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ANALYZE OF ROUTING PROTOCOLS IN MANET NETWORKS

MANET mobile networks are wireless networks without infrastructure. In this network the nodes is mobility. And repeatedly change network topology. In this network routing protocols is very important. Energy and bandwidth constraints are important challenge in MANET networks. Routing protocol should provide a little overhead. Results occupy the little bandwidth.

Key words: *routing protocol, wireless networks, bandwidth, MANET.*

1. Introduction

In the mane networks, Due to dynamic topology routing is important. In addition, there are nodes in Mamet networks, that energy resources, range communication, capabilities calculations are limited.

In these environments, each node must be capable of packets routing. Due to the unstable nature of these networks to find and keep rout of the discussion is important. Two factors: 1. Lack of broadband 2. Limited battery power, Lead to a routing protocol to be affordable. Generally the goal of routing packets is sure transmitted from source to destination. In addition, the maximum network capacity and minimum packet delay are one of the other goal routing [1]. In the first part, we review some of the based on Demand routing protocols. In the part two, some of the based on position routing protocols is reviewed. In part 3, the routing algorithm based on fuzzy computing has been investigated. In the part 4, the on Demand routing protocols with fuzzy algorithm is compared.

2. On-demand routing protocols

In this protocol the routs are only made when needed and consist of two stages: 1. Route discovery 2. Keep rout. The discovery phase created during in source need to rout. But the keep rout stage eliminates invalid paths and a new route discovery phase will begin either the public or locally these protocols in the resource network consumption savings. But more delay in comparison with those based on Table 1. Difference of these protocols together is route discovery and maintenance.

2.1. CBRP: Cluster Based Routing Protocol

The network is divided into clusters that may have overlapping. Each cluster is composed of nodes with a hop form away is available from the head cluster. And between the two clusters overlap, there is a border node. Connections within the cluster must be mutual. Each node has a table as the neighbor table [2, 3]. That for every neighbor the following information is contained:

1. Connection state (Either one-or two-way connection);
2. Neighbor state (Either member or head cluster).

2.2. AODV: Ad-hoc On Demand Distance Vector

This protocol is an improvement of DSDV protocol. To find the rout to the destination, Source sends a route request packet [4]. Origin of neighbors, in turn, sends the packet to its neighbors. Until the packet directly reaches the destination or through intermediate nodes know the route to reach destination. Each node that is observed this packet drops it. Route request packet, a sequence of numbers to ensure there are no loops in the routes they use [5]. The sequence number causes the intermediate node only if the answer to the request that from rout has new information.

2.3. DSR: Dynamic Source Routing

Each node in this protocol saves routes that it has learned, if it was aware of new routes, and then it updates those paths. Whenever the source needed to path looks at its routing table. In the absence an optimal path, broadcasts a rout request packet [6]. Which contains source and destination address.

Each intermediate node cheeks whether or not the path to destination, if present, adds its path to the path stored in the request packet and send reply to the source. But if the path was not found, it adds its own address to the saved route. In the packet, and sends the packet to its neighbors [7]. Each node processes the request if that is not seen it before. While sending reply package, the responsive nodes should have a path to the source that if connection are not two sided, the responsive node begins a path search phase to the source and adds a new path on this new request. Whenever a node was informed of the failure by the layer-line connection, it generates a rout error and so all nodes receiving this package remove the corresponding row of the table. And then if needed, the source up to dates the path.

2.4. DSR: Dynamic Source Routing Protocol

The Dynamic Source Routing (DSR) [8] is a reactive unicast routing protocol that utilizes source routing algorithm. In source routing algorithm, each data packet contains complete routing information to reach its dissemination. Additionally, in DSR each node uses caching technology to maintain route information that it has learnt. There are two major phases in DSR, the route discovery phase and the route maintenance phase. When a source node wants to send a packet, it firstly consults its route cache. If the required route is available, the source node includes the routing information inside the data packet before sending it. Otherwise, the source node initiates a route discovery operation by broadcasting route request packets. A route request packet contains addresses of both the source and the destination and a unique number to identify the request. Receiving a route request packet, a node checks its route cache. If the node doesn’t have routing information for the requested destination, it appends its own address to the route record field of the route request packet. Then, the request packet is forwarded to its neighbors.

2.5. TORA: Temporally Ordered Routing Algorithm

The Temporally Ordered Routing Algorithm (TORA) [9, 10] is a reactive routing algorithm based on the concept of link reversal. TORA improves the partial link reversal method by detecting partitions and stopping non-productive link reversals. TORA can be used for highly dynamic mobile ad hoc networks. In TORA, the network topology is regarded as a directed graph. A Directional Cyclical Graph is accomplished for the network by assigning each node i a height metric hi. A link directional from i to j means $h_i > h_j$. In TORA, the height of a node is defined as a quintuple, which includes the logical time of a link failure, the unique ID of the node that defines the new reference level, a reflection indicator bit, a propagation ordering parameter and a unique ID of the node. The first three elements collectively represent the reference level. The last two values define an offset with respect to the reference level. Like water flowing, a packet goes from upstream to downstream according the height difference between nodes. DAG provides TORA the capability that many nodes can send packets to a given destination and guarantees that all routes are loop-free [11].

TORA has three basic operations: route creation, route maintenance and route erasure. A route creation operation starts with setting the height (propagation ordering parameter in the quintuple) of the destination to 0 and heights of all other nodes to NULL (i.e., undefined). The source broadcasts a QRY packet containing the destination’s ID. A node with a non-NULL height responds by broadcasting a UPD packet containing the height of its own. On receiving a UPD packet, a node sets its height to one more than that of the UPD generator. A node with higher height is considered as upstream and the node with lower height is considered as downstream. In this way, a directed acyclic graph is constructed from the source to the destination and multiple paths route may exist.

2.6. Associatively Based Routing protocol

The overhead of routing protocols for mobile ad hoc networks mainly comes from the dynamically changes of network topology. Some protocols have been proposed aiming to provide routing paths with longevity to reduce the maintenance overhead. The Associatively Based Routing (ABR) protocol uses the degree of association stability as routing metric and tries to find routes that are expected to last longer time.

In ABR, periodic beacons are exchanged between neighboring nodes. Every node keeps an associatively table, in which it records the connection stability between the node and its neighbors over time and space. When receiving a beacon, nodes increase the associatively tick with respect to the sender. Therefore, the link with higher associatively tick is more stable than the one with lower associatively tick. When a neighboring node moves out, the respective associatively tick for it will be reset.

There are three phases in ABR, namely, route discovery, route reconstruction (RRC) and route deletion. When a routing path is needed, the source floods a Broadcast Query (BQ) to initiate the route discovery operation. On receiving a BQ, a node checks if the same message has been seen before. If yes, it discards the BQ. Otherwise, it appends its address and its association ticks inside the BQ packet and broadcasts the BQ. When a subsequent node receives the BQ from its upstream node, it erases the associatively tick entries of its upstream node except the one concerning itself. So, when a BQ arrives at the destination, it contains the addresses of the intermediate nodes and the associatively ticks about all the Links along the route. The destination selects the best route according to the longevity of all possible routing paths. The route with the shortest hop number will be chosen if there are multiple paths with the same degree of association stability. Then, the destination sends a reply packet that contains routing information of the selected path back to the source. When an intermediate node forwards the reply packet, it marks its route as valid, therefore, no duplicated data packet will be sent to the destination.

2.7. Dynamic Load-Aware Routing

DLAR builds routes on-demand. When a route is required but no information to the destination is known, the source floods the ROUTE REQUEST packet to discover a route. When nodes other than the destination receive a non-duplicate ROUTE REQUEST, they build a route entry for the to learn all the routes and their quality, the destination node accepts duplicate ROUTE REQUESTS received from different previous nodes [12]. The destination then chooses the least loaded route and sends a ROUTE REPLY packet back to the source via the selected route.

3. Position assisted routing methodology

The Packages are dispatched based on the geographical destinations in this methodology. Thus odes should query the final destination of the package and receive the required data. Since adhoc networks ply a fixed infrastructure, the position in which a distributed algorithm is used is a key design method for a specific service. Services should not be disconnected due to the malfunctioning of individual nodes. Scalability is an optimum feature of networks. When routing is carried out based on position, nodes are dispatched based on the position of a package and the immediate position of the neighboring nodes [13]. The destination position is situated in a closed header. If any of the nodes contains data about the precise position of the destination, the position may be updated in the package before dispatching. Unilateral emissions reveal the position of adjacent nodes. These adia waves are periodically dispatched by all the nodes, and they have data about the sender's node. Three chief strategies can be specified for position-assisted routing. In the first two strategies, one of the nodes sends a specific package to a greedy forwarding or flooding directed node in the adjacent

One, in a way that these nodes are nearer the destination as compared to the sending node. The third strategy is used to form a hierarchy for scalability with plenty of mobile nodes. Hierarchical mechanisms use various types of ad hoc routing protocols in diverse hierarchical levels. (Thus position assisted routing is carried out in one level and non-position-based routing is executed in another level.

3.1. LAR: Location-Aided Routing

As it is evident in LAR Schematic view the S departure point reveals the request in its route. S double node has two portions. One of them pertains the routing data. Suppose S node contains the data concerning Wd Position of node D at the moment of T0.When S node contains data about the routing detection, T1 is larger than T0. The distance from S node up to Xd, Xd is calculated. This matter has been depicted in DistS. The data of the above distance is inserted into the message. Xd, Xd positions are added to the message request in the routing. When an I node receives data from S dispatching node, node I calculates the pertinent distance from Xd, Xd. DistI has been depicted based on parameters A,B. if Adists + Bdist I is a valid relation, I node will send the request to its adjacent units. When I node forward the routing request, the message contains data about Xd, XdDisti. The data received in Dist S is replaced by the data received in Dist I.

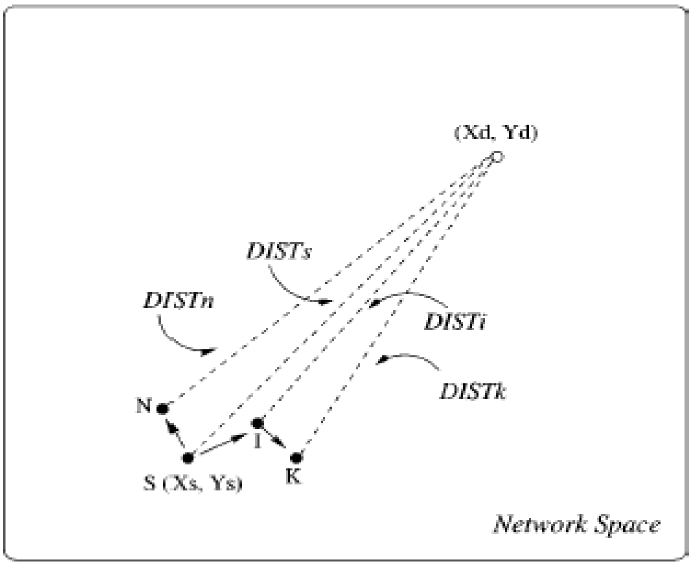

Figure 1. The schematic view of the LAR routing algorithm

3.2. FLAR:Fuzzy Logic Location-Aided Routing

FLAR is a routing algorithm for based on fuzzy calculations We will deal with our suggested algorithm in this chapter. We will enumerate the essential hypotheses that we consider in this algorithm. We will deal with the routing methods for the suggested algorithm.

3.2.1. Essential Hypotheses

The following essential hypotheses will be available in this algorithm.GPS Equipment has adequate precision. (Hence, they return X and y quantities distinctively and correctly as the node moves along it). The nodes motion pattern is fixed while samplings are made. The time intervals regarded for samplings are considered in a way that the nodes motion pattern will be fixed during these intervals. The membership function which has been used for the position numbers is triangular and right angle. There is a fixed interval between the two samplings and the consecutive sampling, to obtain information about the fixed position. These parameters are determined with regard to the GPS tool precision and the motion coefficient of nodes. The velocity of each node is constant.

3.2.2. Routing method

The second schematic view of LAR algorithm has been selected for this algorithm. Fuzzy calculations have been utilized to quantify and collate the interstice of each node up to the destination. Thus, the departure and destination data are inserted in the message, when a message is sent. This interstice is based on a non-fuzzy number. It is sent to the destination based on a fuzzy number in the message. The fuzzy extent is quantified for X and y position of each node. Suppose tp is the time required to make consecutive updates of each node position. This is the time that each node has to request its position from the position-rendering unit. Since positions are regarded based on fuzzy extents, each time the position of a node is updated, two consecutive requests are sent to the service-rendering unit. Suppose sis the interstice between two consecutive requests. Thus the following will apply for making fuzzy quantifications in the positions.

4. Compression of different protocols

In this section examines the based on the demand protocols and algorithm based on fuzzy computing routing (FLAR) in table 1 and table 2. Then their properties are compared in table 3 and table 4.

Table 1

Comparing routing protocols

Method	Criteria	The path reconstructi on schema	Supported of one-way connection	Overhead Route discovery
CBRP	1. speed 2. shortly path	Local	No	Less than DSR
AODV	1. speed 2. speed path	source	No	Much more than DSR
DSR	Shortly path	Through the origin	Yes	More
LMR	1. speed 2. short path	Local	No	Large-scale
TORA	Speed path	Local	No	More
ABR	1. stability 2. shortly 3. amount load path	Local	No	Large-scale
SSR	Power communication path	Through the origin	No	More

Table 2

Comparing routing protocols

Method	Loop-free	Overhead storage	Data productivity	Characterized
CBRP	No	Middle	More than AODV	Use the hierarchical and High speed data transfer
AODV	Yes	Less Than DSR	Better than DSR	No need to send periodic and delay during the connection failure
DSR	Yes	More	Less	No need for periodic sending of each packet
LMR	Yes	Middle	Less	High latency when the network is divided
TORA	No	Middle	Less	High overhead
ABR	Yes	More	Large-scale	Lower delay and using multiple criteria path
SSR	Yes	Middle	Large-scale	high delay for route discovery

According to Table 1 and Table 2 can be seen that some of the protocols for the Ad-hoc networks are not suitable because it has many overhead routing. We could see that the overhead discover routing in all protocols is greater than CBRP protocol.

That is why they are sent request packet to all network nodes. But in the CBRP they are only sent to the head cluster node. Of course the overhead discovery routing in CBRT Is slightly diminished. Because the first request packet will be sent to neighbors, and if not find rout, broadcast in network. The protocols use source routing needed for higher volume storage. In some protocols, such as cluster CBRP, there is maintenance information such as cluster information, and updating information. This makes overhead storage and overhead updating.

But in return speed data transferring is increasing because a part of information is always provided. But in terms of productivity data: in conditions of high load or network crowding the productivity DSR is reduced. So each node to face with multi rout has no diagnostic criterion for newly rout diagnosis. This causes loss of batch data. AODV has a better status. But during a connection failure creates delay.

Table 3

Compression LAR and FLAR

Method	Criteria	The path reconstruction schema	Support of sleep period	Overhead Route discovery
LAR	Speed rout	Local	Yes	modest
FLAR	1. Stability 2. speed rout	Local	Yes	Little from LAR

Table 4

Compression LAR and FLAR

Method	Overhead storage	Loop-free	Data productivity	Characterized
LAR	Middle	Yes	Large scale	Little overhead route discovery
FLAR	Slightly more than LAR	Yes	Large scale	Stability rout during the time period specified

According to table 3 and table 4. in FLAR stability rout increases during time period and overhead rout discovery is less than in LAR.

5. Result

You can see the belated delivery of LAR is a little less than FLAR. The delay in FLAR is due to the short-time calculations that it has to perform each time. Although few calculations of this ilk are carried out, nonetheless. They have their own effect when packages are being delivered. You can see that the success rate of FLAR to deliver packages is considerably higher. When the interstice between the message exchanging nodes is little, LAR and FLAR variance is not noticeable. The extant position of a node is being portended in both methods. Some of the physical formulas can be utilized to calculate the position through this method.

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Ad- hoc şəbəkələri üçün yeni marşrutlaşdırma alqoritmi metodu

MANET mobil şəbəkəsi infrastrukturu olmayan naqilsiz şəbəkədir. Bu şəbəkədə qovşaqlar mobildir və şəbəkənin topologiyası bir neçə dəfə dəyişir. Bu şəbəkədə marşrutlaşdırma protokolları çox mühümdür. Enerji və ötürmə zolağının məhdudiyyətləri MANET şəbəkələrində vacib məsələlərdəndir. Marşrutlaşdırma protokolları qoyulan xərclərin minimal olmasını təmin etməlidir. Nəticələr kiçik ötürmə zolağını tutur. Bu məqalədə marşrutlaşdırma protokolunun əsasları ilə qeyri-səlis alqoritm müqayisə olunub və onların xarakteristikaları göstərilib.
Açar sözlər: *marşrutlaşdırma protokolları, naqilsiz şəbəkələr, keçiricilik qabiliyyəti, MANET şəbəkələri.*

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Новый метод алгоритма маршрутизации для Ad-Hoc сетей

Мобильная сеть MANET – беспроводная сеть без инфраструктуры. В этой сети узлы мобильные, и несколько раз меняется топология сети. Для этой сети протоколы маршрутизации очень важны. Энергия и ограничения полосы пропускания являются важной задачей в сети MANET. Протокол маршрутизации должен обеспечить минимальные накладные расходы. Результаты занимают небольшую полосу пропускания. В этой статье сравнивается основа требований протоколов маршрутизации с нечетким алгоритмом и показаны их характеристики.
Ключевые слова: *протокол маршрутизации, беспроводные сети, пропускная способность, MANET сеть.*