Volume-6, Issue-4 (Nov-16)
ISSN (O) :- 2349-3585

A Review of Energy Efficient Dynamic Source Routing Protocol for MANET

Foram Changela[1], Prof. Shyam Kotecha[2]
[1] M.E. Student, [2] Assistant Professor
[1,2] Computer Department,
[1,2] B.H.Gardi College of Engineering & Technology

Abstract-The Dynamic Source Routing protocol (DSR) is a simple and efficient routing protocol designed for wireless ad hoc networks. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure. The protocol is composed of the two mechanisms of Route Discovery and Route Maintenance.DSR protocol does not take energy as a parameter into account at all. So that energy consumption is the issue in MANET. This paper presents different energy efficient protocols that are based on the basic Mechanism of DSR.

Keywords-Mobile Ad hoc Networks, Challenges, Characteristics, Applications of MANET, Routing Protocols, Energy-aware Routing Protocols, DSR, EDSR, EEDSR, Enhanced-DSR

INTRODUCTION

Mobile ad-hoc network (MANET) is the collection of various mobile nodes which are connected together over a wireless medium having no fixed infrastructure. Each participating node in the network acts as both router and host and responsible for forwarding packets for other nodes.[1]

Figure 1. Mobile Ad Hoc Network [3]

A. Characteristics of MANET[2]

Multihop Communication

The communication between any two remotely located nodes in MANETs is through many intermediary nodes which relay data packets from one point to another for information and data sharing.

Infrastructure Less

MANETs do not need any centralized base station or pre-planned infrastructure. They are formed based on collusion between autonomous, peer-to-peer nodes that are dynamic in nature.

Dynamic Topology

Since the nodes are arbitrary in nature, the network connectivity is unpredictable and directly proportional to the variations in time. MANETs make itself adaptable to the traffic patterns, mobility and propagation conditions. These arbitrary mobile nodes form their own network dynamically as they move about whenever there is a need.

Network Scalability

MANET applications involve large networks with tens of thousands of nodes, due to its nature of being dynamic and infrastructure less, but the scope of deployment of large networks are limited and pose challenges like: addressing, routing, location management, security and configuration management.

Short Range Connectivity

MANETs depend upon radio frequency technology to connect to communicating nodes that lie within the transmission range. The direct communication of mobile nodes requires being closer to each other for short range communication.

B. Applications of manet

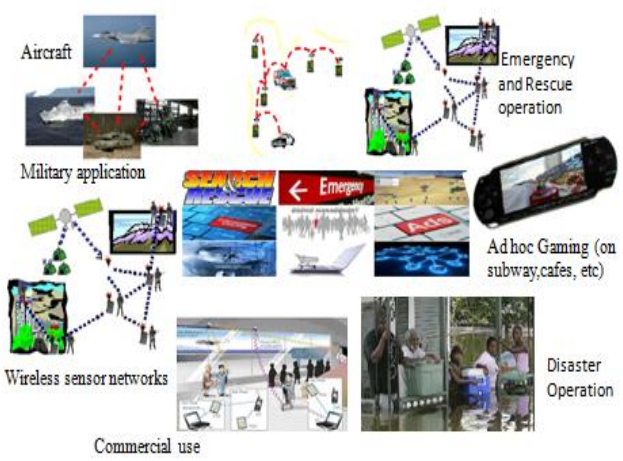

Figure 2. Applications of manet [1][2][4]

C. Challenges[1]

Routing

Security

Reliability

Energy Efficiency

Dynamic topology

Lack of central authority

D. Routing protocols

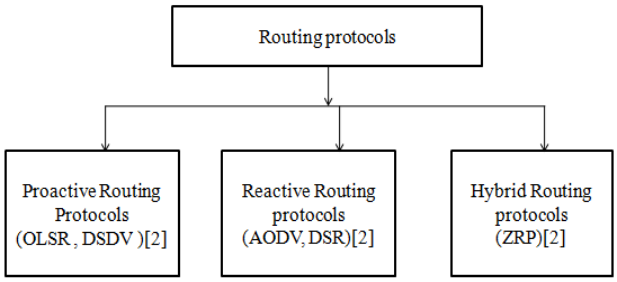

Figure 3. MANET routing protocols [2]

Proactive Routing Protocols[5]

Proactive routing protocols continuously evaluate the current network to find out the possible routes, so that, if user wants to forward a packet from source to destination node, the route is already known and can be immediately used.[5]

Ex.. Optimized Link State Routing (OLSR), Destination Sequenced Distance Vector (DSDV) [5]

Reactive Routing protocols [5]

Reactive routing protocol performs a route discovery procedure, in on-demand basis only, i.e., when the route is required.[5]

Ex. Ad-hoc on demand Distance Vector (AODV) routing, Dynamic Source Routing (DSR) etc.[5]

Hybrid Routing Protocols [5]

A hybrid routing protocol uses a mixture of both proactive and reactive approaches, as it has two states of functions viz., intrazone and interzone routing protocol. Intrazone routing protocol uses proactive routing protocol and interzone routing protocol uses reactive routing protocol to find optimal routes.[5]

Ex. Zone Routing Protocols (ZRP) [5]

DYNAMIC SOURCE ROUTING

Dynamic source routing protocol is a reactive protocol. Source specifies the complete concrete and full route-path to the desired destination as a part of packet header. Each intermediate node in this path works as a router and forwards the packets to the very next node given in that path. Route caching is used to cache all routers a node as has seen so far to use immediately in future. So a source first tries to find a route from its route. If an existing route can be found, the source uses that only. Otherwise, the source tries to discover a fresh and new route by initiating route discovery process. As a part of the route discovery process, the source subsequently tries to flood the network with a packet asking for the route called query packet. Destination or any other intermediate nodes replies to this query packet which is stored in source's route cache. Each packet has an ID and a field to store information about a path. When a node receives a query, if it has already processed that ID or if it finds its own address in the path information, it simply discards the packet stops further broadcasting also called flooding. Else, it modifies the query message by appending its own node address in the path list and floods the query packet to the network which will to its neighbors. If a node can find route for the packet from cache, it sends a reply to the source without flooding the network then after. DSR is suitable for the network in which very few numbers of nodes communicate as source nodes with very rarely used destinations. This may introduce very large end to end delay and large amount of processing overheads in very high dynamic network. Sometimes DSR is not suitable from the scalability point of view. In scalability, if the network grows, all packets like control and data become larger as they have to carry addresses of all the nodes associated

in a specific path. This degrades performance because ad hoc networks are often bound by limited bandwidth. [6]

There are basically two phases in DSR

Route discovery

Route maintenance

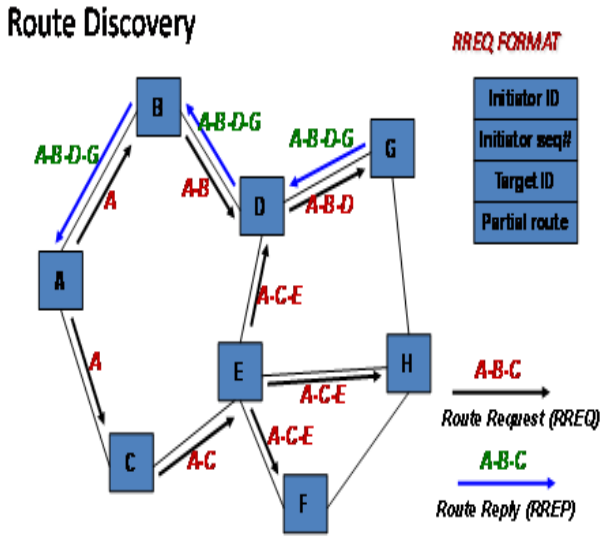

Figure 4. Route Discovery in DSR

LITERATURE REVIEW

Existing Dynamic Source Routing Protocol in MANET

A. Nodes energy aware modified DSR protocol for energy efficiency in MANET[7]

The authors propose the modification for route discovery mechanism in normal DSR protocol for energy efficient route establishment. Performance evaluation in NS2 shows significant improvement in energy efficiency with less routing overhead compared to normal DSR protocol. The idea proposed in this paper is consisting changing the route discovery mechanism. Route discovery can be done on the basis of nodes energy consumption for transmission and reception of single packet rather than considering minimum number of hops in the network. If distance between two nodes is more, transmission and reception power required for packet exchange will also be more as both of them try to remain in range of each other. This may indicate that, energy consumption by such nodes may be higher than the energy consumed by the route having more number of hops but located near to each other. By taking this particular scenario into consideration route discovery mechanism can be modified into which energy consumption of a node is considered as metric to select a particular route.[8]

B. Novel Approach for Reliable Communication Using Energy Aware Routing Protocol in MANET

Here authors are proposed to sort out the problem of energy constraint. Nodes within an Mobile adhoc network are battery dependent. There is a no source of battery replacement and charging. Since these energy sources have a limited lifetime, energy or power availability is one of the most important constraints for the operation of the ad hoc network. The aim of this paper is to overcome the problem of limited battery power due to the problem of energy constraint. As aim to focus efforts on method of power saving and awareness scheme in communications between ad hoc network nodes. This concept is applied to DSR protocol that works on a reactive approach and makes use of alternate paths by satisfying a set of energy and distance based threshold area. So we can achieve the following:

1. Improvement in the lifetime of the entire network
2. Raise the success rate of packet delivery by preventing nodes from dying out due to energy failure.
3. A new protocol can be developed on the concept which is energy aware and location aware algorithm for MANET.

C. Implementing a new power aware routing algorithm based on existing dynamic source routing protocol for mobile ad hoc networks [9]

In this paper, authors are proposed modifying DSR is to select energy efficient paths. The main features of modified DSR are: (i) minimize energy consumed per packet (ii) maximize network lifetime for network and (iii) minimize maximum node cost. However, some intermediate nodes might act selfish and drop the packets for other nodes in order to save their own battery power. The proposed algorithm can find selfish nodes and deal with them by using a modified DSR protocol, which we call as an efficient DSR (EDSR). The simulation results show an increase in the packet delivery ratio in the network. The average node lifetime of proposed EDSR model is 45–60% longer than that of DSR model. This paper defines an extension of dynamic source routing (DSR)

ISSN:-2349-3585 |www.ijrdt.org

protocol that allows the routing of most packets without an explicit source route header. Further, it reduces the overhead of the protocol while preserving the fundamental properties of DSR's operation. Once sending node has discovered a source route through DSR's route discovery mechanism, the flow state mechanism of efficient DSR (EDSR) allows the source node to establish hop-by-hop forwarding state within the network. Based on this, the source route, each node is enabled to forward the packet to the next hop. Flow state is dynamically initialized by the first packet using a source route and is then able to route subsequent packets along the same flow without use of source route header in the packet. The state established at each hop along a flow is soft state and thus automatically expires when no longer needed. The aim of this paper is to extend the network lifetime

by improving the power utilization of the routing mechanism in MANETs.

D. Energy Efficient EE-DSR Protocol for MANET[10]

The authors are proposed DSR algorithm is better as compared to the performance of DSR. This improvised algorithm based on energy-based routing is an advanced form of DSR where the performance parameters are taken into account to choose the best path among the different paths. As the DSR algorithm says that the route discovery part is the most exhaustive part, therefore it takes the major attention while setting up of Manet. This process also includes the route cache updating. Hence a better algorithm solves the purpose better. There is no doubt that the improvised algorithm so proposed is even lengthier but it helps a lot during route maintenance phase as the best path is always stored in the cache reducing its size and thus increasing its speed and reliability. Another major advantage of this algorithm is that it prevents back flooding of the packets. If a node is already added to the packet path then no more flooding of packets

occur to that particular node. This not only saves the network congestion but also increases the life span of the packets and the network. Hence this algorithm is no doubt a better approach for a mobile adhoc network route discovery rather than the DSR algorithm as it provides the best path between any two source and destination pair.

E. A Stable Adaptive Optimization for DSR Protocol in Ad hoc Networks [11]

In this, authors are proposed an optimization for the current DSR, a new adaptive routes selection scheme based on the stability of nodes. In this article, a novel stable adaptive optimization to the routing scheme of DSR is proposed to select more stable routes with using only the nodes' history records. It uses joint nodes' packets delivery records and routes' hop count information as route selection criteria and does not bring any extra cost to the system. The performances of the enhanced-DSR, including packet delivering delay and network throughput, are simulated by GloMoSIM [4]. The article is organized as follows. A new stable adaptive enhanced-DSR protocol is proposed in this article, jointly considered the hop-count and routes stable as the routes selection criteria. The optimization brings less extra routing overhead to the network with using the nodes history transmission information to measure the nodes stability. The enhanced DSR has much less average packets delivering delay and better throughput performance than conventional DSR protocols.

CONCLUSION

In this paper I have discussed, one of the important issue that is energy consumption problem in MANET. As the exiting routing mechanisms like minimum hop count produces overheads and consumes more power in the networks during the communication. So it is required to design energy efficient routing protocols in order to overcome this problem. This paper has also explained few energy efficient routing protocols which are based on the DSR. This paper has also revealed that a single routing protocol cannot stand strongly against the major constraint of MANET that is power consumption until it is integrated with some other techniques like power consumption, load balancing, transmission control, multi path routing and many more. The combination of all these techniques can surely turning out be an efficient solution for energy constraint. It is very difficult to conclude which protocol is the best among all energy efficient routing protocols, because all these protocols are based on different

ISSN:-2349-3585 |www.ijrdt.org

Volume-6, Issue-4 (Nov-16)
ISSN (O) :- 2349-3585

Techniques, different algorithm, different performances matrices and different implementation environments. But all these protocols have proved that they are better than the DSR routing protocol. Still many scopes are there in DSR to add on new functionally and to modify the basic mechanism of DSR as an Energy Efficient Routing protocols.

ACKNOWLEDGMENT

I am thankful to all the faculties and friends whose direct and indirect support helped me to complete this paper.

REFERENCES

[1]. Nawneet Raj, Priyanka Bharti, Sanjeev Thakur , "Vulnerabilities, Challenges and Threats in Securing Mobile Ad-hoc Network" , Fifth International Conference on Communication Systems and Network Technologies , IEEE 2015.

[2]. Shaik Shabana Anjum, Rafidah Md. Noor, Mohammad Hossein Anisi, "Review on MANET Based Communication for Search and Rescue Operations", Springer 2015

[3]. http://cdn.grin.com/images/preview-file

[4]. http://www.antd.nist.gov/images/manetimag2.jpg

[5]. Shruti Thapar and Anshuman Kalla, "A Review on Performance Evaluation of Routing Protocols in MANET" , Springer 2016

[6]. Kalpesh A. Popat, Priyanka Sharma and Hardik Molia, "A Study of Routing Protocols for MANETs", Springer 2016

[7]. Deepti Badal, Rajendra Singh Kushwah, "Nodes energy aware modified DSR protocol for energy efficiency in MANET", IEEE 2015

[8]. Akanksha Meshramt, M.A. Rizvi, "Novel Approach for Reliable Communication Using Energy Aware Routing Protocol in MANET ", IEEE 2014

[9]. [9] Shivashankar, Golla Varaprasad, Suresh Hosahalli Narayanagowda, " Implementing a new power aware routing algorithm based on existing dynamic source routing protocol for mobile ad hoc networks" IEEE 2014

[10]. Mr. Prakash Patel, Ms. Tarulata Chauhan , "Energy Efficient EE-DSR Protocol for MANET", IJEDR 2014

[11]. M.Neelakantappa, Dr.B.Satyanarayana, Dr.A.Damodhara, "A Stable Adaptive Optimization for DSR Protocol in Ad hoc Networks", IJANA 2009