

African Network Geography Update

Patrick Christian

AfPIF Accra

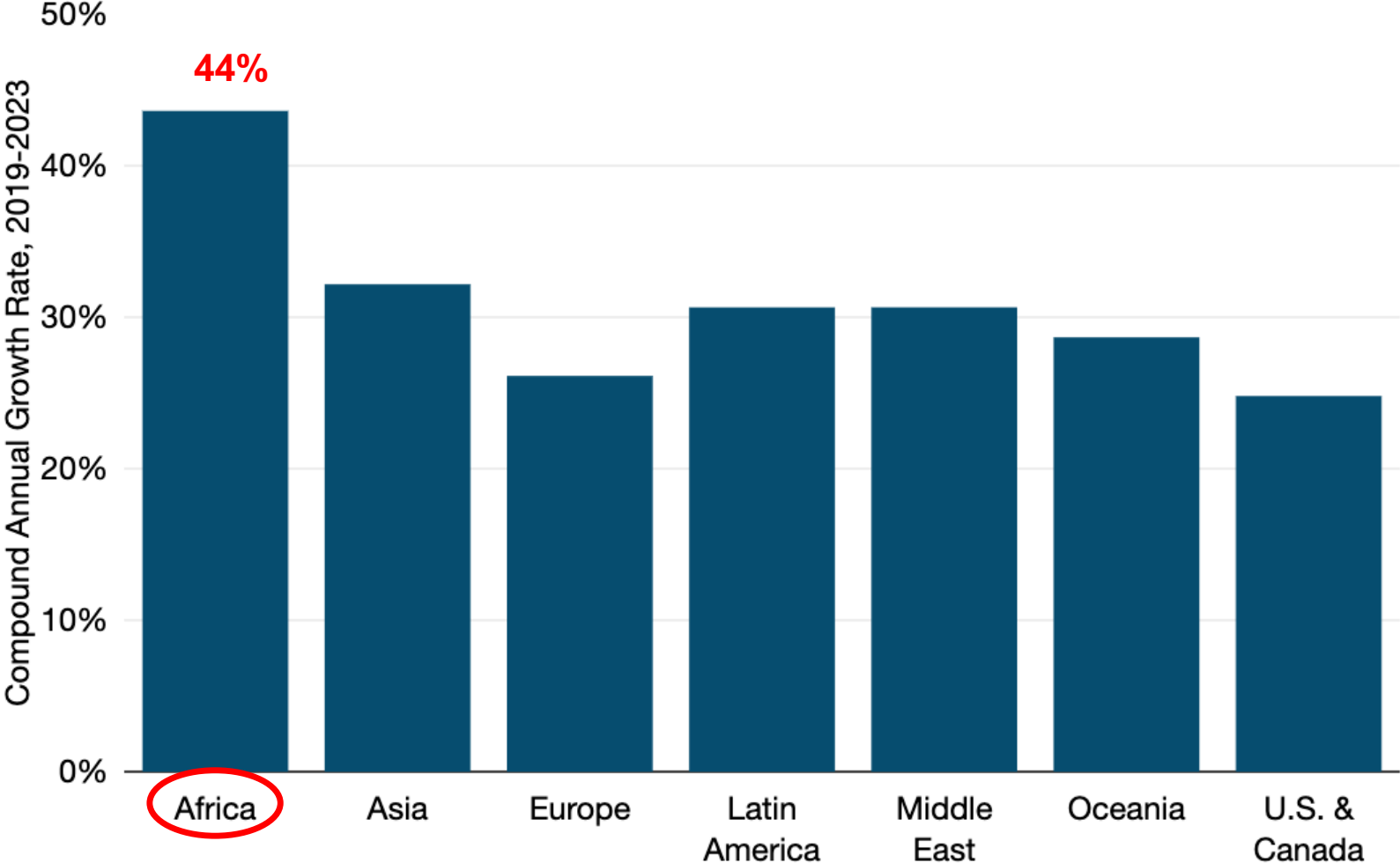
August, 2023

What we'll cover

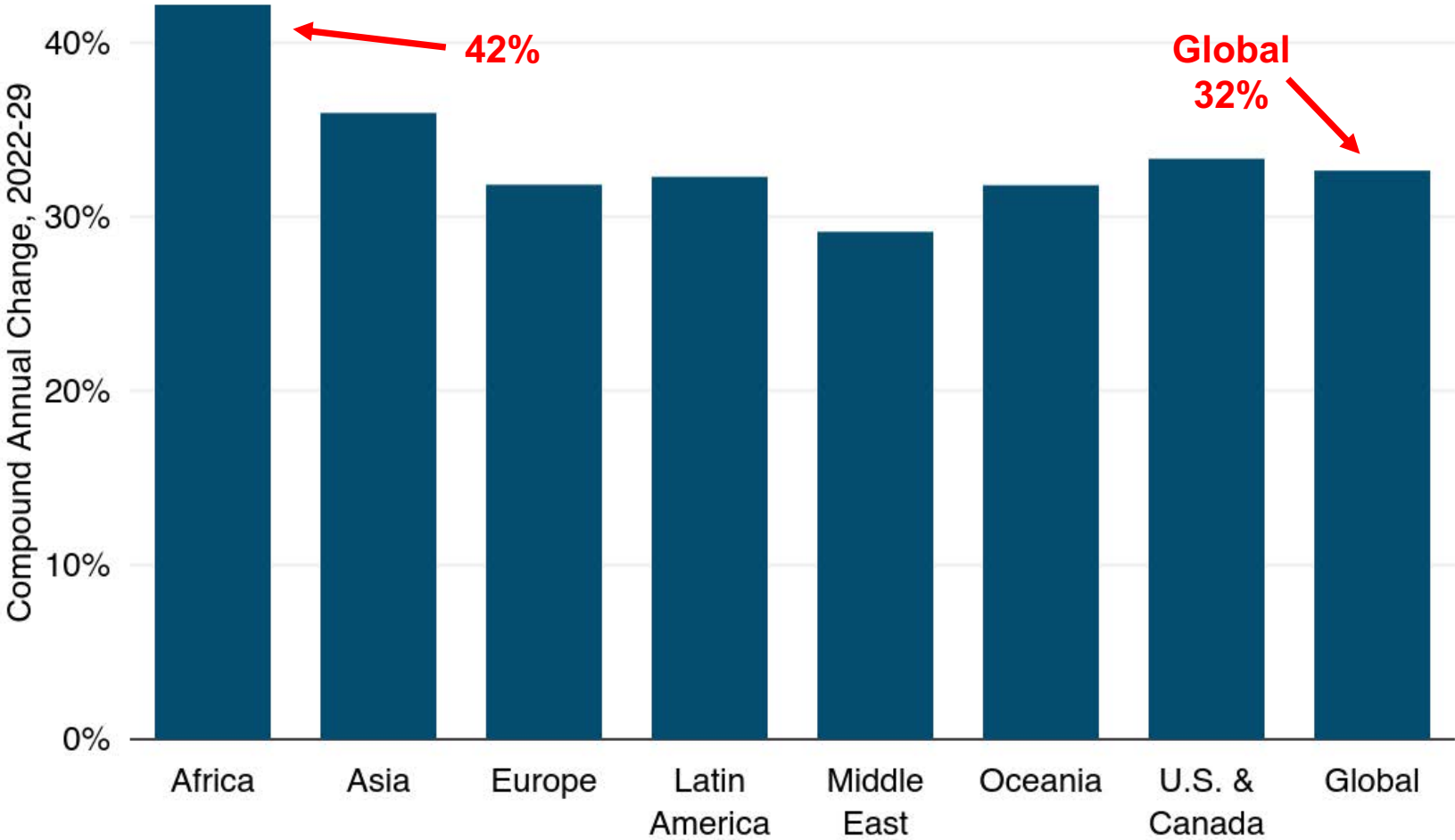
- **Global network trends**
 - How fast is int'l IP bandwidth growing? Where are sub cables landing?
 - Where are content DCs being built? How fast are global prices falling
- **African Bandwidth trends**
 - Intra-African int'l capacity growth vs to Europe
 - Capacity and pricing changes
- **Localized Content Growth**
 - Infrastructure growth – IXs, CDNs/PoPs then DC builds
 - Content provider ecosystems
- **End-user Demand**
 - Growth of 4G and fixed broadband, FTTH
- **So what's going to happen when 2Africa comes online?**
 - Pricing? International capacity growth? Better internet?

Global Network Trends

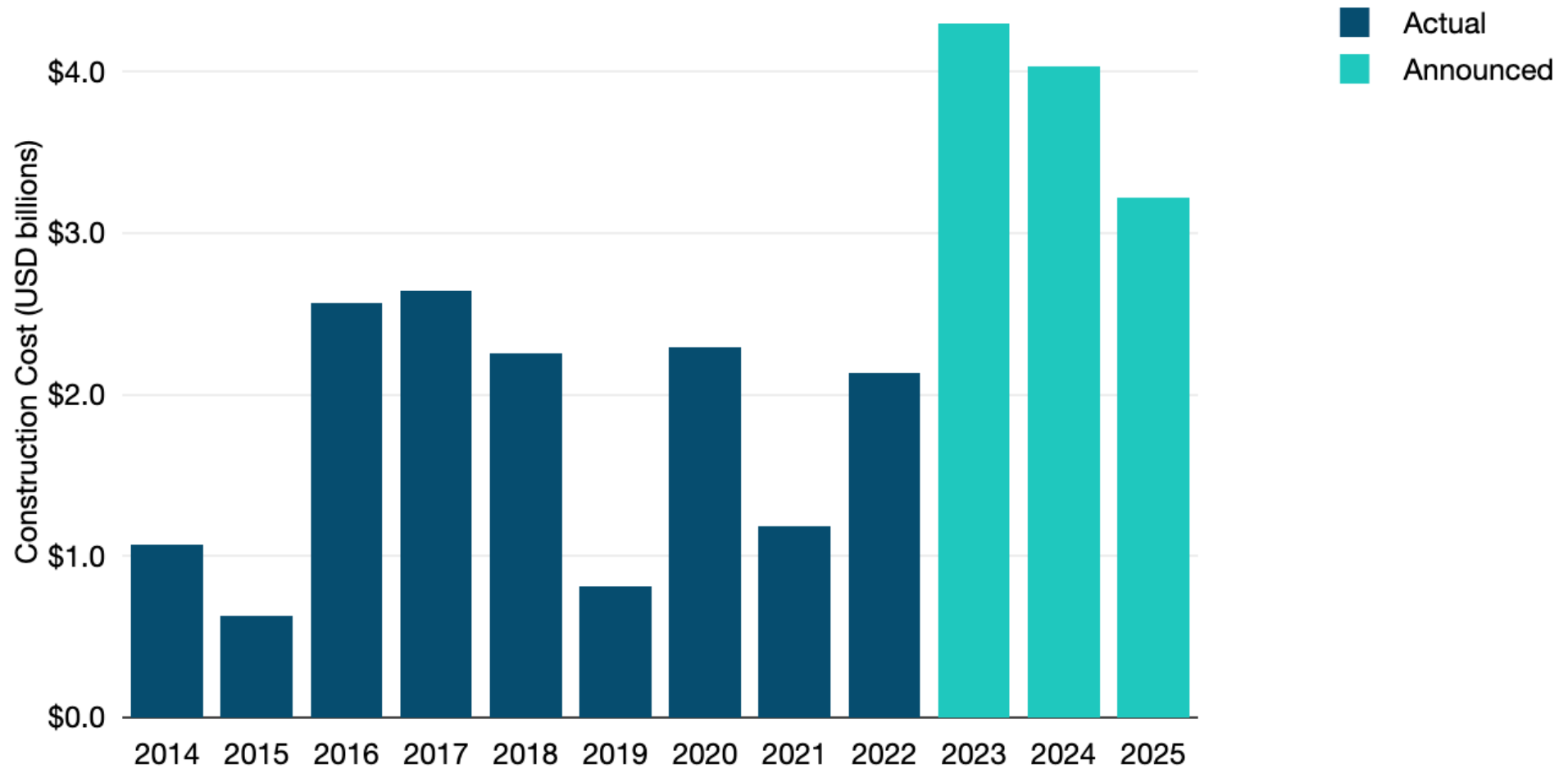
International IP bandwidth growth by region



Forecasted bandwidth growth by region



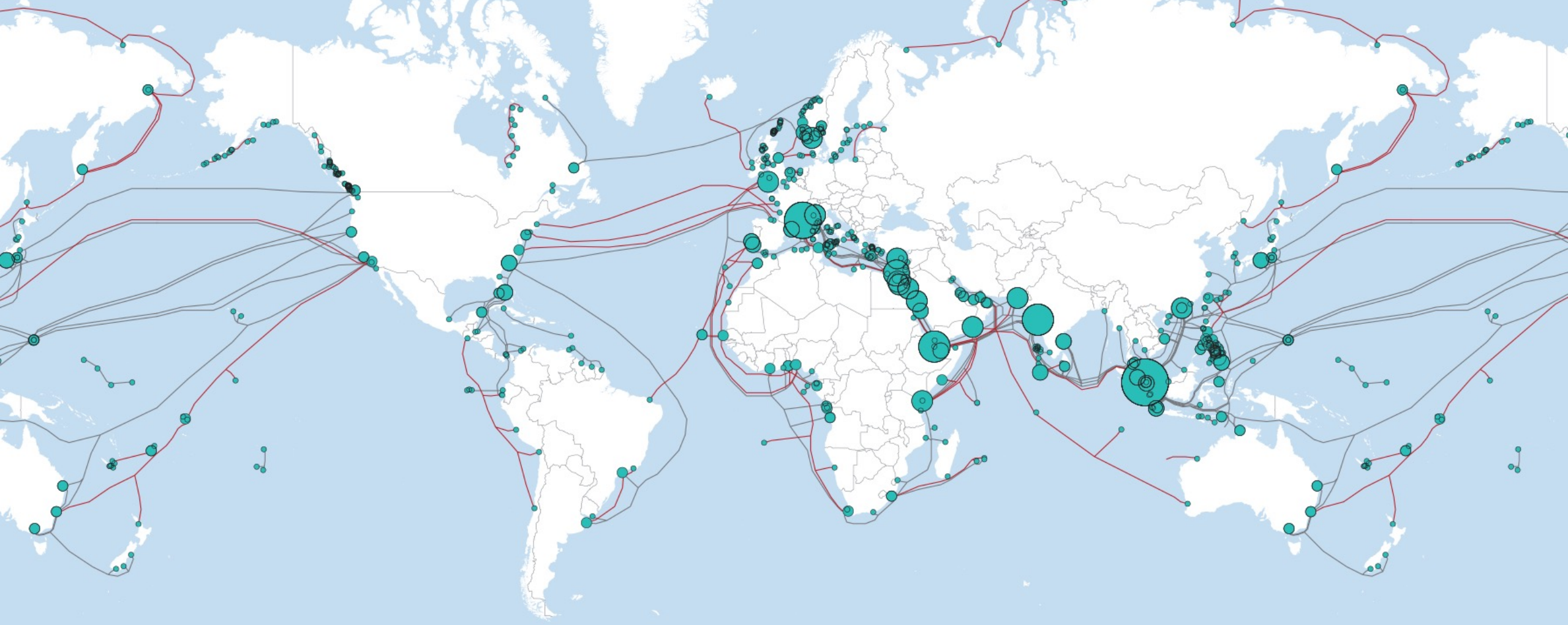
Submarine cable investment



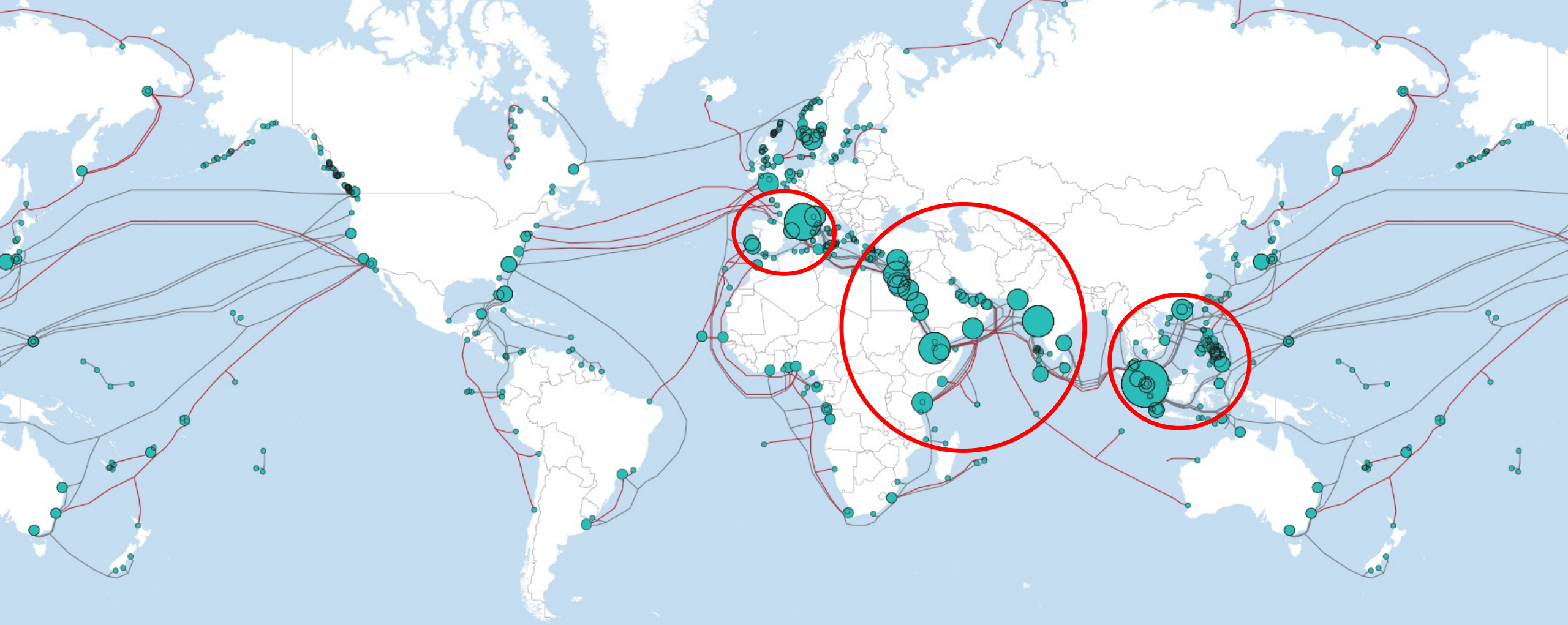
Recently activated cable systems (2021-2023)



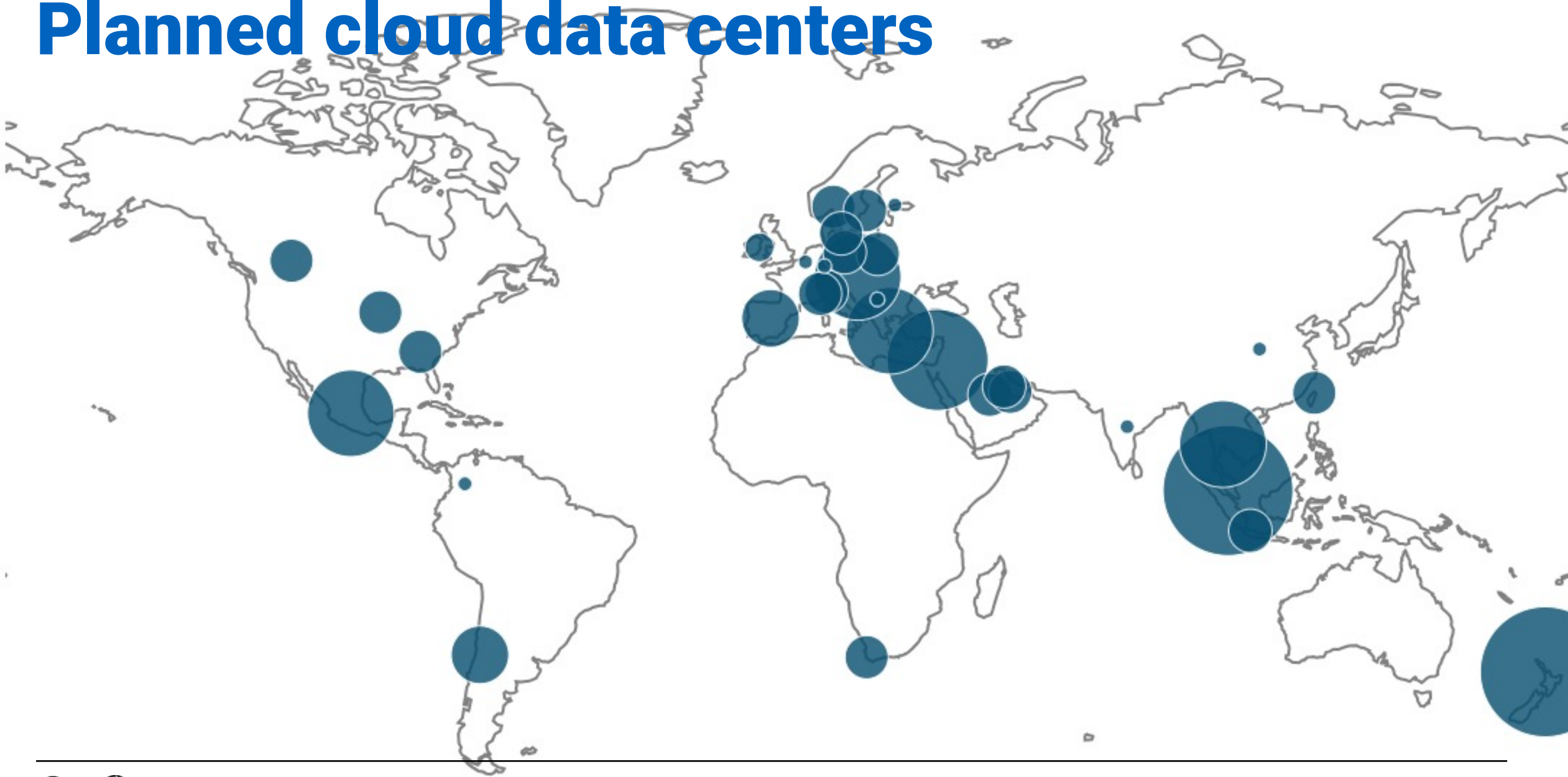
Planned & recent cable systems



Planned & recent cable systems

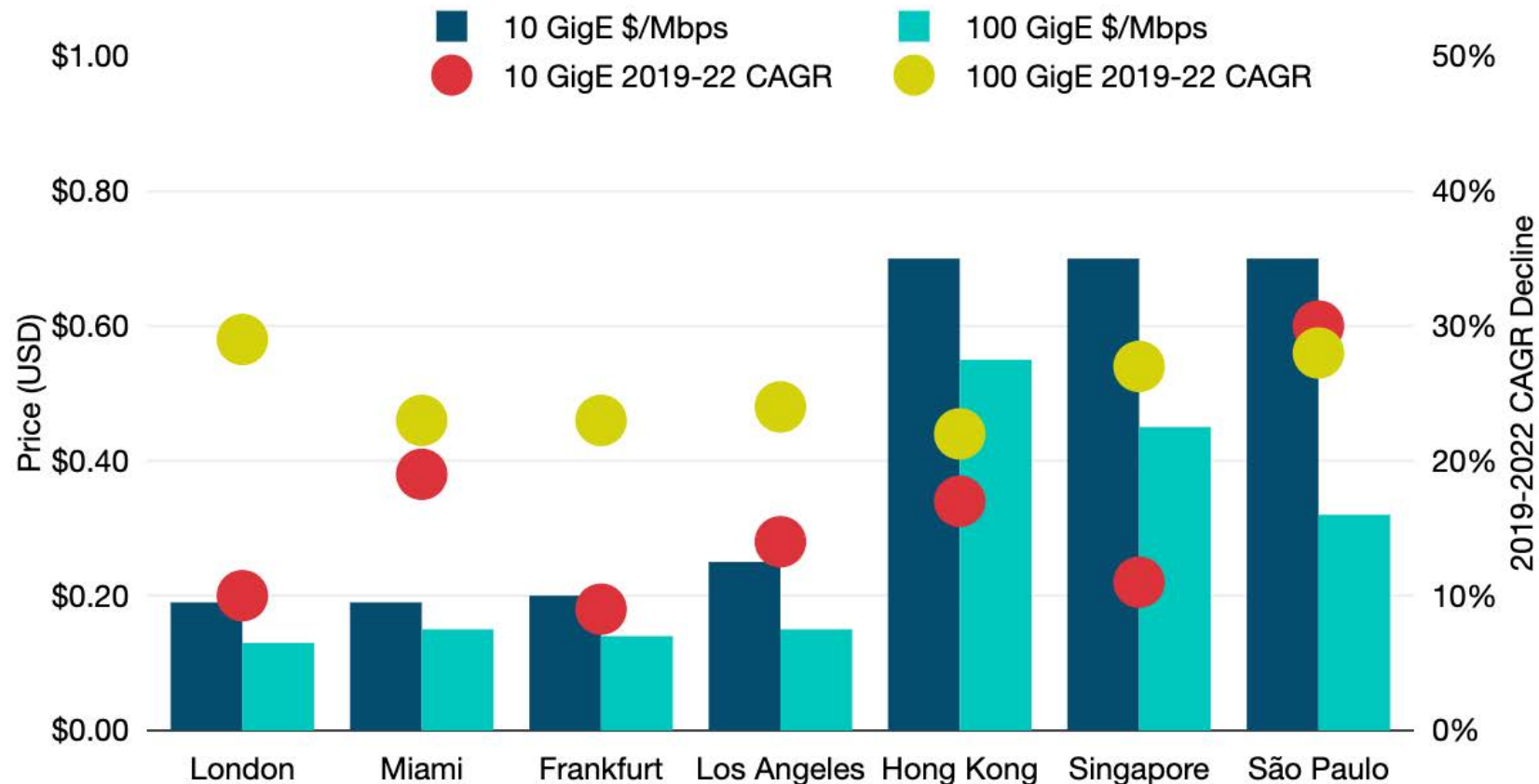


Planned cloud data centers



100 Gbps median prices and erosion rates varies by route

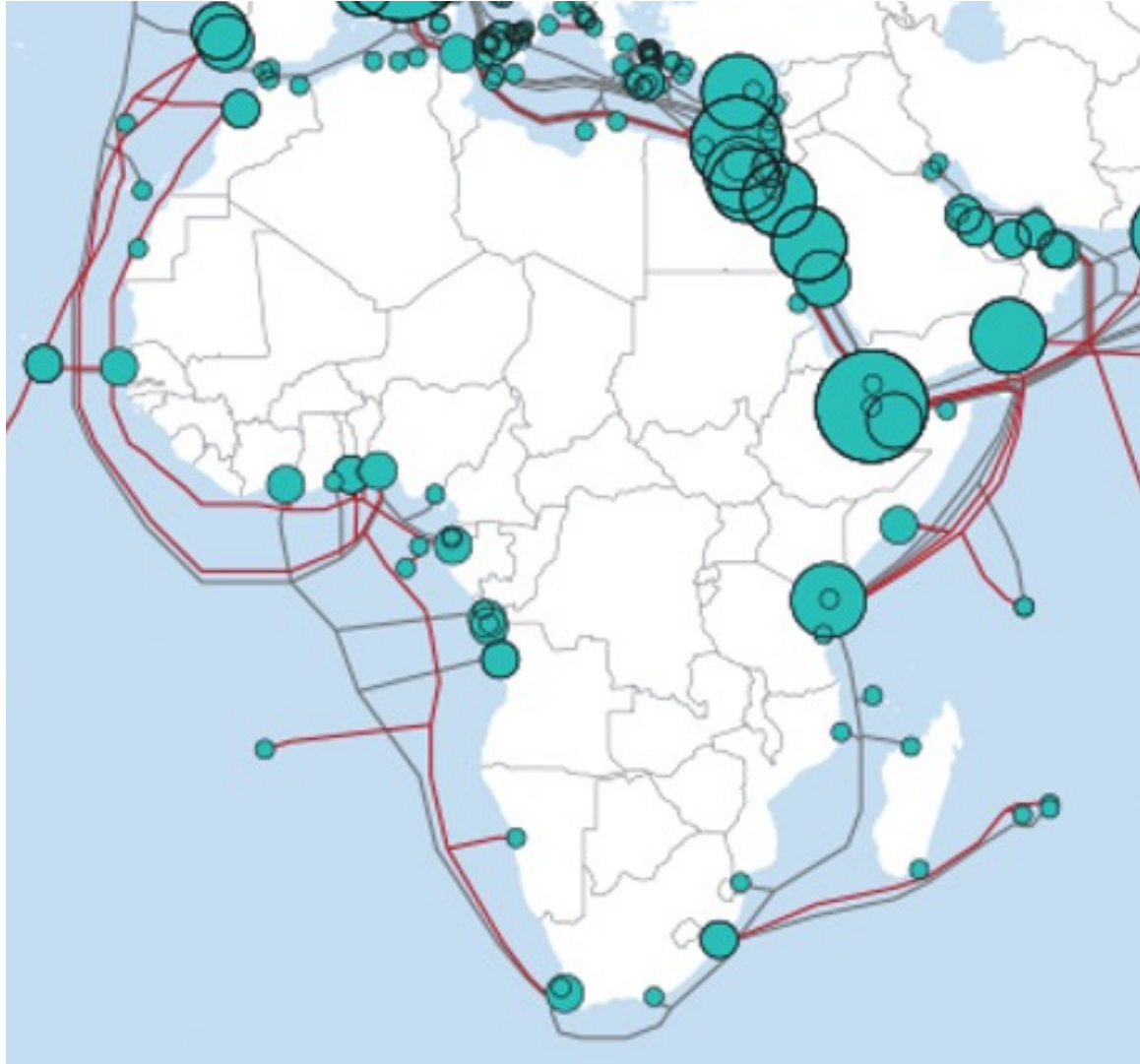
Weighted Median 100 Gbps Wave Prices & CAGR Price Decline on Select Int'l Routes



- Provider shift to primarily 100G reducing avg cost to carry traffic
- 100 GigE prices dropping faster than 10 GigE
- IPT has not experienced a slow down in price erosion like some wavelength markets due to inflation and supply chain constraints
- On avg MRC for 100G was 6.7 times MRC for 10G

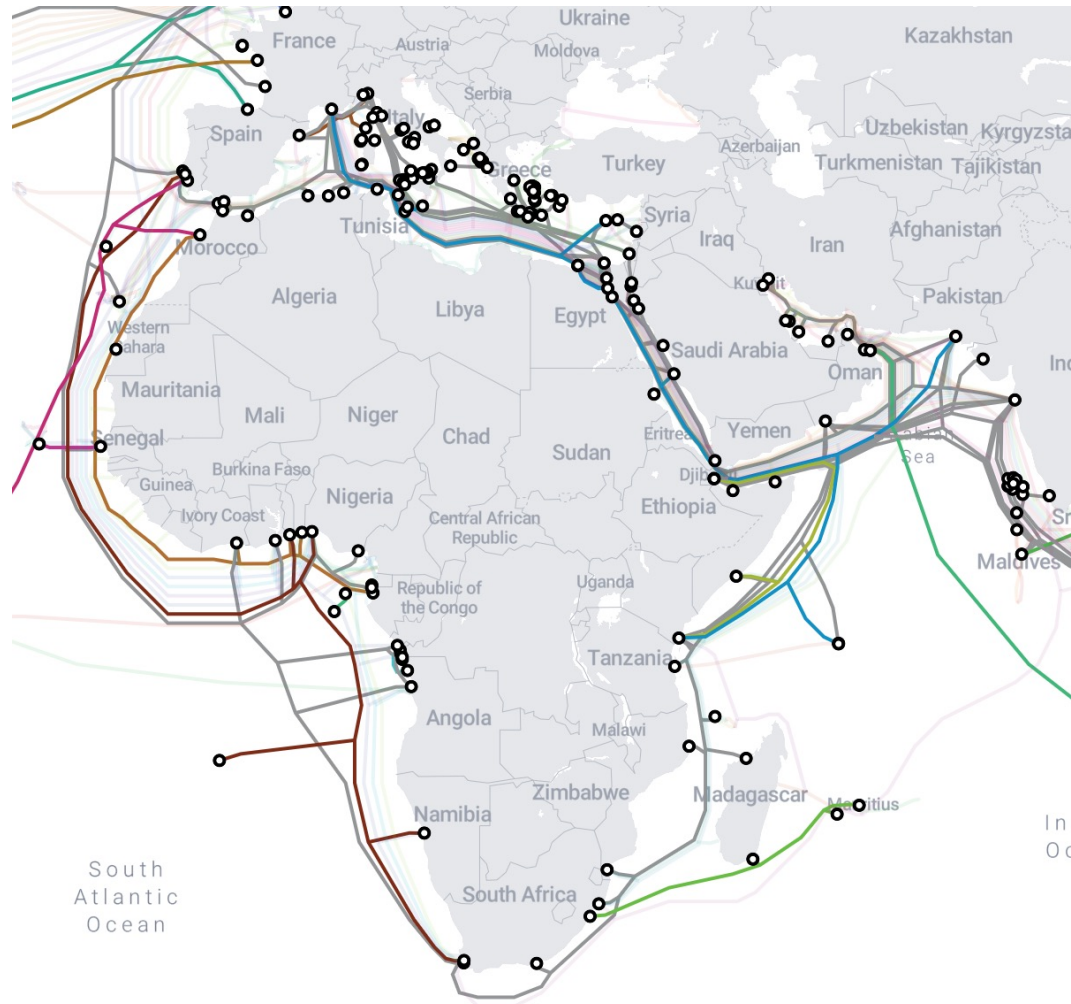
Africa Network Trends

Planned & recent sub cable landings



- Highest number of planned landings in East/NE
 - More concentrated—in just 3 locations
- West has similar number of landings but spread out among more than 12 countries
- South Africa has 5 different locations

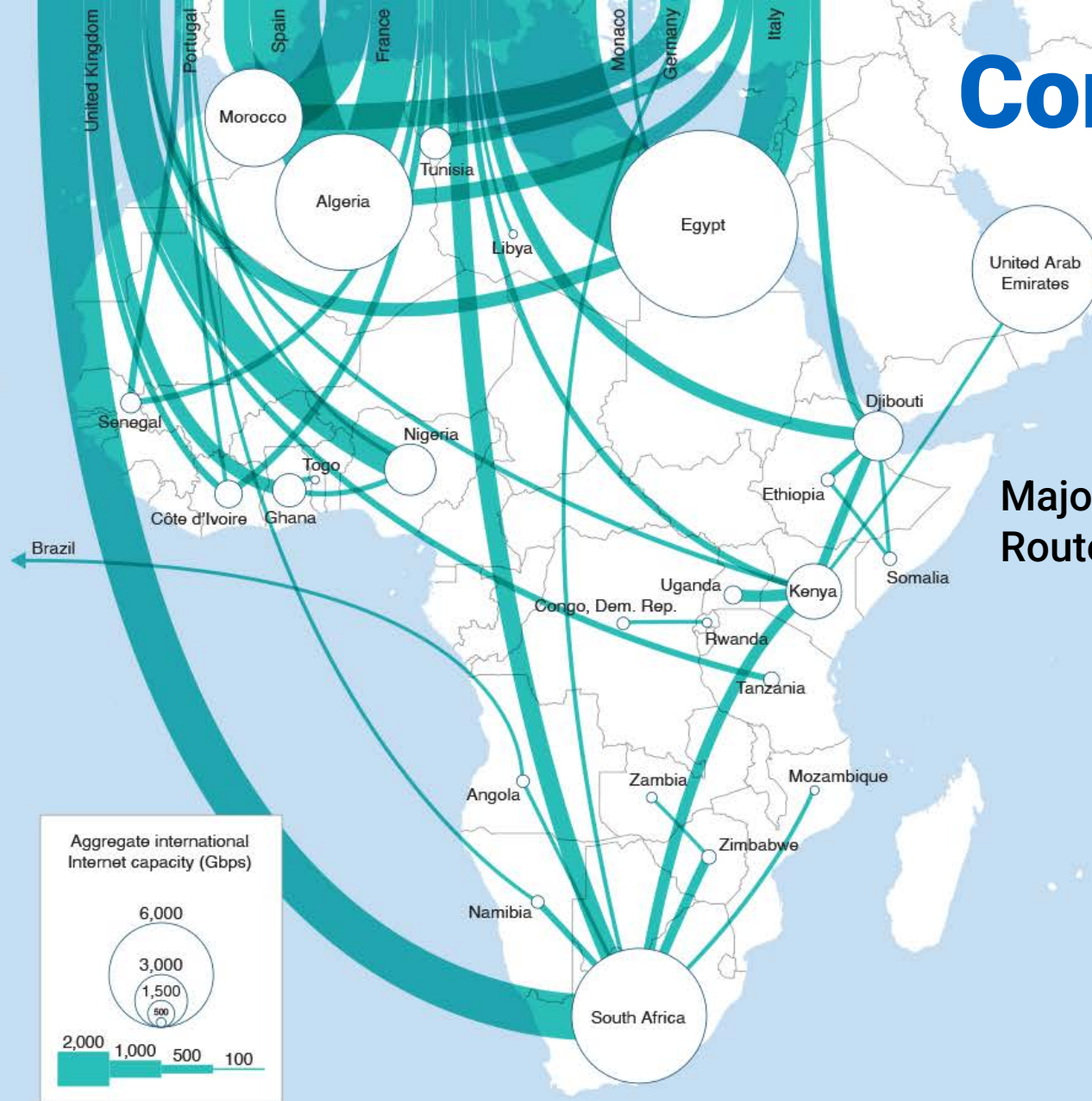
Major recent & planned cables in Africa & ME



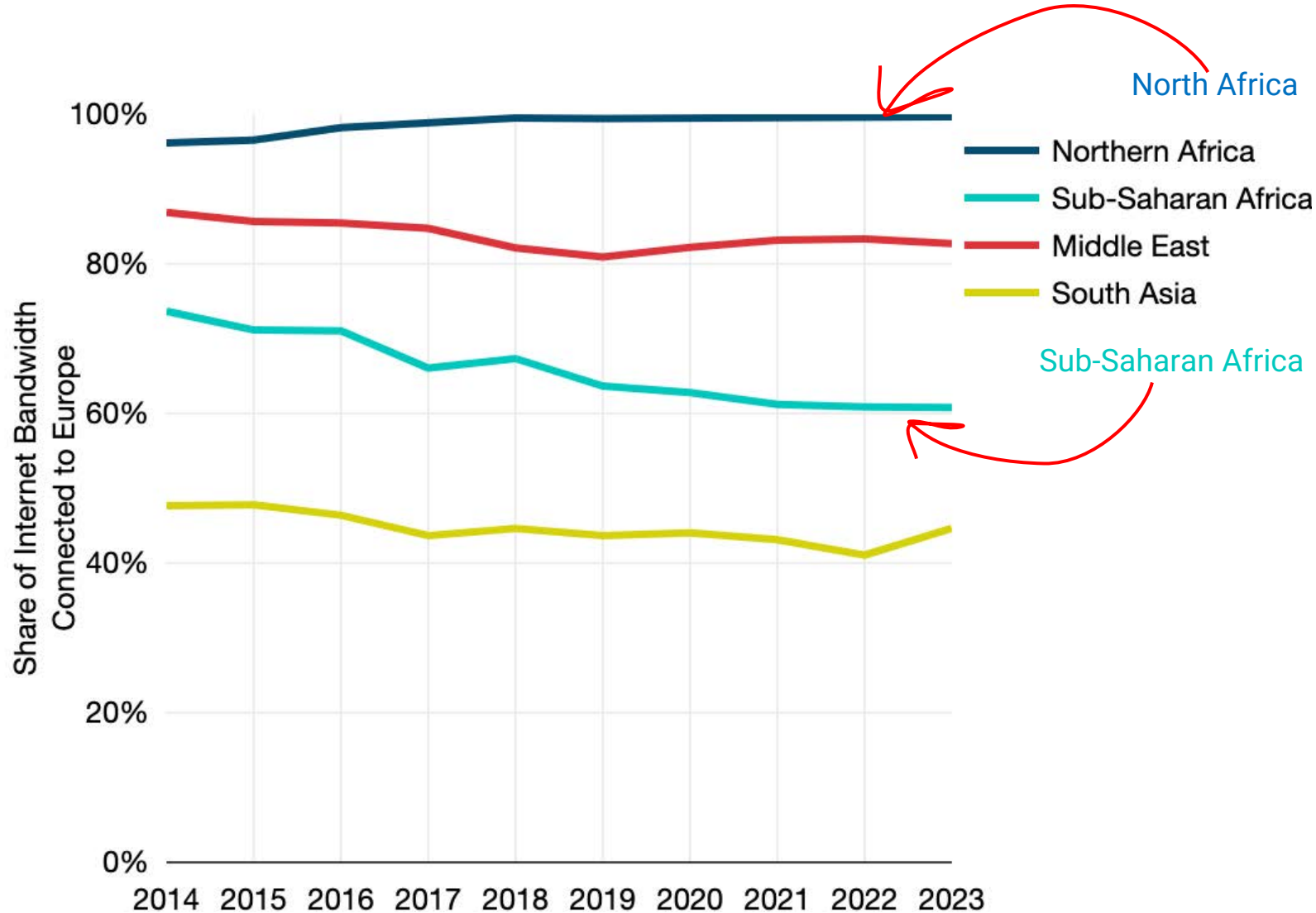
- **Equiano (2023)** – NG, NA, TG, ZA
- **2Africa (2023)** – 33 African, ME, Europe & South Asia
- **Africa-1 (2024)** – Egypt, Saudi Arabia, UAE, Djibouti, Kenya, PK
- **Raman (2024)** Saudi Arabia, Jordan, Oman, Djibouti, India
- **IEX (2024)** – Saudi Arabia, Djibouti, Egypt, Oman, India, Italy
- **Medusa (2024)** – N Africa + S Europe
- **SeaMeWe-6 (2025)** – EG, DJ, SA, PK, LK, IN, BD, MY, SG, FR

Connecting to Europe

Major International Internet Routes in Africa, 2023

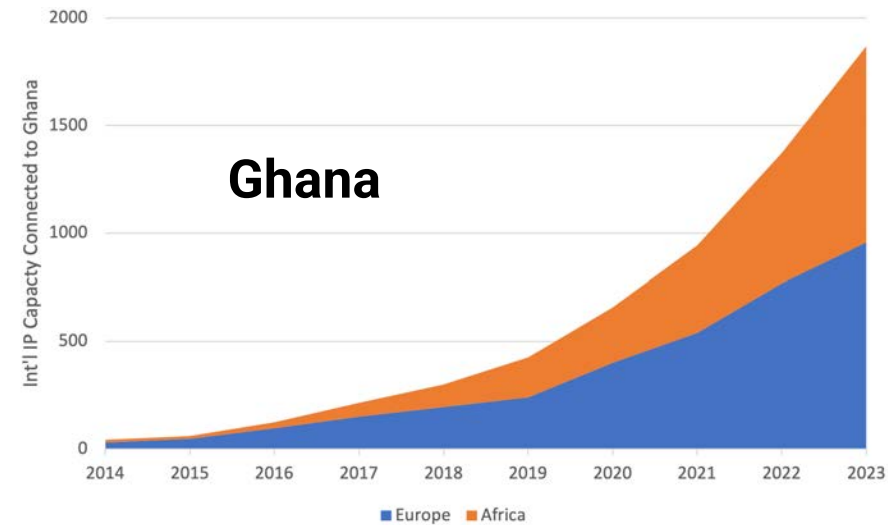
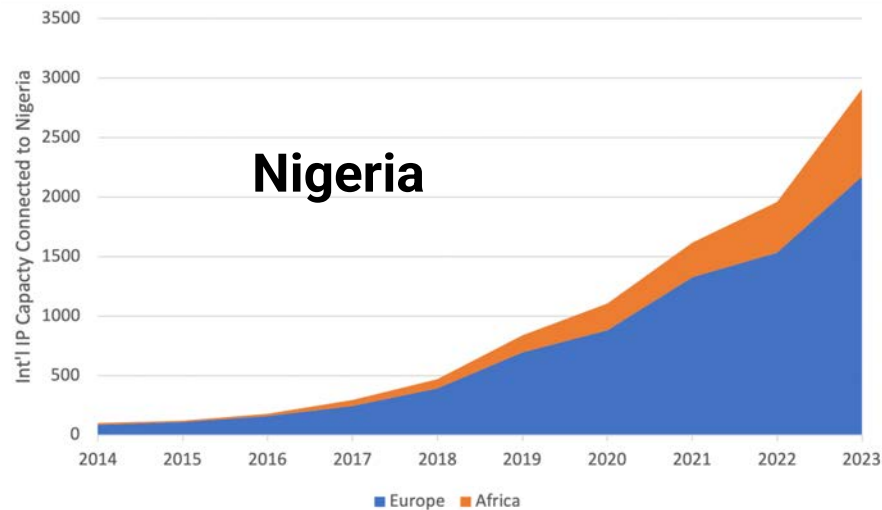
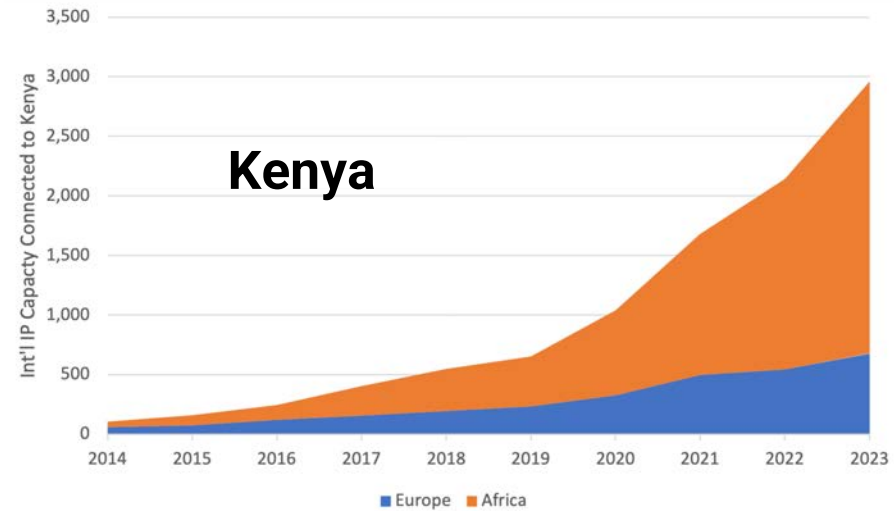
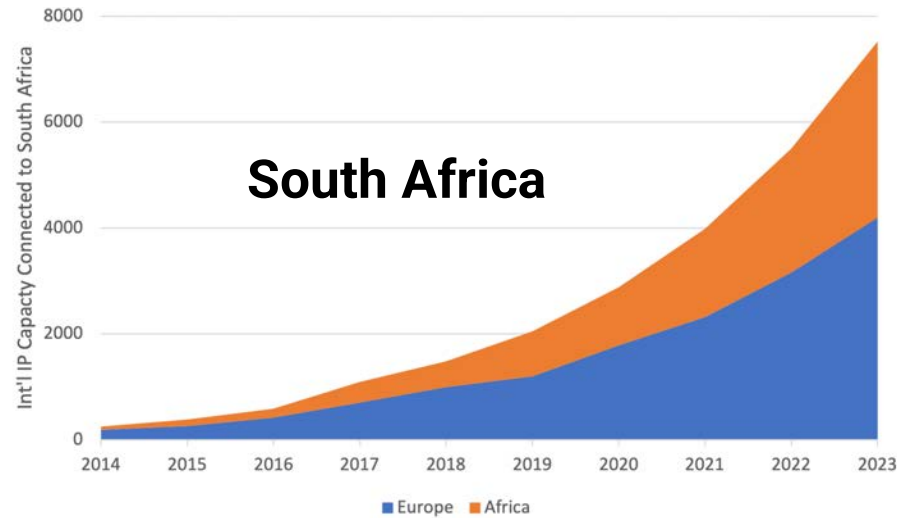


Changes in Subregional Capacity Connected to Europe

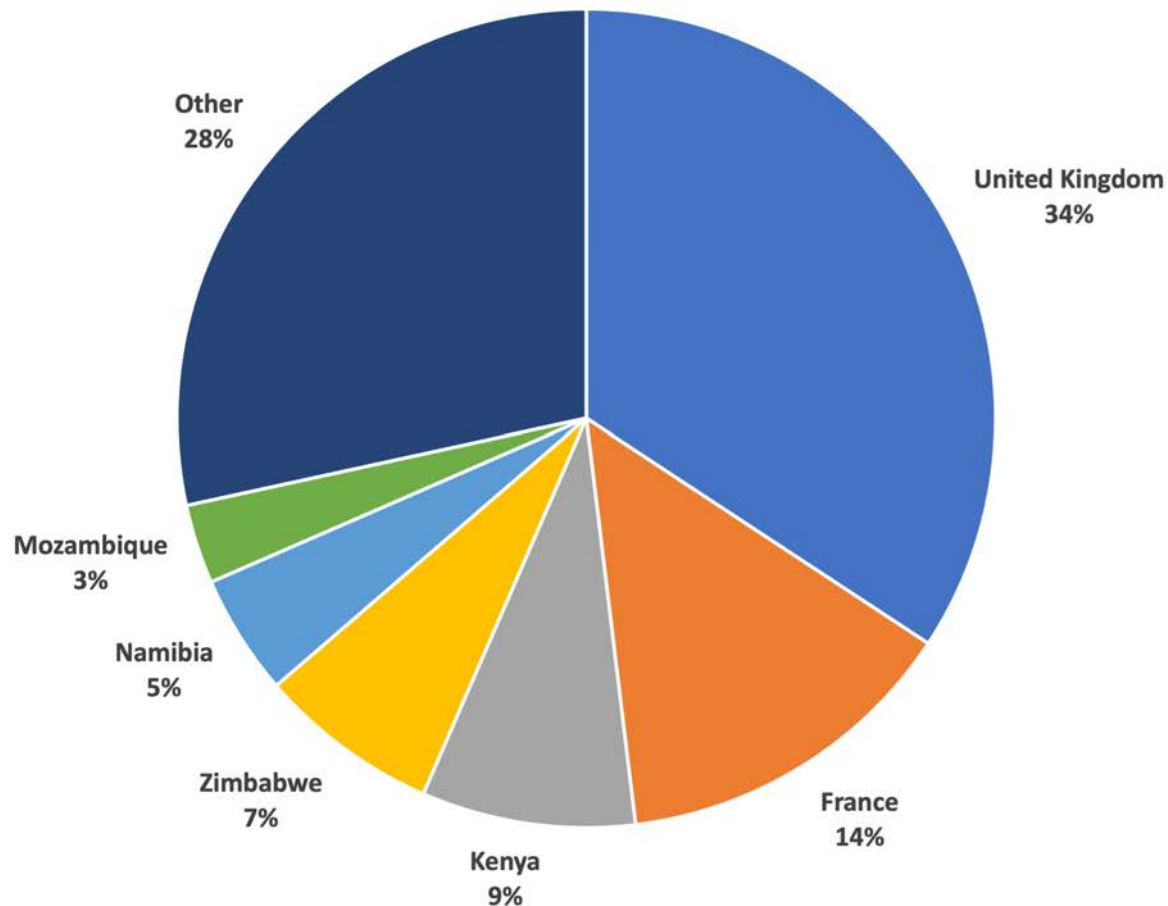


- Total Africa-Europe connectivity has hovered around 80% for the past 5 years
- North Africa's international connectivity is almost 100% to Europe
- While Sub-Saharan Africa's share of connectivity to Europe has dropped to about 60%

Int'l IP Capacity Connected to ZA, Kenya, Nigeria & Ghana

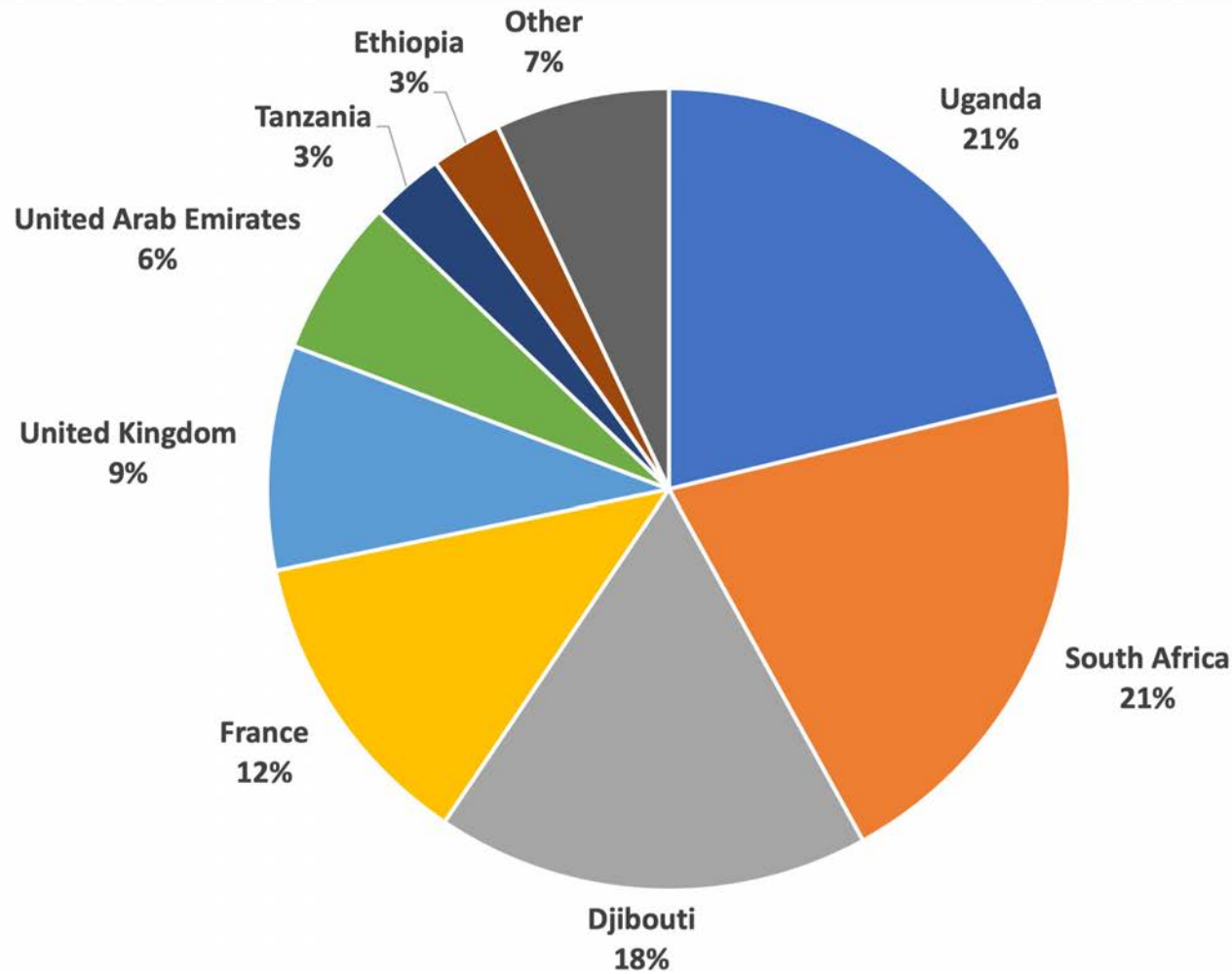


Int'l IP Capacity Connected to South Africa



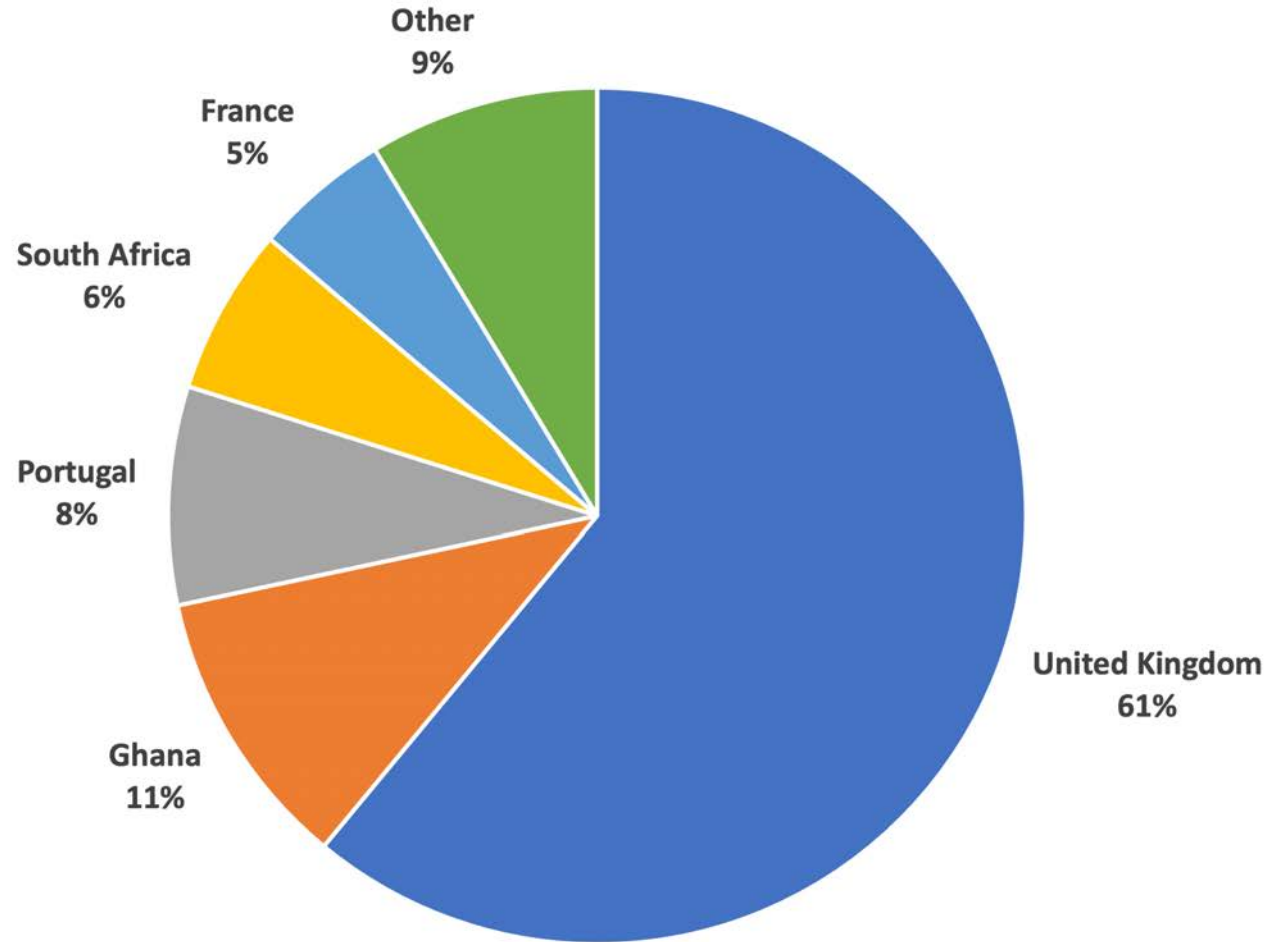
- About 55% total capacity to Europe
- UK & France are two highest
- Four countries pretty even amounts of connected capacity includes Nigeria and Mauritius
- Nigeria still has small share of capacity compared to Kenya
- ZA has a very large number of African routes, most are relatively small vs to Europe

Int'l IP Capacity Connected to Kenya



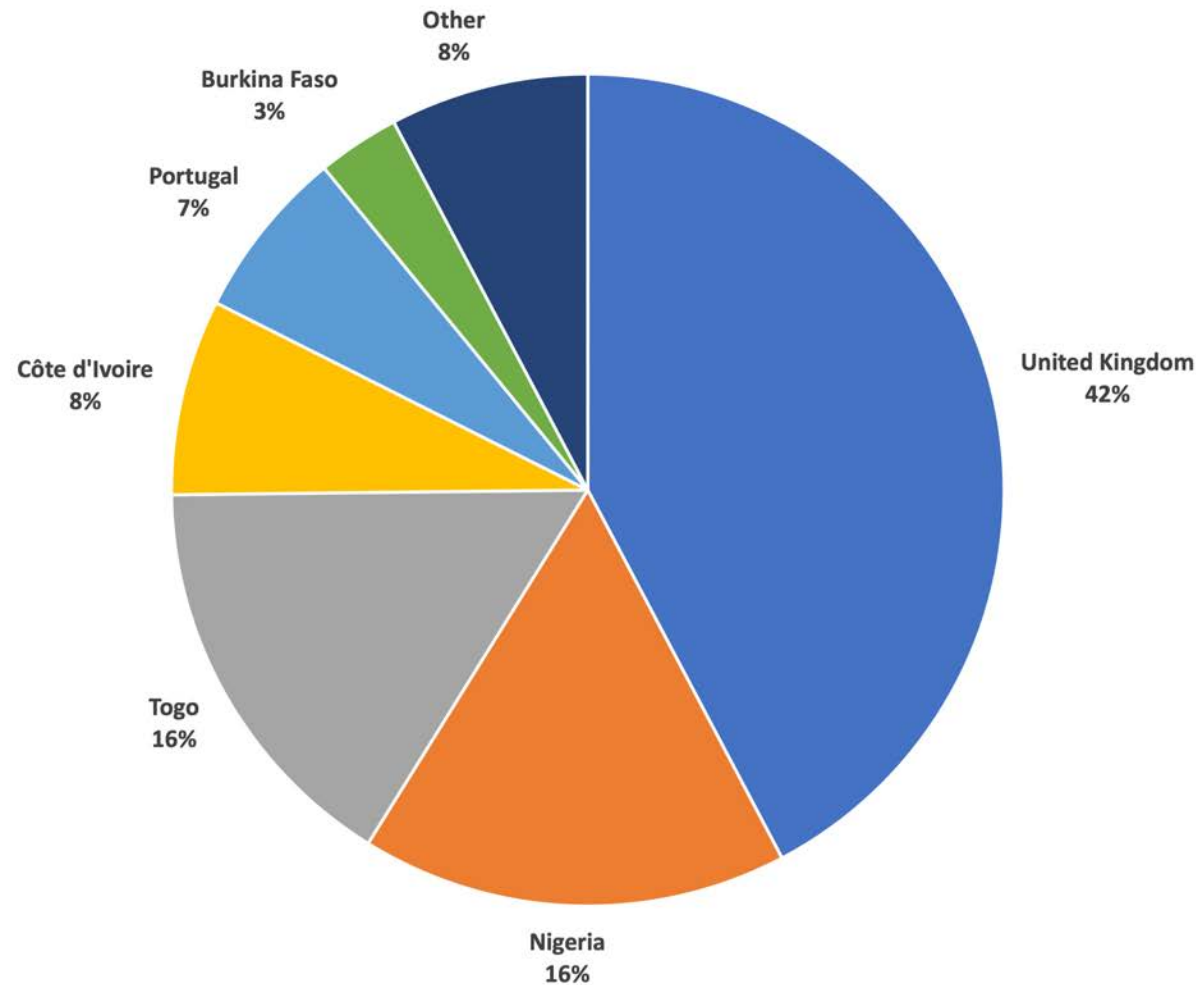
- Largest share of int'l capacity connected to Uganda, ZA, and Djibouti so 3 top route are intra-African
- European routes account for less than a quarter of the int'l capacity

Int'l IP Capacity Connected to Nigeria



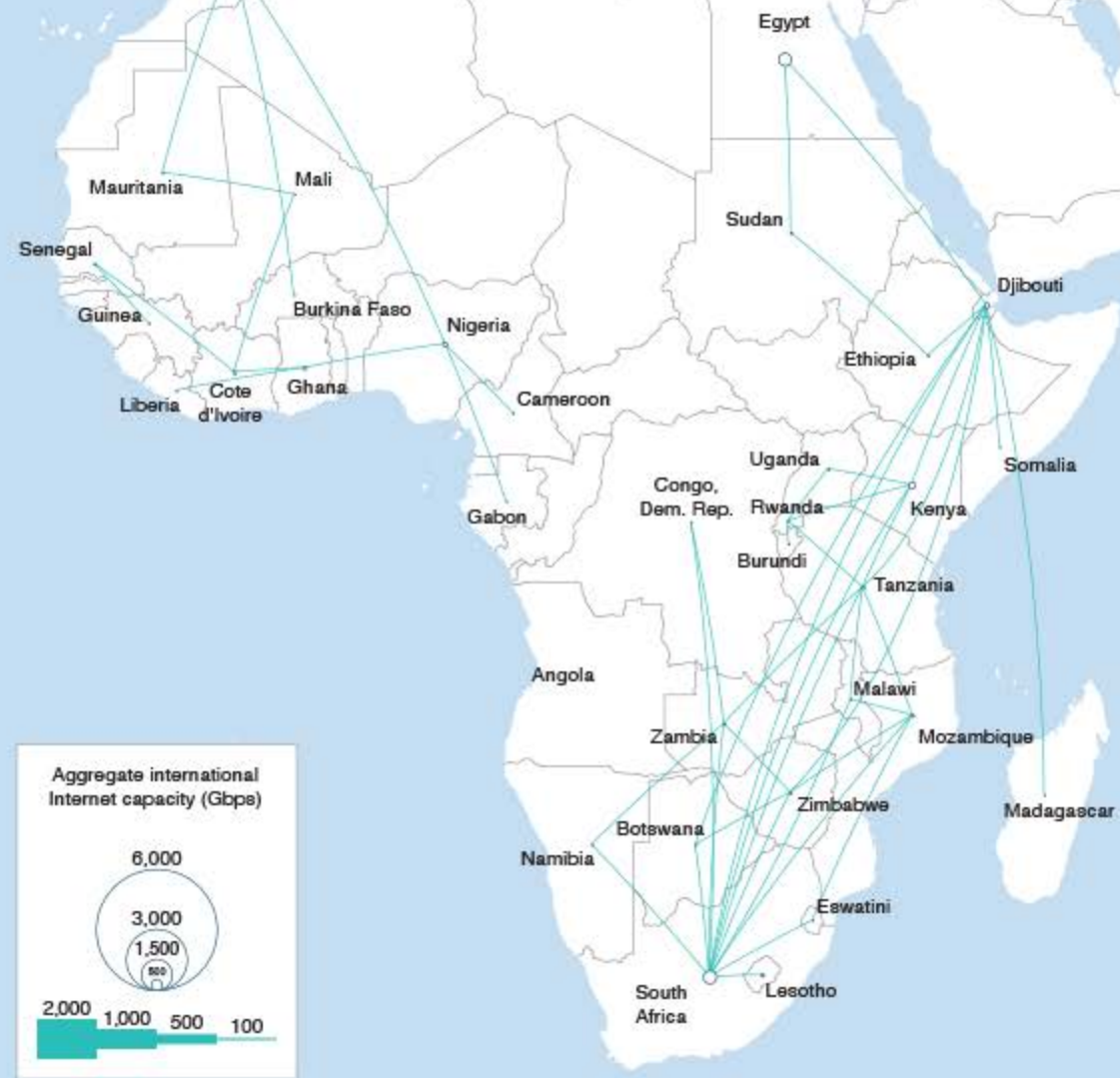
- About 75% of int'l capacity connected to Europe
- Other than Ghana and ZA no large routes to other African countries

Int'l IP Capacity Connected to Ghana



- Similar to Nigeria that largest int'l routes to Europe/UK, over 50%
- But unlike Nigeria the next three countries are African
- Ghana serves as a hub for bordering countries – Togo, Côte d'Ivoire, Burkina Faso

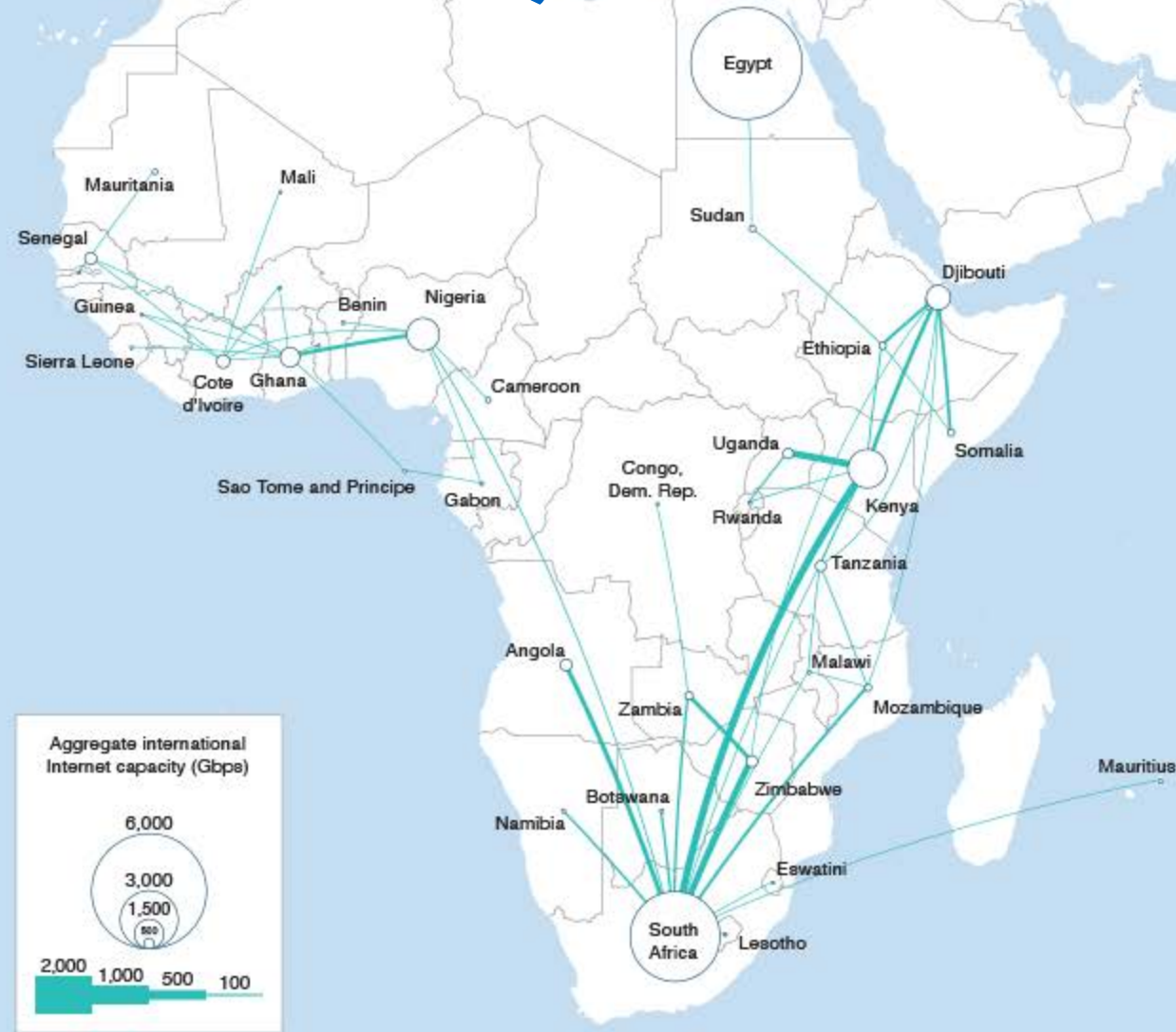
Intra-African Routes, 2016



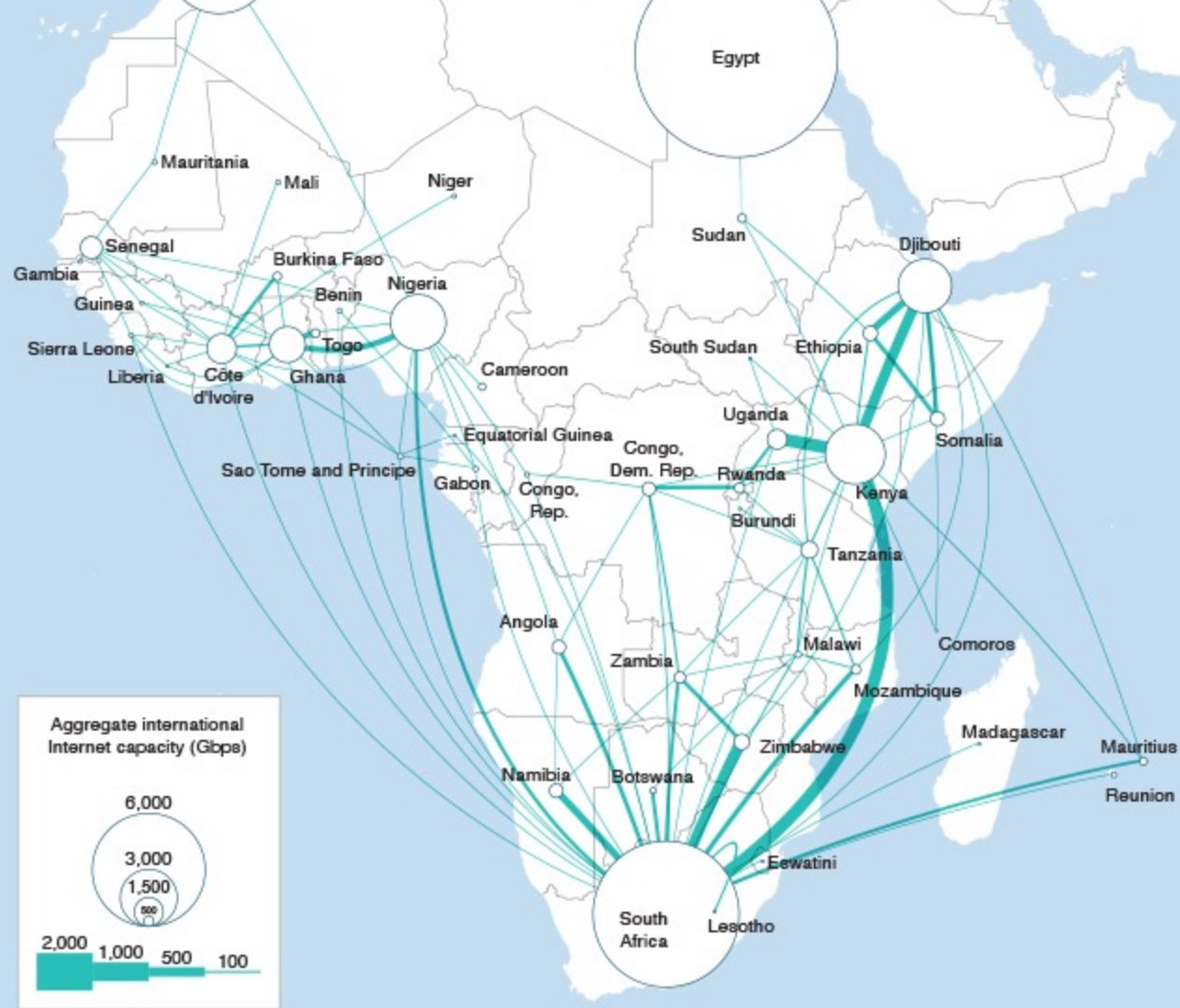
Intra-African Routes, 2019



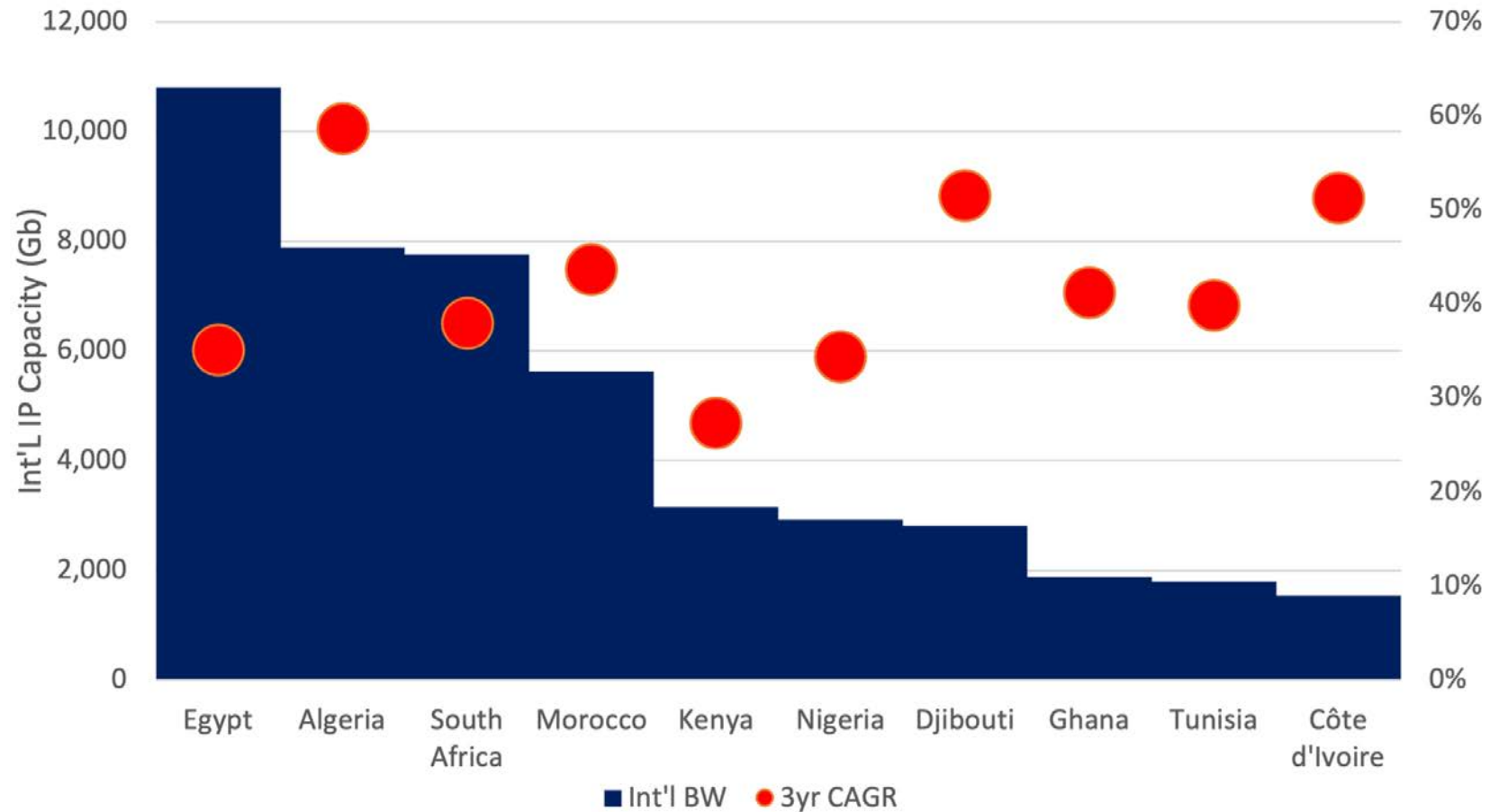
Intra-African Routes, 2021



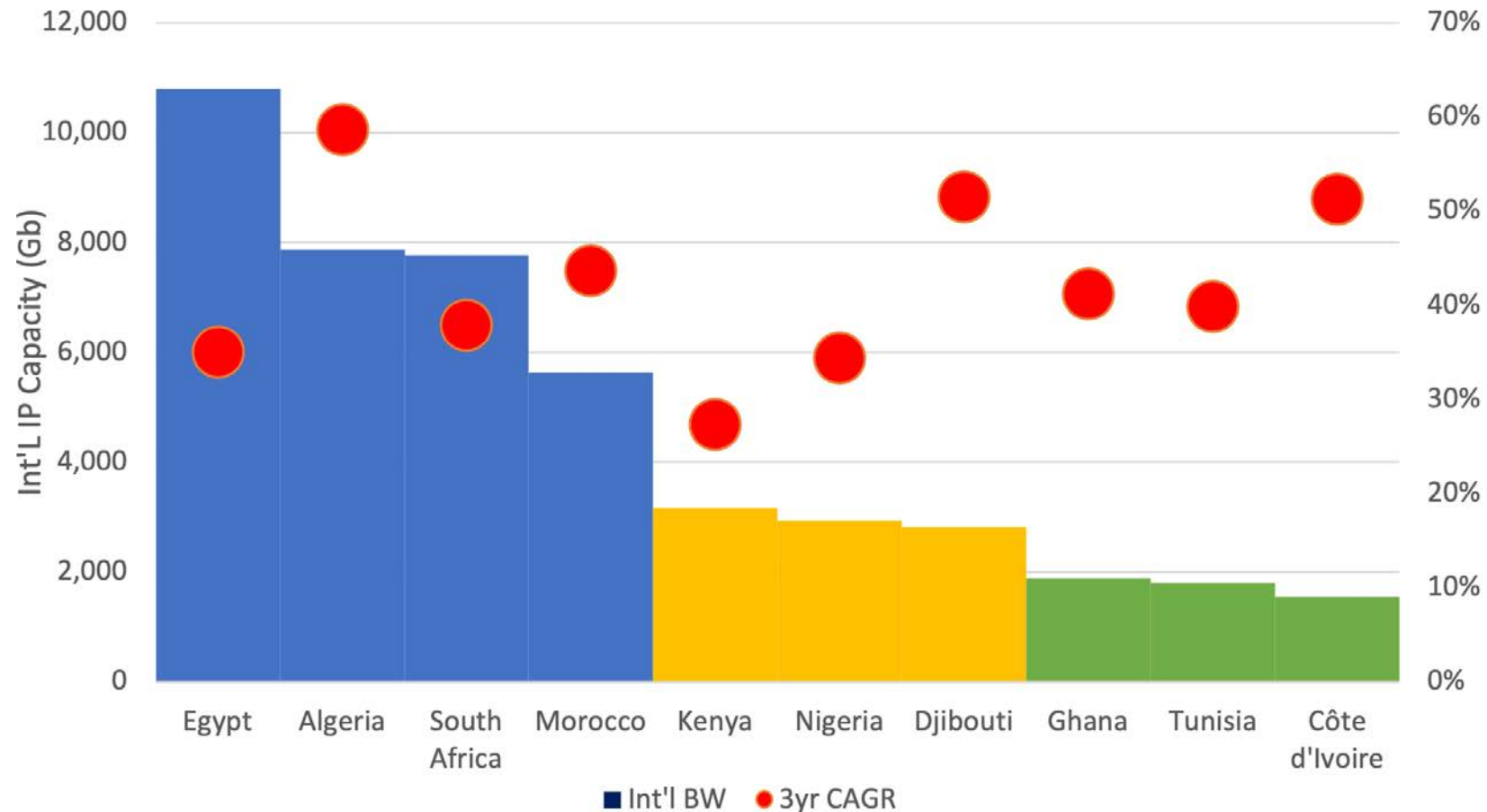
Intra-African Routes, 2023



Top 10 Countries Int'l IP Capacity in Africa

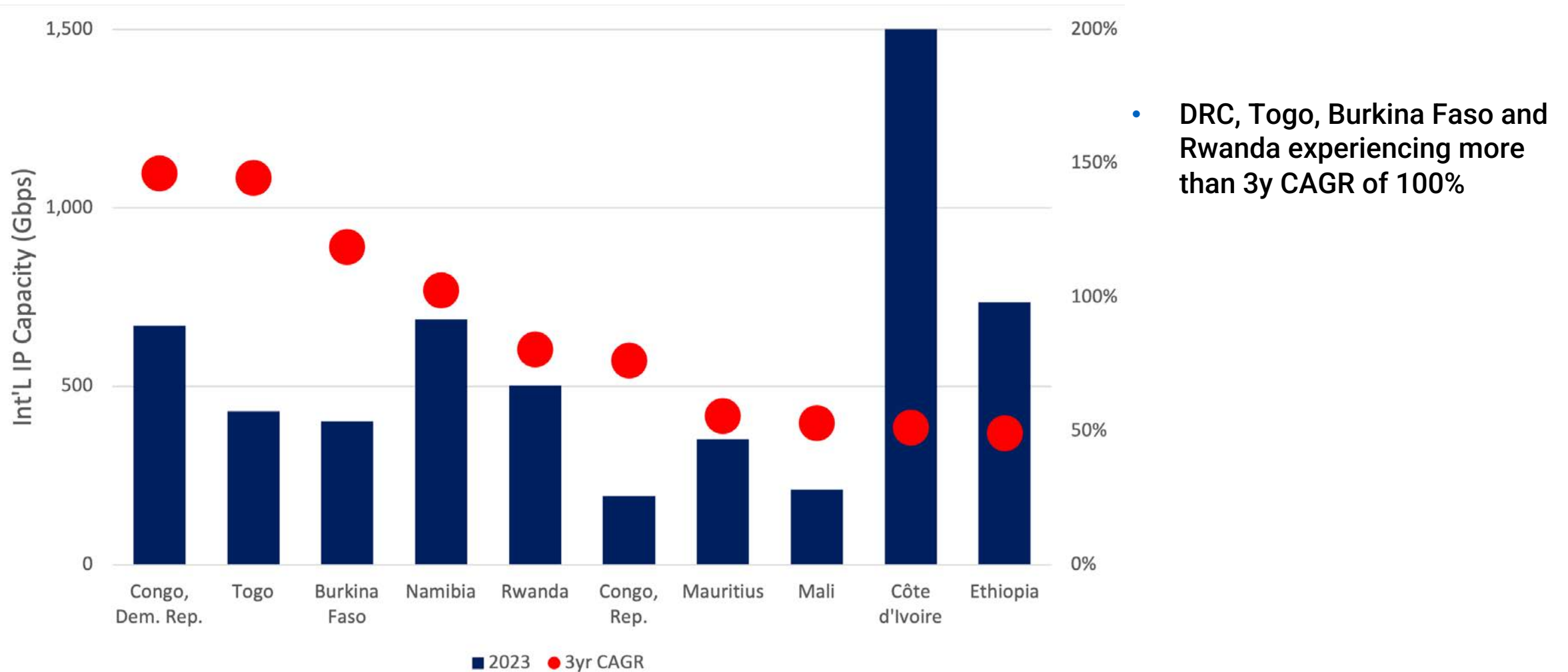


Int'l IP capacity growth of African countries

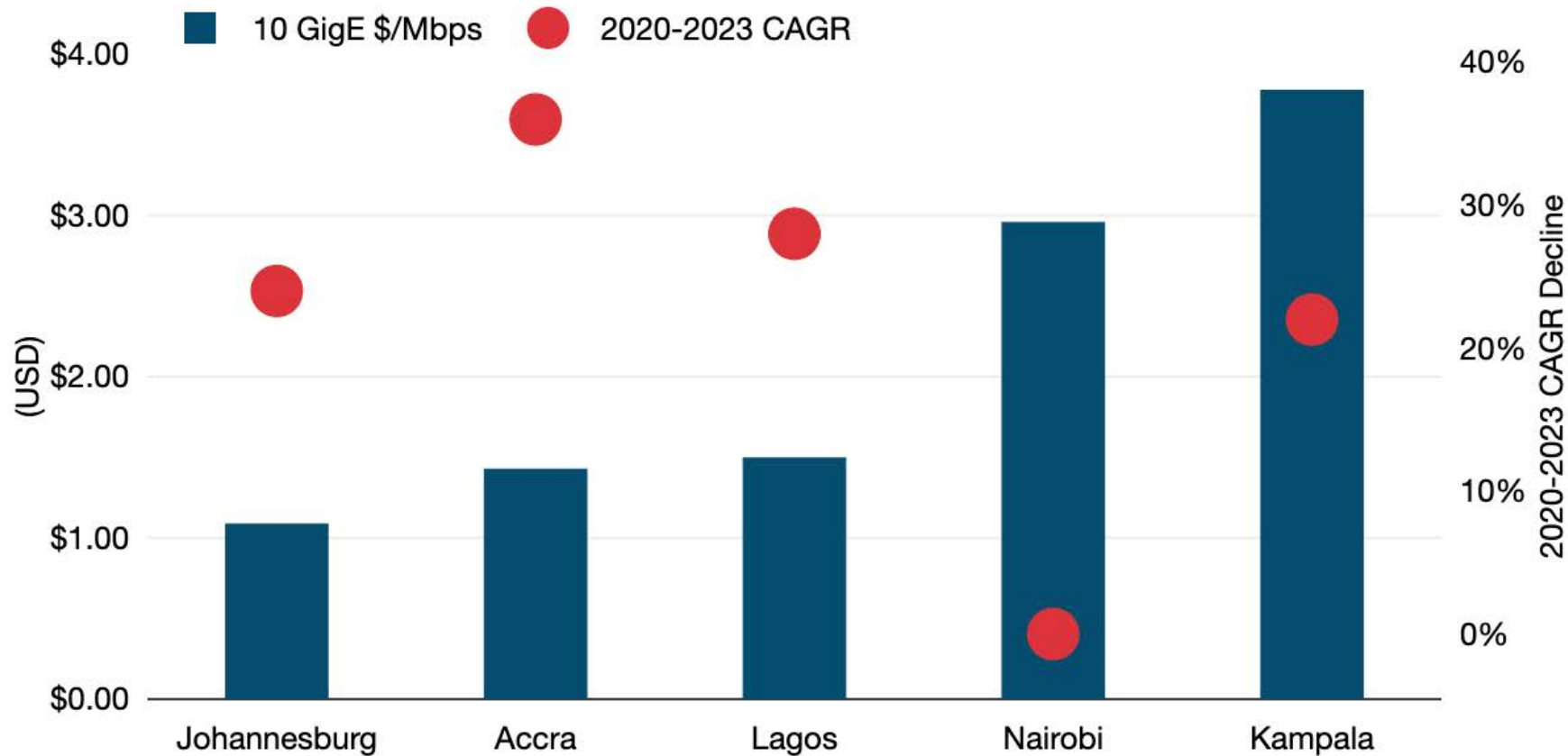


- Three groups:
- North African + ZA – a lot of int'l capacity to Europe
- Second group - major hubs connecting Europe and Africa
- Third group – growing hubs for sub-Saharan Africa + Tunisia

Countries with Highest Int'l IP Capacity Growth Rate



10 GigE IP Transit Prices in Africa



- West Coast cities, such as Accra and Lagos, had the highest rates of price erosion.
- East Coast price erosion is more muted. Higher transport costs to Europe and added backhaul costs affect IPT costs
- Inland routes still highest, but starting to experience higher price erosion

Shift to 100 Gbps Wavelengths

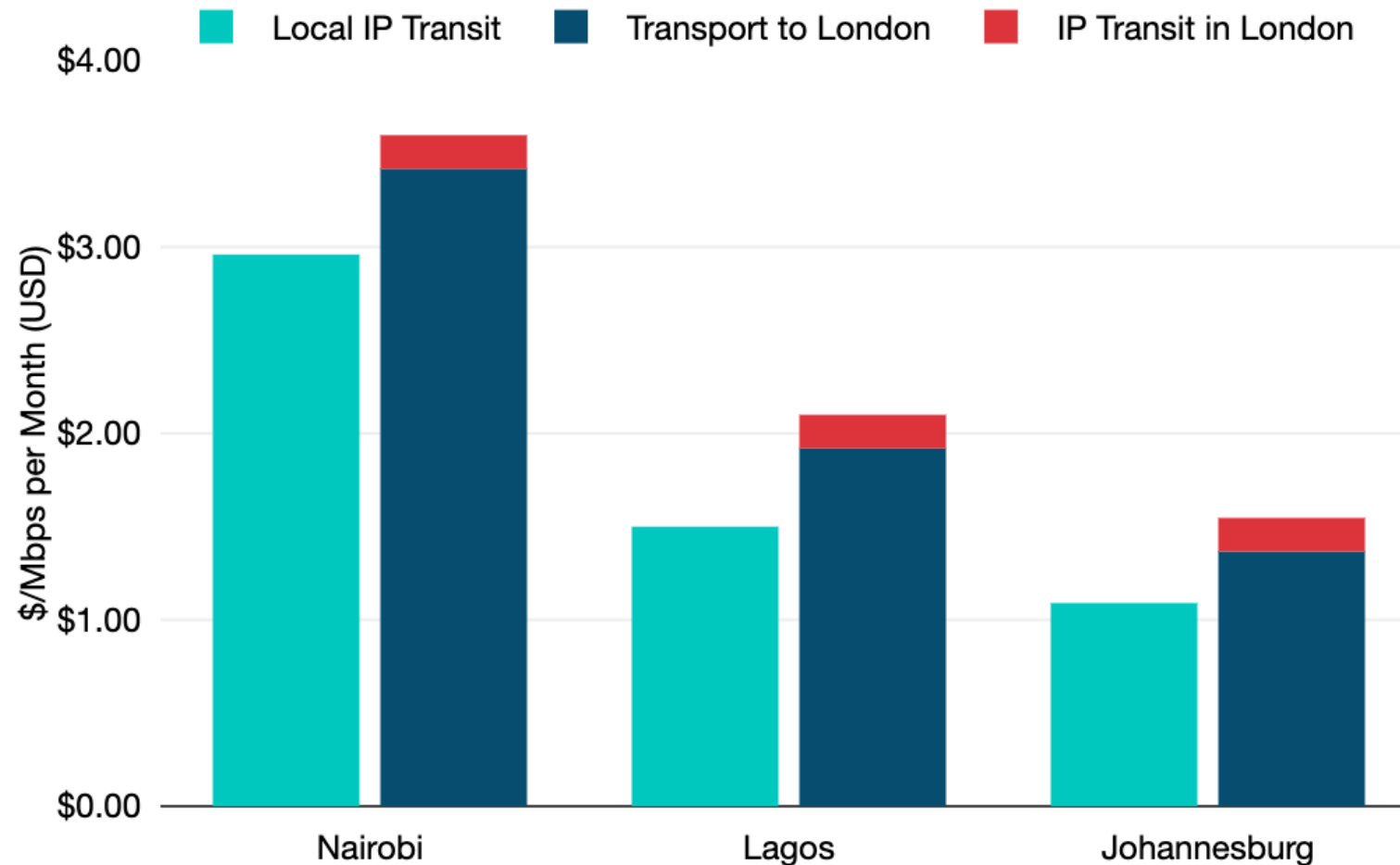
Weighted Median 10 & 100 Gbps Wavelength Prices & Price Multiples in Africa



- 10G waves still make up a large portion of sales in Africa
- But 100G are growing in demand, particularly on high traffic routes out of Joburg and Lagos
- 100G waves on key routes dropped from about 7 times the price of a 10G 3 yrs ago to just 3x on Lagos-London & 4.4x Joburg-London

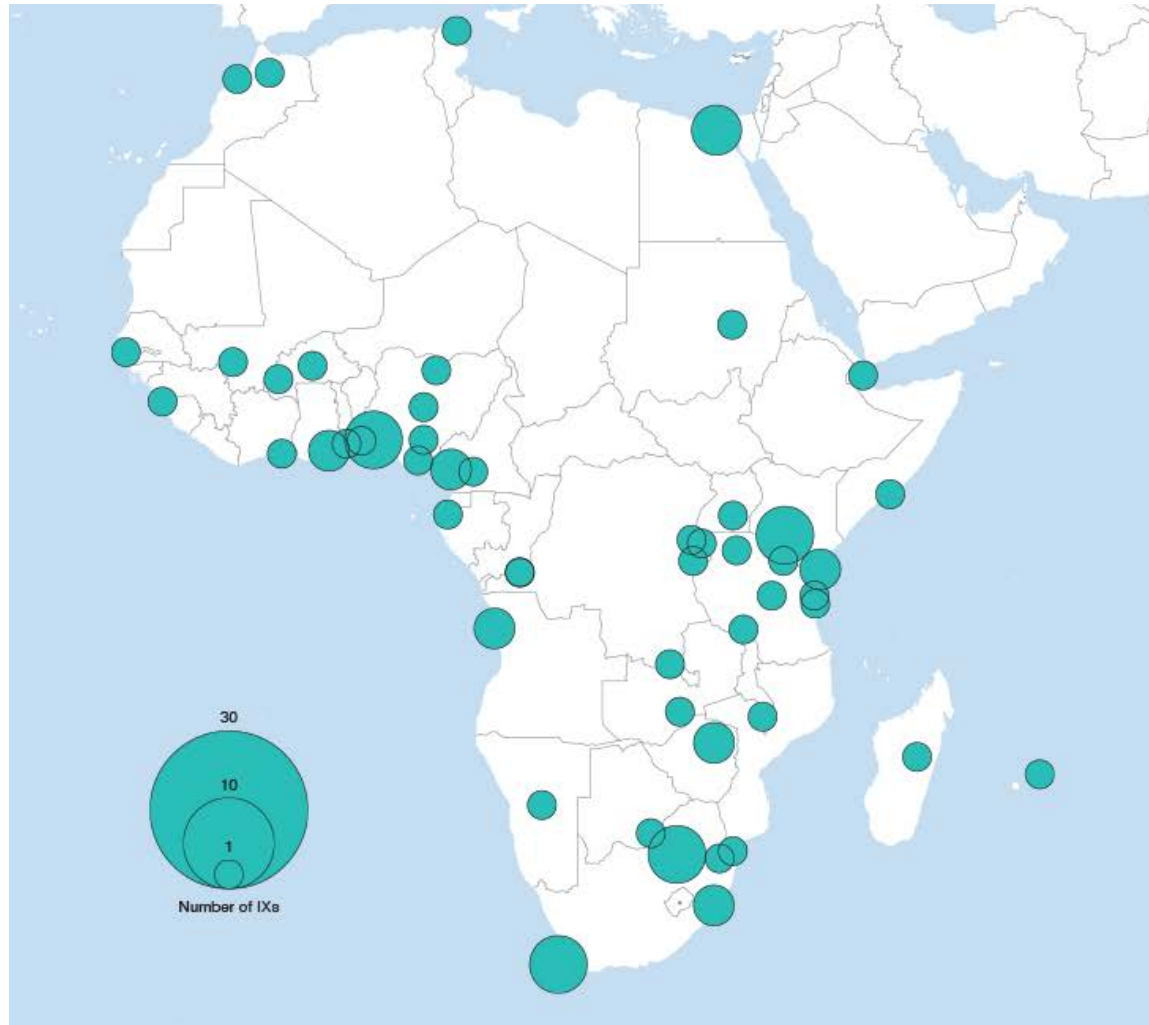
Pipe and Port versus Local IP Transit Prices

Weighted Median 10 & 100 Gbps Wavelength Prices & Price Multiples in Africa



- All 3 cities local IP transit was 25% cheaper than pipe and port.
- 5 years ago it was ~25% more expensive to purchase local IPT

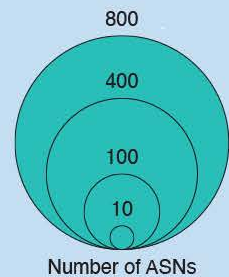
IXP Geography



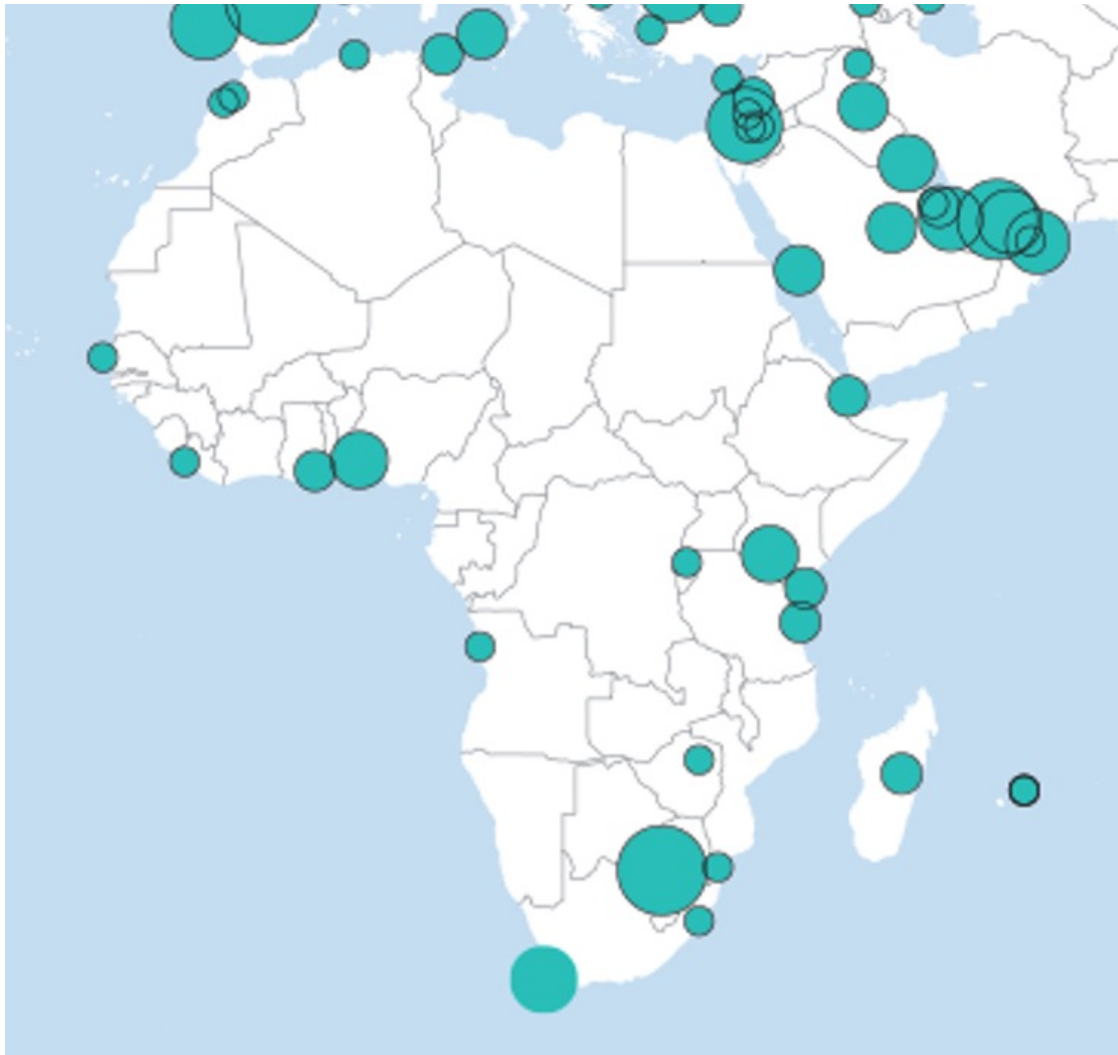
- IXPs help localize traffic and content connecting networks and content providers
- Lowering costs (less IPT) and enhances performance (lower latencies)
- Essential element of creating hubs and their ecosystems
- Sourced from IXPDB & Peeringdb

IXP Geography

Number of ASNs by IXP by Market

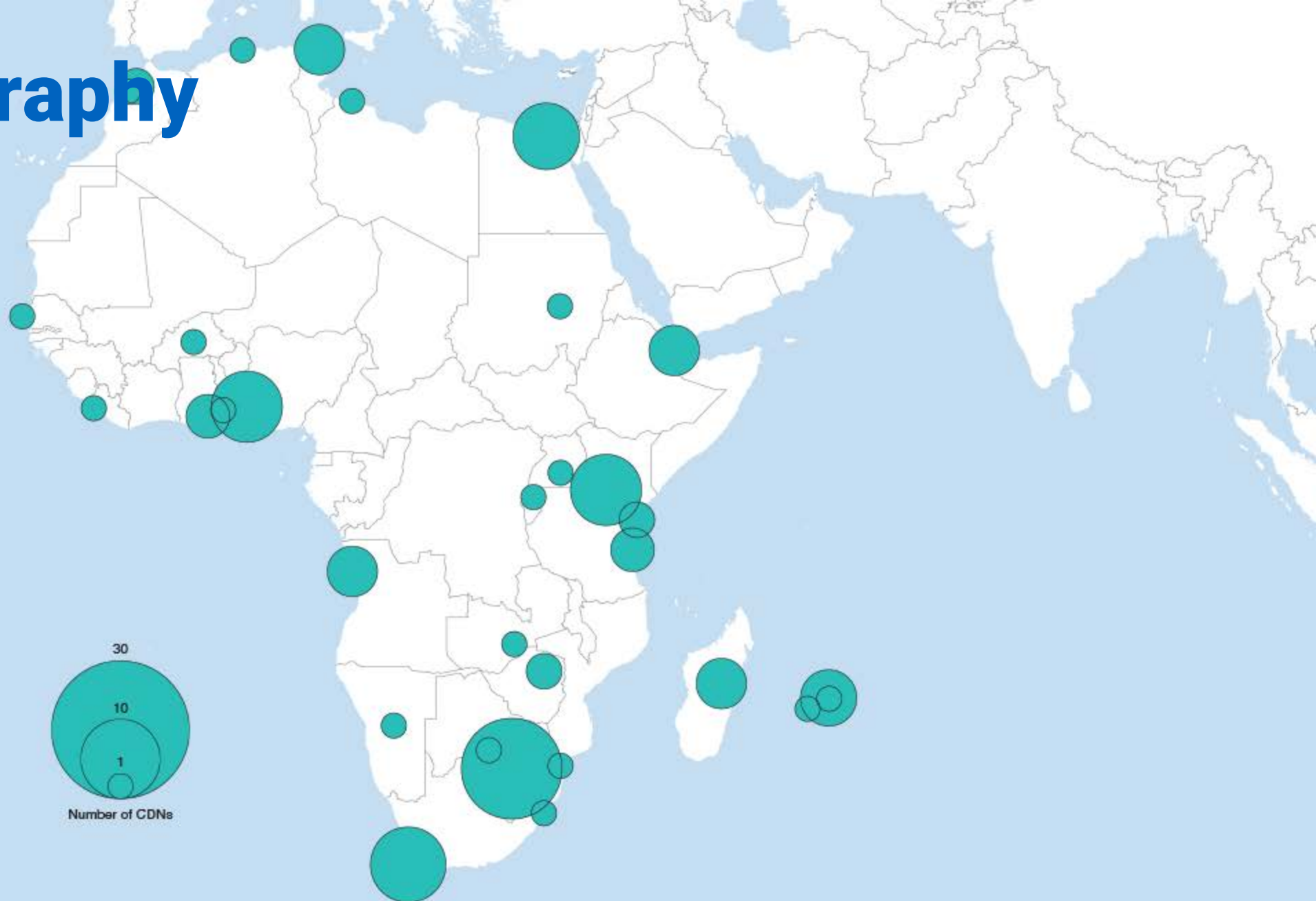


CDN Geography

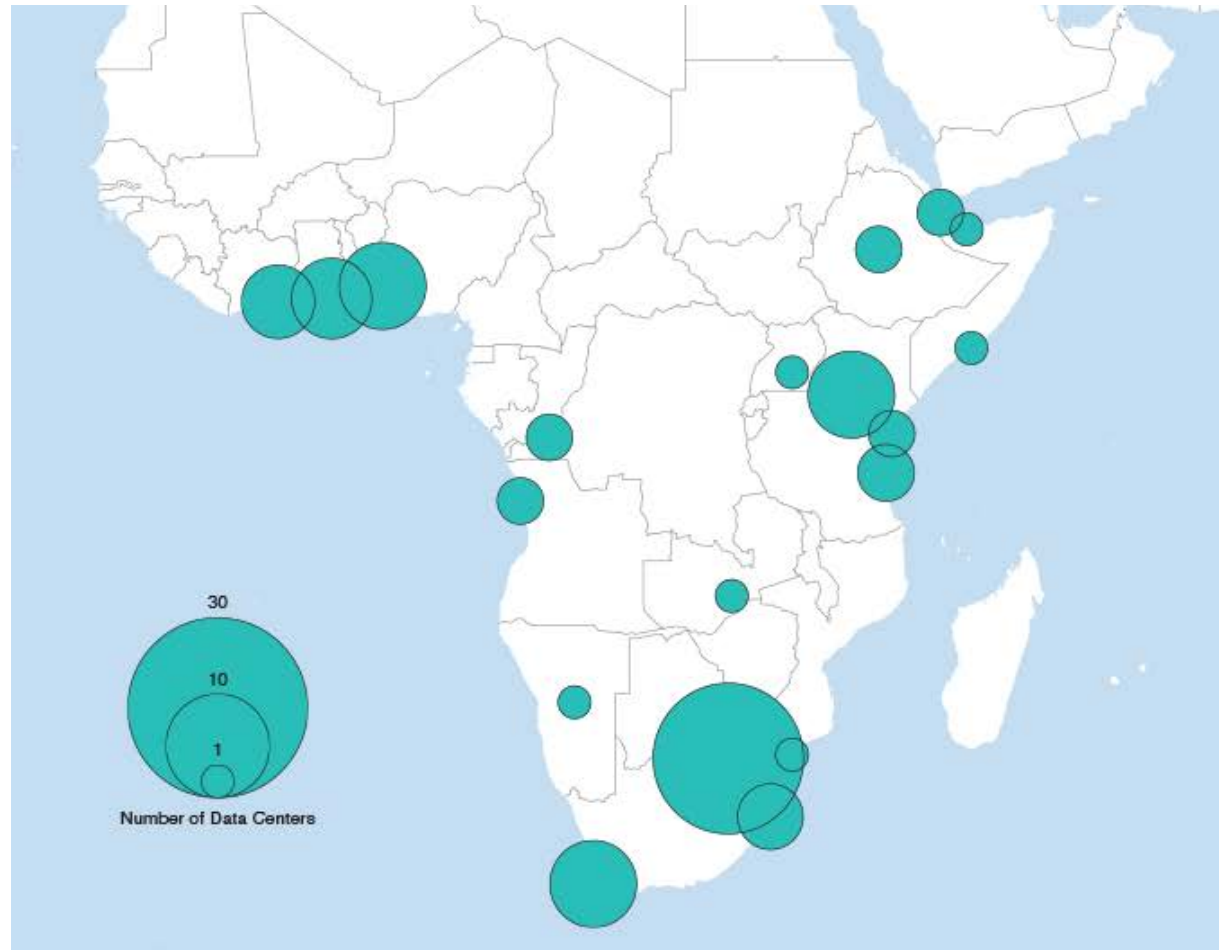


- 46 CDN nodes in Sub-Saharan Africa from 13 providers
- Tracks with the IXP presence
- Mainly in the primary and secondary hubs

CDN Geography

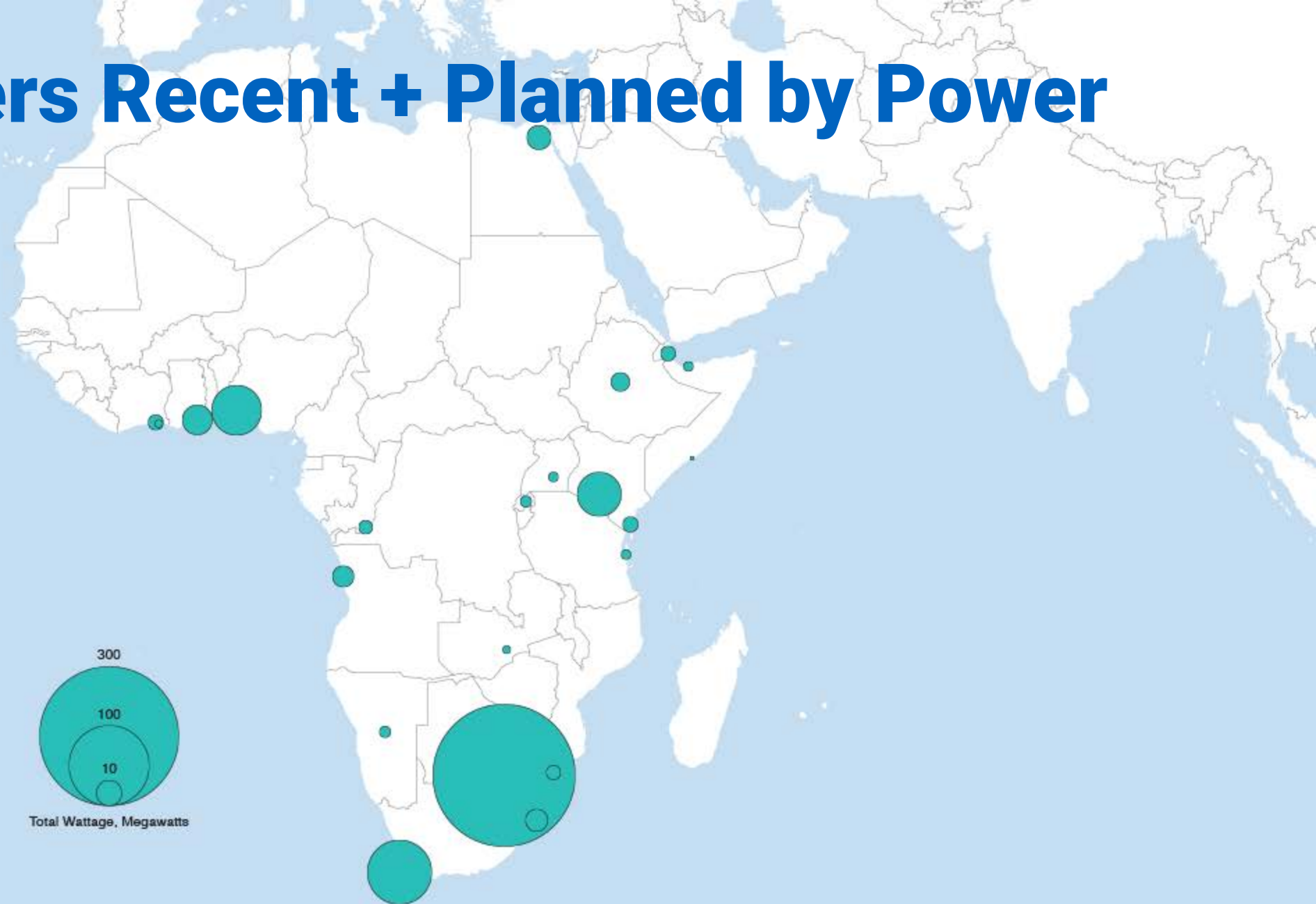


Data Centers 2021-2022 + Planned



- More than 90 current and planned data centers in Sub-Saharan Africa
- Data center investment goldrush... 20 planned or recently launched since 2021
- Primarily in Nigeria and Kenya and South Africa

Data Centers Recent + Planned by Power

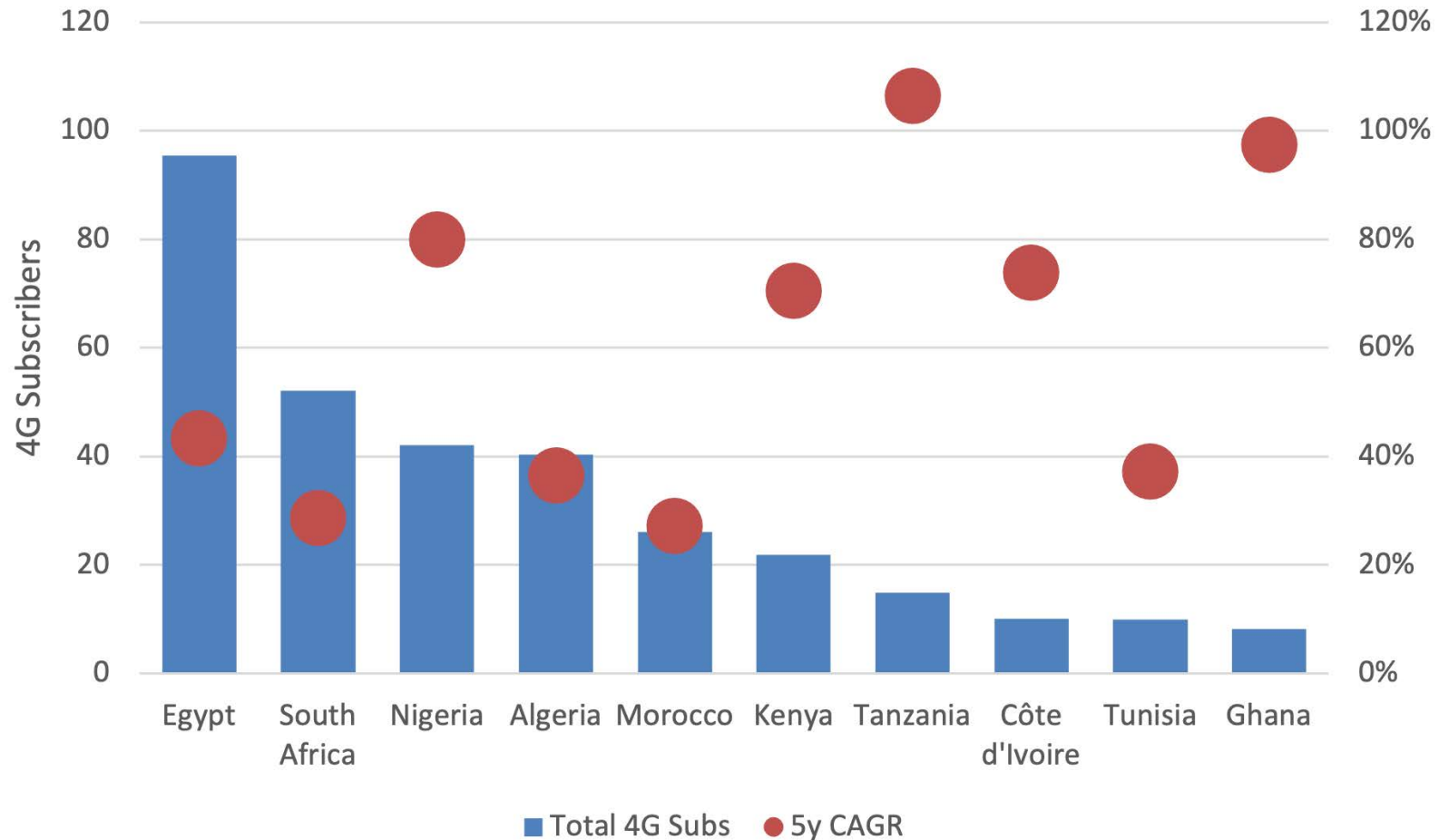


4G Mobile Growth



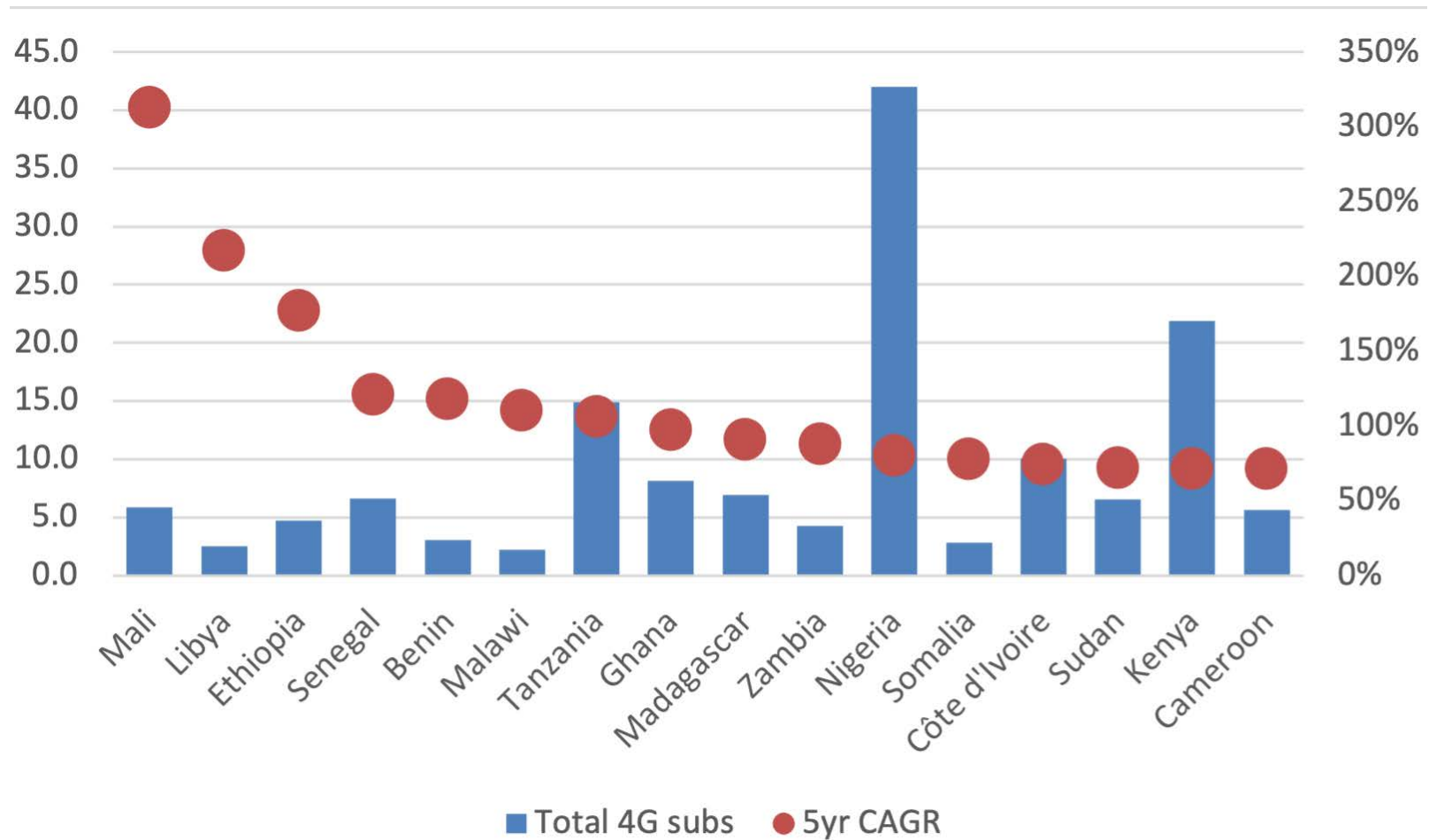
- Only 31% of all mobile subs in Africa are 4G (ROW around 60%)
- 4G Growth important in Africa, 5y CAGR 50%, YoY ~ 20% now
- 5G really has just begun in Africa
- Largest 5G market is South Africa and only 5% penetration

Top 10 African 4G Markets (subscribers)



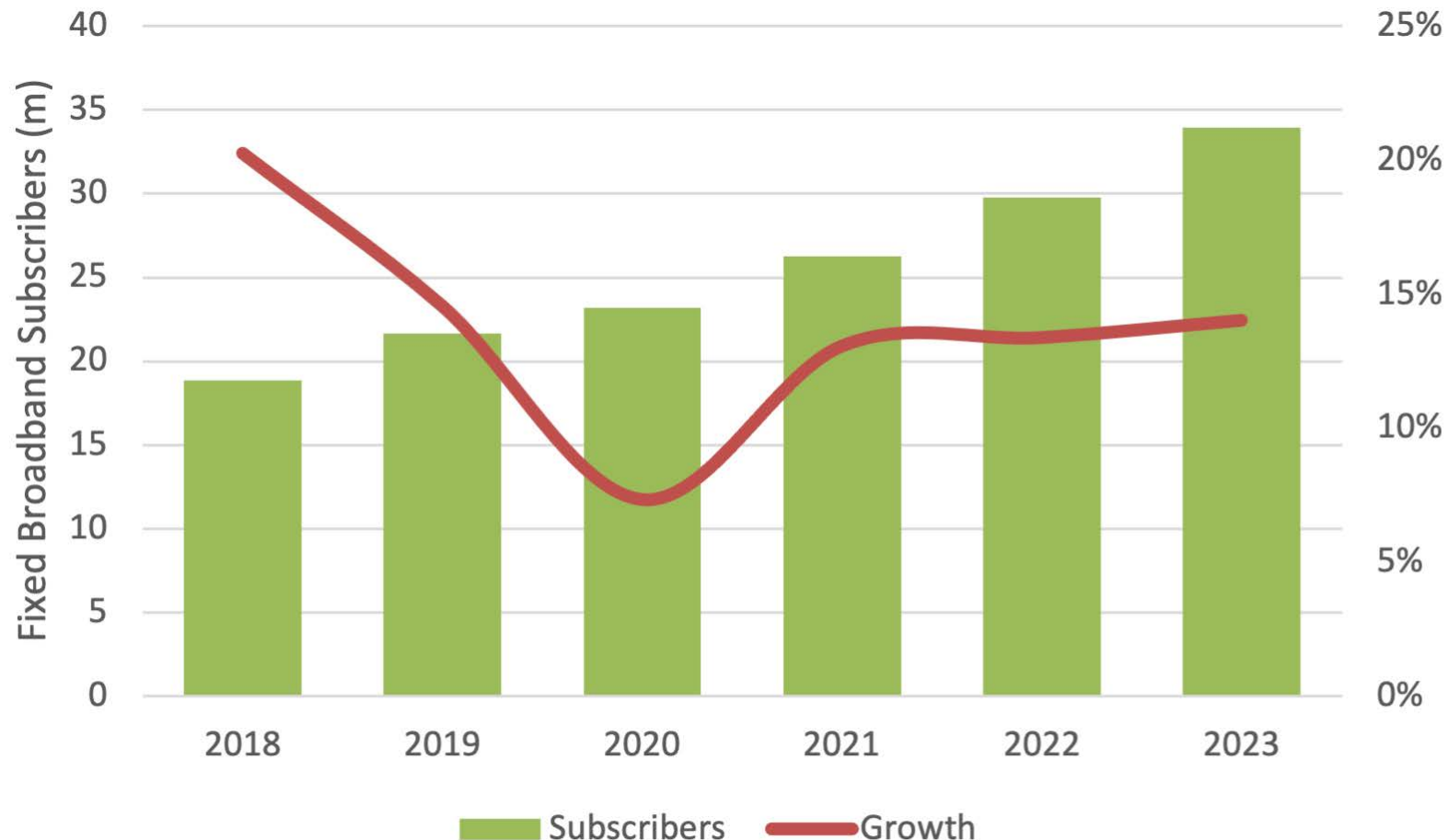
- Largest most mature 4G markets have slowest growth
- North African countries and South Africa have largest subscriber bases but lower growth
- Nigeria stands out with 80%
- Tanzania has the highest growth at over 100%

4G Growth by Country



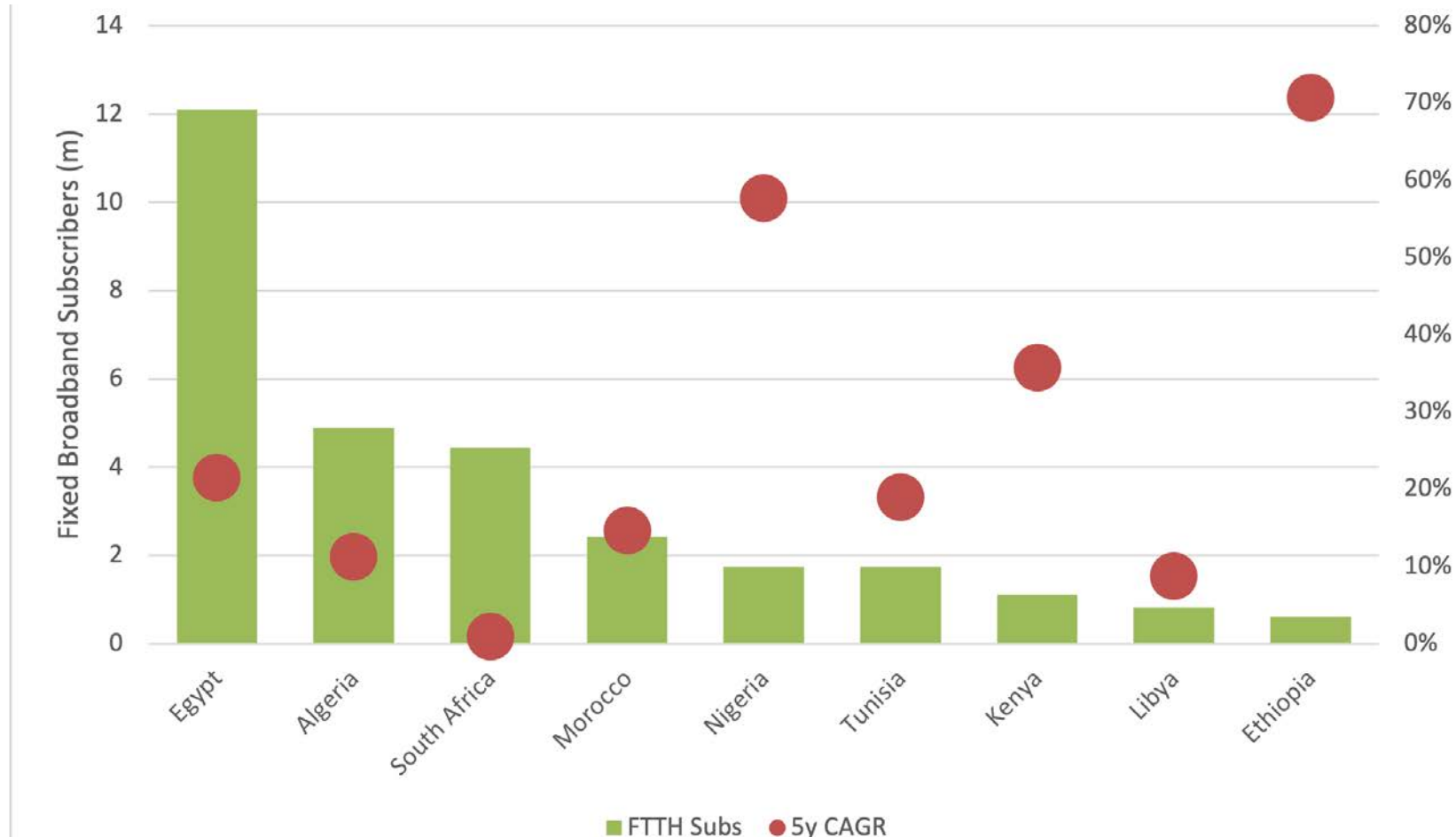
- These are fastest growing markets for 4G all over 70% growth 5y CAGR
- A couple of standouts are Mali and Ethiopia with over 300% and 150% growth respectively

Fixed Broadband Growth (subscribers)



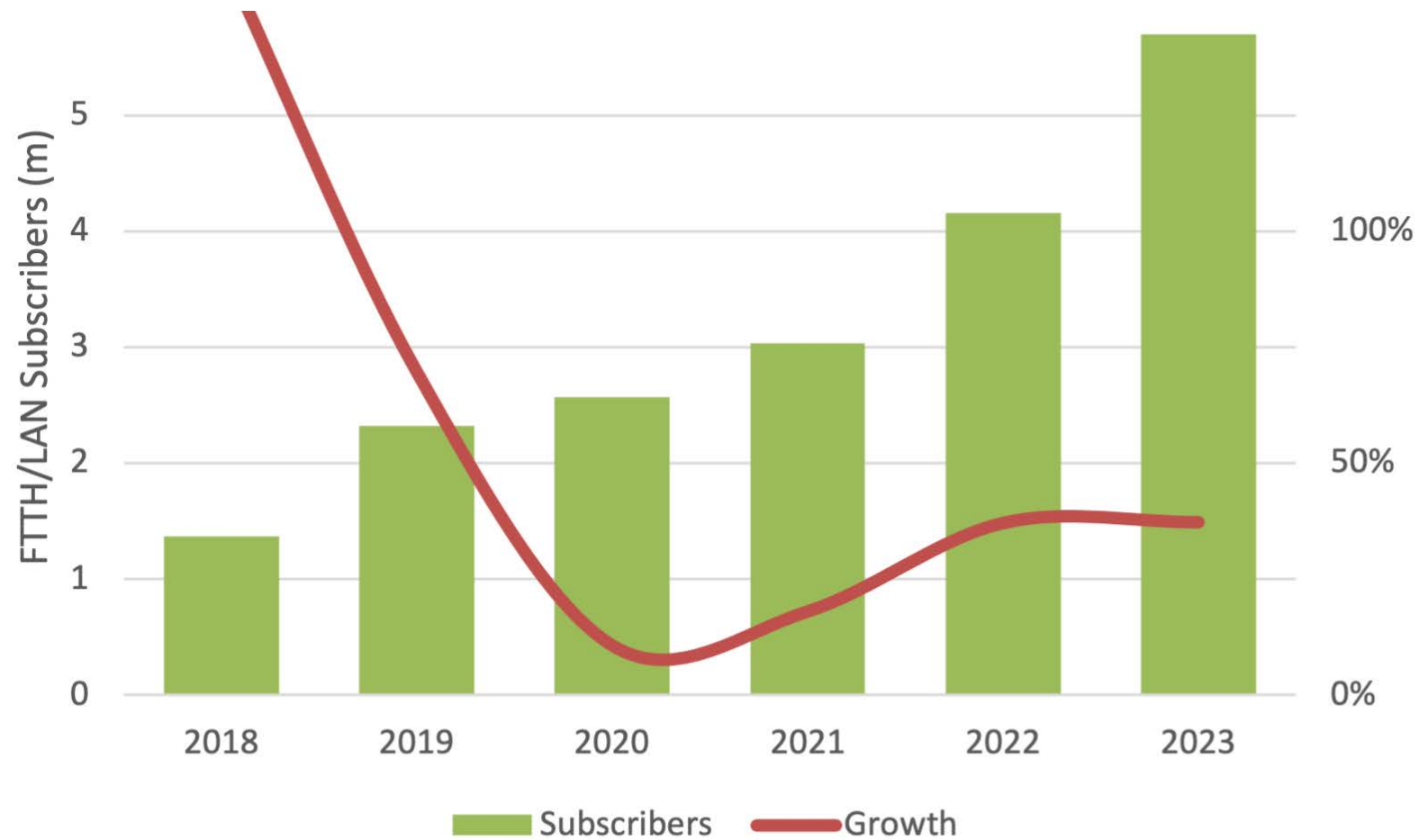
- Slower growth rate than mobile subs, but Africa is experiencing faster than global growth rates due to the small number of fixed lines
- For total fixed, after a dip in 2020 (covid?) now avg between 10-15% (global avg 6%)

Fixed Broadband Growth by Country (subscribers)



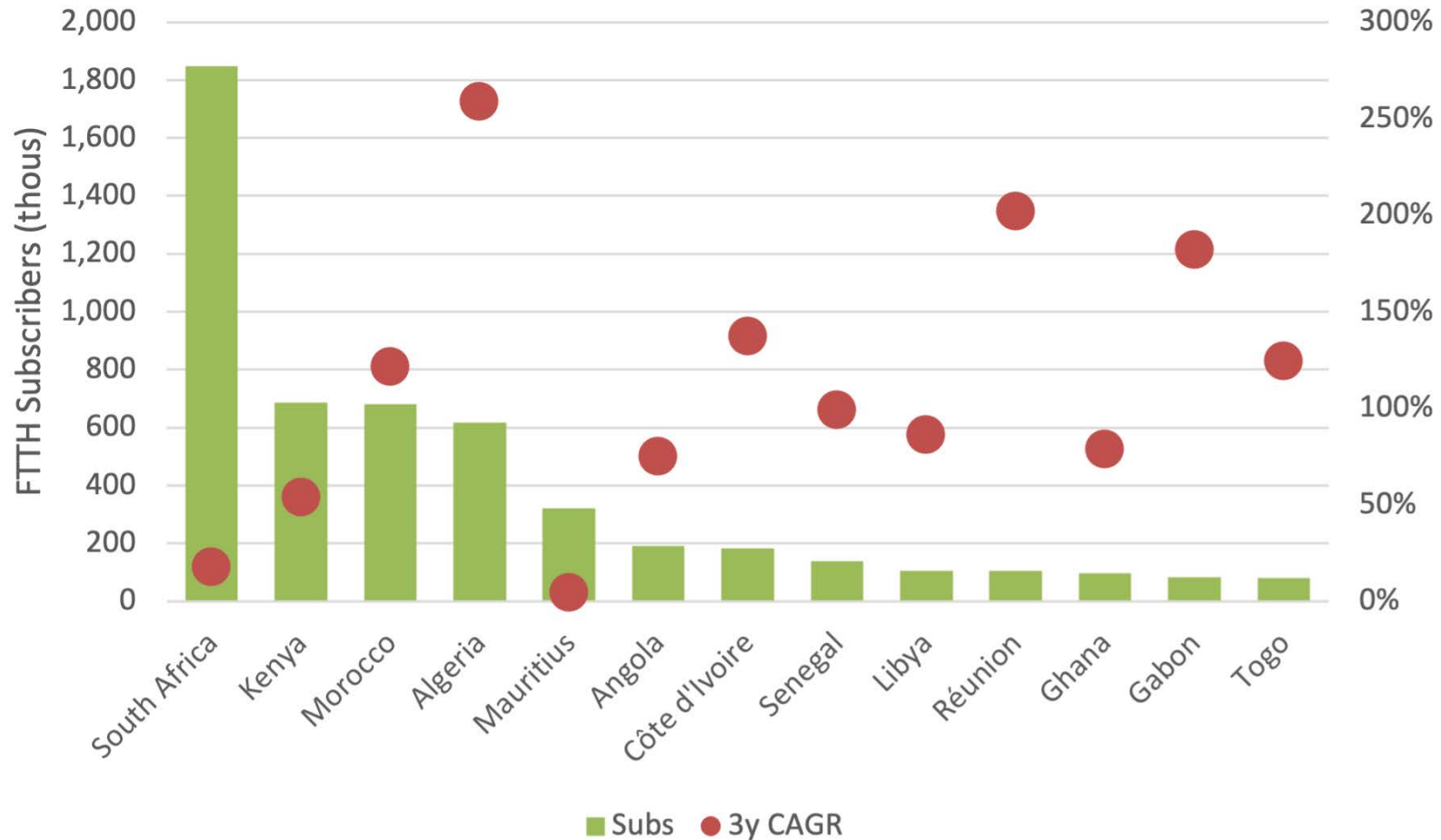
- Notice top 4 fixed bb subs countries are also the top 4 in total int'l capacity
- Egypt is far ahead of rest of Africa in total subs
- The top 4 mature markets also have the lowest growth rate
- Nigeria, Kenya and Ethiopia experiencing very high growth rates

FTTH Growth (subscribers)



- FTTH growing fastest of fixed bb tech
- After dip in 2020, growth rate around 40% last 2 years

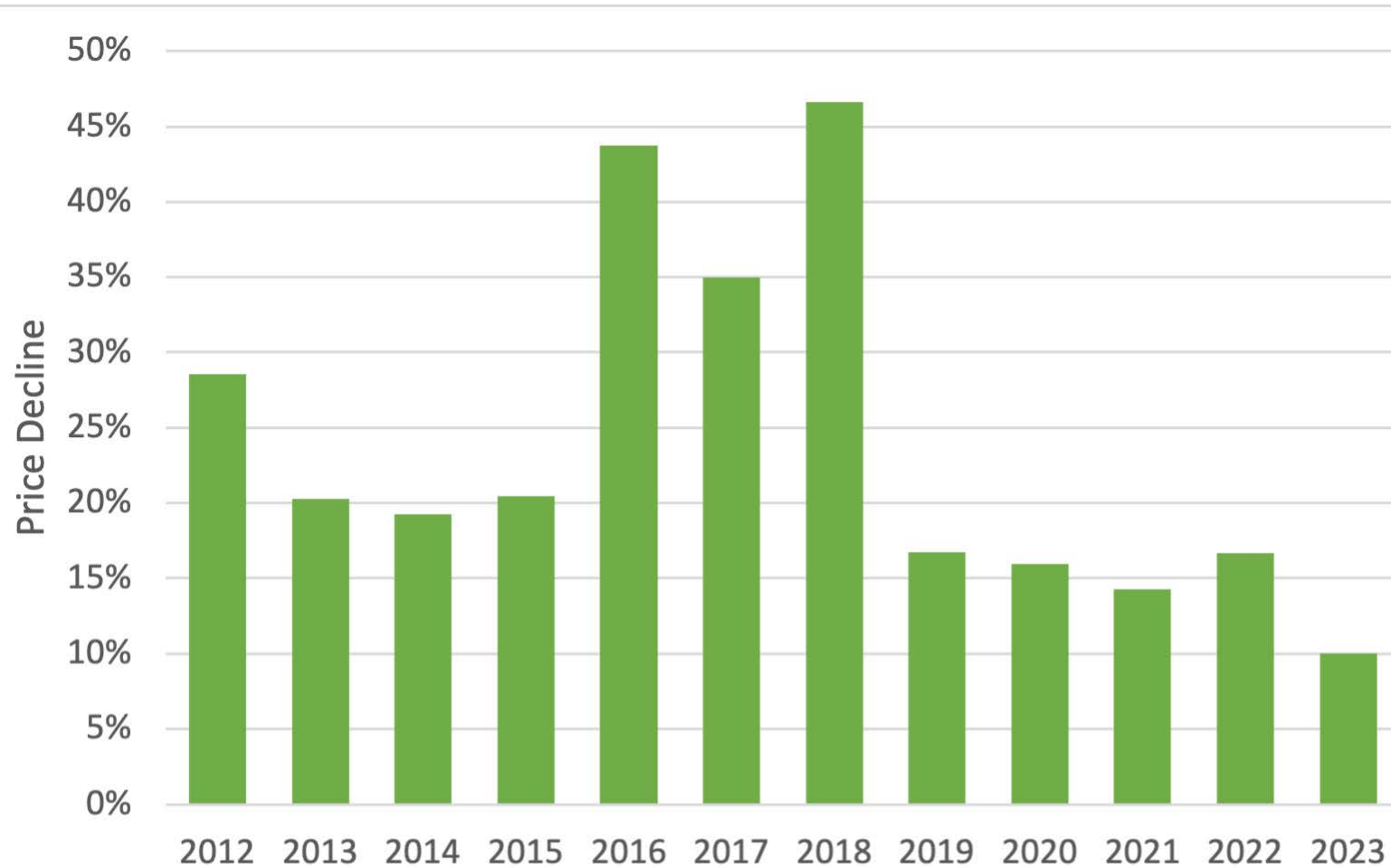
FTTH Growth by Country (subscribers)



- South Africa dominates in FTTH, but also a mature market and low growth rate
- Most countries growing at at least 50% - Kenya, Angola, Senegal, Libya and Ghana
- Many growing at above 100% - Cote d'Ivoire, Gabon, Togo

Price Decline After New Cables in Brazil

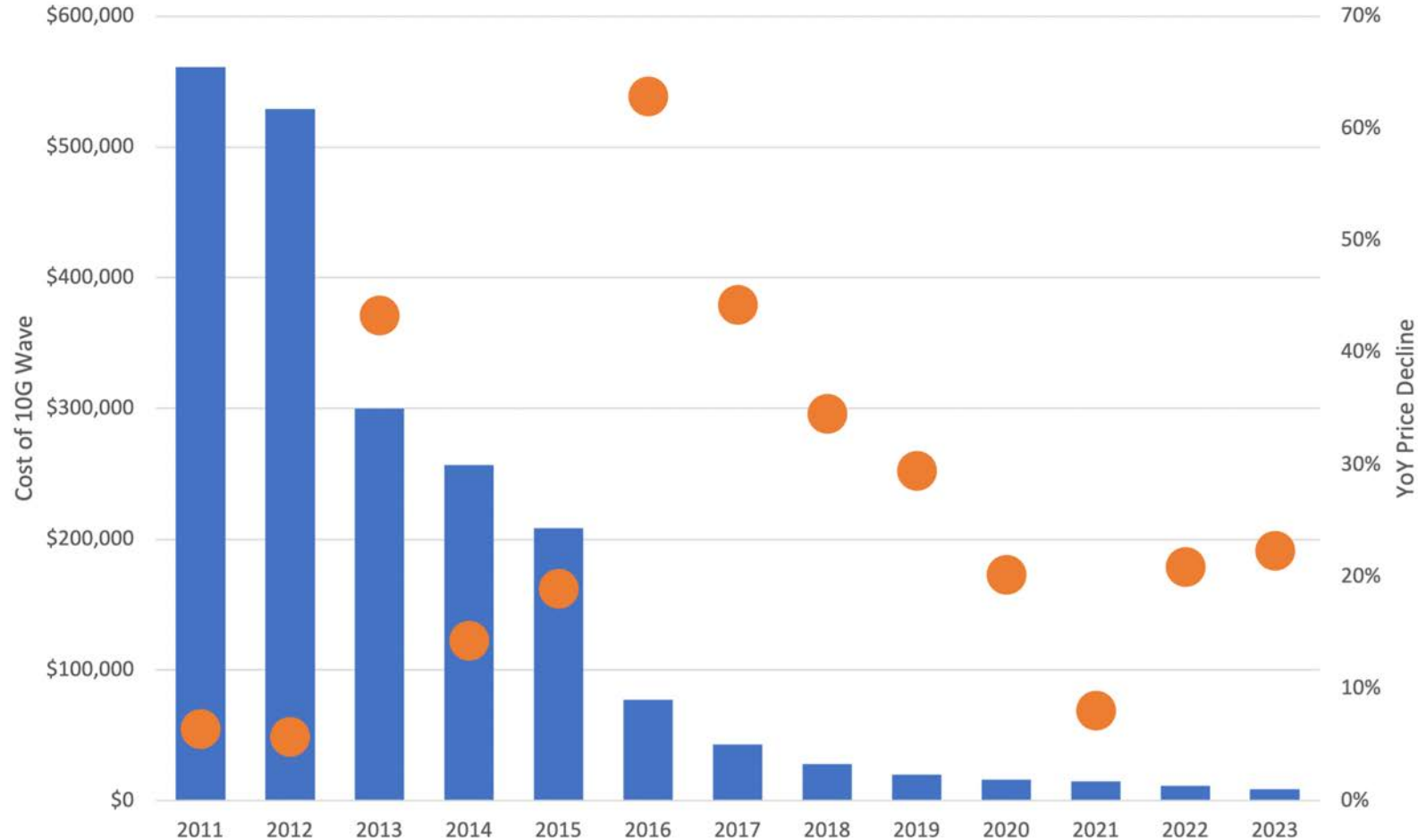
10G IP Transit Prices in Brazil



- Monet, SACS & BRUSA all launched in 2017-2018
- Price declines were 'steady' at 20-25% pre-launch
- Slightly preceding and just after launch avg annual decrease jumped to 35-45%
- Returned to 'normal' decline rate of 15-20% by 2020

Price Decline After New Cables in South Africa

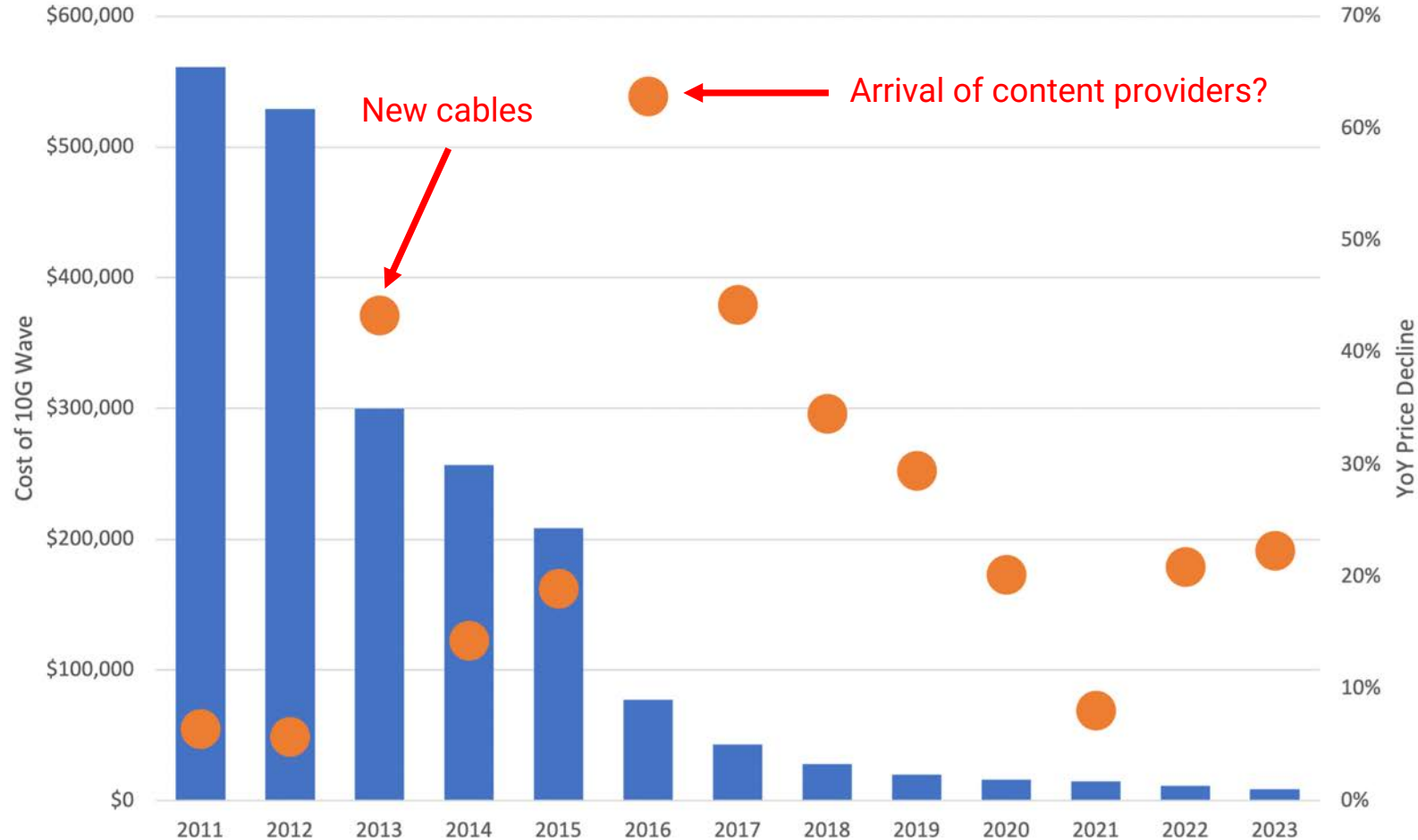
10G Wavelength Prices on Johannesburg-London Route



- Pre-2013 a 10G Wave between London and Jo'burg was more than a half million dollars.
- Pre-2012 cables, growth rate steady at below 10%
- By 2013 40%+ drop, then in 2016 another large drop 60%
- Since then has dropped to between 15-20% annual drop past 4 years

Price Decline After New Cables in South Africa

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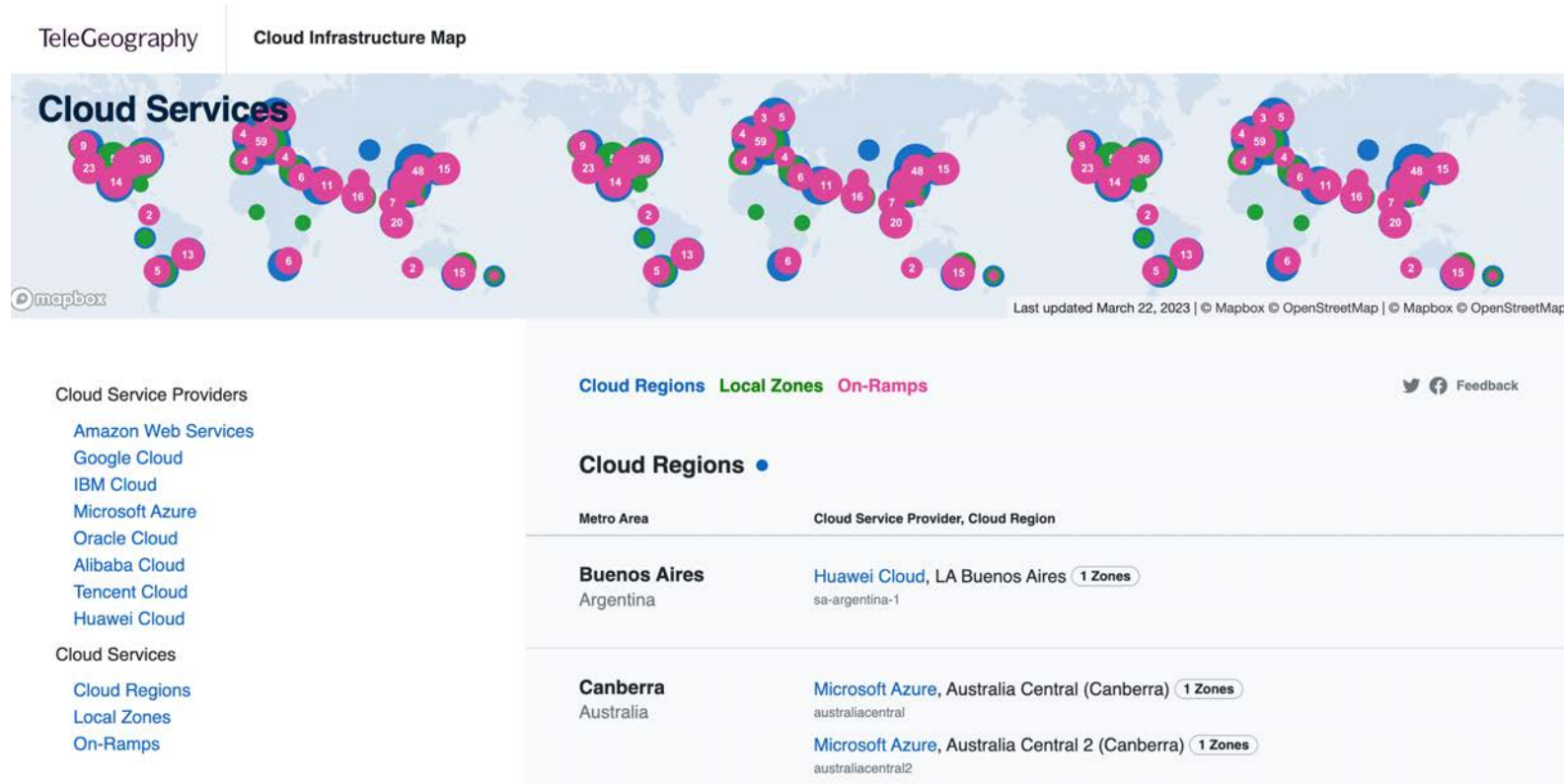


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Looking ahead

- **Increased competition, redundancy, access to capacity**
 - New sub cables offering lower prices and more capacity
 - More cables means more redundancy and better performance
- **Less dependency on Europe**
 - Uptick in data centers, CDNs, exchange traffic
 - Increase in intra-African capacity vs international connectivity
- **End-user demand on track for significant growth**
 - A lot of potential growth for 4G and FTTH
- **The 2Africa effect**
 - If similar to other regions, new cable pushes fairly large drop in price after activated and then goes back to normal price erosion rates

Have you seen the Cloud Infrastructure Map yet?



<https://www.cloudinfrastructuremap.com>

<https://www.submarinecablemap.com> (yeah, you know this one)

Thank You

Patrick Christian

Analyst

pchristian@telegeography.com