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Advancements in Computer and Communications Engineering

Editors

Othman O. Khalifa
A. H. M. Zahirul Alam
Amir A. Shafie
Wajdi F. Al-Khateeb



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Chapter 6

Design and Simulation of Linear Adaptive Antenna Array for Mobile Base Station

Md. Rafiqul Islam, Hany E. Abdel-Raouf, Feisal Aden &
Fouad Abdillahi Barreh

Introduction

Wireless communication development has remained very crucial and cannibalizing wired communication because of its great mobility and weightless advantages. Due to the limitation of radio frequency and relatively high demand of services the channels tend to be overwhelmed. Spectrum efficiency and reliability has become therefore an area which requires competitive advantage skills from mobile communication service providers. Capacity and reliability are limited by two major impairments co-channel interference and multipath fading. Smart antenna is a technology that mitigates the above impairments. It consequently ensures a great increase in both spectrum and power efficiency and provides higher data rate with better reliability. Smart antenna consists of an array of antenna elements whose outputs are adaptive combined by intelligent digital processing units.

Adaptive array system is an array of antenna elements which is capable of steering narrow beam(s) and nulls in desired directions. In this paper, an adaptive array that operates in the range of frequencies 1885-1990 MHz is designed and simulated using IE3D Zeland software. IE3D is an integrated full-wave electromagnetic simulation and optimization package based on Method of Moment (MoM) for the analysis and design of 3D and planar microwave circuits, MMIC, RFIC, RFID, antennas, digital circuits and high-speed printed circuit boards (PCB) [4]. Results from different excitations and their analysis are presented in the following sections.