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Review on Performance of MANET Using Different Routing Algorithm

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Abstract: ***Now a day's wireless ad-hoc network is receiving more popularity as compared to wired networks. A wireless ad hoc network is a decentralized type of wireless network. A Mobile Ad hoc Network can change locations and arrange itself. A Mobile Ad-Hoc Network (MANET) is self-configuring network of mobile nodes connected by wireless links to form an uninformed topology without the use of existing transportation. Previous make inquiries in ad hoc networking have generally studied the routing problem in a non-adversarial setting by considering the trusted atmosphere. In this paper, we investigation the design and performance evaluation of a new efficient on demand routing protocol for mobile ad-hoc networks. Up till now many routing algorithms have been proposed to find the routing trouble in mobile ad-hoc networks so it is difficult to evaluate the presentation of different routing protocols qualitatively as there are many point of view that affect the performance of network. The proposed TAODV (Tactical On Demand Distance Vector Routing Algorithm) algorithm performs superior for finding routing problems in Mobile Ad Hoc networks. Most of the proposed algorithms use a blind flooding technique through the route discovery process. This method is unsuccessful and creates excessive routing overhead. To defeat this problem, the forth put routing protocol uses a query localization technique that importantly reduces the network traffic and raises the performance of network. The simulation results clearly show that proposed on demand routing protocol is more efficient and resizable than existing ones.***

Keywords: Mobile ad hoc network, AODV, Positional communication systems, Query localization technique, Tactical on demand distance vector (TAODV) and wireless networks.

1. Introduction

Now a day's wireless ad-hoc network is obtaining more attractiveness as compared to wired networks. A wireless ad hoc network is a decentralized type of wireless network. The network is ad-hoc because it does not convey on a preexisting transportation, such as routers in wired networks or access points in managed (infrastructure) wireless networks. as a substitute, each node participates in routing by transfer data for other nodes, and so the resolve of which nodes transfer data is made animatedly based on the network connectivity. Ad-hoc networks burden a protocol completely different from those used for wired and transportation wireless networks. Ad-hoc networks have their own requirements and constraints and require a protocol that takes into explanation these issues and provide protected communication under such constraints. The process of Ad-hoc networks depends on the collaboration among nodes to provide connectivity and communication routes.

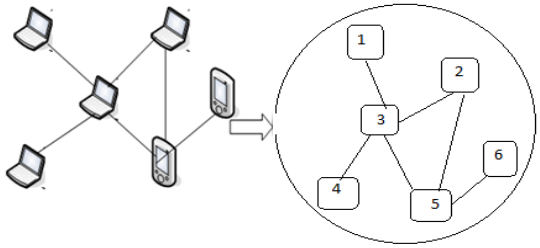


Figure 1: Example of mobile Ad-Hoc network

Mobile calculating has been introduced (mainly as a result of major technological developments) in the past few years forming a new computing atmosphere. Because of the fact that mobile computing is unnatural by poor resources, highly dynamic variable connectivity and limited energy sources, the design of constant and well-organized mobile information systems has been greatly difficult. Until now, two basic system models have been planned for mobile computing. The fixed backbone" mobile system model has been used approximately the past decade and has evolved to a quite stable system that can use a multiplicity of information in order to improve previously existing services and yet give new ones.

On the other offer, the ad hoc system representation assumes that mobile hosts can form networks without the contribution of any permanent transportation Mobile ad-hoc expertise has concerned the awareness of the communications meadow and host of researchers because the growth of the Mobile Packet Radio Networks in study projects initiated by the US military in the 1970 and 1980s.

The MANET is an self-directed network of mobile computers that are associated via wireless links. There is no pre-existing transportation and therefore each node in the network may take action as a host or as a router (an intermediate node) to allow connectivity between other source and destination hosts in the network. The expression ad-hoc implies that the network is fashioned in a natural manner to meet an instant and precise goal. Since the nodes in the network are mobile, the network topology can be configured in an random manner and can change animatedly. An ad-hoc network can function in an cut off manner or it can be connected to the wider internet via gateways. Due to the mobility of the nodes in a MANET, the network topology may be connected in any arbitrary behavior and may change animatedly. Such a topology is arbitrarily changing and is changeable [3,6].

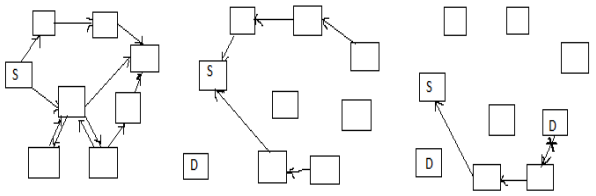
The resources obtainable to a node have to be taken into description in the design of ad-hoc network systems. Bluetooth and IEEE 802.11 standards are the two trendiest technologies being used today for wireless interfaces in ad-hoc networks. The main plan to develop Bluetooth wireless technology was to offer a solution that would give mobile devices right to use wireless channel for communication purposes. The standard is ideal for small devices with short variety low power radio links. It operates in the unlicensed 2.4 GHz band using Frequency Hopping Spread Spectrum (FHSS) [2]. The mobile hosts in an ad-hoc network are most likely power-driven by exhaustive capital such as battery power. It is consequently necessary that any application running the ad-hoc network structural design uses some form of power control during transmissions. This transmission power not only has an crash on the battery life of the host, but also affects the choice in terms of hops that a host's transmission achieves. A higher transmission power would add to the range and create routing easier but it would also unenthusiastically affect the traffic carrying capacity of the channel with the augmented jamming.

2. Literature Review

In [1], the schemes of resulting shortest multi-routing paths from source to destination by detecting procedure. By this detective procedure some uncross routing paths between source and destination nodes are also obtainable this can make up the advantage over the follower route protocol which simply finds a single routing path in the detecting procedure. The entirety valuable network bandwidth will be distended by having many paths. We can get the aim of optimizing the network routine by allocating the total traffic to each path [2]. Many routing protocols are used to administer the traffic in Ad Hoc network. For dependable transmission over the wireless network, shortest path is not a good option to reach its destination[17], it causes wait due to more traffic in at smallest amount in one node in that shortest path during out in network. To administer the traffic, routing protocols are separated into three categories: first is flat routing , in which any path from source to its destination is chosen with hop by hop method, second one is hierarchical routing where routers are grouped mutually to form hierarchy and third is geographic position supported routing protocols[8]. Flat routing is separated into reactive and proactive approach. Entire network in AODV is flooded by the RREQ (Route Request) and RREP (Route Reply) packets. This pointless flooding from side to side each nodes leads to high traffic on network. To decide the geographical location between source and destination nodes, GPS (Global Positioning System) is used. To reduce the traffic on network it is essential to reduce the search liberty for a preferred route, for this Location Aided Routing (LAR) [10] protocol is used, this is like to DSR [12]. In LAR, location in order to which is obtained beginning GPS is piggybacked on every messages, so total overhead is decreases. To reduce the traffic on wireless network one more geographical routing protocol is Greedy Perimeter stateless routing (GPSR), which includes of two types of forwarding: Greedy forwarding and perimeter forwarding. As the mobility of nodes enlarge, it also enlarge the cracks in the routes which results in re-discovering the routes in networks. To keep away from such traffic and crash, a new process called Velocity Aware-Probabilistic discovery model is recognized [4]. While constructing routes from source to its destination, this model identifies the unbalanced nodes (having high mobility) from the network and excludes such nodes as of route. To manage the load in Ad Hoc network, density probabilistic scheme [5] distance based probabilistic scheme [21], a position aware counter based scheme [5] were recognized for minimization of rebroadcasting procedure. The normally used routing protocols in the wired networks are Routing Information Protocol (RIP) and Open Shortest Path First (OSPF). RIP is a distance vector protocol while OSPF is based on the link-state routing philosophy. The two protocols, although quite well-organized for routing data in the wired networks are completely unsuitable for applications in the mobile ad-hoc networks. The dynamic nature of MANET causes arbitrary and volatile changes in the routes of the network. The measured update rate of the wired protocols diminishes their skills to unite to a steady state for finding routes in the ever-changing topology. The routing overhead incurred by the distance vector and link state protocols in terms of protocol control messaging becomes a great deal of a issue in the ad-hoc network environment. Finally, the computationally exclusive operations of the traditional wired protocols would be highly demanding on the scarce CPU, memory and battery power resources of the mobile nodes in an ad-hoc network [8].

3. Different routing protocols

The routing transportations in MANET's should be conventional in a distributed self organized method due to node mobility. Different routing protocols have been planned and are secret into two major categories as Proactive and Reactive [9]. The duty of routing involves making forwarding decisions for data packets depending on the routing state of the network. The routing protocol accordingly has a two-fold operation. The first is to gather information about the state of the network and secondly to use this in order to create routes during which data packets are forwarded. There are dissimilar advantages and disadvantages with each type of routing system and so some protocol designers effort to slot in more than one



philosophy, these protocols are termed as *hybrid* routing schemes as they use both proactive and reactive measures in their operation. In adding up other categorization criteria are based on the type of addressing used. Protocols that use *at* addressing preserve an structural design where every one node in the network are on the equal level. In *hierarchical* addressing the network is aggregated to form groups. This type of addressing is mainly appropriate in large networks where it is necessary to decrease the control messaging simplicity in the network.

I. Destination sequenced distance vector (DSDV).

The Destination Sequenced Distance Vector (DSDV) routing algorithm is the modification of the classic Distributed Bellman-Ford (DBF) algorithm. In MANET any node can act as a router and so each node maintains a routing table that lists all the nodes in the network of which it is aware. Each entry in the table contains the destination and the next hop addresses as well as the cost (in terms of hops) to get to the destination. The reason DSDV is an enhancement of the original wired network protocol is that, it avoids DBF's inclination to create routing loops. Each entry in the routing table and protocol message update is marked with a *sequence number*. This number is maintained by the destination node of a route entry and is improved whenever the node publishes its routing information. The sequence number value is used by all other nodes in the network to determine the freshness of the information contained in a route update for the destination. Since the value is successively incremented, a higher sequence number implies that the routing information is newer [12].

II. Ad-hoc on-demand distance vector (AODV).

This routing protocol is designed for use by mobile nodes in ad hoc networks when two hosts wish to converse with every other and a route is fashioned to offer such connection [15]. It offers fast version to dynamic link situation, low special consideration and memory clearness, low network utilization and determines unicast routes to destinations inside the ad hoc network. The algorithm enables active, self-starting, multi-hop routing between contributing mobile nodes desire to set up and protect an ad hoc network [9]. AODV allows mobile nodes to get routes rapidly for new destinations and at the same time it doesn't need nodes to preserve routes to destinations that are not in active communication. AODV allows mobile nodes to react to link breakages and transform in the network topology in a timely approach. When a link is broken down due to some incorrect condition, AODV observe the artificial set of nodes so that they may invalidate the routes using the lost link [16]. The protocol is parallel to DSR in the route achievement and route upholding mechanisms. However the two protocols be different in that AODV stores the route information in a distributed fashion at every node on the route while DSR includes the route information in the header packet of every data packet that is transmitted. AODV maintains loop free routes at all times using series numbers.

Figure 2: Network flood of route request packets in AODV

This mechanism is import from the DSDV routing algorithm. Each node in the network maintains its own monotonically increasing sequence number, which is incremented at whatever time the node makes and sends a route request packet. The sequence number is used as a form of logical time-stamping and make sure that the most current route is chosen in the route discovery process. AODV categorize it as a untainted on demand algorithm and uses the route request/route reply cycle to find out routes to new destinations. The three main message types used by the algorithm are route requests (RREQ), route reply (RREP) and route errors (RERR). The protocol comes into achievement whenever a new route is required to a destination. AODV make use of an improved version of the traditional route table to store and preserve routes to destination nodes.

III. Associatively based routing (ABR).

The Associatively Based Routing (ABR) protocol is in the family of MANET on-demand routing protocol. Its different characteristic is the use of associatively marks compulsory to form routes based on the constancy of nodes, Below the information that there is no use to figure a route using a node which will be moving out of the topology and therefore manufacture the route to be broken. ABR therefore highlight on the stability of the routes formed [19]. It is one of the first ad-hoc routing algorithms to think routing metric other than the smallest hop count. ABR defines a new metric called the *degree of association stability*. It is a calculate of node's connectivity connection with its neighbours above time and space. Each node in the network occasionally transmits a bonfire to its neighbours signifying its occurrence. A node caches an entry for each neighbour which records the number of beacon received. This information is stored in a changeable termed `associatively tick', incremented each time a beacon is received. A high associatively mark value for a neighbouring node implies a small state of mobility for that node. A constant link with a neighbour provides an ideal opportunity to choose the node for routing purposes [20]. The protocol introduces other Quality of Service (QoS) parameters such as load, signal strength and battery life in addition to the associatively marks to conclude the degree of routing constancy. The routes determined using this metric is predictable to be long-lived routes. These routes however are not essentially the shortest in conditions of hop count between the source and destination. The protocol splits the traditional standard, which holds that the shortest path is best. Thus, even if a longer path is from time to time chosen, with the high degree of constancy, the route will be maintained with lower probability of having to perform route improvements.

4. Proposed protocol method

Query localization technique.

The anticipated query localization technique presents the consequence of adding query localization to the route finding process of an on-demand algorithm. The aim is to create the flooding technique more capable. The protocol initiate a load metric next to the hop count as a choice criterion for route selection. It performs load checking with the aim of balancing the traffic load in the network. Flooding is a healthy method of getting the route request packet to each possible node in the connected constituent network. However, it is unnecessary for the route request to arrive at every possible node; particularly those in-between nodes are not in the path of the source and destination. In a large and extremely mobile network substantial routing transparency is incurred by the flooding method. This reduces the advantage, in terms of protocol routing overhead, which on-demand algorithms have over table driven ones. If the flooding could be made more well-organized it would lower the routing overhead acquired. There would be further profit such as reducing network congestion with fewer route request packets being transmitted in the network. Route request packets are generally broadcasted packets and can have an adverse effect on data transmission

over the wireless channel due to the broadcast storm problem. The effect of this problem would be reduced with a more efficient flooding method. One way to make the flooding of the route request packets more efficient is to intelligently reduce the region in the network where the packet is flooded. Query localization in ad-hoc networks has been examined in this paper to solve above mentioned issues of on demand routing protocols. The proposed query localization technique states that each host in the Positional Communication System (PCS) network is enabled with a Global Positioning System (GPS) module that provides the location information of each host. If a router (which could be any node in the ad-hoc network) has prior knowledge of the destination's location information, it could use this information to aid the query localization process. The technique proposed is related to the Location Aided Routing (LAR) algorithm [22]. In the proposed technique, location information is used to determine the proximity of an intermediate router to the destination node. Once determined, if an intermediate node is closer to the destination node than the node that passed the route request packet, forwards the packet to its neighbours. The packet is dropped if the intermediate node is found to be further away. The aim of the query localization is to bring the route request packet physically closer to the destination node with each hop and hence prevent it from traversing to unnecessary parts of the network.

5. Description of proposed Tactical AODV (TAODV) protocol.

The protocol proposed called Tactical AODV (TAODV), is a modification of the Ad-hoc On-demand Distance Vector (AODV) routing protocol. Although the planned improvements mentioned in the earlier section can be applied to most on-demand algorithms. AODV was chosen because it has the best presentation under PCS appropriate network situation when compared to further protocols in simulation comparisons performed. TAODV is similar to AODV in that the routing information for every route to a destination is maintained in a distributed fashion in the routing tables of the nodes in the network. The protocol only generates routes to destination nodes when requested, by the generation of data packets for the destination. Routes are only preserve as long as they are being actively used. There is a timeout period for every route, and if a route is not used in that period it is considered to be unmoving and is clean. If a source node does not have a route to the destination, it started a route discovery. The data packets for the destination host are broadcasted once a route is found. If the route is out of order throughout the communication session stuck between the source and destination node, it is repaired before further broadcast can continue.

1. Route localization.

The route localization used in TAODV is an optimization of the flooding technique used by on-demand algorithms. If obtainable, the location information of the destination node is used to decide if an in-between node (acting as a possible router) should rebroadcast a route request packet. It will simply rebroadcast the packet if it is believe to be closer to the destination than the node from which it acknowledged the route request packet. This technique aims to stop route request packets from crossing to unnecessary sections of the network i.e., going to nodes that are not in surrounding area of the path between the source and destination pair. Preventing route request packets from reaching such areas will product in a reduced protocol routing overhead. The broadcasting of a node's location data occurs in an on-demand manner. There is no periodic broadcast of the location data, thus it is not essential to modify the basic routing method of the protocol to provide accommodation the route localization algorithm. Other nodes in the network will only know about new nodes location if they have communicated with it, or acted as a router for any of its routes. The location information of a source and destination node is piggy-backed with every route request and route reply packet in that order. The route localization is implemented in such a way that when the route request is generated for the destination node, the source node examine its position cache to see if it has a spot entry for the destination. This is likely if it has either communicated with the destination before or acted as router for it. If the location entrance is found, the positional information of the destination (its x and y coordinates) is used to calculate the distance to it using Equation (1). There is no account of height in this distance calculate as currently NS-2 only ropes at two-dimensional network. This could however be an optimization in the implementation of the anticipated routing protocol in the actual world test-bed.

2. Load checking.

The load examination operation of the protocol is complete at each of the in-between nodes that process a route request. The length of the protocol queue at each node is taken as calculate of the load at a node. The protocol queue is a first-in-first-out (FIFO) queue in which packets that are pending routes are for the moment stored. Packets could be awaiting routes either due to route discoveries being attempted for unidentified destinations or for out of order routes to destinations that are being repaired. When an in-between node receives a route request, the first choice that is completed at the node is whether it will get concerned in the route. The node examine its protocol queue and if it is close to its capacity, the in-between node rejects the route request by dropping the packet. This will avoid already congested nodes from further overload. After the first load check, if the in-between node decides to act as a router for the source, it primary creates a reverse route in its route table entry for the source node. This entry will be used to unicast reply packets back to the source node. The in-between node then performs the load checking algorithm. The technique used in this work is similar to one of the route selection actions in the Dynamic Load Aware Routing (DLAR) protocol [23]. A load variable in the route request packet calculates the number of nodes between the source and destination that have their protocol queues loaded with packets above a certain threshold \t". This variable is initialized to zero by the source node when it creates the packet. previous to distribution the route request packet, an in-between node examines the length of its protocol queue, if the queue length is above the threshold value \t", it increases the *load* variable in the packet. The variable keeps its preceding hop value if the queue length is less the threshold value. The load checking process is performed with each hop that the route request packet takes on route to the destination node. TAODV identifies that the route request should travel to the destination node and that no in-between node is allowed to reply to the route request.

6. Conclusion

Recently Mobile Ad-hoc Networks (MANETs) have gained the attention of research community due to increased adoption of its usage in real life applications. The present wireless

network protocols suggest only limited mobility and this paper has highlighted the causes for ad-hoc networks organism the next step towards really ubiquitous computing and communications. Developing clarification for mobile ad-hoc networks is a significant face up to because of their exclusive characteristics such as the networks having dynamic topologies, and nodes in the network having limited capitals. This paper presented a categorization of the algorithms showing different viewpoints used in the design of ad-hoc routing protocols. The purpose of this research is to build up and design a new routing algorithm called Tactical AODV that would be appropriate for its intended submission, namely the PCS tactical network. Qualitative performance analysis is limited in representation which ad-hoc routing philosophy and more specifically which routing algorithm is best suited for a general ad-hoc network application.

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