International Journal of Engineering Research ISSN:2319-6890)(online),2347-5013(print)
Volume No.5, Issue No.1, pp : 62-65 01 Jan. 2016

Secured Energy Efficient Rebroadcasting With Neighbour Knowledge In MANET

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Abstract: Mobile Ad hoc network is an infrastructure less communication network built with limited resources and absence of centralized management. It has a critical issue of energy efficiency and security. This paper proposes an improved rebroadcasting method which takes decision on the basis of energy and node density; also packets are secured by encryption to avoid from misuse.

Keywords: Mobile Ad-hoc network, Neighbour Coverage, Probabilistic Rebroadcast, Routing overhead, AES

I. Introduction

In MANET nodes plays a very important role. Nodes can change their location accordingly as per the need of network. Mobile Ad-hoc Networks (MANET) do not need fixed infrastructure they are capable to build virtual infrastructure where nodes can communicate in seamless manner. Nodes are acting as router and also as host. Multi-hop transactions are allowed with rebroadcasting the received packets. This network is very useful in scenarios like emergency situations, disaster rescue operations, collaborative group meetings and military operations. Broadcasting is a widely used technique in which packet transmitted by a node is simultaneously received by all its neighbours. This mechanism is useful for route discovery and network maintenance. Flooding is used as a simplest way of broadcasting in which every node blindly rebroadcasts the received packet in the network. In large mobile environments, flooding has the overhead of redundant retransmission, contention and collisions. It also raises several other issues like its inefficiency in terms of resource consumption such as bandwidth and energy. Batteries are the only sources of energy in MANET, so structure has to rely on them. Reduction in energy consumption is the main aim of design architecture, which requires less power consuming approaches.

MANET contains nodes which operate on the battery. Mobile nodes have decreased energy. So for use of battery energy life, nodes should be energy preserved i.e. it needs to save energy. Energy controlling is responsibility of MAC layer. Network layer will take choices depends on traffic and topology. Energy spent by sleeping node is meaningfully fewer than transmit, receive or idle state. We choose the Path which consumes less power.

As packets travelling in existing approach are unsecure without any proper security, so if any attack occurs our sensitive information will be lost. So in our proposed system we are going to send packets in the form of files. At the source end we will` brows the file and send it to destination in the form of packets. Also to make this file secure we will use AES encryption system. AES is reversible. It means the same stages are done to whole both encryptions and decryptions in inverse order. It operates on the bytes, which is making it simpler to implement. The key expanded to separate sub keys, sub keys for respectively operations round. This procedure is named KEY EXPANSION.

II. Literature review

The routing overhead occurred because of the diffusion of routing control packets such as RREQ (Route Request) packets can be quite huge, especially when the network topology frequently changes due to some factors. Traditional on-demand routing protocols that we use, produce a large amount of routing traffic by blindly damaging the entire network with RREQ (Route Request) packets during route discovery. Recently, the issue of reducing the routing overhead associated with route discovery and maintenance in on demand routing protocols has attracted increasing attention. The protocol catches routes on the demand using flooding networks with the Request packets. The disadvantages of algorithm are:

1. High inactivity in routs finding.
2. Extreme floods make network jam.

The AODV protocol is envisioned for the use by nodes in ad hoc networks. It proposals rapid adaptation to lively link circumstances, little processing and also the memory overheads, low networks utilizations, and controls routes to destination inside network. It usages destination order numbers to confirm loops freedom all times, avoiding problem related with distance vector protocol. [1]

The DSR is simple and efficient routing protocol designed specifically for use in multi-hop wireless ad hoc networks of mobile nodes. It allows networks to completely organizing and configuring, without need for network infrastructures. Protocol gets composed of two methods for Discovery of Route and Maintenance. It works together which allows node to determine and preserve routes to any random destinations in network. It allows node to forwarding or to overhearing packet to cache routing info for their future usage. All features of protocols work entirely on the demand, letting routing packets overheads of DSR protocol to gauge automatically. It needed to respond to variations in routes presently in usage. Authors evaluated process of DSR over thorough simulation on diversity of movement and communication. It is done through implementation and important experimentation in physical ad hoc network test constructed in the Pittsburgh, and demonstrated performance of protocol. [2].

This paper presents novel routing protocol for networks, called OTRP. This routing protocol has impending to provide scalable information delivering in large ad hoc networks. The novelty of these protocols is in their approach to route discovery, where a route is determined only when it is required by initiating a route discovery procedure. The protocol chains idea of hop routing like AODV with route detection algorithm called Tree based Optimize Flooding to improve scalability of networks if

ISSN:2319-6890)(online),2347-5013(print)
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there is no preceding knowledge about destination. To attain this in OTRP, discovery expenses are reduced by flooding network through incomplete set of nodes, mentioned to branching nodes. The analysis and the simulations showed that the OTRP outdoes reduces overheads as the number of nodes and traffics get increased. [6] proposed two new probabilistic route discovery method, called Adjusted Probabilistic route discovery(AP) and Enhance Adjusted Probabilistic route discovery (EAP) which addresses the broadcasts storm problem in the existing on-demand routing protocols. The forwarding probability is determined by taking into account about the local density of the sending node. In order to reduce the routing overhead without degrading the network throughput in dense networks, the forwarding probability of nodes located in sparse areas is set high while it is set low at nodes located in dense areas. EAP-AODV reduces overhead by 71% while APAODV reduces the overhead by 55% [3].

This paper is offers frameworks for quantifying overhead of active routing protocol in MANETs. Paper is focusing on circumstances where nodes are moving but wireless transmission can decoded reliable if nodes are in communication. The protocol further singled out for analysis, joining proposed logical models. Consequences are like against Qualnet simulation for random movement, which verify essential characteristics of analytical result. The key vision can haggard from results of paper is nodal movement will be derived up overheads by penalty, which will be function of overall constancy of network [4].

Since the radio signal is overlay with the others in geographic area, forthright distribution by flood is typically costly and result the thoughtful redundancy, contentions, collisions, to we mention as broadcasts flood problems. Here problem is classified by viewing serious it is finished examines and simulation. We suggest numerous schemes which decrease rebroadcasts and delay of rebroadcast to ease the problem. The results are obtainable, which is showing levels of development over flooding issues [5].

Proposed a rebroadcast probability function which takes in to account about worth of packets together with key parameters i.e. topology size, the range of transmission and the number of nodes to control rebroadcast probability. The probability of nodes is calculated founded on these parameters. Compared to the other schemes, simulation results have revealed that counter Function achieved superior saved rebroadcast (about 20% better than its closest competitor i.e., counter-based scheme, in dense network) and end-to-end delay (around 26% better than counter based scheme in dense network without sacrificing reachability in medium and dense networks [6].

Network wide broadcasting in MANET delivers significant control and the route founding functionality for unicast and the multicast protocols. Seeing its use as building blocks for the extra network protocol, MANET needs to regulate methodology which delivers packets from one to other nodes. Although substantial number of broadcast schemes, no complete relative analysis has before done. This work provides such analysis using classify of existing broadcast scheme into groups and simulate subsets of category, so providing shortened but complete side by side evaluation. The simulation is designed in each category, exact disappointments to network conditions that relevant to MANET [7].

Due to high mobile nature of nodes MANETs, frequent breakages in links which lead to frequent path failures and also, route discoveries. We cannot neglect the overhead of route discovery. In the discovery of route, broadcasting is important and real data dispersal mechanism where node is rebroadcasting existence unaware, first received request packet if it has way to destination, so it reasons broadcast flood problem. We propose coverage based probabilistic rebroadcasting protocol for dropping overhead in the MANETs. To effectively feat neighbour coverage knowledge, we propose a novel rebroadcast delay to determine the rebroadcast order, we obtain accurate added coverage ratio by detecting neighbour coverage information. We describe connectivity factors to deliver node adaptation. It is combining coverage ratio and the connectivity factors; it set sensible probability. [8].

III. Related Work

The coverage area which node covers is used for adjustment of rebroadcasting probability. If node located closer to the sender, it means small additional coverage and rebroadcasting from same node reach less added nodes, and it is rebroadcasting probability will fixed lesser. Aware broadcasting schemes is planned to profit greater performance in the terms of packet delivery ratios and number of retransmit the nodes. It is sufficient for informal execution without use of neighbour's info or maintain counter for duplicate packets. [1]

IV. Existing work

Neighbour coverage based probabilistic rebroadcasting (NCPR) is calculating the rebroadcast delay and rebroadcast probability [12]. To successfully use the neighbour coverage knowledge, a novel rebroadcast delay is used to find out the rebroadcast order, and then can get a more correct additional coverage ratio. Network connectivity is used to reduce the redundant retransmissions; a metric named connectivity factor is used. A rebroadcast probability is set, by joining coverage ratios and connectivity factors. It is used to reduce the number of rebroadcasts of the RREQ (route request) packet, to improve the routing performance. It has very less routing overhead and less end to end delay.

The rebroadcast probability can be considered of containing two parts:

A. Additional coverage ratio:

Additional coverage ratio defined as, the ratio of the number of nodes enclosed by the single broadcasting to total neighbours.

Additional coverage = no of nodes covered by single broadcast / total no of broadcast ratio

B. Connectivity factor:

Connectivity factor plays very important role in network coverage. Connectivity factor, as the name suggests, gives relations of networks connectivity and neighbours of node. This scheme uses a rebroadcast delay which helps us to identify the forwarding order and more efficiently exploit the neighbour knowledge. This Creates less rebroadcast traffic than flooding and other schemes. Because of less redundant broadcast it reduces network collision and contention and so increases the packet delivery ratio and decreases average packet end-end delay. Also

has high performance when the network density is high or heavy traffic load.

Calculation of distances to all neighbours does not rely on trust-worthy nodes. This suit, stable sensor networks and it requires several nodes to share info on signal produced by node. The location should verify. This approach services node to collecting information on neighbour actions beforehand choice can occupied, making solution, not fit too many situations.

V. Proposed Work

Each node has a certain battery life. Each node is having density in its surrounding which will be saved in table of proposed protocol. If there is a way to the destination then also intermediate node doesn't forward packets directly to the destination. First node will check its own battery and then node density. There must be enough nodes to forward RREQ packets so second parameter is considered. Two thresholds are taken into consideration.

- ThB (RREQ rebroadcasting)
- ThD (density of the environment)

If batter life is greater than ThB and node density greater than ThD of node who receives RREQ packet then that packet is considered efficient to rebroadcast RREQ which successfully reach to destination.

But if above condition is not satisfied then node stores packet and the above process is repeated until node is found to rebroadcast or sufficient number of checks are over. So unnecessary packet rebroadcasting is avoided also nodes having less energy are avoided to form path so strong path will be established for communication. As packets are encrypted so no compromise of data will be done by intermediate nodes.

Proposed work for security:

In existing system plane packet is travelled. Also they are unsecured. If any attack gets occurred our sensitive information will be lost. So in our proposed system we are going to send packets in the form of files. At the source end we will brows the file and send it to destination in the form of packets. Also to make this file secure we will use AES encryption system. In this at source end file get encrypted using public key generated by AES. It will travel to the destination through the network. Finally at the destination end it will get decrypted to original, using key which exists at destination only.AES scheme is iterated symmetric block cipher.

It has following properties of:

- AES repeats similar defined stages many times.
- AES algorithm is having secret keys encryptions.
- AES operates on a fixed number of bytes.

AES is reversible. It means the same stages are done to whole both encryptions and decryptions in inverse order. It operates on the bytes, which is making it simpler to implement.
The key expanded to separate sub keys, sub keys for respectively operations round. This procedure is named KEY EXPANSION.

VI. Proposed algorithm

- MANET initializes the nodes in the network randomly.
- S broadcasts RREQ packet to any intermediate node after encryption by AES.
- Intermediate node will calculates node density and checks lifetime.
- Check own battery life also calculate the node density of the surrounding (Coverage area).
- If Battery life < than the Threshold 'x'
- (In this context, Threshold means minimum limit of battery)
- Remain silent and after some time drop RREQ packet.
- Else If count < the Threshold 'y'
- Then, Packets are stored in node's buffer.
- Else
- RREQ is broadcasted further.
- If destination reached notify source about path, it decrypts packet by AES.
- Performs communication by AES encryption.

VII. Conclusion

A new secured neighbour based broadcasting algorithm for mobile ad hoc network is proposed to reduce routing and maintenance overhead of the network. This method gives security by introducing packet encryption before it is sent to the network. AES encryption is introduced for better security. Additionally this method includes neighbour coverage and timer based approach to identify the immediate rebroadcasting and wait states. Also by consideration of energy level of nodes decision is made as if RREQ packet is forwarded or not. So any weak routing path generation is avoided. This proposed method exploited the neighbour knowledge more efficiently to improve the performance of network. This approach optimizes MANET by giving efficient route with better energy so it can work for more time without getting down due to node crash. Also packet security is introduced which gives deterministic packet delivery to the destination.

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