A Brief Review: Routing Protocols AODV and DSDV for MANET

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Abstract: An ad hoc network is a group of wireless nodes that create a system without any federal control or access point. MANET stands for Mobile Ad-hoc Network. MANET is robust infrastructure less wireless network. MANET can be designed either by mobile nodes or by both staticnodes. In this paper we review of two well-known routing protocolsAODVand DSDV for MANET and also provide comparison between AODV and DSDV protocol. Further this review will help the other researcher for study and understand which routing protocols perform better with respect to different network senarios.

Keywords: MANET,DSDV and AODV.

I. INTRODUCTION

MANET stands for Mobile Ad-hoc network in this system no need of central point. MANET network is not a permanent structure it is a self-adjustable without any topology because MANET is collection of self-determining nodes like mobile, laptops, notepad etc. [1]. Which have restricted battery power consumption and bandwidth, MANET network is freeform topology network that's means allnode in system move dynamically and topology of network is changed. Nodes in mobile ad hoc networks are free to move in the network and they can establishthemselves in an arbitrary manner. These elements make MANETs extremely commonsense and its arrangement is simple in spots where existing foundation is not sufficiently proficient to permit correspondence, for example, in a debacle zones, or infeasible to convey areas [2]. Routing protocol be determined by the adeptness of the link metric that works on it. It is very important value that is relegated to each route path and this value is utilized by the routing procedure to choose one or more routes path, route path is find out by protocol from set of routes. These values commonlyreproduce the cost of using a certain route with respect to some optimization objectives like throughput, delay, energy consumption and data delivery[3]. It is act as both router and hosts. There are quite a number of uses for MANET for example, the military, for transmitting any data or information like audio video or any information from one node to other.
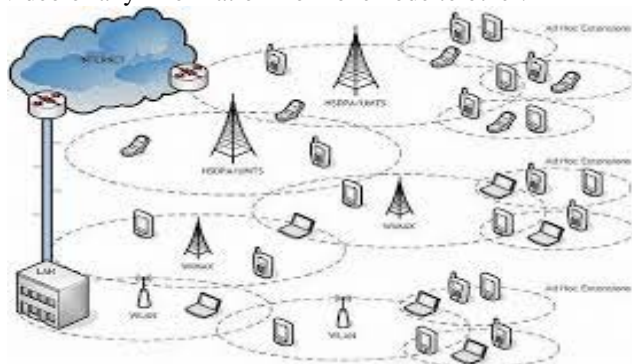

Figure 1 Mobile Ad hoc network

Routing is act as a moving of any information from starting node to a destination. The principle target of Ad-hoc routing protocols is characterizing how to convey informationamong nodes proficiently without scheduled topology or access point. Routing protocols use different metrics to calculate the best path for routing the packets to its final destination. These metrics are a standard measurement that could be number of hops, which is used by routing algorithm to determine the path for the packet to its destination. The procedure of wayassurance is that, routing systemskeep up routing tables, which provides all data for the packet. This route information varies from one direction to next.The most well-known connection metric, least hop count is the conventional routing metric applied in maximum of the common routing protocols like AODV and DSDV, It discovered path with the minimum number of hops. However, new wayshould quickly be found in situations where paths with least quality could not be found in due time subsequently of high mobility[3].Directing conventions in MANETs were created in light of the plan objectives of negligible control overhead,negligible processing overhead, dynamic topology maintenance and loop free [4].Other different methods need to be measured while selecting protocol for MANET is as follow:

Multicasting: In this capability to transfer packet to multiple node at a time. It is same broadcasting method. Broadcasting method is completed to everynode in topology. Multicasting is important for transferring packet to every node in network at once and less time saving [5].

Loop free: In loop free escape the CPU consumptionandconsumption of bandwidth. A loop free problem happens when packet is continually routed the same routing path twice before it reach to its final destination node[5].

Multiple routes: whenever we are sending packet from one to another node in network topology some node are damaged due to certain reasons like disaster. Data could be transferred through other route node. This is way routing network allow multiple routes[5].

Distributed operation: protocol is distributed dynamically with no central access[5].

Reactive: it means direction of path is set up only when data packet is sending from source node to final node[5].

Unidirectional link support: The radio condition can reason the making of unidirectional connections. Consumption of these connection and bi directional is not only civilizing the protocol performance[5].

Power conservation: MANET is collection of self-determining nodes like laptops; cell phones etc. which have restricted battery power consumption and therefore apply various sort of standby mode to save power[5].

Different categories of MANET:

- Vehicular ad-hoc networks (VANETs) are used for messagingamong vehicles and roadside equipment. VANETs are exceptional instances ofMANETs; these mainly aim for the wireless communication among vehicles that normally have relatively high velocity. Besides high velocity, not at all like the ones inMANET that usually move accidentally in an open zone, the nodes in VANETs could mostly only travel following certain pattern in few directions due to the road topology [6].

- Smart phone ad-hoc networks (SPANs) smart phone ad-hoc network form peer to peer network smart phones to construct peer-to-peer systemswith no need of central access point.A smart phone carried by military personnel is a currently available communication device, which is equal to the Ad-hoc device in the future mobile Ad-hoc networks. Request for progressive mobile phones like smart phones in military actions would not halt if we accept that future military Ad hoc devices would operate over existing wireless networks (e.g., 3G or 4G networks) [7].

- Internet-based mobile ad-hoc networks iMANET is Internet based mobile ad-hoc network (IMANET) is developingmethod in this wired network combinesand a mobile ad-hoc network (MANET) for emerging a global communication structure [8].

- Flying ad-hoc network FANET is a sub category of mobile adhoc network. FANET may consist of same or varied flying agents that are able to connect with all in the district, and also interacts with their surroundings to acquire certain kind of valuable information. In network no need of access point [9].

Routing is generallycategorized into static routing and dynamic routing further classified into three major categories:

1. Proactive or Table driven protocols
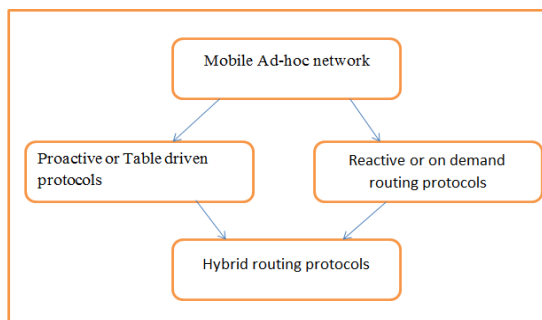2. Reactive or on demand routing protocols
3. Hybrid routing protocols.

Figure 2Three major categories of routing protocol

II. LITERATURE SURVEY

BalramSwamia and Ravindar Singh [1] define that DSDV is a Table driven routing and this protocols manage the route information in tables and that route information is broadcast to other neighbors through this method DSDV minimize the route detection time periods. DSDV is less energy consumption in mobile environment. OWL is on-demand routing protocol it uses the DFS instead of RREQ. The main feature of OWL is less energy and time ingesting in route discovery it include few nodes in route detectionprocedure and remaining nodes are able to accepts other route request by this reduce the interruption and recover the delivery ratio.We studied the evaluationof DSDV and OWL protocol based of power consumption in different phases of routing

A.A. Chavana , Prof. D. S. Kurule and Prof. P. U. Dere [2] presented that routing protocol DSDV and AODV are studied in deferent terms PDR, overhead and end to end delay. AODV is superiorto DSDV.These protocols compare in different terms routing overhead, PDR and throughput. DSDV is a Table driven routing and this protocols manage the route information in tables and that route information is broadcast to other neighbors through this method DSDV minimize the path discovery time periods. Whensome node needs to drive any data to its destination, it firstly checks the table to decide if it has route to final node, if sure then it transfer the data packet to next hop node. If not sure then it begins a route detection process that is path discovery and path maintains process. AODV performance is affected by black hole attack. This paper modifies the protocol AODV by enhance the executionof AODV in presence of the black hole attack.

S. Mohapatra andP.Kanungo [4] defined that Ad-hoc On-demand Distance Vector (AODV), Optimized Link State Routing (OLSR), Dynamic Source Routing (DSR)and Destination Sequenced Distance Vector (DSDV) protocols using four parameters throughput, delay, PDR and control overhead are used for judgment of the performance of routing protocol using NS2 simulator. We studied that DSR protocol is best in term of average PDR then other protocol and it is appropriate for highly mobile random networks. When network scope is not as much of600X600sqm then DSR protocol is outperforms supplementary routing protocols. When network size is more than 600X600sqm then at that point OLSR convention is better answer for high mobility condition if throughput and PDR are the major conditions.

GulfishanFirdose Ahmed, RajuBarskar, and Nepal Barskar [5] Proposed that a new approach, improved -DSDV protocol that executed in NS2. The standards are AODV, DSR and DSDV. In this we studied that paper examines the DSDV that calculates the both protocols established on average delay and PDF. The new method Improved–DSDV progresses the enactment of regular DSDV and reduced the problem of stale routes. PDF of AODV is independent of the quantity of sources. AODV is perfect superior for communication. The state problem in network DSDV routing information will preserve at each node locally. All routing conclusions taken in distributed fashion. Then information may be old or invalid, information is updates time by time. This paper compares the enactment of DSDV

and improved DSDV protocol. In improved-DSDV for achieveangoal nodes can collaborate together.

AfrahDaas, KhuloodMofleh, ElhamJabr and SofianHamad [14] defined that, a comparison between AODV and DSDV have been evaluated. AODV routing protocol is superiortoDSDV.This paper deeply define the MANET and its two well -known routing protocol AODV and DSDV. AODV also wellconcert in other measures like overhead, throughput and real data sent than DSDV.

G. ShankaraRao, E. Jagadeeswararao, U. JyothsnaPriyanka and T. Indira PriyaDarsini [21] presented the functionality, limitations, benefits and simulation results on different protocols. We studied analyzed performance of different protocols that is DSDV, DSR, AODV and AOMDV based on measures PDR, throughput, delay,overheadand packet loss in NS2. The simulation result shows that every routing protocol has its unique significance on a particular QOS metric. AOMDV is best than AODV and DSR in delay, PDF and throughput. DSDV also detected that DSDV has better throughput value, and other protocols also observed that DSR overhead is less and AODV has better throughput than DSDV and AODV has higher packet loss. We studied that every protocols have unique significance and depends on system properties.

Anuj K. Gupta, Harsh Sadawarti, and Anil K. Verma [22] defined that routing protocols deeply in MANET. We studied widely different categories of MANET routing protocols in its types. Every routing protocol has its individual features. Based on topology environment that is choosing by routing protocol. The factor in routing is finding and maintaining route path between source node and destination node.

Divangna Gupta and Rajneesh Kumar Gujral [23] presented that, simulate the presentation of MANET protocols that is DSDV, AODV, ZRP and DSR based on different measures like overhead, throughput and PDF. AODV protocol is improving the quantity of nodes and Average delay. ZRP is better in situation of overhead. Simulation work is completed by NS2.

NehaAggarwal, Teglovy Singh Chohan, KaramveerSingh,RajanVohra and Dr.ShaliniBahel [24] defined the routing protocol which have minimum delay and better throughput. End to end delay and Jitter on sending and receiving side is common measures are used for comparison in AODV and DSDV. AODV is moreappropriate for high speed applications but in situation of AODV accumulation of jitter and value of end to end delay is less. DSDV is better in case of jitter. Both routing protocol is best in application area according to calculated parameters by NS2 simulator.

III. PROACTIVE PROTOCOLS

Proactive Protocols are also called Table Driven Protocols. These protocols retaincontinuallychangedtopology of the network. Every node in network knows about the other network in advance. All the routing information stored in no. of different tables. Whenever any change occurred in topology and tables are also updates according to the change. The nodes interchange network data with each other. They can have path information of nodes any time when they needed. Optimized Link State Routing Protocols (OLSR), Wireless Routing Protocols (WRP), Destination

Sequenced Vector Routing (DSDV) Protocols are examples of Proactive Protocols.

A. *Optimized Link State Routing Protocols:* Clausen and Jacquet proposed the Optimized Link State Protocol. It is indicate point proactive convention that utilizes effective connection state parcel sending system called multipoint relaying [10,11].OLSR Operation mainly updating and maintaining information in a different of tables. The route calculation itself is also driven by the tables.

B. *Wireless Routing Protocols:* Murthy proposed wireless routing protocol and GaricaLuna-Aceves [12].The Objective of this protocol to upholding routing data between all nodes of network related to smallest distance to all final destinations.

C. *Destination-Sequenced-Distance-Vector (DSDV):* DSDV is gets the idea and article of bellman ford algorithm. DSDV is less robust than link state routing protocols. The sender node determines the path from starting node to target node. In this each node keep up a table that contains entries for all nodes and also contains record ofall destinations of network with a sequence number that sequence no. is defined by the target node. This protocol is used for remove the problem of loop [13]. In this routing protocol whole node exchange "Hello" to present them. The neighbor node on getting"hello" message will at the hello sender's to table. Through this method any node will recognize its neighbor. After this each node transfer the routing table to neighbor. Then in network each node will have a path to other node. At last hello packet will transfer by any node will change its location in network [14].
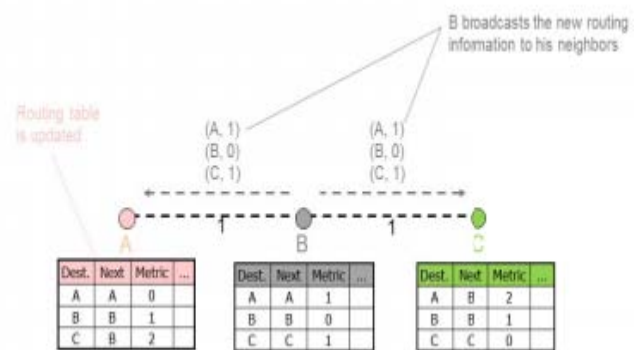

Figure 3 routing table exchange of Hello message [14]

In figure 3 A, B and C node will send the hello message. B Node hasA and C neighbor, node
A and C will introduce B as a neighbor. The metric field in table of each node, in this Number means count of the hop to neighbor. Now each node will send table to its neighbor. By this method A node reach to node C through B node in two hops [14].
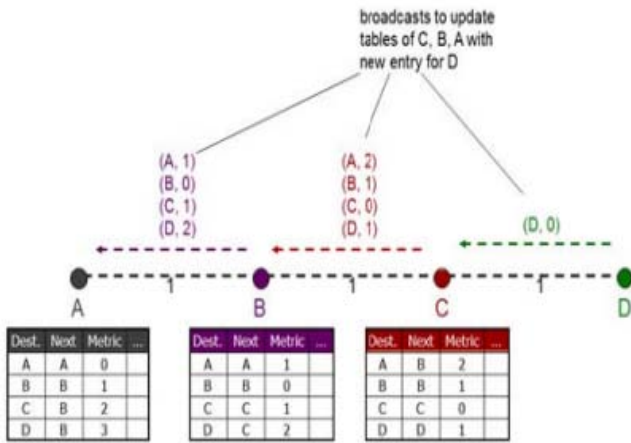
Figure 4 new node arrive to network [14]

In figure 4 when new node reaches to network, it firstly sends the hello packet. Node C will accept the packet and create new D node as a neighbor node in network. C node will transfer announcement about new node D then all node will add the D node as a neighbor node in routing table.
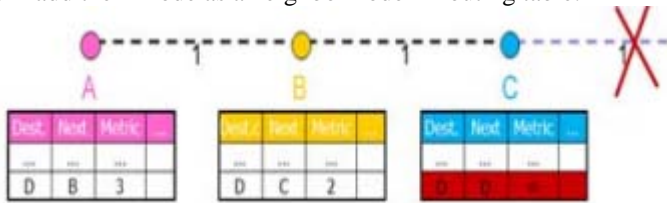

Figure 5 new node arrive to network [14]

Node C cannot arrive to D node because D node moved away from node C. now C node update the network that it cannot arrive to node D. node D will no long available because this will happens by sending advertisement to neighbor. Node C will send in the metrics field that D node have infinity hops.All node receives this message with hops they will recognize that D node is no more accessible through node C [14].

III. REACTIVE ROUTING PROTOCOLS

Reactive protocols are also called On Demand Routing Protocols. In this protocol the route are required between nodes of network only whenever nodes are needed to route the data packets. When a route established by a source nodes to its destination for which are does not have any route information, it starts to establish the process which goes from one node of network to another node of network until it reach at destination. Dynamic Source Routing (DSR), Ad-Hoc on Demand Distance Vector Routing (AODV), andTemporally Ordered Routing Algorithm (TORA) are example of Reactive Routing Protocol.

A. *Ad Hoc on Demand Distance Vector Routing:* AODV is a mixture of both Dynamic Source Routing and Destination Sequenced Distance Vector Routing Protocols. In this follows the basic mechanism for Route Discovery and Route Maintenance, sequence numbers. It is used for MANET. AODV is an on-demand routing protocol, this protocol it send the

request whenever need. This routing protocol algorithm was interested by the restricted BW that is available in media used for wireless communications. AODV uses the advantageous method from DSR and DSDV algorithms. It is loop free routing protocol and notification to be transfer to affected nodes. It is also capable of multicast and unicast routing[15].

Working of AODV: Whenever some node needs to send any data to its destination, it firstly checks the table to decide if it has route to final node, if sure then it transfer the data packet to next hop node. If not sure then it starts path route detection process[15].
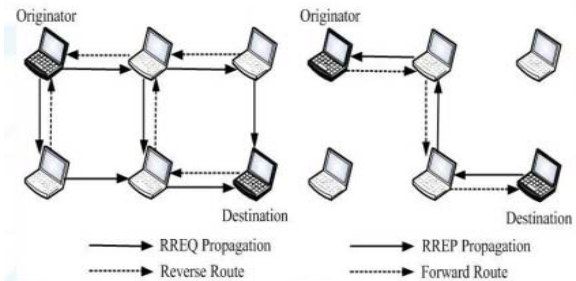

Figure 6 AODV route discovery processes[16]

Rote Discovery: it firstly broadcasts route request (RREQ) packet. The neighbor nodes broadcast data packet to their next node and this process carry ontill packet not reaches to its destination. During forwarding packet request to intermediate nodes record the address of neighbor node. This information is kept in routing tables, which benefits for creating a reverse path [15].
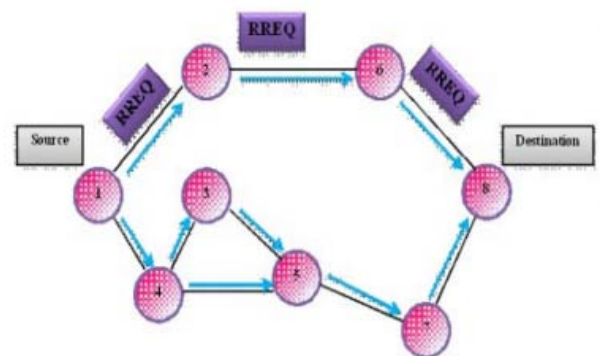

Figure 7 Route Request (RREQ) [14]

Route Maintenance Stage: Broadcasting of active nodes is done occasionally by hello message. There is no message"hello" communication from neighbor active node informs starting nodewith an RERR packet and all node is canceled. Begin is completed by source to an alternate course detection phase. Then it will deluge RREQ packet[15].
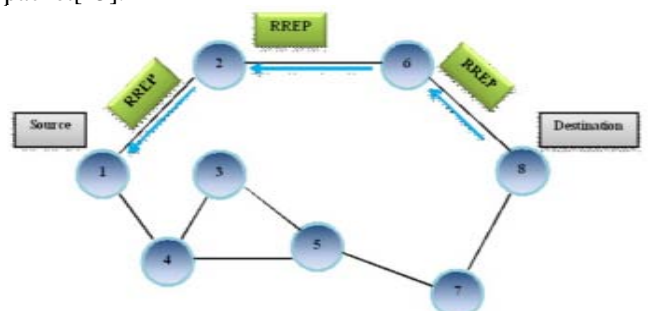

Figure 8 Route Reply(RERR)[14]

B. *Dynamic Source Routing (DSR):* This algorithm is based on the link state algorithm [17]. In this sender node determines the route from source node to its target node and also includes the address of neighbor nodes to route record in the packet. This network was planned for multi hop network for small Diameters areas.

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C. *Temporally Ordered Routing Algorithm (TORA):* it is based on link reversal concept [12]. In this protocol exceptionally designed to localize algorithmic function to topology changes by advance different routes to target node. Smallest hop paths are given extra importance and longer routes are mostly used to reduce the overhead of finding new routes.

IV. HYBRID PROTOCOL

Hybrid Pouting Protocols is mixture of both Proactive Protocols and Reactive Protocols. In this protocols share information of whole network with its intermediate nodes, in this protocol every node has information of its closest intermediate node. In hybrid protocol networkall node have its individual routing zone, route size is definited by a zone radius, that's specified by a metric like a number of hops. Zone Based Hierarchical Link State Routing Protocol (ZHLS*)* andZone Routing Protocol (ZRP) are example of Hybrid Routing Protocols.

A. *Zone Routing Protocol (ZRP):* Zone Routing Protocol is Example of Hybrid Routing Protocols which is effectively combination of best features of Proactive and Reactive Routing Protocols [18,19]. In this protocol each node specifies the zone around itself and radius is defines in the no. of hops to the perimeter of the zone.
B. *Zone Based Hierarchical Link State Routing Protocol (ZHLS):* In this protocol network is separated into non overlappingzones as in cellular network [20]. In this every node identifiesthe connectivity of nodes inside its private zone and also knows the whole knowledge of network connectivity zone.

V. PERFORMANCE MATRICS

- Throughput is the normal rate of effective message conveyance over a correspondence channel. The framework throughput or total throughput is the whole of the information rates that are conveyed to all terminals in a system [21].
  Throughput   =   (total   no.   of   bytes received/Simulationtime) * (8/1000) Kbps
- Packet loss or delivery is conveyance is characterized asnumber of data packets sent and number of data packets lost while transmitting in network [21].
  Packet loss = total no. of packets sent- Total no. ofpackets received
- Overhead is well-defined as the excess traffic generated while transmitting the packet over a network. This leads to dropping of packets before attainment the destination [21].
  Overhead = total no. of routing packets Sent / total no. of data packets Received

- Delay is defined as the overall time taken from the moment the data [21].
  Delay = end time – start time
- Packet loss is the number of lost packets while transmitting in network [21].
  Packet loss= total no of packets sent-Total no of packets received

VI. COMPARISON BETWEEN AODV AND DSDV

Parameters	AODV	DSDV
Throughput	High	Low
Packet delivery ratio	High	Low
Delay	Low	High
Overhead	Medium	High
Packet loss	High	Low
Power Consumption	Less	High
Stability	High	Less
Route updates	Non-periodic	periodic
Scalability	More	Poor
Latency	Yes	No

Figure 9 Comparisons between AODV and DSDV.

VII.   CONCLUSION

This paper is describing the overview of Routing protocol for MANET with its types. The principle motivation behind this paper is to give some essential information about routing protocol and its purpose.We studied different research papers on routing protocols in MANET. Routing protocols categorized into three different categories 1) Proactive or Table driven protocols 2) Reactive or on demand routing protocols 3) Hybrid routing protocols.Correlations amongst AODV and DSDV have been done. We reviewed different simulation result shows that every protocol has its unique significance on a particular QOS metric. Every routing protocol has different feature. In this review main aims to understanding of various routing protocols in MANET.

REFERENCES

1)   Balram Swami and Ravindar Singh, "Simulation Based Comparison between OWL and DSDV", Published in : International Conference on Emerging Trends in Engineering, Science and Technology, pp. 1575 – 1580,2015.
2)   A. A. Chavan , Prof. D. S. Kurule and Prof. P. U. Dere, Performance Analysis of AODV and DSDV Routing Protocol in MANET and Modifications in AODV against Black Hole Attack,Published in : 7th International Conference on Communication, Computing and Virtualization, pp. 835 – 844, 2016,.
3)   M. S. Kabiwa , K. Djouani , and A. Kurien, "Performance Evaluation of the IBETX Routing Metric over DSDV Routing Protocol in Wireless Ad hoc Networks", represented at 8th International Symposium on Intelligent Systems Techniques for Ad hoc and Wireless Sensor Networks (IST-AWSN), pp. 1108 – 1115, 2013,

4) S. Mohapatra and P.Kanungo , "Performance analysis of AODV, DSR, OLSR and DSDV Routing Protocols using NS2 Simulator",Published in : International Conference on Communication Technology and System Design , pp. 69 – 76,2011

5) GulfishanFirdose Ahmed , RajuBarskar , and Nepal Barskarc, "An Improved DSDV Routing Protocol For Wireless Ad Hoc Networks", Published in : International Conference on Communication, Computing & Security , pp. 822 – 831, 2012.

6) Xin Yang, Zhili Sun, Ye Miao, Ning Wang, Shaoli Kang and Yingmin Wang and Yu Yang, "Performance Optimisation for DSDV in VANETs", presented at 17th UKSIM-AMSS International Conference on Modelling and Simulation, pp. 515-519,2015.

7) Younchan Jung and J. William Atwood, "Secure smart phones fitted to mobile Ad hoc networks and devices for security control",Published in: ICTC 2011 IEEE, PP. 269-273, 2011.

8) Sunho Lim, Wang-Chien Lee, Guohong Cao, and Chita R. Das, "A Novel Caching Scheme for Internet based Mobile Ad Hoc Networks", Published in : IEEE, 2003.

9) Kuldeep Singh and Anil Kumar Verma, "Experimental Analysis of AODV, DSDV and OLSR Routing Protocol for Flying Adhoc Networks (F ANETs)", Published in: IEEE, 2015.

10) L. Abusalah , A. Khokhar and M. GUIZANI, " A Survey of Secure Mobile Ad Hoc Routing Protocols", Published in :IEEE Communication Survey and Tutorials, vol. 10 no. 4, 4thQuater 2008.

11) T.Clausen, P. J acquet, A.Laouiti, P.Muhlethaler, A. Qayyum, L. Viennot, "Optimized link state routing protocol for ad hoc network", published in: Proceedings of IEEE INMIC, pp. 62-68, December 2001.

12) S. Murthy and J. J. Garcia-Luna –Aceves, "An Efficent Routing Protocol for Wireless Networks," represented at ACM Mobile Network and App.J., Special Issue on Routing in Mobile Communication Network, pp. 183-97, Oct. 1996.

13) NidhiLal , shishupalkumar, adityaSaxena and Vijay km. chaurasiya, "Detection of Malicious node Behaviour Via I-watchdog Protocol in Mobile ad-hoc Network with DSDV Routing Scheme ", Published in : Peer-review under responsibility of organizing committee of the 4th International Conference on Advances in Computing, Communication and Control (ICAC3'15),pp. 264 – 273, 2015.

14) AfrahDaas, KhuloodMofleh, ElhamJabr and SofianHamad, "Comparison between AODV and DSDV Routing protocols in Mobile Ad-hoc Network (MANET)",Published in : IEEE,2015.

15) PriyankaWarwadekar and Prof. KavitaMhatre, "A Review on Energy Efficient AODV Routing Protocol",Published in: International Research Journal of Engineering and Technology (IRJET), Volume: 03 Issue: 04, pp. 209-212, Apr-2016.

16) Amol R. Kotkarand Nilesh S. Vani, "Performance Analysis of AODV Routing Protocol in MANET: An Overview", Published in : International Journal of Scientific Engineering and Research (IJSER), Volume 3 Issue 5, pp. 27 of 30, May 2015.

17) Johnson. D and Maltz. D.A, "Dynamic source routing in ad hoc computering (Imielinski and H. Korth,eds.), Published in : Kluwere Academic Publishers, 1999.

18) C.Siva Ram Murthy and B.S. Manjoj,"Ad Hoc Wireless Networks Architectures and Protocol", volume ISBN:81-297-0945-7. Pearson Education, first Indian reprint, 2005 edition, 2005.

19) E. Topalis S. Giannoulis, C. Antonopoulos and S. Koubias, "ZRP Versus DSR and TORA: A Compressive Survey on ZRP Performance", Published in : 10th IEEE Conference, ETFA 2005, 1(ISBN:0-7803-9401-1), Sept 2005.

20) D.B.Johnson, D.A.Maltz and J. Broch, "DSR: The Dynamic Source Routing Protocol for Multihop Wireless Ad Hoc Networks," Published in : Ad Hoc Networking, edited by Charles E. Perkins, Chapter 5, Addison Wesley, pp.139 – 172, 2001.

21) G. ShankaraRao, E. Jagadeeswararao, U. JyothsnaPriyanka and T. Indira PriyaDarsini, "Performance Analysis of MANET Routing Protocols - DSDV, DSR, AODV, AOMDV using NS-2", represented at Global Journal of Computer Science and Technology: E Network, Web & Security, Volume 15 Issue 6 Version 1.0,2015.

22) Anuj K. Gupta, Harsh Sadawarti, and Anil K. Verma, "Review of Various Routing Protocols for MANETs",Published in: International Journal of Information and Electronics Engineering, Vol. 1, No. 3, November 2011.

23) Divangna Gupta and Rajneesh Kumar Gujral, "Simulation of Different Routing Protocols in MANET Using NS2", Published in: International Journal of Scientific and Research Publications, Volume 4, Issue 8, August 2014.

24) NehaAggarwal, Teglovy Singh Chohan, KaramveerSingh,RajanVohra and Dr.ShaliniBahel, "Relative Analysis of AODV & DSDV Routing Protocols for MANET based on NS2", Published in : International Conference on Electrical, Electronics and Optimization Techniques , pp. 3500-3503, 2016.