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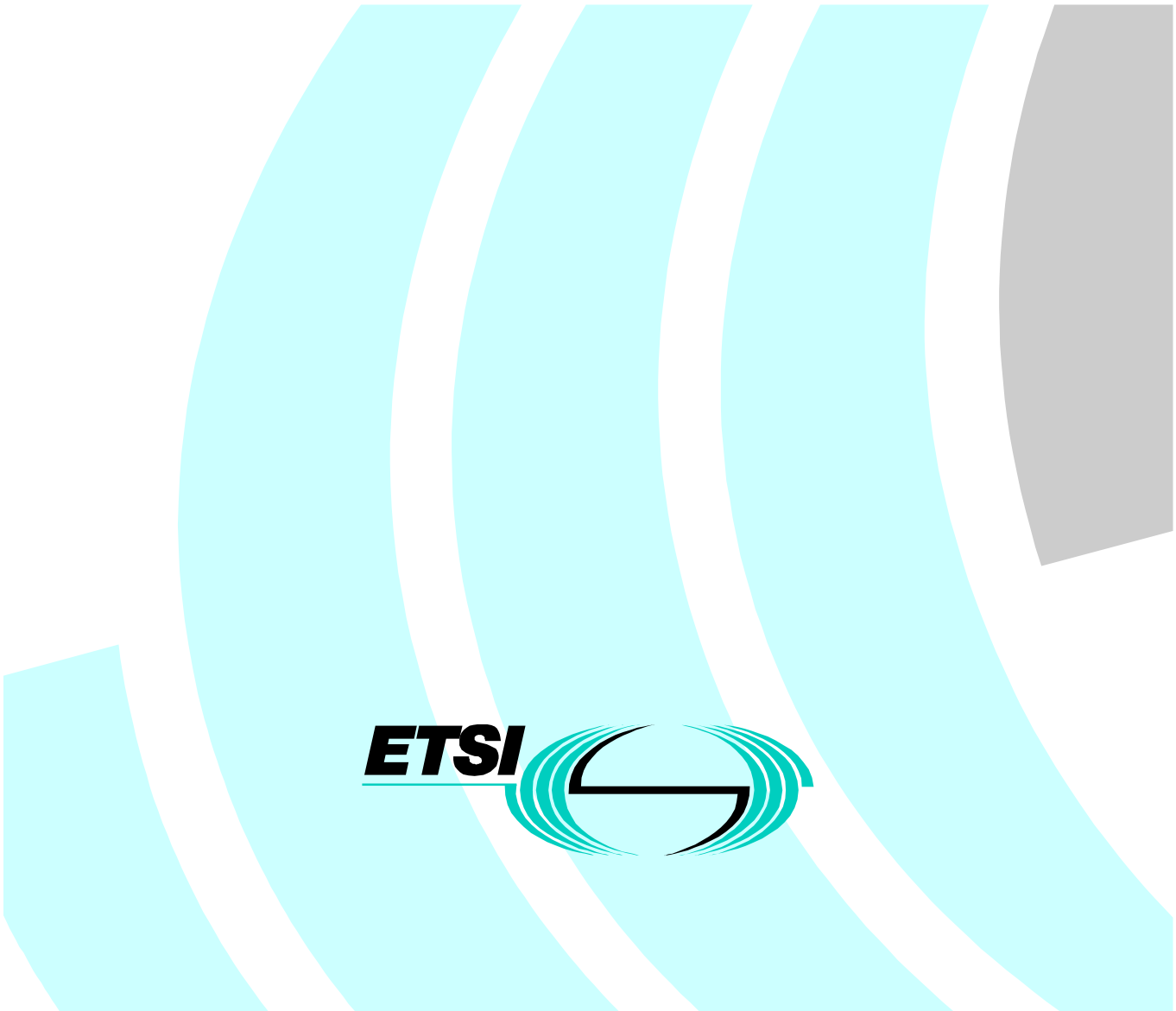
European Standard (Telecommunications series)

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



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Contents

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM), and is now submitted for the Voting phase of the ETSI standards Two-step Approval Procedure.

The present document is part 2 of a multi-part EN covering the Fixed Radio Systems; Point to Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 11 GHz to 60 GHz band, as identified below:

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.

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):	6 months after doa

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 [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 than 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 [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, subsequent revisions do apply.
- 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] EN 301 213-1: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Point-to-multipoint DRRS in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 1: Basic parameters".

[2] ETS 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] EN 301 215-1: "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 part 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 copolar and crosspolar radiation patterns for both azimuth and elevation, shall not exceed the RPE(s) defined in the following list:

- class TS1: table 1, figure 1.

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

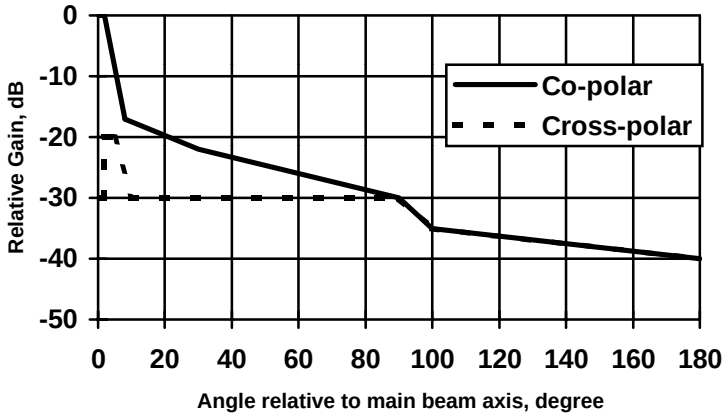

Figure 1: Class TS1 terminal station antenna

Table 1: Class TS1

Angle (degree)	Copolar (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

4.1.2 TS minimum antenna boresight gain

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

- class TS1 26 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°.

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

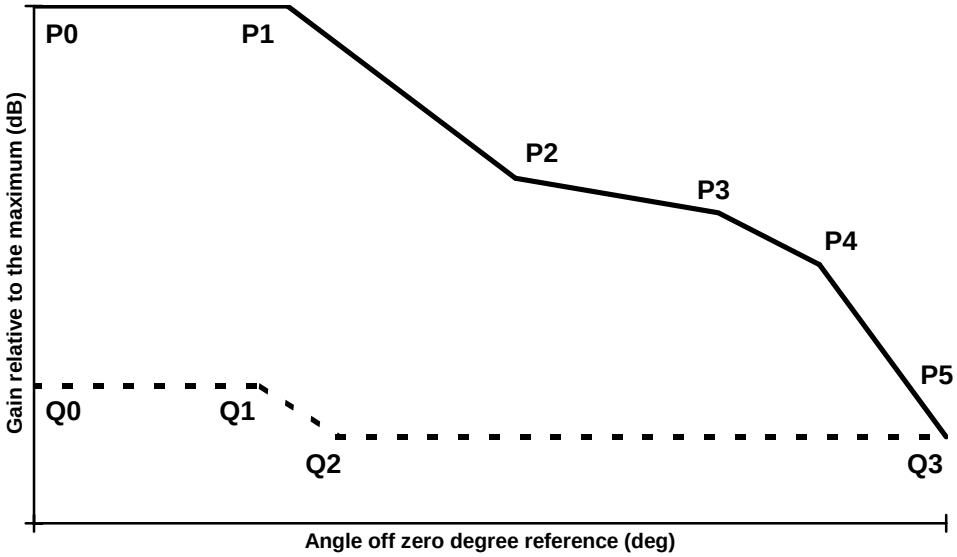

Figure 2: Normalized CS1 sector antenna template for azimuth

Table 2: Class CS 1

a)

Copolar	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

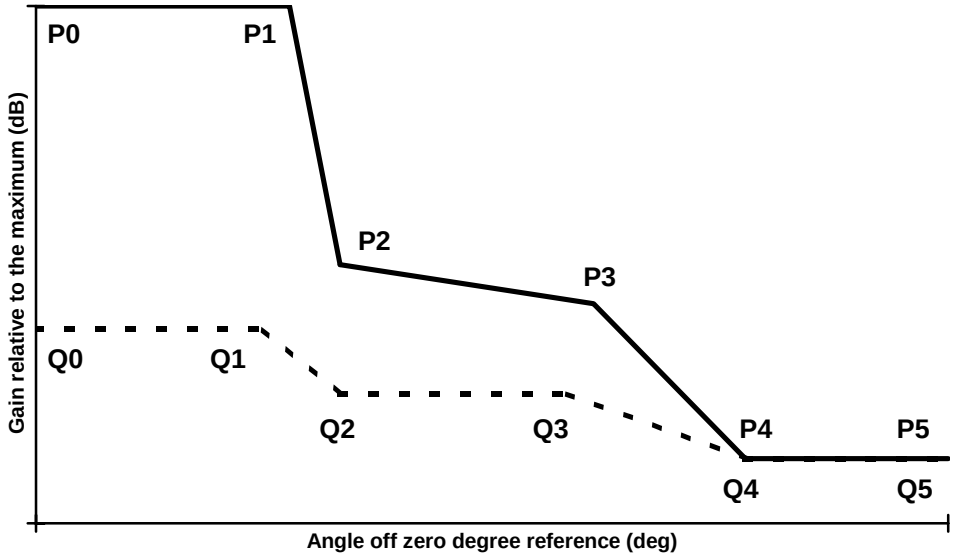

Figure 3: Normalized CS2 sector antenna template for azimuth

Table 3: Class CS 2

a)

Copolar	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

4.2.2 Minimum boresight gain, sectored

The CS sectored antenna boresight gain shall exceed the boundaries defined in figure 4 as a function of sector angle 2α, 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.

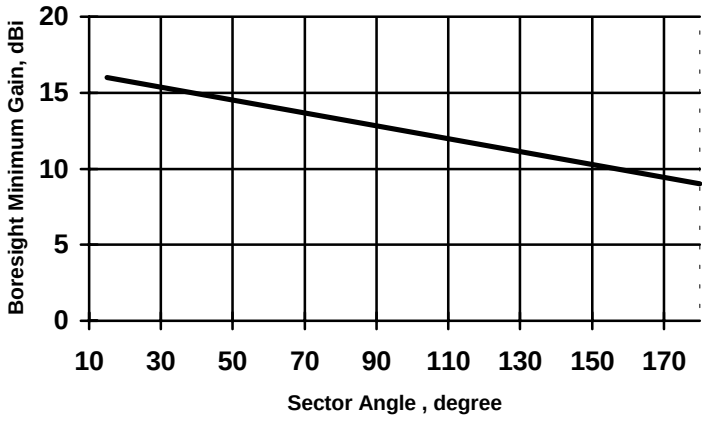

Figure 4: CS sector antenna boresight minimum gain

4.3 Central station omni-directional antennas

No omni-directional antennas have been identified.

4.4 Central station sectored elevation RPEs

One symmetric CS antenna elevation RPE is defined in figure 5. 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 θ° shift along the elevation angle axis.

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

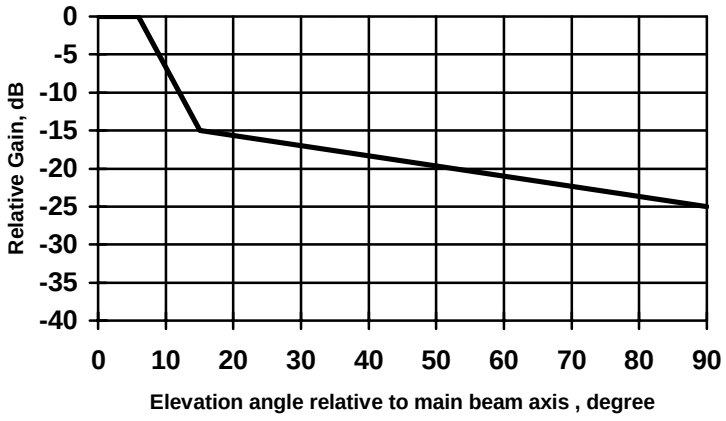

Figure 5: Symmetric CS antenna copolar elevation RPE

The copolar limit in figure 5 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 and 3.

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

4.5 Polarization, 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 sections 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.
- ETS 301 126-3.2: "Fixed Radio Systems; Conformance testing; Part 3-2: Point-to-Multipoint antennas - Defintions, general requirements and test procedures".

History

Document history				
V1.1.1	July 1998	Public Enquiry	PE 9846:	1998-07-17 to 1998-11-13
V1.1.1	November 1999	Vote	V 200002:	1999-11-15 to 2000-01-14