Emergency Network in Aveiro: Integration with ATCLL

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Abstract

The project focused on establishing 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. Furthermore, the project offers the population an emergency Internet access.

This involved setting up a B.A.T.M.A.N. network between Raspberry Pi devices (Fig.1), with tests conducted both inside and outside a building, incorporating line-of-sight (LoS) and non-line-of-sight (No LoS) conditions and connections to the Internet.
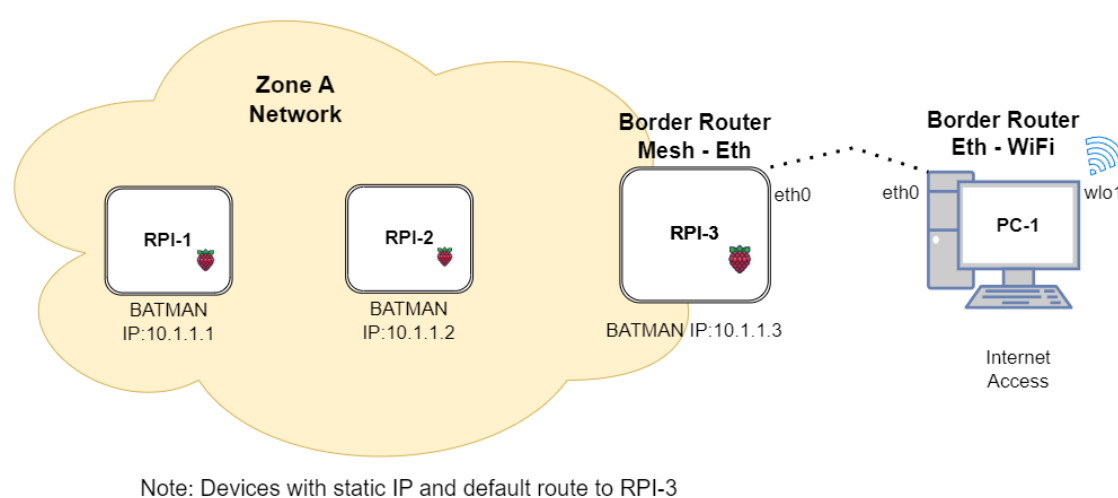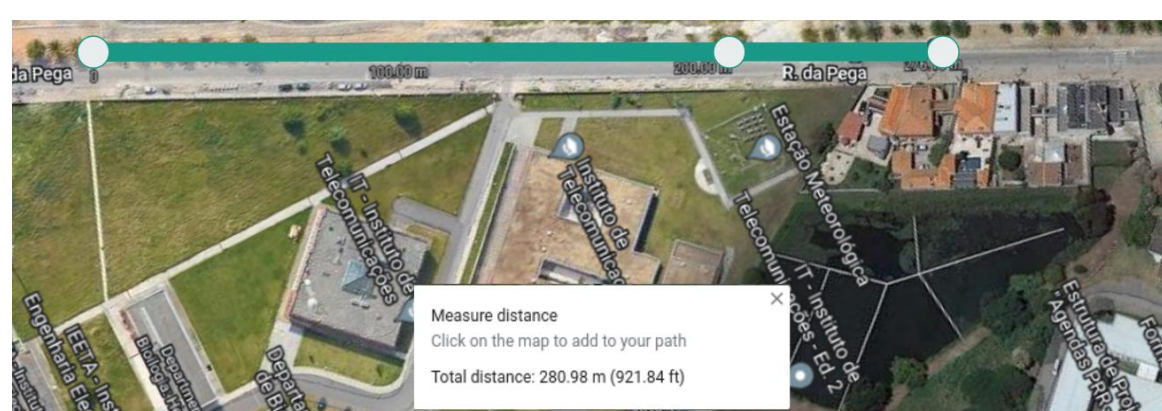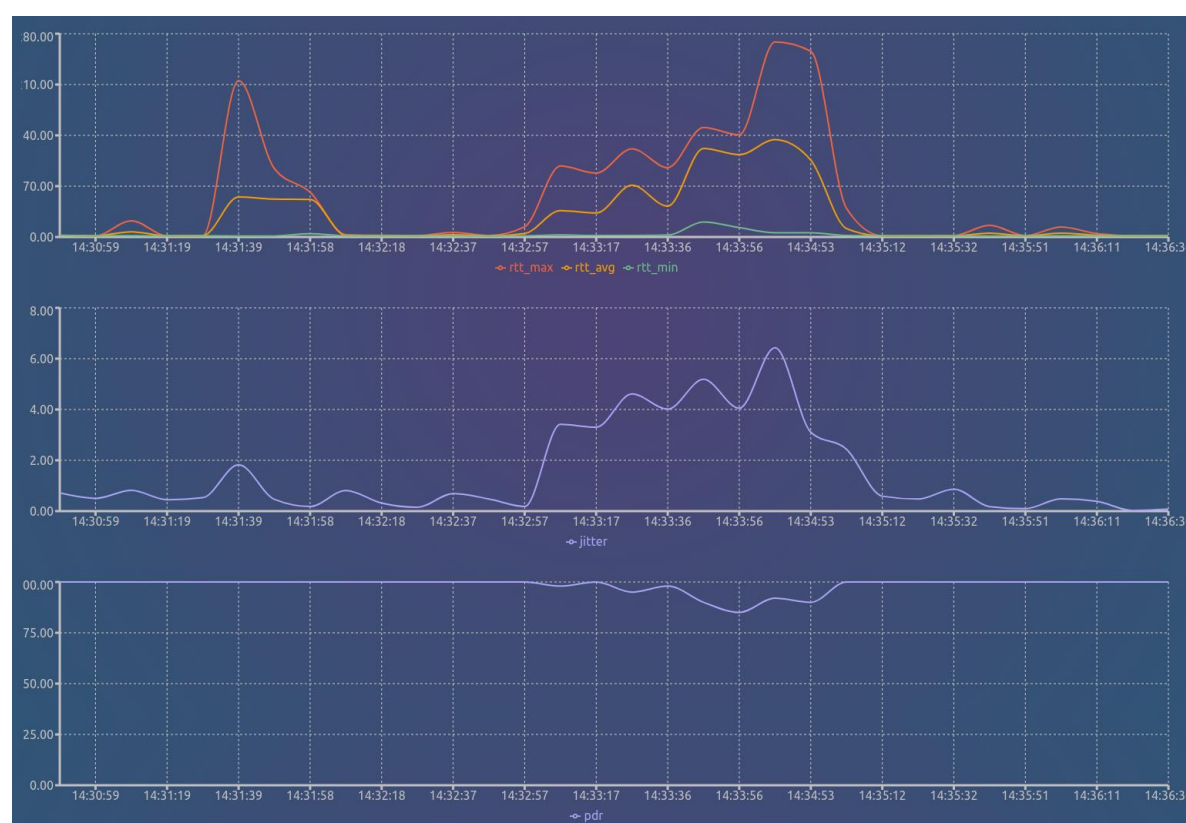
Fig. 1 – Architecture.

Fig. 2 – Maximum Range.

Fig. 3 – Graphics of live demo metrics inside of a building.

Methods

Our experiments involved gauging connectivity over various distances and several scenarios. Having in mind that our measurement tools may lack precision, we ensured a level of consistency across our tests (Fig. 3).

Under LoS conditions, we achieved a maximum distance of roughly 200-230 meters with a single hop. With the addition of an intermediate device, serving as an extra hop, this range was extended to approximately 280-300 meters (Fig. 2). However, these distances varied depending on the atmospheric conditions.
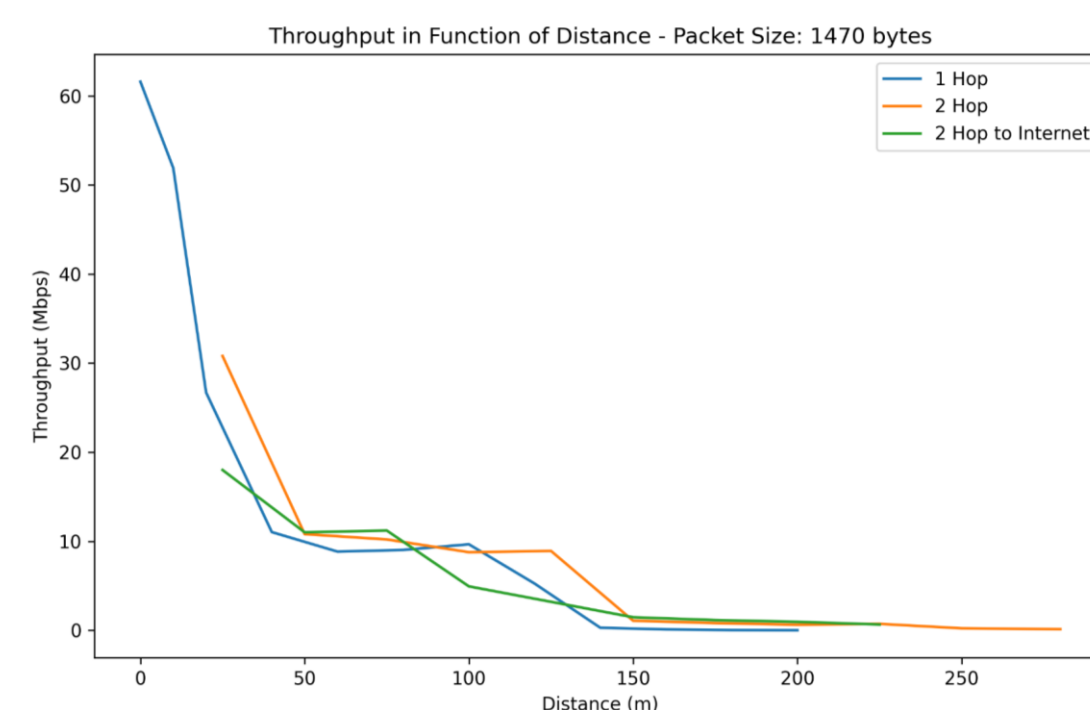

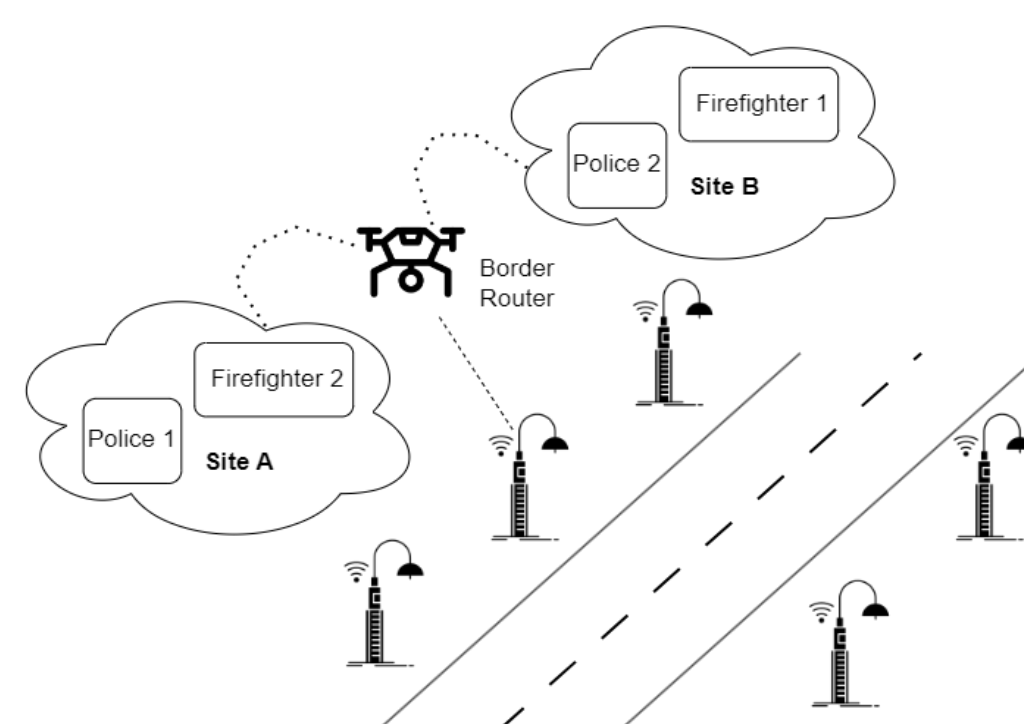
Fig. 4 – Throughput Results in LoS.

Fig. 5 - Envisioned scenario.

Conclusion

Based on our results (Fig. 4), we determine that this technology would be very useful for an emergency network that uses an infrastructure as the one depicted in the envisioned scenario (Fig. 5). We observed a correlation between device height and achieved distance, indicating that if we used the city street poles and a drone, we could easily exceed 500 meters in LoS and with multi hops.

References

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https://github.com/TokTok/c-toxcore
B.A.T.M.A.N., https://www.open-mesh.org/projects/open-mesh/wiki