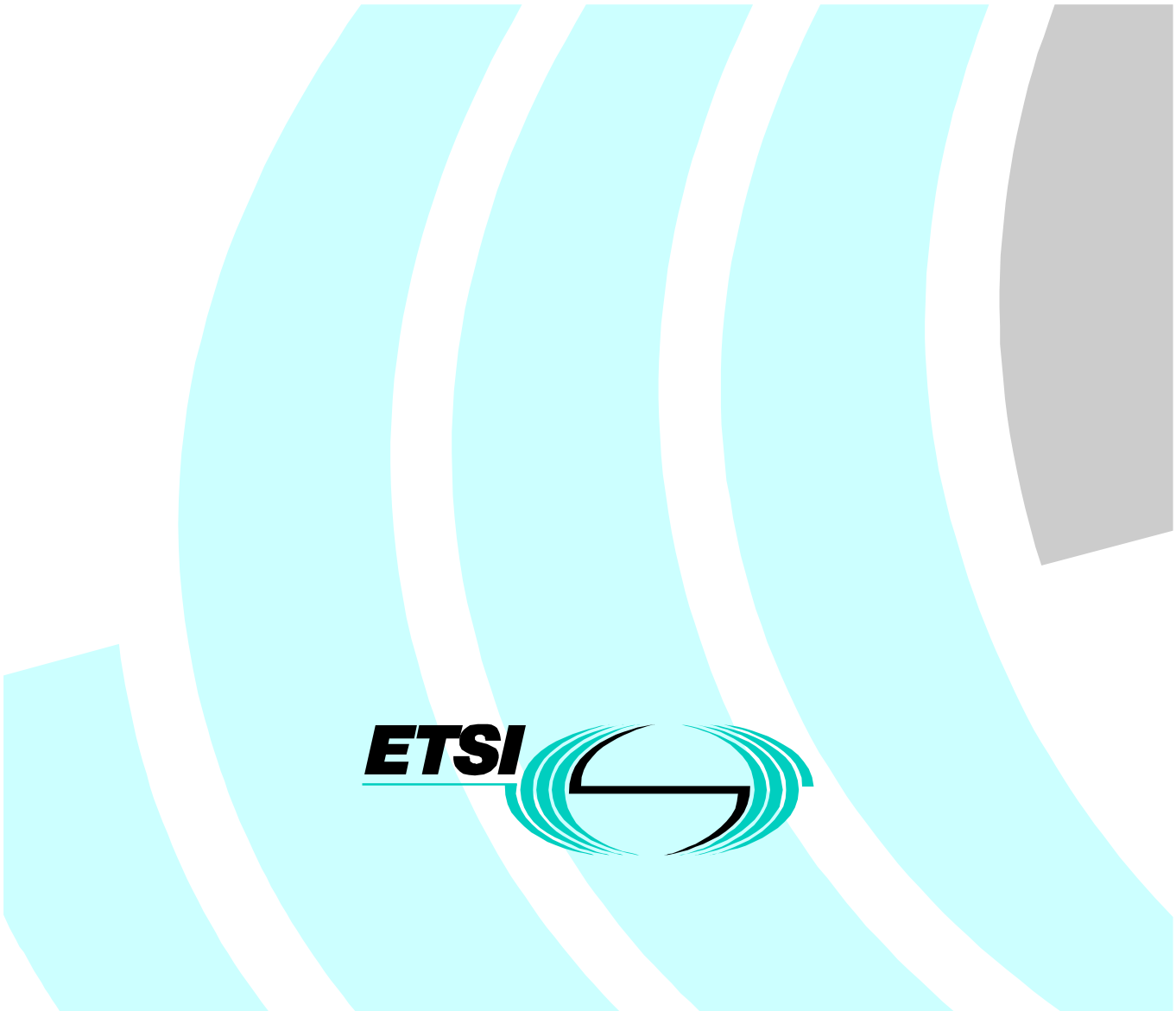
ETSI EN 301 215-2 V1.2.1 (2000-11)

European Standard (Telecommunications series)

Fixed Radio Systems;
Point to Multipoint Antennas;
Antennas for point-to-multipoint fixed radio systems
in the 11 GHz to 60 GHz band;
Part 2: 24 GHz to 30 GHz



Reference
REN/TM-04100

Keywords
Antenna, DRRS, multipoint, radio, RLL,
transmission, FWA

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://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 European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM).

The purpose of this multi-part standard is to define requirements for antennas in conjunction with point-to-multipoint (P-MP) systems necessary to facilitate frequency co-ordination between services in the frequency bands 11 GHz to 60 GHz. The various parts are as follows:

Part 1: "General aspects";

Part 2: "24 GHz to 30 GHz".

The present document is organized in the following way. Part 1 gives general information about the scope, normative references, definitions, classification, normative and informative electrical and mechanical characteristics. Part 1 is the framework for further parts, where distinct values of normative characteristics for a given frequency sub-band are defined. Consequently, Part 1 in combination with another part forms the EN for a given sub-band.

National transposition dates	
Date of adoption of this EN:	27 October 2000
Date of latest announcement of this EN (doa):	31 January 2001
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 July 2001
Date of withdrawal of any conflicting National Standard (dow):	31 July 2001

1 Scope

The present document specifies the essential electrical requirements for linear polarization, fixed beam antennas to be utilized with new Point-to-Multipoint (P-MP) systems EN 301 213-1 [1], including central station and terminal station applications, operating in frequency bands from 11 GHz to 60 GHz. These systems use various multiple access schemes. Electronically steerable antennas, and circularly polarized antennas are not considered in the present document.

The present document, taken together with EN 301 215-1 [3], specifies the requirements for systems operating in the frequency range 24 GHz to 30 GHz.

A regulatory authority may impose tighter requirements that the minimum values given in the present document, in order to maximize the use of the scarce spectrum resources.

For some high gain, point-to-multipoint requirements, antennas may be used having performance as per the appropriate point-to-point antenna standard. For these antennas, minimum requirements are given in EN 300 833 [2].

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] ETSI EN 301 213-1 (V1.1): "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 1: Basic parameters".

[2] 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".

[3] ETSI EN 301 215-1 (V1.1): "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".

3 Definitions, symbols and abbreviations

For the purposes of the present document, the definitions, symbols and abbreviations in EN 301 215-1 [3] apply.

4 Electrical characteristics

4.1 Terminal station antennas

The RPEs and gain parameters apply for both horizontal and vertical linearly polarized antennas.

4.1.1 TS radiation pattern envelope

The co-polar and cross-polar radiation patterns for both azimuth and elevation, shall not exceed the RPE(s) defined in the following list:

Class TS1: table 1a, figure 1a.

The gain values defined are all relative to maximum, actual gain at the measurement frequency.

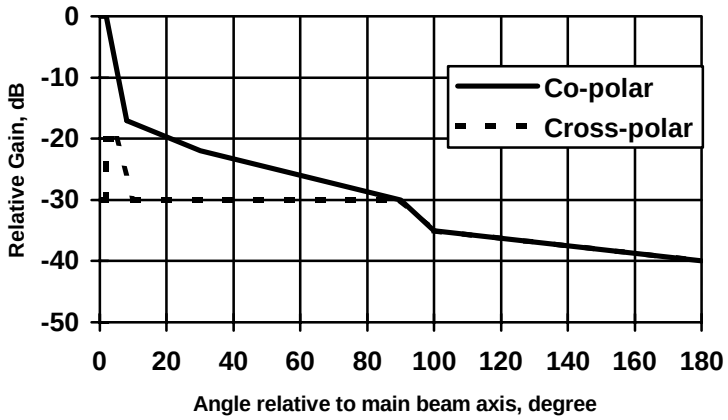


Figure 1a: Class TS1 terminal station antenna

Table 1a: Class TS1

Angle (degree)	Co-polar (dB)	Angle (degree)	Cross-polar (dB)
0	0	0	-30
2	0	2	-30
8	-17	2	-20
30	-22	5	-20
90	-30	10	-30
100	-35	90	-30
180	-40	100	-35
		180	-40

Class TS2: table 1b, figure 1b.

The gain values defined are all relative to maximum, actual gain at the measurement frequency.

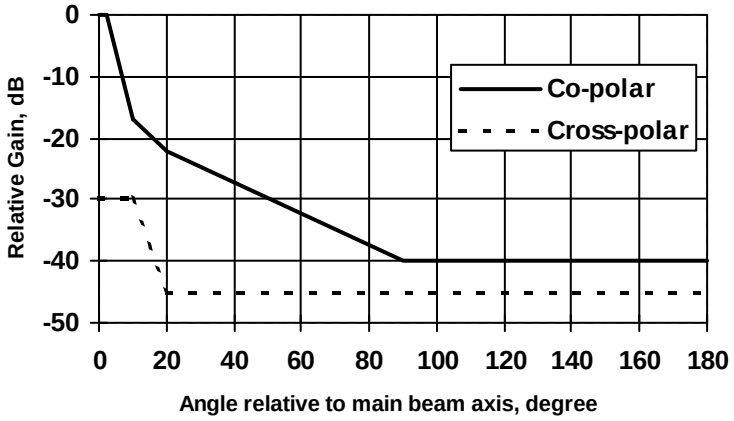


Figure 1b: Class TS2 terminal station antenna

Table 1b: Class TS2

Angle (degree)	Co-polar (dB)	Angle (degree)	Cross-polar (dB)
0	0	0	-30
2,5	0	10	-30
10	-17	20	-45
20	-22	180	-45
90	-40		
180	-40		

Class TS3: table 1c, figure 1c.

The gain values defined are all relative to maximum, actual gain at the measurement frequency.

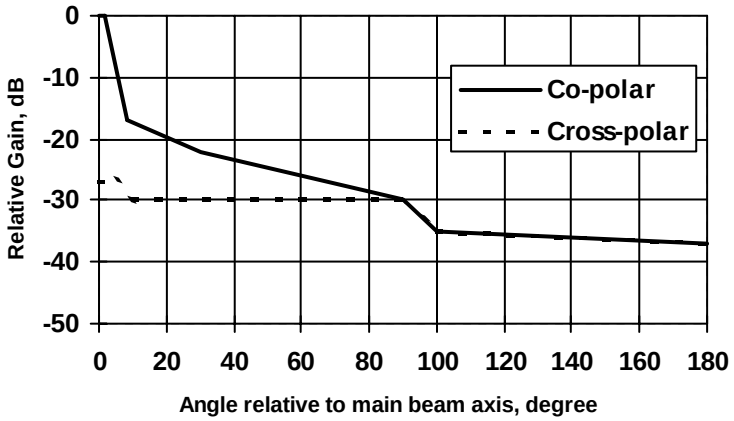


Figure 1c: Class TS3 terminal station antenna

Table 1c: Class TS3

Angle (degree)	Co-polar (dB)	Angle (degree)	Cross-polar (dB)
0	0	0	-27
2	0	5	-27
8	-17	10	-30
30	-22	90	-30
90	-30	100	-35
100	-35	180	-37
180	-37		

4.1.2 TS minimum antenna boresight gain

The minimum gain of the TS antenna, expressed relative to an isotropic radiator, shall be for:

Gain Category 1: 26 dBi.

Gain Category 2: 28 dBi.

4.2 Central station sectored antennas

4.2.1 CS azimuth radiation pattern envelopes, sectored

The Central Station azimuth templates for sectored (i.e. not omni) antennas are defined in the following list:

Class CS1 table 2, figure 2 for sector angles in the range 15° to 130°.

Class CS2 table 3, figure 3 for sector angles in the range 15° to 180°.

Class CS3 table 4, figure 4 for sector angles in the range 15° to 180°.

The templates shall apply for all frequencies in the 24 GHz to 30 GHz band. Both co-polar and cross-polar patterns are defined. The sector angle defined as 2 α (EN 301 215-1 [3]), shall be declared by the supplier. The gain values defined are all relative to the maximum gain in the declared sector angle.

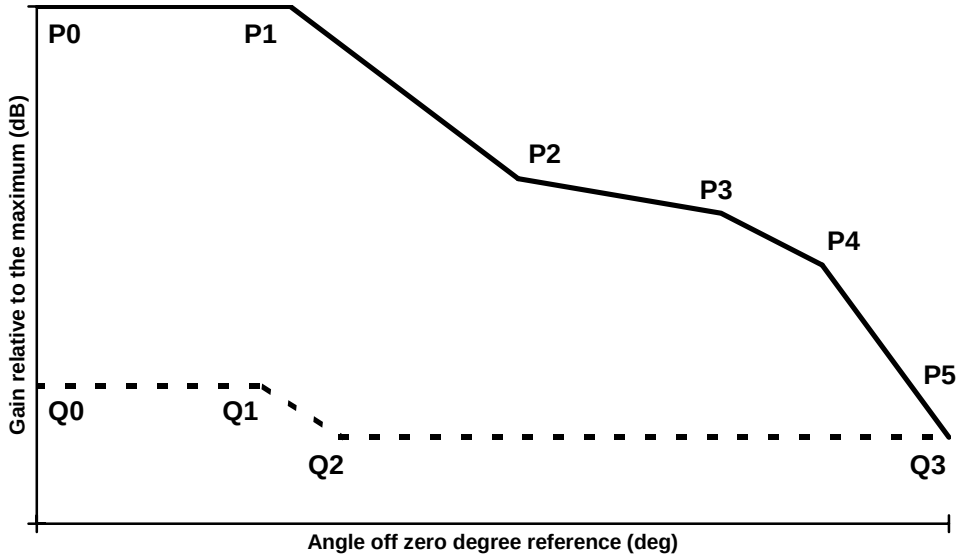


Figure 2: Normalized CS1 sector antenna template for azimuth

Table 2: Class CS 1

a)

Co-polar	Angle (degree)	Relative Gain (dB)
P0	0	0
P1	$\alpha + 5$	0
P2	$2\alpha + 5$	-10
P3	135	-12
P4	155	-15
P5	180	-25

b)

Cross-polar	Angle (degree)	Relative Gain (dB)
Q0	0	-22
Q1	α	-22
Q2	$\alpha + 15$	-25
Q3	180	-25

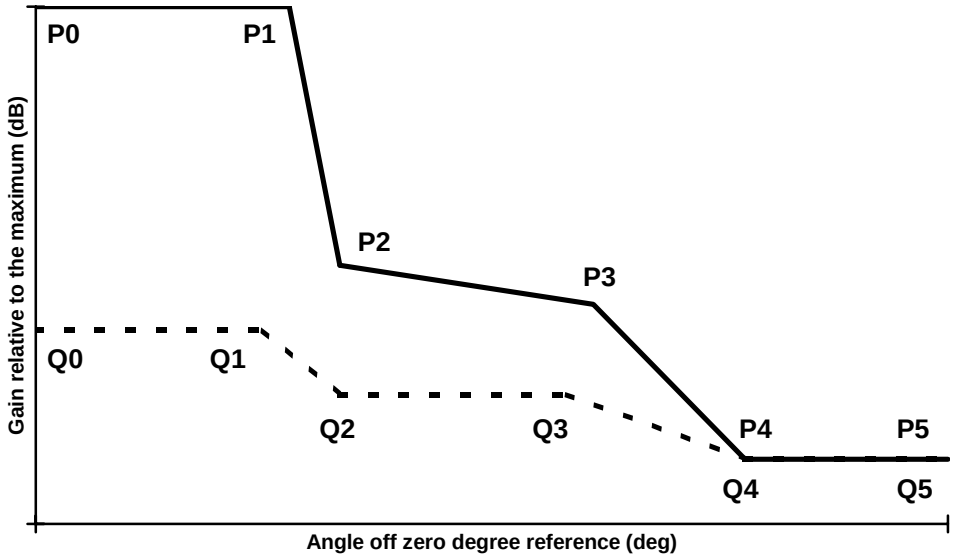


Figure 3: Normalized CS2 sector antenna template for azimuth

Table 3: Class CS 2

a)

Co-polar	Angle (degree)	Relative Gain (dB)
P0	0	0
P1	$\alpha + 5$	0
P2	$\alpha + 15$	-20
P3	110	-23
P4	140	-35
P5	180	-35

b)

Cross-polar	Angle (degree)	Relative Gain (dB)
Q0	0	-25
Q1	α	-25
Q2	$\alpha + 15$	-30
Q3	105	-30
Q4	140	-35
Q5	180	-35

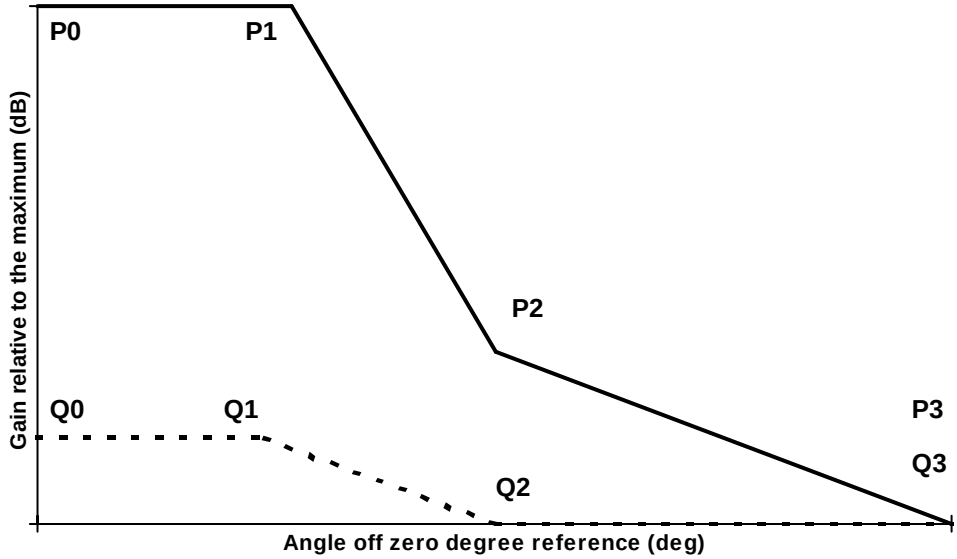


Figure 4: Normalized CS3 sector antenna template for azimuth

Table 4: Class CS 3

a)

Co-polar	Angle (degree)	Relative Gain (dB)
P0	0	0
P1	$\alpha + 5$	0
P2	$2\,\alpha$	-20
P3	180	-30

b)

Cross-polar	Angle (degree)	Relative Gain (dB)
Q0	0	-25
Q1	α	-25
Q2	$2\,\alpha$	-30
Q3	180	-30

4.2.2 Minimum boresight gain, sectored

The CS sectored antenna boresight gain shall exceed the boundaries defined in figure 5 as a function of sector angle 2 α, in the range 15° to 180° and for all frequencies in the 24 GHz to 30 GHz frequency range.

Antenna boresight gain does not necessarily correspond to the 0° – reference gain.

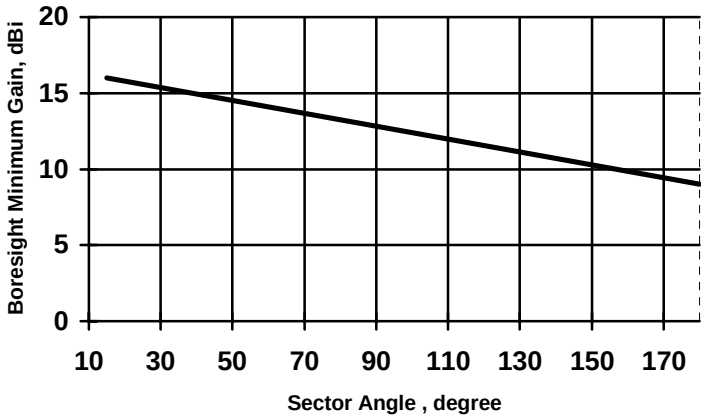


Figure 5: CS sector antenna boresight minimum gain

4.3 Central station omni-directional antennas

No omni-directional antennas have been identified.

4.4 Central station sectored elevation RPEs

Only symmetric CS antenna elevation RPE is defined in figure 6. For antennas designed without any tilt the 0° reference direction normally corresponds to the boresight direction.

It may be necessary in practical deployments to use electrical or mechanical tilt, or a combination of these two, to achieve the required cell coverage, taking into account the surrounding terrain, for example.

The elevation pattern is considered appropriate to the commonly used range of 0° to -10° for electrical downtilt. A further mechanical downtilt of up to ±10° may be suitable for some situations.

An electrical tilt is translated onto the corresponding pattern as a 0° shift along the elevation angle axis.

NOTE: Positive angles are for above boresight (up) and negative angles are for below (down).

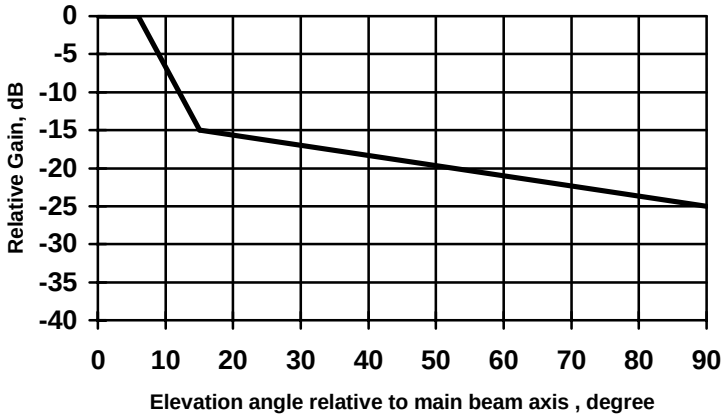


Figure 6: Symmetric CS antenna co-polar elevation RPE

The co-polar limit in figure 6 shall be linearly interpolated beyond the –25 dB, 90° point out to the point defined at 180° by the appropriate azimuth Class of antennas described in tables 2, 3 and 4.

The cross-polar limit shall be linearly interpolated between the 0° point and the 180° point from the appropriate azimuth Class of antennas described in tables 2, 3 and 4.

4.5 Polarisation, terminal station and central station antennas

The antenna shall radiate a linearly polarized wave.

4.6 Radomes

Antennas adopting radomes shall conform to the absolute gain and radiation pattern values stipulated in the clauses above, with the radome in place.

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

- CEPT Recommendation T/R 13-02: "Preferred channel arrangements for fixed services in the range 22,0 GHz - 29,5 GHz".
- ITU-Recommendation F.746-1: "Radio-Frequency channel arrangements for radio-relay systems".
- Final Acts of the World Radiocommunications Conference (WARC-95), Geneva 1995.
- ETSI ETS 301 126-3-2: "Fixed Radio Systems; Conformance testing; Part 3-2: Point-to-multipoint antenna - Deifinitions, general requirements and test procedures".

History

Document history		
V1.1.1	June 2000	Publication
V1.2.1	June 2000	One-step Approval Procedure OAP 20001027: 2000-06-28 to 2000-10-27
V1.2.1	November 2000	Publication