

Chapter 11

Comprehensive Study on Routing in FANET

Mylsamy R.

Sri Ramakrishna Mission Vidyalaya College of Arts and Science, India

Jaikumar M.

Sri Ramakrishna Mission Vidyalaya College of Arts and Science, India

ABSTRACT

The rapid proliferation of networking and wireless communication technologies has led to the development of low-cost unmanned aerial vehicles, which will soon occupy a significant amount of the sky. UAVs may be effectively used to complete complicated missions when arranged as an ad hoc network, leading to the creation of well-known flying ad hoc networks. Without the implementation of an efficient networking model that enables the dependable transfer of data between UAVs, the creation of such networks is not feasible. The diverse flying limits and highly dynamic topology of FANETs make designing routing protocols a very difficult task. An extensive investigation of routing in FANETs is provided in this work. A wide range of current FANET routing protocols are compared and clarified. This work is unique because it can give a thorough analysis of the main FANET routing protocols and assess them based on many restrictions and important characteristics, better representing the state of the art in this field of study at the moment.

1. INTRODUCTION

Unmanned Aerial Vehicles, also known as UAVs, have quickly become highly adaptable instruments for various uses, including border surveillance, ad hoc network relay, wind estimation, wildfire management, disaster monitoring and response, environmental monitoring, traffic monitoring, and security (Hadi et al., 2023). Robust routing protocols are critical to the effectiveness of UAV networks, often referred to as Flying Ad-hoc Networks (FANET), since they provide smooth drone coordination and communication (Wang et al., 2017).

DOI: 10.4018/979-8-3693-2073-0.ch011

FANET, is an innovative technology that addresses the communication and coordination needs of UAVs. Designed for the dynamic and complex environments drones operate in, FANET establishes an autonomous network where UAVs can exchange critical information. The essence of FANET lies in its ability to create a seamless data flow between individual drones. This enables them to collaborate effectively and share real-time data about their positions, trajectories, and operational statuses (Chriki et al., 2019).

The applications of FANET span various sectors. In agriculture, drones can work together to cover larger areas and monitor crops more effectively. Coordinated drones can provide broader coverage and quick data relay during search and rescue missions. In entertainment, synchronized drone performances become possible, creating captivating light shows in the sky. As FANET technology evolves, its potential grows. Swarms of drones operating in a well-orchestrated manner can revolutionize industries such as logistics, surveillance, and environmental monitoring (Pasandideh et al., 2022)(Sahingoz, 2013).

Aircraft without a pilot are known as unmanned aerial vehicles, or UAVs. Drones, also known as remotely piloted aircraft (RPAs), are operated remotely by a pilot, automatically by a ground control station (GCS), or remotely by a satellite. UAVs have been employed in military operations for more than 20 years. For example, they are used in border monitoring, reconnaissance, and airstrikes. The two primary categories of UAVs are fixed-wing and rotary-wing models. Fixed-wing UAVs have a large cargo capacity and travel swiftly. They must also keep going forward constantly to remain in motion. Figure 1 shows an example of a fixed-wing UAV. On the other side, rotary-wing UAVs are less powerful and operate more slowly. They can go in any direction and remain steady in the air. Figure 2 shows an illustration of a rotary-wing UAV.

UAV categorization is displayed in Diagram 1. There are two sizes of UAVs: large and small. The military can benefit from the employment of large UAVs. Small UAVs are more suited for civilian uses because of their simpler design, easier operation, and reduced repair and maintenance costs when compared to larger UAVs. Comparably, while tiny UAVs are usually outfitted with a variety of microelectromechanical systems, including inexpensive aircraft bodies, compact radio devices, small batteries, and microprocessors, their capabilities are equally more constrained than those of big UAVs. Their payload and weight are likewise restricted. Multi-UAV systems provide several advantages over single-UAV systems, but they also present certain difficulties, such as communication. A UAV system's communication medium might be either a satellite or a ground station.

Figure 1. Fixed wing UAV



21 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/comprehensive-study-on-routing-in-fanet/344569

Related Content

Introduction to Neuromorphic Computing

Supriya Amol Londhe, Sunayana Kundan Shivthare and Yogesh Kumar Sharma (2025). *Revolutionizing AI with Brain-Inspired Technology: Neuromorphic Computing* (pp. 1-18).

www.irma-international.org/chapter/introduction-to-neuromorphic-computing/362944

An Artificial Life-Based Vegetation Modelling Approach for Biodiversity Research

Eugene Ch'ng (2010). *Nature-Inspired Informatics for Intelligent Applications and Knowledge Discovery: Implications in Business, Science, and Engineering* (pp. 68-118).

www.irma-international.org/chapter/artificial-life-based-vegetation-modelling/36312

Knowledge in Memetic Algorithms for Stock Classification

Jie Du and Roy Rada (2014). *International Journal of Artificial Life Research* (pp. 13-29).

www.irma-international.org/article/knowledge-in-memetic-algorithms-for-stock-classification/103853

The Grand Challenges in Natural Computing Research: The Quest for a New Science

Leandro Nunes de Castro, Rafael Silveira Xavier, Rodrigo Pasti, Renato Dourado Maia, Alexandre Szabo and Daniel Gomes Ferrari (2011). *International Journal of Natural Computing Research* (pp. 17-30).

www.irma-international.org/article/grand-challenges-natural-computing-research/72692

Computational Methods for Identification of Novel Secondary Metabolite Biosynthetic Pathways by Genome Analysis

Swadha Anand and Debasisa Mohanty (2011). *Handbook of Research on Computational and Systems Biology: Interdisciplinary Applications* (pp. 380-405).

www.irma-international.org/chapter/computational-methods-identification-novel-secondary/52326