RaQSaC: **Ra**ptor**Q**-based data transport for low earth orbit **Sa**tellite **C**onstellations

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Introduction

- Currently over 1800 Low-Earth Orbit (LEO) satellites orbiting the earth which are all part of SpaceX's vast plan for global high-speed internet access.

- Features Include:
  - Interconnected dynamic mesh of thousands of satellites
  - Substantial Latency reductions in comparison to the best fibre available today
  - Aggregate capacity expected to reach multiple Tbps
  - Average Round-Trip-Time (RTT) in a sub-10ms range between a the first satellite and Earth.

Project Goal

- Take an exploratory approach to devising data transport protocols with appropriate congestion control algorithms for LEO satellite constellations
  - Understand the latency characteristics of LEO constellations along with the potential of inter-packet latency variation.
  - Design a novel receiver-driven data transport, driven by our observations.

Challenges

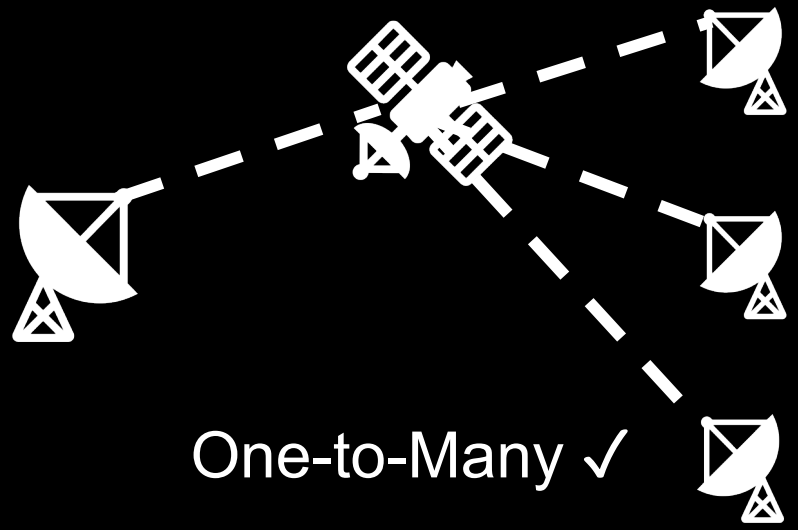
- Latency Variation
- Multiple paths that change over time.
- Fluctuating bandwidth.
- Hotspots

(Full results will be displayed during the larger time slot at 15:30 CET)

RaptorQ-based data transport

RaptorQ features:

- ✓ Systematic Code
- ✓ Spray symbols (not per-flow)
- ✓ Ordering not important
- ✓ Rateless
- ✓ No need for retransmissions



Receiver-Driven with Congestion Control

Receivers manage the rate of data being sent to them by senders. We are influenced by existing receiver-driven approaches for data centers

- ✓ Pull-based approach
- ✓ Packet Spraying
- ✓ Packet Trimming
- ✓ Additive-Increase Multiplicative Decrease (AIMD) congestion control