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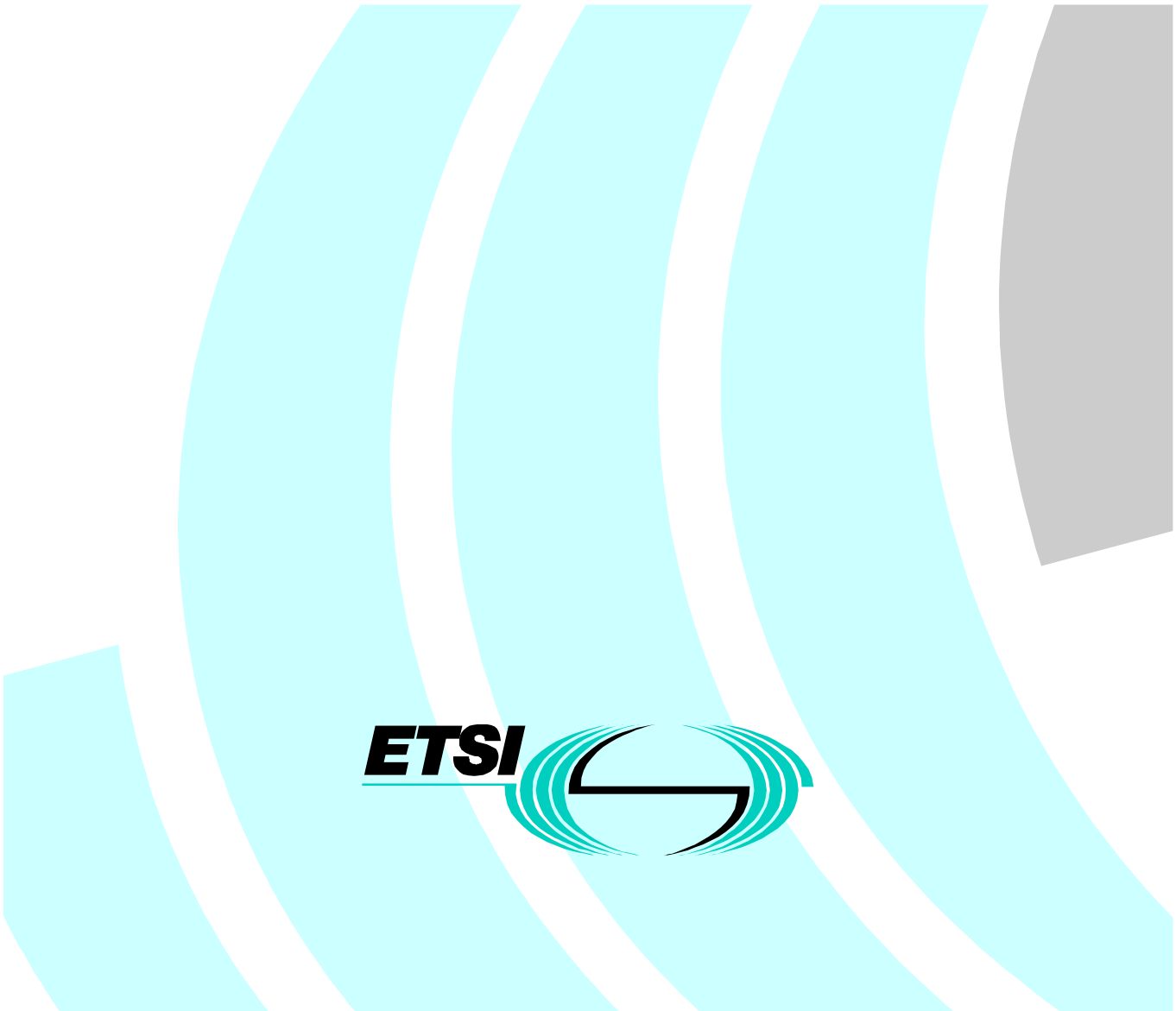
European Standard (Telecommunications series)

Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Antennas for use in point-to-multipoint DRRS 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 Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

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.

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, specifies the requirements for systems operating in the frequency range 24 GHz to 30 GHz.

Only in exceptional circumstances, and after a consultation period with operators and manufacturers, the Regulatory Authority may impose the use of tighter requirements than the minimum values given in the present document, in order to maximize the use of 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: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Antennas used in point-to-point DRRS operating in the frequency band 3 GHz to 60 GHz".

[3] CEPT Recommendation T/R 13-02: "Preferred channel arrangements for fixed services in the range 22,0 GHz - 29,5 GHz".

[4] ITU-Recommendation F.746-1: "Radio-Frequency channel arrangements for radio-relay systems".

[5] Final Acts of the World Radiocommunications Conference (WARC-95), Geneva 1995.

[6] ETS 301 126-4: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Conformance testing for DRRS; Part 4: Point-to-multipoint antenna specific parameters".

[7] EN 301 215-1: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Antennas for use in point-to-multipoint DRRS 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 [7] 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.

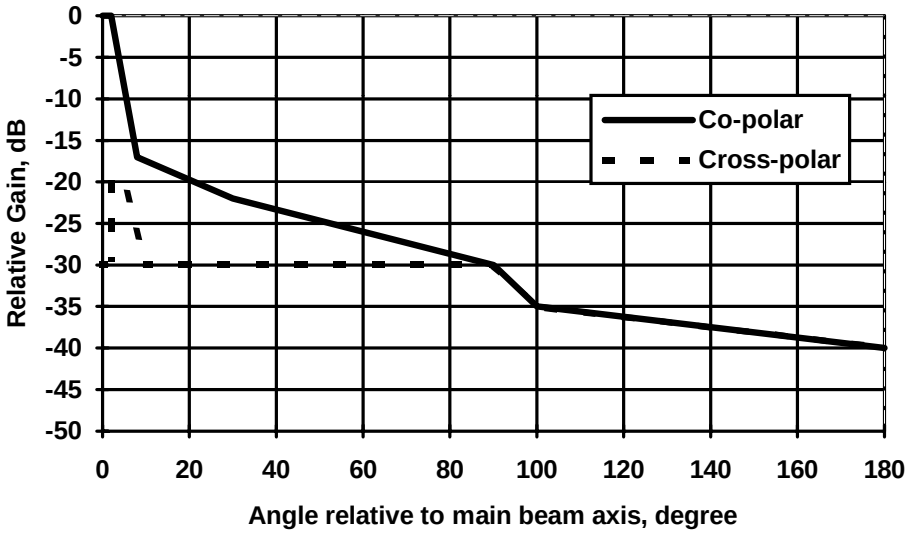

Figure 1: Class TS1 terminal station antenna

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 for sector beamwidths in the range 15° to 180°:

Class CS1 table 2, figure 2
Class CS2 table 3, figure 2

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 beamwidth is the nominal -3 dB beamwidth in degrees defined here as 2α and otherwise referred to as sector angle, and is shown in figure 1 of [7]. The gain values defined are all relative to beoresight actual gain.

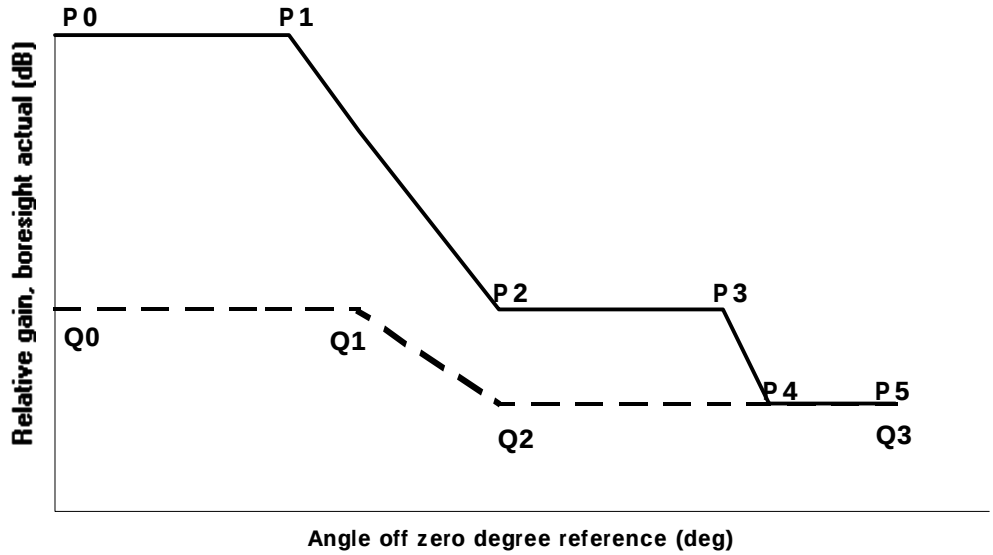

Figure 2: Normalized CS sector antenna template for azimuth

Table 2: Class CS 1

a)

Copolar	Angle (degree)	Relative Gain (dB)
P0	0	0
P1	α + 5	0
P2	2α + 5	-10
P3	135	-12
P4	155	-15
P5	180	-25

b)

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

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)

Copolar	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 3 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.

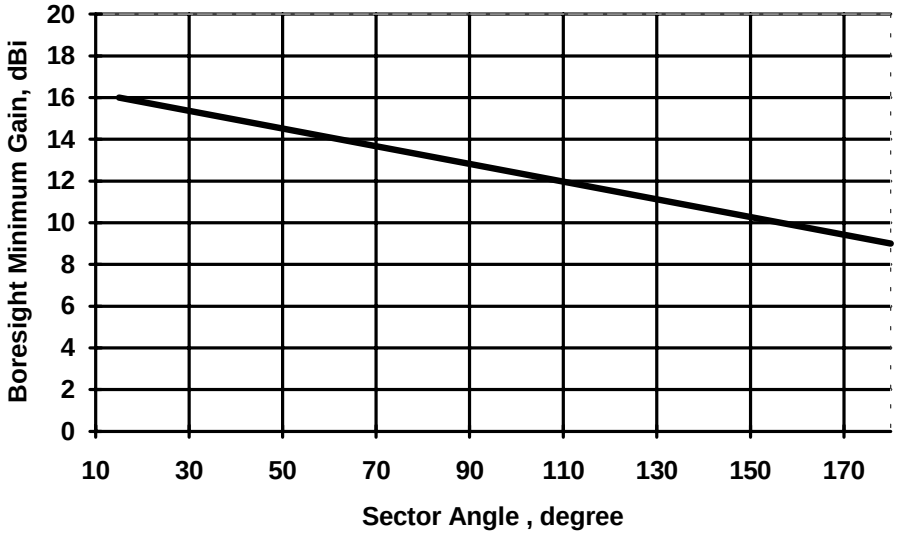

Figure 3: CS sector antenna boresight minimum gain

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 4. 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).

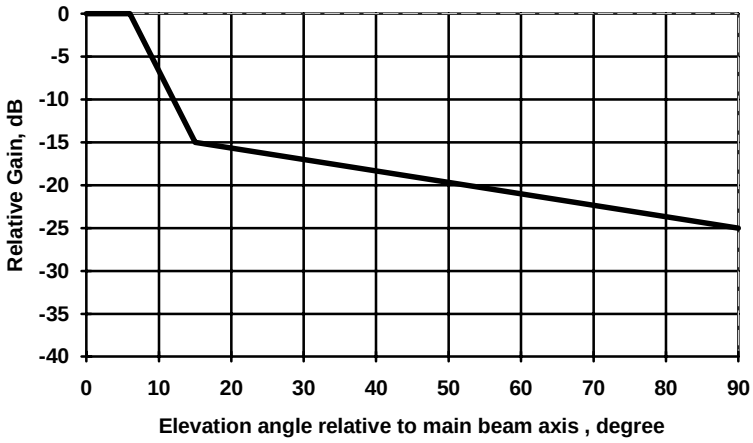

Figure 4: Symmetric CS antenna copolar elevation RPE

The copolar limit in figure 4 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.

History

Document history			
V1.1.1	July 1998	Public Enquiry	PE 9846: 1998-07-17 to 1998-11-13