Spatial and Temporal Characteristics of 60-Ghz Indoor Channels

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Abstract:

This article presents measurement results and models for 60-GHz channels. Multipath components were resolved in time by using a sliding correlator with 10-ns resolution and in space by sweeping a directional antenna with 7° half power beamwidth in the azimuthal direction. Power delay profiles (PDPs) and power angle profiles (PAPs) were measured in various indoor and short-range outdoor environments. Detailed multipath structure was retrieved from PDPs and PAPs and was related to site-specific environments. Results show an excellent correlation between the propagation environments and the multipath channel structures. The measurement results confirm that the majority of the multipath components can be determined from image based ray tracing techniques for line-of-sight (LOS) applications. For non-LOS (NLOS) propagation through walls, the metallic structure of composite walls must be considered. From the recorded PDPs and PAPs, received signal power and statistical parameters of angle-of-arrival and time-of-arrival were also calculated. These parameters accurately describe the spatial and temporal properties of millimeter-wave channels and can be used as empirical values for broadband wireless system design for 60-GHz short-range channels

Index Terms:
angular spread, delay spread, fading, millimeter-wave propagation, multipath channels, space time channel models