Selection of antennas in a smart antenna array for broadband wireless communications

Combining the response of multiple antennas in an array improves the signal quality in wireless communications systems. But the number of antennas often outnumbers the channels that the system can process. This technology provides a method for identifying an optimal subset of antennas to use. An initial subset is selected, and an objective function indicative of the signal quality is recorded. By iteratively replacing antennas and recalculating the objective functions, the configuration with the best response is determined. This may lead to increasing the reliability of wireless communications.

Iterative determination of an objective function allows for smart antenna array selection with limited physical information

Conventional methods require information about the system’s channel matrix, but in some systems this information is unknown. This technology finds the best antenna subset without needing any information about the channel matrix, which makes it implementable in a greater number of systems. A discrete stochastic approximation rapidly identifies which antennas to use. Configurations can be determined for both transmission and reception. The technology is applicable in any hardware system using antenna arrays.

A comparative algorithm is used for determination of when the best configuration has been found.

Lead Inventor:

Xiaodong Wang, Ph.D.

Applications:

- MIMO systems for high data transfer rates, which are used in mobile phones.
- Wireless communication systems that make use of antenna arrays, such as WLAN or WPAN.
Advantages:

• Can be implemented in any type of transmitter or receiver, allowing for existing systems to be upgraded.
• Compatible in systems where the number of antennas is much greater than the number of processing channels.
• Expands versatility by being capable of optimizing arrays that pass received signals through phase shifters.

Patent information:

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Related Publications:


Inventors

Xiaodong Wang