Anycast in underserved regions of the world (WIP)

AIMS-19, SAN DIEGO, FEB'26

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What is anycast?

- Anycast: Making an IP address available in multiple Points of Presence (PoPs)
  - *How*? - Announcing an IP prefix at multiple locations using BGP
  - *Why?* - Distribute load, improve resilience, reduce latency

What is anycast?

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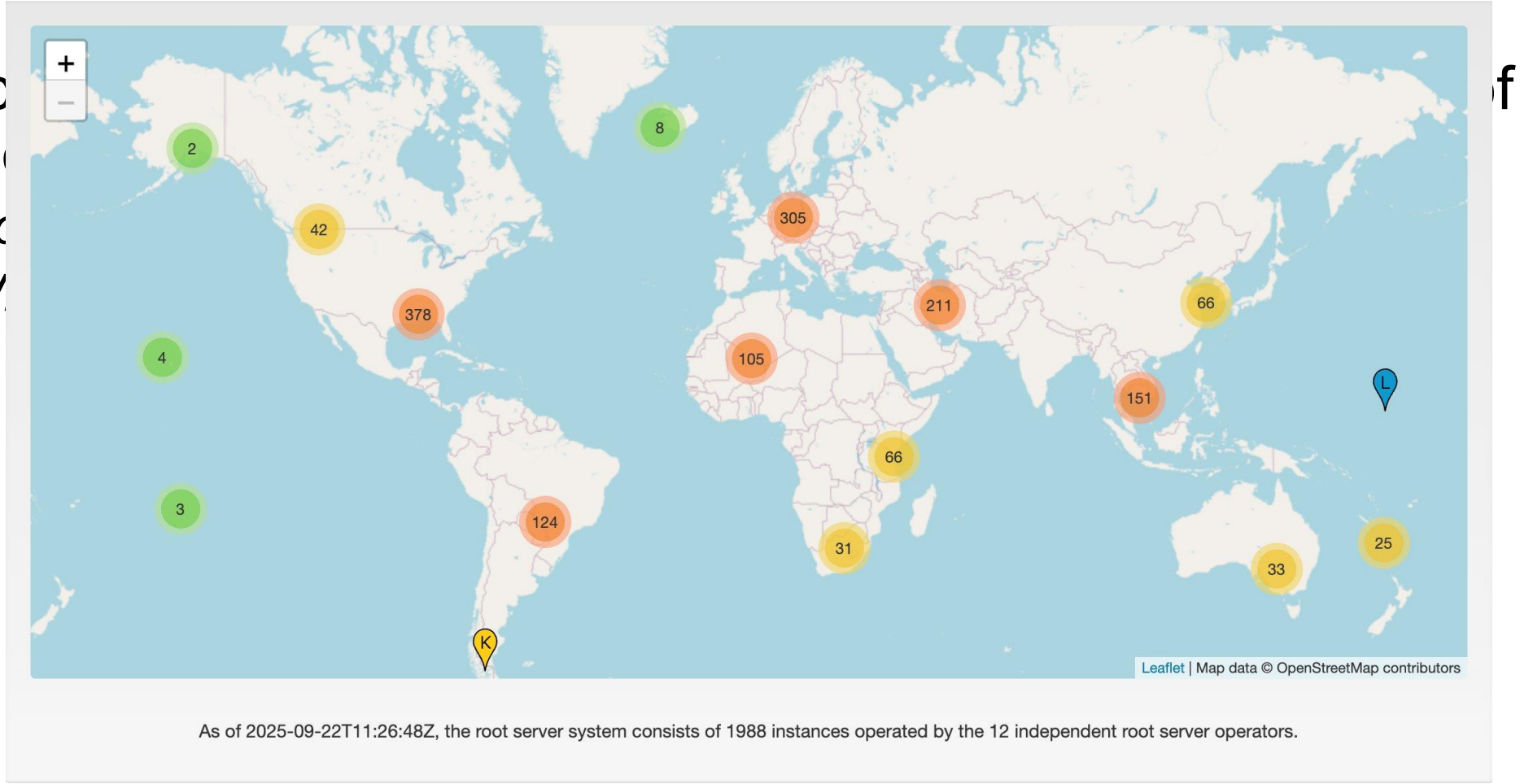
  - *Ho*
  - *W*



Source: root-servers.org
"All 13 DNS root-letters are deployed using anycast; combined totaling 1,988 sites"

Suboptimal anycast routing

- BGP routes users to nearby PoPs
  - … Most often

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  - BGP may route users to distant PoPs
- Examples:
  - Remote peering
  - Transits

Anycast in underserved regions

- IXP and CDN coverage limited in underserved regions

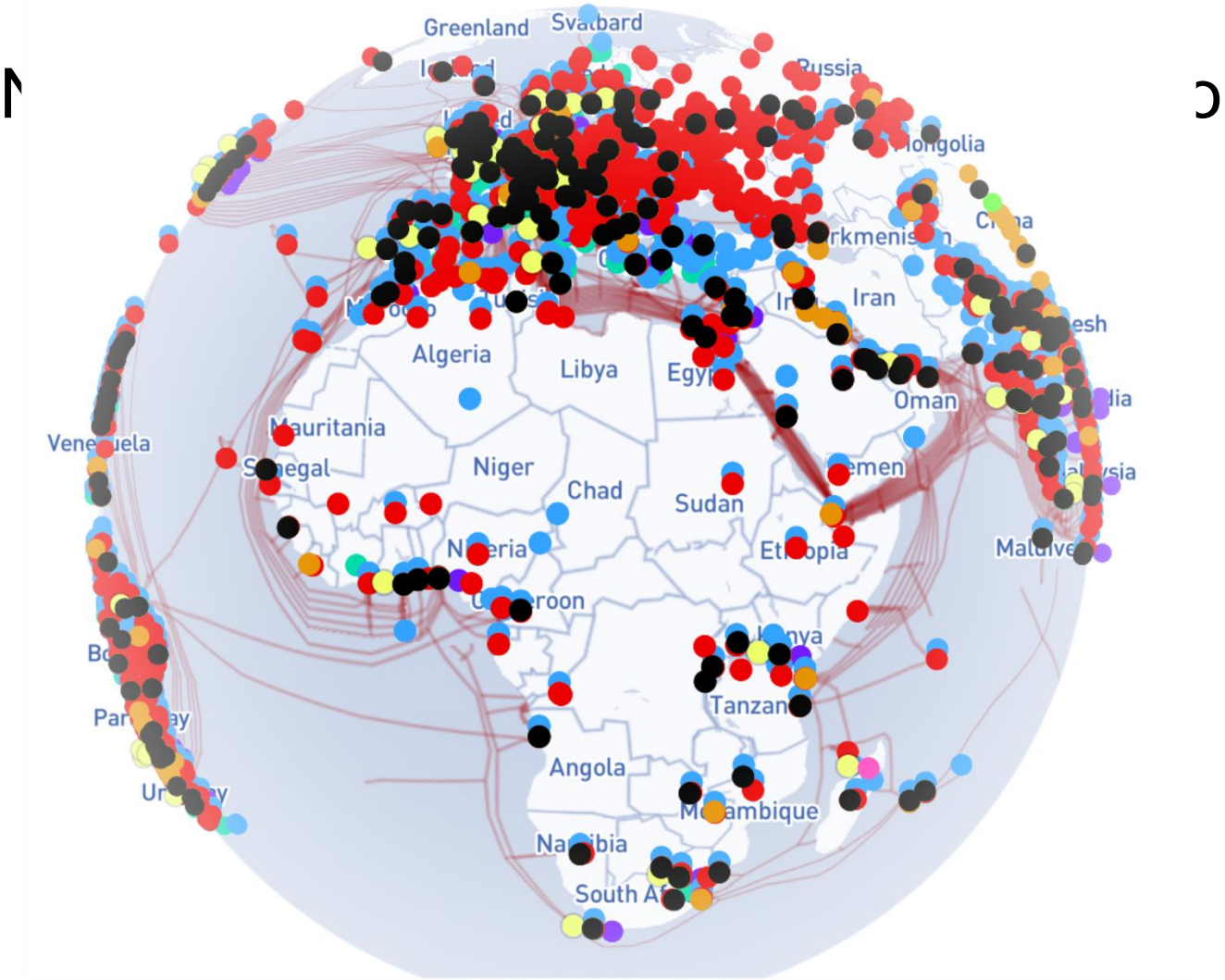
Anycast in underserved regions

- IXP an

IXPs - internetexchangemap.com

Anycast in underserved regions

- IXP and CDN ons



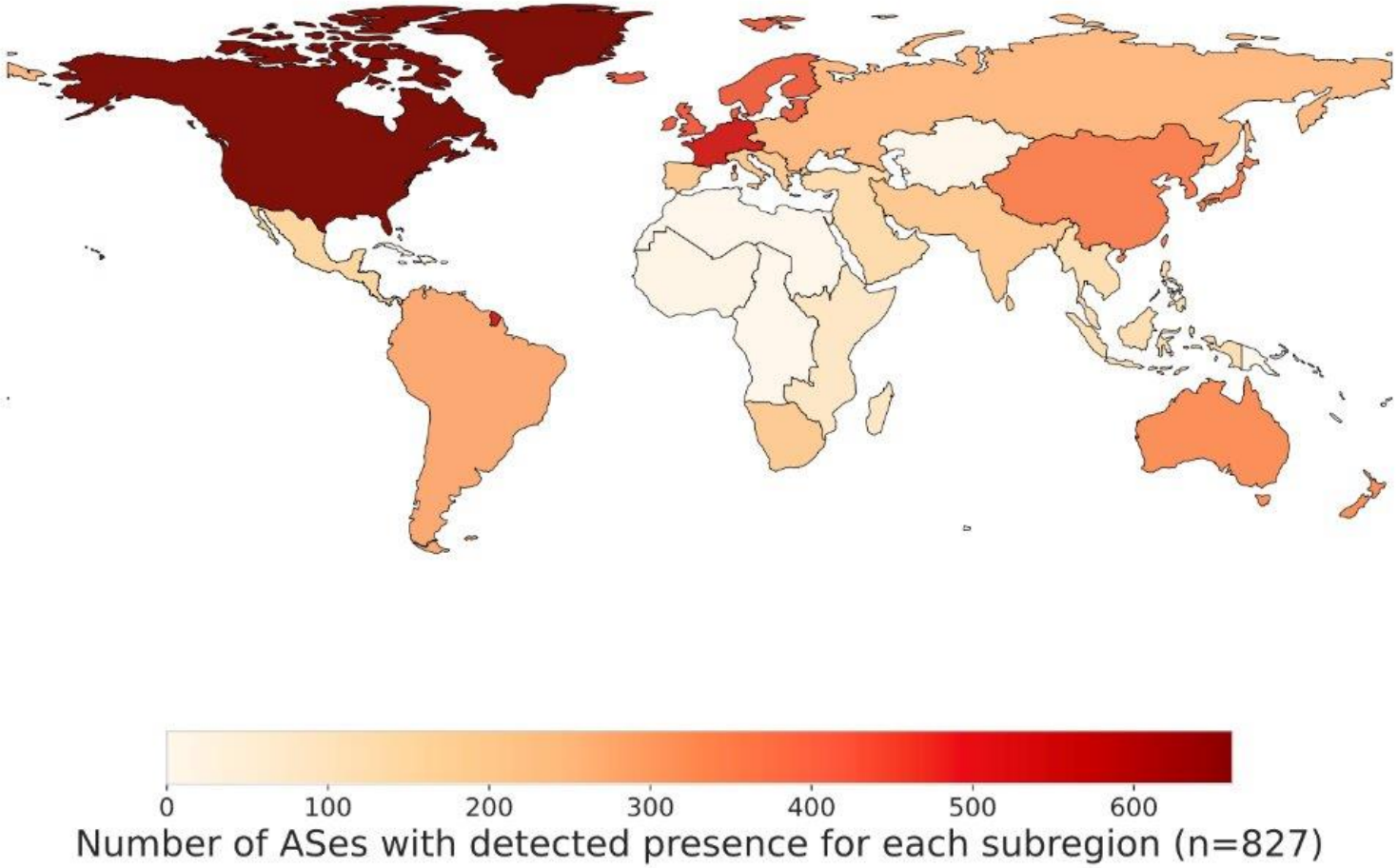
Source https://cdns.nsrc.org/

Anycast in underserved regions

- IXP and CDN coverage limited in underserved regions
- We see this in our anycast census

Anycast in underserved regions

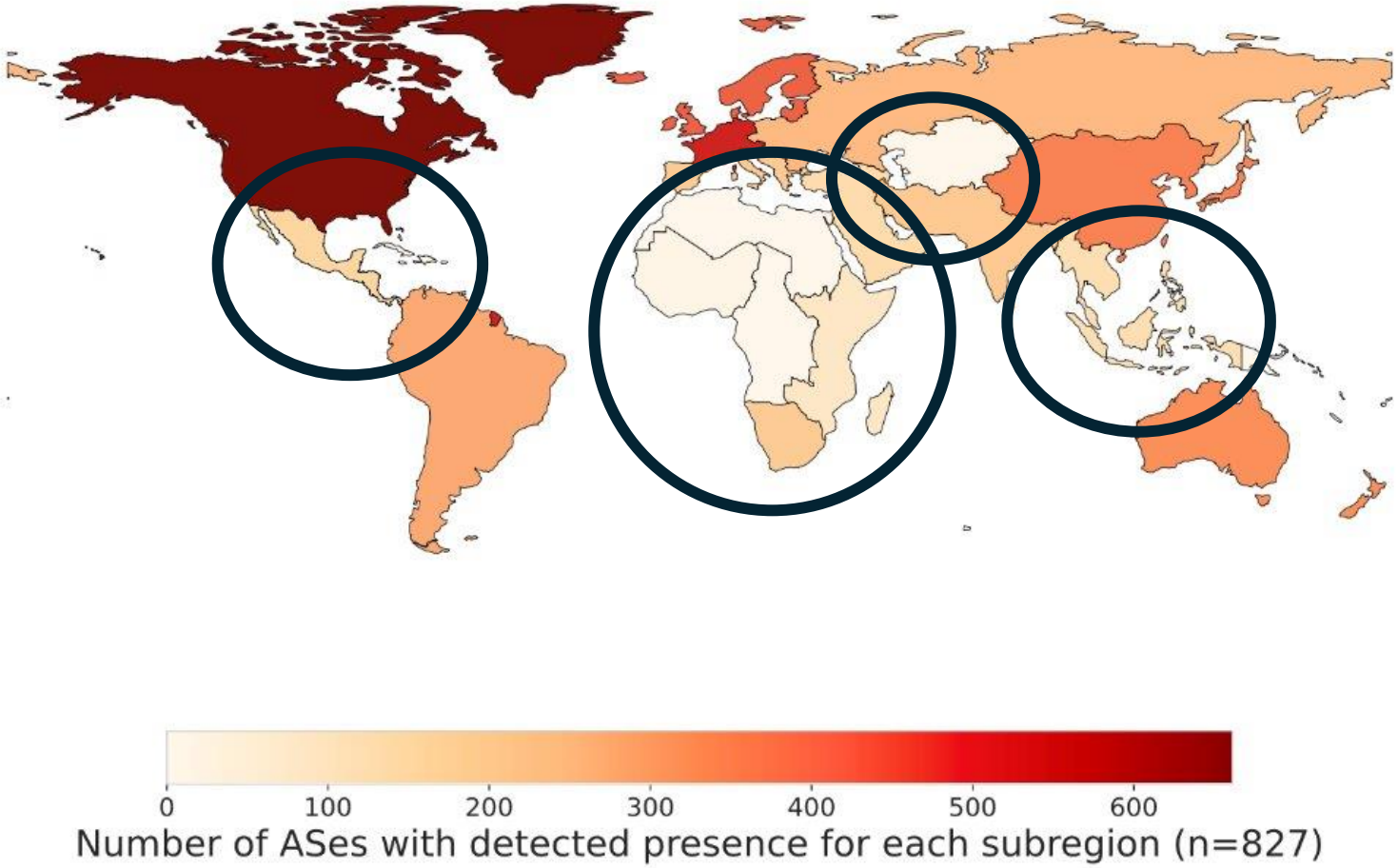
- IXP anc
- We see



Data collected using LACeS

Anycast in underserved regions

- IXP anc
- We see

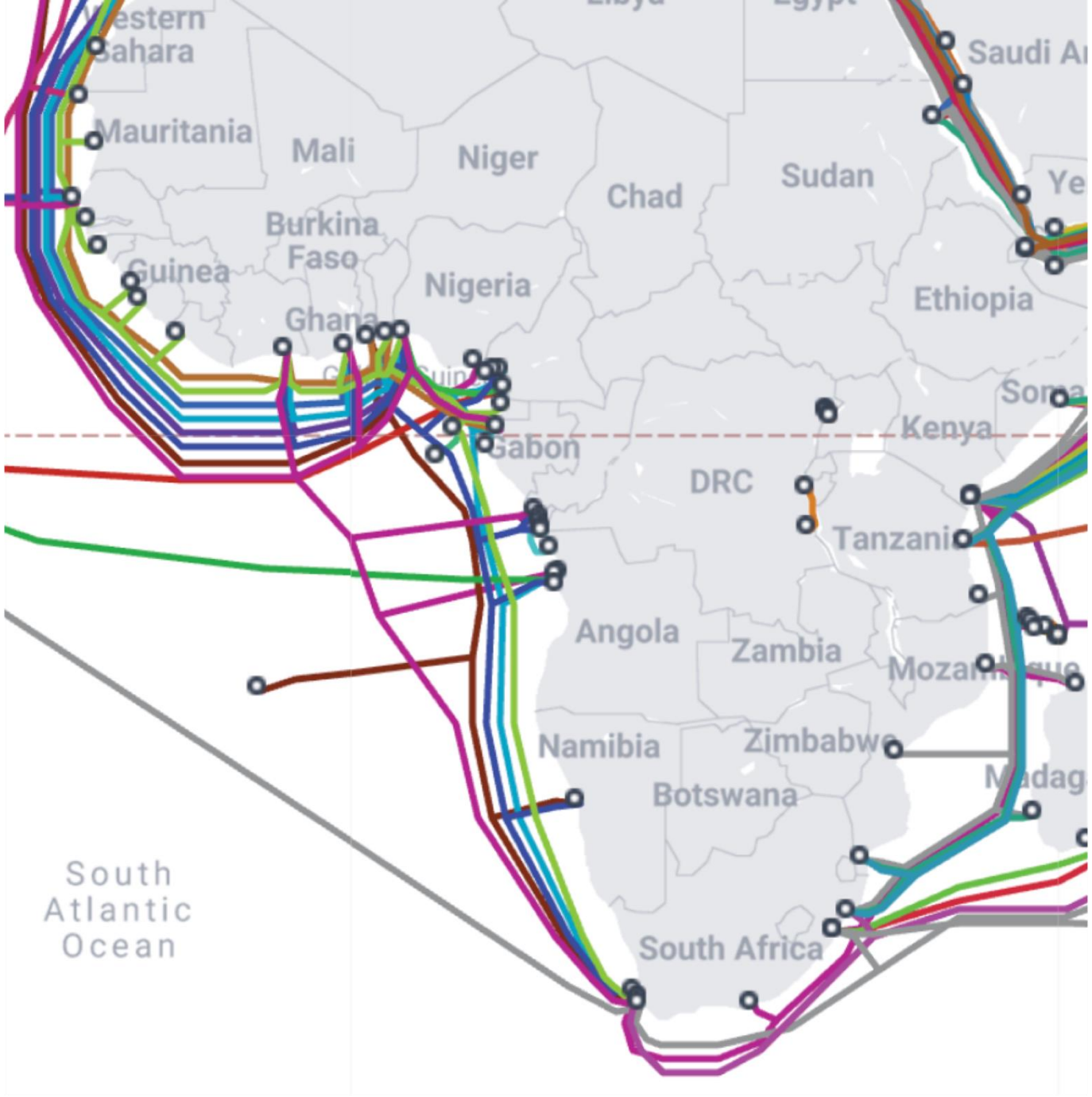


Data collected using LACeS

Colonial routing

- Former colonial regions suffer from colonial routing

- Former colo



submarinecablemap.com

Colonial routing

- Former colonial regions suffer from colonial routing
- Anycast perspective
  - Former French colonies -> prefer PoP in Paris
  - Former British colonies -> prefer PoP in London
  - Limited peering between countries

Colonial routing

- Former colonial regions suffer from colonial routing
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  - Limited peering between countries
- Example: PoP in Nigeria (former British colony)
  - Neighboring French colonies may still prefer PoP in Paris

Goals

- Measure routing problems in developing regions
  - How does anycast routing perform?
  - Does colonial routing impact anycast routing?
- Measure the 'what if you deploy here'
  - How much does resilience/performance increase?
  - Can we identify incentives for operator?
  - How to best strategize PoP placement in these regions?

Preliminary results

- How do African networks route to our anycast testbed?

Preliminary results

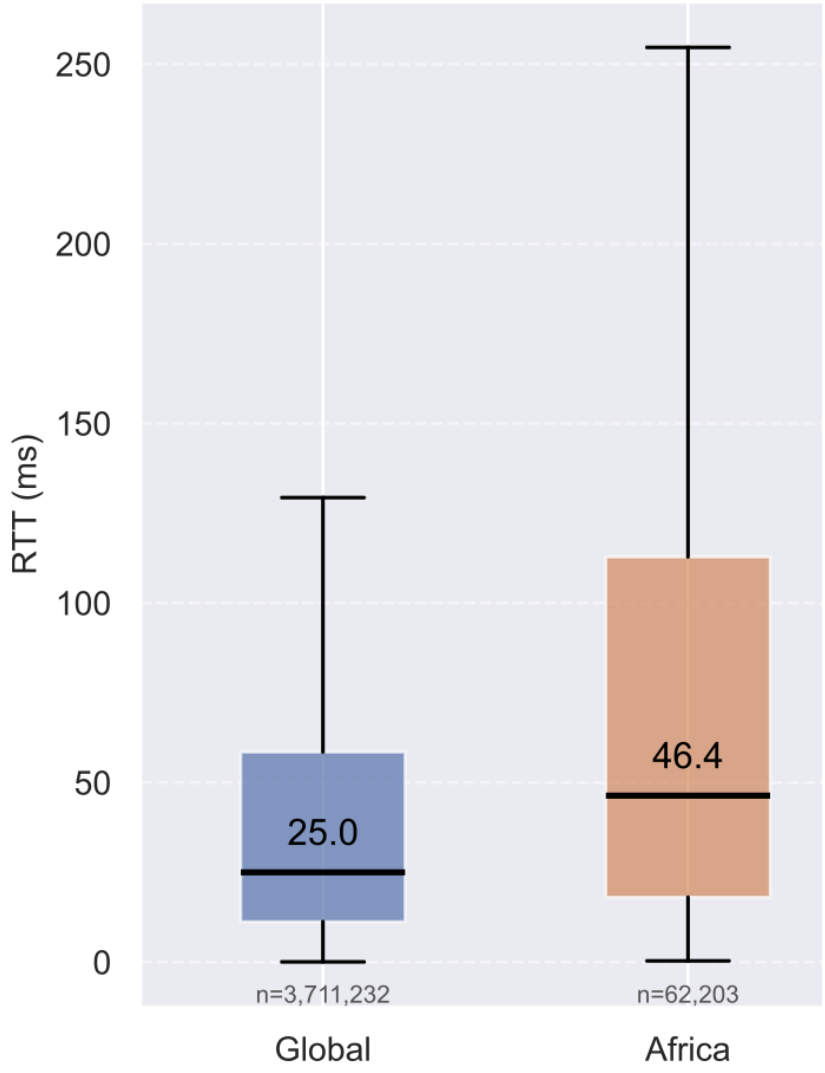
- How do African networks route to our anycast testbed?
- Note:
  - Results are deployment specific
  - But gives some insights as to routing problems in underserved regions

TANGLED

- Our anycast testbed
  - Lagos, Nigeria
  - Johannesburg, South Africa

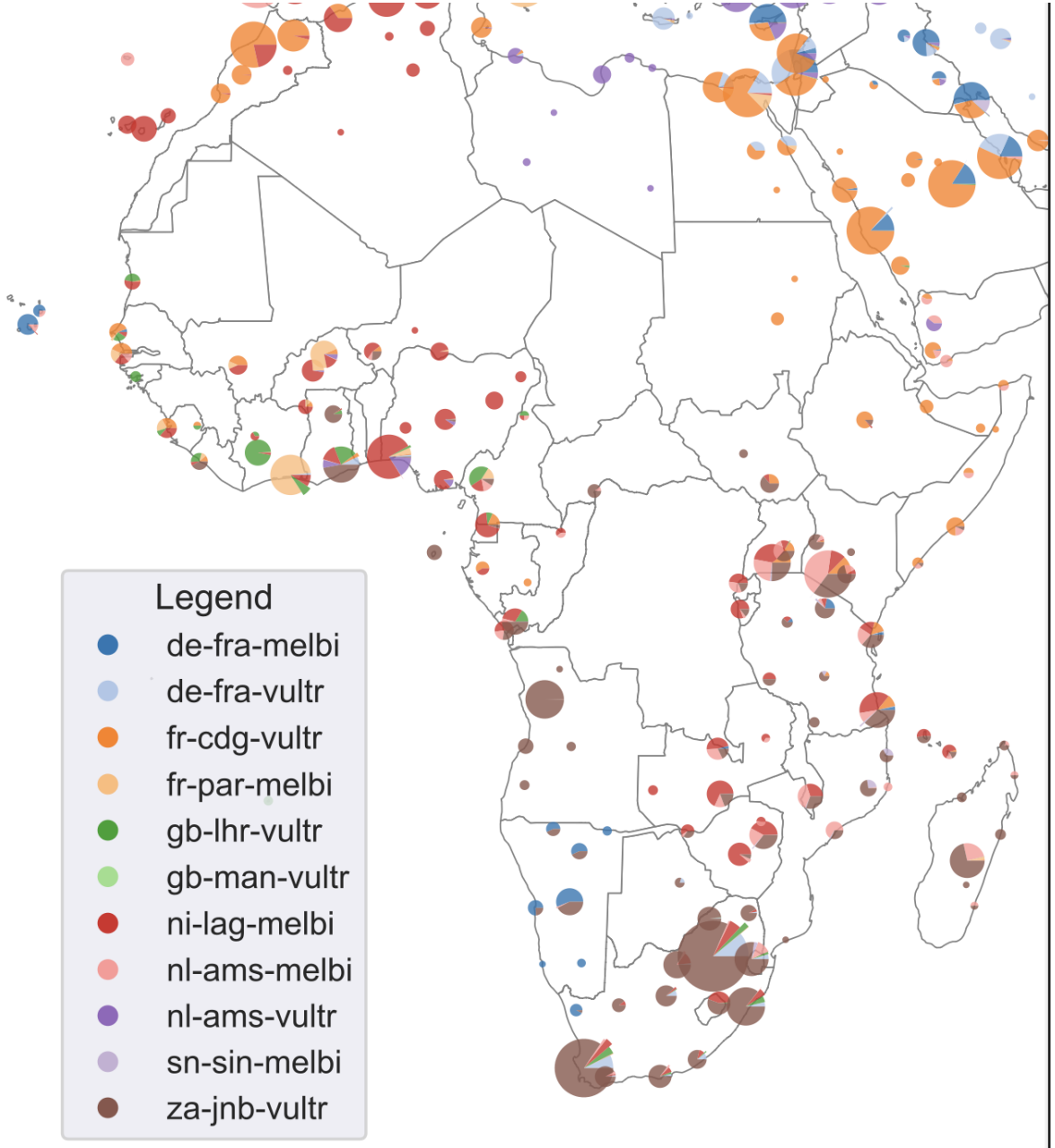
RTT statistics

- RTTs towards TANGLED
  - Global median RTT 25ms
  - Median RTT Africa 46ms (+54%)
- Not surprising
  - Low number of PoPs in Africa
  - But.. other operators don't either



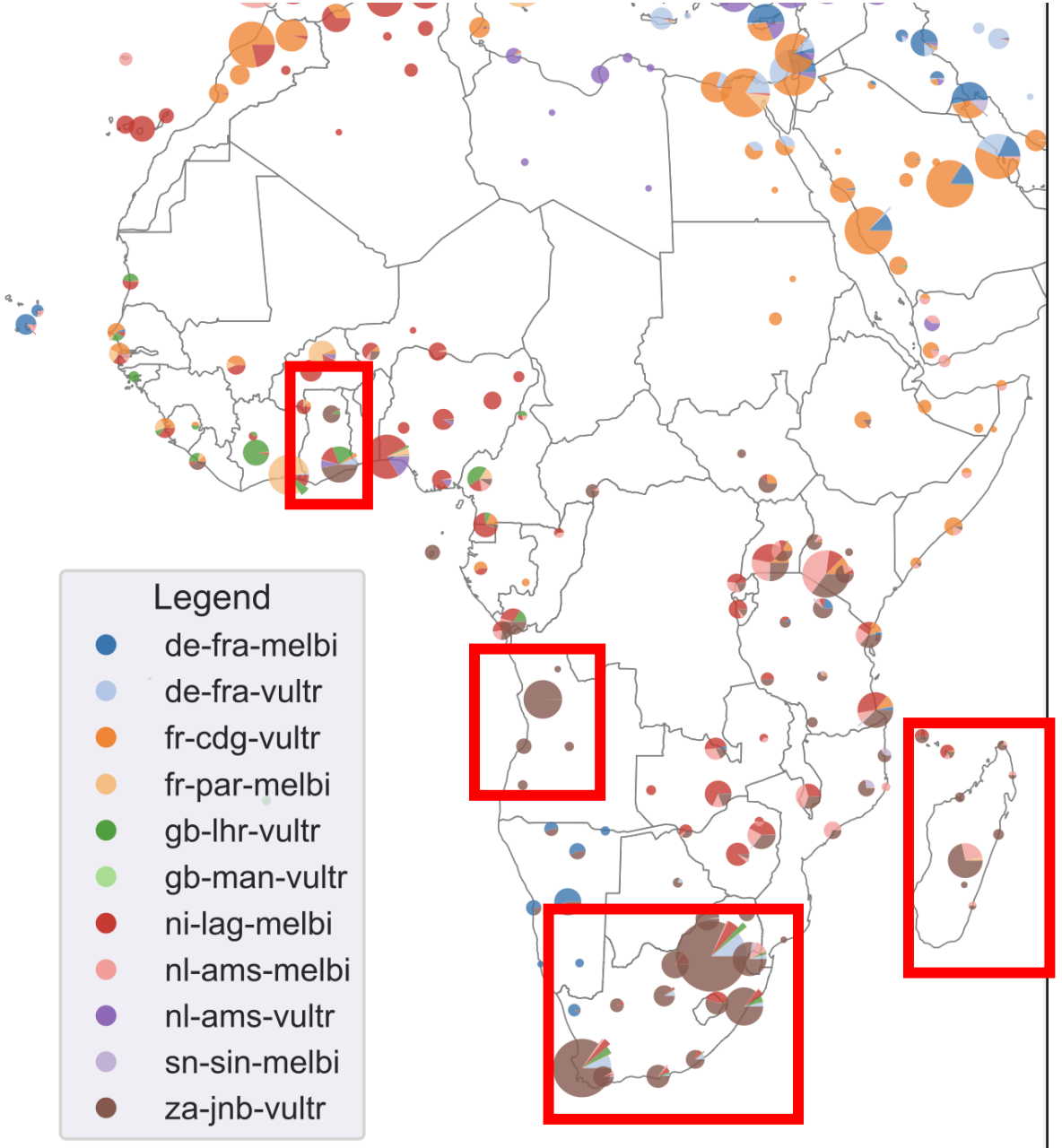
Colonial catchments

- Catchment
  - Set of addresses routing to a PoP



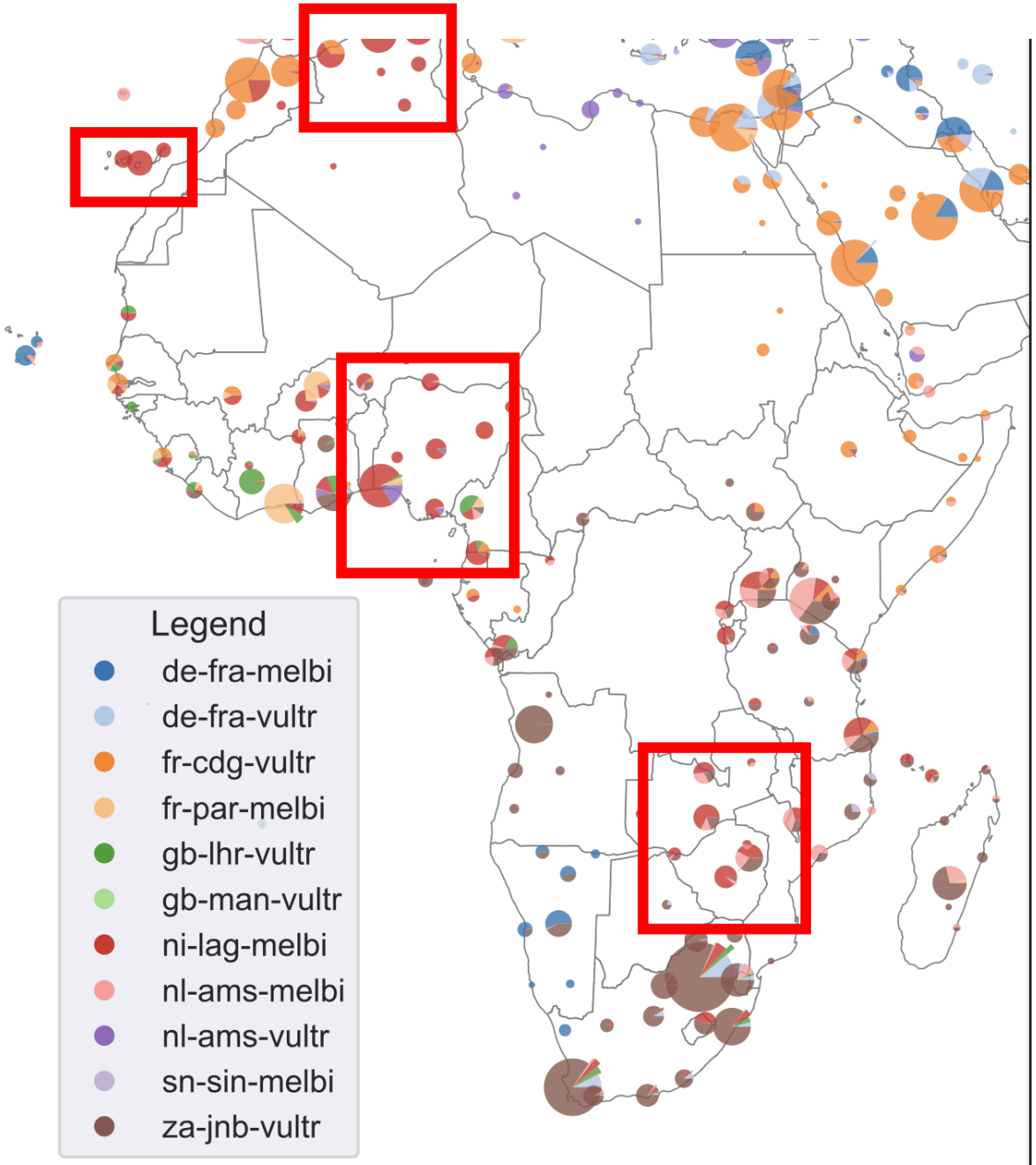
Preliminar

- South Africa (brown)
  - South Africa (British)
  - Ghana (British)
  - Angola (Portuguese)
  - Madagascar (French)



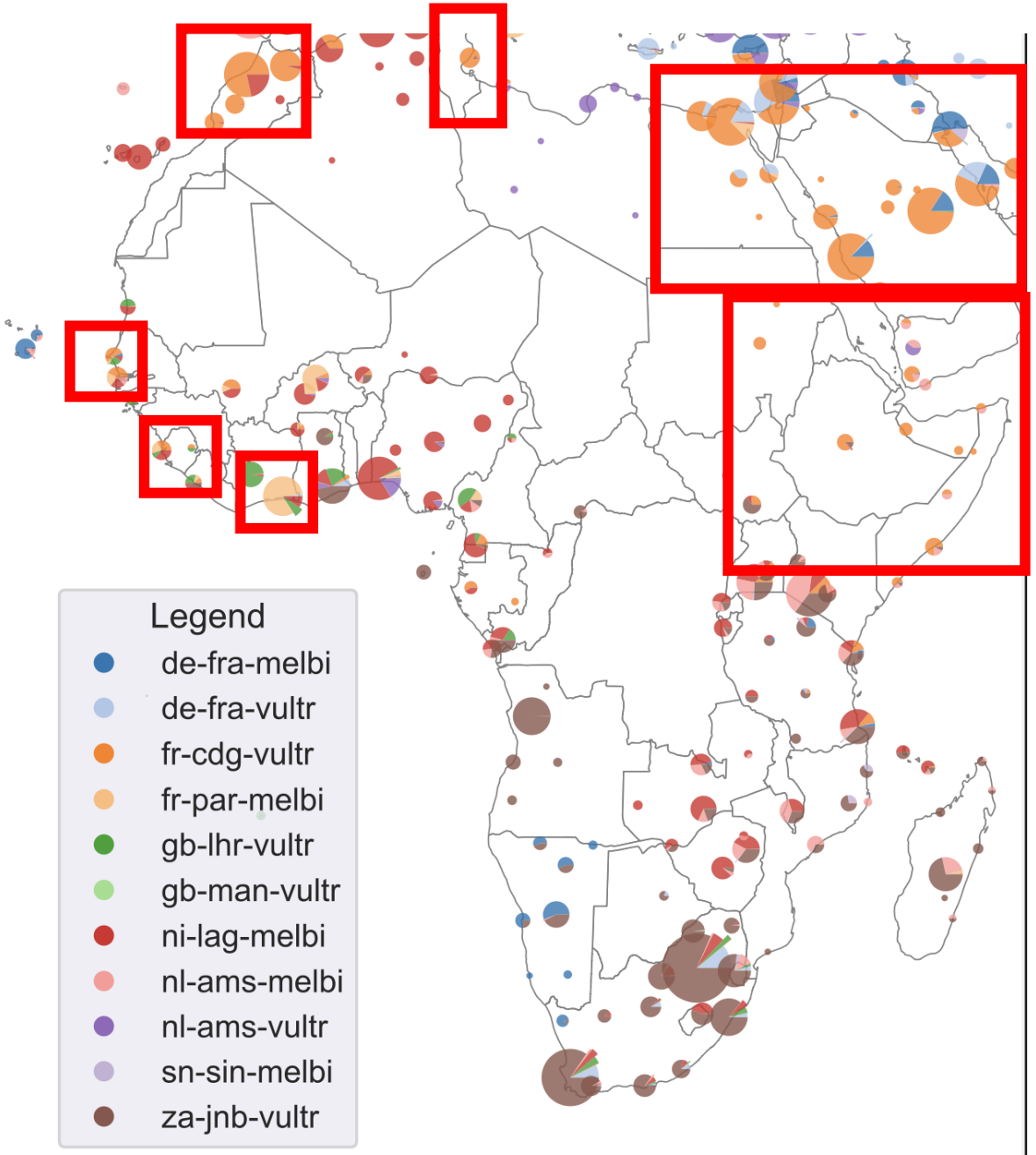
Preliminar

- Nigeria (red)
  - Canary islands (Spain)
  - Algeria (French)
  - Nigeria (British)
  - Zambia (British)
  - Zimbabwe (British)



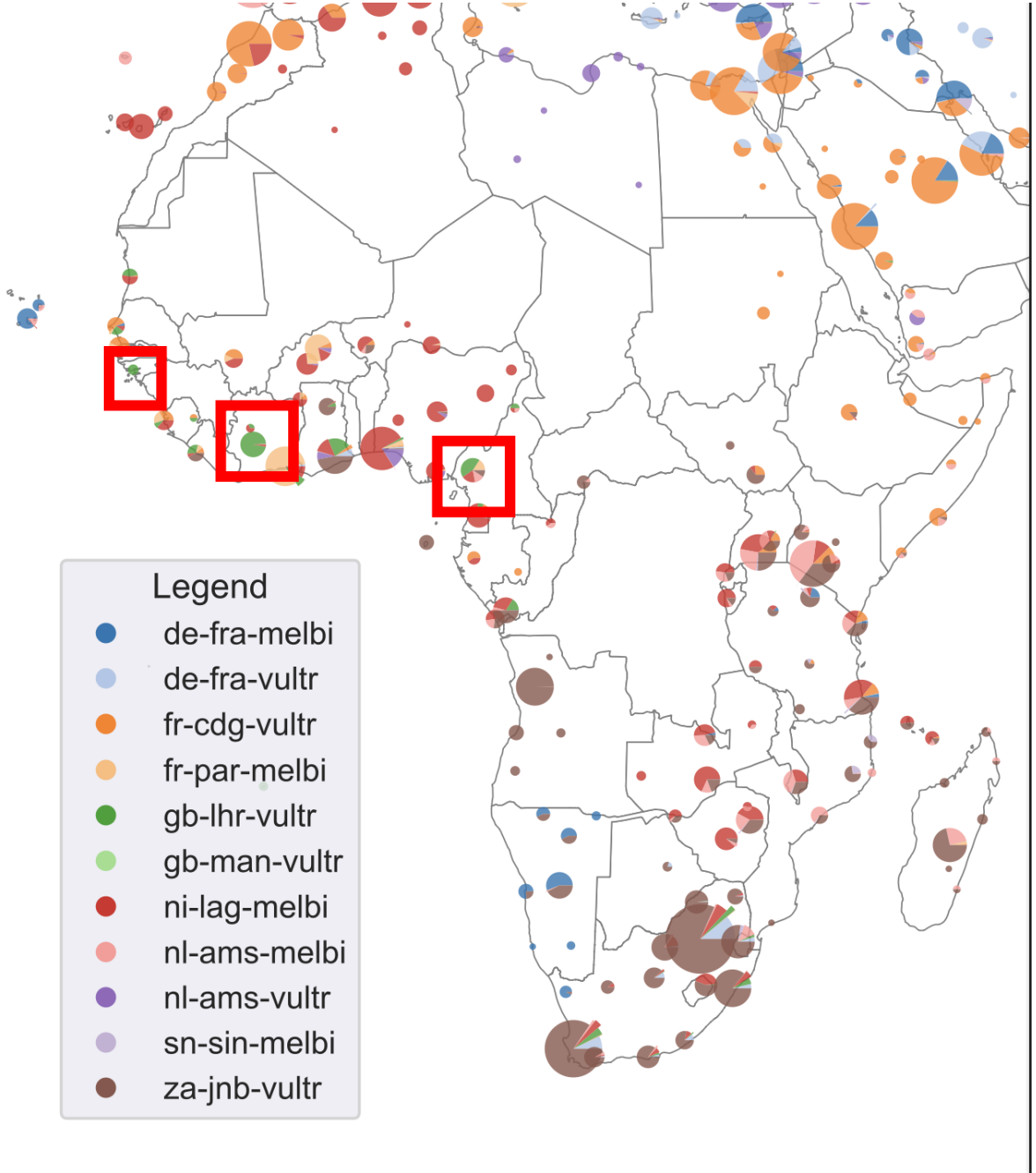
Preliminar

- France (orange)
  - Morocco (French)
  - Tunis (French)
  - Senegal (French)
  - Sierra Leone (French)
  - Cote d'Ivoire (French)
- No PoPs in former French colonie



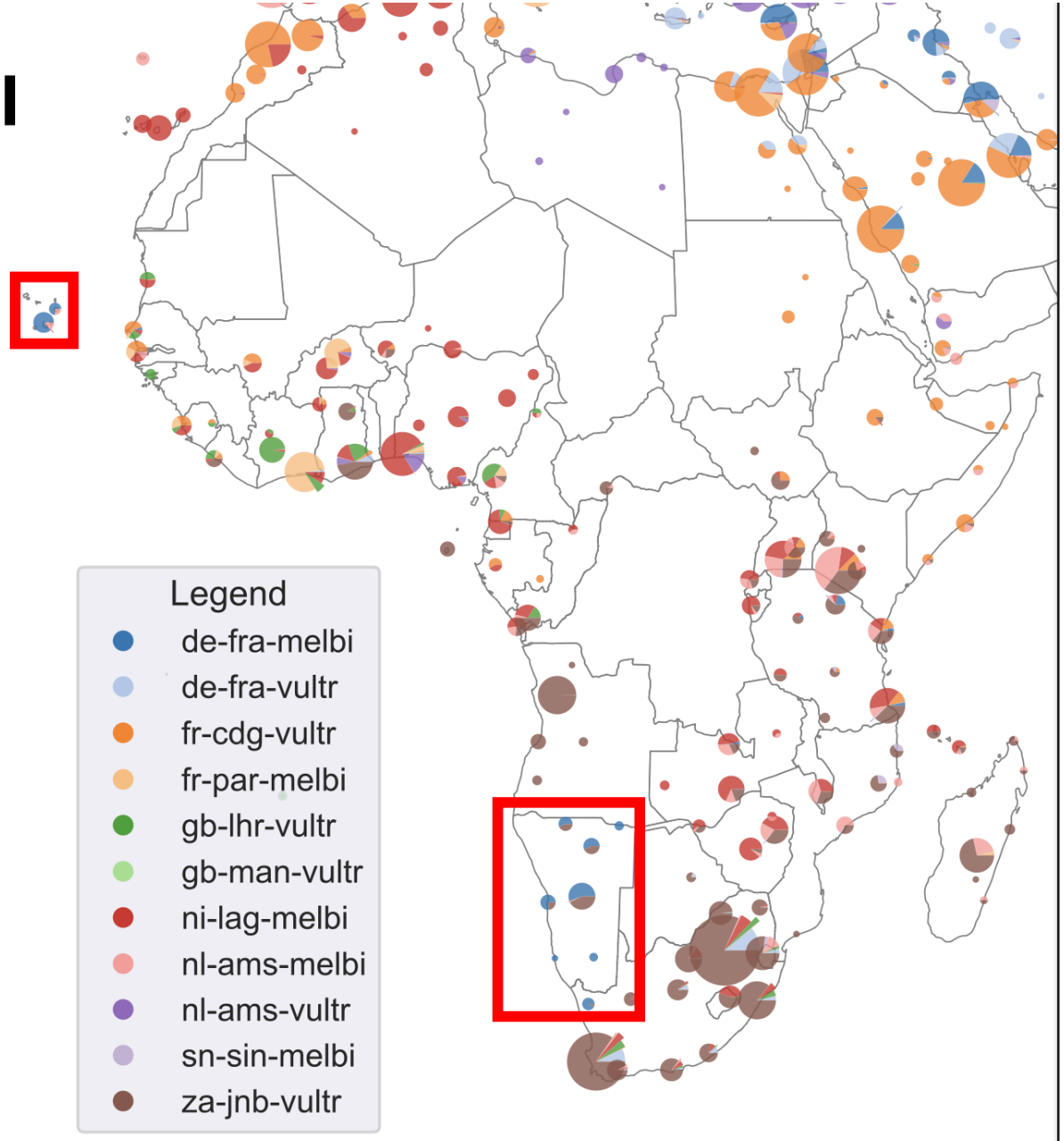
Preliminar

- UK (green)
  - Cote d'Ivoire (French)
  - Guinnea Bissau (French)
- Most British colonies go to
  - Nigeria, South Africa



Preliminar

- Germany (blue)
  - Cabo Verde (Portugese)
  - Namibia (German)
- Limited colonial presence



Conclusion

- CDN deployment is sparse in developing regions
- Also visible in anycast PoP placements
- Preliminary results show
  - Poor RTT for African networks
  - Further complicated by colonial routing
  - (problem: results are for our testbed only)
- We want to investigate this issue further
  - Looking for anycast operators (collaborate)
  - Shed light on problem. Publication, blogpost, .. ?
  - What else can we do as academics?