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AN OVERVIEW OF VARIOUS CONGESTION CONTROL ALGORITHM TOWARDS IMPROVING THE PERFORMANCE DEGRADATION IN CONGESTED SENSOR NETWORKS.

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Abstract

Sensor Networks are used in many application areas. Multiple applications sharing this sensor networks to gather various types of data. Data generating in sensor Network will not be equal. Apart from that congestion control is a key problem in sensor networks. If congestion occurs in Wireless Sensor Networks then few or more important data may be dropped. This problem can be solved using (CAR) Congestion –Aware Routing and MCAR –Mac Enhanced Congestion Aware Routing which will help to differentiate the HP data from LP data. Many approaches have been proposed already regarding this problem. In this paper , We present an overview of various congestion control algorithm to improve the performance degradation in congested sensor networks

Keywords: Wireless Sensor Networks, CAR ,MCAR ,ECAR, CC-CA.

Introduction

Wireless sensor networks are a new class of distributed systems that are an integral part of the physical space they inhabit. Sensor networks are also large collections of nodes. Individually, each node is autonomous and has short range; collectively, they are cooperative and effective over alarge area. A system composed of many short-range sensors lends itself to a very different set of applications than uses a small number of powerful, long-range sensors.A large number of these disposable sensors can be networked in many applications that require unattended operations. A Wireless Sensor Network contains hundreds or thousands of these sensor nodes. These sensors have the ability to communicate either among each other or directly to an external base-station. A greater number of sensors allows for sensing over larger geographical regions with greater accuracy. Basically , each sensor node comprises sensing, processing, transmission, mobilizer, position ending system, and power units Sensor nodes are usually scattered in a sensor field, which is an area where the sensor nodes are deployed. Sensor nodes coordinate among themselves to produce high-quality information about the physical environment. Each of these scattered sensor nodes has the capability to collect and route data either to other sensors or back to an external base station. A base-station may be a fixed node or a mobile node capable of connecting the sensor network to an existing communications infrastructure or to the Internet where a user can have access to the reported data.Wireless networks are used to send and share data quickly whether it be in a small office building or across the world.

2. EXISTING TECHNIQUES

2.1 CONGESTION AWARE ROUTING PROTOCOL

CAR is a network-layer solution. The basic protocol , called Congestion Aware Routing (CAR), discovers the congested zone of the network that exist between high-priority data sources and the data sink and, using simple forwarding rules, dedicates this portion of the network to forwarding primarily high-priority traffic. CAR comprises three steps: network formation , conzone discovery and differentiated routing. The combination of these functions segments the network into on-conzone and off-conzone nodes [5]

CAR increase the fraction of HP data delivery and decrease delay and jitter for such delivery while using energy more uniformly in the deployment. Initially all the nodes are in off-conzone. Nodes discover if they are on the con_zone by using the con-zone discovery mechanism. The con-zone is formed when one area is generating HP data. This area is referred as the critical area. A con-zone must be then discovered from that neighborhood to the sink for the delivery of HP data. To do this , critical area nodes broadcast “discover con-zone to sink” (To Sink) message[1] . This message includes the ID of the source and its depth and is overhead by all neighbors. The depth is included here to ensure that nodes do not respond to the To Sink message heard from their parents.

When a node hears more than distinct To Sink messages coming from its children, it marks itself as on con-zone and propagates a single To Sink message. Once the con-zone is discovered , the next task is to route high priority data on the con-zone and route the low priority data off the con-zone.

CAR also routes an appreciable amount of LP data in the presence of congestion. The limitation in CAR is, it requires some overhead to discover the congestion zone if the con-zone is changing frequently[3]. Hence CAR is unsuitable for highly mobile data sources. Though it supports effective HP data delivery in the presence of congestion CAR is better suited for static networks with long –duration HP floods.

2.2 MCAR

In MCAR, each node in the network can be in one of three states, dictating whether it is a part of the conzone or not or within the communication range of the con-zone. MCAR . This last mode creates a shadow area that separates HP traffic from LP traffic.[1] provides mobile conzone, which follow the HP traffic . MCAR is based on MAC-layer enhancements that enable the formation of a conzone on the fly with each burst of data. The disadvantage is that it effectively preempts the flow of LP data, thereby seriously degrading its service. There is no need to route LP data out of the HP zone in MCAR. As a result , MCAR is more aggressive in dropping LP data and eliminates all competition for the shared channel among the LP and HP packets. MCAR deals with mobility and dynamics in the sources of HP data. MCAR maintains HP data delivery rates in the presence of mobility and the route setup and tear-down times associated with the HP flows are minimal. For bursty HP traffic and/or mobile HP sources, MCAR is a better fit.

2.3 **Enhanced Congestion Aware Routing**

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 is very easy in this method. If the intermediate node finds the route congested for a long time, it sends a Route_Change message to the source. This message contains the alternate route to the destination from the intermediate node. The source after receiving the Route_Change message saves the route and the next onwards it forwards the LP packets through the alternate route. Whenever a node has to transmit a packet to the destination, it prioritizes the packet. It sends a route request RREQ to find the best route to the destination. The intermediate nodes maintain a record of source-id, packet seqno, received time of the visiting packets. When an intermediate node receives a RREQ , it calculates the approximate congestion in the network surrounding it. The congestion is calculated as the density of the packets passing through the node. The previous ten packets are taken and the first received packet time is considered. The number of packets to the time difference gives the density of the traffic through the node. Each intermediate node calculates the density of traffic through it

If the data is HP packet, the destination selects a routewith an average of the best route arrived and the less congestion route. For the LP packets, the destination selects the route

with less congestion and long route. Thus both the HP and LP packets are delivered to the destination without the effect of congestion on them. This will not affect the QoS of the network. The updated traffic information is given to the source and avoids the congestion problem through the network layer itself[4].

2.4 Congestion Control based on Consensus Analysis

The congestion problem is modeled as a distributed dynamic system with time-varying delay, and it can be proven that the sent rate for all nodes converges to the available bandwidth of the sink by the proposed congestion control algorithm. When the offered load exceeds the available capacity in the link, the packet will accumulate in the router buffer, which will induce the congestion. The congestion can be avoided, if the data bulk exchange of all nodes for one task converges to the same equilibrium point in the network. Then the congestion control problem can be attributed to the consensus problem of the complex network. In this all the nodes are considered the same as each other, and they split the bandwidth fairly. Most of the packet drop is caused by the link error: by contrast to the traditional wired network, most of the packet losses are suggested as network congestion notification, and the end host reduces the transmit rate. CC- CA is able to utilize the network resources more efficiently with low drop ratio and low delay time. This algorithm restrains the congestion over the wireless sensor network, maintains a high throughput and a low delay time, and

also improves the quality of service for the whole network[6].

Conclusion

In this paper, we summarized data delivery issues in the presence of congestion in Wireless Sensor Networks. Con gestion Aware Routing (CAR) which is a simple routing protocol that uses data prioritization and treats packets according to their priorities. We analysed E-CAR and CC-CA to an CAR and MCAR. CAR increase the fraction of HP data delivery and decrease delay and jitter control . During such delivery it uses energy more uniformly in the deployment. Both CAR and MCAR support effective HP data delivery in the presence of congestion. CAR is better suited for static networks with long-duration HP floods. For bursty HP traffic and/or mobile HP sources, MCAR is a better fit. In E-CAR , the prediction of the congestion avoids the effect of congestion in the network and dropping of the LP packets. CC-CA controls the congestion over the wireless sensor network, maintains a high throughput and a low delay time, and also improves the quality of service for the whole network.

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