



Efficiency-Driven Packet Forwarding Algorithm in Flying Ad Hoc Networks

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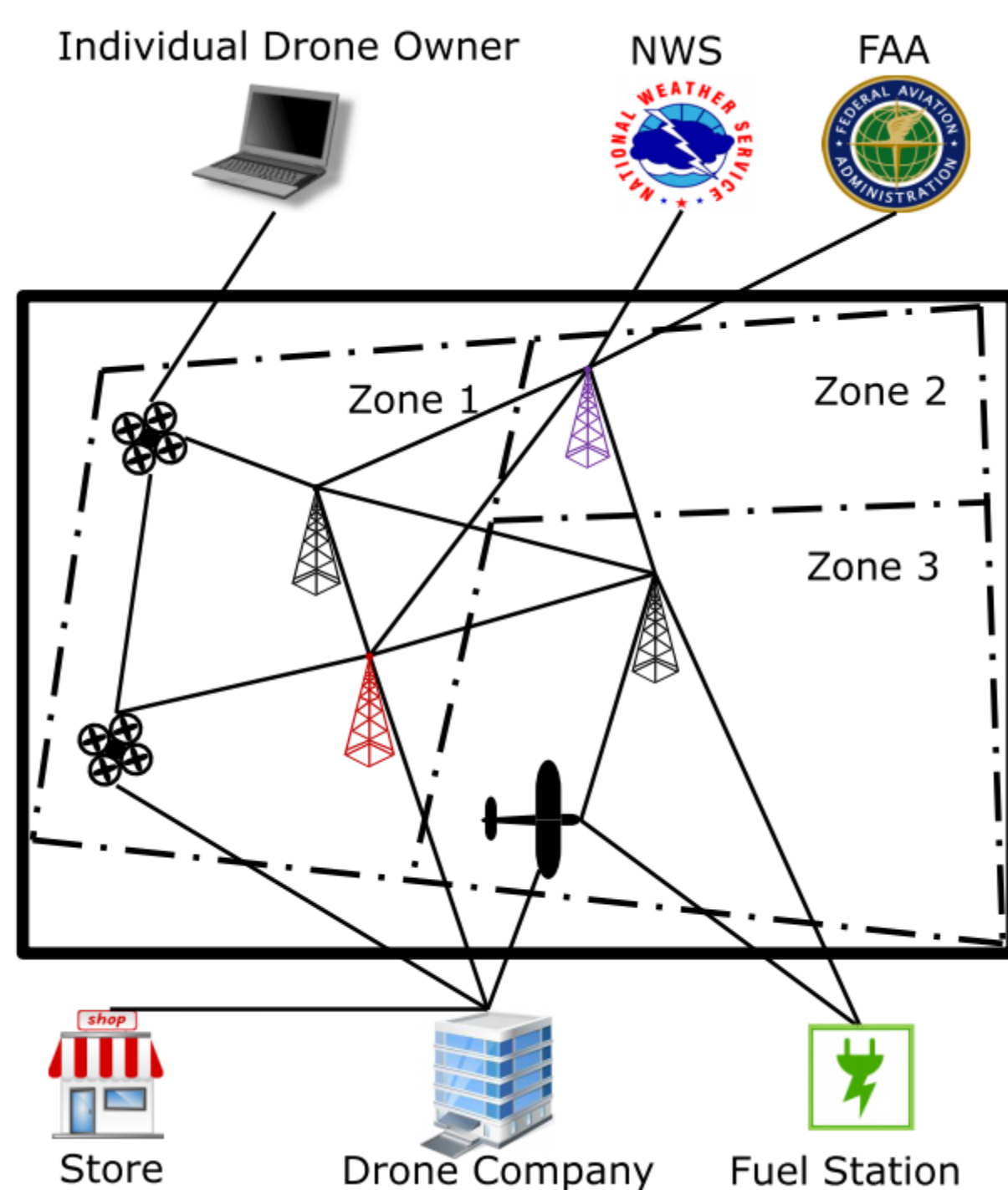


Abstract

In this project, we propose an efficiency-driven packet forwarding algorithm, also called EFF_{fwd} , to efficiently and reliably deliver data packets to ground destination in Flying Ad Hoc Networks (FANETs).

Introduction

- Unmanned aerial vehicles (UAVs), often referred to as drones, have been increasingly popular among hobbyists, researchers, and investors.
 - 7 million drones occupying U.S. airspace by 2020, 4.3 million hobbyist drones and 2.7 million commercial aerial vehicles.
 - \$82.1 billion in job creation and economic growth over the 10-year span from 2015 to 2025.
- As the number of drones rapidly increases, Internet-of-Drones (IoD) and its applications are expeditiously proliferating,
 - A myriad of multi-sized and heterogeneous drones seamlessly interact with each other through zone service providers to realize the goal of coordinating the access of drones to controlled airspace and providing navigation services.



Research Motivation

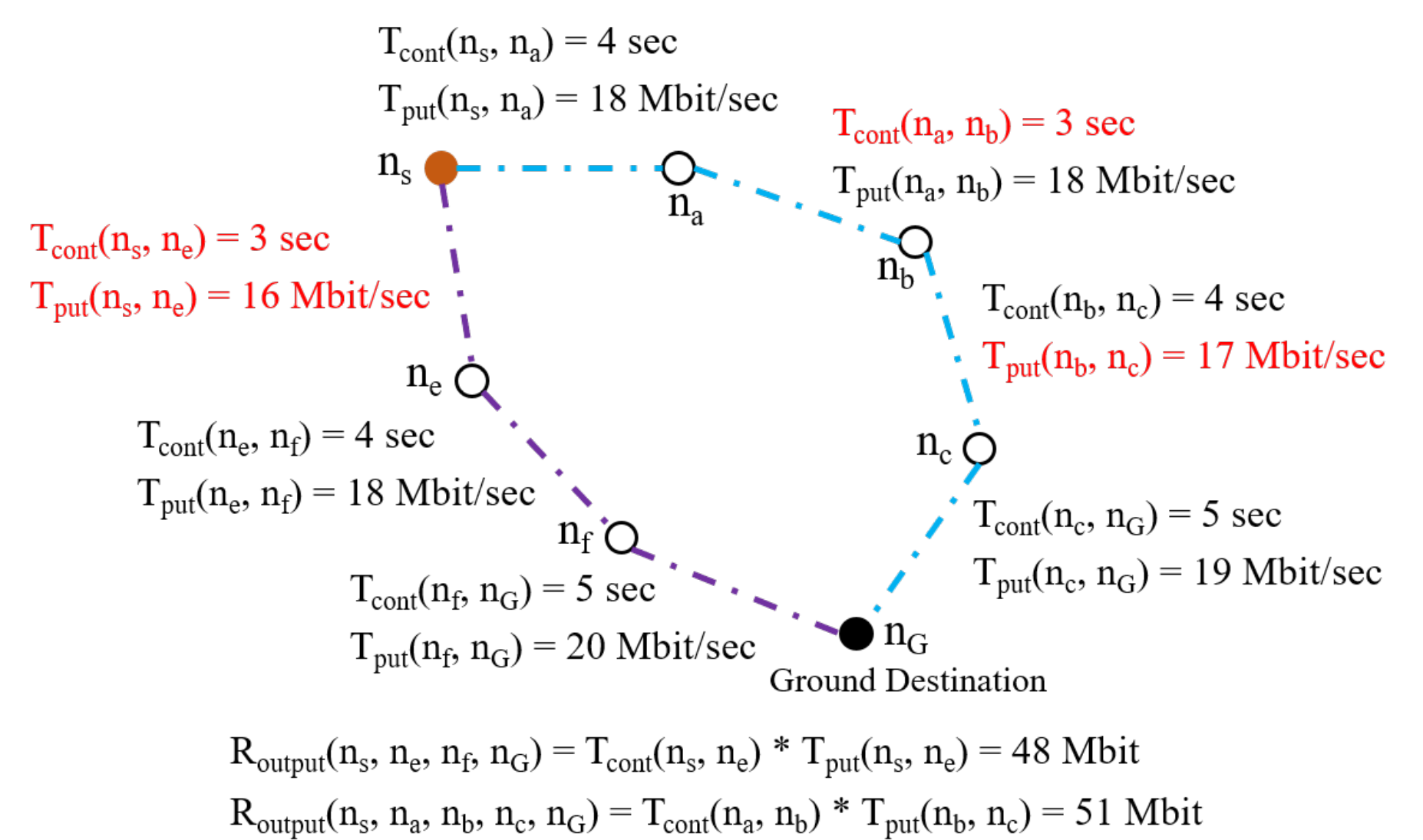
- Drones are small flying robots with the capabilities of photographing, sensing, computing, and wireless communicating.
 - Gather information and transmit often large-sized data to a ground station.
- The communication of a single drone scenario has been well investigated.
 - Load-carry-and-deliver single-hop routing protocol.
- However, as a major part of speedily emerging IoD, Flying Ad Hoc Networks (FANETs) with the advantages of faster multitasking capability, longer network lifetime, and higher scalability pose new research challenges.
 - Routing protocols and communication algorithms that were specifically designed for Mobile Ad Hoc Networks (MANETs) and Vehicular Ad Hoc Networks (VANETs) fail in the highly dynamic aerial environment.
 - How a set of drones efficiently and collaboratively routes data packets to a destination in order to achieve the goal of sharing information and knowledge and coordinating decisions.*

Efficiency-Driven Packet Forwarding

- We propose an efficiency-driven packet forwarding algorithm, also called EFF_{fwd} , to efficiently and reliably deliver data packets to ground destination in FANETs.
- The EFF_{fwd} consists of two schemes:
 - End-to-End Routing
 - Delay-Tolerant Forwarding

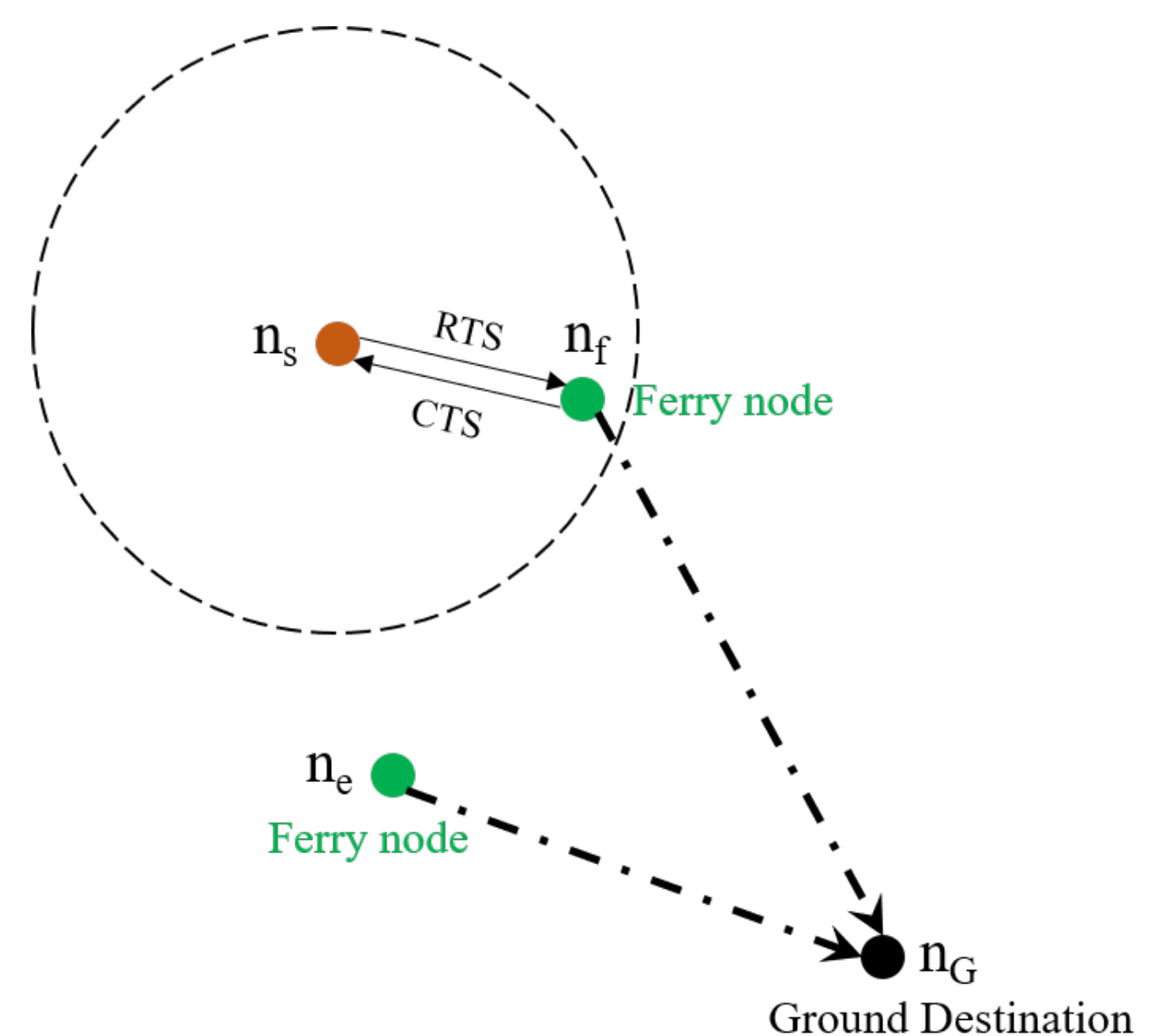
End-to-End Routing

- In end-to-end routing, the drone initiates a route discovery procedure to find an end-to-end routing path to deliver data packets to ground destination.



Delay-Tolerant Forwarding

- In case no end-to-end routing path exists, delay-tolerant forwarding is applied, where the drone forwards data packets to the ferry drone that is moving to ground destination or it carries data packets and moves to ground destination to deliver data packets.



Simulation Environment



Acknowledgement

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