



Method for Improving Performance in a Sparse Multipath Environment Using Reconfigurable Arrays

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Inventors: Akbar Sayeed, Vasanthan Raghavan

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved wireless communication system and method.

Overview

The most salient feature of wireless communication channels is signal propagation over multiple scattering paths. Although this so-called multipath signal propagation leads to undesirable signal fading, it is an important resource for increasing the capacity and reliability of wireless links. In particular, multi-element antenna arrays offer a promising means to improve the rate and reliability of wireless communication devices. However, existing multi-antenna technologies were developed on the assumption of a rich multipath environment—a mathematical abstraction that is seldom found in reality.

The Invention

UW-Madison researchers have developed a wireless communication system and method that use reconfigurable multi-element antenna arrays to support improved performance in sparse multipath environments that are commonly encountered in practice. To maximize the information capacity of a wireless link, the antenna spacings are systematically adapted at the transmitter and/or receiver arrays based on the sparsity of the multipath environment and the operating signal-to-noise ratio (SNR). The method involves two basic steps: 1) channel sounding or estimation at a critical antenna spacing to determine the number of spatial degrees of freedom (DoF) available for communication, and 2) adjusting the antenna spacing at the transmitter and receiver as a function of the estimated number of DoF and the operating SNR to optimize the capacity of the wireless link at that SNR.

Applications

- Wireless communications

Key Benefits

- Provides significant gains in information capacity or reliability by using reconfigurable antenna arrays
- Allows the operator to trade off rate for reliability or vice versa by appropriately adjusting the antenna spacings at the transmitter and receiver
- At medium-to-low operating SNRs, this method results in gains in information capacity in direct proportion to the number of antennas as compared to existing methods based on fixed arrays

Stage of Development

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The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones.



WARF
Wisconsin Alumni Research Foundation

| info@warf.org | 608.960.9850

WARF believes that these technologies are especially attractive opportunities for licensing.

Tech Fields

- [Information Technology : Networking & telecommunications](#)

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846

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