chapter 7 Fibre

Paul Hamilton, Director, Hamilton Research Ltd, Africa Bandwidth Maps

During 2017, an average of 153km of new fibre optic cable network entered service per day across Africa, bringing an average of 145,444 more people within reach of an operational fibre network for the first time. The growing reach of national backbone and metropolitan fibre optic networks, and the upgrading of capacity on existing networks, continues to fuel Africa's dramatic international bandwidth growth.

Africa's inventory of operational fibre optic network has roughly doubled over the last five years. By December 2017 the amount of operational fibre optic network reached 845,755km, according to Africa Bandwidth Maps, compared to 438,713km in December 2012.

In the twelve months since December 2016, an additional 55,688km of new fibre optic network has entered service, an average of 153km per day. In addition, there was in December 2017 a further 127,335km of fibre optic network under construction, 99,074km planned, and 49,519km proposed.

West Africa, in particular, witnessed a lot of activity during 2017, with national backbone rollouts progressing at different stages of completion across the region.

For example, In Niger the national fibre optic inventory reached 3,847km by December 2016, more than doubling in the space of one year from 1,750km in December 2015. In Burkina Faso, the 2,000km first phase of the national fibre optic backbone was officially launched in December 2017. In Benin, Côte d'Ivoire, Ghana, Guinea, Mali, Nigeria, Senegal and Togo, the deployment of fibre networks continues. And in Mauritania, the government awarded a contract in September 2017 for the deployment of 1,592km of additional fibre optic backbone routes and a 40km metropolitan fibre network in Nouakchott.

Investments from MNOs

Mobile operators have also invested heavily in building their own fibre networks during the year to provide the backhaul capacity for 3G and 4G networks, support business services and, in some cases, provide FTTH services.

For example, Movitel Mozambique's national fibre backbone reached 30,000km during the year; Moov Côte d'Ivoire's reached 3,150km; Lumitel's in Burundi reached 3,000km; Tigo Senegal's reached 1,300km; and Moov Togo's reached 910km.

In Tanzania, mobile operators have so far built more than 20,000km of fibre optic network in the three years since 2014 in addition to the NICTBB (National ICT BackBone). By early 2017, Viettel's subsidiary Halotel had deployed 18,192km of fibre network in conjunction with the Ministry of Communication, Science and Technology (MCST). Furthermore, a consortium of the other mobile operators – Airtel, Tigo, Zantel and Vodacom Tanzania – had constructed more than 1,300km of backbone fibre linking the major cities by March 2017, and about 400km of metro fibre in Dar es Salaam (250km), Dodoma (35km), Morogoro (20km), Mwanza (35km) and Arusha (60km). By June 2017, Tigo Tanzania said that this fibre network had increased to 2,294km.

Fibre reach

The continued expansion of terrestrial transmission networks is bringing additional countries, regions, cities and towns within reach of fibre networks for the first time. Network expansion has brought more than 262 million more people within reach of high capacity national and international backbone networks over the last seven years. In June 2017, 52.1 per cent of the population in sub-Saharan Africa (522 million) lived within a 25km range of an operational fibre optic network node compared to 48.1 per cent (469 million) in 2016 and 30.8 per cent (259 million) in 2010.

In the twelve months since June 2016, an additional 53 million people have been brought within reach of a fibre network, an average of 145,444 more people per day. Once the fibre networks that are currently under construction enter service, the fibre reach of sub-Saharan Africa will increase to 53.7 per cent (539 million), and once network which is planned or proposed enters service it will increase to 59 per cent (591 million).

Alongside the building of new backbone routes in many countries, the expansion of metropolitan fibre and FTTH/B networks into additional suburbs as well as new towns and cities is an important factor driving the growth of fibre reach.

There is now more than 70,000km of metro fibre network In South Africa; in Kenya there is more than 15,000km; and in Nigeria more than 12,000km. For example, Dark Fibre Africa's metropolitan network in South Africa reached 9,854km by March 2017, compared to 5,251km in March 2012. Elsewhere, CSquared has deployed more than 800km of metro fibre in the Ugandan cities of Kampala and Entebbe, more than 840km of metro fibre in the Ghanaian cities of Accra, Tema and Kumasi, and announced in July 2017 that it was deploying a metro network in Monrovia, Liberia with plans to expand to further countries.

In Kenya, Safaricom's metro fibre network reached 4,700km during 2017 since the operator first started deploying the network in 2012. In October 2017, the company announced that it had started an FTTH

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regional rollout plan to expand coverage to other towns across the country. "The first phase of Safaricom *Fibre to Home* will start with Kitengela town and its environs, targeting 14,000 homes," stated a company press release, adding that other towns targeted in this phase included Athi River, Buruburu, Ngong Road, Runda, Ruaka and Karen.

International bandwidth

Africa's total inbound international internet bandwidth reached 5.825 Tbps by December 2016, according to Africa Bandwidth Maps. Of the total bandwidth of 3.319Tbps in sub-Saharan Africa by December 2016, 248Gbps (7.5 per cent) was supplied by terrestrial cross-border networks connected to submarine cables. 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 65 per cent to reach 248Gbps in December 2016. This compares to 150Gbps in 2015, 111Gbps in 2014, 61Gbps in 2013, and 45Gbps in 2012.

Several new cross border links were completed during 2017 in Uganda, Burkina Faso and Zimbabwe.

For instance in January 2017, the National Information Technology Authority of Uganda announced that the third phase of the National Data Transmission Backbone Infrastructure (NBI) had been completed, extending the NBI network to the border with Tanzania (at Mutukula) and Rwanda (at Katuna). Orange Burkina Faso announced in May 2017 that it had deployed a 139km metro fibre network in Ouagadougou, a 197km fibre optic link from Ouagadougou to Ghana, and that it had started the construction of a 580km link from Ouagadougou to Côte d'Ivoire. In Zimbabwe, TelOne completed the 330km link from Bulawayo to Beitbridge on the border with South Africa in September 2017.

The expansion of capacity on existing routes has seen operators upgrade a number of major domestic and cross-border routes to submarine cables from a capacity of 10G or 40G to 100G. These operators include Telecom Egypt, Safaricom, Ethio Telecom, SEACOM in South Africa and East Africa, Orange Côte d'Ivoire, Globacom and MTN in Nigeria, and Liquid Telecom in South Africa, Zambia and Zimbabwe. ■

www.africabandwidthmaps.com

Groundbreaking transmission speeds in Algeria

The year began with **Ooredoo Algeria** claiming it had successfully achieved what it described as a "groundbreaking" transmission speed of 1.2Tbps over optical fibre.

At the end of 2016, the operator carried out the trial between the cities of Algiers and Ain Defla over a distance exceeding 200km. It used the *1830* photonic service switch platform from Nokia (formerly Alcatel-Lucent) which is designed to help optimise optical networks to meet unpredictable traffic demands. Ooredoo also utilised the vendor's 500G DWDM muxponder which can carry up to five 100G services per line card and is said to help service providers achieve "superior" capacity, reach and wavelength flexibility. The commercial deployment of the technology in the near future will be a first for Africa and allow Ooredoo Algeria to offer high capacity-based solutions to its subscribers.

Speaking at the time, Pierre Chaume, head of Nokia's North Africa market unit, said: "This trial is an important and critical step in helping Ooredoo Algeria increase capacity and add flexibility to its network. The deployment will also support the 4G deployment plans of the service provider."

The vendor added that because of the new performance levels achieved during the trial, Ooredoo Algeria is updating its digital knowhow by better understanding the needs of the telecoms sector. It said the cellco's core network will therefore be able to integrate new technologies for better performance and optimum care of the increasing demand for mobile services.

In a separate development, **Sparkle**'s Sicily Hub in Palermo, Italy has become Ooredoo Tunisia's main PoP in Europe. The operator said its customers will now benefit from an "enhanced" data experience, improved coverage and increased diversity options as a result of the reduced latency and shorter traffic routes for ISPs exchanging content locally through the PoP. In addition, the hub provides direct access to the 19 submarine cables that land in Sicily, connecting Europe to Africa, the Middle East, Asia and North America.

The eventual commercial deployment of Nokia's 1830 PSS platform in Algeria will be a first for an optical network in Africa.

Two Asian operators planned to use the **Djibouti Data Centre** (DDC) as a strategic hub for their pan-African expansion. The centre serves as a major meeting point for submarine cable systems including the *SEA-ME-WE 5* (*Southeast Asia-Middle East – Western Europe*) cable which was launched at the end of 2016. Stretching around 20,000km, *SEA-ME-WE 5* connects Djibouti with China via 18 landing points including one in Egypt. In December 2016, **China Telecom Global** (CTG) announced that the DDC will help facilitate its network expansion in East Africa. CTG is a founding member of the *SEA-ME-WE 5* consortium.

The DDC also provides access to other cable systems such as *EIG*, *EASSy*, *Aden-Djibouti*, and *Ethiopia-Djibouti*. In November 2015, it also announced an agreement with PCCW Global to support the *AAE-1* (*Asia-Africa-Europe 1*) submarine cable network. Hong Kong-based PCCW Global is a founder consortium member of *AAE-1* which went live in July 2017 (*see Timeline, below*).

JANUARY/FEBRUARY 2017

Huawei Marine Networks has awarded Nexans the contract to supply 6,000km of its second-generation submarine repeatered optical cables for phase II of the National Broadband Network project linking Cameroon and Brazil. Huawei Marine and Nexans previously partnered in 2015 to deliver the *Nigeria Cameroon Submarine Cable System*. This constituted phase I of Cameroon's National Broadband Network being developed for Camtel, the country's national wireless and fixed line operator.

MARCH/APRIL

As part of its aim to become a major IP transit and MPLS player in sub-Saharan Africa, Angola Cables has chosen NAPAfrica as its peering point. IP product manager Darwin Costa says peering with NAPAfrica enables Angola Cables to reduce latency and increase bandwidth throughput, as well as increase overall connectivity performance on the continent: "We want to use peering as a tool to keep traffic paths local and throughput as high as possible."

MAY/JUNE

Cell C has extended *C-Fibre*, its commercial FTTH offering, across major open access fibre networks in South Africa, with additional network agreements under way. The operator says customers that are in areas covered by Openserve – the wholesale and network division spun-off from national incumbent Telkom – can now join those already covered

The Djibouti Data Centre is said to be East Africa's first Tier 3 carrier-neutral facility with direct access to all major international and regional fibre systems connecting Africa with Europe, the Middle East, and Asia.

Omantel Wholesale is interconnecting the *Gulf to Africa* (*G2A*) and *Silk Road Gateway-1* (*SRG-1*) cable systems to deliver ultra-low latency networking between Asia and Africa.

G2A connects Oman to Somalia via two redundant landing stations in Puntland (Bosaso) and Somaliland (Berbera). The system provides onward connectivity to Ethiopia and will connect Kenya, Mogadishu and South Africa in 2018 and 2019.

Meanwhile, *SRG-1* connects Oman to Pakistan with onwards connectivity to Afghanistan, China, Iran, Turkmenistan and Tajikistan. There are two cable landing points in Pakistan – Karachi and Gwadar. These then connect to MultiNet's long haul fibre network with several connection points throughout the country, such as in Lahore and Islamabad. From Torkham and Chaman, *SRG-1* crosses the border to connect Kabul and Kandahar in Afghanistan.

Omantel Wholesale said it will connect the cables to the Ethiopia border from Berbera; Ethiopia Telecom will then extend connectivity into its national network. The total investment in both projects will be more than USD80m.

Omantel Wholesale claims to be the only provider in the world that is able to offer rapid access between Asia and Africa via geographically diverse routes. It said that *G2A* and *SRG-1* add to its more than 20 undersea cable investments which include a high-speed link between Singapore and Frankfurt.

IOX Cable is building its third undersea fibre system to connect Mauritius to Africa and the rest of the world. Towards the end of 2016, the company announced that *IOX* (*Indian Ocean Xchange*) will be the first submarine cable system connecting Rodrigues island to Mauritius and the rest of the world.

Part of Indoi Ltd, IOX is working with Mauritius Telecom on building the USD150m extension to its cable. It will link directly to the existing submarine system that facilitates connectivity to Madagascar, Réunion, Mauritius and Rodrigues. Two fibre pairs will connect to this system near Toliary in Madagascar, while another two fibre pairs will provide the option to connect to any new future cable systems off Africa's east coast or as an extension to South Africa.

IOX claimed it will offer the region's first open access cable system, giving any licensed operators the opportunity to benefit from

IOX will be the first submarine cable system connecting Rodrigues to Mauritius (above) and will allow easy connectivity to current and future undersea cables on Africa's East and West coasts, delivering a gateway to the continent and a new alternate route to and from Asia (top).

the latest technology and seamless access. The firm added that by 2019 it will convert Mauritius to an international data hosting centre and key exchange point in the region by connecting links across Indian ocean islands. The *IOX* cable is expected to be ready for commercial service by the first quarter of 2019.

A few months later in June, we reported that IOX was planning a new cable to connect Africa and Asia. The company announced that it will build

by Frogfoot, Mitsol and Vumatel. Cell C has offered *C-Fibre* on those networks since 2016. It adds that the service has both symmetrical and asymmetrical offers on all networks.

JULY/AUGUST

What's been described as the largest subsea cable system to launch in almost 15 years has now gone live. *Asia-Africa-Europe 1* (*AAE-1*) stretches 25,000km and is the first high-capacity cable system to link all of the major Southeast Asian nations to Africa and Europe via the Middle East. It connects Hong Kong, Vietnam, Cambodia, Thailand with Malaysia and Singapore, then onwards to Myanmar, India, Pakistan, Oman, UAE, Qatar, Yemen, Djibouti, Saudi Arabia, Egypt, Greece, Italy and France. The system is said to deploy "state-of-the-art" 100Gbps transmission technology, with a minimum design capacity of 40Tbps. Members of the cable consortium include China Unicom, CIL, Djibouti Telecom, Etisalat, GT5L, Mobily, Omantel, Ooredoo, OTEG, PCCW Global, PTCL, Reliance Jio, Retelit, Telecom Egypt, TeleYemen, TOT, Viettel, VNPT and VTC.

SEPTEMBER/OCTOBER

SEACOM is bringing high-speed internet access to the Greater Johannesburg area, starting with the rollout of 8km of fibre in the southern suburb of Meyersdal. The company says it plans to "rapidly extend" the reach of its fibre network to more parts of South Africa, including areas that are currently under-serviced by last-mile fibre operators. SEACOM claims some of the benefits of its network include service offerings with low or no contention ratios, symmetrical speeds, and no fair usage policy or out of bundle charges.

NOVEMBER/DECEMBER

The *Monet* undersea cable that will directly connect Brazil and the US has now arrived in Fortaleza. Angola Cables, one of its owners, says the arrival of *Monet* is an important milestone in its strategy as the cable will interconnect to its *South Atlantic Cable System* (*SACS*) that is currently under construction. The company has also built a data centre in Fortaleza and two submarine cable stations, and says it has advanced the construction of *SACS* which should be ready for commercialisation in mid-2018.

the first open cable system to connect Mauritius and Rodrigues island to South Africa and India. IOX is working with Alcatel Submarine Networks (ASN) to build the fibre network that will stretch more than 8,850km to connect the east coast of South Africa, Mauritius, Rodrigues and then on to India's east coast. The company said its cable will provide Mauritius with route diversity and claimed this will reinforce the country as a communication hub in sub-Saharan Africa. It will also connect Rodrigues to a submarine cable for the first time, enhancing ultra high-speed broadband services.

Providing an ultimate design capacity of more than 13Tbps per fibre pair, the system is integrating ASN's *1620 SOFTNODE* and ROADM branching unit which is claimed to offer dynamic features for enhanced system resilience. It is also using the vendor's submarine repeaters as well as its end-to-end submarine network management system. ASN is in charge of project management, system design, marine operations and system commissioning.

In March, we reported the news that **Telco Systems** will upgrade **Internet Solutions Kenya**'s (ISK) entire fibre network infrastructure to 10G.

Formerly AccessKenya Group, ISK provides cloud, communication, connectivity and carrier services to public and private sector organisations in Kenya and across East Africa. It is a licensed ISP, Data Carrier Network Operator, Public Data Network Operator and local loop operator in addition to being a shareholder in the *TEAMS* submarine cable system.

Telco Systems CEO Ariel Efrati (right) said the new network will be one of the best in Africa. Also pictured is Richard Hechle, MD of Internet Solutions Kenya.

The SACS link was officially launched in early August at an event attended by José Carvalho da Rocha, the Angolan Minister of Telecommunications and Technologies (seventh from left), local and international business leaders, as well as Angola Cables' shareholders and guests.

Telco is providing a fully automated software-defined network with the capacity to support 10GbE. The vendor is supplying its *T-Metro 7124*, *T-Marc 3348* and *T-Marc 3308* demarcation devices, as well as its *EdgeGenie Orchestrator* service management system. It said that this means the network will be fully orchestrated, allowing rapid service provisioning along with simplified network deployment and maintenance activities for ISK.

"In the last two years, we have been experiencing a growing demand for higher capacity and other layered services from our customers," said Richard Hechle, MD, Internet Solutions Kenya. "We are confident that [Telco Systems'] innovation networking technologies will enable us to deliver more capacity and will allow us to better utilise our infrastructure in order to better serve customers with new and improved services."

It was claimed that the newly upgraded network will enable ISK to serve thousands of enterprises in Kenya and across the region with advanced business services. It will also provide the company with full MPLS services across all parts of the fibre network and all the way to the customer.

In addition, Telco said the network upgrade will now include the latest MEF 2.0 standards, which means ISK will be able to deliver "more robust" services to its customers. "This network upgrade is a major step forward in creating one of the highest quality and most reliable networks, not only in Kenya but across Africa," said Telco's CEO Ariel Efrati.

Angola Cables moved a step closer to completing the *South Atlantic Cable System* (*SACS*) with the installation of the first direct subsea link between Africa and South America. In what was described as a "watershed" moment for African internet, the link was officially launched on 9 August in Sangano, Angola.

SACS was first announced more than two years ago.[1] The 40Tbps system is being built by NEC and was scheduled to begin operations during 1Q18. When completed, *SACS* will stretch more than 6,500km connecting the Angolan coast in the municipality of Quissama to Fortaleza in Brazil, the closest point to Africa in South America.

In July 2017, Angola Cables said construction had begun on its data centre in Fortaleza. It said the Tier III facility will play a crucial part in promoting Africa's digital inclusion and empowerment and providing high-speed internet at some of the lowest latency speeds between the two continents.

According to the company, it currently takes around 300 milliseconds to connect between Angola and Brazil. *SACS* is expected to reduce

[1] African Wireless Communications Yearbook 2017, pp61-62.

The year ahead: After successfully closing a USD180m offering last November, Liquid Telecom's plans for its new funding include further expansion of its pan-African fibre network which is the largest of its kind in the region.

Earlier in 2018, Liquid and Sudatel Telecom Group signed an MoU to build new FTTH networks across Sudan. Liquid said that the FTTH networks will deliver speeds initially up to 100Mbps. In a separate announcement also made earlier this year, Liquid will operate the Kenya Electricity Transmission Company's (KETRACO) optical ground wire fibre cable and expand internet network across East Africa. KETRACO operates as a national long haulier of fibre that Liquid Telecom Kenya will now commercialise. By 2020, KETRACO will have built more than 8,000km of high voltage transmission lines with concurrent fibre connectivity. Liquid will begin by upgrading fibre connections to Kenyan areas already connected to the national grid with high voltage lines of 132kV and above. It will then extend fibre connections to remote parts of the country as well as neighbouring nations.

Orange has now opened two "very large"capacity PoPs in Cape Town and Johannesburg. They are said to offer resilience with three routes that are protected by a backbone network that includes access to the *SAT3* and *EASsy/SMW5* submarine cables, with *ACE* to be added soon. Orange added that the facilities will enable users to improve QoS by providing delivery content closer to customers, as well as offer local processing, thereby improving roaming and avoiding the need for traffic to go back and forth from Europe.

latency to approximately 60 milliseconds. Angola Cables CEO António Nunes said: "For Angolans, the time to access content available in America – the largest centre for the production and aggregation of digital content and services – will improve five-fold."

Two key routes will run from the Brazilian data centre: *SACS* will connect Fortaleza to Luanda and is expected to be completed by mid-2018; meanwhile Angola Cables' *Monet* system will connect Miami with both Fortaleza and São Paulo and is due to be completed by the end of 2017 (*also see Timeline, previous page*). The data centre also aims to accommodate more connections from the cable-dense region of Fortaleza. Clients who have already signed in Brazil include Prefeitura de Fortaleza, Claranet and AmLight.

SACS is considered a strategic project for Angola to advance the region's digital economy and improve global communications. According to Nunes, the country is becoming a major telecoms hub in sub-Saharan Africa with cable systems such as *WACS* (in which Angola Cables is a partner along with 11 other firms), *SACS* and *Monet*, together with local data centres.

In separate news, Angola Cables said **Angonix** – the internet exchange point it manages in Luanda – has grown to become the continent's third-largest IXP in just two years.

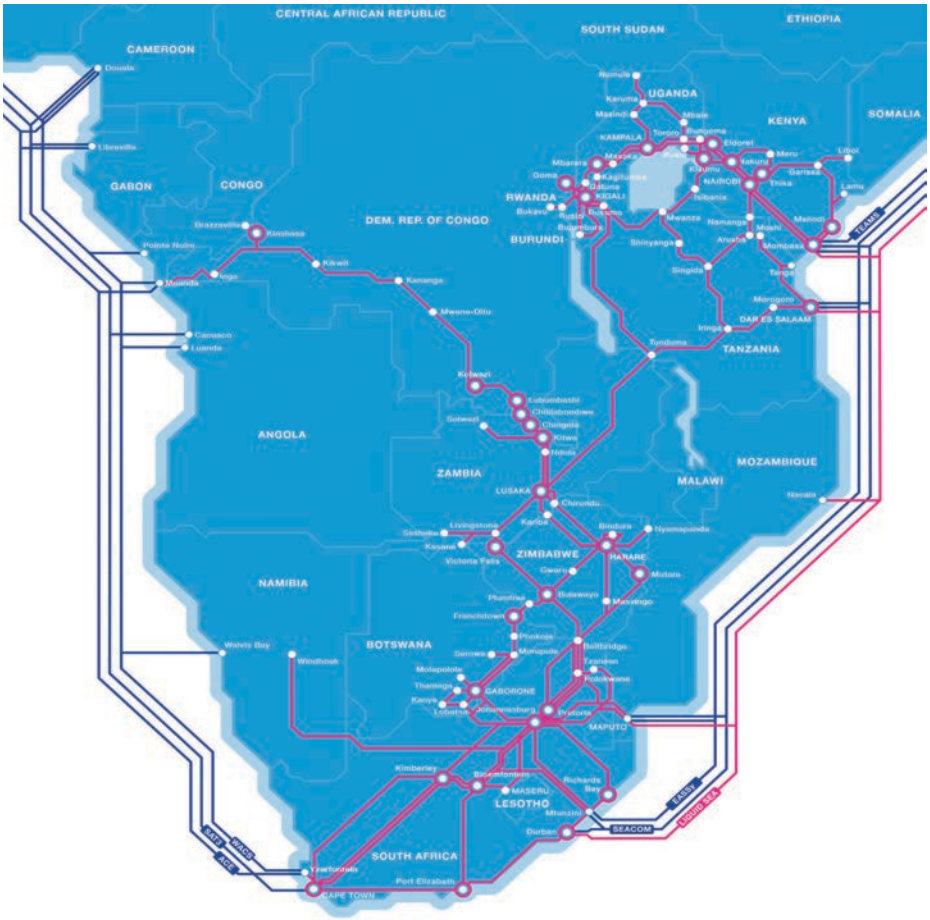
"As a neutral IXP, Angonix allows content to be localised at greatly reduced per-bit delivery costs and offers improved routing efficiency," said the facility's project manager, Darwin Costa. "With a suite of strategic communications assets on the continent, Angola Cables will become the only carrier able to directly connect networks from the Americas and Europe to the third-largest platform in Africa."

Angonix currently has 17 members including major financial institutions, cable and satellite companies, ISPs, MNOs and various CSPs operating on the continent. It's claimed the IXP recorded peak traffic of 10.8Gbps in July 2017.

Costa said Angonix features peering ports of 1GbE and 10GbE with speeds of 1000Mbps and 10,000Mbps, respectively. He added that remote peering services will soon be launched whereby ports on the IXP will be available in other markets.

Since then, **France-IX** has announced the launch of a remote peering service to boost connectivity between members of its IXP in Marseille and those at Angonix. France-IX said the new service will reduce latency and costs for global and national carrier networks, CDNs, social networks and cloud and IT service providers looking to establish themselves in sub-Saharan Africa.

Angonix project manager Darwin Costa said Angola Cables will become the only carrier able to directly connect networks from the Americas and Europe to the third-largest IXP in Africa.



Liquid Telecom's East Africa Fibre Ring now spans 50,000km. An upgrade in 2017 meant users in Rwanda, Uganda and Kenya can now experience 100G network connectivity for the first time.

The company claimed it will also reduce international IP-transit costs for local ISPs and network operators, as well as increase their access to French language content and services. "Since joining the France-IX Marseille peering community in May 2017, we have seen a more than three-fold increase in traffic," said Costa.

In a separate deal, **Djibouti Telecom** will also peer its IP traffic through France-IX's IXPs in Paris and Marseille. The state-owned telco said the agreement will mean its network customers will benefit from a significant improvement in QoS with faster and more stable access to a large amount of French-language content.

France-IX said the connection to its IXPs opens up an alternative route for Djibouti Telecom's IP transit services customers and allows them to optimise their traffic. It claimed that for some destinations, this can "significantly" shorten data travel distance and improve response times. The firm said this is possible thanks to a direct traffic exchange with other networks and on-demand content providers via a 10Gbps port at its facilities in Paris and Marseille.

Djibouti Telecom DG Mohamed Assoweh Bouh believes peering in Paris offers advantages in terms of access to content and IP transit. He added that Marseille is a "natural destination" for the company as it offers a European landing point for new subsea cables such as *Asia-Africa-Europe 1* and *South East Asia-Middle East-Western Europe 5*, in addition to its existing capacity on *Europe-India-Gateway* and SEACOM. "This agreement will not only benefit our final customers but also a number of African service providers, network providers and carriers based in Ethiopia, Somalia, Yemen, Madagascar, Mauritius and Seychelles that use Djibouti Telecom as a hub," said Bouh.

France-IX said that for its existing peering community, the new connection paves the way for additional customers and allows them to offer their services under "satisfactory" technical conditions.

Staying in East Africa, **Liquid Telecom** announced the completion of 100G upgrades to key routes on its *East Africa Fibre Ring*. The operator said the enhancement to its pan-African fibre network that now stretches more than 50,000km enables it to offer the largest lit backhaul capacity on the continent.

The upgrade to 100G wavelengths takes advantage of the latest DWDM technology from Ekinops. Liquid said it delivers up to 10 times

(continued on page 106)

Africa Telecom Transmission Networks
Fixed Line and Alternative Operators

September 2017

ISBN 978-1-5272-1264-0

Published by Hamilton Research Ltd.
Bath Brewery, Toll Bridge Road,
Bath BA1 7DE, UK

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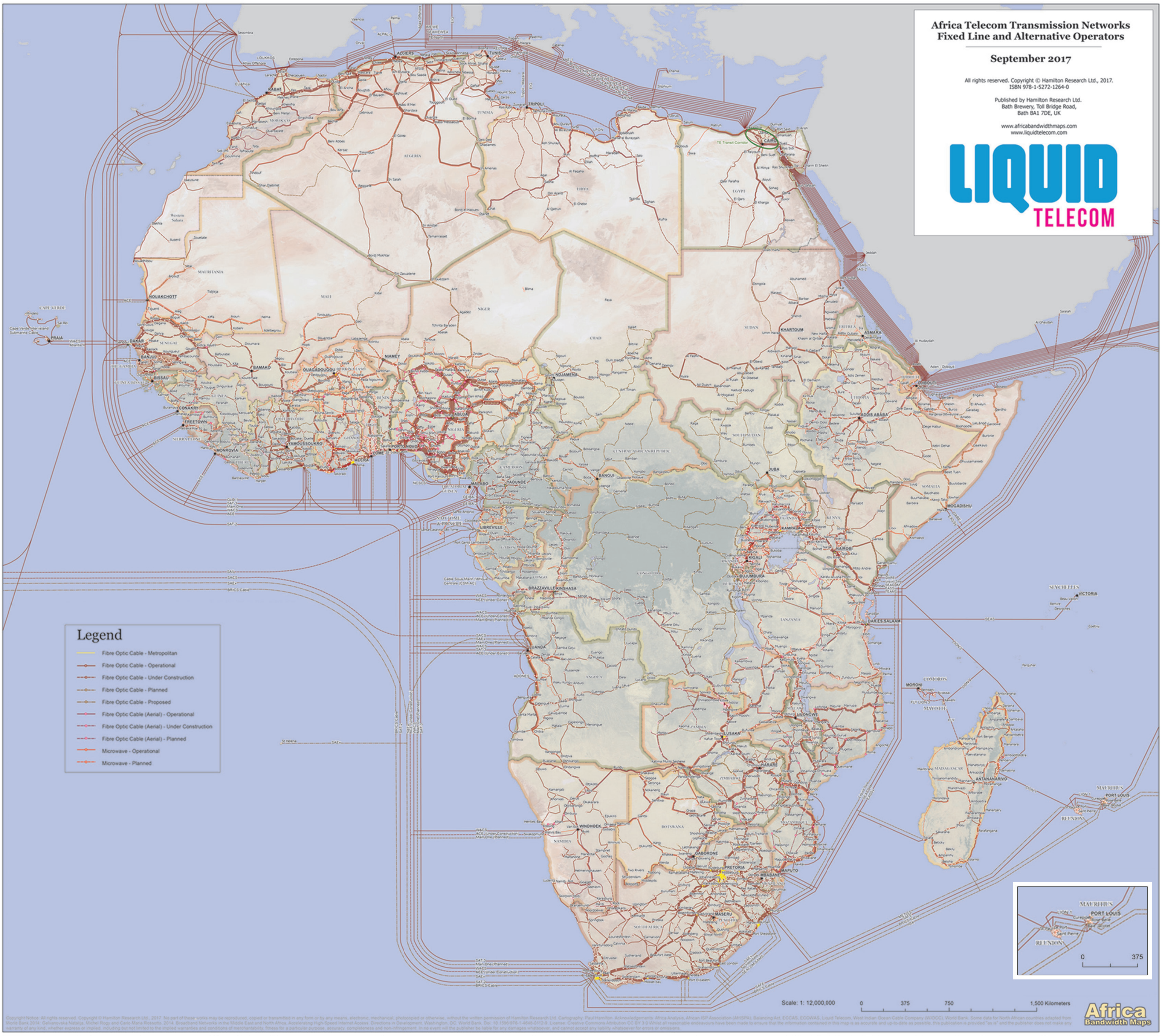
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Fibre Optic Cable - Metropolitan
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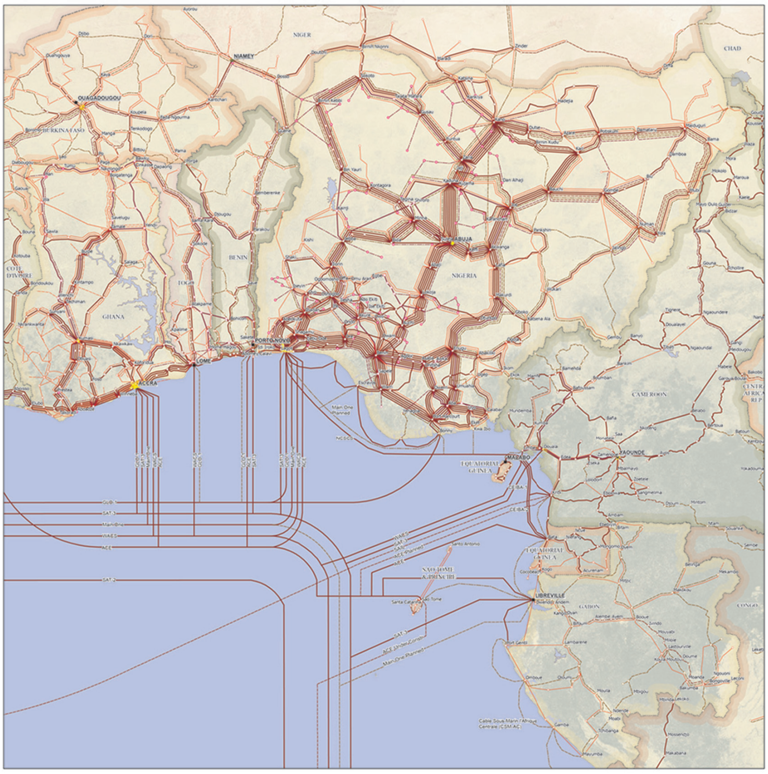
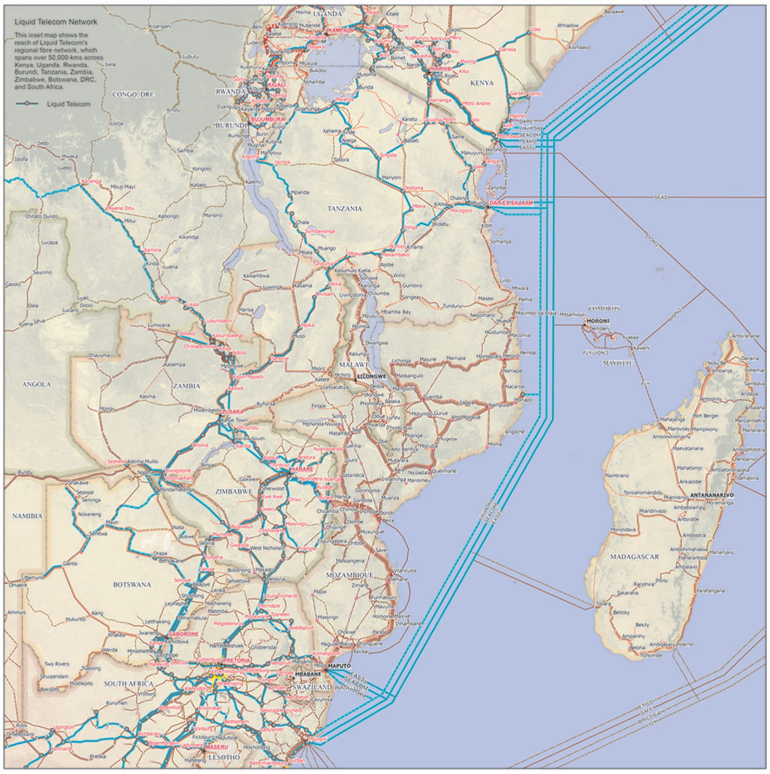
Africa Bandwidth Maps




Liquid Telecom Network
This inset map shows the reach of Liquid Telecom's regional fibre network, which spans over 50,000-kms across Kenya, Uganda, Rwanda, Burundi, Tanzania, Zambia, Zimbabwe, Botswana, DRC, and South Africa.
Liquid Telecom
Scale: 1: 8,500,000
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(continued from page 103)

the speed of previously used 10G waves. The 100G links are available in the cities of Kigali in Rwanda, Kampala and Tororo in Uganda, and Nairobi and Mombasa in Kenya, with further 100G upgrades planned for the *East Africa Fibre Ring* in the near future.

Commenting at the time, Liquid Telecom group CEO Nic Rudnick said: "By upgrading to 100G, Liquid Telecom is ensuring that its fibre backbone can meet the rising demand for high-bandwidth, video and internet services from businesses and consumers across the region."

Built at an initial cost of USD20m, the *East Africa Fibre Ring* connects Kenya, Uganda, Rwanda and Tanzania, with onwards connectivity to Liquid's fibre networks in Burundi and eastern DRC. It also offers direct access to international subsea cables.

Also in East Africa, **Safaricom** unveiled plans to enter the home broadband market in Kenya. It is using Huawei's help to rapidly deploy FTTH and expand its capability to new domestic broadband services.

While Kenya has a steadily developing economy, its fixed broadband penetration rate is said to be lower than one per cent. Safaricom director Thibuad Rerolle said: "By using Huawei's E2E [end-to-end] solution, we can quickly build the FTTH network. We are keen to broaden the development space for new fixed broadband services."

According to Huawei, among the challenges Safaricom faces are scattered user distribution, high network construction costs, and low early phase service provisioning rates and revenues. For cost-effective and precise investment, it said the operator is using analytics to determine network rollout in line with customer demand as its first step.

The company added that for fast network construction through infrastructure synergy and engineering innovation, Safaricom can fully utilise existing MAN optical cables and preferentially use aerial cables. Through the synergy of fixed broadband optical distribution networks and mobile backhaul networks, Huawei said the cellco can deploy mini optical line terminals and wireless base stations in the same cabinet. It claimed this will result in fast deployment, centralised home access, and greatly decreasing network construction costs.

Furthermore, Huawei reckons its "lightweight" mini OSS helps Safaricom to reduce the system integration period and complete deployment within only three months as opposed to 18.

The vendor also provided a smartphone app for engineers. It's claimed this integrates installation, maintenance and operations, supporting on-site service provisioning and acceptance, shortening the service provisioning period from two weeks to less than 48 hours, and doubling installation rates. ■

Antonio Nunes, CEO, Angola Cables

When asked about the general business mood currently in Angola given the global slump in oil prices, Antonio Nunes said that the situation is not "the best one" for the economy. But in terms of the telecoms business and internet growth, he added that there is better news.

"Between 2016 and 2017 we doubled our IP transit delivery to the market, so that means our market is still growing, and growing quite well.

"One of the reasons is because people are becoming smarter and are optimising on some costs. For example, instead of travelling around the country, they are making calls, sending emails, and making greater use of the internet. And economies are also becoming digital nowadays. So people are using the internet in a more efficient way because they're looking for solutions, they're looking for relationships, and the internet is helping a lot."

While that may be the case for enterprises, what about the ordinary consumer – do they now have affordable network services and the affordable smart devices to go with that? "I think no, not yet. The prices are probably not compatible with the market situation, and we do need to decrease prices in order to promote more internet usage."

He spoke more about the need to lower costs later. But on a more positive note for now, 2017 was a milestone year for the *South Atlantic Cable System* (*SACS*), the first submarine cable system in the southern hemisphere that will connect Africa to South America. This has been a key project for Angola Cables over the last few years, and at the time of writing in early 2018, Nunes summarised all the developments that had so far taken place.

"2017 was very good for *SACS* because we got the cable moving, and by the end of the year it had already reached the middle of the Atlantic in terms of deployment. All the installation in the Angolan landing station is 100 per cent complete. We have done the shore end and so all the cables in Angola are completely ready – in fact, it is so complete, that we are now able to monitor the installation of the cable in the middle of the ocean from an Angolan point of view. The fibre is connected into the cable ship and we are able to check the situation from the shore end. From the end of January/beginning of February, the shore end in Brazil will be done."

It seems as everything is going smoothly, so have there been any obstacles encountered so far?

"In general terms we don't have anything to complain about and things are going in accordance with the plan. One of the big issues usually associated with submarine cable systems are the licenses. We are suffering with the licenses in Brazil because some of the local authorities there are taking a very long time.

"Carnival time in Brazil is also very big; it is probably the high tourist season and we are not allowed to build anything on the beach during that period. It is a local issue because Fortaleza [the landing point for *SACS* on the South American side] is a tourist region so we may suffer a little delay because of that. But as of now, we don't really have anything to stop us."

Once *SACS* has landed in Brazil, it will then connect to the *Monet* submarine cable system that links São Paulo and Miami via Fortaleza. Angola Cables co-owns *Monet*, and Nunes explained that the system is completely ready and that he is now waiting for a final license from IBAMA, the Brazilian Ministry of Environment's administrative arm. "As soon as we have the go-ahead, we will start selling the services on *Monet* which is completely tested and is now 100 per cent operational."

When asked why Angola is so interested in connecting to Brazil, Nunes said that the two countries have much in common. "We speak the same language, a very similar culture, and a have a lot of commercial relations.

"Another point is that Brazil needs alternative routes from a South American perspective. With *SACS* operational, the country will be able to connect through our *WACS* cable to Europe and of course directly to Africa, but also to Asia because we can route traffic through South Africa up to Asia, therefore completely avoiding North America and Europe.

"From Africa's point of view, we will open a very large and diverse business opportunity because Brazil is a country that has a lot of digital content. For example, digital agriculture in Brazil is very developed, and agriculture is a major part of the African economy. So in terms of connection where we offer very low latency of 63 milliseconds, systems that are created in Brazil could be used to optimise agriculture production in Africa."

Nunes has previously spoken about his hope for Angola to become a major digital hub for the region once *SACS* goes live. What are the obstacles that Angola Cables needs to overcome in order to realise that?

"That ambition can only be achieved once we can show people what *SACS* is capable of offering them. For example, one of the things this cable will be able to do is enabling a digitalisation process. For example, Angola is one of the biggest oil producers in Africa and one of our problems is how to reduce operational costs because we are drilling in deep waters. So if we use digital and telemetry systems to operate these platforms in a very efficient way, we can reduce the cost of the production. And reducing the cost of the production will prove very beneficial to the local economy.

"So if we become the centre of traffic distribution to the Americas, we start playing a big role for African countries in terms of offering them a very good connectivity path to South and North America.

"One of the things that we are doing is that we have started to sell IP transit to countries such as South Africa, DRC, Congo and Nigeria. One of our ideas is to develop that deeper when we begin connecting to the Americas because some of the content will then be able to come directly from the US rather than from US to Europe and then down to Africa.

"This is very important because as we all know, the cost of IP transit in Africa today is huge because we have to buy it from other parties, mainly from Europe. As Africans, we are paying Europe to use the internet because all the major data centres and all the major content is there.

"So we need to meet the demand and distribution of traffic locally, and you can already see a movement of that to South Africa with the big OTT players building data centres there. Now we can route all of the traffic internally. If we had less miles for traffic to travel, the quality of that traffic will be better and its cost will be lower."

Nunes said that 2018 will be a year of consolidation for Angola Cables as he expects *SACS* to be fully operational by no later than the middle of the year.

"In terms of general challenges for Africa, one of the big problems that we have is the price of internet connectivity which is a question of demand. So if you have a lot of people using it, you can really decrease your price and optimise cost. African citizens therefore need to have more access to the internet, and so we now have a situation where we need to bring the prices down in order to enable that volume of usage.

"But having said that, we still have a very basic problem in terms of other costs. For example, our data centres are using generators around the clock and the cost of that is enormous. At the end of the day, the market is the one that will pay that cost. So before we are able to decrease the cost of internet accessibility, we have to optimise some things internally."

Nunes remains upbeat and very optimistic about the future. He said many countries across the continent are engaged in different activities to find solutions to the challenges and that things are improving.

"The future of Africa is really quite brilliant because we have the second biggest population in the world and the youngest one. These young people will be completely adept to the digitalisation process in three or four or five years time, and then that will be when Africa will really pick up the usage of this new technology and thrives."

Mike Last, CMO & VP international development, WIOCC

WIOCC's mission is to make what Mike Last describes as an "enduring" contribution to Africa's communications. To progress this in 2017, he said that the company continued its large-scale investment in capacity and in infrastructure diversity, developed new capabilities to align with dynamic industry needs, and supported clients in meeting their customers' requirements and aspirations.

"Last year brought explosive growth in demand for international connectivity out of Africa, with requests to deliver multiple 10Gbps becoming increasingly common. Until very recently, capacity demands were typically for just a few STM1s (155Mbps).

"The increased demand is being driven largely, but not exclusively, by global OTT players and content providers – organisations such as Google, Tencent, Microsoft, Alibaba, Facebook and Netflix looking to migrate content from their established markets in North America, Europe and Asia to local servers in Africa – providing them with performance improvements that help in customer acquisition and increased revenue opportunities."

Whilst not directly involved in wireless communication itself, Last said that WIOCC sees the impact of wireless carriers' continued need for international capacity and internet connectivity, driven by end-user demand for broadband and data services.

"For WIOCC, this manifests itself in the form of requests to purchase ever more international connectivity, increased procurement of local IP transit connectivity, and greater need for network diversity to support high service availability.

"A critical challenge for African mobile operators continues to be addressing the implications of declining voice revenues caused by the growing use of applications such as *Skype*, *WhatsApp* and *Facebook*.

"Such revenues have historically been more than enough to fund the relatively minor infrastructure investments needed to maintain voice networks. However, keeping pace with the huge growth in demand for high-quality data services requires massive investment in bandwidth and network diversity in order to deliver video-streaming and other demanding apps/services provided by companies such as iFlix, Netflix and Amazon Web Services.

"If one player in a market invests in improving the performance and capability of their infrastructure, others must follow or risk significant subscriber loss. Data bundles are popular and represent an increasing proportion of many mobile operators' revenues. But there is a limit to the customers' ability or willingness to pay, whilst the investment needed to support data on operators' networks is huge. Finding a workable balance is critical."

Other challenges Last identified include the availability of cost-effective, diverse backhaul to landlocked countries. He believes that despite significant investment in new terrestrial infrastructure by the Chinese government, the World Bank, the African Development Bank, Google, Facebook, and others, this will continue to be a challenge over the coming months and years.

He also warned about regulatory challenges. "Markets continue to open up in some countries, but others remain dominated by just one or two players, restricting customer choice and limiting opportunities.

"There is also market uncertainty. In 2017, a number of international players withdrew completely from some African markets, and there is talk of further withdrawals. While this presents opportunities for other players in such markets, it also creates significant uncertainty for consumers."

Last continued by highlighting another issue concerning the lack of high-quality data centre space on the continent. "Whilst South Africa benefits from a number of high-specification data centres, this is not the case throughout Africa. The lack of similar facilities in other parts of the continent threatens to restrict the ability of OTTs and content providers, in particular, to extend their footprint to other parts of the continent."

Such challenges aside, WIOCC hopes that throughout 2018 an ever-increasing number of businesses and individuals in Africa will benefit from the opportunities presented by improved local and global connectivity, and reliable access to the internet.

"In support of this aspiration, WIOCC will continue to invest strategically in submarine cables and pan-African terrestrial infrastructure for the benefit of the entire wholesale market," said Last. "This will ensure sufficient scale, capability and agility to meet requirements for ultra-high capacity into the continent's largest markets, as well as delivering the capillarity to extend carrier networks to customer locations throughout the continent.

Byron Clatterbuck, CEO, SEACOM

Last year was a busy one for SEACOM according to CEO Byron Clatterbuck, and he talks about one key achievement in particular where the company expanded its direct presence in last-mile fibre.

"We recently completed the first SEACOM fibre 'self-build' project in Meyersdal, Johannesburg. While it is a small 7.4km

The Africa Coast to Europe – ACE - submarine cable links Europe to the west coast of Africa through a very high speed fiber optic system. The first phase was put in service in December 2012. When Phase II is completed in 2018, ACE will cover a total distance of 17,000km and will allow up to 25 countries to access high speed internet.

- Launched on December 15, 2012
- 17,000 km long
- USD 700M investment
- 100G technology implemented
- PoP-to-PoP connection providing access to major cities in Europe and Africa
- PoP resilience via fully protected terrestrial links
- Under construction : segment from Sao Tome & Principe to South Africa, branch to Guinea Bissau (RFS 2018)

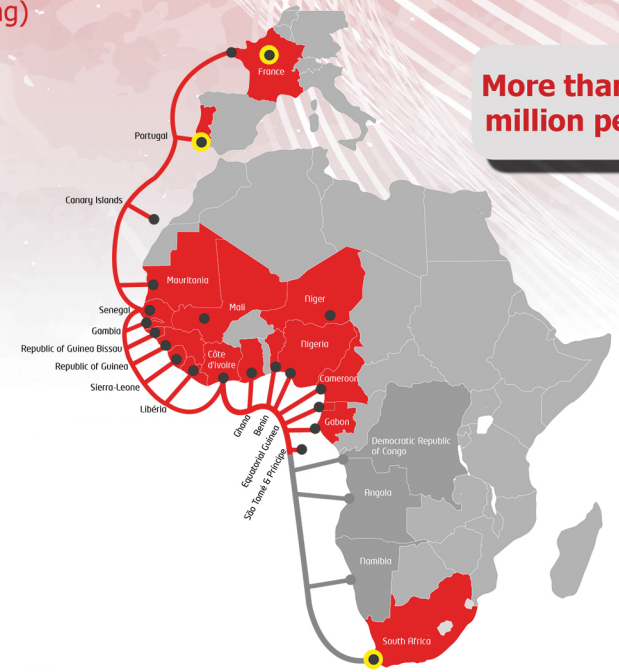
ACE uniqueness

- The only cable which connects 18 countries from Africa to Europe (target 24 countries)
- Consortium environment with SPV members enabling competitive prices
- Aggregate Access Concept (multiple investors in one landing)
- Availability of in-system restoration
- Marine routes with low fault history implemented
- Express and omnibus routes to reduce latency

17,000 km

25 countries

More than 400 million people



Technical highlights

UP TO **12.8 Tb** per second

- ACE Design capacity : 64x100G/fp = 12.8Tb
- Secure monitoring with a NOC (Dakar) and a BNOC (France)
- Low latency (RTD in ms)
  a. Paris – Cape Town = 145 ms
  b. Telvent – Cape Town = 135 ms
- Total Lit capacity
  a. RFS = 173 Gb
  b. Upgrade No.1 = 1.6 Tb
- Future proof upgradability
  a. Longest DLS = 4400 km (Penmarch'- Dakar)
  b. Able to adopt newer transponder technology

A key role in the development of critical infrastructure in Africa

High-performance connectivity offered by ACE cable system helps to develop and maximize Internet interconnection and traffic exchange opportunities. It allows to expand broadband connectivity and to create business opportunities in booming digital services in Africa.

By reducing communication costs and shrinking the digital divide, the ACE cable system is a lever for social development and sustainable economic growth in Africa.

ACE Consortium Members

Landing Parties	ACE Landing Stations
ACE Gabon	Libreville, Gabon
Benin ACE GIE	Cotonou, Benin
Cable Consortium of Liberia, Inc	Monrovia, Liberia
Canalink	Tenerife, Canary Islands Dakar, Senegal
Dolphin	Accra, Ghana Lagos, Nigeria
Gestor de Infraestructuras de Telecomunicaciones de Guinea Ecuatorial	Bata, Equatorial Guinea
Gambia Submarine Cable	Banjul, The Gambia
GUILAB SA	Conakry, Guinea
International Mauritania Telecom	Nouakchott, Mauritania
	Accra, Ghana
MTN	Lagos, Nigeria Duynefontein, South Africa
Orange	Penmarch, France
Orange Cameroon	Kribi, Cameroon
Orange Cote d'Ivoire	Abidjan, Côte d'Ivoire
Orange Mali	Dakar, Senegal
Orange Niger	Cotonou, Benin
Republic of Guinea-Bissau	Suro, Guinea-Bissau
SALCAB	Freetown, Sierra Leone
Sonatel	Dakar, Senegal
STP Cabo	Sao Tome & Principe, São Tomé and Príncipe
All Parties	Carcavelos, Portugal
All Parties	Duynefontein, South Africa

Carrier Neutral POPs

All Parties	Telehouse-2, Paris
All Parties	Itconic, Telvent
All Parties	Teraco, Cape Town

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ACE

Reducing the digital divide

www.ace-submarinecable.com

build, it was an important test case for us. We exceeded our targets for signing up customers in the area and our speed in delivering quality services to our customers has improved dramatically.

"Secondly, we made big investments in our service provider segment by offering increased IP-based services that allow for more flexibility and scale. Easy upgrades, bursting-as-required, and flexible commercial terms have helped us grow traffic on our internet backbone and increase our service provider customers' ability to meet increasing demand from their end-user customers.

"Thirdly, we made large investments into expanding capacity on the SEACOM backbone that connects Africa to the rest of the world. We now have more than 1.2Tbps of capacity live on our east and west coast network routes that support the growth of data internationally. SEACOM has invested in shifting all key elements of the network to 100G technology, which increases capacity throughput while reducing cost.

"Finally, we continued expanding our coverage into new regions and countries. During 2016 SEACOM launched its first IP PoP in Kigali, Rwanda. Today, the company is the largest IP transit provider in Africa, and has led the process of getting all the key content and media players onto the continent."

When asked how the company has seen the wireless communications market adapt and evolve in Africa over the last 12 months, Clatterbuck said that while the competition between mobile/wireless solutions and fibre will prevail, both will continue to grow dramatically.

"Each have their own unique value propositions in the market and can support different uses and applications. Mobile and fibre will work together since no wireless network is fully wireless, and no fibre network can reach everywhere for everyone at the right economics.

"We will see more and more cloud adoption, and security and management of data will become more important. New network applications like SD-WAN and IoT are maturing and moving closer to the mainstream of telco offerings."

When it comes to SEACOM's hopes and plans for the continent in 2018, Clatterbuck said the company will continue down its current path of supporting its service provider partners with better data and content connectivity solutions that they can then offer to their customers. It will also continue to roll out its offering to enterprise customers with what Clatterbuck described as "true broadband solutions".

The company's ambitions also include gaining more market share directly and through its channels; bolstering its value-added service offerings on top of its connectivity solutions; investing in more fibre infrastructure, particularly within South Africa; and looking for more partners or acquisitions that will speed up its ability to implement and grow.

In terms of the challenges SEACOM expects to face in Africa over 2018, Clatterbuck said that over the last five years, the company has seen more infrastructure players invest in connecting metropolitan areas in major economies with fibre, as well as in building national and regional fibre backbones to connect towns and cities to the internet.

But he pointed out that despite this, network coverage remains "patchy" in many parts of the continent. "The industry needs to make significant investments to bring the connectivity from the undersea cables landing stations to the user's doorstep. We're seeing the industry make investments in more fibre to the home and business as well as LTE/4G in many of the larger cities, but more must be done to bring telecoms users seamless and fast connectivity, as well as a more consistent quality of service. In this regard, telecom operators are looking for a good business case. Policy and regulatory certainty will prompt investment into new infrastructure."

Nick Rudnick, CEO, Liquid Telecom

2017 was another busy year for Liquid Telecom which has built Africa's largest independent fibre network, as Nic Rudnick explained.

"Our fibre network spans more than 50,000km in Eastern, Southern and Central Africa where it is delivering quality and affordable broadband to homes and businesses through its FTTH services.

"The company continued to invest in and expand its pan-African infrastructure, developed new VAS for its wholesale, enterprise and retail customer base, and partnered with a number of innovation hubs with the aim of helping and encouraging African entrepreneurs.

"The year saw the completion of the acquisition of South Africa's Neotel, one of the largest deals ever seen in the African telco market. Liquid Telecom immediately started a programme of extensive upgrades and expansions to Neotel's network, delivering greater levels of high-speed connectivity to more customers across South Africa.

"Outside South Africa, the company is continuously laying fibre – FTTH, metro, rural and national/cross border transmission backhaul fibre networks. Higher speeds and bandwidth will play an integral role in supporting the rise of the African cloud and Liquid Telecom is ensuring that its network is ready to meet the increasing demand from businesses for cloud-based services."

Rudnick said major projects for Liquid last year included upgrading the *East Africa Fibre Ring* to 100G, extending its backbone from south-east DRC to Kinshasa, and expanding the company's LTE/4G fixed wireless network in several cities in Zambia to address a larger share of the broadband market. The latter is an open access network and is being used by other wholesale carriers and operators. There was also continued expansion of our GPON FTTH access networks with 34.3 per cent service penetration by November 2017.

Other highlights were the acquisition of Raha, Tanzania's leading ISP, and Zanlink which expanded the network to the island of Zanzibar. Liquid also grew its fibre routes in South Africa, including National Long Distance (NLD) routes.

"Liquid Telecom is committed to partnerships across every sector to advance its mission of ensuring it meets the rising demand for high-quality internet.

"One example of this was an agreement with Kenya Electricity Transmission Company Limited whereby Liquid Telecom will upgrade, expand, operate and commercialise the company's Optical Ground Wire fibre cable.

"In November 2017, we announced a partnership with Huawei to deliver 100G upgrades to our network in South Africa, enabling us to offer additional capacity, faster speeds and greater redundancy to customers across South Africa.

"The first phase of the project will see Liquid Telecom deploy Huawei's *OptiX* OSN solution along 1,200km of its long-haul network connecting Johannesburg and Cape Town. In the second and third phases, the DWDM core network will be extended to the north west then north east regions of South Africa."

Rudnick pointed out that all this will also support growing demand for cloud-based services and provide customers with high-speed access to Liquid's data centres in Johannesburg and Cape Town.

The company has partnered with Microsoft through the *Cloud Solution Provider* programme and is now offering *Microsoft ExpressRoute* across its entire network footprint in Africa.

"Demand for cloud services is increasing exponentially across Africa as organisations look for greater agility, flexibility and security to grow their business. Through our extensive open access fibre network and integrated data centre capabilities in southern and eastern Africa, Microsoft and Liquid Telecom are better positioned to serve Africa's digital future, which increasingly belongs in the cloud." ■