Chapter 2

Flying Ad hoc Networks Routing Constraints and Challenge Perspectives

Sudarson Rama Perumal
Rohini College of Engineering and Technology, India

Muthumanikandan V.
https://orcid.org/0000-0002-5863-5047
Vellore Institute of Technology, Chennai, India

Sushmitha J.
Rohini College of Engineering and Technology, India

ABSTRACT

In recent decades, the most rapid change in wireless technology has been that flying ad hoc networks (FANETs) played a vital role in telecommunications. FANETs are flexible, inexpensive, and faster to deploy, which has led to the pathway to apply them in various applications such as military and civilian. However, FANETs have high mobility, and frequently changing topology patterns and tri-dimensional space movement make routing a challenging task in FANETs. FANETs differ from vehicular ad hoc network (VANETs) and mobile ad hoc networks (MANETs) in terms of features and attributes. It is always a challenge to choose the optimal path in any network using routing protocol. Due to these challenges, the performance and efficiency of the routing protocol have become critical. As network performance metrics like throughput, quality of service, user experience, response time, and other key parameters depends on the efficiency of the algorithm running inside the routing protocol, this chapter presents a novel routing protocol for FANETs in terms of distributed network routing algorithms and data forwarding routing.

INTRODUCTION

FANETs are now a reality thanks to advancements in wireless communication technology that have played a key role. Global 5G wireless network infrastructure revenue is expected to reach $4.2 billion by 2021, an increase of 89% over the revenue generated in 2020, (Zhao, H. et.al., 2018). It is clear from these numbers that wireless technologies will be ideal for FANET applications since they will give more coverage and faster speeds. Flying Adhoc Nodes are quick, maneuverable, and complicated in their flight environment and high degree of combat. P2P and MPR are the most common methods for establishing communication between nodes as proposed (Gong, J. et.al., 2018). When two nodes are in close proximity to each other, point-to-point communication is possible. However, if the nodes are too far apart, MPR techniques are used in their place. (Park, S. Y et.al 2018) proposed a packet forwarder or a relay agent can be established at any intermediate node in MPR.

There has been a lot of research in these areas in the last two decades, especially in the MANET and VANET areas (Lu, J., et.al., 2018). Small Unmanned Aerial Vehicles (UAVs) in a Flying Adhoc Network (FANET) have recently attracted attention because of their availability, versatility, adaptability, autonomy, and ease of deployment (Thammawichai, M., et.al., 2017).

It is also possible to use UAVs in a wide range of applications because of their huge coverage and ease of installation. However, there are several concerns that need to be addressed, such as the high mobility and sparse deployment of UAVs (Trotta, A. et.al., 2018).

MOTIVATION

To keep pace with FANET's ever-changing requirements, a routing protocol must be flexible enough to accommodate its highly mobile and dynamic nature. Packet loss, delay, and jitter have a significant impact on a network's ability to provide a high level of service. Second, it must be scalable in order to deliver an appropriate degree of throughput against the network demand. Nodes must be able to preserve energy in order to extend network life spans, which is a third and most essential issue (Wang, Y., et.al., 2018).

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