ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 2, Issue 2, pp: (52-55), Month: October 2015 – March 2016, Available at: www.paperpublications.org

Tree Based Proactive Source Routing Protocol for MANETs

Jubina Mohammed

M.G University, Kottayam, Kerala, India

Abstract: **A mobile adhoc network (MANET) is a wireless communication network and the node that does not lie within the direct transmission range of each other depends on the intermediate nodes to forward data. Opportunistic data forwarding has not been widely utilized in mobile adhoc networks (MANETs) and the main reason is the lack of an efficient lightweight proactive routing scheme with strong source routing capability. PSR protocol facilitates opportunistic data forwarding in MANETs. In PSR, each node maintains a breadth-first search spanning tree of the network rooted at it-self. This information is periodically exchanged among neighboring nodes for updated network topology information. Here added a Mobile sink to reduce the overhead in case of number of child node increases and also to reduce the delay.**

Keywords: **Mobile Adhoc Network, Proactive routing, Source routing, Opportunistic data forwarding, Mobile sink.**

I. INTRODUCTION

A mobile ad-hoc network (MANET) is a network composed of mobile nodes mainly characterized by the absence of any centralized coordination or fixed infrastructure, which makes any node in the network act as a potential router. MANETs are also characterized by a dynamic, random and rapidly changing topology. This makes the classical routing algorithms fail to perform correctly, since they are not robust enough to accommodate such a changing environment. Consequently, more and more research is being conducted to find optimal routing algorithms that would be able to accommodate for such networks. In MANETs, communication between mobile nodes always requires routing over multi-hop paths. Since no infrastructure exists and node mobility may cause frequent link failure, it is a great challenge to design an effective and adaptive routing protocol. Many restrictions should be well considered, such as limited power and bandwidth.

In this paper, a lightweight proactive source routing protocol is proposed to facilitate Opportunistic data forwarding in MANETs. The information is periodically exchanged among neighboring nodes for updated network topology information. Thus, it allows a node to have full-path information to all other nodes in the network. This allows it to support both source routing and conventional IP forwarding. When doing this, the routing overhead can be reduced. The results of simulation denote that this methodology has only a fraction of overhead of OLSR, DSDV, and DSR but still offers a similar or better data transportation capability compared with these protocols. Addition of Mobile sinks helps in achieving uniform energy consumption and thereby extending network lifetime.

II. RELATED WORK

For ad hoc networks, proactive routing protocols follow the DV or LS paradigm and attempt to keep routing information for all the nodes up to date, e.g., OLSR [1], DSDV [3]. When the topology of an ad hoc network is under constant flux, however, LS generates large number of link state changes, while DV suffers from out dated state. The growing size of the network and the nodes mobility are two hurdles in the design of scalable routing protocols. In contrast to proactive algorithms, reactive routing protocols cache topological information and update the cached information on-demand. Reactive protocols avoid the prohibitive cost of routing information maintenance of proactive protocols, and tend to work well in practice. While the idea of aggressive caching and occasional update results in good average performance, the

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 2, Issue 2, pp: (52-55), Month: October 2015 – March 2016, Available at: www.paperpublications.org

worst-case latency could be high. Examples of reactive protocols are Dynamic Source Routing (DSR) [2], Ad-hoc On-Demand Distance Vector Routing (AODV)[4].

DSDV[3] on the basis of Bellman–Ford routing algorithm with some modifications. In this routing protocol, each mobile node in the network keeps a routing table. Each of the routing table contains the list of all available destinations and the number of hops to each. Each table entry is tagged with a sequence number, which is originated by the destination node. Periodic transmissions of updates of the routing tables help maintaining the topology information of the network. If there is any new significant change for the routing information, the updates are transmitted immediately. So, the routing information updates might either be periodic or event driven. DSDV[3] protocol requires each mobile node in the network to advertise its own routing table to its current neighbors. The advertisement is done either by broadcasting or by multicasting. By the advertisements, the neighboring nodes can know about any change that has occurred in the network due to the movements of nodes. The routing updates could be sent in two ways: one is called a ‘‘full dump’’ and another is ‘‘incremental.’’ In case of full dump, the entire routing table is sent to the neighbors, where as in case of incremental update, only the entries that require changes are sent.

DSR [2] allows nodes in the MANET to dynamically discover a source route across multiple network hops to any destination. In this protocol, the mobile nodes are required to maintain route caches or the known routes. The route cache is updated when any new route is known for a particular entry in the route cache. Routing in DSR is done using two phases: route discovery and route maintenance. When a source node wants to send a packet to a destination, it first consults its route cache to determine whether it already knows about any route to the destination or not. If already there is an entry for that destination, the source uses that to send the packet. If not, it initiates a route request broadcast. This request includes the destination address, source address, and a unique identification number. Each intermediate node checks whether it knows about the destination or not. If the intermediate node does not know about the destination, it again forwards the packet and eventually this reaches the destination. A node processes the route request packet only if it has not previously processed the packet and its address is not present in the route record of the packet. A route reply is generated by the destination or by any of the intermediate nodes when it knows about how to reach the destination.

OLSR [1] protocol inherits the stability of link state algorithm. This protocol performs hop-by-hop routing; that is, each node in the network uses its most recent information to route a packet. Hence, even when a node is moving, its packets can be successfully delivered to it, if its speed is such that its movements could atleast be followed in its neighbourhood. The optimization in the routing is done mainly in two ways. Firstly, OLSR[1] reduces the size of the control packets for a particular node by declaring only a subset of links with the node’s neighbors who are its multipoint relay selectors, instead of all links in the network. Secondly, it minimizes flooding of the control traffic by using only the selected nodes, called multipoint relays to disseminate information in the network. As only multipoint relays of a node can retransmit its broadcast messages, this protocol significantly reduces the number of retransmissions in a flooding or broadcast procedure.

ExOR [5] is an integrated routing and MAC technique that realizes some of the advantages of cooperative diversity on standard hardware such as 802.11. ExOR[5] broadcasts the packet and decides who forwards the packet only after reception. ExOR [5] is more beneficial compared to traditional routing. It improves the throughput. The source node broadcasts a packet and some subset of the nodes gets this packet. The nodes run a protocol to find and decide which nodes are in the subset. Those subset nodes that are near to destination broadcast the packets. ExOR has a metric reflecting the cost of transferring packet from any node to destination. This cost metric is same as ETX but the difference is ExOR [5]uses only the forward delivery probability. This manner continues until the packet is received by the destination. ExOR[5] avoids interference or duplication. The ExOR header follows the Ethernet header followed by packet’s data which includes the batch size, forwarder list size, packet number, forwarder number, batch map and fragment. ExOR avoids multiple nodes transmitting the same packet to the destination node by tying the MAC to the routing, commanding a strict scheduler on routers access to the medium. Even though the medium access scheduler provides suitable throughput gains, it happens so at the cost of losing some of the suitable features of the current 802.11 MAC. Moreover, this greatly organized approach to medium access makes the protocol difficult to extend alternate traffic types mainly multicast. There is also a spatial reuse lost .MORE in contrast to ExOR randomly mixes the packet before forwarding it and it uses network encoding which restricts the amount of retransmission and recovery overhead.

III. PROPOSED SYSTEM

PSR provides every node with a breadth-first spanning tree (BFST) of the entire network rooted at itself. To do that, nodes periodically broadcast the tree structure to their best knowledge in each iteration. Based on the information collected from neighbors during the most recent iteration, a node can expand and refresh its knowledge about the network topology by constructing a deeper and more recent BFST. This knowledge will be distributed to its neighbors in the next round of operation. On the other hand, when a neighbor is deemed lost, a procedure is triggered to remove its relevant information from the topology repository maintained by the detecting node .Intuitively, PSR has about the same communication overhead as distance vector- based protocols. It goes an extra mile to reduce the communication overhead incurred by PSR's routing agents.

A. ROUTE UPDATE: Due to its proactive nature, the update operation of our work is iterative and distributed among all nodes in the network. At the beginning, node is only aware of the existence of itself. By exchanging the table information with the neighbours, it is able to maintain the network topology. In each subsequent iteration, nodes exchange their table data with their neighbours. From the perspective of source node,toward the end of each operation interval, it has received a set of routing messages from its neighbours. Note that, in fact,more nodes may be situated within the transmission range of source node, but their periodic updates were not received by it due to, for example, bad channel conditions. After all, the definition of a neighbour in MANETs is a fickle one.Source Node incorporates the most recent information from each neighbour to update its own table. It then broadcasts this information to its neighbours at the end of the period. In fact, in our implementation, the given update of the table happens multiple times within a single update interval so that a node can incorporate new route information to its knowledge base more quickly. This does not increase the communication overhead at all because one routing message is always sent per update interval.

B. NEIGHBORHOOD TRIMMING: If a neighbour is disconnected from the network then each node removes all the data about the lost node. Such process is triggered by the following cases:

- No routing update or data packet has been received from this neighbour for a given time.
- A data transmission to such node has failed. This process can be initiated more number of times.

C. DIFFERENTIAL UPDATE MECHANISM: In addition to dubbing route updates as hello messages in this mechanism, it interleaves the "full dump" routing messages, with "differential updates". The basic idea is to send the full update messages less frequently than shorter messages containing the difference between the current and previous knowledge of a node's routing module. The goal is to broadcast the information stored at a node to its neighbours in a short packet.

D. MOBILE SINK ADDITION: Energy efficiency is the most important issue for wireless sensor networks since sensor nodes have limited batteries. Replacing the battery needs significant effort: therefore WSNs have to be able to operate without human intervension for an adequately long time. Mobile sinks helps in achieving uniform energy consumption and thereby extending network lifetime.

E. PERFORMANCE EVOLUTION: The performance of PSR is compared by using QOS parameters. Here, the packet drop, PDR, throughput & energy of PSR is compared against OLSR. As it provides global routing information at such a low cost, PSR offer even better data delivery performance.

The comparison of the performances of PSR and PSR with mobile sink is done using the QOS parameters throughput, packet drop, packet delivery ratio & energy.

IV. CONCLUSION

Simulation results shows that proposed protocol has only minimum amount of the total overhead of traditional protocols, and offers a data transportation capability which is greater than or equal compared with these protocols. Therefore, in research on multi hop wireless networking, it usually makes sense us to minimize any impact on the network's communication resources even if there is penalty in other aspects. When it comes to the case when a node should share its updated route information with its neighbours, we chose to delay it until the end of the cycle. So that in each period, only one update is broadcasted. By the addition of the Mobile Sink,the lifetime of mobile nodes are increased.

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 2, Issue 2, pp: (52-55), Month: October 2015 – March 2016, Available at: www.paperpublications.org

REFERENCES

[1] T. Clausen and P. Jacquet, "Optimized Link State Routing Protocol (OLSR)," *RFC 3626, October 2003.*

[2] D. B. Johnson, Y.-C. Hu, and D. A. Maltz, "On the Dynamic Source Routing Protocol (DSR) for Mobile Ad Hoc Networks for IPv4," *RFC 4728, February 2007.*

[3] C. E. Perkins and P. Bhagwat, "Highly Dynamic Destination-Sequenced Distance-Vector Routing (DSDV) for Mobile Computers," *Computer Communication Review*, pp. 234–244, October 1994.

[4] C. E. Perkins and E. M. Royer, "Ad hoc On-Demand Distance Vector (AODV) Routing," *RFC 3561*, July 2003. [Online]. Available: http://www.ietf.org/rfc/rfc3561.txt

[5] S. Biswas and R. Morris, "ExOR: Opportunistic Multi-Hop Routing for Wireless Networks," in *Proceedings of ACM Conference of the Special Interest Group on Data Communication (SIGCOMM),* Philadelphia, PA,USA, August 2005, pp. 133–144.

[6] Y. P. Chen, J. Zhang, and I. Marsic, "Link-Layer-and-Above Diversity in Multi-Hop Wireless Networks," *IEEE Communications Magazine,* vol. 47, no. 2, pp. 118–124, February 2009.

[7] Abdul Hadi Abd Rahman, Zuriati Ahmad Zukarnain," Performance Comparison of AODV, DSDV and I-DSDV Routing Protocols in Mobile Ad Hoc Networks", *European Journal of Scientific Research ISSN 1450-216X* Vol.31 No.4 (2009), pp.566-576

[8] K. Prabu, Dr. A. Subramani, " Performance Comparison of Routing Protocols in MANET", *International Journal of Advanced Research in Computer Science and Software Engineering* , Volume 2, Issue 9, September 2012 .

[9] J. Priscilla, S. Saravana Kumar," Adaptive Lightweight ORS in Mobile Adhoc Networks". *IJESRT*, March 2013.