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A Simulation Based Comparative Study of AODV,DSDV and DSR Protocols In Mobile Ad Hoc Networks

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ABSTRACT

Mobile ad hoc networks (MANETs) are reflected as a newer model of moveable wireless communication arrangements without infrastructure. MANETs are broadly considered and a great variety of applications are appealing to the skill. MANET routing is reflected in an exciting job due to the irregular variations in the topology of the network, caused by the random and numerous node movement and the lack of any centralized controller. We assess the demonstration of routing protocols ofmobile ad-hoc network. This study's key objective is to inspect the presentation of renownedrouting protocol of MANETs under small, moderate and high density setup in high movement cases. Therefore, examining the effect of big motion on the presentation of said routing procedures becomes important.Considering the parameters such as packet delivery ratio, packet drop, and throughputin both proactive and reactive routing protocols.Proactive are best matched for only smaller networks and reactive are well-matched for general Ad-hoc networks.

KEYWORDS *– MANET, DSDV, AODV, DSR*

1. INTRODUCTION

MANET isa combination of dissimilarmoveable and wireless devices, fluctuating from small handheld devices to arbitrarily and dynamically located laptops in such a way that node-to-node interconnections can change on an ongoing basis.

MANET is a community of dynamic nodes without wires in which users collaborate by transmitting informationamong all nodes to permit a user to interconnect outside their direct wireless range of transmission. No centralized management and static network facilities, for example transceivers and access points, is necessary for ad hoc networks and can be set up quickly and cheaply as needed. The individual mobile hosts (nodes) operate concurrently with both the router and the server in Ad Hoc Networks[13].

In a MANET, users within the wireless transmission ranges of each other can interconnect directly. However, if a user wishes to transmit a message to another userexternal its range of communication, it must depend on certain other users to convey its messages. Therefore, there is a multi-hop set-up where numerousintermediary nodes transmit the information directed from

the source node until they visit the endpoint node. Network topology may alteration over time as users travel or amends their transceivingconstraints. Routing protocols should identify packet transmission paths. Routing is the most important research topic in mobile adhoc networks.A routing protocol's value can be measured by means of both quantitative and qualitative metrics. Distributed operation, loop-freedom, demand-based operation, safety, sleep period operation and unidirectional connection support are desirable qualitative properties of a routing protocol for MANETs. Several quantitative measurements that can be used to measure theenactment of routing procedures by different parameters like throughput,PDR, and packet drop, etc. Ad-hoc network's routing protocols must address restrictions such as scalability, high error rates, safety, service quality, multicast, energy efficiency, node cooperation, and aggregation,etc [6][8].

2. ROUTING PROTOCOLS IN MANET

Wireless ad hoc network routing protocols are categorized into two classifications:
Pro-active or Table driven and Reactive or On-demand.

2.1 Pro-active or Table driven Routing

Proactive protocols keep information related to routing about each node's connectivity with all other nodes participating in the network at all times. Often known as proactive, by propagating periodic updates, these protocols permit each userhavingflawless and stable view of the topology of network. Consequently, both nodes may make instant decisions about the sending of particularinformation[10].

The keyhindrances of saidprocedures are –
i. Requisite for a bulkyvolume of information to be stored at each node.
ii. Good response to setbacks and transformation.

2.1.1 Destination Sequenced Distance Vector (DSDV)

This procedurepracticestable of routing like Distance vector, but the sequence number produced by destination is tagged for each routing table entry. Updates are transmitted regularly to preserve consistency between routing tables in anenergeticallyfluctuating topology. Through transmitting or multicasting, routing information is advertised. When changes are observed, packets are transmitted periodically and incrementally. The physical feature of the medium restricts broadcasts in a wireless medium. Because the next hop node has been lost, a usernullifies its entrance to anendpoint; it increases its number of sequence and practices new number of sequence in its succeeding route advertising[12].
Each time a dynamic user gets a lower metric than the next updating of sequence number, it may happen. In that case, each new sequence number will change the route to the destination. This problem can be solved by delaying the announcement if the dynamic host can decide that a path with a superior metric is to be expected to appear in the near future. For these,one routing table for forwarding packets and second for incremental data packets for direction-finding. DSDV ensures a loop-free track to everyendpointdeprived ofdemanding nodes to join in any composite protocol for updating synchronization. In this protocol, each node's tables of routingshouldbe viewed as forming N trees, one rooted in everyendpoint[3][11].

DSDV is uniqueout of the primaryproceduresofferedas well as the key benefit of said protocol is prettyfit with a lesser number of nodes to build ad hoc networks. One of the disadvantages of this protocol is that, even when the network is idle, it needs a systematic updating of routing tables practicing the power of batteryand certain bandwidth. Second, during change in the topology of network, there is a need for a new sequence number before the network congregates. For highly dynamic networks, DSDV is therefore not appropriate.

2.2 On-demandor Reactive Routing

On-demandproceduresseems to be extra appropriate for MANETs, Do not hold the new topology information on the network, as the proactive ones do, but build on-demand routes. Among the most established and popular among the on-demand protocols are the Ad hoc On Demand Distance Vector Routing (AODV) and the Dynamic Source Routing (DSR).By overflowing the network with Route Request information, this type of protocol seeks a route on demand[2]]9].

2.2.1 AdhocOnDemand Distance Vector (AODV)

AODV uses Route Request (RREQ) and Route Response (RREP) control messages to perform Route Discovery. Paths are built in AODV by overflowing the network by RREQ information that does not gather the traversed hop list, however. Rather, as an RREQ crosses the network, the dynamic nodes traversed savefacts and figures about the origin, endpoint, and the dynamicuserresults inobtaining the RREQ. The opposite path to the origin is set using the later results. When the RREQ comes to a remote node, which recognizes a way to the endpoint, the remote node answers to the origin with information (RREP) directedby the RREQ set up oppositetrack. This sets the forward route to the destination from the source. Nodes shed this statistics after a timeout to circumventoverstraining the mobile with statistics about ways that are no longer (if ever) used. RERR will be directed to the exaggerated origin nodes when either destination or intermediate node travels. When the RERR is received by the source node, route discovery can be reinitiated if the track is still needed. Information about the neighborhood is collected through regular broadcasting of Hello packets[1][3].

The keybenefit of this protocol is the establishment of paths on request and the use of destination sequence numbers to discover the up-to-dateway to the endpoint. The lag in setting up the connection is lower. One of the shortcomings of this protocol is that if the number of the origin sequence is very ancientand the transitional nodes have upper but the number ofendpoint sequence is not modern, the transitional nodes can lead to unreliableways. In response to a particular packet of RREQ, multiple RREP packets can also results to hefty overhead power. The downside of AODV is that routine beaconing results in excessive use of bandwidth[4].

2.2.2 Dynamic Source Routing (DSR)

In DSR, it initiates a route discovery process based on flooding when a mobile (source) needs a route to another mobile (destination). The packet of RREQ is overflowed the network by source. The RREQ informationcomprises a collection of hops that are composed as it is propagated through the network by the route request packet. Once either the destination or a node that knows a path to the destination is reached by the RREQ, it responds with an RREP along the reverse of the RREQ collected route.This ensures that the source will receive multiple RREP messages that usually correspond to specific destination routes. If the selected route is disconnected, the routes

in the cache can be used as substitutes to fasten the route discovery. To prevent RREQ information from traveling forever through network, nodes which have already handled a RREQ will reject any additional RREQ with the similar identifier. The keydissimilarityamongAODV and DSR is how they hold the route information: it is kept in the origin in DSR while it is kept in the transitional nodes in AODV. Nonetheless, both phases of route exploration are focused on flooding. This ensures that network having all nodes will engage in any process of discovery, irrespective of their ability to contribute to or not actually setting up the path, thus raising the network capacity[7][5].

3. SIMULATION RESULTS

Simulation has been performed using NS2.33 to conclude the influence of mobility on different routing protocols. The protocols are to be compared are DSDV, AODV and DSR.

Packet Delivery Ratio (PDR)is identified as the proportion of efficiently transported data packets toendpoint nodes and the entire number of data packets created for suchendpoints. PDR exposes the loss rate of packet, which confines the network's throughput. The higher the better distribution ratio is the routing protocol's performance. PDR is proposed as:

$$PDR = (Pr/Ps) \times 100$$

Where Pris the overall packets received and Ps is the total number of packet sent.

Throughput can be defined as the maximum usable packet size recognized in a specific time period by all destination nodes. In network, throughput is calculated in Kilobits per second (Kbps).

Packet Dropped may be defined by subtracted the received packets fromentire number of sent and forwarded packets.

Parameters	Values
Area	1200 * 1200 m^2
Speed	30 m/sec
Pause	10s
Packet Size	1024B
Simulation Time	10s
Number of Nodes	50

Table 1: Simulation Parameters

4. RESULTSANDDISCUSSION

We used AODV, DSR and DSDV routing protocols and equate them during the simulation. The simulation has been repeated for three times for three protocols. The number of nodes in the network is 50. The mobility model used is Random Way point Model.

Throughput

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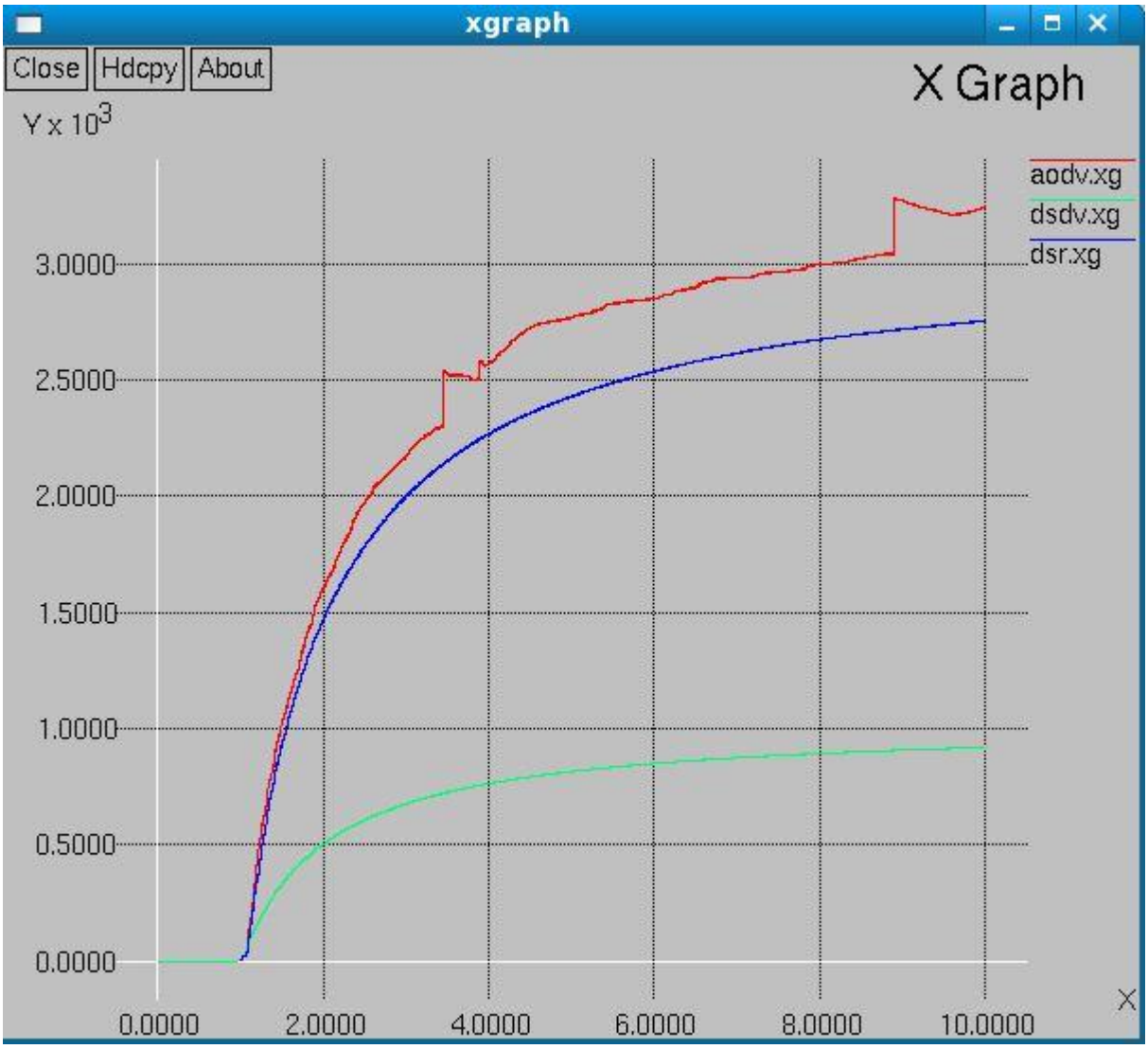

Figure 1: Throughput Vs Simulation Time

Figure 1show the simulation time versus throughput and from the figure 1 it has been observed that AODV outperforms DSR and DSDV in throughput. The AODV has the highest value in case of throughput. Secondly DSR outperforms DSDV in case of throughput.

Packet Delivery Ratio

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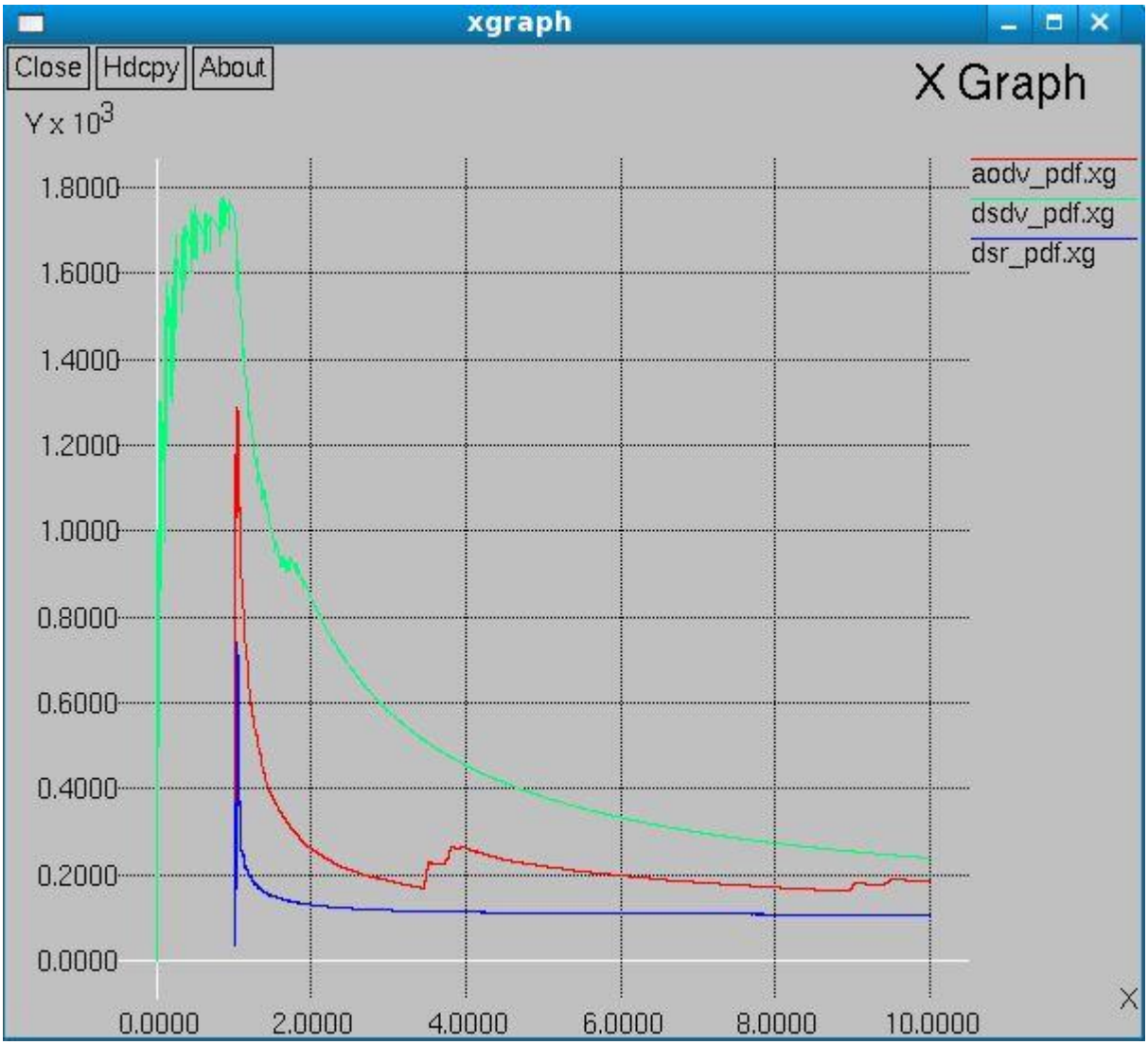

Figure 2: Packet Delivery Ratio Vs Simulation Time

Figure 2 shows the simulation time versus packet delivery ratio and from the figure 2 it has been observed that DSDV outperforms AODV and DSR in PDR. The DSDV has the highest value in case of PDR. Secondly AODV outperforms DSR in case of PDR. DSR has the lowest PDR as expected from the simulation.

Number of Packet Dropped

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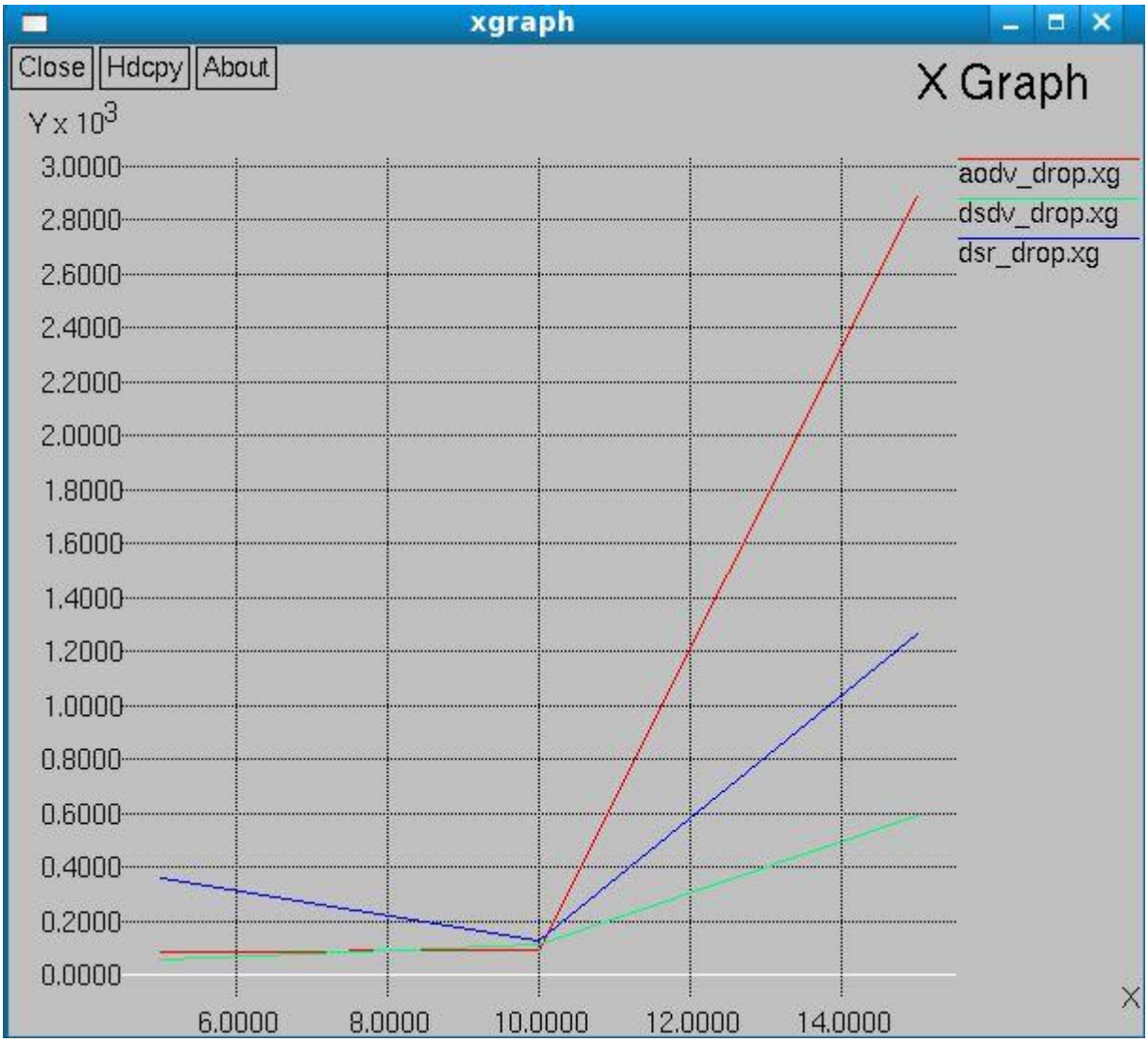

Figure 3: Number of Dropped Packets Vs Simulation Time

Figure 3 shows the simulation time versus Number of dropped packets and from the figure 3 it has been observed that AODV outperforms DSR and DSDV in number of dropped packets. The DSDV has the lowest value in case of number of dropped packets. Secondly DSR outperforms DSDV in case of number of dropped packets. AODV has the maximum number of dropped packets.

5. CONCLUSION

In this paper we have equated three routing procedures AODV, DSR and DSDV. The simulations have been implemented and it has been determined from results that the different protocol behavesdistinctly. The DSDV shows best network performance in two parameters. On the other hand DSR shows better performance than AODV. NS 2.33 simulator has been used for

evaluation of three protocols and for comparing them. In future we can compare the more routing protocol with more parameters.

REFERENCES

[1] Radha, S., &Shanmugavel, S. (2007). Mobility models in mobile ad hoc network. IETE journal of research, 53(1), 3-12.
[2] Boukhalkhal A, Yagoubi M.B., Djoudi D, Ouinten Y and Benmohammed M, "Simulation of Mobile Adhoc Routing Strategies" , IEEE, 2008, pp.128-132.
[3] Jayakumar, G., &Ganapathi, G. (2008). Reference point group mobility and random waypoint models in performance evaluation of MANET routing protocols.Journal of Computer Systems, Networks, and Communications, 2008, 13.
[4] Kumar MK, Rajesh RS. Performance analysis of MANET routing protocols in different mobility models. Int J ComputSciNetwSecur 2009;9(2).
[5] Rahman A, Islam S, Talevski A. Performance measurement of various routing protocols in ad-hoc network. In: Proceedings of the international multiconference of engineers and computer scientists, vol. 1. Hong Kong: IMECS; 2009.
[6] Tuteja A, Gujral A, Thalia A, "Comparative Performance Analysis of DSDV, AODV and DSR Routing Protocols in MANET using NS2", IEEE Comp. Society, 2010, pp. 330-333.
[7] Tyagi SS, Chauhan RK. Performance analysis of proactive and reactive routing protocols for ad hoc networks.Int J ComputAppl 2010;1(14).
[8] Radwan AAA, Mahmoud TM, Houssein EH. Performance measurement of some mobile ad hoc network routing protocols.Int J ComputSci Issues (IJCSI) 2011;8(1).
[9] Aung, C. Y., Seet, B. C., Zhang, M., Xie, L. F., & Chong, P. H. J. (2015). A review of group mobility models for mobile ad hoc networks. Wireless Personal Communications, 85(3), 1317-1331.
[10] Rangaraj, J., &Anitha, M. (2017, February). Performance analysis of proactive and reactive protocol under different mobility models for MANET. In 2017 International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC) (pp. 637-643). IEEE.
[11] Sarkar, S., &Datta, R. (2017). An adaptive protocol for stable and energy-aware routing in MANETs.IETE Technical Review, 34(4), 353-365.
[12] SureshbhaiThakorHirenkumar, MahajanMakul and RaiMritunjay Kumar An investigational analysis of DSDV, AODV and DSR routing protocols in Mobile Adhoc Networks [Conference] // International Conference on Intelligent Circuits and Systems. - Phagwara : IEEE, 2018. - pp. 281-285.
[13] Ziani, H., Enneya, N., Chentoufi, J. A., &Laassiri, J. (2020). Mobility Condition to Study Performance of MANET Routing Protocols.In Emerging Technologies for Connected Internet of Vehicles and Intelligent Transportation System Networks (pp. 73-82).Springer, Cham.

