International Journal of Emerging Trends & Technology in Computer Science (IJETTCS)
Web Site: www.ijettcs.org Email: editor@ijettcs.org
Volume 6, Issue 5, September- October 2017 ISSN 2278-6856

A Survey on DSDV Routing Protocol in Ad hoc Network

Jayashree Agarkhed

Professor, Department of Computer Science & Engineering,
P.D.A College of Engineering, Kalaburagi, India

Abstract: ***Mobile Ad hoc networks (MANET) are the network that lacks fixed infrastructure and random and quickly changing topology of the network necessitates the design of routing protocol that can withstand such dynamic environment. Various routing protocols have been proposed in the recent past focusing on different requirements. One of the proactive routing protocol known as Destination Sequenced Distance Vector (DSDV) routing protocol in MANET works well by exchanging of messages for reconstruction of invalid route in MANET that has high mobile nodes. This paper reviews DSDV and its enhancements to suit various applications.***

Keywords—WSN, DSDV. I-DSDVV, DSR

I. INTRODUCTION

MANET is a wireless network formed by set of nodes forming a network which change topology frequently. Node can be used as both host and router simultaneously, and can join or move out in the network anytime. MANET finds application in different fields like military networking requirements for robust, IP-compliant data services within mobile wireless network. The topology formed by these networks is dynamic autonomous. Wearable computing finds wide applications using MANET technology. MANET technologies when combined properly with satellite-based information system can provide the methods that are flexible for establishing reliable communications for safety/ fire/rescue operations with efficient, survivable, dynamic networking.

The one of key challenge is to find the route with lower routing overhead under various resource constraints in dynamic changing network environment. Overhead specified in as the control messages sent. Transfer of these control messages use large channel bandwidth and the battery power of nodes while routing. DSDV is developed as an improvement over the conventional Bellman-Ford algorithm for routing. It overcomes the problems related to looping properties of routing information protocol (RIP) in the face of broken links [1].

The structure of paper is represented as follows: Section II deals with the related work. Section III gives overview of working of reactive protocol. Section IV describes DSDV routing protocols and its extensions in ireless ad hoc networks. Section V gives the conclusion.

II. RELATED WORK

In implementation of DVR, route information protocol (RIP) is used within networks that are local. It introduces problem called counting to infinity due to frequent topology changes and leads to failures link or router. To overcome this problem triggered updates, poison reverse, split horizon and path hold-down mechanisms [2, 3] have been used with RIP implementations. The advantage of RIP to wireless ad hoc environments is subjected to the frequent topology change. For this reason the distance vector routing algorithm and conventional link state routing protocol are not useful for wireless ad hoc network routing. The disadvantages of these protocols have been fixed by DSDV.

In [4] author improved that the packet delivery ratio of DSDV protocol in MANET that have node with high mobility can be enhanced by a exchange messages scheme. Three basic routing protocols AODV, DSDV and I-DSDV were compared in terms of packet delay, delivery ratio, and routing overhead by varying number of nodes, pause time and speed in different environment. I-DSDV when compared with DSDV minimizes the number of dropped data packets with increased overhead at high rates of mobility of node. In [5] author analyzed performance differentials based on network load, network size, and mobility. In [6] author presents a step by step procedure to compare three popular routing protocols, DSR, AODV and DSDV based on a range of performance metrics such as delay, Packet Delivery Fraction (PDF) and Normalized Routing load by varying the speed and pause time and number of nodes. In [7] author presented an efficient DSDV (Eff-DSDV) protocol for Ad Hoc networks. Eff-DSDV overcomes the stale routes problem of DSDV, and improves its performance. In [8] authors have analyzed performance differentials based on network load, mobility, and network size.

An efficient DSDV (Eff-DSDV) Protocol is proposed for wireless Ad Hoc networks. Eff-DSDV overcomes problems of stale routes to enhance the performance of regular DSDV routing protocol. The author evaluated performance of the proposed protocol with respect to performance metrics like Packet delivery ratio, delay, throughput etc. The performance of the Eff-DSDV protocol is compared with one of the Proactive routing protocol (DSDV) and one of the reactive protocol (DSR) has been carried out. It was observed that the performance of Eff-DSDV is better than the regular DSDV can be

illustrated by considering working of these reactive and proactive routing protocols as discussed in next.

III. WORKING OF REACTIVE ROUTING PROTOCOL

DSR protocol [8, 9] is reactive routing protocol that is based on source routing technique. The source determines the sequence of nodes through which packets can be forwarded. This route information is placed in packet's header explicitly. DSR uses Route discovery technique to builds routes when it is demanded. A source initiates route discovery by flooding the query messages throughout the entire network to seek a route to the destination. Every query message stores the sequence of hops it passed throughout the network in the header of the message. Query on reaching the destination, the destination node send reply packet with the route present in the query packet as a copy back to source. The route learnt by reply packet specifies complete routes to desired destinations. These routes are stored in route caches.

These routes are followed by data packets. In case of route failure detection, an error packet is sent backward to the source. If the route contains the failed link, then all routes in the route caches are erased for all intermediate nodes on the path. To get a new route, a fresh route discovery is initiated. One unique advantage of DSR is a source routing. Routing loops are not formed as route is part of packet itself. And can also be easily detected and eliminated. It uses source routing where the whole route is carried as an overhead and does not use periodic routing messages. Due to these constraints DSR has limited scope.

IV. WORKING OF PROCTIVE ROUTING PROTOCOL

From the wide literature survey, the study is motivated to understand working of DSDV routing protocol.

A. DSDV Proactive Routing Protocol

DSDV is a proactive, distance vector protocol which uses the Bellmann -Ford algorithm. DSDV [10] is a hop-by-hop distance vector routing protocol. It is proactive routing protocolwhere each network node maintains a routing table. Each entry to routing table contains information of the next-hop node to reach destination and number of hops to reach the destination. Periodical broadcasts of routing updates attempt to keep the routing table completely updated at all times. DSDV uses sequence numbers to avoid loop and maintain the freshness of a route. A route 2 is considered more favorable than 1 if route 2 has a greater sequence number or, if the routes have the same sequence number then route 2 has lower hop-count. The sequence number for a route is set by the destination node and increased by one for every new originating route advertisement. When a node along a path detects a broken route to a destination D, it advertises its route to D with an infinite hop-count and a sequence number increased by one.

Advantages:

i. DSDV solves the routing loop problem

Limitations:

i. Uses more battery power, due to frequent update of its routing
ii. Utilize bandwidth even in case of when the network is idle

B. Improvement of DSDV (I-DSDV)

The DSDV has the low packet delivery. This is caused by the use of stale routes when links are broken [11-13]. In presence of stale route, DSDV finds a valid route to reach the destination. The packets are transferred through other neighbours that may have routes to the required destination. When an immediate link from the node say '2' to the desired destination say '5' breaks, the proposed protocol creates a temporary link through a neighbour which has a valid route to the desired destination. The temporary link is established by transfer of message like one-hop ROUTE-REQUEST and ROUTE-ACK. When the node '2' finds broken next hop link, it then broadcasts a message one-hop i.e. ROUTE-REQUEST packet to all its one hop neighbours as shown in figure 2. Then the neighbours respond by returning the ROUTE-ACK if it contains a valid route to the desired destination and the node '2' is not the next hop on the route from the neighbour to the desired destination.

Every entry in the route table consists of an additional entry for route update time. This required update time is enclosed in the ROUTE-ACK packet and it is used in choosing a temporary route. On reception of multiple ROUTE-ACK that have the same number of minimum hops, ad hoc host '2' chooses the route that has the latest update time. Figure 3 shows how node '2' creates a temporary route to the destination '5', when the intermediate link from '2' to '1' is found to be broken, node '2' suspends sending of the packets as depicted in figure 3. After which it broadcasts ROUTE-REQUEST packets to its immediate one hop neighbours. The Ad Hoc node 7 and 6 responds by specifying hop count and the route update time in ROUTE ACK packets and send it to Ad Hoc node 2.

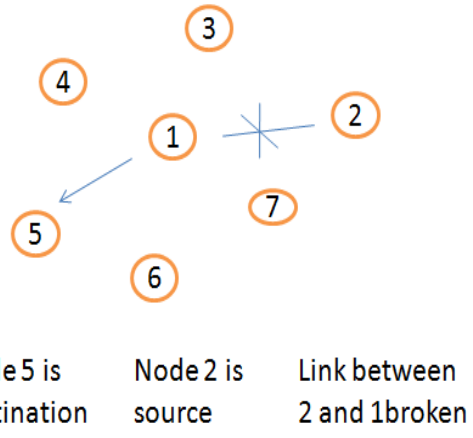

Fig. 1: Link from node 2 to node 1 is broken

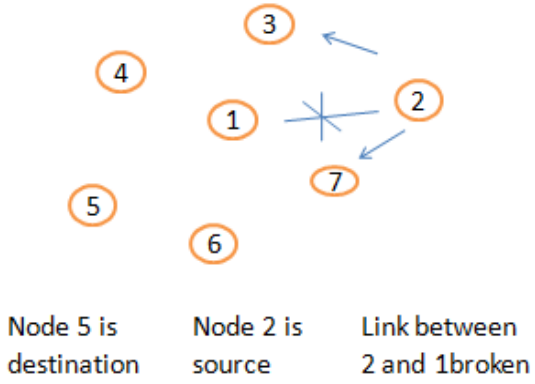

Fig. 2: Node 2 broadcast route request to its entire neighbor

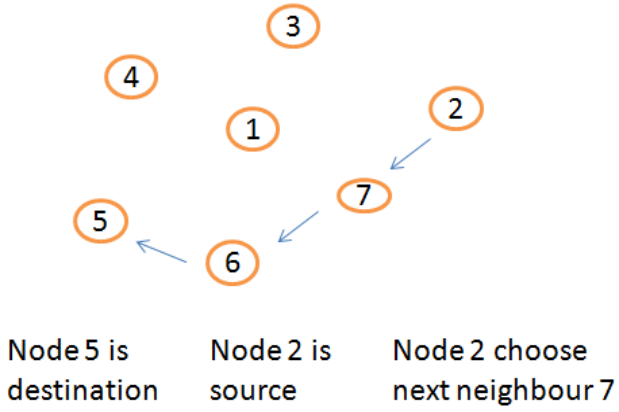

Fig. 3: Node 2 establish a provisional route to the required destination 5

In DSDV determining the maximum setting time is very difficult. One aspect is DSDV lack to provide multi-path routing. The destination central synchronization suffers from latency problem. It has extreme overhead of communication by use of updates performed periodically and triggered updates. Complete routing table has to be maintained by each node. Also DSDV will uncover the problems of all DSDV. It suffers from the unidirectional links problem.

C. Efficient DSDV (Eff – DSDV) Protocol

DSDV suffers from low packet delivery ratio as it uses stale routes when links are broken. The packets are forwarded in network through other neighbors who may have routes to the desired destination.

Working Principle:

When the link between host and destination breaks, the proposed protocol builds a another temporary link through other neighbor that has a valid route to the desired destination. The temporary link is created by sending one-hop ROUTE-REQUEST and ROUTE-ACK messages. The intermediate node on finding the next hop broken link, broadcasts a one-hop ROUTE-REQUEST packet to all its neighbors. In turn, the neighbors return the ROUTE-ACK if it has a valid route to the destination and the host is not the next hop on the route from the neighbor to the destination. It has been found after analysis that the performance of Eff-DSDV is superior to regular DSDV and sometimes better than DSR in certain cases [7].

Advantages:

i. Performance of Eff-DSDV is better than DSDV
ii. Support high packet delivery

Limitations:

i. As number of nodes increase routing overhead increases

V. CONCLUSION

MANET is group of mobile nodes which does not have fixed infrastructure. The performance of the MANET depends upon largely on the routing mechanism used. DSDV being a proactive routing protocol minimize routing delay by use of routing table and resolves the routing loop problem. I-DSDV advantage of reduced packets drop rate. This paper reviews the DSDV routing protocol and its extensions for improved performance.

REFERENCES

[1] He, Guoyou. "Destination-sequenced distance vector (DSDV) protocol." Networking Laboratory, Helsinki University of Technology (2002): 1-9.
[2] Schmid, Andreas, and Christoph Steigner. "Avoiding counting to infinity in distance vector routing." Telecommunication Systems 19.3 (2002): 497-514.
[3] Tanenbaum, Andrew S. "Computer Networks. – Prentice Hall PTR." Ney Jersey (1996).
[4] Rahman, Abdul Hadi Abd, and Zuriati Ahmad Zukarnain. "Performance comparison of AODV, DSDV and I-DSDV routing protocols in mobile ad hoc networks." European Journal of Scientific Research 31.4 (2009): 566-576.
[5] Morshed, Md Monzur, et al. "Performance evaluation of DSDV and AODV routing protocols in mobile ad-hoc networks." New Trends in Information Science and Service Science (NISS), 2010 4th International Conference on. IEEE, 2010.
[6] He, Guoyou. "Destination-sequenced distance vector (DSDV) protocol." Networking Laboratory, Helsinki University of Technology (2002): 1-9.
[7] Johnson, David, Yin-chun Hu, and David Maltz. The dynamic source routing protocol (DSR) for mobile ad hoc networks for IPv4. No. RFC 4728. 2007.
[8] Johnson, David B., and David A. Maltz. "Dynamic source routing in ad hoc wireless networks." Mobile computing (1996): 153-181.

[9] Perkins, Charles E., and Pravin Bhagwat. "Highly dynamic destination-sequenced distance-vector routing (DSDV) for mobile computers." ACM SIGCOMM computer communication review. Vol. 24. No. 4. ACM, 1994.

[10] Liu, Ting, and Kai Liu. "Improvements on DSDV in mobile ad hoc networks." Wireless Communications, Networking and Mobile Computing, 2007. WiCom 2007. International Conference on. IEEE, 2007.

[11] Khan, Khaleel Ur Rahman, et al. "An efficient dsdv routing protocol for wireless mobile ad hoc networks and its performance comparison." Computer Modeling and Simulation, 2008. EMS'08. Second UKSIM European Symposium on. IEEE, 2008.

[12] Ahmed, Gulfishan Firdose, Raju Barskar, and Nepal Barskar. "An Improved dsdv routing protocol for wireless ad hoc networks." Procedia Technology 6 (2012): 822-831.

[13] Agarkhed, Jayashree, Patil Yogita Dattatray, and Siddarama R. Patil. "Performance Evaluation of QoS-Aware Routing Protocols in Wireless Sensor Networks." Proceedings of the First International Conference on Computational Intelligence and Informatics . Springer Singapore, 2017.