

Investigation of millimeter wave Gbps wireless access system based on analysis of millimeter wave propagation characteristics

Nobuhiko Kuribayashi¹ and Wuyi Yue²

¹ Siemens K. K.

3-20-14 Higashi Gotanda, Shinagawa-ku, Tokyo 141-8641 Japan
nobuhiko.kuribayashi@siemens.com

² Department of Information Science and System Engineering
Konan University, Kobe 658-8501 Japan
yue@konan-u.ac.jp

Abstract. In this paper, a detailed investigation of millimeter wave propagation characteristics and investigation of millimeter wave Giga bit per second (Gbps) wireless access systems are described. A desk propagation model is used in this paper along with measurements carried out to investigate propagation loss characteristics, frequency characteristics, and delay profile characteristics in the propagation channel along the surface of a desk plane. In an indoor propagation channel, LOS modeled delay profile and correlation bandwidth are investigated. According to the investigation results of measured delay profile and correlation bandwidth in an indoor propagation environment, OFDM modulation and its parameter settings are proposed. The ratio under received power threshold is calculated by measuring the complex permittivity of the target desk and the propagation loss characteristics along the surface of the desk plane. This calculation result shows Non LOS conditions existence even though line of sight is secured on the desk level environment. Visibility estimation in the typical Japanese office is calculated using a light emission method and shows high rates of Non LOS conditions. In order to minimize Non LOS conditions, reconfigurable multi-hop protocol is proposed.

Keywords: Millimeter wave, Wireless access system, Propagation characteristics, Multi-hop protocol, OFDM, Non LOS conditions.

1 Introduction

Wireless personal network (WPAN) and wireless local area network (WLAN) using microwave band have been established worldwide. These systems have several tens of Mega bit per second (Mbps) transmission data rate and are used for connecting PCs, PDAs, game machines, AV home servers, home electric appliances, etc.

However, high data rate demands for short-range communications are ever increasing. The current target transmission speed of short-range communications is presently 1 Giga

