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Multiple Movable Sink for Dynamic Wireless Sensor Network.

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Abstract— **Dynamic Wireless sensor network (DWSN) is a group of two or more dynamic nodes with infrastructure and networking ability that communicate with each other using sink node. Sink node is capable to move in predefine path in a certain sensor networks. Due to the movable capabilities in the networks path it is known as a Dynamic wireless sensor network. In present scenario Dynamic wireless sensor network is the fantastic machinery for wireless sensor network. In past few years, the sensor node doing many works likes sensing, data gathering and forwarding. In wireless sensor network, sensor nodes lost their Energy very quickly and get disjointed from the network. To avoid this type of problem, movable sink introduced which is helpful for improving network life cycle. We are going to implementing multiple movable sink for wireless sensor network.**

Keywords — Wireless Sensor Networks (WSN), Movable sink, Network Life cycle.

I. INTRODUCTION

With the similar development of the network accessing devices and network mechanism DWSN create an additional significant task in the data communication. In the DWSN every node has sending, receiving capabilities for communicating with movable sink. If a node requests to send the data to the further node in the Dynamic wireless sensor network then they wait for movable sink. When movable sink arrives near to the node, then node send the data to the movable sink. Due to the movable character of the movable sink, the movable sink leaves the collected data to exact destination node.

1. Types of Dynamic wireless Sensor Network

There are two different types of Dynamic wireless sensor network work by the single movable sink and work by multiple movable sink in the wireless sensor network. In the case of multiple movable sink for Dynamic Wireless sensor Network it has very effective in teams of energy consumption. Multiple movable sink increases network life cycle as well as is also covers huge network area as compared to single movable sink. According to moving ability we can separate the DWSN into the three categories dynamic wireless sensor network with movable node to collect the data from wireless sensor node and remove it to the related movable sink. Next one is the other node which moves between the sensor node and movable sink to collect and broadcast the data. And the last one is by the movable sink to move in the network and Collect the data and broadcast the data into the network

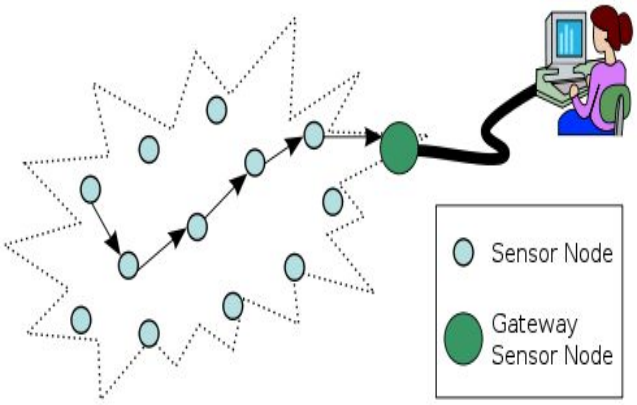


Figure 1: Dynamic Wireless Sensor Network.

2. Application of DWSN

Dynamic wireless sensor Network is useful for many fields they are as follows:-

1. **Air Quality Measuring and Monitoring:** By using DWSN we can measure how much air which has been polluted either it is suitable for our human body & health or not.

2. **Usual Calamity Prevention:** By using DSWN we can take preventive measures for disaster just like and take necessary action before that king of things.
3. **Earthquake Recognition:** By using DWSN we can perceive the sliding of the ground or movement of the soil in the earth and take necessary action before earth quake which is useful for human lives.

4. **Spot monitor:** By using DSWN, spot monitoring of certain spot is possible. This is very helpful for our defence system in border activities.

5. **Machine physical condition monitoring:** By using DSWN we can easily find out the machines physical condition and maintenance of industries and our Instrument.

3. Uniqueness of DWSN

1. **Flexibility of movable sink.**

2. **Lifetime cycle of network.**

3. **Large amount of data collection & transmission.**

4. **Secure data transmission.**

4. Security issues in DWSN

There are different Security issues and challenges in the Dynamic wireless sensor they are as follows:

1. **Data Duplication.**

2. **Data Privacy.**

3. **Data dependability.**

4. **Network simulation.**

5. **Network Authentication.**

II. EVOLUTION

In 2001, I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cayirci studied about wireless sensor networks in which they describe the concept of sensor networks which has been made viable by the convergence of micro electro- mechanical systems technology, wireless communications and digital electronics. First, the sensing tasks and the potential sensor network applications are explored, and a review of factors influencing the design of sensor networks is provided [1].

In 2002, Jason Lester Hill design System Architecture for Wireless Sensor Networks they present an operating system and three generations of a hardware platform designed to address the needs of wireless sensor networks. Their operating system, called TinyOS uses an event based execution model to provide support for fine grained concurrency and incorporates a highly efficient component model. TinyOS enables us to use a hardware architecture that has a single processor time shared between both application and protocol processing. [2].

In 2005, Daniele Puccinelli and Martin Haenggi studied about Wireless Sensor Networks: Applications and Challenges of Ubiquitous Sensing, in which Sensor networks offer a powerful combination of distributed sensing, computing and communication. They lend themselves to countless applications and, at the same time, offer numerous challenges due to their peculiarities, primary the stringent energy constraints to which sensing nodes are typically subjected. The distinguishing traits of sensor networks have a direct impact on the hardware design of the nodes at at least four levels: power source, processor, communication hardware, and sensors. Various hardware platforms have already been designed to test the many ideas spawned by the research community and to implement applications to virtually all fields of science and technology. They are convinced that CAS will be able to provide a substantial contribution to the development of this exciting field [3].

In 2006 Dirk WESTHOFF, Joao GIRAO, Amar deo SARMA describes security solutions for collecting and processing data in Wireless Sensor Networks (WSNs). Adequate security capabilities for medium and large scale WSNs are a hard but necessary goal to achieve to prepare these networks for the market. They include an overview of security and reliability challenges for WSNs and introduce a toolbox concept to support such a framework [4].

In 2006 Al-Sakib Khan Pathan Hyung-Woo Lee Choong Seon Hong investigate; Wireless Sensor Network (WSN) is an emerging technology that shows great promise for various futuristic applications both for mass public and military. The sensing technology combined with processing power and wireless communication makes it lucrative for being exploited in abundance in the future. The inclusion of wireless communication technology also incurs various types of security threats. The intent of this paper is to investigate the security related issues and challenges in wireless sensor networks. They identify the security threats, review proposed security mechanisms for wireless sensor networks. They also discuss the holistic view of security for ensuring layered and robust security in wireless sensor networks [5].

In 2007 Prabhudutta Mohanty, Sangram Panigrahi Nityananda Sarma, Siddhartha Sankar Satapathy they explored explored general security threats in wireless sensor network and made an extensive study to categorize available data gathering protocols and analyze possible security threats on them. [6].

In 2008 Jennifer Yick, Biswanath Mukherjee, Dipak Ghosa The goal of their survey is to present a comprehensive review of the recent literature since the publication of [I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cayirci, A survey on sensor networks, IEEE Communications Magazine, 2002]. Following a top-down approach, they give an overview of several new applications and then review the literature on various aspects of WSNs. They classify the problems into three different categories: (1) internal platform and underlying operating system, (2) communication protocol stack, and (3) network services, provisioning, and deployment. We review the major development in these three categories and outline new challenges [7].

In 2009 Chiara Buratti Andrea Conti Davide Dardari and Roberto Verdone their survey paper aims at reporting an overview of WSNs technologies, main applications and

standards, features in WSNs design, and evaluations. In particular, some peculiar applications, such as those based on environmental monitoring, are discussed and design strategies highlighted; a case study based on a real implementation is also reported. Trends and possible evolutions are traced. Emphasis is given to the IEEE 802.15.4 technology, which enables many applications of WSNs. Some example of performance characteristics of 802.15.4-based networks are shown and discussed as a function of the size of the WSN and the data type to be exchanged between nodes [8].

In 2010 Amar Adnan Rasheed M.S., Northeastern Dr. Rabi N. Mahapatra In their dissertation, they consider a number of security schemes for WSN (wireless sensor network) with MS. The schemes offer high network's resiliency and low communication overhead against nodes capture, MS replication and wormhole attacks. They propose two schemes based on the polynomial pool scheme for tolerating nodes capture: the probabilistic generation key pre-distribution scheme combined with a polynomial pool scheme, and the Q-composite generation key scheme combined with a polynomial pool scheme. [9].

In 2011 Luís M. L. Oliveira Joel J. P. C. Rodrigues in their paper they surveys a comprehensive review of the available solutions to support wireless sensor network environmental monitoring applications [10]

In 2012 Xiaojiang Ren Weifa Liang In their paper they consider data collection in an energy harvesting sensor network with a mobile sink, where a mobile sink travels along a trajectory for data collection subject to a specified tolerant delay constraint T. The problem is to find an optimal close trajectory for the mobile sink that consists of sojourn locations and the sojourn time at each location such that the network throughput is maximized, assuming that the mobile sink can only collect data from one-hop sensors, for which they first show that the problem is NP-hard. Then they devise novel heuristic algorithms [11].

Gyudong Shim and Daeyeon Park in their paper "Locators of Mobile Sinks for Wireless Sensor Networks" in which the Mobile sinks in wireless sensor networks require an additional communication mechanism of geographic routing. Because the sink's location as the destination in geographic routing is changed dynamically, sinks' location should be propagated continuously though the sensor area for sensor's future data report. However this frequent location updates can drain up the sensor's battery power and increase wireless channel contentions.

III. PROBLEM FORMULATIONS AND GRAPHS

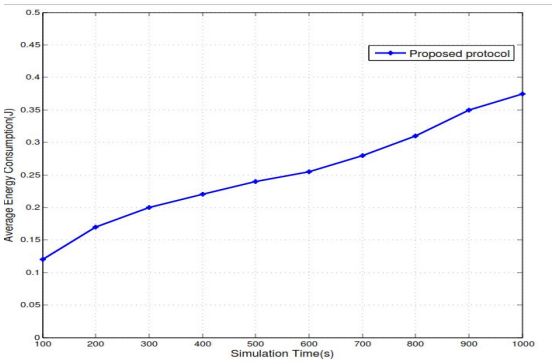
We consider small number of sensor nodes and few movable sinks that collect data from wireless sensor nodes and travels into specific path and transmit data to the destination. We also consider that the paths of sinks are not same for all sinks.

The proposed structure for data gathering called data gathering with mobile sink. This is relating mechanism that can be used to construct energy proficient protected methods that are adaptive to the surroundings. Multiple movable sink is deployed in the network to gather the data from the sensors with one hop connections.

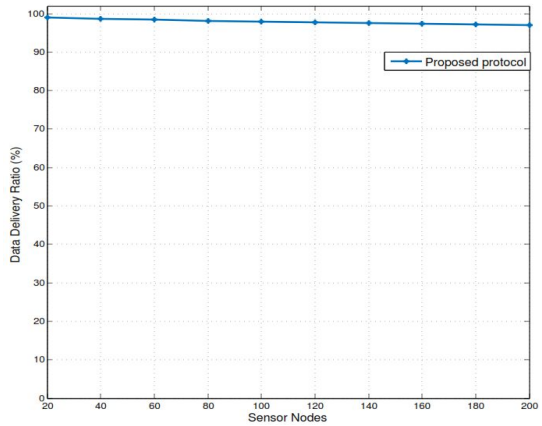
All the sensors are fixed other than the sink node and sensors are deployed lightly to sense the surroundings according to its radio range. The manipulative issue is to extend the network life time and security gather the data by movable sink. Each of these mechanisms can achieve certain level of security and energy proficient data gather in the mobile sink wireless sensor networks.

We consider the various sink movement and calculating energy life cycle of wireless sensor node and then plot graphs accordingly.

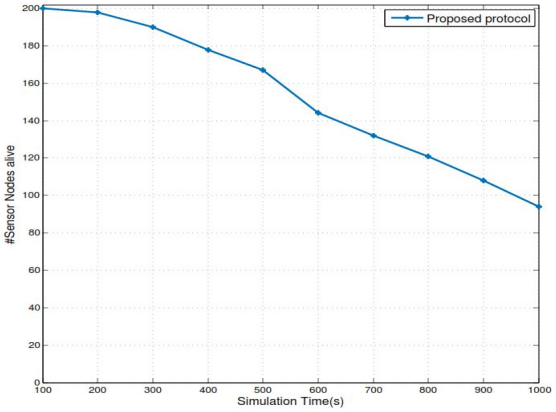
1. Average Energy Consumption



2. Data Delivery Ratio

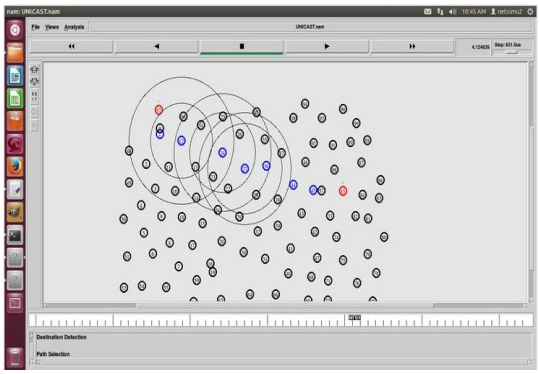


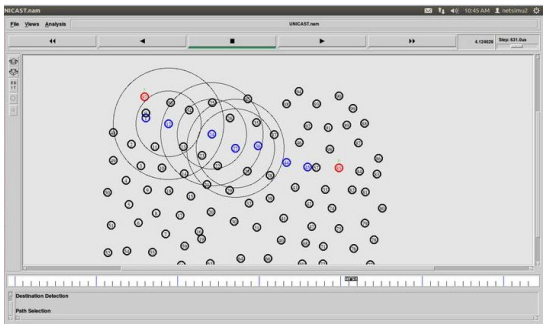
3. Network Lifetime



IV. SIMULATION RESULT

We are using NS 2.35 version for simulation multiple movable sink, in which we are considering 10 movable sink, 200 wireless sensor nodes and our simulation time is 1000 seconds. Our simulation results are as follows:





V. CONCLUSION AND FURTHER DEVELOPMENT

In Current scenario wireless technologies are widely used in worldwide. The significance of the Dynamic wireless sensor network in our daily life has been discussed in the paper, we have discussed the various types of the dynamic wireless sensor network, issues and the advantages wireless technologies.

REFERENCES

[1] I. F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cayirci "A survey on sensor networks", IEEE Communications Magazine, 40(8), pp. 102–114, 2002.

[2] Jason Lester Hill "System Architecture for Wireless Sensor Networks", University of California, Berkeley , Spring 2003.

[3] Daniele Puccinelli and Martin Haenggi, "Wireless Sensor Networks: Applications and Challenges of Ubiquitous Sensing ",IEEE circuits and systems magazine third quarter 2005.

[4] Dirk WESTHOFF, Joao GIRAO, Amardeo SARMA, "Security Solutions for Wireless Sensor Networks",Neo Technical Journal Vol. 01, 03/2006.

[5] Al-Sakib Khan Pathan Hyung-Woo Lee Choong Seon Hong, "Security in Wireless Sensor Networks: Issues and Challenges", Feb. 20-22, 2006 ICACT2006.

[6] Prabhudutta Mohanty, Sangram Panigrahi Nityananda Sarma, Siddhartha Sankar Satapathy, "Security issues in wireless sensor network data gathering protocols: a survey", Journal of Theoretical and Applied Information Technology.

[7] Jennifer Yick, Biswanath Mukherjee, Dipak Ghosa, "Wireless sensor network survey" , Computer Networks 52 (2008) 2292–2330.

[8] Chiara Buratti Andrea Conti Davide Dardari and Roberto Verdone, "An Overview on Wireless Sensor Networks Technology and Evolution " , Sensors 2009, 9, 6869-6896.

[9] Amar Adnan Rasheed M.S., Northeastern Dr. Rabi N. Mahapatra, "security schemes for wireless sensor networks with mobile sink", Texas A&M University.

[10] Luís M. L. Oliveira Joel J. P. C. Rodrigues, "Wireless Sensor Networks: a Survey on Environmental Monitoring" , journal of communications, vol. 6, no. 2, april 2011, Pp: 143-151.

[11] 2012 Xiaojiang Ren Weifa Liang, "Delay-Tolerant Data Gathering in Energy Harvesting Sensor Networks With a Mobile Sink" , globecom 2012, ad hoc and sensor networking symposium.

[12] F. Viani, P. Rocca, M. Benedetti, G. Oliveri, A. Massa , "Electromagnetic passive localization and tracking of moving targets in a WSN-infrastructure environment " in Inverse Problems, vol. 26, (2010), p. 1-15.

[13] L. Lazos and R. Poovendran. Sherlock: Robust localization for wireless sensor networks. ACM Trans. Sen. Netw., 1(1):73–100, 2005.

[14] S. ˘Capkun and J.-P. Hubaux. Secure positioning in wireless networks. IEEE Journal on Selected Areas in Communications, 24(2):221–232, 2006.

[15] L. Yuan and G. Qu, "Energy-efficient Design of Distributed Sensor Networks," in Handbook of Sensor Networks: Compact Wireless and Wired Sensing Systems, M. Ilyas and I. Mahgoub, eds., Boca Raton, FL, pp. 38.1–38.19, CRC Press, 2004.

[16] M. Haenggi, "Twelve Reasons not to Route over Many Short Hops," in IEEE Vehicular Technology Conference (VTC'04 Fall), Los Angeles, CA, Sept. 2004.

[17] S. Meguerdichian, F. Koushanfar, M. Potkonjak, and M. Srivastava,"Coverage problems in wireless ad-hoc sensor networks," in Proceedings of the 20th Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM'01), vol. 3, Anchorage, AK, pp. 1380–1387, Apr. 2001.

[18] http://en.wikipedia.org/wiki/Wireless_sensor_network.

[19] Luís M. L. Oliveira Joel J. P. C. Rodrigues, "Wireless Sensor Networks: a Survey on Environmental Monitoring" , journal of communications, vol. 6, no. 2, april 2011, Pp: 143-151.

[20] Luis E. Palafox , J. Antonio Garcia-Macias , "Security in Wireless Sensor Networks", 2008, IGI Global.

[21] N. Reijers and K. Loangendoen, "Efficient code distribution in wireless sensor networks," in Second ACM International Workshop on Wireless Sensor Networks and Applications, San Diego, CA, Sept. 2003.

[21] D. Ganesan, R. Govindan, S. Shenker, and D. Estrin, "Highly resilient,energy efficient multipath routing in wireless sensor networks," in Proceedings of the 2nd ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc'01), Long Beach, CA, pp. 251–254, 2001.

[22] F. Sivrikaya and B. Yener, "Time synchronization in sensor networks: A survey," IEEE Network, vol. 18, pp. 45–50, July–Aug. 2004.

[23] A. Chakrabarti, A. Sabharwal, and B. Aazhang, "Using predictable observer mobility for power efficient design of sensor networks," in Information Processing in Sensor Networks (IPSN'03), Palo Alto, CA, Apr. 2003.

[24] F. Stajano and R. Anderson, "The resurrecting duckling: Security issues for ad-hoc wireless networks," in 7th International Workshop on Security Protocols, Cambridge, UK, Apr. 1999.

[25] T. Martin, M. Hsiao, D. Ha, and J. Krishnaswami, "Denial-of-service Attacks on battery-powered mobile computers," in Proceedings of the 2nd IEEE Pervasive Computing Conference, Orlando, FL, pp. 309–318, Mar. 2004.

[26] Martinez, K, Hart, J. K. And Ong, R (2009) Deploying a Wireless Sensor Network in Iceland. Lecture Notes in Computer Science, Proc. Geosensor Networks, 5659, 131-137.

[27]http://www.libelium.com/wireless_sensor_networks_to_detec_forest_fires/ Air Quality Monitoring

[28] Daniele Puccinelli and Martin Haenggi, "Wireless Sensor Networks: Applications and Challenges of Ubiquitous Sensing ",IEEE circuits and systems magazine third quarter 2005.

[29] Dirk WESTHOFF, Joao GIRAO, Amardeo SARMA, "Security Solutions for Wireless Sensor Networks",Neo Technical Journal Vol. 01, 03/2006.

[30] Liang Song and Dimitrios Hatzinakos, "Architecture for Wireless Sensor Networks with Mobile Sinks: Sparsely Deployed Sensors" , IEEE Trans. on Vehicular Technology, june 2006.

[31] Al-Sakib Khan Pathan Hyung-Woo Lee Choong Seon Hong, "Security in Wireless Sensor Networks: Issues and Challenges", Feb. 20-22, 2006 ICACT2006.

[32] Luis E. Palafox , J. Antonio Garcia-Macias , "Security in Wireless Sensor Networks", 2008, IGI Global.

[33] Jennifer Yick, Biswanath Mukherjee, Dipak Ghosa, "Wireless sensor network survey" , Computer Networks 52 (2008) 2292–2330.

[34] Dr. Manoj Kumar Jain, "Wireless Sensor Networks: Security Issues and Challenges", 2011 ijcit, issn 2078-5828 (print), issn 2218-5224 (online), volume 02, issue 01, manuscript code: 110746.

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