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Stable Energy Routing Protocol with Dynamic Source Routing Protocol for Mobile Ad-Hoc Network

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ABSTRACT

Design an energy efficient routing protocol in mobile ad hoc networks is one of the major challenges, because of highly dynamic and distributed characteristics of the nodes and nodes are battery powered. Most of the research works in this field have done which is based on specific issues like energy consumption, stability, security and load balancing. In this paper we modified the dynamic source Routing protocol into the secure energy dynamic source Routing protocol for the stability and improve the performance of ad-hoc network. For the evaluation of performance our modified protocol tested in different network scenario tested through simulations for different distributions of nodes and wormholes and different connectivity models. Our proposed modified scheme "SE-DSR" simulate in NS-2 simulator. In simulation process we used 10, 20, 30 and 50 nodes. The evaluation of perform ace is measured by packet delivery ratio, end to end delay and packet throughputs.

Keywords:- Mobile ad-hoc network, Dynamic source routing, Stability, Energy, Traffic, Route.

INTRODUCTION

In the recent years, major research efforts have been focusing such as unreliable wireless links, limited energy, security and dynamic network topology. Routing is one the important issues in MANETs because of highly dynamic and distributed nature of nodes. Particularly energy efficient routing [4] is most important because all the nodes are battery powered.

Failure of one node may affect the entire network because nodes involved not only in data communication but also in forwarding data on behalf of other. If a node runs out of energy the probability of network partitioning will be increased. Since each mobile node has limited power sup-ply, energy depletion is become one of the main threats to the life-time of the ad hoc network and routing plays major roll in this regards. So routing in mobile ad hoc network should be in such a way that it consider to use the remaining battery power in an efficient way to increase the life time of the network.

The process of path selection within a network in order to move a data packet from a source node to a destination node is known as routing. A routing protocol is composed of a routing algorithm consisting of a set of rules to monitor the overall operations of the given network [19]. The main issue in a mobile ad-hoc network is that according to the topological changes within the network, routing protocols must be able to respond. Routing protocols are divided into three types, proactive, reactive and hybrid protocols. Routing is the process of selecting paths from source to node along which the packets can be moved from source to the ultimate destination via passing through selected intermediate nodes following a specific routing protocol. Routing protocols are used to find and maintain routes between source and destination nodes. Traditional routing protocols were developed to support user communication in networks that had a fixed infrastructure with

reliable high-capacity links. However, in the MANET, the network infrastructure dynamically changes and the links are wireless with less capacity and greater susceptibility to errors.

The sources of power consumption, with consideration to network operations have to be classified in two ways as: computation-related and communication-related. Communication related power consumption involves usage of the transceiver at the source, inter-mediate nodes and destination nodes. The transmitter is used for sending control messages, route request messages and response messages, as well as data packets originating at or routed through the transmitting node. The receiver is used to receive data packets and control packets. Understanding of the power characteristics of the mobile radio used in wireless devices is important for the energy aware design of routing protocols. As a typical mobile radio may be present in three modes: transmit, receive and standby. Maxi-mum power is consumed in the transmit mode and the least in the standby mode. Thus, the goal of routing protocol development for environments with limited power resources is to optimize the transceiver usage for a given communication task. Computation costs, involving packet processing and the CPU, not considering in our discussion.

II SECURITY GOALS IN MANET

Security is an essential requirement in Wireless ad hoc networks as compared to wired networks. Security is an important issue for ad hoc networks, especially for those security-sensitive applications. Security in wireless network is becoming more and more important while the using of mobile equipments such as cellular phones or laptops is tremendously increasing. Security in MANETs is challenging task and difficult to achieve as there is no central server and base station. In fact, the security hole provided by Ad hoc networking is not only the Ad hoc network itself, but the bridge it provides into other networks.

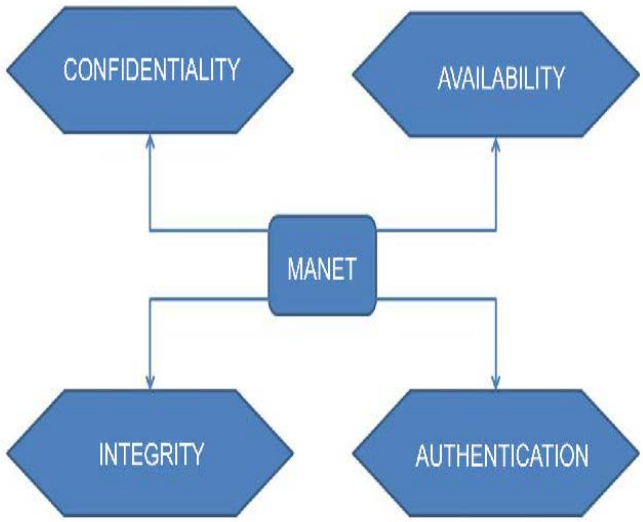

Fig 1: Security goals of MANET.

- Availability: Availability means the assets are accessible to authorized parties at appropriate times. Availability applies both to data and to services. It ensures the survivability of network service despite denial of service attack.
- Confidentiality: Confidentiality ensures that computer-related assets are accessed only by authorized parties. Protection of information which is exchanging through a MANET. It should be protected against any disclosure attack like eavesdropping unauthorized reading of message.
- Integrity: Integrity means that assets can be modified only by authorized parties or only in authorized way. Integrity assures that a message being transferred is never corrupted.
- Authentication: Authentication is essentially assurance that participants in communication are authenticated and not impersonators. The recourses of network should be accessed by the authenticated nodes.
- Authorization: This property assigns different access rights to different types of users. For example a network management

can be performed by network administrator only.

- Non-repudiation: Non-repudiation will facilitate the ability to identify the attackers even after the attack happens. This prevents cheaters from denying their crimes. This ensures that the information originator cannot deny having sent the message.

III PROBLEM STATEMENT

There are two primary motivations related with secured communication in MANETs. At first, secured communication evaluation helps discriminate between good and malicious entities. Creating secured history, one entity can remember others' behaviors. This memory provides a method for good entities to avoid working with (ex-villain) or suspect ones. Secondly, secured communication offers a prediction of one's future behavior and improves network performance. The results of evaluation can be directly applied to a motivation for good or honest behaviors while a punishment for selfish or malicious behaviors in the network. The feedback reminds network participants to act more responsibly. These motivations have interested researchers from the areas of information security and computer network in secured communication of MANETs. And according to that secured communication system we eliminate the un-secured node and improve the performance of the network in MANET environment. The previous dynamic source routing protocol is not efficient in the terms of energy and consume more power, our objective to provide the communication in an efficient manner for the energy and security.

IV EXPERIMENTAL RESULT

As we discussed earlier in related work and problem statement section, many improvements to existing DSR protocol have been showed and observed these approaches make them energy efficient but they have limitations also. This motivated us for the search of new innovative approaches. In this section we present a modified DSR routing protocol which is based on stability, energy and traffic load of nodes in a path. Our proposed protocol has modified route discovery and route maintenance strategies on the basis of stability factor, energy factor and traffic load factor. The modifications in the MAC layer are also done, as it is main part of controlling the various parameters of network activities.

In ad hoc network each node can work like host as well as router. Energy efficient routing is the prime concern in mobile ad hoc net-works. Therefore energy factor play very important role in enhancement of the network life. The nodes in the high traffic load path will die off faster than nodes in paths of lower traffic load. Mobility causes ink break required route maintenance more link break more route maintenance it show stability of nodes also play major role. Hence stability, energy efficiency and traffic load awareness can improve the performance of the network. In mobile ad hoc network, the network topology frequently changes because of the dynamic characteristics of nodes. When the distance increases between two nodes then certain extent, the destination node is unable to receive the transmission signal properly. Therefore, it will result in link failure and rediscovery of route required, which will result in routing delay and packet loss. In order to minimize this problem, the link stability factor plays a major role. The stability of a link is specified by its probability to persevere for a certain time span, which is not necessarily linked with its probability to reach a very high age. The stability of a path powerfully depends on the stability of the constituting links, because the break of any link will lead to the break of the whole path. Thus, links stability factor is expected to be consider in path selection. If relative position of node with its neighborhood doesn't changes frequently then this is said to be stable.

Route maintenance is a procedure of monitoring the proper operation of route in use in DSR protocol. Any node, if it detects that its neighboring node, which is the next hop for a route, is not working then the node sends an error

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packet to the source containing its address and the address of the hop not working. On receiving the route error packet by the node removes the hop in error from its routing cache. On each forwarding link, the transmitting node expects a link-layer acknowledgement in return. In case the ACK is not received within a specified certain time interval, the node re-moves that link from their cache. As in DSR, if it is not the source of the packet, it generates a route error message specifying the link that is broken and sends the route error packet to the source node. Energy Aware Route maintenance involves tracking the maximum energy of the links on the route.

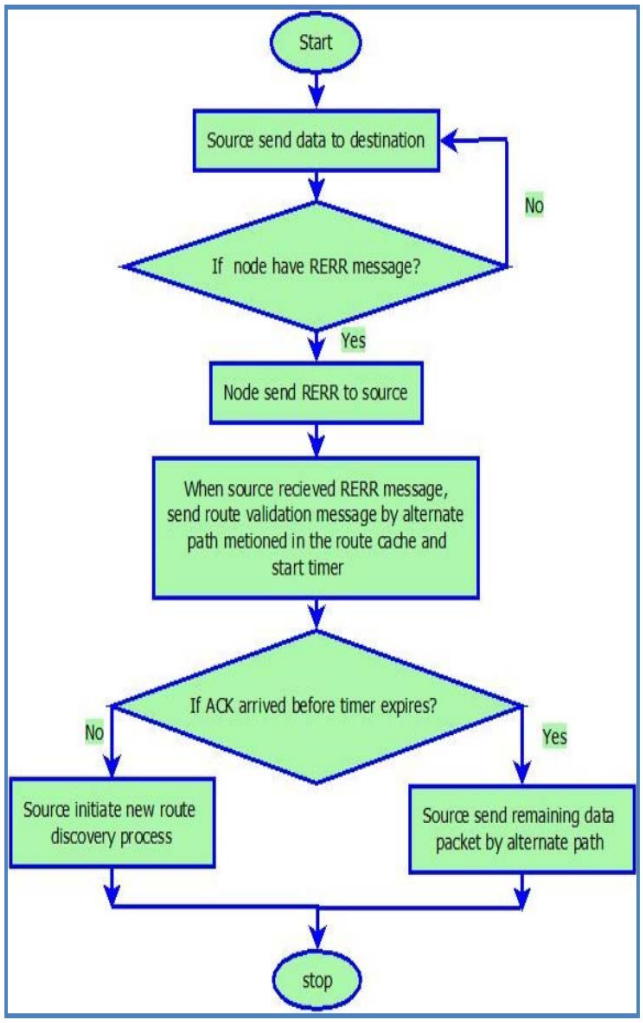

Fig 2: Proposed flow chart for route discovery process in SE-DSR protocol.

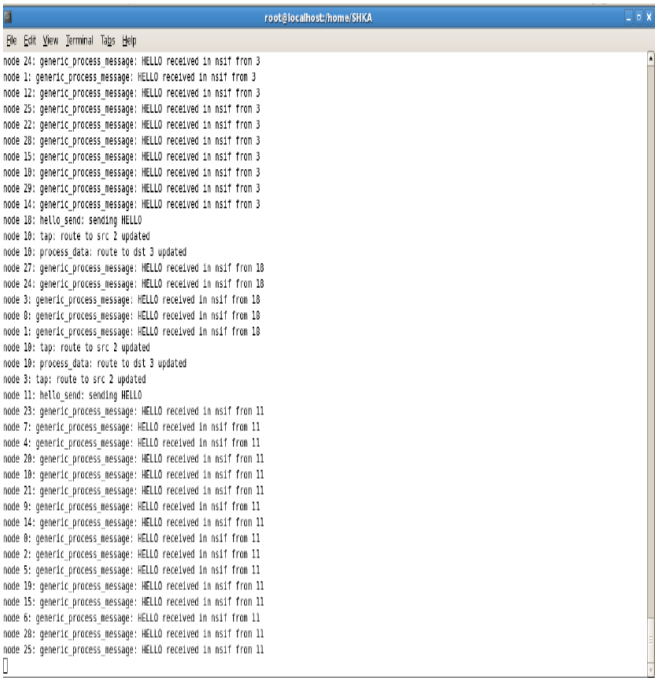

Fig 3: This window shows the running shell files output and used parameters in a network simulator.

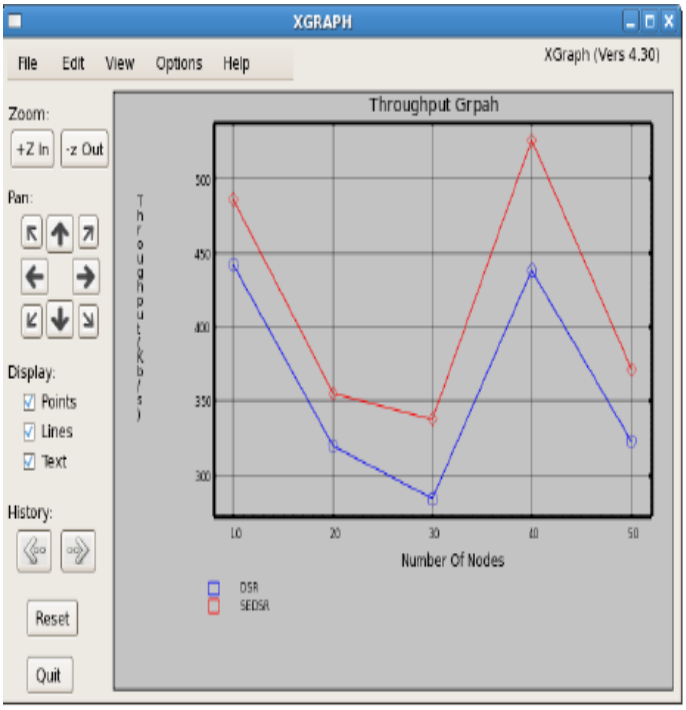

Fig 4: This window shows the result of Throughput parameters after the simulation end.

V CONCLUSION

In this paper, we have described the principle mechanisms of Route Discovery and Route Maintenance used by SE-DSR, and have shown how they enable wireless mobile nodes to automatically form a completely self-organizing and self-configuring network among themselves. In this paper we discussed our proposed routing protocol named as SE-DSR in which we presented stability model, energy model and traffic load models. Using these models we have given modified route request, route reply and route maintenance approaches. We explained these approaches with help of flow chart. Our goal is to create an integrated set of protocols that allow mobile computers, and the applications running on them and communicating with them, to seamlessly make the most efficient use of the best available network connections at any time.

REFERENCES

[1] Golsum Najafia, Sajjad Jahanbakhsh Gudakahriz, "A Stable Routing Protocol based on DSR Protocol for Mobile Ad Hoc Networks ", I.J. Wireless and Microwave Technologies, 2018, pp 14-22.

[2] Gautam M. Borkar, A. R. Mahajan, "A secure and trust based on-demand multipath routing scheme for self-organized mobile ad-hoc networks", Springer 2016, pp 1-18.

[3] Mohammed Ahmed Jubair, Mustafa Hamid Hassan, Salama A. Mostafa, Hairulnizam Mahdin, Aida Mustapha, Luqman Hanif Audah, Farooq Sijal Shaqwi, and Ali Hashim Abbas, "Competitive Analysis of Single and Multi-Path Routing Protocols in Mobile Ad-Hoc Network ", Indonesian Journal of Electrical Engineering and Computer Science 2019, pp 1-9.

[4] Khalid A. Darabkh and Mohammad S.E. Judeh, "An Improved Reactive Routing Protocol over Mobile Adhoc Networks", IEEE 2018 pp 7-11.

[5] Geetika Dhand and S.S.Tyagi, "Performance Analysis of various Routing Protocols in Mobile Ad-hoc Networks ", International Journal of Applied Engineering Research 2018, pp 7378-7382.

[6] Muawia A. Elsadig, and Yahia A. Fadlalla, "Mobile Ad Hoc Network Routing Protocols: Performance Evaluation and Assessment ", International Journal of Computing and Digital Systems 2018, pp 1-8.

[7] P Lavanya, V S K Reddy, A Mallikarjuna Prasad, "Performance Comparison of DSDV, OLSR, AODV and DSR for Mobile Ad hoc Networks", International Journal of Emerging Technology and Advanced Engineering 2018, pp 209-219.

[8] Lubdha M. Bendale, Roshani. L Jain, Gayatri D. Patil, "Study of Various Routing Protocols in Mobile Ad-Hoc Networks ", IJSRNSC 2018, pp 1-5.

[9] Alak Roy and Titan Deb, "Performance Comparison of Routing Protocols in Mobile Ad Hoc Networks", Springer 2018, pp 33-48.

[10] Anil Saini and Rajender Nath, "Performance Evaluation of AODV and DSR Routing Protocol on Varying Speed and Pause Time in Mobile Ad Hoc Networks", Springer 2018, pp 313-322.

[11] Priyanka Pandey and Raghuraj Singh,, "Approaches for Enhancing the Performance of Routing Protocols in MANET", ICACSE 2019, pp 539-541.

[12] Thakor Hirenkumar Sureshbhai, Makul Mahajan, Mritunjay Kumar Rai, "An investigational analysis of DSDV, AODV and DSR routing protocols in Mobile Adhoc Networks", IEEE 2018, pp 281-285.

[13] Gyanappa A. Walikar, Rajashekar C. Biradar, "A survey on hybrid routing mechanisms in mobile adhoc networks", Elsevier 2016, pp 1-50.

[14] Pragati Jain, Akash Sanghi, "Review of Various Routing Protocols in Mobile Adhoc Networks (MANETs)" , International Journal of Innovations & Advancement in Computer Science 2018, pp 45-54.

[15] Shipra Tripathi, Dr. Brajesh Kumar Singh, "Comparative Study of Reactive Routing Protocols in MANET: A Review", IRJET 2019, pp1629-1633.

[16] Rahul Desai, B P Patil, Davinder Pal Sharma, "Routing Protocols for Mobile Ad Hoc Network: A Survey and Analysis ", Indonesian Journal of Electrical Engineering and Computer Science 2017, pp 795-801.

[17] Khalid A. Farhan, Farhan Abdel-Fattah, Feras Altarawneh, "Survey Paper on Multicast Routing in Mobile Adhoc Networks", IEEE 2019, pp 449-452.

[18] Aneri Mukeshbhai, Desai,Rutvij, H. Jhaveri, "Secure routing in mobile Ad hoc networks: a predictive approach", Springer 2018, pp 1-12.

[19] Deepali Aggarwal, Shivani Gaba, "A Comparative Study : Reviewing Performance of Routing Protocols in Mobile Ad-hoc Network ", IJSRSET 2018, pp 109-113.

[20] Vrushali Uttarwar, Ekta Choudhari, Pooja Deshpande, Priyanka Chaudhary, "A Survey to Improve Quality Of Service For Mobile Ad Hoc Networks", IJSRE 2018, pp 8014-8022.

[21] Ali Abdul Wahhab Mohammed, Assad H. Thary Al-Ghrairi, "Differences Between Adhoc Networks And Mobile Ad Hoc Networks: A Survey ", Journal Of Southwest JIAOTONG University 2019, pp 1-12.

[22] Shihu Xiang, Jun Yang, "Performance reliability evaluation for mobile ad hoc networks", Reliability Engineering and System Safety 2016, pp 1-31.

[23] Ms. Monika G. Ghorale, Prof. A. O. Bang, "Wireless Ad-Hoc Networks: Types, Applications, Security Goals", IJARCE 2015, pp 128-132.

[24] Kannhavong, B., Nakayama, H., Nemoto, Y. and Kato, N., " A survey of routing attacks in mobile ad hoc networks" IEEE 2007, Pp 85-91.

[25] Verma, M.K. and Joshi, S. ; Doohan, N.V. "A survey on: An analysis of secure routing of volatile nodes in MANET", IEEE 2012, Pp 1-3.

[26] Baruch Awerbuch, David Holmer, Herbert Rubens, Kirk Chang, I. J. Wang "The Pulse protocol: sensor network routing and power saving" Military Communications Conference, 2004.