Performance Analysis of Employing Array Antennae in CDMA Systems

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ABSTRACT

The performance of linear and circular array antennae deployed in CDMA base stations is analyzed in terms of intra- cellular interference reduction factor, inter-cellular interference increase factor, and improved gain in received bit energy-to-interference PSD ratio as a function of number of antenna elements. Our analysis is performed according to the beam forming pattern derived from the array antennae. We find that as the number of antenna elements increases, the intra-cellular reduction factor decreases, while the inter-cellular interference increase factor increases. In the received bit energy-to-interference PSD ratio, there is a gain due to the application of array antennae, where the optimal gain occurs when the number antenna elements is 12 and 16 for the linear and circular arrays, respectively. The gain decreases as the number antenna elements is greater or smaller than 12 and 16 for the linear and circular arrays, respectively, due to the increase of inter-cellular interference level coming from the main and side lobes direction. Compared the gain performance in our working environment, the linear one has a gain that is at least 7 dB better than the circular one, but requires 50% more elements.

Keywords: CDMA　linear array antenna　circular array antenna　intra-cellular reduction factor　inter-cellular interference increase fa

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