Impact of Connectivity and Interconnection in Africa

How Connectivity and Interconnection will change billions of African lives
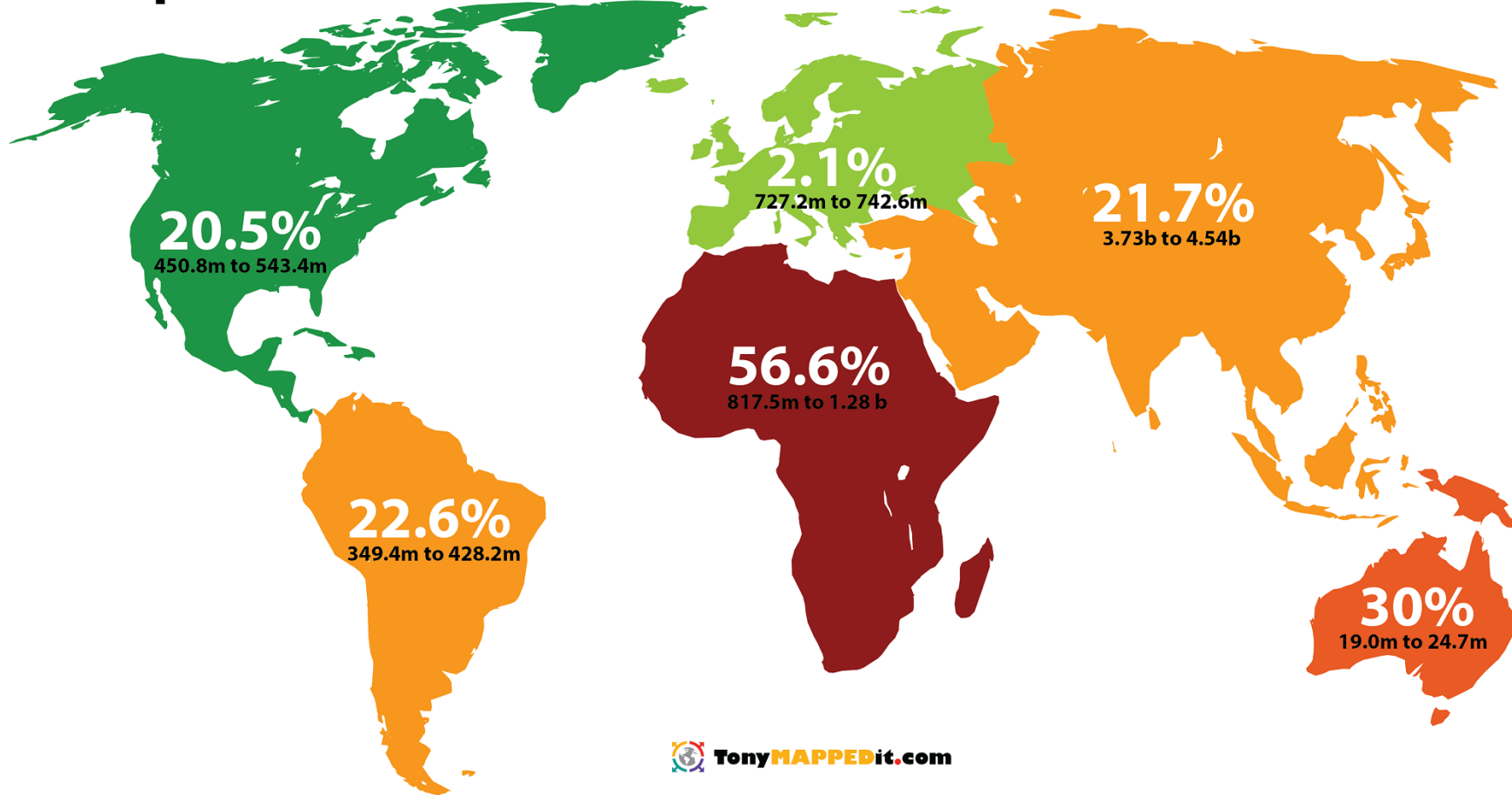
World Population Growth Per Continent

Africa's Growth driven by a youthful population

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Population Growth Per Continent From 2000 to 2018

20.5%
450.8m to 543.4m

2.1%
727.2m to 742.6m

21.7%
3.73b to 4.54b

56.6%
817.5m to 1.28 b

22.6%
349.4m to 428.2m

30%
19.0m to 24.7m

TonyMAPPEDit.com

Africa has the youngest population of any continent. As of 2021, around 40% of the population was aged 15 years and younger, compared to a global average of 26%. The median age on the continent is around 20 years, which represents considerable latent demand for internet services such as social media, gaming and e-sports in Africa.
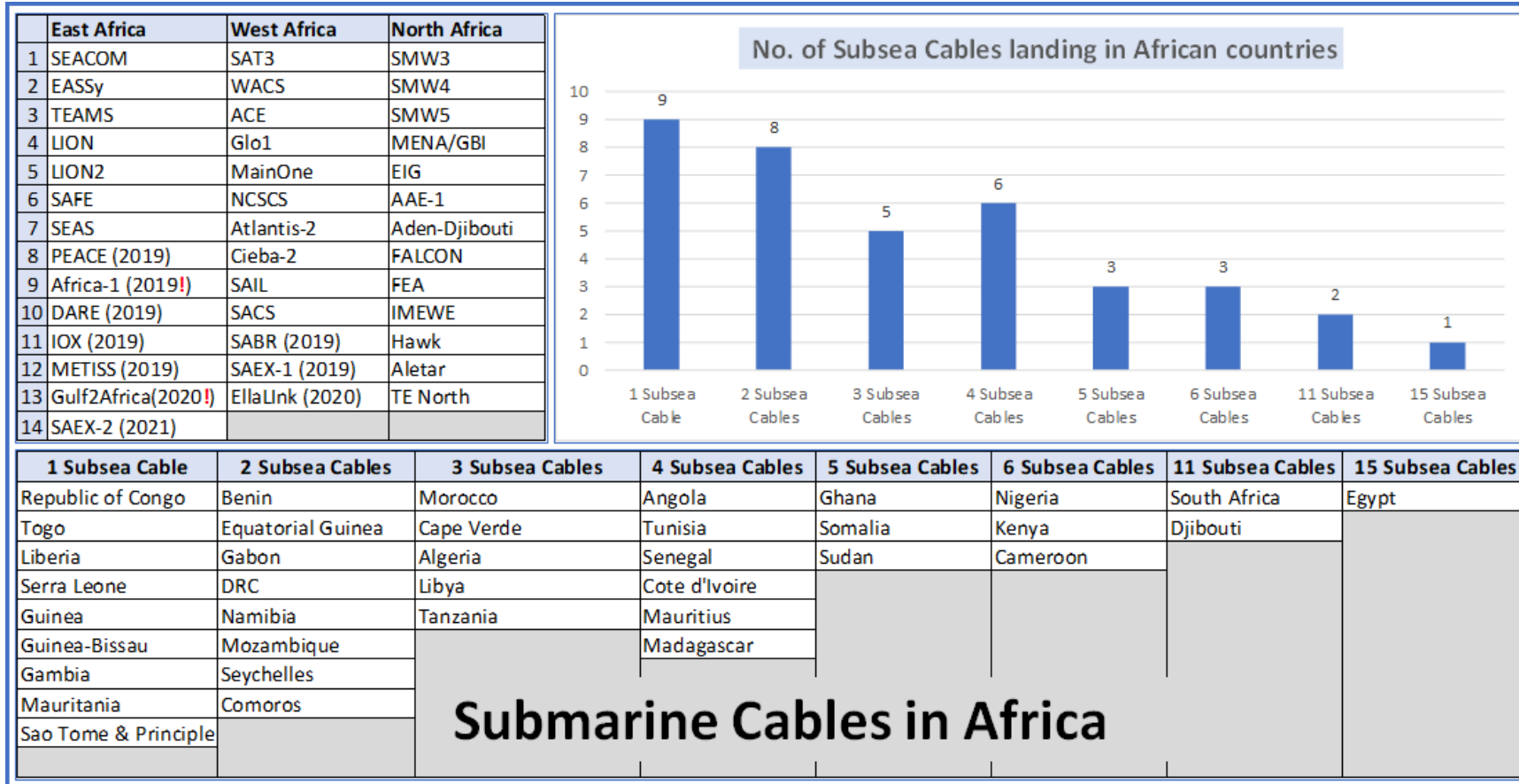
Broadband Connectivity Across Africa

Mobile Broadband dominates internet access in Africa

	Population (Last official estimates)	% Population Penetration		% of Africa's total pop (1.3b)
		Mobile	**Broadband**	
Nigeria	206,139,589	69%	0.7%	**50%**
Ethiopia	109,224,414	55.5%	1.8%	
Dem. Rep. of Congo	102,561,403	42.5%	0.1%	
Egypt	101,334,404	95.0%	38.2%	
South Africa	60,142,978	181.4%	18.5%	
Tanzania	59,734,218	91.7%	3.5%	
Kenya	47,564,290	117.6%	5.6%	
Uganda	45,741,007	65.8%	1.1%	**75%**
Algeria	44,700,000	103.1%	48.4%	
Sudan	42,268,269	77.5%	0.4%	
Morocco	37,034,729	138.6%	25.5%	
Angola	32,097,671	46.5%	1.9%	
Ghana	31,072,940	132.4%	1.6%	
Cameroon	28,524,175	84.0%	1.2%	
Madagascar	28,427,328	44.2%	0.5%	
Mozambique	28,013,000	49.9%	1.3%	

Experts estimate that only 46.7% of Africa's population is connected to the internet—less than global average of 63.2%. The typical African internet user is connected via mobile networks rather than terrestrial broadband. According to TeleGeography, Africa has average mobile usage per capita of 87% (close to 1.17 billion subscriptions) and fixed broadband of 8.9% of households as of September 2021

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Subsea Cable Landing Capacity grows but has not yet always been matched by improved broadband last-mile

	East Africa	West Africa	North Africa
1	SEACOM	SAT3	SMW3
2	EASSy	WACS	SMW4
3	TEAMS	ACE	SMW5
4	LION	Glo1	MENA/GBI
5	LION2	MainOne	EIG
6	SAFE	NCSCS	AAE-1
7	SEAS	Atlantis-2	Aden-Djibouti
8	PEACE (2019)	Cieba-2	FALCON
9	Africa-1 (2019!)	SAIL	FEA
10	DARE (2019)	SACS	IMEWE
11	IOX (2019)	SABR (2019)	Hawk
12	METISS (2019)	SAEX-1 (2019)	Aletar
13	Gulf2Africa(2020!)	EllaLInk (2020)	TE North
14	SAEX-2 (2021)		

No. of Subsea Cables landing in African countries

| 1 Subsea Cable	2 Subsea Cables	3 Subsea Cables	4 Subsea Cables	5 Subsea Cables	6 Subsea Cables	11 Subsea Cables	15 Subsea Cables
Republic of Congo	Benin	Morocco	Angola	Ghana	Nigeria	South Africa	Egypt
Togo	Equatorial Guinea	Cape Verde	Tunisia	Somalia	Kenya	Djibouti	
Liberia	Gabon	Algeria	Senegal	Sudan	Cameroon		
Serra Leone	DRC	Libya	Cote d'Ivoire				
Guinea	Namibia	Tanzania	Mauritius				
Guinea-Bissau	Mozambique		Madagascar				
Gambia	Seychelles						
Mauritania	Comoros						
Sao Tome & Principle							

Submarine Cables in Africa

Existing subsea cable systems and those under development will provide the extensive capacity increases and competitive downward pressure on cost of bandwidth to drive cost out of the end-to-end connectivity value chain, bringing affordable internet and locally hosted content to Africa's digital economies.

Internet Penetration in African Landlocked Countries

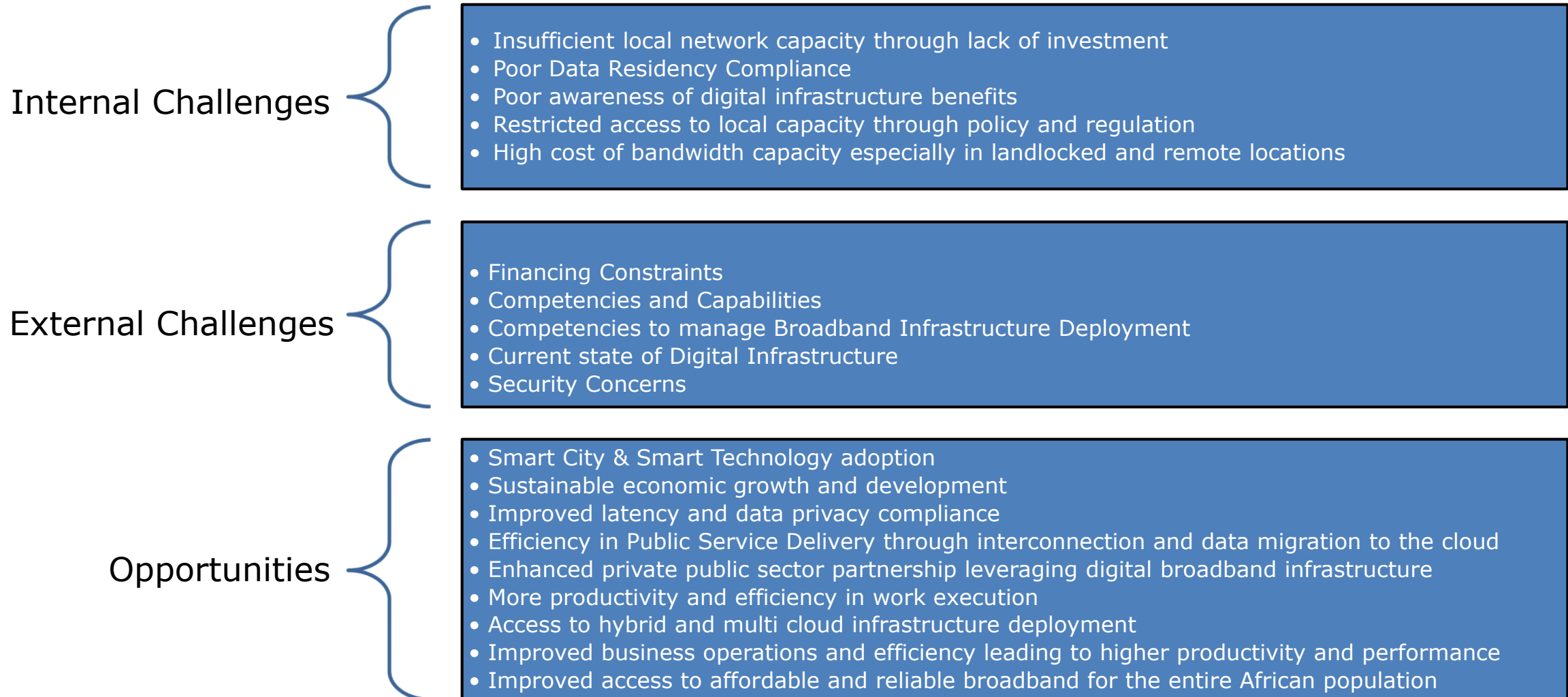Landlocked Countries are insulated from the broadband growth

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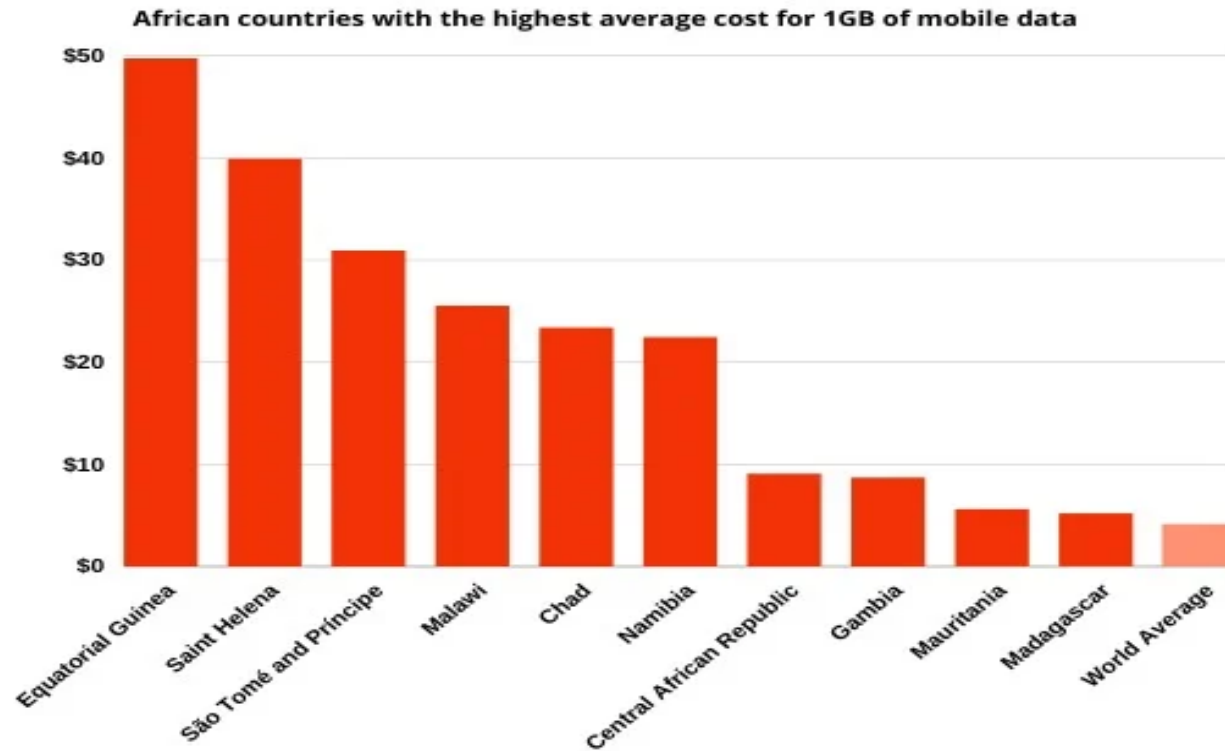
However, for Africa's interior cities and landlocked nations, the cost of national backbone and carrier services to the coastal hubs will continue to put a brake on growth unless restricted competition, capacity and affordability constraints on these inland routes are addressed by governments, ISPs and local content producers.

Factors Affecting Growth of Broadband Connectivity in Africa

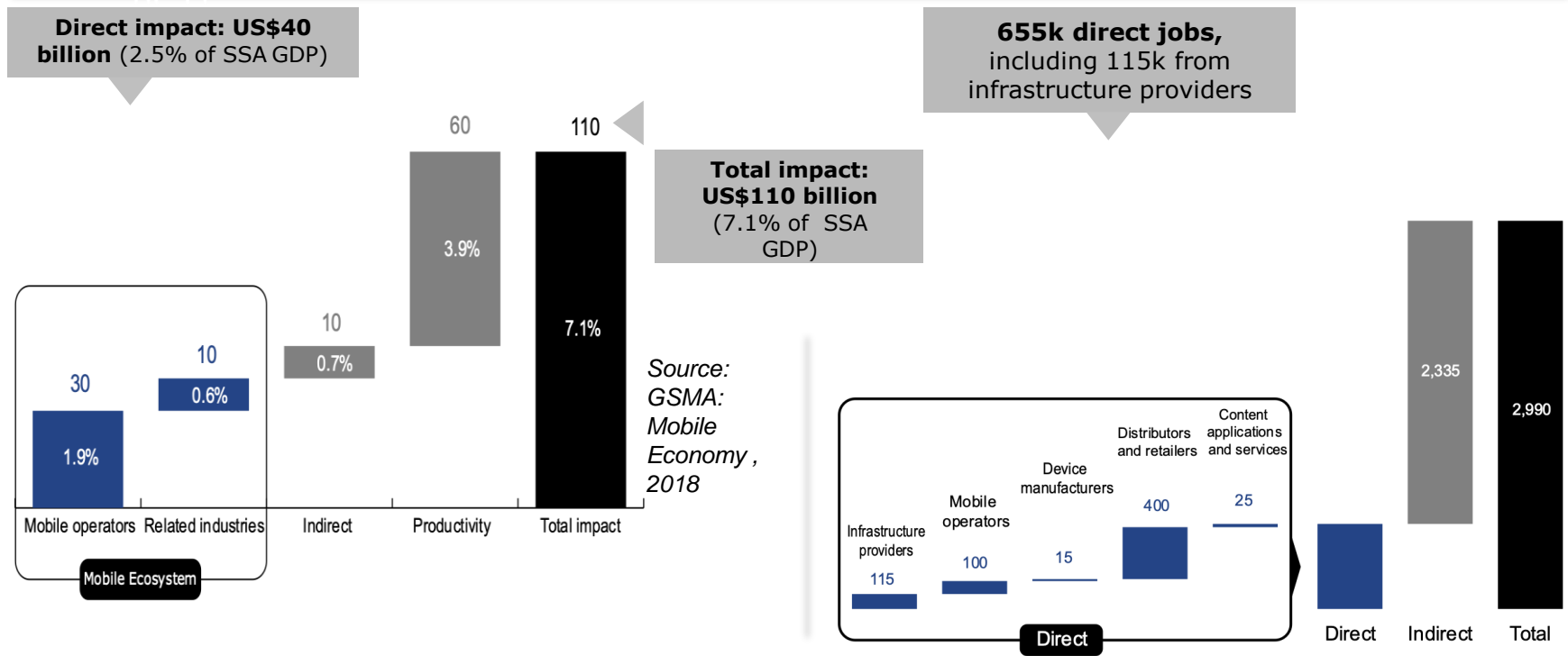## Factors also impacting adoption of Digital Economy in Africa

Internal Challenges

- Insufficient local network capacity through lack of investment
- Poor Data Residency Compliance
- Poor awareness of digital infrastructure benefits
- Restricted access to local capacity through policy and regulation
- High cost of bandwidth capacity especially in landlocked and remote locations

External Challenges

- Financing Constraints
- Competencies and Capabilities
- Competencies to manage Broadband Infrastructure Deployment
- Current state of Digital Infrastructure
- Security Concerns

Opportunities

- Smart City & Smart Technology adoption
- Sustainable economic growth and development
- Improved latency and data privacy compliance
- Efficiency in Public Service Delivery through interconnection and data migration to the cloud
- Enhanced private public sector partnership leveraging digital broadband infrastructure
- More productivity and efficiency in work execution
- Access to hybrid and multi cloud infrastructure deployment
- Improved business operations and efficiency leading to higher productivity and performance
- Improved access to affordable and reliable broadband for the entire African population

Liberalization of Internet and Interconnection in Africa

Economic and Social Transformation Impact in Sub-Sahara Africa

Sub-Saharan Africa: GDP and Job Growth from Information and Communication Technology (ICT)

Direct impact: US$40 billion (2.5% of SSA GDP)

655k direct jobs, including 115k from infrastructure providers

Total impact: US$110 billion (7.1% of SSA GDP)

Chart 1 — GDP impact (US$ billion):
- Mobile operators: 30 (1.9%)
- Related industries: 10 (0.6%)
- [Mobile Ecosystem]
- Indirect: 10 (0.7%)
- Productivity: 60 (3.9%)
- Total impact: 110 (7.1%)

Source: GSMA: Mobile Economy, 2018

Chart 2 — Jobs (thousands):
- Infrastructure providers: 115
- Mobile operators: 100
- Device manufacturers: 15
- Distributors and retailers: 400
- Content applications and services: 25
- [Direct]
- Direct: [total]
- Indirect: 2,335
- Total: 2,990

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Public Internet is closing the Digital Divide & drives the Digital Economy

BUT Enterprise Digital Infrastructure should remain private – ie reduce exposure to the internet

Public Internet B2C "consumer-facing" services
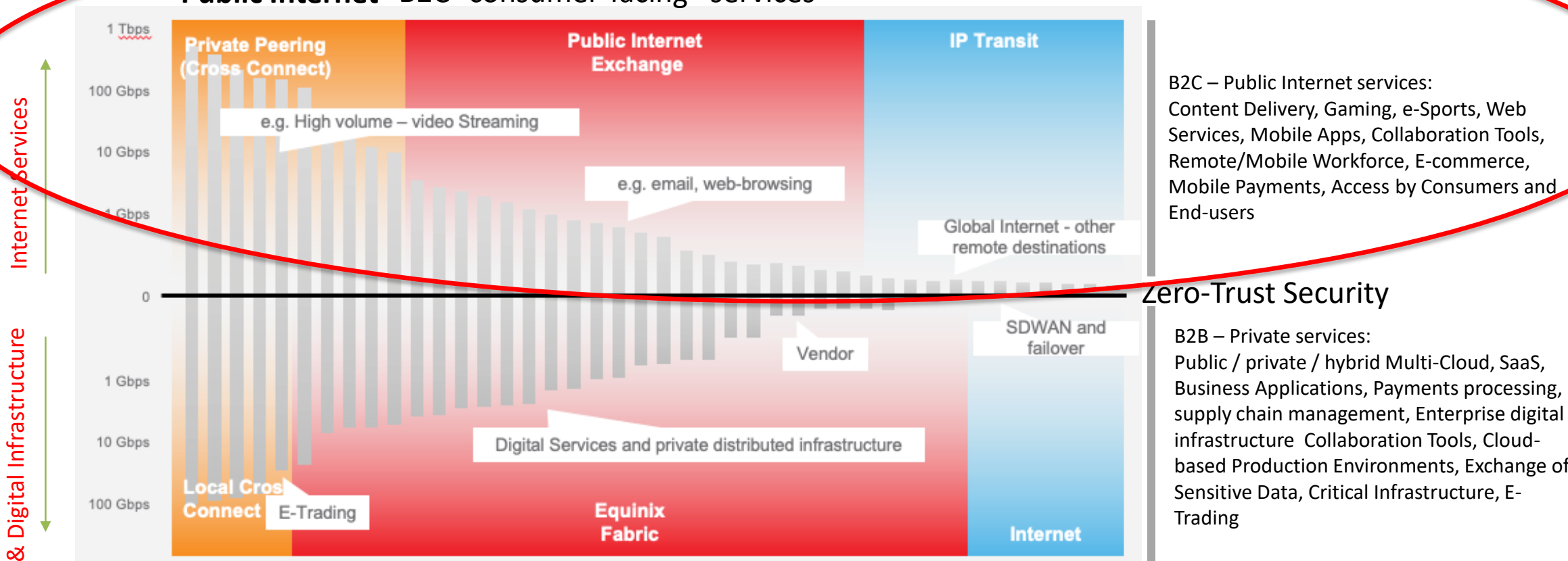
B2C – Public Internet services:
Content Delivery, Gaming, e-Sports, Web Services, Mobile Apps, Collaboration Tools, Remote/Mobile Workforce, E-commerce, Mobile Payments, Access by Consumers and End-users

Zero-Trust Security

B2B – Private services:
Public / private / hybrid Multi-Cloud, SaaS, Business Applications, Payments processing, supply chain management, Enterprise digital infrastructure Collaboration Tools, Cloud-based Production Environments, Exchange of Sensitive Data, Critical Infrastructure, E-Trading

Private Interconnection B2B, Cloud & IT infrastructure: "enterprise grade" services

Plan for a balanced Internet Transport strategy – not just public peering
Ignoring the full choice of interconnection options increases costs and decreases performance

1 IP Transit
- **When used:** Global reach to internet destinations otherwise unreachable by peering
- **What to look for:** Greatest bargaining leverage (hence lowest price). Colocate in data center with a large choice of transit ISPs and carriers.
- **Benefits / disadvantages:** Simple option for global reach, higher cost than peering, latency and performance may be poor.

2 Public Peering on Internet Exchange (IX)
- **When used:** To reduce reliance on transit, improving performance and cost
- **What to look for:** IX with large number of ASNs / destinations of interest
- **Benefits / disadvantages:** A single IX port supports aggregation of large numbers of BGP sessions with peer networks, greatly improving costs versus transit, latency due to reduced hop-count. Higher cost than PNI.

Private Peering (PNI)
- **3 When used:** When traffic exchanged with a particular peer is large
- **What to look for:** Colocate in data center with a large choice of ASNs with open or selective peering policies
- **Benefits / disadvantages:** Scales to very high bandwidths at much lower cost than IX peering, with the higher performance and security. Peer network peering strategy may be selective, restrictive making PNI unavailable.

CDN on-net (eg Netflix model)
- **4 When used:** Very high broadband traffic volumes with low latency / performance as a key requirement
- **Benefits:** Highest achievable end-user QoE at lowest possible cost.

Global Internet

Tier 1 ISP

Internet Exchange

Peer ISP and Content Provider

Network Operator

Mobile Network Operator

Cloud Services

Mobile Services

Cloud Provider

CDM Network & Services

IT Services
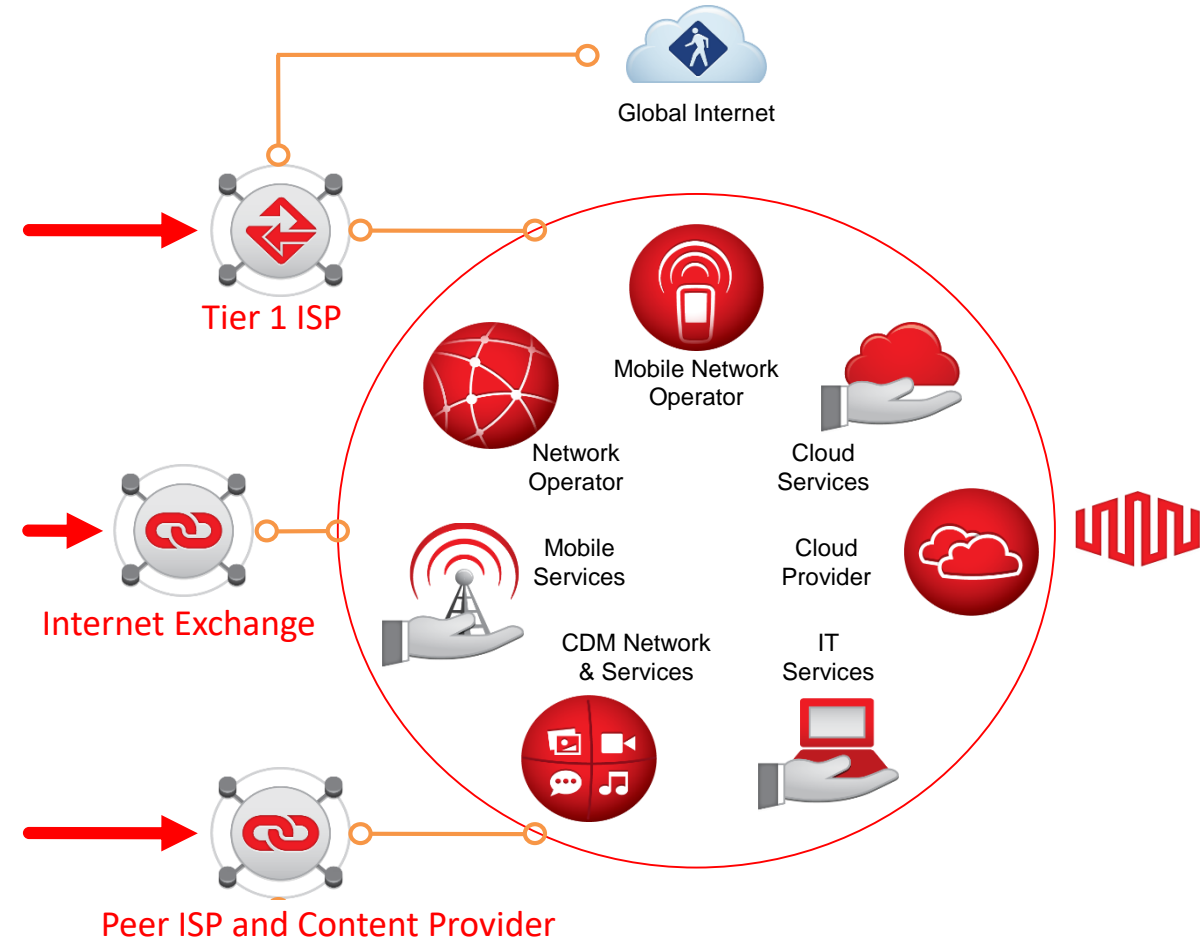
Case Studies: **WAF-IX** Peering

Customer needs, Solutions proffered and outcome

Customer A

Identified Need

Customer A wanted an **Internet Exchange hub** that is localized and serves as a regional hub for connecting to exchanges across the world to provide its network with **lower latency** to major content providers where its users were sending majority of their traffic.

Solution

Customer A was provided with a **1Gbps port** on WAF-IX with **leased line capacity** allowing it to peer at the exchange.
The WAF-IX team deployed the selected 1G port and connections within scheduled timeline.

Results

Customer A reached internet traffic utilization of up to **750Mbps** in a few months, at a far lower cost and a much-improved user experience. Network test showed latency of **~23ms** to widely visited content providers such as Google, Facebook, Cloudflare etc. against latency of about **95ms** when traffic goes over upstream networks.

Customer B

Identified Need

Customer B provides services to Multiple countries in West Africa, with **high bandwidth** and guaranteed seamless experience on the service.
As demand for home broadband internet grew, the need for better network experience with significant **cost savings** and **access to key content** was apparent.

Solution

WAFIX offered a solution that would provide access to key content providers alongside a highly secured colocation for their equipment at the MDXI data center whilst taking up a leased line from Cote D'Ívoire. Customer B was provided with a 10Gbps port on WAF-IX with 10Gbps leased capacity to connect to its equipment at the data centers.

Results

On turning up the 10G port, Customer B reached internet traffic utilization of **4.3Gbps immediately** and has grown to **6Gbps** exchanging traffic with all content providers on the exchange, enabling improved user experience for users in Cote D'Ívoire, Gabon, Rwanda, Burkina Faso, Congo and Democratic Republic of Congo.

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Thank you

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