

Abstract

Prog Biophys Mol Biol. 2011 Dec;107(3):412-20. doi: 10.1016/j.pbiomolbio.2011.08.004. Epub 2011 Aug 16.

Exposure to radio frequency electromagnetic fields from wireless computer networks: duty factors of Wi-Fi devices operating in schools.

Khalid M¹, Mee T, Peyman A, Addison D, Calderon C, Maslanyj M, Mann S.

Author information

Abstract

The growing use of wireless local area networks (WLAN) in schools has prompted a study to investigate exposure to the radio frequency (RF) electromagnetic fields from Wi-Fi devices. International guidelines on limiting the adverse health effects of RF, such as those of ICNIRP, allow for time-averaging of exposure. Thus, as Wi-Fi signals consist of intermittent bursts of RF energy, it is important to consider the duty factors of devices in assessing the extent of exposure and compliance with guidelines. Using radio packet capture methods, the duty factor of Wi-Fi devices has been assessed in a sample of 6 primary and secondary schools during classroom lessons. For the 146 individual laptops investigated, the range of duty factors was from 0.02 to 0.91%, with a mean of 0.08% (SD 0.10%). The duty factors of access points from 7 networks ranged from 1.0% to 11.7% with a mean of 4.79% (SD 3.76%). Data gathered with transmit time measuring devices attached to laptops also showed similar results. Within the present limited sample, the range of duty factors from laptops and access points were found to be broadly similar for primary and secondary schools. Applying these duty factors to previously published results from this project, the maximum time-averaged power density from a laptop would be 220 $\mu\text{W m}^{-2}$, at a distance of 0.5 m and the peak localised SAR predicted in the torso region of a 10 year old child model, at 34 cm from the antenna, would be 80 $\mu\text{W kg}^{-1}$.

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PMID: 21856328 [PubMed - indexed for MEDLINE]



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