AN HYBRID EVENT DRIVEN ROUTING PROTOCOLS FOR WIRELESS SENSOR NETWORKS

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ABSTRACT:

This paper introduces two most popular event driven protocols used in wireless sensor network Direct Diffusion (DD)&Sensor Protocol Information via Negotiation(SPIN).These protocols are analysed using varying parameters to reveal the important features like Throughput, average end-to-end delay, packet delivery ratio that need to be taken into consideration while designing an wireless sensor network.

Index terms: Wireless sensor network, Event driven routing protocols& simulation parameters.

1. INTRODUCTION

A sensor network is an infrastructure comprised of sensing (measuring), computing and communication elements that gives an administrator the ability to instrument, observe and react to events and phenomena in a specified environment. NS2 it is a network simulator. It is a discrete event simulator for networking research. It provides substantial support to simulate of protocols like TCP, FTP, UDP, HTTPS and DSR. It simulates wired and wireless network with primarily Unix based and ns2 uses TCL as its scripting language .It implements exponential on/off traffic generators by using the C++, class which is named expo traffic which is band to an OTCL class .In network simulator NS2 application/traffic/exponential a pareto on/off traffic generator does the same as an exponential on/off generator but the on/off periods confirm to a pareto distribution.

2. LITERATURE SURVEY:

EVENT DRIVEN ROUTING PROTOCOLS:

Routing is a process of finding a path or a route between source and destination for data transmission. Thewsn's use the network layer to implement the routing of the incoming data .The main objective of event driven routing protocol is the event detection and event transmission in a fast and accurate manner. SPIN and DD are event driven routing algorithms.

Directed Diffusion protocol (DD): Direct

diffusion key features are named attribute value creates pairs and path re-inforcement.it is a reactive routing protocol which creates paths based on need not ahead of time sensed data is stored in attribute value pairs when a node is known that a sink node wants information about a particular attribute. It broadcasts interest messages to its neighbour nodes. Is a data-centric and application aware paradigm all data generated by sensor nodes is named by attribute value pairs. It is a query based protocol, where sink sends queries to the sensors in an on- demand fashion by disseminating an interest. It consists of three stages: Interest propagation, Gradient setup and Data Deliveryalongreinforcedpath.

Interest Propagation: When sink node wants some information from source nodes it sends out its query to its neighbour sensor nodes. The corresponding query is carried by interest packet. The sensor node receives the interest packet can temporarily store the packet and search for all of the matching target data as shown in figure1.

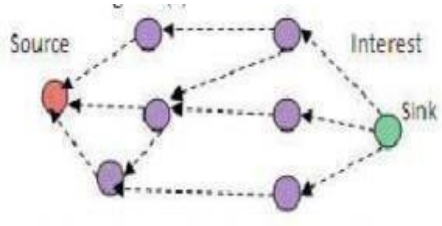

Figure1 **:**Interest Propagation

Initial Gradient Setup: Using Gradient in DD, the data propagation direction with minimum cost principle. ropagation of interest packets setup the gradient in the network for delivering data to the sink. Gradient is a reply link to a neighbor node from which the interest was received as shown in figure2.

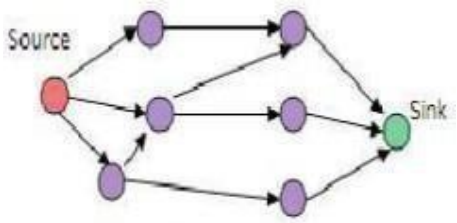

Figure2**:** Initial Gradient Setup

Data propagation phase: source node sends data packets to sink node to the initial setup gradient direction. Sink sends a reinforced packet to the neighbor node which is the first one receiving the target data. The neighbour node which receives the reinforced packet can also reinforce and select the neighbour node which can receive the new data first. Consequently, a path with maximum gradient is formed, so that in future received data packets can transmitted along best reinforced path. Finally the source will send the required data, in selected path as shown in figure3.

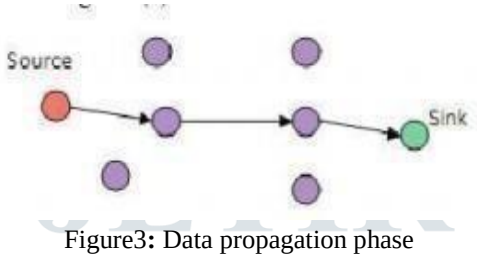

Figure3**:** Data propagation phase

Sensor Protocol For Information via Negotiation (SPIN): SPIN is a negotiation based information dissemination protocol suitable for WSN. It is based on the concept of metadata. Metadata is a description of data which in database, it can be used to describe table. In SPIN sensors use metadata to concisely and completely describe the data collected SPIN is a data- centric routing protocol. It fits under event driven data delivery model in which the nodes sense data and disseminate the data throughout the network by means of negotiation. SPIN nodes use three types of messages for communication:

ADVERTISEMENT (ADV): When a node has new data to share; it can advertise this using ADV message containing Metadata

REQUEST (REQ): Node sends an REQ when it needs to receive actual data.

DATA: It consists of actual sensed data.

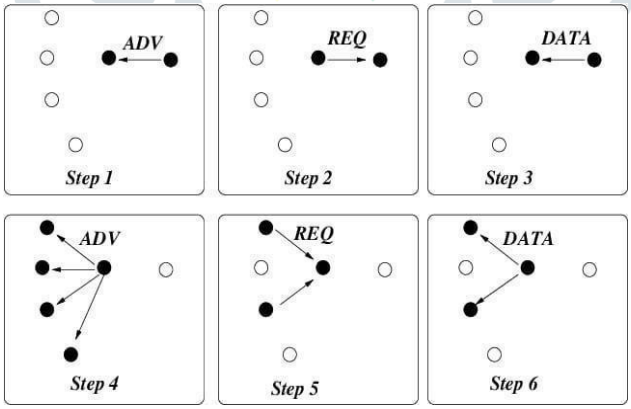

Figure4**:** Stages in spin protocol

The stages in SPIN protocol is shown in figure4. System model In our research the wireless sensor network consists of various sensor nodes scarcely distributed. . The network structure is layer based each node has the capacity to sense multiple types of data and data are transmitted in the form of Meta data. Here both the base station and nodes have the capacity to transmit data.

Disadvantages of SPIN protocol:

I. The source node on receiving the data sends ADV message to all neighbouring nodes, this results in unwanted computation.

II. The node does not reply to ADV message if the sensor node dies out. Data advertisement method of SPIN protocol does not guarantee data delivery.

Disadvantages of Direct Diffusion protocol:

1. Directed Diffusion cannot be applied to all sensor network applications since it is based on a query- driven data delivery model.
2. The applications that require continuous data delivery to the sink will not work efficiently with a query- driven on demand data model.
3. The naming schemes used in Directed Diffusion are application dependent and each time should be defined a priority.
4. The matching process for data and queries might require some extra overhead at the sensors.

3. PROPOSED HYBRID EVENT DRIVEN ROUTING PROTOCOL :

Data Centric Routing the novel protocol conserves energy by becoming active only when changes occur in the network, broad casting data id provides guaranteed data delivery. When there is a need for continuous it sends data without waiting for sink to send its interest. It uses two way hand shake protocol thereby using less energy comparing to the existing protocols. The sink sends interest in the shortest path there by conserving energy. This protocol is mainly developed to work in the environment where multiple data are used as in gas sensors in coal mines, costal sensors for sensing flood as well as depth monitoring etc., initially all the nodes are in sleep state and becomes active upon sensing the changes in the environment. Then the node sends the interest to all the neighbour nodes. Once the node has received and registered the interest it checks in the task descriptor and compares the corresponding value and aggregates the value and updates the value. Whenever the value reaches the threshold value it sends the data to the base station in the shortest path. If the base station needs for a value in a particular region it sends the interest to all nodes in the region and the data is sent back to the base station.

Step-1: N sensor nodes are uniformly distributed in a target area.

Step-2: Initially all nodes are in inactive mode in order to conserve energy.

Step-3: nodes wake up from inactive mode to active mode upon sensing changes in the Environment.

Step-4: each data sensed by a node has a unique data kind id, node id, value and broad cast it to the neighbour node.

Step-5: upon receiving the interest from the neighbour node it checks for the data kind id and compares the value. If value > current value & value > threshold value, sends data packet to base station in the shortest path & go to step9.

Step-6: Else if value> current value & value < threshold, updates the current value.

Step-7: Else discard the value, End if.

Step-8: if base station request for data, send all data kind id and current value of the node in the shortest path.

Step-9: Check whether the data has reached the base station, If yes broad cast the data id to all the nodes (in order to avoid redundancy) Else go to step4.

4. SIMULATION RESULTS:

The simulation environment is shown in table1.And packet transmission is shown in above figure5.

TABLE1: Simulation Environment of proposed routing protocol.

Parameters	values
Simulation area	500*500
Number of sensor nodes	10
Sensor node coverage	50m
Maximum simulation time	20 seconds
Packet size	500 bytes
No of packets/data	50 packets/second
Packet format	Two way ground/RPM
Simulation version/name	Network simulator 2
Channel name	Wireless channel
Basic routing protocol	UDP

The performance analysis of proposed and existing routing protocols are tabulated in table2:

Table2**:** performance analysis of routing protocols

Parameters	Proposed routing	Existing routing
Packet delivery ratio(PDR)	82%	73%
Throughput(bits/sec)	83b/s	74b/s
Average end-to-end delay(m sec)	380msec	540msec

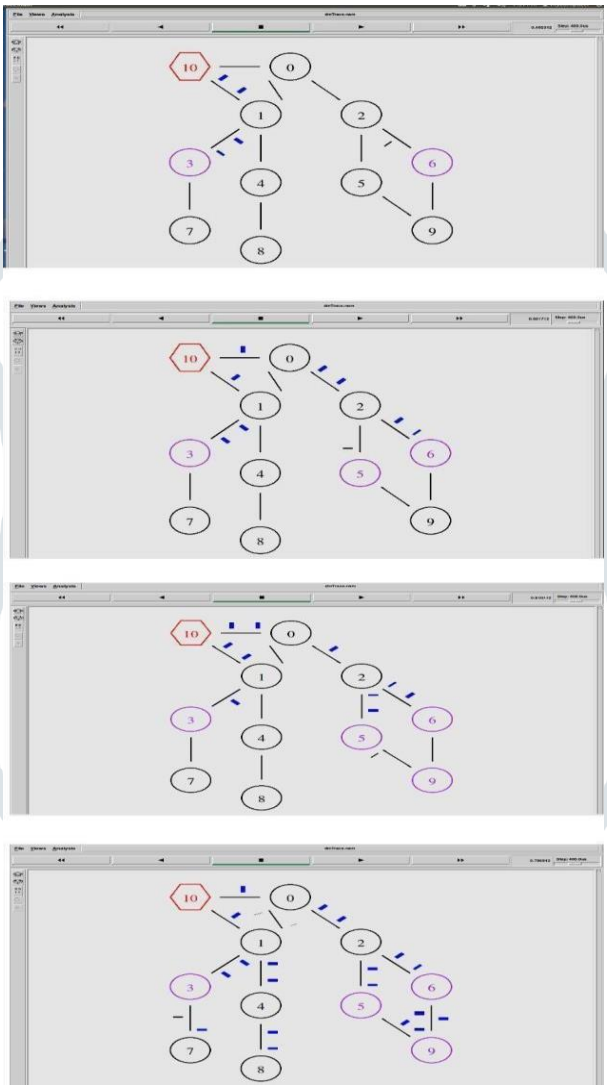

Figure5: packet delivery in proposed routing protocol in NS2

ACKET DELIVERY RATIO: It is the ratio of number of packets received at the destination node to the number of packets sent from the source nodes the performance is better when the packet delivery ratio is high. Packet Delivery Ratio of proposed routing is better when compared with existing routing protocol.as shown in above figure6.

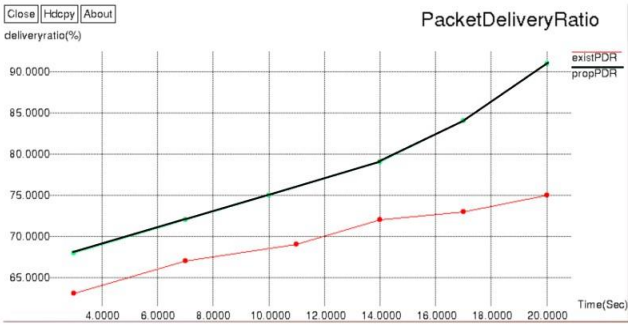

Figure6: Packet delivery ratio

THROUGHPUT: Throughput is the rate of successful message delivery over a communication channel the data belong to may be delivery over a physical or logical link or it can pass through a certain network node. Throughput is usually measured bits per second (or) data packet per second. Proposed routing protocol throughput is better when compared to existing routing protocol as shown in abovefigure7.

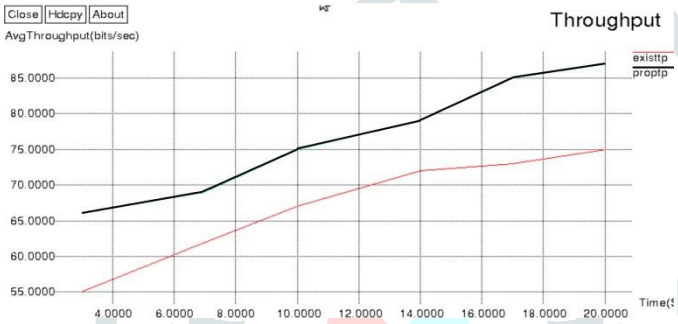

Figure7**:** Throughput.

END-TO-END DELAY: End -to-end delay is the average time delay for the packets form the source node to the destination node. To find out the end-to-end delay the difference of the packet sent and received time was stored and then dividing the total time difference over the total number of packet received gave the average end-to-end delay for the received packet .The performance is better when the packet end-to-end delay is. End to end delay is less in proposed routing protocol than existing routing protocol.as shown in above figure8.

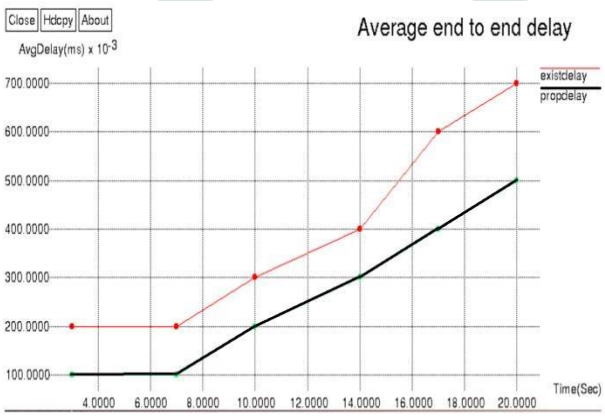

Figure8**:** Average end to end delay

5. CONCLUSION

The performance of proposed routing protocol is compared with existing routing protocol in different parameters like Packet Delivery Ratio, Throughput and Average end to end delay by Using Network Simulator (NS2).Bythe simulations, we conclude that theproposed routing protocol is better with existing protocol.

6. REFERENCES

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