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Are HAPS Suitable for Next-Generation URLLC Services?

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WHAT IS URLLC?

Ultra-reliable low-latency communication, the 5G service for mission-critical control of robots, drones and remote machinery: every packet must arrive within 1 ms, 99.999% of the time [4].

WHAT IS INNOVATIVE

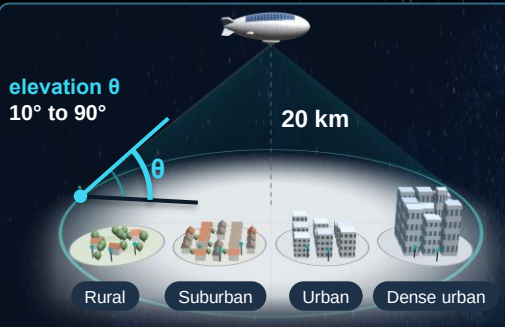
- HAPS as a URLLC platform, not only for coverage [1–3]
- Every packet timestamped at every layer, HAPS and UE
- Worst case against 1 ms at 99.999%, not averages [4]
- Each bottleneck located and matched to a fix

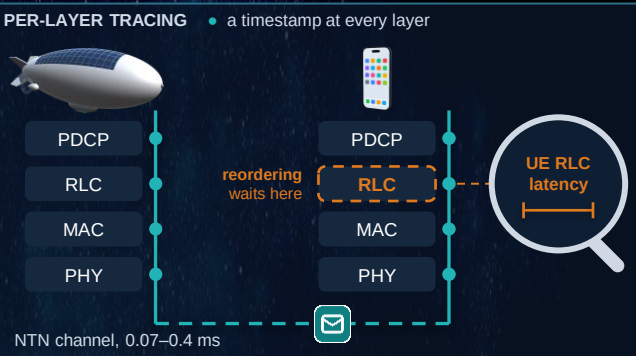
SUSTAINABILITY AND CONNECTIVITY

- One platform covers ≈ 500 terrestrial tower sites [5]
- Solar powered, zero emissions in operation [6, 7]
- Offshore fields and new sites with no ground radio
- Service continues when the towers go down

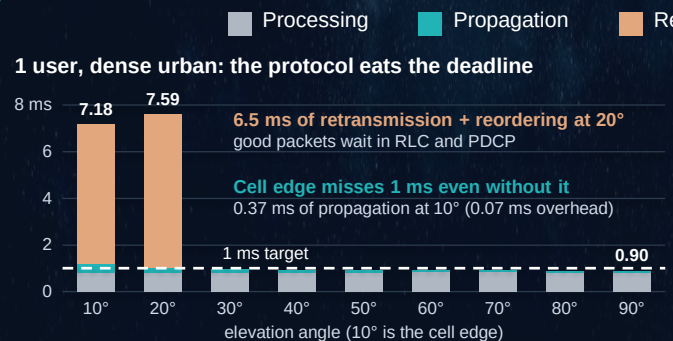
HOW WE TESTED

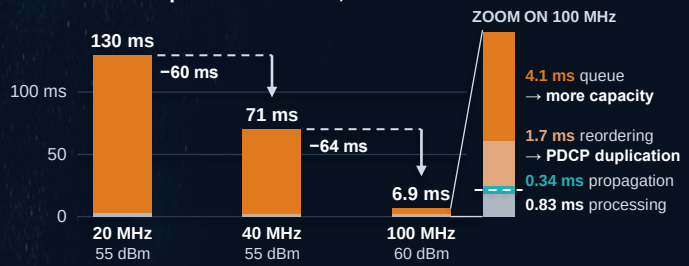
ns-3 5G-LENA [8] one HAPS cell at 20 km over four 3GPP environments [9], with 1 to 16 users





RESULTS

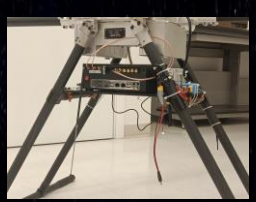




Fixes plan on the usable footprint; out-of-order delivery or PDCP duplication

Fix 130 → 6.9 ms with bandwidth × 2.5 and power +5 dB







FROM SIMULATION TO THE FIELD

Tethered drone 5G testbed at KAUST

references →

THE ANSWER

Yes, if we design for the protocol and the load, not just the propagation.

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