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QOS ENHANCEMENT BY VARYING TRANSMISSION RANGE FOR WIRELESS SENSOR NETWORKS

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Abstract: Wireless sensor networks(WSNs) is a network that is formed when a set of small sensor devices those are deployed in an adhoc fashion cooperates for sensing a physical phenomenon.In this paper, we evaluate some of the widely used efficient routing protocols with varying transmission range of the node. Data transmitted by a node is received by all the nodes within its communication range. Our main focus is on the analysis of varying a range of the transmission in rhe terms of distance. The evaluation is made on the three routing protocols such as : directed diffusion, flooding and omniscient multicast, which are simulated in Network Simulator (NS-2) .The performance of these data dissemination protocols, is analyzed with selected metrics.

Keywords: Wireless sensor networks(WSNs); Quality of service(QOS); Directed diffusion (DD);NS-2(network simulator-2).

I. INTRODUCTION

Wireless Sensor Networks (WSNs) consists of numerous tiny sensors deployed at high density in regions requiring surveillance and monitoring. These sensors can be deployed at a cost much lower than the traditional wired sensor system. A typical sensor node consists of one or more sensing elements (motion, temperature, pressure, etc.), microprocessor, low power radio trans-receiver, a battery and limited memory. The important aspect of such networks is that the nodes are unattended, have limited energy and unknown network topology. Different design challenges that arise in sensor networks are due to the limited resources they have and their deployment in hostile environments.

The important property of sensor networks is the need of the sensors to reliably disseminate the data to the sink or the base station within a time interval that allows the user or controller application to respond to the information in a timely manner, as out of date information is of no use and may lead to disastrous results.

Another important attribute is the scalability to the change in node density, network size and the topology. Sensor networks are very dense as compared to mobile ad hoc and wired networks. That is arise from the fact that the sensing range is lesser than the communication range and hence more nodes are needed to achieve sufficient sensing coverage. Sensor nodes are required to be resistant to failures and attacks.

Wireless Sensor Nodes

The deployment of small, low-power, inexpensive, distributed devices, which are capable of the local processing and wireless communication. Such nodes are called as sensor nodes. Each sensor node is capable of only a limited amount of processing. But when coordinated with the information from a large number of other nodes, they have the ability to measure a given physical environment in the greater detail. Thus, a sensor network can be described as a collection of sensor nodes which co-ordinate to perform some specific action. Unlike traditional networks, sensor networks depend on dense deployment and co-ordination to carry out their tasks.

The main focus is more on wireless, distributed, sensing nodes. But, distributed, wireless sensing when the exact location of a particular phenomenon is unknown, distributed sensing allows for closer placement to the phenomenon than a single sensor would permit. Also, in many of the cases, multiple sensor nodes are required to overcome environmental obstacles like obstructions, line of sight constraints etc. In most of the cases, the environment to be monitored does not have an existing Infrastructure for either energy or communication. Then it becomes imperative for sensor nodes to survive on small, finite sources of energy and communicate through a wireless communication channel.

II. DATA DISSEMINATION PROTOCOLS

Data dissemination is the process by which queries or data are routed in the sensor networks. Data dissemination has many problems including; data propagation, energy balance, power savings. Proposed solutions for these problems are application-specific paradigms, which facilitate efficient delivery of sensed data to inquiring destination. Data centric approach is based on this concept.

Goals of Robust Data Dissemination Protocols

- Fault tolerant
- Minimize energy drain on batteries\
- Reduce redundant energy transmissions
- Distribute data between nodes as quickly as possible

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Data Centric Protocols

In data-centric routing protocols, the sink sends queries to the certain regions and waits for data from the sensors located in the selected regions. Since the data is being requested through out the queries, the attribute based naming is require to specify the properties of the data. The SPIN is the first data-centric protocol, which considers the data negotiation between the nodes in order to eliminate redundant data and save energy. Later, the directed diffusion has been developed and has become a breakthrough in data-centric routing. Many other protocols have been proposed either based on directed diffusion or following a similar concept. Data-centric protocols can be classified as:

- **Push Based**: Sensors push the data proactively towards the sink periodically.
- **Pull Based**: Sink queries sensors and asks for data.
- **Hybrid Push and Pull Based**: Sensors may indicate that it has the data (like push), interested nodes query for the data (pull), the data sources then send the data to the interested nodes.

Directed Diffusion

Directed diffusion is a data-centric communication paradigm where a sink (node requesting a service) sends out a request for the data by broadcasting an interest to all the neighbouring nodes. An interest defines to a named description of a service that a sink node requires. These neighbours subsequently broadcast the interest to their respective neighbours and this process is repeated untill the source node, which is capable of servicing the request comes across the interest . As interests diffuse throughout the network ,the node that receives the interest from a neighbour node forms a gradient pointing to the sending node that indicates the direction in which data from a source node will eventually flow. The source node then generates the data messages using its sensors, which propagate, back to the sink node following the gradients formed along the paths through which the interests originally traversed. Every sink node that receives the data messages from more than one neighbour node reinforces a particular neighbour so that subsequent data messages arrive only from the chosen neighbour.

This chosen neighbour also performs the same procedure on its neighbour nodes it received a data message from. This process is repeated untill the data messages propagate only along the reinforced path from the source to the sink node . If the quality of data transmission from the certain neighbour node degrades, a node in the network can opt to negatively reinforce its current under-performing neighbour and reinforce the another better- performing neighbour , in order to cope with the varying network dynamics.

Flooding

In the flooding scheme, sources flood all events to every node in the network. Flooding is a contrary scheme for DD data dissemination protocol, if the later does not perform better than flooding does.

Omniscient Multicast

In omniscient multicast scheme, each source node transmits its events along the shortest path multicast tree to all the sinks. In the analysis of the omniscient multicast , do not account the cost of tree construction protocols. Centrally compute the distribution trees and do not assign energy costs to these computation. Omniscient multicast indicates the best possible performance achievable in an IP-based sensor network without considering overhead. Omniscient multicast offers the advantage that it is not dependent on fixed multicast trees, as could be defined in fixed topologies, but routes packets based on information of sink. In this protocol ,when router layer receives the paket,then it decides whether to pass the packet up to the stack based on the sink table . This routing protocol is unrealistic in that it assumes all route information is available at no cost.

III. LITERATURE REVIEW

1) **In Ref. [1], I.F.Akyildiz et al.** Presents recent advancements in wireless communications and electronics, which have enabled the development of low–cost sensor, networks. The sensor networks can be used for various application areas (e.g., health, military, home). For different application areas, there are different technical issues that researches are currently resolving. The current state of the art of sensor networks is discussed in this a survey on sensor networks.
2) **A.Bharathidasan et al. [4]** have presented various issues in sensor networks like energy efficiency, routing and localization. Various schemes proposed have been described. Also proposed future work in the areas of media access control, security and privacy.
3) **In Ref. [5], C.Intanagonwiwat et al.** Advances in processor, memory and radio technology will enable small and cheap nodes capable of sensing, communication and computation. networks of such nodes can coordinate to perform distributed sensing of environmental phenomena. Authors explore the directed diffusion paradigm for such coordination. Directed diffusion is data centric in that all communication is for named data. All nodes in a directed diffusion-based network are applications-aware. This enables diffusion to achieve energy savings by selecting empirically good paths and by caching and processing data in-network. Explore and evaluate the use of directed diffusion for a simple remote-surveillance sensor network.
4) **In Ref. [6], C.Intanagonwiwat et al.** explore directed-diffusion paradigm for designing distributed sensing algorithms. Many topics for preliminary evaluation of diffusion. First, directed diffusion has the potential for significant energy efficiency. Even with relatively unoptimized path selection, it outperforms an idealized traditional data dissemination scheme like omniscient multicast. Second, diffusion mechanisms are stable under the range of network dynamics considered. Finally, for

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directed diffusion to achieve its full potential, design of sensor radio MAC layers.

IV. OBJECTIVE

- To compare the performance results of Data dissemination protocol (Direct Diffusion,Flooding, and Omniscient) by varying the transmission range of a network.
- We try to find the suitable range in which quality of a network is best
- To select the best protocol from three based on the values of Quality of a network parameters .

V. METHODOLOGY

The following section, describes the simulation methodology and the performance metrics used for the comparison of data dissemination protocols

1. SIMULATION METHODOLOGY

We have used Ns-2 for the simulation of protocols. Each data dissemination protocol has used the same IEEE 802.11 MAC protocol. The same topology scenarios are used across different protocol simulations.

2.PERFORMANCE METRICES

In this work, following performance metrics will be used to evaluate and analyze the performance of three data dissemination protocols.. These different metrics are calculated with respect to transmission range. These metrics are defined as follows:

- **Remaining Energy**: Remaining energy of a network is defined as the difference of total energy of a network and energy consumed by a network.
  Remaining Energy = total energy of a network – energy consumed by a network
- **Average delay:** Average delay measures the average one-way latency observed between transmitting delay of an event and receiving it at the each sink. That metric defines the temporal accuracy of the location estimates delivered by the sensor network.
- **Routing Overhead:** Routing overhead is defined as the total no of routing packets to the total number of received data packets at the destination. **Routing overhead = the total number of routing packets at destination / total number of received data packets at destination.**

VI. CONCLUSION

The transmission range as a system parameter affects the overall energy consumption of wireless sensor networks. The performance of these three routing protocols shows some differences by varying transmission range and simulation time. The aim of proposed work is to evaluate the performance of data dissemination routing protocol under varying transmission range through simulation studies. The transmission range varies from 90 to 250. Data transmitted by a node is received by all the nodes within its communication range. We try to find the suitable range in which quality of a network is best. The data dissemination protocols are: direct diffusion, omniscient multicast and flooding. Then this work will compare directed diffusion protocol with two other data dissemination protocols namely: omniscient multicast and flooding in terms of remaining energy, average delay,routing overhead with respect to transmission range.

REFERENCES

[1]. I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, and E. Cayirci, "Wireless Sensor Networks: A Survey," Journal of Computer Networks 2002, vol.38, pp.393–422, 2002.
[2]. F.L.Lewis, "Wireless Sensor Networks," to appear in smart Environments, Technologies, Protocols, and Applications 2004, New York, pp.1-18, 2004.
[3]. P.Jiang, Y.Wen, J.Wang, X.Shen, A.Xue, "Study of Routing Protocol in Wireless Sensor Networks," Proceeding of the IEEE 6th World Congress on Intelligent Control and Automation 2006,China, vol.1, pp.266-270, June 2006.
[4]. A. Bharathidasan, V. Anand Sai Ponduru, "Sensor Networks: An overview," Technical report, University of California, Davis.
[5]. C.Intanagonwiwat, R. Govindan and D. Estrin, "Directed diffusion: A scalable and robust communication paradigm for sensor networks," Proceeding of the 6th Annual ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom'2000), Boston, MA, pp.56-67, August 2000.
[6]. C. Intanagonwiwat, R. Govindan, D. Estrin, J. Heidemann, F.Silva, "Directed Diffusion for Wireless Sensor Networking," IEEE/ACM Transaction Networking 2003, vol.11, no.1, pp.2-16, February 2003.
[7]. M. Ditzel, K. Langendoen,"D3: Data –Centric Data Dissemination in wireless sensor networks," Proceeding of the 8th European Conference on Wireless Technology 2005, Paris, pp.185-188, 2005.
[8]. N. Hu, D. Zhang, "Source Routing Directed in Wireless Sensor Networks," Journal of Information Technology 2006, vol.5, no.3, pp.534-539, 2006.
[9]. L. Zhiyu, S. Haoshan, "Design of Gradient and Node Remaining Energy Constrained Directed Diffusion Routing for WSN," International Conference on Wireless Communications, Networking and Mobile Computing, 2007,vol-27, pp.2600-2603, September 2007.
[10]. C.Zhi-yan, J.Zhen-Zhou, H.Ming-zeng, "An energy-aware broadcast scheme for directed diffusion in wireless sensor network," Journal of Communication and Computer, vol. 4, no.5 pp.28-35, May 2007.
[11]. The Network Simulator NS-2, http://www.isi.edu/nsnam/ns
[12]. K. Casey, R.Neeliseti, A.Lim, "RTDD: A Real-Time Communication Protocol For Directed Diffusion," Proceeding of the IEEE Wireless Communications and Networking Conference, WCNC 2008, pp.2852-2857, April 2008.
[13]. Hee-Sook Mo, Hyochan Bang, and Cheol Sig Pyo, "Data-centric Dissemination to Mobile Sink Group in Wireless Sensor Networks," IEEE 11th International Conference on Trust, Security and Privacy in Computing and Communications, 2012
[14]. Hee-Sook Mo, Soochang Park, Jeongcheol Lee, Hosung Park and Sang-Ha Kim, "Energy Efficient Data Dissemination Protocol for a Mobile Sink Group in WSNs," IEEE 22nd International Symposium on Personal, Indoor and Mobile Radio Communications, 2011.
[15]. P. Arivubrakan & V.R. Sarma Dhulipala, "QoS Enhancement by varying Transmission Range in Wireless Ad-hoc Networks," International Journal of Compute Applications (0975 – 8887) Volume 37– No.9, January 2012.