EWSN BASED RELIABLE TRANSMISSION USING MOBILE DATA COLLECTOR NODE

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ABSTRACT

The most important goal in event driven wireless sensor network is to transmit the event information to users as soon as possible. In typical WSN there are number of sensor nodes which detect the event and transmit data packet towards static sink, but the node which are one hop from the sink at this location there lot of chances of both network or congestion, this leads to reduce the energy and data loss (Packet drop).In our EWSN model we use mobile data collector that will collect the event information and send it to sink. sensor node sense the event and announce by broadcasting the alarm packet, when data collector node receive this packet it will find out location and collect data from that sensor node .and by using the concept of travelling Salesmen Problem it will find the route to the Sink node and deliver the packet there for further processing. So by using technique we try to avoid the congestion near to sink and try to improve the reliability of the network.

KEYWORDS: *Congestion, Data collector node, Event driven Network, WSN.*

I. INTRODUCTION

Wireless Sensor Network has emerged as new Technology today. The Sensor Network Consist of many nodes distributed randomly in an network. The nodes consist of the number of sensor deployed in it. The sensor communicates with each other using broadcast mechanism. Whenever an event is generated the Sensor nodes sense the event and broadcast the event information to the Sink node to take appropriate action.

It is suggested that WSN applications can be categorized as event-driven or periodic data generation. For periodic data generation scenarios, constant bit rate (CBR) can be used to model the data traffic arrival process when the bit rate is constant. When the bit rate is variable, a Poisson process can be used to model the data traffic arrival process as long as the data traffic is not bursty. For event driven scenarios such as target detection and target tracking, bursty traffic can arise from any corner of the sensing area if an event is detected by the local sensors. A Poisson process has also been used to model the traffic arrival process in an event-driven WSN. Sequence relations exist in some kinds of packets. For example, a Routing Reply message always comes after a Routing Request message and that is specified by any ordinary routing protocol. There are many network optimization problems to be solved in WSNs, such as rate control, flow control, congestion control, medium access control, queue management, power control and topology control, etc. It is difficult to provide a complete overview in relation to all issues relating to network optimization in WSNs. As WSN supports different data types like normal data that may in one to many or many to one topology. Event driven data is generated when particular event is happen. A large amount of data flows from sensors to sink. The emergency data flows through the network for management purpose or some emergency event when occurred. The traffic will be bursty for some application. Here huge amount of data is generated and which disseminated towards the base station. Depending on the application the data formats are different and there size of packets is also different. In that case the data traffic will not be same. The node must handle this traffic as well. All this different types of data will cause the congestion in the network. If data which is not passed further, it is assume that congestion is occurring. Congestion in a wireless sensor network (WSN) can lead to buffer overflow, wastage of resources and delay or loss of critical information from the sensor Network.

So we are proposing some advancement, my adding some mobile data collector node that will carry the data packets towards the sink node and reduces the energy consumption of node and making reliable transmission of data in the network. The work for review paper is organized as in 2. We are giving the Literature Survey about the paper that we considered,. In 3. We are proposing our System, defining the basics requirement and then proposing the algorithm for the Same, which is followed by Conclusion and References.

II. LITERATURE SURVEY

Lots of work to Avoid congestion in the WSN has been carried out. Some of them focus on trying to avoid the congestion from happening (i.e. taking preventive measures so that congestion will not happen in the network) and other work focuses on controlling the congestion after it has happened. Here in later approach when the congestion is detected at the intermediate node, the sending node is told to decrease the transmission rate, so that rate of congestion can be minimized. The first paper under study "Event to Sink Reliable transport in Wireless Sensor network" [1] concentrated on controlling the rate of congestion after it has happened. For this it uses the rate control mechanism which tells the sender node to decrease the sending speed of the node. But the continuous feedback and rate control scheme causes extra delay in the network, which is not tolerable in the event Driven Network. The next paper RETP-UI was proposed in [2]. it basically tries to avoid the congestion before it happens. for this it not only calculate the current Queue length of the node but also ratio of queue lengths fluctuation. It takes this as an input for multistage rate adjustment Scheme to adjust the sending rate of the sensor node. But this scheme does not work well for a delivery of a Single alarm packet.

The reliable transport protocols for WSNs generally fall into one of the following categories, viz., end-to-end reliability protocols or event-to-sink reliability protocols.

Pump Slowly, Fetch Quickly (PSFQ) protocol, with hop-by-hop error recovery, for reliable transfer in wireless sensor networks. This packet-driven protocol employs intermediate nodes for loss detection and error recovery. The protocol shows fairly good reduction in transmission latency, but at the cost of high energy consumption. Stann [3] has proposed a new transport protocol for directed diffusion, called *Reliable Multi-Segment*

Transport (RMST) protocol. It is a selective NACK-based protocol that can be configured for in-network caching and repair. The paper shows the need for ARQ protocol using ACK to represent the receipt of a packet and NACK to represent the non-receipt of a packet. Another packet-driven protocol, called Rate Controlled Reliable Transport (RCRT) protocol implements all the flow and congestion control mechanisms at the sink node

The protocol implements NACK-based end-to-end loss recovery, where a NACK is sent for any packet which is not received. In applications which involve querying of the nodes by the sink node and peer communication between sensor nodes, the asymmetry in flow control implementation causes performance degradation.

The work regarding the Event detection has been seen in the paper[4]. Here each node in the network makes the decision regarding the happening of the event independently.it also takes help of the observations of the previous node if it is present to make the decision regarding the happening of event, and then it forwards the packet to the next immediate node. This scheme works quite well in case of small networks but as the network grows it costs for extra delay.

The paper referred as the Base paper[5] works out to avoid the congestion by making a single decision.it proposes the EEDP(efficient event detection protocol)to detect efficiently the generation of the event. for this it makes the use of concept of atomic event and composite event. When a event(eg. Fire) is sensed by a number of sensors such as smoke sensor, fire sensor the atomic event of it generated. The node locally broadcast to its neighbor node its reading. By making use of these multiple atomic values, the node forms the composite event which is a single bit of information. This composite event is broadcasted to the Sink node through the intermediate neighboring node which uses the multi copy scheme to avoid the loss of the packet near the sink node. lots of work have shown that there is chance of congestion at the nodes that are one hop away from the Sink node. So to avoid the loss of packets near the Sink node the paper proposes a solution of multicopy Scheme. The Drawback of the paper can be thought as it continuously broadcast the packet for the specified time

period and by using multicopy scheme it maintains the single alarm packet into its buffer until the packet reaches the destination and a acknowledgement is received . Lots of Energy of sensor node is wasted, during this process.
So we are trying to propose a new modification in the paper.

III. PROPOSED SYSTEM

The Event Driven Network Consist of N Number of Sensor that are deployed into node to efficiently detect the event generated in the network. The event (eg. Fire) can be detected with the help of the temperature sensor or with the help of the smoke sensor, or carbon dioxide sensor. Let Γ^i_m be the Threshold value of the m^{th} sensor node. When the sensor value rises the above the specified threshold value of it then the event is detected (for e.g. if Temperature of Sensor node exceeds the Value above 100 C then fire has been detected). This detected event is called as an Atomic Event.

3.1 Atomic Event: The necessary condition of atomic event is

$x^i_m > \Gamma^i_m$ then

$\mu^i_m=1$ else $\mu^i_m=0$

where

x^i_m is observed value of sensor node

μ^i_m is Atomic value is set either 1 or 0 depending upon occurrence of event.

Γ^i_m is the threshold value which is set to some value depending upon the sensor type and beyond which if the value goes then there is some abnormal event happened.

3.2 Composite Event: The Composite Event is formed as

$\Delta = \mu^i_{m1}$ AND μ^i_{m2} AND……. μ^i_{mn}

If $\Delta = 1$ then Event Occurred, the node will broadcast the occurrence of event for time t

Else $\Delta = 0$ then Event has not occurred, it will reset the values of x^i_m

The proposed System makes use of the concept of the Composite Event which is the Anding of all the sensed values of the sensor node.
When a node detects the atomic event it will broadcast its information locally to the neighboring node. The neighboring node similarly broadcast the information to each other. Now when each node receives its value then it will perform the logical AND operation to form Composite Event. If the output of this operation is 1 then the event has been detected else if it is 0 then there is no occurrence of event. When the event has been detected then the node will broadcast the corresponding event information.
The algorithm for the Same is as follows

Algorithm1: Local Broadcast Algorithm

- Input: The observation of node i: $x^i_{m,}$
- Output: Δ^i of node i

while t<=T do

Step 1: Let T be the decision timer

Step 2: when the value of $\mu^i_m=1$, the node i transmit and receives its own primary decision message and hear decision message from neighbor node

Step3: using composite decision determine Δ^I

if $\Delta^I=1$ then there is some abnormal event then node i goes to step 4 else step 5

step 4: Node i will generate and forward the alarm packet to the data collector node using algorithm 2

Step 5: Node i will forward MSG_i to its neighbor and keeps on listening from other nodes

Step6: when node i receives a local primary detection message from node j, the emergency information Δ^I of node i will be updated as $\mu^i_{m=} \mu^i_m | \mu^j_m$ and then go to step 3

end while

Step 7:when timer T expires it will clear the value of μ^i_m

Here in this paper we are using the concept of Mobile Data Collector node which will collect the event information whenever it receives the broadcast message. After receiving the event packet the mobile Data Collector Node will disseminate the data packet to the Sink node by using the concept of the Travelling Salesmen problem. Meanwhile on its way to sink it will collect Event information if

generated and give it to sink. In case if the mobile Data Collector Node Fails then a Backup or Replica mobile Data Collector Node will replace it.

Algorithm 2: Data Collector

- Input: The observation node i: μ^{i}_{m}
- Output: the event information is sent to Sink
- Step 1: For any node i if composite decision Δ^{i} takes place then it will generate an alarm Packet.
- Step 2: When the DC node comes in range of event ,it will receive the alarm packet
- Step 3: it will then send a message to node in range to suspend broadcasting of the alarm packet and clear the value of
- Step 4:if two or more DC nodes comes in Range simultaneously then one that came first will collect the data
- Step 5:if the DC node gets the alarm message more than once it will drop the remaining one
- Step 6: it will then send the alarm packet to the sink, meanwhile on the way to sink it will collect other event information on the way if it exist.

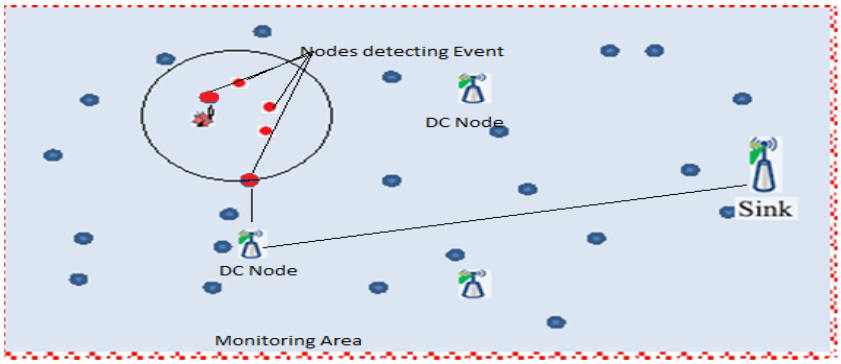

Fig 1: EWSN using Mobile Data Collector Node

The data collector Node will makes uses of the Reactive Routing Protocol. In this we are trying to keep the neighbor information that is present in Geographical Routing Protocol. A On-Demand Distance Vector Protocol will be used, which will keep the neighbor distance location x and y coordinates and Delay.
We think that by using the concept of the mobile Data Collector Node will try to avoid the Congestion near the node that are 1 hop away, as no packets will follow through the it intermediate node. Also will help to reduce the Energy Consumption of the Node increasing the battery lifetime and thus Network Life Time.

IV. RESULTS

As it is a Proposed System we assume that using the Mobile data collector Node it will be useful to deliver the better delivery ratio, end to end delivery of data, less energy consumption, less packet drop.so the simulation used is NS2 with mannasim patch for the proposed system.

V. CONCLUSION

In this paper, we are proposing an efficient event detection protocol in event-driven wireless sensor networks to detect the event and delivery emergency message reliably and timely along with we are also using the Concept of Mobile Data Collector node which will collect the event information and disseminate it to sink .Our algorithm composes composite events, each of which consisting of a few of atomic events. Each sensor node has multiple different sensors and each sensor independently senses the environment to determine one atomic event. Then with the local broadcasting scheme, the sensor node could make a final decision combining with the detect results of its neighbors efficiently.

Thus we think that it will improve the reliability of the network by using the mobile data collector node, and increase the network lifetime by reducing the energy consumption. Our future work includes working on sleep wake state of nodes.

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