

## **A Review on the Data Delivery and Data Prioritization Issues in the Wireless Sensor Networks**

**Mr.Siddarama<sup>1</sup>, Mrs. Neelufar S<sup>2</sup>, Mrs. Kalpana<sup>3</sup>**

<sup>1</sup>*HOD, Computer Science ,Sri Bhagawan Mahaveer Jain college ,KGF, Karnataka, India.*

<sup>2</sup> *Assistant Professor, Computer Science , Sri Bhagawan Mahaveer Jain college, KGF, Karnataka, India.*

<sup>3</sup>*Assistant Professor, Computer Science , Sri Bhagawan Mahaveer Jain college, KGF, Karnataka, India.*

### **Abstract**

Wireless Sensor Networks has turn out to be an explorative area of research since last few years, due to energy constraints of sensors [3]. Reduction of energy is a vital part of the research in this field. Congestion control is a key problem in mobile ad-hoc and sensor networks. In case of congestion system require more power to deliver data. Congestion leads to transmission delay, packet loss, and wastes time and energy for congestion recovery [1]. This congestion leads to indiscriminate dropping of data, i.e. data of high importance might be dropped while others of less importance are delivered. The packet delivery of both the HP packets and the LP packets is to be achieved.

Many approaches have been proposed to overcome these difficulties. I In this paper, we take a comparative look at the data delivery issues in the presence of congestion using AODV(ad-hoc-on demand distance vector), CAR(Congestion Aware Routing) and ECAR (enhanced congestion aware routing).

**Keywords:** Enhanced Congestion Aware Routing, Wireless Sensor Networks and routing optimization

### **I. INTRODUCTION**

Sensor networks are composed of small sensing devices that have the capability to take various measurements of their environment such as temperature, sound, light etc. These devices are equipped with a processor and wireless communication antenna and are powered with a battery. Upon deployment in a field, they form an ad hoc network and communicate with each other and with data processing centers.

The routing protocol in such networks has an important effect on congestion,

especially with increasing sizes of the deployments. Congestion becomes worse when a particular area is generating most of the data. This may occur in some deployments when sensors in one area of interest are requested to gather and transmit data at a higher rate than others. We believe that all data generated in a sensor network may not be equally important; some may have a low priority while others have a higher priority and hence differentiated service must be provided to these data.

Congestion can adversely affect the network in two ways. First, it can lead to indiscriminate dropping of data, i.e. some packets of high priority might be dropped while others of less priority are delivered such applications require data prioritization. The high priority data should receive better service, such as higher delivery ratios and minimal delays. It should also experience low jitter, especially for real-time data. The low priority data, such as periodic temperature readings or measurements of environmental conditions away from the critical area, do not need any special service. In fact, some low priority messages may be dropped or significantly delayed without severe consequences.

A naive solution to this problem would be to stop generating or forwarding any low priority data. This is clearly not an acceptable solution because Low-priority data also contains data that may not be useful at that instance but helpful in future [2]. Hence in the rest of the paper we review data delivery issues in the state of congestion using AODV, CAR, and ECAR.

## II. LITERATURE SURVEY

### A. Ad-hoc on-demand distance vector routing protocol (Aodv)

The AODV Routing Protocol uses an on-demand approach for finding routes, that is, a route is established only when it is required by a source node for transmitting data packets. It employs destination sequence numbers to identify the most recent path.

However, in AODV, the source node and the intermediate nodes store the next-hop information corresponding to each flow for data packet transmission. In an on-demand routing protocol, the source node floods the RouteRequest packet in the network when a route is not available for the desired destination. It may obtain multiple routes to different destinations from a single RouteRequest. The major difference between AODV and other on-demand routing protocols is that it uses a destination sequence number (DestSeqNum) to determine an up-to-date path to the destination.

#### *Advantages*

- 1) Routes established on demand
- 2) It is a self-starting and loop free.
- 3) It can be used for large number of nodes. connection setup delay is lower

**Limitations**

- 1) Intermediate nodes can lead to inconsistent routes
- 2) It does not discriminate data hence at the time of congestion it indefinitely drops both high and low priority data.
- 3) Multiple RouteReply packets in response to a single RouteRequest packet can lead to heavy control overhead

**III. CONGESTION AWARE ROUTING (CAR)**

CAR is a network-layer solution to provide differentiated service in congested sensor networks. CAR also prevents severe degradation of service to LP (Low priority) data by utilizing uncongested parts of the network.

Here we connect the independent Nodes and assign the depth to all nodes and assign all the nodes as Off Conzone (congestion zone discovery). In this Nodes discover if they are on the Conzone by using the Conzone discovery mechanism. A Conzone must be then discovered from that neighborhood to the sink for the delivery of HP data. To do this, critical area nodes broadcast “discover Conzone to sink” (To Sink) messages. This message includes the ID of the source and its depth and is overheard by all neighbors. When a node hears more than Sink messages coming from its children, it marks itself as on Conzone and propagates a signal to sink message. Once the Conzone is discovered, HP data is routed in the conzone, and LP data is routed off the Its children, it marks itself as on Conzone and propagates a signal to sink message. Once the Conzone is discovered, HP data is routed in the conzone, and LP data is routed off the Conzone. LP data generated inside the conzone is routed out of the Congested Zone [8].

**Advantages**

- 1) High priority data delivery is assured without loss.

**Limitations**

- 1) Conzone (congestion zone discovery) is an overhead.
- 2) CAR drops all low priority data.

**IV ENHANCED CONGESTION AWARE ROUTING (ECAR)**

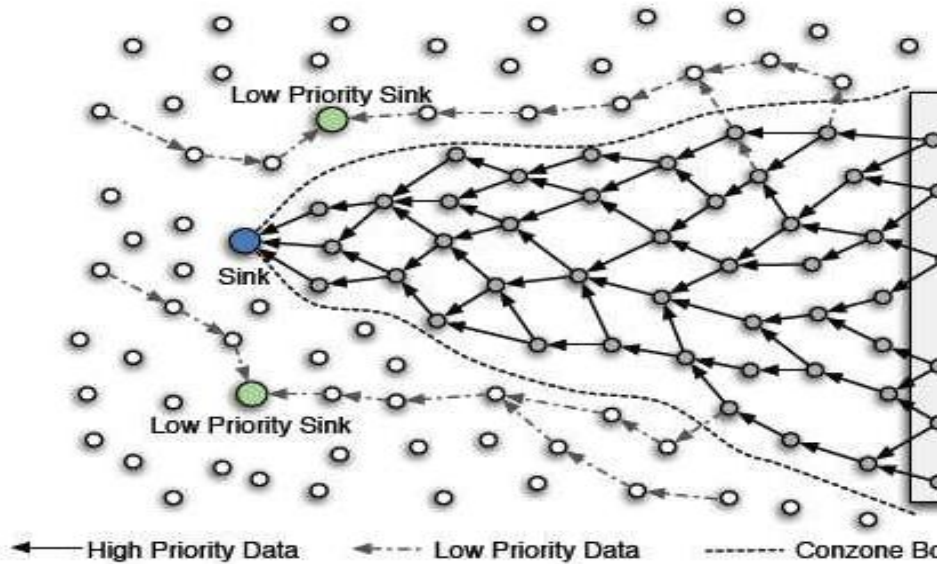
The data is differentiated as High Priority and Low Priority to make the delivery of the High Priority data delivery fast. In presence of congestion the High Priority data is forwarded through the congested nodes and the Low Priority data is routed in a less congested long route by a Route Change message intimated to source by the neighbor of congested node. Discovery of Conzone (congested zone) is very easy in this method [6].

### Advantages

- 1) Low Priority data delivery is assured to maximum extent.
- 2) The burden on intermediate nodes is decreased for discovering Conzone which is overhead in existing system.
- 3) The request and acknowledgements traffic is reduced in this method.

### Limitations

- 1) The Low Priority data has to travel in long path which has less congestion, but in the long path all the sensor nodes has to be in active position which increases battery consumption.



**Fig.2.** High priority data is routed using the conzone nodes. Low priority data originating inside the conzone is routed out. Low priority data originating outside the congestion zone does not use conzone.

## V. CONCLUSION

In this paper, we examine data delivery issues in the presence of congestion in wireless sensor networks.

- As compared to AODV, CAR increases the fraction of high priority data delivery, decreases delay and jitter for such delivery while using energy uniformly in the deployment. Since CAR reduces the energy consumed in the nodes, it leads to an increase in connectivity lifetime. But Car stops all the low priority packets which is an unacceptable solution because Low-priority data also contains data that may not be useful at that instance but helpful in future. ECAR when compared to AODV & CAR

achieves higher percentage of the packet delivery of the HP and LP packets by predicting the congestion in the network. The prediction of the congestion avoids the effect of congestion in the network and dropping of the LP packets. Thus the packet delivery is achieved without any compromise in QoS.

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