SRF Strategy for Logical SWSN

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***Abstract*—** Scheduled Wireless Sensor Network (SWSN) is a kind of WSN where network has a ad-hoc infrastructure with varying topology. Scheduled Wireless Sensor Network (SWSN) is a kind of WSN where network has an ad-hoc infrastructure with varying topology. Key idea of SRF (Shortest Request First) is, most limited demand is handled shortest among the solicitations in the solicitations line. Load balancing in a SWSN requires distributing workloads across multiple computing nodes based on its type of functionality such as temperature sensing, light sensing etc. Hence, load balancing can be achieved to optimize resource use, maximize throughput, minimize response time, and avoid overload by distributing work among similar type of sensor nodes. This will make use of multiple sensor nodes with load balancing instead of single sensor nodes which may increase reliability through redundancy. Physical group represents a set of nodes which are physically neighbors to a node; whereas logical group represents a set of nodes which grouped based on its functionality. This strategy can be experimented on SWSN for the first time.

***Index Terms*—**SWSN, WSN, Scheduled, Topology

1. Introduction

Scheduled Wireless Sensor Network (SWSN) is a kind of WSN where network has an ad-hoc infrastructure with varying topology. Normally WSN contains group of sensor nodes, each nodes is capable of sensing environmental changes over a period. There are assortments of sensor hubs/gadgets are accessible in the market. Be that as it may, the maxim of all sensor hubs is to distinguish the progressions of the earth as far as message/bundle and pass onto close-by/focal/pioneer hub. Typically gathering of such sensor hubs is called as WSN. The utilization of this system is expanding step by step because of exceptional changes in the earth/nature and to anticipate the up and coming calamity/occasion/undertaking/message and so forth. The use of such system is constrained to ecological changes as well as connected to clinic (tolerant/wellbeing observing), farming (product checking framework), vehicles (developments), city observing, swarm observing, ATMs/Banks/VIP places checking, and so forth. SWSN is a scheduled WSN where bundles/occasions are activated/produced/sent in view of specific systems considering many components like hub's vitality, execution, organize lifetime, QOS, steering, inactivity, effectiveness, availability, security, and so on. There are many booking plans can be framed like FCFS(First Come First Serve), SFS(Shortest First Service), Priority, Physical/Logical gathering, Time Quantum, Dynamic, Auto Triggered, Malicious Curing, Validations, and so forth. These systems will help us to enhance vitality sparing, repetition in information, less overhead, expanding system lifetime, less support, exceedingly secured, solid, adaptable, dynamic nature, auto controlled, and so forth.

Figure 1 shows the basic architecture on the WSN, a logical network is a computer network comprised of computers using alike configurations and protocols. A good instance of a logical network is a one using Microsoft Windows over TCP/IP.

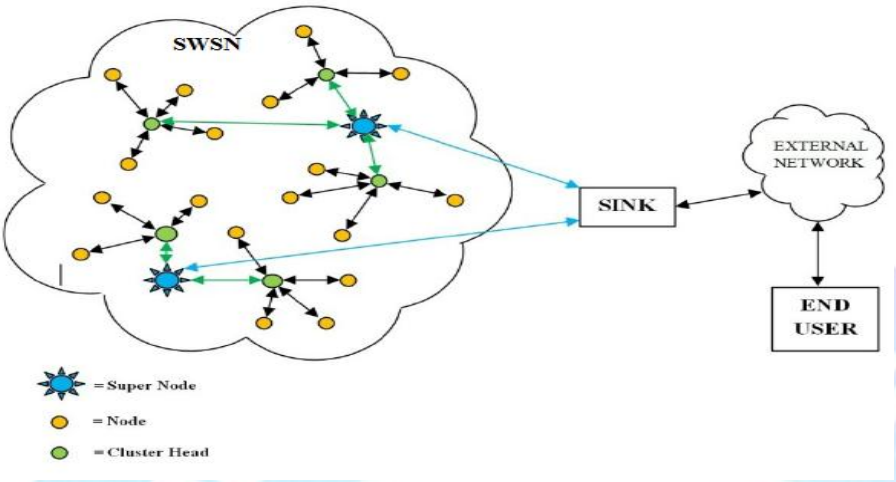

Figure 1: Structure of Logical SWSN.

According to the manner the data are received from the sensor nodes, SWSNs are classified into three broad categories namely (i) logical sensor networks, (ii) heterogeneous sensor network and (iii) hybrid sensor network. In the logical sensor networks, all the sensor nodes and base stations are identical in terms of hardware capability and initial battery energy. As proposed in LEACH algorithm, the role of cluster heads is randomly and periodically rotated over all the nodes to ensure the same rate of dissipation of battery energy for all the sensor nodes. Heterogeneous sensor networks, has two or more different types of sensor nodes with different hardware capabilities and battery power are used. The sensor nodes with higher hardware competencies and more battery power compared to other sensor nodes act as cluster heads and perform as a normal sensor node. In hybrid sensor networks several mobile base stations work cooperatively to give fast data congregation in a real-time manner.

II. RELATED Work

Book [1], briefs basics of wireless sensor network, highlights research areas of WSN; it lists popular simulators for WSN and finally briefs applications and challenges of WSN. Sensors are becoming part of the life hence its usages are also spreading across machine/human health care, traffic control, home control, military operations, inventory control, area/forest/industry monitoring, air/water testing, etc, hence this field provides a wonderful opportunity for researchers, students and others to explore more.

In [2], discussed about security solutions in heterogeneous nodes in MANETs since those networks are more vulnerable to hackers or crackers. And proposed a potential enhancements and new research possibilities in the AdHoc middleware. It is a solution to security challenges in middleware for scalable and non-scalable MANETs and it has found that the malicious node would not be a part of communication in the network. Tried to prove it is one of the effective techniques for security issues in heterogeneous nodes in MANETs.

In [3], paper offers to share the data load among sensor nodes based on the logical grouping of WSN nodes. Load balancing can be accomplished to optimize resource usage, maximizing throughput, minimizing response time, and avoid overload by distributing work between alike types of sensor nodes. This will utilize multiple sensor nodes with load balancing as an alternative of single sensor nodes which may increase consistency through redundancy.

In [4][5][6], since energy efficient load balancing is a very necessary in WSN which helps to optimize resource usage, maximize throughput, maximize network lifetime, minimize response time, and avoid

overload by sharing out work among alike type of sensor nodes with energy efficient routes[8[10][11][12][14]. Finally proposes an energy efficient load balancing among sensor nodes anchored in the logical and/or physical grouping of WSN.

In [7], as we know WSN have broad variety of application such as environmental monitoring, traffic analysis, industrial process monitoring, and planned systems. Large-scale WSNs are likely to play more and more important role in upcoming civilian and military application. Designing of MAC layer protocol for WSN is a challenging task due to limited battery power and limited bandwidth. Time Division Multiple Access Protocol solves both problems at the level of MAC layer. A variety of scheduling method for TDMA protocol with different objective has been proposed for WSNs. In this paper, they first outlined the sensor network properties that are crucial for the design of TDMA protocols and then, they have described quite a few TDMA protocols which are proposed for sensor networks.

In [9], the author has considered the problem of balancing indivisible unit size tokens on dynamic and heterogeneous systems. By altering a randomized strategy invented for logical systems, we can attain an asymptotically nominal expected overload in l 1, l 2 and l ∞ norm while only slightly increasing the run-time by a logarithmic factor.

Low-energy adaptive clustering hierarchy (LEACH) is a popular energy-efficient adaptive clustering algorithm that forms node clusters based on the received signal strength and uses these local cluster heads as routers to the central station [15,16]. LEACH is an application-particular information dispersal convention that utilizations bunches to amplify the life of the SWSN. LEACH uses randomized revolution of neighbourhood bunch heads to uniformly appropriate the vitality stack among the sensors in the system. LEACH utilizes three systems particularly (i) randomized transformation of the bunch heads and comparing groups, (ii) limited coordination and control for bunch set-up and operation, and (iii) nearby pressure to decrease worldwide correspondence. Filter grouping ends in a limited number of Iteration, yet does not affirmation great bunch head dispersion and accept uniform vitality utilization for group heads

Design and Implementation

This work has been carried out in Java language with help of Oracle Database, the results shows the consistency of data processing in the SWSN types.

The simulation has targeted to improve the performance of SWSN types. The simulation experiment is assumed 500 nodes as network size, where the packet End-to-End delay is the standard time that packets get to traverse the SWSN network. Assuming we have divided network into Logical and Physical groups.

The delay includes the time from the generation of the packet from the initiator up to its reception at the application layer of destination including all the delays in the network such as buffer queues, time for transmission and delays induced by the routing activities and MAC control exchanges.

Hence, End-to-End delay is depends upon how better a routing protocol chooses the variety of constraints in the network and shows the consistency of the routing protocol. So, considering proposed algorithm technique and above study on SWSN types, the algorithm has hopes of high growth in the future. The sample algorithm is as follows,

```
Begin
   t ← totalTime;
   i← 0; //current node
   N ← number of nodes;
   j← 0;
  numberOfRequests← All requests are counted;
   Begin  loop (numberOfRequests-- !=0)
 N[i++] = getSRFRequestsFromLogicalGroup();
N[i++] = getSRFRequestsFromPhysicalGroup();
   end loop
   Begin  loop (N[j] != null)
            t =  dataProcess(N[j])
   end loop
end
```

Experimental results

Above algorithm has been simulated and extracted a result shown in Fig.2. All request has been received based on SRF strategy but from logical nodes. The graph shows the consistent performance improvement when a network size grown up. Also proposed a theoretical model for energy efficient routing in logical SWSN network but did not implement and evaluate the performance of the protocol in current simulator extensively. But we judge the impact of the model and its behavior with respect to benchmark of Homogeneous and Heterogeneous protocol.

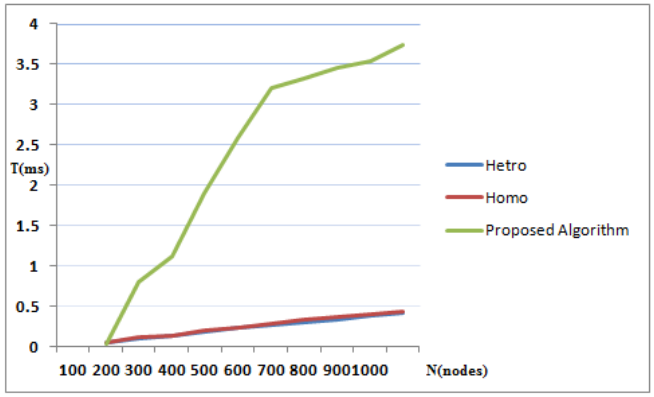

Figure 2. Time T of Logical, Heterogeneous and Proposed algorithm V/S number of nodes.

Conclusion

In this paper, we propose a new strategy on new kind of network which is logical SWSN, since currently existed network is becoming invalidated or less admired, so it is good to have a new technology. The proposed algorithm on this logical SWSN will increase the network lifetime, battery saving, bandwidth saving, and performance improvement by computing the SRF requests of each node based on the arrival information provided by each sensor node in the network. Load balancing can be achieved to optimize resource use, maximize throughput, minimize response time, and avoid overload by distributing work among similar type of sensor nodes.

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