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Improving the Lifetime of the FANET Using AODV Routing Protocol

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ABSTRACT:

Nowadays, wireless mobile networks and devices are becoming increasingly popular due to they provide users access, communication anytime and anywhere. Currently, many studies are focused on MANETs due to their dynamic topology and no centralized administration. In this case, the communication problems faced by multi-drone systems can be solved with the application of ad-hoc networks among drones and GBS this is called FANET which is basically ad hoc network between UAVs. Flying Ad-Hoc Network (FANET) is basically a special form of Mobile Ad-Hoc Network (MANET) which is formed by a group of wireless nodes, which can dynamically form a network to exchange information without the necessity of using a fixed network infrastructure.

Its good performance and its low cost, make it suitable for use in several applications such as environment sensors, vehicular communications, disaster rescue operations, air/land/navy defense and so on. A routing protocol is needed when a packet needs to be transmitted through different nodes in the network. The performance of FANETs is related to the efficiency of routing protocols. The efficiency depends on several factors such as convergence time after topology changes, bandwidth overhead to enable proper routing, and power consumption.

The main objective of the system is to prove the importance of a good routing Protocol for a good performance in the Network.

Keywords: Network Simulator , FANET , AODV , DSDV .

INTRODUCTION:

The routing algorithms are divided into two static and dynamic categories. In the static method, forwarding/routing table is manually configured and during configuration router is adjusted and stays constant over time. Any changes to this table are also applied by the network administrator. In the dynamic method, the routing table is updated every T seconds based on factors such as the latest topology status (the shape of the network devices and their links) or the network traffic. From another view, these algorithms can be categorized into “Global Routing Algorithm” and “Decentralized Routing Algorithm”. In a centralized way, each router needs to collect the information of all

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routers in the network and their relationship, and after the formation of the network graph, uses a search algorithm to find the shortest route suitable for the algorithm to find the best route between the two routers such as Dijkstra Shortest Path Algorithm. These algorithms are also called (Link State Algorithm) LS algorithms. In a decentralized method, the routers do not have complete information about the network infrastructure and can only communicate with the routers directly associated with them (neighboring routers). Then, at regular intervals, each router sends its routing tables only to neighboring routers, so these routers can be based on the values they computed themselves, complete their chart and determine the route between different routers. These algorithms have very little temporal complexity. These algorithms are called Distance Vector Algorithm (DV). Before the flight, the pilot provides the flight plan including the route, altitude and speed of the airplane to the traffic control unit and the air traffic control unit gives each aircraft an invisible route to fly so that the planes do not collide. In fact, aircraft must be apart at least 16 kilometer from the sides, 300 meters from the top and bottom, and for 10 minutes flying forward and backward, so that they feel comfortable not to have collisions. On the other hand, most planes have radar on their nose, responsible for announcing bad weather conditions or the presence of aircraft and other objects in front of the airplane. The radar is a radio device used to detect objects and measure some of their features with radio waves. The radar has a transmitter, a receiver, and one or more antennas. The traditional use of radar and its place of birth and its growth in are in military and aeronautical industries. Military radars are built for monitoring, target tracking, navigation guidance, and visibility behind obstacles. Civilian radar applications are in satellite imaging systems, ship and aircraft guidance, meteorology, traffic control and smart cars . How the radar works on the plane is by using short radio waves that it emits. In fact, these waves are reflected after facing obstacles or clouds, and the receiver recognizes the aircraft with regard to the intensity and time of the wave, the type of obstacle and its distance to the plane. This information is displayed by the radar on the pilot's screen. Indeed, the radar is a device for collecting information from objects, especially at distances where by using electromagnetic wave analysis, information like distance, dimensions, velocity, and target properties are specified. As most modern aircrafts fly very fast at high altitudes, the pilot cannot track down the ground because the planes fly above the clouds and he does not have any sights on the ground, so the pilot and the air traffic control unit requires electronic systems to control the aircraft and routing.

Overview FANET

In methodology, first, the problem of nodes' mobility was investigated and for that a method of forming the group algorithm was proposed. The multipurpose UAV system was created using the data-driven algorithm approach and architecture was presented for

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their relationship. The Pheromone model of the case was examined, considering the location of several fast GPS-based methods, and then we introduced the proposed locator. Finally, we introduced three-way communication protocols that area group of them that are based on topology. It defines the node based on IP. It leads to the most promising routing protocols.

One of the most important problems is the hierarchical routing design of group formation. The prediction of nodes' mobility is developed by the group formation algorithm for FANET network. The moving structure of FANET network nodes is due to the frequent updating of the group and the mobility of the group with the aim of solving this problem to predict the update of the network topology. The prediction of the dynamic structure of the spaceships is carried out with the help of the tree structure prediction algorithm and the time for the expiration of the mobile model. With this model, a set of weights is given to the UAV and the UAV that has a higher weight among the neighbors is selected as the head of the team. Simulated studies show that the choice of team leader can increase the stability of teams and head groups. Data-driven routing algorithms can also be used for a network of services. UAVs are regularly produced for specific missions, and it is difficult to adapt multi-task systems to different missions. Data-driven routing solutions can be used for a variety of applications for multi-drone systems. The distribution model is commonly used for some type of communication architecture. It automatically generates connected data called an emitter and is a consumer of data that is commonly known. Data-centric solutions require aggregation and data compression in an executable network. Unlike flood, it only plays the recorded data type/ content for subscription. In this case, data transfer from one point to several points can be preferred to data transmission from one point to a point. Data-driven communications are divided into three types: 1. Analyzed Space: The parts can communicate at any point. 2. Analyzed time: Data can be sent immediately or later to subscribers.3. Analyzed flow: Delivery can be carried out with high confidence. This model can run for systems including a limited number of drills with predetermined paths that require less collaboration. Routing is one of the most challenging problems in FANET network. Given the unique challenges of FANET network, existing network routing solutions cannot meet the network requirements. Peer-to-peer communications are essential for coordinating and preventing multi-dual system interactions. However, it may be used by the network to collect environmental information through wireless sensor networks that generate different traffic patterns. All data is available to a limited set of drills that directly communicate with the communication infrastructure. Data-based routing is a promising method for network-based services. With the help of the subscriber architecture, the deployment of data-centric algorithms, multi-user systems that support various applications can be made.

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The advantages of using ad hoc flight system are the following:

1. Cost: The cost of flying and the cost of maintenance of small UAVs are much lower than a large UAV. Scalability (ability to change the field of action): Using a UAV only supports a limited amount of field coverage, whereas multi-drone systems can easily expand the field of operations.

2. Durability: If a mission is carried out by a UAV and failure happens, the mission will not be continued, but if a missile drone mission disappears, the mission continues with other UAVs.

3. Running Speed: Depending on the wider area covered with several UAVs, research has shown that missions are carried out by several drone drives faster.

4. Small radar cross-section: A large number of radar cross- sections create a very small cross-sectional area highly critical to military operations.

One model of mobility is the Pheromone model, where UAVs create a pheromone map that guides them in motion. Each UAV will mark the areas it scans on the map and share the map of the pheromone with others. To maximize the area covered, UAVs prefer to fly in areas with fewer symptoms of pheromone odor (marked points). In FANET architecture routing has a very high significance that due to the high speed of the UAVs and the change of position, they do not meet the needs of these networks alone. In this regard, the following fast GPS methods are proposed based on routing. AGPS: This method uses an auxiliary station like a telecommunication tower or information on the Internet to improve the location.

DGPS: In this method, a ground station that knows its exact position receives its position information from the satellites and matches its position. The difference between these two is sending to the moving nodes and they also receive their position from the satellite Correct this amount.

GPS + IMU: Using the inertia measurement unit in UAV, position changes of UAV are calculated from the last exact position and sent to other network nodes.

One of the most important design problems for multi-drone communication systems is to make it very important for the UAV to collaborate. If all drones are directly connected to a connected infrastructure, such as a ground station or a satellite, the connection between UAVs can be realized through infrastructure. However, this architecture limits the communication of infrastructure based on the capabilities of multi-drone systems. The interim UAV network can solve the problems due to the fully-powered drone-based infrastructure.

destinations in the ad hoc network. This is an on demand protocol, which means it builds route only between those nodes which

Existing System:

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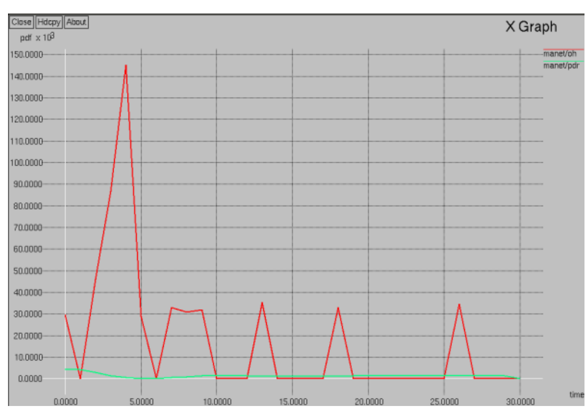
Destination-Sequenced Distance-Vector (DSDV) routing protocol. The DSDV routing protocol is an enhanced version of the distributed Bellman-Ford algorithm where each node maintain a table that contain the shortest distance and the first node on the shortest path to every other node in the network.

Each node, upon receiving an update, quickly disseminates it to its neighbors in order to propagate the broken-link information to the whole network. Thus a single link break leads to the propagation of table update information to the whole network.

Proposed System:

Ad hoc on Demand Distance Vector (AODV) routing protocol. Ad-hoc On-demand Distance Vector (AODV) routing protocol is essentially a combination of both DSR and DSDV protocol. It borrows the basic on-demand mechanism of Route Discovery and Route Maintenance from DSR protocol, plus the use of hop-by-hop routing, sequence numbers, and periodic beacons from DSDV protocol. The AODV protocol is loop-free and avoids the count-to-infinity problem by the use of sequence numbers. AODV protocol uses a simple request-reply mechanism for route discovery. Source node require a route to sends a Routes Request message to its neighbors. Source address and Request ID fields uniquely identify the ROUTE REQUEST packet to allow nodes to discard any duplicates they may receive. Sequence number of source and the most recent value of destination sequence number that the source has seen and the Hop count field will keep track of how many hops the packet has traveled. When source include destination sequence numbers in its route request that actually last known destination sequence number for a particular destination. Every intermediate nodes store most recent sequence number of source. If a neighbor has a route to destination then it informs the source node. If neighbors have no route then it rebroadcast RREQ and increment hop count. Eventually a route must be found if exists. In reverse path calculation, all nodes remember source of the RREQ. When a route is found then it working backwards, route is discovered. The receiver looks up the destination in its route table. To test freshness it compares destination sequence number, if RREQ packet destination sequence number is greater than the Route destination sequence numbers assumes route is still present and remains unused. If route is found Route Reply (RREP) message is returned to source.

SIMULATION RESULT



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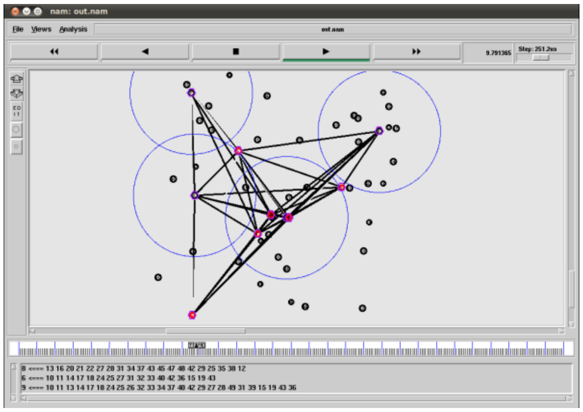

Conclusion:

Finally, in accordance with the results obtained is possible to appreciate good performances It is worth mentioning that although the two ray ground model (radio-propagation) is used it and over proposed algorithm the distance between the nodes reduces.

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