Journal of Critical Reviews

ISSN- 2394-5125 Vol 7, Issue 8, 2020

EFFECT OF DIFFERENT DATA RATE ON THE PERFORMANCE INVESTICATION OF NEW BROADCASTING TECHNIQUES IN WIRELESS MOBILE Ad Hoc NETWORKS

E. Gnanamanoharan[1], K. Padmapriya[2]

[1,2]Assistant Professor
[1]Department of ECE, Annamalai University, 608002, India
[2]Department of ECE, Annamalai university, Deputed to Government College of Engineering, Bodinayakanur, India
Email: [1]gnanamanohar@gmail.com, [2]priyamoniece@yahoo.co.in

Received: 08.04.2020 *Revised: 06.05.2020* *Accepted: 10.06.2020*

Abstract
Mobile Ad hoc Network is collection of autonomous nodes and these nodes could move freely and at anytime and anywhere. They can send and receive information each other. Mobile nodes having the limited bandwidth, dynamic topologies and limited energy in nature and manet routing protocol specifies the routes between the nodes and disseminating information between them to discover routes and maintenance. The motivation of this performance analysis is to assess the impact of variable data bits in the three new routing approaches are probability-based broadcast, neighbor knowledge and neighbor aware techniques in through the NS-2 simulation. The performance indices chosen for analysis is throughput, delay, packet delivery ratio and routing over load.

Keywords-- Ad hoc conventional routing protocol, Broadcasting Techniques, Probability based, Neighbour aware.

© 2020 by Advance Scientific Research. This is an open-access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/)
DOI: http://dx.doi.org/10.31838/jcr.07.08.292

INTRODUCTION

Wireless mobile ad hoc networks are emerged from the technology world and does not require a specific network infrastructure and they are applicable to transmit and receive data packets through a wireless link [1][3] without aid of any fixed infrastructure and without any base-station or a router. Due to random mobility of individual nodes the link between respective source destination pair linked with aid of intermediate nodes the packet transmission [2] will be a challenging issue and its should be taken care of an efficient routing protocol.

In MANET, the prediction of mobile node is not always feasible due to random mobility of individual nodes because of mobility speed. Under this situation the route discovery process using fixed probabilistic route discovery degrades the network performance and each mobile node is fixed regardless of topological information due to mobility of nodes and the forwarding probability [11] should be fixed ad higher if a node surrounded by in large number of nodes compared with less density of nodes.

REVIEW OF THE LITERATURE

Perkins and Bhagwat, (1994) developed DSDV reactive routing protocol and to demonstrated. The Ad hoc On-demand Distance Vector was proposed by Perkins and Royer (1999). Deepak and Yogesh, (2011) presented a probabilistic broadcasting algorithm based on traffic demand. Manickam et al (2011) tested with respect to variable node density. Boukerche et al (2011) presented a detailed survey and evaluated their performance.

Ni et al (1999) addressed the problems of redundant rebroadcast and Cartigny and Simplot, (2003) developed an algorithm to combine the advantages of broadcast and probabilistic methods. Zhang and Agrawal, (2004) proposed a scheme that reduces blind flooding and Kim et al (2004) addressed the issue of redundant RREQ transmissions.

Abdulai et al (2007) investigated the effects of pause time and Abdalla et al (2008) developed a new dynamic probabilistic broadcasting scheme. Ghosh et al (2004) and Mohammadizadeh et al (2009) analysed security threats and proposed a solution to prevent from malicious nodes.

BROADCASTING METHODS

Probabilistic Broadcast Ad Hoc On-Demand Distance Vector (PBAODV)

In On-demand routing protocols, there is no need of periodic updates regarding topological changes due to mobility of individual nodes and routing overhead is minimized as much compared with table driven routing protocols[4][7]. The required route between corresponding source destination pairs is discovered by route discovery and route maintenance phase.

The source node is initiated the route discovery phase by sending route request packet to its one hop neighbor. Then neighbor nodes start sending rebroadcast to its other one hop neighbor till the route is available or reaches to destination. The entire network performance is based on efficient route discovery [9]and maintenance process.

The forwarding probability at a node is fixed based on gathered local topological and neighborhood information and the neighborhood information is obtained by “hello” packet at regular intervals and to construct a list of one-hop neighbors.

In the conventional Ad hoc on demand distance vector routing protocol, the date dissimilation is based blind broadcasting [14]to immediate one hop neighbor and all the other nodes rebroadcast to other nodes in the entire network leads to the problem of broadcast storm and its reduce the network resources and affect the entire network performance. In this new broadcast approach is based on predefined probability “P” and this probability is defined based on neighbor information.

In this Probability based ad hoc on demand distance vector approach, the discovery phase is initiated by source node and rebroadcast probability by intermediate nodes and all the route request packet received first time by source node once the intermediate node knows the valid route between the

corresponding source destination pair. The total number of mobile nodes said to be "N_T "and the total number of maximum rebroadcasts for individual nodes "N_T-1".

A source node broadcast its route request route packet to its one hop neighbors with broadcast probability of P_B is unity (P_B=1).When one hop neighbor node receives first, the value of probability of broadcast P_B is less than unity (P_B< 1) Since the rebroadcasting decision of each and every except source and destination pair is independent, the possible number of entire rebroadcasts is P_B x (N_T− 1) in the network.

Broadcast Neighbor Discovery Scheme (BNDS)

Broadcast Neighbor Discovery Scheme (BNDS) is a new broadcasting approach to minimize the effect of flooding [12]by reducing the redundant broadcast and thus the routing overhead is also reduced. In BNDS, each node maintains a list of subsets of its neighbor nodes to take forwarding decision to other mobile nodes in the network. The list of subsets of neighbor contains largest number of one hop neighbors with source node.

The main focus of this BNDS routing approach is to minizine the unneeded redundant rebroadcast that leads to flooding. The source node selects a group of its one hop neighbor to broadcast the route request packet contains source and destination address and subset of neighbor receives this forwarded packet and start reply to source node otherwise it simply drops the received packet.

When aroute request packet reaches its appropriate destination node, the destination starts reply to the source of the request, and it does not forward further. The subsets of neighbor node are assumed as degree of neighbor "D" where the degree of node N is fixed D(N) and it is the number of one-hop neighbors available with source node and updated frequently in specified intervals.

If a sender S wants to send its data to destination node D, it starts initiated the route discovery phase by sending route request packet to its nearest [15] one hop neighbors and need to select first three or four forwarding nodes based on the degree of node which is largest set and need to select its further forwarding nodes (F) to reach destination node [16].

Neighbor Aware Ad hoc on Demand Distance Vector (NAAODV)

The NAAODV scheme is based on AODV [2]. In this modified approach, the routing decision is depending of its neighbor node remaining energy available and neighbors check their table whether it has the route. If it doesn't have the route, it will forward the packets to its neighbors [10].

The duplication of route request packets is avoided using the sequence numbers of received packet and it is checked with the existing one for the same packet.

Using this sequence number, the freshness of route is obtained and it will be replaced. Otherwise the existing entry will be maintained. Here, the transmission of route request packets happens after getting the information about remaining energy of the node.

SIMULATION METHODOLOGY

Network Simulator-2 is extensively utilized in the research community to carry out network simulation and it is one of the most popular simulators developed by VINT project and a discrete event driven, object-oriented network simulating tool, very much applicable for researchers, professors and students.

The traffic model for this variable packet rate from minimum of 4, 6, 8 and 10 of maximum using the packet size of 512 bytes. It generates Traffic during ON period[13]. The table 1 gives the details of parameters fixed for entire simulation and analysis of the three different approaches. The following four performance indices those substantially affect the performance of routing protocol are throughput, delay, packet delivery ratio extracted for analysis from simulation outcome.

Table 1. Simulation Parameters

Parameter	Value
Simulator	NS2(Version-2.35)
Simulation area	500 x 500 meters
Transmission range	250m
Mobility speed	10 m/s
Number of nodes	50
Traffic type	VBR
Mobility model	Random way point
Packet rate	4,6,8 and 10 packets/sec
Packet size	512 bytes
Protocols	PBAODV, BNDS, NAAODV

RESULT AND DISCUSSION

Throughput

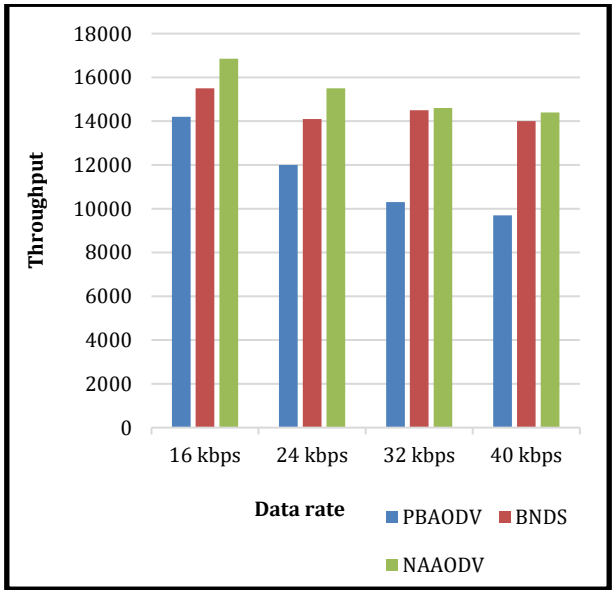

Figure 1. Variation of throughput for different data rate

Fig.1 depicts the variation of throughput of NAAODV, BNDS and PBAODV for different data rates from 16 to 40 kbps. It is evident that all three approaches BNDS, NDLV and NAAODV show closer performance and provide better throughput from 16 to 24 kbps.

The performance of PBAODV is degraded overall than other two techniques. NAAODV is showing better throughput for all the data rate variation from 16 to 40 kbps than other two techniques.

Delay

Fig.2 Shows the variation of delay of NAAODV, BNDS and PBAODV for variable different data rates. The results have revealed PBAODV exhibit superior performance than all the two techniques. It is evident that the two approaches BNDS, and NAAODV consumes maximum delay from data rate 32 up to 40 kbps. The performance of NAAODV is degraded overall than other two techniques.

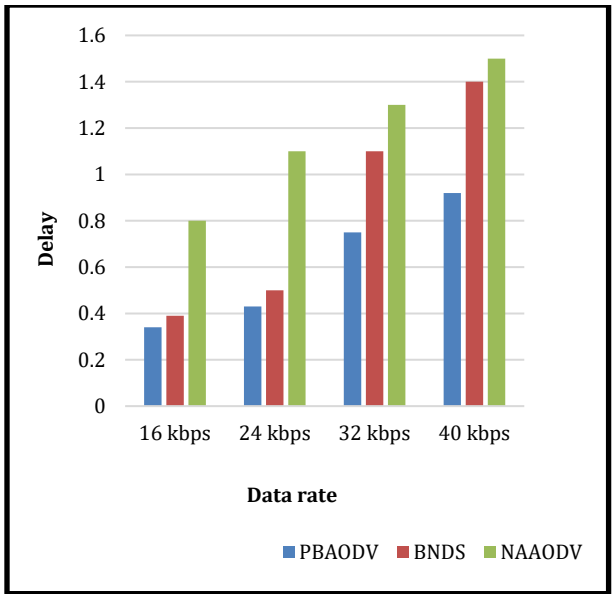

Figure 2. Variation of delay for different data rate

Packet Delivery Ratio

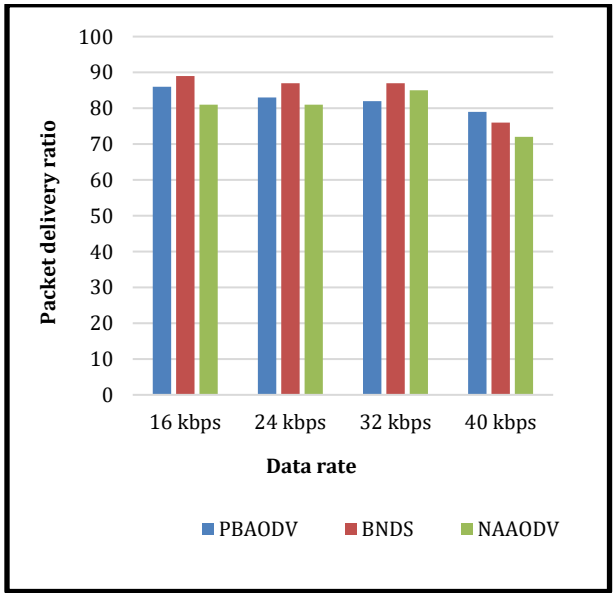

Figure 3. Variation of PDR for different data rate

The bar chart shown in Fig.3 shows the variation of packet delivery ratio for varying in data rate. It is seen that the delivery ratio for all the approaches is greater than 72 %for all the data rate variation. The BNDS and PBAODV have in general higher PDR than NAAODV and delivers the average of PDR 75 %.

Routing Overhead

Fig.4 shows the variation of routing overhead (in packets) of NAAODV, BNDS and PBAODV for variable data rate. For the maximum data rate 40 kbps all the three approaches have increased routing overhead. It is seen that NAAODV has larger routing overhead other than the three approaches. It is clear that PBAODV has improved performance of overhead except for the initial data rate of 16 kbps.

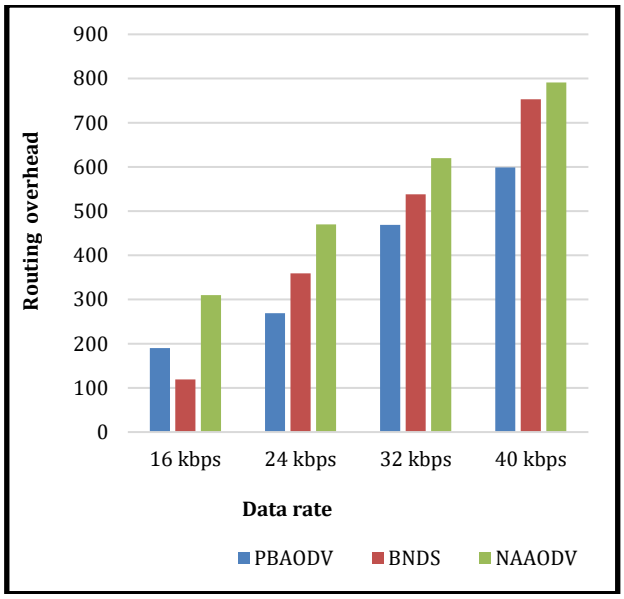

Figure 4. Variation of routing overhead for different data rate

CONCLUSION

This paper investigates the issues concerning the variation data rate on the performance of three broadcasting techniques. The simulation study has been conducted using network simulator 2 for the performance comparison of PBAODV, BNDS and NAAODV protocols in different data traffic. It is clear that the having the possibility to use different data rate is an advantage than constant bit rate traffic. NAAODV exhibits encourage performance regarding throughput and PDR compared with other two techniques. It is observed in the analysis that PBAODV outperforms BNDS and NAAODV in general for all the data rates and it is suitable for both data traffics.

REFERENCES

1. Perkins, C. E., and Bhagwat, P (1994), Highly dynamic destination-sequenced distance vector routing (DSDV) for mobile computers, Proceedings of ACM SIGCOMM 94, pp. 234-244.
2. Perkins, C. E., and Royer, E.M (1999), Ad-hoc on-demand distance vector routing, Proceedings of the 1999 Second IEEE Workshop on Mobile Computing Systems and Applications, IEEE Computer Society, New York, pp. 90–100.
3. Abdalla, M., and Hanashi (2008), Improving Route Discovery of Dynamic Probabilistic Flooding in On-Demand Routing Protocols for MANETs, Proceedings of 10th Telecommunications Forum, pp. 89-92.
4. Abdulai, J., Ould-Khaoua, M., and Mackenzie, L.M., (2007), Improving Probabilistic Route Discovery in Mobile Ad Hoc Networks, 32nd IEEE Conference on Local Computer Networks (LCN 2007) IEEE Computer Society Press, pp. 739-746.
5. Boukerche., Azzedine., Begumhan Turgut., NevinAydin., Mohammad. Ahmad, Z., Ladislau Boloni., and DamlaTurgut., (2011), Routing protocols in ad hoc networks: A survey, Computer networks, Vol. 55(13), pp. 3032-3080.
6. Camp, T., Boleng,V., and Davies, V., (2002), A survey of mobility models for Ad hoc network research, Wireless Communications & Mobile Computing(WCMC),Special issue on Mobile Ad Hoc Networking, Research, Trends and Applications, Vol. 2(5), pp. 483-502
7. Deepak. D., and Yogesh, C (2011), Traffic based analysis of efficient and dynamic probabilistic broadcasting algorithm

in MANETs routing protocols, International Journal of Wireless and Mobile Networks, Vol. 3(01), pp. 108-116.

8. Haas, Z., Halpern, J. Y., and Li, L., (2002), Gossip-based Ad hoc routing, Proceedings of IEEE INFOCOM '02, Vol. 21, pp. 1707-1716.
9. Jaafar, M. A. and Zukarnain, Z. A (2009), Performance Comparisons of AODV, Secure AODV and Adaptive Secure AODV Routing Protocols in Free Attack Simulation Environment, European Journal of Scientific Research, vol. 32(03), pp. 430-443.
10. Linda Farman, Jan Nilsson, and Otto Tronarp(2005), "Using Variable Data Rate in Mobile Ad Hoc Networks Supporting Delay Sensitive Traffic", *Command and Control Systems*, *Technical Report*, October 2005,ISSN 1650-1942.
11. Kim, J.S., Zhang, Q., and Agrawal, D. P., (2004), Probabilistic broadcasting based on coverage area and neighbour confirmation in mobile ad Hoc networks, Proceedings of IEEE Global Telecommunications Conference Workshops (GlobeCom'2004), pp. 96-101.
12. Ni, S.Y., Tseng, Y.C., Chen, Y.S., and Sheu, J.P. (1999), The broadcast storm problem in a mobile Ad hoc network, Proceedings of the 5th Annual ACM/IEEE International Conference on Mobile Computing and Networking, pp.152-162.
13. Gnanamanoharan, E., and Bensraj, R., (2014),Impact of Variable Bit Rate and Packet Size on the Performance Evaluation of Neighbor Aware AODV and DSDV Routing Protocols for MANET's, *International Journal of Computer Applications*, Vol. 92(08),pp.43-47.
14. Gnanamanoharan, E., and Bensraj, R**.,** (2016), Performance Analysis of Probabilistic Broadcast on Demand Route Discovery Protocol for Mobile Ad hoc Networks based on Node Mobility, *International Journal of Advanced Engineering technology*, Vol. 07(03), pp. 174-178.
15. Gnanamanoharan, E., and Bensraj, R., (2016), Performance Analysis of Broadcast Neighbors Discovery Protocol for Mobile Ad hoc Networks based on node mobility, International Journal of Innovation and Scientific Research, Vol. 25(01),pp. 352-359.
16. P. Arunagiri and G. Nagarajan, "Optimization of power saving and Latency in LTE network using DRX mechanism," *2016 10th International Conference on Intelligent Systems and Control (ISCO)*, Coimbatore, 2016, pp. 1-4, doi: 10.1109/ISCO.2016.7727036.