SARs Induced in Human Bodies Due to a LTE Femtocell in an Office

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Abstract— Recently, the rapidly developing technology of LTE femtocells is increasingly applied in indoor wireless communications. With the increasing use of indoor LTE wireless networks, people are great concerned about potential health hazards due to RF exposure from femtocells in everyday life inside indoor environments. It is important to quantify the EM absorption in human bodies when people work in proximity to LTE femtocells in indoor environments. In this study, the finite-difference time-domain (FDTD) method was used to calculate whole-body and localized SARs induced in 20 human bodies for a LTE femtocell placed at the center of a horizontal plane with a distance of 1.0 m from the ceiling inside an office with furniture at 700, 860, 1990, and 2600 MHz. The human body was assumed to stand up or sit on a metallic chair in front of a wooden desk. The LTE femtocell is designed to have omnidirectional radiation patterns with a gain of $6.1 \sim 9.8$ dBi in frequency bands of $698 \sim 960$ and $1710 \sim 2700$ MHz. The emitting power of the LTE femtocell is set to be 10 dBm. It is found that maximum whole-body and localized SARs of 6.05×10^{-7} and 1.04×10^{-5} W/kg are induced in the person numbered 5 when standing up near the LTE femtocell at 860 MHz, respectively. It is clear that maximum whole-body and localized SARs of 6.05×10^{-7} and 1.04×10^{-5} W/kg induced in a human body very close to the LTE femtocell are far below the ANSI/IEEE standards of 0.08 (whole-body) and 1.6 W/kg (localized) for public exposure in uncontrolled environments, respectively.