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PERFORMANCE OF NETWORK LIFETIME USING ENERGY BALANCED ROUTING METHOD IN WSN

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ABSTRACT

Wireless Sensor Networks is a real time system that is used in communication system. The WSN consists of nodes with the insufficient power to collect the important information from the field. So many researchers use a different algorithm to prolong the network lifetime they are DEFL, MTE, and MDR. In this work we have proposed an Artificial Bee Colony algorithm. This is an energy efficient algorithm and consumes energy with balancing to increase the network lifetime with optimal path and reduce a packet loss. Algorithm quickly identifies the shortest path on each node. It is optimizing the routing paths and provides a successful multipath data transmission.

I. INTRODUCTION

A wireless sensor network (WSN) consists of a large scale of cheap micro sensor nodes deployed in the monitoring area. These nodes are usually networked in a multi hop fashion, to enable cooperation among nodes and real-time delivery of sensed data to the users [1]. Due to the limited resources of the computing power, battery, and communication capacity of sensor nodes in a large scale [2, 3], it is a challenge to prolong the lifetime and balance the energy consumption in a WSN [4]. One of the popular techniques to balance the energy consumption in the nodes and prolong the lifetime of the network is clustering [5]. The energy efficiency and the network lifetime of WSNs are extremely related to a self-organization and clustering mechanism, because of their benefits in these issues [6]. Clustering is a method to divide the nodes into several groups called clusters. Each cluster chooses a special node as a coordinator named the cluster head (CH).

In this method, the nodes do not need to communicate with the sink node directly. Alternately, the CHs integrate the data collected in the cluster and transfer it to the sink node. As a consequence, the clustering leads to a significant reduction in the energy consumption in the network.

This project presents a routing protocol for WSN called an energy-balanced routing protocol (EBRP) for wireless sensor networks. The EBRP balances the energy consumption of the network and prolongs the lifetime of the network. The sink node divides the network into K clusters by using a K means++ algorithm and broadcasts the fuzzy rules. In the first round, the sink node calculates the chosen value of each node by FLS and chooses the CHs with the maximum value in each cluster. The CH records the energy and distance information of the cluster member nodes for calculating the chosen value. The CH of this round selects the node with the maximum value as a CH of the next round in each cluster.

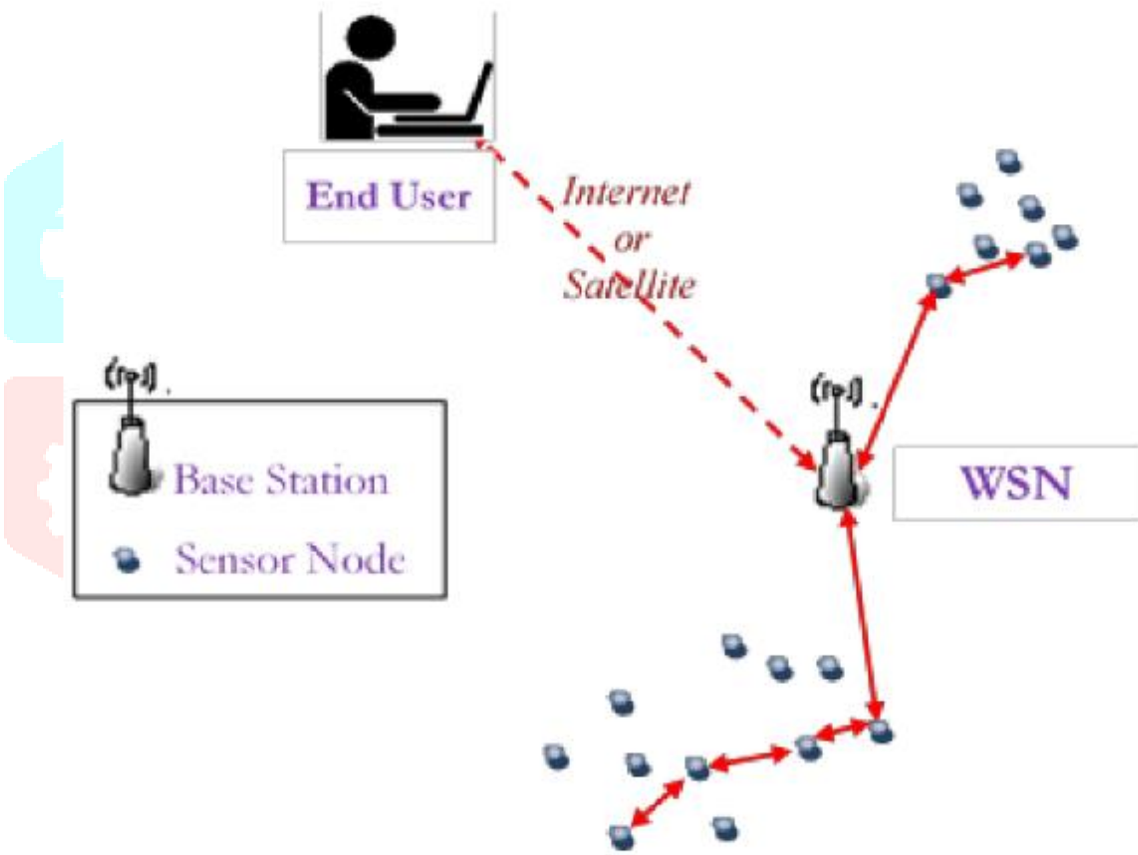


Figure 1.1.Wireless Sensor Network.

The fuzzy rules are acquired by the sink node for the current network deployment through a designed GA. I have code the fuzzy rules as chromosomes of individuals in GA while the fitness function is the lifetime of a specific network model. Then, through crossover, selection, and mutation, the best individual with the longest network lifetime is obtained which is decoded as the best fuzzy rules. In this protocol, the large computation such as for clustering and acquiring fuzzy rules is undertaken by a sink node while the small one is computed by nodes in a distributed way such as the CH selection without communicating with the sink node directly. Therefore, the EBRP is prop gable since we can acquire appropriate fuzzy rules for different sizes or deployment of WSNs with it.

With the development of efficient wireless communication and the progress of electronic information technology, the wireless sensor network (WSN) is widely used in various fields because of its low cost, miniaturization and multi-function characteristics [1–4]. However, in most cases, the nodes in WSN are powered by batteries and are usually deployed in unmanned outdoor or more dangerous environments, which make it inconvenient to replenish energy. The cost of redundant deployment and node replacement is also usually high. Therefore, an efficient routing strategy is needed to minimize network energy consumption and prolong the network lifetime.

II. LITERATURE REVIEW

[1]JASVIR KAUR, SUKHCHANDAN RANDHAWA, 2018 [7], "A NOVEL ENERGY EFFICIENT CLUSTER HEAD SELECTION METHOD FOR WIRELESS SENSOR NETWORKS",

The group of sensor nodes is used to sense the information from the event of the area and it is passes to the base station which reacts to the environment. The number of cluster is based on the routing protocols in a region and it is divided into a number of clusters within the each cluster and a cluster head is elected based on the some parameter and novel selection method for a cluster head having the efficiency in energy and it is based on Flower Pollination Algorithm this is proposed in this project. The performance of a proposed is being analyzed and it is compared protocols like Leach, C-Leach and K-Means in terms of energy efficiency and FPA is smoother than the other two protocols and it is not sustain in traffic rate.

Wireless sensor networks (WSNs) accumulate, analyze, and utilize data that are received wirelessly from sensor nodes, which have been used for various applications such as smart homes [1], air purifiers [2], and fire and disaster monitoring [3,4] due to their improved performance, ease of use, and low price. Sensor nodes are sometimes placed in hazardous environments, hindering the replacement of batteries or malfunctioning nodes. Furthermore, improving the battery performance of a node increases costs. Therefore, research has aimed to improve network lifetime and stability through a variety of network protocols [5]. The low-energy adaptive clustering hierarchy (LEACH) protocol improves energy efficiency via a clustering method [6]. When data are transmitted from a node to the base station (BS), energy consumption is affected by the distance between them. Clustering reduces the transmission distance of the nodes that are not cluster-heads (CHs), which are those that gather data from neighboring nodes for forwarding. Therefore, proper CH selection enables efficient energy consumption.

In LEACH In most existing studies using clustering for WSNs, the nearest nodes to the optimal location are defined as CHs during selection. Thus, clustering mainly locates CHs at the cluster center, and operation problems may arise when the optimal CH locations differ from the actual node positions. First, the calculation burden increases when determining the nearest nodes after defining the CHs, thus increasing energy consumption and shortening the network's lifetime.

Second, the divergence between the optimal CH location and actual CH node location may be large, and a node belonging to another cluster may be mistakenly used as CH. Finally, a node may be selected as CH for multiple clusters given its closeness to the optimal location in different clusters. Consequently, the number of CH nodes may be smaller than the number of clusters, leading to suboptimal operation. Therefore, clustering should be adapted to consider the characteristics of WSNs, including the actual node locations. In this study, we modified SMO by using a sampling method for CH selection in WSNs.

When sampling a population of nodes, their actual locations are always retrieved, thus preventing the abovementioned problems arising from the divergence between the optimal CH location and the actual node location. Moreover, multiple selections of nodes as CH among different clusters are prevented during sampling while avoiding complex computations. In fact, the modified SMO only provides optimal results from the best samples (i.e., actual node locations), as it only differs from the conventional SMO because its searching is constrained to samples. We first introduce the sampling-based SMO approach, and then we detail its application to WSNs by proposing the sampling-based SMO and energy-efficient CH selection (SSMOECHS). We also provide experimental results comparing SSMOECHS with existing protocols to illustrate CH selection and node energy efficiency over time. These results confirm that SSMOECHS improves the lifetime and stability of the WSN compared to similar protocols, namely LEACH-C [7], PSO-C [8], and SMOTECP [18]

[2]K. JOHNNY ELMA, S. MEENAKSHI, 2018 [8], "ENERGY EFFICIENT CLUSTERING FOR LIFETIME MAXIMIZATION AND ROUTING IN WSN",

The sensors are grouping into clusters by the energy efficient of the heterogeneous clustering is that select the cluster head from cluster and the cluster head is nominated with the nodes of the energy. Connectivity is considered as a measure of Quality of the Service and compares the EHC and route identification technique with the Greedy Perimeter Stateless Routing. It is not reducing the energy and packet losses occur.

Clustering is a technique used to extend the lifetime of a sensor network by reducing energy consumption. Connectivity is very essential for data transmission. Clustering can also increase network scalability. Researchers in all fields of wireless sensor network believe that nodes are homogeneous, but some nodes may be of different energy to prolong the lifetime of a WSN and its reliability. A distributed approach to determine if a sensor in WSN is a cluster head to meet the preferred connectivity requirements [1].

Cluster based routing in WSN is used to reach network scalability and maximize lifetime [2]. The existing methods for prolonging the lifetime of WSNs focus on the issues of device placements [3], data processing [4], routing [5] and topological management [6]. In[7]Energy aware algorithm for the selection of sensor and to identify the relay node. Shortest path algorithm is used for choosing the path. In [8] ABC Based Sensor Deployment. Schedule the sensor nodes to achieve network lifetime. Target coverage is provided. Maximized coverage not provided for heterogeneous type of network. On observing the existing work, most of the techniques are applied only in the homogeneous type of WSN and not in the heterogeneous network.

Heterogeneous wireless sensor network consists of many sensor nodes with different energy, communication range and sensing range. Each sensor nodes are battery powered (energy). Energy is being a most important one because the battery present in the sensor node cannot be replaced often. The node has a non-rechargeable battery or impossible to replace batteries in most sensor fields. To lengthen the lifetime of the WSN, clustering is the key technique. Clustering will dynamically re-assign the member nodes in the cluster. So the network disconnection due to energy drain out nodes can be avoided. Energy consumption of the sensor node is reduced to increase the lifetime of the network. Only few works focus on lifetime maximization in heterogeneous WSN.

III SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

- In WSNs, two principal obstacles for enhancing the service that are the communication efficiency and the energy consumption. Indeed, the energy consumption and link quality is strongly linked to the traffic load.
- Thus, the best technique to deal with communication efficiency and energy consumption consist to distribute in a fair and efficient manner the traffic across the network.
- As result, energy-efficiency is a challenge in WSNs because the capacity of sensor nodes' batteries is limited.

3.2 PROPOSED METHOD

- The Artificial Bee Colony is an optimization algorithm that is complete analogy of the shortest path and it is consisting of individuals with the different temporary techniques to represent the distributed adaptive system of the smart control energy.
- The operate mutually and efficiently of the releasing message about the discovered paths to determine the quality at specified nodes similarities between behaviors in the insect societies and the network routing is the last decade and many routing protocols is used in that ABC is have expanded for wireless networks, satellite networks and WSNs and the benefit is increased the flexibility to adapt and changing the environments and this is design for a optimization algorithm for the dynamic and for multi objective work.

- The bee members are utilizing the communication protocol with the end-to-end for the bee to group. ABC algorithm has a 3 bee groups in the colony they are onlooker, scout, and employed bee and each bee represent the position.

IV SYSTEM ARCHITECTURE

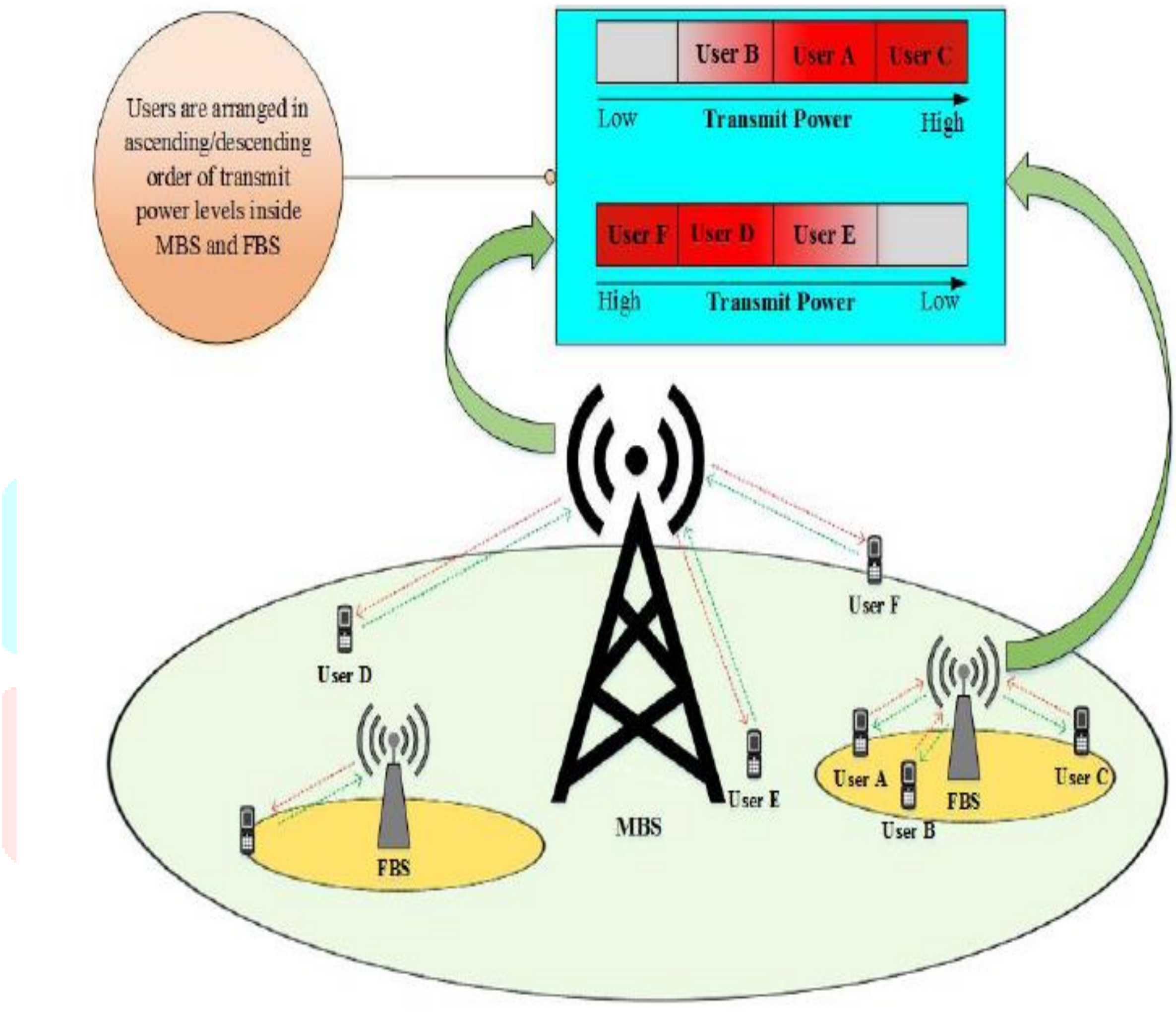


Figure 4.1 Architecture

V SYSTEM IMPLEMENTATION

5.1 MODULES

- Node Formation
- Base Station Work
- Energy Efficient Resource Allocation
- Bandwidth Expansion Schemes
- Load Balancing Schemes

5.2 NODE FORMATION

Node creation to create a node based our requirement here we took 30 no of nodes to create the sample network.

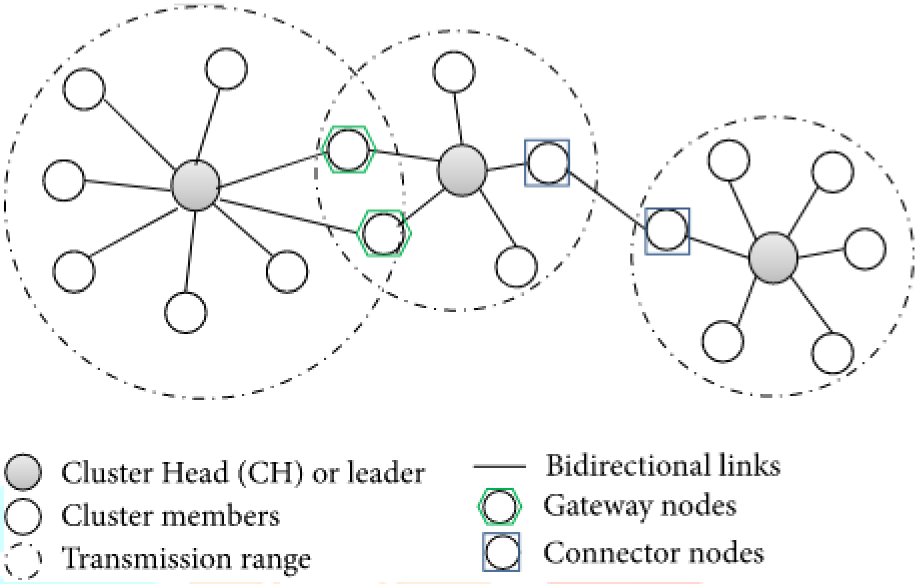
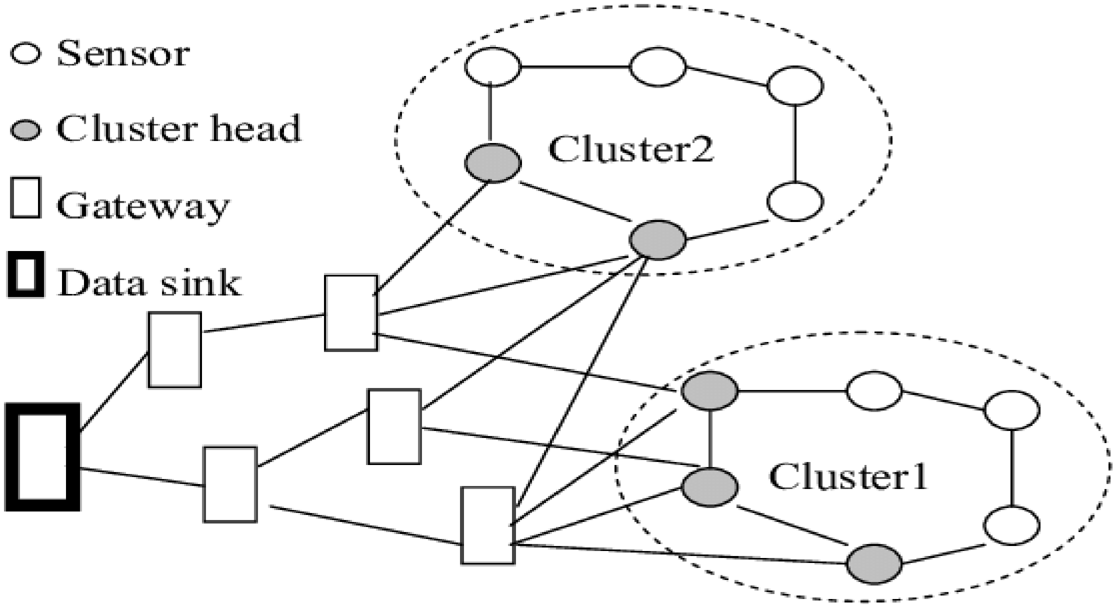


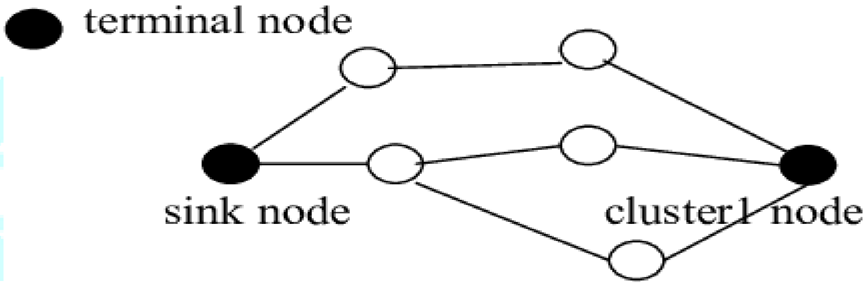
Fig 5.1 Cluster Head(CH)

5.3 BASE STATION WORK

- Due to the employment of OFDMA in LTE, signals have high amplitude variability known as Peak-to-Average Power Ratio (PAPR), which reduces transmitter efficiency.
- Furthermore, the BS provides high data rate at the cost of high dynamic transmission power.
- Energy management has become major challenge in LTE networks to stay portable and also to reduce global warming.



(a) physical topology



(b) 2-terminal graph

5.4 ENERGY EFFICIENT RESOURCE ALLOCATION

Introduces power control based resource blocks allocation scheme in LTE network with MBS and FBS, which employ the concept of Almost Blank Sub frame (ABS) and Reduced Power Blocks (RBs) to allocate reduced transmission power to resource blocks thereby resulting in to reduced downlink power consumption.

5.5 BANDWIDTH EXPANSION SCHEMES

The energy efficient LTE networks can also be realized through bandwidth expansion. Several proposed techniques employing bandwidth expansion for improved energy efficiency are presented below.

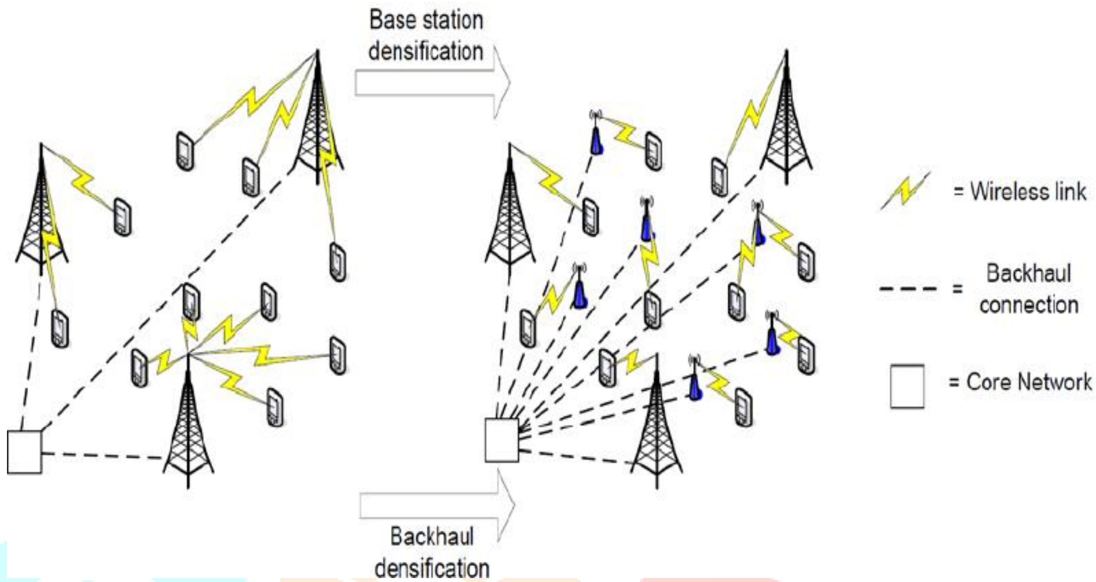


Fig.5.2 Base Station (BS).

5. 6 LOAD BALANCING SCHEMES

Traffic load varies signicantly at the BSs and a lot of energy is wasted during low load operation.

- Load Balancing is a part of Radio Resource Management (RRM).
- The term 'Load balancing' presents any method that could be used to transfer load from highly loaded cells to lightly loaded neighbor cells for the efficient use of radio resources.
- The user's distribution and traffic flow is irregular in cells, which can cause an unbalanced load condition in the network.

5.7 MANAGING CHANNEL QUALITY

There is a lot of talk about how OFDM will provide very high broadband speeds on 4G wireless networks, but the truth is that the data throughput rate on a channel of given RF is bandwidth is limited by channel quality, regardless of channel structure and coding. In urban areas where most of us will be using 4G services, channel quality is generally determined by levels of interference from other users of the same RF channel.

As the channel is used more intensively within a given geographic area, interference levels rise. Indeed, managing mutual interference among users within a wireless network is the fundamental task in network design and optimization.

5.8 THROUGHPUT EXPECTATIONS

The second key challenge for 4G is related to the fact that a wireless data channel is a shared resource. Whatever throughput it delivers has to be shared by all simultaneous users of that channel. This fact is often glossed over in discussions of spectacular 4G bandwidths, but in my opinion it is really the elephant in the room when it comes to long-term prospects for 4G.

A major problem in distinguishing between channel and individual throughput rates is typical usage patterns for Internet access have dramatically changed in the past few years and are still evolving rapidly. Not long ago, the most popular Internet applications (in terms of total demand) were "Web surfing" and e-mail. High bandwidth certainly enhances user experience for these sorts of activities, but on average, throughput is quite modest.

This characteristic of high peak, moderate average user throughput demand is ideal for shared channels because it allows substantial numbers of simultaneous users to be served with satisfactory perceived speeds.

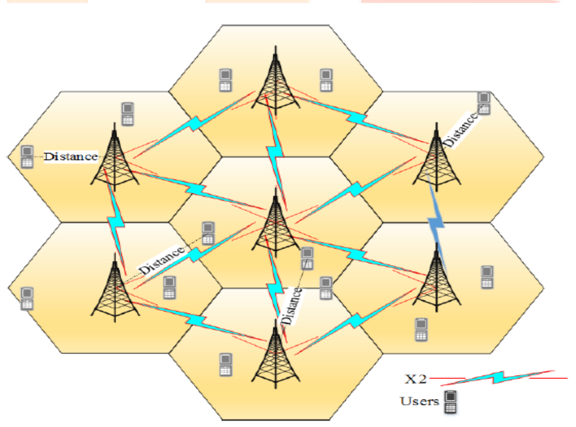


Fig.5.3 Distance between wireless sensor network.

VI CONCLUSION

The energy is an important aspect in each network to improve the network lifetime. To make the appropriate trade-off between the energy efficiency and an energy consumption among with the sensor nodes. The DEFL is compare with the proposed Artificial Bee colony algorithm to find the shortest path. DEFL uses a leach protocol which is a single hop communication and it transmit from source to destination so more energy is used and the network lifetime is not extended but in the proposed algorithm, M-Leach protocol by a multi-hop communication select the three cluster head at a time, so only less energy is used then it extends the network lifetime. The future scope is created the greater number of nodes and evaluates the node density and use different protocol to extent network lifetime.

VII FUTURE ENHANCEMENT

In this future work I will focus on combining mobile charging technology and routing optimization strategies to enhance the performance of wireless sensor networks. The main characteristics of every technique have been discussed. The analysis was focused on whether a single or multiple sinks are employed, nodes are static or mobile, the formation is event detection based or not, and network backbone is formed or not. I have pointed out advantages and drawbacks for every paper present, with the aim of improving and giving a support of the weaknesses and fortress of the used metrics. Centralized and distributed techniques take into account conditions for its application, namely, collision over the wireless medium, traffic, failures in the medium access, loss of messages, the size of a network, and so on.

I have remarked that distributed solutions are preferred over centralized ones. Distributed techniques support scalability, autonomous nodes, deployment, and elimination of nodes; also, it is possible to use self-organization strategies inspired from the nature in which the information is shared only with neighbor nodes, whilst on centralized techniques there are no transmission or reception conflicts because the central node coordinates every node.

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