

Backtracking and Forward tracking based Multicasting Technique in MANET

Arshita Kaur*, Gurmeen Kaur** and Amit Verma***

ABSTRACT

A mobile ad hoc network is a collection of wireless nodes that can dynamically be set up anywhere and anytime without using any pre-existing network infrastructure. All available nodes are aware of all other nodes within range. The route request messages are flooded into the network, and intermediate nodes which are having the path to destination will reply back with the route reply packets. The source selects the best path on the basis of Hop count and sequence number. In the approach of flooding, the network resources like bandwidth, node energy will get wasted which degrade performance of the network. In this work, tree based technique is proposed which will maintain tree for multicasting in MANETs

Keywords: Ad-hoc network, MANET, Tree based multicasting, AODV.

I. INTRODUCTION

A network is a gathering of two or more computer systems which are linked together. It is method of trade of information to communicate with each other. It is a connection of computer gadgets which are appended with the correspondence offices [1]. At the point when number of computer are joined together to trade information they frame networks and share resources. Networking is utilized to share information like data correspondence. Sharing resources can be software or hardware. It is a central administration system or advancement of these sorts of system [12]. In infrastructure based network, correspondence happens just between the wireless nodes and the access points. The correspondence does not straightforwardly happen between the wireless nodes. Here the access point has to be utilized to control the medium access and additionally it goes about as the bridge to the wireless and also the wired networks. In this network, altered base stations are utilized when the node leaves the range of base station another base station comes into range [2]. The fundamental issue in this system is that if controller stops working all the system will crash. The infrastructure less network does not require any infrastructure to work. In this network every node can communicate straightforwardly with different nodes. So in this network no access point is required for controlling medium access. Infrastructure-less networks don't have routers to be altered [3]

An ad hoc network is a wireless network depicted by the nonexistence of a centralized and altered infrastructure. The nonappearance of an infrastructure in ad hoc networks postures incredible difficulties in the usefulness of these networks. In this manner, the paper alludes to a wireless ad hoc network with mobile nodes as a Mobile Ad Hoc Network. More continuous connection breakage and re-connections put an energy requirement on the mobile nodes [4]. In MANETs, accumulation of mobile nodes may powerfully change the topological structure. Mentioning all the more broadly utilized mobile cellular networks .Mobile

* M. Tech. Research Scholar, Department of Computer Science & Engineering, Chandigarh Engineering College, Landran, Punjab, India, E-mail: sangha.arshita@gmail.com

** Assistant Professor, Department of Computer Science & Engineering, Chandigarh Engineering College, Landran, Punjab, India, E-mail: cecm.cse.gurmeen@gmail.com

*** Head of Department, Department of Computer Science & Engineering, Chandigarh Engineering College, Landran, Punjab, India, E-mail: dramit_verma@yahoo.com

Ad Hoc Networks do not utilize any type of altered infrastructure or centralized administration. These sorts of networks have the striking qualities: dynamic topologies, bandwidth constraints, variable capacity links, restricted physical security and energy constrained operations [5].

Proactive protocol contains crisp rundown of the route and their destination from source [13]. In this kind of protocol one node contains more than one table for every node in the network. If by any chance the two routes have the same arrangement number then the route with the shortest route is utilized by DSDV routing protocol. DSDV does not bolster multi-path routing. It gives shortest path which is of good quality, trust commendable and helpful [14]. The Message Retransmission list (MRL) contains a specific end goal to tell a node which of its neighbor has not recognized an upgrade message and to retransmit the complete message to that neighbor. DSR is a reactive routing protocol for ad hoc wireless networks. It likewise has on-demand features like AODV however it's not table-driven. It is based on the source routing [15]. The Dynamic Source Routing protocol (DSR) is a basic outlined particularly for use in multi-bounce wireless ad hoc networks of mobile nodes and proficient routing protocol. Sending multiple copies of packets to various nodes is called multicasting. Wired and wireless networks both are bolstered by both multicasting routing protocols. There are numerous difficulties and errands which must take in thought when send multicasting routing protocol. Reactive Routing Protocol is on-demand protocol. It is lethargic methodology in which all the nodes do not contain the information of the every one of the nodes and keeps up table just on demand [16].

II. LITERATURE REVIEW

Sapma B Kulkarni and Dr. Yuvaraju B N [24] proposed a Node connectivity, Energy and Bandwidth Aware Clustering Routing Algorithm. The algorithm is proposed to overcome the problem of increased energy consumption and delay during real time traffic multicasting in MANETs. An ENB cluster head selection algorithm is used to elect the cluster head efficiently. The nodes with highest residual energy, bandwidth and connectivity are selected as cluster head. The cluster heads are the group leaders and the other node members are the leaf nodes. Using both of these a multicast tree is set up which communicates the multimedia data to various receivers. Before transmission the multimedia traffic is spilt into multiple sub streams using the Top-N rule selection approach.

Limin Tang et.al clarified [6] multicast transmission offers a bandwidth effective answer for delivering media substance to multiple destinations over the Internet. Be that as it may, in numerous current networks, a few nodes don't bolster multicast, i.e., they can't make multiple outgoing flows with one approaching data stream. In this paper, the authors propose a calculation for multicast tree calculation in networks with multicast inadequate nodes. Paths that start at the source and crossing all destinations are figured first; if such paths can't be discovered, destinations are partitioned into subsets and traverse paths are processed over every subset, which is executed recursively until doable trees can be constructed based on traverse paths found or no further segment is conceivable. Two methods for traverse path calculation are displayed and their particular advantages are talked about, regarding both complexity and arrangement optimality. The calculation is likewise appeared to be exceptionally compelling in discovering multicast trees regardless of the possibility that exclusive a couple multicast fit nodes exist in the network.

LI Xut et.al presented that [7] Mobile Ad hoc Networks presumes a critical part in crisis correspondences where network should be developed briefly and rapidly. Since the nodes move haphazardly, routing protocols must be exceedingly compelling and reliable to ensure fruitful packet delivery. Based on the data delivery structure, the vast majority of the current multicast routing protocols can be ordered into two envelopes: tree-based and mesh-based. They watch that tree-based ones have high sending effectiveness and low consumptions of bandwidth, and they may have poor robustness on the grounds that one and only link exists between two nodes. As a tree-based multicast routing protocol, MAODV demonstrates a magnificent execution in lightweight ad hoc networks. As the load of network expands, QoS is degraded clearly. In this

paper, they dissect the effect of network load on MAODV protocol, and propose an optimized protocol MAODV-BB which enhances robustness of the MAODV protocol by consolidating advantages of the tree structure and the mesh structure. It can update shorter tree branches as well as build a multicast tree with reinforcement branches. Mathematical examination and simulation results both exhibit that the MAODV-BB protocol enhances the network execution over conventional MAODV in substantial load ad hoc networks.

Pavel Nekrasov et al [25] In MANETs, because of the bandwidth confinement and links instability, multicast is regularly actualized utilizing SMF protocol. This methodology for multicast takes out the overhead came about because of building and keeping up a multicast tree. SMF protocol can be improved by selecting just a subset of hubs that shape a Connected Dominating Set (CDS) to hand-off the information to the whole network. The SMF protocol essentially advances multicast information to all hubs in MANET. If there should be an occurrence of locally located groups this methodology may prompt extreme redundancy. This paper exhibits an algorithm LG-CDS which proactively performs distributed election of relays for interfacing members of local groups utilizing just two-hop neighborhood data. It is important that the algorithm can be tuned to elect excess relays to enhance fault tolerance. Utilizing recreation as a part of ns-3 the technique demonstrates that LG-CDS gives high network capacity while being stable to topology changes. The Local Group Connected Dominating Set (LG-CDS) algorithm can be utilized as a part of conjunction with SMF protocol for multicasting in MANET. LG-CDS performs distributed election of relays for interfacing members of locally located groups utilizing just two-hop neighborhood data. It is significant that the algorithm can be tuned to elect excess relays to enhance fault tolerance. Utilizing recreation as a part of ns-3 helps in assessing the execution of LG-CDS and demonstrates that this methodology gives high network capacity while being stable to topology changes. The algorithm utilizes just two-hop neighborhood data which can be acquired from one hop HELLO-messages. It merits saying that LG-CDS can be changed in accordance with elect extra relays in this manner enhancing fault tolerance. The execution of LG-CDS is evaluated through reproduction in ns-3 utilizing SMF with UCDS algorithm as the reference point. Reenactment results have demonstrated that LG-CDS gives high network capacity while being stable to topology changes. Adding redundancy to LG-CDS permits it to show the same resistance to expanding speed as SMF with UCDS does. This proposes LG-CDS is a suitable answer for multicasting in MANETs when networks are substantial and groups are locally located.

III. TREE BASED MULTICASTING IN MANETS

In the present situation multicasting has high demand in light of the fact that numerous networks need multicasting routing to communicate with one to numerous or numerous to numerous [17] nodes. The mobile ad hoc networks in multicasting routing can be used in numerous areas even in disaster help and military. Along these lines the multicasting protocols comprise a high bundle delivery ratio in all circumstances including most extreme state (e.g., high mobility and high traffic load). The networks ought to contain a low overhead since bandwidth and battery power is extreme fundamental procurement for them [18]. To deliver data packets from sources to receivers of a multicast bunch tree-based multicast routing protocol development and robbery both multicast routing tree or various source-based multicast routing trees a unit for each and every gathering source. Recently approaches of tree-based multicast routing are multicast ad hoc on-demand distance vector protocol (MAODV), and adaptive demand-driven multicast routing protocol (ADMR) [19]. As in settled (non-mobile) multicast routing, tree-shared tree instead of uniformly dispersed all through the system, on the basis of which protocols fabricate a tree over which multicast data is sent. In spite of the fact that tree based approaches are bandwidth-proficient, they don't generally offer adequate strength and because of mobility susceptible for connection failure [20].

1. Source-Tree-based approach: In this approach each source node creates a solitary multicast tree containing every one of the individuals in a gathering. By and large, the path between the source and every part is not the one which is the most limited.

2. Shared-Tree based approach: A solitary multicast bunch including each source node is created is delivered for a multicast tree amid this approach. After that this tree is rooted at a node regarded as the core node. Each source uses this tree to begin a multicast. Shared-Tree-based approach is not suggested for most brief path for routing, be that as it may it treats single purpose of failure, and thus it frequently saves all the more routing data which leads to overhead. Alongside this, the traffic is totaled on the gives it low throughput [21].

ITAMAR gives a few heuristic plans for building different independent trees. These different backup-independent trees are ascertained with insignificant cover, in a manner that a tree is utilized until it falls flat and afterward is usurped by some other alternative tree. Calculation of independent is finished by minimizing the quantity of edges and nodes which are normal to the trees, based on assumption that node developments are not reliant of each other. This current protocol's point is to enhance the normal time between multicast tree failures. Additionally, new trees are figured at whatever point the possibility of failure for the present arrangement of trees ascends over a threshold. With regards to mobility, it is vital to evaluate the time when this happens, and after that, in the spot of usurping a tree if even one connection comes up short, utilizing an independent path algorithm may regard locate an arrangement of backup paths to usurp the part of the tree which is ruined [22].

Forward-Backward Tracking: Tracking frequently confronts with an issue where the points significantly change appearance or disappear from the camera view. Under such conditions, tracking often brings about disappointments. There is a need to propose a novel method that empowers any tracker to self-assess its reliability. The proposed method depends on so called forward-backward consistency assumption that correct tracking ought to be independent of the course of time-flow [23]. Initially, a tracker creates a trajectory by tracking the point forward in time. Secondly, the point location in the last frame introduces a validation trajectory. The validation trajectory is acquired by backward tracking from the last frame to the first. Third, the two trajectories are compared and in the event where they contrast significantly, the forward trajectory is considered as inaccurate.

IV. PROPOSED TECHNIQUE

In this work, novel technique is proposed which is based on multicasting in mobile ad-hoc network for path establishment from source to destination. The existing technique is based on broadcasting in which source node flood route request packets in the network and nodes which are adjacent to destination will respond back to source node with the route reply packets. The source node selects best path on the basis of hop count and sequence number. It is been analyzed that existing technique has more overhead and bandwidth consumption due to which multicasting technique is proposed which has less overhead and bandwidth consumption. In the proposed technique multicasting tree is established which is used for path establishment from source to destination. In the proposed technique destination node is responsible for path establishment. The destination node will send route request packets to multicasting nodes and multicasting node will backtrack the available path and path which has minimum hop count will be selected as the best path from source to destination. The second procedure in the proposed technique is based on tree maintains like if destination node change its location. In this case adjacent nodes of destination will send route recovery message to all multicasting nodes. The nodes which have path to destination respond back with their resources. The node which has higher number of sources is selected as best path recovery node.

Algorithm of Proposed Technique

Input : Number of nodes

Output: Path from source to destination

1. Tree {}

2. If D is the total nodes which not met criteria of offloading then
3. Terminate
4. End if
5. For node nodes $C \in D$ then
6. If (node (i) attributes = node(i+1) attributes)
7. Split node(i);
8. End if
9. End for
10. C(best)= best node for Destination
11. Tree=c(best) node as the root node
12. For all D(u) do
13. Tree=C4.5(D)
14. Attach branch nodes to the root node
15. End for
16. Return Tree

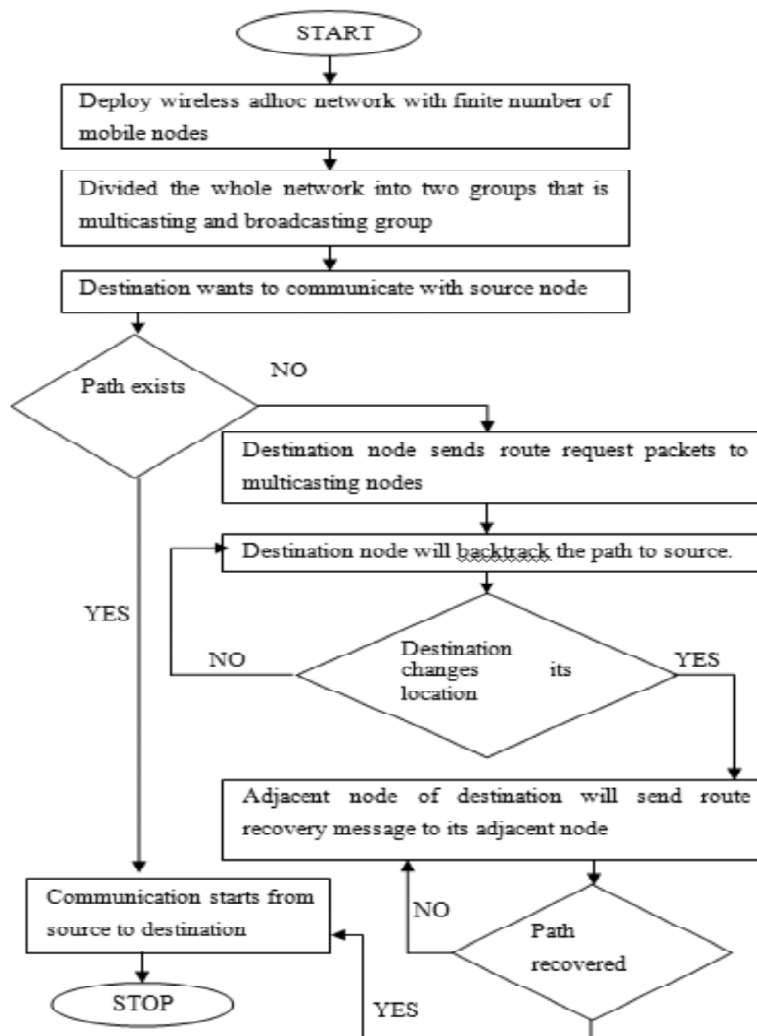


Figure 1: Flow chart of research design

V. EXPERIMENTAL RESULTS

1. Packet loss

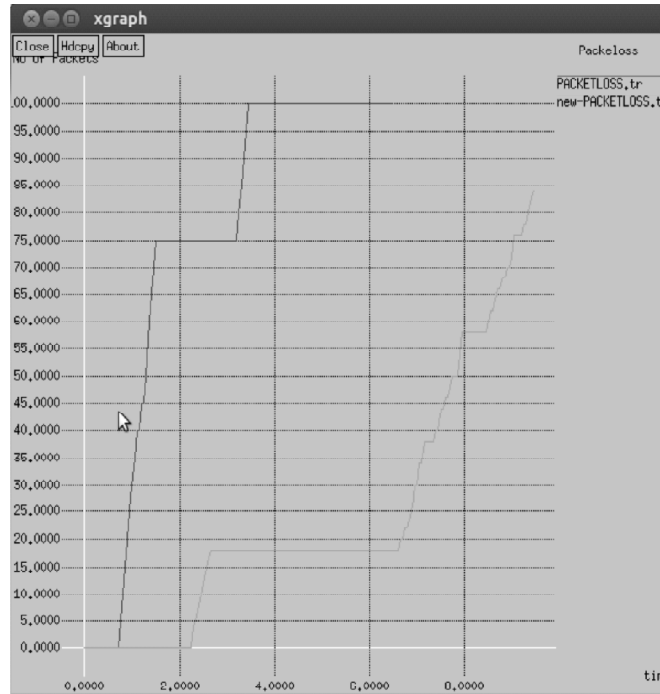


Figure 2: Packet loss graph

As illustrated in figure 2, due to broadcast nature of AODV protocol the packetloss is high in the network. The proposed technique will maintain multicasting tree which leads to reduction in network packetloss.

2. Throughput

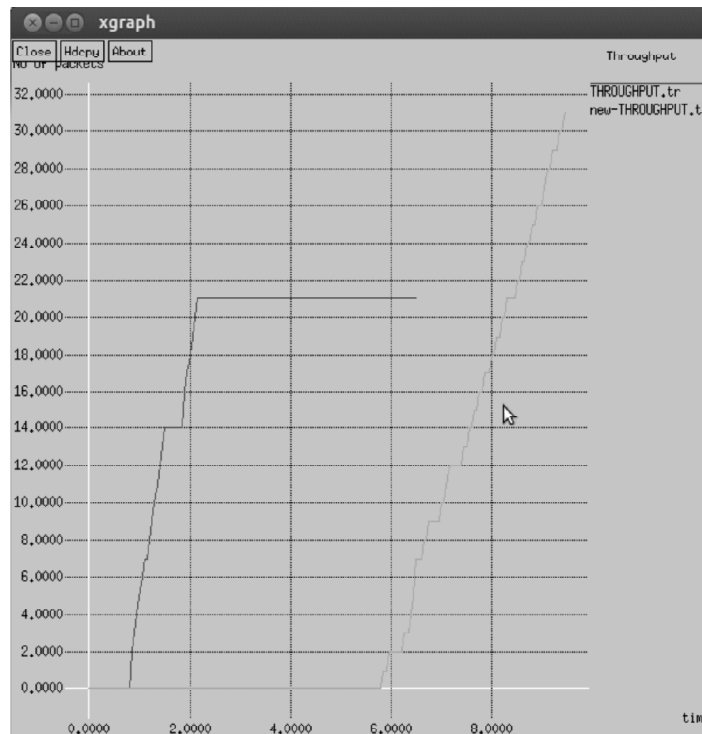


Figure 3: Throughput graph

As shown in figure 3, the network throughput is high as compared to existing broadcasting nature protocol. Due to high bandwidth consumption of existing technique leads to reduction in throughput. In the multicasting technique bandwidth consumption is less which leads to improvement in network throughput.

3. Routing overhead

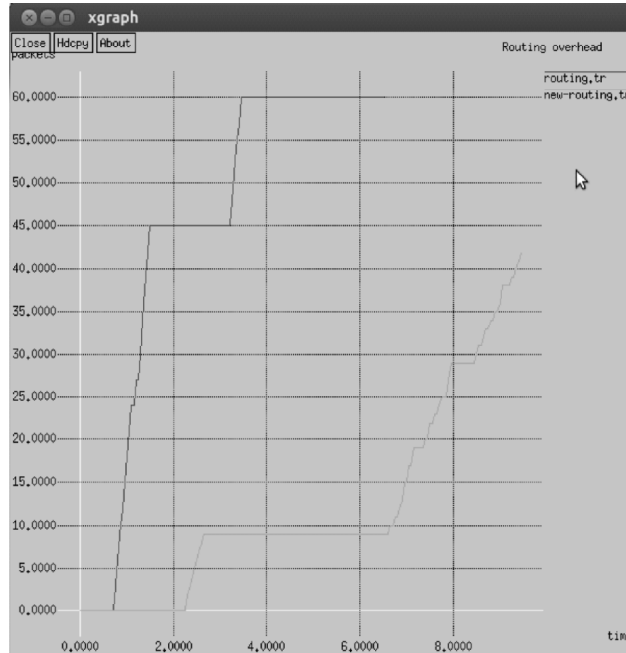


Figure 4: Routing overhead graph

As shown in figure 4, the routing overhead in the proposed technique is less as compared to existing technique. This is due to less bandwidth consumption in the proposed technique

4. Bandwidth

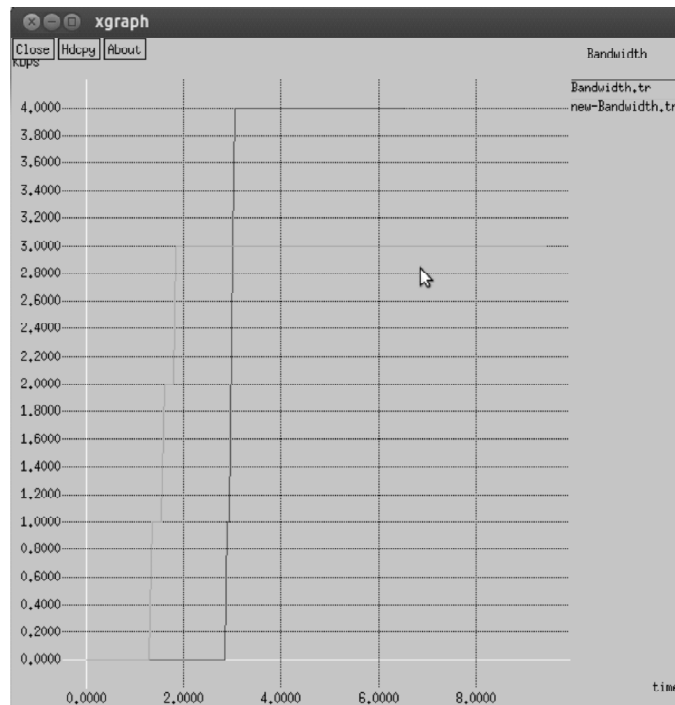


Figure 5: Bandwidth graph

In figure 5 the bandwidth consumption is less in the proposed technique as compared to the bandwidth in existing technique due to decrease in the routing overhead of packets in the proposed technique.

5. Energy

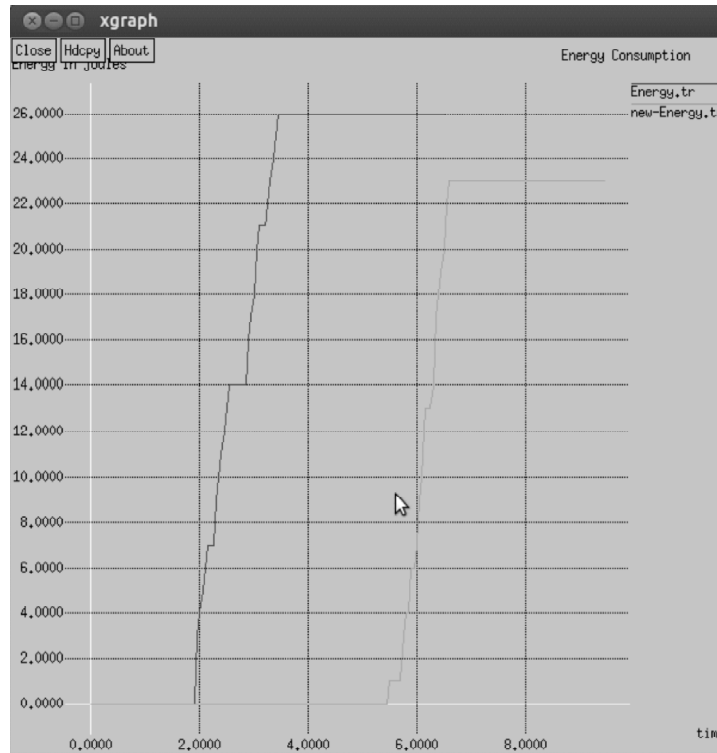


Figure 6: Energy graph

In figure 6 the decreased energy consumption has been observed in the nodes of the network in the proposed technique.

Table 1
Experiment Result

Parameters	Existing Algorithm	Proposed Algorithm
Packet loss	100 Packets	82 Packets
Throughput	21 Packets	31 Packets
Routing overhead	60 Packets	42 Packets
Bandwidth	4 kbps	3 kbps
Energy	26 J	23 J

VI. CONCLUSION

The mobile ad-hoc network is the decentralized type of network in which mobile nodes can join or leave the network when they want. Due to its self configuring nature routing is major issue of the network. The source node flood route request packets in the network to establish path to destination. This approach leads to increase in bandwidth consumption of the network. In this work, novel technique is proposed which is the multicasting technique and this technique is based on tree based topology. The simulation results show that proposed technique performs well in terms of throughput, packetloss, routing overhead, energy and bandwidth.

REFERENCES

- [1] Sunil Taneja, Dr. Ashwani Kush, Amandeep Makkar, "End to End Delay Analysis of Prominent On-demand Routing Protocols", IJCST Vol. 2, Issue1, March 2011.
- [2] Sevil Şen, John A. Clark, Juan E. Tapiador, "Security Threats in Mobile Ad Hoc Networks", 2010, vol.3, iss. 5, 1051-4651/10.
- [3] Wenjia Li and Anupam Joshi, "Security Issues in Mobile Ad Hoc Networks- A Survey", 2005, volume 5, issue 1.
- [4] Erik G. Nilsson and Ketil Stølen, "Ad Hoc Networks and Mobile Devices in Emergency Response – a Perfect Match", 2010, Vol. 16, Iss. 10, (IJCSEA).
- [5] Dhanalakshmi Natarajan and Alli P Rajendran, "AOLSR: hybrid ad hoc routing protocol based on a modified Dijkstra's algorithm", EURASIP Journal on Wireless Communications and Networking 2014, Volume 1, Issue 3.
- [6] Limin Tang, Wanjun Huang, Miguel Razo, Arularasi Sivasankaran, Marco Tacca, and Andrea Fumagalli, "Multicast Tree Computation in Networks with Multicast Incapable Nodes", 12th International Conference on High Performance Switching and Routing, IEEE, 2012, Vol 2, Iss2.
- [7] LI Xut, LIU Tianjiaot, LIU Yingt, TANG Van, "Optimized Multicast Routing Algorithm Based on Tree Structure in MANETs", China Communications February 2014, volume 7, iss 8.
- [8] Arush Gadkar, Jeremy Plante, and Vinod Vokkarane, "Manycasting: Energy-Efficient Multicasting in WDM Optical Unicast Networks", IEEE, 2011, vol3, iss 10.
- [9] Ting Lu and Jie Zhu, "Genetic Algorithm for Energy-Efficient QoS Multicast Routing", IEEE, 2011, volume 4, issue 10.
- [10] R. Manoharan and E. Ilavarasan, "Impact of Mobility on the performance of the multicast routing protocol in MANET", IJWMN, vol.2, No.2, May 2010.
- [11] Luo Junhai a,b, Xue Liu b, Ye Danxia, "Research on multicast routing protocols for mobile ad-hoc networks", Elsevier, 2007, volume 71, issue 29.
- [12] Mohammad Amin Kheirandish Fard, Enchanching Congestion Control To Address Link Failure Loss Over Mobile Ad-hoc Network", International Journal of Computer Networks & Communications (IJCNC) Vol.3, No.5, Sep 2011.
- [13] Wenjia Li and Anupam Joshi, "Security Issues in Mobile Ad Hoc Networks- A Survey", 2005, vol 2, issue 9.
- [14] Vinit Garg, Manoj Kr. Shukla, Tanupriya Choudhury, Charu Gupta, "Advance Survey of Mobile Ad-Hoc Network," IJCST Vol. 2, Iss ue 4, Oct . - Dec. 2011.
- [15] Humayun Bakht, "Survey of Routing Protocols for Mobile Ad-hoc Network", Volume 1, iss. 6, October 2011 ISSN-2223-4985 International Journal of Information and Communication Technology Research.
- [16] Er.Rubia Singla, Er.Jasvir Singh, "Review on Node-Disjoint Multipath Routing Based on AOMDV Protocol for MANETS", International Journal of Computer Science and Information Technologies, Vol. 5 iss 3 , 2014, pp 2755-2757, 2014.
- [17] Abderrahim Benslimane, Cédric Ferraris, and Abdelhakim Hafid," A Comparative Analysis of Multicast Protocols for Small MANET Groups", 2007, LNCS 4686, pp. 213–225, vol 6, issue 6.
- [18] Is-Haka M. Mkwawa and Demetres D. Kouvatso, " Broadcasting Methods in MANETS: An Overview", 2011, LNCS 5233, pp. 767–783, volume 10, issue 8.
- [19] Sangman Moh, Sang Jun Lee, Chansu Yu," Adaptive multicast on mobile ad hoc networks using tree-based meshes with variable density of redundant paths", 2008, Springer Science+Business Media, LLC, volume 4, issue 3.
- [20] Chao Gui, Prasant Mohapatra," Overlay multicast for MANETs using dynamic virtual mesh", 2007, Springer Science+Business Media, LLC, vol. 8, issue 2.
- [21] Uhjin Joung, Hong-Jong Jeong, and Dongkyun Kim," Overlay Small Group Multicast Mechanism for MANET", 2006, LNCS 4217, pp. 205–215, volume 13, issue 14.
- [22] Jason Xie, Rajesh R. Talpade and Anthony Mcauley, Mingyan Liu,' AMRoute: Ad Hoc Multicast Routing Protocol", 2002, Networks and Applications 7, 429–439, Vol. 11, Issue. 14.
- [23] Zdenek Kalal, Krystian Mikolajczyk, Jiri Matas, "Forward-Backward Error: Automatic Detection of Tracking Failures", 2010, ICPR, 1051-4651/10, Vol. 5, Issue 9.
- [24] Sapna B Kulkarni and Dr. Yuvaraju B N, "Node Connectivity, Energy and Bandwidth Aware Clustering Routing Algorithm for Real-time Traffic Multicasting in MANET", IEEE, 2015.
- [25] A. G. Kiryanov, A. I. Lyakhov, P. O. Nekrasov, D. A. Platov, A. A. Safonov, R. U. Feizkhanov, E. M. Khorov, and A. M. Tsyganov, "ProximityúBBased Groupcast in MANET (GiM)", Journal of Communications Technology and Electronics, 2012, Vol. 57, No. 12.