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A Survey on Energy-Efficient Spatial Filtering in Wireless Communication

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ABSTRACT

Spatial filtering, we review the literature on signal processing technique to control the directional for both transmission and receiver side. we are growing concern of energy efficient. Various strategies of improving the energy efficiency of adaptive Spatial filtering, efficient cooperative communication, network coding, etc was proposed. We proposed the cooperative Spatial filtering using mode switching algorithm. The main problem of Spatial filtering is unwanted signal appeared. The issue overcome using mode switching algorithm and also exists the RLS-QRD algorithm and array signal processing was exists. These analytical(algorithm) starts with the Single User Single Output(SISO) and Multiple Input Multiple Output(MIMO).

KEYWORDS : MIMO, energy efficiency, virtual MIMO, Mode switching algorithm.

I. Introduction

In the past decade, energy consumption is very high consumption in wireless communication and energy optimization is very low power in wireless communication. Energy consumption and Energy optimization are both of them in knknnnnThe circuit energy consumption may not neglible than the transmit power. In mobile terminals, current cellular networks, cellular mobile terminals are improve higher transmission rate for a long period of time.

Many number of basestation increased at improving the energy costs improving that mean energy efficient is increased. In significant process is made on the art of design wireless transmitter and receiver such as signal processing technique, network protocol and channel coding technique. In this paper,the literature on energy-efficient communications the number of bits that can be inreliably conveyed over the channel per unit of energy consumed. Two main approaches: a pragmatic approach and information theoretical approaches. The pragmatic approach such as coding and decoding schemes, modulation techniques, etc. The systems investigation either of Single or Multiple antenna terminals.

Many advanced techniques such as Multiple-Input Multiple-Output(MIMO) techniques, Multiple input Single Output,relay transmission, ect to provide high Spectral efficiency(SE). They energy efficient was investigate of fixed rate and variable rate used in MIMO.

The transmitter is adjust depending the function of the channel state. The type of channel state such as static channel state, the fast fading channel state, the slow fading channel and only the statistic of the channel state. The static channel is performed in channel state information at the transmitter and statistic channel state is required only at the transmitter. The information theoretical approach is used only SISO. So, the pragmatic approach is used both SISO and MIMO.

a. Energy Efficient using MIMO vs SISO

The energy efficiency is comparison between MIMO and SISO account to take the extra training overhead needed in MIMO system. In both of them MIMO and SISO was performed has CSI(Channel State Information). MIMO system is containing more no of training symbols is required than the SISO system because SISO system leading to high energy consumption. Suppose if we need the number of training symbols greater than or equal to the number of transmit antennas use the same transmit energy. The systems can achieve higher energy efficiencies even though they use extra circuitry, which consumes more energy. This work has been extended a distributed MIMO sensor network by including the power consumed by the training, For a uplink cellular network, it has that switching from a MIMO to a Single-Input Multiple Output(SIMO) systems can save energy in the mobile terminal when the base station(BS) is utilized. Same, it the downlink, activity only a single antenna in the BS is optimal when random Spatial filtering is used. The maximizes the energy efficiency when the complete CSI is only.

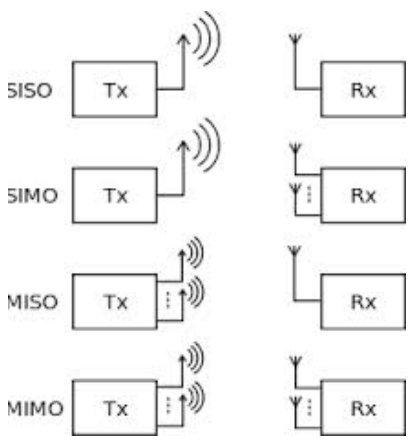


Fig: Energy Efficient using MIMO and SISO

a. Energy saving using MIMO

In SISO we had use only two nodes only that mean one transmitter side at one node and receiver side at another node. In any one have energy is very low at the time we have send the data it can surely loss is determined. So only we can used MIMO it can formed group use many node. It can transmit the data suppose energy can loss at time we already formed group in many node so energy can transmitted from one node to another node and can get energy and transmit the data. These process is running very fast macroseconds

b. Transmission distance using MIMO

The total circuit power consumption values for the D/A converter(DAC), the intermediate frequency amplifier(IFA), the mixer, the active filters at the transmitter side, the active filters at the receiver side, the frequency synthesizer, the low noise amplifier(LNA) and the A/D converter(ADC). The transmission distance is used in both MIMO and SISO but MIMO is better than SISO.

Supposed if the transmission distance taken in SISO, its took to very long distance. So, the receiver side didn't get the every data or information. They have less speed only and the output performance is poor and also not clearly appeared. So we used in MIMO it send the data or information goes in small distance only compared to the SISO. The output performance is clearly appeared and sended the information to the receiver side with efficiently. Supposed if the transmission distance taken in SISO, its took to very long distance.

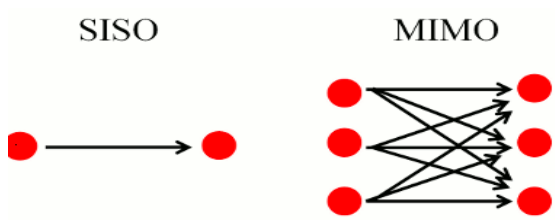
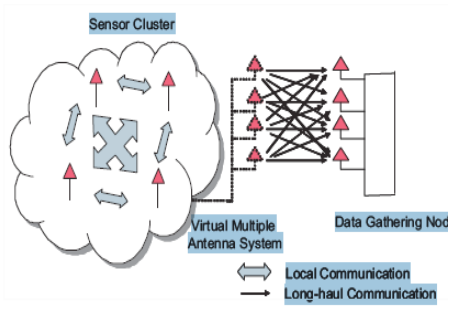


Fig: Transmissio distance using SISO vs MIMO

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c. Virtual MIMO used in sensor network sensor

In node is a wireless sensor network may not able to accommodate the multiple antennas. But we can implemented in MIMO technique in wireless sensor network. In distributed



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Fig: A virtual MIMO based in sensor network

In MIMO technique as followed two achieved are one is The set of data collection node has sent to the data gathering node and another their the data has sent to the time division multiple access scheme. This step is known as the local communications at the transmitter side not at the receiver side. This step of each node has data and from all other sensor node enabling space time block coding to the distinct transmit antenna. In data gathering node have not energy constraint so they have long battery life and also have larger physical dimensions to accommodate multiple receiver antennas. Data collection node in MIMO used in both transmitter side and receiver side it have more convenient and efficiently.

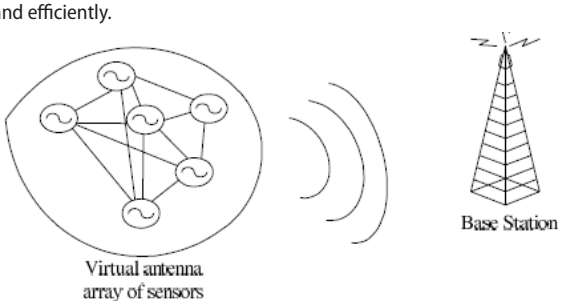


Fig: Communication model for a sensor network

The main assumption is that local communication among the cooperating sensors is inexpensive compared to transmitting to the Base station. We considered a master-slave architecture, a designated master sensor coordinates the calibration and synchronization of the carrier signals of the other slave sensors. The sensors use cheap local communication between the master and the slave sensors to emulate a centralized antenna array, and to avoid the need for coordinating with the distant BS.

II ENERGY EFFICIENT SCHEMES

a.Distributed control algorithm

In energy efficient using Direct communication schemes. D. Feng and C. Jiang is analyzed [Ref-10] was Direct communication observed the distributed control algorithm used. Direct communication is nothing but non-adaptive direct communication. For non-adaptive DC, the source node always transmits at maximum allowed power is a disadvantage of DC. Non adaptive source to destination is allowed direct link in SISO.

b. Mean square LLS algorithm

In energy efficient direct communication used after then adaptive direct communiation is analyzed. G. Lim, L. J. Cimini [Ref-10] was observed adaptive direct communication are mean square LLS algorithm is better than direct communication. In the adaptive system, the power is adjusted so that the bit error probability meets the target. But the efficient is same for both adaptive system and non adaptive systems. The transmission rate is the bits/symbol used for the source-to-destination, the training overhead in the ADC systems is disadvantage one.

c. Information theoretical approach

In information theoretical is the best transmit and receive policies which maximize the number of bits that can be reliably conveyed over the channel per unit of energy consumed and the input alphabet does not contain zero cost symbols. But one disadvantage is appeared in information theoretical only used SISO. They have send only minimum number of bits and receiver power is not available.

d.Pragmatic approach

Pragmatic approach is started with the single antenna and SISO. E. V. Belmega and S. Lasaulce, in both he analyzed pragmatic is also used MIMO(multi- user scenario) in [ref-10]. The transmitter can send independent data flows over a number of orthogonal carriers. The throughput is the transmission rate depending on the SNR gap factor. In pragmatic approach is only reduced 30 percent energy efficient delay only. one of the disadvantage in pragmatic approach.

e.Mode Switching algorithm

In general, for short distances, ADC outperforms CBF since the circuit power consumption dominates the power consumed in transmitting the signal. As the distances increased, CBF provides in a higher energy efficiency than ADC. Because ADC have only its lower outage probability. Gubong Lim is observed the energy efficient delay is reduced only 60 percent and the circuit power is also considered in ref-14. One of the disadvantage is unwanted signal is appered.

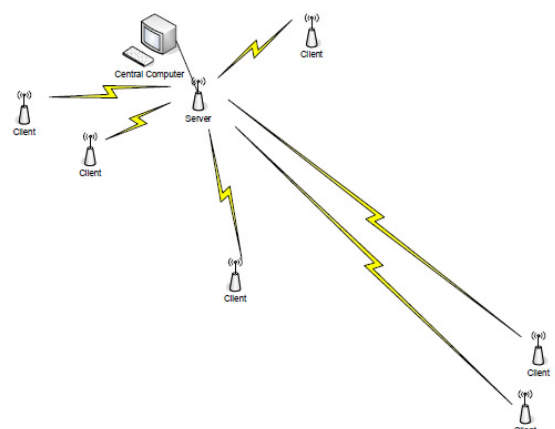


Fig: Star network in ADC

It is the important to consider the actual data flow the network when implementing a Zigbee-type mesh. While all node may be capable of communicating with each other, in reality, most networks are point to mulpoint, and form a star topology. Data from the end points is also able to flow back to the central point. .

In this paper, we analyzed of energy efficient Spatial filtering. Many issues is appeard have includes in transmission distance incremented, energy consumption is high and power consumption is also high. Anyway these issue was overcome and after appeared in unwanted signals. So only used cooperative Spatial filtering. In cooperative Spatial filtering means control the signal with wireless group formed and get needed signal only. In cooperative Spatial filtering is use MIMO system technique. We have avoided includes high transmission distance, high power consumption, etc and to provide high energy efficiency and to control the signal in group formed where the circuit energy is also considered.

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