

Comparative analysis of various Technologies for Sink Mobility in Wireless Sensor Networks

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Abstract:In this paper,sensor nodes of WSN have some degree of source of energy whilst they miles deploy in actual moment surroundings. The whole network depend upon this power to detect an event, collect information from surroundings, data aggregation and talk with base station or else sink to supply the collect statistics. The important challenges are how to increases the network lifetime using less power resource. Paper has shown that nodes close to the sink expend their influence energy faster than the nodes because of heavy operating cost messages from nodes that some distance far away from sink node. Sensors nearly sink are mutual by larger sensors to sink path therefore consume extra energy. The problem is known as hotspot problem, ends in a premature disconnection of the network. Hence Mobile sinks help achieving uniform energy-intake and implicitly offer load-balancing throughout the network and the “Hotspot” problem is alleviated. Also, the performance of network can be advanced in terms of lifetime higher coverage and short reply time.

Keywords:Wireless sensor networks, Sink, Mobility, Networks, Cell.

INTRODUCTION

Wireless sensor community is composed of several sensor nodes deployed over a geographical location to collect and process data that can be forwarded to base stations or sinks that may be similarly transferred to the outer global for specific applications via net or satellites. Each sensor node is collected of many sensor devices such as transceiver with inside antenna or association to an outside of antenna, a microcontroller, an electronic circuit and an energy source, generally a power is a form of energy harvesting. A sensor node using many resource constraints, like some degree of memory, set authority, signal processing, calculation and communiqué abilities; hence it can sense only a little portion of the environment then, a group of sensors collapse by each other can achieve a much bigger task efficiently. Cost and size constriction on sensor nodes result in corresponding constraint on sources like as energy, memory, speed of computation and communiqué bandwidth. The topologies of the WSN can different by multi hop wireless mesh network to simple star topology.

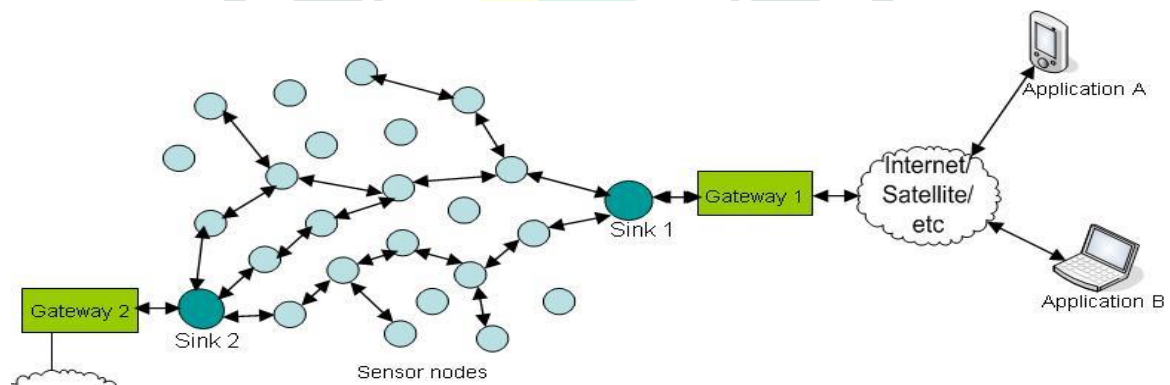


Figure1:Architecture of WSN.

The following terms are important for understanding in a wireless sensor network.

Sensor nodes-Devices with low processing, memory capacity and limited power supply.

Data sink-It has higher capacity than common sensor nodes: more processing power, unlimited power supply. It connected to the end-user application.

Communication link -It is a bidirectional link between two sensor nodes that is used for exchanges information. There is a communication link between a pair of nodes if they are within transmission range of each other. The term is sometimes abbreviated as link.

Neighbours-Two nodes are neighbours of each other if there is a communication link between the two nodes.

Routing path -It is a path which packets use to travel from source node to the data sink.

1.FEATURES

The following features of a WSN

- Energy intake constraint for the use of batteries.
- Dynamic community topology.
- Cross layer layout.
- Maintenance of nodes.
- Variety of nodes.
- Ease of use.
- Self agency.
- Ability to face up to harsh environment conditions.
- Ability to address node failure.

2.MOBILITY

In mobile IP that is a mobile agent that called as router that make easy internet traffic forward for a mobile node when its place is changed to someplace other than its residence network.

2.1.Types of mobility representative

First is **home agent** is a router on a mobile home networks which tunnel the data packets for transporting to the cell node when it faraway from home. It maintains active place information nodes of mobile.

Another is **foreign agent** that is also a router that stores knowledge about mobile nodes visiting its networks.

2.2.Importance of mobility

The popular reason for which mobility was introduced in WSNs is to decrease the no's of hops required to send data from nodes of sensing to the base station. Then, sinking the delay and delay the network lifetime by reducing the amount of power required to send and accept communication as a result, it can be accomplished that the routing protocol used when introduce mobility to WSNs have great impact on the network performance. According to Reddy, two schemes were consider when study about mobility in WSNs namely, **location management and handoff management**. The former is disturbed with rerouting packets while the other focus on how to use location information of nodes in order to improve the performance of the routing protocol because, node mobility affects nodes positions, route to be followed by messages and information nodes have about their neighborhood.

2.3.Sink Mobility Models

Depend at the purpose necessities and the WSNs use area features (roads, vicinity size, navigation, and so on.), the sinks can also comply with specific mobility models. The mobility of sink may be view through the angle of sink and the sensors attitude. The sink reflect the actual movement sample of the sink while the sensors' angle displays the sink mobility anticipated via confined expertise of sensing . The mobility of sink during the sink attitude can be categorised in to one-of-a-kind fashions: constant and nomadic.

2.3.1Continuous Sink Mobility Model: In this, the sink moves continuously with constant or variable speed with absolutely no pauses during its motion. In this pattern, the placement of sink in the network topology is expected to differ frequently, therefore, the routing protocol should be able to perform frequent topology control, and keep the accessibility of brand new sink position to the source nodes.

2.3.2Sink Mobility roaming Model: In this, the sink have association and to come phase during its movement. It has two phases pursue each other in a cyclical way. That model makes be idea of as the arrangement of the static sink case and the continuity cases of sink. The direction-finding procedure perform as fixed sink direction-finding procedure in the sink's waiting phase, minimize topology manage and falling the operating cost of sink mobility mechanism. Then, the sink association do not direct to losses of packet and the latencies should be bounded in both the waiting as well as the movement phases of the sink motion. Special case of nomadic or roaming pattern is a with zero waiting time.

3. LITERATURE SURVEY

H. Luo *et.al*, "TTDD Two-tier statistics dissemination in large-scale wi-fi sensor networks",(2005).

The 2-Tier Data[1] approach in big scale sensor networks the important challenge for limited data is coming from the that fact sink and other resources does not knowing about the other end that is prior. TTDD,[1] approach is design to solve the problem by utilizes the grid based structure or grid structure in a good way reality is that sensor are stationary and aware to the location that allow to every data to make grid based structure. In which each sink flood its data questioning to simplify the result .This approach very mannerly send the data from multiple sources to multiple sinks or cell.Grid based protocols are advantages for the easy access ,minimal numbers of hops required .

K.Parket.al, "Railroad Virtual infrastructure for records dissemination in wireless sensor networks", PE WASUN,(2005).

In which data dissemination approach was explore the Rail. It is a virtual infrastructure which performs as a situation for events and questioning. It is based on the probability of an generating event is regular over the networks and a virtual infrastructure that achieved good features. Railroad stored event information in Rail and cell will retrieve the most necessary data by scan the nodes in rail .In which source and sink mobility supports the rail mechanism. As a result railroad show that it support mobile objects without hurting the energy and power and improves the scalability. It also evaluate and compare communication and hotspot message complexity railroad are higher than LBDD since the sink, query have travel through a longer structure.

P.LChouet.al, "HCDDHierarchicalclusterbased information dissemination in wi-fi sensor networks with cellular sink",(2006).

In this approach they find the route path for deliver the records to mobile sinks or cell. In which WSNs is a main challenge problem due to mobility of sink and less number of resources for the sensing the networks such as power, capacity of storage and simplify the capabilities .This approach is proposed to control the load in the network and make the most suitable and optimal path to deleiver the data from source node to end node. HCDD can operate without requiring large resources and more power.This approach also achieve the longer lifetime of the network.This uses the low power during transfer the data from sender to receiver

Y.-BKoet.al, "A quadtree-based hierarchical data dissemination for mobile sensor networks",TCS,(2007).

This approach is space distribution to provide most relevant route between the several mobile and sink nodes. In which simulation show that the work signifies and reduces the energy consuming during maintaining the higher data delivery ratio.This protocol breaks the network into consecutive quadrants. The middle factor of every quadrant becomes a 2d-tier node.Quad tree based approach is support the stimulus sink mobility It also reduces the data load overhead from the network.This is also Steiner tree. It also depleted the unnecessary data but count measure will be low.

E.BenHamidaet.al, " A line based data distribution protocol for wireless sensor networks with mobile sink" ,(2008).

New version virtual infrastructure is LBDD. It based on the concept of necessary region to mutually operate on data dissemination from data collection .It is based on event describer and questioning based area and it also provide the best tradeoff from the other protocols. This approach describes vertical nodes that divide the field of deployment into two the same portion. The nodes of strip are called as in-line nodes. Sensing message are sent to line and destroy from storage of data .This is simple connection establishment and ease to communicate but energy consumption will be high .

K. Yoon et.al, "Grid-based energy-efficient routing from multiple sources to multiple mobile sinks in wireless sensor networks," Wireless Pervasive Computing, (2009).

This approach deals with packet communication from several sources to several mobile sinks in the large amount of sensing networks .In which each mobile cell needs to update their location time to time in to the sensor network. Due to multiple sinks large number of location are required to updated and it cause large amount of wastes of energy and that's reason this approach uses the hierarchical method to support mobility and makes a grid based structure which causes less poor consuming .It eliminate the high load from the network but traffic is more complex during transferring the data.

A. Diloet.al , "A Virtual Infrastructure basis on honeycomb data transmission in multi-sink mobile WSNs",(2012).

In which this approach is based on Honeycomb and that construct hexagonal grid structure.It aim to protectun necessary spread of the sink's data and avoid the hot region problem, which observing by border lines and centroid lines It also shows the energy distribution over the networks .By the help of wireless sensor networks it deploys the higher energy nodes and communication nodes.Honey comb offers the simplicity in algorithm and fault tolerance against nodes failure.In this method sensing data was sending towards the nearest border lines then propagates through the centre sink and nodes on the border lines will changes the data and then stored the data. Questioning are forwarded through the centre cell.

Chen et.al "A converge-cast tree algo (VCCSR)Virtual Circle Combined Straight Routing",(2013).

It constructs a virtual structure of virtual circles and straight lines. The set of nodes are taken as cluster heads along with virtual circles and straight lines. collectively the set of cluster-heads type a virtual backbone network. The cluster heads in VCCSR follow a set of communication rules to minimize the routes re-adjustment cost in propagating the sink's latest location information .It reduces the route cost but maintaince of whole process is complicated.

M.Y.Donmezet.al, "Ring Routing An power-capable Routing Protocol for Wireless Sensor Networks with Mobile Sink",(2015).

Ring Routing is a mobile sink routing protocol it defined a ring shape that's a closed loop of single-node breadth.It also considering as a benefits and drawbacks of exits protocols.The ring buildeda globally determined community center. The sink describes its position to the hoop through transferring the packets in the direction of the community center geographic routing. And the ring nodes stores the clean function of the sink always. The supply nodes questioning the ring to accumulate the clean sink place facts with the aid of a comparable mechanism. This is simple and quick process but scalability is undefined.

A.Khanet.al, "Virtual grid dynamic Routes Adjustment 'VGDR' method for Mobile Sink-Based WSNs", (2015).

Virtual grid dynamic routing approach that aims to reduce the routes reform amount of the sensor nodes while adjusting nearly optimal routes to the latest location of the mobile sink they propose a set of communicate rules the routes reconstruction process

thereby required a some degree of number of nodes were readjust its data delivery routes towards the mobile sink. And replicates results display compact routes rebuild cost and improved network lifetime of the VGDR.

T.Wimalajeewet.al, “A Survey Compressive Sensing Based Signal Processing in Wireless Sensor Networks”,(2017).

CS based techniques used in wireless sensor networksto cooperate with practical considerations such as channel fading,. Most of the existing work was real valued as well as quantized Compressive Sensing that makes theoretical guarantees needs to be extend to relax these limitations. The classical CS framework is restricted to linear approximate. This is CS base technique and predefined in nature hard to implement but improving the network life but more latency and high cost.

Nicolas Primeauet.al, “A Review of Compute Intelligent Technology in WS & Actuator Networks”,(2018).

CI technologies has many exceptional problem divides in to WSNs: actuation, communiqué , sink mobility,localism and control of topology .The famous type of intelligence of computational era compromises in WSNs are EAs and SIAs given the overpowering number of optimization issues.It deals with more than one hops and target that can be fixing around these structures.

DK Sahet.al, “Parametric survey on cross-layer designs for WSNs”,(2018).

He encapsulations of layers make a profound impact on community efficiency, best of carrier (QoS), communicate overhead, latency, and many others. In addition, it is hard to put into effect it in wireless sensor networks (WSNs) eventualities. To conquer those architectural consequences, move-layer designs (CLDs) opted which indicates promising development. It permits data sharing the various non-adjoining layers and compensates the performance and reliability.

TABLE 1: COMPARATIVE STUDY OF EXISTING MOBILE SINK ALGORITHM

| Protocols years | Virtual structure type | Sink mobility pattern | Advantages | Disadvantages |
|--|--------------------------------------|-----------------------|---|--|
| TTDD(2005) | Rectangular Grid | Random | easy accessibility & hops min. used | Numerous,sensor nodes generate data |
| RailRoad(2005) | Rail(wide) | Random | Improve safety & health deficiencies | Maintaince difficult & high cost |
| HCDD(2006) | Max-Min D clusters | Random | low power used. | In efficient in sources |
| QDD(2007) | Steiner Tree | Random | Deplete unnecessary data | Countmeasure low |
| DDB(2007) | Backbone | Random | Avoids hotspot | sink data queries and data announcements |
| LBDD(2008) | Line(wide) | Random | Simple connection establishment | Energy consumption high . |
| GBEER(2009) | Rectangular Grid | Random | Eliminate high load | Traffic generatator in transferring information. |
| HexDD(2012) | Hexagonal Grid | Random | More reliable | High noise |
| VCCSR(2013) | Concentric circles and straight line | Predefined | Reduce the route cost | Difficult to maintain |
| Ring Routing(2015) | Ring(one node width) | Random | Quick process | Scalaibility undefined |
| Sensing based signal processing (2017) | CS BASED | Random | Good computation | High energy & less latency |
| Cross layer WSN (2018) | Cross layer design | Predefined | hard to impelement improve network life | More latency & high cost |
| Computational intelligence(2018) | WSANs | Random | Solution for small problems | Communication interruption high |

CONCLUSION

In this paper analysis of numerous technology for sink mobility in wireless sensor networks to reduces power intake ,researchers recognition on transferring the burden from the sensors to the sink node and extends the network lifetime. The overall performance of network may be advanced in terms of lifetime higher coverage and brief response time. Mobile sink helps to achieving uniform energy intake and implicitly offer load balancing throughout the network. They have achieved various calculations and provide new techniques for the sink mobility execution in network. this is also a future extension that may accomplished by joining different technologies and successively better outcomes.

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