Dual-Region Reputation based Resource Management in Mobile Ad Hoc Networks

By K. Surendra & K. Delhi Babu

Sree Vidyanikethan Engineering College, India

Abstract- A mobile ad hoc network (MANET) is a kind of wireless ad hoc network. It is a self-configuring network of mobile routers connected by wireless links. Since MANETs do not have a fixed infrastructure, it is a challenge to manage both mobility as well as resource utilizations for Ad hoc networks. In this paper, I propose a Reputation management scheme, called reputation factor (RF) effective resource selection using the reputation based approaches for node selection. The developed resource allocation algorithm is based on different parameters like time, cost, number of processor request etc. The developed priority algorithm is used for a better resource allocation of jobs in the network environment used for the simulation of different models or jobs in an efficient way. After the efficient resource allocation of various jobs, an evaluation is being carried out which illustrates the better performance. Performance is evaluated by using simulation.

GJCST-E Classification : C.2.2 C.2.3

Strictly as per the compliance and regulations of:

Dual-Region Reputation based Resource Management in Mobile Ad Hoc Networks

K.Surendra[α] K.Delhi Babu[σ]

Abstract- A mobile ad hoc network (MANET) is a kind of wireless ad hoc network. It is a self-configuring network of mobile routers connected by wireless links. Since MANETs do not have a fixed infrastructure, it is a challenge to manage both mobility as well as resource utilizations for Ad hoc networks. In this paper, I propose a Reputation management scheme, called reputation factor (RF) effective resource selection using the reputation based approaches for node selection. The developed resource allocation algorithm is based on different parameters like time, cost, number of processor request etc. The developed priority algorithm is used for a better resource allocation of jobs in the network environment used for the simulation of different models or jobs in an efficient way. After the efficient resource allocation of various jobs, an evaluation is being carried out which illustrates the better performance. Performance is evaluated by using simulation.

I. Introduction & Background

We can described the life cycle of mobile ad hoc network into the first ,second and third generations. Present adhoc network are viewed as the third generation. The original ad hoc network can be followed back to 1970's. In 1970's, these are called Packet Radio Network (PRNET). The Defense Advanced Research Project Agency started examination of utilizing parcel changed radio correspondence to give solid correspondence in the middle of PCs and urbanized PRNET. Essentially PRNET utilizes the blend of Areal Location of Hazardous Atmospheres and Carrier Sense Multiple Access for various get to and separation vector directing.

To dynamically identify the optimal selection of Reputation values per mobile node based on the following:

1. Minimize the network cost based on resource management.
2. By using Reputation based approaches.
3. RF combines the strength of grid based location management and pointer forwarding strategy to achieve high scalability and low signaling cost.
4. The communication module acts as an interface for the RMS to communicate to neighbors RMS. The main purpose of this module is to exchange

reputations with immediate neighbors through three types of messages:

1. *REP REQ Message:* This message is sent to neighbors in order to ask for RF values for nodes whose states have changed to suspected. Upon receiving REP REQ, the communication module asks the reputation manager to return the RF values of nodes in REP REQ
2. *REP REP Message:* When the communication module receives the returned RF values from the reputation manager, it constructs the REP REP message and sends it back to the requestor node. Upon receiving the REP REP, the communication module forwards the received RF values to the reputation manager.
3. *ALARM Message:* This message is sent to neighbors when there is a node whose state is changed. Upon receiving ALARM, the communication module forwards the received RF values to the reputation manager.scratch pad, and so on. In the interim the Development of Standard IEEE 802.11 (i.e. WLAN's) profited the ad hoc network. Some different principles are likewise built up that give advantages to the MANET like Bluetooth and HIPERLAN.

II. Related Work

- We assume that every mobile node has knowledge about the global partitioning as well as the hash function such that it is able to locate the center of the home region of any node. All mobile nodes within the home region of a mobile node serve as home region location servers for that node. DrMoM varies the home region size dynamically based on the mobile node's runtime mobility and service characteristics.
- The home region size can be expanded as needed to ensure that at least one node exists to serve as the location server. We assume that node distribution (e.g., random or city-style) is a predefined knowledge known to every node, so every node knows how far Rh should be in order to cover at least one node from the center of its home region. Besides the home region, each mobile node is also associated with a local region, and it exchanges location information with neighbors in the local region. Unlike the home region, which

Author α : Pg Student, Department of Cse, Sree Vidyanikethan Engineering College. e-mail: Keerthipati.Surendra@Gmail.Com
Author σ : Professor, Department of Csse, Sree Vidyanikethan Engineering College. e-mail: Kdb_Babu@Yahoo.Com

does not move, the local region moves with the mobile node.

- The home region keeps location summary information of the node, i.e., the coordinate of the center and radius of the node's local region. Whenever the local region moves due to movement of the node, the location servers in the home region are updated with the location summary information.

- To locate the local region of a destination node, the source node sends a location query to the destination node's location servers.The coordinates of the center of a home region is statically determined, whereas the radius is dynamically determined on a per-node basis, depending on the node's mobility and service characteristics. The home region size, determined by its radius denoted by Rh, is a key factor balancing the tradeoff between the overhead for location queries/updates and the robustness of the location service.

- Specifically, a larger home region covers more location servers on average and consequently increases the chance of a successful location query. However, a larger home region also leads to larger overhead for location queries and updates. Because Rh is dynamic, the size of the home region is dynamic and not necessarily restricted by the size of the rectangular region.

a) Taxonomy of Wireless Ad hoc Networks
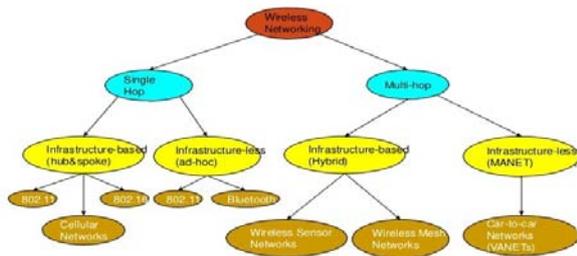
In a MANET, mobile hubs shape an always showing signs of change topology. The configuration of effective and adaptable directing conventions is consequently a basic test. Two sorts of ad-hoc steering conventions have been proposed: topology-based and position-based (or geographic based). The topology-based steering conventions utilization message broadcasting to develop courses coordinated to every hub. In addition, every hub additionally keeps up a directing table to record courses to alternate hubs in the network. These conventions intensely depend on finding and keeping up virtual connection states, yet they additionally include some potential issues.

One of the issues comes from the breakage of the connections on a course where hubs move. Another issue would be the high activity overhead. Rather than topology-based steering conventions, position-based directing conventions are broadly considered as a possibly adaptable steering arrangement since they don't have to keep up steering tables. These conventions use location data of neighboring hubs and destination hub to settle on their sending choices with geographic sending calculations. One of the downsides of the position-construct conventions is their reliance in light of additional situating gadgets, for example, GPS (Global Positioning System) for securing location in-development. These situating gadgets for the most part lead to additional cost and force utilization. Yet, mobile gadgets with situating capacity are getting prevalent as of late because of the wealth of location-based applications. Case in point, situating gadgets have been generally conveyed in different hubs.

b) Worldwide Mobile Information System(GloMo)

- The objective of the undertaking is to make the mobile environment a five star native in the Defense Information Infrastructure by giving easy to use integration and access to administrations for remote mobile clients.

- Self arranging/self mending networks; both level and various leveledmultihop steering calculations like ATM networks over remote.

- Georouting; Satellite interchanges networks; heterogeneous networking with IP overlays; end-to-end network improvements; and security & survivability for ad-hoc networks.

- Wide-Area Information Systems, Information Systems for Dismounted Forces, and Information System for Rapid Deployment of Forces.

- The NTDR framework is a DA-coordinated, test, mobile parcel information radio network that connections Tactical Operations Centers in a brigade area.

- The NTDR gives a self-arranging, self-recuperating, network capacity. Radio network administration is given by a Network Management Terminal.

- The main role of the NTDR is to give information transport to the Army Battle Command System robotized frameworks to units at brigade and beneath

- Lessons gained from this test handling give a bit of the specialized gauge for radios being intended

III. Proposed Work

To diminish the general network activity caused by mobility administration and parcel conveyance herewith we propose proficient mobility administration.

- The proposed plans to oversee both mobility and in addition asset uses for Ad hoc networks.

- For ideal home area size and nearby locale size (characterized by their particular radii meant by Rh and Rl) for every mobile hub in light of the mobile hub's runtime mobility and administration qualities to minimize the general network expense caused for location administration and information parcel conveyance.
- To rapidly distinguish the ideal determination of Reputation qualities every mobile hub taking into account the accompanying:
- Minimize the network expense taking into account asset administration.
- By utilizing Reputation based methodologies.
- RF joins the quality of framework based location administration and pointer sending system to accomplish high versatility and low flagging expense.
- Simulation utilizing NS2.

Mobility in remote networks can take diverse structures ,, for example,

Terminal mobility: the capacity for a client terminal to keep on getting to the network when the terminal moves;

a) Client mobility

The capacity for a client to keep on getting to network administrations from distinctive terminals under the same client personality when the client moves.

b) Administration mobility

The capacity for a client to get to the same administrations paying little respect to where the client is.

In addition, a terminal or a client may be considered by a network to have "moved" regardless of the possibility that the terminal or the client has not transformed its physical location. This may happen when the terminal changed its association starting with one kind of remote network then onto the next, e.g., from Mobility administration is the essential innovation to empower the consistent access to cutting edge remote networks and mobile administrations.

Future IP-based remote networks, for example, a wide range of media administrations including ongoing administrations, for example, voice and feature gushing and also non-continuous administrations, for example, email, web-perusing, and FTP. Fundamental necessities of mobility administration in cutting edge.remote networks ought to include: first and foremost, the backing of all types of mobility; second, the backing of mobility for both constant and non-ongoing applications; third, the backing of clients consistently moving crosswise over heterogeneous remote networks in the same or diverse administrative areas.

Fourth, the backing of an on-set client application session to proceed without noteworthy interferences as the client moves. This session congruity ought to be kept up when a client changes its network connection focuses or moves starting with one sort of remote network then onto the next; and last, the backing of worldwide wandering, i.e., the capacity for a client to move into and use distinctive administrators' networks of home areas.

c) Location administration

A procedure that empowers the framework to focus a mobile gadget's present location, i.e., the present network connection point where the mobile gadget can get activity from the framework.

d) Handoff administration

A procedure that empowers a mobile gadget to change itsnetwork connection point while keeping its on-going activity continuous. In the event that the network connection point change includes the meandering into another network with an alternate administrator, then network access control is likewise included in the handoff process. Network access control incorporates confirmation (check the character of a client), approval (figure out if a client ought to utilize the network administration), and bookkeeping (gather data on the assets utilized by a client).

The framework model exhibited in this paper is in light of the taking after presumptions.
Every hub has an interesting id and it can't be parodied.

- The network is sufficiently thick so that every hub has at least two one-bounce neighbors.
- A remote interface of every hub underpins indiscriminate mode operation: a hub dependably listens to each transmission within its one-jump neighborhood despite the fact that it doesn't involve in those transmissions.
- Links are bidirectional. At time t, if hub B can get a message from hub A, hub An ought to have the capacity to get a message from hub B at time t too.
- A radio wire utilized on every hub is an omni-directional antenna which empowers its transmission to be observed by its one-jump neighbors.
- Each hub is free from one another, no conspiracy.
- We don't consider pernicious hubs, just egotistical hubs seeking to moderate their own asset.
- Flood to get a hub's location.
- Excessive flooding messages
- Central static location server.
- Not blame tolerant
- Too much load on focal server and close-by hubs
- The server may be far away/ parceled
- Every hub goes about as server for a couple of others.
- Good for spreading load and enduring disappointments.

- Limited assets and physical security.
- Intrinsic common trust helpless against assaults.
- Lack of approval offices.

e) Solution Strategy

The Reputation of the node can be calculated based on below assumptions:

i. The time used to send the packet to their adjacent nodes and

ii. The number of processor requests it attains

The equation to find the neighbors based on the above two parameters is :

Reputation Factor (RF) for individual node = (min-time , max-processing power)

i.e., $RF = T_{min}$ & $RF = P_{max}$

f) Algorithm

Processing a ReputationFactor

i. select one cluster /** selection of one grid

ii. selectsrc,des, neighbours /** identify source, neighbours, destination

iii. source(S) ->Rreq (msg) /** sender sends RReq to all its neighbours

iv. S - >Adj-node -> Rec (msg) /** source node receives all of it's neighbour concerned factors

v. S - >cal (RF) /** calculation of RF values

vi. RF - >T_{min}, RF - >P_{max}/** cross-checking all the values

vii. S ->discovered (neighbour) /** now source node select this adj node

viii. S ->D /** now source sends alerts to destination via selected adj node

g) Implementation Performance

Let us consider the 5 nodes
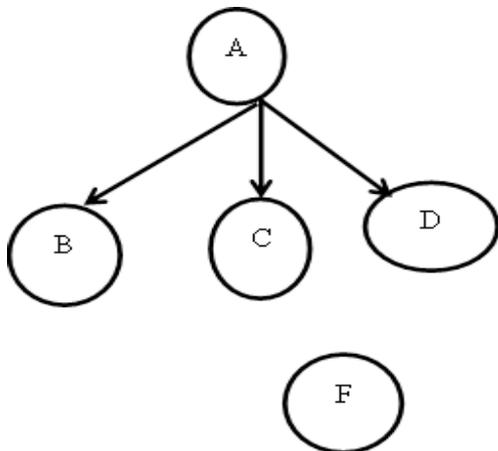
Fig : Node A needs to find Adj Node using Reputation Factor to communicate with Node F

Source node A - > F (Destination node)
Adjacent nodes = B,C,D

Table 1 : Validation with RF

Inputs	Node-B	Node-C	Node-D
Min-Time	10ms	12ms	5ms
Max-Proc. Power	100w	120w	130w

Intermediate Process : cross-checking based on conditions

Output : Node D

The Process now processed as follows :
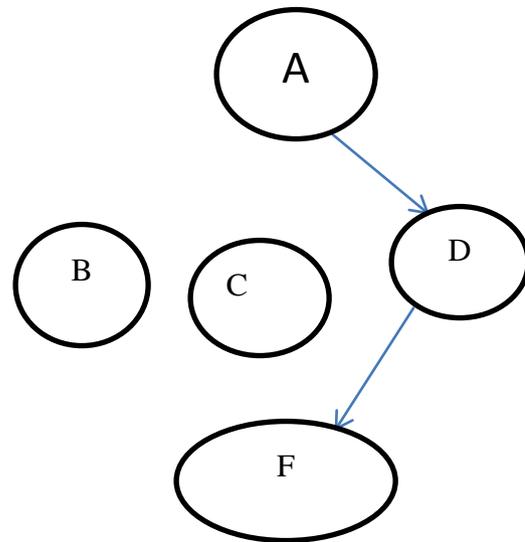
Fig b : Node A establishes path to Node F via Adj node D

- Let us assume the total number of nodes = 1000
- i.e.,
  node1,node2,node3,node4,…………………………n ode99,node100.
- Suppose the 'node 1' contains '5 neighbours' it is easy to find RF
- If 'node 35' contains '100 neighbours ' is very hard to resolve RF
- Finally, the Reputation Factor (RF) for individual node = (min-time , max-processing power)

i.e., $RF = T_{min}$ & $RF = P_{max}$

Where the T_{min} indicates the minimum-time parameter & P_{max} indicates the maximum-Processing Power parameter

i. Case Studies

Table 2 : Process Flow using RF

Inputs	Intermediate Process	Outputs
15-nodes	RF_{h10}	Adj node can be easily identified
20-nodes	RF_{h20}	Adj node identification is slightly hard
40-nodes	RF_{h40}	Hard to resolve
80-nodes	RF_{h80}	Very Hard to find Reputation factor

Where the indication of hardness level is h80>>h40>>h20>>h10

ii. Performance Evaluation

The below graph compares the Dual-Region mobility management and Reputation Management System.
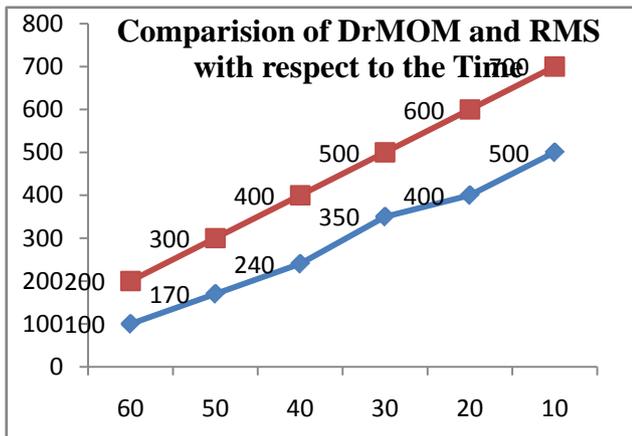
Fig : Comparision of DrMOM and RMS with respect to the Time

The x axis represents the Parameter Min Time and the y-axis represents the cost in terms of no. of nodes.

Similarly, The below figure shows the comparision of DrMOMand RMS with respect to the power.
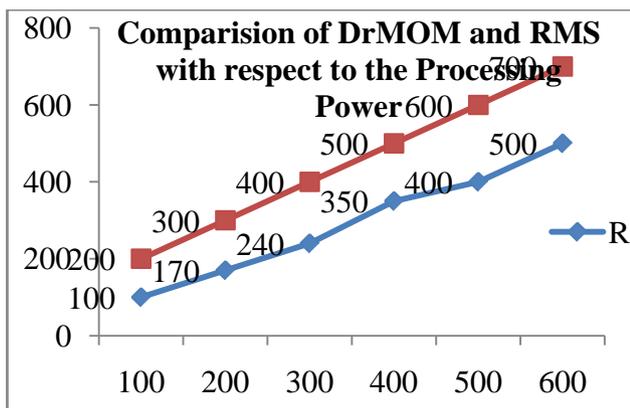
Fig : Comparision of Dr MOM and RMS with respect to the Processing Power

The evaluation is measured in terms of cost factor i.e, based on max-power and number of nodes, the comparision is takes place.

IV. Conclusion

A Reputation-based system as an extension to the existing resource management for detecting the neighbour nodes in mobile ad-hoc networks. The proposed system is evaluated by implementing it on ns2 Simulator.Although they could save their resources by not forwarding packets for others, their packets would not be delivered as well. some simulation results are provided to validate work and show its performance.

And also the evaluation of proposed system is expressed in the presence of nodes who forward only the necessary amount of packets so that they are not detected as malicious. This means that they try to keep their reputation in between the two thresholds which was categorized as suspicious nodes. To refer to this type of nodes, we use the term "partially cooperative".

References Références Referencias

1. A.R. Chen, T. Chen, C. Lee, Agent-based forwarding strategies for reducing location management cost in mobile networks, ACM Mobile Netw. Appl. 6 (2) (2001) 105– 15.
2. C. Hsu, S. Wu, An efficient cost based location service protocol for vehicular ad hoc networks, in: IEEE international Conference on Communication, Networks and Satellite, July 2012, pp. 93–97.
3. H. Saleet, O. Basir, R. Langar, R. Boutaba, Region-based location service management protocol for VANETs, IEEE Trans. Veh. Technol.59 (2) (2010) 17– 931.
4. [22] Y. Michiardi and R. Molva, "Core: A Collaborative Reputation mechanism to enforce node cooperation in Mobile Ad Hoc Networks," Communication and Multimedia Security Conference, September 2002.
5. Y. Bansal and M. Baker, "Observation-based Cooperation Enforcement in Ad hoc Networks," Research Report cs.NI/0307012, Stanford University, 2003.
6. Z. He, D. Wu, and P. Khosla, "SORI: A Secure and Objective Reputation-based Incentive Scheme for Ad-hoc Networks," Proceedings of WCNC 2004, Atlanta, GA, March 2004.

This page is intentionally left blank

36