Journal of Advances in Science and Technology

Vol. 10, Issue No. 21, February-2016, ISSN 2230-9659

REVIEW OF ENERGY EFFICIENT ROUTING PROTOCOL FOR WIRELESS SENSOR NODES IN INTERNET OF THINGS

AN INTERNATIONALLY INDEXED PEER REVIEWED & REFEREED JOURNAL

Journal of Advances in Science and Technology
Vol. 10, Issue No. 21, February-2016, ISSN 2230-9659

Review of Energy Efficient Routing Protocol for Wireless Sensor Nodes in Internet of Things

Mrs. A. A. Miraje[1]* Prof. (Dr.) Athar Ali[2]

[1] Research Student, MUIT, Lucknow, UP, India

[2] Research Guide, MUIT, Lucknow, UP, India

Abstract – In recent few years, wireless sensor network (WSN) technology is developed rapidly. The WSN is mostly used in the medical health, military, agriculture, space and marine exploration. In this areas we analyze the advantage is WSN. WSNs use sensor nodes that placed in open areas or in public places and with a huge number that creates many problems for the researchers and network designer, for giving an appropriate design for the wireless network. We summarize the main factors that affect the applications of Wireless Sensor Network. The problems are security, routing of data and processing of large amount of data etc. This paper describes the types of WSNs and the possible solutions for tackling the listed problems and solution of many other problems. This paper will deliver the knowledge about the WSN and types with literature review so that a person can get more knowledge about this emerging field. In this paper, we have compare and analysis the performance of energy efficient routing protocol for WSN under different scenarios & metrics using NS-2.

Keywords: - WSN, NS-2.

----------♦----------

1. INTRODUCTION

WSN has become an emerging field in research and development due to the large number of applications that can become significantly beneficial from such systems and has led to the development of cost effective, not-reusable, tiny, cheap and self-contained battery powered computers, also called sensor nodes. These sensor nodes can accept input from an attached sensor and process the input data gathered from the sensor nodes. After that the process data wirelessly transmits the results to transit network. WSNs are highly dispersed networks of lightweight and small wireless nodes, deployed in huge numbers, to monitor the system or environment by the measurement of physical parameters like pressure, temperature, or relative humidity. WSNs can be applied in industry, agriculture, military defense, environment monitoring, remote control and city management etc. that is why WSNs are becoming more and more popular. The Wireless sensor network (WSN) has developed as an innovation of decision for a few applications because of the noteworthy progression in smaller scale electro mechanical framework (MEMS) based minimal effort, little estimated shrewd sensors, low power and much incorporated computerized gadgets and wireless correspondence innovation. WSN comprises of vast number of self-governing battery-controlled multi-utilitarian sensor hubs, otherwise called bits. A WSN hub regularly comprises of a sensor, processor which could be a microcontroller, advanced flag processor (DSP), field programmable entryway exhibit (FPGA) or application particular incorporated circuit (ASIC), handset, control source and radio. The emphasis is on three imperative subsystems utilized for detecting, preparing, and imparting. These bits are thickly sent to gauge a given physical condition. Distinctive mechanical, warm, natural, concoction, optical and attractive sensors might be appended to the bit to quantify properties of the earth. Because of the restricted ability and availability of bits, a radio is actualized for wireless correspondence to exchange the detected information to a base station generally situated in a remote site for additionally handling.

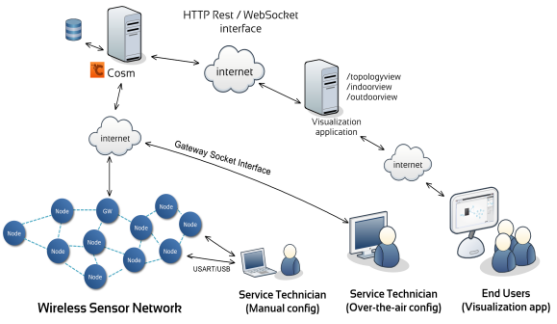

Fig 1: Simple WSN Architecture

An extensive number of uses have been proposed for WSN. These applications are generally identified with following and checking of some physical wonder. Checking applications incorporate condition observing, wellbeing observing, pipeline checking of water, oil and gas, seismic and common structure (structures, spans and so forth.) checking. Following applications incorporate following vehicles, creatures, people and different articles. For WSN, energy efficient is very important to work longer for such remote monitoring applications.

In many WSN applications, the deployment of sensor nodes is performed in an ad hoc fashion without careful planning and engineering. Once deployed, the sensor nodes must be able to autonomously organize themselves into a wireless communication network. Sensor nodes are battery-powered and are expected to operate without attendance for a relatively long period of time. In most cases it is very difficult and even impossible to change or recharge batteries for the sensor nodes. WSNs are characterized with denser levels of sensor node deployment, unreliability of sensor nodes, and sever power, computation, and memory constraints. Thus, the unique characteristics and constraints present many new challenges for the development and application of WSNs.

2. NS-2

NS2 is remaining for the Network Simulator Version 2 which is focused on particularly for the systems recreations. NS2 is only the discrete occasion test system for the inquiries about in the range of systems administration. NS2 giving the re-enactment and study is supporting for wired systems, remote systems by utilizing TCP, and UDP, IP, and CBR examples of the interchanges. NS2 is the key of two unique parts typically like as NS implies organize test system and other one is NAM implies arrange illustrator. NS is regularly taken being used for every one of the conventions, for example, normally utilized IP conventions over the remote and additionally wired systems. At the flip side, the system's artist is the instrument is utilizing to imagine the re-enactment of the systems as the fundamental correspondence designs. NAM is giving the help to wired system reproduction completely done correlation with the remote re-enactment which is conceivable only a somewhat with the NAM. NS2 is the current form 2 of the system test system which was created and distributed by the college in the Berkeley city called as University of California. In any case, from that point forward, VINT venture also. At first system test system was produced just for the wired systems; as of late Carnegie Mellon University in 1999, expanded the working and recreation of the NS2 for the remote specially appointed systems implies MANET also.

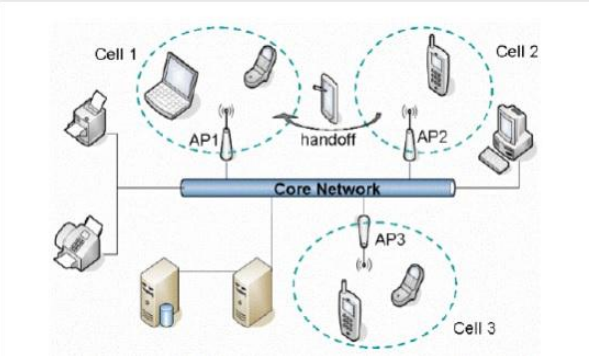

Fig 2: NS-2 Core Network

There likewise some different highlights of the ns-2 which expands our interests of utilizing the ns2 test system for the re-enactment of our system applications, for example:

1. In the MANET systems NS2 provides the system reproduction condition to wired and remote.

2. To the remote channel provides the 802.11, 802.16 and son on.

3. To the decision into whatever the steering is provides the quantity of directing conventions this is done along numerous ways.

4. Simulations of the cell systems required as the portable hosts are the mimicked also.

5. Using the technologies like CPP and OTCL, NS2 is developed as like the purely object oriented network simulator. The class hierarchy which is presented in the C++ and OTcl interpreted is too much depended by the NS in which there is one to one mapping in between the class is which is into the interpreted hierarchy &compile hierarchy.

6. For the NS2 two kinds of programming languages used which discussed above such as C++ and OTcl because of the reason the OTcl language is easily understand to the programs and configurations which are expecting for the quick & frequent network changes and on the other hand C++ is used for the speed efficiency in the simulation of the networks. Thus such tool is very flexible for the useNs-2 as it also allows user to existing protocols for their application simulations as well as to develop their network protocol in manner to expand the functionality of the instrument. Network simulator also helps for the performance measurement from the trace analysis functionality which is very important for the research purposes in order to measure the efficiency of particular application or particular routing protocol. NS2 is open source and free

software tool which is widely available for downloads from the Internet. It was initially developed for the UNIX systems but later by using the environment of the Cygwin under the Windows XP can run the ns2.

3. RELATED WORKS

In wireless sensor network routing protocol are categories into two kinds viz. proactive routing and reactive routing.

Murukesan Loganathan, et al. (2017)

In this paper, the author is displaying Wireless sensor network comprises of hubs with restricted assets. Subsequently, it is essential to plan conventions or calculations which builds vitality proficiency keeping in mind the end goal to enhance the network lifetime. In this paper, methods utilized as a part of the network layer (directing) of the internet convention stack to accomplish vitality proficiency are assessed. For the most part, the directing conventions are arranged into four primary plans: (1) Network Structure, (2) Correspondence Display, (3) Topology Based, and (4) Solid Steering. In this work, just network structure based directing conventions are evaluated because of the page imperative. Additionally, this sort of conventions are much prominent among the scientists since they are genuinely easy to actualize and create great outcomes as displayed in this paper. Additionally, the advantages and disadvantages of every convention are displayed. At long last, the paper finishes up with conceivable further research headings.

Amit Sarkar, et al. (2016)

Directing in Wireless Sensor Networks (WSNs) assumes a huge part in the field of condition arranged checking, movement observing, and so forth. Here, wide commitments that are made toward directing in WSN are investigated. The paper mostly expects to arrange the steering issues and looks at the directing related advancement issues. For accomplishing the intention, 50 papers from the standard diaries are gathered and fundamentally investigated sequentially. Afterward, different highlights that are identified with vitality, security, speed and unwavering quality issues of directing are talked about. Therefore, the writing is examined in light of the recreation condition and exploratory setup, mindfulness over the Nature of Administration (QoS) and the sending against different applications. Also, the advancement of the steering calculations and the meta-heuristic investigation of directing streamlining are investigated. Steering is a tremendous zone with various unsolved issues and consequently, different research holes alongside future bearings are likewise introduced.

Jingjing Yan, et. al. (2017)

Because of a battery requirement in wireless sensor networks (WSNs), dragging out their lifetime is critical. Vitality effective steering strategies for WSNs assume an incredible part in doing as such. In this paper, we express this issue and group current directing conventions for WSNs into two classifications as per their introduction toward either homogeneous or heterogeneous WSNs. They are additionally arranged into static and portable ones. We give an outline of these conventions in every classification by condensing their attributes, impediments, and applications. At last, some open issues in vitality productive directing convention plan for WSNs are shown.

Harendra S. Jangwan, et al (2017)

In this paper, author introducing the wireless sensor networks (WSNs) have investigated diverse application regions from individual, industry, military, agribusiness, condition checking to Internet of Things (IOT). The restricted battery energy of a sensor hub turns into a basic issue when it isn't conceivable to supplant or revive its battery. In this paper, we have announced a broad survey on hierarchal directing conventions in light of single/multi-bounce correspondence and for homogenous/heterogeneous WSNs and in addition a correlation of various existing conventions is done based on a few factors that are control utilization, end-to-end delay, stack adjusting, network steadiness and versatility. A few factors that impact the outline and improvement of directing conventions for WSNs are additionally talked about. Further, a few points of interest and burdens of each steering convention are enrolled.

Er. Megha Dhingra, et al (2017)

In this paper, author displays a writing audit on WSN networks, in which the limit of network hubs are constrained as for vitality supply, confined computational limit and correspondence transfer speed. To draw out the lifetime of these sensor hubs, planning proficient steering conventions are basic. Essentially, the Directing conventions for wireless sensor networks are in charge of keeping up the courses in the network which guarantees solid multi-bounce correspondence. Wireless sensor network comprises of number of sensors, which gathers the data and send to the sink hub. Sensor hub has constrained vitality stockpiling and can't be supplanted in specific applications. This paper is broke down the physical connection between the power utilization and the connection usage of wireless sensor networks.

Muhammad Aslam, et al (2017)

In this paper, the author portray Viable usage of vitality assets in Wireless Sensor Networks (WSNs) has turned out to be trying under questionable disseminated group arrangement and single-bounce entomb bunch correspondence abilities. Along these lines, sensor hubs are compelled to work at costly full rate transmission control level ceaselessly amid entire network activity. These testing network conditions encounter undesirable wonders of intense vitality utilization and parcel drop. In this paper, we propose a versatile resistant Multi-bouncing Multilevel Grouping (MHMLC) convention that executes a Half breed Bunching Calculation (HCA) to perform ideal concentrated determination of Group Heads (CHs) inside sweep of halfway found Base Station (BS) and conveyed CHs choice in whatever is left of network region. HCA of MHMLC additionally delivers ideal middle of the road CHs for bury group multi-bounce interchanges that create heterogeneity-mindful monetary connections. This crossover bunch development encourages the sensors to work at short range transmission control level that upgrades connect quality and maintains a strategic distance from parcel drop. The re-enactment conditions create reasonable correlation among proposed MHMLC and existing best in class directing conventions. Trial comes about give critical confirmation of better execution of the proposed show as far as network lifetime, soundness period, and information conveyance proportion.

Mohamed A. Eshaftri, et al (2017)

In this exploration author introducing the Wireless Sensor Networks (WSNs), bunching procedures are generally utilized as a key successful answer for diminish vitality utilization and drag out the network lifetime. Regardless of numerous takes a shot at bunching in WSNs, this issue is still, notwithstanding, in its earliest stages as most existing arrangements experience the ill effects of long and iterative grouping cycles. While trying to fill in this hole, they propose another bunch based convention, alluded to as Load-adjusting Group Based Convention (LCP) that presents another between bunch way to deal with increment network lifetime. This new convention pivots persistently the race of the Bunch Head (CH) race in each group, and chooses the hub with the most elevated remaining vitality in each round. Broad reproduction tests demonstrate that our proposed approach successfully balances vitality buyer among all sensor hubs and expands network lifetime contrasted with other grouping conventions.

Supreet Kaur, et al (2017)

The author displaying Vitality proficiency has as of late ended up being the essential issue in wireless sensor networks. Sensor networks are battery fueled, along these lines turn out to be dead after a specific timeframe. In this way, enhancing the information dissemination in vitality proficient way turns into the all the more difficult issue, with a specific end goal to enhance the lifetime of sensor gadgets. The bunching and tree-based information total for sensor networks can upgrade the network lifetime of wireless sensor networks. Crossover Subterranean insect state enhancement (ACO) and molecule swarm streamlining (PSO) based vitality, effective bunching, and tree-based directing convention is proposed. At first, groups are framed based on outstanding vitality, at that point, cross breed ACOPSO based information conglomeration will come energetically to enhance the between bunch information collection further. The broad investigation exhibits that proposed convention extensively upgrades network lifetime over different strategies.

W. R. Heinzelman, et al (2000)

In this paper the author is depict first bunching based progressive conventions for homogenous WSNs. The principle substance of discernment is to decrease worldwide correspondence by the development of nearby bunches of the hubs in light of least separation or got flag quality. In each bunch, CHs, in charge of information accumulation and combination, are chosen by the criteria set by Filter. As transmissions to BS are just done by CHs, we can state that they are confined and vitality productivity is upgraded. CHs in Drain are arbitrarily turned after some time to adjust the vitality utilization of hubs. A given hub I creates an irregular number, and looks at. Be that as it may, the haphazardly chose CHs are not ideal in number, and the subsequent bunches are of various sizes. These disadvantages prompt uneven vitality utilization, which prompts diminished network lifetime.

A. Manjeshwar, et al (2001)

In this paper the author proposed Adolescent is to outline a steering layer convention with the ability to respond instantly after the location of progress in the detected quality of intrigue. The CHs choice and hubs' affiliation procedures of High schooler are like those of Filter. Where, every hub creates an irregular number and contrasts it and an edge esteem. On the off chance that the created irregular number is not as much as the limit esteem, and the hub has not been CH for the last 1 p rounds. The hub communicate a message, telling each other hub that it has been chosen as CH. Youngster contrasts from Drain in the relentless state stage. On account of Drain, there is no beware of the transmission of information. In any case, in High schooler, when a hub has information to send, there are checks of hard and soft limits. Hubs first time transmit, when the detected esteem achieves its hard edge. Next time transmissions happen, just when, the detected esteem is more prominent than hard limit and the present estimation of the detected trait contrasts from soft edge by a sum more noteworthy than or equivalent to the soft edge.

In any case, notwithstanding the downsides of Filter this convention has diminished network throughput.

G. Smaragdakis, et al (2004)

Motel this paper author is displaying the bunched directing conventions accepted that every one of the hubs are outfitted with same beginning vitality. With a specific end goal to take full favorable position of hubs' heterogeneity, SEP characterizes two vitality levels. In light of these vitality levels, hubs are sorted into two kinds i.e., typical and progressed. Hubs having α time more vitality in contrast with ordinary ones are called propelled hubs. In this way, the propelled hubs are more favored for the determination of CHs because of their doled out likelihood weights. Be that as it may, the hubs dependably send the detected information to the CH(s) regardless of whether these lie at relatively shorter separation from the BS. Consequently, additional vitality is devoured which causes shrinkage in the network lifetime.

Li Qing et al. (2006)

The author is propose DEEC directing convention for heterogeneous WSNs. In this convention, hubs are outfitted with various vitality levels as the network activity begins. The CHs choice depends on the proportion of the remaining vitality of a hub to normal vitality of the network. The hubs with higher remaining vitality have more opportunities to be CHs for a specific round. This makes the vitality dissemination even among the hubs. DEEC delays security period as hubs with more remaining vitality progress toward becoming CHs much of the time. The CH arrangement in DEEC is comparative as in Filter; in any case, the likelihood for hubs to end up CHs is unique, along these lines, prompting brisk vitality consumption of the CHs having a place with the bunch with thick centralization of hubs when contrasted with that of the meager ones.

A. J. Joseph, et al. (2013)

In this paper author propose a directing convention, in which hexagonal sectoring technique is presented for hubs' arrangement. This sectoring strategy ensures uniform load on CHs all through the network field. The excellence of this strategy is the manner by which hubs connect with CHs. Hubs of any division can connect with any of the CHs (regardless of its part), in view of least separation. In any case, the areas are of settled sizes which need adaptively.

Table 1 Literature Review

Title	Year	Keywords	Techniques
Energy efficient routing protocols for wireless sensor networks: comparison and future directions	2017	Wireless Sensor Network, Network Structure, Communication Model, topology and Reliable routing	WSN, MEMS, wireless body area network (WBAN), wireless multimedia sensor network (WMSN)
Routing protocols for wireless sensor networks: What the literature says	2016	Routing, QoS, Optimization, Meta-heuristic	WSN, Distributed Source coding (DSC), QoS
Recent Advances in Energy-Efficient Routing Protocols for Wireless Sensor Networks: A Review	2016	Wireless sensor networks, Energy efficiency, Routing protocols, Mobile communication, Batteries, Design methodology	energy-efficient routing protocol design, heterogeneous WSN, homogeneous WSN, wireless sensor networks
SEER: A Simple Energy Efficient Routing Protocol for Wireless Sensor Networks	2007	archival routing, flat routing, wireless sensor networks, source initiated, destination initiated, energy consumption, energy efficiency, node lifetime, clustering, distributed sensing	SEER (Simple Energy Efficient Routing), MEMS,

4. CONCLUSION

For Wireless Sensor Network in routing protocol, routing techniques play the very important position in sequence to gain the Q-o-S solutions. Traditional WSN is the routing protocols are suffering from more routing overhead, less energy problem and reduced the packet delivery ratio due to the single path intercommunications in WSN. We analyzed the wireless sensor nodes has efficient energy problem. One of the main challenges in the design of routing protocols for WSNs is energy efficiency. The energy utilization of the sensors is dominated by data transmission and reception. Therefore, routing protocols proposed for WSNs should be as energy efficient as possible to prolong the lifetime of individual sensors, and hence the network lifetime. The protocols conferred have individual merits and shortcomings. It is required to satisfy the constraints introduced by factors such as scalability, cost, fault tolerance, environment, topology alteration, and power consumption for realization of sensor networks.

REFERENCES

A. J. Joseph and U. Hari (2013). “Hexagonally sectored routing protocol for wireless sensor networks,” Int. J. Eng., vol. 2, no. 5, pp. 1249–1252, May 2013.

A. Manjeshwar and D. P. Agrawal (2001). “TEEN: A routing protocol for enhanced efficiency in wireless sensor networks,” in Proc. 15th IPDPS, vol. 1. 2001, p. 189.

Amit Sarkar, T. Senthil Murugan (2016). “Routing protocols for wireless sensor networks: What

the literature says", Volume 55, Issue 4, December 2016, pp. 3173-3183.

Er.Megha Dhingra, Er.Ankush Gupta (2017). "Review Analysis of Optimised Routing In Wireless Sensor Network", International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 6, Issue 4, April 2017.

G. Smaragdakis, I. Matta, and A. Bestavros (2004). "SEP: A stable election protocol for clustered heterogeneous wireless sensor networks," Dept. Comput. Sci., Boston Univ., Boston, MA, USA, Tech. Rep. BUCS-TR-2004-022.

Gerhard P. Hancke, C. Jaco Leuschner (2016). "SEER: A Simple Energy Efficient Routing Protocol for Wireless Sensor Networks".

Harendra S. Jangwan, Ashish Negi (2017). "Energy Efficient Hierarchical Routing Protocols for Homogeneous and Heterogeneous Wireless Sensor Networks: A Systematic Review", Advances in Wireless and Mobile Communications. ISSN 0973-6972 Volume 10, Number 6, pp. 1227-1256.

Jingjing Yan, Mengchu Zhou, and Zhijun Ding (2016). "Recent Advances in Energy-Efficient Routing Protocols for Wireless Sensor Networks: A Review", Received June 7, 2016, accepted June 21, 2016, date of publication August 30, 2016, date of current version October 6, 2016.

L. Qing, Q. Zhu, and M. Wang (2006). "Design of a distributed energy-efficient clustering algorithm for heterogeneous wireless sensor networks," Comput. Commun., Vol. 29, no. 12, pp. 2230–2237.

Mohamed A. Eshaftri, Ahmed Y. Al-Dubai, Imed Romdhani, Muneer Bani Yassien (2015). "A New Energy Efficient Cluster based Protocol for Wireless Sensor Networks", School of Computing, Edinburgh Napier University, 10 Colinton Road, Edinburgh EH10 5DT, UK ,Retrieved on: 10 August 2015.

Muhammad Aslam, Fan Wang, Xiaopeng Hu, Muhammad Asad and Ehsan Ullah Munir (2017). "Multihopping Multilevel Clustering Heterogeneity-Sensitive Optimized Routing Protocol for Wireless Sensor Networks" , Journal of Sensors Volume 2017, Article ID 5378403.

Murukesan Loganathan, Thennarasan Sabapathy, Nur Hafizah Ghazali, R. Badlishah Ahmad and Mohamed Nasrun Osman (2017). "Energy efficient routing protocols for wireless sensor networks: comparison and future directions" MATEC Web of Conferences 140, 01005 (2017) DOI: 10.1051/matecconf/201714001005 ICEESI 2017.

Supreet Kaur, Rajiv Mahajan (2017). "A Novel Swarm Intelligence Based Energy Efficient Protocol for Wireless Sensor Networks", Journal of Theoretical and Applied Information Technology 30th November 2017. Vol.95. No 22.

W. R. Heinzelman, A. Chandrakasan, and H. Balakrishnan (2000). "Energy efficient communication protocol for wireless microsensor networks," in Proc. 33rd Annu. Hawaii Int. Conf. Syst. Sci., 2000.

Corresponding Author

Mrs. A. A. Miraje*

Research Student, MUIT, Lucknow, UP, India