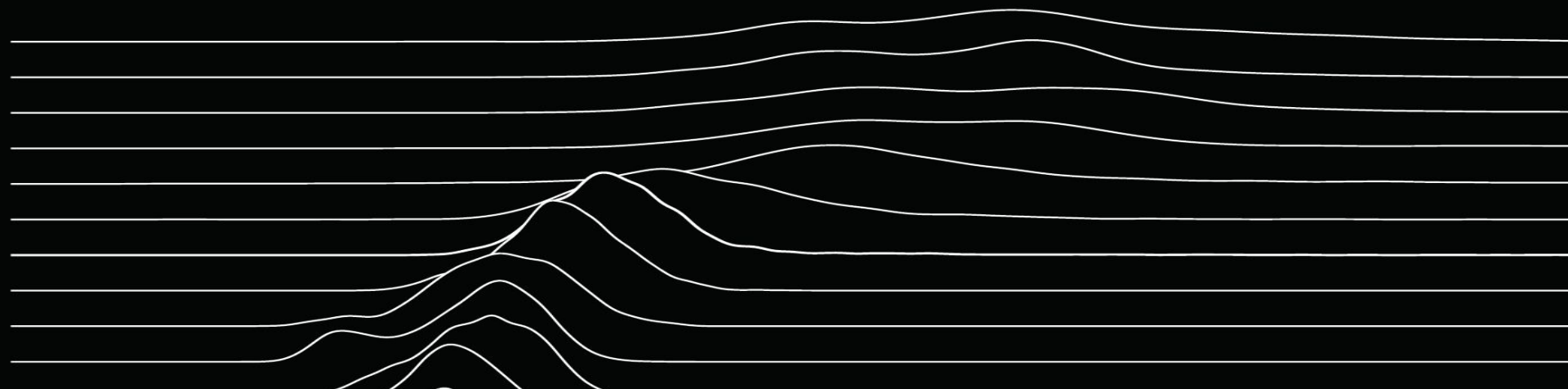


**MLAB**

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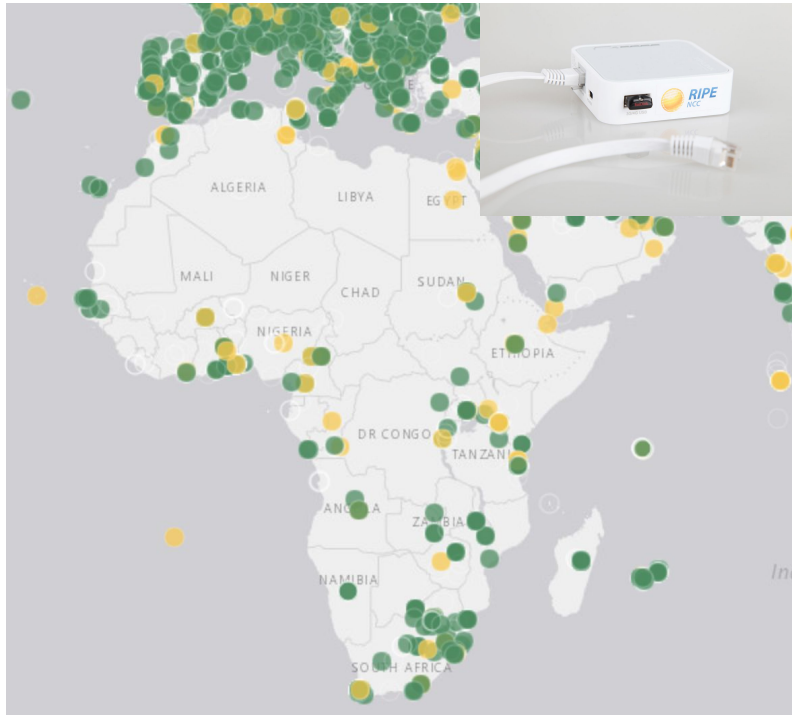
# Internet Performance in Africa

Research ICT Africa, AFRINIC, UCT | Chavula & Kiden



# Data Sources and Tools

---

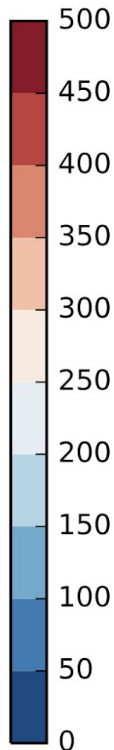
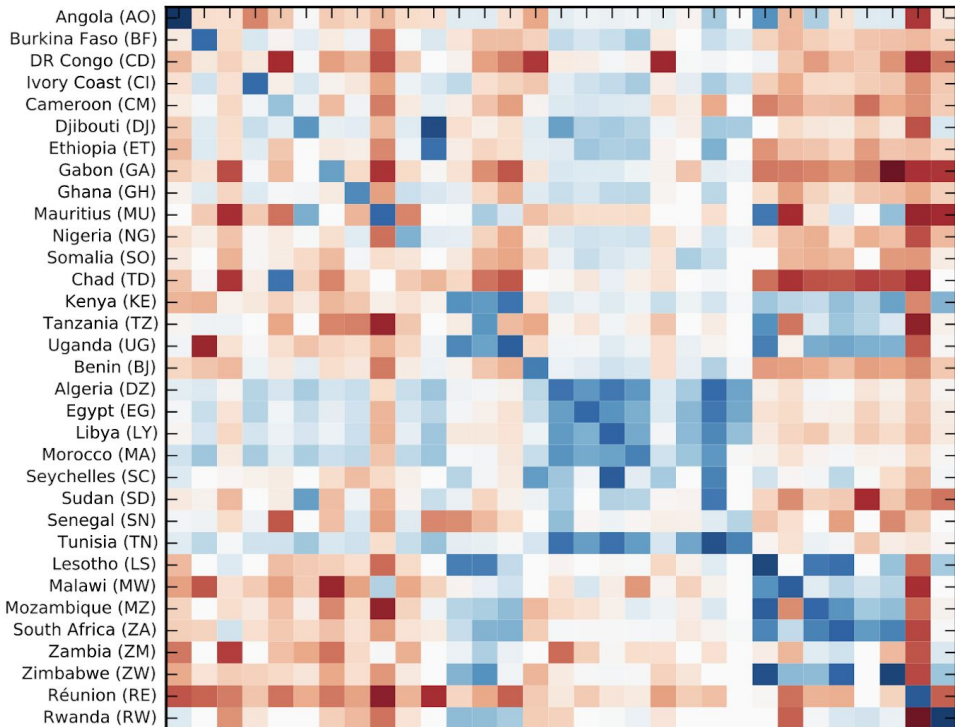


CARTO ●

# Country-level Latencies



AO BF CD CI CM ET GA GH MU NG SO KE TZ UG BJ DZ EG LY MA SC SN TN SD LS MWMZ ZA ZMZW RE RW



**In-country mean:**

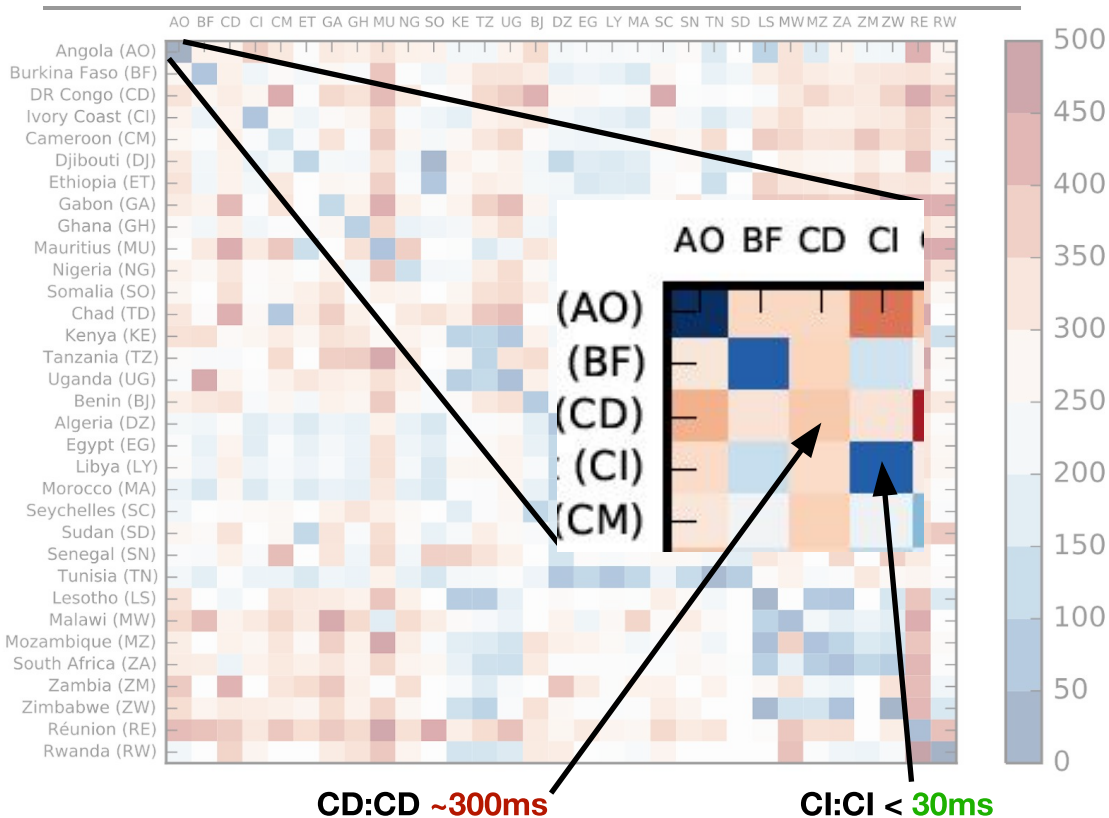
**Africa ~78ms**

**Latin America ~76ms**

**North America  
~45ms**

**Europe ~30ms**

# Country-level Latencies



In-country mean:

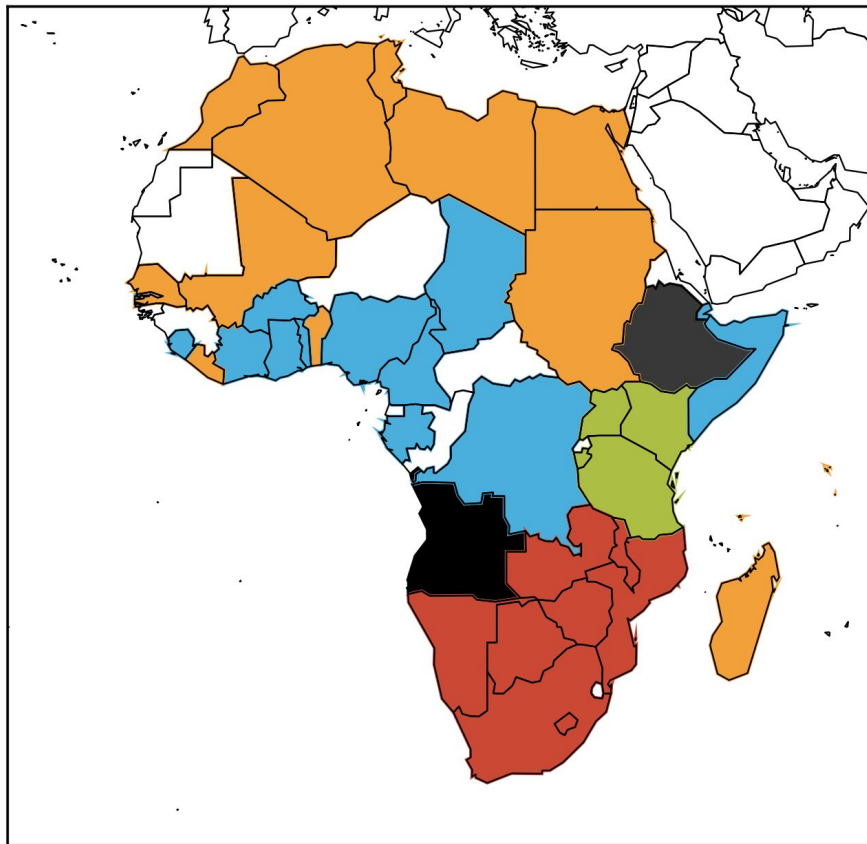
Africa ~78ms

Latin America ~76ms

North America  
~45ms

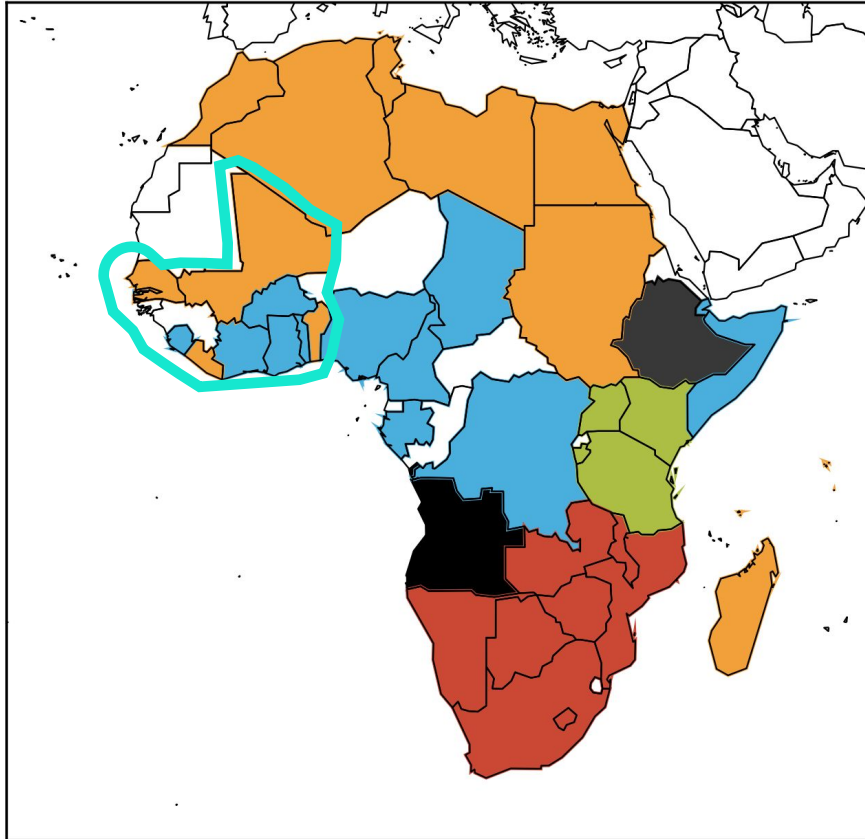
Europe ~30ms

# Latency Clusters



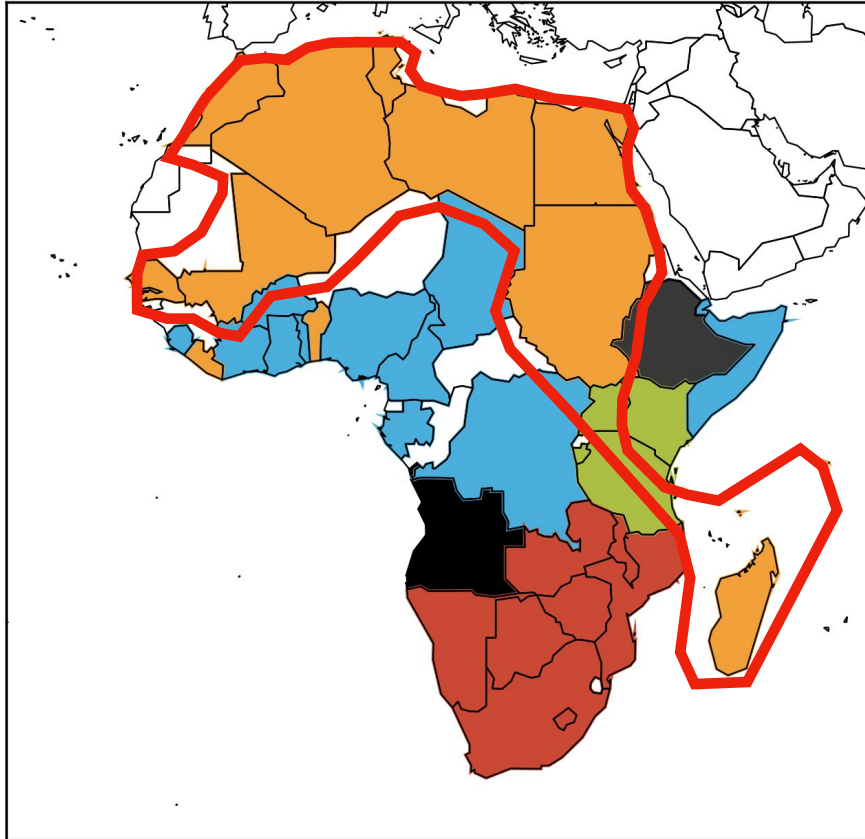
- Northern
- Southern
- Eastern
- Western

# Latency Clusters



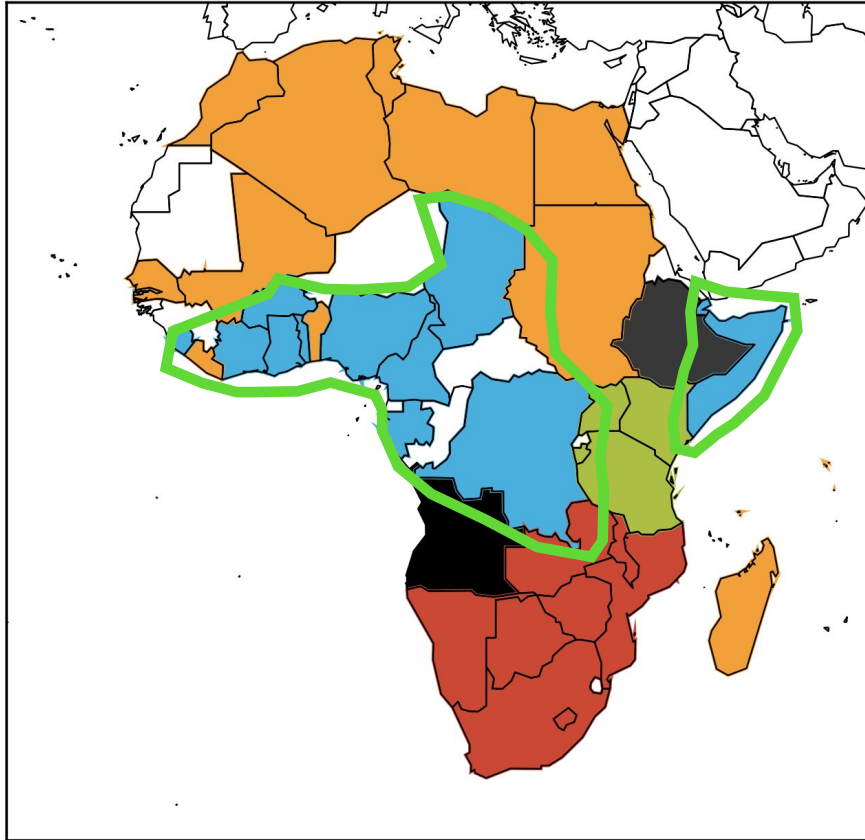
- Senegal, Liberia and Benin on the West coast, in Northern cluster
- Madagascar, Seychelles, islands of the Indian Ocean, clustered alongside countries in the North
- Somalia, on the East coast, is clustered with countries on the West coast.

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# Latency Clusters

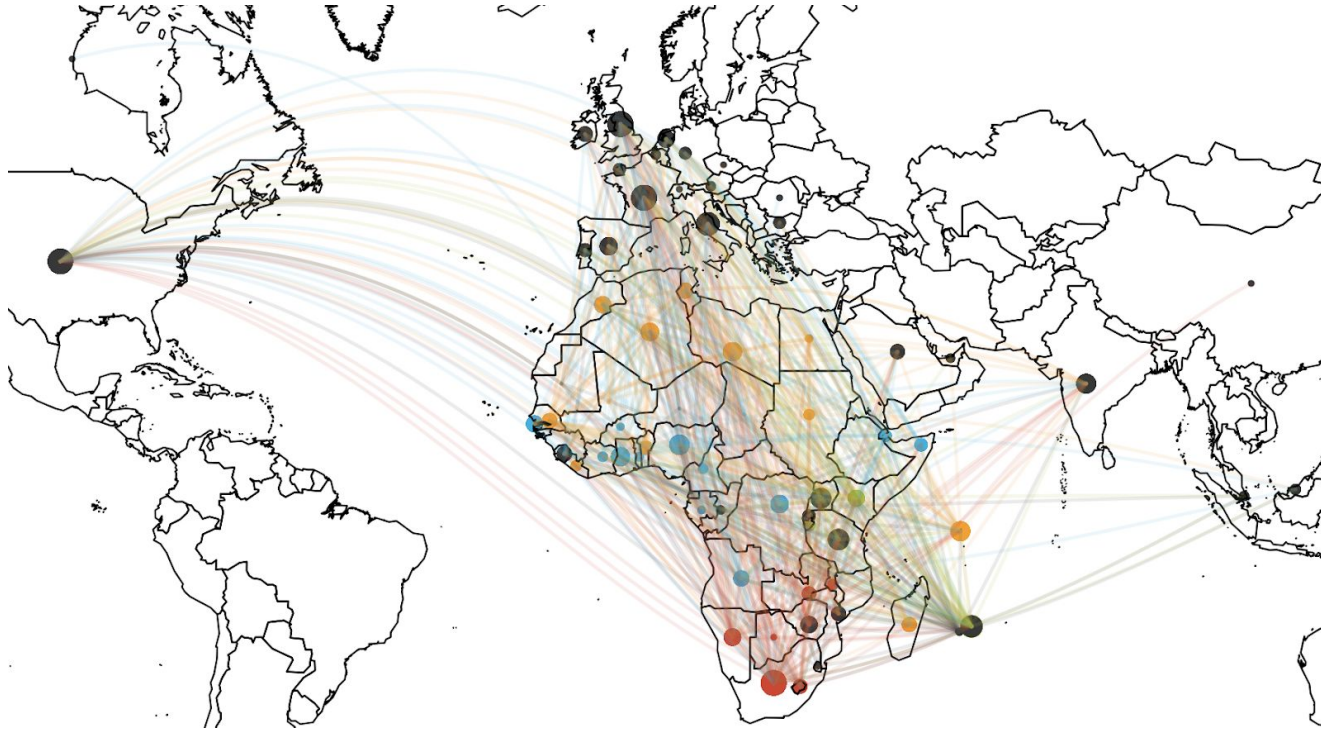


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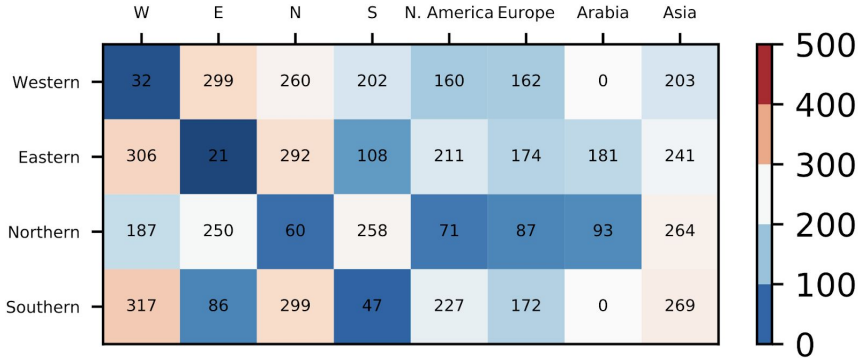
# Upstream Providers

**MLAB**

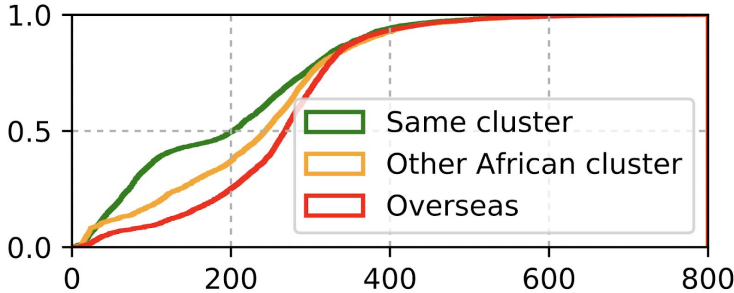


» **37% of Traceroute samples with at least one hop outside Africa**

# Latency to the Upstream



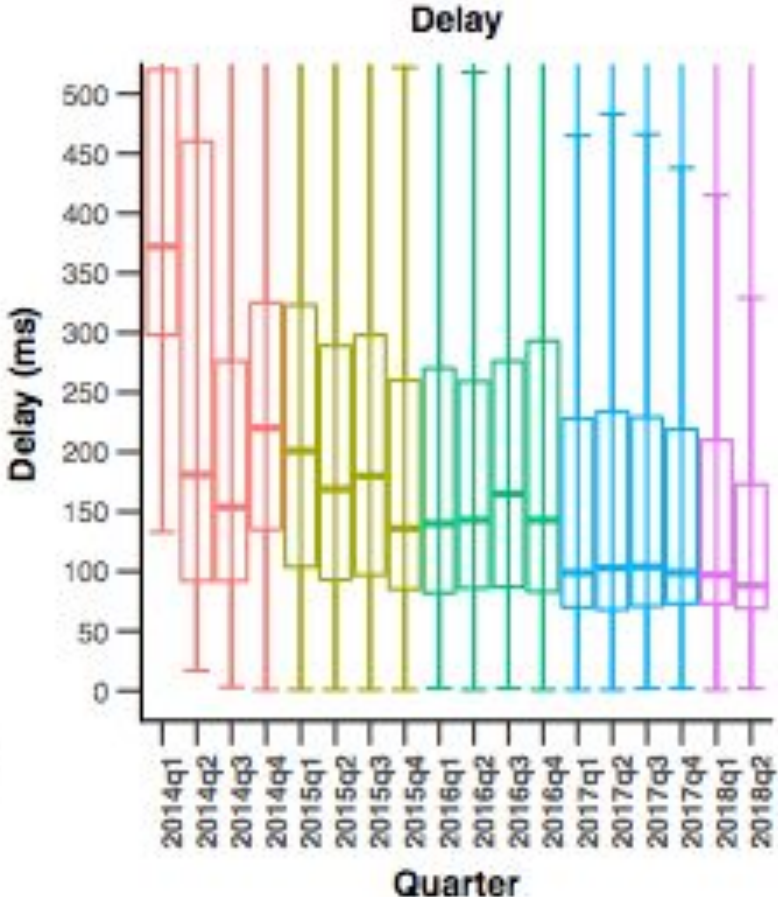
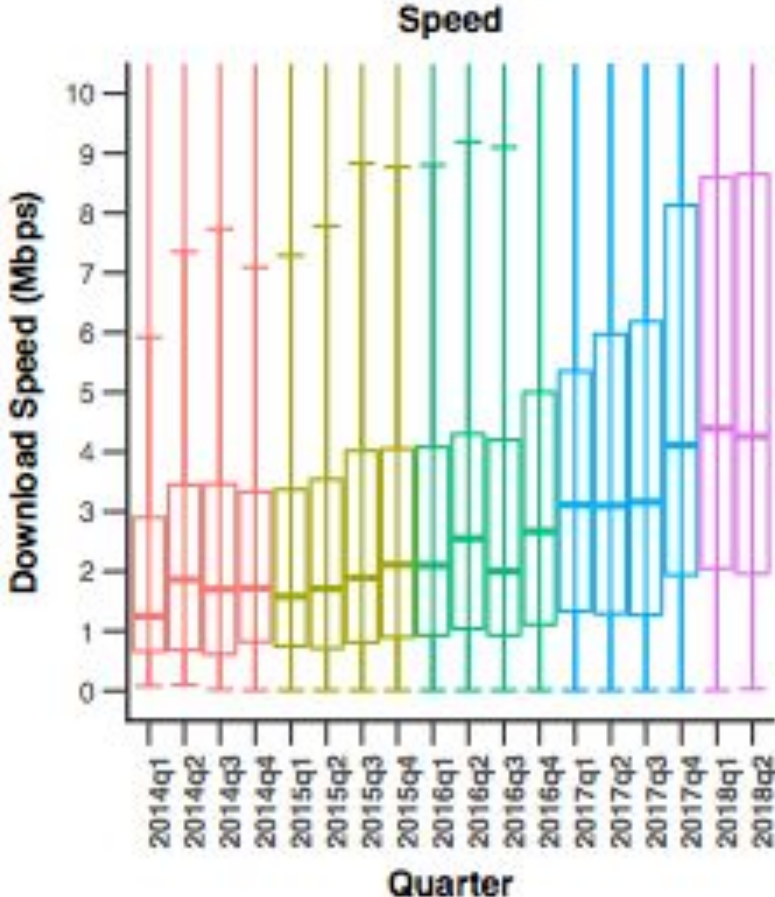
RTT to the first AS hop



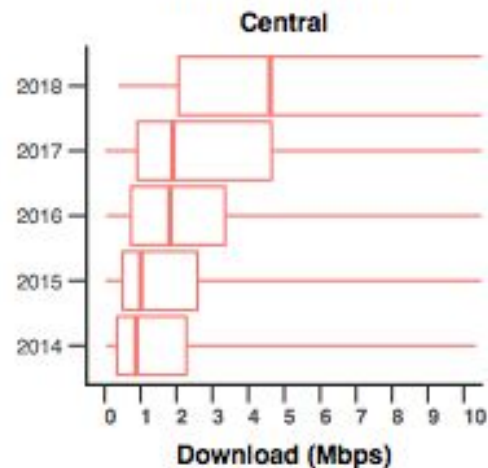
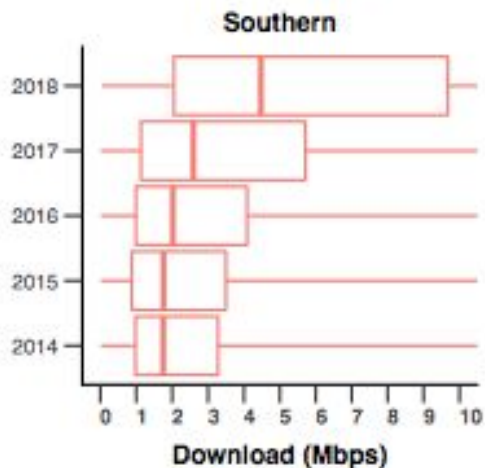
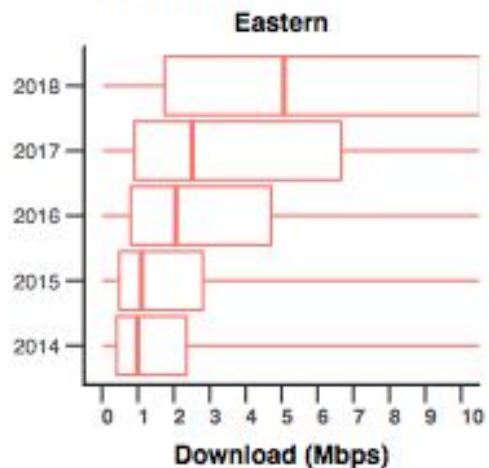
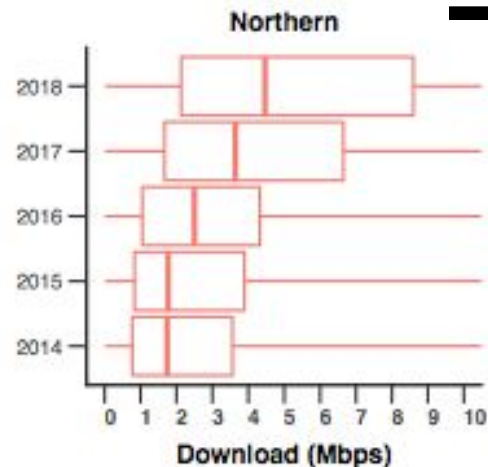
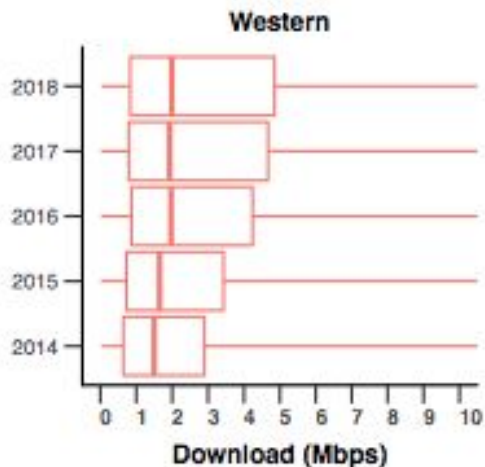
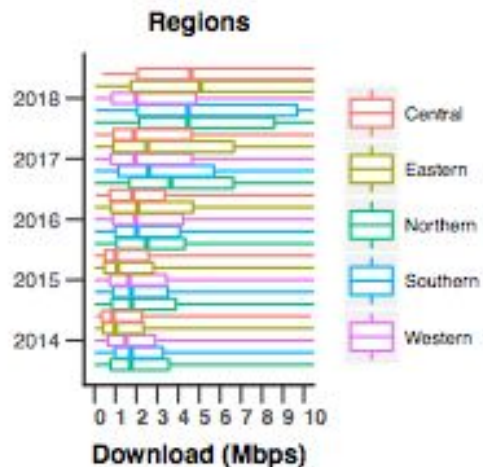
RTTs grouped by location of upstream providers

- Northern ⇒ North America **71ms**
- Southern ⇒ North America **227ms**
- Same cluster **203ms**
- Other African Cluster **243ms**
- Overseas **268ms**

## Speed vs Delay in Africa



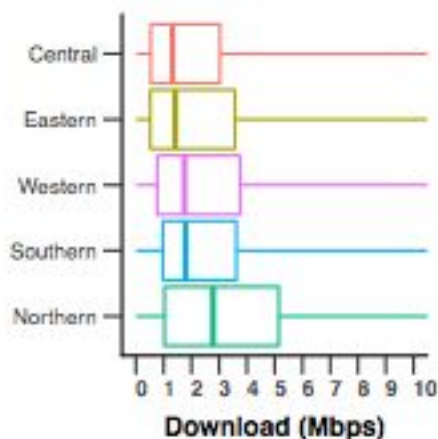
## Download Speeds 2014-2018



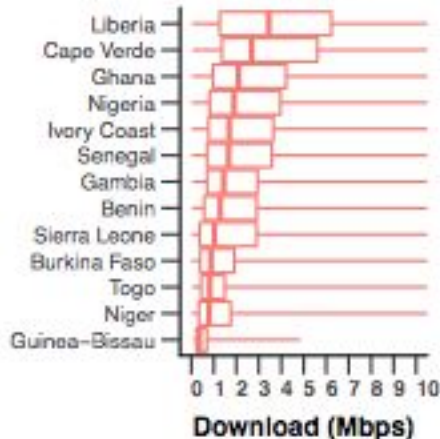
# Download Speeds 2014–2018



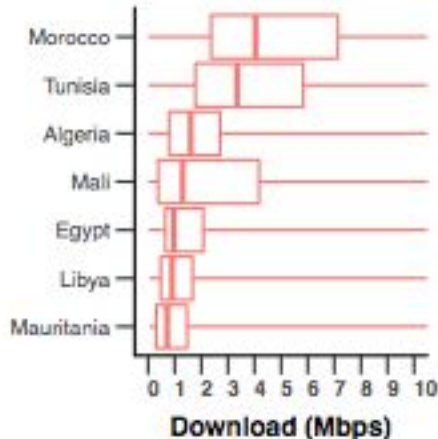
### Regions



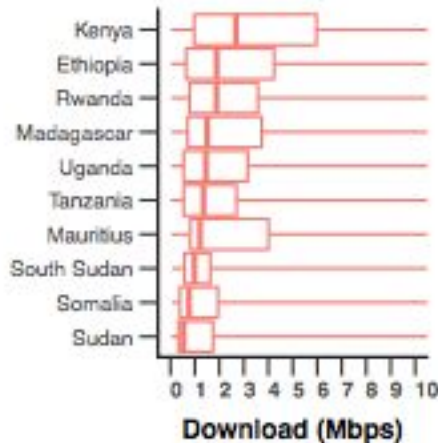
### Western



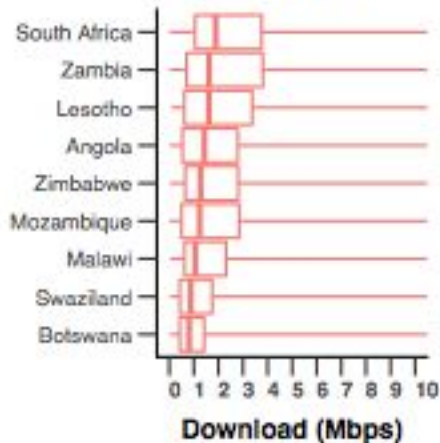
### Northern



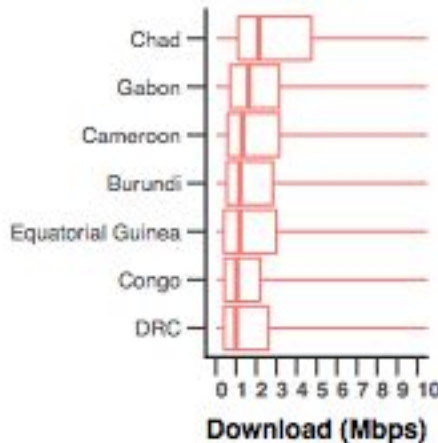
### Eastern



### Southern



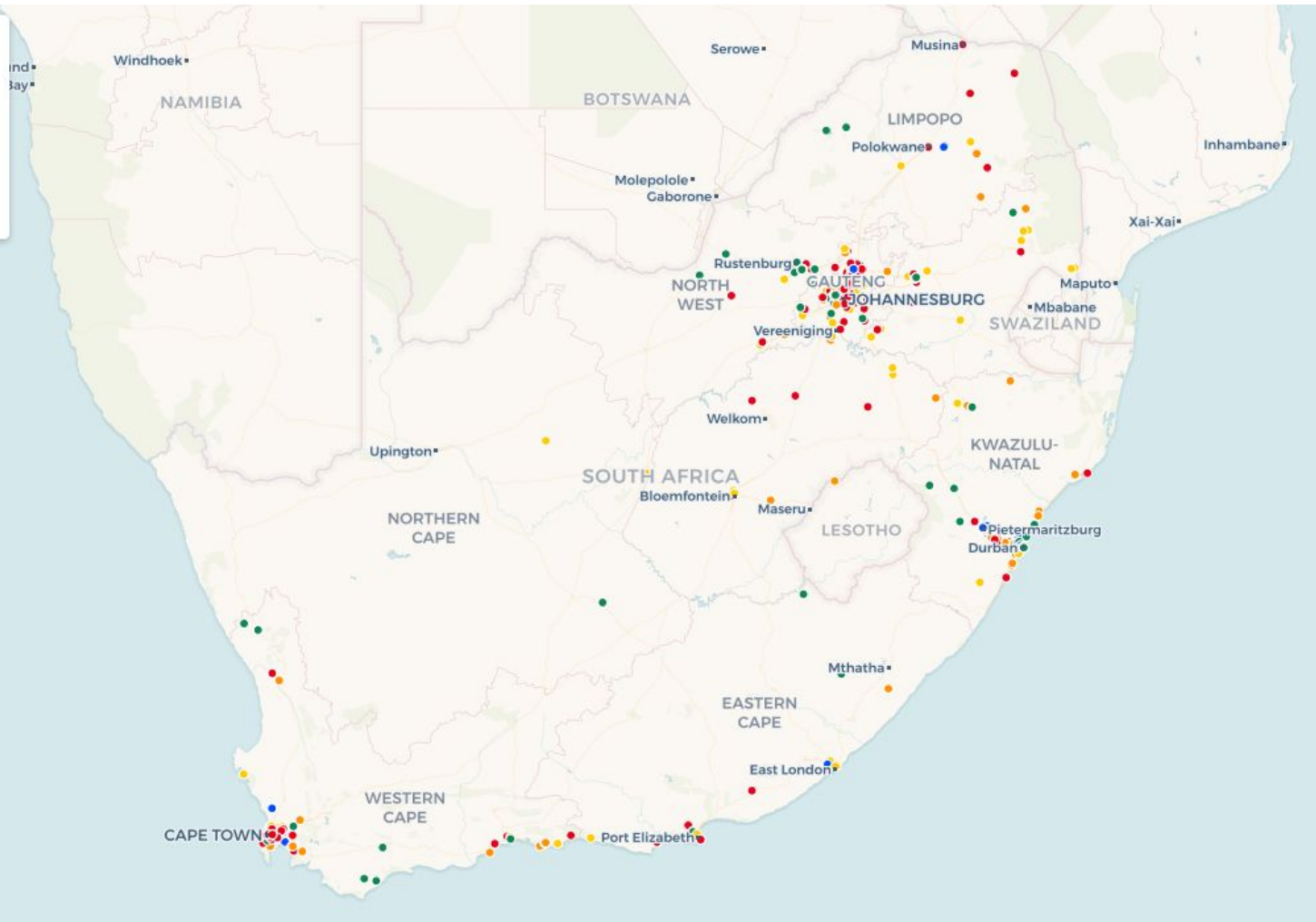
### Central



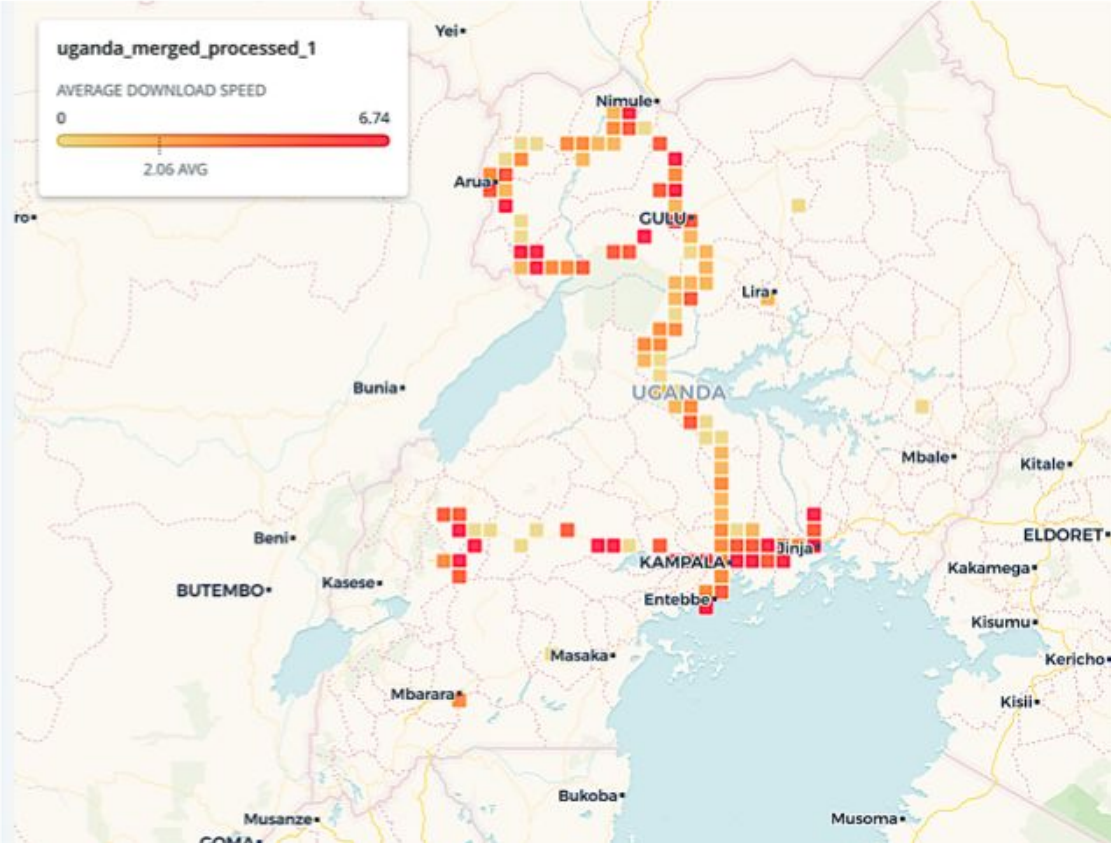
### Southfrica-Netradar-2013-2017

AVERAGE DOWNLOAD SPEED

- VODACOM
- CELL C
- MTN
- TELKOM MOBILE / 8.TA / TELEKOM SA
- ELISA
- NEOTEL

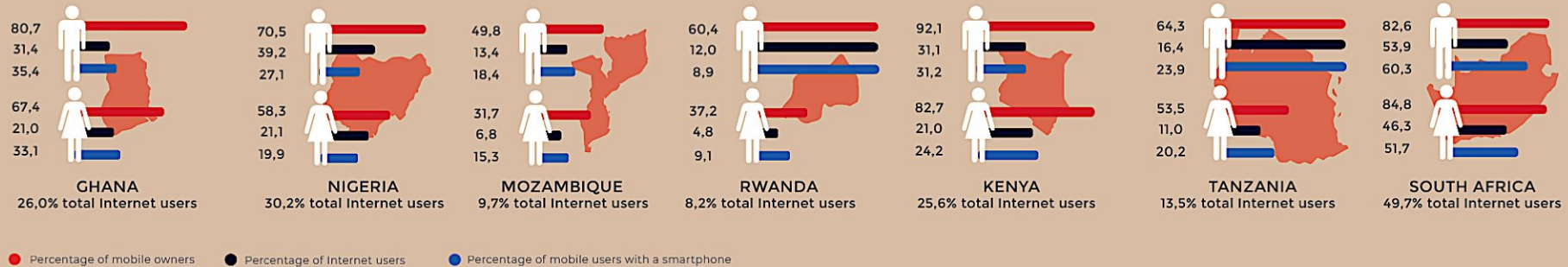


# Rural vs Urban Performance: Uganda



## AFRICA

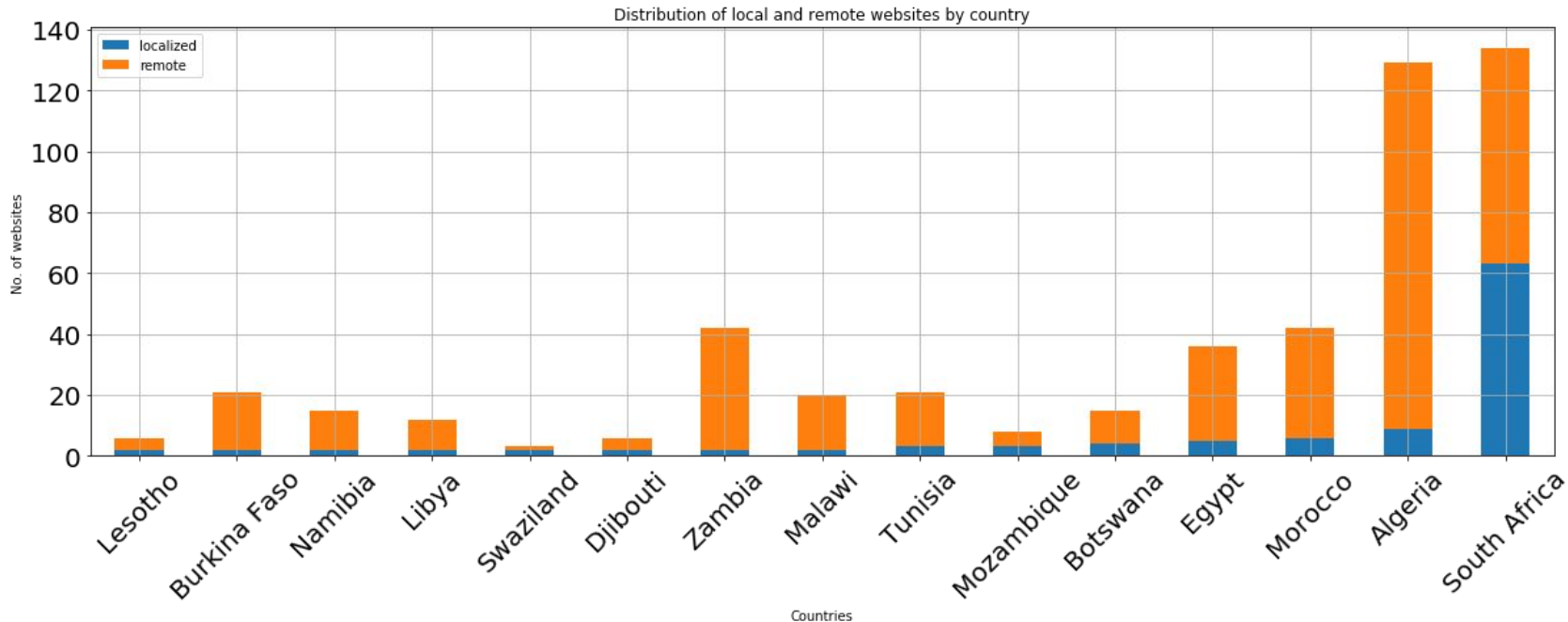
*Rwanda has the lowest Internet penetration and greatest gender disparity*



Source: AfterAccess survey <http://afteraccess.net/>

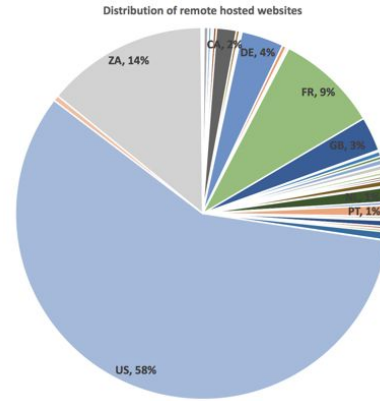


# Africa News Sites

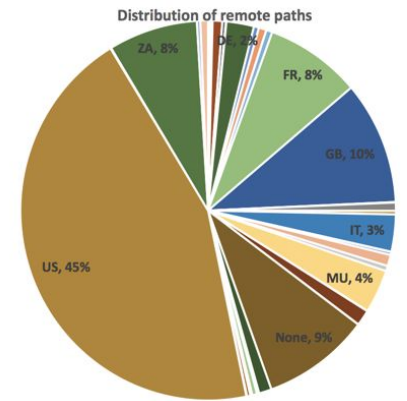


# Geolocation of African news hosting

Hosting distribution of African news website



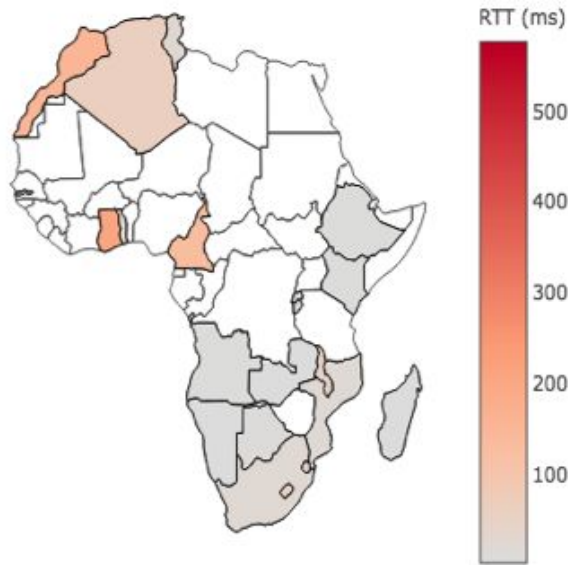
Country-level distribution of remotely hosted African news websites



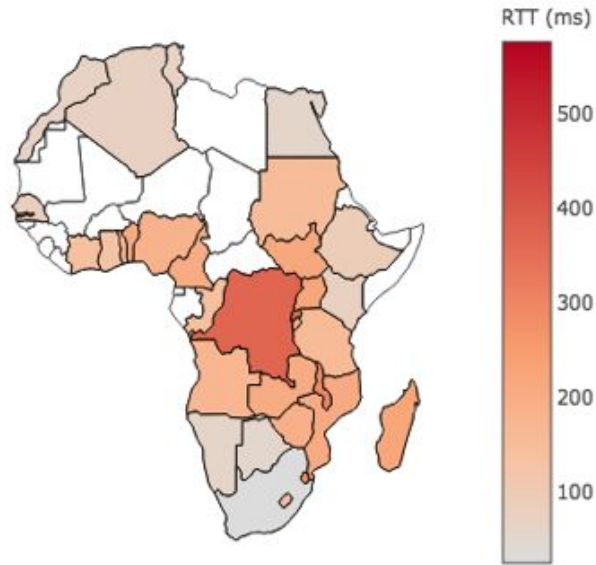
Country-level distribution of Internet paths (IP hops) for accessing African websites from African countries.

# RTTs to news websites

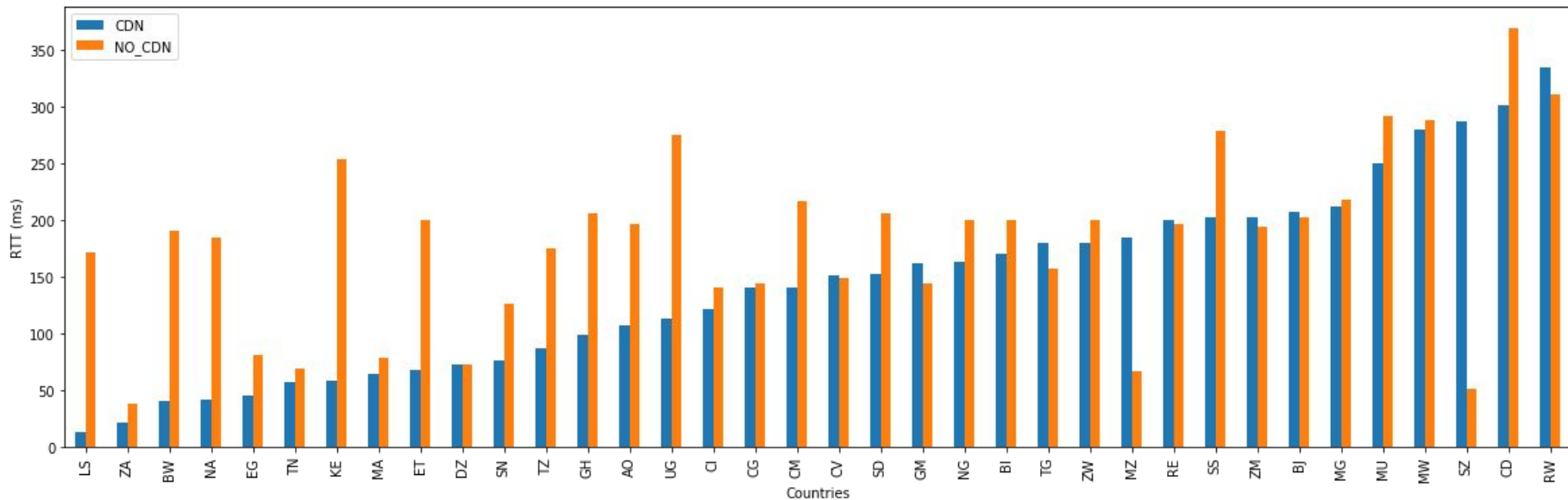
RTT to locally hosted news websites



RTT to remotely hosted news websites



# CDN vs non-CDN RTTs



# World Internet Data Explorer -



# W

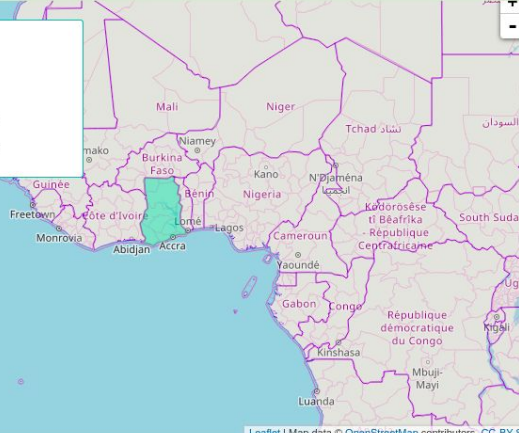
WIDER About Start typing

### Ghana

Country in [Africa](#), [Earth](#)

**8,364,522** Internet users

39 networks (ISPs)  
12,310 IPv6 users



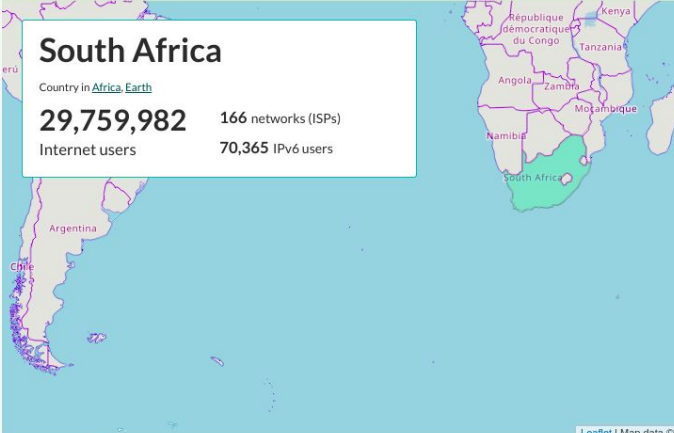
Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA

### South Africa

Country in [Africa](#), [Earth](#)

**29,759,982** Internet users

166 networks (ISPs)  
70,365 IPv6 users



Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA

Interact with charts and statistics for additional information.

#### Internet Access

\*Values that are beneath one percent are rounded down to 0.

#### Internet Users

**8,364,522** People

Ratio of Africa

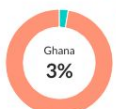


Chart Options

- Ghana
- Africa

#### Internet Access

\*Values that are beneath one percent are rounded down to 0.

#### Internet Users

**29,759,982** People

Ratio of Africa




Chart Options

- South Africa
- Africa

**MLAB**

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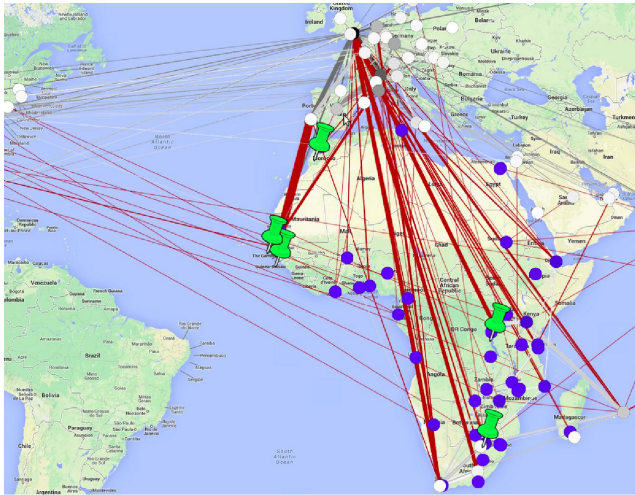
Thank You!

@josiahchavula

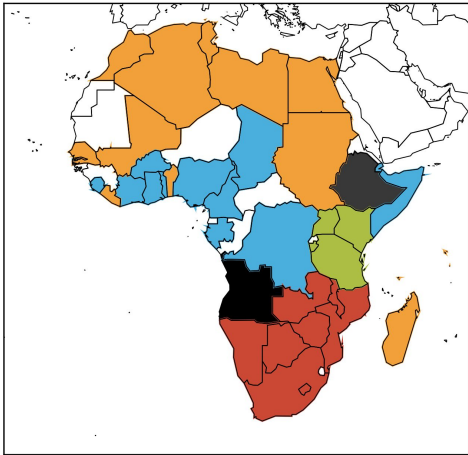
@mskiden



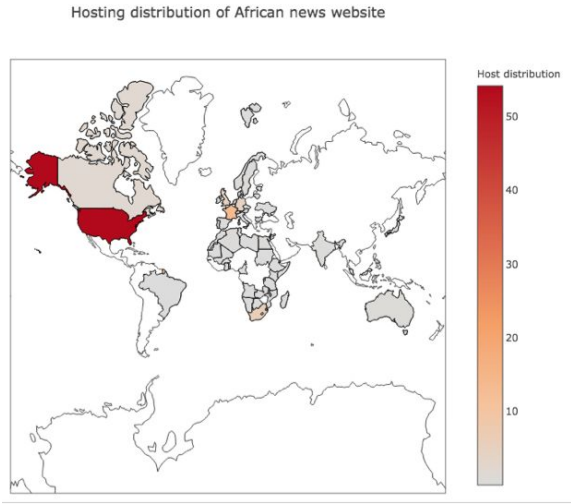
# Africa's Routing, Latency and Hosting



Circuitous Routing

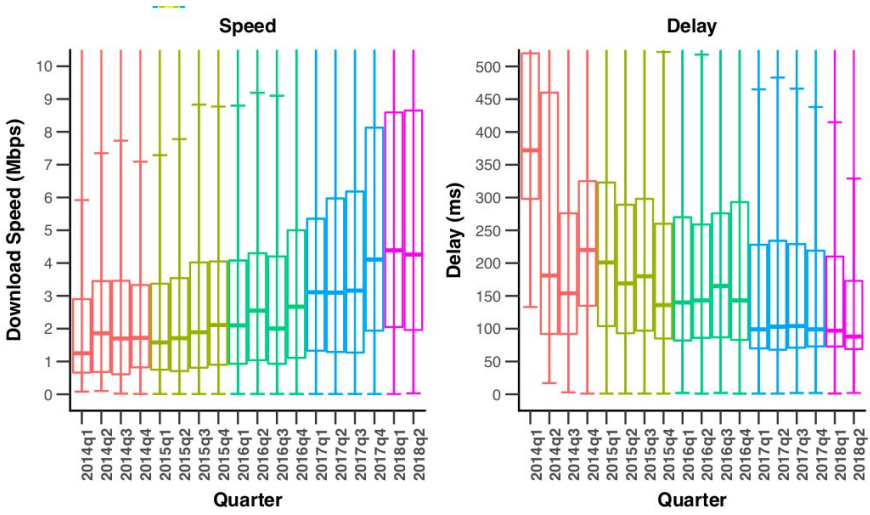


Latency Clusters

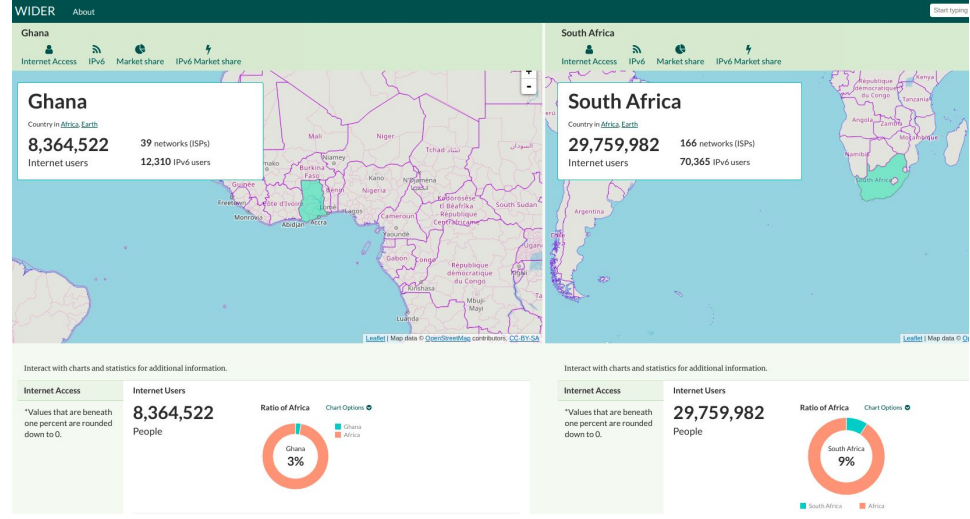


Remote Hosting

# Trends & Data Visualization



Speed and Delay Trends in Africa 2014-2018



World Internet Data Explorer (WIDER): [wider.isoc.org.za](http://wider.isoc.org.za)



**MLAB**

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Thank You!

@josiahchavula

@mskiden

