SMART ANTENNA SYSTEM PERFORMANCE

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ABSTRACT

Over the last few years, the number of subscribers to wireless services has increased enormously at an explosive rate. This ever growing demand for wireless communications services is constantly increasing the need for better coverage, improved capacity and higher quality service. Using the approach of switched beam antenna system, an intelligent sector synthesis of varying azimuth and beamwidth can be established. By doing so, traffic load balancing can be achieved and headroom for the growth of more traffic can be created.

The performance and feasibility of smart antenna for cellular radio systems is investigated. The system is believed to be the solution for high capacity system. MATLAB simulation is used to compare the capacity among omni directional, 3 sector (120^{o}) and 12-switched beam smart antenna system. The project also studies the use of switched beam smart antenna system in cellular communication system for reducing co-channel interference. The C/I performances are analyzed and results are compared with those obtained when omni and 3 sector antenna are used in base station. The switched beam smart system can improve both C/I ratio by 6 dB and trunk efficiency. The C/I under different pathloss exponent and reuse factor are also compared within these systems. Then the trunking efficiencies among these systems are also compared. The result shows, that smart antenna does support reasonable C/I ratio, and the highest trunking efficiency.

Keywords : Switched beam, antenna array, trunking efficiency, pathloss exponent.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The cellular mobile telephone system has found important applications in metropolitan areas. Its frequency band has been allocated by the Federal Communication Commission (FCC) to be on 824-849 MHz for transmission from mobiles and on 869-894 MHz for transmission from base stations. The channel spacing is 30 kHz. This frequency band can accommodate 832 duplex channels. Among them, 21 channels are reserved for call setup, and the rest are used for voice communications.

The rapid growth in demand for mobile communication has led into intense research and development efforts towards a new generation of cellular systems. The new system must be able to provide quality-of-service (QoS), support a wide range of services and improving the system capacity. Small cell systems allow greater spectral reuse, larger capacity. However, small cell systems induce an increasing numbers of handoff.

While overlaying cells provide coverage and service for high-speed users. Hierarchical cell architecture can therefore serve all type of user classes with different services and speed. The system performance characteristics include blocking probability, handoff blocking probability, force termination on ongoing calls and total carried traffic.

Efficient utilization of the scare spectrum allocation for cellular communications is certainly one of the major challenges in cellular system