On-Body Path Loss Modelling Based On UWB WBAN Measurements

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Abstract:

This paper presents a path loss model for an ultra wideband (UWB) wireless body area network (WBAN) on-body communication. The modelling is based on the static frequency domain measurements in an anechoic chamber. The studies are done for several on-body radio channels and with two different UWB antennas (dipole and double loop) for the frequency range of 2-8 GHz. A linear least squares (LS) polynomial data fitting is applied to the post processed measurement data resulting parameters for a path loss model. It is shown that the loop antenna outperforms the dipole antenna in respect to the slope of the attenuation. However, the path loss at the reference distance is higher for the loop. It is also shown that the signal propagation delay in the antenna structures causes error in distance measurement and unless the error is compensated significant differences in the parameters of the path loss model may occur in a WBAN case. Finally, it is observed that by using energy detection notable benefit can be obtained if all propagation paths are considered instead of the first arriving path.