Nat. Volatiles & Essent. Oils, 2021; 8(6): 3583-3594

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An Estimation Of Qos Of Manet Signals With Packet Loss Situation

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Abstract

The effort to reduce the wireless congestion by means of any given network technology, regardless of implementation, cannot provide such benefits to the users experiencing packet loss, since service is always poor in that context. We have accepted the fact that mobility of the nodes is the most challenging part in MANET. Packets take different paths on the network and often experience random delays. With the congestion of the network, every packet will deteriorate the Quality of Service (QoS).In MANET, when protocols work with inconsistent or flexible nodes, there is more chances of packet loss. Therefore, analysis of QoS has been estimated in this paper during the communication process. In this context, the node-to-node paired base station transmission measurements were utilized to estimate cell traffic expansions. Moreover, if we make any changes to the network, it will affect the signal receiving capabilities, therefore, the precise model proposed by Steele and Nofal have been used to evaluate the MANET situation. Additionally, during our research, it has been discovered that various QoS parameters provide different results when applied to each communication round. Hence, numerous QoS parameter have been used together and measured the quality of the MANET network on the basis of energy dissipation on varying the distance parameters. The NS2 Simulator have been used to analysis and execute the proposed model.

Keyword: MANET, Power Estimation, Energy Constraints, Network Simulator 2.

1 Introduction

MANET is a large and self-administered wireless adhoc network that contains ambulant nodes, which doesn't depends on base station to constitute a Transmission. The cellular concept builds a mobile network in a way in which the entire geographic region is divided into several small region called cells. Many low-power transmitters are scattered throughout the coverage area begins through cell boundaries or degrades the strength of the signal on the current channel. Wireless sensor networks are emerging monitoring methodologies. A WSN is constituted of many small, economical and energy-efficient devices which are called Sensor nodes. An enormous number of nodes are expanded and setup in the network environment to prefect the physical process. Wireless sensor network is distinct in compare to traditional wireless networks considering their specific nature, limited resources i.e. power, memory and processing capacity. It is observed that End-to-End communication are not used by these network. Here, the nodes are communicating to the neighbouring nodes only. In WSN, network topology may change due to link failure and node failure. Self-organization and optimization has become a requisite part of MANET operation. QoS imply to the preparedness of a network to bestow improved service to chosen network traffic over copious prime technologies. It is very significant to decree the QoS network which is principally depending upon the network. In MANET, various parameters are used to enhance the QoS of network such as, Packet Delivery Ratio,

Throughput, End to End delay. These parameters can be improved by amending the algorithms and mechanisms. In actual, QoS is further very difficult to assure in adhoc network than in most other types of networks. It can be achieved using Over-Provisioning and Traffic Engineering. But, still there is no well founded mechanism to provide QoS. Therefore, the Researchers and developers are keenly motivated to improve the efficiency and robustness of routing protocol to satisfy the QoS demands.

The rest of the paper is organized as follows: Section 2 provides a brief overview of some of the related works and the motivation of this research. Section 3 explains the proposed methodology. Section 4 deals with the experimental findings and analysis of the proposed work. Finally, Section 5 and section6 sets out the results and discussion, and conclusion and potential scope of the work, respectively.

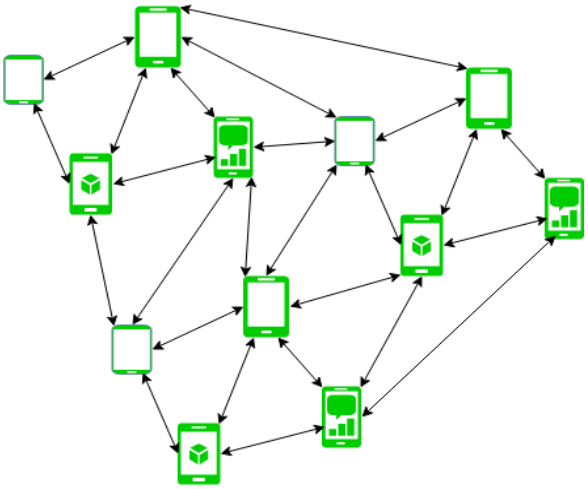


Fig1: MANET Configuration

2 Related Work

In 2003, Pham & Perreau [1] analyzed and compare the single path and multi path routing using the Load balance mechanism in Adhoc network. They come to a conclusion that Multi-path routing mechanism creates more overheads but it provides better performance in congestion as compare to single path routing mechanism. In 2008, Alazzawi & Elkateeb [2], determine din developing of an efficient routing protocol for the Wireless Sensor Network (WSN), scalability is an essential consideration. They have simulated the wireless sensor network routing protocols and their efficiency have also been estimated to assess their capacity to help the scalability of the network. In the year 2010, Zahariadis et al.[3] analysed the confidence models by an attempt to investigate the relationship among criteria for implementation, consumption of capital, and protection achieved. In terms of network capacities, accessible nodes and device characteristics, their purpose was to build a deployable trust model designs. In 2010, Li et al. [4] explored and suggested a scheme to identify different pathways such that the reinforced nodes respond passively to numerous reinforcement signals. To evaluate the performance, they have used the NS-2 simulator with MDC (Multiple Description Coding) created video tracing. The major conclusion of their work indicates that their proposed algorithm provides improved resolution and delay performance, i.e., higher video quality, with low power and energy usage than normal guided broadcasting along a single path z. In 2014,Sahin et al.[5] discusses the usage

of Single-path and multi-path routing algorithms to perceived quality of service (QoS) under harsh Smart Grid (SG) environmental conditions to assess their services variation capacity for reliability and timeliness domains. This research is a significant move in the creation of novel routing protocols explicitly developed for smart grid environments. In 2015, Kim [6] has proposed a hierarchical bandwidth allocation scheme which is based on the trust-based mechanism of VCG-Kelly. In 2016, Kumari & Nand [7] examined the performance of WSN and WBAN in the same network and also in different network considering different parameters i.e PDR(Packet Delivery Ratio), Latency, Throughput etc. Their research implies, to operate well on WBAN, wireless routing protocols must be update to make it suitable for WBAN. In 2016, Satav & Jawandhiya [8]made an analysis on the single/multiple lane routing algorithms, their benefits, and shortcomings. Researchers were entice to rectify, improve and develop complex routing algorithms that satisfy MANET user's suitability requirements. The need for a comprehensive routing protocol with protection and energy consumption has been illustrated in there scheme. In 2016, Rahat et al. [9] in his article tried to identify the paths that estimate the optimal compromise between service existence and network power, and they have proposed, multi-target evolutionary algorithms. A new network intensity metric,the fragility have been added. To solve the combined optimization dilemma, a multi-target evolutionary algorithm has used to pick the routes and traffic distributions that provide the optimal compromise between age and network power. By pruning the search space using k-shortest paths, braided paths and edge disjoint paths the higher efficiency has been achieved. The method has been demonstrated in synthetic networks and a real network deployed at the Victoria and Albert Musuem, London. In the year 2016,Reddy & Satyanarayana[10] suggested a method known as MANET Effective and Secure Multipath routing with congestion detection to solve loss of data packets problem and occurrence of congestion issue. As bandwidth and latency are taken into consideration while routing, this method is an expansion of the previous work. In 2016, Ibrar et al. [11]also analyzed the performance of M-DART(Multipath Dynamic Address Routing)on group of mobility models with the help of different experiments on different networks. The results of their analysis show that M-DART has better performance under group based mobility models than entity based mobility models. Again, in 2016, Atole and Deshpande [12]has analyzed the performance of QoS parameters of WSN by varying the density of network using NSG (ns2 Scenerio Generator)tool. With the help of simulation they have discovered that for constant reporting rate and packet size, 50 nodes scenario gives optimum results. In 2017, Padyal & Kadam[13] developed an Opportunistic based neighbour coverage routing algorithm. When compared to the existing routing protocol, the proposed protocol was performed better because it reduces power consumption and improves network performance. In 2017, Kulkarni & Yuvaraja[14] have proposed a Trust value updation algorithm for cluster head. The proposed algorithm compared to previous algorithm to mitigate the energy consumption and reduced delay. Further, in 2017, Kundu & Pradhan [15]flourished a WAMS (Wide area monitoring system) data based method to identify a transmission line faults for data unavailability of critical buses. The outcome, manifest the ability of the algorithm to detect faulted line in the network even with data loss from selected buses and simultaneous faults. The approach was also capable of distinguishing faults from power swing and load encroachment conditions. In 2018, Zebbane & Chenait [16] discussed that in wireless sensor networks, sensor nodes dissipate energy as the data is detected, processed, sent or received to achieve the result require. The measurements showed that for the key activities, the sensing node spends most of the energy on the data connection. Since the life of a sensor depends greatly on the amount of power in its battery, consumption must be well controlled to increase its life after deployment. At the year 2018, Saravanan et al. [20]formulated a solution that navigates through the fundamental issues in optimization with the aid of global indexing model prevailed by trust propagation model which maintain the network security in terms of using direct neighbour evaluation and preference neighbour selection. In 2019,Khan et al. [21] acquired a new and systematic approach to estimate confidence for Large –Scale WSN that uses clustering to enhanced communication,

efficiency and protection by detecting low resource malicious sensor nodes. In 2019, Huang et al. [22]proposed a successful multipath routing detection technique to accomplish the goal by incorporating a composite probe based on out- of –delivery. This method outperforms other systems in terms of performance and precision. In the year 2019,Kavitha & Geetha [23] have worked to reduce the cost-effective energy consumption of electricity and to reduce costs even during peak hours of electricity consumption. Their acquired result shows that the proposed protocol provides secure routing as well as reduced the energy consumption and also maintains the load balance. In 2020,Pal et al. [24]developed a technique focused on route duration from origin to destination to spread data packets through several routes and analyzed that the proposed algorithm requires relatively less time for better scheduling through several routes to pass the same number of packets from one source to one destination. In 2020,Ren et al. [25]proposed to anticipate the future chaotic baseband signal which is based on the signal received. The outcome shows that the performance of CBWCS(Chaotic baseband wireless communication system) can improve more significantly in multipath channel than in single path channel. In the year 2020, Menaka et al. [26] evaluated their proposed work which achieved maximum performance in both data handover and network lifetime parameters compared with the current method. Further, in 2020, Maimour [27]have introduced and analysed both active and passive control metrics and illustrate thatit is more suitable for restricted networks like WSN. Hence, it has been identified that the energy efficiency and energy consumption are the main issues of sensor nodes in WSN which have been explored with various other issues by the researchers. But their results obtained are not adequate. Also, Qing-An Zheng and Aggarwal [33] discussed the basic concept of Handoff in mobile cellular radio system . In the meantime, we have also discovered that M.Atole's [12] got the outcome of his scheme but doesn't acquired the structured result. Therefore, in our proposed work we have revised the issue of energy loss using various QoS parameters in different routing protocols by varying the no. of nodes.

2.1 Contribution

As per our knowledge, the wireless sensor network suffers with many obstacles during communication process. Congestion is one of the major issue which occurs when number of sensor nodes increases. During communication between movable nodes the packet drop issue occurs and power energy deteriorate because of the limited battery life. We have found out such kind of issues while reviewing some of the existing work. Therefore, these findings motivate us to work. Our Contributions are as follows:

- In our Contribution, we have tried to improve the QoS parameters for MANET, estimated the packet loss, Analysis of energy dissipation have been done.
- The mathematical model of Steele and Nofal has been utilized to control the traffic which create congestion among the cells in the network and also, it has been used to evaluate handoff situation.
- Network simulator-2 has been utilized to evaluate and validate the proposed scheme.

3 Proposed Work

End users and network providers need to improve and maintain the high quality of service of wireless cellular networks. Improved quality includes improved network coverage, reduced costs and reduced latency. This work mainly focuses on the design, implementation and testing of existing algorithms developed to solve Packet Loss problem in different cellular environments. The main objectives of this research is to estimate the QoS for MANET and estimation of packet loss in MANET. The entire simulation has been performed through Network Simulator 2.0 (i.e. NS2). This research focuses on the key attributes of the communication system (MANET). To set a proper communication for MANET it is necessary to build a proper communication from one node to another and set up

communication through certain mechanism. So, taking care of Packet Loss situation in wireless sensor network, we have estimated the QoS parameters of MANET by varying the no. of nodes keeping a threshold point. Here, we have used the Steele and nofal traffic model which is necessary because it establishes the basic parameter to start the communication. The performance of Packet Loss schemes in a Wireless MANET topology has been evaluated using NS2 simulation tool.

3.1 Need Of Traffic Model

For mobile cellular radio frameworks, before applying the search system, it is important to develop a traffic model. A limited number of traffic models have been established based on diverse hypotheses regarding consumer versatility. This paper eminently implies Steele et al. extension[33] . A Steele and Nofal traffic model have been used to constantly help to determine call drop rate and blocking occurrence, which is useful for doing analyses of handoffs and line blocking. This could reduce the packet drop and improve the QoS. This model depends on several essential variables that are related to the whole communication system. With their assumptions, they showed the arrival rate of Packet Loss, as shown in Eq. (1).

$$\lambda H=\sum_{m=1}^{6} [\ \lambda_o * (1 - B_o) * P_h * \beta + \lambda_h * (1 - P'f) * P_{hh} * \beta\ ] \quad (1)$$

Where,

β= the fraction of Packet Loss calls to the current cell from the adjacent cells
$\lambda h= 3\lambda_o(1 - B_o)P_1\beta$
P_1= the probability that a new call that is not blocked will require atleast one handoff

The average channel holding time T in a cell is in Eq. (2).

$$\overline{T} = \frac{(1+\alpha)(1-\gamma)}{\mu_W} + \frac{\gamma(1+\alpha_2)}{\mu_o+\mu_C} + \frac{\alpha(1-\gamma)+\gamma\alpha_2}{\mu_{d+\mu_c}} \quad (2)$$

Where,

$1/\mu_w$ = the average walking time of a pedestrian from the onset of the call until he reaches the boundary of the cell
$1/\mu_d$= the average delay time a pedestrian spends waiting at the intersection to cross the road
$1/\mu_o$= the average walking time of a pedestrian in the new cell
$\alpha_1 = \mu_w P_{delay}/ (\mu_d - \mu_w)$
$\alpha_2 = \mu_o P_{delay}/ (\mu_d - \mu_o)$
$P_{delay}= P_{cross}P_d$, the proportion of pedestrian leaving the cell by crossing the road
P_d = the probability that a pedestrian would be delayed when he crosses the road
γ = $\lambda H (1 - P'_f) / [\lambda H (1 - P'_f) + \lambda_o(1 - B_o)]$

3.2 Procedure

The flow chart presented in Figure 2 shows that how the NS2 has been executed for the evaluation of proposed model by considering the network parameters. Also the formula for distance between two nodes in a network has been Given i.e.,

D = $\sqrt{(x1 - x2)2 + (y1 - y2)2}$

We have run the simulation for certain period of time to analyse the packet loss in the network. The packet loss could be evaluated using QoS Parameters.

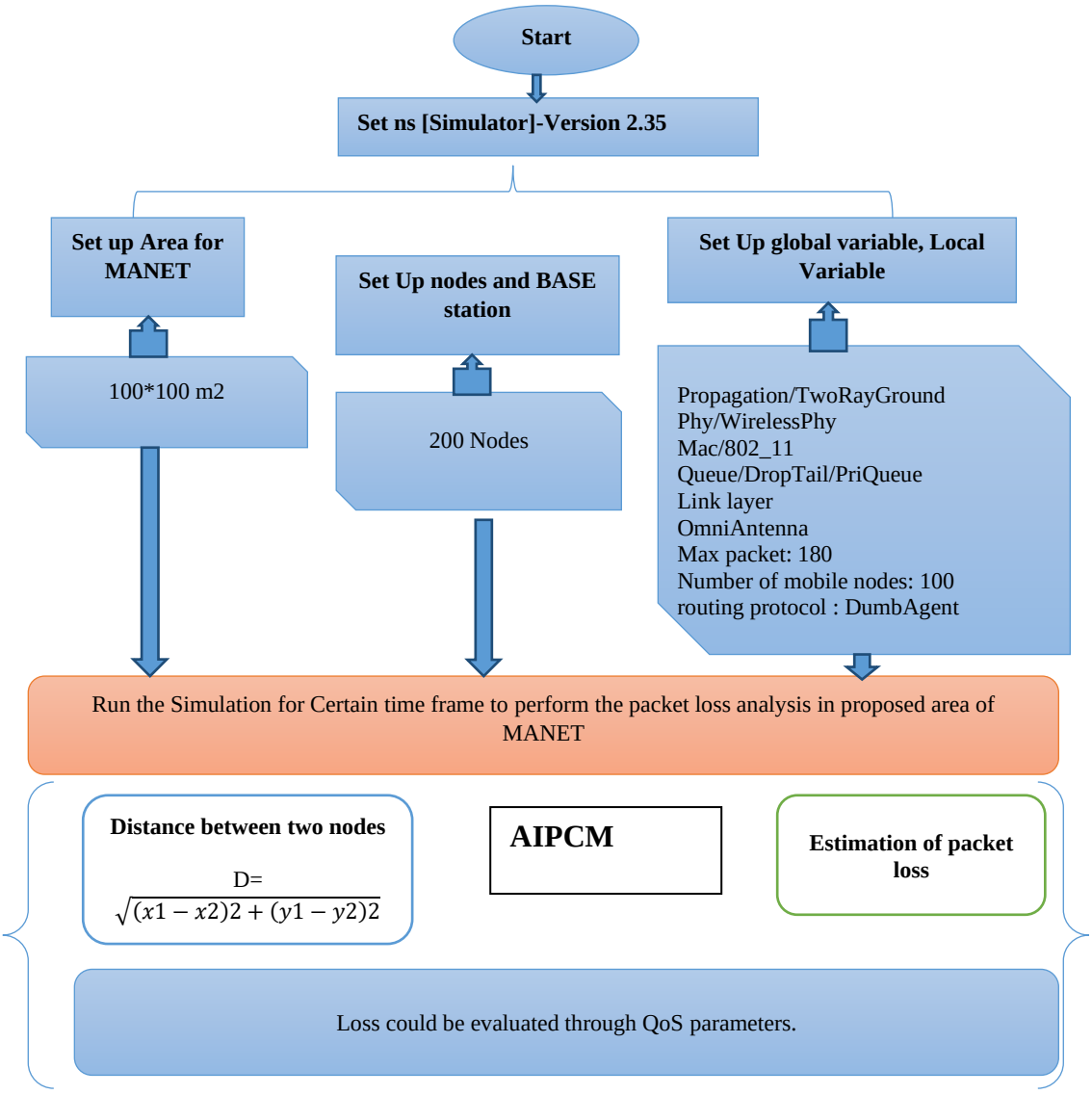


Fig. 2 Flowchart representing the proposed research work

4 Simulation Setup

Simulation setup plays a vital role to determine whether the time and resources are sufficient for evaluation of proposed work or not. Following parameters are used to acquire empirical results about the performance of proposed method in certain scenarios. NS-2 simulator have been used to analyze our work. The following table shows the simulation parameters we have used.

Table 1Simulation parameters

Parameters	Type	Specification
Antenna Set Up	MAC Type	Mac/802_11
	Interface Queue Type	Queue/Droptail/Priqueue
	Network Layer	Link Layer Type
	Antenna Model	Omni Antenna
	Area	100*100(m^2)
Communication Nodes Set Up	Placement of Node	Fixed Dimensional Point
	Number of Nodes	50
	Base Station	1
	Sink Node	3
	Max Packet	100
	Number of Mobile Nodes	30

In the below figure.3, movable nodes have been created and placed in a region of size 100m * 100m . We have also defined its position in the form of X and Y co-ordinates. Here, Steele and Nofal's traffic source is being used with each source generating no.of packets per second.

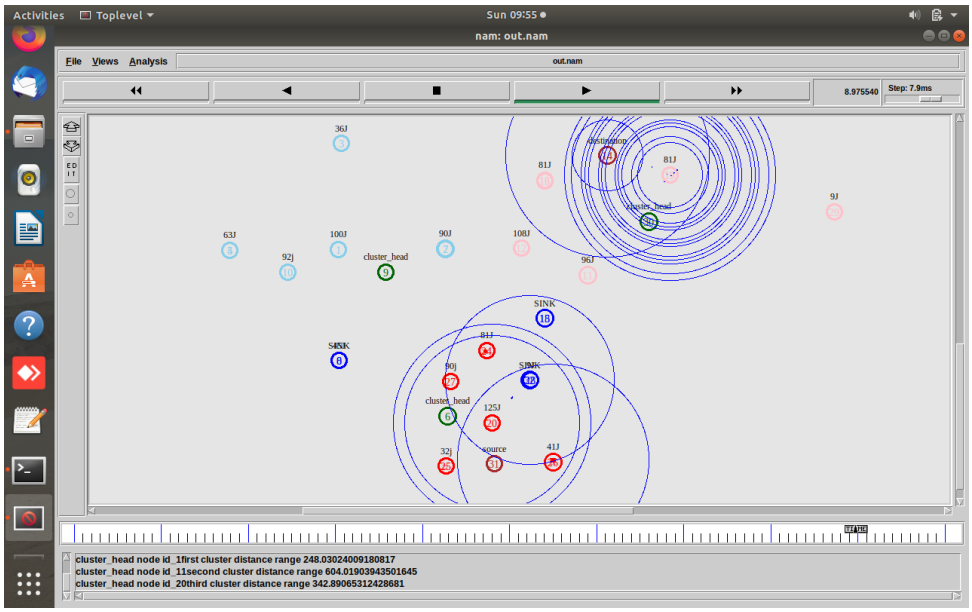


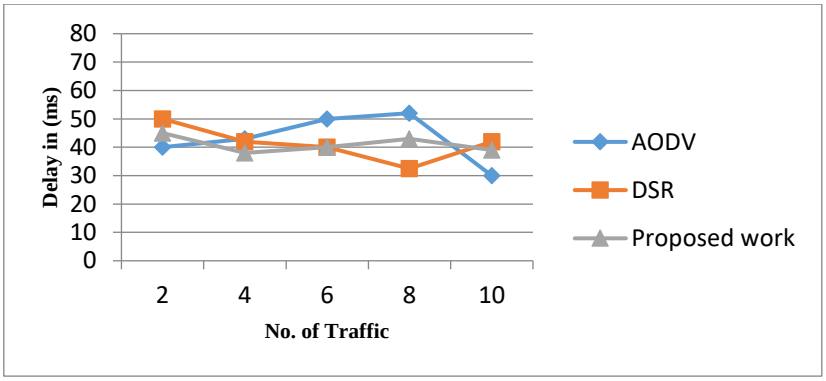
Fig. 3 : Moving nodes communicating each other in the proposed area

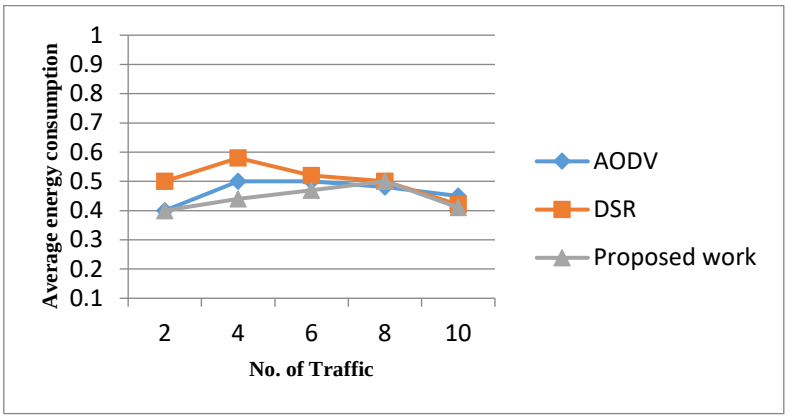
Distance between N(m)	Energy Received at destination Node (dBm)
18	59
40	12
49	8
60	5
75	3
84	3

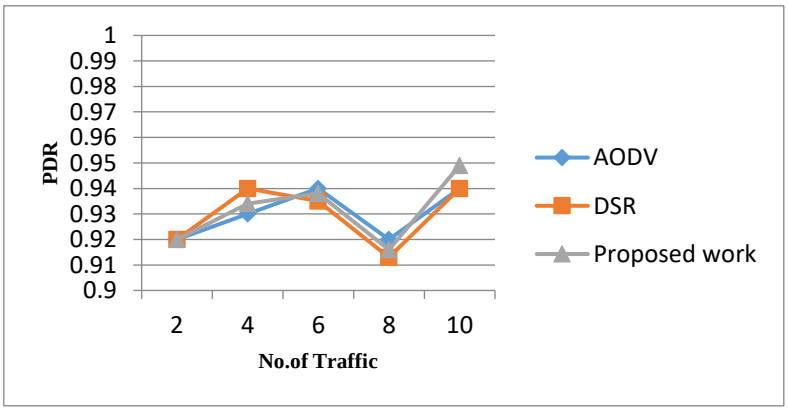
Table 2 : Simulative outcome

No. of Round	Existing	Proposed
1	100	100
2	96	99
3	93	96
4	89	92
5	80	90
6	68	87
7	52	83

Table 3: No. Of Rounds Given







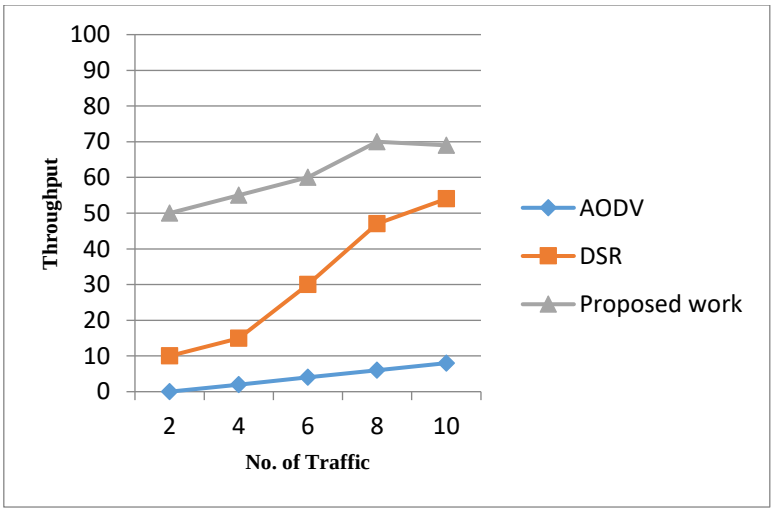


Fig4: QoS Comparision Graph after simulation

5 Results and Discussion

It is evident from the obtained results that the power varies accordingly with the given distance for all the 50 nodes in the MANET during the whole communication process. The table-2 shows that there is a continuation of downfall in power with the increase in the distance and no unexpected change in packets data is received. The performance of the system has been analyzed and controlled under various condition by using Steele and Nofal tele-traffic pattern which gives an error-free results.It is concluded that the lowest distance between nodes has the highest Packet Estimation level, and the highest distance between nodes has the lowest packet Estimation level. The result of the packet loss analysis for MANET, frominitiator node to sink node has been calculated and recorded.Table-3 shows the no. of rounds given to compare the actualization of existing and proposed works. In the findings (Fig.4), it has been observed that the proposed work reflects better as well as gives an improved QoS.

6 Conclusion

In this paper,we have analysed the existing work in which the energy loss and packet loss in MANET were the significant issues. In the existing work it has been observed that as the density of network increased the throughput also increased but after reaching certain threshold point it decreases because of congestion and delay in the network. It also creates packet loss situation in the network. Therefore, in our proposed work, we have tried to deplete the drawbacks of existing scheme. With the help of our findings it has been examined that the proposed work gives an improved and adequate result. To proved the proposed scheme we have used Network simulator-2 for analysis.

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