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| U.S. Radiocommunications Sector  Fact Sheet | |
| **Working Party:** ITU-R WP 5B | **Document No:** USWP5B30-xx |
| **Ref: WP-5B/649** Annex 17 | **Date:** August 30, 2022 |
| **Document Title:** WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R M.1851-1  Mathematical models for radiodetermination radar and aeronautical mobile systems antenna patterns for use in interference analyses | |
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| **Purpose/Objective:** Update the recommendation with several changes including a proposal to discuss accepting agreed editorial changes and a proposal to remove this note: “[Editor’s note: To update the following models to take into account non-uniform amplitude distribution over elementary elements]” in section 6.  The USA should decide on whether to accept “and aeronautical mobile” in the document to move this contribution forward. | |
| **Abstract:** Editorial changes. Need to accept agreed editorials and decide on Aeronautical mobile and phased array antenna taper. | |
| **Fact Sheet Preparer:** Raafat Nasser, ACES Inc. for US Army | |

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| **Radiocommunication Study Groups** | Logo  Description automatically generated |
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| WORKING DOCUMENT PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R M.1851-1 | |

Mathematical models for radiodetermination radar and aeronautical mobile systems antenna patterns for use in interference analyses

Introduction

At the last meeting of WP-5B there was insufficient time to fully discuss this recommendation due to other priorities. There is a need to continue the discussion and devote a little more time to this topic.

**Proposal**

The United States of America would like to continue the development of a working document with the view to minimize the editorial changes and to discuss the inclusion of “Aeronautical mobile” and if phased array antenna taper is to be included in section 6.

**Attachment: 1**

**Attachment 1**

The USA proposes to accept the text revisions that are in track changes and are highlighted in Yellow. The text in [ ] is still open for discussions

**Summary of revision**

USA – Need to discuss this editor’s note in more details.

*[Editor’s note: typical radiodetermination radars use narrow beamwidth antennas in azimuth or elevation (height radars). Typical aeronautical mobile antennas are non-directive. Comparison between the equations and measured patterns are essential, before inserting 'aeronautical mobile’ to the title and other proposed revisions.]*

Scope

This Recommendation describes mathematical models for radiodetermination

Abbreviations/Glossary

3-D : Three-dimensional

CSC2 Cosecant squared

SLL Sidelobe level

**Related ITU-R Recommendations and Reports**

Recommendations ITU-R F.699, ITU-R F.1245, ITU-R M.1638, ITU-R M.1652, ITU-R M.1849

ITU-R F.699 Reference radiation patterns for fixed wireless system antennas for use in coordination studies and interference assessment in the frequency range from 100 MHz to 86 GHz

ITU-R F.1245 Mathematical model of average and related radiation patterns for point-to-point fixed wireless system antennas for use in interference assessment in the frequency range from 1 GHz to 86 GHz

ITU-R M.1638 Characteristics of and protection criteria for sharing studies for radiolocation (except ground based meteorological radars) and aeronautical radionavigation radars operating in the frequency bands between 5 250 and 5 850 MHz

ITU-R M.1652 Dynamic frequency selection in wireless access systems including radio local area networks for the purpose of protecting the radiodetermination service in the 5 GHz band

ITU-R M.1849 Technical and operational aspects of ground-based meteorological radars

***recognizing***

that these mathematical models may not be applicable for all radiodetermination and aeronautical mobile systems, e.g. for some aeronautical mobile telemetry antenna patterns,

***recommends***

3 that, in the absence of additional information, these antenna pattern equations should be considered as appropriate, for some directive antenna of systems operated under the aeronautical mobile service;

**Table of Contents**

Update table of content and accept it.

1. **Introduction**

The result of typical antenna parameter ranges from ITU-R Recommendations are recorded in Table 1.

Accept title of Table 1 and changes in the table.

**2.1 Antenna with a narrow beamwidth**

**Page 6**

USA note: Accept deletion and the highlighted insertions

In the absence of any other information, a simplified antenna pattern fitting with the theoretical main lobe and a mask in other directions may be considered for sharing and compatibility studies with radar systems. Peak or average masks are recommended for doing such studies with single or multiple interferers respectively. The mask departs at break point from theoretical pattern and decreases over sidelobes down to a floor mask to represent antenna far side lobes and back lobes, as described in § 2.1.3.

**Table 2**

Accept the changes in Table 2

**Figure 2**

Accept deletion of figure 2 and accept the replacement

**Table 3**

Accept title insertion in Table 3 to read: Peak and average normalised theoretical mask pattern equations

**Pages 12 (below Figure 4) to page 34 (section 6). Starting at section 2.2**

Accept all insertions and deletions up to section **6 Patterns for phased array antennas**

Delete Editor’s Note above table 4 after accepting the edits

~~[Editor’s Note: look at 'no markups’ Review-view; pay attention to completely delete the empty columns in Tables 4,5 and 8.]~~

Page 34, section **6 Patterns for phased array antennas**

Delete [Editor’s note: To update the following models to take into account non-uniform amplitude distribution over elementary elements]

USA Reason is that there are many ways to add weighting to array elements to reduce the pattern sidelobe levels that vary between radar manufacturer and application.

Page 38 to end of document accept all changes for section 6.1 and below

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