Chapter 6
Measurement Analysis of Ultra-Wide-Band and Ultra-Wide-Band-MIMO Antennas: Review and Analysis

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ABSTRACT

This chapter mainly focused on the recent trends in the antenna design techniques for next-generation wireless communication systems. Ultra-wideband antenna and multi-input-multi-output antennas are very useful to achieve higher data rates. An antenna is a transducer that changes guided electromagnetic energy in a transmission line to radiated electromagnetic energy in free space. Antennas may also be observed as an impedance transformer, coupling among an input or line impedance, and the impedance of free space. The looming widespread commercial deployment of ultra-wideband (UWB) systems has flashed new interest in the subject of ultra-wideband antennas. The power levels approved by the FCC mean that every dB counts in a UWB system as much as or possibly even more so than in a standard narrowband system. Thus, in effect, UWB antenna is a precarious part of an overall UWB system design. Basic principles for ultra-wide-band (UWB) antenna design and radiation are presented and discussed in this chapter.

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INTRODUCTION

The raising requirement for excessive data rates and then the limited obtainable bandwidth revokes the exploration of wireless devices that may effectively make use of the spatial domain (Subramanian & P., 2016). Considering the expense, overall size, and complexity constraints along at the terminal, antenna arrays are often taken into consideration merely along at the base stations (access points) to spatially discriminate the preferred signal via disturbance and noises. Making use of spatial diversity (Dietrich et al, 2001) at the same time on reception and transmission, can certainly make improvements to throughput and so coverage also to permitting a much higher level of spectral reuse and thus maximize the system capability. Therefore for higher data rate can be achieved with UWB and MIMO techniques. Antenna is essential component of any wireless system and hence in this chapter these two type of antennas to be analyze. The Chapter organized as follow: in the first steps the detailed literature of UWB and MIMO antenna have been carried out and in the next section the measurement analysis of monopole UWB and 2×2 MIMO antenna with monopole disc for UWB applications have been carried out. Finally chapter conclude with future direction and scopes.

UWB ANTENNA'S DESIRABLE PROPERTIES

The ultra-wide frequency bandwidth is the key parameter in differentiating the UWB antenna with various other antennas. In accordance with the FCC's specific description (Fields & R. E, 1997) an appropriate UWB antenna should have the ability to deliver an overall bandwidth of in no way lower than 600 MHz frequency or simply a fractional-bandwidth concerning at minimum 0.20 dB. In addition, UWB antenna should be remain working or operational. Also it must show steady impedance matching covering the whole frequency spectrum of 3.1-10.6 GHz in the circumstance of Impulsive-UWB in accordance with the outlined spectral mask defined in the FCC guidelines. In some cases, it might be needed (such as in European countries) in which UWB antennas need to be furnished the band-rejected feature with various other narrowband systems and applications accounting for the exact same operational band.

Depending on the nature of the application being processed, the directional or simply Omni-directional antenna characteristics are often desired in accordance to the functional software programs (Cordeiro et al., 2005) Omni-directional patterns are more often than not preferred in cellular and hand-held devices. Directional radiation patterns are generally preferred for radar units and additional directional unit in which high-gain is often required.