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Multicast Routingfor MANETs using energy level Gossip based method

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Abstract

Mobile ad hoc networks (MANETs) now include a number of notable features that make it easier to visualise the MANETs enabling advanced applications. Multicast routing in the applications lowers the cost of communications. For MANET, various multicast routing protocols were put forth. In contrast to earlier multicast protocols of MANET that concentrated on reducing control overhead, in this research the reduction of superfluous rebroadcast data is evaluated in the multicast protocol based on QoS restrictions like end-to-end delay, power, and bandwidth. This research provides an energy-efficient based adaptive Gossip protocol with an emphasis on improving network performance based on energy resources. We have taken end-to-end delay, energy use, and throughput for performance comparison. The protocol's performance is evaluated using UDP-based traffic models. Using the NS-2 simulator, a TCP-based traffic model's average end-to-end delay is examined.

Keywords:EEBAGP, MAODV, EMCR, Multicasting, MANETs.

I. Introduction

The mobile nodes with an interconnected system not using any centralized coordinator include in a mobile ad hoc network (MANET) which includes each mobile node should be operated as a router and a host is responsible for transmitting the data from one node to another in a network. MANETs have included the advanced applications such as audio and video conferencing, civil applications, military operations, and disaster cases due to the features such as dynamic topology, inherent mobility support, rapid deployment, robustness, and flexibility. Multicasting utilizes when MANETs want to send the same information to more than one destination [1]-[3]. The group communication allows in the multicasting for data routing. In MANET applications which include the connecting of a source node to set of destinations, one of the major challenges is the multicasting. To overcome this problem,

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different multicast routing protocols have been proposed and two categories include in the existing multicast routing protocol such as tree-based multicast routing protocols [5], and mesh-based multicast routing protocols [4]. The proposed routing algorithms with a complete survey for the wireless MANETs is demonstrated in [6]-[11]. Network Coding (NC) can utilize to achieve the proper usage of bandwidth in a network as it is one of the most considerable resources in MANETs. NC can be used as an efficient networking method which will encode and decode the transmitted data for recording the transmission and improving the throughput. At the destination node, the transmission of information decoding is processed. At the destination and intermediate nodes, the huge amount of processing has required to be performed [12] while lesser transmissions are enough for data delivery. NC is a reliable technique because it has a capability of maximizing the network capacity [13]. Before forwarding the data packets, the intermediate nodes can integrate them in the technique of NC. The overall number of data transmission packets minimize by using NC that can be beneficial for broadcasting [14]. The success of wireless network lies in the bandwidth conservation. To decrease the bandwidth amount, the multicast protocol is considered in the MANETs to achieve the advantage in rebroadcasting of data and control overhead while the existing multicast protocols of MANETs focused on the control overhead reductions only. Large amount of bandwidth consumes by the data transmission than control overhead is assumed usually [15], [16], [18]. The network performance could improve with the reduction of even a small amount of data retransmissions. Based on the constraints of QoS such as power, bandwidth, and end-to-end delay, the proposed protocol will reduce the unnecessary rebroadcast data unlike the existing MANET multicast algorithms [17], [19], [20].

II. Related Works

In [21], the mobile ad-hoc networks were discussed and mentioned that the nodes are not static in nature. So, the network may disconnect at any time in the data transmission and signal strength is varied. To determine the neighbors which include a network topology with a localized view that uses the routing protocols, each node should have to monitor the received radio signals in a multihop mobile ad-hoc network.

In [22], the author was demonstrated the mobile ad hoc networks which provide a stable path between the sender and multiple receivers for the data packets routing with multicast flows. The group communications like disaster manager and battlefield communication has a

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drawback of dropping critical information that never get retransmitted if more stable paths are not available between senders and multiple receivers. By considering a node mobility and reducing the construction resources of a distribution tree, we have to make a solution if the distribution tree destroys owing to the nodes mobility.

In [23], the author has been proposed a multicast routing protocol of a shared tree-based multi-source in the multi-source multicast environment for efficient multicasting. The robustness and multicast efficiency could be achieved with the proposed method. In the environment of multi-source multicast, the delivery ratio maintains without losing efficiency of multicast by the proposed protocol. To forward multicast packets, a shared-tree utilized by each node. When compared to the individual single-source multicasting tree, the cost is lower for constructing the shared-tree. Hence, the reliability is lower for shared-tree than the individual single-source multicasting tree. Based on the multiple shared-trees, the multi-path forwarding is proposed to achieve the robustness in MANETs.

In [24], the author was described the MANETs where all nodes are moving randomly and organize themselves arbitrarily. So that, the group members have a lenience in either leave or rejoin in the multicast session frequently. To overcome this issue, the dynamic and efficient multicast routing protocol is needed. In MANETs, the protocol is investigated scarcely although it has been illustrated widely for wired networks. Accordingly, an algorithm of mobile prediction aided dynamic multicast routing (MPADMR) is proposed in this paper.

In [25], the author was introduced a novel design of an Adaptive sleep mode using a RAS or Radio Activated Switch which places on top of the 802.11 MAC layer without requiring the modifications for the standard protocol. To develop an interface sleep-wake method, this schedule synchronization mechanism is applied for decreasing the conservation of energy owing to the idle listening.

III. Proposed Work

A new protocol is proposed based on GSP (GOSSIP PROTOCOL) ad hoc routing for achieving wireless ad hoc networks with reliability and energy efficiency. The nodes are in active mode in this protocol with the probability of 1-p or sleep mode that has a probability of p fixed at the initial stage. A control variable B is maintained by a node and it represents the current number of active neighbors. The similar process is started at each transmitting node and the remaining nodes will be either in 1-p or p state. The node consumes more power to

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send the data packets when the higher value of B and the communication is more reliable. This will lead to more energy consumption in joules for either forwarding or receiving the packets. The algorithm initializes B to one at each node in a network for reducing the conservation of energy. That means the data packets transmit by a node only to the closest neighbour primarily. So, less power requires for the nodes. To achieve the reliability, the intermediate nodes alters to the active mode in the path. By using this, the packet delivery ratio estimates and it is compared with the threshold value in the source node. According to the time when feedback value arrives, the shortest path can be determined. When the time at which the feedback factor receives, the T value is noted and other timing information in other paths are also considered. The value of T and other computed time are compared for estimating the delayed response path when the nodes are into the sleep node in the path. The intermediate nodes are changed to the sleep mode when the packet delivery ratio is more than the threshold value. For each periodic interval, the process is repeated.

The other path results the greater delay than the shortest path time T when packet delivery ratio doesn't meet the required value of threshold. The feedback of packet delivery ratio is estimated. If the packet delivery ratio is more than the threshold value, the nodes trigger to the sleep node that provides greater delay. In this work, the threshold value set to 0.5.

A switch can be developed based on the technology of RF tags that can utilize for an activation of a radio device remotely in the sleep state. Instead of triggering to the active state periodically, nodes wake up whenever necessary to check out whether there is pending traffic.

The proposed protocol has an objective of achieving energy efficiency by considering more number of sleep nodes. Based on a triggering of a signal that consume the power from the RF signal, the sleep nodes in the data transmission path are triggered to be an active state. By comparing with the existing protocols, the proposed protocol can achieve lower delay, less consumption and energy, and more reliability. The nodes are again moved to the sleep mode after achieving the threshold value in the proposed protocol which consumes more power than the existing schemes of power saving.

The performance of MANET is sensitive to the traffic load, scalability, and mobility for examining the performances of different protocol. For efficient traffic routing, a crucial role is played by the varied speed of nodes and the traffic amount. The performance of protocols

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will improve by the important parameter with the varied traffic load, node speed, and network size. The distinct results have showed by the performance analysis of MANET routing protocols in the research studies.

IV. Results and Discussions

Different routing protocols' performances have been evaluated such as MAODV, EMCR, and EEBAGP with the use of network simulator NS 2.35. The EEBAGP protocol compares with the previous methods like EMCR and MAODV based on the simulation results. In the table 1, the parameters are mentioned and they have been used in the routing protocols.

Here we use 100 nodes in area of 1500 x 1500 with application traffic as CBR to transfer data within 10000 bytes/0.5 ms as transmission rate having within radio range of 250m in random topology with two way ground propagation model. Here we transfer a data as a packet and packet size as 10000 bytes within simulation time 20000 ms. In network we use initial energy as 100j, and using MAC Protocol as 802.11, SMAC and we use routing protocol as MAODV.

PARAMETER	**VALUE**
Application Traffic	CBR
Transmission rate	10000 bytes/0.5ms
Radio range	250m
Topology	Random
Propagation model	Two way ground
Packet size	10000 bytes
Simulation time	20000ms
Number of nodes	100
Area	1500x1500
MAC Protocol	802.11, SMAC
Initial energy	100j
Routing protocol	EEBAGP
Maximum packets	10000

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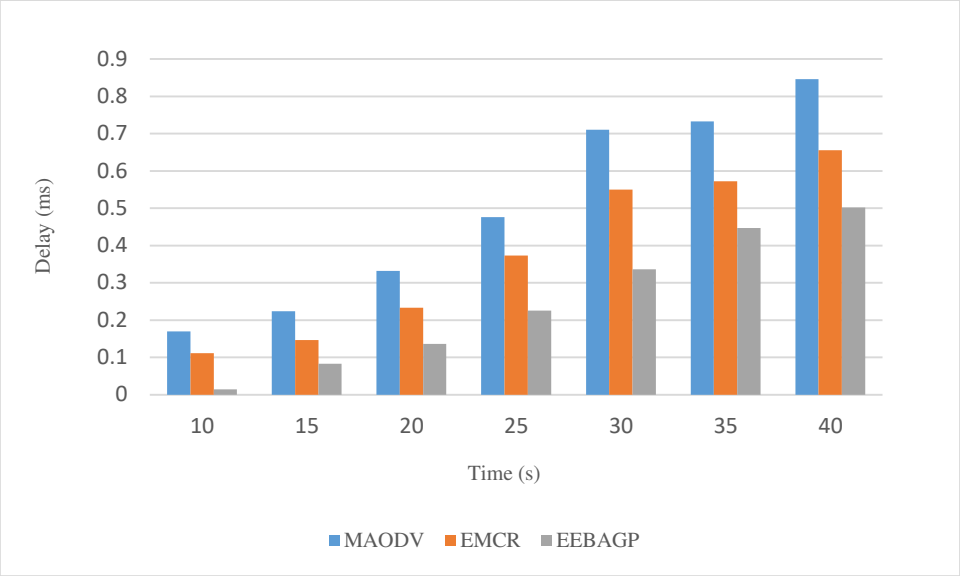

Figure 1: End-to-End Delay

In figure it shows the End-to-End Delay of the network. To get a better performance of the network the delay should be low in our proposed system that is EEBAGP while compared with existing methods like EMCR, MAODV.

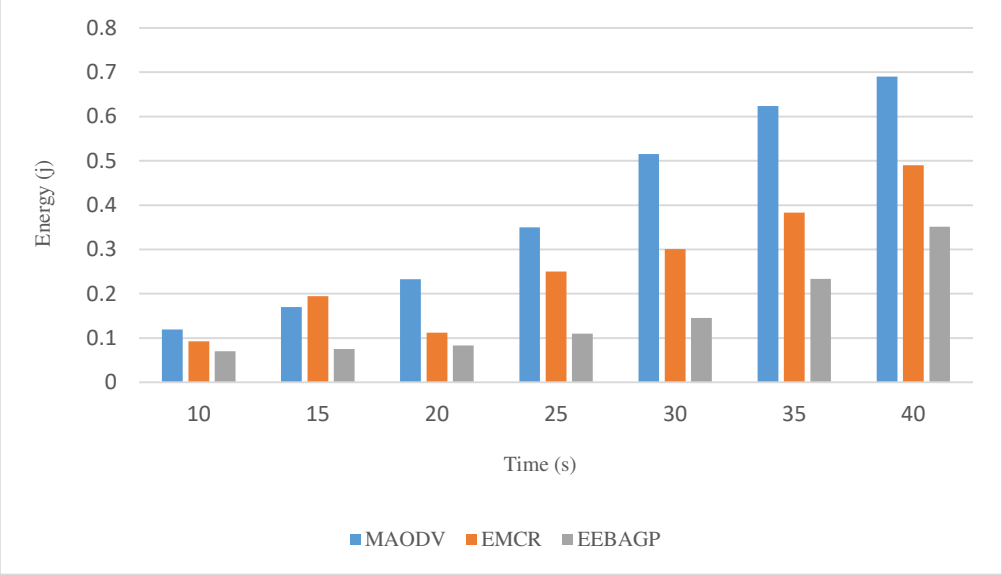

Figure 2: Energy Consumption

In figure it shows the Energy Consumption of the network. To get a better performance of the network the Energy Consumption should be low in our proposed system that is EEBAGP while compared with existing methods like EMCR, MAODV.

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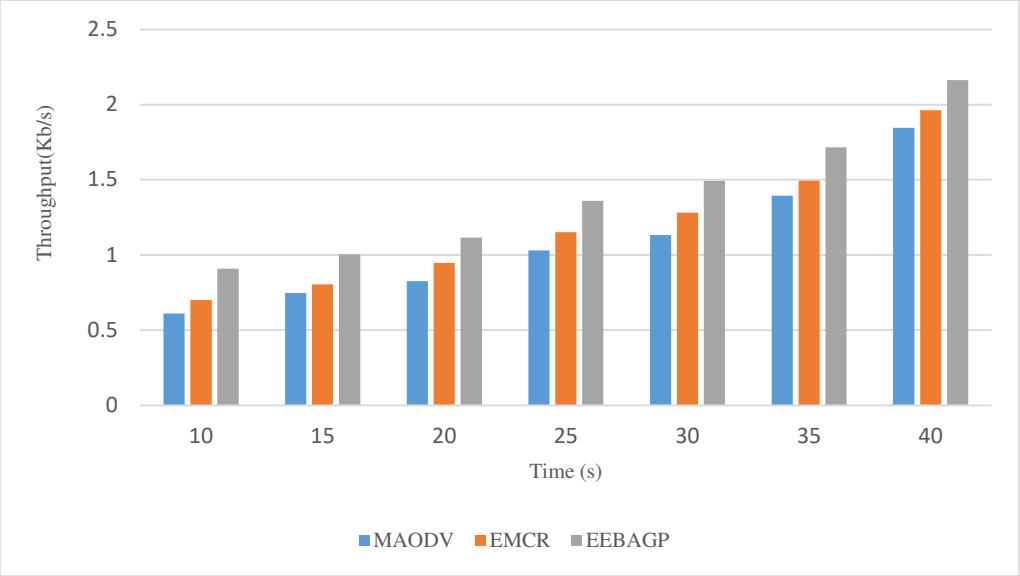

Figure 3: Throughput

In figure it shows the Throughput of the network. To get a better performance of the network the Throughput should be high in our proposed system that is EEBAGP while compared with existing methods like EMCR, MAODV.

Conclusion

The study puts out an energy-efficient, adaptive Gossip system. With the help of this protocol, network performance can be improved while energy usage is decreased. Based on the outcomes of the simulation, the proposed protocol performs better when compared to the currently used methodologies, such as MAODV and EMCR. For future work to perform better, the queue needs to be optimised. The queue is a networked data storage point. In order to optimise the routing for queues in networks with effective parameters, we must employ both the AOMDV and the DSR routing protocol. Check all potential ways to offer security for the queue point at the routing level.

References

[1] Siva Ram Murthy and B. S. Manoj."Chapter 3 AdHoc Wireless Networks, "in Ad Hoc WirelessNetworks: Architectures and Protocols, pp. 213-245.

[2] Luo Junhai, Xue Lin and Ye Daniye, "Research onMulticast Routing protocols for Mobile Ad HocNetworks, "in Elseveier Computer Networks, Vol.52, pp. 988-997. 2008.

ISSN: 2366-1313

[3] Su W, Lee S and 1.Gerla M., "On-demand multicastrouting protocol in multi hop wireless mobilenetworks(ODMRP), "in Springer Link MobileNetworks and Applications, Vol. 7, pp. 441-53,2002.

[4] E.M Royer and C. E Perkins, "Multicast adhoc ondemand distance vector (MAODV) Routing."Internet Draft, draft-ietf-draft-MAODV-OO.txt2000. 6

[5] S. Badarnch and M Kadich, "Multicast Routingprotocols in Mobile Ad Hpc Networks: Acomparative Survey and Taxonoly, "in EURASIPJournal of f'I1reless Communication andNetworking. pp. 1-42. Vol. 2009.

[6] A Boukerche, B Turgut, N Aydin, M Z. Ahmad,Ladislau Bini and DamlaTurgut, "Routingprotocols in ad hoc networks: A survey, "inElsevier Journal of Computer Networks. Vol.55.pp. 3031-3080. 2011.

[7] R C Biradar and S S. Manavi, "Review ofMulticast Routing protocols in Mobile Ad Hpc Networks. "in Elsevier Journal of networks andComputer Applications. Vol. 32, pp. 221-239.2012.

[8] Lue Junhai, Ye Danxia, Xue Lin and Fan Mingya,"Survey of Multicast Routing protocols for MobileAd Hpc Networks. "in IEEE Communications,Surveys and Tutorials, Vol. 11, No. I, pp. 78-91,First Quater 2009.

[9] J M Vella and S Zammit, "A Survey of Multicastingover Wireless Access networks, "in IEEECommunications, Surveys and Tutorials, Vol. 15,No. 2, pp. 78-91, Second Quater 2013.

[10] E Alolaibi and B Mukharjee, "A survey on routingalgorithms for Wireless Ad Hoc Mesh Networks,"in Elsevier Computer Networks, Vol. 56. pp. 940-965. 2012.

[11] B. Nagalakshmi. D. Venkatesh and K Ramesh."Probability Scheme With Network CodingTechnique in Wireless Ad Hoc Networks:Reducing the Number of Transmissions withEnhanced Security, "in International Journal ofAdvanced Research in Electrical. Electronics andInstrumentation Engineering, Vol. 2, Iss. 6. pp.2320-2325.June 2013.

[12] M Hay, B Saeed. Chung-Horng Lung. ThomasKunz. and Anand Srinivasan. "Network Codingand Quality of Service for Mobile Ad HocNetworks. "inInt.J Communications, Network andSystem Sciences, Vol. 7. pp. 409-422. 2014.

ISSN: 2366-1313

[13] S Yang. J Wu and M Cardei, "Efficient Broadcastin MANETs Using Network Coding andDirectional Antennas. "in IEEE INFOCOM 2008,pp. 1-6. 2008.

[14] Li Xu. Liu Tianjian, Liu Ying and Tang Yan,"Optimized Multicast Routing Algorithm based onTree Structure in MANETs, "in ChinaCommunications. pp. 90-99. Feb. 2014.

[15] Y S Yena, H C Chaoc. R S Changd and AVasilakos. "Flooding-limited and multiconstrainedQoS multicast routing based on thegenetic algorithm for MANETs."in ElsevierMathematical and Computer Modelling, Vol. 53,pp. 2238-2250. 2011.

[16] K Chi , X Jiang and S Horiguchi, "Networkcoding-based reliable multicast in wirelessnetworks. "in Elsevier Computer Networks. Vol.54. pp 1823-183, 2010.

[17] N C Wang. "Power-aware dual-tree-basedmulticast routing in mobile ad hoc networks, "inlET Communications. Vol. 6, Iss. 7. pp. 724-732,2012.

[18] J A Torkestani and M R Maybodi, "Mobility basedmulticast routing algorithm for wireless adhocnetworks . A learing automata approach. "inElsevier Computer Communication. Vol. 33. pp.721-735. 2010.

[19] J A Torkestani and M R Maybodi. "A link stabilitybased multicast routing protocol for wirelessmobile adhoc networks, "in Elsevier Journal ofnetwork and computer applications. vol. 34.pp.1429-1440. 2011.

[20] Ozkasap, Z Genc and E Atsan. "Epidemic-basedreliable and adaptive multicast for mobile ad hocnetworks."in Elsevier Computer Networks. Vol.53. pp. 1409-1430. 2009.

[21] E. Baburaj and V. Vasudevan, "An Intelligent on Demand Multicast Routing Protocol for MANETs," 2008 First International Conference on Emerging Trends in Engineering and Technology, Nagpur, Maharashtra, 2008, pp. 214-217, doi: 10.1109/ICETET.2008.102.

[22] K. Kant and L. K. Awasthi, "Stable Link Based Multicast Routing Scheme for MANET," 2010 International Conference on Computational Intelligence and Communication Networks, Bhopal, 2010, pp. 296-300, doi: 10.1109/CICN.2010.68.

[23] F. Sato, "An Efficient Shared-tree-Based Multi-source Multicast Routing Protocol in Mobile Networks," 2009 International Conference on Advanced Information Networking and Applications Workshops, Bradford, 2009, pp. 377-382, doi: 10.1109/WAINA.2009.142.

ISSN: 2366-1313

[24] Bo Rong, G. Amoussou, Z. Dziong, M. Kadoch and A. K. Elhakeem, "Mobility prediction aided dynamic multicast routing in MANET," IEEE/Sarnoff Symposium on Advances in Wired and Wireless Communication, 2005., Princeton, NJ, 2005, pp. 21-24, doi: 10.1109/SARNOF.2005.1426502.

[25] Rajeswari, S., and Y. Venkataramani. "ADAPTIVE GOSSIP BASED PROTOCOL FOR ENERGY EFFICIENT MOBILE ADHOC NETWORK." ICTACT JOURNAL ON COMMUNICATION TECHNOLOGY, MARCH 2012, VOLUME: 03, ISSUE: 01, ISSN: 2229-6948(ONLINE) DOI: 10.21917/ijct.2012.0066.