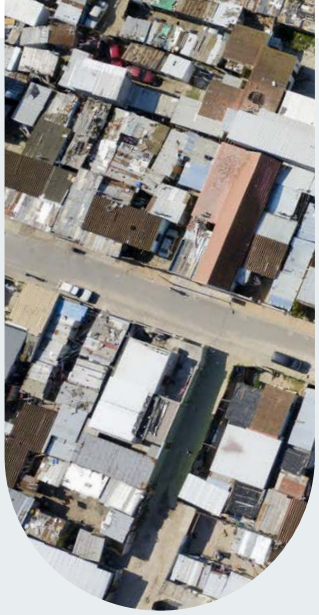

Africa Interconnection Report 2025

The region's data centre and cloud landscape prepares for AI

Research by

balancing act

TELECOMS, INTERNET AND BROADCAST IN AFRICA

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Contents

Introduction

2024 has seen continued investment in connectivity, data centres and cloud services in Sub-Saharan Africa.

Many of the announced data centre plans of previous years have now come on stream. In order to understand how the market is changing, Console Connect has commissioned a third edition of Africa Interconnection Report from consultancy firm Balancing Act.

Balancing Act has spoken to a wide range of data centre operators, carriers and cloud service providers. The report provides an update on:

- The number of carrier-neutral data centres and their geographic location
- The continuing growth and development of regional data centre hubs
- A summary of the significant changes in the cloud market, looking at both international hyperscalers and local cloud operators

In addition, it provides an analysis of how carrier-neutral data centres have in quite subtle ways changed the centre of gravity of the industry (see page 5). As they are the storage places for all forms of data in Africa's new digital economy, they have, not surprisingly, attracted legal and regulatory interest. There are a whole range of regulatory and legal issues affecting the industry, including energy efficiency and competitiveness (see page 22).

There is considerable interest in how Artificial Intelligence (AI) might be used on the continent but perhaps less attention paid to the energy implications. The report's final section (see page 29) looks at the reality of AI in Sub-Saharan Africa and how the industry is tackling the kinds of energy shortages already found elsewhere round the globe. It looks at how additional energy needs might be supplied in green forms.

About Balancing Act
Balancing Act focuses on Africa and carries out consultancy assignments for a variety of clients. The company helps national and global brands with their involvement in the African continent.

Research by:
Russell Southwood, CEO, Balancing Act
Email: info@balancingact-africa.com

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Methodology & Glossary

During 2024, Balancing Act conducted independent research into Africa's data centre and cloud market to produce this third edition of the African Interconnection Report.

The methodology for this report has two parts: firstly, the update of the supply-side (data centres and cloud services) and secondly, a focus on the demand-side (users of cloud services and early adopters of AI).

Companies and organisations were interviewed by combining a short, fixed framework questionnaire with a longer conversation to reveal qualitative insights.

Those interviewed provide a mix of larger regional and multi-country companies, smaller online providers, carriers and cloud service providers. Whilst there is a focus on multi-geography companies and larger markets, such as South Africa, Nigeria and Kenya, the survey also looks at other countries from medium-size economies like Ghana and DRC.

Data sets and analysis were compared to previous editions of the Africa Interconnection Report.

Some common industry terms used throughout the report:

AI agents: An AI agent is a software that performs tasks on behalf of a user. They can automate processes, make decisions, and intelligently interact with their environment.

DDOS: Distributed Denial Of Service attacks are a cyber-attack in which the perpetrator seeks to make a machine or network resource unavailable to its intended users by temporarily or indefinitely disrupting services of a host connected to a network.

DGX: This infrastructure is a complete AI solution, and includes NVIDIA AI Enterprise software to accelerate data science pipelines and streamline development and deployment of production-grade AI applications.

Edge computing: It is a distributed computing paradigm that brings computation and data storage closer to the sources of data. It aims to improve response times and save bandwidth.

Hyperscalers: This term stems from hyperscale computing, which is an agile method of processing data. Depending on data traffic, scale can quickly go up or down. Hyperscalers have taken this computing method and applied it to data centres and the cloud to accommodate fluctuating demand.

Power Usage Effectiveness (PUE): Power usage effectiveness or power unit efficiency is a ratio that describes how efficiently a computer data centre uses energy; specifically, how much energy is used by the computing equipment.

Rack power density: At the rack level, power density refers to the power draw of a single, fully populated server rack, measured in kilowatts.

Executive Summary

The key updates on the region's data centre and cloud landscape are as follows:

- Whilst eight new data centres came into existence in 2023/2024, this number is smaller than for each of the previous three years. DRC has become Africa's newest data centre market with facilities opened by Open Africa Data Centres and Raxio.
- The number of planned facilities has increased by ten in 2024 but these are largely additions to countries that already have data centres.
- The last year has reinforced the position of the four existing regional hubs, which are in descending order: South Africa, Nigeria, Kenya and Djibouti.
- Hyperscaler roll-outs are beginning to happen and new countries have been opened up, particularly using edge data centres. There have also been significant new entrants into the market, both international and local.

Balancing Act would like to thank all those people who gave generously of their time during the course of this research and hope that the many insights provided are fully reflected in this report.

Balancing Act would like to acknowledge specific contributions from Wouter van Hulten, PAIX (a version of the regulatory chart), Jasper Lankhorst, Colo West (market segments) and Martin Atkinson, Equinix (breakdown of cross-connects).

1. Update on the **data centre and cloud landscape**

1.1 Data centre roll-out slows

The chart below (fig.1) shows the speed with which plans for data centres have been converted into reality.

What is striking is that whilst eight new data centres came into existence in 2023/2024, this number is much smaller than for the previous three years. Nevertheless, the number of planned facilities has increased by ten on last year but these are largely additions to countries that already have data centres.

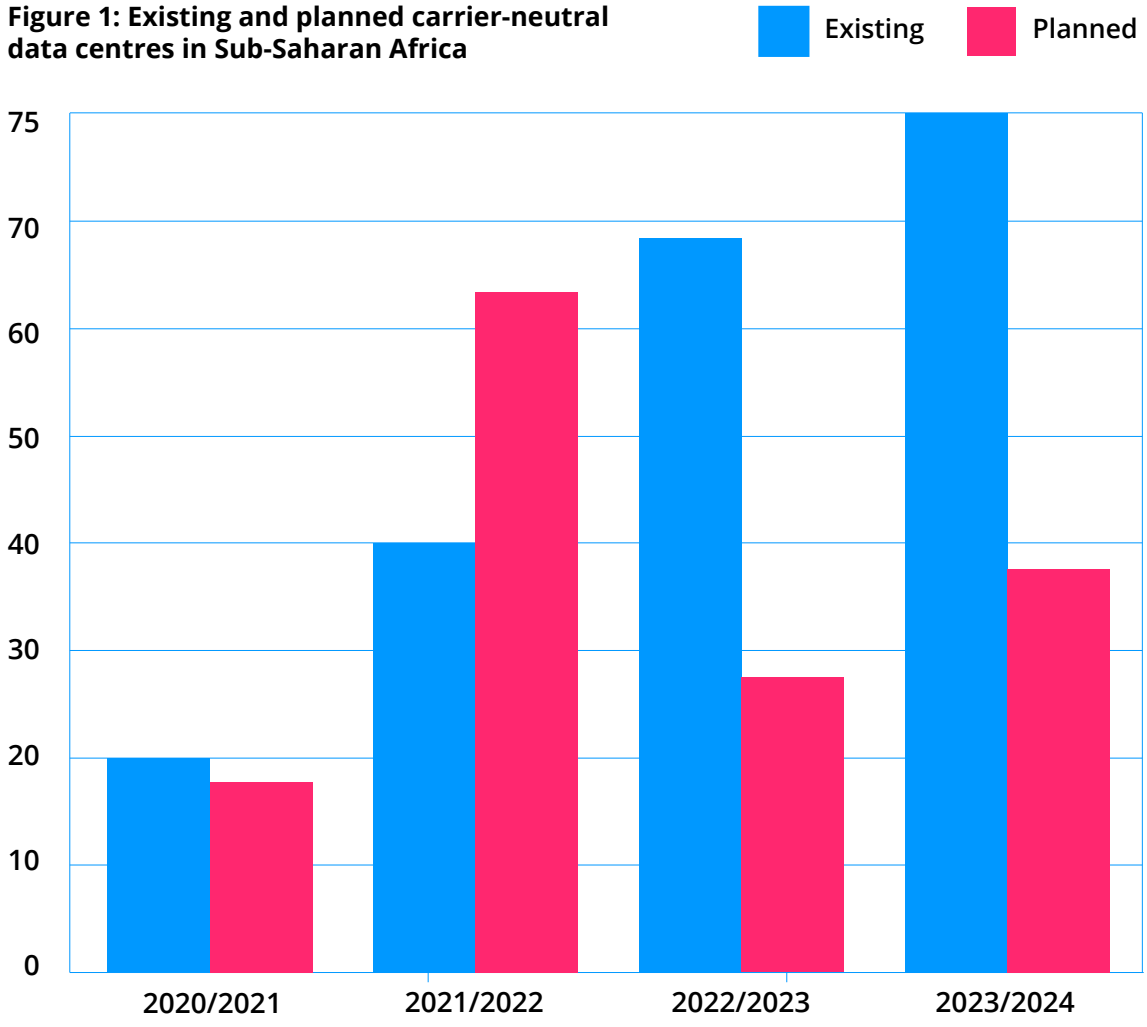
The number of countries that now have access to a carrier-neutral data centres went from 16 in 2020/2021 to 24 in 2022/2023 but has remained static in 2023/2024.

There are only two additional countries – Rwanda and Zimbabwe – that will be added to this number in 2025.

Since it seems to take 18 months to two years for data centres to be completed, the number of countries served or likely to be served has, for the moment, plateaued. Only 14 of these 21 countries have two or more data centres. Two data centres in a country are useful for those wanting to back up their data assets in more than one place but some country markets are very small.

As one data centre operator ruefully commented: "It's now a different ballgame and we have to be more intentional. We are all chasing the same people. In some small places where there are two operators, it means there's only half a pizza available."

Figure 1: Existing and planned carrier-neutral data centres in Sub-Saharan Africa



This realisation has had a dampening effect on some data centre roll-outs. For example, in one East African country where there is an existing carrier-neutral data centre, two other operators have looked at the market but have yet to make commitments. One industry insider thought that the level of demand will probably not support another carrier-neutral facility for another one to two years.

But investment continues to go into countries with existing data centres. For example, Equinix has announced that it will invest US$390 million in building data centres in Africa over the next five years.

Some of these plans include further expansion in Nigeria and South Africa and entering the East African market.

Many of these countries have quite small data centre capacity. Even with some relatively large capacity builds in Kenya and Nigeria, the majority of Sub-Saharan Africa's capacity is still in South Africa. There are other countries that will in due course have potential for a carrier-neutral data centre but government involvement in the market (see section 3 on page 29) may put off potential investors.

In East Africa, the number of data centres built and planned in Kenya and Tanzania is beginning to come closer but Kenya has the advantage in both scale of capacity and length of time in operation.

Fig. 2 shows the number of publicly advertised edge data centres. These are small amounts of data centre capacity (10-20 racks) and can be located in widely varying circumstances, sometimes in more remote areas. As one operator noted: "It's a term used very widely to cover a whole lot of things. It's mostly two things. Firstly, it might be anything from a country that would not ever attract a significant deployment from a global player but there is demand in the market. Secondly, in more developed markets like South Africa with cities like Durban and Port Elizabeth, where local companies need to be close to local markets."

On the basis of the figures below, South Africa has 97% of the edge data centres identified.

Figure 2 Publicly advertised edge data centres

Burundi	1
Lesotho	1
South Africa	1
Zimbabwe	1

The largest announced data centre investment was by Microsoft in May 2024. It is collaborating with UAE Artificial Intelligence provider G42 to build a US$1 billion geothermal powered data centre in Kenya. The first phase of the project is scheduled to be ready in 2026 and offer 100MW of capacity aimed at boosting cloud-based computing.

Hyperscalers all have different attitudes to whether they build their own data centres or buy capacity from others. So far Microsoft seems to have built around 40% of its own capacity and by contrast, AWS has built all its own data centres.

The impact on hyperscalers on local economies is worth pinpointing. According to AWS' Economic Impact Study, the company has invested ZAR15.6 billion between 2018-2022 and will invest a further ZAR30.4 bn up to 2029. It also sustains 2,200 jobs through direct effects, investment in construction and expenditures for operations. Whilst only Sub-Saharan Africa's largest data centre market attracts that level of investment, it does emphasise that the new data centre ecosystem will generate investment, jobs and skills even in more modest markets.

DRC: ONE OF THE CONTINENT'S NEWEST DATA CENTRE MARKETS

DRC has a population of 100 million, 16 million of which are to be found in the capital city Kinshasa. Just across the river from Kinshasa is Brazzaville, the capital of neighbouring Congo-Brazzaville. Sufficiently low-cost connectivity and reliably redundant connections should enable these two cities to be serviced as one.

Two data centres, one from Open Access Data Centres and the other from Raxio, have opened in Kinshasa. Initial customers for both facilities are the usual early-adopters: the mobile operators and other carriers, the banks and local and regional cloud solution providers, including ST Digital's Cloudstore.

There are around 20 carriers in the country and most are members of KINIX, based in Kinshasa. Regional carrier AFR-IX has a peering arrangement with KINIX.

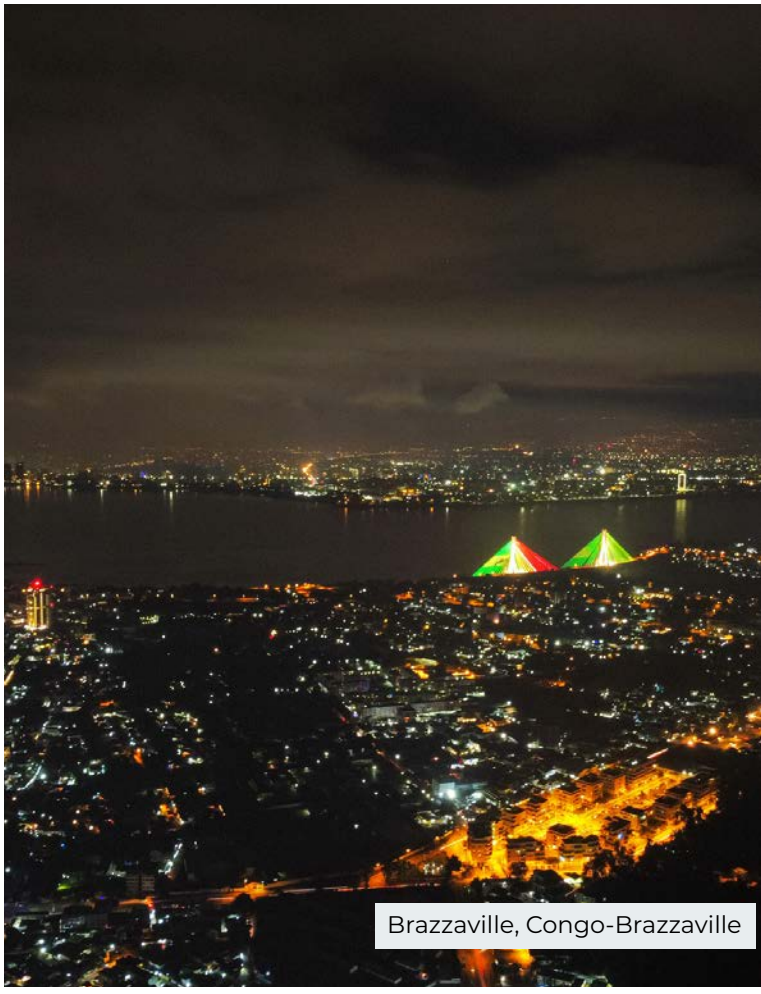
Two of DRC's other cities – Goma and Lubumbashi – each have a local IXP. One local carrier-neutral operator is talking of opening data centres in 4-5 of DRC's larger cities, especially those where mining is a key activity.

Meta has been involved in financing the 2Africa cable that has landed at Muanda and will be operational by the end of the year. It is likely to have a local presence in a data centre in 2025. There are also other CDN providers waiting for this international connection to open. The government offers an online visa service but there are almost no other digitally-enabled services.

Many of the countries without a carrier-neutral data centre are places where governments have been involved in creating their own data centres with development funding from institutions like the African Development Bank and the World Bank.

For example, in August last year the Cape Verde Government signed a US$15.3 million agreement for a technology park, which would include two new data centres run on renewable energy. The operator will be NOSi, which is a government agency.

In 2024, the Congo-Brazzaville government agreed a package of connectivity funding from the African Development Bank. US$14.6 million of this overall package has been set aside to build a data centre of 500m2, of which 400m2 has been allocated for private sector use.



Brazzaville, Congo-Brazzaville

1.2 Regional hubs

The regional geographic distribution of these carrier-neutral data centres broadly reflects the scale of economic activities in the different regions.

Figure 3: Regional geographic distribution of existing data centres:

Southern Africa	**32**
West Africa	**20**
East Africa	**17**
Central Africa	**3**
Indian Ocean	**3**

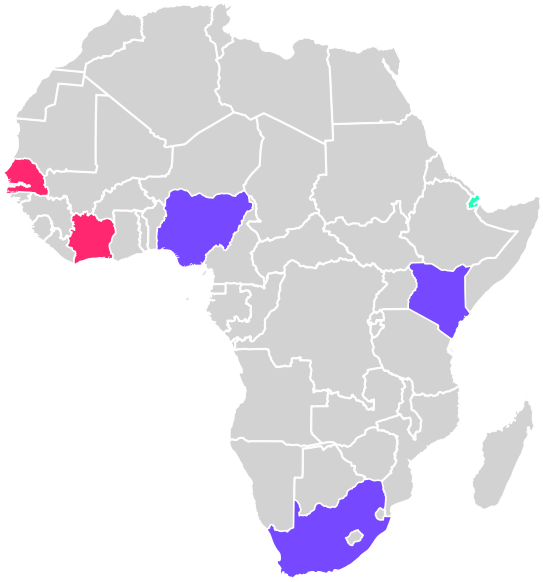
The last 12 months has reinforced the position of the four existing regional hubs, which are, in descending order: South Africa, Nigeria, Kenya and Djibouti.

Nigeria has the potential to act as a hub for parts of West and Central Africa but has yet to come into its own in this role.

2Africa has landed at Qua Iboe, which now can serve Port Harcourt directly. PAIX's announcement that it is planning to build a new data centre in Djibouti will add to its competitiveness, along with the extension of Wingu's capacity.

As a safe country in the often-troubled Horn of Africa, it could – with additional fibre routes - grow into that region's regional hub. The 2Africa cable has added to its existing portfolio of international connections, running to Europe, the Middle East and Asia.

Figure 4: Existing and potential regional hubs



Existing regional hubs

Potential regional hubs

International hubs

Either Cote d'Ivoire or Senegal will become the most likely hub for francophone Africa. Indeed, this is the pitch Raxio made when it opened its data centre in Cote d'Ivoire in September 2024.

The continuing wholesale connectivity monopoly in Cameroon and similar issues in many of the neighbouring countries restricts its further growth as a potential regional hub for Central Africa. This is also despite improvements like the new fibre route to Central African Republic that has created a digital loop in the region. The tragic civil war in Sudan means that nothing will be built there despite its advantageous position of having a significant number of neighbours in the Horn of Africa it could serve.

Regional data centre hubs grow from having a “critical mass” of customers within a clearly defined region. They are often busy junctions where large numbers of international cables coincide. This “critical mass” of customers becomes self-reinforcing over time.

Provided it is well built and operated, the longer a carrier-neutral data centre is in operation, the more customer connections it accumulates.

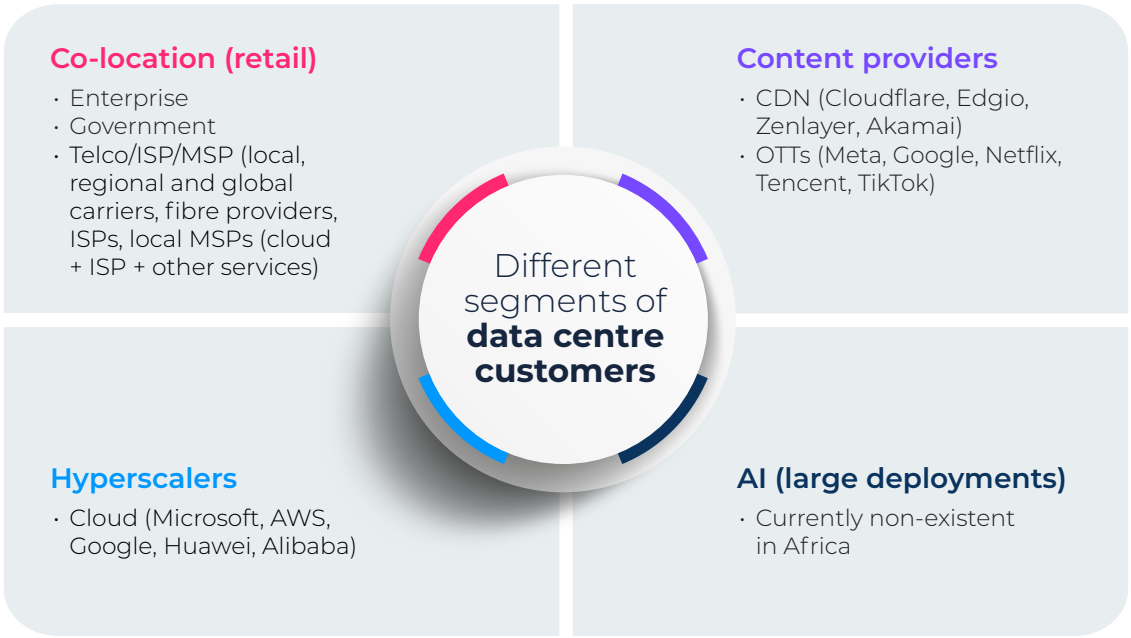
In smaller countries, carriers will put 1-2 racks into all carrier-neutral data centres and banks are legally mandated to have some form of external data recovery. Obviously, if banks have already outsourced their main operation to one data centre, they will need to choose another for recovery that is not geographically close.

The diagram below (see fig.4) gives a segmented breakdown of customers.

The breakdown of colocated users at the NAPAfrica exchange housed in Teraco gives some idea of the density and complexity of the continent’s primary regional hub.

It hosts over 30 African carriers, from countries as far afield as Congo-Brazzaville, Somalia, Seychelles, Rwanda, Equatorial Guinea, Mauritius and Madagascar. At an international level, there are nearly 20 carriers from the USA, Europe and Asia. There are 15 content providers including Apple, Google, Amazon, Yahoo!, Netflix, GVA Canalbox, TV Cabo, DStv and Valve.

Figure 4: Data centre customers by segment



Although not comparing like with like by category, a breakdown of iColo's NBO1 customers also demonstrates this breadth and complexity. It claims 50+ connectivity providers, 40+ enterprise businesses, 10+ East African financial institutions, 6+ cloud/IAAS providers, 5+ payment switches and an unspecified number of public sector services. By contrast, the Raxio data centre in neighbouring Uganda has sixteen carriers hosted locally.

At the heart of colocation is cross-connection between these different customers and this is not simply a case of making direct 'cross-connects' in a data centre.

In terms of public traffic, a video streamer might use a direct 'cross-connect'; a mid-size network might use the local IXP; and out-of-market customers could use IP transit.

For example, Lyca Mobile uses the UIXP to connect to Uganda's networks. For private traffic, sensitive e-trading might go via a direct 'cross-connect'; an enterprise application through the local IXP; and B2B supply chain transactions over the internet.

For sensitive private traffic, Equinix Fabric offers a wide range of global connections in over 50 locations. It also provides APIs for automatic provisioning.

CDNs are another bell-weather for how regional traffic is generated. For example, UIXP in Uganda reported an increase in 2023 from 10Gbps to 45Gbps and although traffic always fluctuates, the largest part of this increase was accounted for by "CDNs coming and going."

There have been two new CDNs, one a Netflix cache in collaboration with Lyca mobile and the other a new cache from Meta. Two other major CDNs initially hosted local caches on UIXP but one took the decision to deliver that content by remote peering from Mombasa with subsequent service outages from its provider before the connection was stabilised. Content service providers like Akami are under margin pressure, making it harder to sustain smaller inland presences.

Although the cost of IP transit has come down to US$1-2 per meg, it is still difficult on small margins to pay for a link to Mombasa or to get someone else to pay for it.

Mombasa, Kenya

1.3 Changes in the cloud market

Sub-Saharan Africa is not a single cloud market but one made up of many different individual countries.

Announced roll-outs by hyperscalers have been blown off course by the flurry of interest around AI and global events. However, these roll-outs are beginning to happen in a small way and progress by company over the last 12 months is identified later in this section.

Going into new markets is a costly commitment for hyperscalers and there is a strong feeling among informed observers that it is the current lack of demand that is holding back faster roll-out.

The continent's largest cloud market is South Africa and there is continuing growth but the picture is somewhat mixed. The larger international providers seem to be experiencing an increase in customers but many of the smaller ones have seen less growth. Nevertheless, as one data centre operator commented: "People who are operating cloud are getting additional customers into the cloud."

Many enterprises are overcoming their initial suspicion of peering with other organisations. Also, as another operator put it: "AI has lit a match under transitioning to the cloud" (see section 4 on page 29).

The next biggest cloud market by size of economy should be Nigeria but it is, as one internationally-owned data centre operator confirmed, "still in its infancy".

But both Kenya and Nigeria are on the roadmaps of several different hyperscalers and it is probably only a matter of seeing the right economic circumstances.

Nairobi, Kenya

The leading international hyperscalers are charging in euros or dollars and the current level of currency fluctuations in many countries is inhibiting growth.

By comparison, a stable Indian Ocean market like Mauritius has 80% of its 'top 100' companies in the public cloud but there is still room for growth at the mid-market level.

The alternative to international hyperscalers who charge in international currencies or peg their rates to them are local providers.

For example, a small country like Uganda has two local providers, Roke Cloud and Sybil. These local providers are optimistic, for as one told me: "In Uganda, there are currently hundreds of organisations using cloud. Next year this will be in the thousands."

Often, those local providers follow data centre operators into new markets. For example, Stellar-IX is working with a local cloud provider in Madagascar and intends to see it roll-out in Senegal and Tanzania.

Nigeria's Layer3 is VMWare Cloud certified and is offering availability zones in Abuja and Lagos. To overcome the need to pay in international currencies, Nigerian fintech start-up Okra is offering a cloud services product called Nebula billed in African country currencies as a way to compete with Microsoft and AWS and with a claim to low latency.

The international cyber-outages on 19 July 2024 that grounded planes, closed banks and affected the online insurance market have sharpened the understanding of the need for digital resilience. As one South African data centre operator said: "Some of these using big providers are asking themselves what to do after all these incidents. They are implementing more hybrid solutions."

Even a small East African country market company reported: "There are lots of requests for managed firewalls. Organisations are looking for threat mitigation, and DDoS solutions. They are looking at clean pipes, not the public internet. They want a pipe that is already protected."

In this context, one of the major Africa data centre operators warned: "Organisations should have 'hard' alternatives to their systems."

Bloomberg reported in April 2024 that the South African Competition Commission was about to start an investigation into one cloud provider's costs charged to customers wanting to switch.

The Competition Commission has a track record of examining digital markets and has two unrelated investigations already under way. One South African data centre operator underlined the importance of 'friction-free' switching: "Implementing data interoperability between providers allows enterprise customers to change providers."

1.4 Cloud provider analysis

There are now a number of different, niche cloud providers whose entry is adding competition to the market:

VPSie: It offers "cost-effective and secure cloud computing" and SSD storage. It has six locations globally: four in the USA, one in Europe (Amsterdam) and one in Africa (Djibouti). It has over 20 apps in its marketplace and can be used with six different operating systems, including Oracle Linux and Windows. It claims that it has "changed the idea that private cloud is more expensive than public cloud as well as made private cloud, air-gapped or hybrid cloud fast and easy to deploy and operate."

Vultr: It offers what describes as "to deliver the most efficient platform of any independent cloud computing company" offering "unrivalled price-to-performance" through its presence in Johannesburg. Users can provision Cloud Compute and Optimized Cloud Compute, as well as Bare Metal, Kubernetes, and Cloud Storage. It has 32 global locations, 14 of which are outside Europe and the USA, and is committed to ensuring all regions of the world have access to critical cloud infrastructure.

Zadara: Its slogan is "Unlock AI power with sovereign edge cloud." It has an ambitious plan to have 18 nodes across Africa by next year. Currently, it has South Africa (2, with Africa Data Centres), Mozambique (with Paratus), Ghana, Angola and Nigeria, Zambia and is in the process of opening up Namibia and Madagascar. Overall, it has 600 nodes globally. Future plans include Ethiopia and Sierra Leone. It claims that it is the "first AI sovereign cloud in Africa" and with AWS EC2 compatibility, it also says it is 50% cheaper than most hyperscalers across the world.

A summary of recent hyperscaler cloud activities in Sub-Saharan Africa:

AWS: AWS operates what it calls the AWS Africa (Cape Town) Region which consists of three availability zones and there is a local zone, single deployment in Johannesburg. It intends to continue to invest significant amounts in South Africa (see page 7 for more detail) and wants to expand its local zones in South Africa, as well as some other parts of the continent, to bring AWS infrastructure closer to end-users. These include another local zone in South Africa and one in Kenya. It also has current availability in Nigeria.

It has built a machine learning chip called Trainium purpose built for the training of 100B+ parameter models. At the 2024 AWS Summit it demonstrated some of its Generative AI (GenAI) capabilities using Amazon Bedrock, a fully managed service that provides foundation models (FMs) from AI companies via a single application programming interface (API). IBM's software portfolio will be made available in 18 African countries on AWS Marketplace. It contains thousands of product listings from independent software providers, making it simple to identify, test, buy, and deploy AWS-compatible software.

Microsoft: Microsoft has agreed to invest US$1 billion in Kenya (see page 7 for more detail). It has also announced that it will build its own data centre campus in Centurion, midway between Johannesburg and Pretoria. It has two Azure regions in the country, Johannesburg and Cape Town.

In partnership with Liquid C2, it offers an Azure stack in five countries: Kenya, Nigeria, South Africa, Zambia and most recently, Uganda. In October 2023 it signed a five-year strategic technology partnership with Nigerian payments platform Flutterwave. As part of the collaboration, Flutterwave will launch transactable solutions on Azure Marketplace, including its SMB finance-as-a-service offering. Microsoft Research Africa has published a white paper on AI and the Future of Work in Africa.

Google Cloud: The long-awaited Google Cloud region opened in Johannesburg in January 2024 in Teraco. It said in September 2022 that it would build cloud interconnect sites, linked to Equiano, in Johannesburg, Cape Town, Lagos and Nairobi. These interconnect sites would provide access to the company's data centre infrastructure in South Africa.

Liquid C2 became the first Google Cloud Interconnect provider on the continent. It also in partnership with AI solutions provider Anthropic and Google Cloud to provide the former's services on Google Cloud's Vertex AI platform1. MTN is using the Advanced Data Analytics Management Platform (ADAM), built on Google Cloud's infrastructure, enabling it to analyse 4 trillion data records across 19 countries.

Oracle Cloud: At the beginning of 2024, Oracle announced its intent to open a new public cloud region in Kenya. In May 2024, it signed an MOU to open two public cloud regions in Morocco, Casablanca and Settat.

It was reported that these were the first public cloud regions in North Africa, followed by Huawei (see below). It has also added new AI capabilities within its Oracle Fusion Cloud Applications Suite that will help customers execute complex tasks, automate workflows, and drive efficiency. It includes more than 50 new AI agents and a range of AI capabilities that assist with authoring, advice, and recommended actions. The new AI-powered capabilities will help customers achieve new levels of productivity across finance, supply chain, HR, sales, marketing, and service.

Huawei: Huawei has plans to add more cloud data centres in Africa, with East and West Africa identified as the next target regions. Huawei Cloud has expanded into Egypt, its first presence in North Africa. In Kenya, Huawei currently has a point-of-presence site, which uses a dedicated connection between the East African country and South Africa. In September 2024 it announced that it had won a US$3 million cloud contract with Nigeria's United Bank of Africa.

Alibaba Cloud: In June 2024, Alibaba Cloud expanded into Mozambique in partnership with BCX, using the latter's data centre in Maputo. It has two availability zones in South Africa through BCX's Midrand data centre and Teraco's Isandro facility. Its services are billed in local currencies and it works with 25 distribution partners, including Cloud Network Solutions, Cipherwave, and QBurst.

Tencent Cloud: Tencent Cloud has partnered with Orange Middle East and Africa to leverage its "mobility framework and Tencent Cloud Mini Program Platform (TCMPP) solution to create an open platform for Max it to integrate a wide range of mini-apps within its super-app. It is supporting African entrepreneurship through this alliance by offering local startups, merchants, content creators, as well as major brands and companies the opportunity to develop mini-applications tailored to the needs of each country.

2. Changing business models and the **state of the industry**

2.1 The formative role of data centres

It was 16 years ago that Teraco launched the first carrier-neutral data centre on the continent and as section 1.1 (see page 6) shows, over the last five years this type of data centre has attracted considerable new investment, international acquisitions and an increasingly wide geographic spread.

Data centres have not caused the same level of hype as other industry disruptors but have in a quite subtle way been part of the shift in the centre of gravity in the industry.

IXPs were the pioneers of the changes to come and are now a key part of the connectivity ecosystem. According to the African IXP Association, there are 56 IXPs in 48 cities in 36 countries, exchanging 4.6Tbps locally.

In the pre-carrier-neutral period, the Mobile Network Operators (MNOs) were at the heart of the industry: they built the international and national fibre networks; through these networks they controlled how others interconnected through their own data centres; they launched significant new products like mobile money; and they set the terms for what little content there was via SMS. They were vertically-integrated companies who controlled nearly all parts of their own 'value-chain'.

With the arrival of platforms like Google and Facebook (as it then was) and the rise of smartphones, this pattern began to change. The MNOs needed this important content but they were no longer directly in control of it. As one long-time industry participant observed: "The platform providers have had a huge impact. These guys are building the submarine cables. Anybody doing anything has to make friends with them."

Customers – both within the continent and from elsewhere globally – looked at how they wanted to interconnect differently.

As one data centre operator put it: "Customers wanted to be in a data centre that was carrier-neutral with multiple connectivity options and multiple redundancies. They judged it on the density of peers and the density of traffic."

Carrier-neutral data centres have become the middle of an emerging traffic architecture on the continent and this has begun to upend how the industry operates. Dark fibre to the landing station and data centre are now an essential part of this new world.

The removal of monopolies on submarine cables to the continent saw wholesale prices fall and applied a downward pressure to other parts of the value chain like retail internet and corporate connectivity that has remained a constant to the present day. At a potential 144Tbps, Google's Equiano cable was twenty times the size of the last cable built. With the part-Meta-financed 2Africa cable (at a potential 180Tbps), these two cables have added a potential total of 324Tbps into the market.

As one global connectivity provider commented: "Carriers are trying to keep revenue numbers steady by bundling connectivity with added services."

A number of them have forged alliances with cloud hyperscalers to find new revenue streams. For example, Liquid C2 offers AWS, Microsoft Azure and Google Cloud products in order to provide 'best of breed' to its customers. It also offers security solutions.

Another example is Vodafone's strategic partnership in Europe and Africa with Google that includes AI and cloud-based applications. Differentiation amongst carriers on their core product connectivity has become a great deal harder on anything but price and service. Two of the remaining differentiators are having unique routes and offering double redundancy routes.

"Carriers are trying to keep revenue numbers steady by bundling connectivity with added services."

2.2 Building digital resiliency

The international cable outages that affected the continent this year focused the industry's attention on being able to provide digital resilience.

Connectivity buyers have bought large capacities on the new cables and even from the new satellite suppliers. There are global moves to get satellite and terrestrial networks better connected. Cables, like SACS and MONET, that had largely been ignored, suddenly found themselves doing brisk business. But despite having over 40,000km of national long haul and cross-border fibre, there are still few east-west terrestrial routes to allow redundancy.

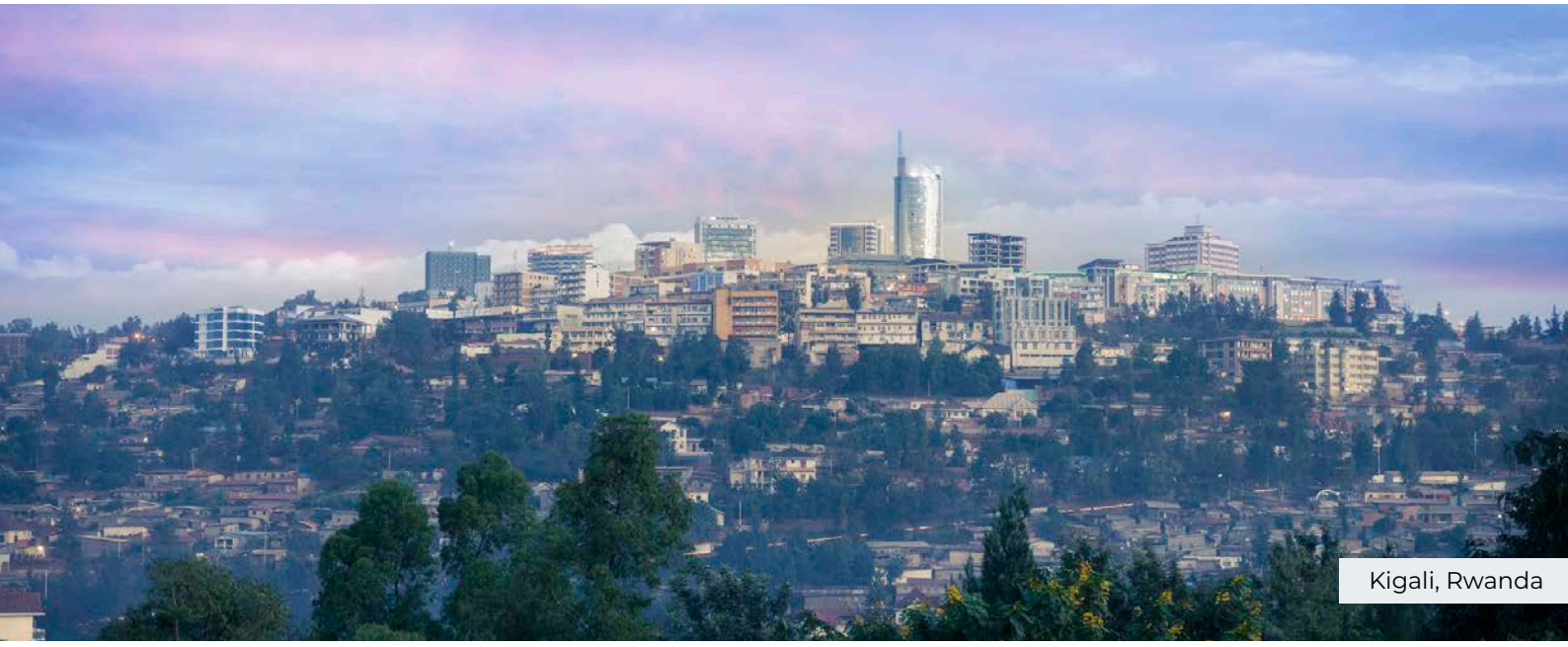
An increasingly complex network of cross-connections at carrier-neutral data centres has opened up the possibility of automating the buying of connectivity and connectivity-enabled applications like cloud.

Something that once took multiple phone calls and several months can now be arranged using an internet platform. Names like Console Connect, Pin Drop and Equinix Fabric all offer different ways and opportunities for doing it.

Others have talked privately of creating their own platforms but have yet to come to market. Like all changes, it will take several years to see its impact. Nevertheless, to have a platform that offers multiple connectivity choices – whether private or public - can only increase the efficiency of the industry. Whatever the challenges, it is now becoming easier to buy and sell connectivity on a regional basis. A company like WIOCC that was set up as vehicle for its stakeholders to operate its East African cable has in a relatively short period of time (without acquisition) become pan-continental. For example, in Nigeria it offers 4,500km of national fibre and has 84 PoPs.

Another example is TelCables, the international operating arm of Angola Cables, which has knitted together a combination of international cables (including SACS and MONET), data centres (including one in Brazil) and physical presences in places like Brazil, Nigeria, Portugal and South Africa. As its CCO Rui Faria put it: "We realised we couldn't operate everything from Angola."

Over 55% of its revenues now come from outside Angola. These opportunities were there before carrier-neutral data centres and regional peering but both of these factors have made this kind of operation somewhat easier to run.



Kigali, Rwanda

2.3 The evolution of MNOs

In the context of these changes, some MNOs have redesigned their formerly vertically integrated businesses. The first mobile tower company deals in Sub-Saharan Africa date back to the early 2000s but the reshaping of the industry really took off in the mid-2000s.

MNOs increasingly became many different businesses, whether or not they were separate. MTN provides a good example of acknowledging this reality. It has separated out its mobile money business (a fifth of its revenues), selling off a minority stake to Mastercard. (A similar separation of mobile money has been carried out by Airtel.) MTN has also separated out its own social media play through Ayoba. Last but not least, it has done the same with its wholesale connectivity assets into Bayobab.

At the time of the separation, Frédéric Schepens, Bayobab Group CEO, said: "As a young entrepreneurial business delivering value through open next-gen digital solutions, we believe Bayobab best encompasses our vision of connecting Africa and ensures we add meaningful value across the continent."

It acknowledged that the business is "super capex intensive" and that with the backing of regional development bank Africa50, it will invest US$320 million in three terrestrial fibre networks across the African continent, linking ten countries in three self-healing rings.

It has been "self-funded so far," but still has $500 million in commitments over the next two years: ""We will be needing added additional oxygen in terms of funding and we're looking at various options there." MTN's website says it has 60 data centres and it has announced that it will build a new data centre in Nigeria.

Airtel Nxtra, Airtel's data centre spin-off which raised independent capital, has also announced that it is building a 38 MW data centre in Nigeria and it has set up Airtel Nxtra companies for each of its subsidiaries.

It has said that its Lagos facility will be the first of five 'hyper-scaler' data centres on the continent. A 7MW data centre s planned in Nairobi, Kenya, with smaller reportedly planned at cable landing stations in Tanzania, DRC Congo, and Gabon.

Once all five are built out, the company will offer a total of 180MW across 13 core data centres and more than 48 edge.

The existing data centres we have listed in 1.1 (see page 6) already contain carriers with separated-out data centres and these new ones would add substantially to the number available and the geographic spread.

The addition of these existing data centres would take the total of existing facilities to over 100. But whatever the judgement about their carrier-neutral status, there is a much bigger fundamental challenge.

The existing data centres will need to be updated and, in some cases, enlarged. In either case, this will take time and significant amounts of CAPEX. As one operator directly familiar with the situation remarked: "These data centres were inherited from the carve-out of MNO assets and are not purpose-built for colocation."

"These data centres were inherited from the carve-out of MNO assets and are not purpose-built for colocation."

3. Meeting **regulatory challenges**

3.1 Regional regulatory change

All multinational companies (including data centres) in Sub-Saharan Africa are affected by three different layers of regulation.

For example, if the company has headquarters in Europe and South Africa, it will need to take account of GDPR from the European Union, South African domestic requirements and African country regulation like Kenya's Digital Protection Act.

Some countries have specific organisations, like Kenya's Office of Data Commissioner, whilst others remain in the hands of existing telecoms regulatory bodies. In Uganda, there is a Personal Data Protection Office under the national IT authority and it issues certificates of compliance.

As one local industry insider said: "It's more active in some sectors than others. Most of the following comply: finance, insurance and telcos. Facilities and cloud providers have to be compliant. They need to see physical infrastructure, security and connectivity between the customer location and hosting platform."

Regulatory issues (see summary on page 25) are not solely confined to issues of data storage and how local data sovereignty is operated.

For example, European countries are increasingly mandating "Power Usage Effectiveness" (PUE values) that require greater efficiencies for operators. To meet their own green energy targets, international customers are seeking data centres in Africa that will be able to meet these ever-stricter regulations.

To date, 36 out of 54 African countries have data protection laws and/or regulations. Sixteen countries have signed the African Union Convention on Cyber Security and Personal Data Protection adopted on 27 June 2014 ("Malabo Convention") and thirteen countries have ratified it, the latest being Niger.

The Malabo Convention aims to establish a harmonized and comprehensive legal framework for Africa by mandating members to develop laws aligned with the Convention, primarily focusing on data protection and cybersecurity, and e-commerce.

Regional body Smart Africa has two pilot projects (Djibouti and Ghana) that are tackling the governance issues raised by data centres. As ever, there is a need for regulatory harmonisation like this across a range of issues that affect the industry.

"To meet their own green energy targets, international customers are seeking data centres in Africa that will be able to meet these ever-stricter regulations."

Kampala, Uganda

3.2 Local regulatory change

The current status of local data sovereignty in many countries lacks overall clarity but nevertheless there are and should be potential solutions.

As one operator said: "You start at the means level. The cloud provider has to be in the country with core equipment. With several of the hyperscalers you can't do this. For example, they don't have a presence in (an East African country)."

Most see local data sovereignty as a catalyst to improve business and make entry a lot easier. The larger, international data centre companies do not see much of an issue with local data sovereignty in Europe and have ways of accommodating it by caching data locally.

There is legislation in Angola that says all types of data from its citizens or assets need to be kept in the country so that they can get access to it. For example, this applies to gaming and online betting. This may be harder to deliver in smaller, tier 2 markets but not impossible.

As one pan-continental operator commented: "You need distributed data centres at key locations in the continent, especially tier 2 markets. Ghana is a good example. You can host in Ghana and deliver elsewhere." There are a number of industry voices speaking up in support of a pan-African data union.

On the next page is an outline overview of the regulatory and legal issues affecting the Sub-Saharan data centre and cloud industry. It contains five broad areas that require attention:

1. Fibre access (removing gate-keeping and monopolies)

2. Energy (increasing energy efficiencies and extending green energy supply)

3. Data (with issues like local data sovereignty)

4. Open markets (import duties and common processes)

5. Removing barriers (licensing, construction and reporting standards).

Zambia is a good example of open markets in relation to import taxes. Its Minister of Technology and Science Felix Mutati said the country had attracted US$58 million in digital infrastructure following the removal of the tax on importation of equipment for this purpose in 2021.

The future agenda for African regulators has a number of issues – like generative AI, social media, energy supply, innovation and creating global competitiveness – that the industry needs to find practical ways of engaging with. These all have implications for those involved in the data centre and cloud industry.

"Most see local data sovereignty as a catalyst to improve business and make entry a lot easier."

3.3 Overview of regulatory and legal issues

The chart below is a summary of the majority of current regulatory 'hot-spots', with recommendations by Balancing Act.

Topics	Issue	Recommendations
1. Fibre access		
1.1 Choice of provision	Customer needs choice of connectity to connect to data centre	Ensure competition in provision of fibre
		Rights of way easy to obtain and low-cost
		Central registry of fibre, electrical and water routes
		Dark fibre sale allowed by multiple providers
1.2 Submarine cable access	Customer needs cost-effective, competitive fibre access to landing stations	Open access cable landing stations with redundant connections to other landing stations
1.3 Inter-country access	Data centres in different countries need to be connected at low cost and with lowest latency	Cross-border cables that allow cost-effective access and multiple redundancies, especially for landlocked countries

Topics	Issue	Recommendations
2. Energy		
2.1 Green energy needs	Large international customers have demanding requirements: 100% green energy by 2030 or 2035. Demand Power Use Effectiveness of 1.5 or less 100% uptime	Faciltate the builder and/or operator of facility to import necessary equipment
2.2 Buying green energy	Data centres are keen to buy green energy. It is not often produced on site	Allow them to buy using Green Power Purchase agreements and trasport to the data centre
2.3 Energy efficiency	Encourage operators to improve energy efficiency	Tax incentives for a) attracting data centers and;
		b) Incentives based on energy standards and improving them over time
2.4 Energy reporting	Data centres vary enormously in terms of energy efficiency	Ensure both in-house, 'on-premise' organisation data centres, government and commercially operated data cetres report to a common standard on energy efficiency to help drive down consumption

Topics	Issue	Recommendations
3. Data		
3.1 Local data sovereignty	Ensure maximum clarity about which data needs to be held in-country and how	Ensure sufficient capacity is available for local data residency
3.2 Common data standards	Multi-country organisations have to be mindful of multiple data regulations: for example, Europe (GDPR), the legislation in the regional HQ country and legislation in operating countries	Ensure that national legislation and regulatory guidelines are broadly compatible with regional and international comparators
3.3 Facilitating locally held data	Customers and data centres are sometimes required to have compliance certificates before being allowed to host data in-country	Simplify local hosting to make it easier to do business
3.4 Regulating AI	AI regulation is beginning to be drafted globally and African countries and the industry will need to agree on guidelines and regulation	Focus on developing best practice globally

Topics	Issue	Recommendations
4. Open markets		
4.1 Import duties	The cost of data centre construction increases, the more taxes are paid on imported equipment	Support the construction of nationally important infrastructure by lowering or exempting data centre equipment from import taxes
4.2 Common processes	Import codes ("HS codes") are not harmonised	Encourage customs administrations to collaborate with World Customs Organisation to align to contribute to African Single Market

Topics	Issue	Recommendations
5. Removing barriers		
5.1 Licensing	Data centres are a new part of the telecoms industry. Some countries licence them and even with transparency, the process can take 12 months	Register them or create a new licensing category
5.2 Construction	Construction is often slow and costs are increased by lack of local sourcing	Encourage the development of local manufacturing
5.3 Reporting standards	Data centres are making claims that cannot always be understood or tested	Adopt and reference open and international standards. Avoid single country national standard.

4. AI and energy – **can Africa keep up?**

4.1 Early adoption of AI

Sub-Saharan Africa has found the idea of using Artificial Intelligence (AI) attractive and it has become a consistent theme of discussion with governments and the private sector in its leading economies.

For example, in 2024, the South African Government put out its National Artificial Intelligence Framework and the African Union has adopted an AI strategy to provide guidance to its member governments. However, it is important to separate out statements made highlighting its importance in policy terms from actual work being done in this area.

AI start-up interest in the region has been spurred by various programmes aimed at encouraging its use by both development actors and two of the hyperscalers, Google and Meta.

The 10th Google Start-Up Accelerator cohort has focused on using AI to tackle issues across Kenya. Nigeria, Rwanda and South Africa. Afrilabs is working with Meta and the Bill and Melinda Gates Foundation to run Sub-Saharan Africa impact hackathons.

Startuplist.africa claims there are nearly 100 companies that have raised US$262 million plus for AI applications. AI start-up examples include Data Prophet (data science); RxAll (drug authentication) and long-standing agtech start-up Aerobotics (image recognition and data analysis).

Nigerian-American David Ojika's Flapmax has announced a new collaboration with high-performance computing (HPC) centres across Africa to strengthen the continent's scientific computing capabilities through its inaugural HPC AI Forum in October 2024.

In 2016, South Africa's Centre for High Performance Computing introduced a peta-scale machine with almost 33,000 cores. In 2018, its compute resources were expanded to include a Graphical Processor Unit cluster of 30 V100 GPUs. It has provided services to radio telescope project, the Square Kilometre Array, and to eight countries across Africa. It has developed a private cloud to make its compute resources accessible to more users.

> "AI cannot be transferred to Africa wholesale."

In 2019, IBM launched a quantum computing programme in Africa that started in partnership with Witwatersrand University and promised to extend to 15 universities across nine countries.

Not all AI is created equal and it is important to understand the kinds of applications (see fig. 5 on page 31) that might be used in the region.

Applications stretch from what is often called 'narrow AI' all the way up to mimicking human thought processes and exceeding human knowledge and decision-making. Most uses in Sub-Saharan Africa are at the narrow end of AI, being used to increase human efficiencies, and are still subject to a level of error.

Also, what it can do at the higher levels is still subject to debate. A recent Apple report written by a team led by ex-Deep Mind researcher Mehrdad Farajtabar challenges claims that Large Language Models (LLMs) can reason: "It may resemble sophisticated pattern matching more than true logical reasoning."

One international data centre operator struck a note of caution: "AI cannot be transferred to Africa wholesale. Parts may accelerate faster and parts may never happen. Currently I don't see a huge amount of AI. It's worth remembering that machine learning has been in place for years."

The challenges, particularly for enterprises outside South Africa, are the skills required and the sort of changes needed to take advantage of it. As one operator said: "There are lots of enquiries about using it to look at data. Most want to adopt it but are not ready yet. You need to structure the company's data and ask: how does it support business functions?"

At the vanguard of those exploring AI use cases in the enterprise space are financial institutions like banks in South Africa, who are all trying to understand its capabilities and looking at how to leverage them.

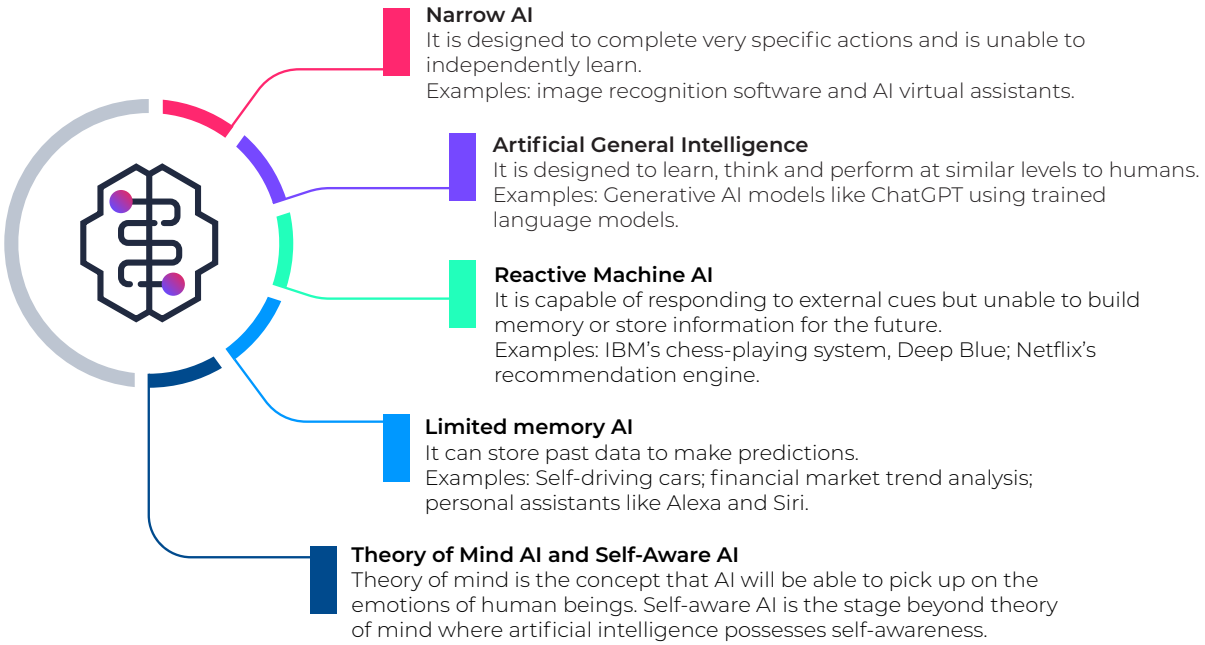
As one supplier told us: "They don't want to miss out on the productivity improvements. One bank told us that we need to get this in place. To do that, you need a data strategy and skills."

Most are looking at customer interaction and one focus area is around customer experience and being able to validate customers through an app. One current user is Standard Bank, which uses Amazon SageMaker which includes advanced fraud detection and machine-learning-based advisor capacities.

But although this interest sounds modest, the implications are considerable for data centres. One South African data centre operator identified the scale of what might happen: "There's not much current deployment but the requests I'm getting from the industry would require ten times the current rack power density. In other words, we'd go from 4KW to 40 KW. As it stands, we'll be getting to 10-15 KW soon."

In another sign of potential future growth, Teraco signed a partnership agreement with Nvidia to create a DGX-ready data centre programme aimed at financial services and gaming companies.

Figure 5: Different types of AI



4.2 Keeping up with new demand for energy

So how might this AI demand in both data centre and energy requirements affect Sub-Saharan Africa? Globally, parts of Europe are already restricting data centre development because of the lack of availability of energy supply. For example, there have been both discussions and restrictions in Ireland, Holland, and the UK (London and Cambridge). As ever, it's worth noting that Sub-Saharan Africa is not a single place. This European energy shortage has led some to suggest that data centre operators in Europe might encourage African customers using European capacity to put their requirements back in Africa, the idea being described as "capacity substitution."

Installed capacity for electricity generation from all energy sources increased by 4% to 246 gigawatts in 2023, according to data from BloombergNEF. However, only 58% of that capacity is in Sub-Saharan Africa and two-thirds comes from gas and coal plants. But green energy is ramping up faster than new additions of fossil fuel capacity. At 7.9 GW it was triple the capacity of new fossil fuel plants.

A tripling of investment in small-scale solar installations drove renewables investment in Africa to a record $15 billion in 2023, doubling the previous year's levels. An example of a future solar installation is the Namibia Power Corporation's contract with Chinese solar suppliers for a 100MW solar plant to be built over 18 months.

Three country examples illustrate contrasting circumstances. In 2019, Uganda commissioned the Karuma Hydropower project that included a 600MW power plant that started producing power this year, bringing the country's total generation capacity to slightly above 2,000MW. As one operator noted: "They still have to do some work on transmission and distribution but the green energies debate is becoming more aggressive."

By contrast, the impact of climate change on water levels at the Kariba dam in Zambia have led to energy shortages throughout the country. Also as noted above, Microsoft has announced a large data centre project in Kenya, close to its geothermal power sources.

In 2023, the Utility Performance and Behaviour In Africa programme, financed by the World Bank, produced its latest analysis of African power utility performance. Its key messages will not surprise those who need to buy power for data centres in many countries. It concludes that there has been little noticeable improvement in the operational performance of utilities with some exceptions.

Its analysis shows that the majority of utilities remain vertically integrated and only 12 countries have multiple utility suppliers. Liberalisation of power supply remains essential for the data centre industry and as deals struck in South Africa show (see Teraco below), the industry can contribute to overall national energy requirements and environmental goals.

The liberalisation of power supply in South Africa has opened up a significant level of self-provisioning. Examples include: AWS (10 MW solar plant in Northern Province); Africa Data Centres (10 MW from a solar plant from a sister company in Bloemfontein); and Teraco (120 MW solar facility connected to the national grid).

Another South African data centre has plans to build its own solar facility on land alongside its data centre. Outside South Africa, both Kenya and Nigeria have this type of potential. One operator said that independent power providers in Nigeria can make up to 50 MW available in a given location. International customers have requirements to have green energy supply and AI has blown some off course from their own ambitious targets so self-provisioned, new builds like those described are attractive.

About Console Connect

The rise of Gen AI and the migration of more workloads to the cloud means networks across Africa are handling larger volumes of more sensitive and mission-critical data than ever before.

With this comes the needs for African businesses to reassess their network model and ensure they have the immediate and long-term capabilities to meet demand.

Console Connect is PCCW Global's on-demand platform and automated network for intelligent data movement. The platform helps businesses easily, quickly and securely connect and move their data between clouds, data centres, office locations, apps, devices and more, whenever and to wherever they need it most to add value.

Figure 6: Console Connect's interconnected ecosystem in Africa

The platform runs on PCCW Global's private network infrastructure, which improves data reliability by taking traffic away from the public internet and helps businesses meet stringent privacy and security requirements.

Console Connect's connected ecosystem has grown alongside the Africa's data centre and cloud landscape, and today the platform is accessible in data centre locations across 14 African cities and offers access to locally hosted cloud providers in South Africa, such as AWS, Huawei, Oracle Cloud and Microsoft Azure (see fig.6 below).

With increased network complexity and cost on the horizon, Console Connect helps local businesses adapt to changes in demand by giving them real-time control over their network connections through point and click provisioning. Users can also dynamically adjust bandwidth the meet the needs of their business, whilst only paying for the connectivity that they use.

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SOUTHWOOD CONSULTANTS LTD TRADING AS BALANCING ACT

www.consoleconnect.com
sales@consoleconnect.com

www.balancingact-africa.com
info@balancingact-africa.com