

chapter 7

Fibre



Paul Hamilton,
managing director,
Hamilton Research Limited

Terrestrial transmission network

Africa's total inventory of operational fibre optic network reached 1,184,028km by June 2022, compared to 820,397km in 2017 and 412,729km in 2012. In the twelve months since June 2021, an additional 34,474km of fibre optic network has entered service, an average of 95km of new fibre optic network entering service per day. In addition, there was in June 2022 a further 119,062km of fibre optic network under construction, 125,541km planned, and 69,352km proposed.

Approximately one-fifth of the total fibre inventory in sub-Saharan Africa is within cities: of the inventory of 1,184,028km of operational terrestrial fibre in June 2022, at least 256,107km was metropolitan fibre rings and FTTH/B (fibre-to-the-home/ building) networks. These metro rings distribute bandwidth from fibre optic nodes to districts and suburbs around each city. The

FTTH/B networks provide the last mile access, delivering fibre bandwidth right to the door.

Fibre reach

The landing of new submarine cables and expansion of terrestrial transmission networks is bringing additional countries, regions, cities and towns within reach of fibre networks for the first time. In the last ten years, network expansion has brought more than 324 million more people within access to high capacity national and international backbone networks.

In June 2021, 57.1% of the population in sub-Saharan Africa (669 million) was within a 25km range of an operational fibre optic network node. This compared to 56.7% (647 million) in 2021, 55.9% (620 million) in 2020, 55.2% (584 million) in 2019, 54.2% (556 million) in 2018, 55.2% (522 million) in 2017, 48.1% (469 million) in 2016, 45.8% (436 million) in 2015, 44%, (410 million) in 2014, 41.8% (371 million) in 2013, and 40% (345 million) in 2012.

Once the fibre network, which is currently under construction, enters service, the fibre reach of sub-Saharan Africa will increase to 57.9% (679 million), and once the network which is planned

or proposed enters service it will increase to 62.3% (730 million).

International internet bandwidth

Africa's total inbound international internet bandwidth reached 26.9Tbps by December 2021. This compared to 20.4Tbps in 2020, 15.8Tbps in 2019, 12.0Tbps in 2018, and 8.2Tbps in 2017. This total of 26.9Tbps in 2021 was split between sub-Saharan Africa, which increased by 32% to reach 16.6Tbps, and North Africa which increased by 34% to reach 10.3Tbps.

Almost two-thirds of all this bandwidth to sub-Saharan Africa is supplied to its three largest markets. South Africa's inbound international internet bandwidth was reported at 5.598Tbps in 2021, Kenya was reported at 2.941Tbps, and Nigeria had an estimated 1.950Tbps.

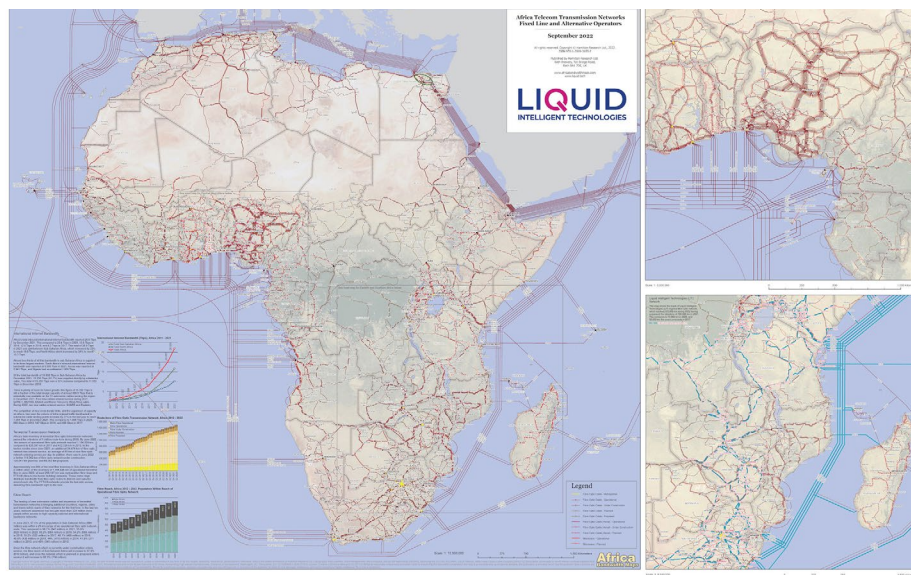
Of the total bandwidth of 16.630Tbps in sub-Saharan Africa by December 2021, 15.255Tbps (91.7%) was supplied directly by submarine

cable. This total of 15.255Tbps was a 32% increase compared to 11.555Tbps in December 2019. There is plenty of room for future growth: this figure of 15.255Tbps is still a fraction of the total design capacity of at least 406.5Tbps that is potentially now available on the 31 submarine cables serving the region in December 2021.

Four new cables entered service during 2021: DARE 1, METISS, Ellalink and Maroc Telecom's West Africa cable. So far during 2022, the SHARE submarine cable has also entered service.

The completion of new cross-border links, and the expansion of capacity on others, has seen the volume of intra-regional traffic backhauled to submarine cable landing points increase by 27% in the last year to reach 1.354Tbps in December 2021. This compares to 1,066Tbps in 2020, 690Gbps in 2019, 547Gbps in 2018, and 400Gbps in 2017.

Map credits: 2022/3 Africa Telecom Transmission Map. Republished with kind permission of Hamilton Research Ltd www.africabandwidthmaps.com ■



Africa's Digital Backbone





Mike Last,
group chief marketing officer,
WIOCC Group

Developments in subsea fibre

Whilst 2021 saw the completion of several ‘infill’ subsea cables - DARE1, connecting Kenya, Somalia, Somaliland and Djibouti; METISS, reinforcing connectivity between the islands of Madagascar, Reunion, Mauritius, and South Africa; and Maroc Telecom West Africa, linking Gabon, Benin, Togo, Cote d’Ivoire and Morocco - 2022 has very much been the year of the African mega-systems. Two new 140+Tbps subsea cable systems are currently in deployment around Africa’s coast, bringing a huge boost to Africa’s subsea capacity inventory.

The 12,000km Google Equiano cable has 12 fibre pairs and 144Tbps design capacity. The system - which landed in Togo in March, Nigeria in April, Namibia in July and Melkbosstrand, South Africa in August - is roughly 20 times larger than the last cable system built to serve Africa’s western seaboard.

The Meta-led 45,000km 2Africa cable, with a design capacity of up to 180Tbps on key parts of the system, is also currently in deployment and will operate 27 landings in 19 African countries. Its first Africa landing took place in Djibouti in May 2022, and it has since also landed at Ras Ghareb in Egypt, in November 2022.

In addition to boosting inter-continental and inter-country connectivity, both subsea cables bring further benefits. Designed and implemented over cable routes that are diverse to existing subsea systems and with numerous

new landing points on Africa’s coastline, the cables offer capacity purchasers the opportunity to build greater resilience into their networks and service offerings to customers. Additionally, with both systems based on open access principles, service providers will be able to access capacity at carrier-neutral data centres and open-access cable landing stations on a fair and equitable basis, supporting the development of healthy internet ecosystems.

Equiano is expected to be operational early in 2023; with 2Africa coming online by end 2023 (East) and end 2024 (West).

The other mega-system in deployment throughout 2022 is PEACE: a 12,000km multi-Tbps system (up to 192Tbps on some segments) linking Pakistan, Kenya, Egypt and Europe. The Pakistan - Egypt - Europe segment went live earlier in the year, with construction of the Kenya segment completed in November 2022.

Finally, SHARE - Senegal Horn of Africa Regional Express - came online in March 2022, linking Senegal to Cape Verde.

Terrestrial fibre on the rise

The impending increase in international subsea capacity is one of the key drivers for further investment in terrestrial infrastructure. Additionally, wider deployment of advanced 4G/5G mobile technologies underpinning broadband rollout, the increased need to support remote working practices necessitated

“The impending increase in international subsea capacity is one of the key drivers for further investment in terrestrial infrastructure.”

by the COVID-19 pandemic, and the growing migration of services and applications into the cloud all demand further investment in terrestrial fibre infrastructure.

According to Hamilton Research, Africa's total inventory of operational terrestrial fibre-optic network reached 1,184,028km by June 2022. This increase of 34,474km compared to 12 months previously was distributed across multiple countries. In addition, in June 2022 a further 119,062km of fibre-optic network was under construction, 125,541km planned and 69,352km proposed.

Approximately 20% of this total fibre inventory - approximately 256,107km - is within city boundaries, as metropolitan fibre rings and fibre-to-the-home / fibre-to-the-building (FTTH/FTTB) networks. These metro rings distribute bandwidth from fibre-optic nodes to districts and suburbs around major cities. FTTH/FTTB networks provide the last-mile access, delivering fibre bandwidth right to the doorstep.

Pan-African operators including Airtel, Liquid Intelligent Technologies, MTN, Paratus and WIOCC have all announced network builds in numerous countries during the year.

Many of the 38 fibre network operators (FNOs) in South Africa, have continued to build out national backbone routes and have significantly extended their FTTH/FTTB networks. A report published in August showed FNOs had passed approximately 3.9 million of South Africa's 17 million homes with fibre. Additionally, 460,000 of South Africa's 860,000 business premises now have access to fibre. Leading operators Vumatel and Openserve have increased the number of homes passed by 400,000 and almost 300,000 respectively.

West and Central Africa has also seen significant network deployments. In January,

construction started on a 285km fibre-optic route interconnecting Congo with the Central African Republic (CAR). This link forms part of the Central Africa Backbone (CAB) project, which was further extended in May with the first cross-border terrestrial fibre-optic route to connect Congo with neighbouring Cameroon. The 347km fibre route - started in mid-2020 - runs from Ouesso via Paris, Biesse, Sembé and Souanké to Ntam. In November, CSquared announced a partnership with USAID to build a 350km national fibre backbone in Liberia, extending from the capital city, Monrovia, to the borders with Côte d'Ivoire and Guinea, connecting at least 13 cities en route.

In the East Africa region, South Sudan and Djibouti signed a Memorandum of Understanding (MoU) earlier in the year to build a cross-border fibre-optic link between Juba and Djibouti via Ethiopia. The Kenyan Government has announced plans to construct over 100,000km of fibre-optic infrastructure throughout the country over the next five years. Bandwidth and Cloud Services (BCS) announced deployment of a submarine fibre-optic cable through Lake Tanganyika to connect towns in Eastern DRC (Democratic Republic of Congo), and to serve as an alternate gateway in Eastern and Southern Africa.

At WIOCC, we have invested in fibre pairs on 2Africa and Equiano and expanded our terrestrial infrastructure in key countries, particularly in South Africa and Nigeria - where we have our own 16Tbps-ready national networks - and across much of the SADC region. These investments ensure that we continue to have the low-cost base and massive on-net scale needed to remain the hyperscale partner of choice for the ongoing capacity needs of our cloud operator, telco, ISP and other wholesale clients. ■



Chris Wood,
group chief executive officer,
WIOCC Group

This year, WIOCC has continued to extend its network which comprises high-capacity pan-African terrestrial infrastructure integrated with strategic investments in major international subsea systems serving Africa. This network has established itself as Africa's digital backbone; with open infrastructure that supports delivery of reliable, fully scalable national and international connectivity to cloud operators, content providers, telcos, and internet service providers (ISPs). Our most recent investment has secured full fibre pairs on the new Equiano and 2Africa high-capacity subsea cable systems, each of which will add more than 100Tbps of capacity. As of November 2022, the cables are in deployment around Africa's coastline and scheduled to be operational by end-2022 (Equiano) and by end-2023/4 (2Africa).

WIOCC was chosen as a landing partner for both open access cable systems. Through WIOCC Group company Open Access Data Centres (OADC), it is hosting landing stations within carrier-neutral, open access data centres in Nigeria (with the Equiano cable landing directly into OADC Lagos) and South Africa (the 2Africa cable is scheduled to land directly into OADC Durban in January 2023, and WIOCC's fibre pair on the Equiano cable is being extended into OADC Rondebosch in Cape Town from the landing point in Melkbosstrand, to the north of the city).

Looking ahead: Demand for digital connectivity will continue to rise, driven by further business migration of operations into the cloud and consumers using more of the ever-increasing number of connectivity-driven applications, products, and services. Our fibre pair ownership

We are increasingly focused on implementing a unique core-to-edge data centre proposition for Africa, together with what we are calling 'WIOCC 2.0': delivery of the converged open digital infrastructure demanded by our clients and needed to expedite the digital transformation of the continent.

We are seeing an opportunity not only to meet carriers, cloud operators and content providers' increased demands for reliable, high-speed international connectivity, and single-sourcing these together with high quality colocation capabilities, but through OADC's transformational core-to-edge data centre proposition to also enable in-country broadband, mobile operators, ISPs, the cloud and content community, enterprises, and government departments to:

- Store, manage and process their data locally in open access DCs that provide security, power backup, field services, roof access (to site antennae) and connectivity, all on an OpEx basis
- Cost-effectively extend their network reach
- Migrate content closer to the point of consumption at the network edge
- Process large data sets closer to their point of origin, saving on transmission costs
- Take advantage of our locally-hosted disaster recovery capabilities.

We are seeking opportunities to secure operating licences in new markets. We are also exploring other areas of business, with announcements in this area to be made early in 2023. ■

in 2Africa and Equiano, together with our existing infrastructure and the expansion of our terrestrial networks in Malawi, Nigeria, South Africa, and Zambia, will create many opportunities for us to continue to meet our clients' connectivity needs across Africa.



Pete Hall,
regional managing director, Ciena

In the last twelve months we have seen an increase in bandwidth demand in the telecoms market overall across MEA. This has been driven by increasing demand for cloud-based services, mobile broadband connectivity, and user desire for bandwidth-hungry services like HD video, gaming, and remote work applications.

Ciena achieved several milestones over the last year. The most recent being teaming up with WIOCC, a leading provider of digital connectivity and infrastructure across Africa, to expand open access digital infrastructure with high-capacity submarine cable connectivity between Europe, Nigeria, and South Africa.

Our collaboration with WIOCC has allowed us to activate a fibre pair on the new Equiano submarine cable system, now in deployment, scheduled to go live in stages throughout 2023 and 2024, landing directly in the new carrier neutral OADC facility in Durban.

“Our customers – network operators - have been challenged with the need to maintain and support the world’s fastest growing bandwidth demand, and, to deliver an acceptable Quality of Experience (QoE), as more bandwidth-intensive applications come to market.”

This cable will run a total of 15,000km from Portugal along the African west coast, making Equiano one of the largest cables serving Africa, with 12 fibre pairs delivering a total of 144Tbps of capacity; substantially reducing the transported cost per bit to satisfy surging digital demands regionally, improve connectivity to Europe, the Americas, the Middle East, and Southeast Asia. We are proud to be providing turnkey planning, design, and deployment services to ensure project success - all vital, as we expand our ability to support the cloud and wholesale community in Africa.

Another success in 2022 for Ciena in the MEA region was delivering GeoMesh Extreme, end-to-end network architecture powered by WaveLogic 5 Extreme to EASSy’s Submarine Cable Network - a 10,000km submarine cable system traversing Africa’s east and south coasts. This network upgrade will migrate legacy traffic, as well as manage and support its network operations center (NOC) in South Africa. It also helped to double network capacity from 18Tbps to 36Tbps across the system and maintain pace with voracious and ongoing bandwidth growth in sub-Saharan Africa at a lower overall cost. Placing EASSy in a better position to expedite the closing of the digital divide for Africans who are increasingly dependent on cloud-based services.

Our customers – network operators - have been challenged with the need to maintain and support the world’s fastest growing bandwidth demand, and, to deliver an acceptable Quality of Experience (QoE), as more bandwidth-intensive applications come to market. This means that delivering reliable and secure networks that rapidly scale and offer low latency is just as critical as supporting the capacity needs and the cost per bit as there has been price erosion over time, resulting in a lot of competition

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between submarine cables.

Another involves the physical placement when it comes to submarine cables. For transoceanic network services, submarine cables contribute most of the total end-to-end latency due to its routed distance of several thousands of kilometres and the fixed speed of light. This makes the selected route for a new submarine cable critical when designing low-latency networks, since once its laid upon the seabed, its latency is essentially fixed over its lifespan, typically 25 years or more.

Emerging opportunities in the telecoms and networking industry that we’ve seen and can build on is doing our part to improve network connectivity in Africa, as prospects are plentiful. It is a market that we are certainly going to continue to see a bigger focus on. As a key enabler

of innovations that drive network connectivity, Ciena is relentlessly focused on helping our customers provide a high-performance low-latency adaptive network that can satisfy the continents growing bandwidth demands.

We have seen a trend towards investment in network assets to help manage, scale, and provide the low latency that the region really needs.

The importance of a broad and vibrant ecosystem should not be overlooked, and we will start to see greater focus on this in the industry in the future. There has also been an increase in submarine network capacity utilisation following the significant growth following the global pandemic, which looks to expand into more countries. ■

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Looking ahead: For us, the next twelve months will see ongoing international bandwidth growth, with Africa far surpassing any other region worldwide. According to consultancy Telegeography, Africa experienced the most rapid growth of international internet bandwidth in recent years, “growing at a compound annual rate of 44% between 2018 and 2022.”

With the fastest growth rate over the last four years and numerous new submarine cables being deployed, this is an emerging market with plenty of opportunity and new infrastructure projects.

A large part of Africa’s bandwidth growth comes down to the population size – as the world’s second largest continent, networks will play an extremely important role – with clear appetite amongst consumers who have a hunger for the latest content, video streaming and other digital applications.

In addition, the networking industry will play an instrumental role in helping Africa to remain connected to the rest of the world and help to create a viable and sustainable economy as we continue to progress in the digital world.



Gaëtan SOLTESZ,
CEO, Silicone Connect

2022 has been phenomenal for Silicon Connect. We secured the network concession to the north, through a joint venture called DATACAB. This network connects Cameroon, the Republic of Congo, and the Republic of Centrafrique to a state-of-the-art DWDM network. We kicked off a project to modernize the Silicone Connect backbone between Pointe-Noire and Brazzaville, upgrading speed to 2x200G and opening market in new cities. This effort will complete during the first quarter of 2023. Kinshasa and Brazzaville were connected with two new high-capacity fibre optic cables laid at the bottom of river Congo.

Business always wants (needs!) to move faster than regulatory issues, and we started slow due to the contractual work needed to finish first. The role of the infrastructure provider is not well understood here, as some traditional operators sell to multiple markets concurrently. This made it a challenge to establish our position on the market. We are nonetheless proud to have signed our first deals with operators and hope to connect many more soon.

Looking ahead: DATACAB needs to focus on its mission to connect operators in Cameroon and in Centrafrique. The network is brand new so this will be a debut year for the company. We need to ensure the right processes and know-how are deployed right away to succeed.

Silicone Connect needs to continue making further investment into its infrastructure, to bring 100G and up across the entire network. This modernization will ensure the right services can be offered to Operators with market SLAs.

The Republic of Centrafrique is a virgin market for infrastructure with immense potential. DATACAB is bringing the first fibre optic international gateway to the country in December 2022. This will provide regional operators 10x speed and massive reduction on price, and the national population with much-needed economic empowerment. We are also seeing operators present in neighbouring countries wanting to transit across the Congo to connect their OPCOs together. This is only possible with the meshed network with multiple international connections which we have.

Throughout the market, we are observing consolidation and rationalisation. It is no longer possible to succeed in Africa by keeping services local. Operators must invest, go big and conquer the larger market by expanding internationally through investments and partnerships. Those who don't risk being made irrelevant by emerging threats such as Google and Meta landing their high-capacity cables to African shores, Starlink, OneWeb and Amazon launching dense LEO constellations.

We will consolidate our network during 2023, taking it to the next level in speed and reliability to fully address the need of operators within the Congo and in neighbouring countries. We will also consider strategic national and international expansion where it makes sense. ■

At the end of 2023, our focus will shift towards commercial and operational streamlining as well as strategic partnership building. 2024 and beyond will see new challenges through demonetization of bandwidth and always-increasing capacities, putting pressure on operators' margins. Operators ought to prepare through streamlining and consolidation of their operation. Also, size does matter: the market will see survival of the fittest, hence the importance of growth and consolidation to build resilience.



David Eurin,
CEO, Liquid Dataport

Liquid Dataport has had one of its busiest years in 2022, working hard to ensure that connectivity across the continent improves to enhance and empower the lives of Africans through digital technology.

However, as a business of Cassava Technologies, we believe that our work is not done until every African individual has affordable and reliable internet access, which we believe can transform and uplift lives.

The spread of connectivity for social and economic upliftment continues to be a priority on the continent, and reliable, fast, and widespread affordable connectivity is crucial in maintaining forward momentum. As a result, the telecommunications space is playing a more significant role than ever before in helping the growth of Africa's many economies.

From enabling access to mobile banking and communication tools used by employees working at multiple sites across the globe to interlinking the formal and informal economies, in 2023 we have a responsibility to empower our customers and help them to take

“Because the new sea cables are enabling a step-change in the amount of international capacity available, we foresee a much-needed drop in internet connectivity prices and improved quality.”

control over their network.

Multiple sea cables are landing on African shores, but at the same time, several are reaching the end of their lifespan. Because of this, international players like Google, Meta and PEACE have already launched newer, more technologically advanced sea cables to Africa.

Liquid Dataport has acquired a fibre pair on Equiano, the new West Coast submarine cable, capable of delivering up to 12 Terabytes of new internet capacity. This is set to significantly empower the development of businesses in Southern African countries through improved access to high-speed, affordable connectivity and increased access to digital technologies.

This acquisition is yet another addition to our steadily growing pan-African telecommunication network, which includes satellite connectivity, subsea links, and our cross-continent terrestrial fibre network – the largest independent network of its kind in Africa. It also adds to our ability to deliver cybersecurity, data centres, cloud services, renewable energy, and fintech services to our customers directly and indirectly, whether they are enterprises, small medium enterprises (SMEs), or governments.

This is a huge step towards addressing many of our customers' challenges. Lack of access to affordable internet connectivity across the African continent, be it in the largest cities or the remotest villages, remains a hurdle for Africans and organisations in adopting digital technologies. High costs and rigid networks that provide users limited control over their networks have also proved challenging to the uptake of connectivity in many communities.

The additional capacity we are bringing in through the Equiano, 2Africa and PEACE subsea cables augments Liquid Dataport's existing pan-African fibre network is a vital element to leverage the digital economy.

Because the new sea cables are enabling a step-change in the amount of international capacity available, we foresee a much-needed drop in internet connectivity prices and improved quality in South Africa, Nigeria, Kenya and many neighbouring landlocked sub-Saharan countries.

In our considerable efforts to enable our customers to take control over their network, we are bringing new technologies to their doorstep. Liquid Dataport established itself as the first African organisation to launch and commercialise its Software Defined Network (SDN) platform called Dataport. This will be deployed in South Africa, Kenya, Tanzania and Europe in its first phase, with more regions set for coverage in the near future.

Through the newly launched Dataport, we also see increased opportunities to connect smaller and medium-sized businesses that can now pay for only what they use. In addition, because our new SDN offering allows customers to choose

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“Lack of access to affordable internet connectivity across the African continent, be it in the largest cities or the remotest villages, remains a hurdle in adopting digital technologies.”

packages based on their size and requirements, more and more people should be able to access stable, high-speed and affordable connectivity irrespective of their size.

Customers will get instant quotes and be able to order services online, as the SDN platform orchestrates service provisioning to configure their service requirements automatically on the Liquid network, making Dataport the most extensive ‘One Africa digital network’. This is empowering customers to take control of their network, tailor-making it to suit all their connectivity requirements, app usage and costs.

At the same time, Liquid maintains that cybersecurity should be at the centre of every online conversation, and we remain steadfast in our efforts to mitigate any threats our customers may face. The high level of security is implemented by Liquid’s own cybersecurity teams. ■

Looking ahead: Africa is a unique continent with countries at different levels of digital transformation. This presents unique opportunities and challenges. We must be mindful of customers’ ability to leverage our technologies and deal with government and regulatory policies simultaneously.

As the largest independent fibre network provider

in emerging markets globally, delivering services in over 30 countries across Africa, we created 100,000km of fibre routes to transport data across the length and breadth of the continent. We will make technology affordable and universally accessible across Africa and drive this vision of a digitally connected future that leaves no African behind.

FibrePoynt

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FibrePoynt manufactures and sells solar-powered wireless broadband antennas, termed HomePoynts, that enable the implementation of a telecommunications network infrastructure system for last mile delivery of broadband data services to underserved high-density residential communities

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The Carrier and Cloud neutrality advantage allows customers to manage traffic to get better value, lower latency, and higher resilience and creates an open market for partnerships between customers, networks, cloud and content providers, the Internet Exchange Point of Nigeria, and managed service providers.

Rack Centre's clientele includes 57+ telecommunication carriers, Internet Service Providers (ISPs), global Tier 1 networks, and pan Africa international carriers, including direct connections to all five undersea cables serving the South Atlantic Coast of Africa including Equiano, 2Africa and every country on the Atlantic coast of Africa.

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WIOCC is the leading player in the deployment of carrier-scale, future-proofed network infrastructure into Africa. We have the flexibility and scale to meet the ever-growing demand for reliable, high-speed capacity throughout Africa, driven by end consumers, enterprise users and the ecosystem that supports them.

Our policy of continual investment in our network to create Africa's first, truly hyperscale network infrastructure means ongoing investment for growth, ensuring our readiness to meet the future data volume demands of end users throughout Africa.

Operating exclusively as a wholesaler, we have revolutionised the delivery of high-capacity connectivity between Africa and the rest of the world. Widely recognised as Africa's carriers' carrier, we offer carriers, content providers, cloud operators, ISPs and mobile operators reliable, seamless, high-capacity connectivity between more than 30 African countries and key global financial and commercial centres.

Our focus on building and maintaining strong, long-term relationships with each client enables us to develop bespoke solutions that meet their current requirements and have the capability to match future demands for growth, extra resilience and geographical expansion.



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