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Efficient Energy Performance of the Wireless Sensor Networks and Cross Layer Optimization

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ABSTRACT

Individual of the largely significant issues in wireless sensor networks is the proper exploitation of the power consumption. Energy consumption in a node takes place at places Circuit level for processing the data and the stage some actions and power consumption during transmission. For our model we have considered both the constraint into a simplified equation. We measured various WSN system consisting different no of sensor nodes and with different topologies are also selected for our simulation function .we found that operating the WSN in a cross layer optimization we can reduce the in general energy of the system. Parameter like first packet send and ,last packet send ,and total bytes send, First packet arriving ,total packet arriving are compared and analysed.

Keywords: WSN, Long haul communication, Local communication and Cross layer optimization.

1. INTRODUCTION

Current developments in embedded system have made likely to implement analog to digital conversation (ADC), signal processing, digital to analog conversion (DAC) and various sensing unit in a single on board chip. Wireless sensor networks are a group of these sensing units placed randomly or with some the particular pattern. One of the limiting factors affecting the operation of WSN is limited battery lifetime. Thus minimizing energy consumption and maximizing network lifetime is one of the fundamental operating constrains. The major source for energy consumption is frequent retransmission efforts, wake up mechanism, periodic beacons to the innermost base stations.

A group of investigate has been carried output increase the network lifetime. Power can be minimized either by routing policy or improvise the corporal characteristics of the wireless sensor networks.

The concept of using a relay knob was first explained by van mulen. The author investigated on sending information in one specific direction assuming that all nodes or terminals cooperate with each other. The bounds discovered by him were appreciably better by cover and EI Gamal in his paper [5]. Two basic relaying techniques decoded and forward (DF) and compressed and forward (CF), were also discussed in their works.

Later sendonari s at Al., 1998 suggested and developed energy efficient transmission protocols which relied on spatial diversity in which diversity gain is achieved through cooperation among cellular CDMA users. their work mainly focused on the number of successful packet transmission .author Tao Yang, Leornard Barolli in [3], gives comparison evaluation for mobile and static sensor nodes in wireless sensor networks (WSNs) using Two ray ground propagation model and different protocols. They considered packet loss and delay metrics to evaluate the recital of WSN. They investigate how the sensor networks performance in this case when the sensor nodes new considering two ray ground and shadowing proliferation models. They carry out replication for topology considering Ad-hoc source-demand distance vector (AODV) and dynamic source routing (DRS) protocol. Author mohnmmnd rakibulislam et.al in [4] describe cross layer optimization communication for force limited wireless sensor networks. It is based on outlet estimated certain nodes and in this scheme, they implement the selective approach on clustered wireless sensor network whose data are correlated. Group coldness for both the local transmission and long haul transmission to make energy spending in line with distance. They investigate the total energy burning up and energy efficiency for different combination of active and selected number of sensors.

The power fitness of cross layer optimization transmission analyze with the consideration of the channel education overhead in [5]. Then a LEACH based solitary –hop transmission scheme was planned using cooperative cross layer optimization techniques. Laneman et al. (2004) [20] worked on a simple relaying protocol to combat fading outcome, though their work was stimulated application in the area of cooperative communication. They energy and delay efficiency of the planned scheme are derived using analytic techniques. They develop technique for evaluating the energy and delay efficiency of the proposed cross layer optimization based sensor networks.

The dependence of these energy and delay efficiency on system and propagation parameters such as transmission distance, gathering size and channel path loss parameter is investigate. They introduce several realistic modifications to the simplified energy analysis technique by taking into account extra training overheads and impact of the channel

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ahead to study also introduced mobility. Our system models is encouraged from the work of [1].

2. SYSTEM MODEL

The energy requirement depends upon:

1. Local inter node distance, dm
2. The distance between source and destination is dm.
3. Nt and Nr nodes to cooperative at Tx and Rx sides respectively.

The intra-cluster communication is required for communication between the nodes within the cluster and inter cluster communication for cooperative MIMO between one cluster and the access point (AP). The total average power consumption of a signal path is divided into the power utilization of the power amplifier and the power consumption of the rest of the circuit components. The energy extreme in long haul transmission can be limited by using data aggregation thechinique.as data aggregation technique. As data aggregation is a technique by which we can reduce the amount of data (elimination of redundant data) in transmission .as the data to be transmission is reduced, it minimize the energy consumption during transmission. Data aggregations can be combined to various techniques' for the saving energy in the WSN. In our scheme of Cross Layer Optimization we several neighbouring sensor nodes to transmit information cooperatively and equip each mobile agents with multiple received antennas. We made some modifications to adopt the CROSS LAYER technique presently pythgogrean scheme is limited to for antenna or less. But a much wider range of antenna scheme can be utilized from vertical Bell Labs Layered Space –Time (V-BLAST), we assume that the mobile agents have received antennas and at altitude much large then the distance between the neighboring sensor nodes, thus can be viewed as a set of transmitter and receiver antennas. SISO can be viewed as a special case with, Mt=1 and Mr=1 for each transmission. The structure of cross layer is illustrated in fig.1. In our model we have used single mobile agent. The total energy of our system can be divided into two parts: the power consumed by the power amplifiers Rpa and that by all the other circuit blocks Rc thus they can be estimated as,

$$R=R_{SA}+R_{C}=(P_{Pa}+P_{C})/R_{b}$$

Where Rb the data rate of the transmission and power amplifier power is given by.

$$P_{PA}=(1+a)P_{out}$$

Where alpha=(e/n)-1 with the drain efficiency of the RF power amplifier and the peak to average relating to the modulation scheme. Pc can be estimated approximately as, Where Eb is the required energy per bit rate at the receiver for a given requirement, rb is the bit rate d is the transmission distance gt is the receiver antenna gain, Y is the carrier wavelength, Mt is the link margin and Nf is the receiver noises figure given by Nf=Nr/No where No is the single side thermal noise power spectral density and Nr is the PSD of the total effective noise at the receiver input.

Assuming that each senor node transmits in different time slot in additive white Gaussian Noise (AWGN) channel the power consumed by the circuit block is a predominant component than the Ppa.

3. DIAGRAM

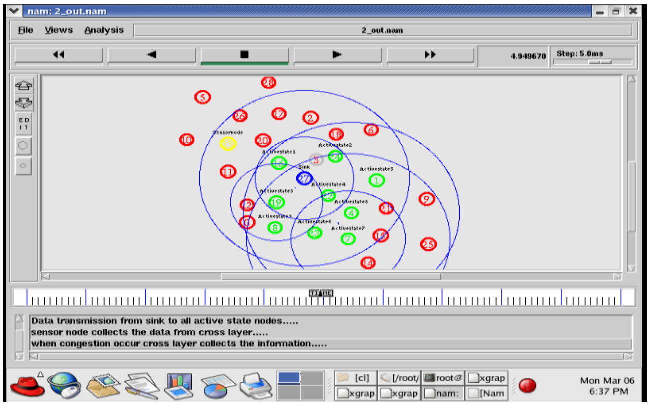


Fig.1. Analysis of efficiency

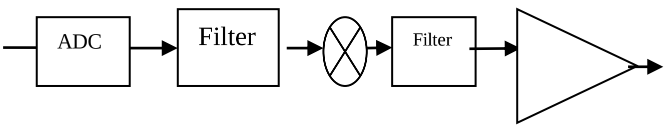
4. PERFORMANCE COMPARISON OF NODES SLEEPS STRATEGIES WITH NON SLEEP COOPERATIVE TRANSMISSION AND DIRECT TRANSMISSION

The performance comparison between transmission schemes given above will be shown for different terms as

- Nodes density
- Inter cluster transmitting distance
- Cluster radius
- Intra cluster energy consumption

For the system parameters (node active rate and energy consumption) the performance of the energy optimized cooperative scheme is shown under this topic foe which different causes are discussed.

5. BLOCK DIAGRAM



Case 1:

The distance of sensor nodes vs. the optimal node active rate: In this case active rate N is set of a variable .how optimal Nis affected by P can be shown in the graphs. When P is smaller than a certain critical the optimal N is the Equal to one. This is because in the cooperation, all the sensor nodes must participate to support the target overall PER. This indicates that number of sensor nodes should be higher in cluster to get become dull p to under the minimization of Eall.

Case 2:

Under this case there is an evaluation of in general energy expenditure of proposed scheme with those of non-sleep scheme (N=1), relay transmission and direct transmission.in the relay transmission source node transmit the packet in the initial time slot.in the second time slot by using some criteria a relay node is certain from the cluster.in relay transmission scheme overall energy consumption.

Case3:

Inter-cluster distance vs. overall energy consumption: In this case U1, I2 U3 introduced how to discuss how the inter-cluster distance affects the overall energy consumption. Here the value of is set as P=0.05 and other parameters are same. According to some surveys, when d increase U1 increases correspondingly. This is because our scheme needs more sensor nodes activation which take part in cooperation when d is increases. Therefore this, scheme increase N and the largely energy consumption reach nearer to the non-sleep cooperative shceme.

Case 4:

Cluster radius vs, the minimized overall energy consumption and the optimal sensor node activate rate: In this case it shows how both energy consumption and node active rate is varied according to cluster radius R[5]. This investigation shows that Eall exist its minimum value when R increases and when R is small, cooperative sensor nodes in the cluster is quite small and hence need higher energy to reach the target. Cluster radius affects the optimal active rate as when group radius is slighter than the certain critical direct (N=1) which situation that there are few cooperative sensor nodes in the which correspond to the situation that there are few accommodating sensor nodes in the cluster and when cluster radius is large than no. of sensor nodes start failing in cluster becoming larger.

Case5:

Intra cluster transmit energy consumption vs .the minimized overall energy consumption. This case is attractive as it shows minimization of E all does not always decrease with E1 and even it exits as an optimal value of E1. It can be clear as. There will be more no. of nodes that can correctly decode the packet and can participle in the cooperative transmission when E1 is increase and during cooperative transmission it also introduces additional transmit power Ect. When there is decrease in the value of E1 the additional intercluster transmitting energy consumption to reach target PER must be increase network. This kind of simulation suggest as that jointly the performance of the network can be optimize more parameters.

6. SIMULATION

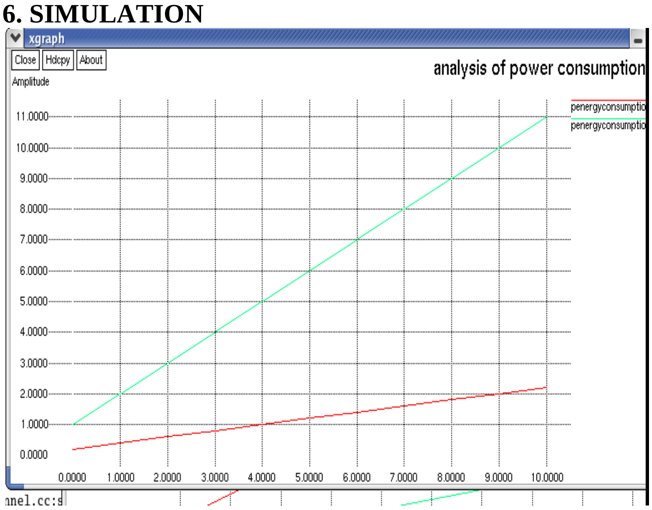


Fig.2. Analysis of power consumption

7. CONCLUSION

Then energy is compare over dissimilar broadcast distances. We assumed over that phythogrean diversity codes are used for the cross layer systems. We then showed that if we allow a node to move, the energy efficiency of systems is dramatically increased, for the data transfer in sensor networks, we show that if we allow the cooperation among sensors for information transmission and/ or reception, we can reduce energy consumption, as well as transmission delay over some distance ranges. Is short-range applications, especially when the data rate and the modulation scheme are fixed, cross layer systems may outperform cross layer systems as the energy efficiency is concerned. However as the distance increased we can extended the superiority of cross layer optimization systems in terms foe energy efficient .we can add mobility to increase receiver diversity in cooperatively cross layer optimization communication which helps in model includes cooperative communication with less decision making mobility and flexibility. This model helpful real life scenarios like border instruction detection, fairest monitoring etc. It shows a new way of getting an energy efficient cooperative cross layer communication model for a long lasting wireless sensor network.

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