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A REVIEW PAPER ON ROUTING USING ADAPTIVE POSITION UPDATE (APU) STRATEGY

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ABSTRACT

MANET is self-configured Mobile Ad hoc network of mobile nodes connected via random topology. The main issue in MANET is the selection of best path between any two nodes. Routing in MANET is to find the efficient path to transfer the data from source to destination. APU strategy is routing strategy for geographic routing in Mobile ad-hoc network which dynamically adjust the frequency of position updates based on the mobility dynamics of the nodes and the forwarding patterns in the network. The beacon updates include the current location and velocity of the nodes. Existing systems use periodic beaconing to update the routing table for data transfer. There are various problems with periodic beaconing which are Each update in Position in a given network consumes node energy, bandwidth of wireless channel, and the risk of packet collision increases correspondingly at the medium access control (MAC) layer. Packet collisions in the network cause packet loss which again decreases the routing performance which results in difficulty to evaluate local topology for transmission. It results in a heavy loss due this factor beacon lost and a lost beacon cannot be retransmitted. A lost data packet does get retransmitted as a result end-to-end delay increases. Hence to solve the above problems an Enhanced APU Based architecture is required. In this paper we have discussed about APU and its architecture.

KEYWORDS: APU, Routing, Geographical Routing, MANET.

INTRODUCTION

A mobile ad-hoc network (MANET) is a self-arranging wireless network of mobile hosts connected through arbitrary topology without the guide of any centralized administration. It is an optimization of link-state routing. It is a collection of mobile nodes sharing a wireless channel without any centralized control or established communication backbone. They have no fixed routers with all nodes capable of movement and arbitrarily dynamic. These nodes can act as both end systems and routers at the same time. When acting as routers, they discover and maintain routes to other nodes in the network. The topology of the ad hoc network depends on the transmission power of the nodes and the location of the mobile nodes, which may change from time to time. Normal routing protocol which works well in fixed networks does not show same performance in Mobile Ad Hoc Networks. In these networks routing protocols ought to be more dynamic so that they rapidly react to topological changes. Figure 1.1 depicts the ad-hoc network and the routing of packets in the network. Different uses of MANET are characterized which incorporate military battle fields, commercial sector like emergency rescue operations, local levels like conferences or classrooms, personal area network(PAN) and numerous more applications [2].

Figure 1.1 Mobile Ad-Hoc Network [41]

CHARACTERISTICS OF MANET

Dynamic Topologies: Since nodes are free to move arbitrarily, the network topology may change randomly and rapidly at unpredictable times. The links may be unidirectional bidirectional.

Bandwidth constrained, variable capacity links: Wireless links have significantly lower capacity than their hardwired counterparts. Also, due to multiple access, fading, noise, and interference conditions etc. the wireless links have low throughput.

Energy constrained operation: Some or all of the nodes in a MANET may rely on batteries. In this scenario, the most important system design criteria for optimization may be energy conservation.

Limited physical security: Mobile wireless networks are generally more prone to physical security threats than are fixed- cable nets. The increased possibility of eavesdropping, spoofing, and denial-of-service attacks should be carefully considered. Existing link security techniques are often applied within wireless networks to reduce security threats. As a benefit, the decentralized nature of network control in MANET provides additional robustness against the single points of failure of more centralized approaches [14].

Routing protocols and there categories

In Topology based approach, routing protocols are classified into three categories, based on the time at which the routes are discovered and updated.

a. Proactive Routing Protocol (Table Driven)
b. Reactive Routing Protocol (On-Demand)
c. Hybrid Routing Protocol

The Proactive routing approaches designed for ad hoc networks are derived from the traditional routing protocols. These protocols are sometimes referred to as table-driven protocols since the routing information is maintained in tables. Proactive approaches have the advantage that routes are available the moment they are needed. However, the primary disadvantage of these protocols is that the control overhead can be significant in large networks or in networks with rapidly moving nodes [6].

Proactive routing protocol includes Destination-Sequenced Distance-Vector (DSDV) protocol, Wireless Routing Protocol (WRP), Optimized Link State Routing Protocol (OLSR) etc.

Reactive routing approaches take a departure from traditional Internet routing approaches by not continuously maintaining a route between all pairs of network nodes. Instead, routes are only discovered when they are actually needed. When a source node needs to send data packets to some destination, it checks its route table to determine whether it has a route. If no route exists, it performs a route discovery procedure to find a path to the destination. Hence, route discovery becomes on-demand. The drawback to reactive approaches is the introduction of route acquisition latency. That is, when a route is needed by a source node, there is some finite latency while the route is discovered. In contrast, with a proactive approach, routes are typically available the moment they are needed. Hence, there is no delay to begin the data session. Reactive routing protocol includes Dynamic Source Routing (DSR) protocol, Ad hoc on-demand Distance Vector (AODV) protocol, Ad hoc On-demand Multiple Distance Vector (AOMDV) protocol etc.

Hybrid protocols seek to combine the Proactive and Reactive approaches. An example of such a protocol is the Zone Routing Protocol (ZRP) [6].

With the growing popularity of positioning devices (e.g. 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 neighbors, 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 [27].

ADAPTIVE POSITION UPDATE (APU)

APU strategy is routing strategy for geographic routing in Mobile ad-hoc network which dynamically adjust the frequency of position updates based on the mobility dynamics of the nodes and the forwarding patterns in the network. APU is based on two simple principles: 1) nodes whose movements are harder to predict update their positions more frequently (ii) nodes closer to forwarding paths update their positions more frequently (and vice versa).

There are some assumptions considered for this strategy:

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1. All nodes are aware of their own position and velocity,
2. All links are bidirectional,
3. The beacon updates include the current location and velocity of the nodes, and
4. Data packets can piggyback position and velocity updates and all one-hop neighbors operate in the promiscuous mode and hence can overhear the data packets.

Upon initialization, each node broadcasts a beacon informing its neighbors 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 neighboring beacons is stored at each node. Based on the position updates received from its neighbors, each node continuously updates its local topology, which is represented as a neighbor list. Only those nodes from the neighbor list are considered as possible candidates for data forwarding. Thus, the beacons play an important part in maintaining an accurate representation of the local topology. Instead of periodic beaconing, APU adapts the beacon update intervals to the mobility dynamics of the nodes and the amount of data being forwarded in the neighborhood of the nodes. APU employs two mutually exclusive beacon triggering rules, which are discussed in the following [8].

In Figure 1.2 the architecture of APU depicts the routing of packets from source to destination on the basis of APU strategy. In this packet is routed to the neighboring nodes within transmission range and beacon is updated on the basis of mobility prediction (MP) and on-demand learning (ODL) rule and the highly stable nodes from source to destination greedy forwarder is selected as best path for forwarding packet.

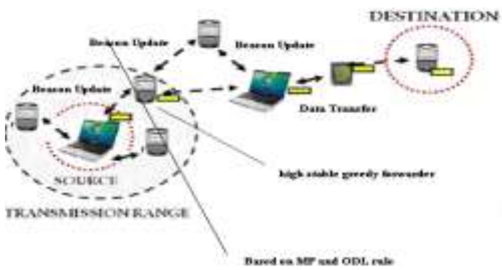

Figure 1.2 Architecture of APU

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 neighbors. The neighbors can then track the node's motion using simple linear motion equations. Nodes that frequently change their motion need to frequently update their neighbors, since their locations are changing dynamically. 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.

On-Demand Learning Rule
The MP rule solely may not be sufficient for maintaining an accurate local topology. Consider the example illustrated in Figure 1.4, where node A moves from P1 to P2 at a constant velocity. Now, assume that node A has just sent a beacon while at P1. Since node B did not receive this packet, it is unaware of the existence of node A. Further, assume that the AER is sufficiently large such that when node A moves from P1 to P2, the MP rule is never triggered. However, as seen in Figure 1.4 node A is within the communication range of B for a significant portion of its motion. Even then, neither A nor B will be aware of each other. Now, in situations where neither of these nodes is transmitting data packets, this is perfectly fine since they are not within communicating range once A reaches P2. However, if either A or B was transmitting data packets, then their local topology will not be updated and they will exclude each other while selecting the next hop node. In the worst case, assuming no other nodes were in the vicinity, the data packets would not be transmitted at all [7].

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LITERATURE SURVEY

Ankur O. Bang, Prabhakar L. Ramteke (2014): This paper propose a model which uses Adaptive Position Update . This paper focus on the working of the model based on this strategy the working efficiency of this model is validated by NS2 simulations .The simulations results (in comparison with GPSR (Greedy Perimeter Stateless Routing Protocol)), shows significant reduction in update cost and improvement in routing performance in terms of packet delivery ratio and average end-to-end delay when compared with other beaconing schemes.

Ravi Kumar Poluru, T. Sunil Kumar Reddy, D.Nagarajun (2014): This paper contend and display the periodic beaconing apart from of the node mobility and traffic patterns in the network is not nice-looking from both update cost and routing recital points of view. This paper suggest the Adaptive Position Update (APU) strategy for geographic routing, which enthusiastically adjusts the occurrence of position updates based on the mobility dynamics of the nodes and the forwarding patterns in the system. Analysis is validated by NS2 simulations of a well-known geographic routing procedure, Greedy Perimeter Stateless Routing Protocol (GPSR), shows that APU can drastically reduce the update cost and pick up the routing performance in terms of packet delivery ratio and regular end-to-end delay in assessment with periodic beaconing and other recently proposed updating schemes.

Babitha U B (2014): This paper propose an adaptive on-demand geographic routing scheme in which topology information is updated in a timely manner according to network dynamics and traffic demands to provide efficient and reliable routing. It uses a limited flooding routing protocol that restricts the broadcast region to all nodes in the same quadrant as the source and destination and does not require maintenance of a separate neighbor table at each node. As a result the number of broadcast messages decreases, reducing data flooding, providing improved channel efficiency and improves bandwidth utilization and lifetime of intermediate nodes which provides improved route stability.

Pasupuleti Neelima, K.Bhargavi (2014): In mobile ad-hoc networks the geographic routing protocol has high priority. This routing protocol maintains the nodes nearest to destination. It requires information about final destination of a packet and neighbor node positions. For maintaining the node updates a unique strategy is used known as Adaptive Position Update (APU).It uses two principles: nodes 1) whose moments are harder to predict & 2) closer to forwarding paths are updated frequently.

CONCLUSION

In this paper, a review on routing techniques using APU strategy is presented. It is concluded that APU saves energy by avoiding unnecessary beacon update and do the beacon update adaptively. Beacon overhead in Periodic beacon scheme is high compared to proposed system due to periodic beacon. Proposed system reduces the beacon overhead by avoiding unnecessary beacon update and only does the beacon update process adaptively. In future, a robust system using Enhanced APU Strategy can be developed to route the packets from source to destination.

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