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BEHAVIOR ANALYSIS OF ROUTING PROTOCOLS FOR A HEALTH DECISION SUPPORT SYSTEM

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ABSTRACT

Mobile ad-hoc network (MANET) is an infrastructure less network, that is a collection of mobile devices connected together without centralized infrastructure that can be configured at any time and any where, it gives the network dynamic topology. The most important thing in MANETs is a routing protocol. MANETs have a three major routing protocols proactive, reactive and hybrid. In this work, the performance of reactive routing protocol Ad hoc on demand Distance Vector (AODV) and proactive routing protocol Destination Sequenced Distance Vector (DSDV) for a health decision support system (HDSS) were evaluated. The major goal of this work is to analyze the performance of well-known MANETs routing protocol in mobility case under low, medium and high density scenario. Hence it becomes important to study the performance of these routing protocols. The performance is analyzed with respect to Average End-to-End Delay, drop packets, Packet Delivery ratio (PDR) and Throughput. Simulation results verify that AODV gives better performance as compared to DSDV.

Keywords: AODV, DSDV, HDSS, MANETs, NS2.

1. INTRODUCTION

Wireless networking is one of the technologies that users can access information and services electronically. Wireless networks can be integrated with wired networks and can be classified in two types [1].

1.1 Infrastructure Network

Infrastructure Network is a set of wireless devices that are connected to central device called (base station), this base station control the communication between the devices as shown in Fig.1 , and if one device go out from range of the base station automatically will be connected with other base station , this process is "called handoff".

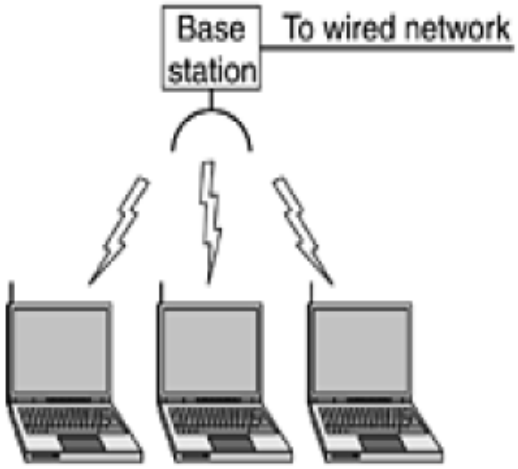

Figure.1: Infrastructure network

1.2 Ad-hoc Network

Ad-hoc network is an infrastructure less network defined as , the devices in a network can be connected together directly without using any central device as shown in Fig.2, but the range in ad-hoc network is limited , therefor the recent study focused on mobile ad-hoc networks (type of ad-hoc network) using multi hope technology with support mobility to the nodes in network to enlarge the coverage . The main challenge in MANETs , is the best selection of routing protocol to the network . Integrating the MANET technology with the e-healthcare field is used in this work.

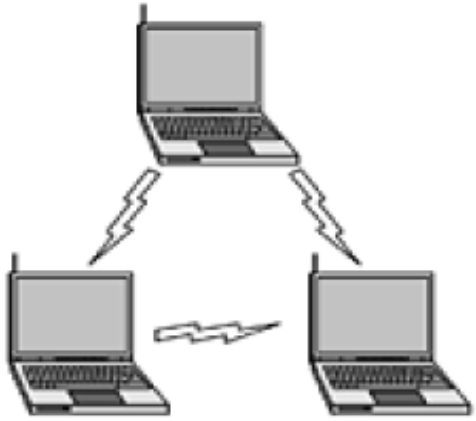

Figure.2: Mobile ad-hoc network

1.3 Routing Protocols

Mobile ad-hoc networks have many types of routing protocols. Fig.3 is a brief description of it. Two types of routing protocols were studied in this work.

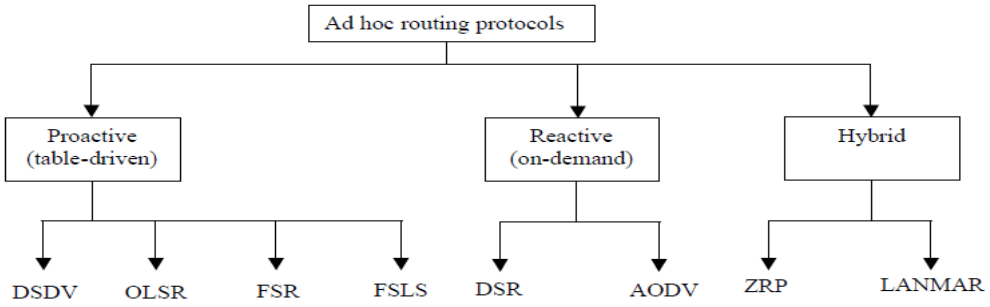

Figure.3: routing protocols

1.3.1 DSDV [DESTINATION SEQUENCE DISTANCE VECTOR]

DSDV is a proactive routing protocol based on the idea of the classical Bellman-Ford Routing Algorithm. The main contribution of the algorithm was to solve the Routing Loop problem. This protocol depend on table-driven means that every node in network maintain a routing table to send data from source to destination. DSDV is a suitable routing protocol for ad-hoc network with small number of nodes , but it has some disadvantage, that this protocol so effect in dynamically change of network because it need regular update for the route path, addition to its performance is not good with large number of nodes in the network[2] .

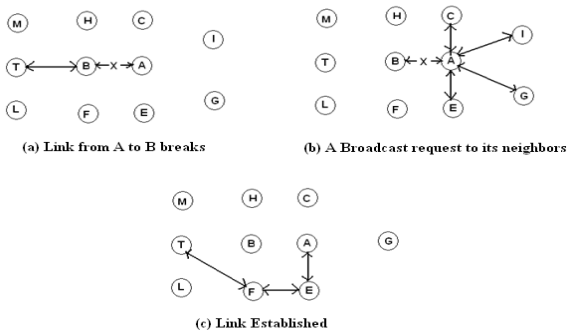

Figure.4: Creation new route path for node A

Table.1: Route Path Update

Neighbor	Hop number	Via node	Update Time
C	2	H	1756
I	3	A	805
G	3	E	1050
E	2	F	1860

In Fig.4 and Table.1, Link between node A and node B was broken, for that node A search for new path to connect with node T by its neighbors and select a new route path depend on less number of hops and the last update for route table .

1.3.2 AODV [Ad-hoc On-demand distance vector]

AODV protocol is both an on-demand and a table-driven protocol discover routes only as needed. AODV is a reactive protocol, although it still uses features of a proactive protocol. AODV takes the interesting parts of DSR and DSDV, in concept of sequence numbers and sending of periodic hello messages from DSDV and it uses the concept of route discovery and route maintenance of DSR. The protocol uses different messages to discover and maintain links. When a node desire to connect with another node, it checks if there is a valid route path to the destination, the node use this route to connect with the destination node. If not valid , the source node send a route request (RREQ) to its neighbor, if this neighbor has a route to the destination or it is a destination ,it will reply (RREP) to the source node to send the data as shown in Figs.5,6 [3]. If there is RERR receive by the source node that mean the source node go to discover a new path to the destination.

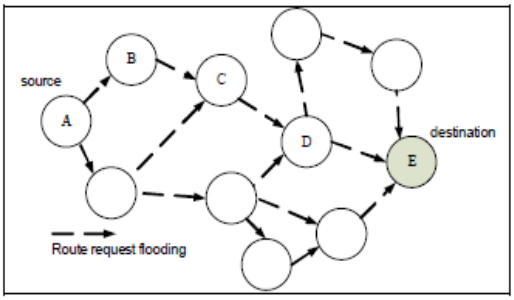

Figure.5: Route Request (RREQ) flooding

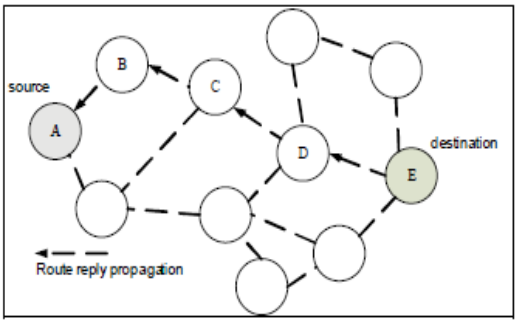

Figure.6: Route Reply (RREP) propagation

1.4 Related work

To assess performance of routing protocol of MANETs Alice Abraham.et al.[4] presented a detailed simulation of AODV and DSDV with different number of nodes and concluded that AODV performance better than DSDV in throughput, end-2-end delay and PDR metrics. Also M.A.SHABAD.et al.[5] gave comparison between AODVand DSDV and conclude that AODV performs better in TCP networks for maintaining connection in network than DSDV. In case of drop packet for comparison between DSDV and AODV Md. Shohidul Islam, Md. Naim Hider, Md.TouhidulHaque and Letonmiah [6] conclude that DSDV performance is better than AODV. Finally [2], [3] and [7] go to that AODV performance better from DSDV in many and different situation.

2. PROPOSED NETWORK AND SIMULATION

For the simulation of the designed system, best version 2.34 of NS-2 has been used in this work. Ns-2 is a discrete event simulator targeted at networking research. It began as a part of the real network simulator and is evolving through an ongoing collaboration between the University of California at Berkeley and the VINT project [8]. Network in this research deals with healthcare field, that number of patients have a smart device, this device is designed to transmit the sensor data from the patient to his doctor .Also this network has high scalability because at any time the network may be have 20 patient and after few time the number of patient will be extend to be 80 or 120 for example. This field was supported by MANETs technology that provide free mobility and free wireless transmission of data by covering 1000m*1000m. Moreover this network can be extend to larger area in this field.
Parameters of the designed network can be seen in Table.2 below.

Table.2: Network Parameter

Simulator	Ns2.34
Simulation Area	1000m*1000m
mac protocol	IEEE802.11
Mobile Nodes	20,40,60,80,100,120
Antenna Type	Omni antenna
Propagation Model	Two Ray Ground
Routing Protocols	AODV,DSDV
Traffic Sources	TCP
Simulation Time	500 s
Mobility Model	random

3. METRICS CALCULATIONS

Four performance metrics were selected to compare the two routing protocols:-

1. Average End-to-End Delay
   It is average of time taken by the data packets that propagate from source to destination through a MANET. This includes all possible delays caused by buffering during routing discovery latency, queuing at the interface queue, and retransmission delays at the MAC, propagation and transfer times. Lower value of the end –to-end delay for better performance of the protocol.

2. Packet Delivery Ratio (PDR)
   It is a ratio of the number of data packets successfully delivered from the destinations to those generated by sources.
   Packet Delivery Ratio = received packets/sent packets * 100.
   Higher value of the PDR for better performance of the protocol.

3. Throughput
   It is the rate of successfully transmitted data packets in a unit time in the network during the simulation. Higher value of the throughput for better performance of the protocol.

4. Packet Loss
   It is the total number of packets dropped by nodes dueto various reasons. The lower value of the packet lost for better performance of the protocol.
   Packet lost = No.of packet send – No .of packet received [9].

4. RESULTS

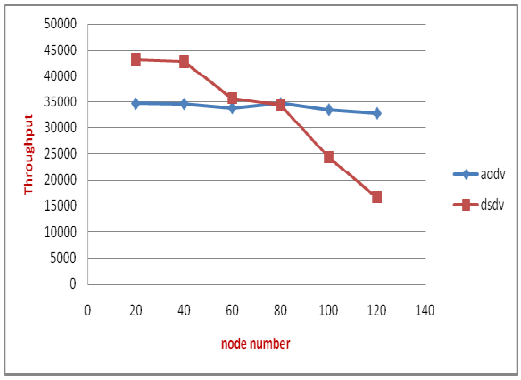

Figure.7: Throughput Vs Varying Number of Node

In the throughput case, it was noticed that the AODV routing protocol keep the throughput at the same range with increasing the number of nodes, but the DSDV routing protocol far decrease with increasing the number of nodes. Therefore the performance of the AODV is better than the DSDV. This can be seen in figure (7).

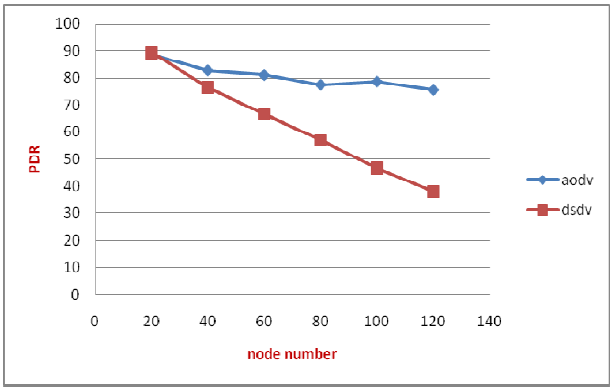

Figure.8: packet delivery ratio Vs varying number of nodes

Figure (8) shows the case of PDR. It is clear that the AODV routing protocol slightly decreases with increasing the number of nodes, but the DSDV routing protocol far decreases with increasing the number of nodes, therefore in this case performance of the AODV is better than the DSDV.

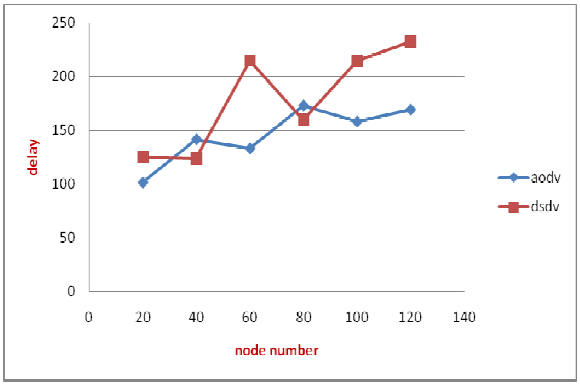

Figure.9: End-To-End Delay Vs Varying Number of Nodes

The case of end to end delay as shown in figure(9), the AODV routing protocol slightly increases in the e2e delay with increasing in the number of nodes, but the DSDV routing protocol far increase in the e2e delay with increasing the number of nodes, therefore performance of the AODV in this case is better than in the DSDV .

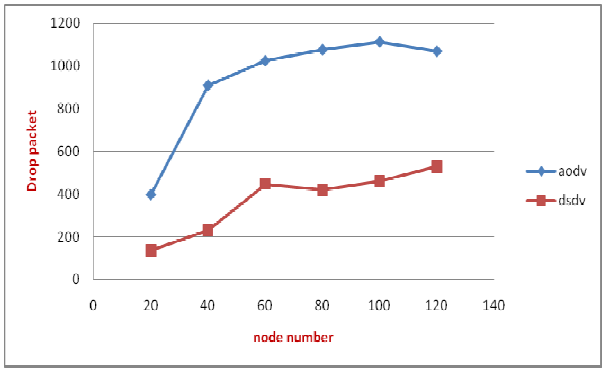

Figure.10: Drop packet Vs varying number of nodes

In case of drop packets, it was noticed that the AODV routing protocol drop packet far increase with increasing the number of nodes, but the DSDV routing protocol few increase with increasing in the number of nodes. Therefore the performance of the DSDV was better than the AODV, this is clear in Figure(10).

5. CONCLUSION

In this work, an effort has been made to Concentrate on the study of routing protocols AODV and DSDV on the basis of quantitative and qualitative metrics and also concentrate on common issues of MANET used for a health decision support system. Based on the simulation analysis, in health decision support system the scalability should be considered which may some times vary in number of nodes (20 -120), for that we used AODV and DSDV. It was found that for 120 nodes AODV gives better performance for three out off the four studied cases, throughput, end to end delay and PDR.

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7. REFERENCES

[1] Introduction to wireless and Mobile Systems‖.D.P. Aggarwal and Qing-An Zeng.― Brooks/Cole, 2005.

[2] Abdul HadiAbd Rahman and 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).

[3] sachinkumargupta and r. k. saket, performance metric comparison of AODV and DSDV routing protocols in manets using ns-2, ijrras7 (3). june 2011.

[4] Alice Abraham, AshutoshTripathy, JesonKamalnath, Naresh T., Samarth Bharani, and Narendra KumarG,] Performance Evaluation of AODV and DSDV for Implementing Robot Swarm, International Journal of Future Computer and Communication, Vol. 2, No. 1, February 2013.

[5] M.A.SHABAD and Dr.S.S.APTE, International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 8, August 2013.

[6] An Md. Shohidul Islam, Md. Naim Hider, Md.TouhidulHaque and Letonmiah, Extensive Comparison among DSDV, DSR and AODV Protocols in MANET, International Journal of Computer Applications (0975 – 8887) Volume 15– No.2, February 2011.

[7] G. Jose Moses, D. Sunil Kumar, Prof.P.SureshVarma and N.Supriya, A Simulation Based Study of AODV, DSR, DSDV Routing Protocols in MANET Using NS-2, International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, Issue 3, March 2012.

[8] NisargGandhewar and RahilaPatel, Performance Evaluation of AODV protocol in MANET using NS2 Simulator, 2nd National Conference on Information and Communication Technology (NCICT) 2011 Proceedings published in International Journal of Computer Applications® (IJCA).

[9] AkshaiAggarwal, Savita Gandhi and NirbhayChaubey, Performance Analysis of AODV, DSDV and DSR in MANETS, International Journal of Distributed and Parallel Systems (IJDPS) Vol.2, No.6, November 2011.

[10] Sunita Kushwaha, Bhavna Narain, Deepti Verma and Sanjay kumar, "Effect of Scenario Environment on the Performance of Manets Routing Protocol: AODV" International journal of Computer Engineering & Technology (IJCET), Volume 2, Issue 1, 2011, pp. 33 - 38, ISSN Print: 0976 – 6367, ISSN Online: 0976 – 6375.

[11] Prof. Vikram M. Agrawal and Prof. Samip A. Patel, "A Study on Security Level of Ad Hoc Routing Protocol to Find Other Approach with DSDV", International Journal of Computer Engineering & Technology (IJCET), Volume 4, Issue 6, 2013, pp. 240 - 246, ISSN Print: 0976 – 6367, ISSN Online: 0976 – 6375.

[12] Sanjukta Tanti, Sukant Kishoro Bisoy, Namita Das and Mohit Ranjan Panda, "Performance of DSDV Protocol Based on Different Propagation Model with Various Topologies", International Journal of Computer Engineering & Technology (IJCET), Volume 4, Issue 4, 2013, pp. 333 - 340, ISSN Print: 0976 – 6367, ISSN Online: 0976 – 6375.

[13] Prinima and Dr.R.K.Tuteja, "Comparative Performance Analysis of Routing Protocols using NS2 Simulator", International journal of Computer Engineering & Technology (IJCET), Volume 3, Issue 2, 2012, pp. 181 - 187, ISSN Print: 0976 – 6367, ISSN Online: 0976 – 6375.

[14] Prerna Malhotra, "A Survey of Energy Efficient AODV Routing Algorithms in MANET", International journal of Computer Engineering & Technology (IJCET), Volume 4, Issue 2, 2013, pp. 213 - 220, ISSN Print: 0976 – 6367, ISSN Online: 0976 – 6375.