

EXPERIMENTAL EXPOSURES SYSTEMS AND PRACTICAL FIELD MEASUREMENTS FOR EVALUATING ELECTROMAGNETIC RADIATIONS FROM MOBILE BASE STATIONS

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ABSTRACT

Practical measurements of the power density are very important procedures to insure that the field levels in the vicinity of mobile base station antennas are within the regulation limits in areas where public could access. This paper presents the techniques as well as the results of practical field measurements that were done among different types of base stations (Macro, Micro-Base stations and Towers) located in Cairo. Base stations operate in urban environment where there are many scatterings and objects in the exclusion zone. Hence, the exposure criteria will differ from that of free space far field exposure. There are two kinds of measuring techniques: broadband and narrowband (frequency selective). The broadband technique evaluates all the possible electromagnetic radiation sources within the probe's frequency range. Thus, the verification of the safety recommendation levels by means of broadband measurements guarantee compliance. Broadband measurements are often performed for a rough survey evaluation of compliance. As such, they can verify that the radiofrequency field exposure is low and below the limits, whereas if broadband measurements results are not below the safety regulations, additional narrowband measurements were done to determine the contribution of a base station to the field at the measurement point. Moreover, it is usual to find areas where the total exposure is from the contribution of more than one operator, thus at points that were found maximum with the broadband probes, the percentage of the contribution of a specific antenna to the total exposure can be determined with frequency selective measurements. A second advantage when performing frequency selective measurements is that a precise compliance evaluation requires frequency-specific data, in order to weight the contribution at different frequencies before summing them. A spectrum analyzer was used in the frequency selective measurements and care was taken to its settings i.e. the resolution bandwidth and the attenuation, also it was important to know the characteristics of the antenna connected to the analyzer, as well as the losses in the cables. Practical field measurements were done for 76 Base stations. These measurements were divided according to the sites criteria: Thirty-one measurements were done over the roofs of buildings where Macro-BS are constructed. Eight measurements were done for Micro-BS located either outdoor or indoor. Seven measurements were done for Macro-BS sited on towers and thirty public access locations were measured using frequency selective instrumentations. A comparison was done between the measured power densities found in Cairo and that from outdoor base station antennas in most of the European countries.