Towards Measuring Traffic Locality

Working to keep local traffic local

Internet Society

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Importance of Consuming Local Food

- **Economic benefits**: Buying local supports local farmers and businesses, keep money within the community, create jobs.

- **Environmental benefits**: Less transportation, less carbon footprint.

- **Health and quality benefits**: Fresh, in-season and healthier food.

- **Community building**: local food movement foster community interactions and strengthen local economies.

Source: Lokaal.lu

Importance of Consuming Local Content

- **Economic benefits**: Supports local ISPs, content providers, infrastructure providers
- **Cost benefits**: Save on expensive international links, free-up bandwidth.
- **Quality and performance benefits**: Improved Internet speeds, higher reliability, improved user experience.
- **Security benefits**: Improve data security and privacy by keeping data in local jurisdictions.
- **Community building**: Enhance technical community engagement through local platforms.

Source: Wikimedia

The 50/50 Vision

Our 50/50 Vision is an ambitious but achievable plan to keep at least half of all Internet traffic local in selected economies by 2025.

When we reach this goal, the people who need it most will have faster, stronger, and cheaper Internet access.

Measurement methodology

Locality definitions

- **Local traffic**: Sourced locally from an in-country server.
- **External traffic**: Sourced from a remote (out-of-country) server.
- **Content Delivery Networks**: operators responsible for delivering content to the edge.
- **Content caches**: content hosting equipment placed by a content provider close to the end-users.
- **Edge Network**: access network where eyeballs (consumers) are located.

https://opentelecomdata.org/cdns/

Proxy: Top 1000 websites by country

Google Chrome Report (CrUX)

- Google Chrome has a ~70% market share (https://gs.statcounter.com/)
- Data collected from real browsers around the world
- Popularity determined by the number of visitors.

https://www.visualcapitalist.com/ranking-the-top-100-websites-in-the-world/
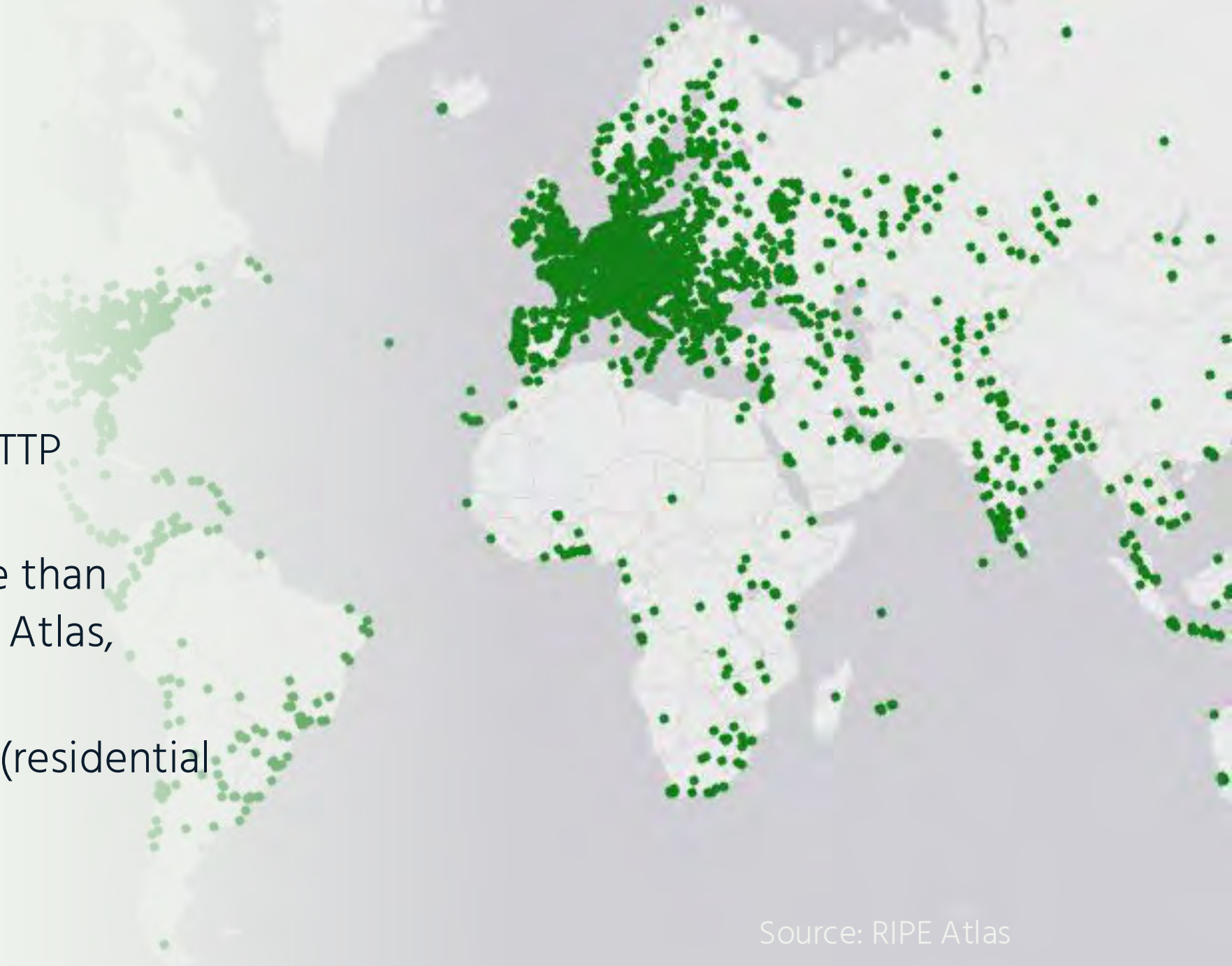
Vantage points

Residential Proxies

- Can be used to run HTTP measurements

- Much larger coverage than physical probes (RIPE Atlas, OONI, etc)
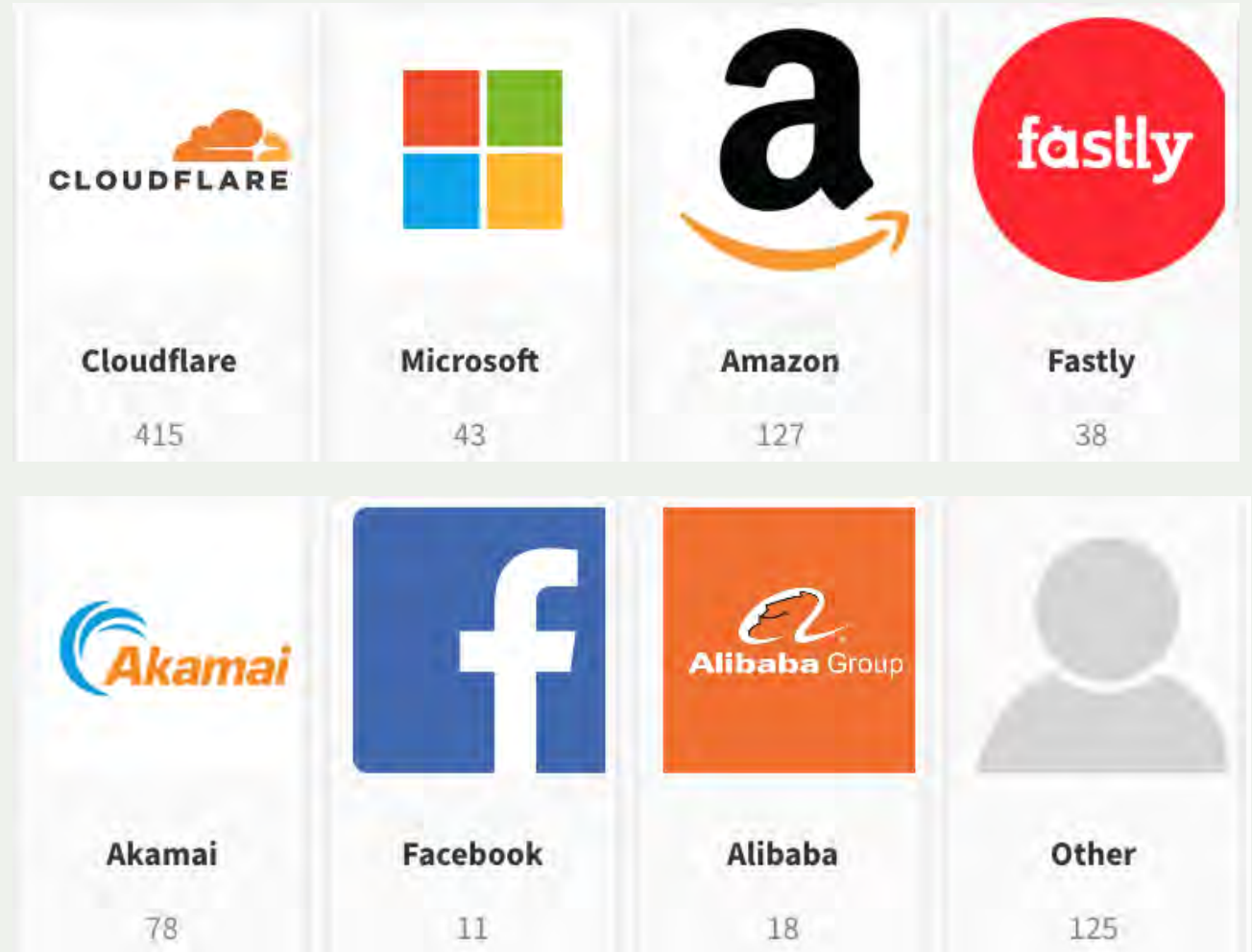
- Real user experience (residential networks)

Source: RIPE Atlas

Hosting mode: CDN or Native?

- For all 1000 websites (by country), we run a test to determine the CDN provider.

- We extract CDN information from WHOIS, CNAME, HTTP Header.

- We categorize by CDN provider or "other" for natively hosted websites.

Website hosting in ZA

Cloudflare	Microsoft	Amazon	Fastly
415	43	127	38

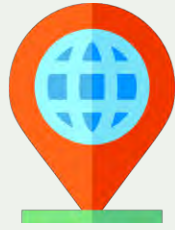| Akamai	Facebook	Alibaba	Other
78	11	18	125

Source: Pulse

How does it work?

1. Select the type of proxy (ISP, Data Center, Residential)

2. Select a proxy in a specific network (ASN)

3. We run the test of the ASNs with the highest market share.

Your IP address → Residential proxy server → Real residential IP pool → Internet
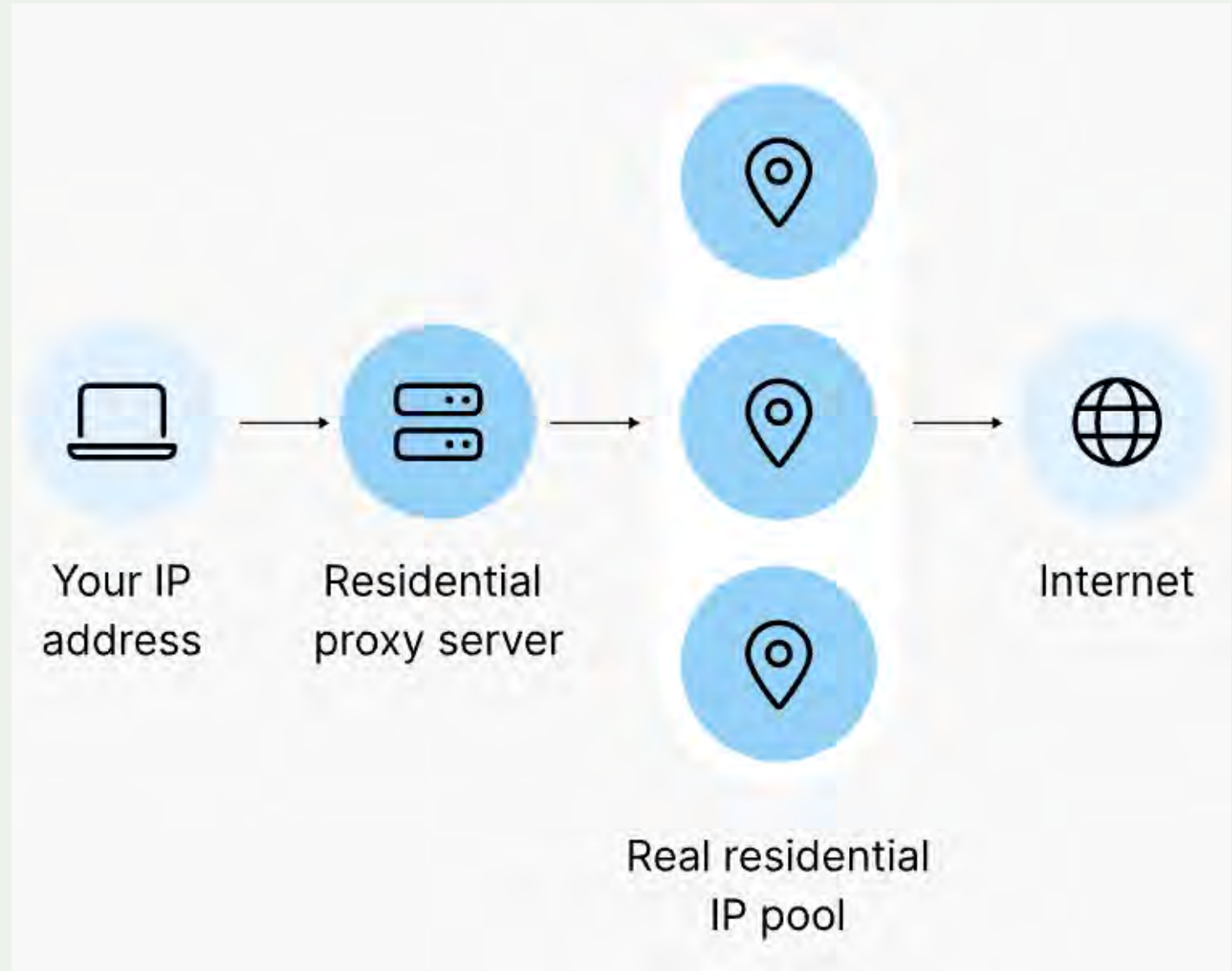
Source: NordVPN

Geolocation

- Most CDNs provide geo-hints in their HTTP header response.

- We use a mix of geo-hints and website information (E.g. Akamai, Microsoft, etc).

- List of prefixes, which can be geolocated.

- For natively hosted website: we use IP geolocation.

CDNs In Johannesburg

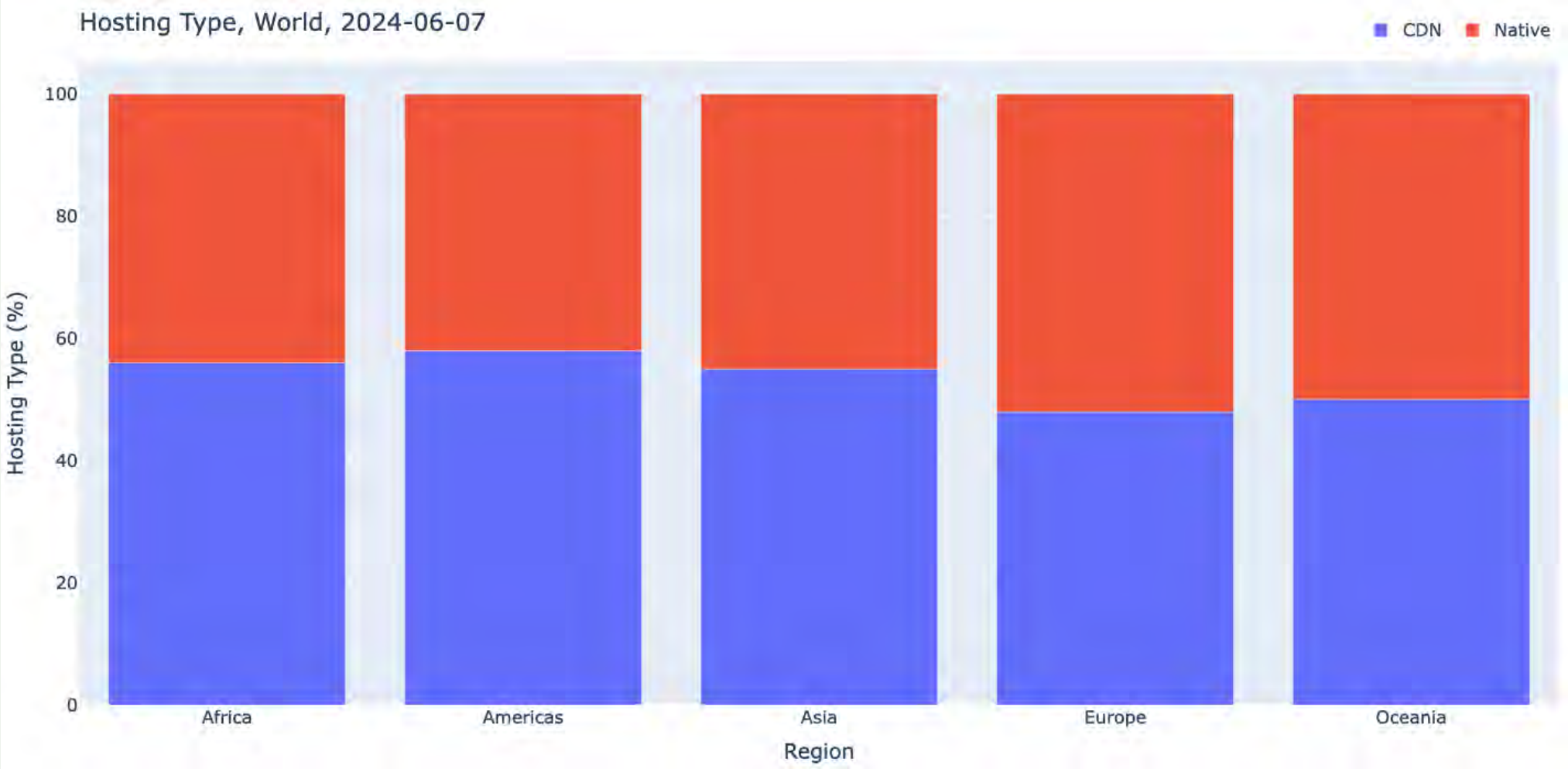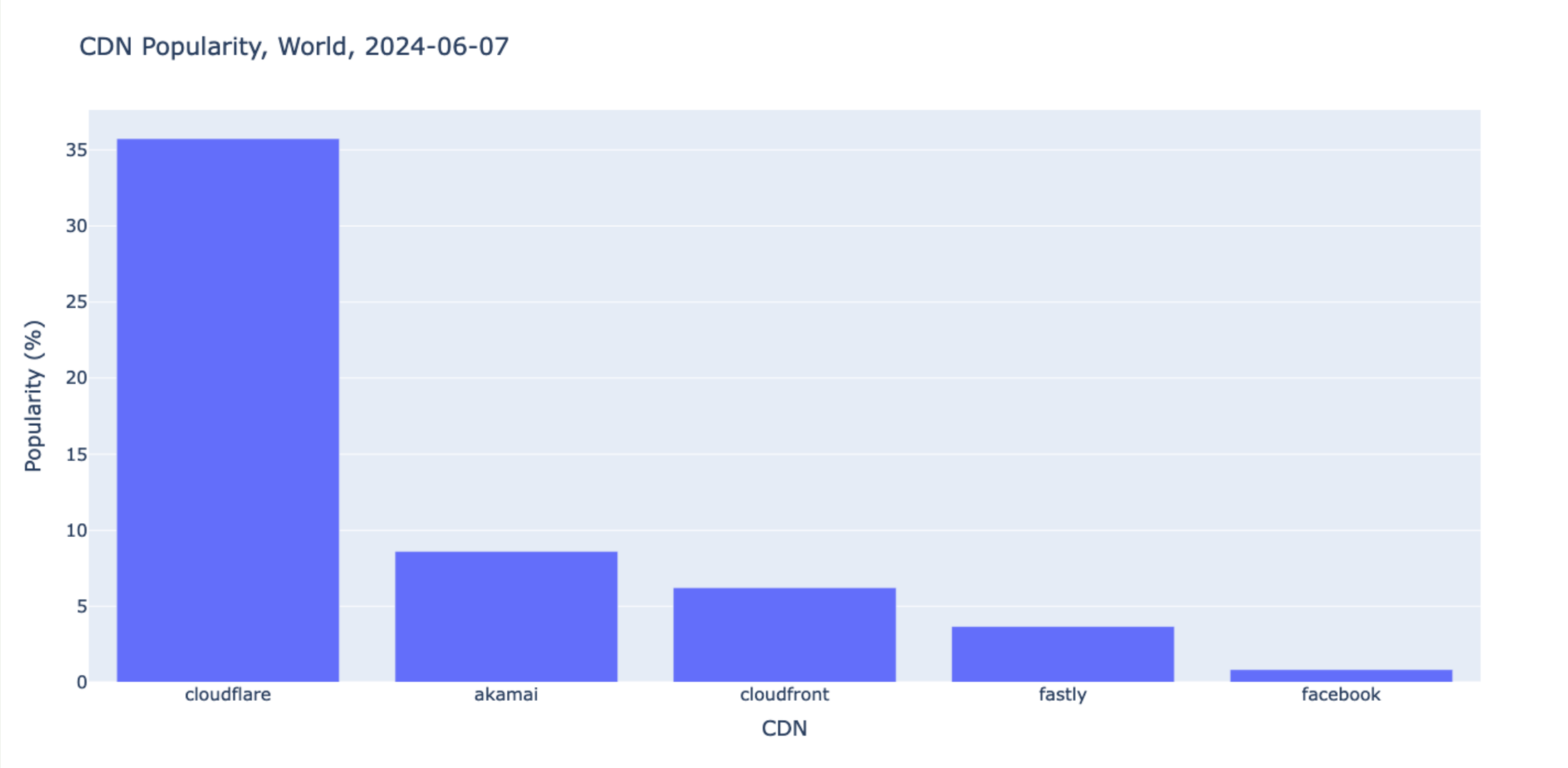| CDN	Header	GeoHint
ArvanCloud	ar-sid	8050
Bunny	server	jh1
CacheFly	x-cf1	jnb
CloudFront	x-amz-cf-pop	jnb
Cloudflare	cf-ray	JNB
Edgecast	server	jnb
Fastly	x-served-by	JNB

Tools used

Aggregation

$$\sum \left\{ \left[\begin{array}{cccc} \text{Local} & \text{Local} & \text{External} & \text{Local} \\ \text{External} & \text{Local} & \text{External} & \text{Other} \end{array} \right] \right\} * \text{ASN market share} = \text{Weighted \% Local Regional External}$$

Number of websites

Hosting type (85k unique websites)

Source: Pulse

Most popular CDNs (World)

CDN Popularity, World, 2024-06-07

Source: Pulse

Locality (World)
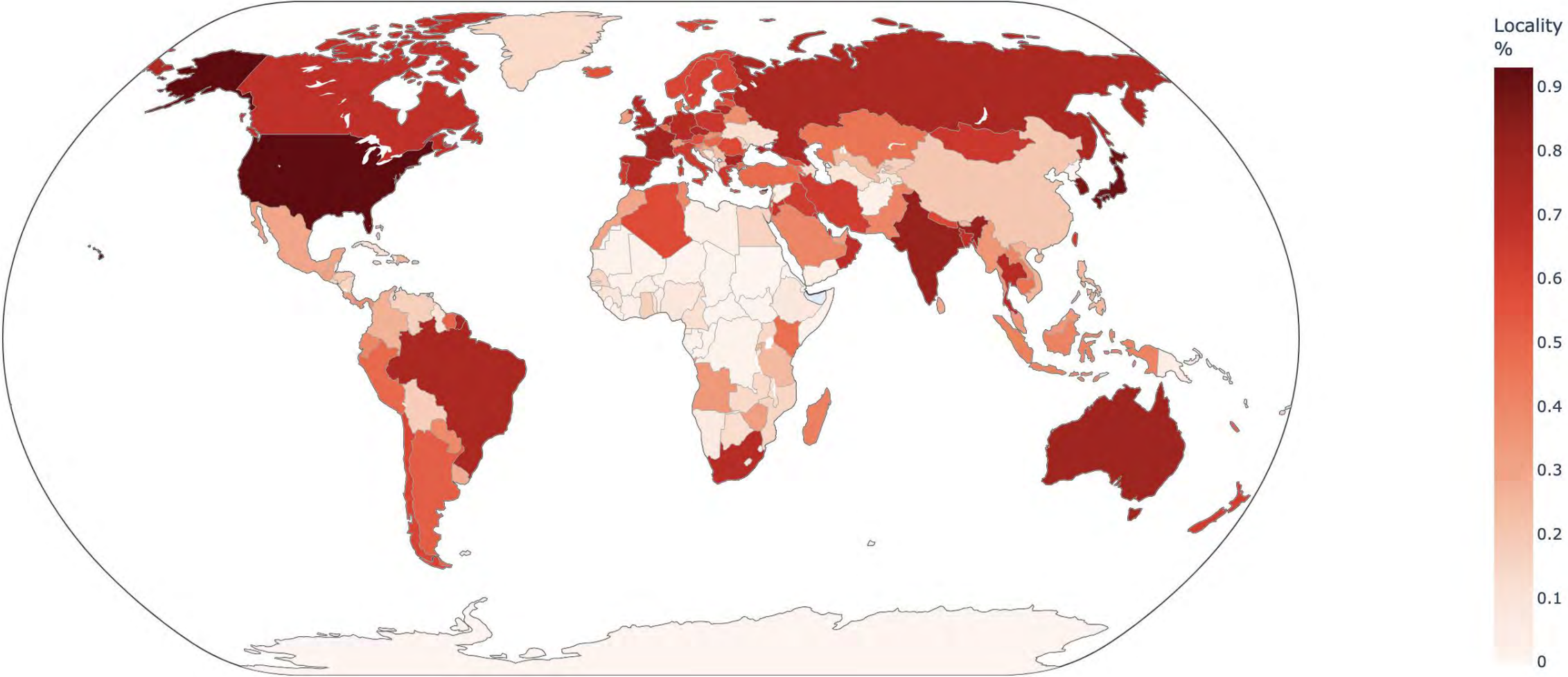
Locality by region
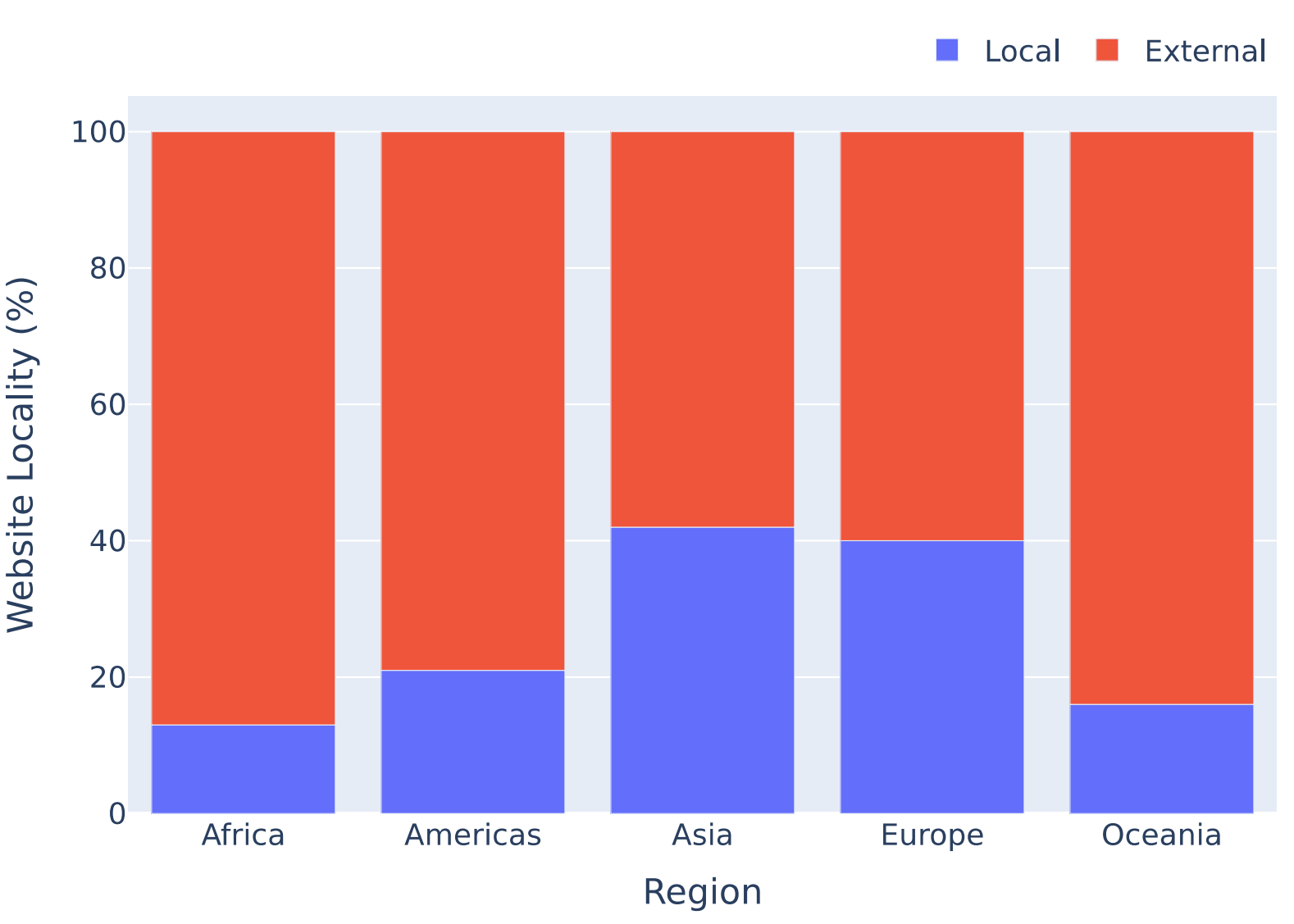
July 2024
Source: Pulse

Locality ranking of CDNs

July 2024, Source: Pulse
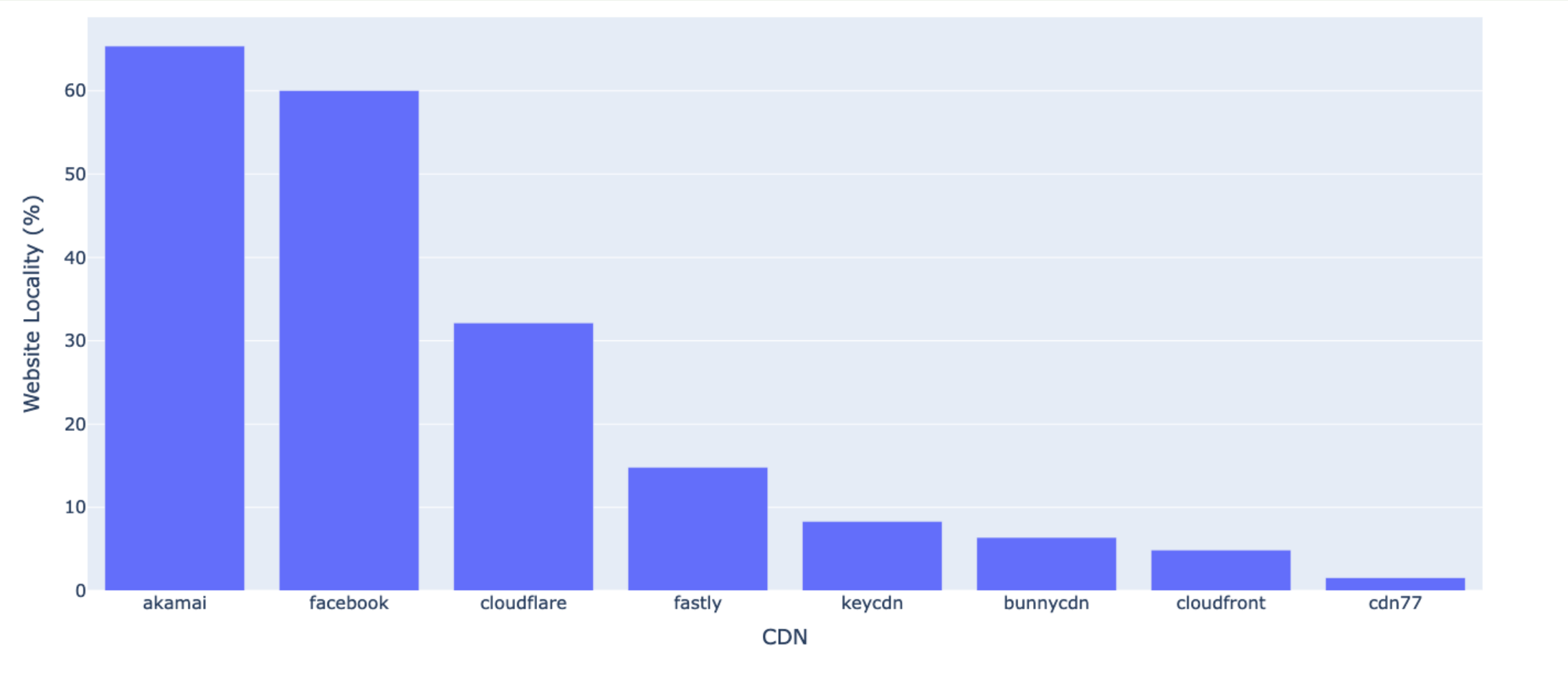
South African Development Community
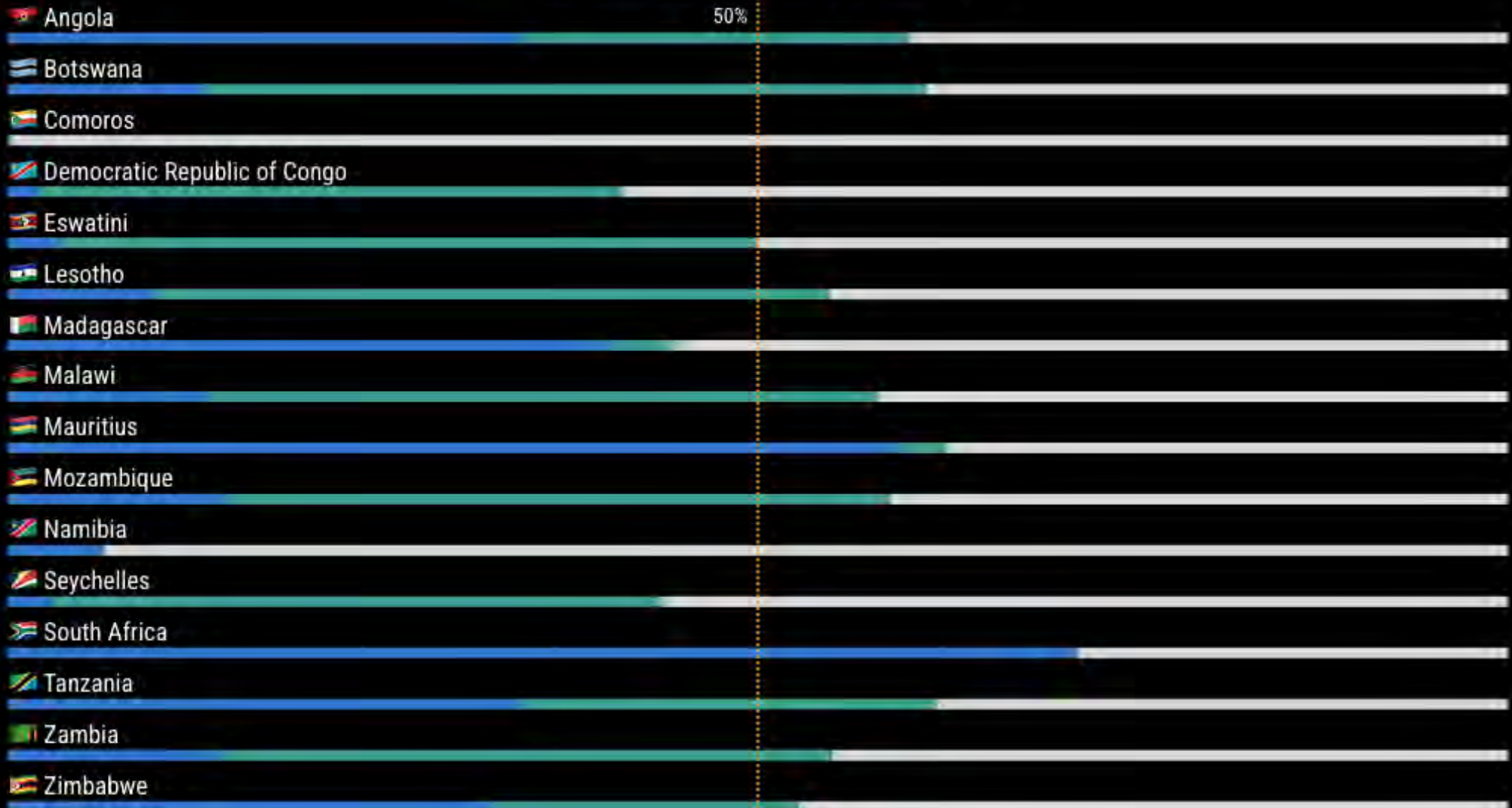
July 2024, Source: Pulse

50/50 Where do we stand?

50/50 Vision Countries, World, 2024-06-07

Selected Economies: 24%

July 2024, Source: Pulse

Locality for the wider 50/50 Vision

Region	Countries > 50% Local	Countries >50% Local (%)
Africa	3	5%
Americas	7	12%
Asia	21	41%
Europe	21	42%
Oceania	4	18%

Worldwide 50/50 Vision: 24%

Democratic Republic of Congo

Keep Internet traffic local

2% local

Democratic Republic of the Congo
Hosting Location of Top 1,000 Websites
Measurement date: 2024-08-06

Source: Internet Society Pulse • Data: Google CRuX, CDNFinder, IPinfo

25
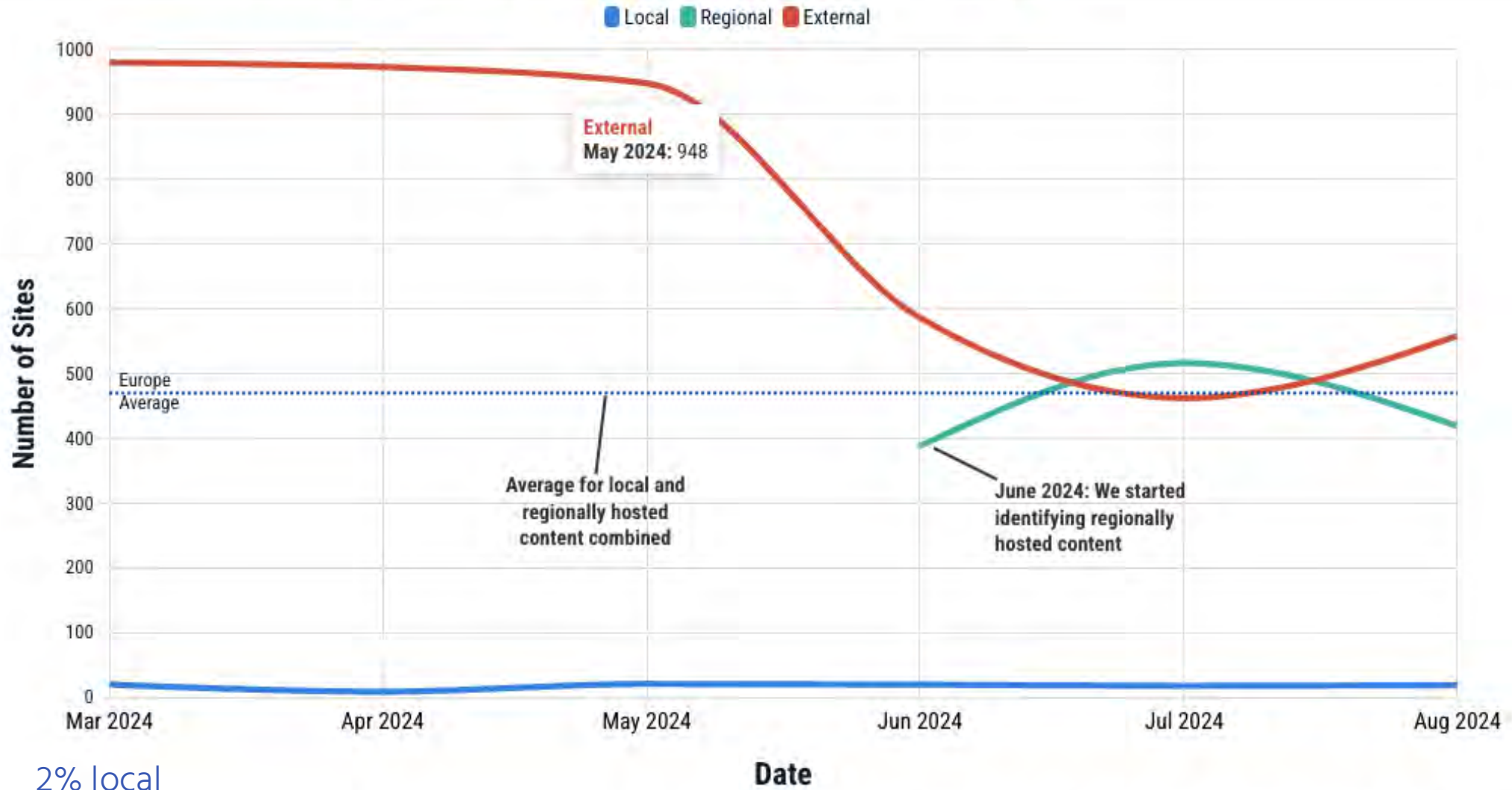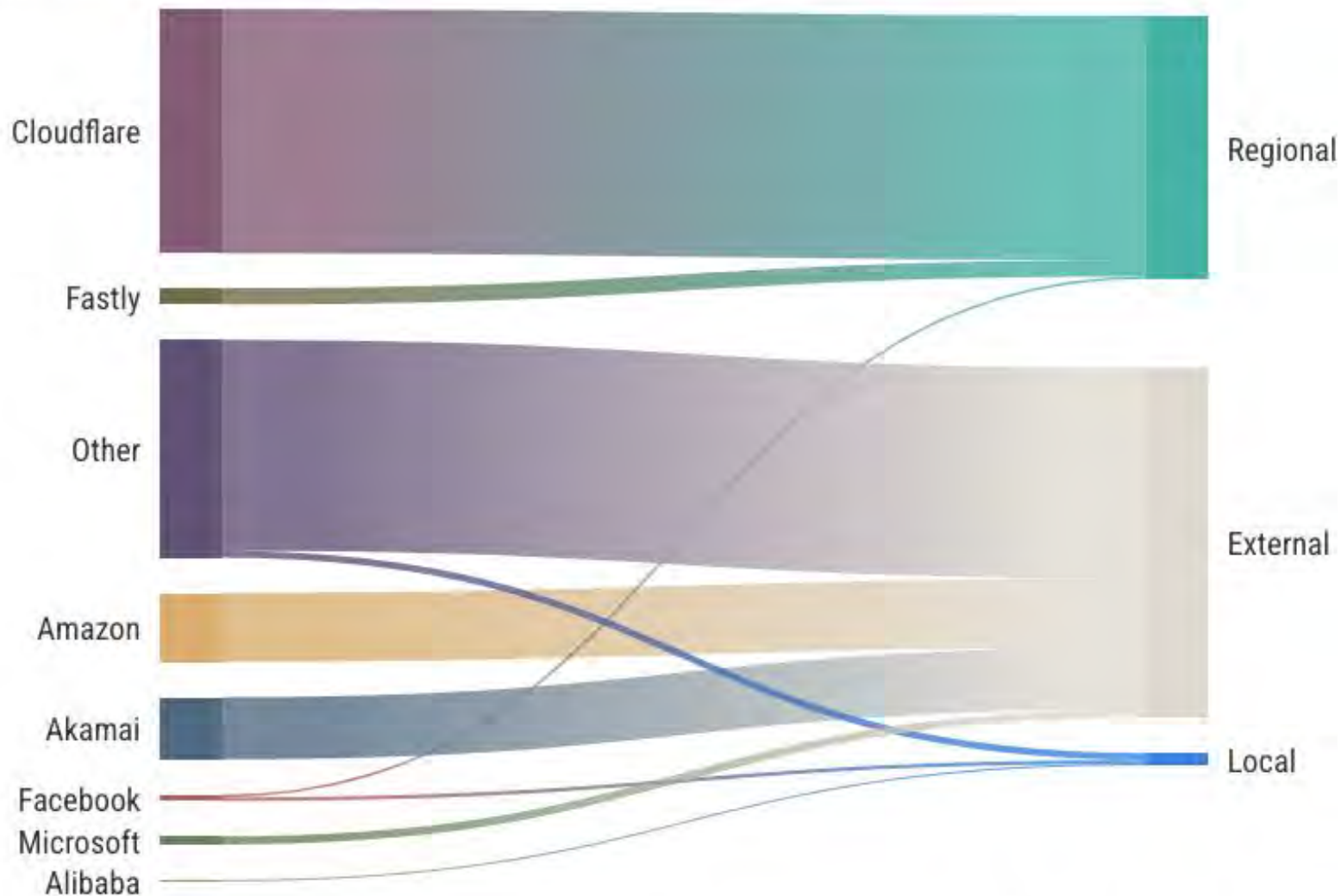
Democratic Republic of the Congo
Location of content caches when accessed from DRC.
Measurement date: 2024-08-06
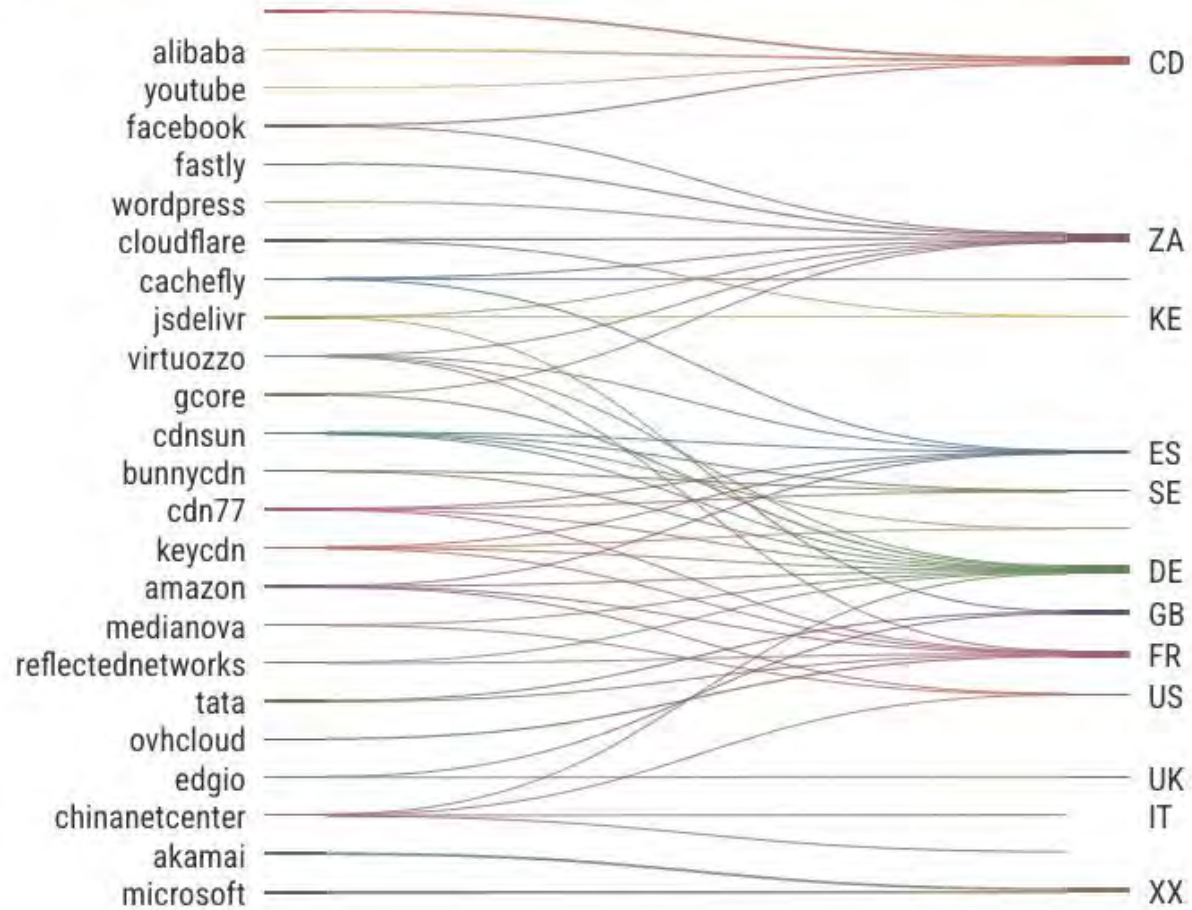
Source: Internet Society Pulse • Data: Google CRuX, CDNFinder, IPinfo

South Africa

Location of content caches when accessed from South Africa.

Measurement date: 2024-08-06

Source: Internet Society Pulse • Data: Google CRuX, CDNFinder, IPinfo

Time to act!

DATA CENTRES & NETWORKS

First phase of DRC's first Tier III data centre is live

VAUGHAN O'GRADY

14 AUGUST 2024

1452 views
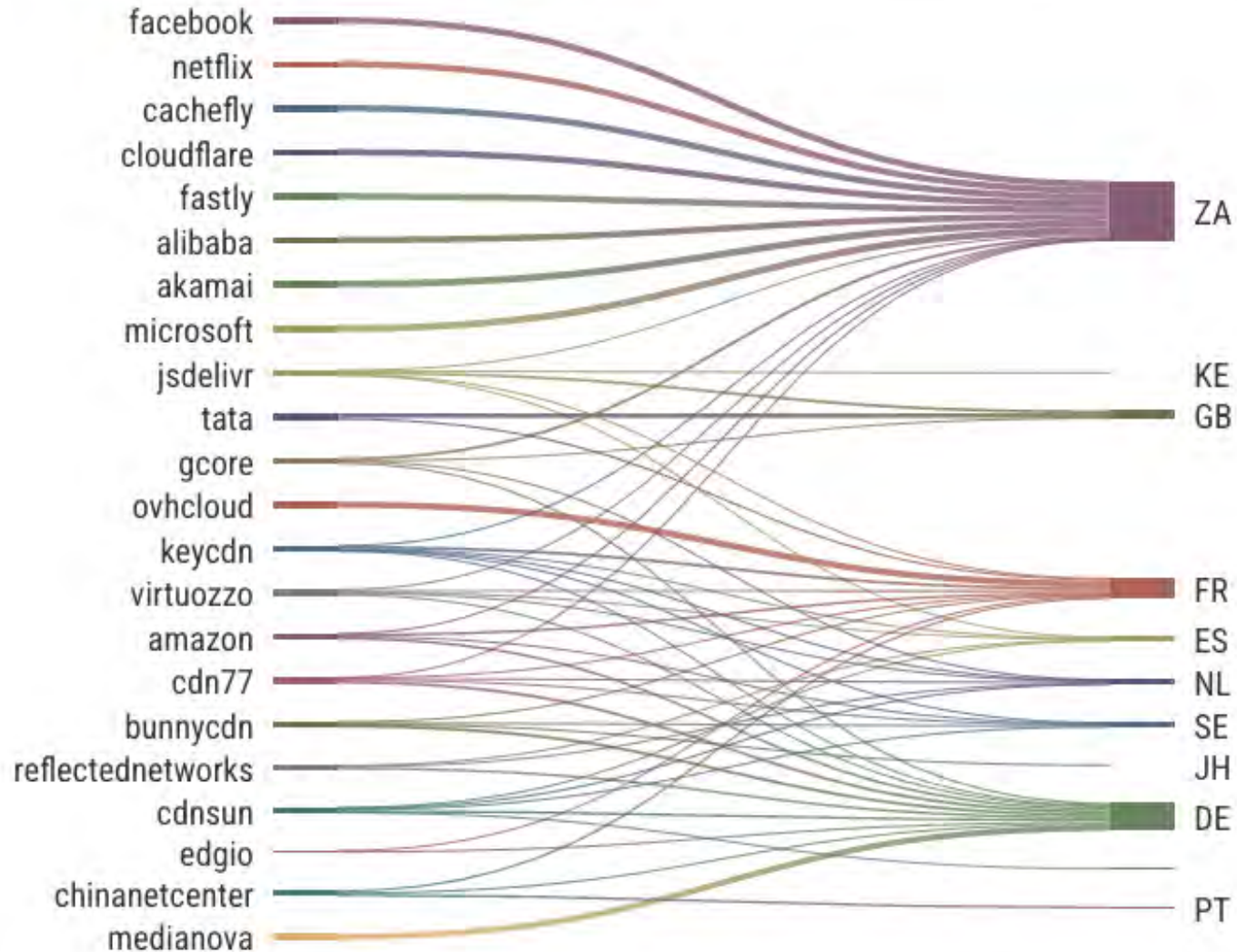
More connectivity   More peering

Hosting infrastructure $ et
                                                          etc)

Next Steps

Expand the testing methodology

Continue testing to find changes/patterns

Publish our results in papers and via Pulse platform

Towards Measuring Content Locality

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Country Report

🇲🇺 **Mauritius**
Africa, Eastern Africa

Open Internet Environment

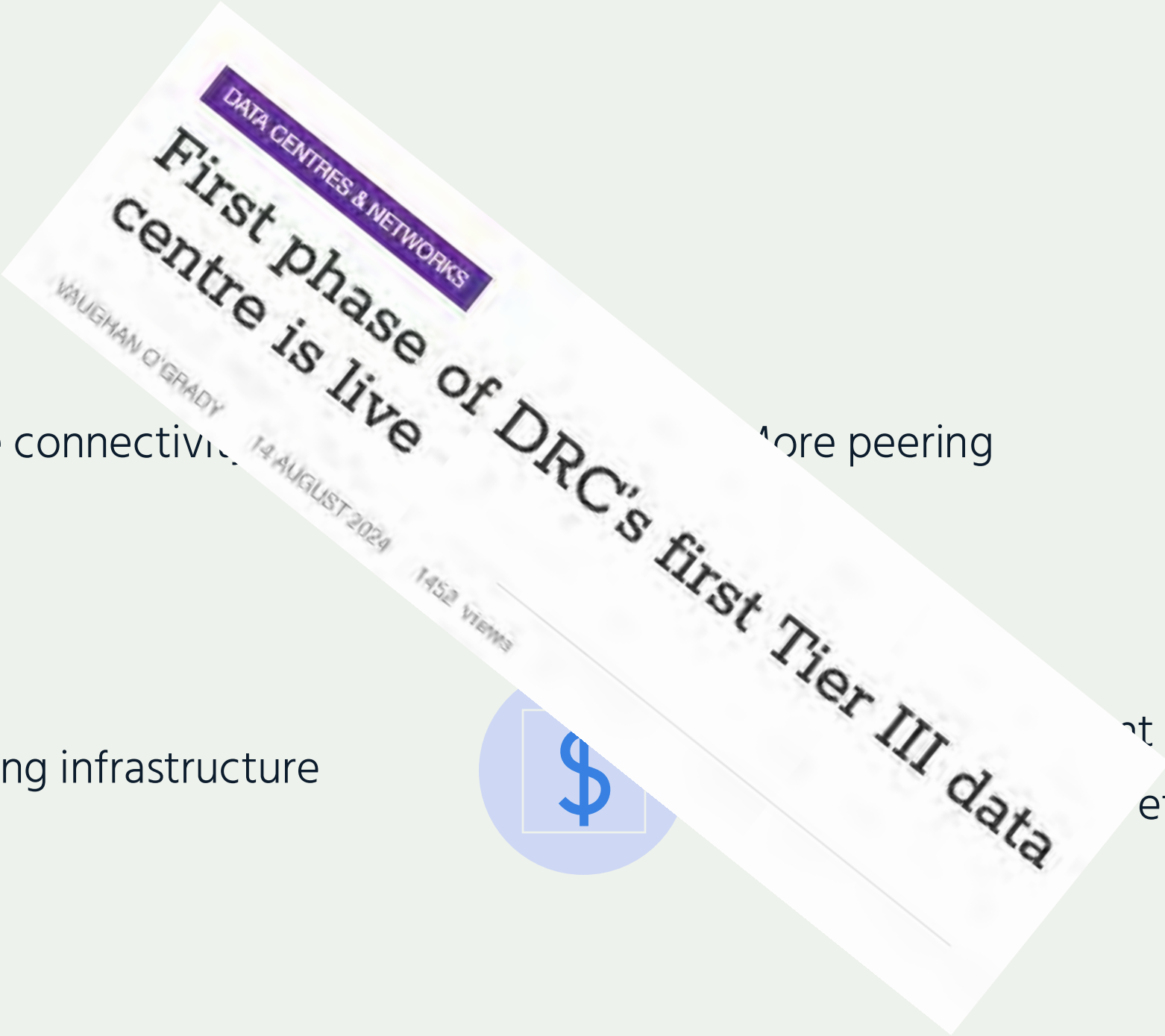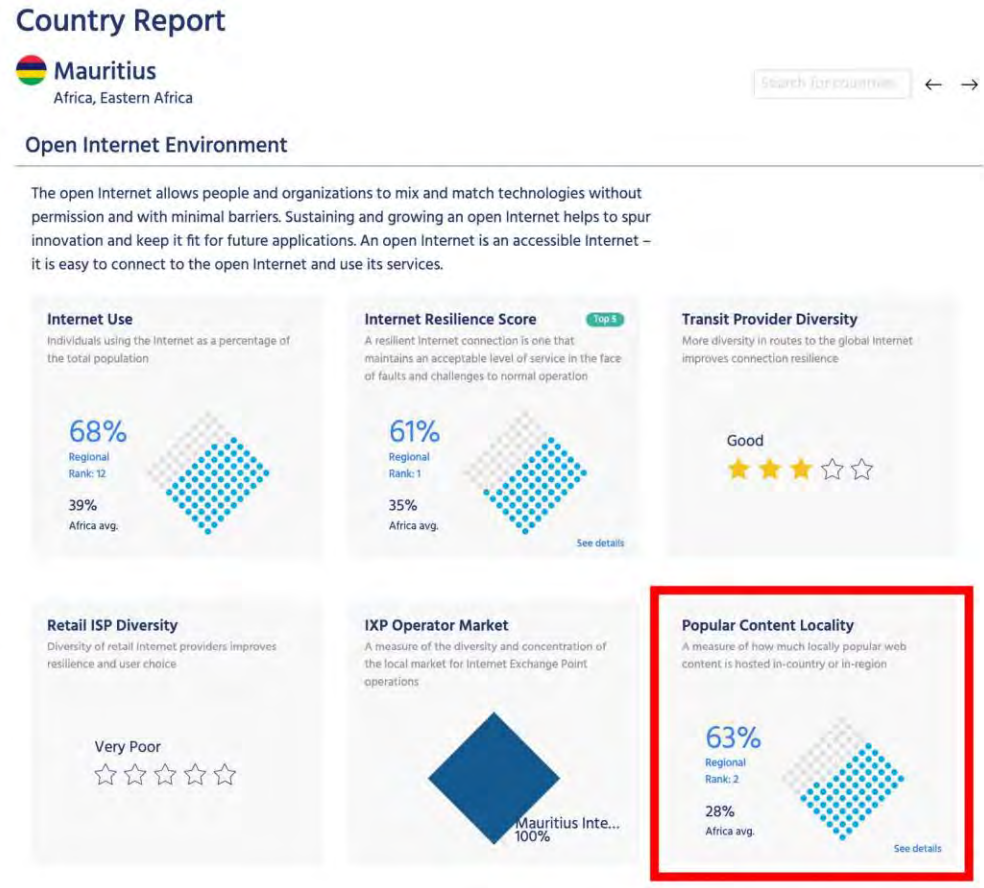The open Internet allows people and organizations to mix and match technologies without permission and with minimal barriers. Sustaining and growing an open Internet helps to spur innovation and keep it fit for future applications. An open Internet is an accessible Internet – it is easy to connect to the open Internet and use its services.

Internet Use
Individuals using the Internet as a percentage of the total population

68%
Regional Rank: 12

39%
Africa avg.

Internet Resilience Score (Top 5)
A resilient Internet connection is one that maintains an acceptable level of service in the face of faults and challenges to normal operation

61%
Regional Rank: 1

35%
Africa avg.

See details

Transit Provider Diversity
More diversity in routes to the global Internet improves connection resilience

Good
★★★☆☆

Retail ISP Diversity
Diversity of retail internet providers improves resilience and user choice

Very Poor
☆☆☆☆☆

IXP Operator Market
A measure of the diversity and concentration of the local market for Internet Exchange Point operations

Mauritius Inte...
100%

Popular Content Locality
A measure of how much locally popular web content is hosted in-country or in-region

63%
Regional Rank: 2

28%
Africa avg.

See details

Research activities

- Locality of content study – ISOC Pulse Fellowship (James Madeley, University of Loughborough)

- Understand the benefits of peering (Networking and Economic)

Thank you.

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