



Comparative Study of Routing Protocol for QoS in MANETs

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Abstract:-

Mobile Ad-hoc Network (MANETs) are group of wireless nodes, Each node can move freely and randomly in the network which is self configuring network where the nodes convey along each and every one without established framework or centralized control . At any time it can dynamically connect with network and leave the network .Due to lack of central coordination it undergoes topological changes and routing in MANET is a over analytical task .To set up proper and capable route b/w a pair regarding mobile nodes is the first target about MANET routing protocol. So that messages delivered within the active route timeout interval.In this paper,we focused on the concept of fundamentally (proactive) table-driven, (reactive) on-demand and (hybrid) RP(routing protocol), as well as their comparison, as well as the literature review based on the QoS analysis. The survey included a comprehensive review of relevant work in the field of RP(routing protocol) in Mobile Ad-hoc Network and the key challenges of RP(routing protocol).

Keywords: MANETS routing protocol, comparison of routing protocol.challenges of RP(routing protocol). challenges

I. INTRODUCTION

In the expansion regarding Wireless network ,Mobile Ad-hoc Network live a appropriate powerful range.Bygone the pastries the popularity regarding Wireless ad-hoc network and mobile devices transform provoking and crucial field.A cellular(mobile) ad-hoc network (MANET) is a autonomous , base less ,wireless connection network appropriate to node (mobile devices , PC etc.) In ad hoc networks, whenever a node (source node) precedes a packet of data to a node (destination node), routing is mandatory and causes problems in ad-hoc networks because of its movable behavior.The connection between node should be done via more than one intermediate node when two host systems aren't belong to the transmission orbit.we can't predict that there will be any jealous node between any two path of nodes in n/w system because of it's property says - anytime it can join the network or leave the network. So There are numerous of issues that affect the prominence in regard to Ad-hoc networks along with boundary their impulse for different sketch.Due to insufficiency in regard to

centralize framework several specific node within MANET necessary thing as a router and is several disadvantages of the wired connection links.

MANETs possess the few characteristic like the Bandwidth-constrained, Energy-constrained Operation, Variable capacity links, Frequent routing updates etc. And certain quality of service parameter by which map the performance matrix of RP. The rest in regard to the paper coordinated as follows -

Region II discussed the routing and classification of routing protocol .Region III have literature survey.in Region IV have Related work.Region V have issue & challenges and last section states the conclusion of the work.

II. ROUTING AND CLASSIFICATION OF ROUTING PROTOCOL

through a source (node) to a destination (node),the transmission of information or packets is an action called routing. Since the revolution of the Ad-Hoc network and its topology are increasingly frequent,makes packet routing becomes a challenge task .The flow of data in networks governments by routing protocol and to reach the destination also decides the well-organized path.

Topology established RP are essentially split into three categories...

1) Table driven or (Proactive RP)

2) On demand or (Reactive RP)

3)Hybrid RP

1) **Proactive RP:** The routing table for proactive routing protocol in the network has to continuously maintain by each node and from each node to every other node keep up-to date routing information of the tables is based on latest view of the network. Packets are only transmitted to known routers and the reason of this, proactive protocol reduces traffic overload infrequently proactive routing protocol called as table- driven RP.The table are consecutive updating with variation in topology,because of this it is unacceptable for high mobile networks. this tends in increasing the packet overhead which lower the network performance Some of the example of proactive RP are DSDV(Destination Sequenced Distance Vector) , OLSR (Optimized Link State Routing Protocol). WRP (Wireless Routing Protocol),GSR(Global state Routing.), HSR(hierarchical source Routing),

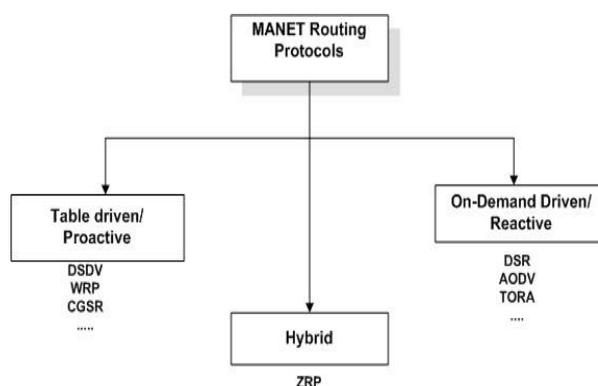


Figure1. RP classification

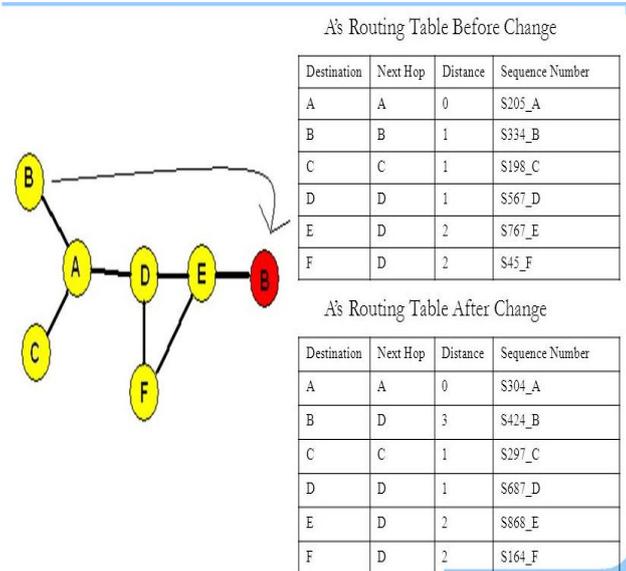


Figure2. DSDV Routing Table ex.

2) **Reactive Routing Protocol:** In Reactive protocol, paths are created as required by the source node. An important advantage is that it requires less routing information than the proactive routing protocol. It calls the path detection mechanism when communication takes place from the source to the destination. The rest of the itinerary is justifiable until the node (destination node) is reached or until the route is no longer required. On the network, route discovery occurs by invading the routing request packet. In the flood process, interrogating network overhead for paths is more common. Some of the existing examples of reactive protocol are: on-demand ad-hoc RP (AODV), dynamic source RP (DSR), and localized RP (LAR), temporarily controlled routing algorithm (TORA).

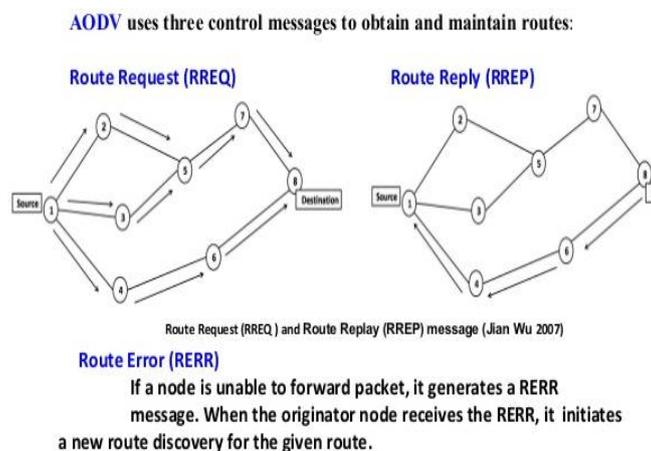


Figure 3. AODV Routing Table ex

3) **Hybrid Routing Protocol:** The Hybrid protocol is the combination of optimal features of both proactive RP and reactive RP . As the name indicate, to make route discovery and maintenance more reliable the nodes are split into different zones.They have higher latency with comparison to proactive RP. Some examples of Hybrid routing are Zone Routing Protocol (ZRP), Zone Based Hierarchical Link State (ZHLS). Inter-zone routing protocol (IERP) and Intra-zone routing protocol (IARP) is two routing schemes used by (ZRP).ZRP divide the network into zones. The Hybrid routing is an appropriate way for routing in large networks. Figure 4 shows the classification of hybrid RP in MANET.

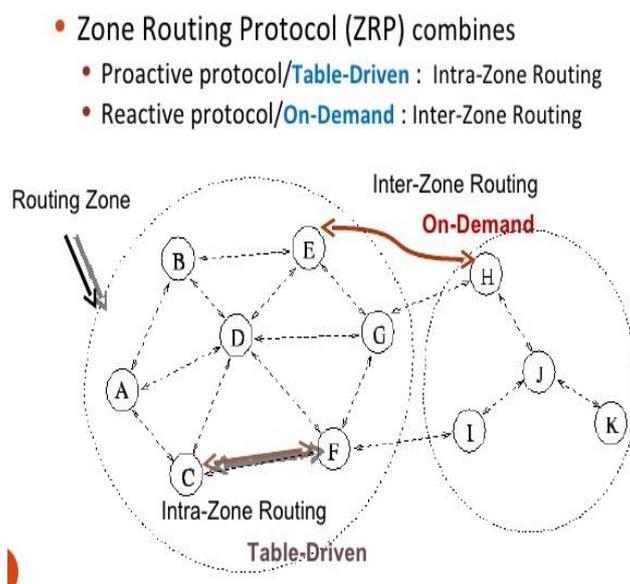


Figure 4. ZRP Routing Protocol

III. LITERATURE SURVEY

In This literature survey considering the current observation ,the survey enclosed a comprehensive inspection of related work in the field about RP in MANETs.In given table included Research Papers and in which they work what RP used,what variables used,what used for performance matrices of each reach paper. The investigation was formed considering TCP-based traffic patterns.The achievement quality were evaluated about the basis in regard to QoS (quality of service) parameter i.e. Packet Delivery Ratio ,Control Overhead ,Throughput End-to-end Delay, Packet jitter etc. along a modification in regard to nodes density and mobility. The results were gathered using the NS-2 simulator .



Sr. No.	Research Paper	Authors Name	Routing Protocol	Performance Matrices	Variable parameter
1	“Performance Evaluation of optimal routing Protocol for Ad-hoc wireless Network”.(2017)	B.Manas et al.	SPR MAODV PDMR	Throughput,PDR, EtoE delay,Energy Consumed,Overhead ratio	Speed , No. of node
2	“Unicast RP to Reduce Electric Energy Consumption in Wireless Ad-hoc Networks”.(2018)	Emi Ogawa et al	IEAO, EAO, LEO, AODV	Electrical energy ratio of each node, Total EE ratio of S→D route,No. of node in a S→D.	Communication range maxd
3	“Performance evaluation & comparison of routing Protocol in MANET”.(2013)	Khanvilkar & Patil	AODV DSR DSDV	Throughput, Overhead, Delay ratio.	Mobility Pause time
4	“A survey on Proactive RP in MANET”.(2014)	Shenbaga priya R, N.Kumar	LPSR,PSR, DSDV,WRP CGSR,GSR OLSR,FSR	EtoE delay,Packet jitter,PDR, Throughput, Overhead	Node Density
5	“Various Packet Size on different MANET RP”.(2013)	Rajasekar et al.	AODV,DSR ZRP	Average jitter , EtoEdelay, Throughput	Mobility , Pause time
6	“Mobility Based Routing Protocol with MAC Collision Improvement in WANET”.(2018)	Zhihao Ding et al.	The Proposed, GPSR	Broken Link, Packet Delivery rate,Average Delay	No. Of vehicles
7	“Performance comparison of DSDV and AODV routing Protocol in MANET”.(2012)	Kumar et al.	AODV DSDV	Packet delivery ratio,Delay	Speed
8	“Resurch on DSDV routing Protocol Based on Wireless Mess Network”.(2018)	Ying Fengjie et al.	MZRP,ZRP DC-DSDV	N/W delay time Avg. Routing overhead, Broadcast packet	No. Of Node
9	Performance Comparison of Ad-hoc Network Routing Protocol using NS2.(2012)	Tonk Kashyap and Tyagi	AODV DSR DSDV	Packet Delivery Fraction,normalize-d routing load, Avg. EtoE delay	Max. Speed No. Of nodes Pause time
10	“A comparative QoS Survey of Mobile Ad-hoc Network RP”.(2018)	Iftikhar Ahmad et al.	AODV DSDV ZRP	PDR,Delay,Data packet received,control packet,NRL	Simulation time,Node Density

Table 1: Literature review



IV. RELATED WORK

Ahmad, Iftikhar et al. In his paper give detailed QoS comparison in regard to reactive (AODV), proactive (DSDV), and hybrid (ZRP) RP about MANET as in orderly to catch which routing protocol works chief in a individual network scenario. The investigation was formed considering TCP-based traffic patterns. According to Ahmad and Iftikhar et al notice that DSDV works better than AODV and ZRP in performance metrics when node density and mobility are kept and when node density and mobility are higher, AODV works effectively. The performance about ZRP depends largely at the zone orbits; by setting the zone radius according to the network density [1][2][3]. Bendale et al. In his paper is discussing the three concept about RP such as Reactive (On demand) Proactive (table driven) and Hybrid RP within their advantage and disadvantage In this paper has discussed the categorization of RP and done comparative investigation as wireless ad hoc networks RP. Each protocol has their own advantages and disadvantages. DSDV has low end-to-end

delay compared to other protocols. When the network load is the low, AODV behave superior in case about packet delivery

ratio but it behave weakly in regard to average End-to-End delay and throughput. Overall, DSR [4][5][6]. Lawrence E.

Edwin et al In his paper analyze and evaluate the performance of the four MANET RP such as ,DSR,AODV, DSDV and ZRP was analyzed using NS-2 Simulator. According to Lawrence E. Edwin et al. DSR has the best behave in regard to speed and mobility for small scale networks. DSR loses its performance whereas the network size is expanded. AODV showed consistent outcome regardless of load, speed and network mobility. DSDV is relevant for limited number about nodes with low mobility and speed by reason of storage about routing information in the routing table at each node. ZRP is hybrid nature and comparable performance in average end-to-end delay and average throughput; but it is the worst performance in packet delivery ratio[6][7]. Thakker et al. In

his article, he examined the many existing protocols and tried to select the procedure that they best limited to ensure reliable and efficient communication between two nodes of a network. According to Thakker et al. every routing protocol has unique characteristics. The prime aspect that distinguishes protocols is that their style of selecting paths for all source-destination pairs. Therefore, after the study, they conclude that the MSR protocol provides the optimal solution for the efficient and reliable operation and use of MANET.[9]. Upendra Sharan Gupta et al. In his paper have done extensive investigation on AODV, DSDV and also DSR routing protocol And simulated the protocols in broadly two script, shifting number in regard to nodes and shifting queue length. According to Upendra Sharan Gupta et al. DSDV presented the least amount of packet loss and delay and high throughput. These salient features of DSDV can be attributed to its quality of maintaining routing tables. AODV also yielded high throughputs in some scenarios. Though DSR didn't perform better than DSDV, an advantage of DSR was that it gave consistent results in different scenarios[8]. According to Khairnar et. al. in his paper, AODV shows the best performance thanks to its ability to maintain transmission through the periodic



communication of information needed by the TCP network. AODV acts as a chief in the case of package delivery rates and GPSR surpasses others in the event of a charge. With variable pause times, the GPSR surpasses others in case of failures and throughput of the package, but overall the AODV, exceeds the GPSR and the DSR because, in an advanced mobility scenario, the topology changes continuously and AODV can adapt to the changes. At the higher node mobility, the AODV is the worst in case of packet and throughput loss, but offers the optimal packet delivery ratio, the GPSR is the optimal of the AODV for greater mobility of the end nodes and throughput, but DSR works best in case of packet loss.[12].Manasa, B and. al. In his article, it is to evaluate and compare with MAODV and SPR using QOS. PDMRP throughput is 22% better than MAODV and SPR by compensating the number of nodes, the PDMRP package transmission ratio increases by 18.81% compared to the SPR and by 1.8% compared to the MAODV by shifting the speed of the node. The end-to-end PDMRP delay is reduced by 88% compared to SPR by shifting the speed of the nodes. Energy Consumed for PDMRP is reduced by 16.6% in comparison to SPR enhanced by shifting number of connections. PDMRP action is good in terms of throughput, packet delivery ratio and end to end delay so it is right for real-time, non real-time and multimedia applications. The energy consumed by the PDMRP is much lower than the SPR, which growth the service life of the network. But the end-to-end delay for PDMRP is increased compared to the MAODV by moving the nodes and the exhausted energy is more compared to the MAODV by varying the nodes, the speed and the number of connections.[10][11].Senga et. al. in his study, they evaluated performance against protocols based on the ad-hoc distance vector on demand (AODV) and the destination distance distance vector (DSDV) according to various performance criteria. According to Senga et. Al if the number of nodes increases in the communication, the throughput is reduced. AODV throughput is finer than DSDV because of his consistent performance. AODV has minimal routing overhead and DSDV has maximal routing overhead. and AODV supply higher packet delivery ratio and DSDV supply lower packet delivery ratio. In the scenario studied, it is found that the overall performance with respect to the ODV is better than that of DSDV.[14].Ray et. al. In his article, they compared the performance of three more well-known RP to the ad-hoc mobile network, such as AODV, DSR, and ZRP. The performance of these RP is studied based on a given set of parameters and compares the packet delivery ratio, the average end to end delay, the packet jitter and the energy consumption activity of AODV, DSR. and ZRP. DSR. it is strictly reactive in nature and its path identification is very efficient for which its flow rate is higher than that of its main counterpart AODV. However, the DSR is experiencing problems that can be dispose. Energy consumption compared to AODV is higher than that of the DSR and ZRP for which it is considered the most energy efficient protocol. ZRP provides very low throughput, but routing overloads are low.[15].Kumar et. al. In paper (Performance Analysis of Routing Protocol in MANETs) work performance analysis of AODV, OLSR, DSR, and TORA ad hoc RP using OPNET technology. according to kumar there are no single protocols with overall tops performance among the considered protocols. one can be primary in terms of routing overload while others in terms of delivery speed, end-to-end, delay and packet throughput. Therefore, the choice of a particular routing protocol will depend on the intended use of the network. In this search, the factor considered that influences the performance against the ad hoc protocols is the



load and the speed of the network. this only affects performance in some cases, while network load has a profound effect on performance. Finally, if a routing protocol is proactive or reactive, it has a profound effect on the performance of the protocol in various scenarios [13].

V. ISSUE & CHALLENGES

A) **End-to-end delay:** Due to the greater distance between two adjacent nodes in the route, the route of the shorter route reduces delays but can increase energy consumption. since the transmission power is proportional to a little power compared to the distance considered in the previous section. Increased delay also means more packets in the system, which could be a problem in terms of network capacity.

B) **Packet loss rate:** Low level transmission power reduces power consumption, but the reasons of lower signal power it can increase packet loss rates. As the packet loss rate increases, this results in packet re-transmission, further it increasing the total number of packets in the system..

C) **Network capacity:** The low transmission power further decreases the transmission node interval, which may result in a decrease in the number of connections to neighboring nodes. Reducing the capacity of network traffic could also reduce the number of links per node; worse, it can even disrupt network connectivity and leave the network on a disjointed sub-net.

D) **Relaying overhead:** Routing in MANET results in multi-hop transmissions because the low transmission power of the nodes requires larger intermediate nodes from the source to the destination. Multi-hop routing adds a transfer overhead to each node in the routing path because each node in the path must accept the physical layer's packet, calculate the next hop, and re-transmit it over the network stack. hop, in some cases, absorbs less energy than that used for routing in a single hop.

E) **Interference:** A high power transmission causes more and more interference with neighboring nodes. Interference always leads to an irrelevant energy consumption in adjacent nodes because they must receive the signal even when the signal is not intended for them. Higher interference could cause further collisions, further increasing energy consumption.

F) **Battery life:** When transmitting the minimum transmitted power, many other nodes for the routing packages may use the same route. When this continues for a period of time, the battery load of the nodes on the routing path becomes depleted, which reduces the network lifetime.

Connectivity: The standby mode reduces the energy consumption by an order of magnitude. But when multiple nodes go into sleep mode to save energy, without coordination, this can disrupt network connectivity.



VII. COMPARISON OF ROUTING PROTOCOL

Table 2.comparison regarding various routing protocol.

. Parameters	Reactive Routing	Proactive Routing	Hybrid Routing
Storage Size	Low . It depend on the No. Of routes	By reason of routing table it is high	Depend on the capacity of reason
Routing scheme	On-demand	Table Driven	Both
Delay Level	Higher than proactive	Small routes are pre determined	Small for local destinations Large as reactive protocols for inter-zone
Network Organization	Flat	Hierarchical/flat	Hierarchical
Availability of routing info.	Accessible when needed	Always accessible.stored in table	Combination regarding both
Mobility support	Route Maintenance	Periodic Updates	Combination regarding both
Communication Overhead	Low	High	Medium
Periodical Updates	route available on demand.So No Needed	whenever the topology of the n/w changes.then needed.	inside the zone needed
Scalability Level	Up-to few hundred nodes. Not suitable for large n/w.	Low ; Above hundred nodes	constructed for large networks. above thousand or more nodes.
Response time	by reason of flooding , It is High	by reason of routing table , it is low	Low Inside zone; Outside related as reactive protocol

VIII. Conclusion

The account regarding fundamental issues,challenges and analyze primary research problem upon MANET have provided in this paper. A workout has been done in this paper toward prime focus on relative study and various routing protocol primarily reactive,hybrid and proactive.It,s notice that DSDV efforts best in opposition to AODV and ZRP in almost about the performance metrics according to literature survey,when the node density and mobility observed low.Since,AODV efforts superior when the node density and mobility are higher. The achievement in regard to ZRP depends mostly on the zone region. b/w nodes we can make systematic conversation through setting the zone radius accordant to the network density.Task can act supplementary enlarged by fetching safety into information in near future. to provide. secure routing strategy and superior energy aware for MANET is the initial desire about RP (routing protocol).

References

- 1) Ahmad, Iftikhar, Uzma Ashraf, and Abdul Ghafoor. "A comparative QoS survey of mobile ad hoc network RP." *Journal of the Chinese institute of engineers* 39, no. 5 (2016): 585-592.
- 2) A. Bakshi, A. K. Sharma, A. Mishra, "Significance of Mobile AD-HOC Networks (MANETs)", IJITEE, Vol 2, March 2013.



- 3) Manish Sharma and Gurpadam Singh PERFORMANCE EVALUATION AODV, DYMO, OLSR AND ZRPAD HOC ROUTING PROTOCOL FOR IEEE 802.11 MAC AND 802.11
- 4) Bendale, Lubdha M., Roshani L. Jain, and Gayatri D. Patil. "Study of Various RP in Mobile Ad-Hoc Networks." *International Journal of Scientific Research in Network Security and Communication* 6, no.01 (2018): 1-5
- 5) Mahajan, Poonam M., "Mobile Ad Hoc Networks: An Overview". *International Journal of Computer Trends and Technology (IJCTT)* V48(3):123-127, June 2017. ISSN:2231-2803. www.ijcttjournal.org. Published by Seventh Sense Research Group.
- 6) Lawrence E. Edwin, Latha Dr.R., "A Comparative Study of RP for Mobile Ad-Hoc Networks" *International Journal of Computer Science and Mobile Computing*, Vol.3 Issue.11, November- 2014.
- 7) Safdar, Muhammad, Izaz Ahmad Khan, Farman Ullah, Fazlullah Khan, and Syed Roohullah Jan. "Comparative Study of RP in Mobile Adhoc Networks." *International Journal of Computer Science Trends and Technology*, ISSN(2016): 2347-8578.
- 8) Upendra Sharan Gupta, Arunesh Soni, TanayPahare"Performance Evaluation of RP on Manet", *International Journal of Engineering Trends and Technology (IJETT)*, V31(3),153-158 January 2016.
- 9) Thakker, Veeral M., G. Manisha Reddy, K. Vinay Kumar, and Diana Moses. "Choosing optimal routing protocol by comparing different multipath RP in mobile Adhoc networks." In *2018 2nd International Conference on Inventive Systems and Control (ICISC)*, pp. 1284-1290. IEEE, 2018.
- 10) Manasa, B., M. Rajesh, and Sreenivasa Rao. "Performance evolution of optimal RP for Ad-Hoc wireless networks." In *2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI)*, pp. 1221-1226. IEEE, 2017.
- 11) M. Rajesh, B.L. Raju, B.N Bhandari, "QoS based data dissemination in wireless networks", *IJEECS*, vol. 6, no. 7, July 2017, ISSN 2348-117X
- 12) Khairnar, Mrs, D. Vaishali, and Dr Kotecha. "Simulation-based performance evaluation of RP in vehicular ad-hoc network." *arXiv preprint arXiv:1311.1378* (2013).
- 13) Kumar, Manoj, and Devendra Singh. "Performance Analysis of Routing Protocol in MANETs." *International Journal of Computer Science and Mobile Computing*, 1 8 (2013).
- 14) Sengar, Er Abhishek, and Er Sandeep Shrivastav. "Performance Evaluation of AODV and DSDV RP for Ad-hoc Networks." *Global Journal of Computer Science and Technology Network, Web & Security* 12, no. 16 (2012).
- 15) Ray, Niranjana Kumar, and Ashok Kumar Turuk. "Performance evaluation of different wireless ad hoc RP." *International Journal of Wireless & Mobile Networks (IJWMN)* Vol. 4, No. 2, April 2012
- 16) Ogawa, Emi, Shigenari Nakamura, Tomoya Enokido, and Makoto Takizawa. "Unicast RP to reduce electric energy consumption in wireless ad-hoc networks." In *2018 32nd International Conference on Advanced Information Networking and Applications Workshops (WAINA)*, pp. 533-538. IEEE, 2018.
- 17) Shenbagapriya, R., and N. Kumar. "A survey on proactive RP in MANETs." In *Science Engineering and Management Research (ICSEMR), 2014 International Conference on*, pp. 1-7. IEEE, 2014.



- 18) Rajasekar, K., C. Kamalanathan, and S. Valarmathy. "Various packet size on different MANET RP." *International Journal of Engineering Trends and Technology* 4, no. 4 (2013): 528-532.
- 19) Ding, Zhihao, Pinyi Ren, and Qinghe Du. "Mobility Based Routing Protocol with MAC Collision Improvement in Vehicular Ad Hoc Networks." *arXiv preprint arXiv:1801.06502* (2018).
- 20) Meenakshi Yadav, and Nisha Uparosiya. "Survey on MANET: RP, advantages, problems and security." *International Journal of Innovative Computer Science & Engineering* 1, no. 2 (2014): 12-17.
- 21) Parsinia, Moein, et al. "Bidirectional AOMDV Routing Protocol for Full-Duplex Ad-Hoc Networks." *2018 IEEE International Conference on Communicationsworkshops (ICCworkshops)*. IEEE, 2018.
- 22) Z. Zhang, K. Long, A. V. Vasilakos, L. Hanzo, "Full-Duplex Wireless Communications: Challenges Solutions and Future Research Directions", *Proc. IEEE*, vol. 104, pp. 1369-1409, July 2016