

New Geo Workshop

A First Look at Starlink's Geofeed: On Discrepancies between Feeds and Routing

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1. Introduction
 2. Methodology
 3. Evaluation
 4. Discussion

Introduction

- RFC 8805, RFC 9632 define standard for self-report by operators
- IP geolocation relevant for e.g. information security and content delivery

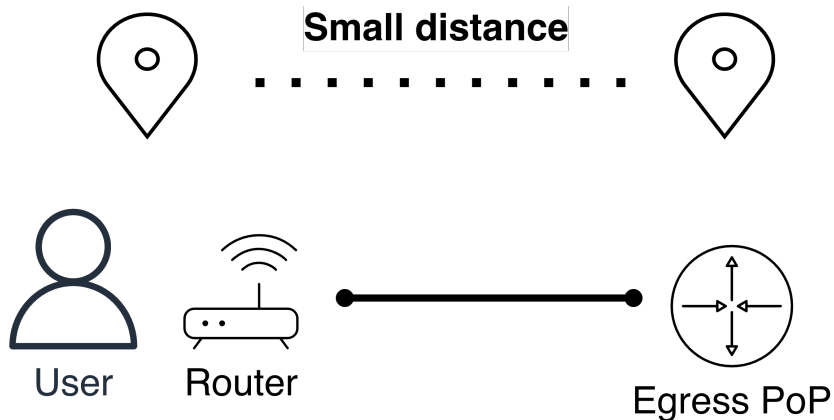


- self reported geolocation information is
“**often root cause of bad IP geolocation data**” (IPinfo)
- LEO satellite networks like Starlink even more challenging

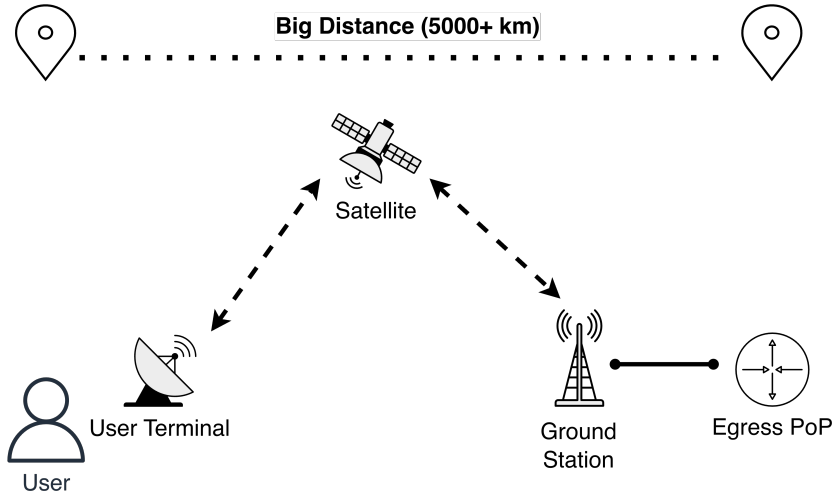
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WHY?

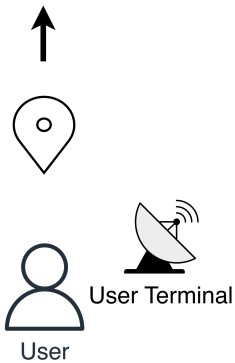
IP Geolocation - the “standard” case



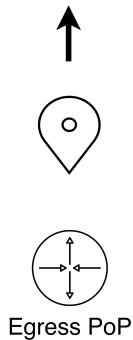
IP Geolocation - the Starlink case



feed.csv



pops.csv





feed.csv

9.170.2.0/24,US,US-CA,Los Angeles,

Prefix, Country, Region, City

pops.csv

9.170.2.0/24,lsancax1,lax

Prefix, PoP Code, IATA Code



What exactly are the problems?

Errors:

- the two feeds disagree 399 prefixes in **feed.csv** without any PoP assignment
- implausible pairings of RFC location and PoP assignment



What exactly are the problems?

Uncertainty:

- APNIC Labs discarded Starlink's geofeed for ≈ 20 economies over accuracy concerns
- Kravtsov (2026) names geolocation lag as limitation for their paper

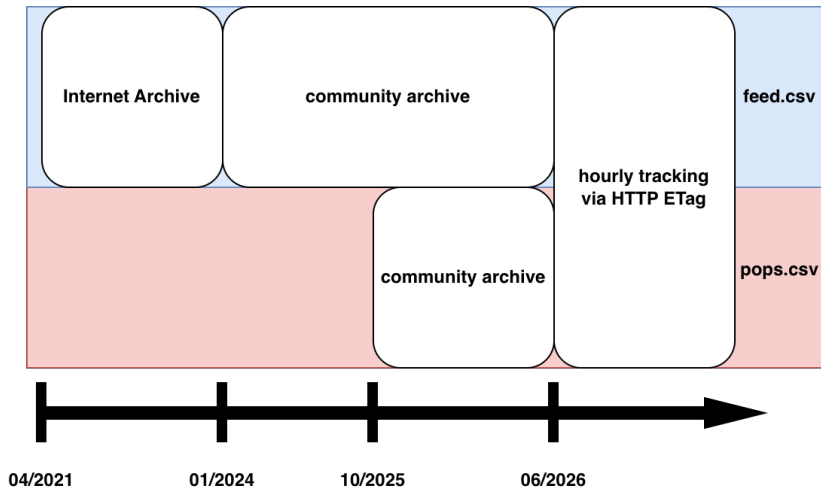


What do we contribute?

- historic evolution of both feeds
- compare feeds against routing
 - differentiating for which economies it is inaccurate
 - detecting changes in routing before they are documented in the feeds

Methodology

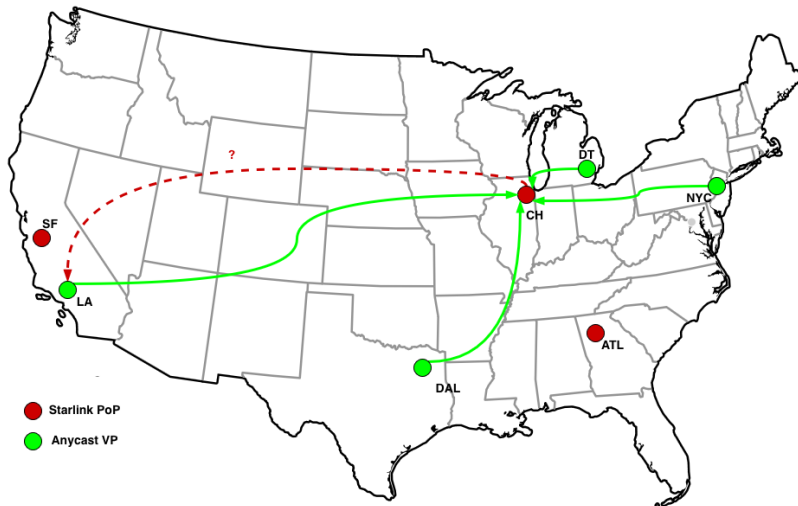
Collecting Starlink's feeds



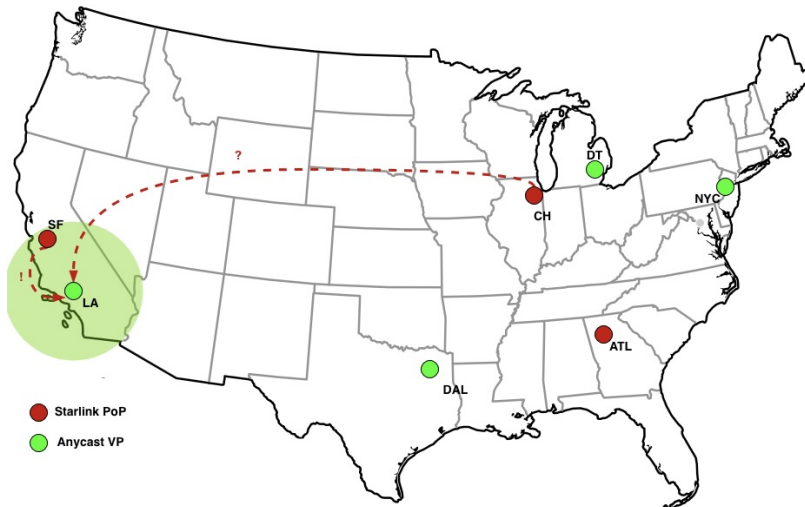


- anycast catchments for our breadth measurement
 - anycast makes same IP address available in distinct sites
 - anycast testbed TANGLED by the University of Twente
 - 32 sites in 19 countries

Starlink's feeds vs routing - breadth



Starlink's feeds vs routing - breadth

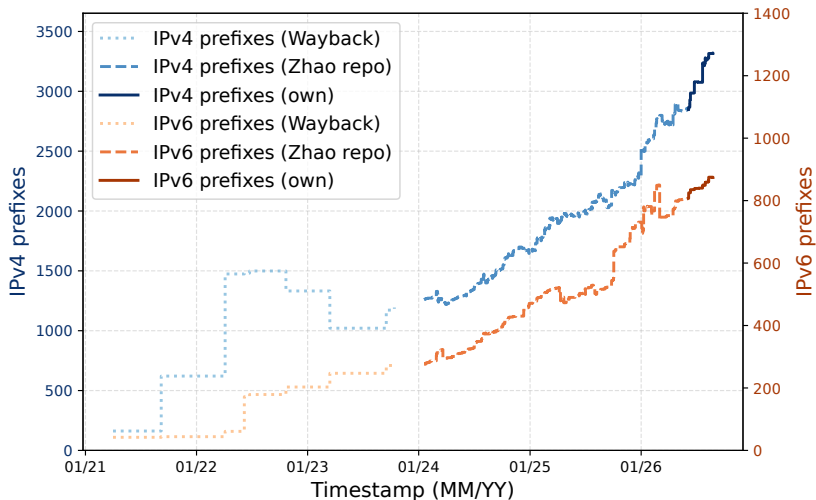




- traceroutes from IPinfo ProbeNet probes traceroutes for depth measurement
 - 1,395 probes in 173 countries, we use subset of 76 probes
 - at least one per 56 Starlink PoP location
 - 12 hourly traceroutes to target IPs from hitlist

Evaluation

Starlink's feed development





143.105.58.0/24

feed.csv

US,US-AZ,Phoenix

↓ 23h

CA/CA-SK/Regina

pops.csv

tmpeazx1,phx

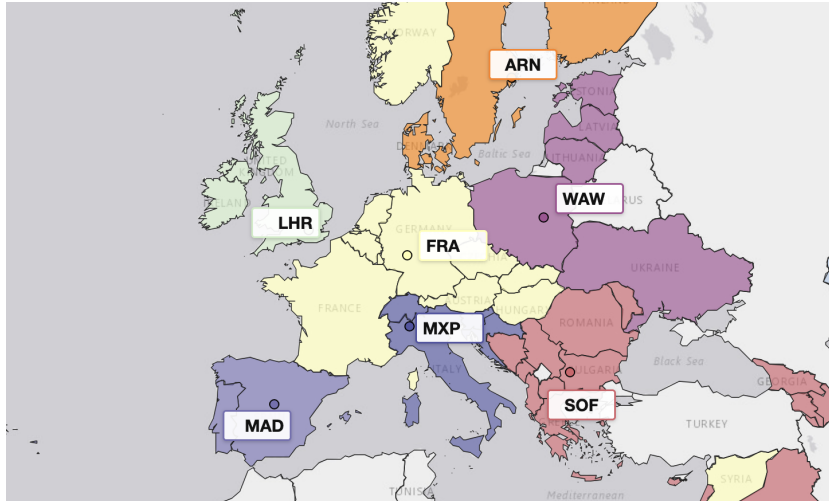
23h ↓

clgycan1,yyc



- ingress IP address, last ASN passed before ingress shifted accordingly
- unresponsiveness during period of shift
- documented changes align with routing based reality

Starlink's feeds vs routing





- prefix changed assignment from Frankfurt to London,
- change was documented on 2026-07-22 in the geofeed
- change was already visible in the Anycast setup, 3 days prior at the beginning of measurement

Discussion

Which feed should a customer use?



- two feeds answer different questions
- $\approx 95\%$ of cases where Anycast VP was at the RFC and PoP location, pops.csv seems to be accurate
- Starlink uses public and private addresses for IPv4, feeds still do not distinguish

- for APNIC Labs discard of Starlink's geofeed for ≈ 20 economies:
- Subset A (e.g., Zimbabwe, Madagascar): routing matches the feed, so valid data was discarded
- Subset B (Yemen, Sudan, South Sudan): all prefixes route to European VPs 5000+ km away, which confirms APNIC's concerns

- Starlink's feeds lag behind its own network
- active measurement and routing-based validation can lead instead
- add an embedded timestamp so consumers can see how old the feed is when fetched
- add a TTL so consumers can match their fetch interval to the change rate

Starlink-specific:

- publish **pops.csv** in a documented, standardized format or fold the PoP assignment into the RFC8805 record