Business Radio Antenna Codes Information Sheet

Business Radio

Information

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Contents

Section 1

Business Radio Antenna Codes

Purpose of this document

1.1 This document provides background on how we have simplified the antenna coverage pattern licensing for Business Radio / Private Mobile Radio (BR / PMR) systems.

1.2 Annex 1 shows an example of the antennas that are selectable within our spectrum management and licensing system (SMS).

Background

1.3 Our previous Business Radio licensing system, RULES, allowed over 100 antenna types. The number of selectable antennas in our SMS is limited to seven generic types; with most generic types having a limited number of sub-types with selectable antenna gains. See Annex 1.

1.4 The coverage pattern descriptions of the 100+ RULES antenna types have typically been converted internally within SMS to the coverage patterns that are represented by the generic types listed below.

1.5 These conversions are not expected to have a significant impact on the existing predicted radio coverage patterns and resulting international co-ordination arrangements.

Generic antenna types

1.6 The seven new basic Business Radio SMS antenna codes are:

- Omni-directional (OM);
- Down-fire (DF);
- Radiating Cable / Leaky Feeder (RC);
- Directional (D?): where '?' = E Elliptical (DE);
  C Cardioid (DC);
  8 Figure-of-eight (D8); and
  O Off-set Omni (DO).

1.7 For each antenna, the following additional information is required:

- Gain (dBd, gain with reference to a half-wave dipole); and
- Tilt (electrical and / or mechanical. Degrees: – down, + up):
  - NB: Down-fire antennas have a fixed tilt of -90 degrees.

1.8 For directional antennas, the following additional information may also be required:

- Azimuth (degrees clock-wise from True North);
- Beam width (degrees); and
- Front-to-back ratio.

1.9 See Section 2 for example diagrams of the SMS generic antenna coverage patterns.

1.10 See Section 3 for the list of generic SMS antenna codes and gains.

1.11 See the following link for more information on the equivalent HCM Antenna Codes (click 'Agreement 2008', Save the file, then view Annex 6 and the Appendix documents):
http://hcm.bundesnetzagentur.de/http/englisch/verwaltung/index_berliner_vereinbarung.htm

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Section 2

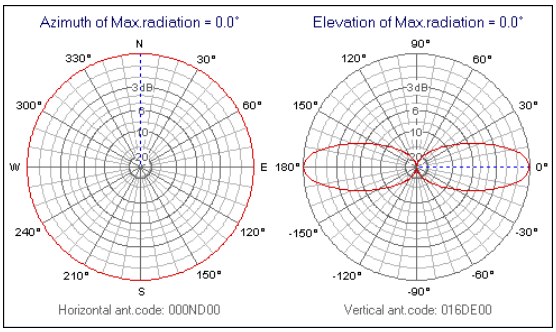
Generic SMS antenna coverage patterns

2.1 The following diagrams show examples of the generic SMS antenna coverage patterns.

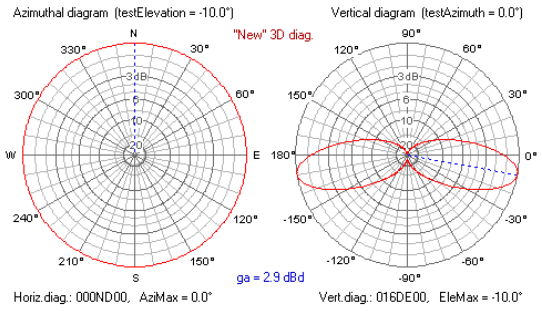
2.2 It is assumed that:

- Omni-directional antennas may have electrical tilt;
- Directional antennas may have mechanical tilt; and
- Down-fire antennas will point directly down to the ground, unless a low mounting height would require them to point directly upwards.

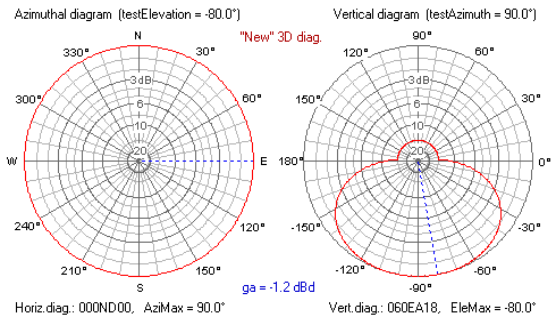
2.3 Note: for Directional antennas, the vertical coverage pattern will change in proportion to a change in an antenna's gain.



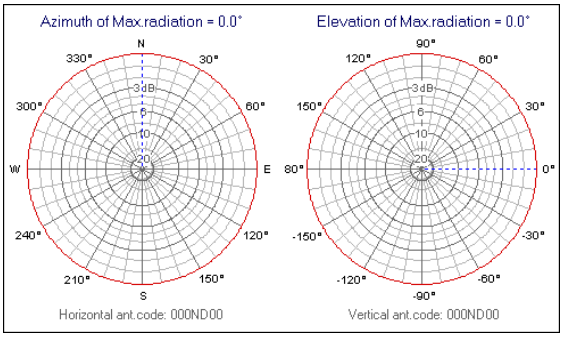
OM with 3dBd Gain (with no electrical tilt)



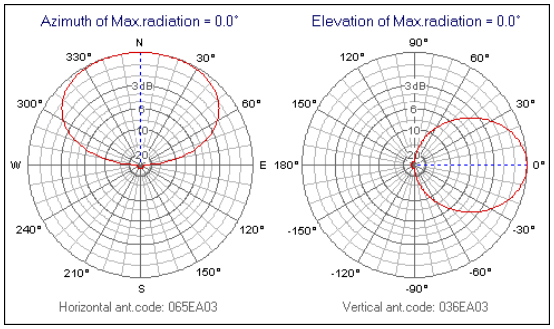
OM with 3dBd Gain (with -10 degrees of tilt)



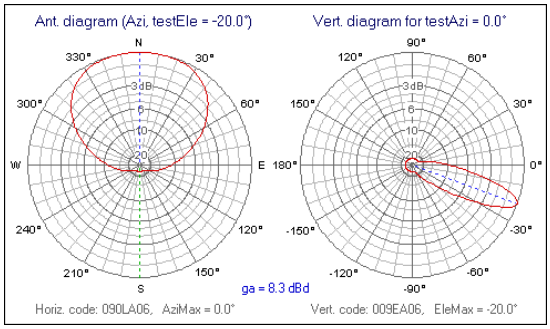
DF with 6dBd Gain [simulated pattern]



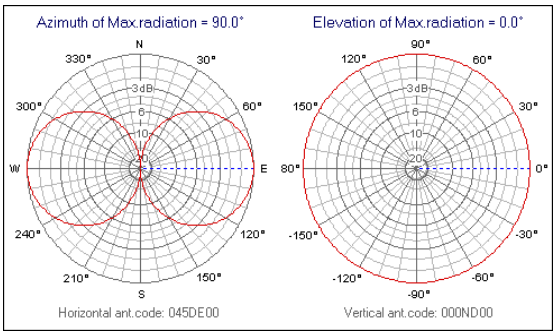
RC (0dBd gain is assumed)



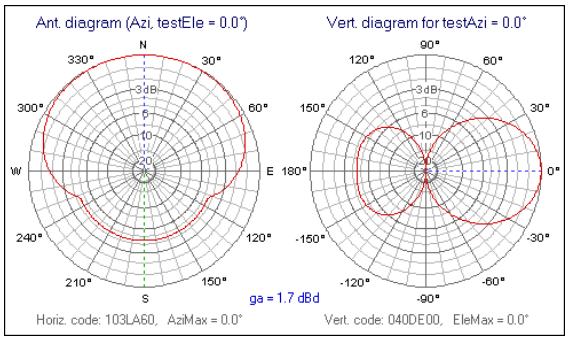
DE with 4dBd gain (with no mechanical tilt)



DC with 6.6 dB Gain (with -20 degrees of tilt)



D8 (Figure-of-eight) with 0dBd gain



DO with 3dBd Gain

Figure1: example antenna coverage patterns (source: HCM VA99 Antenna Editor Tool)

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Section 3

Generic SMS / HCM antenna codes and antenna gains

3.1 Table 1 shows the corresponding HCM antenna code for a selection of the SMS Antenna Codes.

3.2 Additional SMS and HCM Antenna Codes are shown within Annex 1.

Coverage	Gain	SMS antenna code	Typical antenna type	Horizontal	HCM	Code	Vertical	HCM	Code
Omni	0	OM_GAIN_0	Co-linear / end-fed vertical dipole	000	ND	00	450	TA	00
Omni	3	OM_GAIN_3	Co-linear	000	ND	00	160	TA	00
Omni	6	OM_GAIN_6	Co-linear	000	ND	00	100	TA	00
Down-fire	3	DF_GAIN_3	Down-fire #	000	ND	00	800	TA	05
Down-fire	6	DF_GAIN_6	Down-fire #	000	ND	00	400	TA	05
Offset-omni	0	DO_GAIN_0	Centre-fed vertical dipole	103	LA	60	040	DE	00
Elliptical	4	DE_GAIN_4	Yagi	065	EA	03	036	EA	03
Elliptical	8	DE_GAIN_8	Stacked array	103	EC	02	009	EA	02
Cardioid	3	DC_GAIN_3	Cardioid	090	LA	10	038	EA	10
Cardioid	6.6	DC_GAIN_6.6	Cardioid	090	LA	06	009	EA	06
Fig-of-8	0	D8_GAIN_0	Horizontal dipole	045	DE	00	000	ND	00
Omni	0	RC_GAIN_0	Radiating Cable	000	ND	00	000	ND	00

: Down-fire antennas point at the ground, i.e. a tilt of -90 degrees, not the horizon. The typical horizontal gain of a Down-fire antenna is ~-15dB.
Note 1: it is very important to note that Down-fire and Down-tilt antennas are not the same. Down-fire antennas have omni-directional horizontal coverage patterns whereas Down-tilt antennas usually have directional horizontal coverage patterns.
Note 2: omni-directional antennas should only have electrical down-tilt, e.g. -1 to -15 degrees.
Directional antennas usually only have mechanical down-tilt, e.g. -1 to -75 degrees, but may have both mechanical & electrical tilt.
Note 3: down-tilt is indicated by using a '-' sign. Up-tilt is indicated by using a '+' sign or no sign.

Table 1: HCM antenna codes used as the general antenna patterns in Ofcom's Spectrum Management System (SMS)

Section 4

Further Information

4.1 This SMS Antenna Code Information Sheet is available at:

http://www.ofcom.org.uk/radiocomms/ifi/licensing/classes/business_radio/information

4.2 General SMS / HCM Antenna Code enquiries for Business Radio (PMR) and Maritime systems should be sent to:

BusinessRadio@ofcom.org.uk

4.3 Accurate SMS / HCM antenna codes are required so that UK systems may be co-ordinated with adjacent national (UK) and international systems.

4.4 International co-ordination enquiries should be sent to:

BR_co-ordination@ofcom.org.uk

Annex 1:

Selectable Antenna Codes within the SMS

5.1 Table 2 shows the antenna codes that are selectable within our SMS.

5.2 The table may be updated to include additional antenna codes. Please note that these must be agreed by the Business Radio Unit prior to licensing.

5.3 Please note that Non-Directional RULES 'ABC1' antennas are represented with an 'MO_GAIN_3_90' Antenna Code and Directional RULES 'ABC1' antennas are represented with a 'DO_GAIN_3_90' Antenna Code. NB: new licenses must not be assigned antenna codes ending in 'GAIN_3_90'.

5.4 Only the Band III Antenna Codes with the correct Antenna Gain(s) can now be selected. (NB: it may be necessary to change an erroneous Antenna Code to one of those shown below if an impacted assignment is varied in the future.)

5.5 Please note that down-fire antennas are designed for small area coverage, e.g. on-site, systems. They point directly down towards the ground (-90 degrees tilt) unless a low mounting height would require them to point directly upwards (+90 degrees tilt). NB: a requested tilt other than +/-90 degrees or an ERP greater than 5W is likely to indicate that the applicant may actually be seeking to install a down-tilt antenna rather than a down-fire antenna. Please check.

SMS Antenna Code	Near-equivalent Non-Band III Antenna	HCM H Code	HCM V Code	Gain (dBd)
D8_GAIN_0	N/A	045DE00	000ND00	0.0
DC_GAIN_3.1	N/A	090LA10	038EA10	3.1
DC_GAIN_6.6	N/A	090LA06	009EA06	6.6
DE_GAIN_10	N/A	025EA06	022EA06	10.0
DE_GAIN_12	N/A	017EA20	018EA30	12.0
DE_GAIN_3	N/A	080EC05	016EA05	3.0
DE_GAIN_5	N/A	060EB05	034EA05	5.0
DE_GAIN_7_	N/A	044EB05	030EA05	7.0
DF_GAIN_3	N/A	000ND00	800TA05	3.0
DF_GAIN_6	N/A	000ND00	400TA05	6.0
MR_GAIN_30	N/A	000ND00	120TA00	30.0
OM_GAIN_0	N/A	000ND00	450TA00	0.0
OM_GAIN_3	N/A	000ND00	160TA00	3.0
OM_GAIN_6	N/A	000ND00	110TA00	6.0
RC_GAIN_0	N/A	000ND00	000ND00	0.0
B3_AB_GAIN_3	DE_GAIN_3	N/A	N/A	3.0
B3_AE_GAIN_6	DE_GAIN_6	N/A	N/A	6.0
B3_AF_GAIN_4	DE_GAIN_4	N/A	N/A	4.0
B3_AG_GAIN_0	DO_GAIN_0	N/A	N/A	0.0
B3_AN_GAIN_3	DC_GAIN_3	N/A	N/A	3.0
B3_AZ_GAIN_10	DE_GAIN_10	N/A	N/A	10.0
B3_DFA_GAIN_6	DF_GAIN_6	N/A	N/A	6.0
B3_MO_GAIN_3	OM_GAIN_3	N/A	N/A	3.0
B3_OO_GAIN_0	OM_GAIN_0	N/A	N/A	0.0
B3_RC_GAIN_0	RC_GAIN_0	N/A	N/A	0.0
OM_GAIN_3_90	N/A	(RULES ABC1	Non-Directional)	3.0
DO_GAIN_3_90	N/A	(RULES ABC1	Directional)	3.0
B3_ABC1_GAIN_3_90	OM_GAIN_3_90	(RULES ABC1	Non-Directional)	3.0

Table 2: selectable Antenna Codes within the Spectrum Management System.