

Efficient Cluster Formation and Cluster Head Selection for WSN

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Abstract—Wireless Sensor Network (WSN) is built of several sensor nodes with few resources such as storage, battery usage and so on. These nodes may vary in size, topology and cost. This survey paper, mainly concentrates on improving the network life time, and minimizing the usage of energy. Bee-Sensor-C algorithm is the next version of Bee-Sensor algorithm. Bee-Sensor-C provides parallel data transmission through which the network overhead can be minimized which in turn improves the scalability of the network. This survey also includes the various concepts of BEE-C, Artificial Bee, and Ad hoc On-demand Distance-vector Routing Protocol (AODV) in order to minimize the energy consumption of the network. Recent applications of wireless system are more beneficial than the legacy system.

Keywords— Wireless network, computer network, energy consumption, network lifetime.

I. INTRODUCTION

Wireless network (WN) is a kind of Computer network (CN). It makes use of wireless data for the purpose of connecting nodes. Radio communication is used for the execution of Wireless Telecommunication Networks. This overall process takes place at the lowest layer of the Open System Interconnection (OSI) model.

This model consists of seven layers, in which the lowest layer is known as physical layer and the top layer is the application layer. For short distances communication Wireless Local Area network (WLAN) is used. WLAN mainly connects two or more devices together. WN that covers larger areas are known as Wireless Wide Area Network (WWAN).

CN is a collection of one or more computers connected together. The link between these groups of computers can be carried out by using cables. In this network, Computers are referred as nodes. Mainly there are two types of transfer protocols that are used for the communication: Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).

WSN are spatially distributed sensors that are mainly used to monitor the state of environment with regard to its appearance. In WSN, Clustering and multipath are the most widely used routing methods. Clustering is nothing but grouping a large number of objects.

Each cluster consists of one cluster head (CH) and several cluster members, where the CH acts as a leader. Multipath routing consists of multiple paths from source to destination. This helps in selection of better path when the present path fails to reach the destination.

II. LITERATURE REVIEW

Bee-Sensor-C [1] is the advanced version of Bee-Sensor. The operation of this paper is mainly based on the foraging

nature of the bee swarm. It is one of the scalable multipath routing protocols that provide parallel data communication. By this communication process the overall routing overhead can be minimized. The combination of the advanced version of Bee-Sensor, and the dynamic cluster mechanism results in Bee-Sensor-C. The overall function of this paper can be studied by considering the operation of three different phases. The first phase concentrates on the formation of cluster, second phase shows some of the improvements in multiple path construction, and the final phase describes the data communication process.

BEE-C [2] was evolved on the basis of the Low-Energy Adaptive Clustering Hierarchy protocol (LEACH). To perform the clustering of nodes, this paper uses the bio-inspired algorithm whose operation is dependent on some of the characteristics of bee swarm. Besides the bio-inspired technique, BEE-C also uses some other functions in order to minimize the energy consumption. In this paper, the protocol operates in forms of rounds, and the time required for each round is referred as the important parameter of this particular protocol. It consists of two phases: cluster formation, and data transmission. In the first phase the formation occurs in the forms of groups, and once the completion of cluster formation the data transmission is performed. The final outcome of this paper is comparatively much more optimized than LEACH protocol.

Artificial Bee Colony (ABC) [3] algorithm also concentrates on improving the lifetime of WSNs. ABC is mainly classified into three types of bees namely employed bees, onlooker bees, and scout bees.

An employed bee detects various food sources, and also provides the detected information about the food source to the onlooker bees. On the basis of this information which is provided from the employed bees, an onlooker bee selects the food sources probabilistically. Scout bees are considered to be unemployed bees, and without depending on any criteria scout bee chooses its food source randomly.

AODV [4] is an on-demand routing protocol. On-demand routing protocols are also known as reactive protocols.

These types of protocols do not maintain any information regarding the network topology. It mainly includes three different techniques. The first technique concentrates on the discovery of route, second technique is used to maintain the discovered route, and finally the third technique is used for cancelling of route. In this type of protocol, routes can be established whenever needed. In this paper, the AODV protocol uses three types of packets: Route Request (RREQ), Route Reply (RREP), and Route Error (RRER) packets. In

AODV, the delay required for the connection setup is low, and hence it helps in improving the life time of the network by minimizing the energy consumption.

Energy-Efficient Routing Protocols [5], the protocol is mainly divided into four groups: Network Structure, communication model, topology, and reliable routing. These four groups can be further classified as: Flat, Coherent and non-coherent, mobile agent based, and multipath respectively. In this paper, the energy consumption model mainly consists of four modules, they are Sensor, Battery Supply, Processing and Wireless Communication Module. These modules operate in different manner in order to achieve energy efficiency of the network.

III. BENEFITS AND DRAWBACKS OF RESEARCH PAPERS

Methods	Benefits	Drawbacks
Bee-Sensor-C [1]	Minimizes the overall routing overhead, and also increases the scalability of the network.	It consumes more energy, and time.
BEE-C [2]	Maximizes the network life time, and is optimized than LEACH protocol.	Even more effective BEE-C could be obtained by minimizing the power consumption.
Routing Protocols [5]	Efficient data delivery, and also ensures the connectivity of the network.	Better mechanisms could be used to increase the efficiency of routing process.

IV. CONCLUSION

In this survey paper, I have presented the objectives such as cluster formation, construction of multiple paths within WSN. The survey of this system reveals that, it mainly concentrates on maximizing the energy efficiency, and also increases the lifetime of Network. Some of the measures has to be taken in order to solve the problems of the existing system.

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