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?

14What are the best ways of presenting the required data?

15What 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;

2that the above studies should be completed by 2019.

Category: S3