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An Efficient Load Balancing Based Position Update System in Manet Routing

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Abstract— Position information of the nodes is primary requirement in geographic routing. Forwarding nodes are selected among neighbours based on their location. Each node should be aware of its next location at the time of data transfer condition. Hence each node should update its location information through a message called beacon. Existing mechanisms invokes periodic beacon update scheme which consumes the network resources such as energy and bandwidth specifically when the network traffic is high it creates packet loss in the network leads to retransmission of data packet causing additional delay and energy consumption. The novel scheme of Adaptive Position Update (APU) including two rules named Mobility Prediction Rule (MP) and On demand Route Learning Rule (ODL). Nodes whose movements are harder to predict update their positions more frequently (and vice versa) but it cannot achieve load balance in the network traffic and also efficiency of retransmission is less during packet loss and delay time is more. In these paper to overcome this problem by using End Point Admission Control (EPAC) mechanism to achieve the load balance and also the project contributes Mobility based forwarding node selection scheme to reduce the beacon overhead further. To simulate the performance of the network and the load has been balanced.

Keywords— Wireless Communication, MANET, Adaptive Position Update scheme, End Point Admission Control mechanism, Load Balance.

I. INTRODUCTION

In geographic routing, nodes need to maintain up-to-date positions of their immediate neighbours for making effective forwarding decisions. Periodic broadcasting of beacon packets that contain the geographic location coordinates of the nodes is a popular method used by most geographic routing protocols to maintain neighbour positions. A mobile ad hoc network (MANET) is a self-configuring infrastructure less network of mobile devices connected by wireless. Ad hoc is Latin and means "for this purpose". Each device in a MANET is free to move independently in any direction, and will therefore change its links router. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Such networks may operate by themselves or may be connected to the larger Internet.

MANETS can be used for facilitating the collection of sensor data for data mining for a variety of applications such as air pollution monitoring and different types of architectures can be used for such applications. It should be noted that a key characteristic of such applications is that nearby sensor nodes monitoring an environmental feature typically register similar values.

1.1 *OVERVIEW*

APU has all nodes are aware of their own position. The beacon updates include the current location and velocity of the nodes. Nodes which move slowly do not need to send frequent updates. It shows that APU can significantly reduce the update cost and improve the routing performance in terms of packet delivery ratio and average end-to-end delay in comparison with periodic beaconing and other recently proposed updating schemes. Furthermore, since the forwarding decision is made on the fly, each node always selects the optimal next hop based on the current topology. However, in the situation where nodes are mobile or when nodes often switch off and on, the local topology rarely remains static.

With the growing popularity of positioning devices (Eg.GPS) and other localization schemes, geographic routing protocols are becoming an attractive choice for use in mobile ad hoc networks. The underlying principle used in these protocols involves selecting the next routing hop from amongst a node's neighbours, which is geographically closest to the destination. Since the forwarding decision is based entirely on local knowledge, it obviates the need to create and maintain routes for each destination. By virtue of these characteristics, position-based routing protocols are highly scalable and particularly robust to frequent changes in the network topology. Furthermore, since the forwarding decision is made on the fly, each node always selects the optimal next hop based on the most current topology. Several studies, have shown that these routing protocols offer significant performance improvements over topology-based routing protocols such as DSR and AODV[7] .

1.2 ***ABOUT THIS PAPER***

To obtain the latter, each node exchanges its own location information (obtained using GPS or the localization schemes) with its neighbouring nodes. This allows each node to build a local map of the nodes within its vicinity, often referred to as the local topology. However, in situations where nodes are mobile or when nodes often switch off and on, the local topology rarely remains static. Hence, it is necessary that each node broadcasts its updated location information to all of its neighbours. These location update packets are usually referred to as beacons. In most geographic routing protocols (e.g. GPSR), beacons are broadcast periodically for maintaining an accurate neighbour list at each node.

II. RELATED WORKS

In this paper geographic routing (also known as position-based routing or geometric routing)[10][11] is a technique to deliver a message to a node in a network over multiple hops by means of position information. Routing decisions are not based on network addresses and routing tables; instead, messages are routed towards a destination location. With knowledge of the neighbours' location, each node can select the next hop neighbour that is closer to the destination, and thus advance towards the destination in each step.

Participatory sensing is an emerging computing paradigm that enables the distributed collection of data by self-selected participants. It allows the increasing number of mobile phone users to share local knowledge acquired by their sensor equipped devices. E.g.GPS to monitors temperature, pollution level, or consumer pricing information. While research initiatives prototypes proliferate, their real-world impact is often bounded to comprehensive user participation. If the user no incentive, or feel that their privacy might be endangered, it is likely that their privacy might be endangered, it is likely that they will not participatory sensing and introduce a suitable privacy-enhanced infrastructure. First we provide a set of definition of privacy requirements for both data producer users providing sensed information and consumed application accessing the data. Then we propose an efficient solution designed for mobile phone users, which incurs very low overhead. Finally we discuss a number of open problems and possible research direction; PS initiatives have multiplied, ranging from research prototypes to deployed systems. Due to space limitations we briefly review some ps application that apparently exposes participant privacy. Each of them can easily be enhanced with our privacy protection layer.

The Dynamic Source Routing protocol (DSR) is a simple and efficient routing protocol designed specifically for use in multi-hop wireless ad hoc networks of mobile nodes][7][8]. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. The protocol is composed of the two mechanisms of route Discovery and Route Maintenance, which work together to allow nodes to discover and maintain source routes to arbitrary destinations in the ad hoc network. The use of source routing allows packet routing to be trivially loop-free, avoids the need for up-to-date routing information in the intermediate nodes through which packets are forwarded, and allows nodes forwarding or overhearing packets to cache the routing information in them for their own future use. All Aspects of the protocol operate entirely on-demand, allowing the routing packet overhead of DSR to scale automatically to only that needed to react to changes in the routes currently in use.

III. BACKGROUND

Mobile computing is "taking a computer and all necessary files and software out into the field."Mobile computing: being able to use a computing device even when being mobile and therefore changing location. Portability is one aspect of mobile computing."Mobile computing is the ability to use computing capability without a pre-defined location and/or connection to a network to publish and/or subscribe to information."

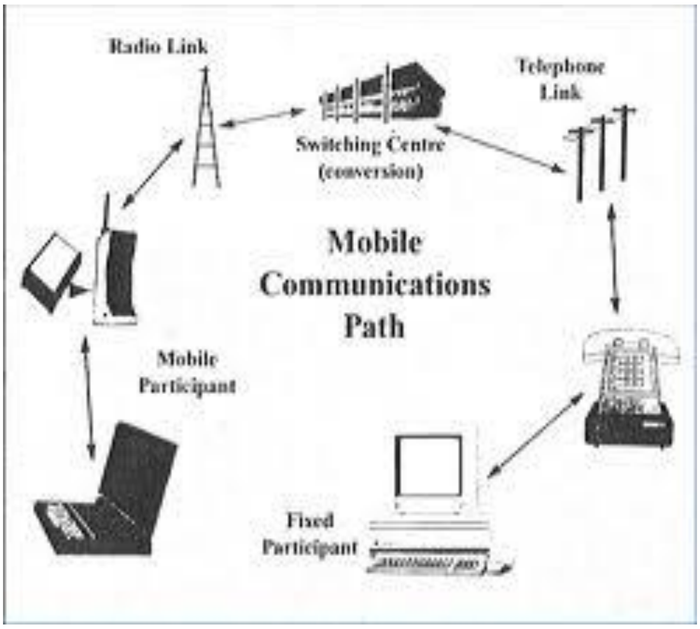

Fig 1. Mobile communication path

3.1 LIMITATIONS

Some of the limitations are:

- **Range & Bandwidth**

Mobile Internet access is generally slower than direct cable connections, using technologies such as GPRS and EDGE, and more recently HSDPA networks. These networks are usually available within range of commercial cell phone towers. Higher speed wireless LAN are inexpensive but have very limited range. Security standards: When working mobile, one is dependent on public networks, requiring careful use of VPN. Security is a major concern while concerning the mobile computing standards on the fleet. One can easily attack the VPN through a huge number of networks interconnected through the line.

- **Power consumption**

When a power outlet or portable generator is not available, mobile computers must rely entirely on battery power. Combined with the compact size of many mobile devices, this often means unusually expensive batteries must be used to obtain the necessary battery life.

- **Transmission interferences**

Weather, terrain, and the range from the nearest signal point can all interfere with signal reception. Reception in tunnels, some buildings, and rural areas is often poor.

- **Potential health hazards**

People who use mobile devices while driving are often distracted from driving and are thus assumed more likely to be involved in traffic accidents.(While this may seem obvious, there is considerable discussion about whether banning mobile device use while driving reduces accidents or not.

3.2 ABOUT MANET

It Stands for "Mobile Ad Hoc Network." A MANET is a type of ad hoc network that can change locations and configure itself on the fly. Because MANETS are mobile, they use wireless connections to connect to various networks. This can be a standard Wi-Fi connection, or another medium, such as a cellular or satellite transmission. Some MANETs are restricted to a local area of wireless devices (such as a group of laptop computers), while others may be connected to the Internet.

For example, A VANET (Vehicular Ad Hoc Network) is a type of MANET that allows vehicles to communicate with roadside equipment. While the vehicles may not have a direct Internet connection, the wireless roadside equipment may be connected to the Internet, allowing data from the vehicles to be sent over the Internet. The vehicle data may be used to measure traffic conditions or keep track of trucking fleets. Because of the dynamic nature of MANETs, they are typically not very secure, so it is important to be cautious what data is sent over a MANET.

Fig 2. Wireless MANET connection

A mobile ad hoc network (MANET) is a self-configuring infrastructure less network of mobile devices connected by wireless. Ad hoc is Latin and means "for this purpose". Each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Each must forward traffic unrelated to its own use, and therefore be a router. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Such networks may operate by themselves or may be connected to the larger Internet. MANETs are a kind of Wireless ad hoc network that usually has a routable networking environment on top of a Link Layer ad hoc network. The growth of laptops and 802.11/Wi-Fi wireless networking made MANETs a popular research topic since the mid-1990s. Many academic papers evaluate protocols and their abilities, assuming varying degrees of mobility within a bounded space, usually with all nodes within a few hops of each other. Different protocols are then evaluated based on measures such as the packet drop rate, the overhead introduced by the routing protocol, end-to-end packet delays, network through put etc. A mobile ad hoc network (MANET) is a self-configuring infrastructure less network of mobile devices connected by wireless. Ad hoc is Latin and means "for this purpose". Each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently.

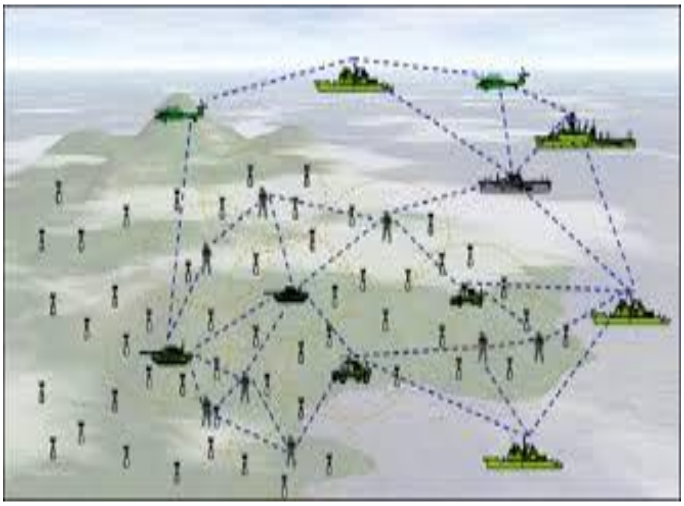

Fig 3. Multi hop MANET connection

MANETS can be used for facilitating the collection of sensor data for data mining for a variety of applications such as air pollution monitoring and different types of architectures can be used for such applications. It should be noted that a key characteristic of such applications is that nearby sensor nodes monitoring an environmental feature typically register similar values. This kind of data redundancy due to the spatial correlation between sensor observations inspires the techniques for in-network data aggregation and mining. By measuring the spatial correlation between data sampled by different sensors, a wide class of specialized algorithms can be developed to develop more efficient spatial data mining algorithms as well as more efficient routing strategies. The purpose of the MANET working group is to standardize IP routing protocol functionality suitable for wireless routing application within both static and dynamic topologies with increased dynamics due to node motion and other factors.

. Hybrid mesh infrastructures (e.g., a mixture of fixed and mobile routers) should also be supported by MANET specifications and management features. Using mature components from previous work on experimental reactive and proactive protocols, the WG will develop Proactive MANET Protocol (PMP) and Reactive MANET Protocol (RMP). If significant commonality between RMRP and PMRP protocol modules is observed, the WG may decide to go with a converged approach. Both IPv4 and IPv6 will be supported. Routing security requirements and issues will also be addressed. The MANET WG will also develop a scoped forwarding protocol that can efficiently flood data packets to all participating MANET nodes. The primary purpose of this mechanism is a simplified best effort multicast forwarding function. The use of this protocol is intended to be applied ONLY within MANET routing areas and the WG effort will be limited to routing layer design issues. The MANET WG will pay attention to the OSPF-MANET protocol work within the OSPF WG and IRTF work that is addressing research topics related to MANET environments.

IV. **SYSTEM ANALYSIS**

Each update consumes node energy, wireless bandwidth, and increases the risk of packet collision at the medium access control (MAC) layer. Packet collisions cause packet loss which in turn affects the routing performance due to decreased accuracy in determining the correct local topology (a lost beacon broadcast is not retransmitted).A lost data packet does get retransmitted, but at the expense of increased end-to-end delay.

4.1 **EXISTING SYSTEM**

Existing mechanisms invokes periodic beacon update scheme which consumes the network resources such as energy and bandwidth specifically when the network traffic is high it creates packet loss in the network leads to retransmission of data packet causing additional delay and energy consumption. The novel scheme of Adaptive Position Update (APU) including two rules named Mobility Prediction Rule (MP) and On demand Route Learning Rule (ODL).

*A. **ADAPTIVE POSITION UPDATE***

We begin by listing the assumptions made in our work:

- All nodes are aware of their own position and velocity.
- All links are bidirectional.
- The beacon updates include the current location and velocity of the nodes.
- Data packets can piggyback position and velocity.

Updates and all one-hop neighbours operate in the promiscuous mode and hence can overhear the data packets. Upon initialization, each node broadcasts a beacon informing its neighbours about its presence and its current location and velocity. Following this, in most geographic routing protocols such as GPSR, each node periodically broadcasts its current location information. The position information received from neighbouring beacons is stored at each node. The APU strategy proposed in this project dynamically adjusts the beacon update intervals based on the mobility dynamics of the nodes and the forwarding patterns in the network.

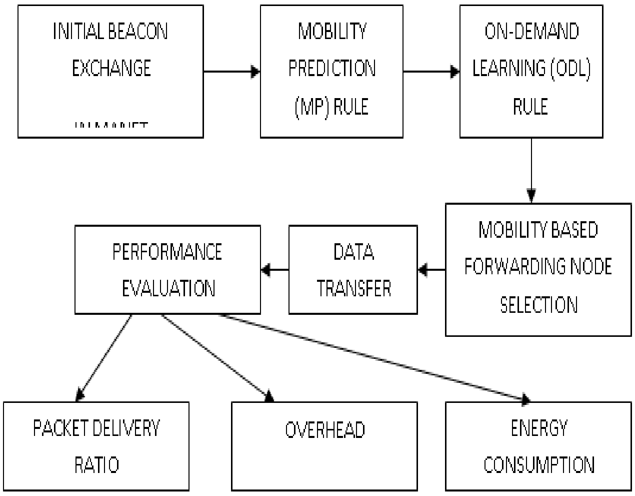

Fig 4. Block diagram for APU

APU employs two schemes based on the mobility dynamics of the nodes and the forwarding patterns in the network.

B. MOBILITY PREDICTION RULE

This rule adapts the beacon generation rate to the frequency with which the nodes change the characteristics that govern their motion (velocity and heading). The motion characteristics are included in the beacons broadcast to a node's neighbours. The neighbours can then track the node's motion using simple linear motion equations. Nodes that frequently change their motion need to frequently update their neighbours, since their locations are changing dynamically. The beacons transmitted by the nodes contain their current position and speed. Nodes estimate their positions periodically by employing linear kinematic equations based on the parameters announced in the last announced beacon. If the predicted location is different from the actual location, a new beacon is broadcast to inform the neighbours about changes in the node's mobility characteristics. On the contrary, nodes which move slowly do not need to send frequent updates. A periodic beacon update policy cannot satisfy both these requirements simultaneously, since a small update interval will be wasteful for slow nodes, whereas a larger update interval will lead to inaccurate position information for the highly mobile nodes.

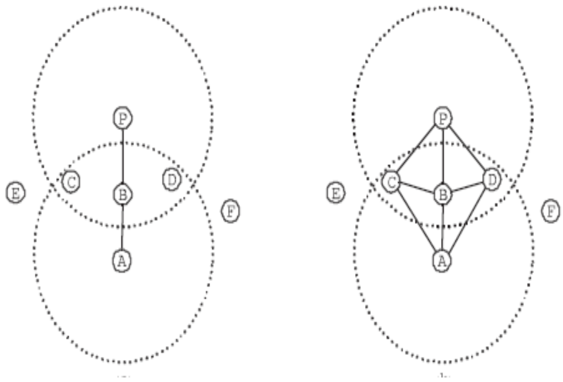

Fig 5. Mobility prediction

In our scheme, upon receiving a beacon update from a node I, each of its neighbour's records nodes i's current position and velocity and periodically track node i's location using a simple prediction scheme based on linear kinematics (discussed below). Based on this position estimate, the neighbours can check whether node i is still within their transmission range and update their neighbour list accordingly. The goal of the MP rule is to send the next beacon update from node i when the error between the predicted location in the neighbours of i and node i's actual location is greater than an acceptable threshold. We use a simple location prediction scheme based on the physics of motion to estimate a node's current location. Note that, in our discussion, we assume that the nodes are located in a 2D coordinate system with the location indicated by the x and y coordinates. However, this scheme can be easily extended to a 3D coordinate system. Table 1 illustrates the notations used in the rest of this discussion. As given the position of node i and its velocity along the x and y axes at time Tl, its neighbours can estimate the current position of i. The MP rule, thus, tries to maximize the effective duration of each beacon, by broadcasting a beacon only when the predicted position information based on the previous beacon becomes inaccurate. This extends the effective duration of the beacon for nodes with low mobility, thus reducing the number of beacons. Further, highly mobile nodes can broadcast frequent beacons to ensure that their neighbors are aware of the rapidly changing topology.

TABLE 1
Notations for Mobility Prediction

Variables	Definition
(X_l^i, Y_l^i)	The coordinate of node i at time T_l (included in the previous beacon)
(V_x^i, V_y^i)	The velocity of node i along the direction of the x and y axes at time T_l (included in the previous beacon)
T_l	The time of the last beacon broadcast
T_c	The current time
(X_p^i, Y_p^i)	The predicted position of node i at the current time

C. ***ON-DEMAND LEARNING RULE***

The MP rule solely may not be sufficient for maintaining an accurate local topology. It is necessary to devise a mechanism, which will maintain a more accurate local topology in those regions of the network where significant data forwarding activities are on-going. This is precisely what the On-Demand Learning rule aims to achieve. As the name suggests, a node broadcasts beacons on-demand, i.e., in response to data forwarding activities that occur in the vicinity of that node. According to this rule, whenever a node overhears a data transmission from a new neighbor, it broadcasts a beacon as a response. By a new neighbor, we imply a neighbor who is not contained in the neighbor list of this node. In reality, a node waits for a small random time interval before responding with the beacon to prevent collisions with other beacons. Recall that, we have assumed that the location updates are piggybacked on the data packets and that all nodes operate in the promiscuous mode, which allows them to overhear all data packets transmitted in their vicinity. In addition, since the data packet contains the location of the final destination, any node that overhears a data packet also checks its current location and determines if the destination is within its transmission range. If so, the destination node is added to the list of neighboring nodes, if it is not already present. Note that, this particular check incurs zero cost, i.e., no beacons need to be transmitted.

4.2 **PROPOSED SYSTEM**

To adapt the beacon update policy employed in geographic routing protocols to the node mobility dynamics and the traffic load using APU scheme. To estimate the accuracy of the location estimate and adapts the beacon update interval accordingly, instead of using periodic beaconing using MP rule. The MP rule, thus, tries to maximize the effective duration of each beacon, by broadcasting a beacon only when the predicted position information based on the previous beacon becomes inaccurate. So, use end point admission control mechanism to reduce the network traffic as well as end to end delivery.

END POINT ADMISSION CONTROL MECHANISIM: An approach to Admission Control (AC) that has emerged in recent years is Endpoint Admission Control (EAC), with all AC decisions taken by the endpoint devices. EAC usually consists of probing the end-to-end path, with probes resembling the traffic profile of the flow to be admitted.

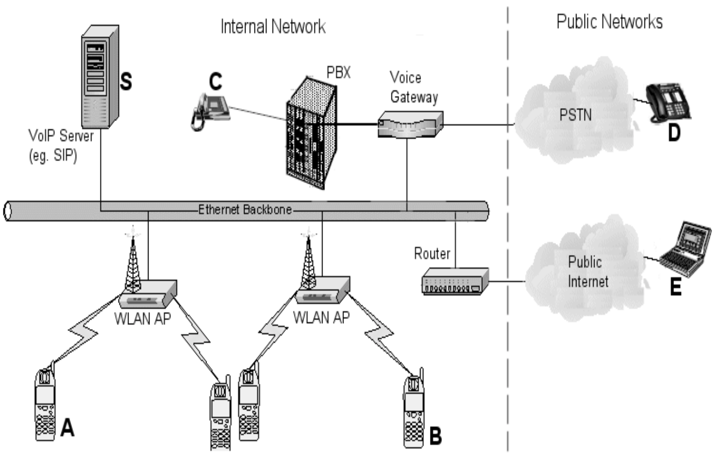

Fig 6. EPAC connection

The call setup procedure including the EAC probing phases, where SIP is used as the signaling protocol. SIP is used to establish and tear down call connections, and is used as is, i.e. no modifications are required to the signaling protocol used. When the WLAN handset, A, receives a call setup request from the user, it first sends probing packets to the VoIP server to verify the originating cell is capable of supporting the quality required for the call. If the decision is to admit the call, then SIP messages are sent to initiate call setup. Upon receiving a call setup request (SIP .INVITE. message) from the VoIP server, the caller's handset, B, also sends probing packets to the VoIP server to verify the terminating cell is also capable of supporting the call. If the call can be admitted, SIP is used to complete the call setup procedure and the voice session begins with acceptable call quality. If on the other hand it is deemed that the quality of either the originating or terminating cell is not sufficient to support the call, a *busy tone* (SIP .BUSY HERE. message is sent by B if its cell cannot support the call) is sent to the user who initiated the call.

4.3 **SYSTEM ARCHITECTURE**

Position information of the nodes is primary requirement in geographic routing. Forwarding nodes are selected among neighbours based on their location. Each node should be aware of its neighbours' location at the time of data transfer condition. Hence each node should update its' location information through a message called beacon. Existing mechanisms invokes periodic beacon update scheme which consumes the network resources such as energy and bandwidth specifically when the network traffic is high it creates packet loss in the network leads to retransmission of data packet causing additional delay and energy consumption. It is necessary to regulate the frequency of each node's beacon update process. It should follow the beacon update frequency adaptively based on mobility and its forwarding topology or pattern instead of fixed ones.

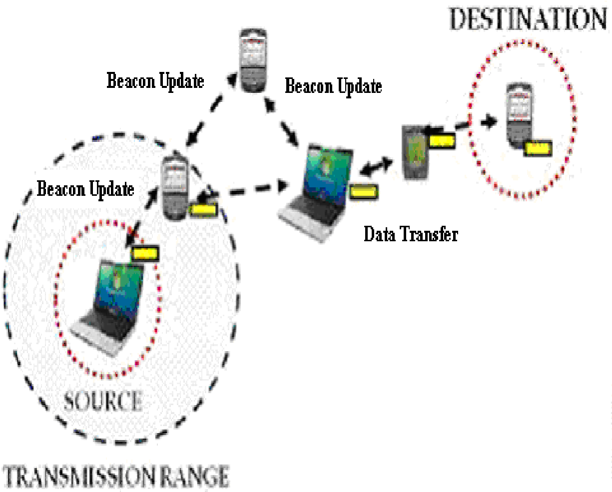

Fig 7. Architecture diagram

4.4 **SYSTEM DESIGN**

In the first set of simulations, we evaluate the impact of varying the mobility dynamics and traffic load on the performance of APU and also compare it with periodic beaconing and two recently proposed updating schemes: distance-based and speed-based beaconing Nevertheless, the second part of the cost also plays a very important role in practice, especially when the content is large (e.g., in the order of gigabytes), and it has a significant impact on the choice of parameters. In some previous work it is proposed to divide the content to be distributed into smaller trunks (sometimes referred to as generations), and random linear network coding is applied to each trunk of content independently. This paper consists of five modules are

- Network Creation Module
- Beaconing Information
- Mobility Prediction Rule
- On-Demand Learning Rule
- Graph Analysis

A. NETWORK CREATION MODULE

Mobile Ad hoc network is created with the total number of 48 wireless nodes. Nodes are configured with simulation parameters listed in the simulation model table. Nodes are deployed in the initial location. After the deployment, each node identifies its neighbours by sending beacon. Nodes which are located within the communication range are known as neighbours. Each node broadcast the beacon to its neighbours. In this module first we create the network environment for adaptive position update for Geographic routing system. The network creation module will be as follows:

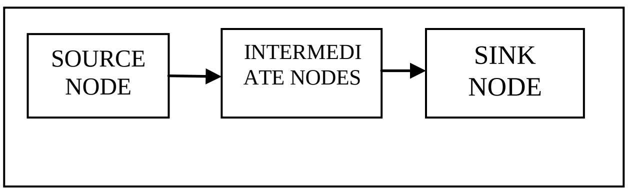

Fig 8. Network creation

So, first we create network module with Source node, intermediate nodes and sink node. In this network environment we are going to perform our technique of Adaptive position update (APU). In the router node, we design as the network nodes perform the operations of Beaconing information, mobility prediction rule and On-demand Learning Rule. The Source node perform the operation of triggering router node by sending the data using Socket technique by giving the IP address from one node to another node. The destination node performs the operation of receiving data and acknowledging the details.

B. BEACONING INFORMATION

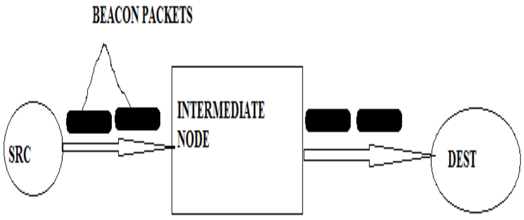

Fig 9. Beaconing information transmission

In this module, the after triggering the router node, the node initialization process is carried out. Then, the beacon packets are transmitted to all the nodes in the network. In this module, we check the nodes distance between previous position and current position. The node distance greater than acceptable threshold update their position to its neighbours through beacon packets.

C. MOBILITY PREDICTION RULE

The beacons transmitted by the nodes contain their current position and speed. Nodes estimate their positions periodically by employing linear kinematic equations based on the parameters announced in the last announced beacon. If the predicted location is different from the actual location, a new beacon is broadcast to inform the neighbours about changes in the node's mobility characteristics The Node Prediction rule is triggered when there is change in the location of the node. The change in the location of the node is cannot be predicated because it moves in the random. The computation overhead involved in the content distribution consists of two parts.

The first part is the cost due to the verification of the packets, and the second part is the cost due to the need to compute random combinations of the data blocks. The preceding sections of this paper focus on the first part of the cost, which can be reduced through the use of more efficient hash functions and batch verification techniques as we have discussed.

Nevertheless, the second part of the cost also plays a very important role in practice, especially when the content is large (e.g., in the order of gigabytes), and it has a significant impact on the choice of parameters. In some previous work it is proposed to divide the content to be distributed into smaller trunks (sometimes referred to as generations), and random linear network coding is applied to each trunk of content independently.

Although this method works in certain application scenarios, it does not address the problem directly but instead avoids high computation overhead by applying random linear network coding to smaller problem instances. Hence, this strategy may lose certain benefits from network coding.

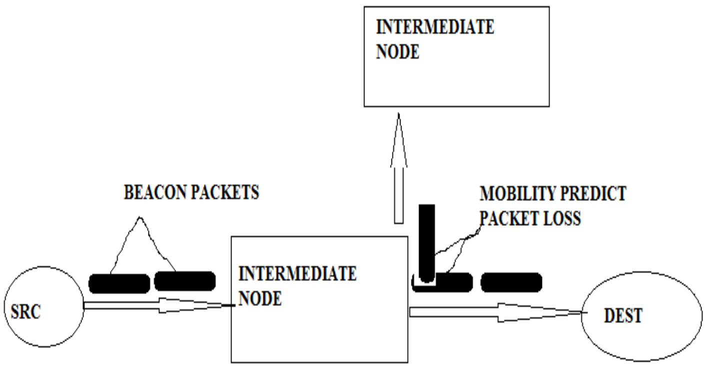

Fig 10. Mobility prediction module

D. ON-DEMAND LEARNING RULE

An accurate representation of the local topology is particularly desired at those nodes that are responsible for forwarding packets. Hence, APU seeks to increase the frequency of beacon updates at those nodes that overhear data packet transmissions. As a result, nodes involved in forwarding packets can build an enriched view of the local topology. As the name suggests, a node broadcasts beacons on-demand, i.e., in response to data forwarding activities that occur in the vicinity of that node. According to this rule, whenever a node overhears a data transmission from a new neighbour, it broadcasts a beacon as a response. By a new neighbour, we imply a neighbour who is not contained in the neighbour list of this node. In reality, a node waits for a small random time interval before responding with the beacon to prevent collisions with other beacons.

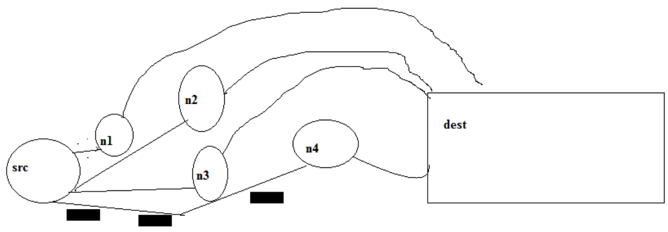

Fig 11. Finding the shortest path by using ODL

E. GRAPH ANALYSIS AND PERFORMANCE EVALUTION

In this module, we analyse our and we evaluate the impact of varying the mobility dynamics and traffic load on the performance of APU and also compare it with periodic beaconing and two recently proposed updating schemes: distance-based and speed-based beaconing (SB). The simulation results show that APU can adapt to mobility and traffic load well. For each dynamic case, APU generates less or similar amount of beacon overhead as other beaconing schemes but achieve better performance in terms of packet delivery ratio, average end-to-end delay and energy consumption.

- **PDR**

PDR is the proportion to the total amount of packets reached the receiver and amount of packet sent by source. If the amount of malicious node increases, PDR decreases. The higher mobility of nodes causes PDR to decrease.

- **ENERGY CONSUMPTION**

It is the amount of energy consumed by the sensors for the data transmission over the network.

Energy Consumption = Sum of energy consumed by each sensor.

- **OVERHEAD**

Overhead = Number of messages involved in beacon update process.

From the trace obtained from the data transmission from source to destination, performance metrics such as energy consumption, overhead, and packet delivery ratio are obtained using the AWK script. AWK script processes the trace file and produces the result. Using the results obtained from AWK script graph is plotted for performance metrics using graph tool available in ns-2. The computation overhead involved in the content distribution consists of two parts. The first part is the cost due to the verification of the packets, and the second part is the cost due to the need to compute random combinations of the data blocks. The preceding sections of this paper focus on the first part of the cost, which can be reduced through the use of more efficient hash functions and batch verification techniques as we have discussed.

4.5 **SIMULATION RESULTS**

In this section, we present a comprehensive simulation based evaluation of APU using the popular NS-2 simulator. We compare the performance of APU with other beaconing schemes. These include PB and two other recently proposed adaptive beaconing schemes in [13]: (i) Distance-based Beaconing and (ii) Speed-based Beaconing.

We conduct three sets of experiments. In the first set of simulations, we demonstrate that APU can effectively adapt the beacon transmissions to the node mobility dynamics and traffic load. In addition, we also evaluate the validity of the analytical results derived in Section 4, by comparing the same with the results from the simulations. In the second set of experiments, we consider the impact of real-world factors such as localization errors, realistic radio propagation, and sparse density of the network on the performance of APU. In the third set of experiments, we evaluate the impact of parameter AER (which is from MP component) on the overall performance of APU. This enables us to investigate which component (MP or ODL) contributes to the performance more significantly.

SCREEN SHOTS

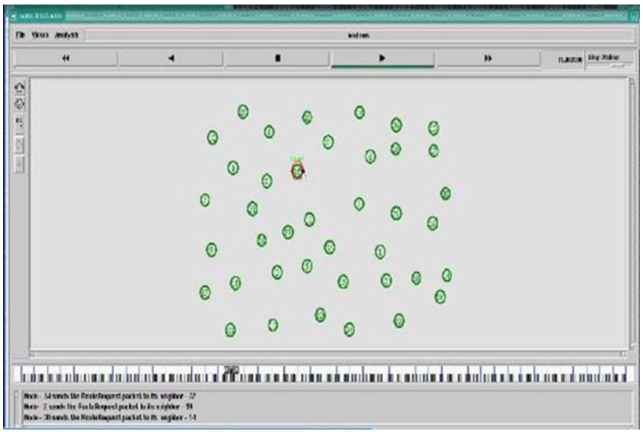

Fig 12. Probing Strategy Output

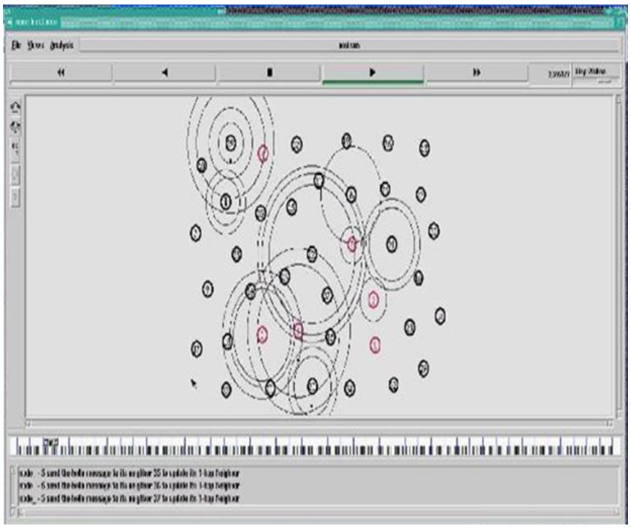

Fig 13. Marking Strategy Output

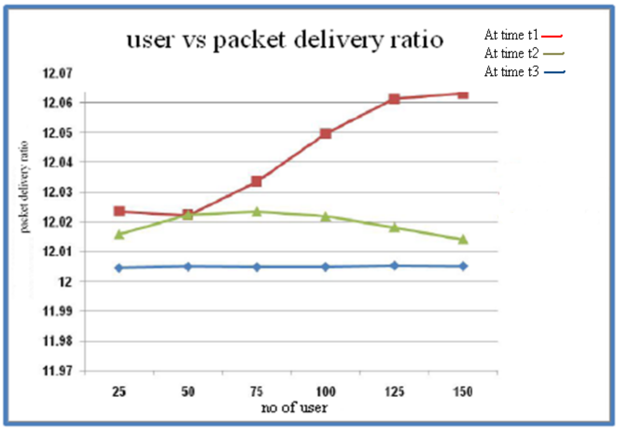

Fig 14. User Vs Packet Delivery Ratio

V. CONCLUSION

In this project, the need to adapt the beacon update is identified and the corresponding policy is employed in geographic routing protocols to the node mobility dynamics and the traffic load. The Adaptive Position Update (APU) strategy is proposed to address these problems. The APU scheme employs two mutually exclusive rules. The MP rule uses mobility prediction to estimate the accuracy of the location estimate and adapts the beacon update interval accordingly, instead of using periodic beaconing. The ODL rule allows nodes along the data forwarding path to maintain an accurate view of the local topology by exchanging beacons in response to data packets that are overheard from new neighbours. Performance of APU is evaluated using extensive NS-2 simulations for varying node speeds and traffic load. Results indicate that the APU strategy generates less or similar amount of beacon overhead as other beaconing schemes but achieve better packet delivery ratio, less overhead and energy consumption.

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