An Enhanced Routing Technique for Node Mobility and Density Classifier in Mobile Ad hoc Networks

$Dr.K.Prabha^1$

(Assistant Professor, Department of computer science, Periyar University PG Extension Centre, Dharmapuri, Tamilnadu)
(e-mail: prabhaeac@gmail.com).

$K.Nirmaladevi^2$

(Ph.D Research scholar, Department of computer science,
Periyar University PG Extension Centre, Dharmapuri, Tamilnadu)
(email: nirmaladevi0291@gmail.com).

***Abstract*—Mobile phones are most common way of communication and accessing internet based services. A mobile ad-hoc network (MANET) is a self-configuring infrastructure less network of mobile devices connected by wireless. Essentially ad hoc network is a collection of nodes communicating with each other by forming a multi-hop network. Each must onward traffic unconnected to its own use and consequently be a router. The primary aim is a MANET is to build the each device to incessantly preserve the information necessary to correctly route traffic. Mobile Ad-Hoc Network (MANET) is often susceptible to security attacks due to its features of open medium, limited physical security, dynamic changing topology and cooperative algorithms, lack of centralized monitoring and organization point, energy constrained operations and often lacks of a clear line of defense.**

***Index Terms*—Density Classifier, LFR, NMDC**

INTRODUCTION

Internet is a worldwide collection of computer networks. Internet is a cooperative effort of many people and organizations. The computers on the Internet can communicate because they are physically linked and because they share a common language called TCP-IP language that two computers use to communicate[1]. This definition describes acceptable messages and outlines the rules that two computers must follow to exchange those messages. The major transport protocol in Internet Protocol suite. It provides reliable communication between two computers in the network. The network protocol in the internet IP provides a best effort to deliver an IP packet between two networks on the Internet.

Mobile Ad-Hoc Network

A Mobile Ad-hoc Network (MANET) is associated through wireless and it is a self-configuring transportation less network mobile devices. Every device in the MANET can move separately in any direction and also will modify its links with other devices normally. A MANET is a self-determining collection of mobile users that write over relative bandwidth controlled wireless links. Since the network topology may change quickly and suddenly over time. Network is decentralized while all network activity has discovering the topology and 4 delivering messages are executed with the nodes themselves. Ad-hoc networks are usually collected of equal nodes that communicate over wireless links exclusive of any central control.

Life Time Forecast Routing (LFR)

The power constrained is one of the main design constraints in MANET and all effort is to be channel towards reducing power. Moreover network generation is a key design metric in MANETs. Since every node has to perform the functions of a router, if some nodes pass away early due to lack of energy and it will not be probable for other nodes to communicate with each other. Hence the network will get disjointed and the network lifetime will be unfavorably affected. It has the lifetime of prediction routing protocol for MANETs that maximizes the network lifetime with sentence routing solutions that minimize the inconsistency of the remaining energies of the nodes in the network.

LITERATURE SURVEY

Mobile Ad-hoc Networks (MANETs) to minimize redundancy, contention. In order to propose this works various literatures which are relevant and helpful to do this work are reviewed and analyzed are presented the network support applications. The main application in wireless sensor networks characterizes the event detection. It is used to modeling and simulating wireless sensor networks and also the authors have the software[2].

The immunity based security architecture and the detection agent in our architecture based on T-cell is responsible nodes in network can be as B-cell Li Hinlai et al., developed it can produce a large number of antibodies that are activated counter attack agent to clear the antigen with cooperate directly with the invader. KrishnaPriya et al.,identified the compromised nodes in the ad-hoc networks

GSR[3]. It is overcome using threshold cryptography and Chinese Remainder Theorem.

The critical challenges in wireless sensor networks (WSNs) to energy conservation. A distributed topology protocol with transmission power alteration based on harmony search and learning automata algorithms called HSLATC (Harmony Search and Learning Automata based Topology Control Protocol) [4]. It has proper transition radius of the sensor nodes that can be resolute. Throughout the intelligent determining the transition radiuses of the nodes in the HSLATC protocol. It can able to offer the full connectivity in sparse consumption and reduce the energy consumption of the sensor network and prolongs the network lifetime.

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A Mobile Ad hoc Network (MANET) is a group of autonomous self-organized nodes. The use of wireless medium for communication that two odes can communicate directly. An emerging area has recently captured more attention in network routing researches is Swarm Intelligence (SI). The acceptance of SI for MANET routing refers to difficult behaviors that occur from very simple individual behaviors and interactions[5]. Each individual has little intelligence and just follows basic rules using local information obtained from the environment. The ants routing be similar to fundamental method from distributed SI in biological systems. It gaining more popularity as of its adaptive and dynamic nature.

An efficient ID a novel architecture that is to detect active attacks against AODV protocol in MANET. This architecture resides in the use of Finite State Machines for particular AODV routing behavior and distributed network monitors for detecting the attacks. It can detect the attacks and require more than one hop information[6]. The authors evaluate the EID architecture beside RID architecture against percentage of detecting the attacks both in static and dynamic case

III. LIFE TIME FORECAST (LFR) ROUTING

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3.1 Density Classifier

Mobile ad hoc networks range from established MANETs somewhere end-to-end paths exist from sources to destinations. For DTNs where no contemporary end-to-end paths exist and communication is achieved by the store, carry, and forward model of routing. The nodes of these networks require identifying the level of connectivity of the network they belong to and classify it as a MANET. A DTN in order to properly select appropriate protocols to achieve end-to-end communication.

Wireless networks are fast popularity to its peak today in the users want wireless connectivity irrespective of their geographic location. There is an increasing threat of attacks on the MANET. Black hole attack is one of the security threat in which the traffic is broadcast to such a node that in reality does not exist in the network. An analogy to the black hole in the universe in which things vanish. The node presents itself in such a way to the node that it can attack other nodes and networks knowing that it has the shortest path. MANETs must have a secure way for communication and communication which is quite demanding and vital issue.

To develop the performance of immediate routing protocols in MANETs the Bayesian classifier model has been used. It can help to enlarge the network throughput and decrease end-to-end delay through controlling the broadcast area. Further information connected to hop-counts and node densities are used to support routing protocol in broadcasting. The number of control packets distributed during route discovery process decreased significantly in comparison with conventional scheme.

A MANET is a collection of nodes forming rapidly changing topologies. MANETs are exposed as to its fundamental characteristics such as open medium, dynamic topology, distributed co-operation and constrained capability. Real time Intrusion detection architecture for detecting the attacks in mobile ad hoc networks. The main difficulty in this approach is that the detection mechanism process relies on a state based misuse detection system. It does not make use of a distributed architecture to detect attacks and it requires more than one hop information. It also occupy the use of finite state machines for specifying AODV routing behavior and distributed network monitors for detecting the attacks.

MANETs are wireless networks without fixed infrastructure based on the cooperation of independent mobile nodes. The proliferation of this networks and their use in

critical scenarios require new security mechanisms and policies to guarantee the integrity, confidentiality and availability of the data transmitted. Intrusion detection systems used in wired networks are inappropriate in this kind of networks. Since different vulnerabilities may materialize suitable to resource control of the participating nodes and the nature of the communication. It has the comparison of the effectiveness of six dissimilar classifier to detect malicious behavior in MANETs.

3.2 Lifetime Forecast Routing (LFR) with Node Mobility and Density Classifier (NMDC) for MANET.

A mobile ad hoc network is a movable, multi-hop wireless network by no fixed infrastructure. Dynamic topologies because of mobility and limited bandwidth and battery power build the routing difficulty in ad hoc networks more demanding than conventional wired networks. A key to develop efficient routing protocols for such networks lies in keeping the routing overhead negligible. A novel category of on-demand routing protocols such as DSR, AODV, TORA try to decrease routing overhead through only maintaining routes among nodes taking part in data communication.

Energy aware and link stable paths turn out to be key issues in designing scalable routing protocols in mobile ad hoc networks (MANETs). The objective of this work is the proposal of a new routing model which could be able to account for a joint metric of more link stability and less energy consumption in MANET.

Energy is a significant resource that needs to be preserved in order to extend the lifetime of the network. In contrast, the link and path stability among nodes permits the diminution of control overhead and could offer some benefits also in terms of energy saving over MANET. However, as will be shown in this work, the choice of more stable routes below nodes mobility could direct to the choice of shorter routes. This is not forever appropriate in terms of energy consumption. Conversely, on occasion, attempting to optimize the energy could lead to the choice of more weak routes. Therefore, it is obvious that both the abovementioned parameters (specifically, link stability linked with the nodes mobility and energy consumption) must be measured in designing routing protocols, which permit right tradeoff between route stability and least energy consumption to be attained.

Node Mobility and Density Classifier (NMDC)

Mobile ad hoc networks have gained a set of interest lately in the investigate community. On the other hand, owing to the different node mobility patterns and density of nodes, such networks have dissimilar connectivity patterns. In conventional MANETs it is implicit that end-to-end paths subsist from any source to any destination most of the time.
In recent times, there has been an endeavor to classify the various types of mobile nodes assuming there is a centralized influence that has whole information of the network and its dynamics. In this work we give a new that classifies density of network and node mobility patterns. This approach provides an attractive insight on the way that mobile nodes operate but it is not practical due to the hypothesis of the centralized mechanism doing the classification.

Node Mobility and Density Classification(NMDC)Algorithm

The Node mobility and density classification algorithm which is based on analytically calculated formulas and simple node observations. First, we present the assumptions and some definitions of quantities that are used

throughout the Node Mobility and Density algorithm and then we present the NMDC algorithm

Algorithm 1: NMDC

Step 1: Estimate the number of nodes N
Step 2: For each node in N
Step 3: Apply node mobility classifier
Step 4: Identify slow state nodes
Step 5: Identify Medium state nodes
Step 6: Identify High state nodes
Step 7: Apply Node density classifier
Step 8: Evaluate grid nodal size
Step 10: Based on optimized grid nodal size
Step 11: Segregate zonal areas
Step 12: Apply non linear programming
Step 13: Find stable link path

Lifetime Forecast Routing (LFR)

Lifetime Forecast Routing (LFR) is an on demand source routing protocol that employs battery lifetime Forecast. The objective of this LFR routing protocol is to make bigger the service life of MANET.

Algorithm 2: Functionality in intermediate node

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Step1: For Intermediate Node i,

Step2: Forecast lifetime LT,

Step3: If LT < Min (LT)
          Replace Min (LT) with its LT
          End if

Step4: If Sequence Number (SNO) exists
          Compare Min(LT) of current with Min(LT)
          If new Min (LT) <= old Min (LT)
          Discard new RREQ
          End if

Step5: If new Min (LT) >old Min (LT)
          Replace old Min (LT) with new Min (LT)
          Forward new RREQ
          End if
          End if

Step6: If SNO does not exist
          Save this Min (LT)
          Forward RREQ
          End if
          End for
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Performance Evaluation of Lifetime Forecast Routing with Node Mobility and Density Classifier.

The performance of proposed Lifetime Forecast Routing with Node Mobility and Density Classifier (LFR-NMDC) Model in a mobile ad hoc network.

Table: 1 Parameters used during simulation

Parameters	**Value**
Area	1000*1000 m
No. of nodes	100-1000
Simulation duration	900 sec
No. of repetition	5 times
Radio transmission range	100 m
Physical/Mac layer	IEEE 802.11
Pause time	30 sec
Mobility model	Random direction model
Node movement	5 – 35 m/s
Data sending rate	2 Mbps
Each packet	512 bytes
Traffic Type	CBR

Table: 2 Node Lifetimes

Node Mobility (m/s)	**Node Lifetime**		
	Proposed LFR-NMDC	**Existing LAER**	**Existing PERRA**
5	98	82	73
10	97	78	71
15	96	80	64
20	96	77	67
25	95	69	61
30	93	63	62
35	92	61	63

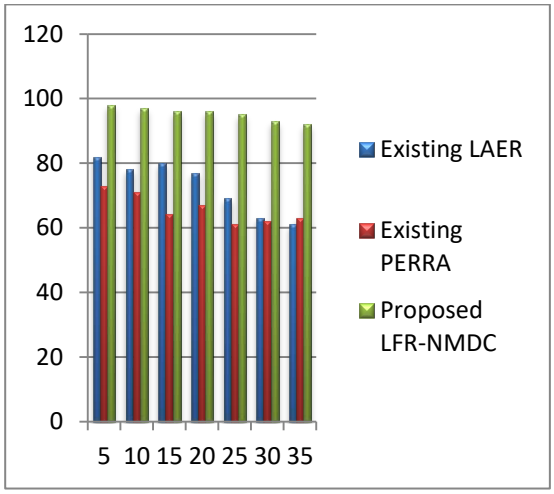

Figure: 1 Node Lifetime

Table 3: Normalized Control Overhead

Node Mobility (m/s)	**Normalized Control Overhead**		
	Proposed LFR-NMDC	**LAER**	**PERRA**
5	0.4	1.2	2.2
10	0.6	2.5	4.1
15	0.8	2.8	7.4
20	0.9	3.1	11.2
25	1.2	3.2	12.5
30	1.3	3.9	15.3
35	1.7	4.5	16.7

3.1 Normalized Control Overhead

The increase in the normalized control overhead for higher speed. It is possible to observe the good scalability of model based on the local topology knowledge such as LFR-NMDC and LAER. The technique applied to both models and the only local control packets exchange (HELLO pkts) determines a similar performance of LFR-NMDC and LAER differently by PERRA that is forced to start new route discovery procedure that increases the control overhead. The proposed LFR-NMDC attains 7-12% less control overhead when compared with LAER and it attains 10-57% less compared to PERRA.

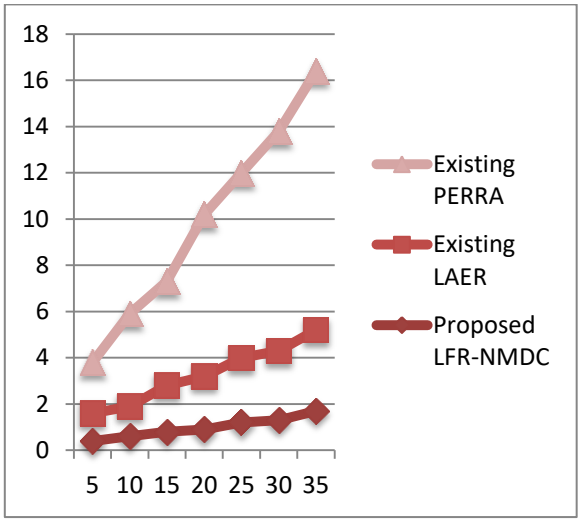

Figure2: Normalized Control Overhead

Table 4: Data Delivery Ratio

Number of Nodes	Delivery Ratio (%)		
	Proposed LFR-NMDC	LAER	PERRA
100	98.72	86.83	83.02
200	98.2	85.25	81.22
300	97.43	83.92	78.93
400	97.14	82.92	77.73
500	96.68	80.04	77.12
600	95.23	79.47	74.25
700	94.17	76.73	68.24

4.1 Data Delivery Ratio

Delivery ratio of proposed LFR-NMDC model and existing LAER, PERRA protocols for different number of nodes is shown in Fig. 4.4. Data delivery ratio is the ratio between number of delivered data packets and the number of generated data packets in all nodes. Note that the number of generated packets is the expected number of generated packets. We generate as many as 10,000 data packets during the simulation. They are generated between random source and destination pairs at random times. Many of these might not have reached their intended destination because of lack of existence of a route between the source and destination for various reasons. Also, the network lifetime clearly affects this ratio. If the network is alive for longer time, it implies that more data traffic goes through since to establish random connections throughout the time of the simulation.

The proposed LFR-NMDC model improves further the performance increasing the data delivery ratio about 22-38% in comparison with LAER and about 25-41% in comparison with PERRA.

CONCLUSION

The Sparse and dense population of mobile nodes in a variety of position of the ad hoc network diminish delay of route discovery. An optimization routing model within MANET minimizes concurrently mobile node energy consumption and maximizes link stability of transmission paths. Topology control attempts to make a decision for every node the smallest amount broadcast power that sufficiently guarantees connectivity of the node. A cooperative authentication and topology control (CATC) scheme is proposed to improve the throughput of the consistent topological control.

A routing protocol called LFR with NMDC, based on the joint metric of link stability and energy consumption, has been proposed. The main objective of LFR-NMDC is to reduce the variance in the remaining energies of all the nodes and thus extend the network lifetime. It attains this by doing local decisions and with minimum control overhead. We demonstrate that LFR-NMDC brings about a clear enlarge in network lifetime.

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