PERFORMANCE OF ROUTING PROTOCOLS AND FILE TRANSFER IN FANET USING SHORTES PATH ALGORITHM

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ABSTRACT

Many Researchers have been attracted the new research area Flying Ad-Hoc Network (FANET) after the lot of research done on mobile ad-hoc network (MANET). Since last few years the evolution of UAV have helped in finding many new application and one of the latest trend using multiple Unmanned Aerial Vehicle System(UAVs) place of single UAV. MANET and VANET cannot tackle all the situation so it can be done by new concept introduced FANET. FANET is an ad-hoc network established between UAV's overcome problem in infrastructure based network. FANET (Flying Ad-Hoc Network) is a collection of small unmanned aerial vehicles (UAVs). UAVs fly in the sky and communicate through each other with the help of satellite or base station and create ad-hoc network. Objective is to find the Optimized Link State Routing protocol applying shortest path dijkstra algorithm for file transfer. In this algorithm, less number of nodes takes part in transmission. In real world environment know the feasibility of flying ad-hoc network to use unmanned aerial vehicle system. In a network, we implement the Optimized Link State Routing protocol algorithm calculate the file transfer in NS2 simulator. The various methods to find the shortest path are optimized link state routing. We can implement the optimized link state routing to find shortest path for each node in the file transfer in FANET it calculate all the possible shortest paths for each node. This paper reports experimental result concerning self-organizing networks of small flying robots without any central infrastructure. Flying adhoc networks composed of small unmanned aerial vehicles(UAVs) are flexible inexpensive and fast to deploy. These protocol were simulated using NS2 and were analyzed on various parameter as number of node, packet delivery radio, end to end delay and throughput.

Keyword: **UAVS, FANETS, Routing Protocol, MANET**

1. INTRODUCTION

The wireless connection can be used in scenarios to extend the network to different places as it removes the need to establish a point to point wired links. Wireless networks can be either communications base network or ad hoc networks. Due to the rapid change in technology

advancement on electronic, sensor and communication technologies, unmanned aerial vehicle system have been introduced, which fly autonomously or operate remotely without carrying a human personal. They have taken AODV as reactive, OLSR as proactive and GPSR as position based routing[1]

Motivation

In real world environment to know the feasibility of flying ad hoc network to use of Unmanned Aerial Vehicle System. MANET and VANET are many popular parts of ad hoc networks. MANET is an ad hoc network of mobile nodes. VANET is an ad hoc network of vehicular nodes. UAV's are used in manapplications such as traffic monitoring, crop monitoring, search and rescue etc.

Problem Statement

The main object of this thesis work is to find the shortest path to transfer the file. Our method involves the least number to node in transmission of data. Because of many applications, flying ad hoc network has fascinated many research institutes and automotive industries. Various types of challenges in flying ad hoc network have been identified and addressed. Routing protocol is an algorithm use to determine an appropriate path to destination along which message can be forwarded.

Objective

The primary objective of this thesis is the simulation and analysis of AODV, DSDV and OLSR routing protocols for FANET. And find the better routing protocol and then simulates and analyze that protocol under different mobility models.

- To simulate AODV, DSDV and OLSR protocols for FANET.
- To compare and analyze their performance in terms of Packet Delivery Ratio, End to End Delay and Average Throughput.
- To analyze the results obtained in order to find best protocol among AODV, DSDV and OLSR.
- To simulate best routing protocol found with special mobility models.
- To find the best mobility model for greatest routing protocol found in FANET.

- To report and analyze the outcome obtained.

Contribution of the thesis

The main contribution of the thesis,

- To find out the shortest path into Optimized link state routing (OLSR) protocol by apply Dijkstra Algorithm.
- Real time environment to know the feasibility of FANET.

Wireless Network

Wireless network is type ofnetwork which does not require wires for establishing a connection between computer systems or network nodes for data transfer. Wireless Networks are based on the technology that uses the standard protocols for communication without physical cable connections. Wireless standard 802.11 first came up with sub-standard 802.11b that operates on 11Mbps using 2.4 GHz frequency band. To improve the speed various versions of 802.11 were introduced. 802.11a came with 54Mbps using 5GHz, 802.11g works on 2.4GHz frequency providing 54 Mbps speed andthen 802.11n operates on both 2.4 GHz and 5 GHz band proving the speed of 300 Mbps [2].Wireless Networks are considered a better alternative to avoid wired complexity of network. Some attractive characteristics of wireless network that prompt its usage are as follow:

- Mobility: Through wireless message, a user can access information beyond their desk and also can conduct their business behavior from anywhere without having wire connectivity.
- Reachability: A wireless communications system provides Improved connectivity and reachability without any constraint like user can be on mountains or in the mid of river etc.
- Simplicity: It is very easy and easy to deploy a wireless communication system in evaluation of cabled network. In initial setup stage, the cost of wireless system could be high but there are many other compensation which overcome the primary cost.
- Maintainability: It is very easy to maintain a wireless system than a wired system. And time spend in maintain wireless system is very less than wired system.
- Roaming Services: By using a wireless network, a user can get services wherever any time like in trains, busses, airplanes.

- Easy Setup: putting in is easy and quick as there is no need to make connection through cable.
- Cost Effective: A wireless network takes less cost than a wired network to work all the function and communication properly.
- Expandable: It is very easy and simple to expand wireless network with existing equipment, which a wired network takes additional effort and required other wired.

Figure 1 Wireless networks

The communication standards future for ad-hoc networks are not only liable to stranded networks, rather they also have wide application in unmanned aerial vehicle networking (UAV). Further, UAV is an aircraft with no pilot on board. UAVs can fly autonomously based on pre-programmed flight plans can be operated using complex active automation systems and versatile and flexible in implementation

[4]. But, when a single UAV system considered, it has always issue of network scalability and flexibility due to its limited surveillance capability and single UAV. In recent research work, UAV based ad-hoc

networks are also termed as “Flying ad-hoc network”. Flying ad-hoc networks are also sub category of mobile ad-hoc networks.

Flying ad-hoc networks are communications less networks with no central control. FANET uses micro air vehicles (MAVs) for communication. UAVs communicated each other locally, with base station and also interact with their environment to get information. It is capable to carry on transmission without any central device .

Flying Ad-hoc Network (FANET)

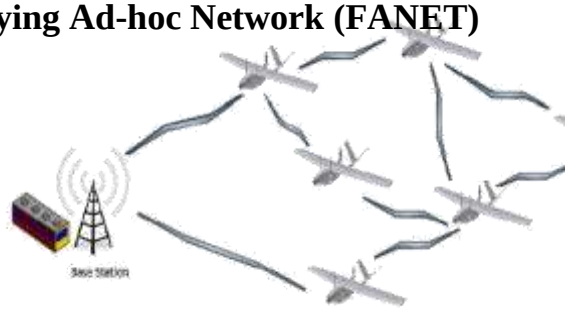

Figure 6: Flying Ad-hoc Network

METHODOLOGY

We can use the Unmanned aerial vehicle (UAV) can move separately and operated faintly. The use of UAVs increases day by day in various areas like military and civilian applications. There are various issues in communication among UAVs. It is beneficial to use a group of small UAVs. So, multi UAV systems are essential to create an network linking the UAV s which is famous as FANET. In this methodology, first create the flying ad hoc network and single server node compare. Otherwise one of UAV is selected as the source node and other UAV can be selected as the destination node. The Message selected could be anything audio, video, text, image etc and after it the dijkstra algorithm will run to find the shortest path to the destination node.

- Dijkstra Algorithm

Step 1: Mark vertex 1 as the source vertex.Assign a cost zero to vertex 1 and (infinite to all other vertices)

Step 2: For each of the unvisited neighbors(vertex 2,vertex 3 and vertex 4) calculate the minimum cost as min (current cost of vertex under consideration, sum of cost of vertex 1 and connecting edge.

Step 3: Choose the unvisited vertex withminimum cost (vertex 4) and consider all its unvisited neighbors (vertex 5 and vertex 6).

Step 4: Choose the unvisited vertex withminimum cost (vertex 2 or vertex 5, here we choose vertex 2) and consider all its unvisited neighbors (vertex3 and vertex 5) and calculate the minimum cost for both of them.

Step 5: Choose the unvisited vertex withminimum cost (vertex 5) and consider all its unvisited neighbors (vertex 3 and vertex 6) and calculate the minimum cost for both of them.

Step 6: Choose the unvisited vertex withminimum cost (vertex 3) and consider all its unvisited neighbors so mark is visited

Step 7: Choose the unvisited vertex withminimum cost (vertex 6) and consider all its unvisited neighbors so mark is visited.

Results and Discussions

Active nodes From all the source node and the destination node is chosen. Three client nodes (uavs) are along with a server node (base station). The activated client nodes are exposed in the server node. In the reply is received from the activated nodes. The source node is selected from the client nodes and the other activated nodes will be in the server node from which the destination node is selected. That the destination node is selected at the source node. The file transfer will take place with those two nodes by taking the shortest path. That on the source node the file can be selected which we want to transfer. The dialog appears in depict that the file is transferred from the source node and it takes the shortest path using the dijkstra algorithm. The file will start to traverse and will achieve the node which falls in the shortest path. In the file finally reaches to the destination node.

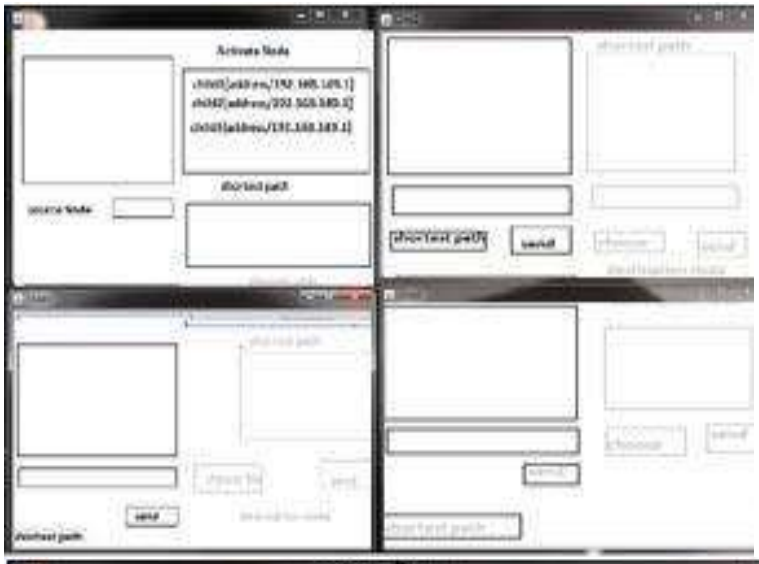

Figure 5.1: Activated Nodes

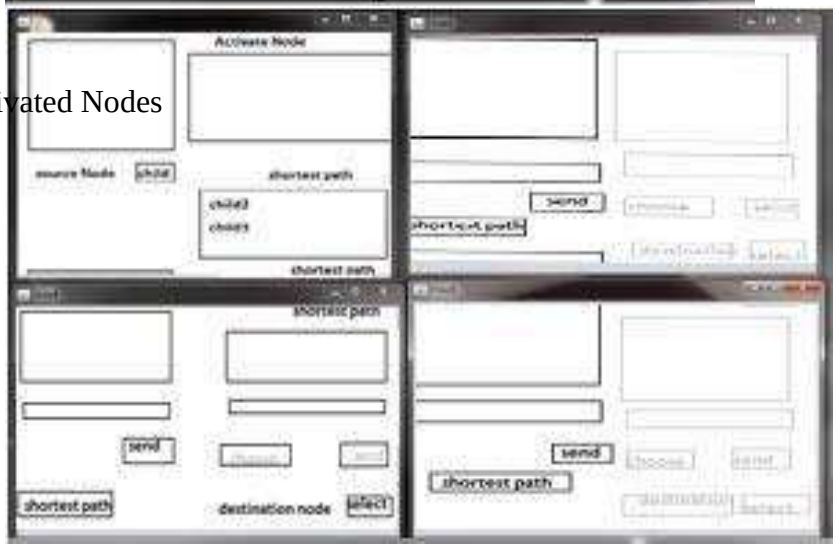

Figure 5.2: Reply from the child nodes

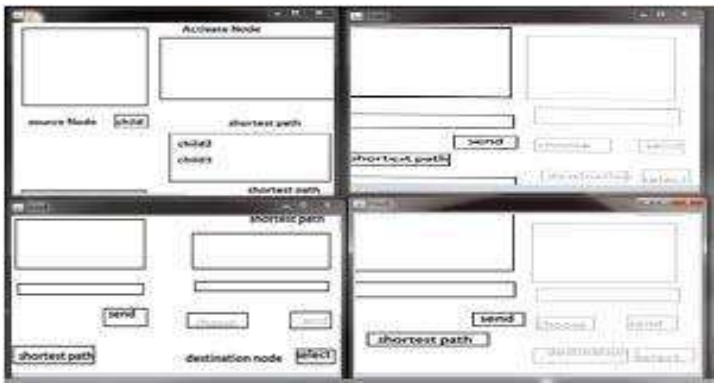

Figure 5.3 : Destination node selected

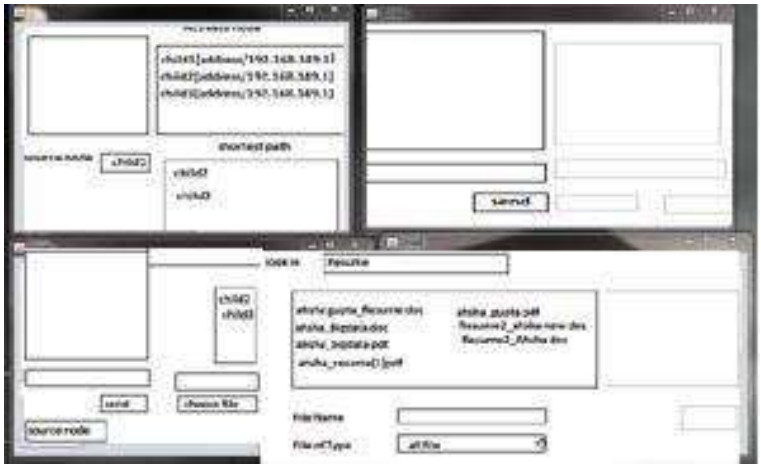

Figure 5.4: Dialog Box of file appears

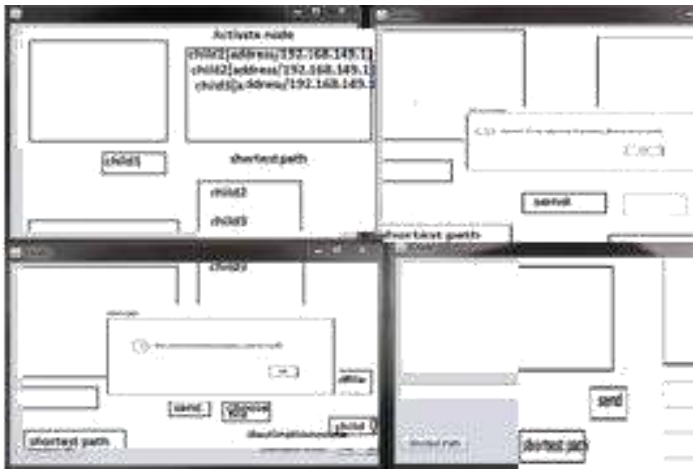

Figure 5.5: File received by node on the shortest path

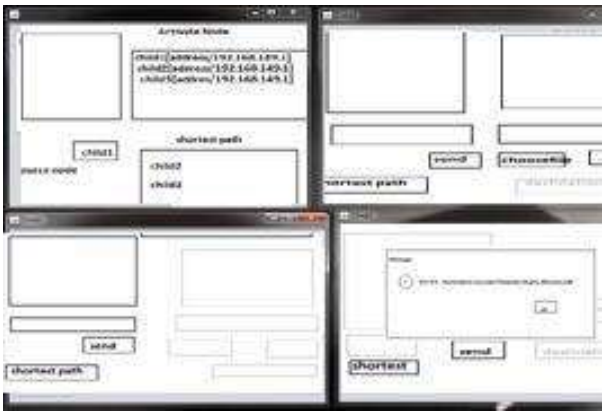

Figure 5.6: File received by Destination node

CONCLUSION

FANET network is made dynamically to show its implementation in real world using the server node which the base station and 3 client nodes which acts as UAVs. The mobility of the UAV nodes is very high so the topology changes frequently so FANET implementation in real world application iscomplicated. The dijkstra algorithm was used to find out the shortest path in wireless network. The performance of AODV, DSDV and OLSR protocols have been analyze in terms of Packet Delivery Ratio, End to End Delay and Average Throughput. It has been observed that OLSR protocols works improved than other protocols. After select OLSR routing protocols as suitable protocol for FANET, different mobility models are simulated and analyzed average end to end and packet delivery ratio with variation in speed of node. It involves only least number of nodes in data transmission and set large number of nodes to file transfer. The communication between the UAVs is consider the main problem in FANET. The shortest path is calculated using dijkstra algorithm. The base station will send the IPs of neighbors to all the nodes in the network. The file will start to traverse moving to all the nodes in the shortest path.

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