QUESTION ITU-R 208-6/3

Propagation factors in frequency sharing issues affecting space radiocommunication services and terrestrial services

(1990-1993-1995-2002-2005-2013-2019)

The ITU Radiocommunication Assembly,

considering

*a)* that propagation data for radio paths are required when planning the sharing of frequency channels in radiocommunication systems;

*b)* that, in accordance with the Radio Regulations (RR), a coordination distance or coordination area should be determined for earth stations in the frequency bands shared between space radiocommunication services and terrestrial services;

*c)* that in the calculation of coordination distances, all pertinent propagation mechanisms and system factors should be taken into account;

*d)* that in the calculation of interference between systems, more detailed consideration of the contributing propagation mechanisms is required;

*e)* that the World Radiocommunication Conference (WRC-2000) approved a revision of Appendix **7** (subsequently modified by WRC-03, WRC-07, WRC-12 and WRC-15) based on material in Recommendation ITU-R SM.1448 which in turn is based on material in Recommendation ITU‑R P.620 covering the frequency range 100 MHz to 105 GHz;

*f)* that Resolution **74** **(Rev.WRC-03)** describes a process to keep the technical bases of Appendix **7** current,

decides that the following Questions should be studied

1 What is the distribution of signal level variations (both fading and enhancement) and their duration due to:

– diffraction;

– atmospheric mechanisms such as ducting, precipitation scatter, troposcatter and reflecting atmospheric layers;

– reflections from the ground and man‑made structures;

– combinations of these mechanisms?

2 What is the dependence of these effects on location, time, path length and frequency, taking into consideration the following points:

– the percentage range of greatest interest is from 0.001% to 50%;

– the reference periods of interest are worst month and average year;

– path lengths of greatest interest are those up to 1 000 km; however, in areas where ducting is prevalent (e.g. oceans in tropical and equatorial regions) much greater distances should also be considered;

– the frequency range of interest is approximately 100 MHz to 500 GHz?

3 How may improved models and prediction procedures be developed for precipitation scatter to determine the practical significance of this mode, and how does it depend on rainfall rate and structure and on system geometry?

4 What precipitation parameters, in addition to rainfall intensity and height of the 0°C isotherm, can be applied to precipitation-related prediction methods to take account of different climates?

5 What refractivity parameters can be applied to clear-air prediction methods to take account of different climates?

6 How can scatter from irregular terrain be quantified (including the effect of vegetation and man-made structures such as buildings)?

7 How can interaction between an antenna and the propagation medium be taken into account when considering modes of anomalous propagation (e.g. coupling into and out of ducts and the impact of use of omnidirectional, sector and high-gain antennas)?

8 How may site shielding be evaluated, with special emphasis on a practical procedure for calculating its magnitude in particular situations (e.g. small earth stations in urban areas)?

9 What is the correlation of fading and enhancements of the signal on separate radio links, and its influence on the statistics of interference?

10 What method best describes the differential rain attenuation statistics between a wanted path and an unwanted path?

11 What is a suitable method by which the total effect of the above-mentioned mechanisms can be taken into account when evaluating interference between terrestrial and Earth-space systems; in particular, what improvements can be recommended to the interference prediction methods contained in Recommendation ITU-R P.452 and to the propagation prediction procedures for determining coordination distance contained in Recommendation ITU-R P.620, including the alignment of these two methods in order to obtain consistency between the determination of coordination area and detailed evaluation of interference in individual cases?

12 Which are the most effective clear-air and hydrometeor-scatter propagation models to allow effective frequency coordination and interference potential evaluation between earth stations for geostationary-satellite systems and those for non-geostationary satellite systems sharing the same frequencies on a “bidirectional working” basis?

13 What method best describes building entry loss, that is the additional loss due to a terminal being inside a building?

14 What method best describes additional loss due to clutter, which refers to objects, such as buildings or vegetation, which are on the surface of the Earth but not actually terrain?

15 What is the correlation of interfering signals on multiple paths?

further decides

that the results of the above studies should be included in ITU-R Recommendations and/or Reports and that the above studies should be completed by 2027.

NOTE – Priority will be given to studies relating to §§ 2, 5, 6, 8, 9 and 10.

Category: S2