Radiocommunication Bureau (BR)

Administrative Circular
CACE/905

25 June 2019

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 22 draft revised ITU-R Recommendations and their simultaneous approval by correspondence in accordance with § A2.6.2.4 of Resolution ITU-R 1-7 (Procedure for the simultaneous adoption and approval by correspondence)**

At the meeting of Radiocommunication Study Group 3, held on 24 May 2019, the Study Group decided to seek adoption of 22 draft revised ITU-R Recommendations by correspondence (§ A2.6.2 of Resolution ITU-R 1-7) and further decided to apply the procedure for simultaneous adoption and approval by correspondence (PSAA, § A2.6.2.4 of Resolution ITU-R 1-7). The titles and summaries of the draft Recommendations are given in the Annex to this letter. Any Member State who 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 25 August 2019. 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 3/105(Rev.1), 3/106(Rev.1), 3/107(Rev.1), 3/117(Rev.1), 3/118(Rev.1), 3/119(Rev.2), 3/120(Rev.1), 3/121(Rev.1), 3/122(Rev.1), 3/124(Rev.1), 3/125(Rev.1), 3/126(Rev.1), 3/127(Rev.1), 3/128(Rev.2), 3/129(Rev.1), 3/130(Rev.1), 3/135(Rev.1), 3/138(Rev.1), 3/139(Rev.1), 3/143(Rev.1), 3/144(Rev.1), 3/145(Rev.1)

These documents are available in electronic format at: https://www.itu.int/md/R15-SG03-C/en

Distribution:

– Administrations of Member States of the ITU and Radiocommunication Sector Members participating in the work of Radiocommunication Study Group 3
– ITU-R Associates participating in the work of Radiocommunication Study Group 3
– ITU Academia
– Chairmen and Vice-Chairmen of Radiocommunication Study Groups
– Chairman and Vice-Chairmen of the Conference Preparatory Meeting
– Members of the Radio Regulations Board
– Secretary-General of the ITU, Director of the Telecommunication Standardization Bureau, Director of the Telecommunication Development Bureau

Annex

Titles and summaries of the draft Recommendations

Draft revision of Recommendation ITU-R P.1057-5   Doc. 3/105(Rev.1)

Probability distributions relevant to radiowave propagation modelling

The purpose of this draft revision to Section 3 of Recommendation ITU-R P.1057-5 is to:

1)   clarify the difference between: a) a normal probability distribution with arbitrary mean and standard deviation, and b) a standard normal probability distribution with mean = 0 and standard deviation = 1, and

2)   revise the approximation for $Q(x)$ and add an approximation for $Q^{-1}(x)$.

Draft revision of Recommendation ITU-R P.841-5   Doc. 3/106(Rev.1)

Conversion of annual statistics to worst-month statistics

This draft revision of Recommendation ITU-R P.841-5 revises Figure 1 to correct:

a)   the missing grid line at $Q = 10$, and

b)   the misplaced vertical label "10".

Draft revision of Recommendation ITU-R P.1407-6   Doc. 3/107(Rev.1)

Multipath propagation and parameterization of its characteristics

This revision proposes to make two additions to the Recommendation:

–   A statistical test to determine the scale over which a process can be assumed to be wide sense stationary (WSS);

–   A description of the relationship between the delay Doppler and Doppler spectra.

Attenuation by atmospheric gases

This draft revision of Recommendation ITU-R P.676-11 incorporates the following revisions to improve the accuracy and augment the prediction methods in the Recommendation. The following existing sections were revised:

1)   Section 1 of Annex 2: revises the water vapour specific attenuation to include all water vapour spectroscopic lines to match Annex 1;

2)   Section 2.2 of Annex 2: revises the oxygen and water vapour equivalent heights consistent with the current Annex 1 spectroscopic coefficients;

3)   Section 2.2 of Annex 1: revises the description of the slant path attenuation method to clarify and extend the method to a descending path between a location above the surface of the Earth or in space and a location on or near the surface of the Earth;

4)   Section 2.3 of Annex 2: corrects a typographic error in a coefficient of the zenith water vapour attenuation;

5)   Section 2.3 of Annex 2: revises the height h of the zenith water vapour attenuation for station heights less than or equal to 0 km a.m.s.l.;

6)   Section 3 of Annex 1: revises the paragraph on dispersive effects to include a method to calculate the phase dispersion on slant paths; and

7)   Figures 10, 11, and 12 were redrawn to improve the clarity;

and the following paragraphs were added:

1)   Section 2.2.4 of Annex 1: adds a method to calculate atmospheric bending on slant paths;

2)   Section 2.2.5 of Annex 1: adds a method to calculate excess atmospheric path delay on slant paths;

3)   Section 4 of Annex 1: adds a method to calculate upwelling and downwelling noise temperatures on slant paths, and

4)   Section 5 of Annex 1: adds a method to calculate slant path attenuation using vertical atmospheric profiles (e.g., Annex 3 of Recommendation ITU-R P.835).

As a result of adding new prediction methods regarding propagation effects related to gaseous attenuation, the title of the recommendation is revised from "Attenuation by atmospheric gases" to "Attenuation by atmospheric gases and related effects".

Draft revision of Recommendation ITU-R P.453-13   Doc. 3/118(Rev.1)

The radio refractive index: its formula and refractivity data

This revision adds cautionary text to Section 3.2 warning users of Recommendation ITU-R P.453 that its predictions should not be used by themselves for prediction of anomalous propagation between surface stations in coastal or maritime and low latitude locations.

The remainder of the Recommendation and the associated digital products are not changed in this revision.

Draft revision of Recommendation ITU-R P.527-4   Doc. 3/119(Rev.2)

Electrical characteristics of the surface of the Earth

This draft revision of Recommendation ITU-R P.527-4 incorporates revisions to the following existing sections:

1   Section 5.1.2: revises the method to calculate complex permittivity of saline (sea) water, and

2   Section 5.3.1: revises the coefficients of the saline water conductivity in the freezing vegetation complex permittivity method and revises the associated Figures 10 and 11;

and adds the follow new sections:

1   Section 6: adds a method to calculate emissivity and the associated Figures 12, 13 and 14;

2   Section 7: adds a method to calculate the isotropic emissivity of the ocean.

In addition, this draft revision:

1   Section 6: Adds the emissivity for circular polarization, and

2   Attachment to Annex 1: makes a minor editorial correction to the figure reference to clarify the associated graph.

Draft revision of Recommendation ITU-R P.310-9   Doc. 3/120(Rev.1)

Definitions of terms relating to propagation in non-ionized media

Recommendation ITU-R P.310-9 defines terms relating to propagation in non-ionized media, including some polarization terminology. However, other ITU-R Recommendations and Reports use polarization-related terms that are either defined in multiple documents or simply not defined.

Modifications to Recommendation ITU-R P.310-9 are proposed to expand, harmonize and group polarization definitions together.

Draft revision of Recommendation ITU-R P.1511-1   Doc. 3/121(Rev.1)

Topography for Earth-space propagation modelling

This input document proposes a draft revision to Recommendation ITU-R P.1511-1 that:

1)   Section 1: Updates the map of topographic height of the surface of the Earth.

2)   Section 2: Adds a description of geographic coordinates and height in P-series Recommendations including a digital map of EGM2008.

Draft revision of Recommendation ITU-R P.1853-1   Doc. 3/122(Rev.1)

Tropospheric attenuation time series synthesis

This draft revision proposes changes to channel models used to synthesize time series of oxygen gaseous attenuation, water vapour gaseous attenuation, cloud attenuation, rain attenuation, scintillation, and total impairments (attenuation + scintillation) for single-site and adds multi-site configurations.

The new Annex 1 deals with the synthesis of single-site and multi-site individual tropospheric attenuation components time series and the synthesis of unit-variance tropospheric scintillation time series on Earth-space paths:

–   Sections 2.2 and 2.3 should be used to synthesize the time series of oxygen gaseous attenuation for single-site and multi-site paths, respectively.

–   Sections 3.1 and 3.2 should be used to synthesize the time series of water vapour attenuation for single-site and multi-site paths, respectively.

–   Sections 4.1 and 4.2 should be used to synthesize the time series of cloud attenuation for single-site and multi-site paths, respectively.

–   Sections 5.1 and 5.2 should be used to synthesize the time series of rain attenuation for single-site and multi-site paths, respectively.

The new Annex 2 deals with the synthesis of single-site and multi-site total tropospheric impairments time series on Earth-space paths:

–   Section 2 should be used to synthesize single-site total impairments time series.

–   Section 3 should be used to synthesize multi-site total impairments time series.

The new Annex 3 deals with the synthesis of rain attenuation time series on single terrestrial paths.

This revision also proposes to modify the title to align it with the proposed modifications to the content.

Draft revision of Recommendation ITU-R P.2109-0   Doc. 3/124(Rev.1)

Prediction of building entry loss

Since its creation in March 2017, Recommendation ITU-R P.2109 has provided valuable input to coexistence studies. During this period a number of queries have been raised about the use of the recommendation. As a result the following revisions are proposed:

1)   The valid probability range is given as $0.0 < P < 1.0$; it is valid to use the method in Monte Carlo models.

2)   In two places μ_1 is referred to as median BEL. This is corrected, and the references are clarified.

3)   Figure 1 plots μ_1, more useful plots of median BEL are provided.

The Recommendation includes some sample cumulative distribution functions for implementation verification.

Furthermore, the draft revised Recommendation takes account of the antenna pattern of the indoor terminal. A brief indication of the magnitude of these effects is given, based on measurements.

Draft revision of Recommendation ITU-R P.528-3   Doc. 3/125(Rev.1)

Propagation curves for aeronautical mobile and radionavigation services using the VHF, UHF and SHF bands

This draft revision proposes to make the following additions to the Recommendation:

–   Replace the existing Annex 2 (interpolation methods) with a new Annex 2 describing a complete step-by-step method to compute the basic transmission loss at any point within the Recommendation's valid input space.

–   Remove Annex 3 and its curves (re-numbering the following Annexes).

–   Rename the title of the Recommendation from "Propagation curves for …" to "A propagation prediction method for …" to reflect the above revisions.

–   Integral software, implementing the new Annex 2's step-by-step method, is provided in this draft revision as C++ source code, along with a readme file.

–   The existing data tables provided with Recommendation ITU-R P.528-3 have been updated with values generated from the example software. A zip-file of these newly generated data files is included in this draft revision.

Method for point-to-area predictions for terrestrial services in the frequency range 30 MHz to 3 000 MHz

The main objective of this draft revision of Recommendation ITU-R P.1546-5 is to introduce a new method for the calculation of location variability dependent on the width of area for which the field strength level is predicted.

Additionally the comparison of field strength predictions with the results of several measurement campaigns came to the conclusion that the frequency range of validity of the recommendation can be extended to 4 000 MHz.

Furthermore, it was observed that the predictions improve, when lower examples of representative clutter heights are used.

The method for the treatment of clutter at the transmitter has been clarified and the correct alternative for the term "path loss" is integrated editorially.

A path-specific propagation prediction method for point-to-area terrestrial services in the VHF and UHF bands

The main objective of this proposed revision of Recommendation ITU-R P.1812-4 is to introduce a new method for the calculation of location variability dependent on the width of area for which the field strength level is predicted.

Additionally an alternative method to calculate the smooth profile diffraction loss L_{bulls} without using terrain profile analysis is proposed to be included in the Annex of the recommendation. By implementing this method, a considerable higher calculation speed can be reached.

Furthermore, the term "path loss" has been replaced editorially by correct definitions.

Draft revision of Recommendation ITU-R P.1238-9   Doc. 3/128(Rev.2)

**Propagation data and prediction methods for the planning of indoor
radiocommunication systems and radio local area networks
in the frequency range 300 MHz to 100 GHz**

This document is intended to enrich the missing parts such as new frequencies or environments of the tables for basic transmission loss coefficients and delay spread, etc. in Recommendation ITU-R P.1238 based on measurement data.

This document proposes a revision to Recommendation ITU-R P.1238 in 3 items as follows:

Item 1 proposes the revision based on the measurement results in indoor environments at representative frequencies of 250, 275 and 325 GHz. This item proposes to extend the upper limit of the frequency band to 450 GHz and to add new basic transmission loss coefficients data to Table 2.

Item 2 proposes the revision based on measurement results in indoor environments at representative frequencies of 12.65-14.15, 25.3-28.3 and 67-73 GHz. This item proposes to add new data (basic transmission loss coefficients, shadow fading statistics and r.m.s delay spread).

Item 3 proposes to add a new model for the beam-width dependent power and to re-structure some sections. This item proposes to add a new model for the beam-width dependent power as a Section 6 and re-structure some sections.

Draft revision of Recommendation ITU-R P.1411-9   Doc. 3/129(Rev.1)

**Propagation data and prediction methods for the planning of short-range outdoor
radiocommunication systems and radio local area networks
in the frequency range 300 MHz to 100 GHz**

This document proposes 7 modifications as follows:

1)   The modification of Table 1 in Section 2 by removing the ambiguous text "Typified by wide streets" for recognizing the urban low-rise/suburban environment.

2)   The modification of Section 4.1.1 to add a new guideline for Monte Carlo simulations using the site-general model for non-line-of-sight urban high-rise and urban low-rise/suburban environments and to prevent the predicted basic transmission loss not to be smaller than free-space basic transmission loss in a simulation.

3)   The modification of Table 4 in Section 4.1.1 to add new basic transmission loss coefficients for the site-general model for below-rooftop propagation based on 0.8-73 GHz measurements in a residential area.

4)   The modification of Section 5.3 to add a new subsection for the estimation of received power loss due to antenna beamwidth based on measurement results in typical urban high-rise environments at 28 and 38 GHz.

5)   The modification of text in the Section 6 "Polarization characteristics" to avoid misapplying the XPD values for the SHF band.

6)   The modification of the Section 9 "Propagation characteristics for high Doppler environments" to add the new scenarios for high-speed vehicles including data tables such as stationary distance, delay spread and K factor based on measurements at 5.9 GHz and 28 GHz, respectively, in expressway environments.

7)   A number of editorial corrections.

Draft revision of Recommendation ITU-R P.1816-3   Doc. 3/130(Rev.1)

The prediction of the time and the spatial profile for broadband land mobile services using UHF and SHF bands

This draft revision proposes the new elevation arrival angle profile formula at a base station based on measured data for the expansion of its applicable situation. This formula can take city structures into consideration and is represented as a function of the distance, base station antenna height and average buildings heights which are the same parameters of other formulas in Annexes 1 to 3.

This draft revision proposes to add the new elevation arrival angle profile formula as a new Section 5 to Annex 2. Also, this document proposes to add the word "Azimuth" to the existing azimuth arrival angle profile model in Annex 2.

Draft revision of Recommendation ITU-R P.531-13   Doc. 3/135(Rev.1)

Ionospheric propagation data and prediction methods required for the design of satellite services and systems

This document constitutes the draft revision of Recommendation ITU-R P.531-14. It presents several changes and the inclusion of a new Section 3, "Considerations for VHF and HF propagation". Moreover, a new equation for seasonal longitudinal dependence of S_4 is included in Section 5.5.2

The revision proposes a modification to the title to refer to "networks" rather than "services".

Guide to the application of the propagation methods
of Radiocommunication Study Group 3

This draft revision of Recommendation ITU-R P.1144-9:

1)   adds a reference to definitions of latitude, longitude, and height in P-series Recommendations to the entry for Recommendation ITU-R P.1511-1 in Table 2;

2)   deletes Section 3 regarding geographic coordinates and height (this Section is moved to Recommendation ITU-R P.1511);

3)   adds a new Section 3 regarding Gaussian quadrature integration, and

4)   corrects a typographic error in Section 2, step 1.

Propagation data required for the evaluation of interference between
stations in space and those on the surface of the Earth

The purpose of this revision to Recommendation ITU-R P.619-3 is to modify Section 2.3 and Attachment C to overcome the shortcomings of atmospheric attenuation due to atmospheric gases through the following:

–   checking if the main beams of the antennas of both the earth station and space station are in the line-of-sight (LOS) of each other;

–   checking if the LOS of the two antennas, if it exists, is free from any ducting;

–   checking for ducting;

–   accounting for zero and negative elevation angles;

–   accounting for ray bending due to the variation of atmospheric refractive index along propagation paths;

–   using Snell's law in polar coordinates rather than recurrence relations;

–   relaxing the 10 km restriction imposed on station altitudes due to the new spherical Earth method.

The proposed method in Annex 1 is based on introducing Snell's law in polar coordinates into Equation (11) yielding a formulation, combining Equations (17) and (19) into a single equation and eliminating the calculation of the intermediate angle α. Introducing Snell's law in polar coordinates into Equation (11) also reveals the approximations used in deriving Equations (17) – (19), and how to minimize errors due to those approximations.

Draft revision of Recommendation ITU-R P.617-4   Doc. 3/143(Rev.1)

Propagation prediction techniques and data required for the design of trans-horizon radio-relay systems

The modification to Recommendation ITU-R P.617-4, Section 4.1, found in Annex 1 of this document, aims to extend the applicability of the Recommendation by making the method suitable for both low elevation angles and high elevation angles, symmetrical and asymmetrical scenarios.

Draft revision of Recommendation ITU-R P.2001-2   Doc. 3/144(Rev.1)

A general purpose wide-range terrestrial propagation model in the frequency range 30 MHz to 50 GHz

The changes proposed in this revision of Recommendation ITU-R P.2001-2 include the following:

1   Minor editorial changes pertaining to the correct use of the terminology for "transmission loss".

2   A minor revision of Section D.6 "Angular-distance dependent loss".

As the result of the review performed across different ITU-R P-series Recommendations on the consistent and unambiguous use of the terminology for "transmission loss," one minor editorial change in the scope and three minor editorial changes in the *notings* are proposed.

The proposed change in Section D.6, limits the angular-distance dependent loss to non-negative values only, which resolves the problem of non-physical basic transmission loss values.

Draft revision of Recommendation ITU-R P.681-10   Doc. 3/145(Rev.1)

Propagation data required for the design of Earth-space land mobile telecommunication systems

The revisions concern the input parameters used in Section 6 and given in Annex 2. New parameters of the statistical prediction method are added in order to address highway, railway, suburban and urban environments for frequencies between 10 and 20 GHz. This revision also proposes a modification to the title to align it with the content of the Recommendation.

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