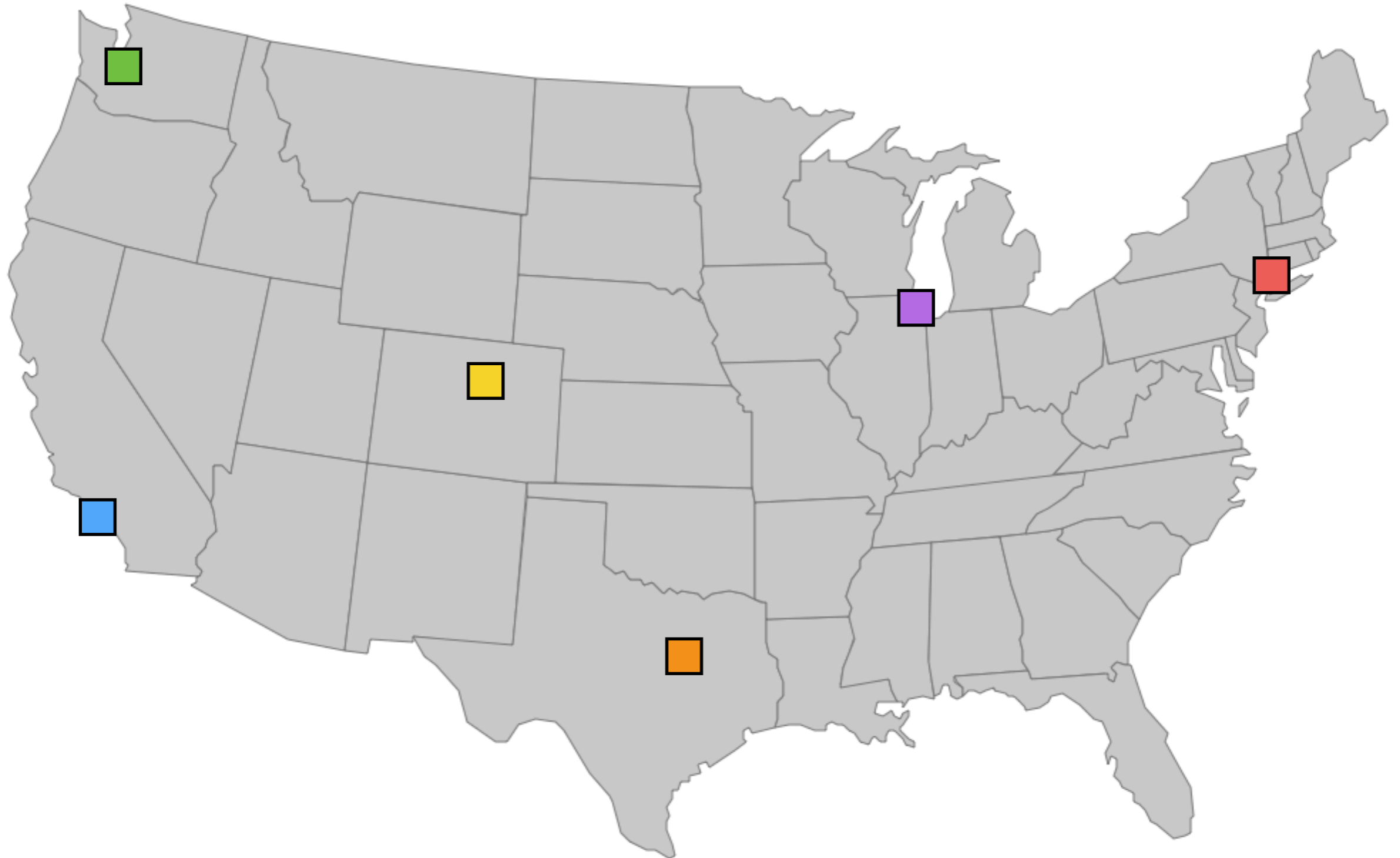# DailyCatch: A Provider-centric View of Anycast Behaviour
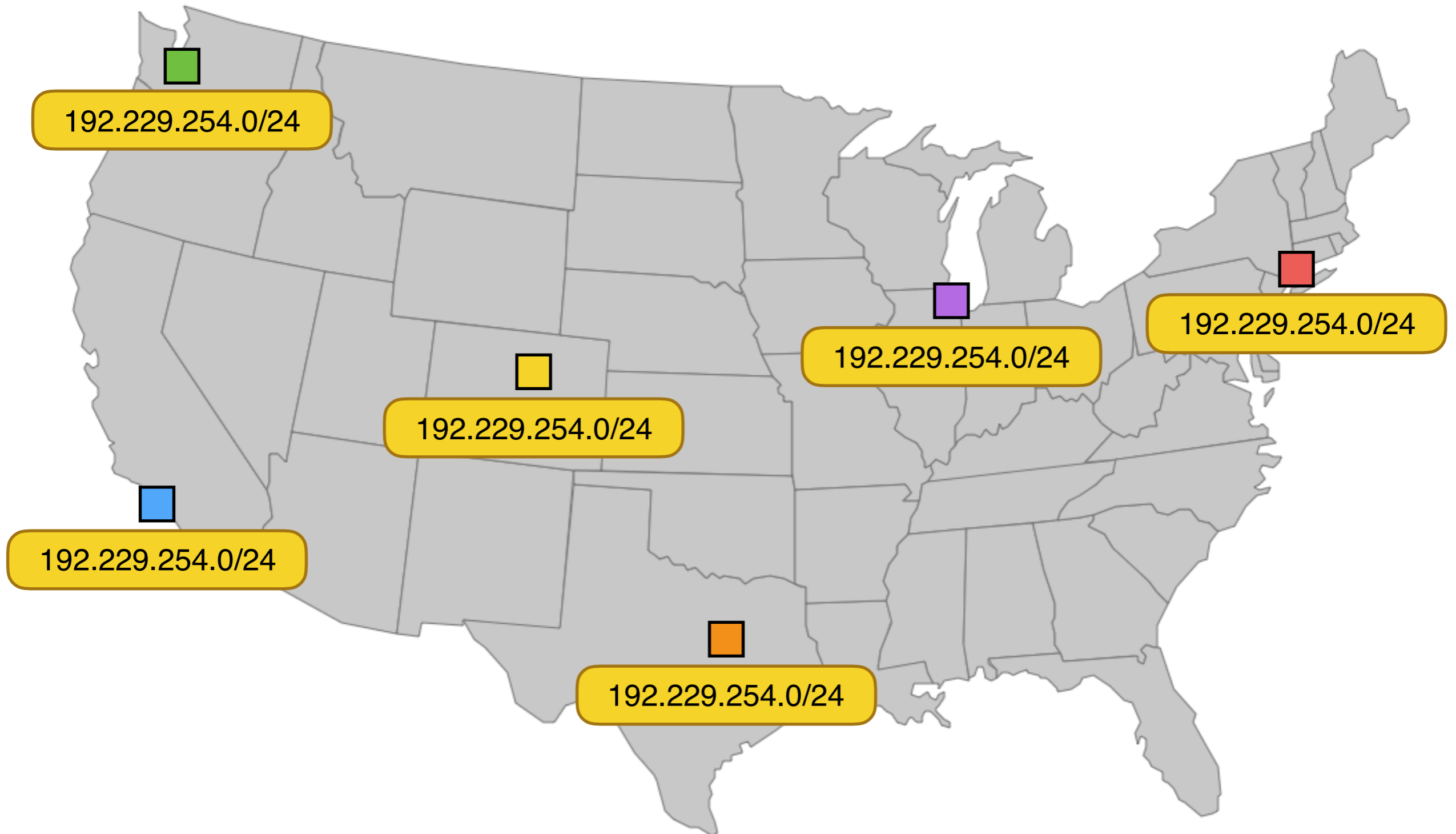
Stephen McQuistin
University of Glasgow

Sree Priyanka Uppu
Marcel Flores
Verizon Digital Media Services
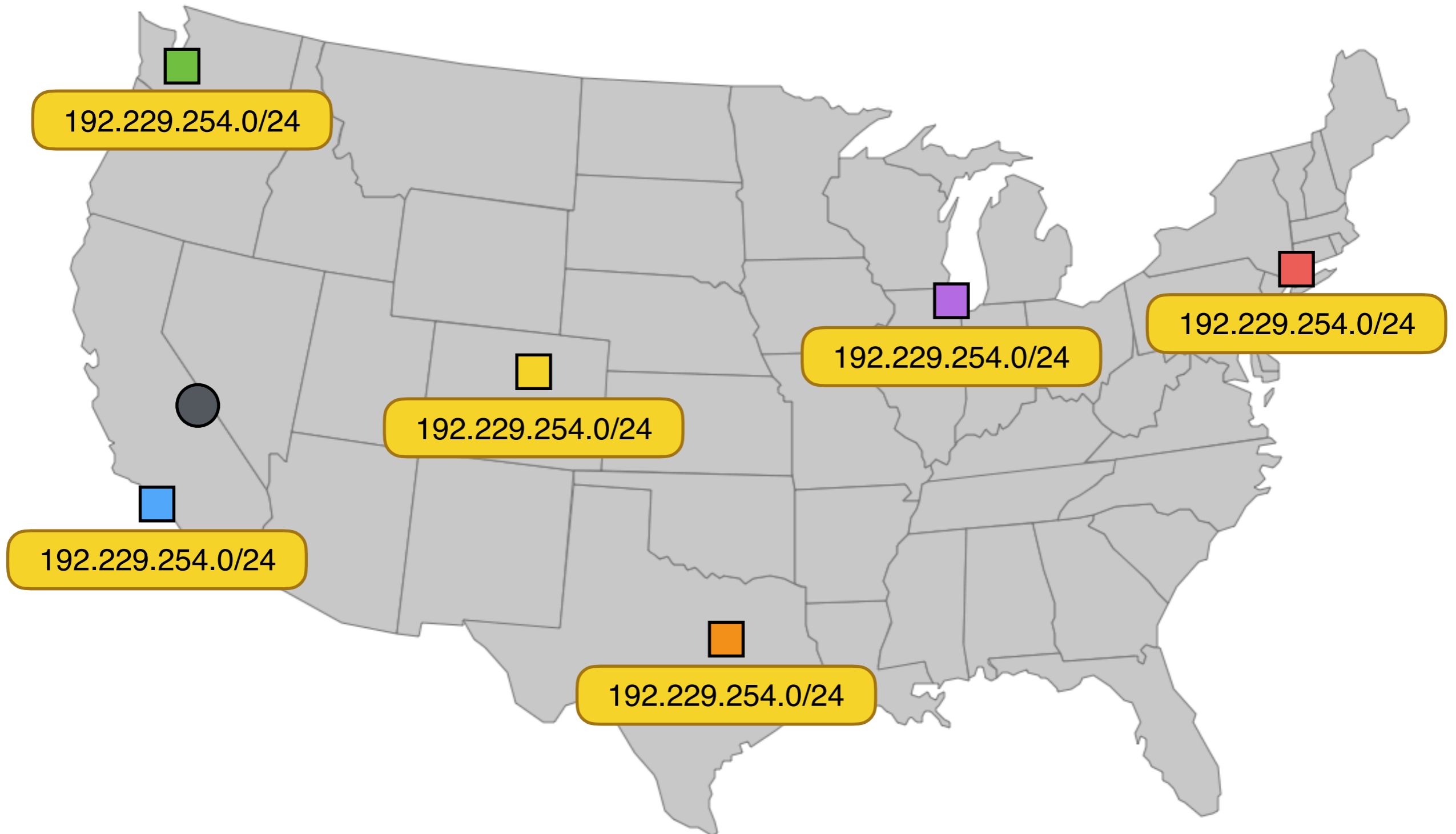
What is IP anycast?
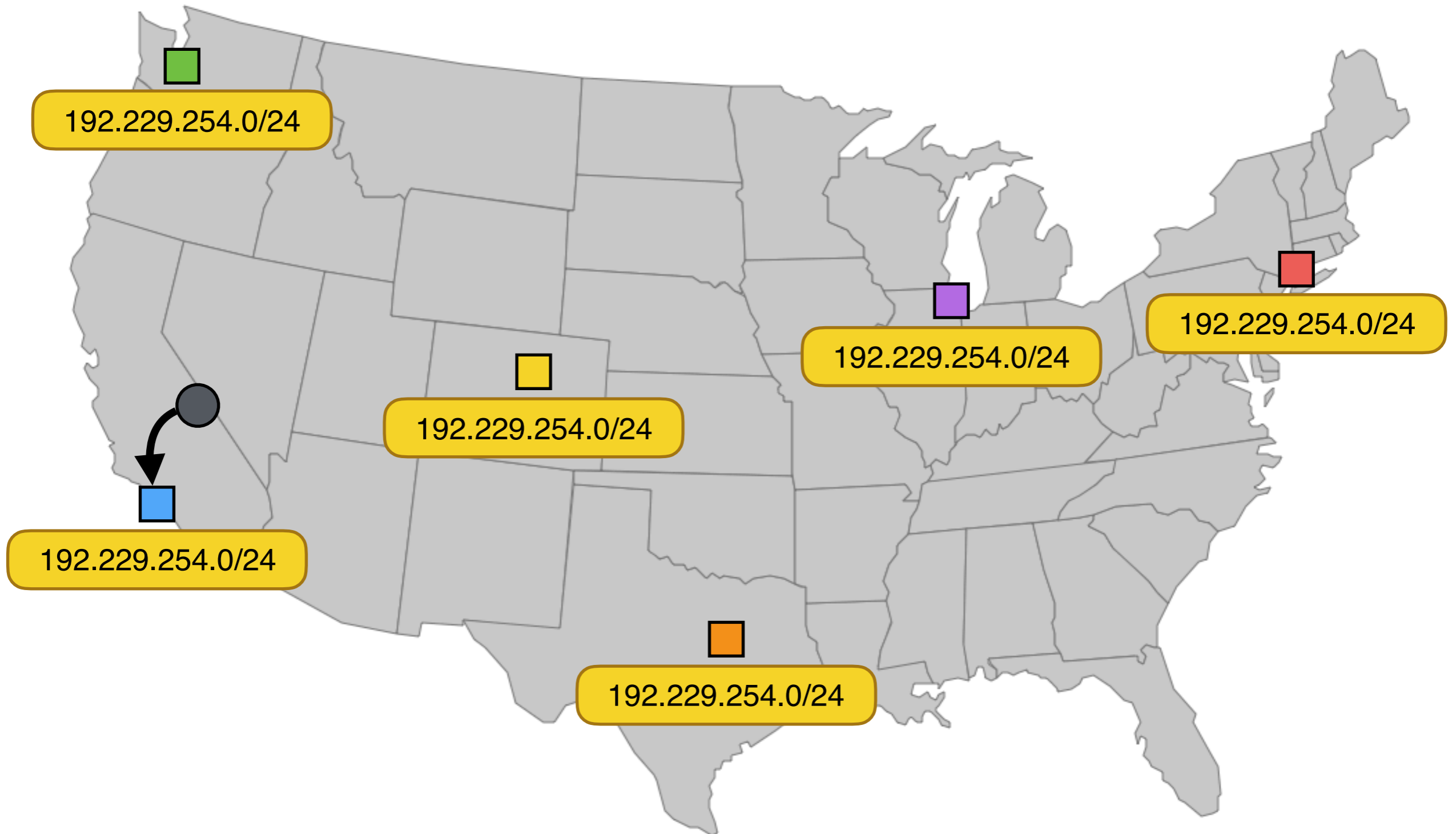
What is IP anycast?

192.229.254.0/24

192.229.254.0/24

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3

What is IP anycast?

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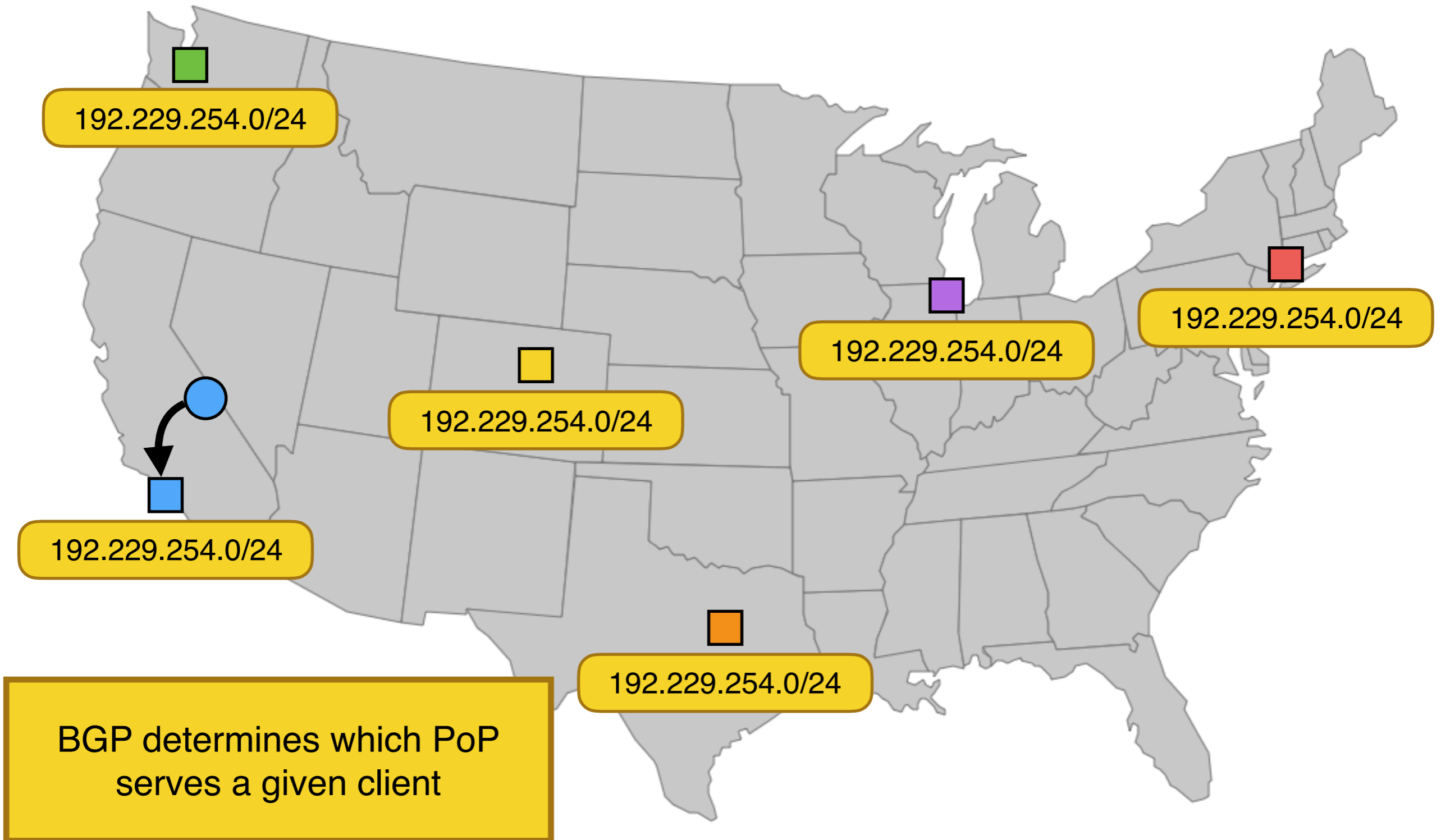
192.229.254.0/24

BGP determines which PoP serves a given client
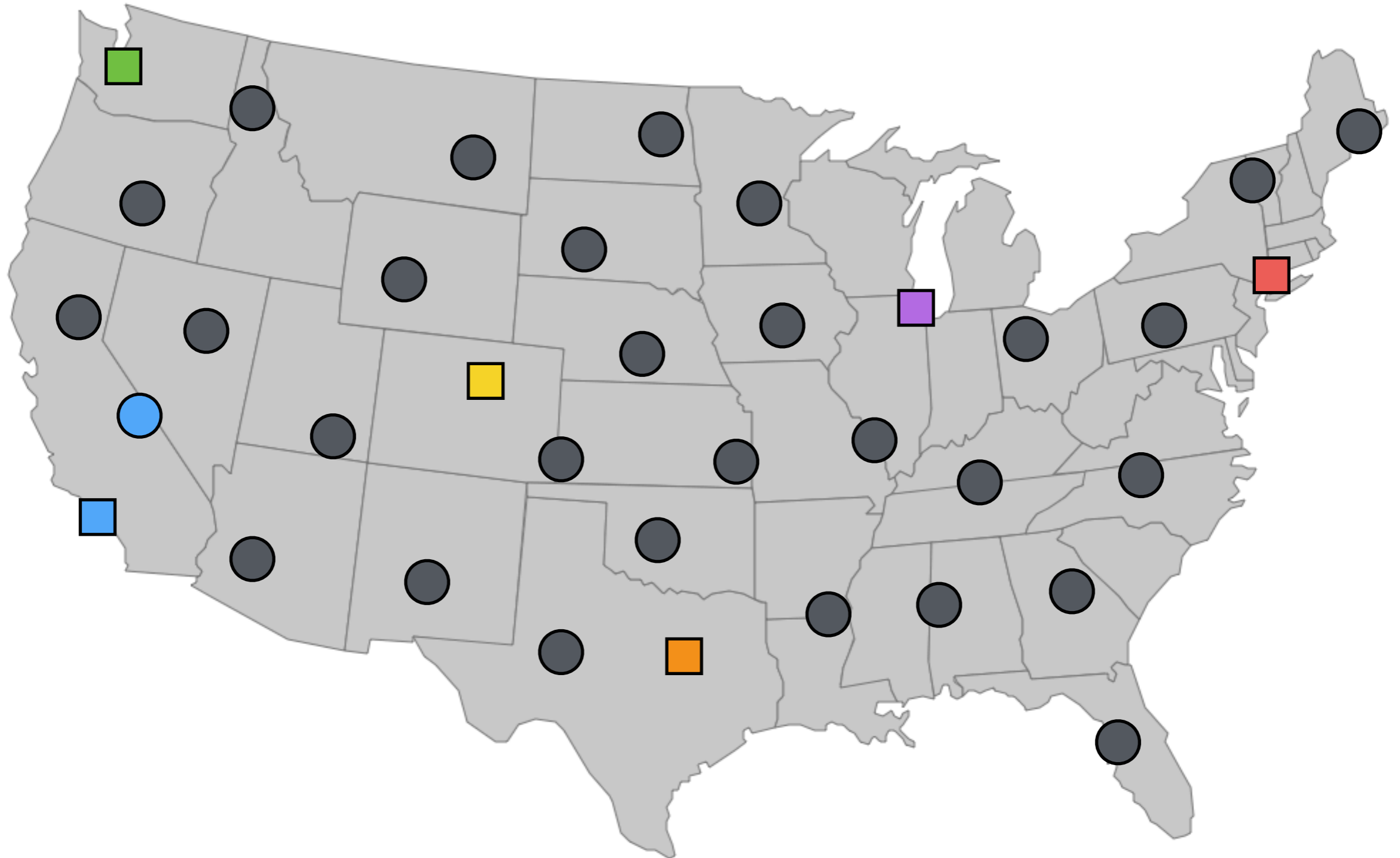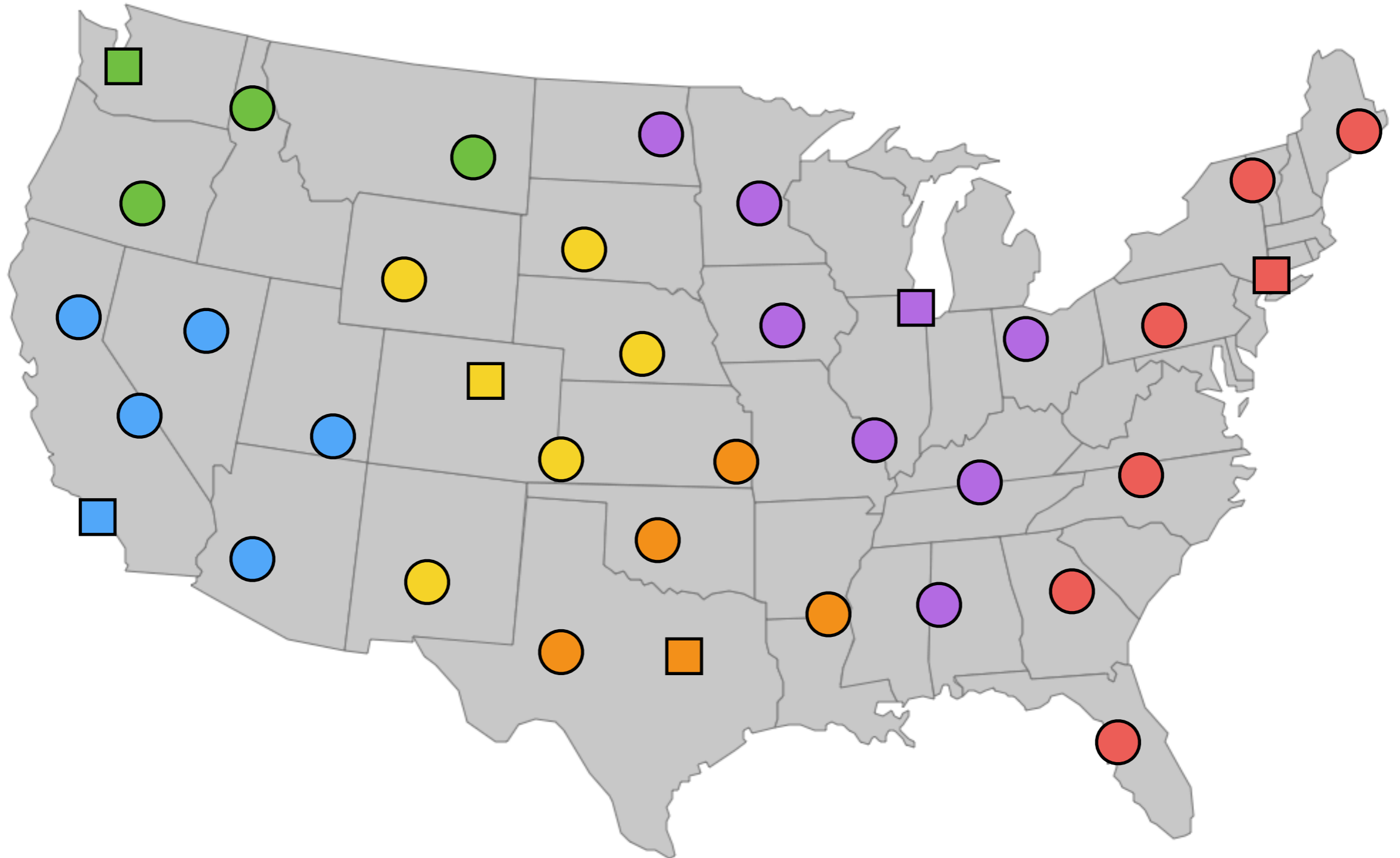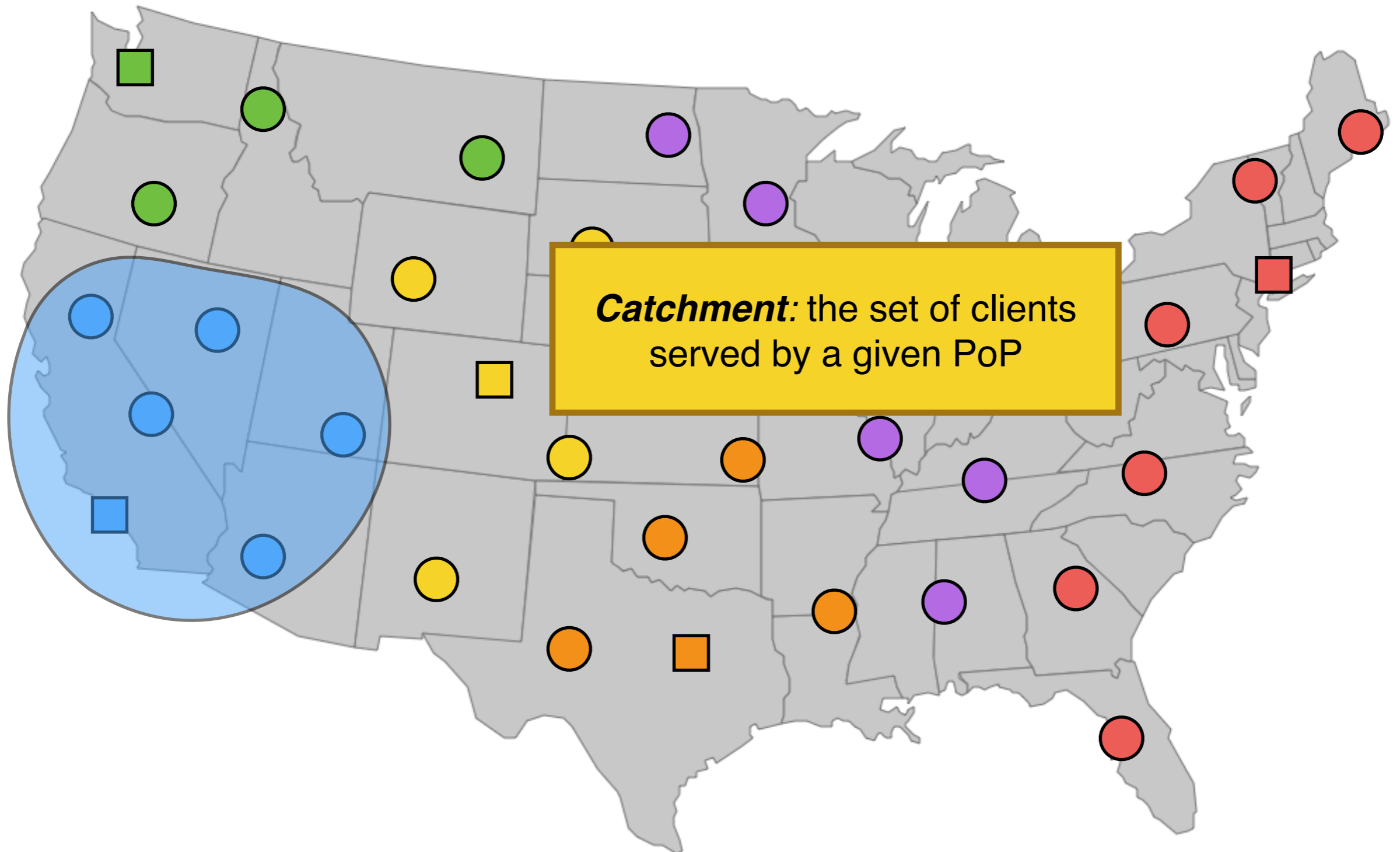
What is IP anycast?

What is IP anycast?

What is IP anycast?

Catchment: the set of clients served by a given PoP

Improving catchments is hard

- Catchments determine performance, and they are shaped by the operator's routing announcements

- .. but the impact of announcements isn't predictable

- BGP doesn't know about performance, load, ..

- Upstream providers have their own policies, often aligned with economics rather than end-user performance

- We need active measurements to determine the impact of announcement changes

RIPE Atlas

- ~10,000 active measurement devices, mostly on eyeball networks

- Many supported measurement types (ping, traceroute, DNS queries, ..)

- Provides reasonable coverage (~61%) of the CDN's traffic

DailyCatch

- Raw data from RIPE Atlas → *actionable data*

- Two main components:

    - Grouping probes

    - Scoring and comparison

DailyCatch: Grouping Probes

- We want to divide probes into groups that *share fate*: they fall into the same PoP catchment as each other, and are likely to switch catchments together

- Improves significance of results, localises results to PoP level

- Intuitive starting place: group by AS

DailyCatch: Grouping Probes
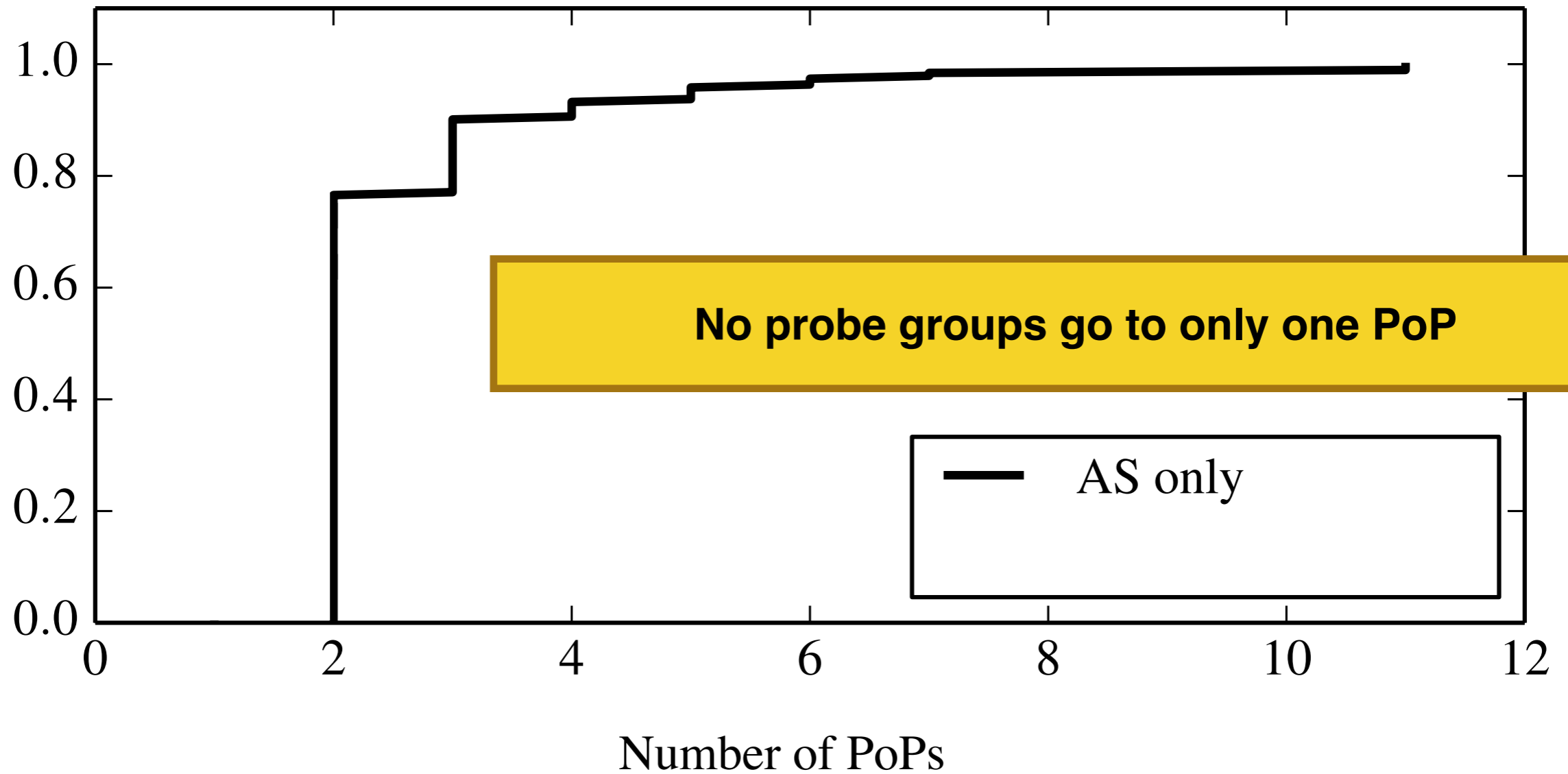
No probe groups go to only one PoP

Legend: —— AS only

X-axis: Number of PoPs

DailyCatch: Grouping Probes

- Proposed grouping features *within* ASes:

    - Geolocation

    - Probe prefix

    - First hop BGP prefix

    - Last hop BGP prefix

- Two metrics: similarity and coverage

DailyCatch: Grouping Probes

- Proposed grouping features *within* ASes:

  - Geolocation

  - Probe prefix

  - First hop BGP prefix

  - Last hop BGP prefix ← **No change to coverage or similarity**

- Two metrics: similarity and coverage

DailyCatch: Grouping Probes

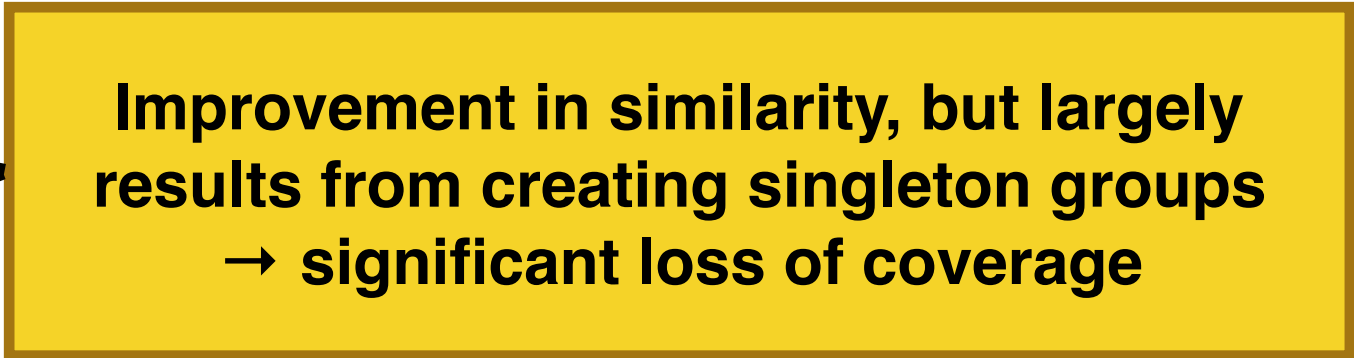- Proposed grouping features *within* ASes:

  - Geolocation

  - Probe prefix

  - First hop BGP prefix

  - ~~Last hop BGP prefix~~

- Two metrics: similarity and coverage

Improvement in similarity, but largely results from creating singleton groups → significant loss of coverage

DailyCatch: Grouping Probes

- Proposed grouping features *within* ASes:

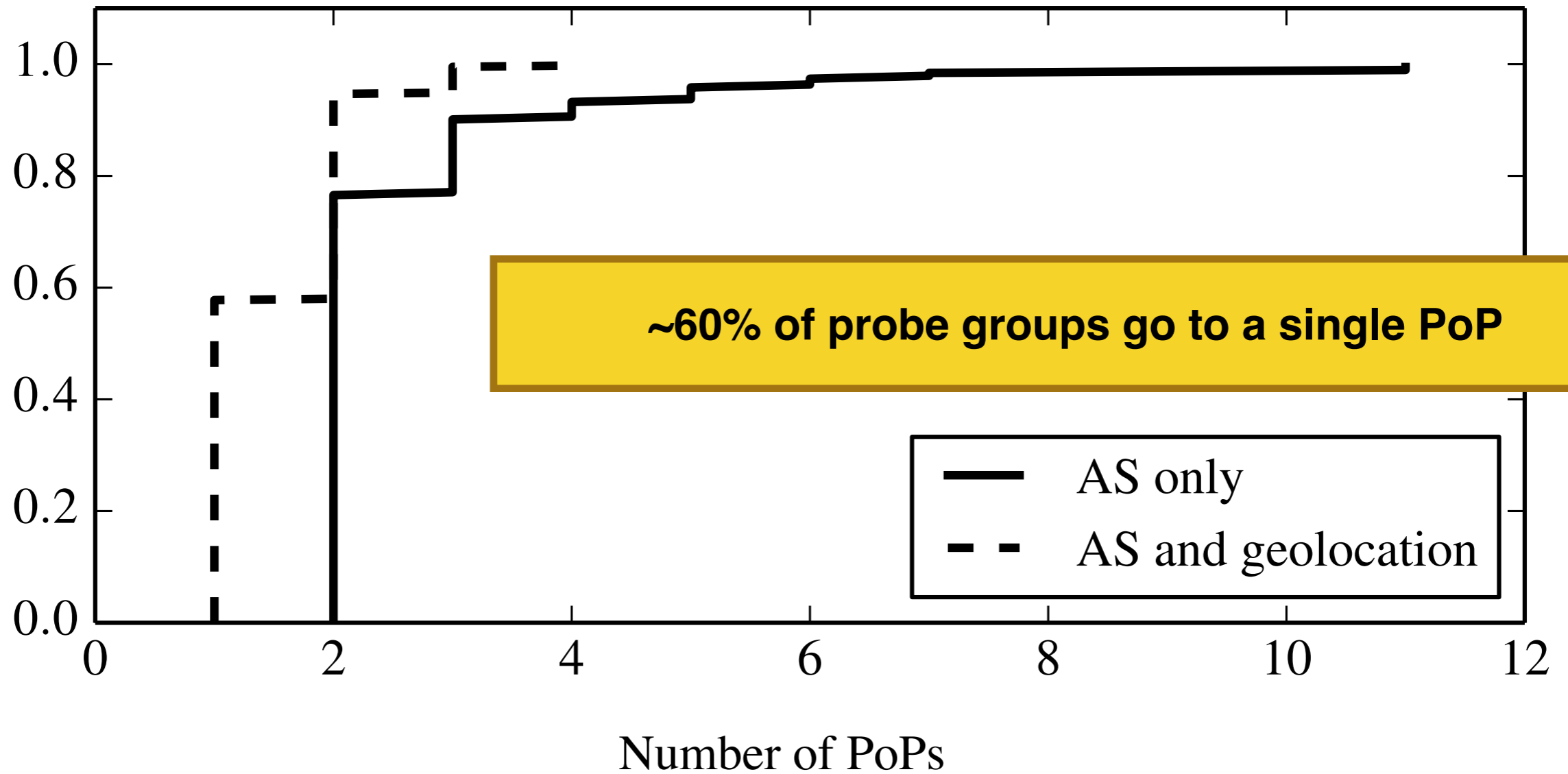 - Geolocation ← **Improves similarity without significant loss of coverage**

  - ~~Probe prefix~~
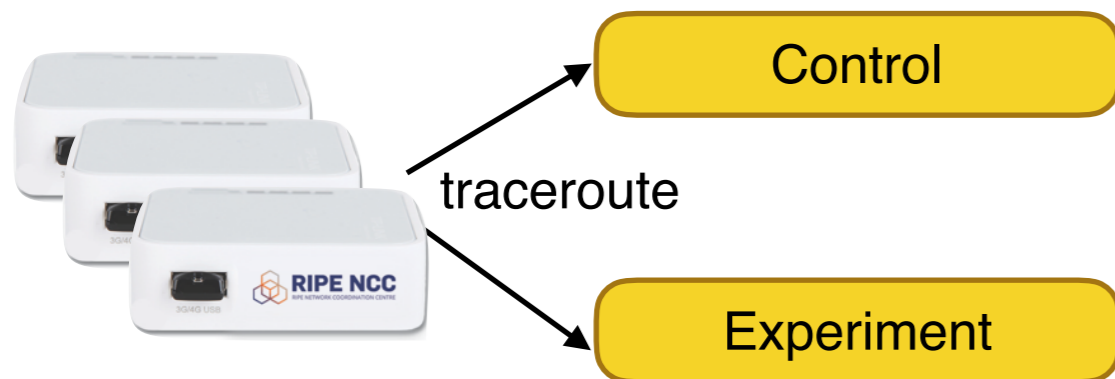
  - ~~First hop BGP prefix~~

  - ~~Last hop BGP prefix~~

- Two metrics: similarity and coverage

DailyCatch: Grouping Probes

~60% of probe groups go to a single PoP

Legend:
— AS only
- - - AS and geolocation

X-axis: Number of PoPs

DailyCatch: Scoring & Comparison
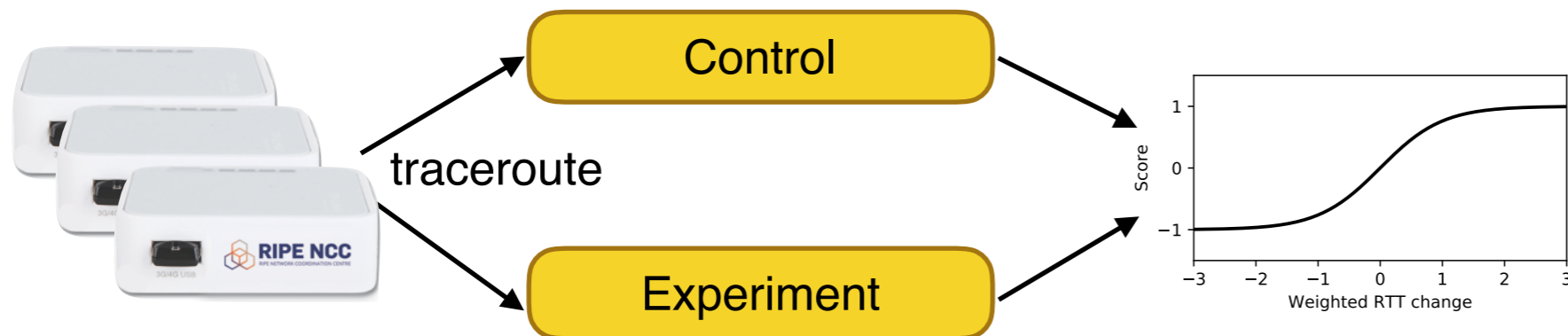
1 Take two snapshots

traceroute

Control

Experiment

DailyCatch: Scoring & Comparison

2 For each group, assign a score, by passing the change in RTT through a logistic function

traceroute

Control

Experiment

Score

Weighted RTT change

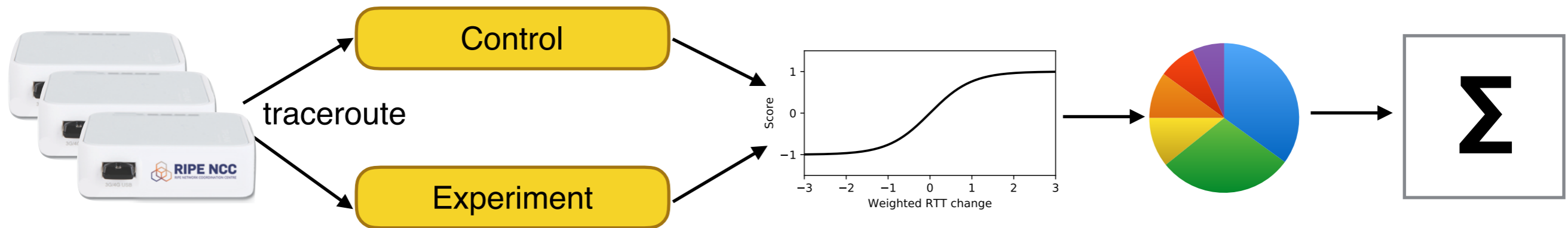# DailyCatch: Scoring & Comparison

3 Weight each group score by the volume of traffic it represents
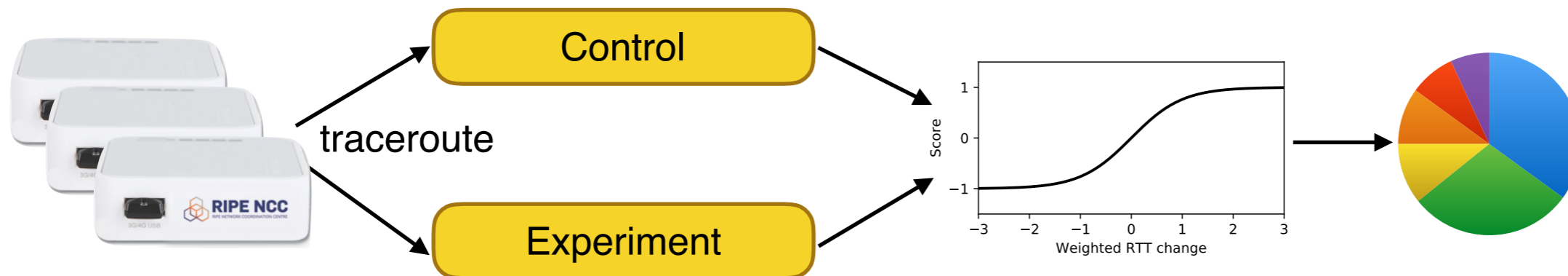
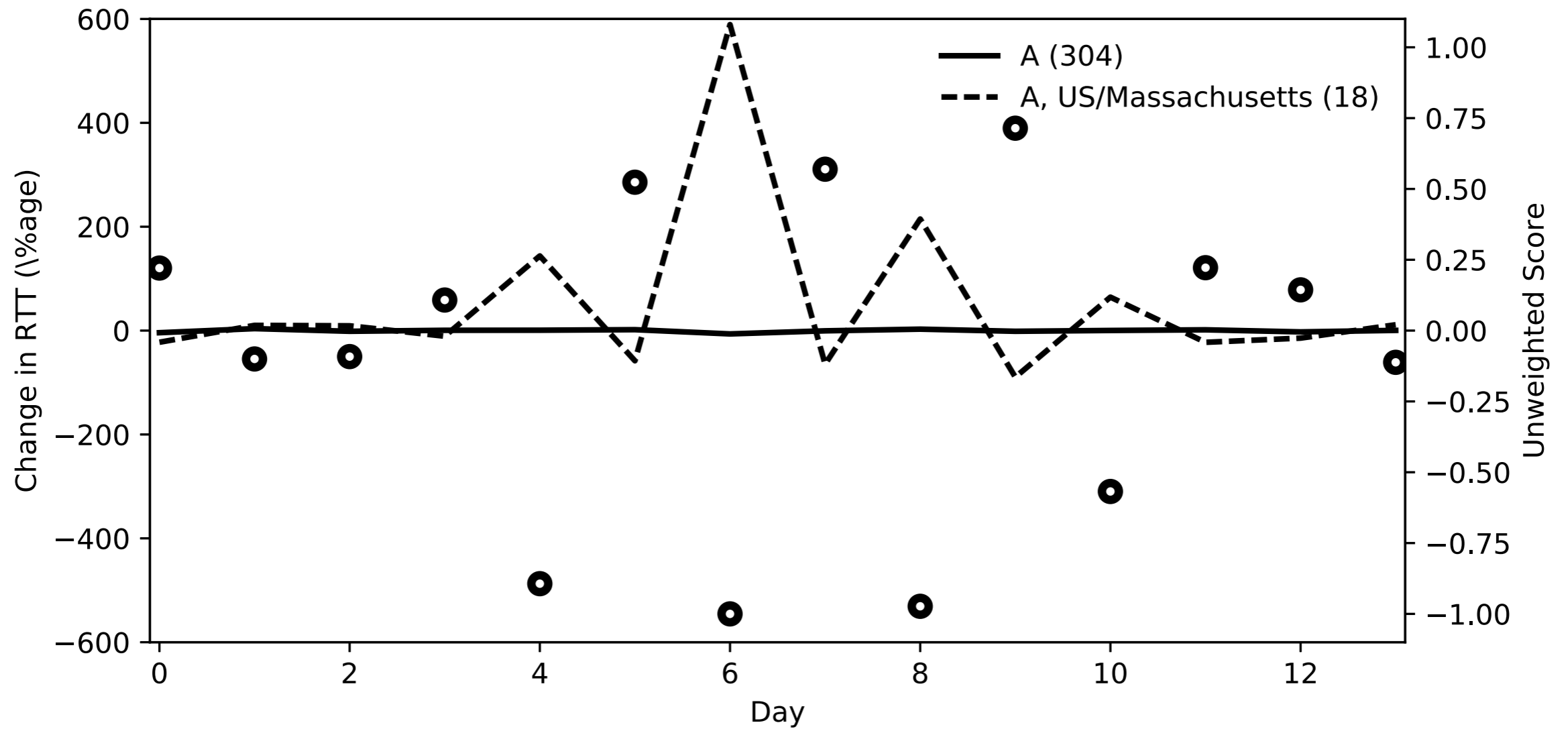# DailyCatch: Scoring & Comparison
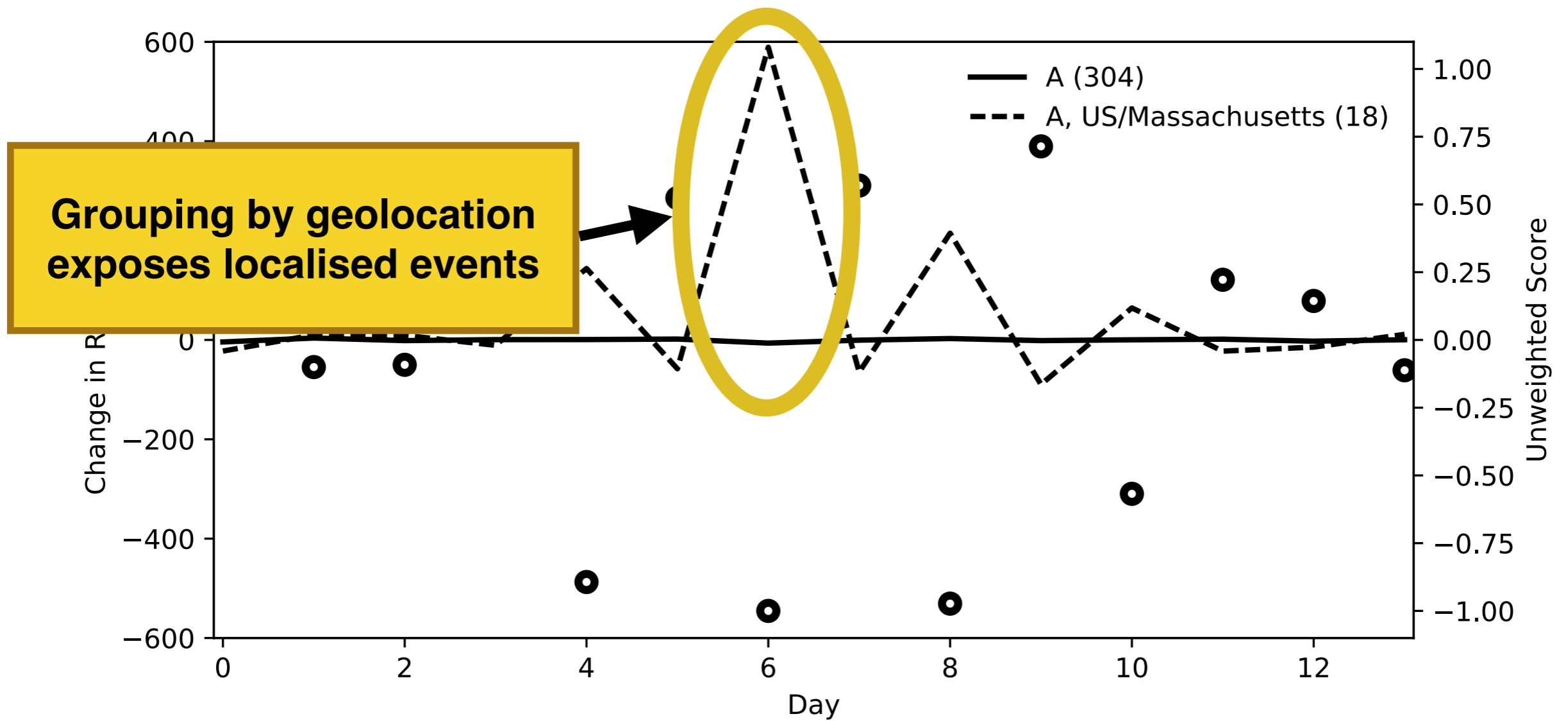
4 Sum for the overall score

Evaluation

- Control: *transit providers only*
  Experiment: ***all*** *peering and transit providers*

- Peering improves performance overall — more pronounced in Europe

- Peering typically provides shorter paths

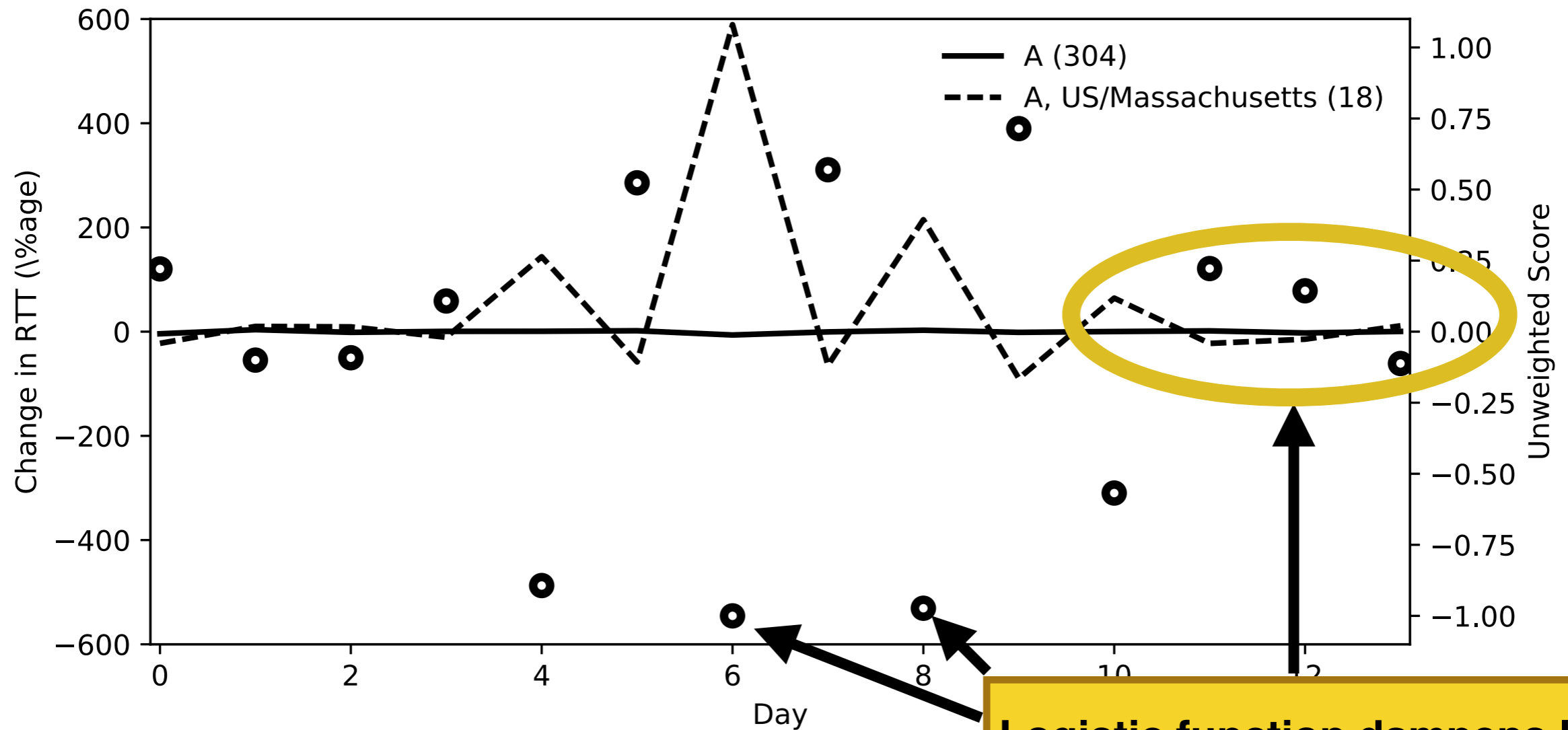- .. but shorter paths don't always mean better performance

Evaluation: Case Study

Evaluation: Case Study

Grouping by geolocation exposes localised events

Evaluation: Case Study

Summary

- Active measurements are needed to determine the impact of anycast announcements

- RIPE Atlas provides coverage for around 61% of traffic of a large anycast CDN

- DailyCatch: a methodology for scoring and comparing two anycast announcement policies