Overview of Factors Affecting Wireless Antenna Integration in the Mobile Platform

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Mobile platforms, including notebook computers and Ultra mobile PCs integrate antennas to support multiple wireless radios in increasingly smaller form factors. The present paper provides an overview of factors and the tradeoffs involved in obtaining an optimal antenna solution for a mobile platform. The wireless radios on the platform include WLAN, WWAN, WiMAX, BT, GPS and UWB, to name a few. In addition to performance being determined by antenna gain, efficiency and matching, digital circuitry produces RF noise that tends to desense radio receiver sensitivity, and compromises user experience. The presence of radios that use overlapping or closely spaced regions of the spectrum also presents a challenge in locating antennas on these platforms. The material composition of the chassis, conductive coating to reduce emissions and concerns about the bio-electromagnetic effects of high power radios are to be accounted for. The cable used to connect the radio module to the antenna and the specifics of this routing through noisy digital components adds another factor that determines the final radio performance.

This paper surveys antenna selection and placement in existing notebook platforms. It also provides an overview of the process involved in arriving at specifications for the antennas. Some common antenna topologies with their size Vs performance numbers are presented. Results will be presented on typical gain, efficiency and isolation between antennas in existing platforms. Simulation can provide a first order estimate of the performance of antennas once embedded in a notebook computer. They also provide a relatively easy method of identifying trends that help in arriving at the final configuration. Results of simulation studies are presented based on a chosen mobile platform. Finally, trends that are likely to affect future platforms will be presented.