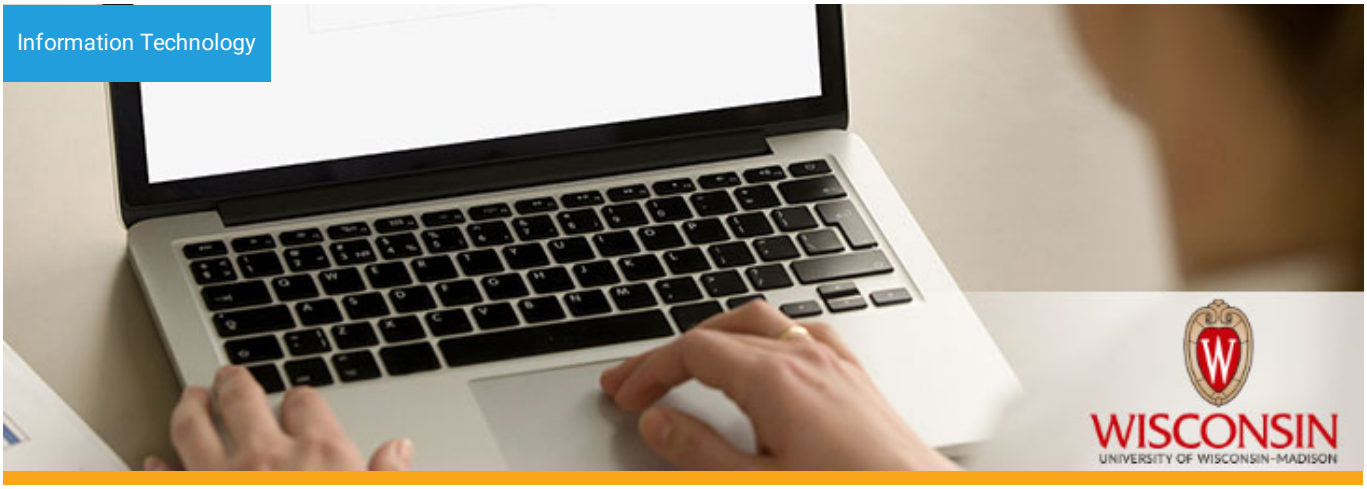
Information Technology



Distributed Scheduling Method for Multi-Antenna Wireless Data Communication System

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method of scheduling the use of antennas in a MIMO wireless communication system to maximize the efficiency of the antennas.

Overview

High-speed wireless data communications systems, such as wireless metropolitan area networks (MANs) operating with multiple input-multiple output (MIMO) systems, use multiple antennas on transmitters and receivers. These commonly used systems can support one customer per antenna.

Maximizing the efficiency of these antennas allows wireless providers to support more customers and earn more revenue. One way of optimizing multi-user communication involves a process called “beam forming,” which allows simultaneous communication over several different channels. The simplest multi-user beam forming methods use zero forcing beam forming (ZFBF), where communication channels are selected to provide zero interference with each other.

Problems arise when the pool of customers exceeds the number of available channels. In these situations, different channel allocation strategies may be used to maximize data transfer rate or quality of service. Determining the optimal user subset from the larger pool of users involves an extremely complex computation and becomes impossible for modern technology to handle with user pools as small as 12, when they are often much larger. In addition, this requires communication overhead, or additional communication between transmitters and receivers. As the pool of users grows, this transmission overhead can overwhelm the benefits of the optimization.

The Invention

UW-Madison researchers have developed a method of scheduling the use of antennas in a MIMO wireless communication system that addresses the problems of mathematical intractability and communication overhead. The method offloads the optimization process to the individual base station receivers, dynamically allocating communication channels between a base station and a group of mobile stations. As a result, as the number of users increases, the potential computational power also increases, improving the scalability of the optimization process. Also, by distributing the optimization process among these base station receivers, the amount of communication overhead is significantly reduced. The invention matches most of the existing schemes in performance, while having a limited overhead.

Applications

- High-speed wireless data communications systems

Key Benefits

- Methods apply to uplink setup as well as downlink
- Fixed overhead that only scales with the number of antennas at the base station
- Competing technologies are prohibitively costly or labor-intensive

- Can be used with the IEEE Standard 802.16, which defines the WirelessMAN air interface specification for MANs
- Base station would contain necessary optimization information without requiring it to perform the optimization process.

Additional Information

For More Information About the Inventors

- Parameswaran Ramanathan

Tech Fields

- Information Technology : Networking & telecommunications

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842