

Towards an African Observatory and Connectivity Index

Theophilus A. Benson (CMU)

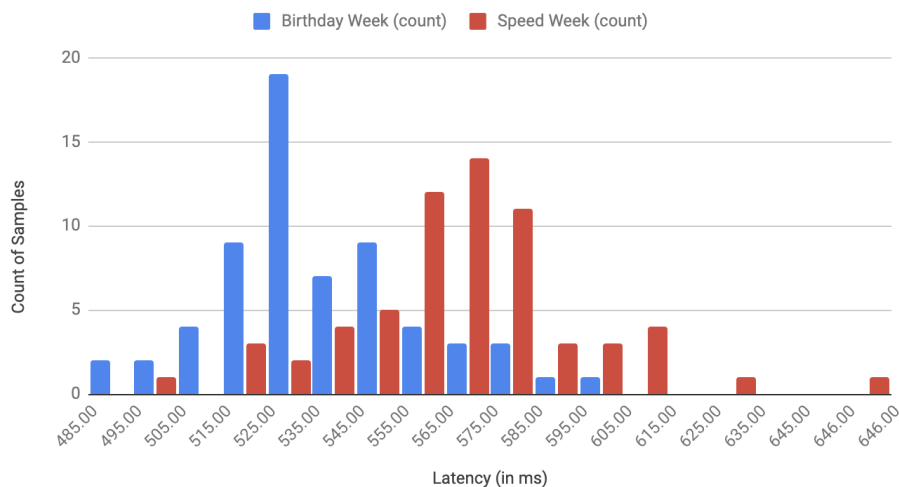
Traffic in Global South (Africa) Remains Non-local (Tromboning)

Unnecessary increase in EU traffic

**Performance Implications for Users
(longer RTT, lower BW)**

**Performance Implications for Providers
(longer RTT, lower BW)**

P95 TCP Connect Improvements since Speed Week - Africa



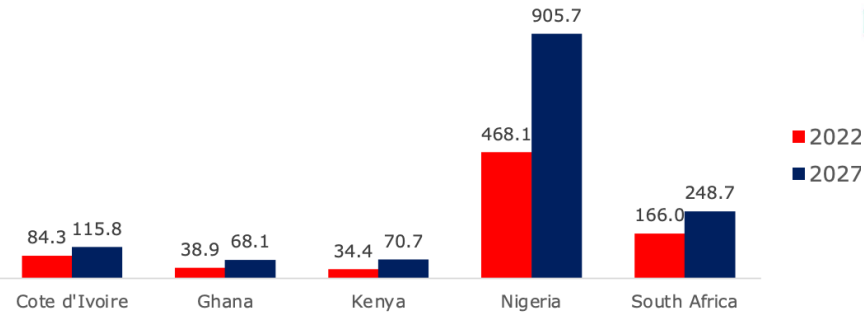
<https://blog.cloudflare.com/african-traffic-growth-and-predictions-for-the-future/>

<https://blog.cloudflare.com/two-weeks-later-finding-and-eliminating-long-tail-latencies/>

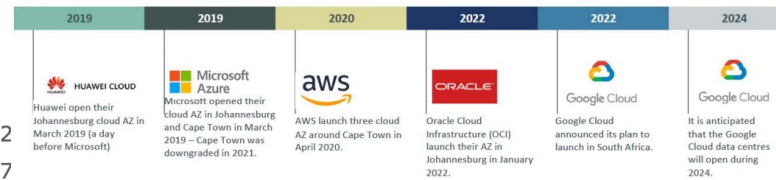
Rich Tapestry of Options

Significant Content Growth in W. Africa

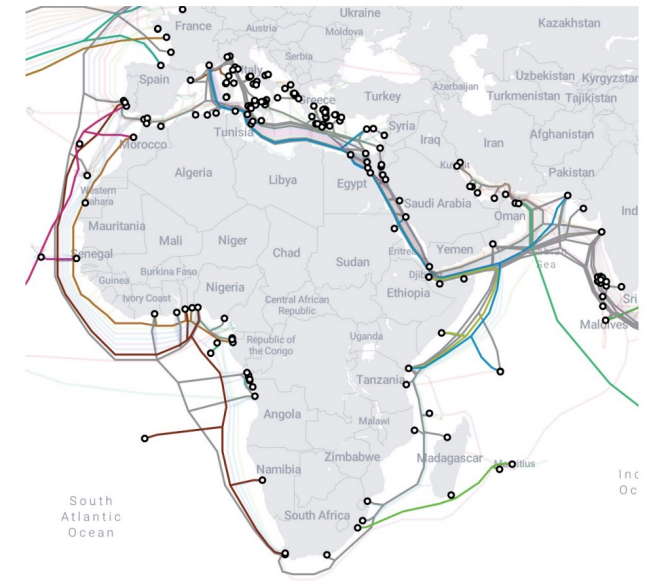
Forecasted Video Streaming Market (2022 - 2027), \$m



DCNs growing in S. Africa



Lots of SubSea + DCN Investments



Incentivize Content providers to peer @ IX in Africa

Remote-peer to keep traffic local

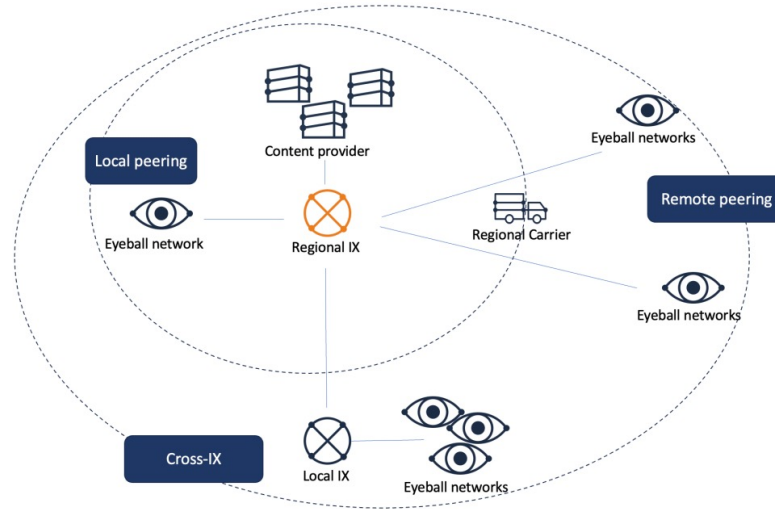
Promote local IXs

Key Challenges: Keeping Traffic Local

**Content providers
@ IX in Africa**

**Remote-peer to keep
traffic local**

Promote local IXs



**Need a richer terrestrial
ecosystem**

**Which Provider to
incentivize?**

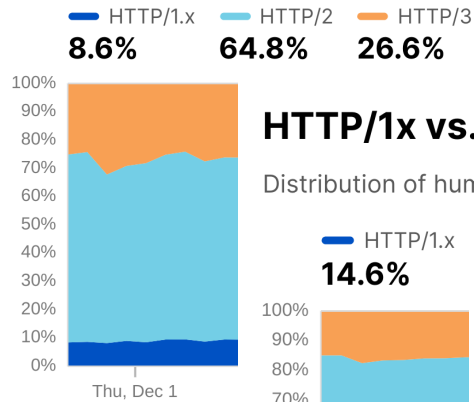
**When is Remote Peering
better than local ISP/EU-
routes**

**reduce IX-startup overheads
(operational overheads)**

The Continent is not Monolithic

HTTP/1x vs. HTTP/2 vs. HTTP/3 in Kenya

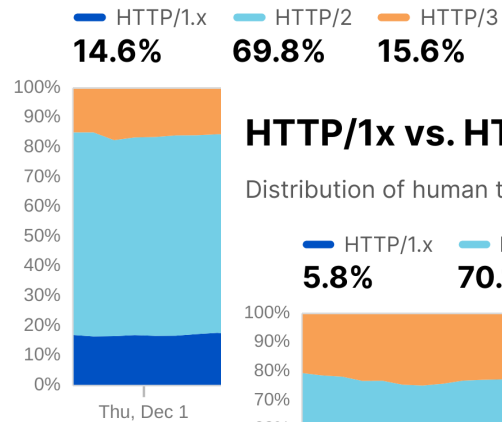
Distribution of human traffic by HTTP version



Cloudflare F

HTTP/1x vs. HTTP/2 vs. HTTP/3 in Nigeria

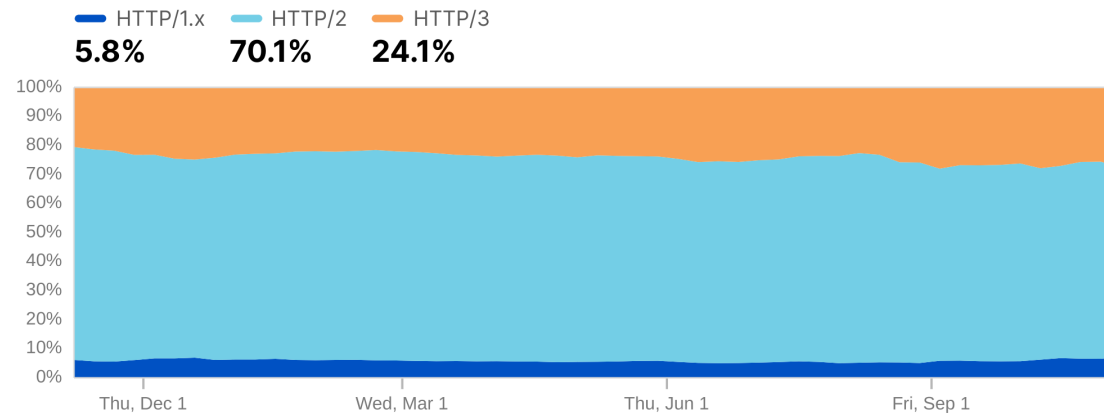
Distribution of human traffic by HTTP version



Cloudflar

HTTP/1x vs. HTTP/2 vs. HTTP/3 in South Africa

Distribution of human traffic by HTTP version



Cloudflare Radar

Last 12 months | Nov 6 2023 15:32 UTC

The Continent is not Monolithic

Bandwidth in Kenya

IQI estimated download speed under average utilization

75th percentile 16 Mbps
Median 7 Mbps
25th percentile 4 Mbps



Bandwidth in South Africa

IQI estimated download speed under average utilization

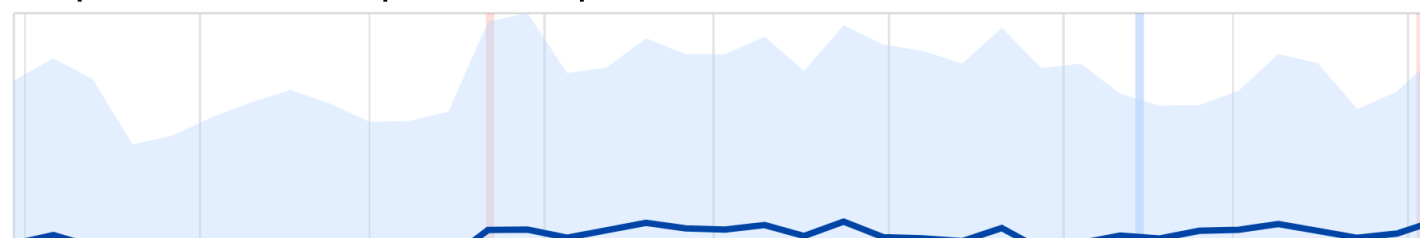
75th percentile 38 Mbps
Median 19 Mbps
25th percentile 9 Mbps



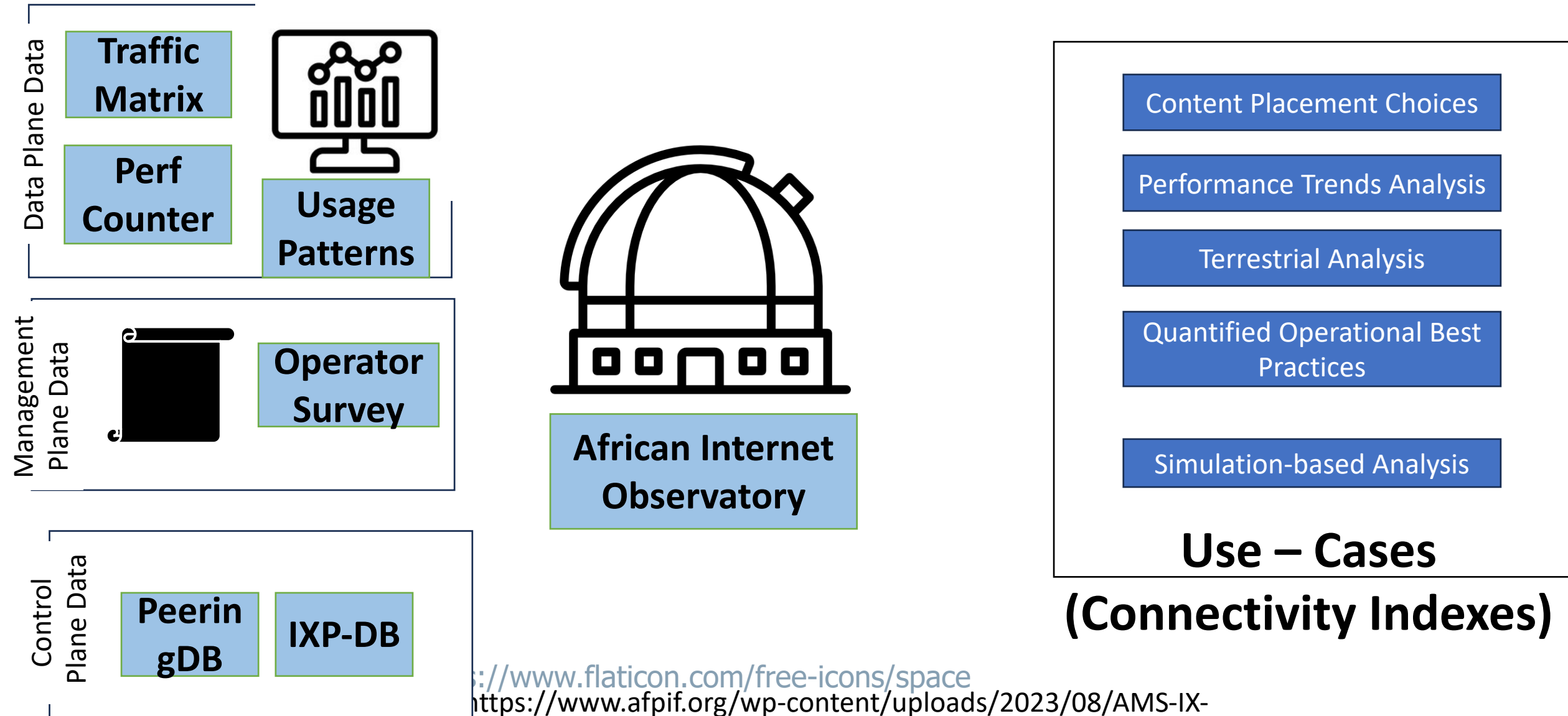
Bandwidth in Nigeria

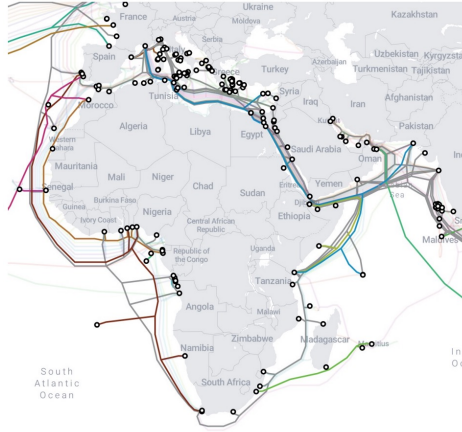
IQI estimated download speed under average utilization

75th percentile 8 Mbps
Median 4 Mbps
25th percentile 3 Mbps



The Path Forward ... (A Data-Driven Approach)





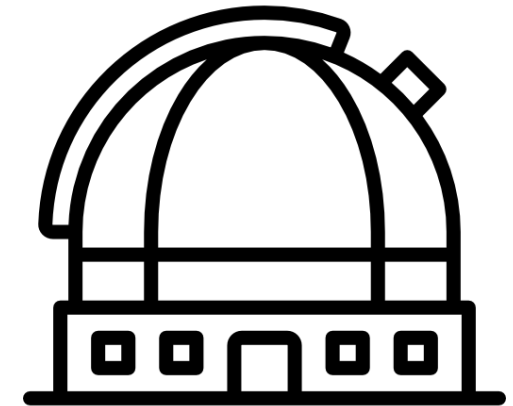
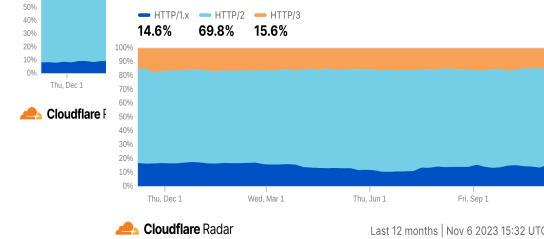
HTTP/1x vs. HTTP/2 vs. HTTP/3 in Kenya

Distribution of human traffic by HTTP version



HTTP/1x vs. HTTP/2 vs. HTTP/3 in Nigeria

Distribution of human traffic by HTTP version



**Content Provider-
driven Change**

Terrestrial

EndUser

**The Continent is
not monolithic**

**Region
Specific**

**Context
Aware**

**African Internet
Observatory**

**Active
Measurements**

**Passive
Measurements**