Location Based Design Issues of Data Centric Protocols

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Abstract: Data centric protocols are based on geographical location is an important research subject in the Wireless Sensor Network (WSN). The most cases location information is needed in order to calculate the distance between two particular nodes. So thus enabling the best routing to be selected, and reducing energy consumption and optimizing the whole network. In the same location based design issues in order to save energy, data aggregation, flooding restrictions, redundancy, throughput, latency, using these issues find the best routing protocol in data centric protocol with wireless sensor networks.

Keywords: ***data centric protocols, location based routing, WSN, Simulation Tools.***

I. INTRODUCTION

A sensor is an electronic device that is proficient of perceives environmental conditions such as sound, temperature or the presence of certain objects [12]. Sensors are generally provided with data-processing and communication capabilities. The sensing circuitry measures parameters from the environment surrounding the sensor and transforms them into electric signals. The sensors are expected to self-configure into a wireless network. Sensor networks consist of a large number of sensor nodes that collaborate together using wireless communication [5] and asymmetric many-to-one data. Indeed, this collects the requested information. In data-centric routing, the sink sends queries to certain regions and waits for data from the sensors located in the selected regions.

Data-centric protocols differ from conventional address-centric protocols in the manner that the data is sent from source sensors node to destination sensor node. In address-centric protocols, each source sensor that has the appropriate data responds by sending its data to the sink independently of all other sensors. However, in data-centric protocols, when the node send their data to the sink, intermediate that node can perform some form of aggregation on the data originating from multiple nodes and send the aggregated data toward the sink.

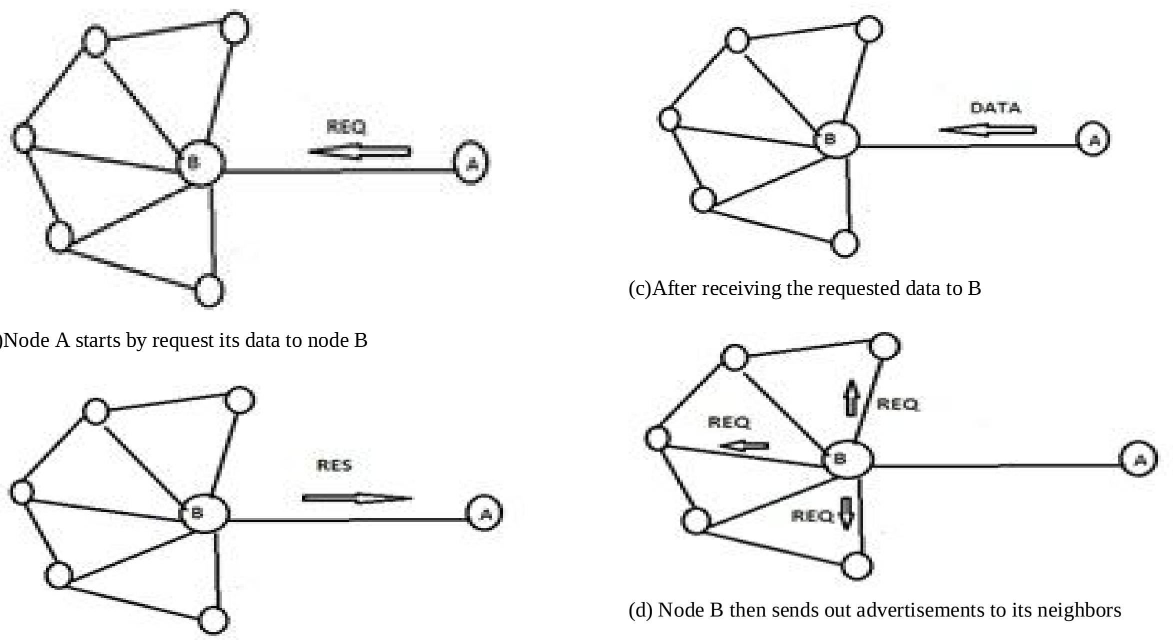
Data centric Routing in sensor networks is very challenging due to several characteristics that distinguish them from contemporary communication and wireless ad hoc networks. First of all, it is not possible to build a global addressing scheme for the deployment of sheer number of sensor nodes [1]. Therefore, classical IP-based protocols cannot be applied to sensor networks. Second, in contrary to typical communication networks almost all applications of sensor networks require the flow of sensed data from multiple regions (sources) to a particular sink. Third, generated data traffic has significant redundancy [9] in it since multiple sensors may generate same data within the vicinity of a phenomenon. Such redundancy needs to be exploited by the routing protocols to improve energy and bandwidth utilization. Fourth, sensor nodes are tightly constrained in terms of transmission power, on-board energy, processing capacity and storage and thus require careful resource management.

II. DATA CENTRIC PROTOCOLS

Location-based routing protocols compute routing paths based on the location of nodes and that source nodes are going to be randomized. These data centric protocols use of source and destination nodes location information, instead of links' information for routing. They are also known as position based routing protocols. In position based routing protocols, it is supposed that the packet source node has position information of itself and its neighbors and packet destination node.

1.1. *Spin*

SPIN protocol was designed to improve classic flooding protocols and overcome the problems they may cause. The SPIN protocols are resource aware and resource adaptive. The sensors running the SPIN protocols are able to compute the energy consumption required to compute, send, and receive data over the network. Thus, they can make informed decisions for efficient use of their own resources. The SPIN protocols are based on two key mechanisms namely negotiation and resource adaptation [18]. SPIN enables the sensors to negotiate with each other before any data dissemination can occur in order to avoid injecting non-useful and redundant information in the network. SPIN uses meta-data as the descriptors of the data that the sensors want to disseminate.



(a)Node A starts by request its data to node B

(c)After receiving the requested data to B

(d) Node B then sends out advertisements to its neighbors

. (b) Node B responds to node A.

Fig 1: Location based and position based nodes in the SPIN.

Based on this design some design issues in the location based and position based network in the SPIN protocol. Those issues are going to be overcome like energy considerations [10], reduce packet losing, throughput and latency in the SPIN protocol.

1.2. *Direct diffusion*:

Directed diffusions data centric in that all communication is for named data. All nodes in a directed diffusion-based network are application-aware [11]. This enables diffusion to achieve energy savings by selecting empirically good paths and by caching and processing data in-network (*e.g.*, data aggregation). We explore and evaluate the use of directed diffusion for a simple remote-surveillance sensor network analytically and experimentally.

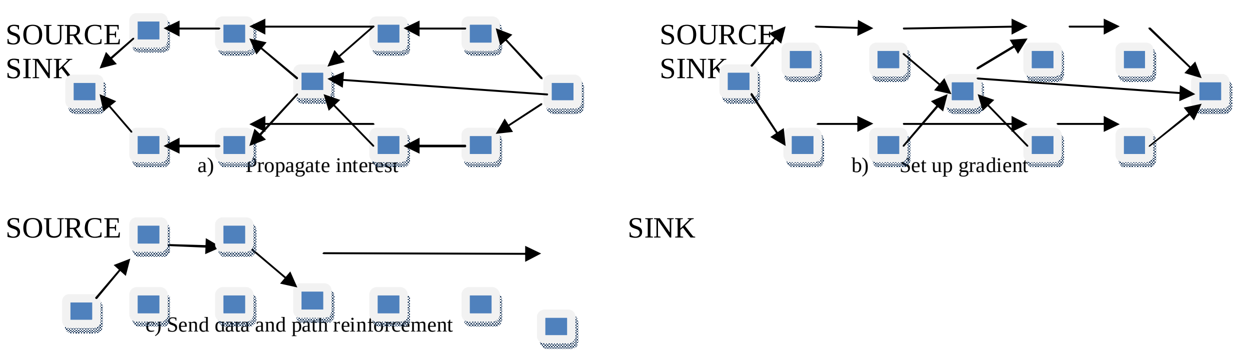


Fig 2: Location based and position based nodes in the direct diffusion.

2.3 *Roumer Routing*

It is Agent-based path creation algorithm it is another variation of direct diffusion. This routing is between query flooding and event flooding [1]. It route the query to the node one who has observed the event to occur rather than flooding to entire network. Rumor routing use long lived packet known as agent, created at random by nodes, and agent will die after visit another hops. If number of events is small and then number of queries is large.
Rumor routing is a tunable and more energy-efficient algorithm than flooding-based ones in many situations, especially when geographic information is not available. It also handles node failures quite well [15]. Rumor routing is a good choice also when events are not geographically locatable, like large concentrations of some chemical or looking for some acoustic pattern in a big network.

2.4 Cougar

The Cougar Sensor Database Project, in which we are investigating a database approach to sensor networks: Clients "program" the sensors through queries in a high-level declarative language. I give an overview of our activities on energy-efficient data dissemination and query processing [17]. Due to space constraints, we cannot present a full menu of results; instead, we decided to only whet the reader's appetite with some problems in energy-efficient routing [4] and in-network aggregation and some thoughts on how to approach them.

2.5 *Acquire*

ACtive QUery forwarding In sensoR nEtworks (ACQUIRE). The basic principle behind ACQUIRE is to consider the query as an active entity [3] that is forwarded through the network (either randomly or in some directed manner) in search of the solution. ACQUIRE also incorporates a look-ahead parameter d in the following manner: intermediate nodes that handle the active query use information from all nodes within d hops in order to partially resolve the query. When the active query is fully resolved, a completed response is sent directly back to the querying node.

III. LOCATION-BASED ROUTE DISCOVERY

When the Location is defined, the addresses of the source node and the destination node are stored in the RREQ. Each intermediate node x0 receives an RREQ and then executes the recvRREQ algorithm .

Algorithm 1: recvRREQ
Input: RREQ, Xo
Result: how to deal with RREQ

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Establish a reverse link to the node from which it
Received RREQ
If RREQ received before then
If RREQ receive before then
discard    RREQ;
else
  if RREQ.destination== x0  then
    respond with RREP using the reverse link;
  else
    if RREQ.destination is the x0 's neighbor  then
      forward RREQ to RREQ.destination;
    else
      if  X0 ∈ Location  then
        if  x0  is static  then  broadcast RREQ;
      else
        discard RREQ;
      end
    end
  end
End
```

Algorithm: Location Based Route Request from source to sink

VI. DESIGN ISSUES

4.1 *Energy considerations*:

The process of setting up the routes is greatly influenced by energy considerations. Since the transmission power of a wireless radio is proportional to distance squared or even higher order in the presence of obstacles, multi-hop routing will consume less energy than direct communication. However, multi-hop routing introduces significant overhead for topology management and medium access control. Direct routing would perform well enough if all the nodes were very close to the sink. Most of the time sensors are scattered randomly over an area of interest and multi-hop routing becomes unavoidable.

4.2 *Reduce packet losing:*

Packet Losing is defined the number of all data packets delivered to the base station. Packets reflect how efficiently the network is collecting and delivering data. Here we regard high packet losing as one of Energy deficiency: so If every node in a WSN consumes approximately the same energy to transmit a unit-sized data packet, we can use another metric hop-per-delivery to evaluate energy efficiency. Under that assumption, the energy consumption depends on the number of hops, i.e. the number of one-hop transmissions occurring. To evaluate how efficiently energy is used [6], we can measure the reduce packet losing to the hops that each delivery of a data packet takes, abbreviated as hop-per-delivery.

4.3. *Data Aggregation*:

Data aggregation is the process of collecting and aggregating the useful data. Data aggregation is considered as one of the fundamental processing procedures for saving the energy Data aggregation is the combination of data from deferent sources according to a certain aggregation function, Data aggregation is the combination of data from different sources by using, min, max and average functions such as eliminating duplicates. So the data aggregation has been used to achieve the energy efficiency and traffic optimization in number of data centric protocols.

4.4. *Throughput*:

Throughput is defined as the ratio of the number of all data packets delivered to the base station to the number of all sampled data packets. Throughput reflects how efficiently the network is collecting and delivering data. Here we regard high throughput as one of Energy Efficiency: If every node in a WSN consumes approximately the same energy to transmit a unit-sized data packet, we can use another metric hop-per-delivery to evaluate energy efficiency. Under that assumption, the energy consumption depends on the number of hops, i.e. the number of one-hop transmissions occurring. To evaluate how efficiently energy is used, we can measure the average hops that each delivery of a data packet takes, abbreviated as hop-per-delivery.

4.5. *Latency:*

Latency is analyzed when hop length is varied between sink and destination; where the event has occurred assume more than one event of interest to occur in the network.

4.6. *Reduced Redundancy:*

Data Redundancy is considered as one of the duplication processing procedures avoiding reputed data for saving the energy. Data Redundancy is the combination of data from deferent sources according to a certain aggregation function, Data aggregation is the combination of data from different sources by using, min, max and average functions such as eliminating duplicates.

VII. CONCLUSION

The real-time protocols are to completely depend on data aggregation. The average-case performance of these protocols can be evaluated by measuring the message delivery ratio with time constraints. The lifetime is another important goal. Protocols try to balance energy consumption equally among nodes, considering their residual energy levels. However, the metric used to determine network lifetime is also application dependent. Most protocols assume that all nodes are equally important and they use the time until the first node dies as a metric, but the average energy consumption of the nodes may also be used as a metric. And one more thing is reduce packet loss and reduce the redundant information. So these are the major objectives.

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