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Routing table of DSDV in Mobile Ad-hoc Networking

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Abstract: In mobile ad-hoc networks a routing procedure is always needed to find a path so as to forward the packets appropriately between the source and the destination. A routing protocol is a protocol that specifies how routers communicate with each other. Each router has a knowledge only of networks attached to it directly. A routing protocol shares this information first among immediate neighbors, and then throughout the network. This way, routers gain knowledge of the topology of the network. An ad hoc routing protocol is a standard, that controls how nodes decide which way to route packets between computing devices in a network [10]. Various routing protocols available for Ad- hoc networks are AODV, CGSR, DSDV, DSR, OLSR, WRP, ZRP etc. In this paper DSDV is represented.

Keywords : MANET, DSDV, Routing protocol, Routing table

I. INTRODUCTION

A mobile adhoc network is a collection of wireless mobile nodes that dynamically establishes the network in the absence of fixed infrastructure. One of the distinctive feature of MANET is, each node must be able to act as a router to find out the optimal path to forward a packet. As nodes may be mobile, entering and leaving the network, the topology of the network will change continuously.

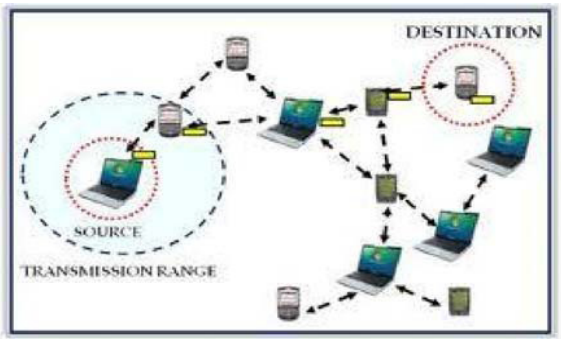

Fig 1: Mobile Adhoc Network (Manet)

Routing is the mechanism of forwarding packet towards its destination using most efficient path. In mobile ad-hoc networks a routing procedure is always needed to find a path so as to forward the packets appropriately between the source and the destination.

Various protocols have been developed for adhoc networks. In Ad-hoc network each host node acts as specialized router itself. Routing Protocol is used to find valid routes between communicating nodes. They do not use any access points to connect to other nodes. It must be able to handle high mobility of the nodes. Routing protocols can be mainly classified into 3 categories.

A. Reactive (On-Demand) Routing protocols,
B. Proactive (Table-Driven) Routing Protocols,
C. Hybrid Routing Protocols.

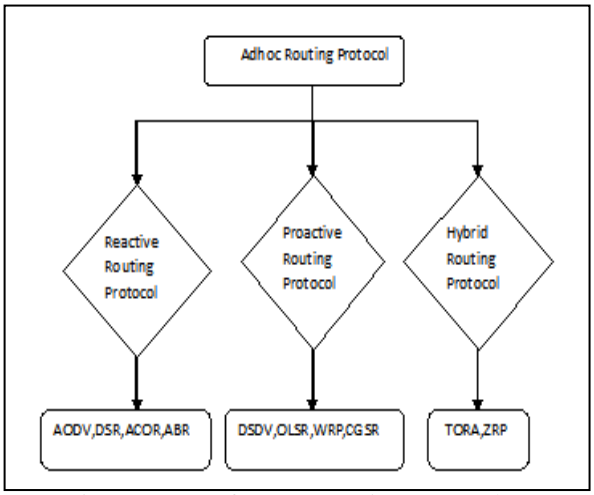

Fig 2: Types of Manet Routing Protocol

A.*Reactive (On-Demand)Routing protocols* :
For protocols in this category there is an initialization of a route discovery mechanism by the source node to find the route to the destination node when the source node has data packets to send. When a route is found, the route maintenance is initiated to maintain this route until it is no longer required or the destination is not reachable. The different types of reactive routing protocols are: Ad-hoc On-Demand Distance Vector routing (AODV), Dynamic Source Routing (DSR), Admission control enabled on demand routing (ACOR), Associativity based Routing(ABR) etc.

B.*Proactive(Table-Driven)Routing Protocols* :
In this protocol, all the nodes continuously search for routing information within a network. Every node maintains one or more tables representing the entire topology of the network. These tables are updated regularly so that when a route is needed, the route is already known. If any node wants to send any information to another node, path is known, therefore, latency is low. However, when there is a lot of node movement then the cost of maintaining all topology information is very high.
There are various types of Table Driven Protocols: Destination Sequenced Distance Vector routing protocol (DSDV), Optimized Link State Routing protocol (OLSR), Wireless routing protocol (WRP), Cluster head Gateway Switch Routing protocol (CGSR) etc.

C. *Hybrid Routing Protocols* :
These protocols incorporate the merits of proactive as well as reactive routing protocols. Nodes are grouped into zones based on their geographical locations or distances from each other. Inside a single zone, routing is done using table-driven mechanisms while an on-demand routing is applied for routing beyond the zone boundaries. Examples of hybrid protocols are Zone Routing Protocol (ZRP), Temporally Ordered Routing Algorithm (TORA) etc.

II. DSDV ROUTING PROTOCOL

DSDV is a table driven routing protocol which is based on the distributed Bellman Ford algorithm. This protocol was developed by C. Perkin and Bhagwat in 1994. In this protocol each node maintains the routing table with all possible destinations within the network and the number of required hops to reach the destination is also maintained in the table. Each node maintains its routing table. With the help of this table each node transmits the packets to another node in the network and also maintains the list of all the available destination and the number of hops required to reach the destination. The entry in the routing table contains the sequence number which is generally even if the links are presents. Otherwise these numbers are odd. These sequence numbers are generated by the destination[9]. Each node of the ad hoc network updates the routing table with advertisement periodically or when significant new information is available to maintain the consistency of the routing table with the dynamically changing topology of the ad hoc network. Periodically or immediately when network topology changes are detected, each mobile node advertises routing information using broadcasting or multicasting a routing table update packet. The update packet starts out with a metric of one to direct connected nodes. This indicates that each receiving neighbor is one metric (hop) away from the node. It is different from that of the conventional routing algorithms. After receiving the update packet, the neighbors update their routing table with incrementing the metric by one and retransmit the update packet to the corresponding neighbors of each of them. The process will be repeated until all the nodes in the ad hoc network have received a copy of the update packet with a corresponding metric. The update data is also kept for a while to wait for the arrival of the best route for each particular destination node. If a node receives multiple update packets for a same destination during the waiting time period, the routes with more recent sequence numbers are always preferred as the basis for packet forwarding decisions, but the routing information is not necessarily advertised immediately, if only the sequence numbers have been changed. If the update packets have the same sequence number with the same node, the update packet with the smallest metric will be used and the existing route will be discarded or stored as a less preferable route. In this case, the update packet will be propagated with the sequence number to all mobile nodes in the ad hoc network. The advertisement of routes that are about to change may be delayed until the best routes have been found. Delaying the advertisement of possibly unstable route can damp the fluctuations of the routing table and reduce the number of rebroadcasts of possible route entries that arrive with the same sequence number. The elements in the routing table of each mobile node change dynamically to keep consistency with dynamically changing topology of an ad hoc network. To reach this consistency, the routing information advertisement must be frequent or quick enough to ensure that each mobile node can almost always locate all the other mobile nodes in the dynamic ad hoc network. Upon the updated routing information, each node has to relay data packet to other nodes upon request in the dynamically created ad hoc network.[2]

Here is an explanation of DSDV routing table using the following figure which has 8 hosts in the network. We will have a look at the changes to the H6 routing table with reference to the movements of H4. H6 is the source node. [4][8]

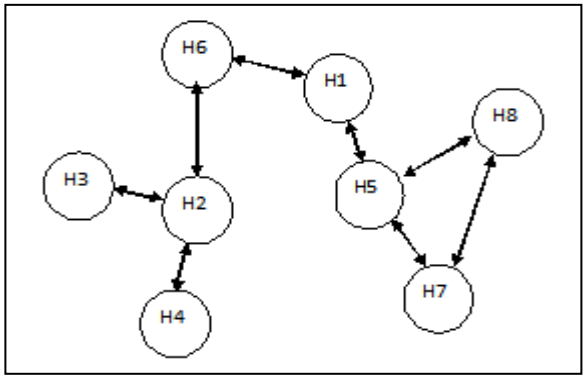

Figure 3. Mobile hosts in Adhoc Networks.

Initially, all the nodes advertise their routing information to all the nodes in the network and hence the routing table at H6 initially looks like this.

Destination	Next Hop	Metric	Sequence No.	Install time
H1	H1	1	S406_H1	T001_H6
H2	H2	1	S128_H2	T001_H6
H3	H2	2	S564_H3	T001_H6
H4	H2	2	S710_H4	T002_H6
H5	H1	2	S392_H5	T001_H6
H6	H6	0	S076_H6	T001_H6
H7	H1	3	S128_H7	T002_H6
H8	H1	3	S050_H8	T002_H6

Table 1: Routing table at H6.

Forwarding table for H6 will looks like this.

Destination	Metric	Sequence No.
H1	1	S406_H1
H2	1	S128_H2
H3	2	S564_H3
H4	2	S710_H4
H5	2	S392_H5
H6	0	S076_H6
H7	3	S128_H7
H8	3	S050_H8

Table 2: Forwarding table for H6

Routing table of H6 and the forwarding table at the H6 would look like this. But, when the host H4 moves its location as shown in the figure nearer to H7 and H8 then, the link between H2 and H4 will be broken resulting in the assignment of infinity metric at H2 for H4 and the sequence number will be changed to odd number in the routing table at H2.

H2 will update this information to its neighbour hosts. Since, there is a new neighbour host for H7 and H8; they update their information in the routing tables and they broadcast. Now, H4 will receive its updated information from H6 where H6 will receive two information packets from different neighbours to reach H4 with same sequence number, but different metric. The selection of the route will depend on less hop count when the sequence number is the same.

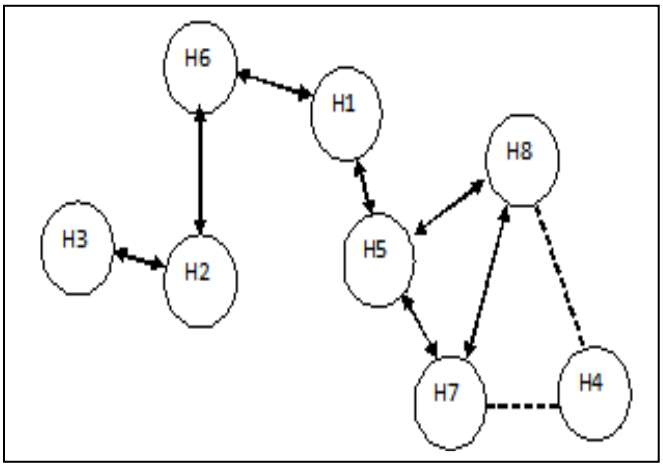

Figure 4: Movement of mobile host(H4) in the Adhoc network.

After the movement of H4 the routing table will looks like this.

Destination	Next Hop	Metric	Sequence No.	Install time
H1	H1	1	S516_H1	T001_H6
H2	H2	1	S238_H2	T001_H6
H3	H2	2	S674_H3	T001_H6
H4	H2	4	S820_H4	T002_H6
H5	H1	2	S502_H5	T001_H6
H6	H6	0	S186_H6	T001_H6
H7	H1	3	S238_H7	T002_H6
H8	H1	3	S160_H8	T002_H6

Table 1: Routing table at H6 after movement of H4

And the forwarding table at the MH6 would look like this

Destination	Metric	Sequence No.
H1	1	S406_H1
H2	1	S128_H2
H3	2	S564_H3
H4	4	S710_H4
H5	2	S392_H5
H6	0	S076_H6
H7	3	S128_H7
H8	3	S050_H8

Table 2. Forwarding table at MH6 after H4 movement.

III. MERITS AND DEMERITS OF DSDV.

DSDV was one of the early algorithms available. It is quite suitable for creating ad hoc networks with small number of nodes. Since no formal specification of this algorithm is present so there is no commercial implementation of this algorithm. It has several advantages and disadvantages.

A. *Advantages of DSDV*

1. DSDV protocol guarantees loop free paths.
2. In DSDV count to infinity problem is reduced which was a major problem in Distance vector protocol.
3. Extra traffic can be avoided with incremental updates.
4. In routing table, DSDV not maintain multiple paths to destination. A good practice in DSDV is to maintain best paths to a destination only. Because of this space consumed by routing table is reduced.

B. *Limitations of DSDV*

1. DSDV requires a regular update of its routing tables, which uses up battery power and a small amount of bandwidth even when the network is idle.
2. DSDV doesn't support Multi path Routing.
3. It is difficult to determine a time delay for the advertisement of routes .
4. Whenever the topology of the network changes, a new sequence number is necessary before the network re-converges; thus, DSDV is not suitable for highly dynamic or large scale networks.
5. Problem of fluctuation and damping fluctuation.[4]

IV. CONCLUSION

DSDV is an adaptation of classical distance vector routing protocol to ad hoc networks. In DSDV, two tables are maintained at each of the nodes. One of them is the routing table, which contains addresses of all other nodes in the network. Along with each node's address, the routing table contains the address of next hop, route metric, destination sequence number, etc. Route updates are broadcasted periodically or scheduled as needed in the network. Routes are always selected with later sequence number. If the sequence numbers are identical, the route with smallest metric will be selected. These criteria guarantee loop-free routes, but they also induce routes fluctuation [2]. DSDV, have several drawbacks when it comes to scalability. Therefore this work can motivate further research on improving the current protocols and/or create new ones to meet the challenges of large-scale wireless networks.[1]

V. REFERENCES

[1]. Deepak Kumar et al "Performance Comparison of DSDV and AODV Routing Protocols in MANETS" International Journal of Electronics Communication and Computer Technology (IJECCT) Volume 2 Issue 3 (May **2012**)

[2]. Pooja saini and Meenakshi Sharma, "Impact of Multimedia Traffic on Routing Protocols in MANET", ISROSET-International Journal of Scientific Research in Network Security and Communication, Volume-03, Issue-03, Page No (1-5), May -Jun **2015**

[3]. Bhagyashree Thakur, Sharda Patel, Ashok Verma and Shivendu Dubey, "Simulation Of Blackhole Nodes And Prevention Using IDS For MANET Reactive Routing Protocol AODV", International Journal of Computer Sciences and Engineering, Volume-02, Issue-12, Page No (114-120), Dec -**2014**, E-ISSN: 2347-2693

[4]. Prof. B.N. Jagdale, Prof. Pragati Patil, Prof. P. Lahane, Prof. D. Javale "Analysis and Comparison of Distance Vector, DSDV and AODV Protocol of MANET" International Journal of Distributed and Parallel Systems (IJDPS) Vol.3, No.2, March **2012**.

[5]. Akshai Aggarwal, Savita Gandhi, Nirbhay Chaubey. "Performance analysis of AODV, DSDV, and DSR in Manets" International Journal of Distributed and Parallel Systems (IJDPS) Vol.2, No.6, November **2011**.

[6]. Biswaraj Sen1, Sanku Sinha "A Simulation Based Performance Analysis of AODV and DSDV Routing Protocols in MANETs" International Journal of Modern Engineering Research (IJMER) www.ijmer.com Vol.2, Issue.4, July-Aug. **2012** pp-2404-2408 ISSN: 2249-6645

[7]. Ritika Kachal and Shrutika Suri, "Comparative Study and Analysis of DSR, DSDVAND ZRP in Mobile Ad-Hoc Networks", International Journal of Computer Sciences and Engineering, Volume-02, Issue-05, Page No (148-152), May -**2014**, E-ISSN: 2347-2693

[8]. Md. Shohidul Islam et al, "An Extensive Comparison among DSDV, DSR and AODV Protocols in MANET" International Journal of Computer Applications (0975 – 8887)Volume 15– No.2, February **2011**

[9]. Preeti Singla "Review of Theoretical Comparison between ADOV, DSR and DSDV" International Conference on Advances in Management and Technology (iCAMT - **2013**) Proceedings published in International Journal of Computer Applications® (IJCA) (0975 – 8887)

[10]. Sapna S. Kaushik1 & P.R.Deshmukh "Comparison of effectiveness of AODV, DSDV AND DSR Routing protocols in mobile adhoc networks" International Journal of Information Technology and Knowledge Management. July-December **2009**, Volume 2, No. 2, pp. 499-502

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