



## Radiocommunication Bureau (BR)

Administrative Circular  
CACE/744

7 August 2015

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

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

- **Adoption of 5 revised ITU-R Questions and their simultaneous approval by correspondence in accordance with § 10.3 of Resolution ITU-R 1-6 (Procedure for the simultaneous adoption and approval by correspondence)**
- **Modification of categories and/or target dates of 18 ITU-R Questions**
- **Suppression of 1 ITU-R Question**

By Administrative Circular CACE/727 dated 28 May 2015, 5 draft revised ITU-R Questions were submitted for simultaneous adoption and approval by correspondence (PSAA), following the procedure of Resolution ITU-R 1-6 (§ 10.3). Study Group 3 also proposed modification of the category and/or target date of the 18 ITU-R Questions. In addition, the Study Group proposed the suppression of 1 ITU-R Question.

The conditions governing this procedure were met on 28 July 2015.

The texts of the approved Questions are attached for your reference in Annexes 1 to 5, and will be published in Revision 3 to Document [3/1](#) which contains the ITU-R Questions approved by the 2012 Radiocommunication Assembly and assigned to Radiocommunication Study Group 3. The new category and/or target date of 18 ITU-R Questions is shown in Annex 6. The suppressed ITU-R Question is indicated in Annex 7.

François Rancy  
Director

**Annexes: 7**

**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
- Chairmen and Vice-Chairmen of Radiocommunication Study Groups and the Special Committee on Regulatory/Procedural Matters
- 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 1

### QUESTION ITU-R 231-1/3\*

#### **The effect of electromagnetic emissions from man-made sources on the radiocommunication systems and networks**

(2007-2015)

The ITU Radiocommunication Assembly,

*considering*

- a) that electromagnetic emissions occur from a wide variety of man-made sources, such as ignition systems in internal combustion engines, electrical machinery, electronic equipment and apparatus, information technology and telecommunications equipment, etc.;
- b) that the reception of such emissions may affect the performance of radiocommunication systems and networks;
- c) that the information on man-made noise in Recommendation ITU-R P.372 relates to the aggregated noise from all man-made sources in typical environments, and does not provide information on the emissions received from individual or identifiable sources;
- d) that such emissions may be impulsive in character and cannot be adequately described in terms of an external noise factor;
- e) that emissions from individual sources may become of increasing importance in determining the performance of radio systems and networks,

*decides* that the following Question should be studied

How can the distribution of the radiation from individual sources be described and measured?

*further decides*

- 1 that the results of studies should be included in Recommendations and/or Reports;
- 2 that the above studies should be completed by 2019.

Category: S2

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\* This Question should be brought to the attention of Radiocommunication Study Group 1.

## Annex 2

### QUESTION ITU-R 209-2/3

#### **Variability and risk parameters in system performance analysis**

(1993-2012-2015)

The ITU Radiocommunication Assembly,

*considering*

- a) that for the proper planning of terrestrial and Earth-space links it is necessary to have appropriate parameters for the formulation of performance criteria of radiocommunication systems;
- b) that the “average annual worst month” has been defined as the long-term statistic relevant to performance criteria referring to “any month”;
- c) that due to the stochastic nature of propagation effects in radiocommunication systems there is a need for information on variability of these effects, with respect to the long-term statistic which may itself be subject to longer-term variability, for various periods of reference;
- d) that there is a need for an unambiguous formulation of variability parameters to allow proper cost and performance trade-offs to be made in the analysis of system reliability, availability and quality,

*decides* that the following Questions should be studied

- 1 What is the variation of propagation effects for various periods of reference?
- 2 What is the variation of propagation effects for any location in the world?
- 3 What are the periods of reference to be specified for the formulation of risk parameters associated with the variation of propagation statistics?
- 4 What are the parameters most suited to the formulation of confidence limits and risks associated with the specification and estimation of system performance?
- 5 What are the procedures for the calculation of the parameters defining statistical variation of propagation effects in radiocommunication systems?

*further decides*

- 1 that the above studies should be completed by 2019.

Category: S3

### Annex 3

#### QUESTION ITU-R 202-4/3

#### **Methods for predicting propagation over the surface of the Earth**

(1990-2000-2007-2015)

The ITU Radiocommunication Assembly,

*considering*

- a) that the presence of obstacles on the propagation path may modify, to a large extent, the mean value of the transmission loss, as well as the fading amplitude and characteristics;
- b) that, with increase in frequency, the influence of the detailed roughness of the surface of the Earth as well as that of vegetation and natural or man-made structures on or above the surface of the Earth becomes more significant;
- c) that propagation over high mountain ridges is sometimes of great practical importance;
- d) that diffraction and site shielding are of practical significance in interference studies;
- e) that the increase in performance and storage capacity of computers, permits the development of detailed digital terrain and clutter data bases;
- f) that the field strength of the ground wave for frequencies between 10 kHz and 30 MHz is given in Recommendation ITU-R P.368, and a computer implementation, GRWAVE, is available from the Radiocommunication Study Group 3 Web page;
- g) that information on the phase of the ground-wave mode is required;
- h) that information on ground conductivity is often available in digital form;
- i) that seasonal variation of ground-wave propagation has been observed;
- j) that the availability of high resolution terrain and building databases makes it practical to develop diffraction models which take 3-dimensional information into account;
- k) that frequency-selective and other specialised materials are expected to be increasingly incorporated into the built environment (e.g. buildings, bridges, dams, etc.),

*decides* that the following Questions should be studied

- 1 What is the influence of terrain irregularities, vegetation and buildings, the existence of conducting structures and seasonal variability, both for locations within the service area around a transmitter and for the evaluation of interference at much greater distances, on the transmission loss, polarization, group delay and angle of arrival?
- 2 What is the additional transmission loss in urban areas?
- 3 What is the screening provided by obstacles near a terminal, taking into account the propagation mechanisms over the path?

- 4 What are the conditions under which obstacle gain occurs and the short-term and long-term variations of transmission loss under these conditions?
- 5 What are suitable methods and formats for describing the detailed roughness of the surface of the Earth including topographic features and man-made structures?
- 6 How can terrain data bases, together with other detailed information on terrain features, vegetation and buildings be applied in the prediction of attenuation, time delay, scatter and diffraction?
- 7 Can more accurate evaluation of losses be made by taking the three-dimensional shape of terrain and building obstacles into account?
- 8 How can quantitative relationships and statistically-based prediction methods be developed which treat reflection, diffraction and scatter from terrain features and buildings, as well as the influence of vegetation?
- 9 What is the phase of the ground-wave mode?
- 10 How can information on ground conductivity be made available digitally as matrix or vector information?

*further decides*

- 1 that the results of the above studies should be included in Recommendations and/or Reports;
- 2 that the above studies should be completed by 2019.

Category: S2

## Annex 4

### QUESTION ITU-R 211-6/3

#### **Propagation data and propagation models in the frequency range 300 MHz to 100 GHz for the design of short-range wireless radiocommunication systems and wireless local area networks (WLAN)**

(1993-2000-2002-2005-2007-2009-2015)

The ITU Radiocommunication Assembly,

*considering*

- a)* that many new short-range personal communication systems are being developed which will operate indoors as well as outdoors;
- b)* that future mobile systems (e.g. IMT) will provide personal communications, indoors (office or residential) as well as outdoors;
- c)* that there is a high demand for wireless local area networks (WLANs) and wireless private business exchanges (WPBXs), as demonstrated by existing products and intense research activities;
- d)* that it is desirable to establish WLAN standards which are compatible with both wireless and wired telecommunications;
- e)* that short-range systems using very low power have many advantages for providing services in the mobile and personal environment;
- f)* that ultra-wideband (UWB) is an important wireless technology and may have impact on radiocommunication services;
- g)* that knowledge of the propagation characteristics within buildings and the interference arising from multiple users in the same area is critical to the efficient design of systems;
- h)* that while multipath propagation may cause impairments, it may also be used to advantage in a mobile or indoor environment;
- i)* that there are only limited propagation measurements available in some of the frequency bands being considered for short-range systems;
- j)* that information regarding indoor and indoor-to-outdoor propagation may also be of interest to other services,

*decides* that the following Questions should be studied

1 What propagation models should be used for the design of short-range systems operating indoors, outdoors, and indoor-to-outdoors (operating range less than 1 km) including wireless communication and access systems and WLANs?

- 2 What propagation characteristics of a channel are most appropriate to describe its quality for different services, such as:
  - voice communications;
  - facsimile services;
  - data transfer services (both high bit rate and low bit rate);
  - paging and messaging services;
  - video services?
- 3 What are the characteristics of the impulse response of the channel?
- 4 What effect does the choice of polarization have on the propagation characteristics?
- 5 What effect does the performance of the base station and terminal antennas (e.g. directivity, beam-steering) have on the propagation characteristics?
- 6 What are the effects of various diversity schemes?
- 7 What are the effects of the siting of the transmitter and receiver?
- 8 In the indoor environment, what is the effect of different building and furnishing materials as regards shadowing, diffraction, and reflection?
- 9 In the outdoor environment, what is the effect of building structures and vegetation as regards shadowing, diffraction, and reflection?
- 10 What effect does the movement of persons and objects within the room, possibly including the movement of one or both ends of the radio link, have on the propagation characteristics?
- 11 What variables are necessary in the model to account for different types of buildings (e.g. open-plan, single-storey, multi-storey) in which one or both of the terminals are situated?
- 12 How may building entry loss be characterized for system design, and what is its effect on indoor-to-outdoor transmission?
- 13 What factors can be used for frequency scaling, and over what ranges are they appropriate?
- 14 What are the best ways of presenting the required data?
- 15 What propagation models are most appropriate to evaluate the effect for system design such as Multiple Input Multiple Output (MIMO) technology?

*further decides*

- 1 that the results of the above studies should be included in one or more Recommendations and/or Reports;
- 2 that the above studies should be completed by 2019.

Category: S3

## Annex 5

### QUESTION ITU-R 207-5/3

#### **Propagation data and prediction methods for satellite mobile and radiodetermination services above about 0.1 GHz**

(1990-1993-1995-1997-2000-2009-2015)

The ITU Radiocommunication Assembly,

*considering*

- a) that there is a requirement for methods to estimate the field strength or the transmission loss when planning mobile and radiodetermination services using satellites;
- b) that a number of administrations are studying satellite systems for aeronautical and maritime safety, radiodetermination, communication and control;
- c) that there is considerable interest in providing communication services to handheld and vehicular terminals, including in railway environments, with mobile-satellite systems;
- d) that for VHF, UHF and SHF systems involving satellites, both the ionosphere and troposphere may affect propagation, as well as reflections from the ground, sea and/or man-made structures;
- e) that for land mobile-satellite systems, blockage and shadowing will affect propagation;
- f) that there is a requirement for propagation data and modelling for all path elevation and azimuth angles, especially for systems employing constellations of non-geostationary satellites;
- g) that knowledge of fade-duration and non-fade-duration distributions is of particular importance to satellite mobile and radiodetermination systems;
- h) that a number of mobile-satellite systems sharing the same frequency band will be introduced;
- i) that frequency-selective fading and delay spread are important aspects of the propagation channel which must be taken into account in the design of digital wideband mobile radiocommunication and navigation systems,

*decides* that the following Questions should be studied

- 1 To what extent does the field strength or transmission loss depend on the nature of terrain, the effects of vegetation and man-made structures, antenna location, frequency, polarization, angle of elevation and climate; and how do these factors affect the selection of frequencies and wave polarization for such systems?
- 2 What are the effects of the local environment for handheld and vehicular terminals and personal communication systems?
- 3 What are the effects due to multipath propagation and Doppler spread changes, and how do these depend on the parameters listed in § 1?



4 What is the most suitable form of prediction method, for each radio service, for use in the preparation of national and international frequency plans?

5 What are the characteristics and effects of land- or sea-reflection and multipath fading on radiocommunication or radiodetermination signals transmitted by satellites, both geostationary and otherwise, for the use of land vehicles, aircraft and ships?

6 What propagation data may be collected for modelling, statistical characterization and mitigation of tropospheric and multipath-induced impairments, especially for low elevation angle slant paths, as a function of sea or land surface state (wave height or terrain irregularity), satellite elevation angle, antenna radiation pattern, local site clearance and environment, including terrain and vegetation blockage and shadowing and frequency?

7 What is the method for estimating signal-to-interference ratio where both wanted and unwanted signals are affected by multipath fading?

8 What are the advantages of physical-statistical propagation models for the characterization of the radio channel in multiple environments for land mobile satellite systems?

9 What are the methods to model the propagation channel and evaluate performance improvement due to diversity (satellite, polarization, antenna) and multiple-input-multiple-output (MIMO) techniques for mitigation of propagation impairment models in satellite mobile radiocommunications?

*further decides*

1 that the available information should be prepared as a new Recommendation;

2 that the above studies should be completed by 2019.

NOTE 1 – Priority will be given to studies relating to *decides* 1 and 2.

Category: S2

## Annex 6

### Modification of categories and/or target dates

Question ITU-R	Title	Category	Target date
<a href="#">201-5/3</a>	Radiometeorological data required for the planning of terrestrial and space communication systems and space research application	S2	2019
<a href="#">203-6/3</a>	Propagation prediction methods for terrestrial broadcasting, fixed (broadband access) and mobile services using frequencies above 30 MHz	S1	2019
<a href="#">204-6/3</a>	Propagation data and prediction methods required for terrestrial line-of-sight systems	S2	2019
<a href="#">205-2/3</a>	Propagation data and prediction methods required for trans-horizon systems	S2	2019
<a href="#">206-4/3</a>	Propagation data and prediction methods for fixed and broadcasting-satellite services	S2	2019
<a href="#">208-5/3</a>	Propagation factors in frequency sharing issues affecting fixed-satellite services and terrestrial services	S2	2019
<a href="#">212-3/3</a>	Ionospheric properties	S3	2019
<a href="#">213-4/3</a>	The short-term forecasting of operational parameters for trans-ionospheric radiocommunication and radionavigation services	S3	2019
<a href="#">214-5/3</a>	Radio noise	S3	2019
<a href="#">218-6/3</a>	Ionospheric influences on satellite systems	S3	2019
<a href="#">222-4/3</a>	Measurements and data banks of ionospheric characteristics and radio noise	S3	2019
<a href="#">225-7/3</a>	The prediction of propagation factors affecting systems at LF and MF including the use of digital modulation techniques	S3	2019
<a href="#">226-5/3</a>	Ionospheric and tropospheric characteristics along satellite-to-satellite paths	S3	2019
<a href="#">228-2/3</a>	Propagation data required for the planning of space radiocommunication systems and space science service systems operating above 275 GHz	C1	2019
<a href="#">229-3/3</a>	Prediction of sky-wave propagation conditions, signal intensity, circuit performance and reliability at frequencies between about 1.6 and 30 MHz, in particular for systems using digital modulation techniques	S3	2019
<a href="#">230-3/3</a>	Prediction methods and models applicable to power line telecommunications systems	S2	2019
<a href="#">232-1/3</a>	The effect of nanostructure materials on propagation	S2	2019
<a href="#">233-1/3</a>	Methods for the prediction of propagation path losses between an airborne platform and a satellite, ground terminal or another airborne platform	S2	2019

## Annex 7

### Suppressed ITU-R Question

Question ITU-R	Title
<a href="#">221-2/3</a>	Propagation by way of sporadic E and other ionization

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