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Position Based Energy-Efficient Protocol for Mobile Ad-hoc Networks

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Abstract -- Position based routing procedures are stateless mean while they rely on position information in promoting decisions. Though, their efficiency be contingent on presentation of position facilities which provide the position information of the desired terminus node. Several position service arrangements have been proposed, but the most promising among them, graded hashing based procedures, rely on instinctive design in the available solutions. In this paper, we deliver full examination of the efficiency of routing in graded hashing based procedures as a function of the assignment of the routers. Based on the hypothetical analysis of the gain and costs of the query and reply routing, we proposition a novel position service protocol (PSP) that enhances the distance tracked by the position update and query packets and, thus, decrease the in general power consuming cost These gains are supplementary increased in the second presented practice by the optimal position of servers that we established through analysis of geometrical relationships between nodes and position servers. Reproduction results establish that the proposed protocols achieve around 30–35% energy efficiency while improving or sustaining the query success rate in comparison to the previously anticipated algorithms.

1. INTRODUCTION

Freshly, there has been accumulative practice of mobile devices such as smart phones, iPods and GPS strategies by people and vehicles. The requestsconsecutively on these mobile devices require ad hoc type of communication, and consequently necessitated the design of new cost efficient routing procedures for MANETs with constantly changing topology. Subsequently these mobile devices are carried voluntarily by people (the power of these nodes is not consumed for suppleness), the main factor that depletes the energy of such devices is the set up and conservation cost of routing, procedures that provide the communication between the nodes [4].Among many routing algorithms proposed for MANETs, position based routing has received much attention and is considered to be the most efficient and scalable routing paradigm [3]. However, before a package can be routed, the source node needs to repossess the position material of the destination node. Thus, a critical issue for position based routing protocols is to design efficient position services that can track the positions of mobile nodes and at any time reply to queries about the positions of nodes residing anywhere in the network. Since mobile nodes are battery powered with limited vitality, vigor efficiency must be taken into deliberation when designing position service etiquettes.

2. RELATED WORK

Around must remained several protocols projected for position service. The original of them were flooding based methods. DREAM [1], DLS [2], and SLS are instances of those in which each node periodically floods the entire network with its position information. However, the storage and distribution overhead of such an approach is very high. Sensitive flooding based methods (e.g., RLS) are better than practical ones in terms of overhead. Yet, they might still resort to flooding the entire network when the terminus position information is not available in neighbor nodes. To limit the position apprise and query flooding, minimum based protocols were planned. One example is the column row protocol familiarized in , where each node occasionally propagates its position information in the north south bearing, while any position query is broadcasted in the east west direction. In this case, informs and query above is much lower than it is in flooding based methods [5]. Yet, the position update cost in terms of journey count is still the full distance of the network and the query cost could be nearly as high if the query enters the query column far from the connection of this column with the apprise row. This method is then extended by conveyance request and update in non-vertical directions [6] and in multi directions [7]. Freshly, hashing-based protocols, in which position servers are determined via a global hash function, have been proposed. These protocols can further be divided into flat or graded, depending on how the home districts of the position servers are structured. In the flat chopping based protocols [8, 9] each node's identifier is mapped to a home region consisting of one or more nodes within a fixed position in the network area. All nodes in the home region serve as position servers preserving position information and replying to position inquiries. However, there are several disadvantages of such an approach. First, a large overhead is presented when moving nodes periodically send position updates to their position servers which may be far away. Second, even if the terminus node is arbitrarily close to the source node, the foundation node still needs to send position query to the destination node's position server that could be far away. Third, when all the position servers are within a fixed geographical area, recurrent position queries and responses sewer energy and cause early death of the nodes within this area. Multi home province method was proposed to fix some of the above disadvantages. The concept of ordered structure used for position service was first familiarized in. In the ordered hashing based protocols [11 - 14], the network area is recursively divided into a hierarchy of squares. For each node, one or more nodes in each four-sided at each level of the grading are assigned as its position servers. Maintaining a hierarchy offers several benefits.

First, moving nodes do not need to send position update to position servers of certain level if they have not moved out of the consistent square. Thus, the position update cost is significantly concentrated. Second, if the source node and the terminus node are close to each other and within the same low level square, the position query can be replied swiftly [10]. Third, position servers are scattered all over the network, complementary the total network energy usage among nodes. Although energy related limitations are considered in some routingetiquettes such as, position service protocols mainly concentration on the ability to find the position of the destination nodes. Thus, their designs are not supported by the demanding analysis of the vitality efficiency of stimulating position inform and position query containers. Inversely, the lower left coordinate of the level-I square can be computed as follows:

$$y_{A|V}^{j}=\sum_{l=1}^{K-i} m(k-l \times W_{A|V}^{K-L}$$

With such a partitioning and the square address scheme applied to the entire network, the specific location of a node can be identified by the square in which this node resides. Obviously, if a node oscillates between two nearby points at two sides of a high level square boundary, sending of location updates immediately after each slight location change will be costly. Therefore, to reduce such an overhead, we employ lazy update technique. Lazy update allows a node to move out of level-I square up to a certain distance without updating corresponding location servers. This scheme will keep the location query to be efficient and locality aware, and reduce the overhead due to oscillating nodes, as verified in [16, 15]. For example, if the source node and the destination node are within the same grid a, then the location query packet will first go to H1a and then will find the destination node's information and go to the destination node directly. Thus, the location query cost will be 0. If the source node is within grid A and the destination node is within grid B, then the location query packet will visit H1a, H2, H1b and the destination node in sequence. Thus the location query cost will be a + b.

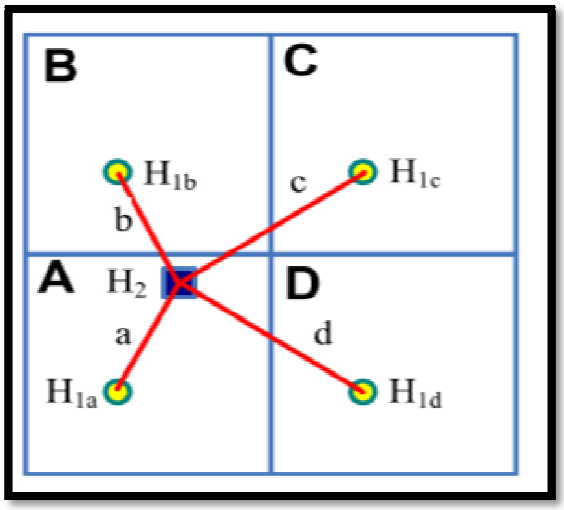

Fig. 1. A two-level grid example

3. PROPOSED WORK

We also present a novel protocol subsequent from this analysis that enhances energy consumption of the protocol induced communication. We emphasis our analysis on hierarchical hashing-based protocols introduced in. They use the graded grid with servers randomly assigned to each node based on its ID.

Using the lower left point as the origin of the system, we can define the address of level-i square as a sequence of coordinate pairs

$$(f_a^{k-1},f_b^{k-1})\dots(f_a^{l},f_b^{l})$$

Computed as:

$$f_{a|d}^{i} = w_{a|d}^{i} - \sum_{x=1}^{k-i-1} L(k-x) \times a_{a|d}^{k-x} / l_i$$

We made the following observations about the previous methods described in [14–16]. In these methods (through- out the paper we specifically refer to HIGH-GRADE method in [14], abbreviated as HG here, as the representative of such methods), the source node calculates all candidate level I location server points assuming the destination node resides in the same level-i square as itself. Then, the location query packet traverses the candidate location server points in increasing order of the corresponding square levels until the lowest level square in which both the source and the destination nodes reside is found. Clearly, such a common square always exists (in the worst case this is the level-N square). In this paper; we made the following important contributions to this approach: We examined analytically the gain and cost of the position query routing and derived the optimum position query and update approaches. Based on this examination, we proposed an efficient procedure for reducing the coldness

traveled by position update and inquiry packets. The proposed protocol decreases the energy cost of position service, growths the delivery ratio, and balances the position service load equally among all nodes.

The benefit of the existence of the optimal positions (that we identified) for the servers; transmission server duties to nodes near these optimumpositions brings the energy ingesting and the delivery ratio close to their optimal values. We performed widespread simulations with many changing parameters running over many dissimilar environments to establish experimentally the recompenses of futureetiquettes over the leading existing conventions.We prototypical a mobile ad hoc network as a set of wireless nodes organized randomly with unchanging distribution over a prearranged finite two-dimensional2 square area. All nodes have an exclusive ID, and are fortified with an announcement radio with a message protocol supporting reliable internode communication with adjustable transmission range. We assume that each node knows its own position (e.g., via low power GPS strategies or localization techniques) and also knows the positions of its neighbors. The latter is naturally accomplished via intermittent hello messages with Time to Live (TTL) set to one hop. Thus, this package will only be received by one hop neighbor of the sender, instead of flooding the entire network. Moreover, we assume that the nodes move within the four-sided network area according to a mobility model.

The entire network area is recursively alienated into a hierarchy of quadrangles which are known to each node in the network. Aimed at a non-square area, it could be protected by a four-sided with smallest size.Some schemes try to address the aforementioned first drawback by forwarding position query packet in a spiral with increasing radius until it meets one of the position servers. Even though this helps in finding the nearby position servers quickly, the position query packet still travels a long distance if the position servers are far away from the source. Considering the above points, we conclude that: for the source node, it is worth searching the adjacent squares outdoor its own high level square, but only if the expected gain (finding right position server quickly, thus decreasing the average distance traveled by packet) is greater than the cost for visiting extra position server points; If hopping over lower level applicant position server points and staying higher level candidate position server point first will decrease the average coldness traveled by packet, then the source node should send the position query packet to visit the advanced ones first.

4. RESULTS AND DISCUSSION

The proposed protocol PGP is simulated with NS2 simulator with the below settings and also compared with the DSR and AODV protocol with the performance metrics packet delivery ratio, throughput, Packet Drop and Overhead. Results show that PGP outperforms better in all the aspects than the AODV and DSR protocol. The settings used for the simulation are as below:

No. of Nodes	150
Terrain Size	1000 X 1000 m
MAC	802.11b
Radio Transmission Range	100, 150, 200, 250 mts
Simulation Time	100 seconds
Traffic Source	CBR (Constant Bit Rate)
Packet Size	256 Kbits
Mobility Model	Random Waypoint Model
Initial Energy	1 to 3 Joules
Speed	2 m/s

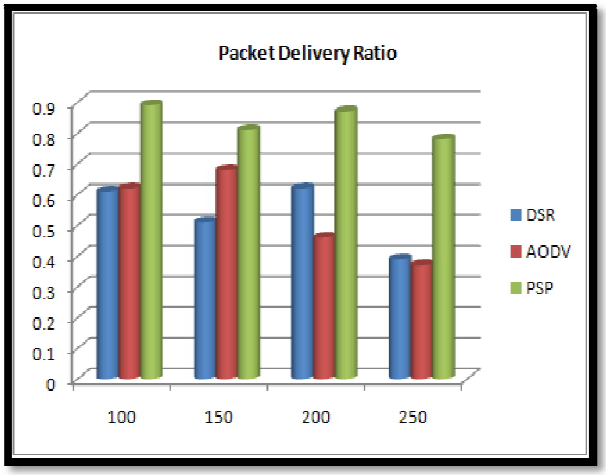

Fig.1: Distance vs Packet Delivery Ratio

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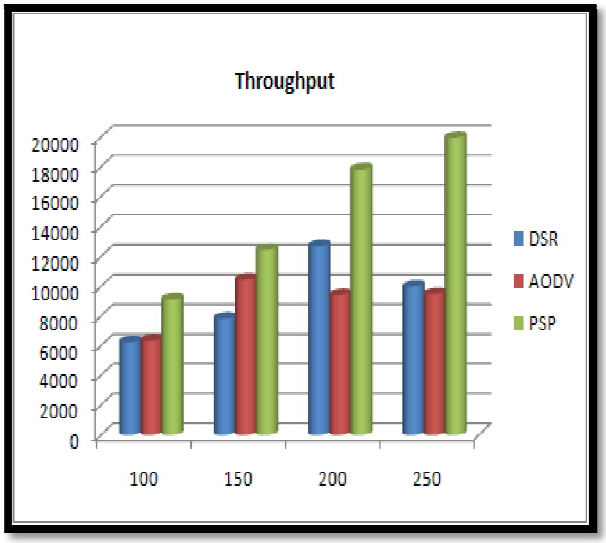

Fig.2: Distance vs Throughput

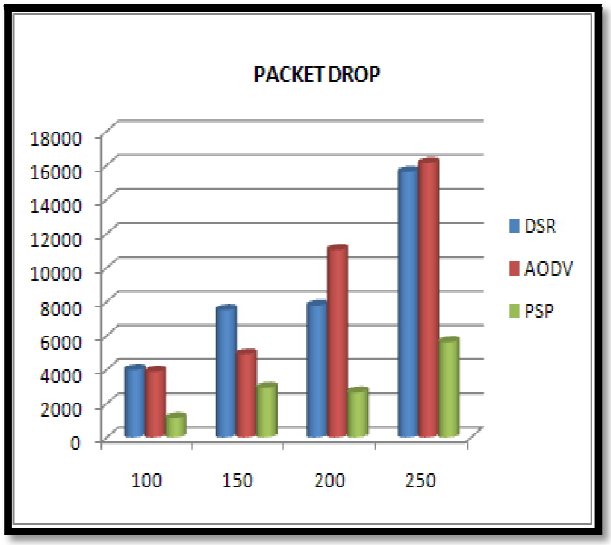

Fig.3: Distance vs Packet Drop

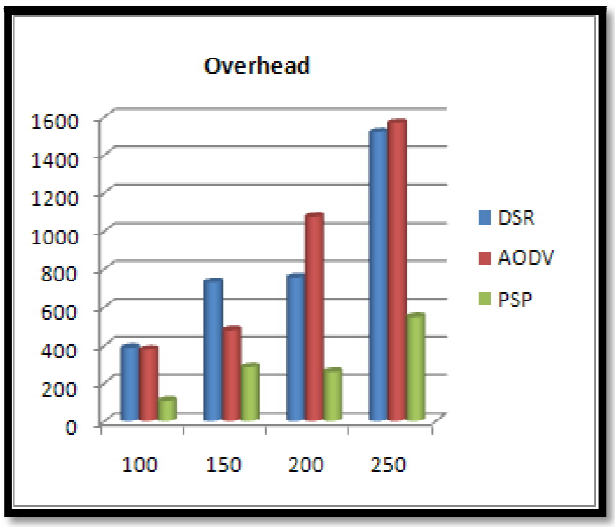

Fig.4: Distance vs Overhead

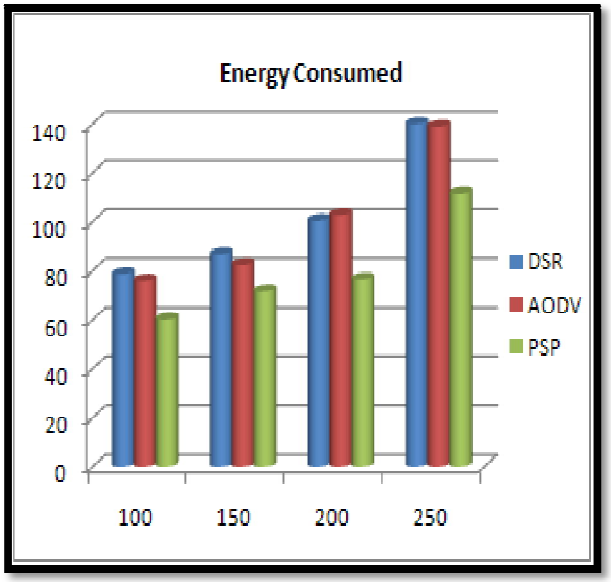

Fig.4: Distance vs Energy Consumed

5. CONCLUSION

In this paper, an investigative model for the presentation of graded hashing based position server procedures is presented. Based on this examination, binary novel position service procedures presented to optimize the overall energy cost of position service by declining the distance traveled by the position update and query packets. The existing protocol AODV adjusts the path for position apprise and query packets, while the other one, DSR, places the position servers at their optimal positions. Extensive simulations were completed to demonstrate that the new protocol PSP achieve significantly higher energy efficiency and improve general presentation when associated to the existing methods. In future work, I will use these position services in designing routing protocols and submissions for mobile wireless networks. When comparing with the existing protocol namely AODV and DSR, the proposed protocol PSP outperforms in all the aspects of the performance metrics with the main intention of reducing the energy consumption.

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