



## Radiocommunication Bureau (BR)

Administrative Circular  
**CACE/1031**

24 June 2022

**To Administrations of Member States of the ITU, Radiocommunication Sector Members,  
ITU-R Associates participating in the work of Radiocommunication Study Group 3  
and ITU Academia**

Subject: **Radiocommunication Study Group 3 (Radiowave Propagation)**

- **Proposed adoption of 4 draft new and 10 draft revised ITU-R Recommendations and their simultaneous approval by correspondence in accordance with § A2.6.2.4 of Resolution ITU-R 1-8 (Procedure for the simultaneous adoption and approval by correspondence)**

At the meeting of Radiocommunication Study Group 3, held 13 June 2022, the Study Group decided to seek adoption of 4 draft new and 10 draft revised ITU-R Recommendations by correspondence (§ A2.6.2 of Resolution ITU-R 1-8) and further decided to apply the procedure for simultaneous adoption and approval by correspondence (PSAA, § A2.6.2.4 of Resolution ITU-R 1-8). The titles and summaries of the draft Recommendations are given in the Annex to this letter. Any Member State which objects to the adoption of a draft Recommendation is requested to inform the Director and the Chairman of the Study Group of the reasons for the objection.

The consideration period shall extend for 2 months ending on 24 August 2022. If within this period no objections are received from Member States, the draft Recommendations shall be considered to be adopted by Study Group 3. Furthermore, since the PSAA procedure has been followed, the draft Recommendations shall also be considered as approved.

After the above-mentioned deadline, the results of the above procedures will be announced in an Administrative Circular and the approved Recommendations will be published as soon as practicable (see <http://www.itu.int/pub/R-REC>).

Any ITU member organization aware of a patent held by itself or others which may fully or partly cover elements of the draft Recommendations mentioned in this letter is requested to disclose such information to the Secretariat as soon as possible. The Common Patent Policy for ITU-T/ITU-R/ISO/IEC is available at <http://www.itu.int/en/ITU-T/ipr/Pages/policy.aspx>.

Mario Maniewicz  
Director

**Annex:** Titles and summaries of the draft Recommendations

**Documents:** Documents 3/69(Rev.1), 3/70, 3/72, 3/74, 3/75(Rev.1), 3/76, 3/77(Rev.1), 3/78, 3/79(Rev.1), 3/83(Rev.1), 3/84, 3/85, 3/87 and 3/88

These documents are available in electronic format at: <https://www.itu.int/md/R19-SG03-C/en>

## Annex

### Titles and summaries of the draft ITU-R Recommendations

Draft revision of Recommendation ITU-R P.684-7

Doc. 3/69(Rev.1)

#### **Prediction of field strength at frequencies below about 150 kHz**

The draft revisions to this Recommendation are the following:

- added clarifying statements or wording to several sections within Annex 1 (1.1, 1.3, 2.1, 2.2.3, 2.2.5, 2.3.3, 2.3.4, 2.3.6) and Annex 2 of the document;
- added definition to cymomotive force in footnote to 2.2;
- replaced references to “GRWAVE” with “LFMF-SmoothEarth”;
- corrected spelling and grammatical errors.

Draft revision of Recommendation ITU-R P.368-9

Doc. 3/70

#### **Ground-wave propagation prediction method for frequencies between 10 kHz and 30 MHz**

The draft revisions to this Recommendation are the following:

- introduces “LFMF-SmoothEarth” as integral, replacing interpolation method to generate desired value of field-strength;
- removes reference to “GRWAVE” program, replacing with “LFMF-SmoothEarth”;
- moves field-strength curves (Figures 1 – 12, and Figures 14 – 50) to a supplemental repository, replacing them with example Figures.

The revision proposed in the document replaces the Recommendation in its entirety.

Draft revision of Recommendation ITU-R P.372-15

Doc. 3/72

#### **Radio noise**

The draft revisions to this Recommendation are the following:

- Changed the titles of Figures 13b – 36b and 13c – 36c as follows:
  - If the title contains “Dec-Jan-Feb”, change “Dec-Jan-Feb” → “Northern hemisphere: Dec-Jan-Feb; Southern hemisphere: Jun-Jul-Aug”
  - If the title contains “Mar-Apr-May”, change “Mar-Apr-May” → “Northern hemisphere: Mar-Apr-May; Southern hemisphere: Sep-Oct-Nov”
  - If the title contains “Jun-Jul-Aug”, change “Jun-Jul-Aug” → “Northern hemisphere: Jun-Jul-Aug; Southern hemisphere: Dec-Jan-Feb”
  - If the title contains “Sep-Oct-Nov”, change “Sep-Oct-Nov” → “Northern hemisphere: Sep-Oct-Nov; Southern hemisphere: Mar-Apr-May”.

- Updated Figures 13c – 36c to reflect errors corrected in the software used to generate the graphs displayed. This error was corrected in version 14.3.
- Changed footnote on page 1 to: A supplemental computer program associated with the calculation of atmospheric noise due to lightning, man-made noise, and galactic noise (at frequencies below about 100 MHz) described in this Recommendation is available at: <https://github.com/ITU-R-Study-Group-3/ITU-R-HF/releases/tag/v14.3> (this link is not currently active).

Draft revision of Recommendation ITU-R P.581-2

Doc. 3/74

### **The concept of “worst month”**

This draft revision clarifies the concept of worst-month in terms of two statistics: 1) the worst-month exceedance probability and 2) the worst-month cumulative probability. The term exceedance probability is synonymous with the complementary cumulative distribution function (CCDF), and term cumulative probability is synonymous with the term cumulative distribution function (CDF).

Draft revision of Recommendation ITU-R P.841-6

Doc. 3/75(Rev.1)

### **Conversion of annual statistics to worst-month statistics**

This draft revisions of Recommendation ITU-R P.841-6 are the following:

- 1 adds the conversion method for cumulative statistics, and
- 2 modifies the corresponding text.

Draft revision of Recommendation ITU-R P.1057-6

Doc. 3/76

### **Probability distributions relevant to radiowave propagation modelling**

The draft revisions of Recommendation ITU-R P.1057-6 are the following:

- provides a required relationship between the cumulative distribution function (CDF) and the complementary cumulative distribution function (CCDF);
- renames the constant  $p$  of Equation (5b);
- replaces the inverse of the CCDF reported in Equations (5d) – (5e) with a more rigorous formulation based on Acklam’s algorithm<sup>1</sup>;
- adds a new section 11 to Annex 1 to give the main theoretical background of the Weibull probability distribution;
- adds a new Annex 3 to give the step-by-step procedure to approximate a complementary cumulative distribution by a Weibull complementary cumulative distribution.

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<sup>1</sup> Acklam, P. I. ‘An algorithm for computing the inverse normal cumulative distribution,’ <https://stackedboxes.org/2017/05/01/acklams-normal-quantile-function/>

### **Attenuation by atmospheric gases and related effects**

This draft revision of Recommendation ITU-R P.676-12 revises the scope, *considerings*, and *recommends*, deletes the guide to the recommendation, and replaces Annex 2 with new approximate prediction methods.

The draft revision of Annex 2 provides instantaneous and statistical prediction methods for the slant path gaseous attenuation attributable to oxygen and water vapour as well as an approximation to the slant path gaseous attenuation attributable to water vapour approximated by a Weibull probability distribution used by Recommendation ITU-R P.1853. The statistical prediction methods use the digital maps in the draft new Recommendation ITU-R P.[P.676 Maps], see Document [3/78](#).

The draft revision of the scope, considering, and recommends is shown in Attachment A, and the draft revision of Annex 2 is shown in Attachment B. There are no revisions to Annex 1.

### **Digital maps related to the calculation of gaseous attenuation and related effects**

This draft new Recommendation ITU-R P.[P.676 Maps] contains integral digital maps of surface total (barometric) pressure, surface temperature, surface water vapour density, and integrated water vapour content referenced by the associated draft revision to Recommendation [ITU-R P.676-12](#), Annex 2. See Document [3/77\(Rev.1\)](#).

These digital maps were derived from 30 years (1991-2020) of fifth generation European Centre for Medium-Range Weather Forecasts (ECMWF) atmospheric reanalysis of the global climate (ERA5) that significantly improved the spatial resolution and statistical accuracy of the various meteorological parameters.

### **Sea surface bistatic scattering**

This draft new recommendation provides a method for predicting the bistatic scattering coefficient and coherent reflection coefficient for the sea surface. This model can be applied at any elevation angle, except grazing incidence, and is applicable for frequencies up to 100 GHz, and for wind speeds between 0.5 m/s to 25 m/s.

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<sup>2</sup> The adoption and approval of the draft revision of Recommendation ITU-R P.676-12 and of the draft new Recommendation ITU-R P.[P.676 Maps] are interdependent.

<sup>3</sup> The adoption and approval of draft new Recommendations ITU-R P.[SEA\_SURFACE\_BISTATIC\_SCATTERING] and ITU-R P.[WIND\_SPEED\_MAPS] are interdependent.

### **Propagation data required for the design of Earth-space maritime mobile telecommunication systems**

The draft revisions of Recommendation ITU-R P.680-3 are the following:

- replaces ‘fading depth’ with ‘fade depth’ in Section 4.1;
- clarifies the calculation method; and
- provides a clear description of the method.

### **Propagation data required for the design of Earth-space aeronautical mobile telecommunication systems**

This draft revision proposes updating this Recommendation as follows:

- for Section 4.2.1, replace ‘fading depth’ with ‘fade depth’ and the calculation method is clarified, and a clear description is given;
- add a new figure, that is Figure 1, so this recommendation does not need to refer to the figure in Recommendation ITU-R P.680;
- add a left parentheses to Equation (4) and Equation (6) to be vertically aligned correctly.

### **Prediction methods required for the design of Earth-space systems operating between 20 THz and 375 THz**

In this draft revision, a new approximate model for scattering attenuation in Step 1 in Section 3.1 is proposed, which removes the irrationality of the original model and has better accuracy.

### **Acquisition, presentation, analysis and use of digital products in studies of radiowave propagation**

Resolution ITU-R 25-3 on “Computer Programs and Associated Data for Radiowave Propagation Studies” and ITU Software Copyright Guidelines defines the framework of Study Group 3 activities on digital products. This draft new recommendation addresses the requirements for ITU-R members submitting digital products and the processes within Study Group 3 for the evaluation of digital products.

### **Digital maps related to surface wind speed statistics**

This draft new recommendation contains integral digital maps of global wind speed statistics.

The database for the wind speed at 10 metres above the surface of the Earth is derived from the ERA5 reanalysis produced by the European Centre for Medium-Range Weather Forecast (ECMWF). The details on the ERA5 data used to assemble the statistical dataset are:

- ERA5 dataset: reanalysis-era5-single-levels
  - Time period: 10 years, from 1 January 2011 00:00:00 UTC to 31 December 2020 23:00:00 UTC
  - Spatial resolution:  $0.25^\circ \times 0.25^\circ$ , i.e. latitude =  $[90^\circ:-0.25^\circ:-90^\circ]$ , longitude =  $[0^\circ:0.25^\circ:359.75^\circ]$
  - Time resolution: 1 hr.
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