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?

9What 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 2023.

Category: S2