

Efficient on-Demand Routing Protocol for Mobile Ad hoc Network

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Abstract— Mobile Ad hoc Network (MANET) is collection of all individual mobile nodes (with in transmission range) that able to communicate via air link for emergency environment world anytime anywhere in the network link with all the nodes each other with acts as transmitter, receiver and router. This self configured infrastructure less network degrade network performance due to so many problems such as overhead, end-to-end transmission delay, throughput, energy, security for malicious nodes, bandwidth and storage etc., more are less energy and security attacks is very dangers issue due to dynamic nature, battery power, packet drop, misbehaviour attack, conjunction and mobility. TO overcome and reducing packet loss rate we developed and tested this research work efficient packet drop model called Relay Node Selection Randomly (RNSR) for MANET designed and compare to existing research work of traditional Dynamic Source Routing (DSR) on-demand that overcome existing issue and increasing node lifetime when solve energy problem. Simulation results of suggested work better than DSR analysis with parameters such as end-to-end delay and remaining energy using RNSR under leading simulation model called Network Simulator (NS2).

Index Terms— Ad hoc, MANET, Energy, Security, Ns.

I. INTRODUCTION

Infrastructure (base station based) and Infrastructure less network (base station based) that means cellular network and ad hoc network: wireless ad hoc network also classified different types of temporary network such as mobile ad hoc networks, wireless sensor networks, wireless mesh network and vehicular ad hoc networks that developed especially safety with quick emergency communication and traffic management etc.,. A mobile ad hoc network is collection of separate autonomous mobile nodes that connect and communicate through air links figure 1 show simple diagram of mobile ad hoc network. **MANET having some unique characteristics is given below:** Self organization nodes, Peer-to-peer, Multi hop, Dynamic, Low power, Auto configured, Limited security, Inefficiency.

All the MANET related research and communication performances based on routing protocols, classified three types first routing is proactive or table driven, reactive or on-demand and hybrid routing protocols every protocol having some unique advantage and drawbacks than other protocols. Although these research papers contribute and we discussed existing suggested technology for energy because of when reduced delay and retransmission also avoided misbehavior attacks.



Figure 1 A simple diagram of MANET

II. BACKGROUND WORK

Part of in this work here we discussed some of efficient developed existing research work with outcome of advantage to developed system and drawbacks of different designs. Single and double scalar multiplication algorithms were almost always faster than their widely used counterparts. Moreover, this algorithm increased energy consumption because of increase the average running time of network taken by **Jithra Adikari et al, (2010)**. Improve whole network life time and communication duration will be increased in this aspect one of the researchers is strongly suggested efficient model called PEER protocol that improve maximized energy discussed by **Jinhua Zhu and Xin Wang [2011]**, overall network remaining energy 25.67% is increased then existing model although proposed model not consider misbehaviour. Power Control Ad hoc On-Demand Distance Vector (PC-AODV) this idea simulate using 100 nodes and 1000 meters network area, PC-AODV achieve 15% of remaining energy, packet delivery ratio increased 8% and reduced 13% of end-to-end delay than AOD when enter misbehaviour node totally collapse the active networks is proposed by **R. Madhan Mohan and K. Selvakumar [2012]**. **Wang et al, (2013)** have proposed Distributed energy Adaptive location based Cooperative Medium Access Control (DEL-CMAC) to improve the performance of the MANETs in terms of network lifetime and energy efficiency but for large network cannot support new protocol due low security and network throughput will be reduced. Proposed one of efficient techniques called Frame Error Rate (FER) this design work on three main layers such as physical layer, medium access control layer and network layer. FER energy efficient routing protocol consumption more energy of available for both types of routing. Moreover packet delivery ratio not satisfied and not suitable to cluster network and also isolated network not considered by following author **Jing Zuo, et al [2014]**. Efficient Remote User Authentication with Key Agreement Scheme Using ECC, technology evolution identity authentication in the network that is becoming more and more significant, proposed scheme was much more secure and practical as the secure universal access control mechanism also increased delivery ratio and remaining energy than other existing schemes proposed by **Baojun Huang et al, (2015)**. **Parth Patel et al, (2016)** proposed approach; Hybrid EAACK (HEAACK) is designed to tackle three of six of six weaknesses of watchdog scheme presence of malicious attacks. HEAACK is capable of finding the malicious nodes as compared with the existing scheme. Moreover, the malicious node increases the network remaining energy, average delay and also key exchange problem has not been solved. One of my best research article **K.Thamizhmaran et al, (2017)** is proposed enhanced acknowledgement based research work EA3EAK. This work mainly focused to reduced routing conjunction during to detect malicious attackers this work secure routing also reducing time delay, utilization energy, increased packet delivery ratio and throughput. Moreover this concept not suitable for all the environments whenever mobility high automatically performances will be decrees. Recent published energy efficient research work proposed by **Neha et al, (2018)** they designed clinched using directional antenna are to find destination location, antenna focusing, signal power and distance calculations. Simulation result show improved energy savings using re-configurable directional antennas and an associated algorithm. However, developed system reduced throughput due to increased packet drop because of misbehaviours. **K. Anish Pon Yamini et al, (2019)** proposed transition state MAC protocol compared with existing models static power consumption MAC protocol and dynamic power consumption MAC protocol, result in better performance of the reduces the total energy consumption minimum

14% DPCMP and minimum 24% than SPCMP with traffic falls almost 45% than SPCMP and 27% than DPCMP. Although an isolate misbehaviour attack is still not overcome. Predicting the mobile node position and routing based on predicted positions that developed routing protocol improved network performance with multi path routing is fine tuned based on the spatial temporal results, malicious node detection and correction not considered taken by *N.S. Saba Farheen and Anuj Jain, (2020)*. Most recent publishing article *Nobuyoshi Komuroa and Hiromasa Habuchi, (2021)* developed effective nonorthogonal Code Shift Keying Spread Spectrum (CSK/SS) ALOHA design that improve throughput and delay under MANET environment, security attack not considered above model. One more most recent article going to proposed random repeat trust computational that suggested technology provide better quality of mobile nodes, detect attacker more than 30% then existing scheme. Even through malicious node detection and energy an issue is cannot considered taken by *V. Nivedita and N. Nandhagopal, (2021)*.

Moreover, the above authors introduced various energy efficient routing protocols to detect minimizing utilization energy, increases network and node lifetime during varying nodes with topology size of communication is successfully tested, but still having many challenges that need to be solved, such as all the schemes fail to detect malicious node, congestion and energy in changing transmission range in this aspect we proposed relay node selection randomly that increasing remaining energy and also maximized throughput with test various environment.

III. PROPOSED SCHEME

We discussed our new developed design which improves remaining energy in same network in terms of reducing end-to-end delay, so special designed for mobile ad hoc network called Relay Node Selection Randomly (RNSR) compare to existing developed model. *Before transmit the data packed find malicious node for trust path*

- Sender nodes require transmitting to destination.
- The entire receiving node need to sends ACK packet ID to source node in same route.
- If source node receives this node details packet from destination node.
- Each sender done with predefined time period, successfully completion of this process maximum number of misbehaviors will be identified and detected.
- After the original data transmission starts from source node to destination.
- If node S, N₁, N₂, N₃, N₄, N₅,..... D. During the transmission any link breakage or not receiving ACK packet, once find alternate path to the destination and go to step2.

IV. SIMULATION CONFIGURATIONS

Performance of routing protocol of MANETs in an open environment is evaluated for in this section, the MANET protocols are simulated using this network simulator 2.34 by varying the number of nodes. The IEEE 802.11 distributed coordination function is used as the medium access control protocol and the traffic sources are used to user datagram protocol. The simulation parameters are specified below table I.

TABLE I. SIMULATION PARAMETERS

Parameters	Values
Simulation area	680m * 680m
Protocol	RNSR
Number of nodes	50
Transmission range	250m
Constant bit rate	2 (Packets/Second)
Initial energy/node	100 joules
Simulation time	500sec

A different packet type in different schemes in RNSR, 2 b of the different types of packets is used. Details of different packet types are listed in Table II.

TABLE II. PACKET TYPE INDICATORS

Packet type	General Data	ACK Packet	Dropped Packet	RNSR Packet
Packet flag	00	01	10	11

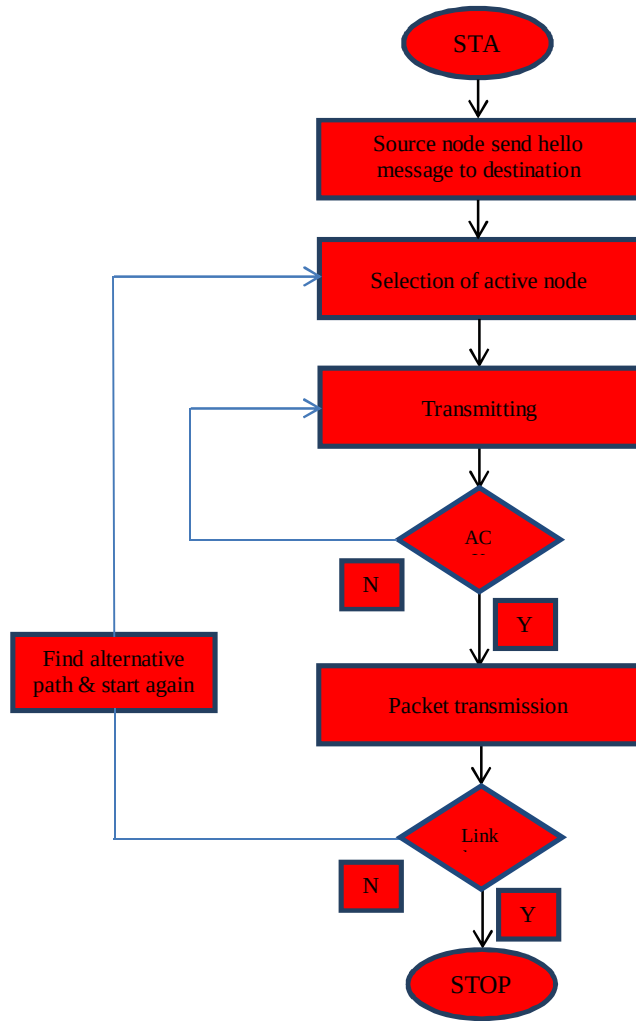


Figure 3 Flow Chart of RNSR

V. RESULT AND DISCUSSION

Malicious attack passive nodes are possible to provided warning received packets, this way, the network lifetime will be decrees due to utilization energy will increased. The proposed approach RNSR is designed to tackle weaknesses of traditional routing protocol, in this paper compare with base paper of this work is existing research work of traditional Dynamic Source Routing (DSR).

TABLE III. SIMULATION RESULT OF END-TO-END DELAY VS NUMBER OF NODES

RP/NN	10	20	30	40	50	60
DSR	0.51	0.47	0.42	0.34	0.27	0.20
RNSR	0.34	0.30	0.25	0.21	0.16	0.08

TABLE IV. SIMULATION RESULT OF REMAINING ENERGY VS NUMBER OF NODES

RP/NN	10	20	30	40	50	60
DSR	0.86	0.78	0.73	0.69	0.65	0.61
RNSR	0.98	0.92	0.87	0.83	0.79	0.75

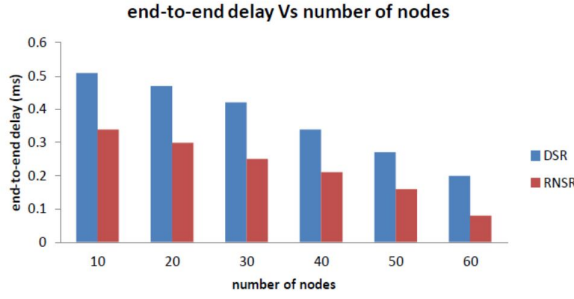


Figure 4 end-to-end delay Vs number of nodes

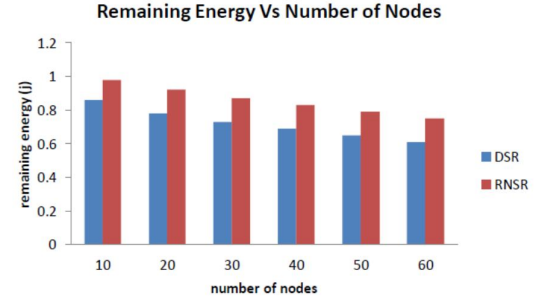


Figure 5 remaining energy Vs number of nodes

Table III and figure 4 shows that RNSR has reduced end-to-end delay with the number of nodes increased compared to the existing protocol. According table 3, the proposed scheme RNSR surpasses the performance of DSR in minimizing average end-to-end delay by 14.5%, when there are 10 to 60 nodes in the network. As the proposed relay node selecting randomly scheme motioned two different short routes and minimum link breakage path every time frequently update the table, it is possible to minimize the delay. Simulation results of Table 4 and figure 5 shows that suggested system reduces utilization energy when the number of nodes varied compared to the existing system. It is clear that the proposed RNSR decreases the remaining energy by 16% with the number of nodes 40 than dynamic source routing, due to increases duration of whole network life time period because of node life time is improved because of randomly selecting relay node detected misbehaviour node, packet drops and link breakage nodes it is possible to decrease remaining energy. From all the above tables it is clear that the comparison of the proposed relay based randomly selection energy efficient routing protocol RNSR better than existing DSR schemes.

VI. CONCLUSION

Acknowledgement based transmission becomes essential and is very safe with high security. In this research, a proposed routing protocol named energy consumed RNSR with random selection work, the simulation results minimizing average end-to-end delay by 14.5% when there are 10 to 60 nodes in the network, delivery ratio performance by 16%, 15% when there are 10 and 20 nodes in the network respectively, 10% to 40% when compared to the existing method and suggested new method has the reduce routing overhead by 23.4% when there are 10 to 60 nodes in the network and it is clear that the proposed RNSR decreases the utilization energy by 16% with the number of nodes 40 through the NS 2. Developed new model not only reduces overhead, but also solves packet dropping problem using relay algorithm. Plan to investigate the following issues in our future research.

- The same concept can be tried to implement in satellite to save more energy.
- The possibilities of adopting the cluster based network to eliminate the delay.
- EE-RNSR can be tested in real time network environment.

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BIOGRAPHICAL NOTE

Prof. K. Thamizhmaran received his M.E degree from Faculty of Engineering Annamalai University, Tamilnadu in the year 2012 respectively, M.sc in yoga degree from Faculty of Education, Annamalai University, Tamilnadu in the year 2019 respectively and Post Graduate in Guidance & Counselling degree from Faculty of Psychology, Annamalai University and Tamilnadu in the year 2020 respectively. He is currently pursuing Doctor of Philosophy in Mobile Ad-hoc Network (Network Security), Faculty of Engineering Annamalai University from 2013 to till date. He is currently working as an Assistant Professor in the Department of Electronics & Communication Engg, Government College of Engineering, Bodinayakkanur, Theni, and Tamilnadu, India. Teaching Experience 12 years 10 months and Industrial Experience 3 months (team leader in honey drops-chennai). His research interest includes Wireless Communication, Ad-Hoc Networks, and Networks security. He has published more than 160 technical papers at various National / International reputed Conferences and in journals including IEEE Explore, Inderscience, and Serial Publication also Scopus with UGC approved publications. He has published one technical book for International Publication and 06 book chapters from international publication including India & Germany. He is a life member of 23 professional bodies. He is editor, advisory board member and reviewer of 22 international journals.

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