Efficient Mobile Ad Hoc Routing Protocol for Overhead Reduction

C. Arun Kumar, Research Scholar, Department Of Information and Communication Engineering, Anna University
R.S.D.Wahidabanu, Professor, Government College of Engineering, Salem
S.K.Deepa, Assistant Professor, Mahendra Engineering College, Namakkal
K.Pradeep, P.G.Student, Mahendra Engineering, College, Namakkal

Abstract— MANET's have high mobility of nodes due to which there exists a frequent link breakage leading to path failures and route discoveries. The overhead of route discovery cannot be neglected. Broadcasting is the primary and effective data dissemination in route discovery, where a mobile node blindly re transmits the first received route request packets except it has a route to the destination, and therefore it cause the broadcast storm problem. In this paper, there is a new neighbor coverage-based probabilistic rebroadcast protocol for reducing the routing overhead in MANETs. To organize this, effectively exploit the neighbor exposure information, a novel rebroadcast delay to determine the rebroadcast order. The more accurate additional coverage ratio is obtained by sensing neighbor coverage knowledge has been proposed in this paper. A connectivity factor to provide the node density adaptation has also been defined. By combining the additional coverage ratio and connectivity factor, a reasonable rebroadcast probability can obtain. We introduce E-Endaira protocol to calculate the rebroadcast delay and exploit the neighbor coverage information. This work combines the advantages of the neighbor coverage knowledge and the probabilistic mechanism, which can drastically decrease the number of rebroadcasting so as to reduce the routing overhead and in turn, can also improve the routing performance. This in addition also enhances the existing method of having efficient broadcast with added security.

Index Terms— ***MANET, DSR, E-Endaira*** .

1 INTRODUCTION

The Dynamic and self- configuring nature of MANET's make them to be used in specific situations where rapid network deployments are required or it is primarily costly to deploy and manage network infrastructure. Broadcasting techniques are broadly classified into Probability Based Methods, Area Based Methods and Neighbor Knowledge Methods. Simple Flooding requires each node to rebroadcast all packets. Probability Based Methods use some basic understanding of the network topology to assign a probability to a node to rebroadcast. Area Based Methods assume nodes have common transmission distances; a node will rebroadcast only if the rebroadcast will reach sufficient additional coverage area. Neighbor Knowledge Methods maintain state on their neighborhood, via "Hello" packets, which is used in the decision to rebroadcast.

2 EXISTING SYSTEM

The existing system comprises of various effective techniques used in MANET for reducing overhead. Initially in this paper we discuss about the existing mechanisms (1) like broadcasting mechanism for route discovery, rebroadcasting is costly and also consumes a large network. This broadcasting induces a huge routing overhead which causes many problems in the network such as redundant retransmissions, collisions of packets and contention. The authors have implemented probabilistic rebroadcast mechanism in which a delay is introduced to establish the neighbor coverage information which will help in finding correct extra coverage ratio and rebroadcast organization. In paper (3) the author discusses about energy saving scheme by using AODV protocol based Expanding Ring Search (ERS). They implemented the scheme called E^{2}AODV protocol based on relay value, the redundant rebroadcasting of the RREQs are reduced and provides 65-75% less overhead than AODV.

2.1 Disadvantages of existing system:

The existing broadcasting protocol tested analytically and experimentally, and showed that the rebroadcast is very costly and consumes too much network resource. The broadcasting incurs large routing overhead and causes many problems such as redundant retransmissions, contentions, and collisions

3 PROPOSED SYSTEM:

In this paper we discuss about the proposed work which includes the neighbor coverage based probabilistic rebroadcast protocol which combines both neighbor coverage and probabilistic methods. Consecutively to effectively develop the neighbor coverage information, a novel rebroadcast delay to determine the rebroadcast sequence, and that can obtained in a more accurate additional coverage ratio. To maintain the network connectivity and to reduce the redundant retransmissions, it also needed a metric named connectivity factor to determine how many neighbors must receive

the RREQ packet. Later, by combining the additional coverage ratio and the connectivity factor, we would initiate a rebroadcast probability, that can be used to reduce the number of rebroadcasts of the RREQ packet and to improve the routing performance.

This paper explains the schemes to calculate the rebroadcast delay to determine the forwarding error. Nodes having more common neighbors compared to the previous nodes are considered having less delay as well as if this node rebroadcast a packet, then extra neighbors will know about this information. Hence, this rebroadcasting is the primary input for the success of this scheme. The information about the uncovered neighbors, local node concentration along with the connectivity metric is also focused. The rebroadcast probability has two main divisions first it describes about the number of nodes that should be covered by a particular broadcast to the total number of neighbors. Additionally the connectivity factor which reflects the association of the network, the number of neighbors of a given node.

The protocol used here is E-Endaira algorithm (extended) is proposed to be implemented uses acknowledgement based reply to discover the secured routes which provides security to overcome the hidden channel attack. E-Endaira algorithm uses hash based technique in which, whenever a source sends its route request to its neighbor, the neighbor node which receives the route request send an acknowledgement based reply that it has received the route request and hence it avoids the presence of faulty nodes by which the source receiving the identity of every node in the network and hence the network is more secure without harmful nodes. Therefore the route discovered is secure.

4 Neighbor Coverage Based Probabilistic Rebroadcast (NCPR) Protocol:

To effectively utilize the neighbor coverage information, we need a original rebroadcast delay to determine the rebroadcast sequence, then it can obtain a more exact added coverage ratio. In order to keep the network connectivity and to reduce the redundant retransmissions, it also needed a metric named connectivity factor to determine how many neighbors should receive the RREQ packet. So we implemented Rebroadcast Delay, Rebroadcast Probability.

4.1 Risk-Aware Response Mechanism:

The adaptive risk-aware response mechanism is based on quantitative risk estimation and risk acceptance. Instead of applying simple binary isolation of harmful nodes, this approach adopts an isolation mechanism in a temporal manner based on the risk value. Here risk assessment is performed with the extended D-S evidence theory introduced for both attacks and corresponding countermeasures to make more accurate response decisions. This risk aware response mechanism is divided into the following:

Evidence collection-This method Intrusion Detection System (IDS) gives an attack alert with a assurance value, and then Routing Table Change Detector (RTCD).

Risk assessment- Alert assurance from IDS and the routing table varying information would be more considered as independent evidence for risk calculation and combined with the extended D-S theory.

Decision making- The adaptive decision component provides a flexible reply for decision making method, which takes risk evaluation and risk tolerance into explanation.

Intrusion response- With the help of output from risk evaluation and decision-making component, the corresponding response measures, including routing table recovery and node isolation, are carried out to mitigate attack damages in a distributed manner.

4.2 Response to Routing Attacks

We also use two different responses to deal with different attack methods: routing table recovery and node isolation Routing table recovery includes local routing table recovery and global routing recovery. Local routing recovery is performed by sufferer nodes that detect the attack and automatically recover its own routing table.

Advantages:

The proposed protocol E-Endaira reduces the routing overhead in MANETs. The neighbor coverage information includes additional coverage ratio and connectivity factor. A new scheme is obtained to dynamically calculate the rebroadcast delay, which is used to determine the forwarding sequence and more resourcefully utilize the neighbor coverage information. Simulation results show that the proposed protocol generates less rebroadcast traffic than the flooding and some other optimized schemes.

4.3 DSR protocol:

Dynamic Source Routing (DSR) is a routing protocol for MANETS are similar to AODV in that it forms a route on-demand when transmitting between nodes. Though, it uses source routing instead of depending on the routing table at each intermediate device. The route discovery and route maintenance mechanisms are helpful in the network to route packets between successive nodes. When the path gets accumulated information is cached by nodes processing the route discovery packets. The known paths are used to route packets. To achieve source routing, the routed packets contain the address of each device the packet will cross. This may result in high overhead for long paths or large addresses, like IPv6. To keep away from using source routing, DSR optionally defines the hopping techniques to avoid such defects. DSR is actually based on source routing whereby all the routing in sequence is maintained at mobile nodes. Route Reply would only be generated if the message has reached the proposed destination node.

To revisit the Route Reply, the destination node must have a route to the source node. If the actual route is in the destination Node's route cache, the route may be used. Or else, the node will reverse the route based on the route trace in the Route Request message header .In this event of terminal broadcast, the Route Maintenance Phase is initiated whereby the Route Error packets are generated at a node. The invalid hop will be removed from the node's route cache and all routes containing the hop are reduced at that point. Again, the Route Discovery period is initiated to establish the most possible route.

5 Results and Discussions.

The simulation results also show that the proposed protocol has good performance when the network is in high density or the traffic is in heavy load. A simulation based framework for on-demand source routing protocols that allows us to give a particular description of routing security, to model the procedure of a given routing protocol in the presence of an opponent, and to prove that the protocol is secure. This paper also discusses on the proposed on-demand source routing protocol, E-Endaira and made a complete simulation. In this paper we proposed a general solution to packet dropping misbehavior in mobile Ad Hoc networks. The solution allows monitoring, detecting, and isolating the droppers. It implement the solution with the secure source routing protocol ENDAIRA, and made a comprehensive simulation study to first fix the crucial parameters of our solution to best values, and then to compared it with the fundamental protocols. Compared with ENDAIRA, the cost of our protocol is really minor, in both latency and power utilization. On the other hand, there is a significant difference between these secure protocols and DSR. This difference is caused mainly by the employment of digital signatures, which indeed are robust but costly. Implementing our solution with another lighter secure routing protocol could represent a perspective to this work. Proposing a solution for self setting the parameters according to network configuration and conditions also represents a potential perspective.

6 Simulation Parameters:

Parameter	Value
Terrain Size	(1200, 1200) Esq.
Simulation Time	15000 sec
Number of Nodes	100
Node Placement	Uniform
Transmission Range	200m
Bandwidth	2MHz
Propagation Model	Random Way Point Model
Minimum Speed	0 sec
Maximum Speed	30
Pause Time	20 Sec
MAC protocol	802.11
Network protocol	IP

7 RESULTS:

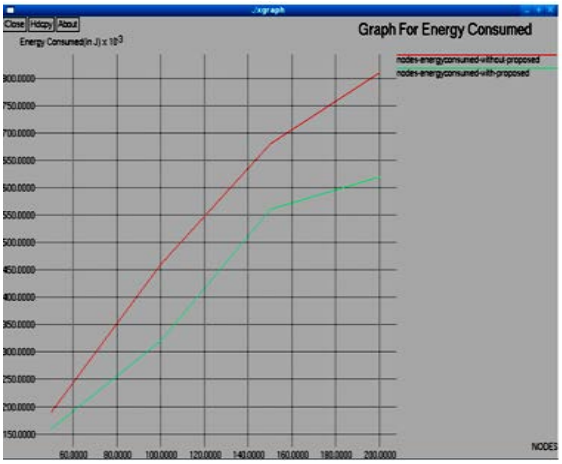

Fig 1: Graph showing energy consumed

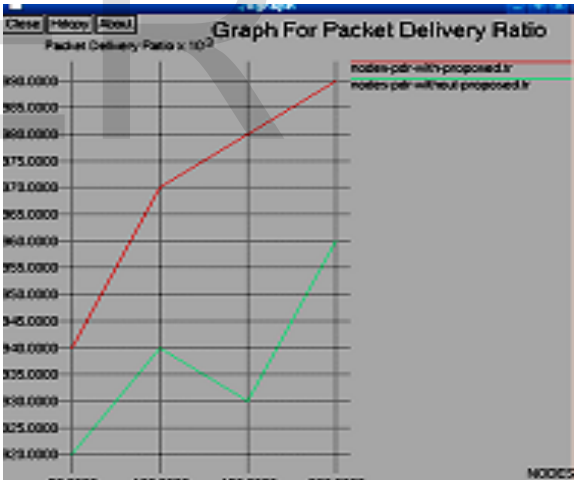

Fig 2: Grapg for Packet delivery ratio

8 Conclusion:

In this paper, a probabilistic rebroadcast protocol based on neighbor coverage is used to minimize the routing overhead in MANETs. The neighbor coverage information includes additional coverage ratio and connectivity factor. This proposes a new method to dynamically analyze the rebroadcast delay, which is used to establish the forwarding sequence and more effectively utilize the neighbor coverage information. Simulation results show that the proposed protocol generates less rebroadcast traffic than the flooding and some

other optimized schemes. Because of less redundant rebroadcast, the proposed protocol mitigates the network collision and contention, so as to increase the packet delivery ratio and decrease the average end-to-end delay.

9 Future work:

The future scope of this technology is tremendous and a lot of research is currently going on to further improve data services for the users. Attacks against Ad Hoc routing protocols can be subtle and thus difficult to discover. Since proving that a routing protocol is free from attacks is impossible by informal reasoning. As the future works, we would test and implementation in the real world which is more exposed to the real attacks.

10 References:

[1] Ambarish R. Bhuyar , Prof. V. T. Gaikwad"A Review on Reducing Routing Overhead in Mobile Ad Hoc Network using Probabilistic Rebroadcast Mechanism", IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 5 (1) , 2014,390-393.

[2] Rupali Mahajan, Rupali Jagtap "Energy Efficient Routing Protocols for Mobile Ad-Hoc Networks", International Journal of Science and Modern Engineering (IJISME) ISSN: 2319-6386, Volume-1, Issue-3, February 2013

[3] Dr.G.Mary Jansi Rani, Dr. S. Arumugam," Control overhead reduction: A Hierarchical Routing Protocol In Mobile Ad hoc Networks", International Journal on Computer Science and Engineering.

[4] S. Sindhuja S. vidhya," Enabling efficient rebroadcast for reducing routing overhead in MANETS", International Journal of Technology Enhancements and Emerging Engineering Research, vol 2, issue 6 65 issn 2347-4289.

[5] Pedro M. Ruiz, Antonio F. Gomez-Skarmeta, "Reducing Data-Overhead of Mesh-based Ad hoc Multicast Routing Protocols by Steiner Tree Meshes",

[6] J.D. Abdulai, M. Ould-Khaoua, L.M. Mackenzie, and A. Mohammed,"Neighbour Coverage: A Dynamic Probabilistic Route Discovery for Mobile Ad Hoc Networks," Proc. Int'l Symp.Performance Evaluation of Computer and Telecomm. Systems (SPECTS'08), pp. 165-172, 2008.

[7] J.D. Abdulai, M. Ould-Khaoua, and L.M. Mackenzie, "Improving Probabilistic Route Discovery in Mobile Ad Hoc Networks," Proc.IEEE Conf. Local Computer Networks, pp. 739-746, 2007.

[8] H. AlAamri, M. Abolhasan, and T. Wysocki, "On Optimising Route Discovery in Absence of Previous Route Information in MANETs," Proc. IEEE Vehicular Technology Conf. (VTC), pp. 1-5, 2009.

[9] D. Johnson, Y. Hu, and D. Maltz, The Dynamic Source Routing Protocol for Mobile Ad Hoc Networks (DSR) for IPv4, IETF RFC 4728,vol. 15, pp. 153-181, 2007.

[10] A. Mohammed, M. Ould-Khaoua, L.M. Mackenzie, C. Perkins,and J.D. Abdulai, "Probabilistic Counter-Based Route Discovery for Mobile Ad Hoc Networks," Proc. Int'l Conf. Wireless Comm. And Mobile Computing: Connecting the World Wirelessly (IWCMC '09),pp. 1335-1339, 2009.