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ABSTRACT

An unmanned aerial vehicle (UAV) is an aircraft without a human pilot and a type of unmanned vehicle. UAVs controlled with the help of remote controller. Due to increasing demand of UAVs the various researchers developed the new technologies in wireless communication system. This paper majorly concerns over the Analysis and comparison of MANET Routing protocols for UAV communication. UAVs are playing vital roles in mobile ad-hoc networks (MANETs). Routing is most important task when we are conducting the wireless communication among UAVs. In this paper we analyse the performance of different type of mobile ad-hoc network (MANET) protocols for the communication of UAVs. Various research papers over MANET Routing protocols for UAV communication are discussed in this review paper.

KEYWORDS: Routing protocols; Unmanned aerial vehicle (UAV); mobile ad-hoc network (MANET); Flying ad-hoc network.(FANET).

1. INTRODUCTION

The mobile ad hoc network (MANET) is one of the most growing field for research purposes. It helps for the development of the wireless network. This network is consisting with dynamic topology and applied for provide security purpose. In this network nodes are free to move in any direction. They move for one place to another place with the help of signals. Because every node has a particular IP address and this is provide to every node separately. They have no any physical connection and some time the nodes



Figure: Structure of MANET[11]

performed the task of router. Due to the of demand of wireless communication system various type of MANET protocols are use to improve communication system from air to ground floor. Because this is WiFi network UAVs are use for many types of observations for wind estimation and set the traffic signals. This interchange the information related with the dynamic topologies through the WiFi links. So this is the main reason it is widely used for border security and military services purpose. The main purpose of MANET is to provide the necessary information in emergency situations and when the human communication is not possible.

2. MANET ROUTING PROTOCOLS

These can be defined into three main categories.

- Reactive protocols (On demand Reactive protocols)

- Proactive Routing Protocols (table driven protocols)
- Hybrid Routing Protocols.

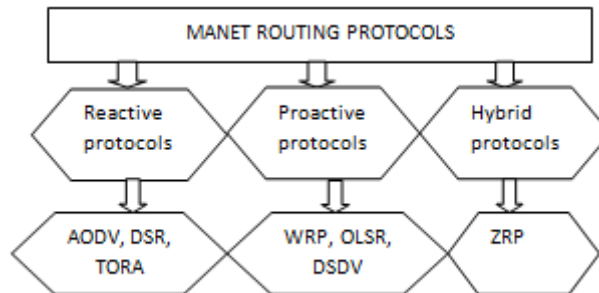


Figure: Classification of MANET protocols.

Reactive protocols: This is on-demand routing protocol. And in this the route is discovered when it is needed. So the route discovery is set according to on-demand basis. The DSR, AODV are the examples of reactive protocols.

Proactive protocols: In this protocol, routing table is maintained by each node so this is called table driven routing protocols. The routing table contains the information related with network topology. Every node in this network has one or more routes to any possible destination in its routing table. The main task of this protocol is that each node in this network maintains a route to every other node in the network at all times.

Hybrid Routing Protocols: This is combination of both Reactive protocols and Proactive protocols. HRP is designed to take the best features of both routing methods. This routing protocol is dependent upon the concepts of zones. Just because of overlapping this is not suitable for more than 100 UAVs within the zone.

We read various types of protocols such as (GRP, OLSR, AODV, DSR, TORA) for this review paper and compare their results with each other. The main difference is the delay, throughput, and simulation time. The results are discussed in this review paper.

3. IMPORTANCE OF UAV NETWORKS

UAVs are very useful and reliable when the telecommunication network is not possible due to some critical situations like the military wars, police rescues, and fire problems in forests. We can get the estimate related with the situation and start the operation to solve that problem. Public use is by public agencies such as police, public safety, and transportation management. Some time when in a critical situation like wildfires, poisonous gas infiltration, etc. UAVs could be used to help in a critical situation. We can get the information with the help of

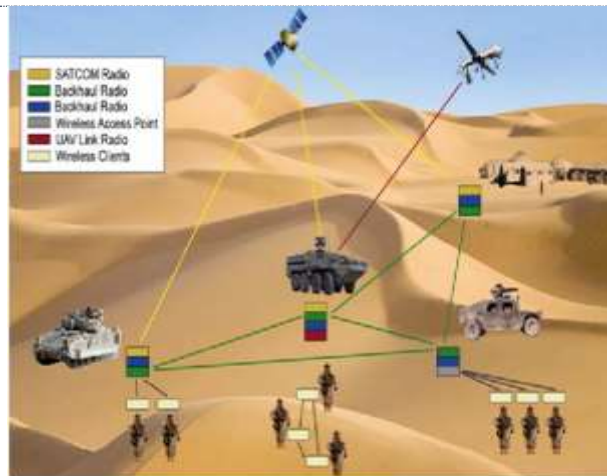


Figure: Military application of MANET [10]

Drones. UAVs come in various sizes: large UAVs and small UAVs. Large UAVs can be use in single way. While small one is use in swarms. They are quite useful in army applications. Many authors discussed that UAVs are become more useful for provide security purpose in military services and police department in near future. It is very useful in electronics and sensor system also. It also use for transportation system and use for get the information about the direction and speed of wind for weather information.

4. LITERATURE REVIEW

In [1] they determine how the information is passing with stable manner and one node to another node via the method of ant colony optimization and they proposed a protected algorithm to preclude the information from black hole attacks in the MANET routing protocols. In [2] They describe multihop protocols having some moveable nodes on the boundaries of the whole network. These mobile nodes are rechargeable and the result shows the better performance as compare with basic SEP. In [3] They compared the few of the IEEE standards on the behalf of their maximum data transmission rate, frequency band used, range, channel bandwidth, modulation technique etc with their ratified date. Keywords-Wireless communication, WLAN, IEEE 802.11, IEEE 802.11a, 802.11b, 802.11g, 802.11n, 802.11p, 802.11ac. I. In [4] The performance analysis of DSR reactive MANET routing protocols is made for throughput and delay using OPNET simulator, the DSR protocol is analysed on the basis of HTTP traffic because today the internet application are most important for the security of wireless communication. In [8] they compared the performance of OLSR and GRP over different IEEE standards on the basis of delay, load and media access delay and throughput GRP total traffic send and received. The simulation result shows GRP and OLSR protocols in IEEE802.11a/g has better performance in term of delay , total traffic sent and received and routing traffic send and received in packets.

5. PERFORMANCE ANALYSIS

We examined the effects of mobility and density of nodes according to the behaviour of four protocols (AODV, OLSR, GRP, DSR). We check the performance of all these protocol for the UAV communication for the behaviour of changing data rate. OLSR produced more routing traffic as compared with DSR . DSR is best in case of density and high mobility networks. But OLSR also perform better task in terms of delay followed by AODV. The results showed that proactive protocols have lowest delay than reactive protocols. Routing traffic send: This is the total amount of routing traffic sent and received in bits per second in the entire network during the operation.

- Delay: This is end to end delay of all packets that are received by the nodes through the signal.
- Load: This is the total load in bits per second.
- Throughput: the total number of successful bits forward from WLAN layers of all nodes in the entire network to the other higher layers.
- Traffic sent: This is the ratio of packets successfully received to total send.



6. Conclusion

Unmanned Aerial vehicle (UAVs) is a process to communicate from air to ground for extracting essential information. UAVs have the benefits for improving communications in wireless network atmosphere. In this review paper, we have presented the performance analysis of four MANET routing parameters (AODV, DSR, GRP, and OLSR) for UAVs communication based on scenarios with varying data supported by IEEE802.11p(WAVE) standard. The evaluation result showed that OLSR protocol has maximum load followed by GRP and AODV. AODV has least load followed by DSR and GRP. In this paper, we will check the performance of these protocols suitable or not when applied to other supported data rates in WAVE and different application traffics as ftp and video. This paper especially focuses on the MANET routing protocols and their performance evaluation. The main thing behind the comparison of these parameters is that we want to use appropriate and reliable parameter for UAVs and videos traffics systems. Thus there is great need to use the reliable and suitable parameters for ftp and videos traffics systems.

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