

QUESTION ITU-R 211-5/3

**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)

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;
- j) that there are only limited propagation measurements available in some of the frequency bands being considered for short-range systems;
- k) 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 2013.

Category: S3