

Practical Applications of Smart Antennas to Wireless Networks

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Abstract

Smart antenna systems allow for more efficient use of the overburdened cellular spectrum. Smart antennas provide greater capacity from existing cell sites, more consistent coverage with improved call quality, and a reduction in the number of antennas. Smart antennas allow service providers the ability to elegantly clear spectrum for digital services, and, in the deployment of co-located CDMA systems, allow the analog and digital networks to use the same antennas without having the same sector orientations and sector beamwidths.

Simulation and field testing results of smart antennas system show that a significant increase in carrier to interference (C/I) over a conventional omni or 3-sector system are achievable. This presentation addresses how to practically take advantage of the reduction in interference that smart antennas provide.

Using switched narrow-beam antenna systems allows a frequency planner greater flexibility in designing a cellular system. In addition to supporting flexible sector sizes, smart antennas provide more precise traffic data. By studying the amount of time particular beams or antennas are being used, the probability of having an unacceptable interference condition can be determined. As a result of having improved interference reduction and more detailed system information, aggressive frequency reuse is possible. Field results confirm theoretical calculations and show that it is possible to increase system capacity by tightening frequency reuse without degrading network switch statistics.