilling obligation of the R&TTE Directive [1].

NOTE: Additional information on antenna gain may be found in EN 302 217-4-1 [7].

5 Testing for compliance with technical requirements

5.1 Environmental conditions for testing

The technical requirements of the present document apply under the environmental profile for intended operation of the antenna, which shall be declared by the manufacturer.

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

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, requested to generate the test report and/or declaration of conformity in order to fulfil any Conformity assessment procedure foreseen by the R&TTE Directive [1], for integral or stand-alone DFRS antennas (technical requirements of clause 4), shall be carried-out at reference environmental conditions of the test field according to clause 4.1 of EN 301 126-3-1 [3].

The test report shall be produced according to the procedure set out by article 10 of the Directive 1999/5/EC [1].

5.2 Wide radio-frequency band covering antennas specification and tests

DFRS antennas commonly cover an operating frequency range. The antenna parameters shall comply with all the requirements of the present document at any possible operating frequency.

The tests, requested to generate the test report and/or declaration of conformity in order to fulfil any Conformity assessment procedure foreseen by the Directive 1999/5/EC [1], shall be carried-out at the highest and the lowest possible operating frequency.

5.3 Essential antenna test suites

In table 3 are stated, where applicable, the test methods for Radiation Pattern Envelope (RPE), Cross-Polar Discrimination (XPD) and Gain.

Table 3: Transmitter/receiver antenna parameters - test clauses and conditions.

Clause	Parameter	EN 301 126-3-1 [3] reference clause for the test methods	Climatic conditions		Other specific conditions
			reference	extreme	
4	**Antenna directional requirements**				
4.1	**Radiation Pattern Envelope (Off-axis EIRP density)**	6.1	X		
4.2	**Antenna Gain**	6.3	X		Test against the declared gain
4.3	**Antenna Cross-Polar Discrimination (XPD)**	6.2	X		

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

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 support 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.

Table A.1: EN Requirements Table (EN-RT)

EN Reference		EN 302 217-4-2 Requirements for point-to-point antennas		
No.	**Reference Clause**	**EN-R (see note 1)**	**Status**	**Supplier comments for declaration**
1	4.2	Radiation Pattern Envelope (RPE)	M (see note 2)	
2	4.3	Cross Polar Discrimination (XPD)	M (see note 2)	
3	4.4	Gain	M	
NOTE 1: These EN-Rs are justified under article 3.2 of the R&TTE Directive. NOTE 2: For antennas operating in frequency bands where frequency co-ordination is not applied, the cross-polar part of RPE and the XPD may be considered not essential requirements (e.g. as in 58 GHz band).				

Key to columns:

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;
- O.n this status is used for mutually exclusive or selectable options among a set. The integer "n" shall refer to a unique group of options within the EN-RT. A footnote to the EN-RT shall explicitly state what the requirement is for each numbered group. For example, "It is mandatory to support at least one of these options", or, "It is mandatory to support exactly one of these options".

Comments To be completed as required.

Annex B (informative): Bibliography

EC Standardization Mandate M.284: "Harmonized standards for the R&TTE Directive".

ETSI EN 301 489-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: General".

ETSI EN 301 489-4: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 4: Specific conditions for fixed radio links and ancillary equipment and services".

ETSI EN 301 751: "Fixed Radio Systems; Point-to-Point equipments and antennas; Generic harmonized standard for Point-to-Point digital fixed radio systems and antennas covering the essential requirements under article 3.2 of the 1999/5/EC Directive".

ETSI EN 300 631: "Fixed Radio Systems; Point-to-point Antennas; Antennas for point-to-point fixed radio systems in the 1 GHz to 3 GHz band".

ETSI EN 300 833: "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".

ETSI EN 302 217: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas".

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

Language	EN title
Danish	
Dutch	
English	Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 4-2: Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for antennas
Finnish	
French	Systèmes de Radio Fixes; caractéristiques et spécifications pour équipements et antennes; Partie 4-2: norme harmonisée, exigences essentielles sous l'article 3.2 de la Directive R&TTE pour les antennes.
German	
Greek	
Italian	Sistemi radio per il Servizio Fisso; Caratteristiche e requisiti per apparati punto-punto e relative antenne; Parte 4-2: Norma armonizzata riguardante i requisiti essenziali per l''articolo 3.2 della Direttiva R&TTE delle antenne.
Portuguese	
Spanish	
Swedish	

History

Document history			
V1.1.1	August 2003	Public Enquiry	PE 20031205: 2003-08-06 to 2003-12-05