

## Human Exposure to RF Fields from a LTE Femtocell in an Office

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In the near future, LTE femtocells will play a key role in the enterprise and metro deployment areas for 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. Therefore, the study of long-term exposure due to RF field emission is especially important, since people spend most of their life time in indoor environments. In this study, the finite-difference time-domain (FDTD) method was used to calculate whole-body SARs induced in 20 human bodies for a LTE femtocell placed at the center of a horizontal plane with a height of 2.65 m above the bottom slab inside an office with furniture at 700, 860, 1990, and 2600 MHz. The office has a dimension of  $19 \times 9 \times 3.65$  m and consists of two reinforced concrete slabs with a thickness of 20 cm, two reinforced concrete walls with a thickness of 15 cm, two concrete block walls with a thickness of 15 cm, two wooden doors with a thickness of 5 cm, seven glass windows with a thickness of 1 cm, and four square reinforced concrete columns with a side length of 80 cm. The LTE femtocell is designed to have omnidirectional radiation patterns with a gain of 6.1 ~ 9.8 dBi in frequency bands of 698~960 and 1710~2700 MHz. The emitting power of the LTE femtocell is set to be 10 dBm. Maximum whole-body SARs induced in 20 human bodies are found to be  $2.4 \times 10^{-4}$ ,  $3.2 \times 10^{-4}$ ,  $1.4 \times 10^{-6}$  and  $8.2 \times 10^{-8}$  W/kg at 700, 860, 1990, and 2600 MHz, respectively. It is clear that the maximum whole-body SAR of  $3.2 \times 10^{-4}$  W/kg induced in a human body very close to the LTE femtocell is far below the ANSI/IEEE standard of 0.08 W/kg for public exposure in uncontrolled environments. Fig. 1 shows whole-body SARs induced in 20 human bodies at 700 and 860 MHz, respectively.

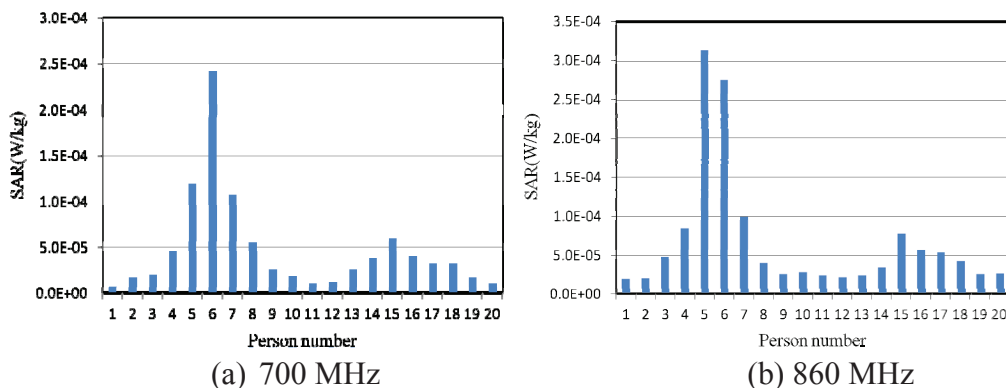


Fig. 1 Whole-body SARs induced in 20 human bodies at 700 and 860 MHz, respectively.