universidade de aveiro

Emergency network in Aveiro:

Integration with ATCLL

Redes e Sistemas Autónomos
André Clérigo 98485
Pedro Rocha 98256

TOC

Overview

The objective of the project is to establish an emergency network infrastructure in Aveiro by integrating the current infrastructure of the Aveiro Tech City Living Lab (ATCLL) using the street poles and drones to expand the ad-hoc network. Additionally, the project intends to offer the population an emergency 5G network utilizing 5G modules on the posts, which will subsequently be complemented by drones.

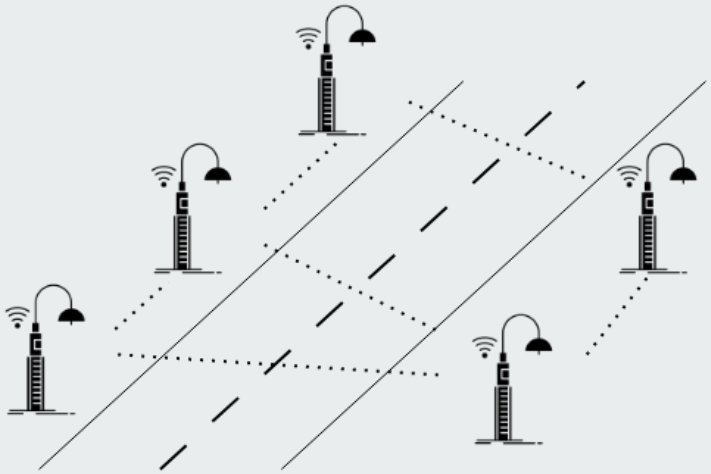
Project objectives

1. Use the ATCLL infrastructure to create an ad-hoc network and expanding its range among emergency entities (firefighters, police, etc.).

2. Whenever possible, provide a 5G network that will be strong near the infrastructure and weaker near the areas covered by drones. The 5G modules will be activated upon detection of disasters or network failures.

3. Use drones to extend the network's range (5G and Ad-hoc) by connecting the street poles and devices that are not close to each other, establishing connections between areas that are difficult to access or have a lack of connectivity.

Architecture Overview



Ad-hoc Network Infrastructure:

Utilize the existing ATCLL infrastructure and street poles to create an ad-hoc network backbone for emergency entities by setting up B.A.T.M.A.N. routing protocol.

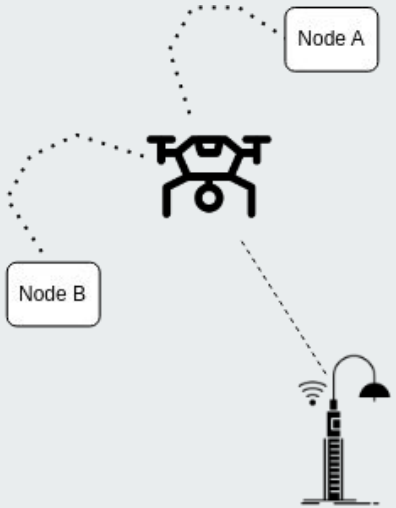
Ensure the ad-hoc network is self-forming and self-healing, adapting to changes in network topology.

5G Network Integration:

Install 5G modules on the street poles to offer emergency 5G connectivity.

Implement a network controller that activates the 5G modules during disasters or network failures.

Architecture Overview



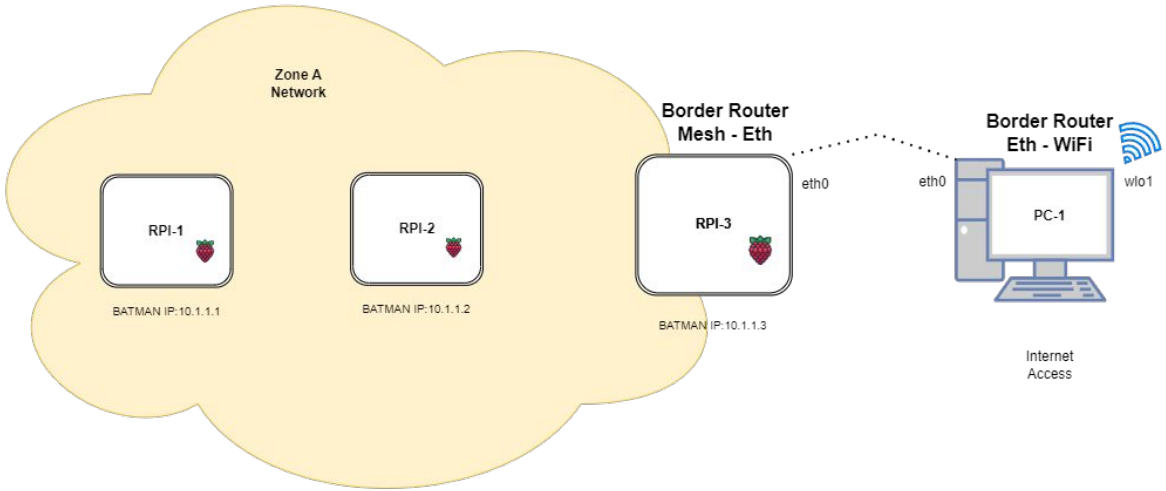
Drone-Assisted Network Expansion:

Deploy drones equipped with communication equipment compatible with BATMAN and 5G networks.

Develop a drone control system to coordinate their movements and maintain optimal network coverage.

Use drones to extend the range of both the ad-hoc network and the 5G network, connecting street poles and devices in hard-to-reach areas.

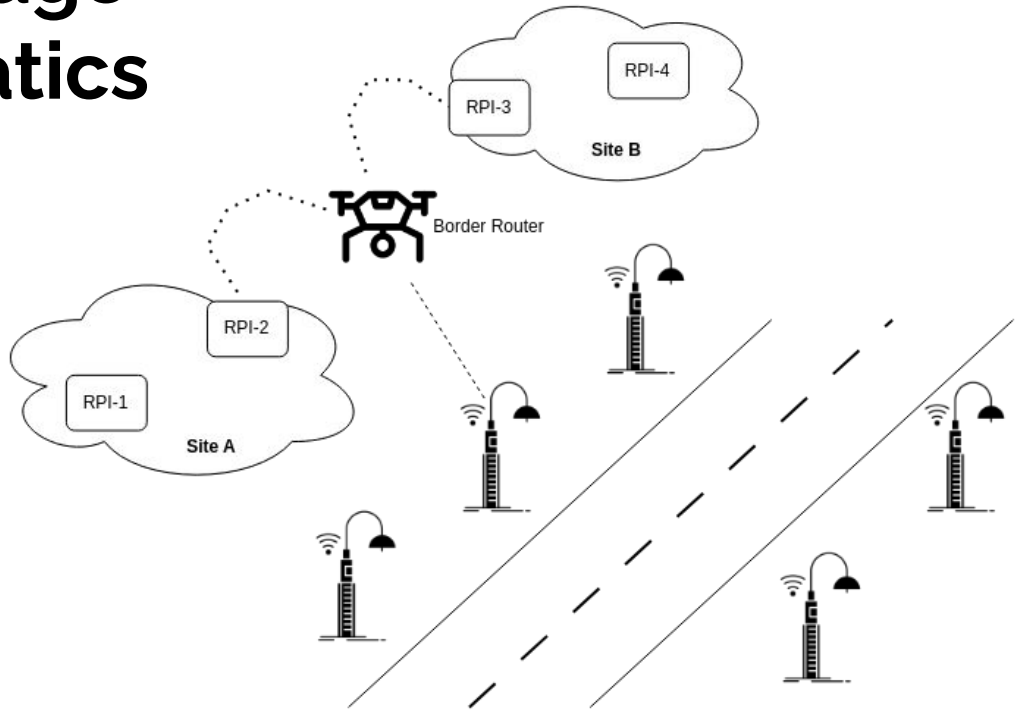
Early Stage Schematics



Messages exchanged:

- OGM
- Unicast TVLV
- OGM, Gateway Information (by the BR)

Final Stage Schematics



Messages Timeline

OGM

The primary mean of disseminating routing information throughout the network by broadcast containing details such as transmission quality, translation table, multicast, and distributed ARP table.

OGM Rebroadcast

The process by which nodes forward OGMs they receive from their neighbors. This mechanism helps disseminate routing information and enables nodes to discover and maintain routes to other nodes.

Unicast TVLV

Are used for exchanging unicast information between nodes. The type can be Translation Table Request and Translation Table Response messages with the TVLV structure to request and share translation table entries.

UDP, TCP, ...

Data exchanged between the devices

OGM, Gateway Information

After configuring the gateway the OGMs sent by the node contain TVLV Gateway Information announcing itself as a gateway and sharing download and upload speeds

universidade de aveiro

Demo Preview

Border Router integration