

AFRICAN WIRELESS COMMUNICATIONS YEARBOOK 2018

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AFRICAN WIRELESS COMMUNICATIONS YEARBOOK 2018

From the publisher of
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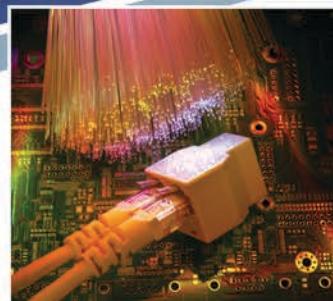
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Bridging the partnership divide



Rahiel Nasir,
Editorial director,
The African
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Even rivals can become bedfellows. If there is one thing that is a must when it comes to making progress in Africa's wireless communications markets, it is the need for partnerships. This came up time and again with many of the interviewees featured in this year's publication.

And it is not just about the partnerships that the public and private sectors have to forge and maintain – those are obvious alliances that should already be in place. It is about an entire ecosystem coming together that includes all stakeholders, from developers, startups and technology entrepreneurs, to hardware and software providers, administrators and investors. The push to connect the world's billions who still lack access to wireless comms connectivity will come to nothing without a concerted effort.

And that is likely to mean setting aside commercial rivalries. Meidad Pariente, founder of nanosatellite company Sky Space and Global, sums it up neatly when he says that he does not regard other communication service providers as competitors to his company, instead referring to them as only "partners or future partners" (see Chapter 5, *Satcoms*, p75).

Everyone is on the hunt for specialist partners – whether it's the likes of Yahsat aiming to promote its latest satellite services on the continent, Motorola Solutions looking to bolster its local presence in critical comms, or Ericsson working with various industries to develop use cases for the IoT or 5G, narrowing the digital divide will never be accomplished by working in isolation or by using one technology.

Even companies that are typically seen as offering competing technological solutions are likely to agree with that. For instance, satellite operators such as Intelsat have also developed terrestrial fibre networks, while Liquid Telecom, which has created the continent's longest land fibre network (see Chapter 7, *Fibre*, p108), continues to invest in VSAT.

Why? Because such companies acknowledge that the continent's wireless communications future needs to leverage a mix of complementary technologies. So while satellite is arguably unable to compete in an urban environment that offers fibre, it comes into its own in remote and hard to reach places where fibre or even other terrestrial wireless technologies have yet to reach.

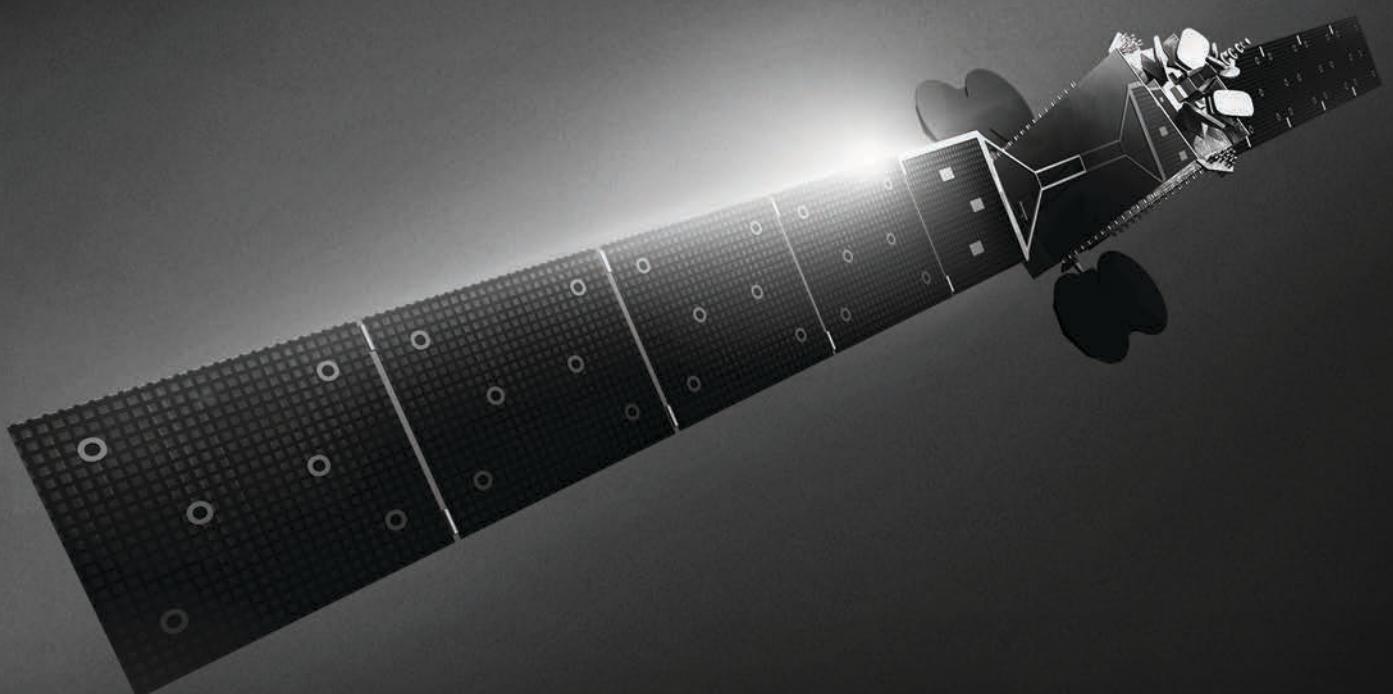
What's more, such partnerships present a win-win situation for all. CSPs and operators need to focus on their subscribers and services – they don't make their money by managing infrastructure. That's where the technology experts come in. By leaving the running of the network in the hands of such specialists, operators can free themselves and focus instead on what they originally set out to achieve: connecting people.

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chapter 1

State of the market

Is Africa still rising?



Brahima Coulibaly,
Global economy & development director,
Africa Growth Initiative,
The Brookings Institution

Between 2000 and 2014, Africa grew at a strong clip, fuelling belief in the narrative of an 'Africa rising'. But since 2015, growth across sub-Saharan Africa (SSA) has weakened, and the poor outlook for commodity prices has cast doubt on the continent's economic promise, even leading some to pronounce it dead.

Such scepticism is perhaps understandable. The 2014 oil-price shock hit several African economies hard, and played a role in pushing aggregate growth down from 5.6 per cent in 2004-2014 to just 2.5 per cent in 2015-2017 – a rate that barely keeps up with population growth.

Moreover, the continent's three largest economies – Angola, Nigeria and South Africa – have experienced major declines in performance. In 2016, the Angolan and South African economies stagnated, while Nigeria actually contracted for the first time since 1991. The latest projections suggest that these economies will experience tepid recoveries in the coming years.

But the sceptics have overlooked a number of important factors. For starters, when one sets the three largest economies aside, SSA's aggregate growth rate for 2017 increased from 2.5 per cent to almost four per cent. That is faster than the 3.5 per cent rate at which the global economy was growing at in November 2017. In fact, five of the ten fastest-growing economies in the world are African. And over the next four years, around half of all SSA economies will expand at an average rate similar to or higher than that which prevailed during the 'Africa rising' heyday.

High commodity prices were just one factor in the region's strong economic performance

between 2000 and 2014. Many African countries have also made vast improvements to macroeconomic management, governance, and the business environment, and entrepreneurship is on the rise. Even with lower commodity prices, these developments will continue to bolster many African economies.

Policymakers across the continent have sustained the 1990s-era reforms that set the stage for the subsequent period of high growth. Although there is still much work to be done, the economic and business environment in many countries has continued to improve, and institutions and governance have grown stronger.

Owing to new ICTs, Africans, particularly young people, are better informed, more engaged in civil and political discourse, and increasingly capable of holding their leaders accountable. These technologies have also unleashed a wave of innovation and entrepreneurship across the continent.

Such positive trends are unlikely to be reversed, and will continue to improve the economic conditions in Africa, even if commodity prices do not rebound; after all, the region's economic growth averaged 5.6 per cent between 2000 and 2004, before commodity prices had begun their rapid ascent.

But that is not to say the region will be spared from daunting challenges in the years ahead. Globally, the economic environment will become less favourable for African nations. In the major advanced economies, interest rates will soon rise, and the political backlash against globalisation may force governments to abandon their past commitments to development assistance.

In light of all this uncertainty, African policy-makers should look inward by focusing on policies to mobilise national resources and finance their economic agendas. Those agendas should include a number of key priorities. African countries need to diversify their economies to withstand future shocks better, while also accelerating the pace of industrialisation. Governments will have to

find a way to create decent jobs for the 11 million people now entering the region's labour force every year. And they will need to enact policies to reduce poverty, and ensure that prosperity is shared across all cohorts of society.

These are particularly important goals for Angola and Nigeria which need to become far less reliant on oil, as well as South Africa which still needs to implement far-reaching reforms to address structural problems that have plagued it since the apartheid era. Seeing these projects through will require competent political leaders who are committed to the principles of good governance. Failure could result in an extended period of low growth.

Brahima Coulibaly is also a chief economist and head of the emerging market and developing economies group at the Board of Governors of the US Federal Reserve. The above is an edited version of his article that was first published at www.project-syndicate.org on 4 October 2017. All content reproduced with kind permission. The Brookings Institution is a non-profit public policy organisation based in Washington, DC. Its mission is to conduct in-depth research that leads to new ideas for solving societal problems.

Banking on infrastructure



Dr. Ibrahim Mayaki,
CEO,
NEPAD Agency

Africa faces a yawning gap between its infrastructure needs and its ability to attract the foreign investment required to finance projects. The continent's leaders must recommit to creating a more favourable investment climate, one that can attract capital while limiting investors' risk exposure.

As the US Federal Reserve embarks on the 'great unwinding' of the stimulus programme it began nearly a decade ago, emerging economies are

growing anxious that a stronger dollar will adversely affect their ability to service dollar-denominated debt. This is a particular concern for Africa, where, since the Seychelles issued its debut Eurobond in 2006, the total value of outstanding Eurobonds has grown to nearly USD35bn.

But if the Fed's ongoing withdrawal of stimulus has frayed African nerves, it has also spurred recognition that there are smarter ways to finance development than borrowing in dollars. Of the available options, one specific asset class stands out: infrastructure.

Africa, which by 2050 will be home to an estimated 2.6 billion people, is in dire need of funds to build and maintain roads, ports, power grids, and so on. According to the World Bank, Africa must spend a staggering USD93bn annually to upgrade its current infrastructure. The vast majority of these funds – some 87 per cent – are needed for improvements to basic services like energy, water, sanitation and transportation.

Yet, if the recent past is any guide, the capital needed will be difficult to secure. Between 2004 and 2013, African states closed just 158 financing deals for infrastructure or industrial projects, valued at USD59bn – just five per cent of the total needed. Given this track record, how will Africa fund even a fraction of the World Bank's projected requirements?

The obvious source is institutional and foreign investment. But to date, many factors, including poor profit projections and political uncertainty, have limited such financing for infrastructure projects on the continent. Investment in African infrastructure is perceived as simply being too risky.

Fortunately with work, this perception can be overcome, as some investors – such as the African Development Bank, the Development Bank of Southern Africa, and the Trade & Development Bank – have already demonstrated. Companies from the private sector are also profitably financing projects on the continent. For example, Black Rhino, a fund set up by Blackstone, one of the world's largest multinational private equity firms, focuses on the development and acquisition of energy projects, such as fuel storage, pipelines and transmission networks.

But these are the exceptions, not the rule. Fully funding Africa's infrastructure shortfall will require attracting many more investors – and swiftly. To succeed, Africa must develop a more coherent and coordinated approach to courting capital, while at the same time working to mitigate investors' risk exposure.

Public-private sector collaborations are one possibility. For example, in the energy sector, independent power producers are working with governments to provide electricity to 620 million Africans living off the grid. Privately funded but government regulated, these producers operate through power purchase agreements, whereby public utilities and regulators agree to purchase

electricity at a predetermined price. There are approximately 130 such producers in SSA, valued at more than USD8bn. Forty-seven projects are underway in South Africa alone, accounting for 7,000 megawatts of additional power production.

Similar private-public partnerships are emerging in other sectors, too, such as transportation. Among the most promising are toll roads built with private money, a model that began in South Africa. Not only are these projects, which are slowly appearing elsewhere on the continent, more profitable than most financial market investments, they are also literally paving the way for future growth.

Clearly, Africa needs more of these ventures to overcome its infrastructure challenges. That is why I, along with other African business leaders and policymakers, have called on Africa's institutional investors to commit five per cent of their funds to local infrastructure. We believe that with the right incentives, infrastructure can be an innovative and attractive asset class for those with long-term liabilities. One sector that could lead the way on this commitment is the continent's pension funds which, when combined, add up to a balance sheet of around USD3tn.

The 5% Agenda campaign was launched in New York in October 2017. It underscores the belief that only a public-private approach can redress Africa's infrastructure shortfall. For years, a lack of bankable projects deterred international financing. But in 2012, the African Union adopted the *Programme for Infrastructure Development in Africa* which kick-started more than 400 energy, transportation, water, and communications projects. It was a solid start – one that the 5% Agenda seeks to build upon.

But some key reforms will be needed. A high priority of the 5% Agenda is to assist in updating the national and regional regulatory frameworks that guide institutional investment. Similarly, new financial products must be developed to give asset owners the ability to allocate capital directly to infrastructure projects.

Unlocking new pools of capital will help create jobs, encourage regional integration, and ensure that Africa has the facilities to accommodate the needs of future generations. But all of this depends on persuading investors to put their money into local projects. As business leaders and policymakers we must ensure that the conditions for profitability and social impact are not mutually exclusive. When development goals and profits align, everyone wins. ■

Dr. Ibrahim Assane Mayaki is a former prime minister of Niger and is now CEO of the New Partnership for Africa's Development (NEPAD) Planning and Coordinating Agency. The above is an edited version of his article that was first published at www.nepad.org on 17 November 2017. All content reproduced with kind permission.

Cutting through the gloom

The International Monetary Fund (IMF) began a gloomy start to 2017 with a forecast that GDP per capita in sub-Saharan Africa will contract for the first time in 22 years. In its *Regional Economic Outlook for Sub-Saharan Africa* report published towards the end of 2016, the organisation expected average growth to have declined to 1.4 per cent during the preceding 12 months. It said that was less than half of 2015's growth and "far below" the five per cent plus experienced during 2010-14.

Speaking at the time, Abebe Aemro Selassie, director of the IMF's African Department, identified two main factors behind the sharp slowdown: "First, the external environment facing many of the region's countries has deteriorated, notably with commodity prices at multi-year lows and financing conditions markedly tighter.

"Second, the policy response in many of the countries most affected by these shocks has been slow and piecemeal, raising uncertainty, deterring private investment, and stifling new sources of growth."

The IMF said most commodity exporters are under "severe" economic strain. It pointed out that this is particularly the case for oil exporters like Angola and Nigeria, and five of the six countries from the Central African Economic and Monetary Union (CEMAC) whose near-term prospects had "worsened significantly" in recent months despite the modest uptick in oil prices. (The five CEMAC countries were Gabon, CAR, Chad, Republic of the Congo and Equatorial Guinea. Cameroon is the exception.) Repercussions from the initial shock have now spread beyond the oil-related sectors to the entire economy in these countries, and the slowdown risks are becoming "deeply entrenched", warned the IMF.

The organisation continued by saying conditions in non-oil commodity exporters also remained difficult, including in South Africa where output expansion was expected to stall in 2017. It said that growth in the DRC, Ghana, South Africa, Zambia, and Zimbabwe was also "decelerating sharply or stuck in low gear". The IMF added that the challenges for several of these countries had been compounded by the acute drought affecting large parts of eastern and southern Africa.

However, the organisation was more optimistic about non-commodity exporters which represent around half of the countries in the region. It said they continue to perform well with growth levels at four per cent or more, and benefit from lower oil import prices, improvements in their business environments, and strong infrastructure investment. Countries such as Côte d'Ivoire, Ethiopia, Senegal and Tanzania were expected to continue to grow at more than six per cent for the next couple of years.

The report showed that overall growth in the region could recover to close to three per cent in 2017 if policymakers implemented “strong action” in the coming months. While many of the hardest hit oil exporters have taken steps to adjust to the new reality of low commodity prices, Selassie believes their adjustments have generally been too slow and incomplete. “Given the scale and persistent nature of the shock and limited policy buffers, a growth rebound will require a much more sustained adjustment effort, based on a comprehensive and internally consistent set of policies to re-establish macroeconomic stability,” he said.

For countries outside monetary unions, the report urged central banks to allow the exchange rate to fully absorb external pressures, and tighten monetary policy where needed to tackle sharp increases in inflation.

The outlook for Africa continued to remain gloomy as 2017 progressed with separate news from Moody’s Investors Service. During Q2, it warned that Nigeria’s dollar liquidity shortage was likely to continue as oil revenues stay lower. For several years now, Nigeria has been regarded as a key African market, and has the continent’s largest number of mobile users with more than 154 million subscribers, followed by Egypt and South Africa (see *ITU table on p16*).

In May 2017, Moody’s published a report that said dollar usage in Nigeria is “unlikely” to return to previous levels, and that oil prices are “highly unlikely” to return to the USD100 per barrel level that would lead to greater forex inflows. The credit ratings agency said the slump in oil prices in 2014-15 more than halved the country’s forex earnings, with exports falling from an average of around USD90bn between 2013 and 2014 to USD46bn in 2015. It added that this was compounded by attacks on oil infrastructure in the Niger delta region which led to reduced production volumes.

The report continued by saying that during 1Q17, the Central Bank of Nigeria (CBN) began to increase the availability of forex through two new exchange rate windows and interventions in the interbank market. But Moody’s pointed out that this had been heavily supported by USD1.5bn in international debt issuances rather than non-oil exports. It said a recent rebound in spot oil prices and the recovery in production since 4Q16 were more significant and believed that these would be the factors to support dollar availability in 2017.

Nigeria’s current account had already moved from a deficit of USD15.3bn in 2015 to a small surplus in 2016. Moody’s forecasted a positive balance of payments outlook for 2017, taking into account additional external borrowing and stable reserves of around USD30bn, despite some volatility expected during the year.

Ericsson’s troubles from previous years¹ continued into 2017 and were not helped when Moody’s downgraded the company’s credit rating to Ba1. This is generally regarded in the market as ‘junk’ status as it is below investment grade.

Alejandro Núñez, a Moody’s VP, senior analyst and lead analyst for Ericsson, said: “The downgrade reflects the anticipated negative impact on the company’s operating earnings and cash flow in 2017 and 2018 due to rising restructuring charges and provisions, leading to credit metrics that will no longer be commensurate with investment-grade ratings.”

The downgrade was said to be the first time since 2005 that Ericsson had been given such a rating. A company spokesperson reportedly said it was not expected to have any impact on costs for corporate bonds and loans that the company currently has. But following Moody’s announcement in early May, Ericsson shares fell by up to 2.7 per cent and were trading 2.6 per cent lower at SEK57.30 in Sweden.

Bucking the trends

Despite all the negative forecasting, M&A activity did not stall on the continent. For instance, Liquid Telecom received unconditional approval from the Independent Communications Authority of South Africa (ICASA) for its ZAR6.55bn acquisition of Neotel. This followed earlier approval from South Africa’s Competition Commission in October 2016 and paved the way for the closure of the deal during 1Q17.

Liquid Telecom, which is majority-owned by Econet Global, claimed that combining its network assets and service platforms with Neotel’s give it “unrivalled” reach across Eastern, Central and Southern Africa. It said this will enable it to offer access, via a single connection, to more than 40,000km of cross-border, national and metro fibre networks across 12 countries.

Liquid’s partner, South African investment group Royal Bafokeng Holdings (RBH), now owns a 30 per cent stake in Neotel. Speaking at the time, RBH CEO Albertinah Kekana said: “Together, we are well positioned to expand through telecommunications infrastructure and services sector in other key markets beyond South Africa.”

The transaction included two of Neotel’s tier 3 data centres in Johannesburg and Cape Town. Liquid said the facilities will complement the East Africa Data Centre which it operates in Nairobi.

Since its launch in 2006, Neotel is said to have invested more than ZAR7bn in infrastructure, deploying a nationwide backbone fibre connecting the top 40 cities and towns in South Africa. The company is said to connect more than 5,000 businesses and passes close to another 100,000

addresses. It has fully redundant backhaul fibre to landing stations with access to all five of the international subsea cables serving South Africa (SAT-3, SAFE, SEACOM, EASSy and WACS). Neotel is also said to operate one of Africa’s largest Ethernet networks.

Getting the green light for its Neotel acquisition followed a period of significant expansion for Liquid. Towards the end of 2016, it signed a joint venture agreement with the Botswana Power Corporation, and in December it received regulatory approval for the acquisition of Tanzanian ISP Raha. The latter claims to serve more than 1,500 businesses as well as a growing number of retail customers with a range of connectivity solutions including fibre, satellite, WiMAX and Wi-Fi. It operates a metro network throughout Dar es Salaam’s central business district as well as other areas of the capital. Liquid said the acquisition – which marked its debut in Tanzania – provides enterprise and wholesale customers with direct and faster access to the country as well as to the Eastern, Central and Southern African regions.

Buying up ISPs seemed to be in vogue on the continent in 2017. In a separate deal, pan-African communications service provider Internet Solutions entered into an agreement to acquire the business of MWEB Connect.

Founded in 1997, MWEB is said to be one of South Africa’s largest ISPs and has around 325,000 customers. It is owned by MultiChoice South Africa Holdings, which is 50.7 per cent owned by black South Africans and is a subsidiary of Naspers. Its acquisition immediately gave Internet Solutions a presence in the rapidly growing consumer market.

Financial details were not disclosed in the announcement that was originally made in December 2016 through Internet Solutions’ parent company, Dimension Data. The deal was expected to close during 1Q17 following approval by South Africa’s competition authorities and shareholders.

Meanwhile, further north across the border in Zimbabwe, broadband internet access provider Dandemutande Investments purchased local ISP YoAfrica for an unspecified sum. Established in 1997, Dandemutande is licensed to use 30MHz paired 2.5GHz spectrum to provide internet services to Zimbabwe’s wholesale, corporate and retail markets. In May 2015, it became part of Gondwana International Networks and operates the AfricaOnline, iWayAfrica, uMAX and Utande brands in the country.

It was claimed that the acquisition enabled the merged companies to harness YoAfrica’s “best-in-class” technical expertise with Dandemutande’s infrastructure and pan-African reach to provide enterprise customers with a ‘one-stop shop’ for all their connectivity needs. Dandemutande added that, following

¹ The African Wireless Communications Yearbook 2017, State of the market, p7.

STATE OF THE MARKET: REVIEW

INVESTMENTS, MERGERS & ACQUISITIONS IN 2017

Date	Buyer	Seller	Item	Price	Notes
19/12/16	SoftBank	OneWeb	40% stake	USD1bn	Japanese tech giant becomes biggest stakeholder in OneWeb which now has estimated worth of USD2.5bn.
1/2/17	MTN Group	Nigeria Tower InterCo share exchange	51% stake	NA	Nigeria Tower InterCo is the parent company of Lagos-based towerco INT Towers. MTN has exchanged its stake for additional shareholding going from around 15% to approximately 29%.
14/2/17	Joint management team	Epsilon Global Communications	Cataleya	NA	Cataleya says acquisition will enable it to push intelligent networking into new areas & develop new commercial models for next-generation session border controller technologies.
17/2/17	VimpelCom Holdings	Various banks	Credit facilities	Up to USD2.25bn	New agreement replaces existing USD1.8bn revolving credit facility signed in 2014. Several international banks have committed to the TL/RCF in an aggregate amount of USD2.108bn.
29/3/17	Mobile Mark	Comtelco	Company acquisition	NA	Comtelco Industries makes a range of LMR antennas. Following the acquisition, its manufacturing facilities were moved to Mobile Mark's facilities in Illinois.
29/3/17	Mobile Mark	Luxul's X-WAV & TMA antenna ranges	Acquisition	NA	Mobile Mark said acquisition of X-WAV and TMA lines from Legrand's Luxul brand immediately position it to develop new & "innovative" antenna solutions.
25/4/17	BICS	TeleSign Corporation	Company acquisition	USD230m	BICS claims combination creates the first global end-to-end Communication Platform as a Service (CPaaS).
3/5/17	Actility	Abeeway	Company acquisition	NA	France-based Abeeway specialises in geolocation solutions for LPWANs. Actility said acquisition will give it "best in class" portfolio of IoT location services.
8/5/17	MTN Group	Iranian Net	49% stake	ZAR540m (approx.)	MTN plans further investments of around ZAR3.4bn in both equity & loans to facilitate Iranian Net's rollout targets over the next five years. The fixed broadband provider has a national license for the construction & operation of an optical data transmission & access network across Iran.
10/5/17	CLX Communications	Dialogue Group	Company acquisition	GBP32m	CLX purchased the UK-based global provider of mobile messaging & security services on a cash- & debt-free basis.
22/5/17	VEON	Sberbank	Loan	RUB110bn	The five-year agreement will refinance existing loans between Sberbank & VEON's subsidiary, VimpelCom Holdings, as well as provide additional funds for general purposes.
26/5/17	Hytera Communications	Sepura Group	Company acquisition	GBP74m (reported)	Hytera has now completed its acquisition of Sepura that was first announced in early February and was approved by 97% of Sepura's shareholders.
30/5/17	Cevian Capital	Ericsson	5.6% stake	USD1bn	Said to be one of Europe's largest activist investors, Cevian Capital is now Ericsson's third-largest shareholder & is likely to raise its position to become the biggest, according to some reports.
22/6/17	Globetouch Inc.	Teramatrix	Company acquisition	NA	Globetouch will integrate Teramatrix's xFusion platform to create IoT applications that support connected cars, autonomous driving, predictive maintenance & edge intelligence.
7/7/17	Liquid Telecoms Financing	Debt capital markets & banks	Bond & term loan financing package	USD700m	Liquid Telecom's financing arm has raised USD550m in the international debt capital markets in its debut bond, in addition to a USD150m term loan.
12/7/17	CommScope	Cable Exchange	Acquisition	NA	US-based Cable Exchange manufactures a variety of fibre & copper cables, trunks & related products used in high-capacity data centres and other enterprise applications.
14/7/17	CETel	Onlime Managed Satellite Services	Company acquisition	NA	Transaction allows Onlime to concentrate on developing its core business of community software applications as well as its fibre & wireless based communications solutions in Africa.
28/7/17	Motorola Solutions	Airbus	Plant Holdings	NA	Plant Holdings includes Airbus' DS Communications business which provides command centre software for fielding emergency calls & citizen emergency notifications in North America.
4/9/17	SEACOM	MacroLan	Company acquisition	NA	SEACOM said the purchase of the Cape Town-based ISP was part of its strategy to extend the reach of its fibre network to more metropolitan areas across South Africa.
9/8/17	Investor group	Globecomm Systems	Company acquisition	NA	Investor group is led by HPS Investment Partners & funds managed by Tennenbaum Capital Partners. Financial terms not disclosed. Deal was expected to close 3Q17.
8/9/17	4Sight Holdings	Digitata	Company acquisition	NA	4Sight focuses on investing in Industry 4.0 companies. Earlier in August, Digitata announced acquisition IP rights of RanWorx Solutions' NetTrax & Tectonix network performance solutions.
21/9/17	Alphabet Inc.	HTC	Pixel division	USD1.1bn	Google's parent has bought the HTC division that develops its Pixel smartphones. Google gains 2,000 HTC employees, non-exclusive license for IP, but no manufacturing assets.
22/9/17	Proceria Networks	Sandvine Corporation	Company acquisition	Approx. USD562m	The two companies have combined to offer a wider portfolio of network intelligence solutions. Merged entity will operate under Sandvine name led by Lyndon Cantor as president & CEO.
6/9/17	Shareholders	Redknee Solutions	Rights offering	CAD0.63 per share	Under the offering, an aggregate of 108,519,936 subordinate voting shares were issued for gross proceeds to Redknee of around CAD68m. Net proceeds will be used to fund restructuring. Company later re-branded to Optima.
3/10/17	ARRIS International	Broadcom Limited	Ruckus Wireless & Brocade's ICX switch business	USD800m + unvested employee stock awards	ARRIS originally announced its agreement to acquire both Ruckus Wireless & Brocade's ICX switch business from Broadcom in March 2017 – deal contingent on Broadcom closing its acquisition of Brocade Communication Systems, the current owner of Ruckus.
4/10/17	Ekinops	OneAccess	Company acquisition	EUR60m (estimated)	It's claimed the combination creates a "major player" in transport, Ethernet & corporate routing solutions for telecoms networks. Market capitalisation of new group around EUR119m (as of 29 September 2017).
16/10/17	CITIC Telecom CPC	Linx Telecoms	Company acquisition	NA	Hong Kong telco says completion of its acquisition of Europe-based Linx's telecoms business gives it 140 PoPs in 130 countries across the so-called 'Digital Silk Road' that links Asia, Europe & Africa. Merged company is named CITIC Telecom CPC Europe.
19/10/17	ENGIE	Fenix International	Company acquisition	NA	Founded in 2009, Fenix offers solar home systems in Africa. ENGIE says investment will contribute to its goal of providing 20 million people around the world with access to "de-carbonised, decentralised" energy by 2020.
25/10/17	DragonWave	Transform-X	Company acquisition	NA	The acquisition ends months of uncertainty for the Canada-based microwave radio specialist which went into receivership earlier in 2017. According to reports, DragonWave struggled to repay debts of CAD17.2m & had been trying to pursue alternative financing.

approvals, the deal will strengthen its national presence with additional regional PoPs and an office in Victoria Falls, and widen YoAfrica's reach for its strong enterprise base. It also claimed the transaction would give it the largest VSAT customer base in Zimbabwe.

To merge or not to merge?

In March, Airtel and Millicom entered into an agreement to combine their operations in Ghana. The financial terms were not revealed but each company will have equal ownership and governance rights in the merged entity. It was claimed the combination of Millicom's Tigo operation in Ghana with Airtel's local subsidiary will cover more than 80 per cent of the population with high-speed data, providing the widest 3G coverage across the country. The merged operations will have revenues of just under USD300m and a 25.93 per cent market share, making it Ghana's second-biggest mobile voice operator.

Millicom and Airtel said the integration of their networks, which was subject to the usual conditions, will provide a "major boost" for customers in both rural and urban network coverage. They added that their combined fibre footprint and increased data centres will also give enterprise customers access to a diverse portfolio of "world class" solutions. Mobile financial services will also be enhanced with combined agent networks and platforms.

"The combination of Tigo and Airtel will create an operator that will be able to offer Ghanaian consumers and businesses a state-of-the-art network with high-speed mobile data coverage," said Millicom Africa EVP Mohamed Dabbour. "This transaction underlines confidence in the Ghanaian economy, and provides the opportunity to develop nationwide digital infrastructure and services."

According to December 2016 figures from Ghana's National Communications Authority, the total number of mobile voice subscriptions in the country increased year-on-year by 9.42 per cent to reach 38,305,078. That represented a penetration rate of 136.34 per cent. Scancom (MTN) remained the market leader with 19,296,157 voice subscribers and was the only celco in the country to have recorded an increase from the previous month. It was followed by: Vodafone (8,289,913); Tigo (5,339,052); Airtel (4,591,051); Glo (695,306); and Expresso (93,599).

Earlier in February, Millicom had signed an agreement to sell its Senegal business to Dakar-based provider of mobile and digital services, Wari Group. But several months later in July, the operator announced the termination of the agreement. This was followed by a statement from Millicom saying that it wanted to make corrections concerning the termination after what it claimed to be "incorrect and misleading" claims made by Wari.

The statement said that the February agreement signed between the two companies set 2 June 2017 as the deadline for Wari to provide the funds required as part of the transaction (which was worth USD129m). In the event of Wari not complying with the financing requirements, the agreement granted Millicom the right to terminate the process immediately upon notification.

On 28 July, almost two months after the deadline, Millicom said that Wari had still not provided the funds required. It therefore notified Wari of the termination of the deal. The company added that subsequent claims mentioning an ongoing due diligence process were also incorrect, as no such process was outstanding as part of the original sales agreement.

Separately, Millicom signed an agreement to sell its Senegal operations to a consortium consisting of NJJ, Sofima (the telecoms investment vehicle managed by the Axian Group) and Teyliom Group, subject to customary closing conditions and regulatory approvals.

NJJ is a private holding company owned by French telecoms entrepreneur Xavier Niel. Incorporated in France, NJJ holds various stakes in a broad range of operations in Europe and the USA. Niel is also the founder and main shareholder of Iliad, the parent of Free in France.

Owned by the Hiridjee family, the Axian Group specialises in infrastructure and services in Indian Ocean countries and Africa. It has interests in energy, financial services, property, as well as in telecoms through Telma, Tom, TRM and Telco OI, which it jointly owns with Iliad.

Teyliom is said to be one of the precursors of mobile telephony in Africa and has been active in the sector since 1996. Focused on West and Central Africa, it is now a diversified investment holding group whose interests include, amongst others, a seven per cent stake in MTN Côte d'Ivoire.

Over in Kenya, Vodafone Group agreed to buy Vodafone Group's 34.94 per cent stake in Safaricom. Subject to all approvals, it planned to fund the acquisition by issuing 226.8 million new ordinary shares. Based on closing share prices at the time of the announcement in mid-May, the proposed transaction was valued at ZAR34.6bn (USD2.6bn).

Vodacom Group CEO Shameel Joosub said that given this was a related-party transaction, appropriate governance controls had been implemented to ensure that it will continue to be negotiated, evaluated and executed on an "arm's length basis." As a result, Vodafone, which owns 65 per cent of Vodafone, was precluded from voting at a general meeting in August where minority shareholders were due to approve the deal.

Joosub said acquiring a strategic stake in Safaricom will provide Vodafone shareholders with access to a "high growth, high margin, high cash generation business operating in a

high growth market". He said that in addition to producing mutually beneficial opportunities for growth, the deal will create further incremental value through the close cooperation between the two businesses, particularly in driving M-PESA adoption across their operations. Safaricom's M-PESA is regarded as an important driver of Kenyan economic growth. Joosub said the proposed transaction will improve Vodafone Group's presence in East Africa, jointly increasing the firm's growth in financial services customers to 32 million.

In its 2017 fiscal year, Safaricom saw 8.8 per cent revenue growth. It is Kenya's leading MNO with a 71 per cent customer share, and is the only one with a network that currently provides 3G and 4G coverage to 85 and 25 per cent of the population respectively (also see interview with Thibaud Rerolle on p28).

Meanwhile in Nigeria, Etisalat was re-branded as '9Mobile' amid disputes about its ownership and financial difficulties. Abu-Dhabi-based Etisalat Group owns a 45 per cent stake and 25 per cent preference shares in Emerging Markets Telecommunication Services (EMTS) which had been trading as Etisalat Nigeria. According to some reports published by local outlets in mid-July, Etisalat gave EMTS a three-week ultimatum to stop using the Etisalat brand for its business in Nigeria. This followed the collapse of negotiations between Etisalat Nigeria and its lenders that comprise 13 local banks.

In 2013, these banks loaned Etisalat USD1.2bn for a network upgrade and expansion. But according to reports, the operator told its creditors that it was unable to make any further repayments without raising further funds, blaming the economic downturns and devaluation of the naira. The banks rejected Etisalat's argument and threatened to take over its local operation.

This prompted the Nigeria Communications Commission (NCC) to emphasise Etisalat's "network integrity" in a bid to allay consumer concerns. In a statement issued on 20 June it said: "The NCC wishes to reassure the over 21 million Etisalat subscribers that it will do all within its regulatory power to ensure that [they] continue to enjoy the services provided by the operator."

"The commission has taken proactive steps to cushion the impact of the takeover; this is without prejudice to the ongoing effort between Etisalat and the banks toward negotiated settlement."

The NCC continued by reminding the banks of the Nigerian Communications Act 2003. This states that a license is personal to the holder and cannot be operated by, assigned, sub-licensed or transferred to another party without the prior written approval from the regulator.

In conjunction with the Central Bank of Nigeria, the NCC mediated by holding several meetings with the banks, Etisalat and other stakeholders with a view to finding a resolution. However,

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talks between all parties ultimately collapsed, leading to the Emirates Telecoms Group walking away from the negotiations and the resignation of its board and management staff.

On 10 July 2017, EMTS issued a press release stating that it has a "valid and subsisting" agreement with the Etisalat Group which entitled it to use the Etisalat brand. It said that discussions about the continued use of the name were ongoing between the two companies, and added: "The final outcome on the use of the brand in no way affects the operations of the business as our full range of services remain available to our customers." A few days later, EMTS introduced '9Mobile' as the new brand identity for its operations.

March saw the announcement of a proposed merger in a share-for-share deal between Intelsat and OneWeb which is planning to launch a fleet of Low Earth Orbit satellites over the next few years. But on 1 June, Intelsat said that following the expiration of the deal on the previous day, the minimum tender conditions for the exchange offers and consent solicitations had not been satisfied. A company press statement said: "The Issuers have not accepted any of the Existing Notes for exchange; any Existing Notes tendered for exchange will be promptly returned to holders, and the Exchange Offers and Consent Solicitations have accordingly been terminated."

According to Intelsat CEO Stephen Spengler, there were many stakeholders' interests that needed to be satisfied in the "complex" transaction, and bondholders were unwilling to accept the terms of the exchange offers presented.

Although the deal was off, Spengler said the pre-existing commercial agreement between SoftBank, Intelsat and OneWeb would still continue. Japan's SoftBank Group owns 40 per cent of OneWeb and had previously agreed to make a cash investment of USD1.7bn in exchange for common and preferred shares of the combined company.

Speaking at the time, Spengler said: "Under this agreement, we plan to jointly develop integrated solutions utilising both of our fleets and to act as a sub-distributor to SoftBank for the attractive application segments of mobility, energy, government, and connected car. As we create integrated services for these applications, we expect to accelerate and enhance our goal of unlocking new and larger opportunities in the communications landscape."

Putting more money in

The continent's technology firms looked set to receive a big boost in 2017 with two separate investment initiatives from big name players.

In June, Orange announced the creation of a new Africa section in its flagship programme for investment in startups. *Orange Digital Ventures Africa* is the group's investment vehicle for early-

stage innovation projects in areas such as new connectivities, fintech, IoT, energy and e-health. The operator said its aim is to target solutions from startups who are responding to Africa's fundamental challenges while leveraging its own assets on the continent.

Orange is committing EUR50m to support new entrepreneurs in the region. This corresponds to half of the direct investments that will be made via the programme; the other half is devoted to indirect investments through specialised funding for Africa. All innovative startups are eligible for support, whether they're based on the continent or address its issues from elsewhere. Orange planned to setup a dedicated *Digital Ventures* team based in Dakar in September.

The company claimed new services and business models in Africa have been one of the priority investment themes of the group's corporate venture business. With this latest announcement, Orange said it was "engaging a bit further alongside the African digital ecosystem which, like everywhere else and maybe even more than elsewhere, carries with it a development challenge".

In September, Silvertree Internet Holdings declared that it has now channelled more than USD15m (around ZAR200m) into African consumer-focused technology firms since it was established in 2014. The Cape Town-based firm, which claims to be the continent's leading internet platform, said its portfolio has achieved an average annual revenue growth rate of more than 200 per cent, helped by fast-growing companies such as car-buying site Carzar and meal-kit delivery company Ucook.

Silvertree planned to invest more than USD10m (ZAR130m) during the next 12 months into new and existing portfolio companies that make use of technology to reach consumers, with a focus on growth stage and buy-out opportunities. It believes the biggest opportunities for tech investment in Africa are in businesses driven by strong teams that are executing simple, proven models.

Furthermore, it claimed that a focus on all three long-term value creation drivers – net revenue growth, margins and cash – enable the group's operations to reach break-even much earlier in their lifecycle. "We want to partner with like-minded entrepreneurs looking to disrupt large and high margin industries in Africa," said Silvertree founder and MD Peter Allerstorfer. "It is still day one of the internet in Africa."

To help build on its success, the company appointed Freddy Caspers as non-executive chairman of the board. Caspers was previously an executive board member and CEO of emerging markets for UK-based multinational Reckitt Benckiser.

In April, Teraco announced that it had secured a medium-term funding facility from Absa Bank to help build what it said will be the

largest commercial data centre in Africa. The company's current colocation data centres in South Africa include CT1 in Cape Town, DB1 in Durban, and JB1 at Isando in Johannesburg. It said the facilities enable clients to "easily connect" to submarine cable systems, terrestrial networks and major IP backbones on the continent. Teraco is also home to NAPAfrica which is said to be Africa's largest carrier-neutral Layer 2 IXP.

Teraco CFO Jan Hnizdo said the ZAR1.2bn (USD87.24m) funding facility will be used to expand the Isando campus which has been established as the connectivity gateway into South and sub-Saharan Africa. "The site presently has 20MW of capacity which needs to all be brought online," he said. "We have also purchased land adjacent to the existing site allowing for further expansion. In addition, a component of the funding has also been earmarked for the construction of Teraco's new data centre in Bredell."

Absa's loan enabled the completion of the plant and data centre fit-out of the new facility located on the Isando campus. It also partly funded the Bredell facility where construction commenced in November 2016 and was due for completion towards the end of 2017. According to Hnizdo, the Bredell site will feature more than 6,000 square metres of technical deployment space and 24MW of power, thereby eclipsing the current campus for power availability. "Bredell will be the largest commercial data centre in Africa, and Teraco will be the largest commercial data centre operator in Africa," he said.

Staying in South Africa, Cell C, the country's third mobile operator, began 2017 on a sour note with news that its long-term corporate credit score had been lowered for a second time in recent months. In December 2016, Standards & Poor (S&P) downgraded the operator from 'B' to 'SD' (selective default), and in early February 2017 this fell again to 'D' (default).

At the same time, S&P also lowered the company's issue rating from CC to D on its EUR400m senior secured bonds due in 2018. The agency said it had revised the recovery rating on the debt from 3 to 4 because it expected an approximate 45 per cent recovery in the event of a payment default.

It added that the downgrades were mainly due to uncertainty over a potential buyer's ability to have unrestricted use of Cell C's spectrum, and the resulting impact to its value in a bankruptcy scenario. If the operators' restructuring negotiations – that had been ongoing since 2016 – concluded successfully, S&P said it could revise its recovery ratings based on the new capital structure and ownership.

In August, Cell C finally concluded its recapitalisation process which saw its net debt reduced to no more than ZAR6bn, including USD184m of bonds which are fully hedged into rand. The recapitalisation was made

possible by a subscription for shares from Blue Label Telecoms of ZAR5.5bn and a further subscription from Net1 for ZAR2bn. Cell C said former bond and debt holders supported the debt restructure. Blue Label Telecoms now has a 45 per cent shareholding in Cell C, 3C Telecommunications has 30 per cent (which comprises 29.4 per cent by the Employee Believe Trust, 45.6 per cent by Oger Telecoms, and 25 per cent by broad-based black empowerment grouping CellsAf), Net1 has 15 per cent, and 10 per cent is held on behalf of Cell C management and staff.

The operator pointed out that its ownership by South African shareholders has now increased from 25 to more than 86 per cent, and that the participation of "historically disadvantaged" persons has risen from around 25 to more than 30 per cent at ownership level. It added that, for the first time, Cell C management and staff now have the opportunity to participate in the equity of the company.

The recapitalisation secured jobs for around 2,500 full-time Cell C staff, and a further 15,000 people that are employed in the industry value chain as a result of the company's operational and commercial activities.

Speaking at the time CEO Jose Dos Santos said: "The recapitalisation provides a sustainable growth platform for Cell C that will promote healthy competition in the South African telecom market to further drive down costs and improve our value offerings."

Following the successful recapitalisation, S&P upgraded its credit ratings for the company to B.

But that was not the end of Cell C's challenges in 2017. In October, South African regulator ICASA said the operator may not be complying with the terms of its license in the wake of the recent recapitalisation.

ICASA said it had received notification from the operator about its change of shareholding as per the 2010 Regulations on Standard Terms and Conditions for Individual Licences. But after considering the notification, ICASA said: "The preliminary view is that the Cell C recapitalisation transaction – on the face of it – triggers the provisions of Section 13 of the Electronic Communications Act of 2015 and ought to have been filed as an application for change of control of the licensee.

"The Authority is engaging Cell C to seek clarity on this apparent non-compliance with the legislative provisions. In addition, the Authority is also taking external legal advice on the matter, including on appropriate enforcement actions it can take to ensure compliance."

In a subsequent media statement issued online, Cell C said that despite "repeated requests", it remained "unclear" as to why the regulator had reached its conclusion without first discussing it. It said: "Cell C has received

extensive legal advice and is comfortable that the recapitalisation does not amount to a transfer of control that would have required approval. The company is of the view that once ICASA, or whomever ultimately considers the transaction, has a proper understanding of it (which Cell C is at pains to provide), it will be clear that there has not been any transfer of control and that no approval is required."

Moving forward

More upbeat news for the continent came as the year began drawing to an end.

For instance, Nigeria was hailed as the most successful network sharing country in the world, according to IHS Markit's *Mobile Infrastructure Market Tracker* report. The analyst said Africa, India and Latin America are three regions where network sharing has been working well. It pointed out that although India pioneered network outsourcing in 2005 and has since moved fast to network sharing and managed services, it is EMEA that is now leading this area with sharing deals across Eastern Europe and Africa.

"We can't really pick a particular country because consolidation among service providers led to pan-African shared networks," said Stéphane Téral, IHS

Markit's executive director of research and analysis, mobile infrastructure and carrier economics. "However, in Africa I think Nigeria, the most populous African [nation], is the most successful and innovative telecom infrastructure country."

IHS Markit said that as service providers all over the world operate in saturated markets, they increasingly focus on customer satisfaction and retention, and on business and network transformation. These require increasing dedicated resources.

However, because significant revenue growth may no longer be achievable, the analyst added it is necessary for

MNOs to "de-emphasise" network operations through outsourcing, managed services, and network sharing to preserve margins and sustain cash flow.

The tracker report identified a number of trends that IHS Markit had seen in infrastructure sharing in emerging markets. As well as EMEA leading the way here, it said Africa-based IHS Towers (which is unrelated to IHS Markit) is the largest company of its type in emerging countries and is contributing to the success of Nigeria.

The analyst predicted that more towercos will emerge in the future because of market saturation putting pressure on revenue growth for celcos. It said: "More and more service providers will sell their towers to companies like IHS Towers, which is in a strong position to keep growing. There is also the opportunity for others to create competition in the tower business."

IHS also believes NFV will provide the next wave of operational efficiencies in network sharing. It said: "By moving more network functions from hardware to software, using off-the-shelf IT components and platforms, the cost of network nodes decreases and new services can be turned up and down at the power of a click. Overall, with the concept of network slicing, it will become easier to share networks among several service providers."

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See Parallel Wireless interview on page 31

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Connectivity

In its annual *ICT Development Index (IDI)*, the ITU publishes a benchmark of the level of ICT development in 176 member states. Unlike the previous three years, the Republic of Korea no longer tops the rankings for the global top 20 as the latest 2017 index sees it knocked into second place by Iceland (see *IDI 2017 – Global Top 20 table*, opposite page).

What has remained constant though is the fact that there are still no African nations in the top 50, let alone the top 20. Mauritius is the highest ranking continental representative and is up three places from 75 in 2016² to 72 in 2017. Other African nations in the top 100 include Seychelles, South Africa, Tunisia³ and Morocco³ (see *IDI 2017 – Africa table*, below). Botswana just misses out at 105.

And once again, as with the previous *IDI*, Africa dominates the latter parts of the index with Haiti being the only non-African country in the final 10 that sees Eritrea right at the bottom. These are among the nations classified by the ITU as ‘Least Developed Countries’ (LDCs). According to the union, the LDCs comprise 47 developing countries around the world that suffer from “severe structural impediments” to sustainable development.

Twenty-eight of these nations are identified as African, although if Mauritania, Somalia and Sudan³ are also included, that figure is 31.

But there are now signs that things are beginning to move in the right direction. In a report released towards the end of January 2018, the ITU said that the LDCs are now on track to meet the sustainable development goal on universal and affordable internet access by 2020. It said the LDCs are recording “impressive” progress toward achieving the UN’s sustainable development goal (SDG) 9.c on increasing access to ICTs. It noted that all 47 LDCs have launched 3G services and more than 60 per cent of their populations are covered by such networks. These countries are also on track to reach on average 97 per cent mobile broadband coverage, and to make internet prices relatively affordable by 2020.

By the end of 2017, the report stated that the number of mobile subscriptions in the LDCs had increased to about 700 million with a penetration rate of 70 per cent. At the same time, more than 80 per cent of the population in these countries live within range of a mobile network.

Mobile subscriptions continue to rise

In its influential annual *Mobility Report* for 2017 published last November, Ericsson said that global mobile subscriptions were now growing at almost six per cent year-on-year. By 3Q17, it said there were 7.8 billion subscriptions worldwide, with 95 million users added during the quarter. China had the most net additions during the quarter (+30m), followed by Indonesia (+7m), the US (+4m), Angola (+4m) and Pakistan (+3m).

² Note that there are often variances in the IDI scores from year to year. For example, the table left states Mauritius’ 2016 ranking as 75. However, in The African Wireless Communications Yearbook 2017, the country’s 2016 rank was given as 73. According to an ITU senior statistician, values are recalculated to accommodate changes arising from corrections and updates received after the union first publishes its indices in its annual *Measuring the Information Society* report. It should also be noted that rankings may change due to the number of countries included in each report.

³ Along with Algeria, Djibouti, Egypt, Morocco and Tunisia, the ITU does not include Mauritania, Somalia and Sudan in its Africa region and instead categorises them as “Arab States”.

ICT DEVELOPMENT INDEX (IDI) 2017 – AFRICA³

IDI 2017 RANK	ECONOMY	IDI 2017 VALUE	IDI 2016 RANK	IDI 2016 VALUE	RANK CHANGE
72	Mauritius	5.88	75	5.51	▲
90	Seychelles	5.03	92	4.8	▲
92	South Africa	4.96	88	4.91	▼
93	Cape Verde	4.92	91	4.83	▼
99	Tunisia	4.82	95	4.7	▼
100	Morocco	4.77	98	4.57	▼
102	Algeria	4.67	106	4.32	▲
103	Egypt	4.63	104	4.44	▲
105	Botswana	4.59	102	4.51	▼
114	Gabon	4.11	118	3.62	▲
115	Libya	4.11	112	3.93	▼
116	Ghana	4.05	113	3.88	▼
118	Namibia	3.89	123	3.33	▲
131	Côte d’Ivoire	3.14	134	2.84	▲
132	São Tomé & Príncipe	3.09	131	2.91	▼
133	Lesotho	3.04	130	2.94	▼
136	Zimbabwe	2.92	133	2.85	▼
138	Kenya	2.91	137	2.67	▼
142	Senegal	2.66	142	2.48	-
143	Nigeria	2.6	143	2.44	-
144	Gambia	2.59	145	2.43	▲
145	Sudan	2.55	141	2.56	▼
146	Zambia	2.54	149	2.19	▲
149	Cameroon	2.38	150	2.14	▲
150	Mozambique	2.32	147	2.23	▼
151	Mauritania	2.26	152	2.08	▲
152	Uganda	2.19	158	1.9	▲
153	Rwanda	2.18	151	2.1	▼
155	Mali	2.16	153	2.05	▼
156	Togo	2.15	159	1.86	▲
158	Djibouti	1.98	161	1.8	▲
160	Angola	1.94	156	2	▼
161	Benin	1.94	157	1.92	▼
162	Burkina Faso	1.9	163	1.74	▲
163	Equatorial Guinea	1.86	160	1.82	▼
164	Comoros	1.82	162	1.78	▼
165	Tanzania	1.81	164	1.73	▼
166	Guinea	1.78	166	1.71	-
167	Malawi	1.74	169	1.58	▲
169	Madagascar	1.68	167	1.7	▼
170	Ethiopia	1.65	171	1.42	▲
171	Democratic Republic of Congo	1.55	170	1.48	▼
172	Burundi	1.48	172	1.39	-
173	Guinea-Bissau	1.48	173	1.38	-
174	Chad	1.27	174	1.06	-
175	Central African Republic	1.04	176	0.89	▲
176	Eritrea	0.96	175	0.96	▼

SOURCE: ITU ICT DEVELOPMENT INDEX (IDI) 2017

Indices for African ITU member states, listed in order of their rankings.

But the report also pointed out that the number of subscriptions exceeds the population in many countries, mainly because of inactive users, multiple device ownership or optimisation of subscriptions for different types of calls. As a result, Ericsson said the number of unique users is actually currently around 5.3 billion globally and therefore lower than the subscription figure above.

Nonetheless, the number of subscriptions continues to grow across regions, driven by a strong uptake in mobile broadband (Ericsson classes the following as mobile broadband: HSPA (3G), LTE, 5G, CDMA2000 EV-DO, TD-SCDMA and Mobile WiMAX. WCDMA without HSPA and GPRS/EDGE (2G) are not included). According to the report, the most common way to access the internet across the world is over a mobile network, and mobile broadband subscriptions now account for 50 per cent or more of total subscriptions in all regions (with the exception of India).

The GSMA Association's Intelligence unit published three individual *Mobile Economy* reports last year that covered Africa.

In its Middle East and North Africa report, it said that there were 365 million unique subscribers across the region by mid-2017, accounting for 63 per cent of the population. According to the GSMA, global subscriber penetration overtook MENA during 2015, and as a result it is now the second least penetrated region in the world after APAC.

Meanwhile in West Africa, the association said there were 172 million unique subscribers by the end of 2016, accounting for 320 million mobile connections. It said the region's penetration rate is currently around 49 per cent which is slightly more than the 47 per cent rate across wider sub-Saharan Africa.

Over the next four years, the GSMA predicts West Africa will see average subscriber growth of six per cent. It said this represents one of the fastest rates globally, resulting in an additional 45 million individual users by 2020. The GSMA said the region's biggest market, Nigeria, will account for two-thirds of this growth, with another quarter coming from Benin, Côte d'Ivoire, Mali, Niger and Senegal.

Sub-Saharan Africa remains the fastest growing mobile market according to the GSMA's *Mobile Economy* report for the region. At the end of 2016, it said there were 420 million unique mobile subscribers here, which means a penetration rate of 43 per cent. The report forecasts SSA will have more than half a billion unique mobile users by 2020 by which time around half the population will subscribe to a mobile service. It said the total number of SIM connections in the region reached 731 million at the end of 2016 and will grow to nearly a billion by 2020.

The GSMA believes that the adoption of mobile services by underserved groups, such as women and those under the age of 16, will help drive future subscriber growth. It added: "Four of the most populated markets in the region – DRC, Ethiopia,

ICT DEVELOPMENT INDEX (IDI) 2017 – GLOBAL TOP 20						
IDI 2017 RANK	ECONOMY	IDI 2017 VALUE	IDI 2016 RANK	IDI 2016 VALUE	RANK CHANGE	
1	Iceland	8.98	2	8.78	▲	
2	Korea (Rep.)	8.85	1	8.8	▼	
3	Switzerland	8.74	4	8.66	▲	
4	Denmark	8.71	3	8.68	▼	
5	United Kingdom	8.65	5	8.53	–	
6	Hong Kong, China	8.61	6	8.47	–	
7	Netherlands	8.49	10	8.4	▲	
8	Norway	8.47	7	8.45	▼	
9	Luxembourg	8.47	9	8.4	–	
10	Japan	8.43	11	8.32	▲	
11	Sweden	8.41	8	8.41	▼	
12	Germany	8.39	13	8.2	▲	
13	New Zealand	8.33	12	8.23	▼	
14	Australia	8.24	16	8.08	▲	
15	France	8.24	17	8.05	▲	
16	United States	8.18	15	8.13	▼	
17	Estonia	8.14	14	8.16	▼	
18	Singapore	8.05	20	7.85	▲	
19	Monaco	8.05	18	8.03	▼	
20	Ireland	8.02	19	7.9	▼	

SOURCE: ITU ICT DEVELOPMENT INDEX (IDI) 2017

	2016	2017	2018 forecast	CAGR 2017-2023 (unrounded figures)
Mobile subscriptions (millions)				
Middle East & Africa	1,390	1,440	1,800	4%
Sub-Saharan Africa*	660	700	990	6%
Smartphone subscriptions (millions)				
Middle East & Africa	470	600	1,340	14%
Sub-Saharan Africa*	260	340	850	17%
Data traffic per smartphone GB/month (active devices)				
Middle East & Africa	1.3	2.0	11	34%
Sub-Saharan Africa*	1.0	1.4	7.0	31%
Total mobile data traffic EB/month				
Middle East & Africa	0.71	1.3	14	48%
Sub-Saharan Africa*	0.25	0.41	4.6	50%

SOURCE: ERICSSON MOBILITY REPORT, NOVEMBER 2017

Key figures for Middle East and Africa (*figures for sub-Saharan Africa are also included in Middle East & Africa).

Nigeria and Tanzania – will account for nearly half the 115 million new subscribers expected by 2020.”

Ericsson agrees that factors such as a young and growing population with increasing digital skills, as well as more affordable smartphones, will lead to increased mobile data traffic across MEA. It said the rises will equate to a CAGR of 49 per cent from 2017 to 2023, while mobile subscriptions will increase at a CAGR of four per cent. Citing data from various sources,⁴ the report said MEA has a young and growing population with a median age of 21 and represents 22 per cent of the world's total population. But it also pointed out that the region only accounted for seven per cent of GDP in 2016. As previously noted above, GDP growth in that year slowed to 1.4 per cent in sub-Saharan Africa due to the sustained effects of low oil prices and political instability.

Despite this, the report forecasts “strong” growth for both WCDMA/HSPA and LTE in MEA. Ericsson said that while half of all mobile subscriptions in the region are currently GSM/EDGE-only, by the end of 2023 90 per cent will be for mobile broadband with LTE being the dominant technology. The company also said that the first 5G subscriptions in MEA are expected from 2020, reaching around 17 million by the end of 2023.

Meanwhile in sub-Saharan Africa, Ericsson predicted that GSM/EDGE-only subscriptions will represent almost half of total mobile subscriptions by the end of 2017. It said that although GSM/EDGE-only subscriptions have been declining since

⁴ The United Nations Organisation, *World Population Prospects (2017)*; *CIA World Factbook*; and *IMF World Economic Outlook* (April 2017).

STATE OF THE MARKET: REVIEW

ITU AFRICAN COUNTRY REPORTS 2017

COUNTRY	POPULATION		GNI PER CAPITA	INTERNATIONAL INTERNET BANDWIDTH PER INTERNET USER (bps)	SUBSCRIPTIONS PER 100 INHABITANTS				PERCENTAGE OF:		
	TOTAL	DENSITY			FIXED-TELEPHONE	MOBILE TELEPHONE	FIXED BROADBAND	ACTIVE MOBILE BROADBAND	HOUSEHOLDS WITH A COMPUTER	HOUSEHOLDS WITH INTERNET ACCESS	INDIVIDUALS USING THE INTERNET
Mauritius	1,257,630	674.33	9,760	63,490.79	30.65	144.24	16.90	51.75	61.23	63.80	53.23
Seychelles	94,188	233.14	15,410	52,432.77	22.12	161.23	14.90	22.65	56.67	55.17	56.51
South Africa	53,835,382	45.44	5,480	263,029.93	6.62	142.38	2.84	58.62	24.39	52.96	54.00
Cape Verde	512,896	127.17	2,970	23,356.75	11.65	122.02	3.03	70.01	37.39	62.00	48.17
Tunisia	11,351,043	69.15	3,690	31,166.81	8.59	125.82	5.65	62.97	37.00	33.00	50.88
Morocco	34,387,658	52.10	2,850	25,701.52	6.02	120.72	3.65	46.00	54.90	68.50	58.27
Algeria	41,316,407	17.35	4,270	40,014.54	8.24	117.02	6.92	46.81	38.42	34.67	42.95
Egypt	86,009,615	85.99	3,460	17,193.52	7.11	113.70	5.20	52.60	53.12	43.32	39.21
Botswana	2,074,620	3.61	6,610	7,879.92	6.85	158.53	2.85	67.93	28.47	43.70	39.36
Gabon	1,791,366	6.69	7,210	4,844.38	1.06	144.17	0.73	66.12	30.97	34.43	48.05
Libya	n/a	n/a	n/a	5,285.50	21.49	119.78	2.64	34.86	23.52	22.04	20.27
Ghana	27,532,054	115.53	1,380	9,850.94	0.91	139.13	0.31	71.34	20.84	32.51	34.67
Namibia	2,436,086	2.96	4,620	15,915.37	7.71	109.19	2.19	66.15	20.00	29.53	31.03
Côte d'Ivoire	21,784,182	67.56	1,520	6,825.19	1.33	126.01	0.63	47.53	10.40	22.65	26.53
São Tomé & Príncipe	n/a	n/a	n/a	37,317.03	2.76	85.28	0.69	24.04	16.80	20.04	28.00
Lesotho	2,142,077	70.59	1,210	4,484.09	1.92	106.57	0.10	36.94	8.18	27.93	27.36
Zimbabwe	15,483,220	39.67	940	9,119.43	1.97	83.18	1.10	38.12	12.89	22.07	23.12
Kenya	47,959,453	82.31	1,380	69,014.25	0.15	81.28	0.33	26.16	14.78	22.30	26.00
Senegal	15,389,936	78.23	950	4,976.72	1.86	98.68	0.64	26.08	15.10	19.93	25.66
Nigeria	188,630,392	204.18	2,450	11,256.53	0.08	81.82	0.01	21.80	10.56	15.23	25.67
Gambia	2,032,624	190.16	440	13,296.62	1.87	139.63	0.18	21.26	9.26	11.21	18.50
Sudan	40,518,825	21.77	2,140	2,034.50	0.34	68.63	0.06	25.19	17.96	33.61	28.00
Zambia	16,033,884	21.30	1,300	3,924.74	0.63	74.95	0.20	32.16	8.14	14.33	25.51
Cameroon	23,977,290	50.43	1,200	2,549.08	4.38	68.11	0.19	9.59	13.70	10.50	25.00
Mozambique	27,780,571	35.4	480	1,114.54	0.30	66.25	0.14	49.52	6.53	16.17	17.52
Mauritania	4,177,284	4.05	1,120	4,476.59	1.27	86.52	0.25	30.21	5.00	11.24	18.00
Uganda	41,468,240	175.28	660	5,509.90	0.89	55.07	0.26	33.71	7.60	8.90	21.88
Rwanda	12,759,695	484.61	700	7,454.72	0.11	69.92	0.17	27.01	4.50	9.30	20.00
Mali	16,774,653	13.53	750	598.17	1.20	120.31	0.03	24.40	3.18	8.95	11.11
Togo	7,349,312	129.42	540	4,489.86	0.46	74.91	0.61	19.55	6.81	7.74	11.31
Djibouti	912,918	41.5	N/A	15,227.96	2.73	37.82	2.96	11.61	20.31	9.10	13.13
Angola	23,520,528	18.87	3,440	8,796.24	1.29	55.28	0.52	17.11	10.51	10.00	13.00
Benin	11,164,695	99.13	820	1,655.59	1.12	79.65	0.81	5.58	5.81	6.61	11.99
Burkina Faso	18,419,797	67.2	640	2,810.14	0.35	83.63	0.05	19.87	5.82	10.59	13.96
Equatorial Guinea	820,924	29.27	6,550	2,397.35	1.22	65.90	0.49	0.07	16.02	9.35	23.78
Comoros	n/a	n/a	n/a	12,728.80	1.66	57.66	0.36	0.01	8.71	5.12	7.94
Tanzania	53,851,077	57.3	900	1,741.27	0.24	74.36	0.25	9.22	3.90	8.47	13.00
Guinea	12,656,200	51.48	490	589.37	0.00	85.33	0.01	15.01	2.84	7.65	9.80
Malawi	17,801,575	189.22	320	4,201.09	0.06	40.32	0.05	18.50	6.40	11.46	9.61
Madagascar	24,915,324	41.93	400	14,258.05	0.60	41.79	0.06	10.52	6.16	6.97	4.71
Ethiopia	101,407,490	82.88	660	2,242.35	1.13	50.51	0.55	5.28	5.03	15.37	15.37
DR Congo	73,172,515	31.2	420	770.25	0.00	39.48	0.00	14.18	2.68	2.80	6.21
Burundi	11,152,671	400.69	280	6,083.21	0.18	48.04	0.04	8.30	3.36	3.50	5.17
Guinea-Bissau	1,830,119	50.66	620	4,706.68	0.00	70.26	0.04	6.89	2.78	2.20	3.76
Chad	14,008,915	10.91	720	3,761.89	0.10	44.48	0.07	9.51	3.32	3.50	5.00
CAR	n/a	n/a	n/a	1694.63	0.04	25.49	0.02	3.28	2.93	3.06	4.00
Eritrea	n/a	n/a	n/a	3600.51	0.95	7.29	0.01	0.00	3.30	1.90	1.18

SOURCE: ITU ICT DEVELOPMENT INDEX (IDI) 2017

As well as ranking member states, the union also gives each an IDI value which is arrived at after measuring ICT access, use and skills. The above shows some of the indicators for African countries which are presented in order of their ranking as seen in the table on p14. Current and comparable data was not available for: Liberia, Sierra Leone, South Sudan or Swaziland.

2016, the technology “remains relevant”, especially in rural areas where coverage and purchasing power are low. By 2023, GSM/EDGE are forecast to represent 12 per cent of total subscriptions.

“As investments continue to be made in faster networks in sub-Saharan Africa, WCDMA/HSPA and LTE are expected to represent around 90 per cent of total subscriptions in 2023,” stated the *Mobility Report*. “The opportunity for operators to take advantage of these technologies relies on the ability to migrate GSM/EDGE-only subscriptions to WCDMA/HSPA and LTE, especially as smartphones become more affordable.”

For sub-Saharan Africa, the company forecasts smartphone subscriptions to grow by 17 per cent per annum between 2017 and 2023. It also expects the first 5G subscriptions in the region in 2022, predicting that they will reach two million a year later.

According to the GSMA smartphones account for over half of total mobile connections globally and that growth is being led by African and Asian markets as affordability improves. It believes five markets will account for more than 40 per cent of the 1.6 billion new smartphone connections forecasted by 2020 – India, China, Nigeria, Indonesia and Pakistan. The organisation said lower cost smartphones from local manufacturers, such as AfriOne in Nigeria, are helping to address the affordability barrier.

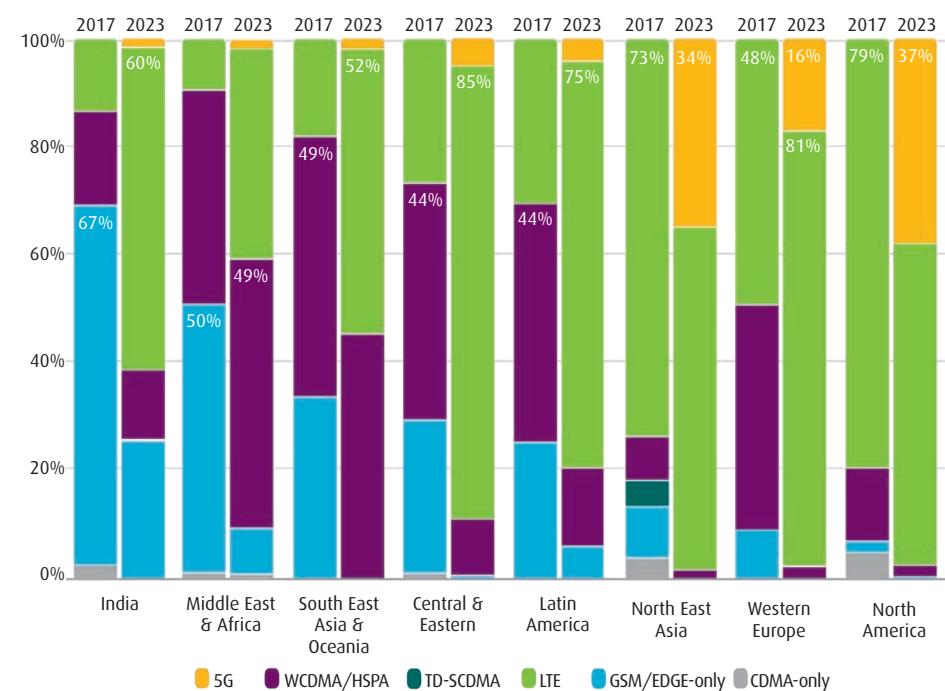
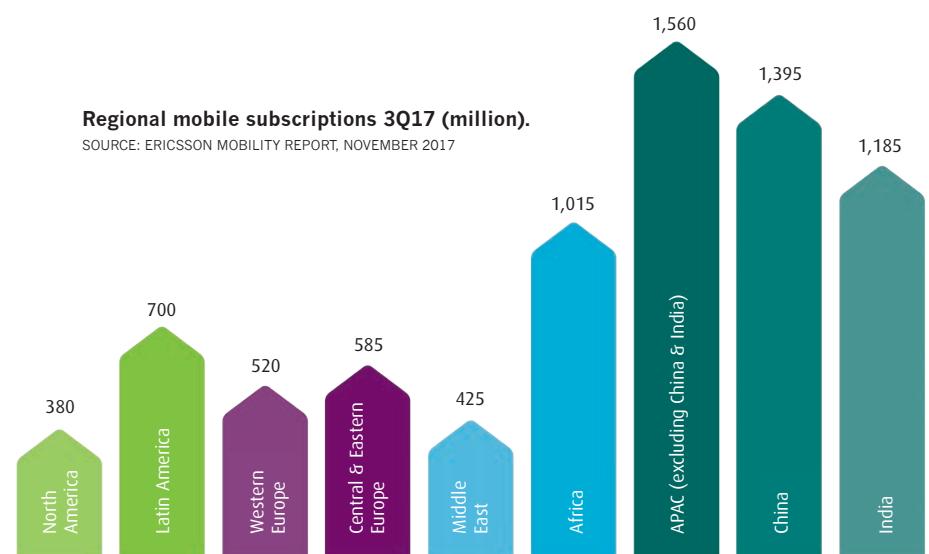
But in spite of all the increases, and as has been well documented by the ITU and its research, half the world is not yet on the internet at all. The GSMA said that the digital divide is greatest in sub-Saharan Africa and India, which together account for 42 per cent of the world’s unconnected people. It said that more than 60 per cent of their respective populations are not yet online.

As the association pointed out, mobile coverage is not the only barrier: “The largely rural populations and lack of fixed line infrastructure make extending coverage a longstanding challenge for many developing countries. Of the 3.7 billion not yet on the internet, around a third (1.2 billion) live outside a 3G or 4G signal and so could be considered excluded because they don’t have fast enough coverage.

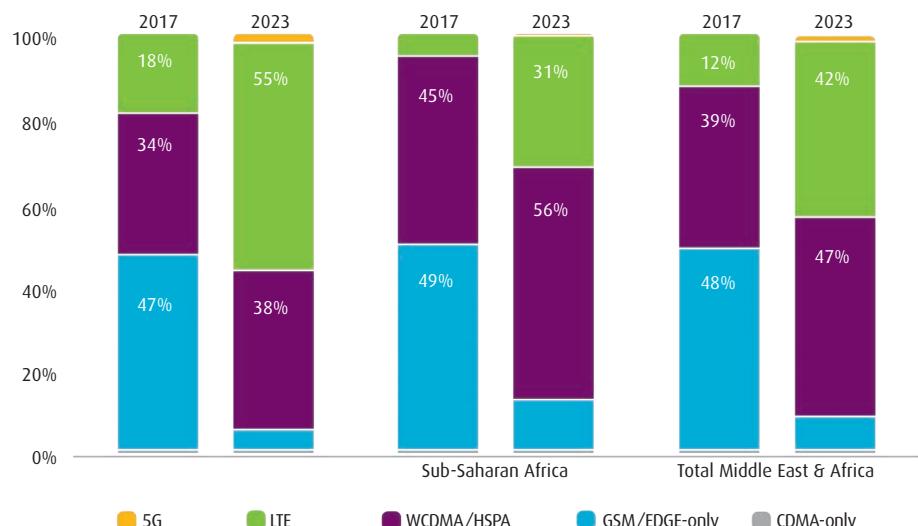
“The corollary is equally important: for two thirds of the unconnected (2.5 billion), coverage is not the problem. Affordability, content relevance, literacy skills and gender factors are all part of the discussion.”⁵

Satellite

The satellite industry has long claimed it offers the only technology capable of rapidly creating ubiquitous wireless networks, especially in remote, rural and hard to reach areas. Even the GSMA, in its *Global Mobile Trends 2017* report,



Mobile subscriptions by region and technology (per cent). SOURCE: ERICSSON MOBILITY REPORT, NOVEMBER 2017



Total mobile subscriptions by technology in the Middle East and Africa (per cent).

SOURCE: ERICSSON MOBILITY REPORT, NOVEMBER 2017

⁵ All figures as of June 2017. Source: GSMA Intelligence.

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believes satellite has “re-emerged from the ashes of failed attempts in the early 2000s” as an alternative connectivity option.

According to the association, the significant difference is the new Low Earth Orbit (LEO) missions currently being developed by the likes of OneWeb, Sky and Space Global (see p74), SpaceX, *et al.* These companies are planning to launch hundreds of satellites at altitudes of around 1,100km that, as well as increasing end-user speeds, also aim to reduce latency.

While conventional geostationary satellites, which orbit the equator at a distance of around 36,000km above sea level, suffer from latency of around 600ms, SpaceX is targeting latencies of 25 to 35ms. The GSMA pointed out this would be faster than terrestrial LTE networks which have a latency of around 80–100ms. “Over a 10-year period, SpaceX and OneWeb alone will at least quintuple the number of satellites in orbit worldwide, massively increasing industry capacity,” said the GSMA. “This could provide an alternative backhaul option in reaching rural unconnected areas in emerging markets such as Africa. Satellite would be a complement to mobile networks, offering capacity wholesale to operators.”

Northern Sky Research agrees that cellular backhaul represents a “huge future” for the satellite industry. In its *Wireless Backhaul via Satellite* report published in early June 2017, the analyst said the days of satellite being a “last resort” for universal service obligation with “negligible” returns for MNOs were now gone. It expects satellite backhaul to generate large global growth opportunities in the next 10 years, and forecasts growth at double-digit CAGRs with more than 110,000 units installed by 2026.

According to NSR, the arrival of high throughput satellites (HTS) together with advanced ground segment is making satellite a viable option for backhauling 3G and 4G base stations. “Looking forward, the majority of new opportunities will be generated from 3G and 4G/LTE deployments,” said analyst Lluc Palerm-Serra. “2016 marked a key milestone in this transition. For the first time, 3G global data traffic surpassed 2G demand despite the latter still comprising 65 per cent of the installed base.”

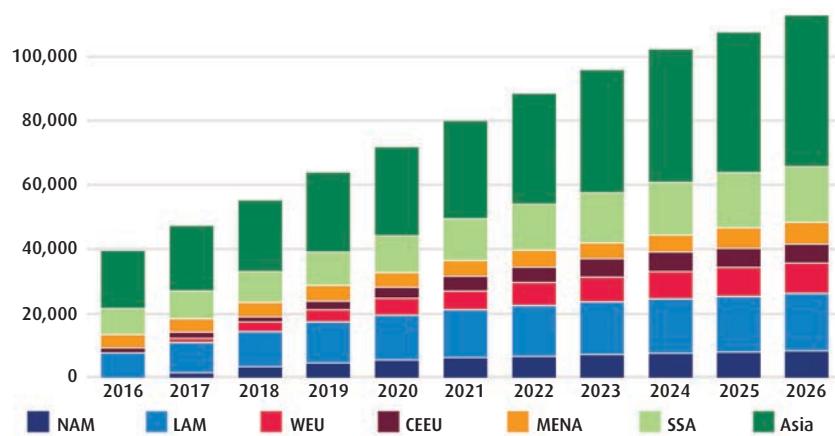
The firm added that broadband was taking over even in less developed markets like Africa where many new deals progressively include a 3G footprint. It predicted that the shift will be nearly complete by 2026 as more than 90 per cent of the installed satellite base will service broadband sites.

However, reiterating its warning from the *Satellite Capacity Pricing Index* above, NSR said price per Mbps will be critical to facilitating broadband services. “The efficiency at which the system transforms MHz into Mbps has an obvious impact in this equation,” said Palerm-Serra. “Satellite power, ground segment design,



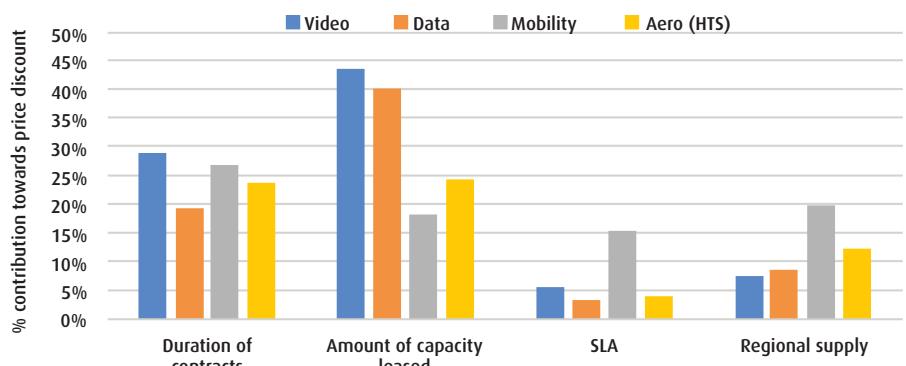
Bubbles show the number of active satellites currently in orbit worldwide.

SOURCE: GLOBAL MOBILE TRENDS 2017 SEPTEMBER 2017, GSMA INTELLIGENCE



Satellite-based cellular backhaul in-service units.

SOURCE: NSR



Some of the key factors influencing price reductions in the satellite market.

SOURCE: NSR

modem and other elements all have their roles to play in end-to-end system efficiency.”

But in its separate *Satellite Capacity Pricing Index* released during 3Q17, NSR also predicted pricing to further decline. With operators and service providers focusing on a volume business in data and mobility verticals, the analyst said pricing had plummeted over the past couple of years from a high of USD3,000–4,000 per MHz per month, to below USD1,500.

According to the index, 13 factors can exert influence over pricing. NSR said these depend on a company’s growth strategy and sales positioning, consolidation in its value chain vertical (operator, service provider or anchor client), customer relationships, and deal contracts. NSR analyst

Gagan Agrawal added that while the factors shown in the chart above represent satellite leasing contracts historically, other influences, such as SLA (“premium versus frugal” maritime customers), regional oversupply and HTS fill rates below 40 per cent, and high spectral efficiency leading to low per Mbps pricing and bargaining power, are all becoming more important and resulting in large retail/wholesale discounts.

He noted that data/backhaul deals consistently come in at prices under USD500 per Mbps per month during 2017. “Some of the most prominent examples of the deals include backhaul capacity leased at sub USD400/Mbps/month in Western Europe and Africa, aero capacity leased at sub USD700/Mbps/

month in South East Asia, and video capacity at sub USD2,000/MHz/month in North America."

NSR expects mobility and data pricing to drop between five to 15 per cent and 10 to 30 per cent globally during 2018. For a leasing economy to maintain/grow top line revenues, it said operators would need anchor customers in the aero, backhaul and broadband businesses for their upcoming satellites and, in addition, fight off competition from new entrants to maintain the relevance of their "ageing" FSS fleets.

Given these price drops, Agrawal reckoned a wholesale business with a pseudo-lease or mixed lease-service model could be one of the winning strategies for operators to adopt. He said a mixed lease-service business at the operator's end or upstream vertical integration on the service provider side has potential to grow top line revenues for either of the players in the value chain. "Ultimately, the companies which pivot early based on efficient fleet consolidation and customer matching, stand a chance in winning the pricing battle," said Agrawal.

There were similar warnings for the satellite industry from Moody's Investor Service. In October, it said a "marked decline" in prices in the data services segment of the global satellite services markets will constrain operators' revenue growth over the next four years. Senior analyst Alejandro Núñez said: "We anticipate price declines in the data and enterprise segment to average around 15 per cent per year, including the impact from cannibalisation of traditional widebeam capacity by high-throughput satellite capacity."

In its *Satellite Services Sector – Global: Pricing Declines, Sustained Capex and Dividends to Pressure Credit Quality* report, Moody's stated that pricing pressure had arisen mainly due to increasing deployment and cheaper production costs (per unit of Mbps) of HTS capacity targeted at the data and enterprise market. It said this had led to overcapacity in that market as well as growing supply of conventional widebeam capacity, particularly in emerging regions such as Africa and Latin America.

The report warned that falling revenue and earnings bases over the next two years will lead to either declining free cash flow generation, or the need to adjust more discretionary elements of capex and opex budgets and/or dividend payouts to maintain deleveraging capacity and credit quality. It expected most operators to generate negative free cash flow in 2016 and 2017 with the exception of Eutelsat and Telesat.

The firm said all operators offering data and enterprise services will be affected to some extent. It believes the revenue impact here will be about -5 to -8 per cent per year through 2020. Overall, Moody's expected the sector's weighted average revenue to decline by 2.4 per cent in 2016 and remain flat in 2017. It added that Avanti Communications Group (rated as Ca-

negative) and Intelsat (Caa2 negative) are the "most vulnerable" as a result of their exposure to the data and enterprise services segment.

Moody's continued by saying revenues and earnings in the video segment provide a "stronger buffer" against credit deterioration than other segments. It said revenue streams in the broadcast sector were steadier, and that operators that are more exposed to video markets, such as SES (Baa2 stable), Eutelsat SA (Baa3 stable) and Telesat Canada (B1 ratings under review), should continue to be less susceptible to earnings variability over the next few years. The agency added that emerging markets continue to offer higher growth potential than developed markets in this segment.

Moody's believes revenue growth from the government services segment will be insufficient to offset weak growth in the data business. It also expects softer than previously expected growth in demand in some emerging markets, such as Africa and Latin America. Beyond 2020, the firm believes HTS technology has the potential to expand markets such as mobility and the IoT.

The Internet of Things

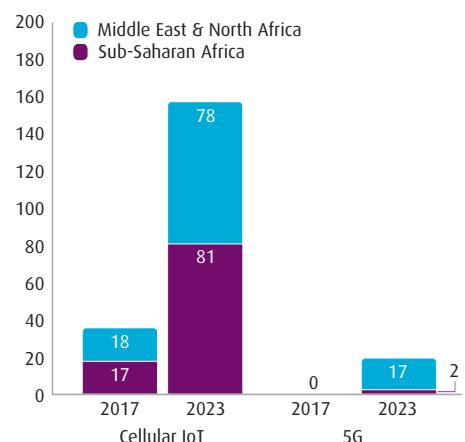
There are high hopes for the IoT as it continues to grow around the world, including parts of Africa. For instance, according to Vodafone, the percentage of companies globally with more than 50,000 connected devices active in the IoT has doubled in the last 12 months.

For its fifth annual *IoT Barometer Report* published at the end of September, the operator surveyed 1,278 key decision makers across various industries in 13 countries. They included the US, Germany, UK, India, China, Brazil, Italy, Spain, New Zealand, Ireland, Australia and Japan, as well as South Africa where 96 respondents were polled.

The study found that IoT technology is increasing revenues or opening up new revenue streams for 51 per cent of adopters, and that 66 per cent of all companies agreed that digital transformation is impossible without IoT. Energy and utility companies are at the forefront of the largest projects worldwide, with applications such as smart meters and pipeline monitoring.

EMEA polled higher than the global average (71 per cent) when it came to the topic of the future of IoT, with 74 per cent of the region's respondents stating that by 2022 they will no longer talk about IoT as it will just be another factor influencing business outcomes.

Ericsson's *Mobility Report* forecasts that cellular IoT connections in the Middle East and Africa will increase from 35 million in 2017 to 159 million by 2023 (a CAGR of around 30 per cent). It predicts cumulative earnings across MEA to hit USD242bn through 2026 as mobile operators continue to seek new revenue streams in the face of decreasing incomes from traditional sources.



Cellular IoT connections and 5G mobile broadband subscriptions in the Middle East and Africa (millions).

SOURCE: ERICSSON MOBILITY REPORT, NOVEMBER 2017

Even though IoT is still in its infancy throughout most parts of the MEA, Ericsson said there are still examples of how it has helped improve the livelihood of communities and industries in the region. For instance, it said Narrowband-IoT (NB-IoT) technology is being introduced in South Africa to address the utilities sector, enabling tools for energy efficiency such as smart meters.

Vodafone's report offers more insight for Africa. Among some of the key research findings for South Africa, its *IoT Barometer* said 86 per cent are optimistic about the possible business outcomes of connecting almost everything, and 57 per cent revealed that they will be using IoT in the next 12 to 24 months to manage risk.

As the scale of IoT projects increases globally, the report also noted a rise in connectivity requirements. Vodafone said organisations are looking to use a mix of technologies from fixed line to LPWAN depending on the application. Mobile and Wi-Fi are the two most popular options for large-scale projects, but there is also increasing interest in newer technologies such as NB-IoT with 28 per cent now considering it as well as other LPWAN options for new IoT projects.

"Over the five years of this report, we have seen the number of companies that have adopted IoT double, and projects have grown from small pilots to global rollouts of tens of thousands of connected devices," said Vodafone's Erik Brenneis (now CEO at Vodafone Global Enterprise). "IoT is clearly here to stay and the future looks exciting as 79 per cent of adopters are saying that [it] will have an enormous impact on the whole economy in the next five years."

Brenneis said the IoT has now "come of age" and is proving itself across all industries and geographies. His words were echoed by Deon Liebenburg, managing executive for IoT at Vodafone subsidiary Vodacom. Speaking last September, he said that the IoT was "no longer hype" and claimed Vodacom was averaging 55,000 new IoT connections per month in South Africa. ■

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chapter 2

Cellular networks



**Joe Barrett,
President,
GSA**

In its quarterly *LTE Evolution to 5G* report published in January 2018, GSA (Global mobile Suppliers Association) identified 848 operators investing in LTE including pre-commercial trials. Of those, 651 have commercially launched either LTE or LTE-A in 202 countries across the world.

In North Africa, 13 operators have launched LTE and of these, six have launched LTE-A with one operator in a testing phase. In the larger sub-Saharan Africa region, 139 operators are investing in LTE, with 98 networks launched; 17 of these have deployed LTE-A. Globally, the African region as a whole now accounts for 17.5 per cent of the total operators investing in LTE and 17 per cent of the commercially deployed networks.

The sub-Saharan region has also seen a number of operators deploy LTE-TDD technology mode in unpaired spectrum. Here, 23 operators have now launched commercial services.

Generally, Africa has been keen to adopt the 3GPP standards and LTE technology, although most of the countries globally that are currently without LTE are either on the continent or islands in the Pacific and Atlantic Oceans. In total, there are 54 countries around the world that have yet to deploy LTE and 18 of these are in sub-Saharan Africa, equating to 32 per cent of the total. They are: Burkina Faso, Cape Verde, Central African Republic, Djibouti, Equatorial Guinea, Eritrea, Guinea, Mali, Mauritania, Mozambique, Niger, São Tomé and Príncipe, Senegal, Sierra Leone, South Sudan, Swaziland, Togo and Western Sahara.

Even so, Africa has increased its share of LTE networks and operators investing in the technology during the past two years as the technology has gained a reputation globally as the most advanced mobile broadband

platform. LTE was first launched in Angola in 2012 and Africa has benefited from an established ecosystem of infrastructure and devices. Growth was initially slow, but in the past two years a slew of MNOs have launched commercial services.

LTE-Advanced Pro is also gaining traction. Networks supporting 3GPP release 13/14 have been launched by Ooredoo in Tunisia and by Vodacom in South Africa. At least three other operators are trialling or planning to trial LTE-A Pro.

African subscriptions

According to Ovum, the number of mobile subscriptions in Africa passed one billion in September 2017.¹ LTE subscriptions reached 22.6 million, almost doubling the number from September 2016. However, 3G is still the dominant technology in Africa which is the only world region increasing the number of new subscribers here. 3G accounted for almost 80 per cent of the growth in new users on the continent, while GSM and CDMA technologies are both experiencing declining subscription numbers (which is the general trend globally).

LTE is still gaining a foothold in Africa, especially in the sub-Saharan region but as it becomes the preferred technology, eventually delivering a Gigabit service, GSA expects a migration from 3G to 4G/LTE and then 5G as new devices come to market.

Spectrum

In Northern Africa, the predominant LTE spectrum used is in band 3 (1800MHz) and band 20 (800MHz) with band 3 utilised for LTE by more than 70 per cent of operators. In sub-Saharan Africa, 34 per cent of operators are using band 3, followed by band 20 (19 per cent) and then the TDD band 40 (2300MHz) (17 per cent).

Due to the size and topography of the continent, the sub-1GHz bands have become popular and interest in deploying LTE in band 31 (450MHz) is prevalent due to the reduction in number of cell sites required to cover sparsely populated areas. But while there has been discussion and consultations around the lower bands, progress in this area is slow.

A large number of countries in different regions, including Africa, are exploring the opportunities for IMT, in the 3300 to 4200MHz frequency range (sometimes also referred to as C-band spectrum). Countries are taking action in order to reach 200 to 400MHz of contiguous bandwidth in this range, especially when thinking about 5G. Based on national circumstances, it is also expected that a given regulator may make different portions of the 3300 to 4200MHz range available at different times, incrementally building large contiguous blocks. This large amount of spectrum will enable contiguous spectrum assignments to operators in the order of 100MHz or more, allowing them to reap the full benefits of 3300 to 4200MHz frequencies for 5G.²

5G for Africa

Network vendors and operators are currently testing 5G in multiple locations around the world and GSA reports on these trials and the spectrum that is being used.

It is not too early for African operators to think about 5G and there are several South African MNOs that have tested or trialled pre-standard fifth generation technology.

For instance in October 2017, Comsol revealed plans for a fixed wireless access

¹ Ovum Global subscriber numbers 3Q 2017.

² For further reading here, see the GSA white paper *The Future of IMT in the 3300-4200 MHz Spectrum Range* at gsacom.com.

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5G trial. The 280MHz of spectrum that the company holds in the 28GHz band could enable a commercial point-to-multipoint network capable of delivering 1Gbps speeds for its customers.

MTN has partnered with Ericsson to trial 5G in the first half of 2018 after they agreed an MoU at AfricaCom 2017. They say the first lab trial achieved 20Gbps throughput with five millisecond latency, and MTN is now investigating what the first applications and use cases could be.

Meanwhile Nokia is working with Vodacom, which has close to 70 million customers in Africa including almost 40 million in South Africa. Both companies see 5G as a way to help cope with the mobile connectivity boom that is happening in the region. ■

About the GSA

The Global mobile Suppliers Association tracks and reports the progress of mobile technologies. The association has been representing the mobile supplier ecosystem since 1998, producing mostly free to download reports on technologies, networks, spectrum and the phenomenal expansion of mobile broadband devices. GSA intelligence is regularly referenced by the broader mobile industry, and the organisation is also very active in numerous spectrum forums around the world, including Africa. <https://gsacom.com/>

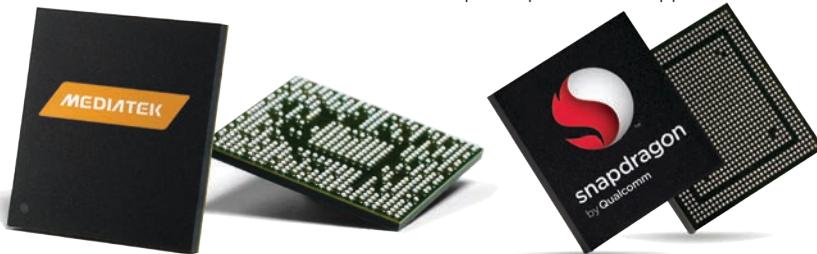
Going to the next level with LTE

With advancements in 4G continuing across Africa in 2017, we began last year with news about what was claimed to be the first Gigabit Class LTE network on the continent.

Ericsson and **Qualcomm** said they had successfully demonstrated the technology in South Africa with the use of licensed spectrum. Gigabit Class LTE (LTE Category 16) enables the delivery of up to one billion bits of information delivered to a mobile device in one second. It utilises three-carrier aggregation (CA) with 256 QAM, and by applying 4 x 4 MIMO across 40MHz of spectrum.

It's claimed that during the demo, peak data speeds of more than 900Mbps were recorded using Ericsson's RAN equipment and Qualcomm's *Snapdragon X16* LTE modem mobile test device which supports LTE-A Pro. According to the latter firm, its modem can receive 10 streams of LTE data simultaneously using four antennas. Qualcomm adds that the device uses better signal processing to extract more bits out of every LTE transmission, boosting the throughput of each of the 10 streams to around 100Mbps.

Speaking at the time, James Munn, VP of business development at Qualcomm's South African branch, said: "This achievement of Gigabit Class LTE download speeds with Qualcomm Technologies and Ericsson is an important milestone on the road to Africa's first 5G networks."



Right: The demo used an LTE modem with Qualcomm's first chipset to support LTE-A Pro. Left: Ericsson also teamed up with chipmaker MediaTek to bring affordable LTE-A handsets to Africa.

JANUARY 2017

The Communications Authority (CA) of Kenya denies local media claims that it is deploying a regulatory device management system (DMS) with the express intention of accessing private mobile data. CA director general Francis Wangusi said the implementation of the DMS was driven by the need to curb the illegal termination of traffic and counterfeit handsets, as well as phone models that have not been type approved to work in Kenya.

FEBRUARY

Méditel in Morocco has now been re-branded as Orange. The country contributes nearly 10 per cent of revenues within the French telco's

MEA footprint, and with 14.2 million subscribers as at the end of September 2016, it provides services to the second-largest number of customers for the group in the region after Orange Egypt. The Orange Group has backed Méditel since December 2010 when it acquired 40 per cent of the company. In July 2015, it increased its holding to 49 per cent.

MARCH

Facebook has appointed HYLA Mobile to collect high-end smartphones for re-distribution in emerging markets as part of its *Smart Restart* initiative. It's claimed the re-distribution of devices will have a major impact in many parts of Africa where device affordability is a major

In a separate development, rival mobile chipmaker **MediaTek** also teamed-up with Ericsson to make LTE-A features available in mainstream mobile devices across the continent.

According to Ericsson, most, if not all the LTE networks that are currently live in Africa, are expected to evolve to LTE-A (4.5G or 4G+) over the next few years. However, devices that can currently support this technology can cost as much as USD800. MediaTek said its smartphone chipset technology, which enables consumers to take advantage of the benefits of CA, will be available on affordable handsets that are powered by its silicon for the region's mass market.

Staying in Southern Africa, **Zamtel** launched a 4.5G network in Zambia's Copperbelt Province. Using LTE-2300 technology, the government-owned telco rolled out the network in Kitwe, Kalulushi, Chambishi, Chingola, Chililabombwe, Mufulira and Solwezi.

Speaking at a launch event held earlier in Kitwe, the country's transport and communications minister Brian Mushimba said that the rollout was part of the advanced delivery of the Universal Access Phase 2 Project that the government is implementing together with Zamtel and Huawei Technologies. He said: "The successful implementation of this project by Zamtel signifies the transformation of the ICT industry on the Copperbelt, redefines internet services, and opens up numerous opportunities in ICT."

barrier to mobile broadband adoption. For example in Kenya, Facebook has been working with Medic Mobile to deliver smartphones to frontline health workers in Isiolo County. Devices collected through *Smart Restart* and refurbished by HYLA are being donated to 120 community health workers. US-based HYLA Mobile reckons the global secondhand device market is worth around USD17bn.

APRIL

ZTE has launched what it claims is the most advanced network operation centre (NOC) in Uganda. The centre will serve MTN's entire national network. ZTE says it will support the operator with a full scope of managed services



Sudani said it now offered Sudan's fastest mobile data speeds.

In May, **Sudani** went live with an LTE-A network in Sudan. After completing an introduction in Khartoum, the Sudatel subsidiary planned to expand the network to other major cities and towns throughout the year. It worked with Huawei on the deployment, and is using LTE-FDD and CA over 1800MHz and 850MHz frequencies.

The company is offering what it claimed was a wide variety of pricing packages for both pre-paid and post-paid users, including "affordable" bundles for low-income customers. According to Sudatel Telecom Group president and CEO Tarig Hamza Zainelabdin: "We have invested a significant amount in our 4G networks as we know that fast and reliable telecoms infrastructure will help our country's economic development. We want the people of Sudan to 'Live The New Wave' and enjoy the benefits of 4G in both their personal and business lives."

Meanwhile, across Sudan's south eastern border in Kenya, Safaricom claimed that it was continuing to roll out Africa's "most advanced" mobile network following the introduction of 4G+ services in major towns across the country. In June, the operator announced that it had already activated 100 sites in Nairobi, Mombasa, Kisumu, as well as parts of Kisii, Naivasha, Kitui, Machakos, Kakamega and

Kericho. More territories were scheduled to be switched on during the months that followed.

Safaricom said the new LTE-A technology, which supports CA, builds on the growing footprint of its 4G network which has gone live on more than 1,100 sites across Kenya. It said the 4G+ base stations will supplement its existing sites of which 4,677 are 2G, 3,517 are 3G, and 1,103 are 4G. The operator added that they will also complement its fibre rollout strategy that had so far seen more than 50,000 homes and 1,500 commercial buildings passed by high-speed links.

"These faster speeds not only benefit the customer, they also empower small businesses who can now use the internet for more commercial activities, democratising data access," said CEO Bob Collymore. "We expect that our network will empower more small enterprise to participate in commerce as well as drive more data use by critical sectors in the education, health and agricultural sectors."

In Algeria, **Djezzy** announced that its LTE network had now reached a total of 24 provinces and 25 per cent of the population (or 10 million people) since beginning the rollouts in October. This followed the extension of its footprint to four new 'wilayas' (or provinces) which included Annaba, Tamanrasset, Mascara and Adrar.

Djezzy had previously promised that it would eventually cover 16 million people with what it claimed would be Algeria's largest 4G network. It said the latest extension was the "concrete



Safaricom CEO Bob Collymore said faster network speeds are "democratising data access".



Djezzy said deploying the "best network" and attracting talent will mean "nothing" without customers: it had already opened 36 retail outlets in 2017 and a further 19 were expected by the end of the year.

result" of that ambition. The company has also been reinforcing its 3G coverage, especially in urban areas, and upgrading its 2G network.

Djezzy is 51 per cent owned by the National Investment Fund while the rest is held by Global Telecom Holding and Veon (formerly VimpelCom). But the company regards itself as Algerian and said that it therefore aims to contribute to the nation's economic and social development, as well as its infrastructure.

Back in South Africa, **Internet Solutions** and **Rain** teamed-up to offer commercial LTE-A to the country's ISPs. According to the partners, in areas of high-density mobile coverage, LTE-A offers ISPs and their customers distinct advantages over a wired network like ADSL or fibre, particularly for ISPs that want to deliver services to customers quickly with minimal disruption during installation.

Rain (formerly known as Wireless Business Solutions) has been busy building an LTE-A network to boost fixed and mobile connectivity. From September 2016 to around mid-2017, it had so far deployed 750 active base stations extending across South Africa's major centres and metropolitan areas. Speaking earlier in

for its equipment from various providers. MTN's total number of network components are planned to increase from more than 4,000 to more than 5,000 by 2019. According to ZTE, the establishment and opening of the NOC will improve the operator's network quality and simplify its management.

MAY

Tigo has opened a new call centre in Tanzania with the claim that it is the first of its kind in the country. The cellco has migrated its facility from E1 to SIP. It says the technology allows for a wide range of functionality and offers the agility necessary to service its growing subscriber base which currently includes

around 10 million customers. The centre is also said to feature embedded data security measures to protect subscribers' information and identities, and a USSD/SMS platform for query follow-up and escalation. With 100 per cent CRM monitoring of customer satisfaction, Tigo boasts that its customer service is expected to "rocket sky high".

JUNE

In Morocco, the total number of mobile subscribers shared between Maroc Telecom (Etisalat), Orange and Inwi for 2Q17 stood at 42.05 million, a 0.64 per cent increase from the previous quarter. According to the country's National Telecommunications

Regulatory Agency, 4.7 million of these subscribers were 4G users, a 37 per cent rise from 1Q17. The regulator adds that compared to the same time during the previous year, ARPU was "virtually stagnant" for June 2017 and reached MAD0.23 (USD0.02) per minute.

JULY

Mobile data traffic will grow 12-fold from 2016 to 2021 in Africa and the Middle East, according to Cisco's latest recently released annual *Visual Network Index (VNI)*. It forecasts that mobile data traffic in the region will rise from 610.3PB per month in 2016 to 7.4EB per month by 2021. Cisco says business mobile data traffic in MEA grew 79 per cent

CELLULAR NETWORKS: YEAR IN REVIEW

Rain CEO Duncan Simpson-Craib said all tests were "looking good", and that the company remained on track to roll out 2,000 sites by the end of 2017.



2017, CEO Duncan Simpson-Craib said Rain was on target to reach 2,000 sites by the end of the year, expected to increase its footprint to 5,000 base stations by 2018, and ultimately grow to 10,000 sites over time. He added: "In future, we will be launching a full mobile data service."

Internet Solutions will act as the open access partner for delivering the company's fixed wireless broadband service, dubbed *Rain to the Home*. The two firms believe that offering competitively-priced access to LTE-A will lead to new growth opportunities for local ISPs whose customers will benefit from fibre-like mobile connectivity.

Expanding coverage

Mobile development in Africa is not all about LTE, and the continent's major cellcos were also busy expanding their 2G and 3G networks in 2017 as part of ongoing efforts to increase capacity and access to mobile connectivity, especially in rural areas.

For example in June, **MTC** (Mobile Telecommunications Company) said that it had built more than a dozen new cell sites across Namibia in only four months. "Just in 2017 between February and May, we have erected 14 new sites in Okahandja, Rehoboth, Tschudi, Windhoek (Soweto), Otiwarongo, Otjokavare, Transfontein, Swartbooisdrif, Katima, Rundu Mall and Dr. Lemmer," said MTC spokesperson Tim Ekandjo.

He added that the investment was an "absolute priority" because MTC needed to keep up with the rapidly growing customer demand.

in 2016. It predicts this will grow at a CAGR of 52 per cent to hit 493.9PB per month by 2021, up from 60.7PB per month in 2016. The **VNI** also reveals that there were 1,330 million mobile-connected devices in the region in 2016, and that 59 million net new devices and connections were added to the mobile network during the period.

AUGUST

Zambian telco Zamtel says it has "continued to batter all growth barriers" as it announced that it had now reached two million subscribers. Acting CEO Sydney Mupeta says

Ekandjo also said that the company was on a mission to ensure that development gets to each and every corner of Namibia, and that it will continue to build more sites throughout the course of the year with further new locations planned for both rural and urban areas.

MTC said it is investing NAD1.1bn (USD848m) on expanding its network capacity as part of its *081EVERY1* project. This is described as the "beginning of a journey towards 100 per cent population density coverage". Starting in October 2017 and running until October 2019, the company said it will build more than 524 new sites which is said to represent a 10-fold increase in its footprint. The sites will include 412 new locations in rural areas, and 88 in urban zones across all of the country's 14 regions.

MTC added that the project will also see the introduction of 3G in major rural areas. Currently, the operator mainly has 3G and 4G coverage in urban areas and limited coverage in most rural areas which have 2G.

However, Ekandjo pointed out that the company remains concerned by the fact that it takes more than six months to get environmental clearances to build sites, and warned that this could delay the rollout plans. "In as much as MTC is committed to bringing service to rural areas, patience was imperative due to the vastness of the country. We also implore authorities to speed up the process of approvals especially those that deal with environmental clearance."

According to MTC's CFO Thinus Smi (who was speaking as the company's acting CEO at the time), *081EVERY1* is geared towards future full system convergence, especially with forthcoming IoT and 5G technology. "There is a noticeable rapid growth in technology, where customers engage in an increasing number of ways with the network, and this enhanced network coverage project will aid these communications."

While MTC did not announce its technology partner(s) for the project, it previously worked

the company has recorded consistent growth since May when it became profitable for the first time in 2017. He reckons this was due to "prudent resource utilisation and exciting product offers". Mupeta adds that Zamtel will continue to invest in its fixed and mobile business segments, and "remains focused on pushing growth barriers out of the way."

SEPTEMBER

South African MNO Vodacom says that all customers affected by a recent billing systems error will be given a 500MB bundle for free, over and above any airtime and data

with Huawei in 2016 on what it claimed was Africa's first 4.5G trial.

In South Africa, **Vodacom** outlined accelerated plans to expand network coverage for people who live in rural areas. Through continued investment in its *Rural Coverage Network Expansion* programme, the operator said it committed to expanding its footprint to cover an additional 150 small deep rural communities during 2017 alone. Most of these communities are in KwaZulu Natal, Limpopo, Eastern Cape, North West and the Free State.

By June, Vodacom claimed that it had already achieved voice coverage for 99.9 per cent of the urban and 99.6 per cent of the rural populations, and data coverage for 99.9 and 95.6 per cent of the urban and rural populations, respectively. The company said it was now looking at "innovative" ways to connect the outstanding 4.4 per cent rural population with data coverage and 0.4 per cent with voice coverage. It planned to increase network capacity, and bring faster data services to tens of thousands more people living in rural areas who only have voice and EDGE data services.

According to Vodacom Group CTO Andries Delport (right): "It can no longer be acceptable that multitudes of people in our rural areas watch the 'Internet Revolution'

from the sidelines without being part of it."

Orange officially launched its brand in Sierra Leone in mid-September. This followed the company's acquisition of Airtel Sierra Leone together with its Senegal-based partner Sonatel which was finalised in July 2016.

With a population of around seven million people, Orange reckons Sierra Leone offers "significant" potential for growth in mobile services. Sekou Drame, CEO, Orange Sierra Leone, said: "We remain committed to taking

refunds. The operator says the system error, which impacted certain pre-paid and top-up customers, was caused by a configuration change on its billing system. In an apology issued online, Vodacom Group CEO Shameel Joosub said: "An error of this kind has never happened before and we've taken steps to ensure it never recurs."

OCTOBER

On 30 September 2017, MTC announced that its tower in Leonardville, Eastern Namibia, had collapsed. Five days later, the operator announced that it had put up a temporary





CEO Sherif El Barbary told reporters that Zantel aims to deliver “best in class” services to customers and the country.

our network and services deeper into the country, right up to the doorsteps of each and every Sierra Leonean, with the aim of bridging the digital divide within the country. With the support of Orange and Sonatel we can truly deliver on this.”

Earlier in 2017, the operator announced a USD33m modernisation and expansion plan to enhance the quality of its network, voice and data services in the country. By mid-October, it said most of this investment had already been realised with 30 new radio sites on air and more than half of the entire mobile network upgraded.

Zantel (Zanzibar Telecom) promised to take both its customers as well as Tanzania to new heights following the completion of its network modernisation. At the end of September, recently appointed CEO Sherif El Barbary told reporters that his company aims to improve network quality and coverage in order to deliver “best in class” services. He said Zantel was in the final stage of its network modernisation and that it now covered 22 regions across the country with 4G infrastructure.

“We have created more than 5,000 [jobs] countrywide. This is direct and indirect employment through our EzyPesa platform where we have more than 2,500 agents, and also have partners providing different services who also employ staff to serve Zantel.”

El Barbary added that Zantel will also work on supporting the government to reach various SDG targets. Furthermore, he planned to focus on the company’s wholesale and enterprises operations which he considered to be “key for business”. Zantel manages the EASSy and

SEAS submarine cables with landing points in Dar es Salaam.

Established in 1999, Zantel is currently 85 per cent owned by Millicom while the remaining shares are held by the government.

Burundi’s state-owned **Onatel** is aiming to modernise its mobile subsidiary with the help of a multimillion dollar loan from Huawei.

ONAMOB is one of four mobile operators in the country. Together with its rivals – Econet Leo, Smart and Vietnam’s Lumitel – it shares a mobile subscription base that stands at around nine million connections which represents 82 per cent SIM penetration (according to GSMA Intelligence as at February 2018).

Built in 2004, the company’s network was expanded once in 2010 but has struggled to compete with rivals who have invested in more modern and efficient network infrastructure and services. In 2013, it was widely reported that the government wanted to offload a majority stake in ONAMOB. At the time, *TeleGeography* stated that the operator was running 51 sites in Burundi with claimed coverage of around 80 per cent of the population. It added that in order to achieve total coverage, ONAMOB’s new owners would need to deploy a further 50 sites.

Towards the end of 2017, we reported that the country’s government now hopes that with Huawei’s backing, the modernisation and network extension will enable ONAMOB to better compete and improve revenues. Huawei is financing the project via a USD30m 10-year loan which government secretary-general and spokesman Philippe Nzobonariba reportedly described as “a survival investment”.

State-of-the-art tech

In early March, **Vodafone Egypt** went live with what was claimed to be the first commercial NFV platform in the Middle East and North Africa. Since October 2016, Ericsson’s virtual Serving GPRS Support Node – Mobility

Management Entity (SGSN-MME) had been handling and managing commercial mobile broadband traffic on the operator’s network. The platform is designed to support multi-access technologies such as GSM, WCDMA and LTE, and interworks with Wi-Fi. Ericsson added that it also provides full feature parity and is agnostic to the underlying cloud system with support for both Open Stack and VMware.

Vodafone Egypt’s network now runs using a combination of virtual and native SGSN/MME in the same pool which, according to Ericsson, supports efficient capacity expansion. The vendor said its system extends network capabilities to meet even the “most aggressive” traffic growth predictions, and provides “superior scalability and capacity” so that operators can optimise their operations and manage the increasing volume of traffic from mobile broadband.

“Virtualisation will enhance the speed

and efficiency of services we provide to our customers which will in turn support our main goal to reach customer satisfaction,” said Vodafone Egypt technology director Osama Said.



Ericsson’s blade system for SGSN-MME. The company’s virtualisation technology has been managing Vodafone Egypt’s mobile broadband traffic since last October.

DECEMBER

Viettel Global is planning to launch operations in Nigeria. At its AGM earlier in 2017, the Vietnam military-owned telco said investments in the country along with a new operation in Indonesia would create conditions for it to continue to grow its interests elsewhere. It is aiming to begin in 1Q18. Viettel reported a 21 per cent YoY decline in revenues last year, with its networks in Mozambique and Burundi particularly suffering due to forex issues. But it did see earnings growth in Tanzania, Cameroon and Mozambique.

mobile site and that full GSM services had been restored for the village and its surrounding areas. It said the replacement site would continue to serve local subscribers whilst reconstruction of the fallen BST was ongoing. The operator did not offer a timescale for this or any reason as to why the tower had collapsed in the first place.

NOVEMBER

Sudatel will be the first company in Sudan to benefit from the US recently lifting a trade embargo that had been in place for more than a decade. The most prominent company

that has now been dropped from the US trade ban list is part state-owned Sudatel Telecommunications Group (STG). After flying back from the US together with Sudanese ministers, STG CEO Tariq Hamza told reporters that they had held talks with representatives from the US Chamber of Commerce, the Board of Companies for Africa, Apple, Boeing, ExxonMobil and Ford. They also met with representatives from the British and German governments, as well as the IMF. He added that the next phase for Sudatel will see partnerships with major international communications companies.



In early 2017, **Intracom Telecom** announced that it had successfully completed a live field trial of its point-to-multipoint (PtMP) *StreetNode* platform (pictured left) in South Africa.

The trial took place in Johannesburg late last year, and according to Greece-based Intracom, the aim was to evaluate *StreetNode*'s "unique capabilities to provide the most advanced high-quality and high-availability services to MTN's enterprise customers".

The platform was tested in both a lab environment and external network. Software-defined operation allowed activation and reconfiguration in the field in PtMP mode, demonstrating what Intracom described as "unparalleled flexibility".

StreetNode is based on a self-organising network. According to the firm, while traditional PtMP technology only allows homing to a single base station, the trial with MTN successfully proved that its platform automatically reconnects to alternative base stations in the event of the primary site failing, thus rapidly re-establishing connectivity for subscribers.

It added that the trial also confirmed that non-technical telecom engineers could install and commission the *StreetNode* unit quickly and easily, even at night, thanks to what's described as a unique auto-alignment feature.

Intelsat introduced a managed services platform to help mobile operators provide 2G services for remote populations throughout sub-Saharan Africa.

IntelsatOne Mobile Reach Solar 2G is a turnkey package that includes all satellite, cellular and power components. It integrates satellite services from Intelsat's globalised network, a backhaul terminal solution and network

deployment expertise from Switzerland-based BCom, as well as Newtec's *Dialog* equipment. The service was initially available in sub-Saharan Africa with the claim that it can be rapidly deployed and easily scaled to serve populations of all sizes. BCom said that it was designed to fit each community with basic 2G GSM services and cover a larger area or population based on a "pay-as-you-grow" model.

According to Intelsat, now that smaller and more portable kits can be used with its *EpicNG* high throughput satellite platform, connecting remote and rural communities will become "easier and more cost-effective".

Regulating the networks

The **Independent Communications Authority of South Africa** (ICASA) published the findings of its review of the 2014 Call Termination Regulations (CTR). At the start of 2017, the regulator announced that it would now conduct a review of the pro-competitive conditions imposed as part of the CTRs. These were originally proposed in October 2013 and finalised in September 2016 after protracted wrangling between ICASA and local mobile operators.

The regulations included provisions for asymmetrical symmetric pricing of call termination rates to address differences in economies of scale between operators. This would allow smaller MNOs (such as Cell C and Telkom) with less than 20 per cent share of the total minutes billed in either the fixed or mobile market, to charge up to 40 per cent more than the reciprocal rate. It is on a three-year glide path from ZAR0.20 to ZAR0.10 for mobiles, and ZAR0.12 for fixed calls within a calling area and ZAR0.19 for calls terminated outside the area.

In essence, the 2014 CTRs meant that market leaders Vodacom and MTN pay their smaller rivals more to terminate calls on

their networks. ICASA said that after "careful consideration" of all submissions from the industry, it would not change the definitions of mobile termination and fixed termination markets in terms of regulation 3 of the 2014 CTRs, with the exception of the exclusion of termination of internationally originated voice calls. It said competition in the relevant markets was still "ineffective", and that all network service licensees that offer wholesale voice call termination services continue to have "significant market power" in their own networks for wholesale voice call termination

ICASA added that pro-competitive conditions imposed in 2014 remained relevant, but following concerns it extended the current glide path for 12 months and outlined the consultative approach and timeframes to determine new termination rates. Smaller operators have therefore been given five years from 2014 to grow their market share to 10 per cent of call minutes terminated. Once their share hits the threshold, they will have to charge the reciprocal rate.

Separately in early February, ICASA announced that it would be updating its National Radio Frequency Plan (NRFP) to ensure efficient spectrum use. The regulator said it wanted to ensure that the NRFP was in line with the latest version of the International Telecommunications Radio Regulations, and reflects the final agreements reached at the World Radio Conference (WRC) in 2015.

WRC-15 addressed more than 40 topics related to frequency allocation and sharing for the efficient use of spectrum and orbital resources. Among some of the key decisions taken, delegates agreed on the provision of enhanced capacity for mobile broadband in the 694-790MHz band in ITU Region-1 which comprises Africa, Europe, the Middle East and Central Asia.

for Africa.

The dramatic upswing in LTE services in Africa in 2017 will continue with industry research showing an increase in the number of MVNOs and smaller operators introducing LTE roaming services in the region.

As more LTE networks are deployed across Africa, especially in those countries with no LTE networks yet, and the regional workforce becomes more globalised, we expect to see African companies become more relevant and competitive.

Growth in data usage, smartphones and new mobile broadband coverage will all bring positive aspects to the people of Africa and will lead to a few more 5G trials towards the end of 2018 and into 2019.



Joe Barrett,
President,
GSA

The year ahead: According to GSA expectations, 2018 will be a major growth year for LTE in Africa. We expect a 40 per cent rise in the number of LTE commercial networks launched, taking the regional figure to 140+.

More than 50 per cent of these networks should be LTE-A as MNOs deploy carrier aggregation to increase download speeds. Also look out for more operators to follow South Africa's Vodacom in deploying 256QAM and 4x4 MIMO to deliver Gigabit LTE and a faster network for customers.

According to Ovum data, the number

of new 3G subscriptions added in Africa per quarter over the past three years has remained fairly consistent at around 18-19 million. However, as LTE networks reach a critical mass in 2018, GSA expects the number of new 3G WCDMA subscriptions in Africa to slow down, following the global trend away from 2G and 3G subscriptions.

The take up of VoLTE will also increase from less than 10 operators deploying the technology at the end of 2017 to more than 30 by the end of 2018. This is in line with the predictions on VoLTE growth in Ericsson's *Mobility* report that suggests a doubling of VoLTE subscribers in 2018. There were more than 700 new LTE devices supporting VoLTE launched in 2017 most of which are suitable

ICASA also said an update was necessary to ensure that the NRFP is consistent with SADC's latest frequency allocation plan. This aims to integrate and harmonise spectrum across the community, and was endorsed by its 15 member states in October 2016.

The **Rwanda Utilities Regulatory Authority** (RURA) imposed administrative sanctions on MTN Rwanda for what it said was non-compliance with its license obligations.

In a statement released in May, the regulator said MTN Rwanda provided services that contravened the directives that were previously issued to it in 2011. These concerned a regional IT shared services initiative where MTN Rwanda was part of the MTN South and East Africa IT hub based in Uganda. At the time, RURA instructed MTN Rwanda to exclude itself from the arrangement and said failure to do so would be considered a "serious breach" of its license obligations. Despite the directives, RURA said MTN implemented an interim phase for the hub from September 2012, and then fully "operationalised" its IT services management in Uganda in October 2014.

During a regulatory board hearing on 12 May 2017, MTN admitted the breach. As a result, the operator faced an administrative fine totalling RWF7.03bn (USD8.5m). This breaks down as a daily administrative fine of RWF5,000,000 from 26 October 2014 to 27 June 2016, and a daily fine of RWF15,000,000 from 28 June 2016 to 20 March 2017.

Following the announcement of the penalty, MTN released a press statement acknowledging receipt of the notification, and said that it had been in discussions with RURA about the issue since earlier this year. It added: "MTN Rwanda is currently studying the official notification and will continue to engage with the regulator on this matter."

In mid-October, Congolese regulator **ARPCE (Agence de Régulation des Postes et des Communications Electroniques)** announced that its technical teams had dismantled an illegal mobile network in Pointe-Noire, the country's economic capital. Working closely with the police, they discovered a SIM box with a capacity for 80 cards, 16 pre-activated Airtel SIMs, recharge cards worth nearly CDF50,000 (around USD32), and an electric generator. Police arrested two people who had been operating the network for some time from a wooden hut.

This latest dismantling came just a few weeks after another fraudulent network was found in Brazzaville. ARPCE said this kind of fraud causes MNOs to lose profits which amount to millions of francs. Speaking at the time, director of networks and electronic communications services Sandé Ndé, said: "One minute of international calling amounts



In Congo, ARPCE's technical teams and police found a SIM box with capacity for 80 cards.

to 170 francs, and sometimes these fraudsters total up to thousands of minutes of calling."

Augustin Ngoma, head of the ARPCE departmental antenna in Pointe-Noire, also pointed out that the lack of verifying a customer's identity before he or she is sold a SIM is a major contributor to mobile fraud. "We recovered 16 activated but unidentified SIM cards from these fraudsters. They were smart enough because they bought all of these from street vendors. Otherwise, they would have been apprehended long before."

Ngoma added that as from the beginning of 2018, no SIMs will be sold by street vendors in Congo. Instead, they will have to be purchased through resellers authorised by the operators.

The quality of services provided by Benin's mobile operators is "deteriorating day by day", according to the country's regulator. In early September, **ARCEP (Authority for the Regulation of Electronic Communications and the Post office)** met with Glo Mobile, MOOV and MTN to discuss the reasons for the "general degradation" of the quality of service found in their networks. It said that the aim of the meeting was to find the appropriate solutions to satisfy subscribers' expectations.

ARCEP said that the blocking rate as well as the rate of call termination was "abnormally high" across all networks.

The three operators acknowledged that their service quality had deteriorated, but said a number of factors were to blame. Among other things, these included: the need for network optimisation; the on-availability of energy commercialisation; the sizing of chain cores at the level of their networks; greater network security to combat SIM box fraud; and the extension of networks to ensure complete nationwide coverage.

ARCEP's regulatory board president Flavien Bachabi said the problems listed by the operators did not exempt them from the quality of service they are obliged to provide to

consumers. He added that while the operators had already been sanctioned for their poor services, such penalties were not the ultimate target. "The aim is the quality of service for all consumers. For the state, what is important is not the taxes levied on operators, but to ensure operators contribute effectively to the development of the country," said Bachabi.

Zambia plans to issue new network licenses following revised telecom laws approved earlier in 2017 to enable more voice service providers in the country.

In an RFP published in late September, the **Zambia Information and Communications Technology Authority** (ZICTA) invited applications for international network and national service licenses. It said that the international network license will authorise the holder to install and commission gateway facilities such as an Earth station, VSAT/hub, switching centres, nodes and servers. Meanwhile, the national service licensee will be permitted to provide services such as voice, messaging, internet, VoIP, VAS, tracking, amongst others.

Mobile spectrum will be available in: 900MHz (8MHz, FDD); 1800MHz (10MHz, FDD; 2600MHz (30MHz, TDD); and 2300MHz (30MHz TDD). Fixed service spectrum will be in 5GHz, lower 6GHz, 11GHz and 18GHz.

The deadline for application submissions was November 2017, while spectrum prices were calculated in ZICTA's revised Statutory Instruments document issued in June (SI 48).

The move finally paved the way for a fourth mobile operator in Zambia. In 2009, the government restricted the number of mobile voice operators in the country in order to help grow the existing companies – MTN, Airtel and Zamtel. Mobile Broadband Zambia (Vodafone Zambia) entered the market in 2016 but only as a data service provider. According to figures from GSMA Intelligence, as of February 2018 Zambia has 12.1 million connections and a population of 16.5 million people, meaning SIM penetration of 74 per cent,

In September, Zambian communications minister Brian Mushimba reportedly told parliament that the country now needed to get rid of restrictive laws to attract investors and create more jobs. He said a new operator could be in place over the next six to 12 months and that there may even be room for a fifth. ■



Communications minister Brian Mushimba said Zambia needed to attract investors and create more jobs.

CELLULAR NETWORKS: INTERVIEWS



**Yves Bellego,
Director, network
strategy,
Orange Group**

Orange's African networks are evolving significantly along a number of different paths, as Yves Bellego explains. "The mobile deployment continues, and we opened commercial 4G services in four new countries: Cameroon, Egypt, Madagascar and Mali. Fixed networks are also being deployed, and we started FTTH services in Senegal and Mali. This is just the beginning – the areas covered by the FTTH network remain limited but it is an indication of a general trend: there is a market in these countries for these technologies and these services. We also further developed our FTTH networks in Jordan and Morocco.

"We also developed network automation and centralisation of network operations, with the aim of improving the quality of our networks and to enhance customer experience. Network automation was developed with the use of C-SON (centralised self-organising networks) that automates the optimisation of the radio network. Centralisation of network operations, with the setting up of a multi-country NOC, is a way to make the best use of our experts and their skills. With these actions, we improved the quality of the network while, at the same time, the complexity of our networks increased with the deployment of new technologies (4G, IP, fibre)."

The deployment of 4G is resulting in a general shift of focus from voice and messaging towards data, and Bellego said this has meant that Orange has to rethink its commercial offers in order to get the markets "accustomed" to a new balance in value.

"It also requires us to redesign our networks. With the deployment of 4G, data traffic grows considerably, and the entire network – from base stations to international connectivity – needs to be upgraded. We anticipated this some years ago so we increased international connectivity, laying down submarine cables and terrestrial international backbones. As a result, Orange has today the largest terrestrial transmission network (national and multi-country) measuring some 20,000km."

This should certainly help the company in addressing one of the biggest challenges that Bellego, in line with all his peers in the industry, identifies for Africa. "We have to expand coverage, both mobile and fixed, in a cost-effective way. There is still a significant part of the population that does not have access to connectivity or to broadband, or does not have the financial resources to do so.

"We have tested various solutions to expand coverage in a cost effective way, using satellites, balloons, and low cost radio sites with wooden poles. In recent years, we have

also deployed solar powered radio sites, which cost a bit more in terms of initial investment but bring significant savings over time.

"We have also worked with our suppliers in order to enable the introduction of low cost 4G devices to the market, and tested different models of sharing towers or outsourcing parts of the operations. However, bridging the digital divide remains a challenge that will keep us busy for the coming months and beyond.

"We will continue to work to improve connectivity, deploy broadband access, and to put affordable devices on the market. These are enablers for the development of services. I expect that in the coming months and years we will see the demand for services continue to boom, especially around content and services that are designed, developed and hosted in Africa for the African market."



**Thibaud Rerolle,
Director
technology,
Safaricom**

According to Thibaud Rerolle, Safaricom's mission is to add value to its customers' lives in Kenya. He said that it is always a key highlight for the company whenever it reaches more customers with services and, in the process, bring the "transformative power of technology" to even more people.

"Backed by an increase in capital expenditure, we progressed with our network expansion in 2017 to not only provide additional geographical and population coverage, but also to meet the growing needs of our customers. This saw an additional 2.9 million customers choose Safaricom as their preferred network between September 2016 and September 2017.

"Our network grew to more than 4,800 sites, up from 4,000 the previous year. Notable was our 4G footprint which more than doubled from 635 sites to 1,450 sites, underlining growing data consumption in 2017.

"From a customer base of 29.5 million customers, we saw a 13.5 per cent year-on-year growth in data subscribers to 16.9 million. Data usage per customer per month grew a tremendous 65 per cent to stand at 382 megabytes reflecting increasing maturity in the mobile application space."

As a testament to what Rerolle described as the "growing strength" of Safaricom's network, global network speed test specialist Ookla recognised the operator as running Kenya's fastest mobile network for July to September 2017, with average download speeds of 21.25Mbps and average uploads of 9.67Mbps [Kenya's other cellcos include Airtel, Faiba and Telkom]. And in its *State of the Internet* report published in May 2017, Akamai ranked the country as having the third fastest average internet speeds in the Middle East and Africa. This placed the country ahead

of Egypt and South Africa, and even Australia on a global level. [Qatar and Israel were ranked first and second respectively for the MEA region.]

"The growth in data demand is reflected in the expansion of our *Fibre to the Home* network, which at the end of 2017 reached more than 100,000 homes. We see that our customers are leading increasingly digital lifestyles and taking up smart homes, resulting in the need for fixed, always-on connectivity."

Rerolle continued by saying that increasing smartphone uptake amongst the customer base has also made it necessary for Safaricom to adapt its products and services to remain relevant in a new digital era. "We introduced a number of new innovations around M-PESA, starting with the launch of a smartphone application in March 2017. This app has vastly improved the M-PESA user experience and, in the process, increased the accuracy of transactions. It also allows us to take advantage of smartphone capabilities to introduce new M-PESA features such as scan-to-pay, which we are currently rolling out.

"In October, we launched Masoko, a vendor-agnostic platform that seeks to connect merchants and customers in Kenya. Masoko allows businesses to take advantage of e-commerce capabilities to reach customers anywhere in the country. More importantly, it saves merchants the need to invest in the technology, logistics, payment solutions and marketing that are required with e-commerce.

"Masoko provides the freedom and choice for our customers to access a variety of products and merchants from anywhere in the country. The platform further seeks to cater to emerging customer demands as more Kenyans access the internet through smart devices."

According to Rerolle, four factors have underpinned the evolution of the Kenyan communication market: growing uptake of mobile services by both private and public enterprises; deployment of new LTE networks and LTE technologies; increasing adoption of mobile payments; and increasing deployment of services and network infrastructure in the cloud.

"Evidence of growing uptake of mobile services in the enterprise is best brought out by the more than 1,670 buildings that are now connected to our *Fibre to the Enterprise* network.

"Growing cloud uptake is being driven by deployment of new services and the network on cloud-based infrastructure, providing customers and service providers with greater flexibility and resilience. The launch of Masoko marked one of most successful cloud use cases in the year.

"In Kenya as well as across the continent, we continued to see the deployment of new LTE networks. At Safaricom, we deployed an advanced carrier aggregation network, enabling customers with 4G+ devices to enjoy speeds of up to 300Mbps.

"Increasing adoption of mobile payments can be seen through changing customer trends, with the number of *M-PESA* deposits and withdrawals now falling below 75 per cent of transactions. Customers now want to make payments, access instant loans or affordable healthcare through new innovations such as *M-TIBA*."

Launched at the end of 2015, *M-TIBA* enables users to save and pay for healthcare services using their phones. By June 2017, the platform reportedly had more than 920,000 registered users, 450 connected healthcare providers, and generated more than KES140m in health insurance bills.

When asked what obstacles Safaricom expects to face in carrying out its mission over 2018, Rerolle said: "In the last 17 years, we have expanded our network to reach over 95 per cent of the population and 3G/4G broadband coverage to reach more than 85 per cent of the population. While it has never been more important to reach the remaining five per cent, the difficulty of doing so presents a number of challenges.

"Most of the underserved live in remote, geographically sparse areas with little other infrastructure. It is therefore necessary that mobile operators, regulators and vendors work on innovative ways to bridge this gap, especially around the design costs of infrastructure that can reach such underserved areas.

"Another emerging challenge is cyber security. Our networks form the basis on which customers run their day-to-day lives making any disruptions or infiltrations quite costly. An increasingly sophisticated digital threat-space therefore calls for more proactivity from communication providers, including increased investment in skills and tools to secure customer information. In a related matter, we have also seen insecurity incidences across the continent begin to spill over into the telecommunication sector as communication infrastructure increasingly comes under attack."

In terms of the Safaricom's hopes and plans for the continent over the year, Rerolle expects the popularity of data-rich applications to continue to grow amongst the customer base, driven especially by increasing consumption of video on social media and the emergence of entertainment applications such as *ShowMax* and *Netflix*. To support this data explosion, he said that the operator plans to further expand its fibre network, connecting more base stations to fibre and reaching more homes.

He also said that since the *M-PESA* platform launched in 2007, it has been upgraded twice, the second of which was carried out in August 2017. "This upgrade will enable us to gradually deploy new features and innovations to our customers in coming months. Many of these features are geared towards enhancing the experience of our customers. So for example in 2017, we reduced the number of steps it takes to make payments

and introduced a number of enhancements for visually impaired customers. Subscribers can expect to experience more new features in the coming 12 months."



**Tariq Hamza Zain
El Abdein,
CEO,
Sudatel Telecom
Group**

In October 2017, the US Government announced that it had lifted the wide-ranging economic, trade, and financial sanctions against Sudan that had been imposed in 1997. Tariq Hamza Zain El Abdein, CEO of Sudan's incumbent telecoms operator, was quick off the mark in initiating the first US trade mission organised in conjunction with the Corporate Council on Africa (the CCA is a US business association focused solely on connecting business interests in Africa). Alongside most Sudanese, he hopes that overseas investment will result in economic growth across his country.

Sudatel provides both mobile and fixed (voice and data) services to businesses, residents and ISPs across North and West Africa, in addition to the provision of wholesale services to international carriers. Its best-known brands are Expresso and Sudani. El Abdein said 2017 was another solid year for the company as it achieved positive financial performance despite tough industry and market climates. And given Sudan's geographic location, he believes Sudatel will continue to play a major strategic role in connecting Africa and the Middle East to the rest of the world.

A major highlight for the company last year was the completion in April of a new fibre route that spans 3,983km from Port Sudan on the east coast to N'Djamena, the capital of Chad. El Abdein claimed this link is the largest ever fibre project completed in Northern and Central Africa, and the first continuous fibre connection to countries in the Eastern, Western and Northern parts of the continent. The network was the result of a joint initiative that was led by Sudatel and included Sotel, Tigo and Airtel in Chad, as well as the Chadian and Sudanese governments.

El Abdein explained that the new fibre link is delivering low cost, high availability telecom services to Central African countries (Chad, Central Africa, Cameroon, DRC and others) by providing an eastern route to these countries and their people. He said it is also providing the lowest latency route for Asia to West Africa, as well as an alternative route for this region in the event of a problem with the cables that are on the coast.

Furthermore, the network directly connects to the submarine cables on Africa's east coast, providing onward connectivity to Asia, the Middle East and Europe, as well as diverse routing for the Mediterranean crossing cables and Southern Cape (South Africa) route.

"This is a link that was long overdue as shown by the immediate usage" said El Abdein. "Traffic levels have been higher than expected with the route being used by every major operator in Northern Africa."

According to El Abdein, the network offers a "blueprint" for how operators across the region can work together to build a shared infrastructure. Work on the next phase of fibre expansion is already underway and has attracted other stakeholders, in particular operators from Cameroon and Nigeria which border Chad.

Another home-grown success story for Sudatel is a USD45m data centre that is a cornerstone in its transformation into a full ICT player. Said to be the first purpose-built facility in Northern Africa, the data centre opened in 2014 and covers some 14,000 square metres with four rooms that each have a capacity of 1,000 servers.

El Abdein added that Sudatel has always had a strong CSR programme for which it was awarded special recognition from the ITU during its conference in October in Buenos Aires. He concluded that the company remains "extremely optimistic" for 2018 with ambitious expansion and investment plans.



**Rafiah Ibrahim,
Head of Middle
East & Africa,
Ericsson**



**Nicolas Bixell,
Head of West
Africa, VP of sub-
Saharan region,
Ericsson**

As has been well documented, it has been a tough time for Ericsson over the last few years. And for Rafiah Ibrahim and her regional team, the challenges are perhaps even greater given that she is responsible for a continent where the socio-political and economic hurdles that need to be overcome are notoriously huge.

Despite all that, Ibrahim appears cool-headed and confident, and has previously said that Ericsson's strategy refresh that it embarked upon earlier last year is beginning to pay off. Her view is that going through bad quarters is all very much part of corporate life, especially for large global organisations such as Ericsson that have been around for a long time now.

Her colleague Nicolas Bixell echoes this when asked about how the company is doing in Africa. "The key message is that Ericsson is in Africa and we are here to stay despite what you might read in the papers. 2017 was the turnaround year. All companies at one

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point or another need to revise their strategy and execute it, and that is exactly what we are doing in Africa which is a key market for us."

Ibrahim explained that the company is almost going back to basics by renewing its focus on what it is good at: technology. Gone is Ericsson's emphasis on the 'Networked Society' approach, and in its place is a regional business that is all about securing technology leadership and consolidating the partnerships it has built-up with longstanding customers. That has meant less focus on offering, for example, managed services to smaller clients that have not been contributing to the top-line. These customers have been helped to migrate to other vendors.

Not to say that Ericsson is getting out of the managed services business which is still very much of the strategy going forward. Ibrahim mentioned the notion of the 'Ericsson Garage', innovation hubs that it is setting up to develop technologies in collaboration with its partners. In general, Ericsson's overall idea is to work with operators mainly on three areas which, as well as managed services, also include radio technology and core services. And, according to Bixell, it seems to be working.

"I can only speak about West Africa which for us is 24 countries from Senegal all the way down to Namibia and also Botswana, Madagascar and Mauritius because of their Francophone heritage. So for our customer unit, we have performed pretty well compared to the rest of the group because it is a more dynamic market. There is a lot of demand for data and mobile technologies in West Africa. We have 3G all over the place and some countries, like Angola, even have LTE-A. But many have not followed through and deployed 4G, as yet. So compared to the rest of the world we are behind in the evolution and rollout of the networks."

"But Africa is no different to anywhere else; 4G will come and it is being rolled out, and we are still in that growth phase. Plus, the operators are investing because they see the dynamics across the continent – the young population, many subscribers – and so all the big telco groups are present in the region."

Ibrahim would agree here, and where others see challenges she sees opportunities: "African GDP is growing and there is a young and upwardly mobile population who are demanding more digital services." She also cited Ericsson's latest *Mobility Report* which predicts that there will be 29 billion devices connected by 2022 of which 18 billion will be in the IoT. In order to reap the benefits of all this, operators therefore need to have the right technologies and services in place to help all their users, consumers and businesses alike. And that, for Ericsson, is opportunity knocking.

But of course, the Swedish company is not unique here. As Bixell said earlier, all the big telco groups are present in Africa, but so are

all the players in network infrastructure and services. That makes for a highly competitive market. "We are competing on technology leadership, local presence, delivery and support. It is for the operator to make their choice whether they should do it on price or whether they should do it on the technology level, the local presence, or a mix, etc. I cannot comment on my competitors but I can tell you that they are all present and we're having a good fight!"

Bixell continued by saying that the operators understand only too well that the most important thing to have is strong network performance. "Ten years ago a friend showed he had downloaded a song on his phone and we were all amazed. Today, we can all download a song from an artist of choice, but it is too slow. So now, we all expect to be able to download content over the air interface but we want a perfect, seamless and superior customer service. That is what makes a subscriber stick to one operator. The operators have understood all that which is why they are investing in top-notch networks."

"Some have also asked the vendor to operate the network. We have the competence here, and can leverage our expertise globally from remote centres, etc., just so that the operators can focus on delivering a service and other value-added services."

For Bixell therefore, the "name of the game" is network quality. And he believes this also comes before price for subscribers who are prepared to pay a small premium for better network performance. "Smartphone penetration is rising and people are using Facebook, Instagram, etc., so they just want the network to function."

While admitting that he doesn't like the phrase, Bixell said Ericsson is basically a company of "plumbers", installing all the network and enabling "pipes" for the service provider. He is also keen to point out that the company is not coming up with technology for technology's sake, or launching solutions that then need to look for problems to solve.

"As I said, I don't like the word 'plumber', so we are thought leaders as well, right? We don't say 'here is something we have developed in our backyard, do something with it'. No. We are inventing the whole network and we are talking to the entire ecosystem, our customers first and foremost, but also other actors such as the car-makers, for example, when it comes to use cases for the IoT and 5G."

"So instead of inventing and then selling, we are working together [with industry partners] to see if it is all feasible in the first place. And because of the network development opportunities that we have, we actually enjoyed a very decent year on the business side in 2017. It is not because we are smarter, it is because the market is more dynamic and we have been responding to that."



Alisa Amupolo,
CEO,
PowerCom

PowerCom started life as Namibia's second mobile operator in 2007. Trading as Cell One, it was owned by Norwegian and local shareholders, Nampower, Old Mutual and Nammic. In 2009, the company was taken over by Orascom which later re-branded Cell One as 'Leo'. But just two years later, Orascom returned PowerCom to investors Investec and Ned Capital, resulting in Telecom Namibia acquiring the business in 2012 and subsequently integrating Leo into its operations in 2013. Leo is now known as TN Mobile.

PowerCom then acquired the tower infrastructure from its shareholder, and its business objectives changed from being a mobile operator to an ICT infrastructure and equipment provider, positioning it as the first MNO led towerco in the market.

Looking back over the last decade, Alisa Amupolo said it's clear that the acquisition was a success in terms of the asset-swapping and transactions that took place between the shareholder and subsidiary at an inter-company level. She said PowerCom's acquisition of Telecom Namibia's 198 towers boosted the company's balance sheet. In exchange, when Telecom Namibia acquired mobile equipment, PowerCom powered it to provide fixed mobile convergence, and fully integrated the kit into its operations.

"This has begun to pay dividends in the past year, ensuring that PowerCom is a key enabler in the growing Namibian telecoms industry and cementing our marketplace relevance in the years ahead. These have involved establishing foundations for the future, in addition to establishing a new line of business and improving our existing tower portfolio," said Amupolo.

She continued by saying that the company's focus over the last year has been to continue the good work already underway in redefining its business model and rebuilding the brand within the marketplace. "Since the acquisition of the company by Telecom Namibia in 2013, we have worked to reposition the business as a dedicated infrastructure company. We have focused particularly on building capability to deliver bespoke and dedicated infrastructure to clients who want to gain a competitive edge in their own markets. This infrastructure also has the potential for on-boarding other clients, making it carrier neutral."

"We have seen capital expenditure in this current financial year and commissioned five new sites. We have also seen an increase in new deployments on our towers from new arrivals into the market such as MTN and MTC's 081 project.³

³ See Year in Review, p24.

"We have also made a concerted effort over the last year in planning to decommission duplicated infrastructure, redeploying to areas without coverage. This has aided the commitment by the Ministry of ICT to initiate 100 per cent network coverage across Namibia.

"The core of PowerCom's value proposition is that we serve as a hub of connectivity. We are at the very beginning of the value chain with connectivity for industries, starting from our infrastructure and our services.

"We power telecoms operators, allowing them to connect with their end users via various communication solutions including 2G, 3G, 4G and 4.5G. Our infrastructure also empowers broadcasters such as NBC and One Africa Television as well as radio services nationwide, whilst impacting other non-mainstream industries. For example, aviation companies are on-boarding our towers to monitor aircraft, and national rail companies are utilising our infrastructure for two-way communication between trains. We also cater to security companies. PowerCom's value lies in an ability to diversify the communications solutions that it can supply to the Namibian market.

"The wireless communications industry is consistently changing and evolving. Over the last 12 months, more players have entered the marketplace and the regulator has issued numerous licenses to broadcasters and telecoms companies. Demand has increased across the board, including the demands made of us.

"Technological advances necessarily have an impact on our services, and it's important that we're equipped to deal with these advances. This readiness can be found, for example, in our preparation of our sites and our teams to for 5G deployment. There are also interesting developments taking place in the field of radio, with a merger between One Africa Television and 99FM which will influence the broadcaster landscape in the future. PowerCom is committed to remaining ahead of the curve and serving existing and new clients in innovative ways."

According to Amupolo, there are several key challenges facing the telecoms industry in Namibia over the course of this year, and some facing PowerCom specifically.

"The national picture is shaped by the necessity to realise the 100 per cent coverage mandated by the Ministry of ICT. PowerCom must ensure that its sites are ready, including ensuring they have effective capability and the load capacity to accommodate multiple tenants.

"It is also vital that our sites are well maintained. Acquisition of assets necessarily results in towers and other infrastructure being obtained with patchy maintenance histories, and this is something that PowerCom continues to address. Doing so is important not only in terms of ensuring durability and load capability, but also as a foundation for increasing our client base.

"The PowerCom five-year plan includes strategic endeavours that we must continue to work towards. We are committed to improving our skilled and dynamic workforce, along with building relationships with partners in the vertical markets such as properties and municipalities. Such relationships will improve our lead time on roll out.

"There is also scope for technical partnerships to help improve our internal capacity on design, deployment and maintenance. Similarly, we are in discussions with various investment partners who can add value to our portfolio and improve our abilities within the marketplace.

"Our technical capabilities and our skilled workforce are the core drivers behind our brand. We also recognise the importance of a conducive environment from a regulatory and policy perspective. There is a definite domino effect available: growth will initiate further investment into existing infrastructure and assets, this then attracts more skills and improves our value to GDP as well as the economy more generally.

"Quality is key to reach these levels, and we strive towards that in all our projects and internal capacity development. As a recipient of a regulatory license, we are a company operating within parameters in terms of service and pricing, ensuring that we have accountability to our clients and the wider public."

Over 2018, PowerCom plans further capital expenditure to cover new projects and new towers, and improve infrastructure and connectivity for its clients. Amupolo said the company will also roll out smart technologies, including lamp poles, making it part of the smart city revolution.

"Our intention is to diversify into areas beyond passive infrastructure and tap into active infrastructure in continuing to be at the heart of connectivity across the continent.

"PowerCom is of increasing relevance in the booming Namibian telecoms industry, yet we have so much more potential. We'll continue to serve as a one-service and central point for all infrastructure demands and requirements in the market while looking at exploring other shared models such as data centres and fibre opportunities.

"We are even examining the prospect of providing energy solutions around our sites as a value addition and upgrading our security to incorporate world-class technology, allowing remote site monitoring, tracking access and improved reporting and business intelligence.

"PowerCom plans to evolve with the market, giving clients the stability to use our infrastructure and value-added services to improve their own competitive edge. It's an exciting time to be involved in the African telecoms industry, and we relish the changes that the future will bring to our sector."



**Lux Maharaj,
Sales director for
Southern Africa,
Parallel Wireless**

Lux Maharaj was appointed as Parallel Wireless' sales director for Southern Africa in December 2017. This followed a career with Intracom Telecom⁴ where he led the company's exponential growth in Africa for the past three years.

Maharaj has been focused on assisting operators and ISPs realise growing revenue streams from African corporate and enterprise markets. As a professional electrical engineer with more than 20 years in the telecoms industry, he has held positions at Ericsson, Alcatel-Lucent, and various system integrators working with mobile and fixed operators on the continent.

Headquartered in the US, Parallel Wireless has African sales offices in Ghana and South Africa, as well as active deployments in Ghana, DRC, Senegal, South Africa, Gambia, Nigeria and Tunisia. In his new role, Maharaj said his personal goal is to assist the region's governments realise their universal service obligation of bringing cost-effective connectivity to every person – even in the most remote and underserved rural areas.

"We hope to make some of these engagements public soon. Africa is a significant market for us, and we firmly believe our products and solutions are ideally suited to enable service providers to provide services at affordable rates to their subscribers, while at the same time ensuring profitability for themselves."

According to Maharaj, Parallel Wireless' products are based on what he describes as a "unique approach" of rethinking the way a cellular network is designed. "We adopt a total solution-based approach for 2G, 3G, 4G and 5G in the future, which helps us to empower telcos to better address the challenges of costly and complex install and maintenance.

"Mobile telephony is changing Africa for better. Once called the 'Dark Continent', the mobile revolution has illuminated the possibilities of economic prosperity in Africa. According to the GSMA's *Mobile Economy Africa Report 2016*, mobile technologies and services generated 6.7 per cent of GDP or USD150 billion in 2015, and this is further likely to increase to 7.6 per cent or USD210 billion, by 2020 as mobile services increase productivity.

"The launch of several new mobile broadband networks recently is a key driver of this trend. The ever-increasing demand for internet services coupled with a drop in the prices of devices is further fuelling this growth. Not surprisingly, mobile has emerged as a platform of choice for

⁴ See The African Wireless Communications Yearbook 2017, p56.

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consuming innovative digital solutions and services in Africa. The expansion of advanced mobile infrastructure in the region is also inspiring local and global innovators and tech entrepreneurs to come up with mobile-based solutions. It is no coincidence that Africa Internet Group or Jumi, the continent's only 'unicorn' (a private company with more than USD1 billion revenue), leverages internet technology."

Maharaj believes Africa poses varied and unique challenges for service providers, the first being severe lack of basic infrastructure in most countries. "Persistent and long power outages hamper service providers from offering more comprehensive coverage and seamless services. In the absence of continuous power supply, telecom operators fall back on the use of generators which significantly increases their operational costs.

"Being mostly an underdeveloped region, ARPU in Africa is lower compared to other markets. Operations at such low ARPU are difficult to sustain given that the cost of setting up and maintaining networks is very high. And increasing the tariff beyond a limit is not an option for the service provider as the subscriber's spending capacity remains limited – the GSMA report quoted earlier suggests that countries in Africa have among the highest total cost of mobile ownership as a proportion of income, particularly for those at the bottom of the income pyramid.

"Mobile operators in Africa need to come out with new strategies to arrest the falls in fortune. Copying network strategy which worked in developed markets may not work here. So they will have to leverage technological solutions and breakthroughs to offer services at affordable prices for the majority of the population.

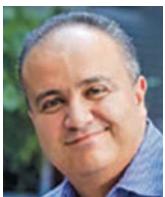
"They can do so by using innovative technologies to cut cost. [For instance], cloud computing and automation provide immediate solutions to keep costs lower. Cloud allows service providers to use the basic infrastructure of a third party to offer their services without having to spend a fortune to begin operations.

"Small form-factor solutions, which are easy-to-install and support many technologies on the same platform, can further bring the cost down for service providers.

"However, unless these countries provide the infrastructure, there is limited scope for innovations. If governments cannot deliver these infrastructures on their own, they must allow new players into the market who may come up with their own support, like optic fibre, and rent it to existing players.

"The same can be done to address the power outage issue. New and alternate power solutions like solar and wind energy may help tackle this problem in many areas."

Maharaj concluded by saying Parallel Wireless' "radically different approach" includes products that are easier to deploy and designed to significantly bring down the expense of network deployment and maintenance. "In keeping with the challenges identified above, our products usually have a small form factor and try to maximise the use of available resources. We extensively use automation and software as much as possible to ensure simplification and ease of deployment of our products."



**Mohamed
Abdelrehim,
MEA head for end
to end sales &
solutions,
Nokia**

// 2017 was a busy year for Nokia in Africa. As mobile subscriber penetration continues to grow, operators are moving swiftly to roll out 4G technology. The emergence of the IoT and a keen interest in 5G are key drivers for our business going forward and this has been evident in the several new deployments we announced last year."

Abdelrehim said that these deployments included implementing *Customer Experience Management (CEM)* solutions to fuel MTN's transformation to subscriber-centric operations, increase efficiencies, optimise services and deliver a "superior" customer experience. Nokia also implemented and carried out a commercial LTE launch for Vodacom Tanzania. Abdelrehim claimed this has enabled the operator to deliver "world-class" mobile broadband services to subscribers.

"We also signed an MoU with Vodacom to jointly conduct lab and network trials of new services and business cases using Nokia 5G technology in South Africa. And in Rwanda, we deployed smart city systems for the government to enable the delivery of public-safety, waste-management, utility and healthcare services [see page 52].

"Nokia also continues to invest significantly in skills development in the region by supporting and participating in various initiatives. One such example was *CodeBus Africa*, a 100-day tour connecting Finnish and African innovators as part of Finland's official 100th-anniversary celebrations. The *CodeBus Africa* journey covered ten countries in total – Ethiopia, Ghana, Kenya, Mozambique, Namibia, Nigeria, South Africa, Tanzania, Uganda, and Zambia. At every stop, the team – in collaboration with Aalto University, the Finnish Embassy and several African tech hubs, schools and private companies – taught music coding and creativity to local young people, especially girls.

"Another initiative Nokia has been involved in on a global scale is *Green Light for Girls*. Here, girls aged 11 to 15 from schools in less advantaged communities are engaged and exposed to hands-on science and technology workshops and activities.

"Nokia also presented cost-effective solutions for rural connectivity using GSM. Our end-to-end portfolio includes Single RAN Advanced radio products, as well as solutions for sites, backhaul, power and energy. Basic connectivity solutions based on 2G can be upgraded to 3G and LTE when demand grows."

Abdelrehim said overall subscriber penetration is still growing in Africa, especially on the mobile side. "According to the GSMA, penetration in sub-Saharan Africa is forecast to grow from 44 per cent in 2016 to 50 per cent by 2020. We are also seeing a much faster adoption of smartphones in sub-Saharan Africa, with the GSMA predicting numbers to grow from 28 per cent in 2016 to 55 per cent by 2020.

"Access to the internet continues to be predominantly over mobile on the continent and this is where we are seeing an acceleration of 4G deployment overall. To put that into perspective, according to the GSMA, LTE was only two per cent of subscriber rates in 2016. But by 2020, this number is anticipated to grow to 12 per cent. So we see a stronger acceleration of LTE with the network being deployed as we speak. Nokia is currently involved in several LTE network rollouts with the large operators on the continent."

Having said that, Abdelrehim pointed out that 3G is still the predominant technology in the region, and that 2G has yet to totally disappear and will remain strong for years to come.

But in the meantime, he said the next wave of technology is also emerging, particularly in South Africa, where Nokia announced one of the first G-Fast deployments with Telkom in 2016. "This shows that fixed technology remains very important to Nokia in South Africa, and we are seeing some growth in terms of FTTx technology in some parts of Africa. So, I would say that the future still isn't truly mobile."

"The IoT is also emerging on the continent. While it is still very nascent in Africa, some operators here have already made an announcement around deploying networks that will enable narrowband IoT technologies. These are optimised in terms of battery life and coverage for IoT. That is something very specific to emerging markets like Africa, where the use cases may not be the same as in more mature markets."

On the subject of unique challenges for emerging markets, what will the continent need to watch out for over the course of 2018? Abdelrehim said that despite the price of smartphones dropping, there is still a cost barrier to putting such a device into everybody's hands.

"While the industry is bringing economy of scale, we still see an economic barrier. Although the United Nations provides a guideline that the most affordable data packaging pricing should stand at around four to five per cent of monthly GDP per user, the economics and the need for operators to

monetise their networks means that overall mobile data and smartphone prices are still a bit too high. This has created an affordability barrier that must be overcome in Africa.

"The region can also be subject to political instability. Telecoms is a very capex intensive industry, particularly in this part of the world, and companies require access to financing and are sensitive to exchange rate fluctuations. In certain parts of the continent, that also creates export challenges for operators, making it difficult to get access to financing in order to fund the necessary investment to monetise their infrastructure."

"The industry also relies on a very scarce resource: spectrum. It is critical for the regulatory framework to enable and drive the adoption of mobile broadband by making spectrum available. By this, we mean the spectrum that is relevant for the technology requirement, that the process of assigning is fair, and that the operators have access to the same resources in a way that makes economic sense."

Challenges aside, what are Nokia's hopes and plans for Africa over the foreseeable future? Abdelrehim said two years have passed since Nokia purchased Alcatel-Lucent and that it is now reaping the benefits of what he claimed is a "truly end-to-end portfolio".

"Because of market changes and the keen interest being shown by the industry to move towards the adoption of 5G, this is the dawn of a very exciting era to see how fast we can bring this technology to Africa. Nokia has showcased a live 5G demonstration using commercial hardware and use cases such as our virtual reality camera at AfricaCom and at CairoICT.

"We have an ambitious plan to shape the future by expanding the human possibilities of technology in Africa and connecting the unconnected, pushing the limits of performance to bring services to people instantly and effortlessly."



**Mahmoud Oubrahim,
Regional director
Africa,
EXFO**

EXFO specialises in network testing, analysing and monitoring, and says that 90 per cent of the world's top CSPs use its solutions. In February 2018, the company added Astellia's mobile network and subscriber analysis products to its portfolio following its acquisition of the France-based company in a EUR25.9m deal.

Mahmoud Oubrahim said EXFO has been working in Africa since 2003, with major groups such as Orange, Veon, Airtel,

as well as local operators leading their home market. "Our market share on passive probing is above 30 per cent and we have over 30 active customers. As the continent developed, the need to better understand the changes in the business model of our customers led us to look for an improved customer intimacy. To increase this, and understand deeply the changes the MNOs are experiencing in their business model, we opened an office in Casablanca in 2016, which followed one that we had opened in South Africa in 2012."

"We cover this diverse continent with a specific approach to major countries from Morocco, Algeria, Tunisia to Zimbabwe and Mozambique, all along through Ivory Coast, Nigeria, etc."

"We started working in Africa supporting our customers in their efforts to enhance the network quality and availability for their subscribers. We moved forward with the MNOs during the last half decade towards understanding subscribers' behaviour."

"More specifically during the last year, several mobile operators moved their internal organisations to put the subscriber at the heart of their strategy and processes. We supported them deploying CEM platforms, gathering different teams to work around the same platform with unique value outcomes for each. Technical KPIs

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CELLULAR NETWORKS: INTERVIEWS

tend to be read through the subscriber experience prism. Some call centres have been equipped with a solution allowing the staff to know, in real-time, the activity and the nature of issues encountered by subscribers on the line.

"Following those efforts, the majority of MNOs are enhancing their network operations centre to create a service operations centre. That is specifically important for Africa. The operators do not have the luck to enjoy healthy ARPU, which leads them to be quite innovative in developing new revenue streams. These emerging streams are facilitated by the fact that the mobile connection, in most of African countries, is the unique communication link for subscribers. Creating innovative day-to-day subscriber services, like mobile money, knowledge sharing, logistics services, allows MNOs to be more relevant to their customers and generate new revenues."

Oubrahim said the specific challenges African operators are encountering are related to the short term return on capex needed to offer services that remain highly relevant to the market. He said low ARPUs place great pressures on MNO budgets, and that the tight availability of cash coming from the market leads them to consider each project, even from the technical side of the network, as something that has to deliver a high impact on the business' KPIs.

"On the other hand, the mobile being at the heart of communications for each subscriber, gives a unique opportunity to the MNO to generate additional revenue through services which are highly relevant to, even though those services would have not been considered as naturally belonging to the telecoms industry in other parts of the world.

"For example in Zimbabwe, the biggest bank based on the number of individual subscribers is a mobile operator. And in some Western African countries (Senegal, Burkina Faso) the announcement of a birth could be done via a mobile app. These are simple examples of how mobile services are relevant to local market needs and have an impact on subscribers' daily lives."

What are EXFO's plans for the continent in the coming months, particularly now that it can also offer Astellia's products?

"Thanks to the Astellia acquisition, EXFO has the scale and differentiation to become a major player in the global service assurance market (passive and active). We are in a unique position to cover a large part of the MNO technical value chain.

"Fibre deployment is changing the game in Africa and we are very well positioned to support the efficiency and the quality of those projects. Moreover, our analytics capabilities around customer experience management, customer value management and services monitoring allow us to climb that value chain to make a unique impact on the business side of fibre.

In short, we can make the investments of our customers more efficient by showing them the right spots with the right coverage, enhance the quality of their network and services, decrease the churn by being more relevant to their subscribers based on their own usage, thereby allowing the MNO to develop new revenue streams.

"Continuously decreasing smartphone prices, the massive deployments of new mobile and wired technologies, together with the specific unanswered needs from the subscribers in their daily lives, all put the operators in the best position to profitably support the development of the whole continent. Here, the MNO can be the bank, the assurance company, the distribution network, the platform for e-health, e-education, etc. No other industry in Africa has the same access to the population and a better knowledge of behaviours, constraints and aspirations. It is a unique position for our industry across the globe.



**Biren Sasmal,
CEO,
Subah**

West Africa has seen a number of home-grown tech companies emerge over the past few years, such as fibre and data centre service provider MainOne and online retailer Jumia. The Subah Group classes itself among these players and currently ranks as the eleventh largest African tech firm by revenue according to figures from *The Financial Times' Equity Screener*.

For CEO Birendra Sasmal, an Indian ex-pat who has been based in Ghana for the past seven years, 2017 was both a personal and professional success. He was named international businessman of the year at the annual *Asian Achievers Awards* in recognition of his work in building Subah into a thriving IT, telecoms and manufacturing company with operations across West Africa.

Today, the company offers multiple services including local call, mobile and international gateway monitoring and rural telephony, and also operates an assembly plant in Accra. However, it is in the area of revenue assurance that the company is said to have really made its mark.

"Revenue assurance issues tend to be bracketed in the unglamorous category of network maintenance and expansion," said Sasmal. "However, with operator revenues continuing to be squeezed, minimising leakage is now high on the agenda of both CEOs and CTOs across Africa."

Subah has ongoing revenue assurance contracts from regulators in Equatorial Guinea and Sierra Leone as well as from the Government of Ghana. In particular, its SIM box anti-fraud system is credited with generating an extra USD1m in revenues every month for operators in Guinea with USD300,000 in extra taxes for the government.

These financial rewards run alongside reductions in network congestion, improved QoS and greater transparency in cell planning and spectrum management issues.

In 2017, the company launched a number of new revenue assurance products in response to specific demand from existing and potential operator customers. It said that the most notable of these is the *Mobile Money Monitoring* suite of tools. These have been specifically developed to provide authorities with the full visibility they need to protect consumers against fraud and identity theft, and tackle tax evasion, money laundering and revenue leakage.

For Sasmal, the challenges for Africa's wireless industry are clear. Among the issues, he said most governments do not carry out periodic reviews of their national communications act and policies.

Sasmal also believes that national spectrum is not being managed effectively, and that there is not enough consideration of new technologies, innovations in spectrum management techniques, consumer demands for new services, and regional and international developments.

"Practices are mostly still based on early wireless and radio technology capabilities. In particular, evolving spectrum issues as a result of proliferation of wireless technologies are not being addressed. There are few African representatives and experts in international telecommunication conventions and regulatory bodies which means that best practice is not being shared across the continent.

"Furthermore, varied legal, regulatory and tax frameworks in African nations make it more difficult to expand outside a home country. There is a lack of central coordination and resources to analyse and solve common problems, for example, interference between the wireless networks of neighbouring countries.

"Furthermore, unreliable power supply system across most regions as well as widespread theft of network equipment absorb time and money that operators should be using to expand their networks and services."

Sasmal is also particularly concerned by the lack of home-grown IT talent, citing Subah's ongoing difficulties in recruiting programmers and experienced project managers across West Africa. He added that the company has a pro-active CSR programme focused on education and training young people, and has established six ICT training and resource centres across Ghana with jobs and internships guaranteed to successful graduates.

Sasmal remains optimistic about the potential for growth in both his adopted home country as well as across West Africa: "In 2018, Subah will continue to invest in rural connectivity and work with governments to improve revenue assurance across the entire telecoms market. It will be expanding its operations to Mozambique, Nigeria and Tanzania." ■

Moving Wireless Forward

Mobile Mark is a leading supplier of innovative, high performance antennas to wireless companies across the globe. We've been in the wireless industry for over 30 years and have our roots in the early Cellular trials. We have grown and evolved over the years, along with the industry.

Today, we benefit from enhanced design capabilities and expanded production capacity – along with a greater understanding of new and emerging markets – all of which have allowed us to become one of the best antenna developers in our field.

Our customers have been our partners throughout the years. We believe in taking the time to understand our customers' individual needs. Through close consultation with clients, we are able to deliver innovative, tailored solutions that meet specific antenna requirements.

Rapid prototyping capabilities allow us to take our designs from concept to reality in an extremely short time span, and to verify the performance of the antenna. A variety of network analyzers and an anechoic chamber enable us to conduct measurements up to 13 GHz, and ensure that the antennas designed meet or exceed customer requirements.

We have onsite injection molding equipment and a fully equipped modeling shop staffed with skilled model makers to assist in the design phase and help us come up with a superior product – an antenna that not only meets the customer's electrical specifications, but is also very attractively packaged.

Mobile Mark antennas are used in many sectors of the wireless industry. Here are just a few examples:

Asset Tracking & RFID

Managing and tracking important assets can be a challenge in the field, and both RFID and WiFi offer effective wireless solutions. RFID / WiFi technology allows us to identify, monitor and track items ranging from medicine to fruit to parcels to people. Since each application has its own challenges, Mobile Mark offers a range of antennas so network developers can choose the right mix.



We are now looking for distributors throughout Africa

Commercial Fleet Management

Mobile Mark has consistently lead the industry with the most extensive and innovative range of antenna solutions that combine multiple wireless technologies: from simple GPS & Cellular antennas to complex 6-cable antennas combining LTE MIMO, WiFi MIMO, DSRC and GNSS in the same antenna housing. This combination of wireless technologies allows fleet owners to track and/or redirect their fleets of cars and trucks for optimum efficiencies. Mobile Mark antennas are rugged enough to handle tough environments and efficient enough to maintain reliable connections.

Public Transit & Bus Management

From monitoring the location of the bus to monitoring the condition of its tires, wireless has become an essential part of professional bus management. Mobile Mark's multiband antennas allow the system to capture that information and transmit it back to a central monitoring station with real-time connectivity. For an added touch, real-time WiFi service can also be added for the passengers. That's why companies like INIT have selected Mobile Mark antenna to complete their product offerings. And they have made the following endorsement:

"INIT GmbH – as a worldwide leading supplier of integrated planning, dispatching, telematics and ticketing systems for buses and trains – uses Mobile Mark bus antennas in public transportation projects all over the globe.

For example: INIT has installed Mobile Mark antennas in projects located in Abu Dhabi, Hertfordshire UK, Turku Finland, Oslo Norway, Montreal Canada, Luxembourg, as well as several German projects.

In 2017, a fleet of more than 1,500 buses will have Mobile Mark Antennas installed in one of INIT's

current major projects for National Express, West Midlands, UK."

Remote Monitoring & Surveillance

Surveillance plays an important role in maintaining secure settings. Network deployments need to be low maintenance and weather resistant. Broadband surface mounts offer flexibility for multi-frequency coverage and are rugged and dependable. YAGI antennas provide practical point-to-point coverage. Our antenna solutions are designed to handle tough conditions while providing the reliable wireless connection you would expect from a Mobile Mark antenna.

Mining & Exploration

Modern mining operations rely on a battalion of vehicles, ranging from massive extraction vehicles to modest-sized material transport trucks. These vehicles operate in tough environments where high vibration is a frequent wear and tear challenge. Mining companies throughout Africa have relied on our rugged, foam-filled mobile antennas for consistent connections. Mobile Mark's infrastructure antennas have been used for rapid deployment and redundancy coverage for effective wireless coverage in isolated settings.

Smart Cities & Smart Highway

For cities and highways, the lynchpin of a successful "Smart" system will be dependable wireless connections. Companies like Kapsch understand this, and have worked with Mobile Mark to find ideal antenna solutions. Wireless networks must reach seamlessly into hard-to-cover corners of city intersections and along vast expanses of highways. They must be carefully embedded in city lighting and electrical meters. Mobile Mark offers both small network infrastructure as well as embedded antenna elements to help network designers tie all the pieces together.

Let us know how we can help

We understand the RF wireless world and are ready to help you evaluate your options. Contact us by email, phone or fax and let us know how we can help.

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Communications

This segment consists of the Mobility Infrastructure, Customer Experience Management, Service Assurance and Automation Platform Technologies lines of business.

This segment's solutions enable the measurement of network performance and customer experience periodically and the rapid diagnosis of detected or reported network performance and customer experience problems.

Its purpose is to provide active testing and analytics in the operational network, with a focus on wireless service providers. Active test assurance helps customers stay ahead by reducing operating costs while maintaining the quality of service and user experience. It enables the real-time assessment of the network, allowing faster fault fixing and giving insight into the users' experience.



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chapter 3

Value-added services



**Brian Richardson,
Co-founder &
group CEO, WIZZIT
International**

Financial inclusion is a key enabler of sustainable economic and social development. Initiatives by the United Nations and the World Bank Group continue to drive financial inclusion and it has become a priority for regulators and policymakers worldwide. Out of 7.5 billion people and a mobile phone in almost every pocket, two billion adults worldwide are unbanked. Financial service providers (FSPs), fintechs and mobile network operators offer superior solutions to bridge the gap. However, despite the size, reach and power of banks and MNOs, little impact is being achieved on the number of unbanked people which remains essentially unchanged over the last decade which is shameful.

Regulation is often blamed as a major barrier. What doesn't help either are statements from European Central Bank executive board member Yves Mersch who has given a spirited defence of cash, praising its ability to facilitate privacy, equality and security, insisting there is "no viable alternative". India has spent more than USD1bn to acquire 500 million mobile wallet users – the majority of whom are previously unbanked. A tightening of compliance regulation means that 40 per cent of these accounts will be closed. Paytm has allocated USD500m to get the KYC (know your customer) correctly done for 280 million users. Perhaps most of these customers will simply say 'it is easier to stick with cash'...

Digitalisation is the key to financial inclusion. Basic transactional accounts should be a birthright, together with a concerted effort by governments to remove cash and to support every effort towards financial inclusion. Illegal

and illicit activities such as money laundering and funding of terrorist activities are facilitated predominantly through cash. The sooner we accept this fact the better. What is urgently required is the removal of cash and the enforcement of policies that promote simple and seamless access to bank accounts for all. This provides full audit trails of every single transaction. Digitalisation will go a long way to making a meaningful difference.

So Does this mean the creation of digital only banks? McKinsey believes there are five routes to digitalisation that a bank can adopt:

1. Go it alone and transform existing operations. But this is not easy to do, and is very expensive and time consuming.
2. Build a digital bank which could cost close to USD100m.
3. Partner with a specialist fintech. This can be achieved in a matter of months at nominal costs.
4. Partner with a telco/MNO. There are very few success stories here and failures have been very expensive.

Telcos/MNOs have the reach and understand the power of marketing. Banks understand compliance and systems. Fintechs such as WIZZIT can work effectively with both operators and banks in providing digital financial services.

The bulk of mobiles in developing regions are feature phones and the USSD channel provides functionality that is quick, safe and easily accessible from all handsets. For the vast majority, USSD will remain the clear channel of choice for many years to come – it is the most successfully integrated and widely adopted technology for financial services in emerging markets and the lower end of the market.

However, instead of embracing mutually beneficial partnerships, mobile operators in some countries refuse to give banks access to their USSD gateways. These MNOs think

that by denying banks access, they can create a bigger market for their own financial service offerings. This is most evident in countries like Angola and the DRC where the unbanked populations are 71 and 89 per cent respectively. This abuse of power is tantamount to anti-competitive behaviour and is creating a major barrier to financial inclusion, something communication regulators should be aware of. The lack of progress in these and other emerging markets may well be the result of the prejudiced practices of telcos gatekeeping access to the USSD gateway.

As smartphones become more affordable, so will the popularity of app-powered platforms as a channel for financial services. However, until there is a dramatic decrease in the cost of smartphones, the number of feature phones will remain at around 70 per cent in developing markets. USSD is still therefore critically important and banks will depend on MNOs for access – unless (and as has happened in some markets) banks get their own MVNO license and control their own destiny. [Editor's note: such as Kenya, for example.]

"Basic transactional accounts should be a birthright, together with a concerted effort by governments to remove cash and to support every effort towards financial inclusion."

VAS: INTRODUCTION | YEAR IN REVIEW

It will be argued that banks cannot be all things to all people and effectively service all segments of the market. It will also be argued that financial regulators are not there to protect banks from innovative competition from non-banks such as MNOs, Apple, Samsung, Google, Amazon, PayPal and Alipay. However, governments and global agencies are putting enormous pressure on banks to drive financial inclusion and this is taking on increasing importance.

The mobile banking industry globally started some 12 years ago with WIZZIT (South Africa), M-PESA (Kenya) and GCash (Philippines) recognised as the early pioneers. It is interesting to note that there has not been a single successful partnership between banks and MNOs despite numerous attempts. Perhaps a truly strategic collaborative model is still way off and competition between banks and MNOs is here to stay – at least for the foreseeable future. The question is whether or not this competition is supporting global efforts on financial inclusion through digital financial services.

Customers are demanding digitalisation: they want a safe place to keep their money; they want to be able to access it; they want to be able to make payments; and they want to be able to build a financial track record so that they can avail of credit when they need it. To do this, they certainly do not need to go into a branch. As someone once said “banks are dead – long live banking”. If banks do not respond the chances are, much like the post office, they will have great infrastructure with very few customers and relevant products. Some opinion leaders are even giving the banks a lifespan of five years if they do not re-invent themselves and embrace the digital age.

The way forward

Digitisation and mobile penetration will continue to drive the growing trend of MNOs and FSPs infiltrating each other's space to gain traction in new services. However, these rapidly blurring lines are bound to spark territorial

claims regarding customers. This could impede financial inclusion if it lacks the required consumer protection measures and regulations.

The next major wave is around e-commerce and online shopping. Retail stores globally are closing rapidly. Almost 50 per cent of the world's population are totally excluded from this convenient and cost effective way of shopping because they do not have the means to pay – e-commerce and online shopping simply do not work with cash. However, of the currently banked people with access to credit cards, 50 per cent do not shop online because of the fear of fraud and their credit card being skimmed. Hence the introduction of a virtual card gives banks and FSPs a massive opportunity.

Governments must regulate competitive behaviour amongst all role players and promote cross-sector collaboration towards financial inclusion. It is essential for countries to enforce policies that promote responsible financial access, financial capability, innovative products and delivery mechanisms. Any initiative that promotes financial inclusion should be praised and much work needs to be done.

McKinsey go on to claim the global benefits of financial inclusion include:

- ◆ An additional 1.6bn financially included people
- ◆ An increase in deposits of USD4.2tn
- ◆ An increase in credit of USD2.1tn
- ◆ The creation of 95 million jobs
- ◆ A six per cent GDP increase of USD3.7tn

This is surely an opportunity that banks quite simply cannot ignore. And if they do, others certainly will not. ■

Brian Richardson is the co-founder and group CEO of South Africa-based WIZZIT International. He is recognised globally as a disruptive innovator in the financial services space, and has fostered powerful partnerships with major FSPs around the world to advance mobile banking technology. The above article is based on his blog that was first published at www.wizzit-int.com in February 2018 and is reproduced here with kind permission.

MFS dominate African VAS

Mobile financial services and mobile money in particular, continued to dominate the continent's value-added services market last year.

2017 was a milestone for **Safaricom** which marked 10 years since the launch of *M-PESA* in Kenya. In early March, the operator published the findings of a study carried out by KPMG which used ‘Social Return on Investment’ principles to evaluate the impact of the mobile money system. It revealed that the social value generated by *M-PESA* grew from KES83m (USD851,702) in 2007 to KES184bn (USD1.8m) by the end of March 2016. According to the research, *M-PESA* customers were the biggest beneficiaries of this social value, receiving a return in value of KES160bn (USD1.5m) as a stakeholder group in the financial year ending 2016.

Speaking at the time, Neil Morris, climate change and sustainability director at KPMG South Africa, said: “Although Safaricom earns growing revenues from the *M-PESA* product, the social value it has generated for customers continues to exceed the financial benefits to Safaricom in each of the years since its inception.”

The study also found that the platform had attracted 20,000 customers when it was first introduced in March 2007. By March 2016, the service had more than 16 million users, while the value of transactions rose from KES10.3m (USD101,764) to KES5.2tr (USD5.1bn) over the same period. Safaricom added that KPMG's report complemented recent findings



Since its launch in March 2007, it's claimed *M-PESA* has lifted 194,000 Kenyan households out of extreme poverty.

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JANUARY 2017

UK-based digital money transfer provider SimbaPay has launched its money transfer service to Ghana and Uganda. Using the SimbaPay app or website, people living in Europe can now send money to users in the two countries instantly. Transfers are credited within seconds to the recipient's mobile money wallet. SimbaPay also delivers money transfers via mobile money and bank accounts to other African countries, such as Nigeria and Kenya, and says that more destinations and partners are being sought for addition in 2017.

FEBRUARY

Mobile users in Zambia will be able to receive regular updates on their favourite celebrities and sports clubs following Zamtel's launch of Kirusa's *InstaVoice* services. Using the voice blogging feature, celebrities can record voice messages which are delivered instantly to fans, creating what Kirusa describes as a “voice Twitter-like experience”. Subscribers can also opt for a sports content service to receive daily football alerts and updates from their favourite clubs. Content include team news, pre- and post-match analysis, and quotes from players and managers.

MARCH

In a study carried out on behalf of the Communications Authority of Kenya (CA), consultancy firm Analysys Mason reportedly recommends a “functional separation” of Safaricom's mobile money service from its core telecoms business. The CA issued a press statement which said that it has no intention of taking such “drastic” actions that would create disruptions to potentially destabilise dominant market players, and that it did not regard dominance in any market segment as an offence.



Customers use the Ecobank Scan+Pay system with mVisa by scanning a QR code at the point of sale with a smartphone, or entering a unique merchant identifying code into their feature phone.

by economists from MIT and Georgetown University in the US who found that M-PESA has so far lifted 194,000 Kenyan households out of extreme poverty.

Given the need to ‘bank the unbanked’ in developing markets, two of what could be arguably described as the world’s most famous multinational financial services corporations have been ramping up their activities in Africa in recent years.

For instance, **Visa** and Ecobank joined forces in what they said was a strategic tie-up that signals interoperability on a cross-border level. They launched Ecobank’s Scan+Pay system with mVisa solutions across 33 African countries, enabling consumers to use their mobiles to directly access their bank funds for person-to-merchant or person-to-person transactions.

It’s claimed the combined system delivers instant and secure cashless payment for goods and services. Customers use the service by scanning a QR code with a smartphone, or entering a unique merchant identifying code into either a feature phone or smartphone. The payment goes straight from the customer’s bank account into the merchant’s account, and provides real-time notification to both parties.

Ecobank said the new service will accelerate digital commerce and overcome some of the challenges merchants have faced using traditional point of sale systems, such as the cost of installation and the need for electricity and internet connectivity.

Ecobank mVisa solutions also allow users to send money instantly to any Visa cardholder

worldwide. The companies said that this was a “major innovation” that serves the need of Africans living overseas, enabling them to send money home quickly and securely.

Not to be outdone by its rival, **Mastercard** promised to “empower” more than 150,000 micro, small and medium enterprises (MSMEs) in Kenya in 2017 by giving them access to its *Masterpass QR* system.

The company said MSMEs have traditionally struggled with the cost of installing payment infrastructure such as POS devices, as well as with issues of security surrounding payment. It claimed *Masterpass QR* (Quick Response) combats these challenges in a “simple and user-friendly” manner, helping to stimulate the economy by digitising a sector previously solely dependent on cash-based transactions.

In Kenya, the company began introducing its mobile solution via various mobile banking applications in February. This enabled consumers to pay for in-store purchases by scanning a QR code displayed at the checkout on their smartphones, or by entering a merchant identifier into their feature phones.

Mastercard said *Masterpass QR* can be used at any supported location across Africa. Along with Kenya, the system is already available in Rwanda, Tanzania, Uganda and Ghana, as well as in Nigeria which was the first market on the



MatchMove and YouTap’s solution enables cellcos to issue Mastercard companion cards to mobile money users.

continent to see the launch of the platform in September 2016 following a partnership with the Ecobank Trans International Group.

Mastercard’s global goal is to connect 40 million micro and small merchants to its electronic payments network by the end of 2020. By then, it reckons *Masterpass QR* will have been rolled out to 33 countries across Africa.

In a separate move, Mastercard is helping **MatchMove** to provide **YouTap**’s customers in Africa and Asia with an off-the-shelf payment acceptance solution for mobile money wallets. Founded in New Zealand in 2007, YouTap is a global provider of contactless mobile money payments and financial services software. Airtel and MTN are listed as among the MNOs in Africa that use YouTap Pay, its mobile money payment processing platform.

The firm has integrated MatchMove’s secure mobile wallet solutions with its platform for the acquisition, processing and settlement of credit, debit and pre-paid cards linked to a mobile money wallet. The combined solution enables MNOs to issue Mastercard companion cards to their customers. Cards can be branded and integrated with the cellco’s current mobile wallet app, and allows users to buy products online and in stores.

According to the partners, there is growing global demand for Mastercard companion cards connected with mobile money accounts. Shailesh Naik, CEO of Singapore-headquartered MatchMove, said: “Our partnership with YouTap will expand the availability of our secure cashless solutions for mobile operators around the world, thus creating a new channel to bridge the gap between mobile money and end users.”

As well as offices in Asia and the US, MatchMove planned to open new premises in South Africa and Dubai to support its global growth.

In a separate development, Mastercard also launched **2KUZE**, a digital platform that connects smallholder farmers, agents, buyers and banks in Kenya, Uganda and Tanzania.

APRIL

FreeConferenceCall.com has launched in Tanzania to give families, businesses and communities instant access to simple conferencing services for free. The cloud-based technology aims to save users money in long-distance fees. Once they have created and activated an account using their email and password, users can invite up to 1,000 participants via phone or VoIP with in-country dial-in numbers. Video conferencing and screen sharing can be added by downloading a collaboration tool to host free online meetings. The firm said there are no hidden

charges and participants can talk for as long as they want, paying only standard local rates.

MAY

x-Mobility is helping to drive a major East African network operator’s quest to extend its subscriber base beyond its national boundaries and increase revenues. According to the UK-based mobile virtual network aggregator, its platform will enable the cellco to offer an OTT app that gives subscribers a local mobile number – wherever they are – through a virtual SIM. Local or international users can then make and receive calls or

texts from anywhere in the world at a flat rate without roaming charges and without the need to replace their existing SIMs.

JUNE

Tigo Rwanda has gone live with Ericsson’s ‘as a Service’ model for its complete BSS needs. The solution covers charging, billing, provisioning, mediation and roaming functionality, combined with advanced customer care and self-care solutions for management and ordering of services. Ericsson claims the partnership will enable Tigo to better serve its customers with new and innovative offerings together with

2KUZE (Swahili for ‘let’s grow together’) enables farmers to buy, sell and receive payments for agricultural goods via their feature phones. The platform aimed to bring the benefits and security of mobile commerce and payments to farmers in the three countries.

In an initial pilot scheme at the start of the year, **2KUZE** was launched in partnership with non-profit organisation Cafédirect Producers Foundation. The trial saw 2,000 small-scale farmers in Nandi Hills, Kenya using the solution to sell their produce and working with farmer-friendly agents to ensure they reach the right buyers for the best price.

“80 per cent of farmers in Africa are classified as smallholder farmers having less than 1·2 acres of farming land, making it extremely difficult to drive growth and prosperity within this community,” said Daniel Monehin, division president for sub-Saharan Africa and head of financial inclusion for international markets at Mastercard. “We believe that by using mobile, a technology that is so ubiquitous among farmers in Africa, we can improve financial access, bring in operational efficiency and facilitate faster payments.”

2KUZE was developed at the Mastercard Lab for Financial Inclusion in Nairobi which was set-up in 2015. Through an USD11m grant from the Bill and Melinda Gates Foundation, the lab is working with East African entrepreneurs and other stakeholders to develop local products rooted in what Mastercard says is its “global knowhow”.

Meanwhile in Nigeria, even legendary footballer Kanu Nwankwo signed up for some mobile money action by becoming the brand ambassador for Azimo. According to the UK-



Kanu, known as ‘Papilo’ to his fans, claimed Azimo was enabling Nigerians living abroad to send money back home faster and at “radically cheaper” rates.

shorter time to market, improved customer experience and increased operational efficiency.

JULY

Sub-Saharan Africa accounts for more than half of all mobile money deployments worldwide, according to the GSMA. In its latest *State of Mobile Money in Sub-Saharan Africa* report published in July, the GSMA says the number of live mobile money schemes in SSA reached 140 across 39 countries at the end of last year, accounting for more than half of the 277 mobile money deployments globally.

headquartered online digital money transfer service, as many as three million Nigerians receive money from overseas every year, with more than GBP20bn sent back home in 2015 alone. But it said that the fees charged by legacy providers were “very high”. Azimo claimed that it offers the best rates and zero fees to Nigeria, saving customers as much as 10 per cent. The company added that users can also send money from their mobiles, tablets or PCs to any bank in Nigeria in as little as six seconds.

To celebrate its partnership with the former Nigeria captain and Arsenal striker, Azimo pledged to make a donation to the Kanu Heart Foundation for every transaction sent to Nigeria.

March saw the launch of a new app in Uganda in an effort to drive what was described as a “crucial need” for insurance on the continent.

SureBuddy works on *Android* devices and is designed to be simple and easy to use. The app renders advertisements and the developer then uses the revenue this generates to reward the user directly with cover. The company claimed that the ad images are non-intrusive, use very little data, and disappear with a click.

SureBuddy initially started with a non-insurance product in order to build up consumer trust, as spokesperson Johan Basson explained: “Starting with screen cover means that clients will feel immediate gratification – when their phone screens break, they can have them repaired immediately. The only thing the user will ever pay for is an administration fee to the repairer of a maximum 10 per cent of the repair value.”

Basson reckoned this will make users feel “more comfortable” with the idea of insurance, adding that the initial purchase decision is easy because it’s free. “Over time, they can change to insurance products such as life cover, as their trust increases from this experience.”

SureBuddy implemented the first phase of the service by providing screen cover in conjunction with Phone Doctor. It has also partnered with Africell in Gambia, Sierra Leone, DRC and Uganda.

It says that there were 277 million registered mobile money accounts across SSA at the end of 2016, plus 1.5 million registered agents.

AUGUST

Safaricom has announced the availability of revamped APIs for its *M-PESA* service, providing the capabilities for anyone to build and deploy their solutions on top of the platform. The operator reckons these enhanced capabilities for developers will usher in an age of increased interconnectivity for the mobile money platform, which will support a wider range of

Bringing power to the people

In early 2017, **Orange** and France-based energy specialist **ENGIE** began work to deploy around 1,000 solar kits in Senegal, Côte d’Ivoire and Cameroon. Several villages in rural areas were identified to participate in the first phase of a pilot programme prior to a larger-scale rollout.

The kits include a solar panel connected to a battery that can be used to power LED lights, small electrical appliances, or recharge mobile phones. **ENGIE** is supplying the solar kits and is also responsible for installation and maintenance.

The kits also contain a remote control solution and a mobile payment system. **Orange** is ensuring the commercial deployment and management of billing via *Orange Money*. This enables customers to pay the rental charges for using the equipment, and allows them to pay by instalments rather than through an upfront investment.

The companies said the kits offer a low-cost alternative to kerosene lamps, disposable batteries or diesel-powered devices, which are all potentially dangerous pollutants.



The kits include a solar panel connected to a battery that can be used to power domestic appliances. Billing is managed via Orange Money.

In what was claimed to be a world first, in July we reported that a new solar electricity service was being pioneered in Nigeria. Designed and operated by Abuja-based **Lumos Mobile Electricity Service**, the *Yello Box* was launched earlier in the year and provides solar electricity which consumers pay for using their **MTN** mobiles. Customers can sign-up for the service at their local MTN shop. After paying a one-off fee, they receive a kit that comprises a large 80W

capabilities for several different partners.

SEPTEMBER

TerraPay and **Instant Cash** have teamed up to enable real-time cross-border money transfers to mobile wallets. A B2B company incubated by Mahindra Comviva, **TerraPay** has developed an interoperability engine to enable real-time transactions to be sent and received across diverse payment platforms and regions. **Instant Cash** customers can send remittances to mobile wallets run by rival operators in Tanzania, Nigeria and Uganda.



Thousands of people are using Lumos' system in Nigeria to power lights, TVs, mobiles, etc.

solar panel and cable, an eight-socket power unit, USB mobile phone adapter, and two LED lights. An “easy” self-installation kit enables users to mount the solar panel on the roof and connect it to the indoor power unit. They can then access electricity from the unit by making a payment via their mobile airtime. Once the payment has been credited, the service unlocks and customers can access electricity 24 hours a day.

Lumos claimed it was already benefiting more than one hundred thousand people in homes, clinics, schools and businesses across Nigeria. The company’s CEO Yuri Tsitrinbaum said: “The Y’ello Box saves customers money all while providing better and more reliable electricity. It’s time we did more to harness the power of the sun. That is why the Y’ello Box is changing so many lives. It is affordable, it is reliable, and paying by mobile phone makes it easy.”

In a separate development further south, MTN extended its partnership with energy and financial services firm Fenix International to launch pay-to-own solar home systems in Zambia.

The Swedish Embassy in Lusaka has committed nearly USD3m (SEK24.75m) to Fenix between now and 2020. The funding is provided as part of the *Power Africa: Beyond the Grid Fund Zambia* (BGFZ) initiative which is managed by the Renewable Energy and Energy Efficiency Partnership. BGFZ has been setup to accelerate private sector growth in clean energy generation and enable a million people to access such energy. USAID is contributing an additional USD750,000 to Fenix. Its support is provided as part of the *Scaling Off-Grid Energy: Grand*

Challenge for Development programme which aims to create up to 120,000 new connections in off-grid communities across Africa.

The Zambian launch represented Fenix’s first step to expand the availability of its ReadyPay Power system across the continent. This provides what’s described as “ultra-affordable” solar power to people living off-grid. They can buy the system with instalments of as little as USD0.20 per day via MTN Mobile Money until they have paid in full. Fenix uses these continuous micro-payments to generate a credit score, enabling customers to access additional system upgrades or financial services.

The two companies had already been working together in Uganda where it’s claimed that Fenix’s more than 120,000 customers have so far generated in excess of three million payments via mobile money.

Wane Ngambi, MTN Zambia’s head of mobile financial services, said: “In the past, MTN was focused on voice and then data. We’ve been working on unlocking the potential of MTN Mobile Money for many rural consumers who have gone without access to basic financial services for far too long.”

Fenix expects to reach 850,000 people living in rural Zambia by 2020. According to the firm, around 15 million inhabitants live without access to the electrical grid, representing 80 per cent of the total population and 95 per cent of rural residents.



At the heart of Fenix’s technology is the ReadyPay Solar Power system. Customers can purchase it by paying low-cost instalments via MTN Mobile Money.

“Over 90 per cent of rural Zambians lack access to electricity and have no options other than dangerous candles and kerosene lanterns to light their homes,” said Lyndsay Handler, CEO, Fenix International. “Ten years from now, we hope to eliminate the use of candles and be an important part of our customers’ lives across Zambia.”

She added that with MTN’s distribution networks, Fenix will be able to reach unbanked and off-grid customers. “Once power and credit are established, the possibilities to bring other life-changing products – from smartphones to financial services – are endless.”

m-Health

The Vodafone Foundation introduced a pioneering mobile-based HIV programme in Lesotho, where an estimated 23 per cent of the population is HIV positive.

The programme was developed in conjunction with the country’s Ministry of Health and was initially rolled out in the Maseru and Leribe districts. It combines Vodafone’s M-Pesa mobile money service with travelling clinics and a smartphone app designed for healthcare professionals which enables the tracking of patients in remote areas.

The clinics use a fleet of 4x4 vehicles and provide on-site HIV testing in remote areas as part of a wider effort to provide basic primary healthcare. When people are identified as HIV positive, they are immediately registered with the M-Pesa service and receive the funds needed to pay for transportation to a treatment centre.

At the same time, their details are recorded, via mobile, on a central database so that their future treatment and care can be planned and recorded. These details can then be recalled in real-time by healthcare professionals in the field using a smartphone app developed by the Vodafone Foundation and Vodacom Lesotho.

Following the first rollouts, the Lesotho government committed to launching the programme across all other districts and

OCTOBER

Accra-headquartered IT solutions specialist Subah reckons its *Mobile Money Monitoring Suite (M3)* protects consumers against fraud and identity theft, and tackles tax evasion, money laundering and revenue leakage. The standalone software is installed at the operator’s NOC and is designed to capture, analyse and record all mobile money transactions, including information about the sender, receiver and operator.

NOVEMBER

Lumitel has claimed a “giant leap” for

Burundi’s economy as subscribers can now pay government duties and fees via its *Lumicash* mobile banking service. Developed with the country’s Office of Revenue, the operator reckons *Riha OBR* via *Lumicash* will make life “easier” for citizens. It says instead of “waiting all day” in front of the OBR offices, subscribers can use their mobiles to pay taxes and fees remotely. But it adds that the service can only be used for “small” sums.

DECEMBER

Econet’s new pan-African media division

has launched a new IPTV video on demand service. It claims *Kwesé Play* will be “slicker and faster” than anything currently available on the continent. The firm will leverage Africa’s largest fibre network available through sister company Liquid Telecom which acquired Neotel in 2016. According to Econet Media, Neotel holds “leading-edge” 4G and 5G spectrum capability which is being configured to carry video. The company promises more than 100 VOD services including content from Roku, Netflix, YouTube, RedBull TV, et al.



The travelling clinics use a special mobile app and a fleet of 4x4 vehicles to provide on-site HIV testing in remote areas of Lesotho.

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integrating it within the country's primary healthcare strategy. It was expected to be fully funded by the government from mid-2017.

Meanwhile in West Africa, the local **Red Cross Society of Côte d'Ivoire** (RCSCI) launched a mobile app to spread awareness about its mission and activities. It also provides resource mobilisation opportunities to increase the organisation's membership and volunteer base, as well as tools to improve community engagement.

Founded in 1960, the RCSCI now has 12,000 volunteers throughout the country. It operates 50 local branches with an additional 26 first aid teams capable of rapid deployment in emergency situations.

Its new app supports mobile devices with *Android* and *Apple iOS*, and offers users a variety of features, including membership access to the organisation's services and benefits, as well as volunteer opportunities in local projects. It can deliver up-to-the-minute emergency alerts, both nationally and locally, as well as information such as locations of blood donation centres. In addition, users can register for training courses and events, access the organisation's news, purchase Red Cross equipment through a dedicated marketplace, etc.

The app was built in partnership with Connectik, a UK-based company that develops digital services for enterprise and large member organisations. Connectik also helps governments in the development of their digital policies. The RCSCI said it was encouraged to digitise its



The RCSCI App offers users a variety of features to support the Red Cross in Côte d'Ivoire.

operations and improve its services following the success of the apps Connectik developed for the Red Cross in Kenya and South Africa.

Boosting business and services

MTN Rwanda is using a system from **Digitata Insights** to enable new digital marketing channels on its network. Called *MeMe*, the platform has been developed to offer brands, advertisers and digital agencies the ability to reach out and engage with consumers.

It delivers selected marketing messages to MTN's subscribers on their mobile devices in "an unobtrusive manner", according to Digitata Insights. The company said its system has the ability to target consumers based on demographics, time of day and location, and that its "advanced" profiling capability ensures that the right person is targeted to help ensure messages are not viewed as spam. *MeMe* is also said to offer various engagement options including 'call me back' messages, surveys, app downloads and voucher offers, as well as customised methods such as bespoke gamification campaigns.

MTN's use of the platform came amidst heightened enforcement in Kigali of a 2013 by-law aimed at regulating outdoor advertising. This requires agencies to modernise billboards to improve safety, aesthetics and functionality. Digitata said *MeMe* therefore provides a modern digital advertising solution for MTN Rwanda.

In Egypt, **Orange** deployed **Openet's Real-Time Offer Manager (RTOM)** along with reporting tools in a bid to improve subscriber experience and increase data revenues. Openet claimed that the platform enables the operator (formerly Mobinil) to better target upsell offers to its users, thereby increasing uptake rates and reducing churn. The Ireland-based BSS specialist said its solution allows real-time offer presentation via intelligent contextual offer mapping.

Upsell offers are triggered by real-time customer context (e.g. usage information, application access, location, profile, etc.) in order to enhance their relevance. These are then sent in real-time to the subscriber's device and are presented by push notifications via Orange Egypt's self-care mobile app.

Openet believes the ability to deliver contextually relevant and highly targeted offers will play a pivotal role in improving the operator's profitability. It claimed that by deploying RTOM combined with real-time reporting capability, Orange has "significantly" cut the time to market for developing and launching new offers and customer packages. It added that this has further enabled the operator to react faster to competitor deals.

In May, we reported that **Opera Software** plans to invest USD100m over the next two years to facilitate the growth of Africa's digital economy. The



Opera's Africa VP Richard Monday (third from left) said the firm will build a platform to strengthen the continent's internet ecosystem. Also pictured from left to right: Jørgen Arnesen, global marketing head; Folarin Komaiya, business development director, Opera Nigeria; and Song Lin, COO, Opera Software.

Norway headquartered web browser specialist said its aim was to speed up internet adoption on the continent and strengthen the digital ecosystem with local partners.

According to Opera, Africa is on its way to transforming itself into a digital continent with the rapid adoption of the mobile internet. For the past five years, the firm claims its *Mini* browser has been a "key facilitator" in bringing more than half of the region's internet population online by featuring tools for lowering data costs.

Speaking at the time, Richard Monday, Opera's VP for Africa, said: "We aim to invest heavily in Africa, to build a local platform and grow with the local business partners. This platform will expand the user base for content providers, e-commerce businesses, operators, OEMs and others to strengthen the African internet ecosystem."

Opera said its focus was now on making the next generation of browsers to cater to the needs of local web users. For example, to bring more first-time internet users without the fear of high data costs or lack of local relevant content, the company planned to invest in developing what it described as a "state-of-the-art" AI engine for smartphone users. It claimed Opera users in Africa will get fully personalised and localised content delivered to their browser, the entry point for their internet experience, while data usage can be reduced by up to 90 per cent.

The company said it is working with more than 47 top tier African publishers covering 107 websites as part of the initiative. It was also seeking local partners to integrate value-added services, mobile payment and data bundling into its browser product. Furthermore, Opera said it was expanding with new offices in Lagos and Nairobi to support business and product development. These will add to the premises it currently has on the continent in Cape Town and Johannesburg. The firm aimed to hire around 100 people for its new offices over the next three years.

According to Monday, nine of the top 20 countries globally that use Opera's *Mini* web browser are African. In November 2016, the company announced that it had notched up 100 million monthly users on the continent, and claimed that *Mini* was now the region's most popular mobile browser. This was partly corroborated by separate research by Jumia. In its *Mobile Africa Study* published in April 2017, the Nigerian online retailer carried out surveys in 15 countries which generate more than 80 per cent of Africa's GDP: Algeria, Nigeria, Morocco, Tunisia, Egypt, Mozambique, Ghana, Côte d'Ivoire, Cameroon, Rwanda, Uganda, Tanzania, Kenya and Senegal. It revealed that while 50 per cent of customers on the continent access its mobile site using *Google Chrome*, that figure falls to 28 per cent in Nigeria. Here, *Mini* is more popular, with 41 per cent of Jumia Nigeria's mobile traffic coming from the browser.

Telma (Telecom Malagasy) is hoping to fuel its mobile growth and enable innovative VAS, such as its *MVola* mobile banking application and pre-paid online reload service, with the help of Sicap.

Part of Axian Group, Telma is said to be Madagascar's leading telco and offers services delivered via its nationwide mobile, fixed and fibre networks. It is now using Sicap's mobile Device Management Centre (DMC), USSD and USSD *Menu Browser* solutions. Citing 2015 data from the GSMA, the Switzerland-based vendor said Madagascar's mobile broadband and SIM penetration is only around 30 per cent. It said that despite providing a "great" revenue growth opportunity for local operators, the prevalence of low-cost handsets in the market makes it hard for cellcos to make profits.

Telecom Malagasy
CTO Jerome Valentin
said Sicap will enable
the launch of VAS that
can be used with low-
end devices.



"Low-cost devices are costly for operators as they are more difficult to connect to a network and the owners frequently seek for support from operators' care centres," stated Sicap. "The under-developed mobile device base also makes implementation of value-added services challenging for mobile operators."

Telecom Malagasy CTO Jerome Valentin said using the vendor's USSD and *Menu Browser* solutions will enable the implementation of innovative VAS which can be used by low-end features phones as well as smartphones. He added: "Sicap's DMC automatically detects and configures most device brands in the African market and handles devices with fake device identification code (IMEI)."

Movicel Angola is protecting its SMS network and aiming to maximise revenues with the help of **Sparkle**, the international service arm of Italy's TIM Group. It is using the company's *SMS Booster* which is described as a "sophisticated" all-in-one solution that allows mobile operators to take control of their SMS incoming traffic. According to Sparkle, *SMS Booster* detects and blocks messages delivered via unauthorised originations which turn into revenue leakage. It said the system not only helps to fully monetise SMS traffic but also improves customer satisfaction as it blocks spam and all fraudulent SMS traffic.

As Movicel's exclusive SMS international application-to-person gateway provider, Sparkle said it boosts revenues for the operator by collecting SMS traffic from its wide customer base which comprises SMS providers, OTT players, and enterprises. This latest solution from Sparkle is in addition to the existing voice interconnection and other mobile data services it has implemented for Movicel in Angola.

In May, **Facebook** said that the number of people connected to its platform across Africa had grown 42 per cent since 2015 to reach more than 170 million monthly active users. Of these, it said 94 per cent access the services via mobile devices.

"Facebook is deeply committed to Africa, a mobile-first continent where seven in 10 of all connected people use the platform," said Carolyn Everson, VP of global marketing solutions. "Many people in Africa are coming online for the first time, unleashing new possibilities for people and businesses alike. We're also seeing growth of small- and medium-sized businesses that are driving economic development, companies that Facebook wants to help grow locally and regionally across the continent."

As a result of the expansion, Facebook moved its Johannesburg offices into new premises. Everson said this was part of the company's "ongoing commitment" to invest in the African market and work with innovators across its key target countries.

Nunu Ntshingila, Facebook's regional director for Africa, reckons the firm has grown from "strength to strength" since first establishing a direct presence in sub-Saharan Africa in 2015. She said: "We have enjoyed working closely with entrepreneurs, partners, developers and small

The year ahead: In research published last November, Ovum said mobile data will be the main growth driver in Africa's telecoms market, with the number of mobile broadband connections set to more than double from 419m at end-2017, to 1.07bn at end-2022. It said this increase in data connectivity is accompanied by rising data revenues for operators, and is creating a platform for new, digital services.

The firm believes it is also shaking up Africa's telecoms, media and technology (TMT) market. Facebook said earlier last year that it had 170m active users in Africa, which means it has more customers on the continent than the MTN Group which had 165m mobile subscriptions at end-1H17.

"Data connectivity is growing strongly in Africa, and there are also good prospects on the continent in areas such as digital media, mobile financial services, and the Internet of

Things," said Matthew Reed, practice leader MEA at Ovum. "But as Africa's TMT market becomes more convergent and complex, service providers are under increasing pressure to make the transition from being providers of communications services, and to become providers of digital services."

The GSM Association would agree here. In its 2017 *Mobile Economy* report for sub-Saharan Africa also published last November, it said that although economic pressures are expected to ease across the region in the coming years, revenue growth will remain subdued for the remainder of this decade due to the increasing "cannibalisation" of traditional voice and messaging revenues as subscribers shift to alternative platforms.

It stated that IP messaging has become the top use case among smartphone users across the region; according to GSMA research, up to 90 per cent of smartphone users in Nigeria,

South Africa and Tanzania use at least one IP messaging service, such as *WhatsApp*, *BBM* or *Facebook Messenger*, regularly.

The report said: "Uptake of IP services varies across the region, but the general trend is in the same direction: rising smartphone adoption and mobile broadband penetration rates are fuelling the shift to IP services. With traditional voice and messaging services accounting for more than 70 per cent of service revenues for many operators in the region, this trend is expected to weigh on overall revenue growth for the foreseeable future."

"Slowing growth from traditional services underscores the need for mobile operators to implement new strategies to drive overall growth and ensure the long-term sustainability of their operations. Strategies already in play include consolidation and revenue stream diversification."



Carolyn Everson, VP global marketing solutions (left) said Facebook wants to help SMBs grow locally and regionally across the continent. Also pictured is regional director for Africa, Nunu Ntshingila (middle) and Nicola Mendelsohn, VP EMEA.

businesses as they have used Facebook as a platform for growth. It's inspiring for us to learn from the continent and to play a role in helping people and organisations connect with the world."

In September, Senegalese fintech firm **InTouch** announced that it will work with global integrated energy producer Total, and transactional services specialist Wordline, to bring a new mobile payment solution to the continent. *Guichet Unique* ('single window' or 'one-stop shop') has been designed to provide retail networks with what's claimed to be a "unique customer-friendly" device that makes it possible to securely and seamlessly accept all means of payments, including mobile money, cards, as well as cash. The system also enables retailers to distribute third-party services, such as subscriptions to media content, bill payment, money transfer, card top-up, banking and insurance.

Under the agreement, Total and Wordline are supporting the implementation of the *Guichet Unique* platform in Burkina Faso, Cameroon, Côte d'Ivoire, Kenya, Mali, Morocco and the Republic of Guinea. It is already installed in more than 170 Total service stations and more than 600 independent points of sale in Senegal, where the platform is said to manage more than 30,000 transactions per day.

InTouch went on to target deployments to more than 5,000 retail network and independent points of sale in the above mentioned African countries. As part of the agreement, Total and Wordline are funding the first phase, and will also become shareholders in InTouch alongside its founder Omar Cissé. As well as providing its payment expertise, Wordline said it will provide secure, enterprise-class hosting infrastructure to support the rollout and operation of *Guichet Unique*.

Video future

Video traffic on mobile networks in Africa doubled from 2016 to 2017, increasing from 8.6 to 18.1 per cent, according to research from **Sandvine**. For its *Global Internet Phenomena* report, the network intelligence specialist

gathered data from a selection of its 300-plus communications service provider customers in Africa, Asia-Pacific and the Middle East. It found that *YouTube* is driving video growth in Africa, and continues to be the top mobile application in both APAC and the Middle East. Sandvine predicted that the rapid growth of video in Africa will make it the top app on the continent by mid-2018.

The report also revealed that WAP browsing, typically associated with feature phone use, has seen its traffic share cut in half in Africa over the past two years. Sandvine said this is indicative of increasing smartphone adoption in the region.

The vendor believes that the rapid growth of video on mobile networks in Africa underscores the need for operators to have solutions in place that allow them to measure, monetise, and optimise the real-time entertainment traffic that subscribers value. Speaking earlier last year, Tom Donnelly, Sandvine's COO for sales and global services, said: "These strategies have been extremely successful for our customers in both Asia-Pacific and the Middle East, and has allowed them to provide their subscribers a high quality of experience when using the applications they care about most."

Falcon Media House (FMH) joined forces with **Media Nucleus** and **Quiptel** to offer an OTT service to millions of users in Africa and Asia. The partnership enables FMH – a UK-based global digital media group – to offer an OTT platform to medium- and large-sized broadcasters, as well as parts of its content portfolio to local content service providers.

Media Nucleus specialises in broadcast and pay TV solutions, and its clients include East African satellite broadcaster Zuku TV. The company is using FMH's Q-Flow technology to enable customers to experience high quality video streaming. It's claimed this overcomes the challenges of congested and slow connections to deliver content to the end user using the most efficient and cost effective route. FMH reckons this results in "seamless streaming over even the most challenging networks and mobile conditions".

The two firms are working with Chinese business-to-business OTT platform provider, Quiptel. It has integrated with Media Nucleus' subscriber management software to provide billing solutions to customers.

The partners added that their joint solution will enable broadcasters and cable companies to increase their market share with lower capex, as they will not need to invest in hardware and lay new network cables. ■



**Thomas Chalumeau,
MEA strategy director,
Orange**

Thomas Chalumeau believes that providing value-added services in Africa is more important than ever because the region is a land of growth.

"If you look at the population, it is younger than other regions in the world. The average age is less than 30, and they are driving a huge demand for digital services. The middle classes are developing and represent a third of the population, and more families are online. Additionally, there is still a low banking rate, and mobile-based services are heavily relied upon given the lack of physical infrastructure compared to the huge appetite for services."

Chalumeau mentioned the continent's low banking rate. But while 'banking the unbanked' remains a worthy quest, when it comes to mobile operators developing VAS in developing markets such as Africa, would he agree that the main focus for cellcos only seems to be around mobile money and mobile financial services?

"Providing mobile financial services has been the most prominent and pervasive of diversified services in Africa. But it is certainly not the only one, and is also not the only one that's rapidly growing. Just based on the countries Orange operates in, we are developing new services and usages in areas as diverse as B2B, e-commerce, energy, e-health, agriculture, cyber security, digital services for education and teaching, just to name a few."

"Take energy for example. In Africa, very few companies have, until now, thought of deploying an electricity grid in very rural areas. But today, for USD50 to USD200, one can buy a kit including solar panels and a battery."

Chalumeau is referring to Orange's partnership with France-based energy specialist ENGIE to deploy solar kits in West Africa (see *Year in Review*, p40).

"We also have a role to play in energy in cities and regions that are already electrified. Smart metering enables Orange to help states combat fraud, which is a big issue today. We are also helping customers to manage their energy spend. For example, it is possible for a bar owner to purchase two hours of electricity so that they can, say, broadcast a football game, which can be paid for by mobile payment."

Moving on to other VAS, Chalumeau said in Mali, approximately 400,000 farmers rely on mobile applications to check weather forecasts or track market prices for selling their crop or purchasing fertiliser.

"Another example is in the growing demand for digital services in teaching and education covering services such as training or mobile learning tools.

With 50 per cent of Africa's population under 15 years of age, Orange has been working to translate the contents of the Khan Academy into French to help make the world's largest e-learning platform accessible to more Africans."

Of course, Chalumeau remains keen to point out that while mobile money services may not have been successful for some operators – such as MTN and Vodacom who both shut down their mobile money operations in South Africa in 2016 – *Orange Money* has been a hit.

"The success of mobile financial services is directly correlated to the unbanked rate in a country which is, for example, lower in South Africa than other parts of Africa. I can't speak for these other operators but *Orange Money* has been very successful for Orange and continues to grow not just in terms of the number of users and transactions, but also in the different types of services that we now offer beyond just payments."

Those successes have not been easy as he goes on to explain that operating on the continent continues to present challenges.

"The regulatory and tax environment remains difficult for telecoms operators. We are still confronted with high taxes – for example, taxation in Guinea represent 75 per cent of our revenues there. Regulatory constraints, such as the identification of customers, can also mean a very heavy burden for operators, and the acquisition of licenses in terms of pricing and terms of payment can be challenging."

For Orange, overcoming the challenges involves ongoing dialogue with regulators and governments. Chalumeau believes that it is critical for African states to understand that a "normal" level of taxation can not only help to generate more revenues for governments but can simultaneously encourage investment in the country so that everyone benefits.

He continued by saying that another criterion to deal with in terms of challenges is having a clear business model and a long-term commitment to the continent.

"Orange's investment in Africa is around EUR1bn each year, making us one of the largest private investors on the continent. We also invest heavily through research and development because we know that by boosting growth in Africa we can create new income, not just for Orange but also helping to generate wealth for the countries to help create jobs, support locally grown talent, help skills development, and create new opportunities and usages for Africans."

"At Orange, our strategy has been to take a more global, ambitious but long-term approach because we see an opportunity and a role to become a major partner in Africa's

digital transformation. We are doing this in four key areas.

"Firstly, we are committed to accelerating the digital transformation of usages, services and customer relationships. Secondly, excellence in our traditional business (connectivity, customer services, pricing, network sharing) is key. Thirdly, we are mobilising key growth drivers such as the development of uses, financial services, and services for the digitalisation of companies. And lastly, we're committed to supporting and developing job skills and opportunities created by the new digital society in diverse areas ranging from agriculture and

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health to e-government or agriculture. There is always more that can be done. Encouraging, supporting and nurturing local, entrepreneurial innovation is essential. That's one of the main reasons why we at Orange created new R&D centres and development teams, including Orange Fab, our seed accelerator in Abidjan, Cairo and Amman."

Orange Fab is a startup accelerator programme launched by Orange that aims to support innovation and entrepreneurship. Born in Silicon Valley in 2013, the programme is now present in 14 countries in Europe, Africa, the USA, Middle East and Asia. Under the initiative, selected startups are given three months of support to enable them to develop their products and services. They also receive advice from Orange innovators and experts as well as a number of entrepreneurs.

"Orange opened incubators in five African countries: CTIC in Senegal, Ebene in Mauritius, Cipmen in Niger, Createam in Mali and Saboutech in Guinea. Designed with inclusive, horizontal governance to unite the public sector, private sector and civil society, the originality of this model lies in this co-creativity which is designed to nurture the emergence and development of very small, small and medium businesses, and startups. This approach is also being deployed in other countries on the continent.

"In June 2017, Orange Digital Ventures also launched a new investment initiative devoted to startups in Africa. The group is committing 50 million euros corresponding to half of the direct investments made via its new Orange Digital Ventures Africa programme; the other half is devoted to indirect investments through specialised funding for Africa."



Jonathan Hoehler,
GM of sales &
marketing,
Digitata

In June 2017, 4Sight Holdings acquired Digitata on a share for share basis for an undisclosed sum. Incorporated in Mauritius, 4Sight presents itself as an international technology holding company and earns its income through its subsidiaries, mainly from licensing intelligent algorithms in an SaaS annuity revenue model. Digitata has retained its operational autonomy, and its management, 150 staff and product offerings remain unchanged.

We caught up with Digitata some months later at Mobile World Congress in February 2018, and asked Jonathan Hoehler what the previous 12 months had been like for the firm in Africa. He was keen to point out that Digitata does not just provide services to African operators and looks at emerging markets as a whole.

"Our established market is and will continue to remain sub-Saharan Africa. But we have customers and emerging customers in South East Asia, Latin America and in the Middle East, each with their own different challenges.

"Global operators are battling with churning subscribers. That has been a common thing for many years. Subscribers are reducing their average usage per month and that is obviously affecting the mobile operators bottom line because they are seeing their customers using less and wanting more."

Hoehler said the challenges that operators are facing in Africa are unique to the region, citing price elasticity as an example. "You have got a subscriber that has a finite amount to spend and you have got all these services that are being piled up. Where does the subscriber get the best possible benefit? How do you create that value for a subscriber while maximising their spend on the services that you're providing? Because 99 per cent of those subscribers have a finite amount of money to spend and you need to look at stretching it as much as possible.

"Multi SIM card usage has been common for many years now. We have seen Chinese and Indian manufactured devices with two, three or four SIM card slots, and subscribers running SIMs from multiple mobile operators simultaneously in the devices. Those subscribers are looking for offers in near real-time to see where the best value is. And that is what we're looking to help mobile operators with. They need to know how to extract that value, how to keep their SIM in the device as the primary one for the user, and how to increase active days for the subscriber.

"So ultimately you need to create the relevance for the mobile operator that enables the subscriber to say this is my mobile operator of choice because I believe I'm getting a greater value proposition by the offers I am being presented with."

Looking back over 2017, how did Digitata perform with this kind of business in Africa? Hoehler said the year was good and that the company saw a lot of engagement with mobile operators. He added that the firm had been very fortunate in that it has actually grown with its operator customers, especially in fiercely competitive markets, such as Malawi and Uganda for example, where there is a high propensity for price elasticity.

"We have seen an influx of many companies coming into Africa because it is still regarded as the untapped mobile market. You have millions of active SIMs in the market in a population of 1.1bn people and the penetration rate is still growing. So as a vendor participating in that space, it is important to be always creating that additional value. We have to constantly ask ourselves if we are being innovative and bringing value propositions to our mobile

operator clients that they can pass onto subscribers? That is a big challenge. We see the need to innovate and the need for near real-time personalised offers to help operators increase their metrics.

"And it is not just looking at the quarterly metric and saying we have increased ARPU from this point to this point and satisfied our shareholder value. I have got some mobile operator clients looking at metrics on an almost daily basis now and asking themselves if they are improving active days, minutes of use, and revenues. And as an extension of that, they are putting offers, campaigns and value propositions into the market that are quick and effective in trying to get those returns. That is where I think the market is changing now."

And that, according to Hoehler, is where Digitata comes in. Many operators have stated that they don't want to manage networks as their aim is to engage with subscribers and provide services. Does that work in the VAS provider's favour?

"As is well documented, it is very expensive to run mobile networks in Africa – you have the high cost of diesel, theft, maintenance when you're out in rural areas, etc. So how does the operator maximise its investment? How does it sweat those assets a lot better? These are some of the business challenges that we are also facing. So it is not necessarily about revenue improvement, active subscriber days, increasing subscriber value propositions – it is also about saying to the mobile operators that you have made this investment on your network, so how do we get most out of that investment?

"Some of the value propositions that we are bringing to the market reflect that. For instance, we look at value propositions to subscribers based on time, location and the customer segment that they belong to – high medium or low value. That's our *Dynamic Tariffing* platform. And that is all integrated into our intelligence algorithm of processing that determines what is the right price to deliver to the right subscriber.

"I will give you the classic example (and I am oversimplifying this). The operator has already made an investment in the network which is good when it is humming at 100 per cent capacity at 6pm, but perhaps not at 3am when it is not so busy but still has to be run.

"Let us stop milking our subscribers for everything that they have got and let's actually create value for them."

So how does the operator get the most out of the network at three o'clock in the morning? It is very hard for operators with standard pricing offers to change the price. This is where we come in. We say let's create a value proposition at this time of day and at this location that gets the network being used. It is not going to be used anyway, so let's give the subscriber a 90 or 99 per cent discount, get them loyal so that he or she knows they can actually use that service at that particular time.

"And now, suddenly, you have got subscribers on your network using your services that are not going to waste; you are sweating your assets better and creating a return on investment. That is what we do with mobile operators. So it is not just about the revenue."

Cellcos are likely to want other insights and intelligence about their subscribers that can be offered by not only specialist players but also by the bigger vendors. So why should they come to Digitata?

"Our bread and butter has been Africa and we were built in this market. Of course, Africa as a whole is made up of multiple markets and multiple dynamics, and that means you have to be able to understand what leverages those particular markets. We believe that our home experience and being present in the markets gives us a distinct advantage over new entrants coming in.

"There are a lot of guys offering very similar types of solutions to us, but where is their track record in developing markets? It's very different from, say Europe, where you have unlimited bundles, pay your five euros and get so much. Subscribers in Africa can't afford those five euros. Unfortunately, that is the reality of the subscribers that we're working with. So once again it is about how we create the value propositions that address that? It is our understanding of the market that allows us to do that and compete against the likes of the bigger companies coming in to Africa."

When asked what plans Digitata has for Africa in 2018 and beyond, Hoehler said that it all boils down to that 'Eureka' moment for mobile operators. "If we have done our job properly, we have created a return on investment for our customers which of course means great results for us. We need the mobile operators to take a step back and say 'We need to do this, and we need to do this right. Let us stop milking our subscribers for everything that they have got and let's actually create value for them'.

But that's a longer term view. I think a lot of operators take a short term view on things, but that is just the pressure of shareholder value – you have to show excellent results and always be improving. What they should also be looking at is how they protect that subscriber and how they can grow with customers and take them on a lifestyle journey.

So for me the year is more about mobile operators embracing the idea of working with companies like ourselves in order to give phenomenal value propositions to their subscribers and not just do the same old offerings that haven't worked.

"It is a mindset. Developing this value proposition becomes a very time-consuming exercise and a mobile operator battles with that. So how do we automate it? How do we create that intelligence and that machine learning? That is what we're doing. The operator needs to understand that we are not developing prices in an *Excel* spreadsheet any more. We are using Big Data, we are using all the subscriber's interactions, who they're talking to, etc., and we are combining all those metrics together to be able to give operators the best possible opportunity to be able to achieve their KPIs. This is not the early 2000s. Cellcos can no longer just put a price frame in the market and then, three months later, come and revisit it. The world has changed."



**Magnus Moller
Petersen,
EVP sales &
marketing,
Sicap**

Sicap has not said much about its activities in Africa over the last few years but it seems that the company now has a renewed focus on the continent – is that the case? "Yes and no," said Magnus Moller Petersen. "Sicap has been chasing business in Africa all the time but I think we invested too little in the outbound marketing and the messaging. Perhaps Sicap forgot to share success stories that focus on the company and the values that it provides."

Sicap's roots go back to 1997 when a small team of engineers in Switzerland from Swisscom came up with what was the first SIM-based system for pre-paid billing. Although it was successful, the solution eventually became usurped by network-based pre-paid billing technologies. But by that time, the team that had come up with the original idea had built up expertise in USSD solutions as well as device and SIM over-the-air management. This paved the way for Sicap to be setup as an offshoot of Swisscom.

Over the years, the company has seen some changes in leadership and style. In 2013, a management buyout team purchased the company from Swisscom. In 2016, Sicap's CEO Thomas Vontz was diagnosed with cancer and sadly later died. Markus Doetsch has since taken over the company's helm bringing in some new team members including Petersen who joined at the start of last year.

"I was heading sales and marketing at Mobilethink, and had been working there since around 2005 up until the end of 2016.

Mobilethink was doing some of the same stuff as Sicap in terms of device management and customer engagement, and I was working with different operators such as Vodacom, Airtel, Globacom, Millicom, amongst others."

Did Petersen see Africa from a different perspective when he arrived at Sicap? "I think there have been some changes over the last year. One of the interesting opportunities for us is the EIR [equipment identity register] and central EIR software solutions that we provide. We have seen a lot of barriers come in from regulatory bodies in Africa, Nigeria for instance, and these are also barriers for operators. They now have to comply with different kinds of regulatory requirements to be able to block stolen devices or ones that have not been imported properly into the country. As well as Nigeria, Tunisia and Tanzania are some of the countries where there are requirements to have a central EIR in place. So we have built up quite a significant business on that side, and we are trying to mature that even further."

He adds that there are also various greenfield opportunities on device management with new newly started operations in some countries, particularly in Southern Africa.

In terms of the business mood and climate in Africa, Petersen said that he has seen some stiff pricing competition. "There were a few opportunities where we had to go in and reduce prices more than we like to. Sometimes we do it because it is also a good case study for us. But we have a good cost structure in the company, as well in terms of our resources; we have a big development, support and project team in India, for instance, and no longer have expensive European resources any more."

Earlier, Petersen referred to Sicap's 'marketing silence' and said that the company has been continuing to do business in Africa. So what were its highlights on the continent for 2017?

"Vodacom Lesotho was using a legacy device management system and we swapped it out with a pure cloud-based customer engagement and device management solution that we completely host and integrate. So that is a good case study showing how the market can move forward."

Other customers he talks about include Telma in Madagascar (see *Year in Review*, p43) and Tunisie Telecom. Earlier in 2017, the latter became the first operator to deploy Sicap's TargetMe contextual customer engagement solution to expand its 4G network and VAS revenues, and reduce customer call centre costs.

The company used TargetMe to replace its previous Bulk Campaign Management 1.0 tool. According to Sicap, its solution enables MNOs to capture data from various sources, such as network elements, and subscriber

and location databases, to visualise and segment a customer base in real-time. The same data can be used for real-time system provisioning actions and personalised customer engagement campaigns. These are said to be performed automatically whenever a subscriber belonging to a certain customer segment is detected in the network.

Tunisie Telecom started using *TargetMe* for real-time promotional customer engagement campaigns. Sicap claimed that this enabled the operator to speed up the adoption of new services and consequently increase revenue. It said that Tunisie Telecom runs an average of 30 customer engagement campaigns each day which trigger a total of five million “compelling” service offers to customers daily.

The operator has also used *TargetMe* to boost 4G service adoption. Each time a subscriber with an LTE-capable handset is detected, the solution automatically instructs the mediation system to activate the 4G service for that subscriber and without asking the subscriber to change the 4G SIM.

So how does Sicap enhance its platforms – what are the things that it can't do today that it is looking at for future iterations?

“We work with some of our bigger customers like Tunisia Telecom a lot in terms of enhancing our platform,” said Petersen. They come with good suggestions about what it needs to do, and what can we do with the platform. So that is one approach.

“The other is that we tell customers about new features and our roadmap for development. They then say whether or not they would like an upgrade or an activation of these additional features. I place great emphasis on having good communication with the existing customer base to ensure they have what they need and also so that we can bring in what we develop for other customers.”

Looking ahead, Petersen’s ambition for Sicap is to move ahead with one of the bigger groups in Africa and he said that the company was already in discussions with a few of those to deploy a more cost-effective group-wide solution than what they have today.

“So that is one of my targets for Africa. And then I think pricing will be essential going forward and there will be a lot of focus on that. When you talk about a bigger group deal you have to find the right pricing as there is a lot of competition in the device management space.

“Furthermore, you also have to make sure that you have good sales coverage as well, working with the customers when they need it but also going to see them for random meetings. You cannot do business from behind your desk when you are talking about Africa. So it is very good to build up good strong relationships with the key players.”



Indranil Das,
VP, head of
digital services,
MEA,
Ericsson

With a background in IT and consulting gained from his days at PwC and IBM, Indranil Das joined Ericsson around eight years ago and moved to the company's digital services business in January 2018. So what does he define as ‘digital’ – isn't everything all about zeros and ones these days?

“We used to call it IT and cloud but digital has now gone beyond this. Business is moving towards rapid digitalisation – so you have virtualisation, digital transformation, and the digital stack with everything together.”

So as the head of this particular division for Ericsson, what does he see as the company's mission on the continent? “If you look at Africa's development in terms of the telecoms revolution, it is a little bit behind compared to other markets, with low broadband and LTE penetration. But I see that as an opportunity because now development will be rapid.”

Citing Ericsson's *Mobility Report* that was released in November 2017, Das said that the number of LTE subscribers in Africa are projected to rise from 30 million to more than 300 million over the next five years. “So that is huge growth that is going to happen and it will unlock the new wave of digitalisation on the continent. That presents a significant opportunity.”

Das continued by saying that there are needs in Africa that are not evident in other parts of the world which is leading to innovation. “Mobile financial services are a good example. They have become central to the digitalisation strategy of some operators and are championed here with other parts of the world now looking at them. I see more innovation like that happening in Africa going forward, and so the region can become an innovation ground for the rest of the world. Technology such as 4G and narrowband IoT will accelerate all that. So there is a significant opportunity powered by the new digitalisation, and as LTE penetration increases and new devices come in, it will be rapid going forward.”

Ericsson's presence on the continent is not new and the company has been building networks in the region for decades. And yet the same conversations about vast numbers of people still lacking access to connectivity and a huge digital divide that needs to be bridged persist. As head of a digital services division Das' main focus is presumably on software, but given the prevailing challenges shouldn't hardware and infrastructure be the priority here?

“In Africa, you see that divide between countries – let's say a country like Kenya is a bit more advanced compared to others and

mobile penetration is better there. In terms of challenges, I believe the technology solutions are there. But it is also about government policy and you will see a direct correlation between a national broadband policy and the development of mobile and mobility in a particular country.”

He also pointed out that other issues could be about how much the government is investing, its taxation policies, or how they motivate operators to build out to rural areas. “Those are the things that are going to be very important. For me, it is not a technology issue any more; it is about government policy and the kind of incentives the operators are given to roll out the technology.”

Das said that one way to address some of these challenges is to work together with the operators to influence their entire ecosystem which includes government, all consumers, service providers, stakeholders, etc.

He added that Ericsson also conducts social responsibility programmes, such as its *Connect To Learn and Technology for Good* initiatives, for example. “We tend to do those more in Africa than any other continent as we see it as our responsibility to bring in technology in order to improve society. But it will be a long and hard journey.

“The other thing is making everything affordable. That is another thing we are investing in. Whatever technology we bring, we make sure that we keep in mind that it should work smartly and that it is not just for the Western market. We are very conscious that it should work in this market and in countries that are not developed.”

While Ericsson's results reports have not made for comfortable reading for its investors over the last couple of years, Africa is one of the markets where it has grown its net sales in recent quarters, according to Das. “Both in Africa and the Middle East, our operator customers are investing more. While in the Middle East it is 4G, for the African market it is 3G. And once you have 3G networks, subscribers can do a lot more with their devices, so they start on a digital journey.”

Supporting the customer through this digital journey is clearly key for the operator, and in a similar vein, it is also key for Ericsson. “We value our client relationships and believe that we have a good set of products and solutions to help them on their digital journeys. For example, MTN has our charging solution in all of their opcos, and they are in around 18 countries in Africa.”

“I believe we have a 70 per cent market share with our charging solution. So we have the product, we have the solution, the client believes in us, and we value that relationship. But it is not just about a solution for charging.

Our platform also comes with subscription management; it can support 2G and 3G, and we now also have SMS and USSD as a channel built into that. So the customer is able to deploy that charging and subscription management solution together, and that gives immediate revenue uplift. I believe no other competitor comes close to that solution."

In another innovative solution deployment, last June Ericsson announced that it had worked with Millicom to launch a 'Business Support System as a Service' (BSSaaS) for Tigo Rwanda. The platform covers charging, billing, provisioning, mediation and roaming functionality combined with advanced customer care and self-care solutions. Ericsson claimed that the model will enable Tigo to better serve its subscribers with new and innovative offerings, with shorter time to market, improved customer experience and increased operational efficiencies.

As well as BSSaaS, Ericsson has also come up with 'Information as a Service' using its *Hyperscale Datacenter System* which uses software-defined infrastructure. Das said: "This gives the ability to our clients to utilise hardware infrastructure much more efficiently. Normally, you would have to wait for 60 days if you needed new infrastructure. We have now been able to cut down that cycle time to days and sometimes even to just less than a day by unlocking existing infrastructure and virtualising it."

So what does he expect in Africa over the course of this year? "I believe you will see a lot more about two aspects. One is the digital transformation. You will see that some of the operators in Africa will actually have been much more focused on that. It has started already with some of the mobile financial services, but the ecosystem is now getting stronger and more developed. The operators will gradually come to stage where they offer digital transformation as a platform and launch new services on top of that. That is part of the digital journey."

"The second thing you will see is a lot of virtualisation being done. Our business is primarily with telcos, and I would say that many of them will start virtualising their hardware infrastructure, the orchestration layer and the application layer. It is only just beginning but I believe Africa is going to catch up fairly quickly [with the developed markets] and particularly some of the African countries that Ericsson is in. Because many of the things that we have done here – such as the information as a service platform mentioned above – is one of the first in the world."

"Going forward, you will see innovation happening in Africa that we will take to the rest of the world."



Mariam Abdullahi,
Telco industry
lead,
SAP Africa

According to Mariam Abdullahi, no industry will remain undisrupted in 2018 and the years to come. And for African telco providers – who she believes have "feasted" on near-uninterrupted subscriber and revenue growth over the past two decades – the need to adapt is paramount.

"In a market where the average business lifespan is 12 years (compared to 25 years in the last two decades), the objective is not to simply improve that which is already working. African telcos need radical transformation of their entire business models in order to become digital supply networks and re-imagine work, resources management, and contingent worker management."

"Since the advent of the internet and the more recent emergence of technologies that include machine learning, IoT, cloud computing, and predictive analytics, businesses with exponential growth models such as Amazon, Uber, Airbnb and M-PESA have entirely transformed their industry sectors almost overnight."

Abdullahi said that thanks at least in part to these companies, customer expectations have ballooned, with modern consumers demanding personalised, efficient service at low cost and with added convenience.

"Talented employees have also increasingly gravitated toward these companies, putting further pressure on incumbents who suddenly are outperformed and out-innovated at every turn. 'Too big to fail' in today's market is a near-certain recipe for decline and eventual disaster."

"Telco executives across Africa and other emerging markets have scrambled to reinvent their business models in the face of shifting customer demands and the arrival of agile, customer-centric competitors. Airtel Africa merged its Ghana operations with Tigo Ghana and sold off operations in Sierra Leone and Burkina Faso to adapt to rapidly changing market conditions. South Africa's Cell C is seeking investments into fibre-to-the-home providers to enable its diversification into new service offerings including insurance and media. Kenya's Safaricom is building on its much-lauded M-PESA platform by diversifying into new revenue streams, including Uber competitor Little and e-commerce portal Ma Soko to claim a greater share of its customers' wallets."

"These companies have already felt the effects of declining traditional revenue streams as disruption from the likes of OTT players such as WhatsApp, Skype and YouTube put pressure on what were, until recently, primary (and highly dependable) sources of revenue."

Abdullahi said that according to PwC, many telcos globally are seeing revenue decreases of as much as 30 per cent in SMS, 20 per cent in international voice, and 15 per cent in international roaming. "Incremental improvements and operational changes are no longer enough. Those that can adapt to take advantage of technology mega-trends such as hyper connectivity, cloud computing and IoT are far better placed to reinvent their business models and can further incorporate SDN and NFV to speed up the innovation cycle."

"Digital transformation in 2018 is not about cutting costs or optimising existing processes. It is a re-look at the entire telco business model. It is asking the hard questions: am I serving my customers in the right way? Are my operations efficient? Is cost-cutting adequate and sustainable? Am I able to hire the correct staff, attract the best talent, and empower them to contribute to an inclusive and innovation-focused workplace?"

"Telco executives must ensure their company's day-to-day culture drives innovation across the entire business. The aim should be on developing personalised services and to deliver such services in a way to meet the demands of an empowered customer base. The only way to do that is to have access to the correct customer insights – such as data usage and consumption habits, call volumes, area of residence – and to act on such insights in a humane and personalised manner. For this, analytics and data are key, especially when matched to an in-memory computing platform that enables real-time actionable insights."

"At a time when telco offerings are highly commoditised and there's not too much distinguishing one operator from the other, Abdullahi reckons telcos need to simplify their core business operations to allow for the development of a clear and unique value proposition for sustainable growth that takes local conditions into account."

"For example, with so many African countries not yet fully adopting 4G technology, does it truly make sense to invest heavily in emerging 5G technology?"

"The African telco market has moved away from improvement to large-scale disruption and transformation. Telcos who embark on a process of total business model change underpinned by powerful exponential technologies will be far better placed to withstand and overcome the challenge posed by the new breed of disruptors."

"2018 will determine who adapts, maximises on operational efficiencies and leverages innovation for new revenue streams, and who relies on old ways of doing businesses that negatively impacts their go-to-market offerings." ■

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chapter

Fixed wireless access

4

Three initials are currently dominating discussions within many parts of the wireless communications industry: I.o.T. Given the oft quoted figures from Cisco, Ericsson et al, the world will see billions of connected devices as part of the Internet of Things over the coming years, and the entire IoT ecosystem is expected to expand rapidly.

However, according to a report published by consultancy firm Arthur D. Little (ADL) earlier this year,¹ while mainstream IoT deployment is already prevalent across many vertical industries, its increased penetration across use cases poses “unique” challenges for ICT policy-makers and regulators beyond traditional telecoms-focused regulatory topics such as spectrum, numbering and roaming.

“The complexity and scale of the IoT brings increased focus on elements such as the safety of various stakeholders, new business models, data security and privacy,” stated the report. “Given the potential benefits of the IoT, growth can be accelerated, and some of the pitfalls are avoided at the same time by effectively involving other national departments and ministries in addition to telecom regulators.”

ADL believes IoT use cases blur traditional industry-specific boundaries and challenge governance of industry verticals by respective sector authorities. It added that IoT success is dependent on collection and use of data to provide customised solutions, and that this poses a “significant threat” to consumers’ data privacy and security. “So there is an emerging trend to develop regulations which are case specific, as we have seen in the cases of drones and consumer data privacy protection,” says the firm.

The report went on to point out that these regulations are being developed independently. It said that so far, only New York state in the US has issued a comprehensive IoT policy which not only covers data privacy and

security, but also plans to make information about IoT infrastructure public and share such infrastructure through public-private partnerships.

As a result, ADL said investors into the IoT ecosystem are looking for clarity on what is regulated or unregulated and permitted or prohibited. It reckons this situation makes it even more critical that policy-makers have holistic views for better management of the IoT ecosystem, and that ICT regulators are better placed to coordinate this cross-sector effort.

Wi-Fi

The level of industry confidence in Wi-Fi investment is at its highest-ever, according to the Wireless Broadband Alliance (WBA).

In its industry report for 2017 published last December,² the alliance found that more than 80 per cent of those surveyed felt as, or more, confident than they did a year ago as the wireless industry becomes crucial to delivering high quality, high speed, low latency connectivity. And when looking at unlicensed spectrum more broadly, 47 per cent said that they felt more confident.

The WBA said its report (which was compiled by Maravedis) comes at a significant time for the wireless ecosystem. It said there is a growing consensus that the success of 5G, unlike previous generations of standards, will rely on the convergence of multiple radio access technologies (RATs) in unlicensed, shared and licensed spectrum, with Wi-Fi playing the central role. According to the alliance, developments in the latest Wi-Fi standards, including 802.11ax, will improve Wi-Fi performance and capabilities to support 5G use cases – including high-density networks, extreme Mobile Broadband (eMBB), and aggregation of multiple frequencies, amongst others.

As industry attention moves toward monetising Wi-Fi, WBA’s study also highlighted the drivers of additional traffic over the network, as well as use cases with initial revenue potential in different verticals.

In the 2017 survey, respondents said that the applications most important to monetisation strategies for 2018 included location-based services (37.5 per cent), roaming (33 per cent), and marketing analytics (almost 33 per cent).

According to the WBA, the three Wi-Fi use cases tipped to drive near term revenue potential include: extending internet access and media to a full smart home; richer and more efficient enterprise services driven by cloud managed networks and security; and expansion of the Wi-Fi roaming model.

“As Wi-Fi continues to evolve, enabled by new technologies, it has the ability to support new connected services and use cases in the 5G era across all segments including, carriers and service providers, connected cities, and enterprise and hospitality ecosystems”, said WBA CEO Shrikant Shenwai. “This report shows that confidence in Wi-Fi is at its highest level ever, as the industry starts to recognise the central role the technology will play in next-generation wireless networks.”

Shenwai concluded that, further extended by 802.11ax, Wi-Fi will remain “incredibly important” to support a range of use cases and industries. But he also warned that ensuring interoperability with other technologies will be the key. ■

¹ With the Internet of Things (IoT) everywhere, can regulation be far behind?, Jan 2018, <http://www.adlittle.com/en/insights/viewpoints/internet-things-iot-every-where-can-regulation-be-far-behind>

² WBA Annual Industry Report 2017/18, <https://www.wballiance.com/resource/wba-annual-industry-report-201718/>

FIXED WIRELESS ACCESS: YEAR IN REVIEW

Africa's IoT ambitions

From having very little network connectivity just a few years ago, Rwanda now has ambitions to become a smart city blueprint for other African nations to follow. In May 2017, the country's government launched a flagship IoT project in Kigali which features technology supplied by **Inmarsat** and **Nokia**. Inmarsat deployed low-power WAN infrastructure around the capital using the LoRaWAN protocol to connect sensors and devices. The IoT network went live at the beginning of May was expected to remain active for an initial period of a year. It was developed with Actility, the France-based M2M and IoT specialist which is now backed by Inmarsat as an investor.

The network is providing city-wide coverage enabling a variety of organisations to develop and deploy IoT applications on a large scale, as well as allowing entrepreneurs to easily connect their front-end IoT devices through a middleware layer.

To demonstrate the IoT's transformative potential, Inmarsat planned to work with Jersey Telecom and other partners to deploy a number of proof of concepts and technology validations around Kigali. These included a smart bus equipped with satellite internet to provide ubiquitous connectivity for remote communities. The bus will also be LoRaWAN-enabled to provide real-time data acquisition in the communities that it services.

Other planned demos included a precision farming initiative intended to increase crop yield and better manage water resources, and environmental monitoring systems that will feature sensors installed in buildings to gauge air quality.

Inmarsat also began a range of initiatives designed to educate and empower the next generation of students and entrepreneurs in Africa. It launched a *Smart Cities Education* programme in Rwanda and planned to replicate it in other countries on the continent in an effort to accelerate the deployment of IoT and smart city solutions. The programme includes a three-month student internship, as well as an IoT boot camp for students and entrepreneurs.



Engineers setting up Kigali's smart city LoRaWAN network.



Rosine Mwiseneza, the winner of Rwanda's 2016 'Ms Geek' competition, has developed an IoT-based agricultural irrigation solution.

As part of the initiative, Inmarsat is also working with Rosine Mwiseneza, the 2016 winner of Rwanda's 'Ms Geek' competition which is designed to inspire female university students to employ technology to overcome local issues. Inmarsat collaborated with Mwiseneza and her team to implement a prototype IoT-based agricultural irrigation solution for potential commercialisation. Their aim was to create a scalable solution that can be used across Rwanda as well as Africa and the rest of the world via Inmarsat's global networks.

Separately, Nokia was chosen by local Rwandan company SRG as part of its collaboration with the government's smart city rollout. SRG is using a variety of products from the Finnish vendor including a mission-critical access network, IP and Cloud Core networks, as well as its *Impact Platform* with associated IoT applications.

Speaking at the *Transform Africa Summit* held in Kigali in May, Rwanda's youth and ICT minister Jean Philbert Nsengimana, said:

"Through this project, we will not only improve people's day to day lives with improved services and security, but [also] anticipate long-term, positive socio-economic benefits."

Nsengimana claimed Rwanda was now a "pioneer" in deploying a smart city solution in Africa, and that the government's vision is to position the country as a technology hub. He added that the plan was to share Rwanda's experience with other nations on the continent.

Elsewhere in Africa, the IoT will help deliver clean energy to millions of people living in off-grid communities following a partnership between **Aeris** and **BBOXX**. US-based M2M specialist Aeris offers IoT connectivity in East and Central Africa, while UK company BBOXX designs, manufactures, distributes and finances plug and play solar systems. Its core products are a range of solar battery boxes that allow users to power small appliances, from lights and mobile phones to TVs and computers.

The collaboration between the two aims to ensure that the battery boxes have reliable IoT connectivity and can be remotely monitored. BBOXX has installed Aeris' global SIM at the point of manufacture, thereby reducing both supply-chain costs and deployment time. BBOXX said that by utilising Aeris' single global access point name, its solar system can also be deployed anywhere in the world on a simple plug-and-play basis, removing the necessity to configure local network settings.

Aeris is also providing its *AerPort* connectivity management platform for IoT devices. This



BBOXX's solar 'battery boxes' can power domestic appliances such as TVs.

JANUARY/FEBRUARY 2017

The Nigerian Communications Commission has told local operators it will re-plan the 23GHz microwave frequency band. Following industry consultation, it has decided to re-channelise the 23GHz band from its original 7MHz plan to 28MHz in accordance with recommendation ITU-R.F. 637-4. The new plan will take effect from 30 May 2017. All affected operators will be given two years to migrate from 7MHz to 28MHz channel spacing in the 23GHz band. New assignments on the band will now be based on the 28MHz plan, and channel aggregation will no longer be permitted.

MARCH/APRIL

Mobile operator InterCEL + is building a major wireless network that will distribute high-capacity broadband from the ACE submarine cable system to major urban and business regions in Guinea. The company is using a point-to-multipoint microwave system and has already established phase one in Conakry. It has rolled out a network that supports 600Mbps across many parts of the capital, and is said to be offering businesses up to a ten-fold increase in bandwidth compared to the legacy WiMAX links they had previously been limited to.

MAY/JUNE

Windhoek's Police Department has replaced its Wi-Fi network with a wireless video surveillance system based on broadband access equipment from RADWIN. Namibia aims to be the safest African country by 2020. As part of that ambition, RADWIN's point-to-point and point-to-multipoint systems have been installed in dozens of crime hotspots throughout Windhoek. The systems are said to transmit high-quality video from the cameras directly to police headquarters, enabling on-the-spot detection and response to events.

gives BBOXX real-time access to data usage, as well as alert and device-connectivity management over each SIM's lifecycle. BBOXX added that Aeris' global support of major mobile standards such as GSM, CDMA and LTE, means that it will be able to deploy its devices across the world as it looks to expand.

In South Africa, **SqwidsNet** teamed up with Johannesburg-based **Adroit Technologies** to boost the Industrial IoT. The partnership is enabling IIoT application and service providers to use Adroit's cloud-based SCADA and industrial-automation platforms via SqwidsNet's network which is licensed to use Sigfox technology in South Africa.

SqwidsNet launched in November 2016 and is a wholly owned subsidiary of open-access fibre connectivity provider DFA. The company's network is already said to cover all of South Africa's eight major metro zones and 64 per cent of the national population. The firm planned to cover the entire country with its network by 2018.

Meanwhile, Adroit Technologies MD Dave Wibberley said: "We see Sigfox technology as much more compelling from a scalability, simplicity, cost, and ease-of-integration perspective than traditional telemetry options."

He continued by saying that SqwidsNet's technical experts have helped Adroit to build interfaces to the Sigfox back-end. A number of trials based on data from sensors and connected devices on the SqwidsNet network had also been developed. "We have successfully completed several proofs of concept for use cases such as water quality readings, automated meter readings for both water and electricity, and manhole tip sensor readings."

France-based Sigfox is a global provider of IoT connectivity and currently has deployments in around 45 countries. In 2017, Adroit began the process of becoming a certified Sigfox partner for devices and for its SCADA platform.

In late September, **Vodacom** proclaimed that the Internet of Things was no longer hype as its IoT division had now passed the three million connections milestone. According to

the company, it was averaging 55,000 new IoT connections per month in South Africa.

"It's worth noting that it took us eight years to get to two million connections and it took us only one year to get to three million," said Deon Liebenberg, managing executive for Vodacom IoT. "The rate of IoT adoption is picking up speed locally, and with the commercial rollout of NarrowBand-IoT, this is only going to accelerate even faster. The Internet of Things is no longer hype – it's real and it's becoming more and more a part of our daily lives."

In February, Vodacom's parent company, Vodafone, said that it had become the first global IoT mobile provider to exceed 50 million connections, demonstrating growth of around one million new connections a month. It said performance was particularly strong in the automotive, healthcare and utilities sectors.

Earlier in the same month, Vodacom announced that it had successfully completed the launch of Africa's first live NB-IoT site, in partnership with **Huawei**. The live site, which is on the roof of Vodacom's data centre in Johannesburg, was the company's first step towards the development of a smart campus which will monitor and meter utilities on the network. The operator said collection of this data will reduce the risks of water losses, mitigating both environmental sustainability and cost risks.

The live site was followed with Vodacom opening a new lab at its campus in June. The facility aims to commercialise M2M and IoT systems using narrowband low power. It has been designed to provide a controlled test environment and framework for customers and specialists to come up with hardware and applications as well as test their endpoint devices on the NB-IoT network.

Liebenberg (*pictured*) said: "Our ultimate goal is to nurture an ecosystem of developers, engineers and entrepreneurs for NB-IoT applications on the continent."



Expanding connectivity

Software giant **Microsoft** has been increasingly making its presence felt across the continent in recent years and continued to do so in 2017.

In January, we reported that the company had teamed up with Nominet to help ISPs across Africa leverage unused broadcast frequencies and deliver low-cost broadband access using TV white space (TVWS) spectrum. As the available set of TVWS frequencies varies, Nominet has developed a geo-location database that tells devices which frequencies they can use in a particular area, at what power, and for how long. The database allows wireless devices to access TVWS frequencies, and was also the first to receive regulatory approval for use in the UK.

As part of its *Affordable Access* initiative, Microsoft is working with public and private sector partners around the world to develop technologies and business models that will make it easier for billions more people to affordably get online. In Africa, the company has been involved with broadband connectivity programmes in Kenya, Botswana, Malawi, Ghana, amongst others.

To support its goals, Microsoft is now using Nominet's TVWS database across its *Azure* cloud platform to enable the deployment of low-cost terrestrial wireless broadband internet to communities across the continent.

It is also leveraging Nominet's dynamic spectrum management technology. This has been designed to support two-way communications at relatively high data rates over long distances, and delivers connectivity to large open areas where it would be difficult to deploy fixed infrastructure.

Speaking at the time, Nominet's R&D director Adam Leach said: "Spectrum is a scarce and valuable resource, and demand can outstrip supply. Dynamic spectrum sharing allows the available spectrum to be used more efficiently than any existing static techniques. Maximising the efficiency of the spectrum usage lowers the barriers to access, enabling more users and devices to get connected."

JULY/AUGUST

Liquid Telecom has introduced a new roaming hub that enables operators and ISPs to access its pan-continental network of public Wi-Fi hotspots for the first time. The company says the *Africa Wi-Fi Hub* will allow customers of its wholesale clients to connect to hundreds of locations across Kenya, Rwanda, Uganda, Zambia and Zimbabwe, with additional markets to be rolled out soon. Partners can connect via peering points in Eastern and Southern Africa, with the option to connect to hundreds of locations in one country, or join a global network of public Wi-Fi hotspots.

SEPTEMBER/OCTOBER

ATM Mobilis (formerly Algeria Telecom Mobile) will provide customers with access to PCCW Global's international connectivity, as well as a portfolio of managed services and UCaaS (unified communications-as-a-service) products. In 2016, ATM signed a high capacity IPX interconnect agreement with PCCW. This has now been extended to cover services beyond traditional voice, and the two partners have also extended their combined MPLS network coverage.

NOVEMBER/DECEMBER

Microsoft and Orange Business Services will

deliver large-scale, end-to-end IoT solutions that boost the digital processes of companies in the manufacturing sector. The *Microsoft Azure IoT* suite now supports Orange Business Services' IoT *Datavenue* service which is said to offer a comprehensive set of solutions and services to securely manage IoT projects and their integration with information systems. Orange Business Services says the software environment provided by Microsoft will allow for the use of advanced solutions such as the *Cortana Intelligence Suite*, *Power BI*, and the *Xamarin* app to ensure a "flawless" mobile user experience.



In Africa, Microsoft has been supporting TVWS projects in Botswana, Ghana, Kenya, Malawi, amongst others.

UK-based Nominet is a global internet company. Since 1996, it has managed and run domain names that end in .uk and is now said to be one of the world's largest country code registries.

In another agreement signed under its Affordable Access initiative, Microsoft also teamed up with ISP Brightwave to bring Wi-Fi and broadband access based on TVWS technology to schools and clinics in South Africa. At the end of July, the two partners announced that more than 213,000 students at 609 primary and secondary schools in the OR Tambo district will gain network access. They also planned to extend connectivity to several healthcare clinics in the municipality of King Sabata Dalindyebo in the Eastern Cape.

The deployment is co-funded by Microsoft and the Universal Service and Access Agency of South Africa. Lumko Mtimde, the agency's CEO, said: "This initiative will provide many entrepreneurs within underserved communities and rural areas with the tools they need to create businesses, address community problems and also help close the local skills gap."

Under the agreement, Brightwave is also able to leverage the Microsoft partnership to sell internet access, devices, as well as cloud-based services such as *Office 365* to government offices, small businesses and consumers.

Brightwave CEO Charles Mwaura said: "Our new partnership with Microsoft enables Brightwave to offer an integrated services value proposition that will power e-learning, e-health, e-government and e-commerce in rural and underserved communities in South Africa."

Brightwave is a certified black-owned enterprise that builds infrastructure to enable the delivery of high speed, affordable broadband access and services for the majority. For instance, in the under-served community of Soweto, the ISP is said to have successfully deployed and commercialised the largest Wi-Fi network through offering data bundles at a tenth of market prices by leveraging an ad-driven 'freemium' model.

Enterprise connectivity Wi-Fi

Microsoft was also busy building partnerships to push the greater usage of enterprise services on the continent. In May, the company unveiled plans to deliver its complete range of cloud services for the first time from data centres in Africa. The company will offer products such as *Azure*, *Office 365* and *Dynamics 365* from its own facilities in Johannesburg and Cape Town with initial availability anticipated in 2018.

According to Microsoft, many companies in Africa currently rely on cloud services delivered from outside of the continent. It claimed its investment will provide highly available, scalable, and secure cloud services across the continent with the option of data residency in South Africa.

Speaking at the time, Scott Guthrie, EVP, cloud and enterprise group, Microsoft Corp, said: "With cloud services ranging from intelligent collaboration to predictive analytics, the *Microsoft Cloud* delivered from Africa will enable developers to build new and innovative apps, customers to transform their businesses, and governments to better serve the needs of their citizens."

The company said that it had so far helped to bring 728,000 SMEs online across the continent and supported them to transform and modernise their businesses. It added that more than 500,000 firms are now utilising its cloud services, with 17,000 using the *4Afrika* hub to promote and grow their businesses. Furthermore, it said that the *Microsoft Cloud* is also helping Africans build job skills, with 775,000 trained on subjects ranging from digital literacy to software development.

Microsoft believes businesses across the continent have traditionally been slower adopters of cloud services, particularly in areas with limited ICT infrastructure. In March, it joined forces with **Liquid Telecom** to further accelerate the use of such services. By combining Liquid's fibre network reach (see p.108) with Microsoft's business solutions, the companies said they will bring the cloud closer to the end user. They reckoned this will enhance business potential and enable startups and home-grown operations to be more productive and efficient.

"Cloud computing is still gaining momentum on the continent but we believe it has the potential to transform the way businesses of all sizes operate," said Ben Roberts, group CTO, Liquid Telecom. "Through better connectivity, faster internet and secure cloud offerings, businesses will have the platforms and tools they need to grow and succeed. We have the infrastructure to enable locally and regionally hosted cloud solutions keeping African data in Africa."

Part of the project is *Business in a Box*, a cloud-based toolkit of relevant applications, cloud services and connectivity for SMBs.

As well as the delivery of cloud services, Microsoft and Liquid are also focusing on SMB development and the enablement of a TVWS technology and partner ecosystem to provide further connectivity across Africa.



Dr. Omar Elloumi,
Technical plenary
chair,
oneM2M

The year ahead: CSPs must adopt an open standards approach if they are to make the most of the revenue opportunities presented by IoT applications that use LPWA networks. A common IoT service layer will result in increased cost-effectiveness, improved scalability, and greater confidence that today's IoT deployments will be future-proof.

While the latest figures from Analysys Mason³ suggest there could be 3.4bn LPWA connections by 2025, the forecasted revenue per connected device is relatively low unless CSP strategies to tap into the larger revenue opportunity

provided through application enablement become mainstream. With the recent ramp-up of LPWA deployments worldwide, we have seen an increasing number of CSPs adhering to the oneM2M value proposition, but they will need to expedite their strategies to improve the value they are seeing from the IoT.

Open standards for the IoT were developed after enterprises that deployed the early wave of IoT connections found themselves restricted by a vertical approach to platform management. Working in this way restricted the applications' scalability, limited cost-effectiveness and stifled interest from device manufacturers and app developers, who found themselves repeating efforts to integrate different connections and device management protocols.

The need for interoperability is what drives

oneM2M's architecture, which allows CSPs to break down the silos that inhibit growth and creates a single, horizontal platform for data sharing between applications. This not only delivers opex savings from not having to manage multiple horizontal silos, but also opens up new service innovation opportunities. LPWA provides the means to deliver the IoT and a standards-based, horizontal approach makes it a stronger business case.

The above is based on information first published in the whitepaper 'Boost LPWA Revenue Through oneM2M', December 2017. For the full article, visit: <https://tinyurl.com/y7nlgu4>

³ Preparing for LPWA: How operators are maximising their chance of success, Michele Mackenzie, Analysys Mason, September 2017.

In a separate deal, **Liquid** and **GlobalReach Technology** launched a new managed service to help businesses in Africa that want enterprise-grade Wi-Fi without the worries of procuring and managing a WLAN. In January, the two firms claimed users ranging from the smallest cafés to the largest shopping malls and hotels will be able to offer Wi-Fi securely to customers without having to incur high installation costs.

According to Liquid, the partnership with UK-based GlobalReach brings the “power and scale” of a global Wi-Fi enabler into its core network and data centres, allowing its customers to benefit from the latest Wi-Fi technology deployed in-country.

The service combines connectivity from Liquid, hardware from Ruckus Wireless (which has since been acquired by the ARRIS Group), and GlobalReach’s cloud-based platform which provides authentication, authorisation and accounting. It enables businesses offering Wi-Fi to their guests to connect and engage with them through customisable and branded captive portals, and tap into new commercial opportunities. The platform is also said to offer “comprehensive” analytics of user demographics and engagement. This will allow businesses to better understand customer behaviour, and tailor their services accordingly.

Liquid’s existing managed Wi-Fi customers, along with its public Wi-Fi networks, were migrated to the new GlobalReach platform over the months that followed. The new service can be bought for a fixed monthly fee and is now available in Zimbabwe, Zambia, Rwanda, Uganda, DRC and Kenya, with Tanzania and South Africa to follow.

Software specialist **D2L** said its cloud-based learning platform, *Brightspace*, is enhancing education for more people across the EMEA region, including South Africa where **AFRICOLLEGES International** (ACI) is now using the system.

ACI is an online college addressing the agricultural education gap. It introduced *Brightspace* to provide students with affordable, accessible and industry-relevant course content. “For the very first time, *Brightspace* will give our students here on the continent the opportunity to study from anywhere, at any time, whether it’s on their mobile, desktop or tablet,” said ACI founder and CEO Howard Blight. “This provides a dynamic learning environment without the added costs of being ‘on campus.’ It will enable ACI to accommodate those students that may not have the financial resources associated with traditional learning models.”

Canada-based D2L says *Brightspace* was created for the digital learner and helps schools and institutions deliver personalised learning in a classroom or anywhere online. The platform is claimed to make designing courses, creating content and grading assignments easier, and also features analytics that track and deliver insights into the performance of departments, teaching programmes or individuals. ■



**Chris Mason,
Director of sales
& marketing,
EMEA,
Rajant
Corporation**

According to Chris Mason, US-headquartered Rajant has a “solid” position in Africa, with both deployments of its technology and the size of the networks in operational sites growing.

“Mining has always been at the forefront of our work in the continent. However, as we continue to expand globally, our partners and customers from different verticals across the region are realising the benefits that *Kinetic Mesh* can bring to their organisation.”

Rajant claims its *Kinetic Mesh* technology provides fully mobile wireless broadband connectivity that is “simple, instantaneous, and failproof in any application”. The system uses a combination of the company’s *BreadCrumb* wireless network nodes and *InstaMesh* networking software. The firm says these nodes have been designed to communicate with any Wi-Fi or Ethernet-connected device to deliver low-latency, high-throughput data, voice and video applications across the meshed, self-healing network.

“Rajant enables companies and organisations to build private wireless networks that support the IIoT [Industrial Internet of Things],” said Mason. “We refer to those networks as ‘Living Networks’ because they thrive in dynamic network environments where everything in the network can move and evolve as connectivity demands change. With our *Kinetic Mesh* technology, network infrastructures can be built with the ruggedness, mobility, and autonomous application support required in today’s demanding business environments.

He continued by saying that security, port terminals, petrochemicals, and municipalities are a few of the verticals that the company is continuing to branch into in the African market.

“A recent and particularly notable deployment has involved the ability to deploy our *Kinetic Mesh* networks to a mining operation in South Africa. We are hoping to publicise more on this activity soon. But in summary, this network is supporting an autonomous drilling rig and mine-wide monitoring made possible due to the high-bandwidth support and, more importantly, low latency that the network can deliver. As a result, operations are improved and safety measures have been put in place.”

When asked how Rajant has seen the wireless communications market adapt and evolve on the continent over the last year, Mason said the telecoms boom continued in 2017. “In Ghana for example, the value of products and services produced by the ICT sector surged 239 per cent since 2012 according to data compiled by

Bloomberg.⁴ This impressive explosive growth marked the sector as one of the fastest of any in the country.

“2017 also saw a key trend in fleet automation and optimisation in the mining industry. Deloitte reported an estimate in its annual trend report that said approximately 35 per cent of current mining positions in South Africa will be completely automated by 2037.⁵

“With this emergence of the Internet of Things and the rise of autonomous equipment such as self-driving technology in mines, increase in production along with reduced cost in fuel and maintenance is rife in the industry. To sustain this powerful production, operators must ensure that they have a fully supported network infrastructure capable of supporting the increasing demands for mobility and autonomy within the mine environment.”

So what does Mason see as the challenges for Africa over 2018 and beyond?

“The exploitation of data from within organisations’ operations is extending from consumer and enterprise into industrial environments. The IIoT is extending into every industry and further underlining the requirement for all assets, devices and people to be connected.

“Added to the escalating population growth, operators must consider environmental and economical challenges when working to provide the best technology. Whether it’s a mine, an oil rig or a CCTV implementation, telecom operators must adapt their approach on a situation-by-situation basis, to ensure the best connection for their operation. In mining, even brief periods of operational downtime can cause significant loss of revenue in short order, and thus the need for iron-clad network infrastructure is critical to ensuring that autonomous vehicles and industrial robots operate flawlessly.

“The potential for significant growth of technology adoption across the continent is immense. As we now look to connect anything and everything, a ‘Network of Things’ in all environments of diverse moving assets and next-generation applications is imperative. Today’s expansive industrial operations require robust connectivity everywhere. People and assets must be able to take robust connectivity with them wherever they go, and that’s where we come in.”

So what are Rajant’s hopes and plans for the continent over the coming months? “While we have a growing number of deployments and testing in Botswana, Zambia and Lesotho, our

⁴ <https://www.bloomberg.com/view/articles/2017-11-13/african-economic-growth-rides-on-wireless-rails>

⁵ <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/gx-er-tracking-the-trends-2017.pdf>

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aspirations for growth are already extending into other African countries such as Namibia, Kenya and Tanzania. We are also exploring opportunities in North Africa and French-speaking countries on the continent.

"As digital transformation takes hold across the world, Rajant has ambitions for companies across several verticals in Africa to reap the benefits of *Kinetic Mesh*. Of course, for us to continue to grow and expand in the region, we need to secure partners which relate to the geographies and markets identified.

"As previously mentioned, mining is a big focus for us in Africa, and we are always aiming to help more firms in this sector with their connectivity efforts. In a critical industry like this, where short periods of operational downtime can cause millions of dollars in losses, operators must be empowered to continuously monitor, manage and control their fleets of high-value equipment, vehicles and personnel wherever they roam. *Kinetic Mesh* networks, which have already been proven to stand up to the extremes of mine environments across the continent, effectively connect sprawling open pit and underground mining operations.

"*Kinetic Mesh* networks have been implemented in some of the largest mining operations around the world to reliably cover people and assets across all remote operations. And there is no clear sign of any slowing down, with 69 per cent of mining companies looking at remote operation and monitoring centres, 29 per cent at robotics, and 27 per cent at unmanned drones, globally.



Kamal Mokrani,
Global vice
president,
InfiNet Wireless

In the 2017 edition, Kamal Mokrani said that Libya⁶ had been a good market for InfiNet Wireless until the whole country was turned upside down by the unrest and political turmoil that began in 2011. But at the time, he also said that there were signs that the country was being re-built. Catching up with Mokrani once again at AfricaCom in

November 2017, we asked if that had lead to the firm returning to Libya for new business.

"We are still active there – it's not yet at the stage where it is stable enough, but it has grown in leaps and bounds from last year. There is some kind of government that did not exist in 2017 (at least a recognised government), so things are moving. What we are seeing today is a lot of entrepreneurs, for example, who are starting things on a regional basis. A lot of Libyan business people had escaped to Southern Europe or to Dubai but now they are coming back with their money and they are investing. In fact, just in GITEX in Dubai three weeks ago, I met separately with

two guys who were in the telecoms business before and now want to go back to Libya and want to setup nationwide ISPs.

"And the oil and gas sector is slowly coming back – foreign operators like Total and Schlumberger are now going back to Libya and they need all the connectivity that was there before it had been destroyed. They have also discovered some oil offshore which, for them, is easier to drill rather than on land. So we are providing connectivity to a number of rigs that have been setup in the past 12 months."

Mokrani mentions oil but the last few years have certainly been tough for countries such as Angola and Nigeria whose economies are fuelled by the stuff. Has that had any impact on InfiNet's business in Africa?

"Oil and gas has never been our main focus in terms of market sector so it perhaps only has a tiny impact on us. Our biggest sectors are ISPs and homeland security/video surveillance. Take Egypt for example, which was our biggest country in Africa last year. They created a safe city programme to attract tourists back so we're working a lot with law enforcement agencies and the army to secure the tourist sites, Sharm El Sheikh, Hurghada, Cairo, Alexandria, Luxor, etc.

"The tourists are coming back but slowly and a lot slower than the Egyptian authorities want. The Russians and Germans are coming back, but the British are still hesitating. It takes time. Tunisia is still suffering from the terrorist attack of three or four years ago. It will be forgotten, eventually, if nothing else happens. Turkey is having a similar problem now as well, as did Malaysia seven or eight years ago, but now people go to Malaysia without thinking."

Do such security threats mean more business for specialist vendors such as InfiNet Wireless? "A problem for some is an opportunity for others, so unfortunately and fortunately that is true. I know Colombia is outside your remit but we see that is coming back very quickly; the government has signed an agreement with the rebels, the drug lords are handing in their weapons, and the authorities are re-building the country."

On the subject of Latin America, it sometimes seems as if that region is almost the 'new Africa' as many wireless communications specialist seem to have switched their focus to the developing markets on that side of the Atlantic. Is that at the expense of Africa?

"I recruited a team of five people in Latin America to cover Brazil, Colombia and Argentina, and we already had a presence in Mexico. We are not re-focusing. We are just addressing another market; as one market goes down another comes up. Take Saudi Arabia, for example. For the past five years, that was traditionally our best market but right now I could not tell you what's going to happen there

in the next few months because of what's going on [refers to the high profile anti-corruption arrests that had taken place at the time, and the changes being brought in by the new regime]. But because we are spread across the world, if one market goes down another comes up and it has little impact on our business."

At this point, Mokrani is keen to point out that Africa is certainly not a market that is going down, and that it remains an exciting and vibrant region for InfiNet. "I would not be here if I didn't feel that there was a big chunk for us to address. We have partners here, and we're putting more efforts into raising brand awareness even further with dozens of meetings planned for the weeks to come. They will include a mix of people such as ISPs, operators wanting to do backhauling, enterprises such as banks wanting to link up different branches to headquarters, or manufacturing facilities wanting to link up their different locations together, etc."

When asked about what trends he has observed over the last year, Mokrani said that in South Africa he is seeing more ISPs interested in what InfiNet offers because they have invested quite heavily in, for example, WiMAX, which is becoming fairly obsolete now. "So they want to secure the next generation and this is where we come in. WiMAX did what it did, when it had to do it, but manufacturers have stopped investing in that technology. There are alternatives, such as LTE as well as our solutions, that can plug the gap."

"Earlier, I was sitting in some separate meetings with ISPs from Congo, DRC and Somalia that are more interested in video surveillance. They want to secure their mining sites or the hotels or airports, for example. So I am seeing a mix of different things. I would say that in Africa, the two main areas of interest right now are definitely ISPs at number one, while number two is video surveillance."

In terms of building infrastructure, Africa is no longer, in the main, a greenfield site. Earlier, Mokrani spoke about replacing WiMAX in some situations so in general would he define the market as one where users are upgrading rather than building new networks?

"It really is a mix. As I said in Libya you are getting some entrepreneurs who are starting from scratch, and then at the other extreme you have operators like Vodacom who have approached us to help them migrate their existing infrastructure into platforms that are more carrier grade and offer higher capacity, better QoS, etc.

"So you get a bit of both. But I would say that maybe 70 per cent of what we are seeing today is more replacing existing platforms. Everybody talks about the IoT, 5G, etc. They want to be ready with the higher capacity pipes as and

⁶ African Wireless Communications Yearbook 2017, p53.

when that happens. The big operators such as MTN, Vodacom, Orange, Liquid Telecom and a few others are talking to us about that and thinking along that direction. But you can't talk about Africa as if it was a single market. Ghana and South Africa for me are far more advanced, for example, than other countries so you see different trends in different markets."

But from general perspective, 2017 was certainly a good year for InfiNet. "Traditionally, we have been very strong in the CIS, Russian-speaking countries and that still remains important as we have a strong installed base there. The second region for us was the Middle East, but now I can see a shift where Africa and Latin America are becoming more important than that region for us. From a dollar figure we are still growing in the CIS, but we are growing faster in Africa and certainly in Latin America.

"As you know, the fixed infrastructure is almost non-existent in certain countries so you have no option but to go wireless. But we do not promise to fix all problems because we cannot, and if I was an operator, I would need a mix of different technologies to provide the whole thing."

In the 2017 interview, Mokrani mentioned the XG 1000 radio that InfiNet had just launched at the time. The company has since launched a version that is claimed to deliver up to 1Gbps of data over 80km to 100km and also offers extra frequencies. So what hopes does he have for the future?

"Maybe I didn't mention it much last year but the XG was our first foray into a fully SDR-based approach. So we can do many more different things using the same hardware, whether it is changing frequencies, increasing capacities, offering different types of QoS, etc. We are therefore definitely fully engaged with the software-defined radio route and our next generation, which we are aiming for release around mid-2018, will take the current product into a full SDR. That is the only way to go and it is the reality. 5G is our driver here. We need to be super-flexible when 5G is fully ratified and fully deployed, and you cannot be flexible if you have fixed hardware that you cannot change."



Dan Zajicek,
CEO,
Gilat Telecom

In 2017, Gilat Satcom changed its name to Gilat Telecom as part of an effort to highlight the fact that it offers more than just satellite communications. Speaking last year, Dan Zajicek said that the change supported the firm's strategy of long-term investment in African fibre as well as satellite networks. Gilat is a shareholder in the West Africa Cable System (WACS) and also in WIOCC which owns the Eastern Africa Submarine Cable

System (EASSy). The company also continues to provide space segments over numerous satellites including Intelsat, Telesat, Hellas Sat, ABS, SES, and others. It operates three international teleport in the Middle East and Europe, as well as 16 hubs/PoPs, of which 14 are in Africa and two are in Europe.

According to Zajicek, 2017 was the year that the cloud became a hot topic in Africa with Microsoft becoming the first of the major cloud providers to actively target the continent with its Azure, Office 365 and Dynamics 365 products being offered from multiple data centres.

"An increase in the number of data centres in Africa combined with ever-improving connectivity infrastructure is increasing confidence in cloud. A flash poll on the ConnectingAfrica.com website, operated by the organisers of the annual AfricaCom conference, asked the question: *"How important are cloud services to African enterprises in 2017?* The answers are both very interesting and encouraging to cloud service providers."

Citing the survey results, Zajicek said 41 per cent of all enterprises reported that cloud services are "very important". Sixteen per cent said that they were only important to large enterprises, while 10 per cent believe they are only of "limited importance". Meanwhile, 30 per cent stated that such services are not yet important but may become so later in 2018 or beyond, and three per cent didn't know.

However, while the popularity of cloud services continues to grow and data centres and connectivity infrastructures are improved, Zajicek said Africa's protection policies are still unclear, and that security fears along with the high cost of bandwidth are limiting market growth. "Still yet, there is general mistrust of the global technology providers in Africa, and an understandable desire to work with companies that are on the ground and present in [the region].

"We have found that all of these concerns can be addressed. Indeed, security is one of the first interests of African customers when they approach us. Companies understand the tremendous risks that exist to their data and they want to ensure that they are protected properly – and able to quickly restore their data when they need it."

Zajicek went on to state that the issue of latency is also being resolved by establishing data centres in Africa's capital cities. "This way, the delay is just of a few minutes as opposed to a much longer one when the cloud services exist out of Africa."

He added that the company sees opportunities for smaller providers to differentiate themselves by offering a fully managed platform that combines cloud services with the provision of a fast and reliable broadband service, allied to a genuine interest in helping their customers succeed. "As both knowledge and interest in cloud services

"There is general mistrust of the global technology providers in Africa, and a desire to work with companies on the ground."

continue to grow and as more companies learn to ask the right questions they need to provide to technology providers, there's no doubt in my mind that in 2018 we will see widespread adoption of cloud services across Africa."



Chris Meering,
Vice chair of
marcom,
oneM2M

OneM2M's aim is to develop technical specifications that address the need for a common M2M service layer. It says this can then be readily embedded within various hardware and software, and relied upon to connect the myriad of devices in the field with M2M application servers worldwide.

The organisation currently has around 200 members and partners. One of its critical objectives is to attract and actively involve organisations from M2M-related business domains such as telematics and intelligent transportation, healthcare, utilities, industrial automation, smart homes, etc.

As well as being an 'IoT evangelist' at HPE (Hewlett Packard Enterprise), Chris Meering also works as oneM2M's vice chair of marketing and communications. He believes that – whether it's from an increasing proliferation of smartphones, demand for new bandwidth-hungry services or an explosion of low bandwidth IoT-connected devices – countries everywhere have one thing in common: a growing requirement for connecting people and things.

"For CSPs, this equates to increasing pressure and a need to rethink their infrastructures, with no such thing as a one-size-fits-all approach. This is especially true as the global rollout of the IoT, which is determined to bring convenience and simplicity to everyday life, continues.

"In many areas, fibre is too expensive or impossible to install due to the challenging terrain and economic conditions. As such, new cost-effective solutions which overcome these physical and economic challenges is required – with fixed wireless access being one of the frontrunners for high bandwidth services. New innovations in this area mean it can bring levels of performance and gigabit internet

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speeds to rival the best fibre connections. "When it comes to connecting battery-powered devices that require infrequent transfer of small data payloads (such as smart meters), LPWA (low power wide area) networks will play a particularly important role."

According to Meiring, matching the right connectivity option to the use case is key to ensuring customer satisfaction and driving economic value. However, when it comes to the IoT, he said CSPs must look beyond basic connectivity to ensure return on investment.

"Connectivity revenue is a relatively small component of the IoT value chain, with the bulk of this expected to come from applications. But there's no need for CSPs to be restricted to pure connectivity. By pioneering a standards-based horizontal approach to IoT deployments – such as that provided by oneM2M – they can avoid growth-inhibitive silos, re-use sensor data in multiple applications, and deploy devices for more than one purpose."

"This approach boosts connectivity volumes, attracting device and application providers onto networks and creating partnerships within a vibrant ecosystem. Ultimately, this enables entry into the applications space and movement up the value chain – whatever the connectivity type."



**Mahmoud
El-Banna,
Global IoT solution
management
leader,
Nokia**

The term smart city is not a new one and, while some examples already exist on the African continent, it is not as widespread as it should be, according to Mahmoud El-Banna. He said urbanisation, economic, social and environmental sustainability requirements are putting increasing pressure on cities' infrastructure, and believes this requires a paradigm shift to urban centres operational and management models by adopting new and smart technologies to create sustainable living environment for their citizens.

"Cities across the globe are facing persistent challenges in different sectors in terms of energy consumption, environmental sustainability, citizen safety, traffic management, vulnerability to disasters, changing climate conditions and many more. These challenges are accelerating the need of new business models for cities management to improve the quality of life inside the city."

"Cities looking to thrive in the future are encouraged to invest in a 'Six 6s' smart city model – this creates smart, safe and sustainable applications enabled by a shared, scalable and secured ICT infrastructure."

"The challenges translate into various opportunities for cities to embrace new technologies and improve efficiency of urban operations. The IoT, which aims at connecting everything around us towards the journey to a programmable world, is on the high rise and at the heart of future proof smart cities. IoT will be the technology of choice to enable unlimited possibilities for smart city applications and use cases."

"Smart city IoT applications will have various requirements with direct implications on the ICT infrastructure. These requirements will vary in terms of data volume, throughput, number of devices and the latency pattern for transferring the data."

"This in return mandates the need to have a robust and flexible infrastructure to support a wide range of use cases that would be implemented as part of a smart city. The adequate infrastructure would be composed of a massive scale broadband access technologies layer supported by an agile networking gear and topped by a city management platform to manage all aspects of the city. Across all these horizontal layers, security is vertically positioned to secure the data across the entire ICT infrastructure."

"Optimal smart city implementation will truly benefit from the Six 6s. By sharing network infrastructure, applications and data over a single IP infrastructure, cities can minimise cost and provide residents with ubiquitous and real-time access to applications anytime and anywhere."

"Cyber security and data privacy also remain ultimate priorities. Endpoint data protection, device management, authentication, authorisation, traffic profiling and encryption must be key points on both governments' and citizens' checklists. On the scalability aspect, while the initial uptake of smart cities initiatives might start small, they can grow fast and cities must ensure that their ICT infrastructure anticipates this growth."

"To ensure smart city initiative success, applications must satisfy the smartness, safety and sustainability angles."

"Smart applications aim at improving the quality of success, bolster innovation and drive social and economic development, but also make the cities more attractive places to live, visit and do business. Safety comes through providing applications that prevent or minimise the risks of adverse events, such as crime, accidents and natural disasters."

"Sustainability applies to minimising the environmental impact of the municipality's operations and the activities of its businesses and citizens, while ensuring that cities select the right business model to fund, invest and cost-efficiently manage innovations."



**Mak Rahnama,
Senior technology
analyst,
GlobalData**

// Telcos in sub-Saharan Africa, which have traditionally focused on voice and data connectivity, are increasingly looking to expand their enterprise services portfolio and transition towards offering IT services. Data centres are a key pillar for them to provide colocation, managed platforms, cloud services, amongst others.

"The key drivers in the adoption of data centre services in the region include increasing fixed broadband coverage and a growing number of submarine cables providing improved wholesale and international connectivity. This has led to the data centre competitive landscape developing significantly over the past few years, as in addition to telcos and dedicated providers, governments are also launching data centres and selling these services to enterprises."

"However, enterprises have limited familiarity with data centre services, making it a key barrier to adoption. Telcos need to address this in their go-to-market strategies by launching targeted awareness campaigns to inform and educate the market about such services."

"One commercial strategy deployed by providers of data centre services in sub-Saharan Africa involves using the technical features of their facilities as the main way to differentiate service offerings. These include access to a reliable power supply, a feature that is particularly important in a region plagued by unreliable national electricity grids."

"Investment in data centres allows a telco to strategically position itself to cater to the demand for IT services from the enterprise segment. It expands the operator's revenue stream to beyond just connectivity services. Failing to capitalise on the opportunity for data centres would mean telcos risk missing out on a key revenue opportunity, and an important component in their enterprise services portfolio."

The above article by Mak Rahnama first appeared in the Jan-Feb 2017 issue of Southern African Wireless Communications magazine.

"Enterprises have limited familiarity with data centre services, making it a key barrier to adoption. Telcos need to address this in their strategies."



**Eckart Zollner,
New business
development,
Jasco Group**

isted on the Johannesburg stock exchange, Jasco is a South African technology specialist that works across telecoms, IT, energy and industry. As well as having multiple offices throughout South Africa, the group has an office in Kenya to service East Africa as well as one in Dubai to service the Middle East and Northern Africa region. It also trades in many sub-Saharan African countries with a special focus on the Southern African Development Community.

Eckart Zollner said: "We are able to provide active and passive infrastructure elements as well as network services from the planning and design phase, the deployment and commissioning phase right through and including the operational and ongoing support services."

In South Africa, Zollner said the firm has seen "good growth" in demand for its solutions from neighbouring countries and is currently servicing numerous opportunities across its solution portfolio. It is now concentrating its attentions on the eastern side of the continent. "Following our entry into East Africa through the Jasco Kenya office in 2016, we have now focused on growing our client base in East Africa and to maximise opportunities through regional expansion with customers in the area. We have started building capacity in the region for additional solutions as offered across the Jasco group.

"Areas of uptake and growth include enhancement of contact centres, provision of hosted solutions, and automation. Jasco is currently assisting customers to improve their businesses and services to their customers through the establishment of multi-channel contact centres, automation of functions and implementation of transactional recording.

"Wireless networks are an essential platform for provision of new services and solutions in Africa, and will contribute directly to improving economic development in its countries.

We have the knowledge and skills to bring additional services, such as electronic security, IoT deployments and value added virtualised data platforms, to these markets.

"To drive down costs and increase provision and uptake of services, regulators and telecoms incumbents in Africa are supporting the establishment of carrier-neutral data centres and infrastructure sharing models. This is a major area of opportunity for Jasco with its ability to provide wireless and managed services, as well as to implement wireless infrastructure. There are already a number of data centre players in African markets, and we are able to provide hosted, storage and recovery services out of these centres."

Zollner continued by saying that Africa's wireless communications market has followed the trend of shifting from voice to data services. However, he added that large parts of the population remain underserved by the latest generation 4G LTE standard. "A number of smaller networks have been licensed and are challenging incumbent operators, but network rollout remains slow due to the lack of funding. Effective 4G LTE broadband services require a cost effective and affordable fibre backhaul solution, and these are often still lacking in the geographic areas, due to a lack of competition and open regulation.

"Where networks are rolled out, we are able to offer core network components, offering service providers hosted and as-a-service solutions. This model not only lowers the cost of services to service providers' customers, but will also enable those service providers to scale quickly as demand grows."

When it comes to identifying the challenges in Africa for the foreseeable future, Zollner said the biggest one will be the build-out of wireless infrastructure to reach the unconnected population living outside the metropolitan areas. He believes infrastructure sharing will be key to achieve this. "Because backhaul for optic fibre and satellite networks is very expensive, these networks must be built on the concept of infrastructure sharing. Governments, regulators, incumbents and industry must work together to achieve this – it's the only way forward to deliver effective economic growth.

"A lot of socio-economic progress can be made once communication networks and underlying platforms are rolled out. This will facilitate the growth of e-commerce and e-health, and extend the reach of education and government infrastructure. Africa already has the vision – smart cities are being planned and piloted in numerous countries. We expect to see a lot of localised innovation across these areas as metro platforms expand into un- and underserved areas to achieve critical mass.

"We also expect to see transformative growth as Africa steps up its capabilities in key areas. Tourism is a useful example: potential holidaymakers expect to access information about countries online to make their decisions and book their vacations. They don't just want websites and reservation capabilities, they want to be able to see hotspots using live webcams. Once the telecoms and digital infrastructure and platforms are in place, Africa can reach deeper into the global tourism market.

"Jasco is able to offer full turnkey solutions for wireless infrastructure and services deployment, from the planning and design phase to deployment and commissioning, operational and ongoing support services. Our

model is to work in these emerging markets with local partners, leveraging a programme of knowledge and skills transfer to increase penetration of wireless services into relevant markets."



**Nick Ehrke,
Sales director,
Southern Africa,
RADWIN**

In the 2017 edition of the Yearbook, Nick Ehrke said RADWIN saw expansion across all of its segments during 2016.⁷ So how did the last 12 months pan out for the company? "We continue to see growth across all of our sectors, including the mining sector. Our ongoing success in this sector in Africa is due to the fact that mines run

in mission critical environments with regards to internal data and security. This requires the reliability and assured availability that the RADWIN networks have been able to provide."

Ehrke also pointed out that the company had been involved in a number of projects to replace obsolete WiMAX networks in 3.5GHz spectrum and to address the enterprise market which fixed LTE is unable to do. While further details about this were not provided, he said: "Our operator customers are expanding their networks rapidly in order to replace the LMDS [local multipoint distribution service] networks as carriers come under increasing pressure to reduce cost. The issue of availability has become a key factor in the competitive market place."

One thing he notes about the way the continent's market is now developing is what he describes as an "unfolding maturity".

"Traditional mobile markets have come under increasing pressure to be more cost effective particularly with the cloud facilities developing and evolving. Services have been focused on higher margin enterprise business.

"In this environment, connectivity availability is critical and continues to drive demand for RADWIN products. Our outlook is positive. Investment in Africa is changing, business and retail are becoming more digital; the continent's economies are diversifying rapidly and we believe the prospects for growth are good. However, the usual proviso of political and economic uncertainty is something we continue to monitor."

To prepare itself for the opportunities ahead, the company recently launched two new products, the *DuoJet* and the *Smart-Node*, which Ehrke claims will give users a "competitive advantage". And in terms of the year ahead, he said RADWIN's plan is to continue to listen to its customer's needs, and design and develop products that give customers "cutting edge" technology. ■

⁷ African Wireless Communications Yearbook 2017, p55.



Russian Satellite
Communications Company



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chapter

Satcoms

5

Throughout the last dozen or so years that we have been rounding-up developments in Africa's satellite markets for this annual publication, the same three questions have kept coming up: Isn't satellite capacity too expensive? Is there a risk of over-supply? Who needs connectivity from the sky when we have fibre in the ground?

Perhaps a fourth question can now be added to that list: are these issues still relevant for African satellite in 2018?

Certainly, concerns about capacity pricing still dominate discussions both within the satellite industry as well as without it. But now, that conversation is actually about low, rather than high, costs. For instance, in an interview first published in an issue of *Northern African Wireless Communications* magazine last year,¹ the Global VSAT Forum's secretary general, David Hartshorn, said there was a period in Africa where prices rose from USD2,000-3,000 per megahertz to USD8,000 in the space of just one or two years. He said this was created by unsatisfied demand and an undersupply of capacity. But today, with the launch of new types of satellites that offer high throughput coverage over the continent, prices have been driven down into the hundreds of dollars.

According to Hartshorn, capacity costs have historically been regarded in the industry in terms of price per megahertz. He believes this stems from the traditional business model of satellite operators running a wholesale business selling bandwidth.

"The traditional way that the entire value chain, right down to the end customer, has viewed bandwidth is central to the change that is currently under way in the satellite industry globally," said Hartshorn. "But now there is high throughput satellite, new technologies on the ground as well as in other variables in play,

where everyone is thinking not in terms of price per megahertz but rather price per megabit."

Innovations in satellite technology – both on the ground with new terrestrial infrastructure, as well in space with satellites that use more efficient propulsion systems that enable more cost-effective launches – are contributing to ongoing price declines for satellite capacity pricing.

In fact, according to the latest *Satellite Capacity Pricing Index, 4th Edition (Q1 2018)* report released by Northern Sky Research (NSR) in March 2018, prices have actually fallen for a third straight year. NSR revealed that on average, capacity price declines for 2016-2018 ranged from 32 to 57 per cent across various applications and regions. According to the research firm, the road ahead "appears unclear as greater supply enters the scene, demand lags in some markets and competition intensifies".

NSR stated that while operators are now deploying strategies such as vertical specific market entry partnerships and framework agreements on discounts, these haven't stopped the impact of the widening gap in supply-demand economics. It added that this trend is exacerbated by competitive sales positioning by operators in each region. Despite expecting to see smaller price decreases in 2019, NSR reckons the industry must wait longer for them to bottom out. Report author Gagan Agrawal said: "With video hotspots facing pressure from both global pricing declines and OTT opportunities for non-streaming content, along with consumer broadband over Ka-band HTS consistently in the USD150 per Mbps per month range, the chances of recovery remain uncertain."

But he also pointed to a possible silver lining for the industry: "However, with capex per Gbps for new satellites marking new lows, declining lease prices come as a blessing to service providers in data and mobility, so they can fund expansion of their businesses and create mini telco businesses backed by satellite in the scaling process."

On the issue of over-supply, while some satellite operators acknowledge that there may be a risk here (ABS and Spacecom, for example – see interviews section starting on p70), most believe that Africa currently needs all the capacity and bandwidth it can get. With optimistic forecasts for GDP growth, booming demand for connectivity and digital services, plus a relatively young population for whom the use of mobile devices and services is now not only second nature but also a must, increased connectivity is an imperative for the continent.

Of course, that connectivity could come from satellites high above the Earth or from the cables that are buried within it. But on the subject of fibre, many commentators agree that it will be a long time before such cable networks penetrate deep within Africa's mainland – if at all.

While fibre continues to connect people in urban areas, satellite is still playing a unique role in providing a solution in remote, rural and hard to reach locations. Indeed in many instances, the technology continues to present the only viable solution where fibre cannot reach and mobile operators are unable to cost effectively build and run cellular networks.

"Today, with the launch of new types of satellites that offer high throughput coverage over the continent, prices have been driven down into the hundreds of dollars."

¹ See *Up in the air*, pp27-28, Apr-May issue.

Satellite also represents key infrastructure needed for accelerating digital transition. Last November, Eutelsat pointed out that it had been two years since the expiration of the digital migration deadline set by the ITU for Africa, and yet only six nations on the continent had so far completed their digital transitions. The firm blamed this slow progress largely on the steep challenges faced by countries with a large landmass, mountain ranges or islands that typically remain beyond the range of terrestrial networks, or with interferences issues in border regions, as well as by the question of funding. Eutelsat added: "In most cases, a terrestrial/satellite solution beats standalone terrestrial in terms of cost effectiveness and speed. Homes within a satellite coverage can receive DTT channels immediately without having to wait for new investment in terrestrial infrastructure and its gradual deployment across a territory."

The company believes that without digital migration, African countries are missing out on a number of opportunities that include:

- Transforming the diversity, signal quality and reach of channels into viewer homes
- Generating infrastructure upgrades and stimulating the local content creation industry
- Releasing analogue frequencies for other applications such as mobile services

Thus in answer to the first three questions above, it is apparent that satellite capacity prices are continuing to fall, the risk of over-supply is small compared to satisfying Africa's booming demand for mobile services, and terrestrial solutions such as fibre do not provide the ultimate answer in connecting the continent.

So what about the answer to the fourth question? If satellite was no longer viable in Africa, you would not see all the big name operators continuing to invest in new spacecraft for the region. So until such time when demand for satellite service in Africa begins to take a nosedive, and there is truly ubiquitous coverage from terrestrial network operators, continuing to ask the same old questions about the technology no longer seems relevant. ■

Upcoming missions

Boeing will help expand broadband services in Africa with two new satellites planned for the continent. In a deal worth USD161m, **Spacecom** announced in late December 2016 that it had contracted the company to build **AMOS-17**. The new satellite is expected to be launched in 2019 and will cover Africa, the Middle East and Europe. It will operate from 17°E – the same location that was previously used by **AMOS-6** before all contact with it was suddenly lost at the end of 2015 resulting in its write-off.²

Spacecom said **AMOS-17** will be designed for an in-orbit life of more than 15 years and offer a payload power of around 8.5kW. It will offer Ka-, Ku-and C-band services, and feature a combination of broad regional beams and high throughput spot beams to maximise throughput and spectral efficiency.

In a separate deal announced in September 2016, Boeing will also build **GiSAT** for Cayman Islands-based **Global IP**. The spacecraft will be based on Boeing's 702 platform but with a new digital payload offering twice the capacity of previous designs. Global IP's mission will be to deliver streaming media, digital broadcast and other communications services to sub-Saharan Africa. With a coverage area encompassing 35 countries and 750 million people, it claims **GiSAT** will deliver higher data rates at lower costs than previous satellites serving the region.

"Our vision for **GiSAT** is to provide end users with connectivity and services that are affordable, rich in local content and truly broadband in nature," said Bahram Pourmand, CEO, Global IP. "With the ability to reconfigure the **GiSAT** on-board processor, the Boeing digital payload will allow us to broadcast different channels to different beams from different locations, providing better service to broadcasters, mobile operators and ISPs."

Scheduled to enter service in 2019, **GiSAT** is designed to operate with more than 10 gateways in Europe and multiple gateways within Africa.

Towards the end of 2017, **Avanti Communications** announced that the launch



GiSAT will feature Boeing's new digital payload technology and provide coverage over sub-Saharan Africa.

PHOTO: BOEING

of **HYLAS 4** would be delayed but added that it will be able to save time thanks to the technology behind the satellite.

Built by Orbital Science, the new Ka-band hybrid propulsion spacecraft features part traditional chemical orbit raising, part electric orbit raising, and electric station keeping. The previously announced launch slot of 4Q17 for **HYLAS 4** would have required around 100 days of electric orbit raising for it to reach geostationary orbit, meaning that it would be on station by the end of 1Q18. **HYLAS 4** was finally launched by Arianespace in early April 2018. Avanti said the launch configuration of this new slot meant that extra chemical fuel was loaded on the satellite as it was paired with a partner spacecraft that was lighter than originally planned. This enabled chemical-only propulsion to be employed and meant that **HYLAS 4** was able to reach geostationary orbit in just 10 days, saving approximately 90 days of electric orbit raising.

As a result, Avanti said revenues from **HYLAS 4** were expected to flow from July as previously planned. It added that the launch configuration also provided sufficient fuel on board to support the new satellite for up to 19 years in orbit, an increase of 27 per cent over previous expectations.

² African Wireless Communications Yearbook 2017, pp74-76.

JANUARY 2017

ABS-2A began commercial service on 21 January 2017 following its launch on board a SpaceX *Falcon 9* rocket in June 2016 and subsequent testing. Equipped with 48 Ku-band transponders, the satellite orbits at 74.725°E and will serve customers in Africa, the Middle East, Russia, South Asia and South East Asia. **ABS-2A** is the second of two all-electric satellites Boeing has delivered to ABS. The operator adds that it has now completed its investment to build and launch three satellites in three consecutive years.

FEBRUARY

Hong Kong's Asia Satellite Telecommunications has agreed to relocate *AsiaSat 8* from 105.5°E to Spacecom's 4°W orbital position. It will be co-located with Spacecom's **AMOS-3** for a four-year period and is expected to begin service in 1Q17. Spacecom has an option to extend the agreement for an additional year of service. *AsiaSat 8*'s beams will cover Africa, the Middle East and central Eastern Europe, enabling Spacecom to continue serving its customers at 4°W following the end of life of **AMOS-2**.

MARCH

UAE-based Intersat is delivering internet services across Africa following the signing of a multi-year capacity agreement with SES. It will use *NSS-12* located at 57°E to deliver broadband connectivity to businesses and consumers. The agreement includes a new C-band capacity lease, infrastructure services out of SES' Betzdorf teleport, and a renewal of upgraded Ku-band capacity out of the Djibouti Teleport. The latter is managed by BringCom and has been used by SES since

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SATCOMS: YEAR IN REVIEW

New birds

In what it described as “one of the biggest tech refreshes” in history, Iridium finally launched the first orbiters that will eventually replace and enhance its existing network of LEO satellites that span the entire globe.

The first 10 that comprise the operator’s *NEXT* constellation were originally due to be launched by SpaceX in September 2016. But the loss of Spacecom’s AMOS-6 on the launchpad² resulted in a backlog in SpaceX’s schedule. Iridium’s satellites were eventually sent to space on 14 January 2017. They were delivered to a 625km temporary parking orbit where they were tested before being moved into their 780km operational orbit a few months later.

These first 10 satellites are the start of what the company claimed will be the largest commercial fleet in space, providing 100 per cent truly global communications coverage.

SpaceX planned to carry out seven more launches for Iridium over an 18-month period, deploying ten *NEXT* satellites at a time. One-by-one, these new birds will be positioned near a current generation Iridium satellite, each moving at around 17,000 miles per hour as testing



A SpaceX Falcon 9 rocket lifts-off with the first 10 LEO satellites for Iridium’s *NEXT* constellation.

begins. Iridium said “unique” inter-satcom links from nearby satellites will be repositioned to point to the new *NEXT* spacecraft as it prepares to take over service. Existing satellites will eventually be de-boosted and de-orbited, and the entire Iridium *NEXT* network is scheduled to be completed by mid-2018.

At the end of January, *Intelsat* announced that it had finally gone live with what was claimed to be the first multi spot beam, Ku-band, high throughput satellite (HTS) service for the EMEA, APAC, Mediterranean and Indian Ocean regions. *Intelsat* 33e was successfully launched in August 2016 and is the second satellite to use the company’s *EpicNG* HTS platform. It was due to enter service at the end of 2016,³ but this was delayed due to a malfunction in the primary thruster which meant orbit raising took longer than originally planned. The satellite eventually entered service on 29 January 2017.

Manufactured by Boeing, *Intelsat* 33e is said to be equipped with the “most advanced” HTS payload design that is also “exceptionally flexible”. From its orbital location of 60°E, *Intelsat* said the new spacecraft will enable the delivery of enterprise-grade, broadband services to fixed and mobile network operators, aeronautical and maritime mobility service providers, and government customers. Some of the African customers committed to *Intelsat* 33e’s vast geographic coverage include Orange Cameroon, Djibouti Telecom, Africell, MultiChoice, Vodacom, Telkom South Africa, amongst others.

Intelsat said its global footprint of satellites that use the *EpicNG* HTS platform will be completed following additional launches over 2017-18. This included 35e which left Earth on board a *Falcon* 9 on 5 July and now orbits at 325.5°E where it replaces *Intelsat* 903 which was redeployed. 35e is delivering C- and Ku-band services for wireless infrastructure, mobility, broadband, government and media customers in the Americas, Caribbean, Europe and Africa. Orange, INWI, Sonatel and Speedcast were named as among some of the first customers using the satellite’s capacity.



Intelsat 33e was launched on an Ariane 5 rocket last August, but its in-orbit testing was delayed.

The launch of the company’s fifth HTS satellite did not go to plan and had to be re-scheduled following an earlier failed attempt. *Intelsat* 37e was due to go up from French Guiana on board Arianespace flight VA239 together with its co-passenger, Japan’s BSAT-4a, on 5 September. But lift-off was stopped due to an “out of specification condition” on the launch vehicle. The following day, Arianespace said: “Just after the ignition of *Ariane* 5’s main stage *Vulcain* engine, the on-board computer detected an anomaly affecting electrical equipment on one of the two solid-propellant boosters (EAP). This anomaly led to an interruption of the automated lift-off sequence.”

The electrical equipment was replaced and after carrying out all related checks, Arianespace said that it was planning for a launch as “early as possible”. Following a delay of more than three weeks, 37e finally blasted off on 29 September. *Intelsat* was expecting to begin commercial services in 1Q18 after all in-orbit tests are successfully completed. The new satellite orbits at 342°E and will be

² African Wireless Communications Yearbook 2017, pp74-76.

³ African Wireless Communications Yearbook 2017, p76.

2014 after it installed a nine-metre Ku-band antenna and hub equipment at the site.

APRIL

Gilat Satcom is providing satellite connectivity to Orange in the DRC. Following its acquisition of Tigo’s operation in the DRC in 2016, Orange says it has seen greater demand for broadband and cellular services across all sectors in the country. Gilat Satcom and its local partner Raga Sat were previously providing 400Mb to the operator and this has now increased to 1Gb. Orange will use

the additional capacity to support its international data, domestic and backhaul networks.

MAY

Ethiopia’s Information Network Security Agency (INSA), which is responsible for the transformation of the country’s high-tech and security industry, will use capacity on *EUTELSAT* 8 West B to deliver services from its new Ethiosat broadcast platform. *EUTELSAT* 8 West B orbits at 7/8°W which, according to its owner, is the “prime” video neighbourhood for North

Africa and the Middle East. Ethiosat plans an initial launch of nine national channels.

JUNE

Asian satellite operator Thaicom has teamed up with Intersat to launch a managed satellite network service for African enterprises and governments. The platform will use capacity from *THAICOM* 6/*AFRICOM* 1 which orbits at 78.5°E. Intersat will manage the end-to-end service from its teleport and NOC in Nairobi which features iDirect’s

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SATCOMS: YEAR IN REVIEW

used by broadband, mobility and government customers, not only in Africa but also in Europe and the Americas. It replaces *Intelsat 901* which will be repositioned to another location. Built by Boeing, the all-digital *Intelsat 37e* has full beam interconnectivity in C-, Ku- and Ka-bands, and also includes enhanced power sharing technology and steerable Ku- and Ka-band beams.

On 26 December 2017, a Zenit-2SB launch vehicle successfully lifted off from the Baikonur Cosmodrome in Kazakhstan carrying **Angosat-1** – Angola's first satellite. Developed by Russian company RSC Energia, *Angosat-1* will orbit at 12.8°E with a payload that includes 22 C- and Ku-band transponders. The satellite is said to have a conventional capacity equivalent to 44 transponders of 36MHz which covers all of Africa and parts of Europe.

Despite a successful launch, ground teams lost contact with the spacecraft in the days that followed. However, on 29 December Energia announced that the satellite was now communicating and that its onboard systems were functioning normally.

Angosat-1 will be operated by InfraSat which was established in 2008 as an independent business unit of Angola Telecom. InfraSat executive director Diogo de Carvalho said that the new satellite had registered a lot of interest from national operators, and that contract negotiations were ongoing.

For instance in July we reported that DRC-based satellite operator Renatelsat had signed a deal to use capacity on the satellite. It joined Angolan Public Television as one of the first two companies to sign for capacity on the USD320m spacecraft.

The deal marked the official campaign to commercialise capacity. Renatelsat executive director Richard Achinda said *Angosat-1* will allow the expansion of his company's services in neighbouring countries as well as into Angola. Multichoice Angola's communication director, Adilson Garcia, added that *Angosat-1* will enable national operators to take advantage of satcoms

services locally and in national currency – unlike providers from America and Europe where payment is made in foreign currency.

Expanding services and markets

While 2017 only saw a handful of new launches for the continent (but still more than 2016 which saw significantly fewer lift-offs by comparison), it was on the ground rather than in space where most of the new market activity happened.

For example, NSSLGlobal announced that it was working with Lagos-based ISP and system integrator Coolink to bring L-band coverage to remote parts of Nigeria where mobile services are non-existent or erratic. Speaking earlier last year, Coolink's Nadim Chidiac said: "Satellite remains the only viable means of providing universal internet access beyond the reach of terrestrial communications in emerging markets."

NSSLGlobal believes that by investing in local agents such as Coolink, it is stimulating technology development and business opportunities in Nigeria which is Africa's largest economy. From its Cape Town office, the firm said it brings together the "best-in-class" satellite solutions from key market providers, offering options across L-, C, and Ka-band networks. NSSLGlobal also owns a fully operational VSAT network, including six

teleports, 23 beams and 15 satellites covering 95 per cent of the Earth's surface, and with specialist services for land-, sea- and air-based applications.

iWayAfrica launched what it described as a "much needed" pan-continental Ku-band managed retail satellite service. With *Jola* – which is said to mean 'one who brings happiness' – the company said it can provide affordable satellite internet in sub-Saharan Africa, including areas with limited connectivity options. iWayAfrica claimed *Jola*'s pricing is lower than any existing Ku-band satellite service, and that it offered users flexibility to select a monthly data allowance and speed according to their needs. With pre-defined, branded packages available throughout its retail channel and extending across all user profiles, the company said the service effectively addresses both business and household needs. Some of the features offered include the *Jola SOS* business continuity service, a 1GB emergency data advance for those occasions when a user's data allowance has expired, free night usage, and others.

Gazprom Space System's (GSS) *Yamal-402* satellite was kept busier in Africa over 2017. In mid-February, the Russian operator announced that the satellite's capacity was used for the 2017 *Africa Cup of Nations* football tournament that was held in Gabon at the start of the year. The event was broadcast by Equinoxe Television Cameroun



A Zenit-2SB launch vehicle being prepared to launch Angola's first satellite.

Evolution hub technology. The two partners say their new offering provides a fully managed, customised turnkey service.

JULY

Globecomm has added the South Indian Ocean passage between the southern tip of Africa and Australia to its Ku-band VSAT network. The operator claims the expanded footprint now provides 100 per cent coverage of all major shipping routes to address new market demands. Globecomm's network already covered the Barents Sea, north of Scandinavia. The company says the extension was in

response to its customers having increased transit to the South Indian Ocean area.

AUGUST

Thaicom is providing iSAT's key customers in East Africa with fully managed telecoms services via satellite, including backup of its fibre network. In the event of the company suffering any fibre outages, Thaicom will provide IP connectivity via *THAICOM 6*. The Thailand-based operator adds that its services are based on a point-to-point satellite link between its designated teleport and iSAT's remote site, thus providing uninterrupted access to the network.

SEPTEMBER

Belgium-based GlobalTT has completed an upgrade of its inbound C-band service which offers pan-African coverage. The VSAT operator says it now offers 2Mbps using a 'regular' modem or 3Mbps using a 'professional' one. It adds that download capacity is still up to 30Mbps. GlobalTT has also upgraded its inbound Ku-band capacity that is claimed to offer satellite connectivity anywhere on the continent. The service works using a small 1.2m dish and is now said to offer more than 1Mbps upload speeds as well as up to 30Mbps downloads.

using Yamal-402's Southern Beam which covers sub-Saharan Africa. GSS said it will work with Equinoxe on further plans to develop business for full-time and occasional use TV broadcasting.

As the winner of the tournament, Cameroon was able to participate in the Confederation Cup that was held in Russia in June 2017. Once again, Yamal-202 was used to arrange backup links for TV broadcasting of Confederation Cup games. It will also be deployed during the FIFA World Cup Finals due to start in Russia on 14 June 2018.

In a capacity deal signed in late April, UAE-based **HorizonSat** will use Yamal-402 to provide internet connectivity in the Central African Republic, DRC, Kenya, Tanzania, and other countries. According to GSS, its satellite's Southern Beam offers good coverage of Central and Eastern Africa, while cross-strap with Yamal-402's European Beam will enable HorizonSat to use its teleport in Munich which is connected to high-speed internet backbones.

Gilat Satellite Networks (GSN) also struck a deal with GSS in late 2016 to use Yamal-402's Southern Beam to deliver services based on its SkyEdge II-c technology in sub-Saharan Africa. The capacity is initially being used to implement broadband connectivity in schools and deliver services to mobile operators in rural Ghana.

In February, **CETel** announced that it had upgraded its extended C-band service from **Arabsat** to meet increasing demand in the mining sector. As part of the upgrade, CETel is utilising more than 50MHz of extended C-band capacity from Arabsat-5C which orbits at 20°E. It is using this to deliver up to 200Mbps to critical and sensitive operations in the natural resources industry, as well as connectivity to rural areas in many countries, especially Mali, Niger, Nigeria, DRC and South Africa. CETel and Arabsat have been long-term strategic partners. For instance in 2015, they built an Earth station which uses a 9.3m antenna at CETel's teleport in Ruppichteroth, Germany.

In a separate deal, Arabsat and Office National de la Telediffusion (ONT) signed an agreement to launch a Tunisian broadcast platform on



Cameroon clinched their fifth title after defeating seven-time champions Egypt in the 2017 Africa Cup of Nations final.

Arabsat's BADR-4. It started operating around the end of Q217 and gives Tunisian and regional broadcasters direct access from Tunis to the growing 26°E neighbourhood with coverage encompassing MENA and Western Europe. Rohde and Schwartz was chosen for the installation and commissioning of the platform which is said to use the latest technical specifications.

Staying in Tunisia, **Globalstar** said that oil companies working in the country were turning to its satellite systems to monitor their fleets and safeguard workers.



In 2015, Arabsat and CETel built an Earth station which uses a 9.3m antenna at CETel's teleport.

Virtual Mobile Data (VMD), Globalstar's local partner, worked with local technology firm Neuron Technology Systems to design the *Integrated Vehicle Monitoring System (iVMS)*. It's claimed this switches seamlessly between Globalstar's simplex satellite network and land-based GSM/GPRS networks in the event of outages or transmission failures.

In VMD's most recent deployment, a Ukrainian oil services company is using 30 *iVMS* devices which incorporate Globalstar's *SmartOne B* simplex tracker to help its oil exploration and production customers monitor their vehicle fleets and safeguard staff across Tunisia. Earlier in 2016, Tunisian civil works contractor Kilani Enterprise for Public Works deployed *iVMS* to track its fleet of 4x4 vehicles for better security and to help monitor driver behaviour. Kilani has also been using Globalstar's *SPOT* handheld devices since 2013 as its only means of safeguarding staff carrying out operations in southern Tunisia's vast desert.

In a third deployment, VMD integrated *SmartOne B* transmitters with GPRS devices from another local reseller for a Tunisian company that supports oil industry firms. The unnamed company's services include providing equipment, transportation, site maintenance and staff services. It is using 56 *iVMS* devices to track transporters and containers carrying mechanical and oil rig equipment used in petroleum production.

Monaco-based **Sonema** extended an agreement with Intelsat to provide satellite services to enterprises in Africa. Sonema is a telecoms service provider which owns and operates two teleports in France. The company said it supports more than 650 VSAT sites for banking and financial institutions across the continent, and the majority of the networks are supported by C-band services from *Intelsat 14* which orbits at 315°E and *Intelsat 904* at 60°E.

Using Intelsat's global infrastructure, Sonema said it will provide "enhanced" communications services to customers on the continent.

OCTOBER

Vivacom has signed a multi-year contract with Eutelsat for C-band capacity in order to expand its video business in Africa. According to the Bulgarian telecoms services provider, the aim is to provide contribution services for international channels seeking carriage by major African pay-TV operators. The first six channels are already being uplinked to *EUTELSAT 8 West B* via Vivacom's Plana teleport located around an hour away from Sofia. Plana is also one of Eutelsat's partner teleports, and is certified by the World Teleport Association.

NOVEMBER

ABS will expand its VSAT technology using equipment from UHP Networks. Over the last five years, the satellite operator has rolled out several UHP-based networks across Africa and APAC providing internet and VSAT connectivity. It now plans to deploy new services in the Middle East. ABS will use multiple high-density redundant *UHP-HTS* hubs and *UHP-100* remote routers for the expansion. It's claimed the technology will provide a high-availability, bandwidth-efficient and cost-effective service to ABS customers.

DECEMBER

Teledata de Moçambique will use satellite technology to backhaul its 2G, 3G and banking application sites across Mozambique. The state-owned telco will utilise two Ku-band spot beams on *Intelsat 33e* to provide web access and file transfer capability along with equipment from Newtec. The latter includes the vendor's *Dialog* platform with the *4IF* hub module at its core. Newtec says its *MDM3310* satellite modem will also be used for backhaul, while its *MDM2500* IP satellite modem will connect hundreds of ATMs at remote sites, as well as providing backup connectivity for regional bank branches.

SATCOMS: YEAR IN REVIEW

According to Intelsat, the agreement ensures that Sonema's customers will be able to expand their operations knowing that each of their sites will have access to the same level of reliable broadband connectivity, regardless of location.

Under the multi-year extension, Sonema has integrated C-band connectivity from *Intelsat 33e* (see *New Birds*, above) to expand services to more remote regions of Africa. Sonema said the combination of the *33e* and 14 satellites will enable it to provide customised solutions, with a focus on "robustness and high quality of experience".

Speaking at the time, the company's managing director Catherine Delom said: "The banking sector is a major growth engine for Africa. As such, our customers depend on the highly reliable and secured corporate networks we deploy and maintain for them."

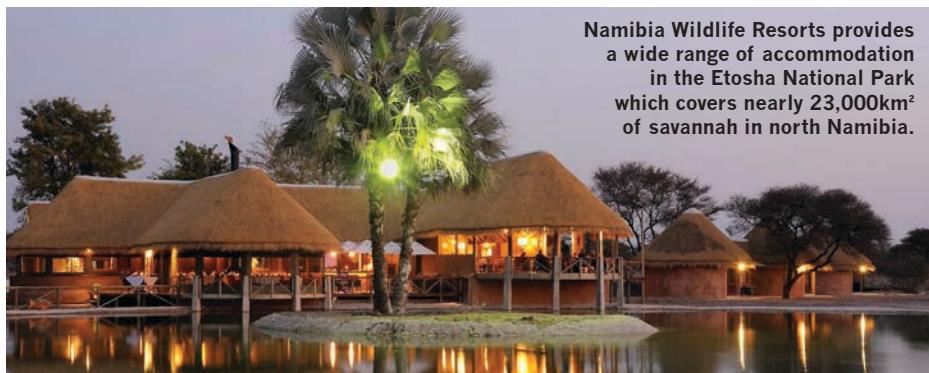
"*EpicNG* will also enable the option to offer our customers new, innovative solutions and services that can be easily delivered via C- and Ku-band spot beams to the most remote locations."

There was a further connectivity boost for Africa's banking sector with news in April that **eProcess International** will use a high throughput satellite platform to expand and strengthen its corporate banking services throughout the continent.

The company, which is a subsidiary of pan-African banking conglomerate Ecobank Group, connects head offices and affiliates across 27 countries, enabling transactions and corporate data exchanges through its network.

Given the growth in commerce across the region, eProcess needed to enhance its network to address increasing transaction volumes for its customers.

The company's HTS solution uses Intelsat's C-band spot beam capacity that is now available on *Intelsat-35e* which was launched later in July 2017. The capacity complemented



Namibia Wildlife Resorts provides a wide range of accommodation in the Etosha National Park which covers nearly 23,000km² of savannah in north Namibia.

eProcess' existing network at the time. This was based on wide beam C-band connectivity on *Intelsat-903* which was due to be re-deployed in late 2017.

Claude Edmond Traoret, group manager for technology services at eProcess, said: "Our banking and mining customers across Africa will truly benefit from these latest improvements, as *EpicNG* enables us to deliver over 30 per cent more throughput, driving improved economics within our business model."

SatADSL has been helping wildlife reserves to offer Wi-Fi connectivity to tourists. The Belgium-based African VSAT specialist said it is offering a hotspot solution with multiple wireless connectivity applications to safari parks in very remote areas.

The parks often provide accommodation for tourists during safaris. These lodges are usually located within or near national wildlife reserves, and offer activities such as game drives. Different types of lodges are available, from rustic camps to luxury designs, with the latter expected to provide Wi-Fi connectivity even if they are located in remote areas.

SatADSL said it makes remote wireless network access possible with its *Safari Solution*. One of the latest users is Namibia Wildlife Resorts. It provides a wide range of accommodation in the Etosha National Park

which covers nearly 23,000km² of savannah in the north of Namibia. SatADSL said its solution enables visitors to stay connected, and added that selling Wi-Fi access vouchers to tourists also generates extra profit for the parks.

In a separate announcement, the company said it had participated in a "unique and extraordinary" pilot application that involved the use of satellite telemetry to track animals in Namibia and Kenya. The pilot was made possible with the support of the *SATLAS* project and in collaboration with the European Space Agency (ESA) and SES.

SATLAS is run by the ESA and was concluded in September 2017. It served as an incubator for developers to test and refine innovative ideas over satellite, in order to verify their viability from a technical and business model perspective.

SatADSL was involved in one of five pilots that were conducted in Africa and Europe. It helped national safari parks in Namibia and Kenya who wanted to be able to determine the number of animals, locate them for protection, monitor their movements, and quickly identify sick or abandoned ones. The application it helped test also provides an alarm signal if an animal leaves a specific area. All information is stored in the animal's tracking device and communicated to orbiting satellites. ■



The year ahead: With the arrival of HTS, satellite has found a new niche to serve in consumer broadband. According to NSR's *VSAT and Broadband Satellite Markets, 16th Edition* report, consumer broadband will add more than 11.6 million new subscribers in the next ten years, the majority of them coming from international markets.

Half of the world's population is still unconnected to the internet (ITU, 2017⁴), and satellite must step in and play a definitive role in connecting unserved and underserved

populations. NSR estimates the global addressable market for satellite internet at 472 million households. With ground alternatives continuously expanding and other key barriers like affordability at play, the vast majority of these potential customers will not be captured by satellite. However, compared with today's 2.5 million active subscribers, there is still a massive opportunity ahead for satellite consumer broadband.

Most of the addressable market resides in emerging markets in Latin America, Middle East and Africa and Asia; collectively they represent 90 per cent of the potential global subscribers.

Having said that, a massive addressable market does not mean attracting customers will be easy and effortless. Several of the

early projects have fallen in the 'build it and they will come' trap, not putting enough emphasis on developing strong retail channels. Early broadband offerings from Thaicom/IPStar, Yahsat, Eutelsat and Avanti (among others) were initially met with lacklustre demand and challenging growth.

Awareness is another major barrier as satellite broadband is completely unknown for many potential customers.

Finally, affordability certainly drags growth, but the industry must pay a closer look into market conditions before being discouraged by low average income levels.

⁴ <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf>



Daniel Losada,
VP international
sales,
Hughes Networks
Systems



Dharmendra Singh,
Regional director,
sub-Saharan Africa,
Hughes Network
Systems India

Hughes credits itself as the pioneer of VSAT technology. Today, as well running a fleet of 24 satellites that it either owns, leases or manages under the *EchoStar* name, it provides a variety of services as well as its *JUPITER* high throughput satellite (HTS) platform.

"One unique thing about us is that we are across the complete vertical market," claims Daniel Losada. "So we do everything from managed networks, we also sell hardware, and then we offer complete turnkey solutions for enterprise users as well as for consumers not only in satellite but also in terrestrial communications. So as a company we cover every part of satellite communications."

However, when it comes to running its own

branded satellites and offering a network that operates under that, Hughes primarily focuses on the Americas, and company spokespersons have previously said that *EchoStar* will never fly over Africa. Why not?

"We have been doing some exciting work with the main providers here in Africa that are offering the same type of services that we offer with our satellites in the Americas," said Losada. "Locally and regionally within Africa, we work very closely with Intelsat, Eutelsat, SES, and others."

"Other providers of broadband connectivity over satellite in Africa – such as Yahsat, Konnect Africa and Global IP which is going to be launching here in the next couple of years – are all going to be doing broadband connectivity over Africa in different ways and in different approaches to the market. One might be doing trunking, the other might be doing direct retail, and another might be doing all of this through channel partners to empower the regional and in-country providers. Avanti is also on our older platform and we are working with them on their plans for new satellites, etc. [Losada points out that this is currently at the discussion stages and is therefore preliminary]. These are all Ka-band HTS providers and mostly come from outside of the region but deliver connectivity through local presences."

"In more regional networks we work very closely with, for example, Intelsat, Gondwana and other providers, as well as some local and regional telcos that have setup their own VSAT networks."

"So we work here with all of those operators on their new high throughput satellites. We partner with them and have very good coverage in terms of technology and equipment."

As a result, Losada suggests that there is therefore perhaps no need for Hughes to launch a dedicated bird for Africa when it is already being serviced by both the major operators as well as the relatively smaller Ka and other specialists. Instead, he believes that what Hughes can bring to the continent, is its technology expertise. "One of the new frontiers is trying to look at new applications for these latest satellites, like higher throughput backhauling for LTE growth, aero connectivity, and other mobility services. That hasn't been done a lot in Africa as yet but now, with these HTSs, the possibilities are great for us to really enhance what satellite does."

Losada continued by saying that advances in technology are helping to bring down the prices of satellite connectivity for the end user, but he reckons the more important story is how much more you can now do with the equipment with that price.



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SATCOMS: INTERVIEWS

"The dependency that people have on being connected is growing so much that you have to have the technology to match that. With the new capabilities that we are bringing to bear with the equipment, and the integrated solutions that you see [cites Konnect Africa and its Wi-Fi integrated units], the way people access a satellite network is no longer about connecting a cable to a modem; now it's about using your own devices to connect into a satellite network."

"So the user experience has dramatically improved because you have more throughput, and people are accessing the network over their mobile device which already has a lot of optimisation built into it to address latency challenges and to support the latest applications."

In terms of industry applications, satellite has traditionally been used in Africa to provide cellular backhaul but has Hughes now seen the emphasis shift to broadcast and broadband? Here, Singh said that while the company has always offered backhaul services, this had not been the main focus. But now, he says there is a specific Hughes' team developing cellular backhaul solutions led by his predecessor, Vinay Patel.⁵

"We want to take our cellular backhaul solution over satellite to the next level, and are even looking at how we can be ready ahead of time for 5G."

"While some of the competition were talking about backhaul and announcing solutions, we were just supporting it. But now it is a primary focus for us as it might lead to satellite operators deploying a few hundred or thousand satellite terminals and that is a bigger pipe. With consumer broadband you can probably fit in around 10,000 sites in a transponder. With backhauling, the satellite operator probably ends up selling one transponder for 10 sites. So for them it is probably an easier and more lucrative business."

Losada said that Hughes is developing entry-level gateways that suit the telco's model because they allow them to have few sites with high throughput which is exactly what they have been looking for. "We have created products now that are fully focused on the kind of environment where you have high-end terminals that have high packets per second processing capability and can also manage many TCP sessions. We have combined that with a gateway that has a small footprint but packs a lot of density, enabling higher speed trunks."

According to Losada, the push for greater security – both in terms of homeland services as well safeguarding the network – is another driver for the satellite business in Africa, especially in the northern part.

"The best way to be able to do this is in a satellite environment that offers assured connectivity when you don't have line of sight connectivity or when the infrastructure might be down. Let's face it, the first thing that gets hit in a lot of attacks is the comms infrastructure. Satellite connectivity is the best way to maintain connectivity in a lot of ways, and so you are now seeing that the need to protect your communications is one of the most important things for this region."

"We have been developing a series of products and features that will allow you to have satellite connectivity on multiple platforms; that could be on an aeroplane or even on helicopters

because we have a new waveform that is capable of communicating through the [rotor] blades. We have very specialised small terminals that allow you to be highly portable and move into many areas. We want to bring that to the security forces here in Africa."

"On the IP side of things and cyber protection, we are bringing in some of the knowledge that we have in protecting our own networks to some of customers. That whole mix of everything – from broadband connectivity to people communicating with their mobile devices and then also being able to secure communications for the emergency responders and the military forces – basically brings our whole portfolio to Africa. And working mostly through our partners, operators are using Hughes' technology to really connect the whole continent and the next generation."

When asked what the company hopes to achieve over the course of 2018, Singh said "more face time" with customers is one priority: "That is something that we have not done for the last few years. Secondly, we want to be part of more cellular backhauling opportunities with MNOs. Thirdly, we want to create a partner network across Africa. We would like to have a partner in every country who represents us and works with the customer on a day-to-day basis."

Losada added by saying that Hughes' aim with this third priority is to capture at least one mobile operator network in each country, and enhance its presence throughout the continent.

Singh continued: "By the end of the year, you will probably see our market share growing significantly. There are two sides to it. If you talk about the number of terminals, we probably already have the highest share but you will see it as, for example, Avanti's market share, or Eutelsat's market share, or Yahsat's, etc., because what they are selling is our products. The second is the enterprise side and what we're going to do with direct sales. Our focus will not be on what percentage share we have in Africa, but on what our direct sales percentage will be."

Losada believes one of the biggest challenges here is ensuring a proper payment structure that not only enables customers to be comfortable but also means that Hughes is not exposing itself to a level of risk. "We get through the technical bits fairly quickly. What drags and takes the longest time is making sure that all the funding is coming from the right places and that the investment is happening. For example with USO programmes, you need to make sure that you don't get interrupted by elections somewhere or some disruption in the country."

According to Singh, Hughes' products have always been considered to be ideal for large or

The advertisement for Sky and Space Global features the company logo at the top left, followed by the tagline "SKY AND SPACE GLOBAL PROVIDES NARROW-BAND CONNECTIVITY SERVICES TO ANYONE, ANYWHERE, ANYTIME". Below this, three main service categories are listed: TELECOM, IOT & M2M, and ASSET TRACKING, each with a list of specific applications. At the bottom, a diagram illustrates the "2020 PEARLS CONSTELLATION IN ACTION" with satellites in orbit above Earth, connected to various ground-based devices like phones, cars, and buildings. The website "www.skyandspace.global" is displayed at the bottom.

⁵ African Wireless Communications Yearbook 2015, p81.

complex networks, but he admits that for smaller networks there are probably other options. "At the beginning of 2017, Dan and I decided that for Africa we needed to have a product which has high-end specs but can start with significantly lower capex for the VSAT operators.

"We now have that product and are using it to compete in more opportunities. It is not easy to get to a VSAT operator whose competition is the incumbent. But most of them are seeing that product of ours to be very lucrative. And when it comes to their next decision-making cycle, I think we stand a very strong chance of replacing some of their existing [equipment]."

Losada concluded by saying that Hughes expects to grow, probably in the 20-30 per cent range, in 2018 in Africa. "This is based on the focus, the right product placement, and on the fact that we see a lot of interesting connectivity in the growth of newer networks here. We offer the right mix and the environment is good for us in Africa."



**Dmitry Sevastiyanov,
Director general,
Gazprom Space
Systems**

Russian satellite operator Gazprom Space Systems (GSS) has been well known in the African market since 2013. It runs a fleet of four satellites of which *Yamal-402* covers the continent with Ku-band services from 55°E, as Dmitry Sevastiyanov explains.

"There are three beams on the satellite to serve the African market – Southern, European and steerable. The Southern beam has high energy characteristics and covers a significant part of sub-Saharan Africa, Madagascar and the adjacent waters of the Indian Ocean. The European beam covers North Africa and the Middle East, as well as most of Europe. Our customers are able to operate within the African coverage in the Southern beam and to use a cross-connection between the European and Southern beams. The steerable beam that can be also connected with Europe, is now pointed at Egypt."

Sevastiyanov said that *Yamal-402*'s capacity is multi-purpose and can be used for communication channels of various types, TV broadcasting services, broadband internet access, etc. And despite strong competition in the African market in recent years due to the appearance of a large number of new satellites, he claims *Yamal-402*'s capacity remains "very popular".

"Currently, the African and Middle Eastern markets account for approximately 50 per cent of all foreign currency earnings for Gazprom Space Systems.

"In 2017, many customers operating on *Yamal-402* increased their capacity utilisation to offer more satellite services to their users. In particular, Telemedia expanded its use of the

satellite's capacity in order to support 'Occasional Use' services for South African TV companies (sports and political events coverage). There was also the extension of a capacity contract for Angolan state television. A new contract has been signed under which a new horse racing channel will be broadcast via *Yamal-402*.

"GSS also reached an agreement with Gilat Satellite Networks, providing broadband internet access to schools as well as services to cellular network operators in rural areas of Ghana.

"One of the leading satcom providers within the African market, HorizonSat, has been using *Yamal-402*'s capacity since 2017 to provide internet access in Central and Eastern Africa. The Southern beam has a good coverage over this region, while the cross-connection with the European beam allows the use of HorizonSat's teleport in Munich which offers a high-speed connection to European internet nodes."

Sevastiyanov continued by adding that the Southern beam's capacity is popularly used for SNG. "In most cases, it is used for broadcasting high profile social and political events in African countries, as well as sports reports. In 2017, it was used to broadcast the African Cup of Nations as well as the Kenya Championship."

Sevastiyanov said that no operators can consider 'Occasional Use' as the main source of profit.

Nonetheless, he said that such use increases the orbital capacity fill rate and brings new customers to utilise the satellite's capacity on a permanent basis. "In addition, these particular services and solutions clearly demonstrate the unique capabilities of satellite communication in terms of responsiveness and global coverage."

As well as broadcasters, Sevastiyanov said large providers offering satcoms services to global energy, oil and gas companies in Africa also extended their contracts and increased the volume of capacity leased on *Yamal-402* in 2017. However, and primarily in the corporate sector, he added that

satellite communication has been particularly sensitive to pressure from fibre optic networks over the last years.

"In areas where optical fibre is laid, cheaper offers for trunking appear and, accordingly, satellite capacity demand on the side of ISPs and mobile operators decreases. However, cases of cable damage, that quite often happen, indicate the vulnerability of non-redundant communication networks. For example in July 2017, an accident on an underwater fibre cable stretched along the coast of Africa deprived West African countries of internet access. A little earlier (again due to a cable break), Angola experienced problems with internet access. GSS knows this first-hand since our *Yamal-402* was engaged to remedy the situation."

Sevastiyanov said that such events and realities of life therefore suggest that satcoms will continue to be in demand despite the introduction of fibre networks across Africa.

In terms of the future, he said the optimistic forecasts about the growth in global demand for mobile data, objects and devices are forcing all the players in the telecoms industry to rethink their business strategies. "Everyone understands that future solutions will be a combination of terrestrial and satellite technologies. The obvious advantages of satellite communication will enable

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it to find its place in future innovative projects. This confidence about satcom's future is shared by our industry colleagues and most experts, and this encourages us to further development."

Sevastiyanov concluded that in around a year, GSS is planning to put into operation a new satellite, *Yamal-601*. Orbiting at 49°E, this will replace *Yamal-202* which has been located here since 2003. "Despite its age, *Yamal-202* continues to attract interest from providers operating in North Africa and the Middle East. This therefore sets the scene for the subsequent successful implementation of the capacity of the new *Yamal-601* which will assume its predecessor's entire customer base."



**Flavien Bachabi,
Managing
director, Africa,
ABS**

Flavien Bachabi describes 2017 as an "interesting year" for ABS which saw opportunities and challenges posed by the economic and political instabilities in key Africans countries. He also said the company did "exceptionally well" in the video market where its contracted multiple transponder deals with DTH operators.

"We saw a trend where regional DTT operators are looking to expand into the DTH services. We have three satellites serving the continent for both DTH and contribution links. ABS-2 and ABS-2A have a strong video neighbourhood at 75°E. Both satellites are well positioned for video operators broadcasting in East and Central Africa. ABS-3A, at the strategic location of 3W°, is highly suited for pan-African coverage with excellent look angles. African pay TV subscribers are expected to grow by 73 per cent by 2023, reaching 41m with total revenues growing to USD6.6bn. Most of the channels delivered to this growing media subscriber base will be delivered via satellite due to satellite unmatched reliability, security and efficiencies."⁶

"The data market has been a bit sluggish with constant pressure prevailing on lowering the price. We saw consolidation amongst the mobile operators on the continent and an emerging trend where they consolidated the capacities on a global level with one or two vendors. We have managed to secure our position as one of the preferred vendors with some of these operators.

"We have also been successful in growing our VNO business for broadband services on both C- and Ku band though our partners. NSR believes enterprise network demand for wide-beam Ku-band will remain strong with a 10 per cent CAGR forecasted through 2022 supporting oil and gas, banking and wireless backhaul networks."

When asked how ABS saw the wireless

communications market adapt and evolve in Africa in 2017, Bachabi said that although 54 countries on the continent are now connected with submarine cables, 66 per cent of the population still lives outside the 25km reach of a fibre node. "The last mile terrestrial connectivity has always been a challenge in Africa, hence we see wireless communication securing its prime position. We see the wireless market getting crowded between various competing technologies be it; WiMAX, FWA, GSM, LTE, satellite, and more."

He continued by saying African smartphone usage has been increasing as less expensive, Asian handsets have made their way to the continent. "In 2017, there was a 45 per cent increase in smartphone usage versus 2016. According to Ovum, the smartphone penetration rate will grow at 52.9 per cent year-on-year. Currently, there are 293.8 million smartphone users across the continent. Ovum predicts there will be 929.9 million smartphones by 2021.

"Data applications over mobile and handheld [devices] have pushed the demand for more bandwidth as a result of which we have seen mobile networks transformed from 3G to 4G/LTE. This has led to the increase of domestic backhaul and internet backbone capacities.

"Ka-band satellite operators have made broadband services more affordable for rural areas with lower entry cost of hardware, though we still see them struggling to get desired volumes.

"Also, we've seen a digital migration in the video sector where the terrestrial DTT networks have been replaced with satellite which have simplified operations and reduced the overhead costs of maintenance."

When it comes to the challenges in Africa for 2018, Bachabi agrees there are now too many satellite operators covering the continent and that there is a danger of over-supply. "Undoubtedly yes, there is an oversupply of satellite capacities in the region. Today, Africa is served by many satellite operators around the world flooding dedicated capacities in the marketplace, and many undersea and terrestrial fibre operators that have penetrated this region extensively. Even some African countries are looking to pursue their own indigenous satellite programmes which will further augment capacities.

"Moreover, the demand for satellite capacities has declined with the penetration of fibre in the continent, thereby dropping the price expectations for satellite bandwidth. Overall, the demand-supply gap has further increased.

"Compounding supply-demand problems is the growth of the HTS supply expected to come into the market over the next five years. NSR believes operators will launch up to 1.3Tbps of GEO and non-GEO HTS capacity into Africa through 2022."

Bachabi said that other challenges include Africa being impacted by the global economic situation.

"We see countries like Nigeria, Angola, Chad, South

Sudan, Ethiopia and others affected with either devaluation or struggling with a shortage of forex.

"Political instability is also a major factor that hinders growth, particularly in key markets like DRC, Zimbabwe and South Sudan."

With ABS-2A entering commercial service last year, ABS concluded its launch programme of three new satellites. "All these satellites have high-performance C- and Ku-band beams focused on the continent. With state-of-the-art teleport in Germany, Cyprus, South Africa and Kenya, we offer managed teleport services for our data and video clients in Africa. We hope to enhance the value proposition to our clients in the coming year with more creative services.

"Looking ahead, we see growth in the video area with media operators looking to aggregate and share ethnic contents locally (within the same countries) and regionally (within economic sub-regions and continent-wide). Video penetration is still very low in Africa, and capacity on ABS-3A and ABS-2 can help the growing demand for such services. Also, the rapid expansion of terrestrial and submarine cables calls for backup capacity of satellites to make the networks more resilient and secure.

"We expect that the difficult economic and financial situation of the largest countries will ease over the next few months, and that those countries will resume investing. The mining and oil and gas industries are also sectors that drive the use of satellite bandwidth for their communication needs."

When asked if ABS is interested in LEO missions or whether they present a threat to established MEO operators, Bachabi said the company is looking at the new constellations and what impact they might have on business.

Having said that, he said ABS "excited" by the development in the industry, and looked forward to seeing the progress of LEO operators. "This could bring a big relief to operators and clients running data applications which are latency sensitive. However, LEO's success will be determined by the commercial proposition offered by the operators, both on the capex for the ground infrastructure as well as bandwidth costs. If LEO constellations are successful, they could expose many people to satellite technology and the benefits our industry can offer.

"We shall be focused on the GEO satellite business and are quite confident that there is enough market for both GEO and LEO operators. Although we see a small drift of market share to LEO (based on a successful commercial model), eventually the market size will only grow for the satellite industry.

"Most research organisations show significant growth for LEO bandwidth on the consumer side for broadband access. ABS believes enterprise network and media distribution and DTH customers will continue to demand high quality,

⁶ Source: IDG Connect.

high availability GEO FSS satellite technologies to ensure their networks are up and running without the threat of significant outages."



Jacob Keret,
SVP sales Europe,
North Africa &
Middle East,
Spacecom

Despite the loss of two key satellites over the last few years,⁷ Jacob Keret is keen to point out that Spacecom is neither down nor out.

"Just to give you the bottom line from the start, we have recovered from these two events. We leased AMOS-7 from AsiaSat for four to five years and it has replaced AMOS-6 for some customers.

It has been operational since March 2017 and has allowed us to recover from the loss of AMOS-6."

Spacecom is planning to launch its next satellite, AMOS-17, in early 2019. It will replace AMOS-5 to orbit at 17°E, and feature a digital payload that offers Ku-, Ka- and C-band services.

"It is a HTS on the C-band, and we will have 12 beams covering sub-Saharan Africa. It will also have Ku-band for broadcasters and four steerable Ka beams that can be used for either commercial or military tasks as well as broadband internet. As with AMOS-5, AMOS-17 will also cover Europe so that west and central Europe can be connected to Africa, and the same goes for India and the west part of China."

Keret continued by explaining that since the loss of AMOS-5 in November 2015, Spacecom has basically preserved or kept some of its customers on different satellites, and continued to provide them with services on these other operator's spacecraft.

"That was the immediate response. We have about 10 customers that remain with us and hopefully they will remain until we bring in AMOS-17. In Africa, [the loss of AMOS-5] caused us to develop less business and so we developed our businesses in other parts of the world, mainly in central and eastern Europe. We also expanded with AMOS-4 at 65°E into Nepal. That was part of the company's strategy to expand business into some parts of Asia, and we will continue to develop this orbital slot which is perfect to operate over South East Asia."

When asked whether Africa's satellite industry is suffering from a perceived high cost of capacity, Keret said: "It's no secret that the prices went down over the last two or three years, and the good thing is that in 2017, from our perspective, there were less than 10 new orders for satellites. That means the satellite operators realise that there is overcapacity in the market, not only in Africa but worldwide,

and basically you see fewer launches. And fewer launches mean that the prices will hopefully be more stable.

"But they went down to a level where new companies can setup, because if you sell a megahertz for USD3,000-3,500 or sell it for USD1,500, that difference allows newcomers to enter the market.

"Africa needs the capacity because the smartphones are taking a great part of it. Many low cost devices are coming into the region and they of course need voice connectivity and low rate internet. So we definitely see growth."

Many satellite operators seem to be addressing the market more for broadband and broadcast. Does Keret see this trend?

"With our C-band beam on AMOS-17, we are aiming to continue to try to sell services for cellular backhaul. Of course, although there are terrestrial solutions for this, there are still some uncovered places and satellite plays a role in that.

"Mobility is one of the applications in which we see growth – maybe not as yet in Africa, but it will come in terms of maritime, air mobility, as well as services on the ground.

"It is not going to be easy. There are quite a lot of newcomers in countries, such as Angosat, launching

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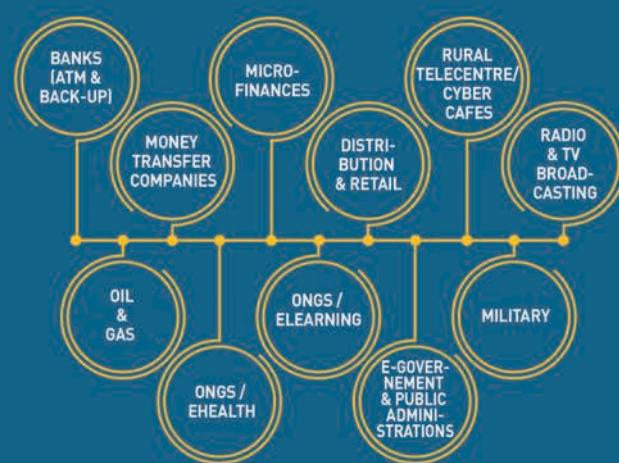
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⁷ African Wireless Communications Yearbook 2017, p74 & 76.

satellites over Africa. But I think that the era where there is oversupply will end in 2019-2020 because this is the cycle of our industry. Sometimes the prices go up and sometimes they go down. I think the more challenging thing would be to actually acquire Tier 1 customers like we did in the past."

When it comes to having any interest in non-geo satellites, Keret said that Spacecom is looking into this segment but emphasised that it had not as yet made any decisions about this. "This is definitely on the business development side of our company, and we have to keep pace with the trend. We don't currently have any structure planned. But we are not a big company, and I would assume that if we come to non-geo satellite it will be through a partnership with other companies.



**Meidad Pariente,
CTO & founder,
Sky Space and
Global**

Sky Space and Global (SAS) describes itself as the first company to plan, build and operate a commercial telecoms network using nanosatellites. According to the firm, the low mass and high capabilities of these satellites makes them the preferable choice for constellations and applications in what it terms the "New Space" industry.

SAS plan to launch 200 satellites, providing equatorial coverage and beyond. These will be placed in synchronised orbits that circle the Earth almost every 90 minutes. The satellites will communicate between each other to create a mesh in the sky where each one serves both as a base station and a router. SAS said the aim is to create a network to provide narrowband communication suitable for IoT, M2M, personal voice and messaging. It said the fleet will operate in the S-band frequency range that enables a very small device with patch antenna (8cm) or monopole antenna and low power consumption.

In 2017, SAS signed its first binding commercial contract with a wholesale customer, Sat-Space Africa. It is also working with African startups such as Universal Cyberlinks to help deliver digital services to citizens of Ghana, and BeepTool which provides mobile apps and services.

To help service providers to reach more customers, SAS has developed a dedicated *Android* application called *Chatellite* which, it's claimed, will provide affordable chat, voice and messaging services to people living in areas with poor or no network infrastructure. The app will be integrated into Social Finance Systems USD1 smartphone as well as BeepTool's mobile payments, messaging and voice app that is said to be used by more than 800,000 customers

across Africa and globally. SAS is also testing connectivity solutions for farmers in Africa and other regions with its partners WeFarm which is described as the world's largest knowledge and data network for small scale farmers.

SAS was founded by Meidad Pariente who started as an engineer working with Spacecom on AMOS-1 and went on to become deputy mission manager of AMOS-2, chief systems engineer of AMOS-3, and special engineering advisor for AMOS-5. Meidad was eventually appointed chief systems engineer and led a team of technicians and scientists designing the VENUS project, an Israeli-French hyperspectral satellite, before establishing SAS in 2015. The company made its debut at *AfricaCom* in November 2017, which is where we caught up with Pariente and asked him about what stage he had reached in SAS' mission.

"Four months ago we launched the predecessor, the *3 Diamonds*, as a technological demonstration. These are in a low Earth orbit of 500km. We proved that we could perform voice calls, data forwarding, instant messaging over the nanosatellites, and we also proved the capability to integrate to other customers. We also did financial transactions and even used a USD1 smartphone to communicate to our system.

"We are currently around five months before starting production of more than 200 satellites for the full constellation. The satellites are being built by a subcontractor in Denmark, GOMSpace, which was the same company that built the *3 Diamonds*. We already have four launches contracted with Virgin Orbit, and are currently between the preliminary and final designs of the system. Once this is finalised, we will start building the satellites at a rate of two per week. We will then start launching in batches at the end of 2018. Each and every batch can be anywhere between two to three dozen, and every quarter we will launch a batch."

Pariente said that SAS will be able to launch M2M and IoT services with the first batch, and expects to begin commercial services for these applications in early 2019. Real-time services, such as voice, are expected at the end of the following year – the *2020 Vision*, as Pariente called it. By this time, the company expects to have around 200 satellites in orbit. For real-time services, the fleet will cover the planet at 15°N and 15°S, while for M2M, the satellites will be located at between 18°N and 18°S.

"There will be five orbital planes on altitudes between 700km and 740km. We will reserve another altitude, 750km, for replacement satellites, and will replace them whenever technology improves. It is a bit like changing your smartphone where you replace a completely operational model simply because there is a new one available on the market. Technology improvements will allow us to provide

better services, and so we will decommission completely working satellites and replace them with new ones. They will decay all the way down to the atmosphere and because they are small enough, they will burn just like shooting stars."

Pariente explained that a typical nanosatellite measures around 30cm x 10cm x 10cm. He said that SAS' next generation spacecraft are called the *Pearls* and are much more capable. "Each one is about half a metre long and the diameter of the solar panels is about three metres long. This satellite will provide about 100W for the payload so it is like a mini communication satellite. Its lifespan is at between three to seven years but it will be replaced after four years.

"Within our system, we have redundancy built-in. So it is okay to lose even several satellites and still keep the availability and connectivity required because they are overlapping."

All this sounds very expensive and capex intensive. But Pariente claims SAS' programme is not as expensive as conventional satellite missions for comms. "The entire system, including the redundant satellites and the launches, is USD150m. To put one of our satellites in space is about half a million dollars. As I mentioned, there are five orbital planes, and when we replace we replace a full plane so that means around 40 satellites. It will be roughly around 20-25 million dollars to replace a full orbital plane.

"The breakeven point is one million customers – and we already have two million customers signed and waiting for the service. You can find announcements about everything and all customers on the website."

In Africa, SAS plans to cover the continent's central and equatorial zones, meaning that the northern and southern regions will not benefit. But Pariente pointed out that for M2M and IoT services, the company has the ability to increase services on demand. "The first three satellites, the *3 Diamonds*, are in polar orbit. That means they can cover each and every point on the globe between 10 and two times a day depending on the latitude. The higher and lower the latitude, the more passes you have. If demand will come from Mediterranean areas or even South Africa, we have to plan to add additional satellites in polar orbits in order to allow M2M services with gaps of 10 to 15 minutes."

Why did SAS decide to focus on the narrowband market rather than broadband which is what other LEO operators are planning? "So far it was untapped and unserved because of the capital expenditure. But if you compare our capex to other satellite service providers, you will find that ours is about five to ten per cent of theirs. The narrowband communications services market is so huge that we anticipate that other players will also enter the market."

Parente goes on to say that SAS has a lab in Poland where it has developed modulation technology that will allow any kind of terrestrial protocols to be converted into the IP protocol that will be used by its network. "This process is very straightforward and we already have several successes. It allows us to be agnostic because we will have a converter between LoRa and IP, and Sigfox and IP, and so on. The converter is on the ground. The data packets going up to the satellites will already be IP and they are conveyed within the routers as IP and then converted back into the relevant protocol for the end use.

"All of our hardware uses software defined radio which is again something that is very unique. Our satellites also have the ability to change frequencies based on location. That means that the same satellites will transmit and receive in one frequency over Africa, and then in another over South America, and a third frequency over Latin America or South East Asia. And they would do that automatically based on location.

"Also very importantly, we have the ability to build ad hoc communication networks. Let's say you have (God forbid) a natural disaster somewhere in the world within our service area that makes all the ground infrastructure collapse. The homeland security services can connect to us and ask for a specific frequency, and our satellite will adjust to cater to their needs whenever they are above these countries and then they will switch back. Building ad hoc networks is something that the space industry has never offered to customers as far as we know, and the ability to automatically switch frequencies is also something which is quite unique."

At this point, Pariente explained that SAS' entire proposition across the board strives to be highly cost-effective. "That means that not only are the satellites affordable, the launches are affordable, the service is affordable, the end user devices are affordable, and the prices are affordable. It will vary a lot based on geographical

location because we want to reach the masses. This means that we have the capability to cater to each and every need based on the fact that we have a huge margin between the current prices on the market and what we can offer and still be profitable."

But why would customer's choose SAS' satellite network over terrestrial-based services, such as cellular or fibre, for example? "We're not competing with MNOs and ground infrastructure. We are providing a complementary service in regions that have no connectivity regardless of the technology. You have a lot of areas in the world that have no cellular networks,

no fibre, not even copper lines. The only technological solution is satellite connectivity but it is too expensive and that is a barrier for a lot of people as well as a lot of companies.

"We're not competing with a service that already exists. So if you are a telco, we are not trying to take customers away from you; we are trying to bring you more customers because now you can provide your services anywhere, not only just in major cities."

Pariente concluded by saying that he does not refer to other telcos and CSPs as competitors to SAS. Instead, he believes that there are only "partners" and "future partners". ■

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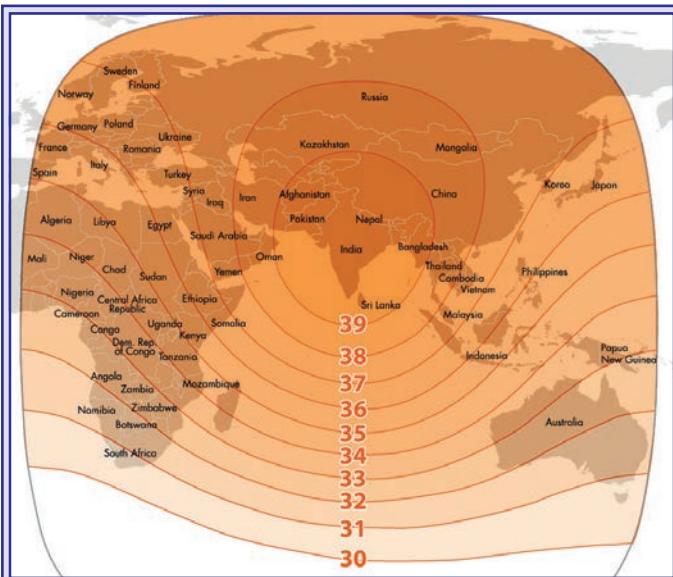
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- 24/7 customer support
- above 250 company customer base

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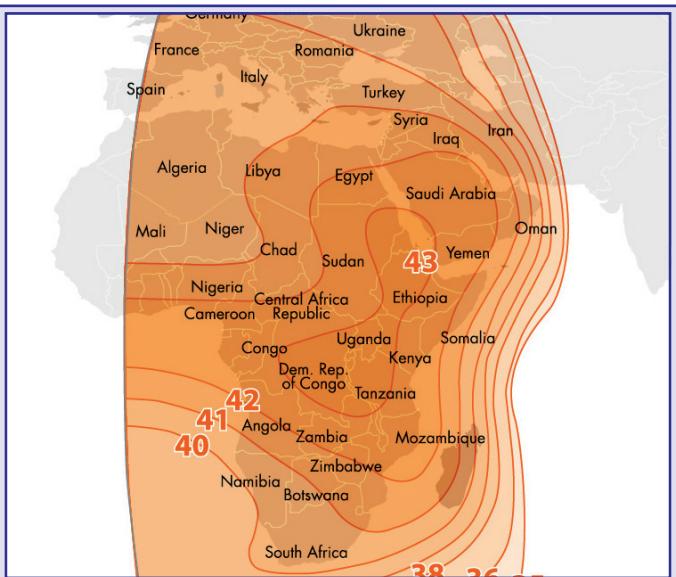
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SPACE SYSTEMS

SATCOMS: FOOTPRINTS



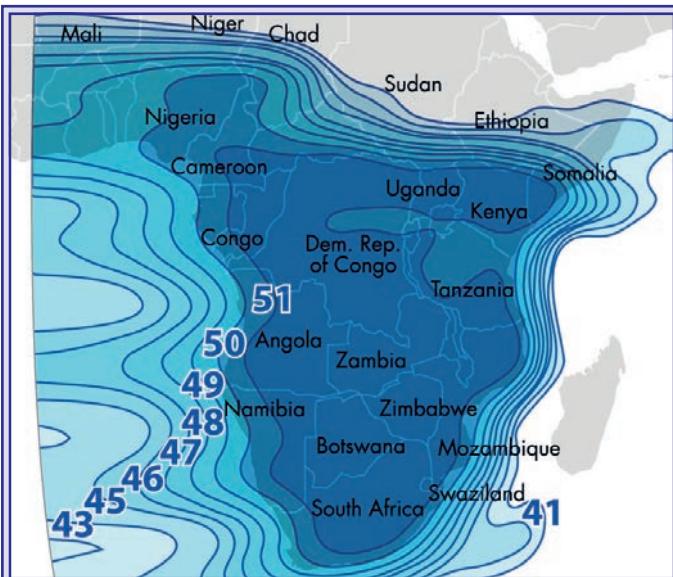
ABS-2: 75°E – Global beam

Launch date:	February 2014
Transponders:	Up to 32
Bandwidth (MHz):	36, 72, 104
Uplink/downlink frequencies (GHz):	Standard & extended
Uplink/downlink signal polarisation:	Linear horizontal/vertical
Cross-polarisation separation:	Better than 27dB
EIRP (peak):	45dBW
TWTA size:	62W
TWTA redundancy:	34
G/T (peak):	+6dB/K



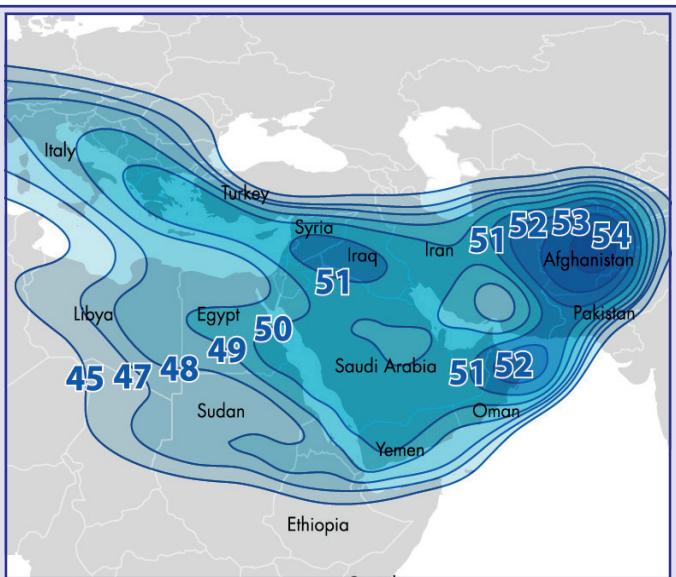
ABS-2: 75°E – West hemi beam

Launch date:	February 2014
Transponders:	Up to 32
Bandwidth (MHz):	36, 72, 104
Uplink/downlink frequencies (GHz):	Standard & extended
Uplink/downlink signal polarisation:	Linear horizontal/vertical
Cross-polarisation separation:	Better than 27dB
EIRP (peak):	45dBW
TWTA size:	62W
TWTA redundancy:	34
G/T (peak):	+6dB/K



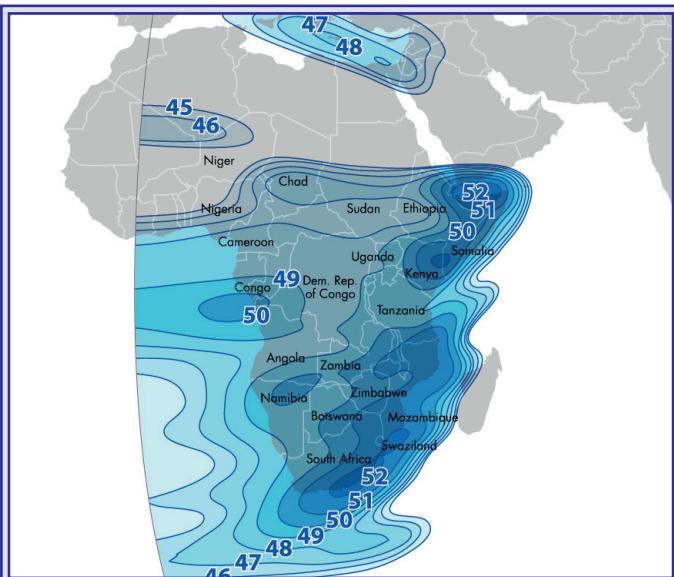
ABS-2: 75°E – South & Central Ku-band beam

Launch date:	February 2014
Transponders:	Ku-band Ka-band Up to 51 Up to 6 (commercial & military)
Bandwidth (MHz):	54, 108 435 (commercial), 225 (mil.)
Uplink/downlink frequencies (GHz):	FSS & BSS Commercial & military
Uplink/downlink signal polarisation:	Linear H&V Circular RHCP & LHCP
Cross-polarisation separation:	Better than 27dB
EIRP (peak):	53dBW 49dBW
TWTA size:	143W 117W
TWTA redundancy:	52 6
G/T (peak):	+7dB/K +2dB/K



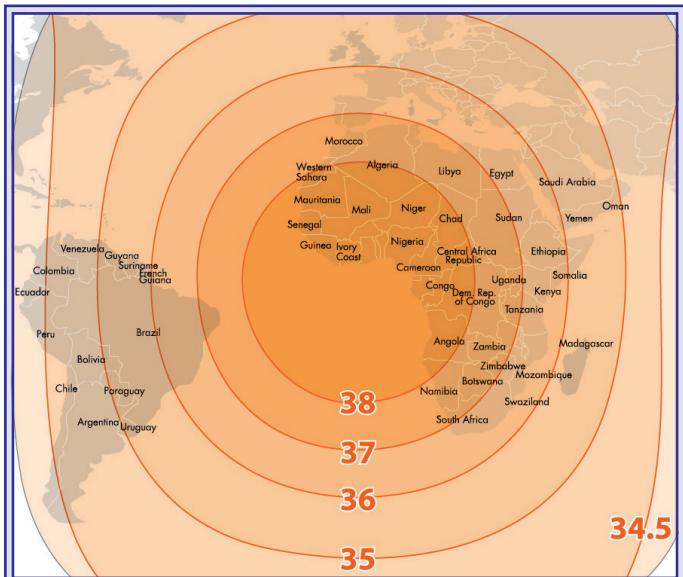
ABS-2A: 75°E – MENA Ku-band beam

Launch date:	June 2016
Number of transponders:	48
Transponder bandwidth (MHz):	54, 72, 108
Uplink frequencies (GHz):	13.750 to 14.800 & 17.300 to 18.100
Downlink frequencies (GHz):	10.950 to 11.200 & 11.450 to 12.750
Uplink/downlink signal polarisation:	Linear horizontal/vertical
Cross-polarisation separation (dB):	> 27
EIRP (peak value) (dBW):	52
TWTA redundancy:	48 for 40 (with eight active spares)
TWTA size:	150W
Uplink SFD (dBW/m²):	-96 to -74 (0 dB/K G/T)
G/T (peak value)(dB/K):	7



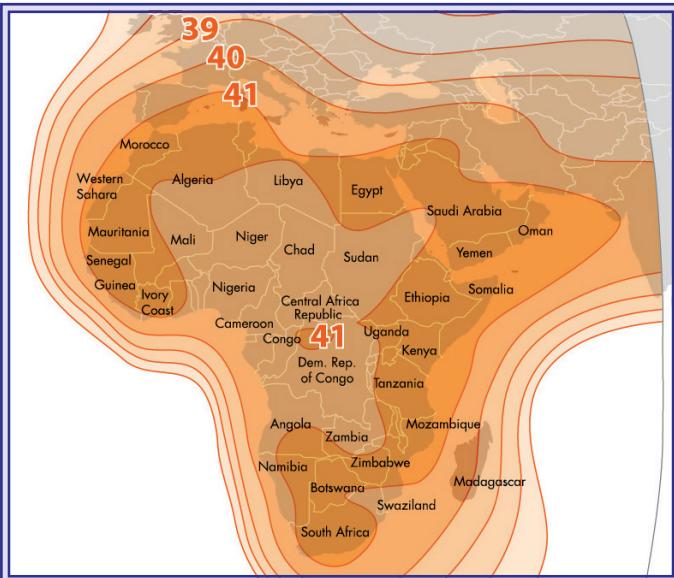
ABS-2A: 75°E – Africa Ku-band beam

Launch date:	June 2016
Number of transponders:	48
Transponder bandwidth (MHz):	54, 72, 108
Uplink frequencies (GHz):	13.750 to 14.800 & 17.300 to 18.100
Downlink frequencies (GHz):	10.950 to 11.200 & 11.450 to 12.750
Uplink/downlink signal Polarisation:	Linear horizontal/vertical
Cross-polarisation separation (dB):	> 27
EIRP (peak value) (dBW):	52
TWTA redundancy:	48 for 40 (with 8 active spares)
TWTA size:	150W
Uplink SFD (dBW/m²):	-96 to -74 (0 dB/K G/T)
G/T (peak value)(dB/K):	6



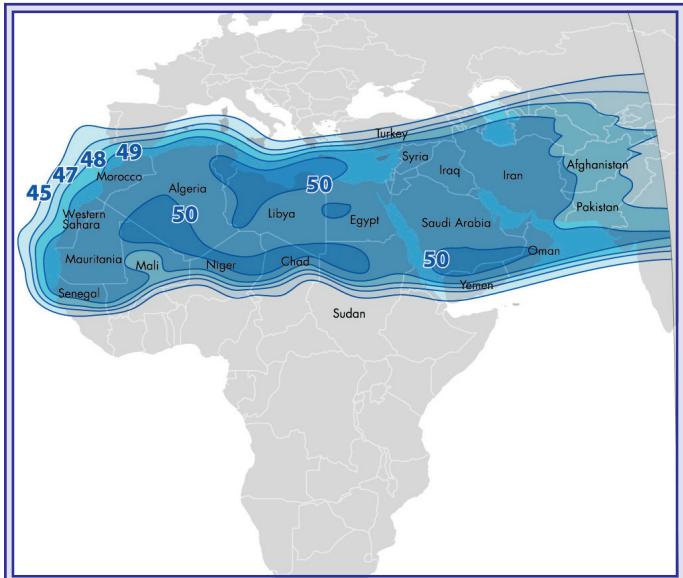
ABS-3A: 3°W – Global beam

Launch date:	March 2015
Transponders:	24 C-band 72MHz; 24 Ku-band 72MHz
C-band uplink/downlink:	5.850 to 6.425GHz/3.625 to 4.200GHz
Ku-band uplink/downlink:	13.750 to 14.750GHz/10.700 to 11.200GHz 11.450 to 11.700GHz, 12.500 to 12.750GHz
EIRP (peak value) (dBW):	C-band: 39 (global) Ku-band: 49 (Europe) 41 (east hemi) 50 (MENA) 42 (west hemi) 49 (SAF) 51 (Americas)
TWTA size:	70W 150W
Polarisation:	Linear horizontal/vertical



ABS-3A: 3°W – East Hemi beam

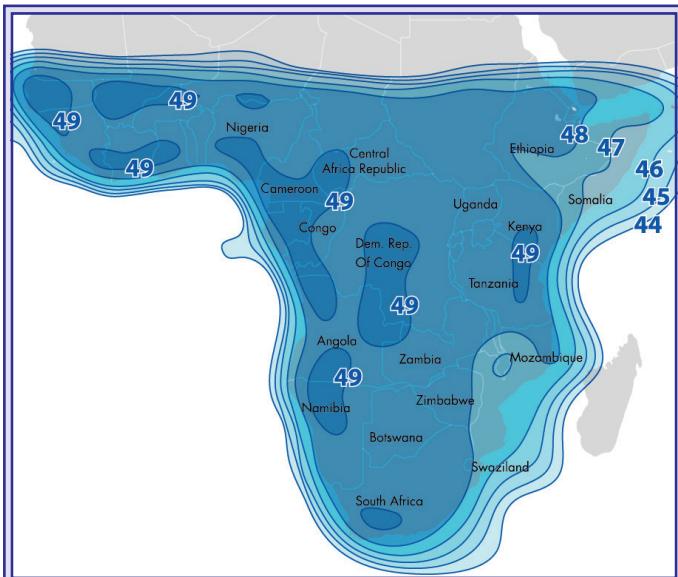
Launch date:	March 2015
Transponders:	24 C-band 72MHz; 24 Ku-band 72MHz
C-band uplink/downlink:	5.850 to 6.425GHz/3.625 to 4.200GHz
Ku-band uplink/downlink:	13.750 to 14.750GHz/10.700 to 11.200GHz 11.450 to 11.700GHz, 12.500 to 12.750GHz
EIRP (peak value) (dBW):	C-band: 39 (global) Ku-band: 49 (Europe) 41 (east hemi) 50 (MENA) 42 (west hemi) 49 (SAF) 51 (Americas)
TWTA size:	70W 150W
Polarisation:	Linear horizontal/vertical



ABS-3A: 3°W – MENA Ku-band beam

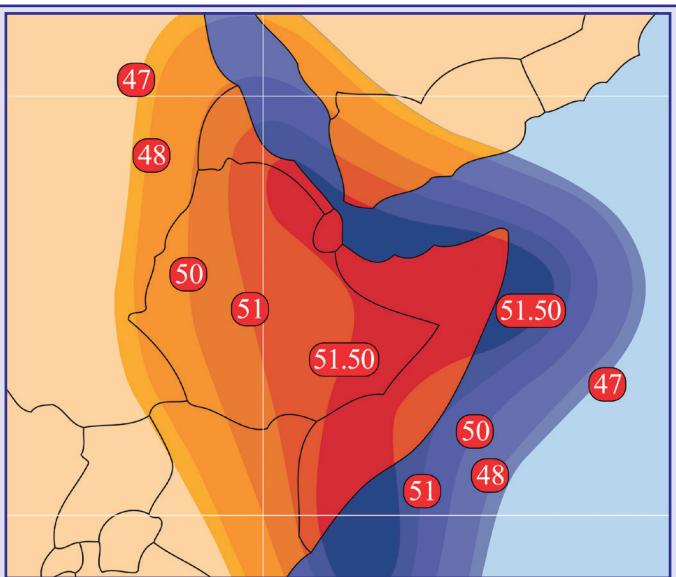
Launch date:	March 2015
Transponders:	24 C-band 72MHz; 24 Ku-band 72MHz
C-band uplink/downlink:	5.850-6.425GHz/3.625-4.200GHz
Ku-band uplink/downlink:	13.750-14.750GHz/10.700-11.200GHz 11.450-11.700GHz, 12.500-12.750GHz
EIRP (peak value) (dBW):	C-band: 39 (global) Ku-band: 49 (Europe) 41 (east hemi) 50 (MENA) 42 (west hemi) 49 (SAF) 51 (Americas)
TWTA size:	70W 150W
Polarisation:	Linear horizontal/vertical

SATCOMS: FOOTPRINTS



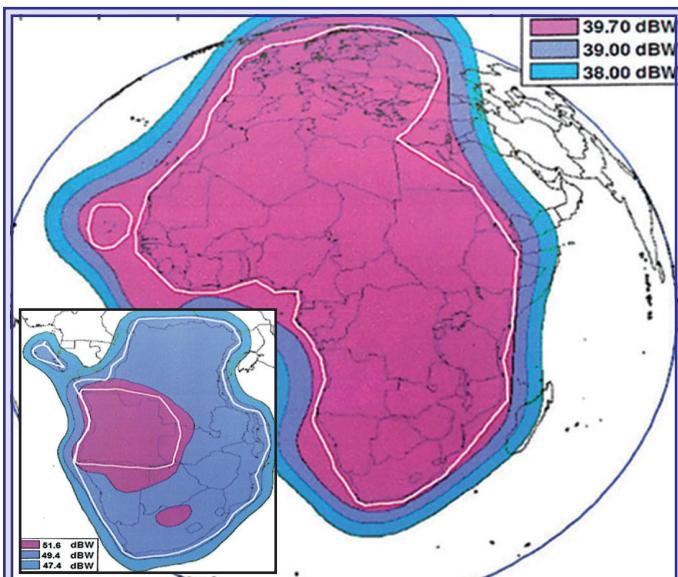
ABS-3A: 3°W – SAF Ku-band beam

Launch date:	March 2015	
Transponders:	24 C-band 72MHz; 24 Ku-band 72MHz	
C-band uplink/downlink:	5.850 to 6.425GHz/3.625 to 4.200GHz	
Ku-band uplink/downlink:	13.750 to 14.750GHz/10.700 to 11.200GHz 11.450 to 11.700GHz, 12.500 to 12.750GHz	
EIRP (peak value) (dBW):	C-band: 39 (global) 41 (east hemi) 42 (west hemi) 51 (Americas)	Ku-band: 49 (Europe) 50 (MENA) 49 (SAF)
TWTA size:	70W	150W
Polarisation:	Linear horizontal/vertical	



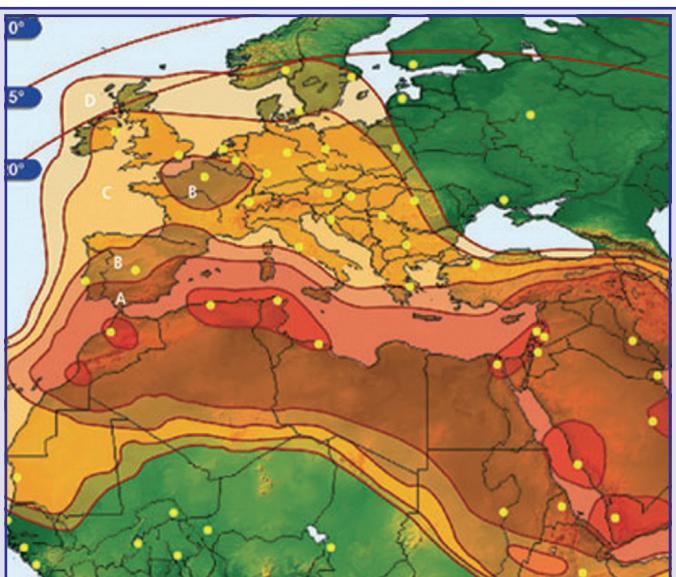
AMOS-4: 65°E

Launch date:	August 2013
Transponders:	4 x 216MHz Ka-band (steerable beam)
Band-1 uplink frequency range:	27.5 to 31.0GHz
Band-1 downlink centre frequencies:	19.875 or 20.125 or 20.375 or 20.625GHz
Band-2 uplink frequency range:	29.625 & 29.875GHz
Band-2 downlink centre frequencies:	18.325 & 18.575GHz
Uplink/downlink polarisation:	RHCP/LHCP
EIRP at beam peak (dBW):	51.4
G/T at beam peak (dB/K):	8.9 (Ka1); 9.9 (Ka2)
Saturated flux density (dBW/m²):	-72 (min) -92 (max) (Ka1); -75 (min) -96 (max) (Ka2)



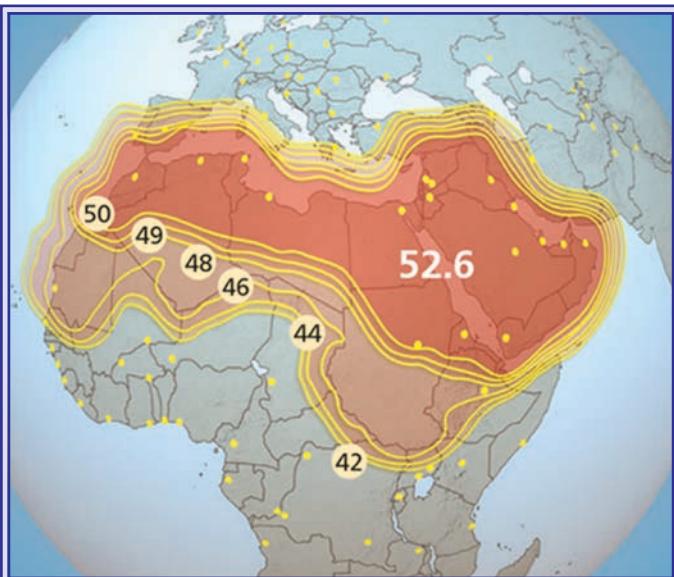
Angosat 1: 12.8°E

Launch date:	December 2017
Manufacturer:	Airbus
Lifespan:	15 years
Transponders:	16 C-band 72MHz (coverage zones: Africa & Europe, and Cape Verde); 6 Ku-band 72MHz
C-band uplink/downlink:	3570 to 4130MHz/5795 to 6355MHz
Ku-band uplink/downlink:	10990 to 11160MHz/14040 to 14210MHz
Polarisation:	Linear C-band; circular Ku-band
Minimal EIRP:	39.7dBW (C-band); 49.4 to 51.6dBW (Ku-band depending on zone)
Power consumption:	3704W
Propulsion:	8 x SPT-70 stationary plasma thrusters
Nominal SFD:	-86 dBW/m² (C) -86 dBW/m² (Ku)
C-band G/T:	No less than -6.0dB/k
Ku-band G/T:	No less than -0.2dB/k



Arabsat BADR-4: 26°E

Launch date:	November 2006
Transponders:	Ku-band/FSS - 16 LTWTAs for 12 active channels Ku-band/BSS - 20 TWTAs for 20 (BOL) or 16 (EOL)
Bandwidth:	Ku-band/FSS: 36MHz Ku-band/BSS: 34MHz
Frequencies:	Ku/FSS: 13.75 to 14.00GHz (uplink); 12.50 to 12.75GHz (downlink) Ku/BSS: 17.30 to 18.10GHz (uplink); 11.70 to 12.50GHz (downlink)
Polarisation:	Linear horizontal/vertical
Typical G/T:	Ku-band/FSS 6.2dBK; Ku-band/BSS 3.2dB/K
Typical EIRP:	Ku-band/FSS 51.8dBW Ku-band/BSS 51.8dBW



Arabsat BADR-5: 26°E

Launch date: June 2010

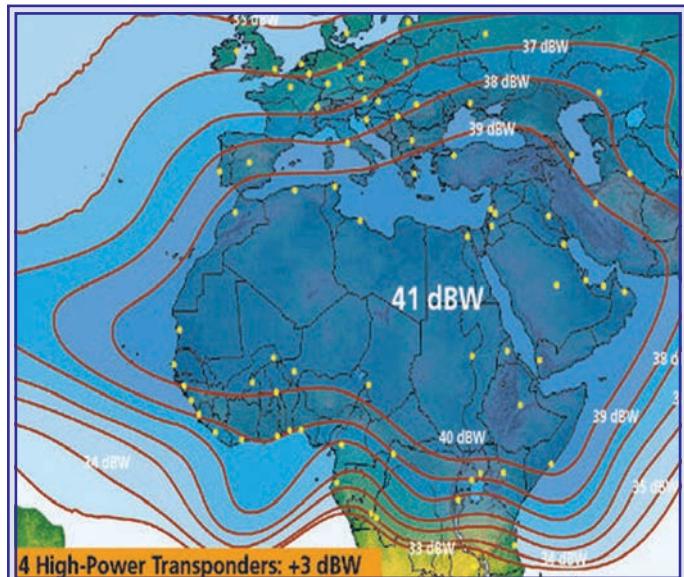
Frequencies: Ku-band/FSS MENA Uplink: 13.75-14.00GHz
Downlink: 12.50 to 12.75GHz
Ku-band/FSS Apx-30B MENA Uplink: 13.00 to 13.25GHz
Downlink: 10.70 to 10.95GHz

Polarisation: Linear horizontal/vertical

Transponders: Ku-band/FSS switchable to Ku-band FSS Apx-30B MENA 12x36MHz

Typical G/T: Ku-band/FSS switchable to Ku-band/FSS Apx-30B MENA 2.2dB/K

Typical EIRP: Ku-band/FSS switchable to Ku-band/FSS Apx-30B MENA 52.6dBW



Arabsat BADR-6: 26°E

Launch date: July 2008

Transponders: Ku-band/BSS 20 (BOL) or 16 (EOL)
C-band - 30 TWTAs for 24 active channels

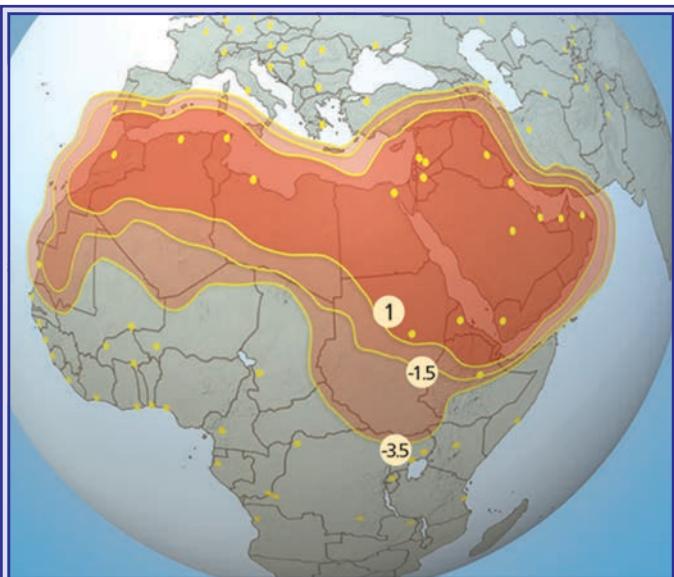
Bandwidth: Ku-band/BSS: 34MHz; C-band: 36MHz

Frequencies: Ku/BSS: 17.30 to 18.10GHz (uplink); 11.70 to 12.50GHz (downlink)
C-band: 5.925 to 6.425GHz (uplink); 3.700 to 4.200GHz (downlink)

Polarisation: Linear horizontal/vertical

Typical G/T: Ku-band/BSS 52.1dBK; C-band 1.2dB/K

Typical EIRP: Ku-band/BSS 52.1dBW
C-band 41dBW (medium power) & 43.5dBW (high power)



Arabsat BADR-7: 26°E

Launch date: November 2015

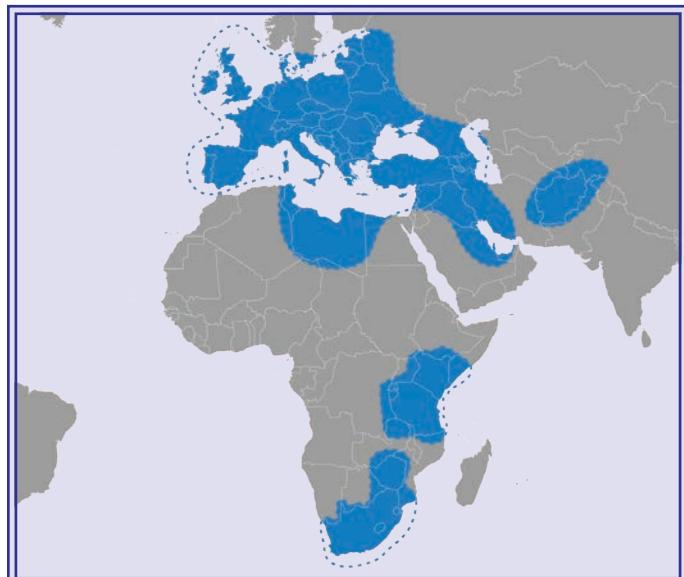
Frequencies: Ku-band/FSS uplinks: 14.00 to 14.25GHz; 14.25 to 14.5GHz
Downlinks: 10.95 to 11.20GHz; 11.45 to 11.70GHz
Ku-band/FSS Apx-30B uplinks: 13.00 to 13.25GHz/12.75 to 13.00GHz
Downlinks: 10.70 to 10.95GHz/11.2-11.45GHz

Polarisation: Linear

Transponders: 12 x 36MHz

Typical G/T: 5.1dB/K

Typical EIRP: 51.5dBW; 52.4dBW



Avanti Communications HYLAS 2: 31°E

Launch date: August 2012

Ka-band uplink: 27.5GHz (forward); 29.5GHz to 30GHz (return)

Active Ka-band forward transponders: 24

Forward channel bandwidth: 230MHz per beam

Ka-band downlink: 19.7GHz to 20.2GHz (forward);
17.7GHz to 19.7GHz (return)

Active Ka-band return transponders: 6

Return channel bandwidth: 220MHz per beam

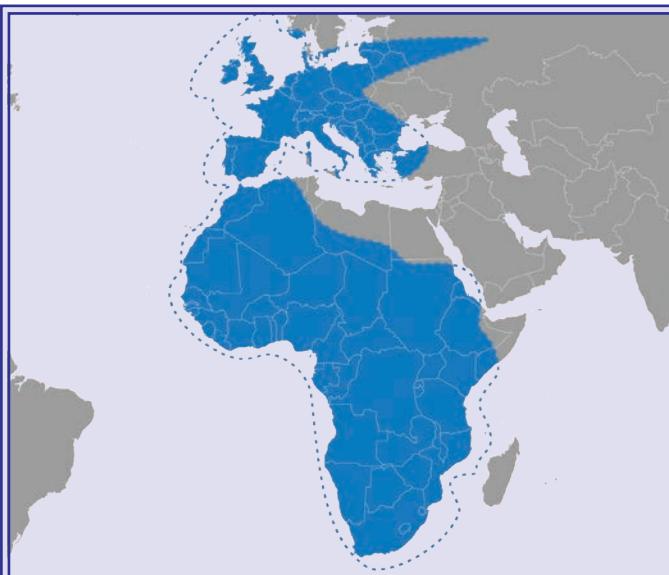
Typical 'dry beam' EIRP (at edge of coverage): up to 58dBW

G/T (at edge of coverage): up to 11.5dB/K-1

Typical 'wet beam' EIRP (at edge of coverage): up to 61.5dBW

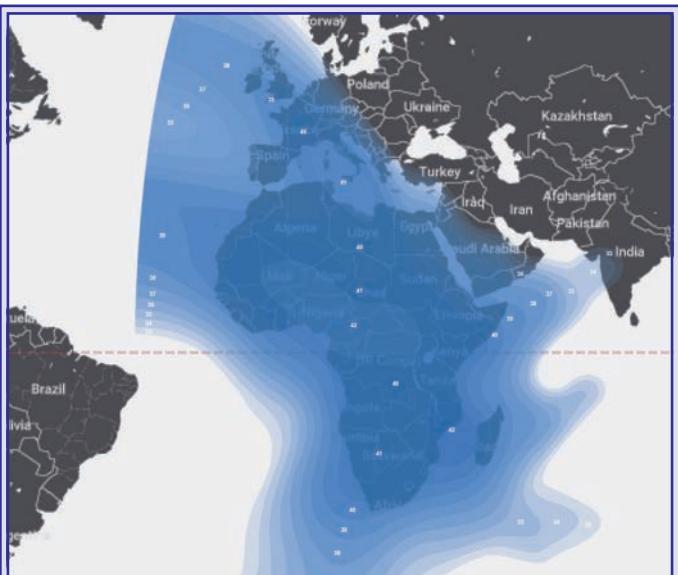
G/T (at edge of coverage): up to 14.0dB/K-1

SATCOMS: FOOTPRINTS



Avanti Communications HYLAS 4: 33.5°W

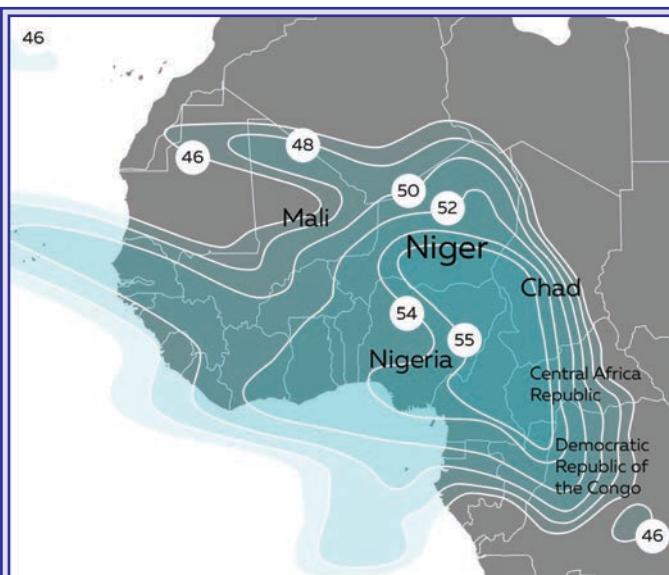
Launch date: April 2018
Ka-band uplink: 27.5GHz to 29.5GHz (forward); 29.5GHz to 30GHz (return)
Active Ka-band forward transponders: 32
Forward channel bandwidth: 220MHz per beam, 64 beams
Ka-band downlink: 19.7GHz to 20.2GHz (forward); 17.7GHz to 19.7GHz (return)
Active Ka-band return transponders: 8
Return channel bandwidth: 220MHz per beam
Typical Ka-band fixed beam performance: EIRP (at edge of coverage): up to 61.5dBW
 G/T (at edge of coverage): up to 14dB/K
Bandwidth per steerable beam: Fwd: 2 x 230MHz; Rtn: 2 x 230MHz; 920MHz
Steerable beam frequencies:
 Civilian bands - 29.5 to 30GHz (uplink); 19.7 to 20.2GHz (downlink)
 Government bands - 30.0 -31.0 GHz (uplink); 20.2- 21.2 GHz (downlink)
 Broadcast only - 21.4 to 21.9GHz (downlink)
Typical steerable beam performance:
 EIRP (at edge of coverage): up to 54.5dBW; G/T (at edge of coverage): up to 7dB/K



Azerspace-1/Africasat-1a: 46°E – C-band Africa & Europe

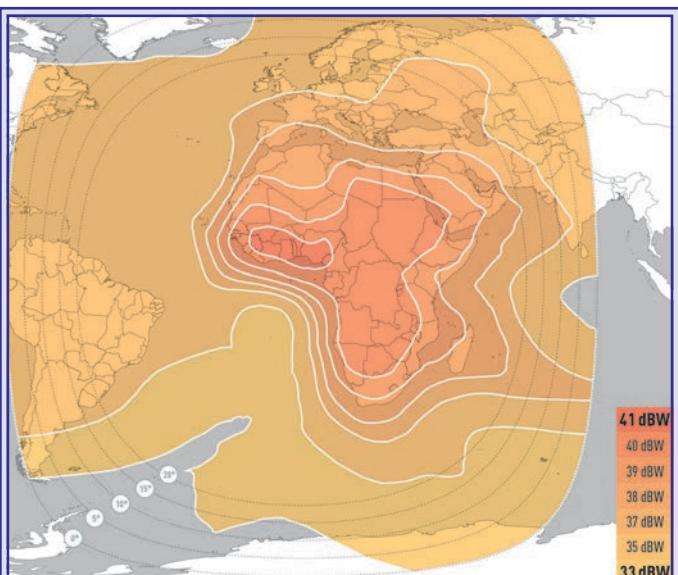
Launch date: February 2013
Active transponders: 24 (36MHz each)
Uplink: 5925 to 6425MHz
Downlink: 3700 to 4200MHz
Beams: Central Asia & Europe beam, Africa & Europe beam
Polarisation: RHCP/LHCP and V/H relatively
TWTA power: 65W

All uplink and downlink channels are 4-block channel cross strap switchable between Central Asia & Europe and Africa & Europe beam.



Azerspace-2: 45°E – Ku-band

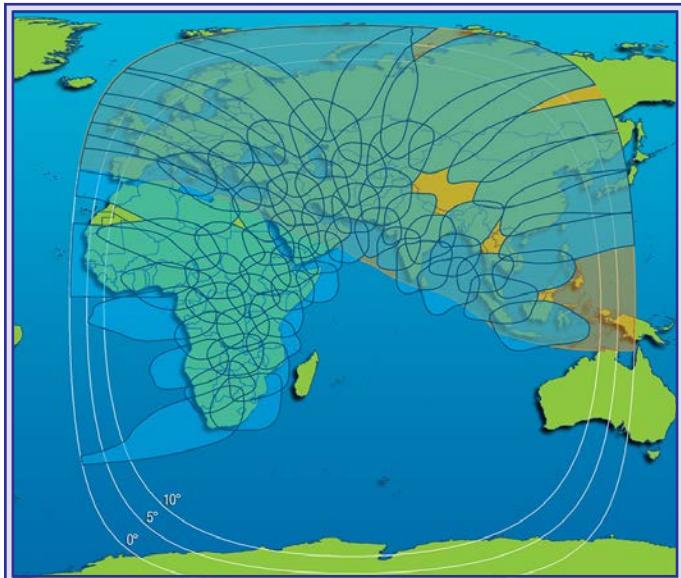
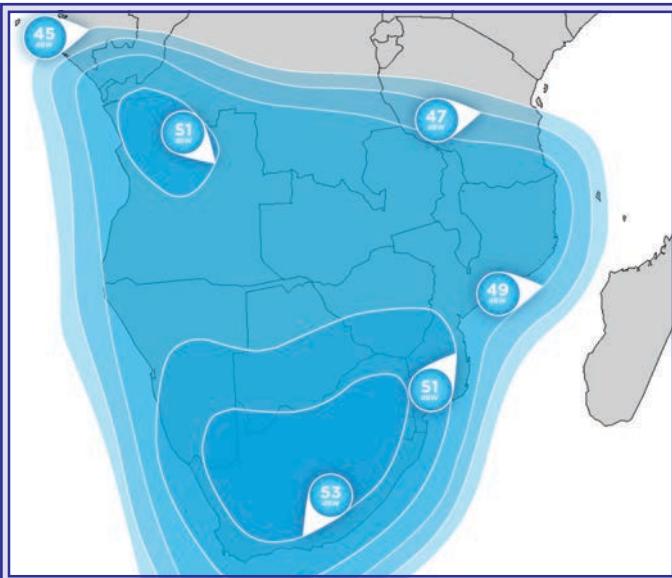
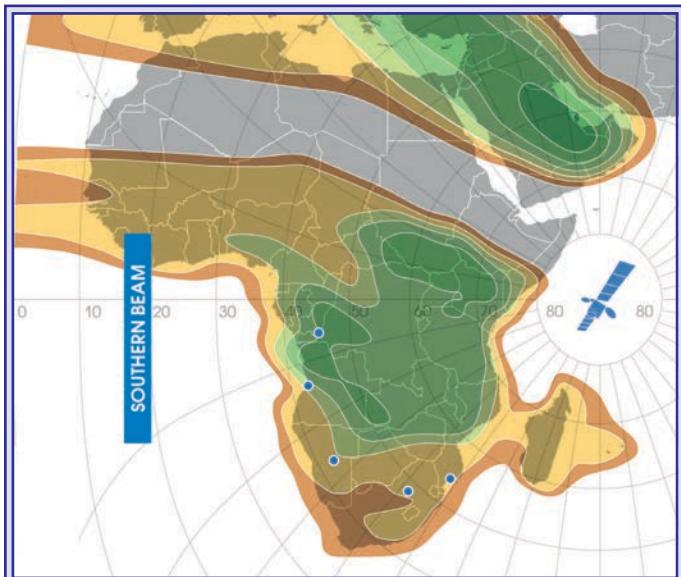
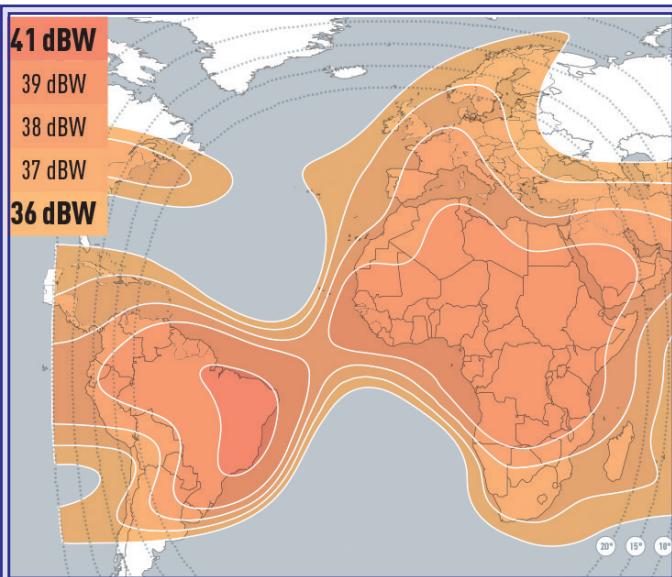
Launch date: Expected 2017
Manufacturer: Space Systems/Loral
Bus platform: SSL-1300
Launch vehicle: Ariane-5ECA
Active transponders: 35 (36, 54, 72, 76MHz)
Uplink: 14000 to 14750MHz
Downlink: 11450 to 12750MHz
Beams: Europe & Asia, Pakistan & Afghanistan, West Africa and Central Africa
Polarisation: Linear
TWTA: 150W



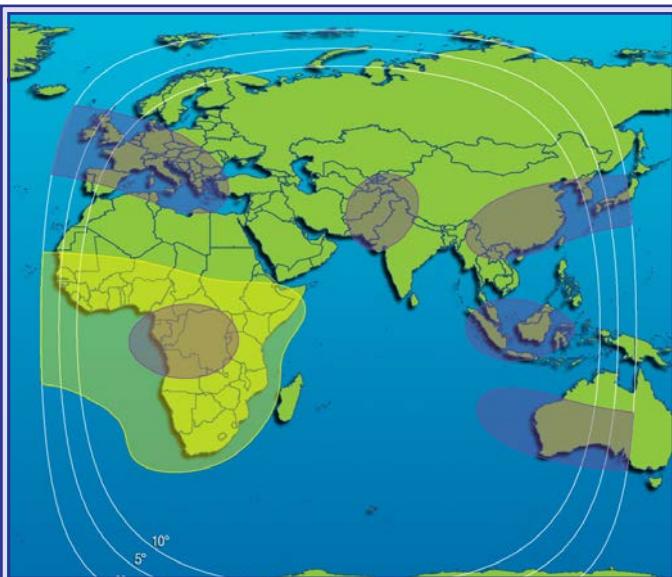
EUTELSAT 3B: 3°E

A tri-band satellite for Europe, Africa, the Middle East, Central Asia and South America, EUTELSAT 3B offers resources in Ku-, C- and Ka-band connected to fixed and steerable antennas for flexibility. It enables users to select the most relevant frequency band. Eutelsat says the Ku- and C-band capacity is optimised for broadcast and data markets, while the high throughput Ka-band beams are ideal for bandwidth-demanding markets.

Launch date: May 2014
Manufacturer: Airbus Defence and Space
Operational life: Over 15 years
Launch craft: Sea Launch AG's Odyssey
Operational transponders: Up to 51
Downlink polarisation: Ku-, Ka- and C-bands

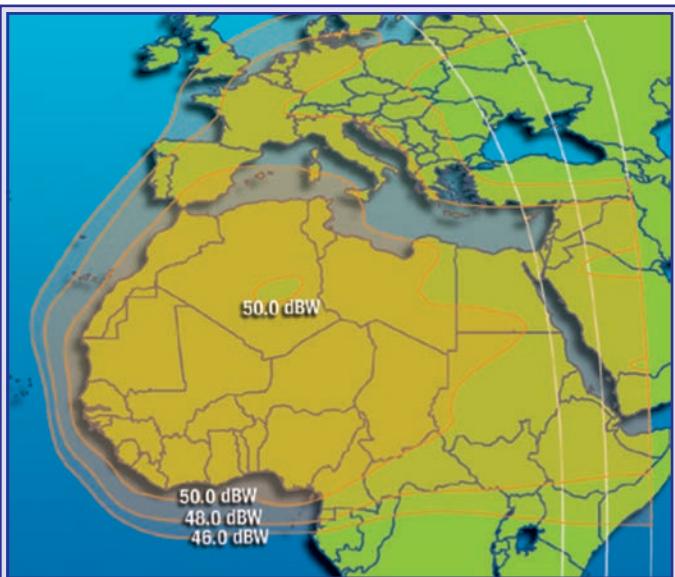


SATCOMS: FOOTPRINTS



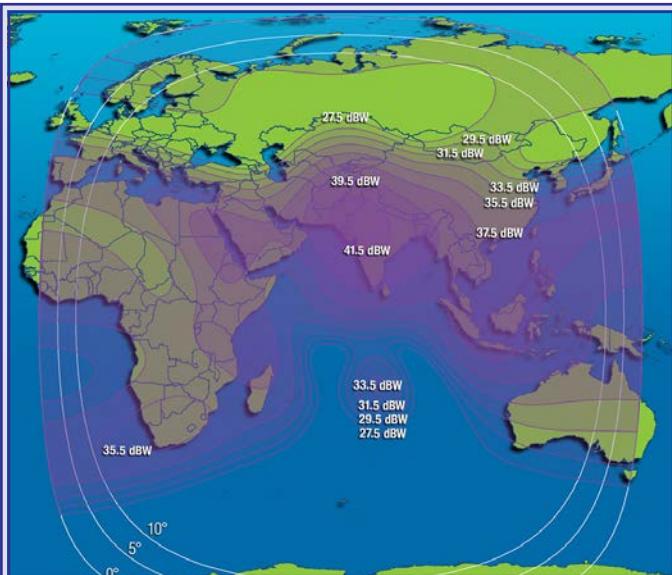
Intelsat IS-33e: 60°E – C-band Sub-Saharan & Spot Beams

Launch date: August 2016
Configurable capacity: 79 (in equivalent 36 MHz units)
Polarisation: Linear horizontal/vertical
Circular – right hand or left hand
Typical edge of coverage EIRP: C-band spot: 46.2 up to 52.4dBW
 Sub-Saharan: 41.0 up to 43.5dBW
 Global: 33.3 up to 37.5dBW
Typical G/T range: C-band spot: 2.6 up to 12.8dB/K
 Sub-Saharan: -1.6 up to 1.5dB/K
 Global: -10.3 up to -7.2dB/K



Intelsat IS-35e: 325.5°E – Ku-band

Launch date: July 2017
Configurable capacity: 39 (in equivalent 36MHz units)
Polarisation: Linear – horizontal or vertical
Downlink frequency: 10.95 to 11.20GHz & 11.45 to 11.70GHz
Typical coverage EIRP range: Caribbean: > 47.4 dBW
 Europe/Mediterranean: >45.4dBW
 Africa/Europe: > 47.1dBW
Uplink frequency: 13.75 to 14.50GHz
Beam peak G/T: Caribbean: up to 10.6dB/K
 Europe/Mediterranean: up to 11.3dB/K
 Africa/Europe: up to 5.1 dB/K



Intelsat 36: 68.5°E – C-band Landmass Beam

Launch date: August 2016
Configurable capacity: 12 (in equivalent 36MHz units)
Polarisation: Linear horizontal/vertical
Downlink frequency: 3700 to 3990MHz
Typical edge of coverage EIRP: > 28.3dBW
Uplink frequency: 5925 to 6215MHz
Typical G/T range: Up to 0.6dB/K



Intelsat IS-37e: 342°E – C-band

Launch date: September 2017
Configurable capacity: 90 (in equivalent 36 MHz units)
Polarisation: Circular – right hand or left hand
Typical coverage EIRP range: Spots: 46.4 up to 52.2 dBW
 Africa/Europe: 38.1 up to 43.3 dBW
 Central Africa: 42.8 up to 47.6 dBW
 Latin America: 41.8 up to 46.3 dBW
 Global: 34.6 up to 38.1 dBW
Typical G/T range: Spots: 2.0 up to 13.4 dB/K
 Africa/Europe: -5.6 up to -1.0 dB/K
 Central Africa: -2.2 up to 3.0 dB/K
 Latin America: -2.7 up to 0.7 dB/K
 Global: -9.0 up to -5.9 dB/K

Limited service(s)
± 62° Latitude
Standard service(s)
± 45° Latitude

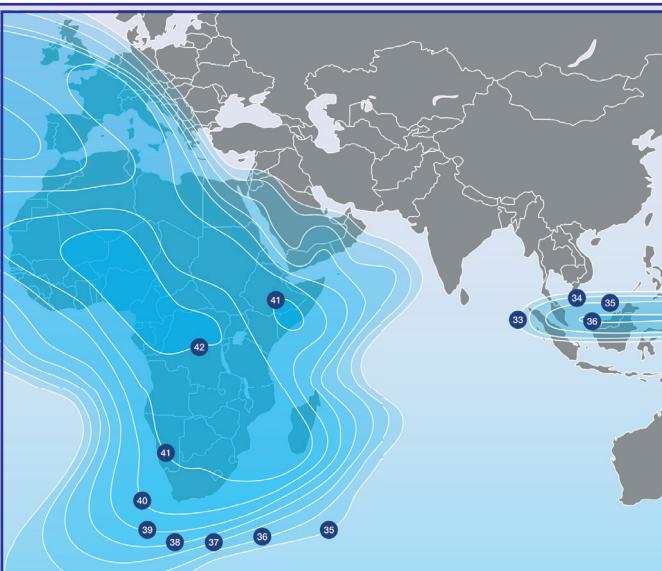
● Gateway
● PoPs



O3b Networks: 45°N/S

O3b Networks has launched an initial constellation of 12 satellites. These have been placed in medium Earth orbit (MEO) and circumnavigate the planet from a height of 8,062km. O3b says its fleet will provide around 70 per cent of the world's population with fibre quality and low latency services such as internet connectivity and trunking. It has established a global network of gateways that have been strategically located on the internet backbone. SES – which now owns 100 per cent of O3b – started the next phase of launches in March 2018.

Launch dates:	June 2013 (first quartet); July 2014 (second quartet); December 2014 (third quartet); March 2018 (fourth quartet); 1H19 (fifth quartet expected)
Manufacturer:	Thales Alenia Space
Orbital inclination:	<0.1°
Ground period:	360 minutes/Four contacts per day
Beams:	Ka-band; 10 beams per region (seven regions) totaling; 70 remote beams per eight satellite constellation
Capacity:	Up to 1.2Gbps per beam (600Mbps x 2); 84 Gbps available per 8 satellite constellation
Beam coverage:	700km diameter
Transponder bandwidth:	216MHz; 2 x 216MHz per beam



MEASAT AFRICASAT-1A/AZERSPACE-1: 46°E

AFRICASAT-1a / Azerspace-1 is the result of a collaboration between Malaysia-based MEASAT Satellite Systems and the Azercosmos Joint Stock Company set up by the government of Azerbaijan. It provides high-powered services across Africa, central Asia and Europe. As well as C-band capacity across Africa with connectivity to Europe, the Middle East & South East Asia, Ku-band services are also offered across South East Asia.

Launch date: February 2013

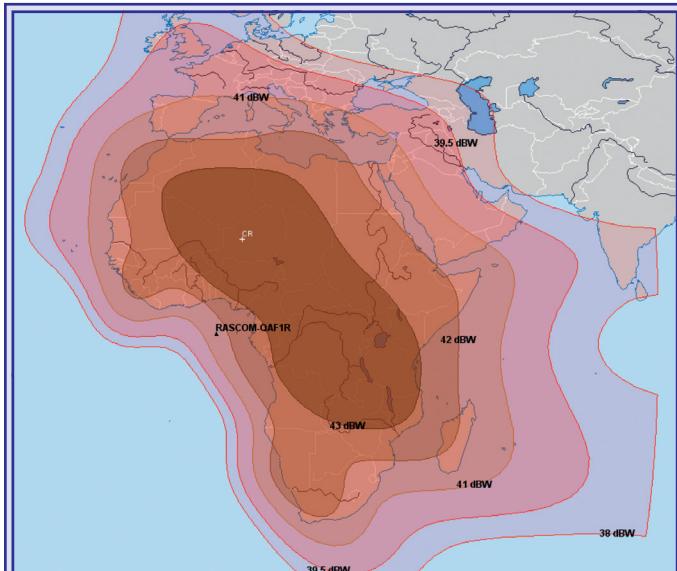
C-band transponders (36MHz equivalent): up to 24

Typical EIRP beam coverage: 42dBW (max)

G/T (dB/oK): -1 (max)

TWTA power: 65W

Polarisation: linear



Rascomstar-Q1R: 2.9°E – Standard C-band EIRP

Launch date: August 2010

Launch vehicle: Ariane 5

Platform: TAS Spacebus 4000B3

Bands: C-band standard & planned;

Ku-band planned

C-band beam peak EIRP (dBW): 45

6190 to 6425

Uplink (MHz): 3965 to 4200

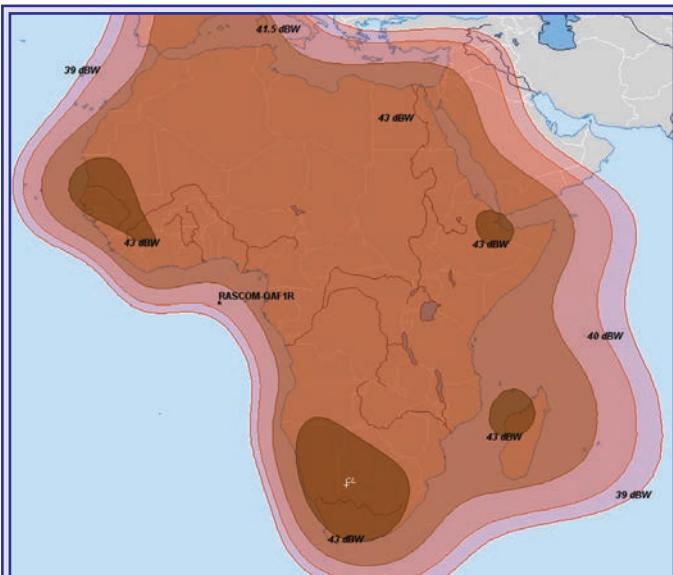
3965 to 4200

Downlink (MHz): 3965 to 4200

3965 to 4200

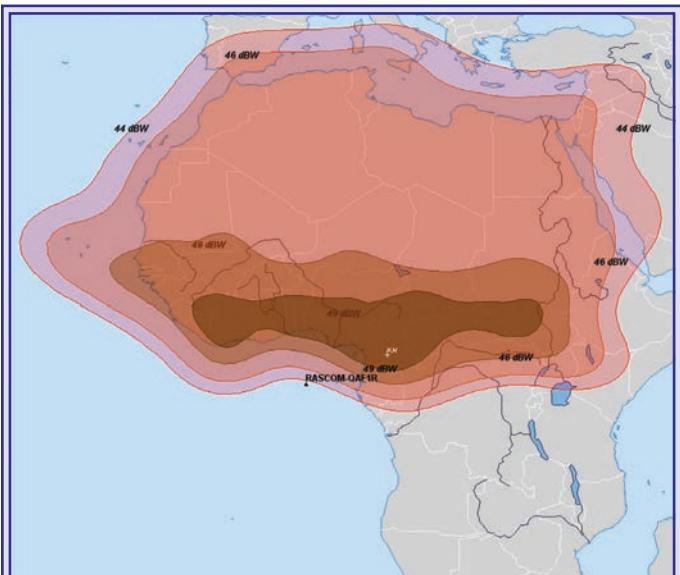
Polarisation: Circular

SATCOMS: FOOTPRINTS



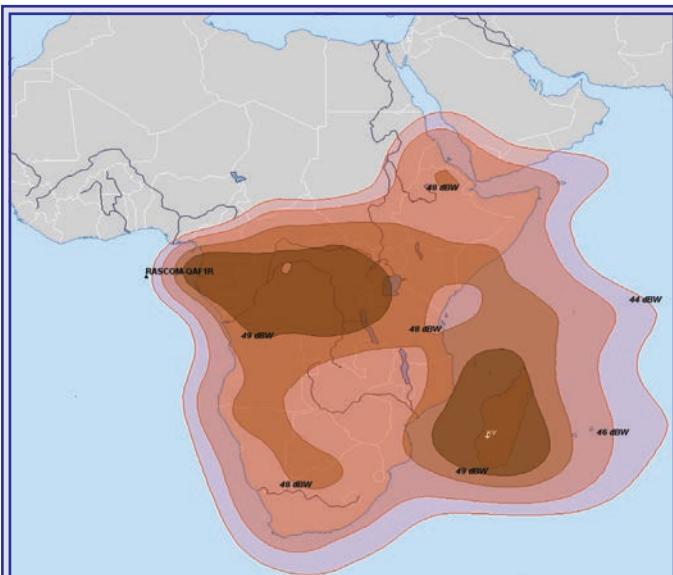
Rascomstar-Q1R: 2.9°E – C-band (still showing as “planned” at rascomstar.com)

Launch date: August 2010
Launch vehicle: Ariane 5
Platform: TAS Spacebus 4000B3
Bands: C-band standard & planned;
 Ku-band planned
C-band beam peak EIRP (dBW): 44
Uplink (MHz): 6725 to 7025
Downlink (MHz): 4500 to 4800
Polarisation: Circular



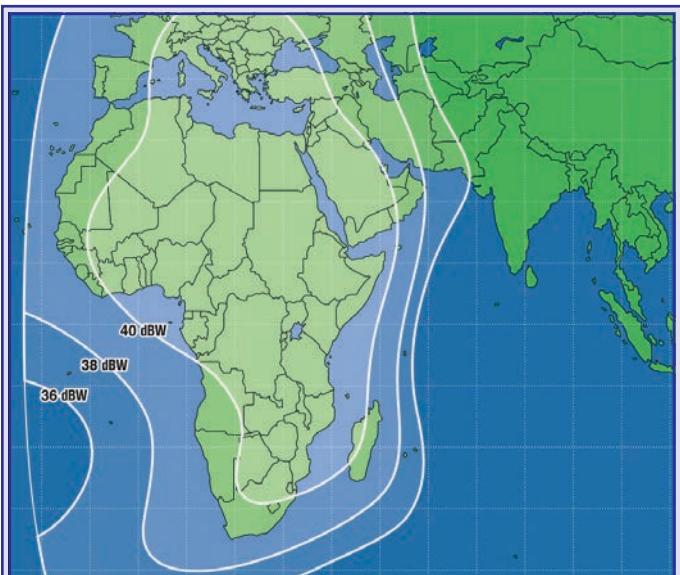
Rascomstar-Q1R: 2.9°E – Ku North beam EIRP

Launch date: August 2010
Launch vehicle: Ariane 5
Platform: TAS Spacebus 4000B3
Bands: C-band standard & planned;
 Ku-band planned
Ku-band North Beam peak EIRP(dBW): 49.4
Uplink (MHz): 12750 to 13250
Downlink (MHz): 10270 to 11450
Polarisation: Linear



Rascomstar-Q1R: 2.9°E – Ku South beam EIRP

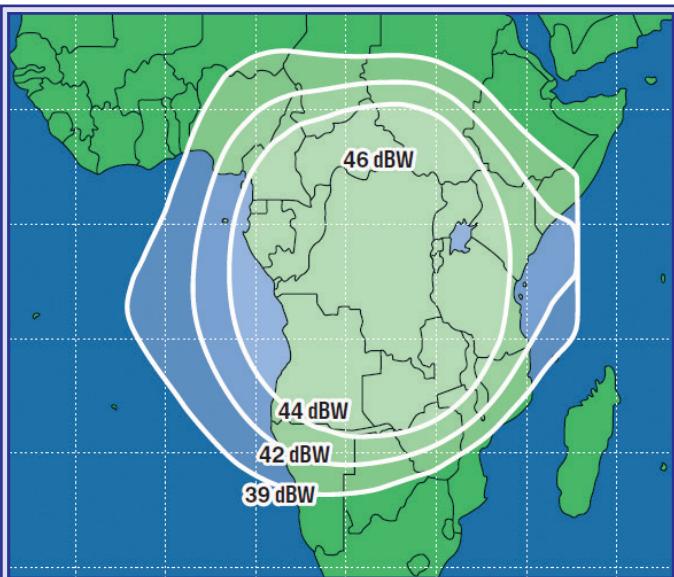
Launch date: August 2010
Launch vehicle: Ariane 5
Platform: TAS Spacebus 4000B3
Bands: C-band standard & planned;
 Ku-band planned
Ku-band South Beam peak EIRP(dBW): 50
Uplink (MHz): 12750 to 13250
Downlink (MHz): 10270 to 11450
Polarisation: Linear



RSCC Express-AM6: 53°E – C-band, fixed beam, EMEA

Express-AM6 satellite is designed for TV broadcasting, enterprise networks, disaster recovery and business continuity, IP trunking, cellular backhaul, oil & gas and mobility applications.

Launch date: October 2014
Coverage: Russia, EMEA, sub-Saharan Africa
Operational life: 15 years
Operational transponders: C, Ku, Ku-/Ka-, Ka, L



RSCC Express-AM7: 40°E – C-band, steerable spot beam, optional pointing: West Africa

Express-AM7 is designed for TV broadcasting, enterprise networks, cellular backhaul, oil & gas, and government applications.

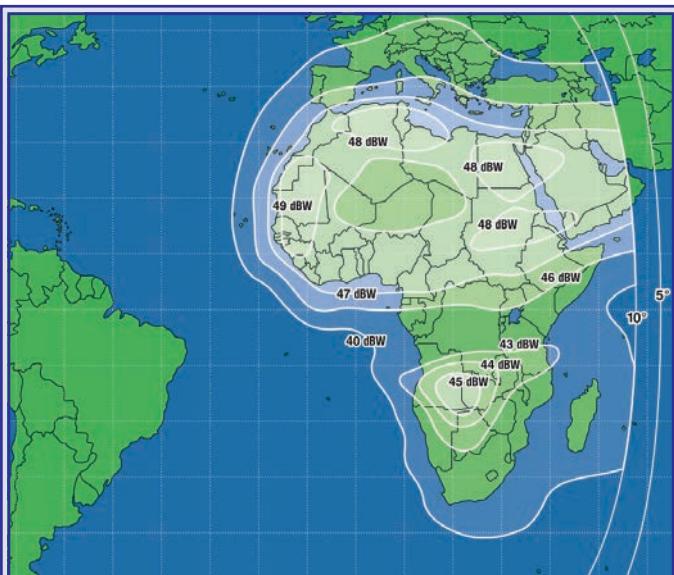
Launch date:	March, 2015
Coverage:	Europe, Middle East, sub-Saharan Africa, Russia, South-East Asia
Operational life:	15 years
Operational transponders:	C, Ku, L



RSCC Express-AM7: 40°E – Ku-band, steerable spot beam, optional pointing: East Africa

Express-AM7 is designed for DTH, enterprise networks, broadband Internet access, USO, telemedicine and distance learning applications.

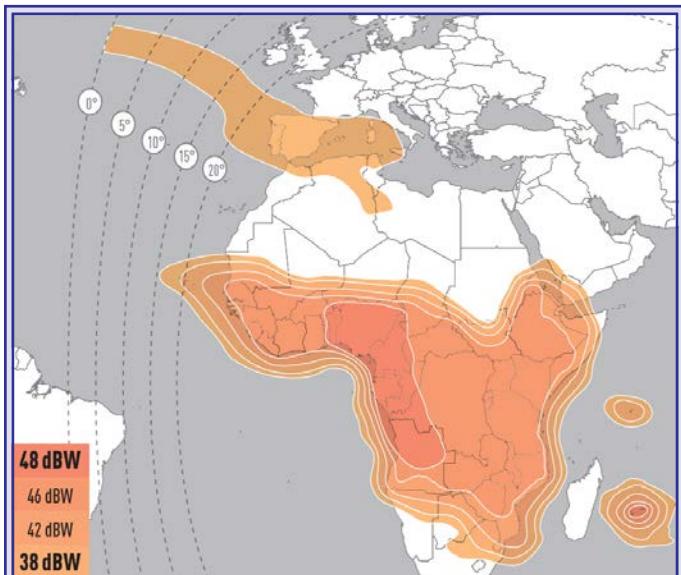
Launch date:	March, 2015
Coverage:	Europe, Middle East, sub-Saharan Africa, Russia, South-East Asia
Operational life:	15 years
Operational transponders:	C, Ku, L



RSCC Express-AM8: 14°W – Ku-band, fixed beam, MENA & East

Express-AM8 is designed for TV broadcasting, enterprise networks, broadband Internet access, USO, telemedicine and distance learning applications.

Launch date:	September, 2015
Coverage:	Europe, MENA, sub-Saharan Africa, Latin America
Operational life:	15 years
Operational transponders:	C, Ku, L

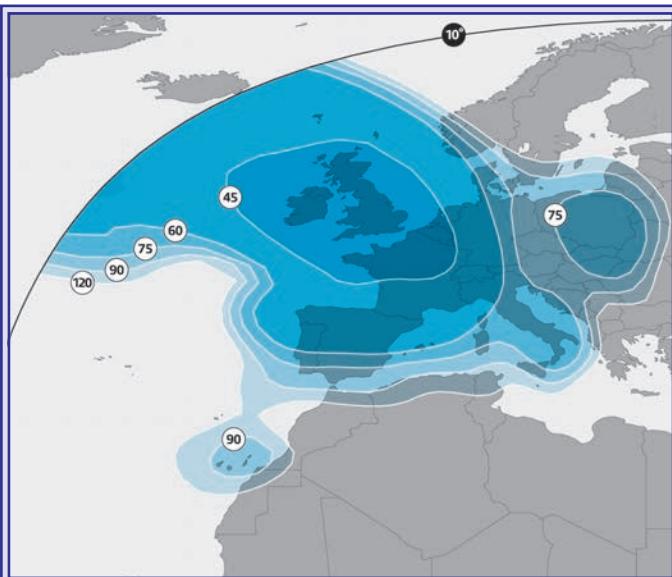


RSCC Express-AMU 1/Eutelsat 36C: 36°E

Express-AMU1 has up to 70 transponders in Ku- and Ka-band. It provides service to Russia and continuity and growth for broadcast markets developed by Eutelsat in sub-Saharan Africa under the name Eutelsat 36C.

Launch date:	December 2015
Coverage:	Russian, sub-Saharan Africa
Launch vehicle:	Proton-M
Operational life:	15 years
Manufacturer:	Airbus Defence and Space
Polarisation:	Ku-band: linear; Ka-band: circular
Total transponders:	70 Ku- and Ka-band

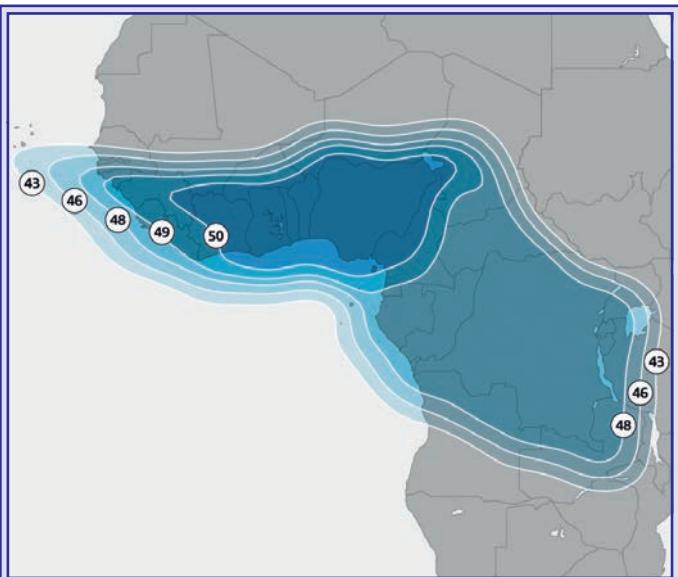
SATCOMS: FOOTPRINTS



SES ASTRA 2E: 28.2°E/28.5°E

Delivers broadcast, VSAT and broadband services in Europe, Middle East and Africa, and carries Ku- and Ka-band payloads at a prime dual orbital location. Middle East beam provides a Ka interconnect feature.

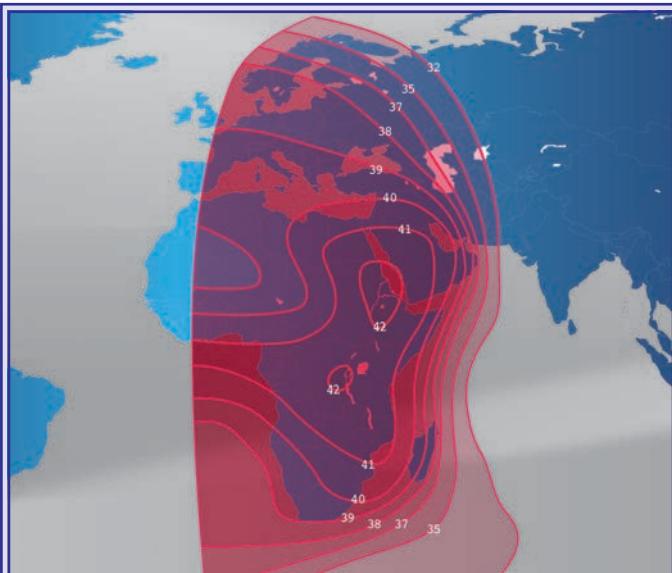
Launch date:	September 2013
Coverage:	Middle East , North Africa, Europe
Launch vehicle:	Proton
Operational life:	15 years
Manufacturer:	EADS Astrium
Polarisation:	Ku-band: linear; Ka-band: circular
Total transponders:	Ku-band: 42 (Europe); 12 (Middle East). Ka-band: 4 (250MHz, 500MHz and 600MHz)



SES ASTRA 2F: 28.2°E/28.5°E

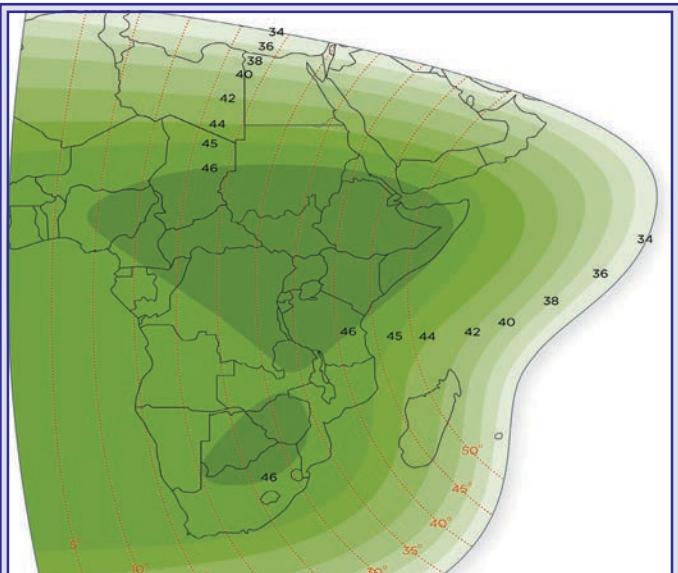
Serves to deliver next-generation broadcast, VSAT and broadband services in Europe, Middle East and West Africa, and carries Ku- and Ka-band payloads.

Launch date:	September 2012
Launch vehicle:	Ariane 5 ECA
Operational life:	15 years
Manufacturer:	EADS Astrium
Polarisation:	Ku-band: linear; Ka-band circular
Total transponders:	Ku-band: 40 (Europe); 12 (Africa) Ka-band: 3 (500MHz & 600MHz)



Singtel ST-3: 75°E – Africa C-band

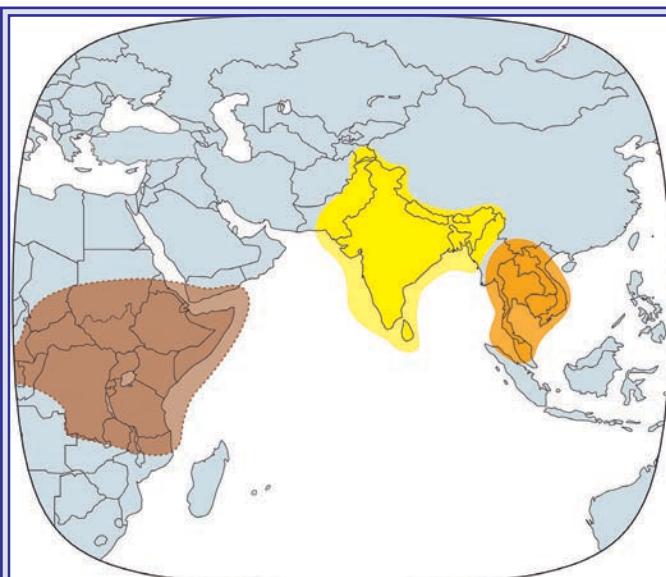
Launch date:	February 2014
C-band Payload:	13
Frequencies:	Uplink: 5.950 to 6.385GHz Downlink: 3.680 to 4.200GHz
Transponder bandwidth (MHz):	36 & 72
Polarisation:	Dual linear
Cross-polarisation separation (dB):	Better than 27
EIRP (peak value) (dBW):	45
TWTA size:	62W
TWTA redundancy:	34 for 26 primary TWTA
G/T (peak value) (dBK):	+6



Thaicom 6/Africacom-1: 78.5°E – C-band Africa Beam

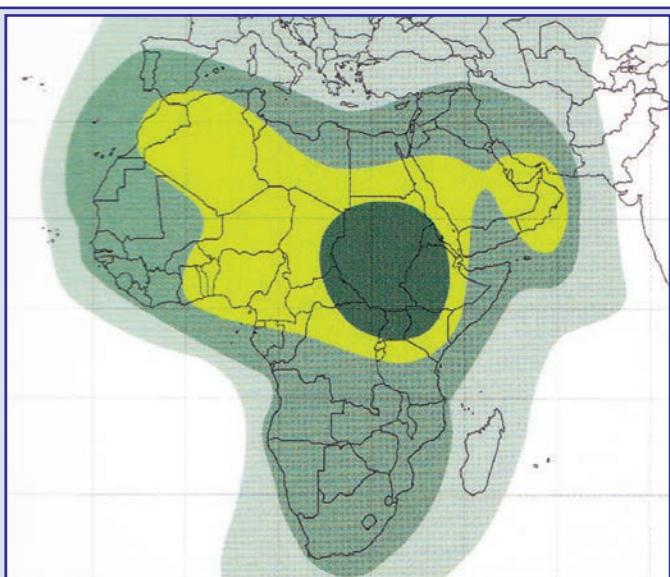
Thaicom 6 has 18 active C-band and 8 active Ku-band transponders. The satellite's African capacity, 6 C-band transponders each with 72MHz bandwidth, is being marketed under the AfriCom 1 designation.

Launch date:	January 2014
Operational life:	≥ 15 years
Solar arrays:	Three panels per array, UTJ Gallium Arsenide cells
Stabilisation:	3-axis stabilised; zero momentum
Propulsion:	Liquid bi-propellant transfer orbit system; monopropellant (hydrazine) on-orbit system
Transponder capacity:	Asia C-band 12 x 36MHz; Asia Ku-band 2 x 54MHz, 6 x 35MHz; Africa C-band 6 x 72MHz



Thaicom 8: 78.5°E

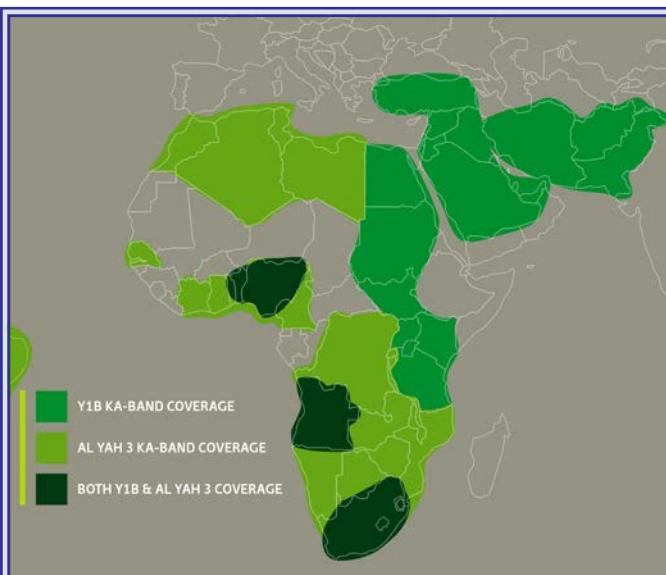
Launch date:	May 2016
Operational life:	≥ 15 years
Altitude control:	3-axis stabilised
Launch mass:	<3,200 kg
Solar arrays:	Two 4-Panel Solar Wings with UTJ cells
Stabilisation:	3-axis stabilised, using thrusters and reaction wheels; zero momentum biased
Propulsion:	Liquid bi-propellant transfer orbit system; monopropellant (hydrazine) on-orbit system
Payload:	Ku-band repeater: 24 active transponders
Antenna:	Three deployable single offset reflectors, 2.4 m, 2.6 m, and 2.5 m x 2.7 m



Yahsat Y1A: 52.5°E – C-band

Yahsat claims to be the first company in Africa and the Middle East to offer hybrid satellite services to the region with the Y1A. Its tri-band coverage connects users to more than 85 countries across Africa, the Middle East, Europe, & South West Asia. It also offers the possibility of inter-beam connectivity.

Launch date:	April 2011
Number of transponders:	C-band 8 x 36MHz plus 6 x 54MHz Ku-band BSS 25 x 33MHz Ka-band secure Military 21 x 54MHz
Primary power:	10,900W
C-band power:	>37dBW to >43dBW



Yahsat Y1B: 47.5°E

Launch date:	April 2012
Launcher:	ILS Proton
System Supply Contractor:	EADS Astrium & Thales Alenia
Operational life:	15 years
Capacity:	Ka-band: government payload Ka-band: commercial payload: 60 spot-beams
Payload power:	9.7KW
Gateway locations:	Europe and UAE



Yahsat Al Yah 3: 20°E

Al Yah 3 carries 53 active Ka-band user beams and four gateway beams. It provides multipurpose solutions for broadband, broadcast, government and communications use across Africa, Brazil, the Middle East, Europe, and Central and Southwest Asia.

Launch date:	January 2018
Launcher:	Arianespace
System supply contractor:	Orbital Sciences Corp.
Operational life:	15 years
Payload:	58 Ka-band spot beams
Primary power:	Approx. 7.5kW, electrical
Gateway locations:	Brazil, Greece, Luxembourg, Spain, UAE

A new world of possibilities with the new **Hellas Sat 3** satellite in **Southern Africa**



High power coverage
more than **53 dBW**



Unique backup
capability



Cross-region connectivity
Europe - Southern Africa



• • • • • • • • • • **Bridging worlds**

chapter

Broadband

6

According to the UN Broadband Commission for Sustainable Development, 50 per cent of the world's population is expected to be connected to the internet by the end of 2019. This leaves the other half – an estimated 3.8 billion people – unconnected and unable to benefit from key social and economic resources in an expanding digital world. In response, the commission has set what it describes as "seven ambitious yet achievable" targets in support of connecting the other half of the world's population by 2025.

The targets were launched in January 2018 at a joint meeting held in Davos between the Broadband Commission and the World Economic Forum. They specifically seek to expand broadband infrastructure, internet access and their use by populations around the world, in support of achieving the SDGs (sustainable development goals) that were established by the UN and the international community in September 2015.

By 2025, the commission says:

- ◆ All countries should have a funded national broadband plan or strategy, or include broadband in their universal access and services definition
- ◆ Entry-level broadband services should be made affordable in developing countries, at less than two per cent of monthly gross national income per capita
- ◆ Broadband/internet user penetration should reach 75 per cent worldwide; 65 per cent in developing countries; and 35 per cent in least developed countries
- ◆ Sixty per cent of youth and adults should have achieved at least a minimum level of proficiency in sustainable digital skills
- ◆ Forty per cent of the world's population should be using digital financial services
- ◆ Unconnectedness of micro-, small- and medium-sized enterprises should be reduced by 50 per cent, by sector

- ◆ Gender equality should be achieved across all targets

The UN hopes to achieve these by continuing to work with top CEOs, senior policy-makers and government representatives, international agencies, academia and organisations concerned with development. It said that the Broadband Commission engages in "high-level" advocacy to promote broadband in developing countries and underserved communities. In so doing, the UN said its commissioners work together to devise practical strategies – including private-public partnerships – that call for higher priority to be given to the development of broadband infrastructure and services, and to ensure that the benefits of these technologies are realised in all countries and are accessible to all.

Technology's role

Technological solutions will of course help the UN, international community and all stakeholders in expanding broadband connectivity. The satellite industry claims to play a unique role here.

According to the 16th edition of Northern Sky Research's *VSAT and Broadband Satellite Markets* report published in November 2017, consumer broadband will add more than 11.6 million new subscribers in the next ten years. With the UN stating that half of the world's population still lack internet access, NSR reckons satellite must "step in and play a definitive role" in connecting unserved and underserved populations.

The analyst estimates the global addressable market for satellite internet at 472 million households. With ground alternatives continuously expanding and other key barriers like affordability at play, the vast majority of these potential customers will not be captured by satellite. However, compared with today's 2.5 million active subscribers, NSR believes

there is still a "massive opportunity" ahead for satellite consumer broadband. It said that most of the addressable market resides in emerging markets in Latin America, Middle East and Africa and Asia. Collectively, NSR said these represent 90 per cent of the potential global subscribers. Having said that, the firm pointed out that a massive addressable market does not mean attracting customers will be easy and effortless. (*Also see Lluc Palerm-Serra's comments in Chapter 5, Satcoms, The Year Ahead on p68.*)

"Several of the early projects have fallen in the 'build it and they will come' trap, not putting enough emphasis on developing strong retail channels," said NSR. "Early broadband offerings from Thaicom/IPStar, Yahsat, Eutelsat and Avanti (among others) were initially met with lacklustre demand and challenging growth."

It added that awareness is another major barrier as satellite broadband is completely unknown for many potential customers. NSR also said that affordability hampers growth, but advises the industry to pay a closer look into market conditions before being discouraged by low average income levels.

"There's no doubt this is a highly elastic market and, consequently, the cheaper the price the more market that can be captured; however, satellite has obvious cost limitations and affordability will always be a barrier," stated the report.

It continued by saying that even in emerging markets with low average incomes, there are many wealthy households "eager" to subscribe to satellite broadband. As an example, NSR said HughesNet in Brazil launched a service with an entry level cost of USD70 per month, much higher than those in North America, but was still able to attract tens of thousands of subscribers in less than a year.

According to the report, the largest portion of the addressable market resides in the low-income segment. NSR said multiple projects

BROADBAND: INTRODUCTION | YEAR IN REVIEW

have been developed using Wi-Fi hotspots and similar offers with the aim of selling small data allowances to end users through aggregation points. But it believes that, apart from the already mentioned barriers, this segment tends to be very challenging due to low penetration of devices, lack of digital skills and the actual value the end-user gets by going online and seeing relevant content.

"Despite it being feasible to build an affordable and functional solution to target these segments, barriers are still high and, many times, outside the control of the satellite distributor. Consequently, it is hard to ensure long-term recurrent revenues for these models without government sponsorships, making profitability of these models challenging."

"Wi-Fi aggregation points still need to see a big success case to validate the model. Key barriers such as digital literacy are outside of control of the satellite actors. But, with these challenges progressively alleviating, this could become a large growth opportunity."

It is interesting to note the comment about key barriers being "outside of the control" of the satellite industry. Indeed, this can be applied to all the technology specialists involved in enabling broadband connectivity. As has been constantly stated in previous editions of *The African Wireless Communications Yearbook*, the fact that half of the world's population still lacks internet access is not for want of innovation or technology solutions. But what is clear as we move forward is that expanding broadband to those that still lack access is not the sole responsibility of any one organisation or sector. What is now needed, as the UN points out above, is a concerted effort by all the stakeholders involved, and the successful establishment of public-private partnerships hold the key to the future. ■

Connecting remote communities

Mozambican technology startup company Kamaleon developed what it believes is an "innovative and engaging" way of promoting digital literacy through a shared platform. The *Tablet Comunitário* (*Community Tablet*) is a solar powered mobile computer. Built on a trailer to provide internet access to remote areas, it features touchscreen displays and virtual keyboards. Kamaleon is also offering training on how to use the internet to members of the community and the local workforce.



The solar powered *Community Tablet* is quite literally a mobile device. It is built on a trailer so that it can be towed (top), and features touchscreen displays and virtual keyboards to provide internet access to people in underserved areas (bottom).

JANUARY/FEBRUARY 2017

Towards the end of 2016, it was widely reported that Liberia had become the first country to have its entire internet taken down following a DDoS attack. Experts said *Mirai* was used – the same malware that had crippled sites such as Netflix and eBay earlier in the year. The code for *Mirai* is freely available online, and the Liberian attack is thought to have come from a single source and therefore may have been the work of a lone attacker. *Mirai* botnets targeted the companies that co-own the fibre cables into the country and flooded the network with traffic. Liberia's subsea fibre connectivity comes via ACE and this is then extended across

a national backbone developed by the Cable Consortium of Liberia which is made up of the government along with local telcos.

MARCH/APRIL

Maroc Telecom claimed a first in Morocco with the launch of its new broadband satellite internet service for residential and business customers. As a result, the company said it had become the first operator to offer full coverage of the country. It added that customers can take advantage of a "wide range" of broadband packages of up to 20Mbps priced from MAD249 (USD25) per month. Enterprise users can also choose a VPN satellite service with speeds up to 6Mbps.

MAY/JUNE

TelOne has launched what's said to be Zimbabwe's first Tier III data centre. It unveiled two new mirrored facilities in Harare and Mazoe in late March. Built at a cost of USD4m, they are part of the state's National Broadband project and were funded by a USD98m loan arranged with China's Export Import Bank two years ago. TelOne said it is in the process of transforming its business model from a fixed landline provider to a fixed mobile converged company with emphasis on broadband, cloud and digital services. Ring fibre connectivity links user branches to the data centre via VPN or dedicated leased IP lines.

distributions to convey life saving information. Kamaleon founder and CEO Dayn Amade said: "A few years ago, anyone who could not read and write was considered illiterate. But today, this concept goes further, encompassing people who do not know how to use ICT."

"Health organisations and schools in Africa often face a unique set of obstacles, including a lack of access to much-needed health education and counselling platforms. The *Community Tablet* was created to help solve these problems."

Following the launch failure of Spacecom's AMOS-6 satellite last year, **Eutelsat** said its African broadband initiative was back on track thanks to an agreement with **Yahsat**. Under a multi-year deal signed on October 2016, Eutelsat said it would roll out broadband services during the first half of 2017 using capacity on up to 16 Ka-band spot beams on Yahsat's 1B satellite. Further expansion will be supported later using capacity on 18 spot beams on Yahsat's third satellite, Al Yah 3, which was launched in January 2018. The capacity replaces the payload Eutelsat previously contracted on AMOS-6 which was lost in September 2016 following a launchpad explosion.¹

Eutelsat originally set up its *Broadband for Africa* initiative in 2015 and re-branded it as **Konnect Africa** in November 2016. By working in close partnership with local partners to promote high-quality broadband at affordable prices for homes and businesses, the company said its aim is to accelerate satellite broadband connectivity across the continent. On 6 June 2017, Konnect Africa launched services in Benin, Cameroon, Kenya, Lesotho, Nigeria, South Africa, Swaziland, Tanzania and Uganda. Rollouts were also planned for: Angola, Côte d'Ivoire, Congo, DRC, Ethiopia, Ghana, Madagascar, Mozambique, Rwanda, Senegal, South Sudan, Togo, Zambia and Zimbabwe.

Eutelsat said customers would benefit from "innovative" services including packaged offers

inspired by 'pay-as-you-go' models and Wi-Fi hotspots schemes. It claimed hotspot access will be available for a "few cents" while family offers will be optimised for a "few dozens" of dollars. High-grade enterprise services were also proposed to enable video-conferencing, data storage, multimedia content development, and safe and reliable communication.

Some of the first partners to support Konnect Africa included: AfrikaNet GoSat; Bentley Walker; China Telecom (which is establishing communication links between Africa and Asia-Pacific); Terrace Projects, a managed satellite service solution provider in South Africa; amongst others. Eutelsat said it will give partners the means to succeed through dedicated commercial, marketing and technical support. The company added that it will also train and reward local installers to enhance service quality and drive more talent into the industry.

With the successful launch of Konnect Africa during the first four months of 2017, Eutelsat said it will revert to its initial business plan of a revenue contribution of EUR15m in 2017-18 and around EUR25m in 2018-19.

In August, we reported that **Kenya's Communications Authority (CA)** had awarded contracts to three companies to roll out high-speed internet connectivity to schools under the first phase of projects financed by universal service funds. Liquid Telecom, Xtranet Communications and Commcarrier Satellite Services will undertake the KES836m (USD8m) Education Broadband Connectivity Project which includes giving 898 rural secondary schools access to 5Mbps internet speeds. They beat 11 other firms in a competitive tendering process.

CA chairman Ngene Gituku said: "The project will greatly improve education through digital learning by enabling access to online content by student and teachers. This will be actualised through creation of an education portal with digitised KCSE [Kenya Certificate of Secondary Education] curriculum."

The schools were identified using 'e-readiness' criteria agreed upon between the CA and the Ministry of Education. Qualifying institutions were expected to have: secure electricity supply from Kenya Power or a constant diesel/solar powered generator; secure computer lab with an uninterruptible power supply; at least 10 computers in good working order along with a printer and projector; and at least one full-time accredited teacher for computer studies.

The education project is one of two key initiatives recommended for immediate implementation following an ICT Access Gaps study commissioned by the CA in 2016. This also identified a need for more 2G voice infrastructure in selected sub-locations. According to the study, 5.6 per cent of Kenya's population (about 2.66 million people) have no access to telecom services; about 418 sub-locations have less than half of their population covered by services, while another 164 sub-locations have no access to 2G mobile services. The study also established that 3G and broadband services are limited to urban areas. It found that only 2,454 sub-locations have 100 per cent population coverage of 3G and broadband, while 1,244 sub-locations have no access at all.

In other developments, **Global-IP** and **Hughes Network Systems** announced a partnership to bring broadband to millions of people in sub-Saharan Africa. Global-IP planned to use Hughes' JUPITER satellite platform to bring high-performance connectivity to mobile devices across the region. This will provide 100 per cent of the capacity on Global-IP's GiSat-1 150Gbps high-throughput satellite which is expected to enter service in 2019. It's claimed to be the first VSAT system to support DVB-S2X which is widely recognised as the most bandwidth-efficient standard available.

¹ African Wireless Communications Yearbook 2017, pp74-76.

JULY/AUGUST

MainOne is aiming to become West Africa's largest internet hub with a new interconnect service for carriers, enterprises and ISPs. The launch of *Open-Connect* follows the partnership of MainOne's data centre company MDXi with the Nigerian Internet Exchange to improve national transit traffic (see page 92). The company reckons it now "guarantees the best cross connect services in Nigeria", enabling customers to bypass the public internet and connect directly to partners, cloud and SaaS providers with secure, reliable and flexible direct connections. It also means internet traffic

originating and terminating on any network in Nigeria can remain in-country.

SEPTEMBER/OCTOBER

More than 8,000 companies and individuals on the continent are said to have so far registered for the new .africa internet address. Lucky Masilela, CEO of the ZA Central Registry (ZACR) which is responsible for administering the domain name, described .africa as "valuable virtual real estate". He said: "Leading continental and international brands are snapping up .africa domain names because they recognise the importance of being associated with Africa's bright future online. ZACR appeals to all

Africans to take ownership of .africa, because it truly belongs to us all."

NOVEMBER/DECEMBER

Guinea's Authority for Posts and Telecommunications (ARPT) said the local Consumer Union had sued Orange Guinea for compensation following the operator's redesign of its internet passes. The union alleged damage to consumers who had already purchased packages. After several months of discussions mediated by the ARPT, Orange Guinea agreed to compensate customers who had purchased passes when the new packages were put into service with online credit.

BROADBAND: YEAR IN REVIEW



Hughes is supporting Global-IP's mission of bringing high-performance connectivity to mobile devices throughout sub-Saharan Africa.

Hughes will supply 11 gateway stations in Europe using a centralised architecture for routing traffic in and out of the internet, as well as its HT2500 and HT2600 terminals. Beyond supporting high-quality Wi-Fi access, the company claimed that its "powerful" terminals are designed with LTE acceleration technology to meet MNOs' demanding requirements, making it economical for data delivery anywhere.

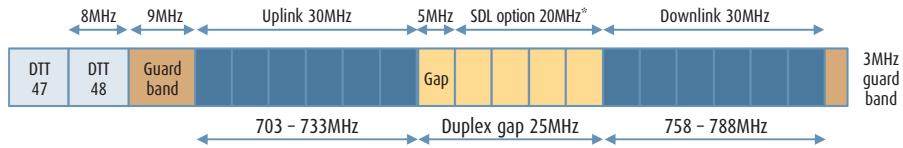
Due to be launched by SpaceX during Q4 2018, GiSat-1 is currently being built by Boeing² and will be the first in a series of satellites from Global-IP. The company said its network will have multiple gateways located in Europe for connectivity to the internet via Tier 1 fibre backbones. It claimed GiSAT's advanced digital payload capabilities will allow the deployment of multiple in-country gateways and terminals for customers who wish to have local connectivity.

The **Tanzania Communications Regulatory Authority** (TCRA) is planning to allocate digital dividend spectrum by June 2018. In October, we reported that following the successful migration from analogue to digital television, the authority had released the 700MHz frequency range which was now available to be assigned for mobile broadband services.

² See Chapter 5, Satcoms, p62.

The year ahead: There is certainly no shortage of means to deliver broadband connectivity in Africa and the foreseeable future certainly looks bright.

2018 has so far already seen a number of key satellite launches that promise to boost broadband access across the continent. They include Al Yah 3 from Yahsat which, despite having some launch issues, still looks on track to begin commercial services later this year. Eutelsat's much vaunted *Konnect Africa* broadband initiative – which will start by using connectivity on Al Yah 3 – is also expected to begin rollouts in the coming months and aims to cover most of sub-Saharan Africa by 2019.



*The SDL option of zero or up to four blocks of 5MHz provides an approach that offers flexibility for other options being considered.

Tanzania's regulator planned to implement European Conference of Postal and Telecommunication channel arrangements – APT 700MHz lower duplex – 3GPP Band 28.

The authority plans to sell 2 x 30MHz of FDD through an auction process subject to a reserve price. Further details of the process were expected to become available after the authority conducted consultation exercises with key stakeholders during 1Q18. To ensure that consumers benefit fully from access to mobile broadband services, the TCRA said it will include coverage obligations as part of the assignment process.

As well as helping to further Tanzania's National ICT Policy, the authority said the sale of 700MHz spectrum will bring a number of benefits to the country. Along with socio-economic benefits, it believes mobile communications costs will fall due to savings as a result of deploying fewer base stations for wider coverage, and that more people, especially those in rural areas, will be able to access mobile broadband services.

Boosting traffic

MainData Nigeria (MDXi) and the **Internet Exchange Point of Nigeria** (IXPN) teamed up to expand the peering of internet transit traffic within Nigeria. MDXi is the region's only Tier III certified data centre and is operated by MainOne which also owns and runs an open access 4.96Tbps submarine cable system.

With its IP transit network already connected to the Lagos, Accra, London and Amsterdam internet exchanges, it's claimed MDXi will give IXPN the capacity to connect directly with the

"greatest number" of IP transit and content delivery networks in West Africa. IXPN CEO Muhammed Rudman said this will enhance local internet performance, lower costs, and minimise traffic bottlenecks for internet traffic in Nigeria.

According to MainOne, its vision is to improve connectivity across West Africa. The company's CEO Funke Opeke (*pictured*) said: "MainOne is committed to the penetration of high quality and affordable broadband internet services in West Africa, and bringing the IXPN closer to our network plays an important role in helping us realise that vision not only for Nigeria, but for all of West Africa."



Further north in Egypt, **Vodafone** is aiming to enhance customer experience for its 39 million fixed and mobile subscribers with the help of **Procera Networks**. The operator said the vendor's solutions will enable it to dynamically deploy analytics capacity to ensure customers are receiving a high-quality broadband experience across its entire network footprint.

Under a multi-year, multi-million dollar deal, Procera is supplying its analytics solutions. It said the solutions take advantage of the "superior" visibility provided by its *PacketLogic DRDL* engine to enable the delivery of fine-grained application identification, despite the increasing use of encryption on the internet.

both begun trialling 5G in Africa, with the latter operator also stating that it is now on a mission to connect all rural users. Speaking last August, Vodacom Group CTO Andries Delport said: "It is our firm view that broadband penetration has transformative power and is an enabler for economic and social growth and, as such, makes it an essential tool for empowering people in rural areas."

Given all the ambitions of the wireless industry – not to mention the ongoing introduction of fibre in many countries – Africa's broadband penetration looks set to see a marked improvement this year and beyond.

Vodafone is also using Procera's ScoreCard technology. This is claimed to provide a unique view of quality, with high-frequency performance measurements in categories that subscribers can relate to, such as web surfing, streaming video, social media, real-time gaming, upload/download, and voice applications. Procera said the operator will be able to use the data gained from analysing ScoreCard results to guide investment into network capacity and identify service creation opportunities for network planning teams. According to the vendor, with regional operators competing on network quality, reducing the cost and increasing the deployment flexibility of analytics through virtualisation is a "business imperative".

Towards the end of 2017, the **African Union** (AU) published a study which said that more than half of the UN's SDGs (sustainable development goals) cannot be tracked in Africa due to data constraints. Universal broadband access is one of the key SDGs.

The *2017 Africa Sustainable Development Report: Tracking Progress on Agenda 2063 and the Sustainable Development Goals* was jointly published by the African Union Commission, African Development Bank, the UN Economic Commission for Africa (ECA), and the UN Development Programme. It was described as the first comprehensive appraisal of its kind since the adoption of the SDGs and Africa's own *Agenda 2030* and *Agenda 2063* targets.

The report said that the continent needs to sustain efforts to eradicate extreme poverty and gender inequality and also improve its statistical capabilities to implement and track progress towards these objectives. The study called upon African nations to "harness the data revolution and upgrade the continent's statistical capabilities". It said they should address the gap in the region's data collection capacities, as these are seen as "critical" for the evidence-based policy-making and tracking of progress towards the goals and targets stated in *Agenda 2030* and 63.

"Six out of every 10 SDG indicators cannot be tracked in Africa due to data constraints," said ECA executive director Vera Songwe. "Strengthening our data ecosystem is therefore imperative not only for performance tracking but for informed policy-making."

The report estimated that USD1bn is needed annually to allow 77 of the world's lowest income countries to establish reliable statistical systems that are capable of measuring and sustaining SDGs. It added: "The increasing demand for data and statistics under the 2030 and 2063 Agendas is an opportunity for Africa to embark on the data revolution in order to improve statistical capacity in all domains." ■



Mark Rotter,
Treasurer,
Dynamic
Spectrum Alliance

The Dynamic Spectrum Alliance (DSA) is a global organisation advocating for laws and regulations that will lead to more efficient and effective spectrum utilisation.

Its membership spans multinationals, small- and medium-sized enterprises, as well as academic, research and other organisations, all working to create innovative

solutions that will increase the amount of available spectrum to the benefit of consumers and businesses alike. Mark Rotter explains what progress the alliance and its members made in Africa last year.

"TV White Space (TVWS) technology continued to be the band of choice in 2017 for dynamic spectrum developments in Africa. We saw continued organic growth on existing projects such as those in Botswana, Kenya, Malawi, South Africa and Zambia.

"On the regulatory front, we saw various country regulators taking TVWS and the use of dynamic spectrum more seriously and applying their minds to spectrum use for scaling to larger projects with multiple service providers. This has led to more interest in how to manage and control the available spectrum by means of Dynamic Spectrum Databases.

"For example, one DSA member, Nominet, has started to see increased interest in simple TVWS database services as both a planning tool by implementation partners as well as a spectrum assessment tool by regulators."

Rotter said that the adoption of TVWS as a broadband technology was initially hampered by a lack of understanding of where best to deploy it in the network. But over time, he said this has developed into a more normalised approach where the technology has found its natural cost/benefit place within network solutions.

"These kind of hybrid networks – where traditional fibre, high-speed microwave or satellite links are used as backhaul combined with lower-bandwidth microwave and TVWS links to extend the network coverage to community end-points where users connect to WiFi – are now becoming more prevalent.

"It's also becoming clearer that a more integrated approach is needed to provide connectivity to increasingly remote areas to ensure affordability. So there have been examples deployed of e-health solutions which range from electronic patient registration, to the storage and handling of detailed medical records between clinicians at regional clinics, doctors and regional hospitals.

"Also, where TVWS is used to achieve rural connectivity goals, there is now typically an education context where we have seen the

technology contribute to affordable broadband access to rural schools and deliver learning material and curated curriculum content in a cost-effective manner."

Rotter continued by saying that the DSA is seeing focus shift from investigating and piloting TVWS to increasingly scaling and commercialising the technology in an affordable manner for the benefit of operators as well as end users.

"One of the more innovative ways we have seen this being done is by means of a hybrid commercial model where the network traffic is segmented into 'eHealth', 'education' and 'social' traffic. This sharing model allows for different types of content to be identified and network costs to be recovered across the broader base of customers.

"This in turn means increased impact from universal services funds (USFs) on a variety of government service delivery commitments and increased connectivity to users in remote areas. With regulators and USFs increasingly being able to optimise such funding to achieve better sharing of backhaul infrastructure, it can bring significant price savings to end users in remote areas while also keeping the network running costs low.

"Another issue that we see investors grappling with is how to leverage standardised regulations across multiple countries to accelerate opportunities and drive down costs with increased volumes and reduced overheads. Traditionally, regulators in each country have needed to invest significant time and effort on a costly multi-year investigation to draft, revise, review and publish their own dynamic spectrum regulatory frameworks. This resulted in slight variations from country to country which contributed to delayed investment, adoption and rollout of TVWS technology within each country.

"In a bid to help reduce the cost and time regulators needed to get regulations into market, the DSA released version 2 of its Dynamic Spectrum rules in January 2018. This policy has been written in such a way that regulators can more easily adopt our document in whole or in part, and quickly progress to being able to release a set of TVWS regulations within their country no matter which global region they are in."

When asked about what the DSA's hopes and plans for the continent are over 2018, Rotter said that the alliance sees widespread publication of simple regulations that keep the unused TV spectrum free and unlicensed.

"In countries that take this approach, the barriers to entry for operators to use that portion of broadcast spectrum are as low and affordable as possible, so we expect this to lead to investment for new and existing projects in ever more remote and hard to reach

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areas. This should stimulate the adoption of TVWS technology immensely.

"Hand-in-hand with this greater adoption, we are seeing the cost per unit for the TVWS network radios continuing to fall – driven by both increased adoption and technical advances in the field.

"Finally, it is expected that all the key radio producers will release their technology to combine individual channels in the next 12 months. This will effectively double the throughput as inbound and outbound traffic is separated into discrete channels."



Farhad Khan,
CCO,
Yahsat

When we last spoke to Farhad Khan in 2016,³ he had only just joined Yahsat having worked with MTN for a number of years. We caught up with him again a year later and, with 12 months experience of the satellite industry now under his belt, we asked what differences he saw between Africa's cellular and space markets.

"I think there is a 100 per cent correlation across a couple of dimensions, and the first of these is elasticity and the elasticity of behaviour between GSM (or fixed, for that matter) and satellite. If I take the behavioural analysis studies that we did for churn, for example, I can overlay the same hypotheses into a satellite environment. However, what is different is the underlying technology, because by and large this either adds an opportunity or a limitation in terms of the market.

"In the traditional cellular environment, where it was predominantly circuit switched, you had the limitation of maybe seven people per sector of an antenna. In satellite, you don't have that limitation; the only limitation is literally the type of quality that you want to give to customers. And with advancing technology, we can discriminate by customer type and segment, so I can actually give a [high-end] service to an enterprise customer while giving a basic GSM-type service to a low-end consumer at the same time. That is the beauty of satellite technology that we have never been able to achieve in the GSM or fixed line connectivity space."

So how does Khan answer critics who say that such a service comes at a high price?

"We are burdened by a legacy which says that with any satellite connection you had to have a minimum of USD1000 per month in perpetuity, and you had to have five or ten thousand dollars to actually have the antenna and the gateway itself. So if you had asked me that question 18 or even 12 months ago, I would have said yes,

you're right, because we were in uncharted territory. Ka-band is different, and it was a learning curve for me when I first joined.

Yahsat uses Ka technology for two reasons: one is that the efficiency in frequencies and spectrum utilisation allows us to have multiple users concurrently without deteriorating the service in any way. And the second and perhaps most important criteria in the differentiation between Ku- and Ka-band is cost. Take South Africa as an example. In the most outlying area of the Northern Cape – which is the least connected province in the country – I can give you a connection at less than USD300 and at less than USD2 per gig. This is unprecedented and will light up the eyes of any subscriber who understands the need for internet and broadband access. USD300 is the price of a mid-end smartphone. The current price for 4G in a built-up urban area is just over one dollar per gig, and I am giving you two dollars per gig in the middle of nowhere. And I can do it consistently to all the customers in that area without a single additional dollar of capex because my infrastructure has been invested in already.

"I will admit that, today, we will never be able to compete in an urban area. In one or two years' time, the conversation is different. But today, we cannot compete on a dollar per meg basis with the 4G and fibre players. And that is fine, because my value proposition is most relevant in the underserved and unserved areas."

Khan goes on to describe his definition of underserved and unserved. "Underserved for me is any subscriber who has less than a 4G or a 3G connection. Today, if you had to make network decisions on the basis of accessibility, quality and speed, my proposition is better on those three dimensions. It is second to none. On the price dimension alone I may be found wanting. But no decision in the broadband space is made on price alone. It is made on accessibility, quality and speed.

"And then, if I take the unserved market, as I move from served, underserved to unserved, the size of the market becomes less purely as a function of affordability. Even if my affordability quotient in an unserved market is, say, one per cent of the total population, it is still too big for me to be able to satisfy the total market.

"For example, the total market size in South Africa today with the current affordability rate of a Ka connection is between 60,000 and 100,000 subscribers. My growth aspiration in the next five to 10 years is less than 60,000. That means that at present, even if I have the right channel partner, I will not be able to satisfy the bandwidth needs of an underserved population."

So does that suggest that all the satellite operators will end up competing for the same, ever-dwindling piece of market share? Khan dismisses this and says it is not relevant today

because the competition in Ka-band satellites is very limited. "The players and competition in Ka are Avanti and shortly Broadband For Africa [Eutelsat's initiative now known as 'Konnect Africa']. So the number of companies that can compete in this category is very limited. But that is good because now there will always be the pressure and scrutiny on price and on the qualities of your signal and partner. That's a good harmony to maintain."

For Khan, the more worrying competition comes from traditional sources such as fibre and firms like Dark Fibre Africa venturing into rural markets. "The day that fibre becomes ubiquitous is the day that I don't have a business case. But we all know that there is no return on investment for fibre or even for GSM to be ubiquitous in Africa. As long as there is that divide or vacuum, Yahsat remains relevant."

Khan continues by saying that while satellite currently may not be able to compete with mobile technologies in urban areas, the evolution of Ka technology means that in four years time the availability of Ka-based broadband and the capacity will be sufficient to justify a price parity environment.

"Previously, our CPE used to be in the USD400 mark. In the last 18 months we have carved it down to 300, and in 2018 it will be 200, and so on. I would not overlay a Moore's law onto satellite CPE but it has a very similar characteristic. My opinion is that the ideal price point for a satellite connection on Ka is around the USD100 mark. If you were to ask me how big should the market be at that price, I would say without hesitation, 200,000 to 300,000 subscribers. Because today, with the current insights that we have in terms of disposable income, that is the number of people that have that kind of money to spend on the CPE."

Since speaking to Khan at AfricaCom in November 2017, Yahsat launched its third satellite, *Al Yah 3*, on 26 January 2018. While the launch was successful, the company issued a press statement at the time which said: "The mission experienced some challenges during the launch stages which resulted in the satellite

"The day that fibre becomes ubiquitous is the day that I don't have a business case. But we all know that there is no return on investment for fibre to be ubiquitous in Africa."

³ African Wireless Communications Yearbook 2017, p83.

being inserted into an orbit that differed from the flight plan. However, the satellite is healthy and operating nominally."

Yahsat added that a revised flight plan will be executed in order to achieve the operational orbit and fulfil the original mission, but at the time of writing this chapter of the yearbook in mid-March 2018, the company had not publicised any further updates. *Al Yah 3* was scheduled to begin delivering commercial services later in 2018 and may still be on course to do this.

Khan said that unlike its two predecessors, Yahsat has not pre-booked capacity for Africa on the new satellite and has instead created a pipeline of partners for all the countries on the continent. However, *Al Yah 3*'s footprint will also cover Brazil as well as Africa, and here the operator has pre-booked capacity. "We are selling more managed capacity there because we have a license in Brazil. I think almost 40 per cent has been pre-booked. You don't need licences in Africa so for every country that we have footprint here, we now have partners lined up. We are now at the stage where we are looking at how much capacity we can commit to them, country by country."

"The overlap countries for *Al Yah 2* and *Al Yah 3* are Nigeria, South Africa and Angola which is perfect because we knew that these would be the three highest uptake countries in Africa. *Al Yah 3* will give us a lot more coverage and a lot more depth. It increases our capacity threefold."

While Yahsat operates a fleet of satellites that are in conventional geostationary Earth orbit, is the company interested in alternative satellite technologies such as MEO or LEO missions? "We believe that the best way is to have a partnership type of approach, and that way you have alignments and affiliations with different technology types. I say that because the pace of technology change is far too rapid to take a static position at an investment level. And I don't think that is the optimal way to realise shareholder value. From a long-term sustainability point of view, it is in our interest to partner with as many technology vendors as possible so that we can actually have access to all these types of satellite technologies."

And while fibre may be satellite's 'enemy', many operators have invested in connectivity technology that is both high above the Earth as well as buried within it. Is Yahsat interested in such a hybrid future? "In serving the underserved and unserved markets in Africa we can identify clusters and communities where the type of technology that we use to give them connectivity will not necessarily be restricted to satellite. And I think that in some of these communities, once we have identified them, we are hoping to harness different technology types in order to deliver a single solution to them. You will see a lot more announcements about this during 2018."



Caroline De Vos
Co-founder & CCO
SatADSL

Since being set up by a handful of engineers in 2010 and reselling capacity on Telesat's *Telstar 11N* satellite in Western Africa, SatADSL now offers capacity from 10 satellites operated by the likes of Arabsat, Avanti, Eutelsat, Gazprom Space Systems, Yahsat, amongst others. The company also works closely with satellite technology specialists such as iDirect, Hughes and Newtec.

Caroline De Vos explains that since the outset, the company decided that by not having any upfront investment or capex, it could remain flexible in answering market needs. "We would just buy raw capacity and resell it. We had started in the consumer market but grew to the corporate market."

Working through a network of partners that, within Africa, include 75 different local partners in 40 countries, the company has built-up a reputation for providing affordable and reliable IP communication solutions to banks, telcos, MNOs, etc., across the continent.

According to De Vos, 2017 was a key year for SatADSL. In November, the company launched what was claimed to be the industry's first multi-hub *Cloud-based Service Delivery Platform (C-SDP)* with C-, Ku- and Ka-band capability. "We created this huge software beast that is in the cloud and hosted in a data centre in Brussels," she said. "The platform allows us to buy raw capacity as a VNO from any satellite operator and buy that in bulk. The capacity then goes through the C-SDP where we manage it and shape it into what the customer needs."

C-SDP is described as a complete OSS/BSS, carrier-grade, fully redundant platform. SatADSL said it will enable telcos and service providers to offer, for the first time, cloud-based satellite services over any frequency band. The platform includes a network management system that allows IP traffic to be shaped and routed to and from different hubs, while a built-in end user tool allows users to monitor their own customers. It also features a hotspot management system to enable remote hotspot networks to be configured, managed and monitored.

SatADSL clearly has high hopes for C-SDP as it means that the company can now not only add new revenue streams to its traditional business of re-selling capacity, but also has something that gives it the edge over rivals.

"The platform is multi-satellite, multi-frequency and multi-technology, and we offer it to users who have VSAT equipment installed from any vendor. We have this layer of added value services which are included in the platform. It gives us a big differentiator,

especially with Liquid Telecom which is still really focusing on the consumer market whereas we are focusing on hotspot systems with integrators.

"We did a great project in Ghana where we equipped 50 schools. There was a network with a studio in Accra with a teacher being filmed, and lessons were broadcast to the schools. We also developed hotspot functionality so that the community could use the infrastructure to access the internet which they could pay for using an integrated mobile payment system or through vouchers. So this is all included as a value-added service on top of just offering internet connectivity."

De Vos continues by saying that the C-SDP also enables users to monitor their traffic. "So, for example, if you are a bank, you can control private internet usage during lunchtime or out of office hours. These little extras make a difference. The platform also includes a full, end-to-end billing system."

On the subject of pricing, when asked if this is coming down, De Vos says that it is, adding that SatADSL also has the advantage of having a voucher system which enables users to connect. "We are putting the satellite operators in competition because if one company's price is too great we can go to another and buy from them if it's cheaper. We buy capacity sometimes from the operator or sometimes from the teleport operator if they have better prices. For example, we buy capacity on Arabsat from a teleport operator and not from Arabsat themselves because the teleport has a better price than we would have directly. The satellite operators can of course sell directly to the end user, but none of them offer what we offer."

She adds that one thing that characterised the satellite year in Africa in 2017 was the availability of Ka-band satellites which have "drastically" lower prices than what SatADSL currently has in Ku-band. "Because we can offer frequency independence, our offer will be one fourth of the price tomorrow compared to what we had in 2017."

With the launch of the C-SDP, SatADSL believes that it can now not only offer something new to its ISP partners, but also has something to offer back to the operators. "Since we announced the C-SDP in November, a lot of the satellite, mobile and teleport operators have shown interest in having it. They want to purchase it and we say no way! This is our differentiator, our extra added value."

"So our new business model is to offer the operator the possibility to use this platform, and instead of putting a retail price on it we'll offer a revenue sharing model. This is separate to what we are continuing to do in terms of selling IP connectivity."

"Say, for example, we buy capacity from SES. We will use that capacity and everything

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goes through the C-SDP. SES then either gets back 80 per cent and we keep 20 per cent, or if they want to sell directly to their customers via the platform with all of its value-added services, they will pay us 20 per cent of what they invoice to their customers for the usage, support and maintenance of the C-SDP."

While the platform is currently located in Brussels, because SatADSL is connecting to different operators in different parts of the world, De Vos says the company is now duplicating the setup in PoPs in Russia, Hong Kong, and Singapore. In Africa, there will probably be a C-SDP PoP in Nairobi or Johannesburg.

So what about fibre – is that having an impact on the company's satellite business? "Fibre has been in our business plan since 2006 and the numbers are still fairly similar today. Okay, we know about the projections and that the cables are coming around Africa and in every city. In some of the capitals you have fibre everywhere but we still had, for example, a project in Accra where we needed to connect to fibre. The first 200 metres are included in the price and then for everything after that you pay USD900 per metre just for laying the cable. So it is still quite costly and the fibre operators are making the end user pay for that. Plus, it takes a lot of time to dig holes in the street."

"In the city of course, there is mobile and fibre, and these are our competitors. But there are still more corporations who are putting branches in remote areas, and these people need connectivity as well."



Amr Kamel,
GM, WECA &
Indian Ocean
Islands,
Microsoft

Africa is cloud computing's next "great frontier", according to Amr Kamel. He believes this is being driven by mobile growth, decreasing connectivity costs, and more international and local vendors offering a variety of new services.

In a mobile- and cloud-first world, Kamel says Microsoft is "deeply invested" in Africa, and that it continues to educate businesses and government organisations across the continent about the benefits of cloud. But he acknowledges the need for technology companies, communities and governments to work together to achieve Africa's digital ambitions.

As a contribution to this, Microsoft published a book last year entitled *A Cloud for Global Good*. This details 78 public policy recommendations in 15 categories to help make cloud technologies more trusted, responsible and inclusive.

"By encouraging the adoption of cloud computing, we are also committing to the SME sector – the backbone of the African economy,"

says Kamel. "SMEs are at the heart of our 4Afrika initiative. This was launched in February 2013 to aid in accelerating the continent's economic development and also to improve global competitiveness. Through this, Microsoft has been able to deliver on its promise to develop affordable access to the internet, skilled workforces, and innovation to increase economic opportunities in communities."

Here, Kamel cites *Project Mawingu* in Kenya as a key highlight. *Mawingu* (the Kiswahili word for 'cloud') started five years ago in collaboration with the Global Broadband and Innovations Alliance, a partnership between USAID and NetHope. It was the first time TVWS frequencies were combined with solar-powered base stations to provide internet access to communities in the surrounding countryside at rates as low as USD3 per month.

Microsoft 4Afrika currently has around 15 TVWS connectivity pilots running across six countries in Africa which, as well as Kenya, also include Botswana, Ghana, Namibia, South Africa and Tanzania.

Kamel says there are several examples of how entrepreneurs and countries are using Microsoft and wireless comms technologies to act as digital enablers and accelerators across all sectors. "For example, CHIFCO is a Tunisian tech startup specialising in the IoT and M2M. By using Microsoft's Azure platform it has developed technological infrastructure that allows users to connect their daily devices to the internet, therefore enabling them to be in control of their surroundings, wherever they are, and whenever they want.

The adoption of IoT and wireless technology is also present in Ethiopia where individuals can walk into clinics using a biometric scanner to check in. This technology can also pick up their previous visits as well as check their medical records. After examination, prescriptions can be sent wirelessly to the nearest pharmacy."

Other examples include Botswana where Microsoft and its partners are introducing specialised telemedicine services along with a cloud-based records management system for women at local clinics. In Namibia, the company is working with MyDigitalBridge to connect three provincial regions across a 9,000km² area, and is also bringing 28 schools online.

Working with Africa's educators is clearly another key focus for the software giant. For instance in Ghana, it is working with SpectraLink Wireless to deliver affordable campus-wide internet access and cloud services along with device financing to university students for the first time. And in 2016, the company teamed-up with the Ministry of Education in Rwanda to develop employment skills among students and educators through its *Partners in Learning* programme.

"The programme helps teachers and schools around the world improve students' experiences and skills through technology,"

explains Kamel. "It has already reached 12 million educators in 134 countries worldwide. In sub-Saharan Africa, over 13 million students have benefitted from the programme to date."

He continues by saying that showcase schools have been introduced in Kenya. "This is a global community of schools engaged in digital transformation to improve learning outcomes. Showcase schools create immersive and inclusive experiences that inspire lifelong learning, stimulating development of essential life-skills so students are empowered to achieve more."

"In Africa, 42 schools were selected as *Microsoft Showcase Schools* for 2016, boasting the highest intake in any region across the globe. It is our goal that in five years time every African country with a national technology deployment will have a core 'army' of 21st century-ready schools. These will model new competencies and accompany other schools in their journey to transformation."

When asked about the challenges in Africa over the foreseeable future, Kamel says organisations are now managing data that is more diverse and greater than ever before. "It is estimated that by the year 2020, 30 million devices will be connected to the internet. This will include 30 billion connected 'things' that are largely driven by intelligent systems collecting data."

"In terms of the IoT, modern organisations in Africa will continue to face a variety of challenges. Microsoft recognises that advancements in technology can be exciting but also challenging to assess from a business perspective. However, with the correct tools, organisations can ensure that these new technologies generate profit. The valuable information that is obtained from these tools, along with the appropriate skills, will aid companies across the board to achieve more."

In conclusion, Kamel believes that a society that is "digitally savvy" will not only consume technology but create it: "With the onset of digital transformation comes the concept of the smart cities and digitally transformed governments. Government policy in many territories is leaning towards the creation of smart nations through cloud technology, data analytics and IoT."

"One of the ultimate goals of smart nations is to reduce costs for all stakeholders, increase the efficiency in delivery of services, and democratise technology."

"We base our theory of the smart nation on four basic citizen rights which smart cities must be able to deliver – education, healthcare, freedom and social justice and equality. This, coupled with attention to infrastructure, investment climate, innovation and execution capability, must all be underpinned with technology for a smart nation to be achieved." ■

The above interview is based on an article first published in the June-July 2017 edition of Northern African Wireless Communications magazine.



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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

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 celco'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



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

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.

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.

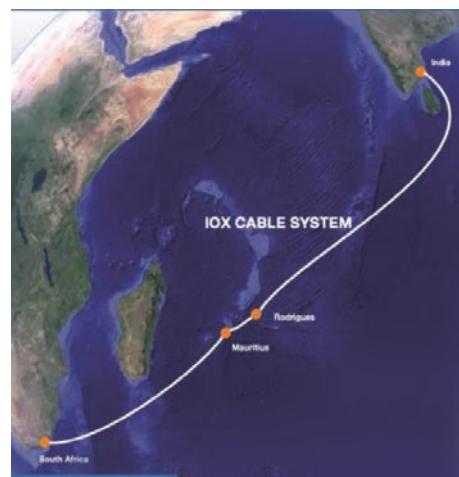
Omantel Wholesale said it will connect the cables to the Ethiopia border from Berbera; Ethiopia Telecom will then extend connectivity into its national network. The total investment in both projects will be more than USD80m.

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, GTSL, 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.

FIBRE: YEAR IN REVIEW

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 EASy/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.

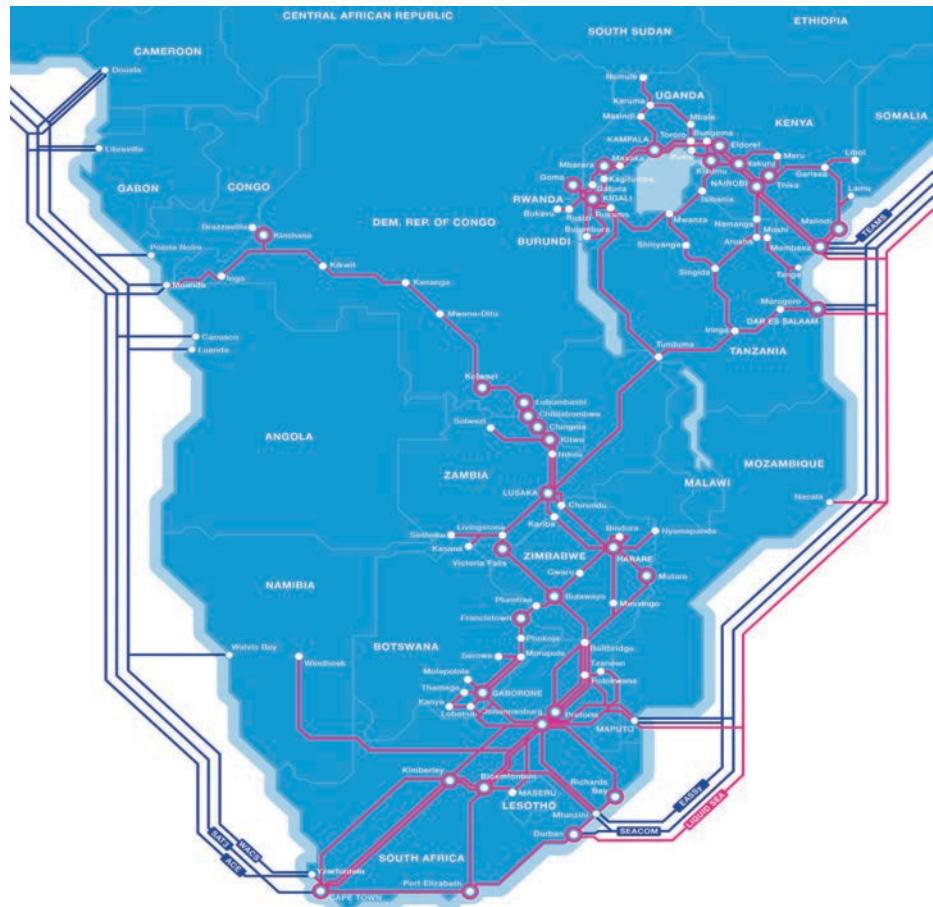
In separate news, Angola Cables said **Angonix** – the internet exchange point it manages in Luanda – has grown to become the continent's third-largest IXP in just two years.

"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



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 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.

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 submarine 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)



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.

September 2017

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Legend

- Yellow line: Fibre Optic Cable - Metropolitan
- Red line: Fibre Optic Cable - Operational
- Orange line: Fibre Optic Cable - Under Construction
- Yellow dashed line: Fibre Optic Cable - Proposed
- Orange dashed line: Fibre Optic Cable - Planned
- Red dashed line: Fibre Optic Cable (Aerial) - Operational
- Red dotted line: Fibre Optic Cable (Aerial) - Under Construction
- Red dash-dot line: Fibre Optic Cable (Aerial) - Planned
- Blue line: Microwave - Operational
- Blue dashed line: Microwave - Planned

Scale: 1: 12,000,000

0

375

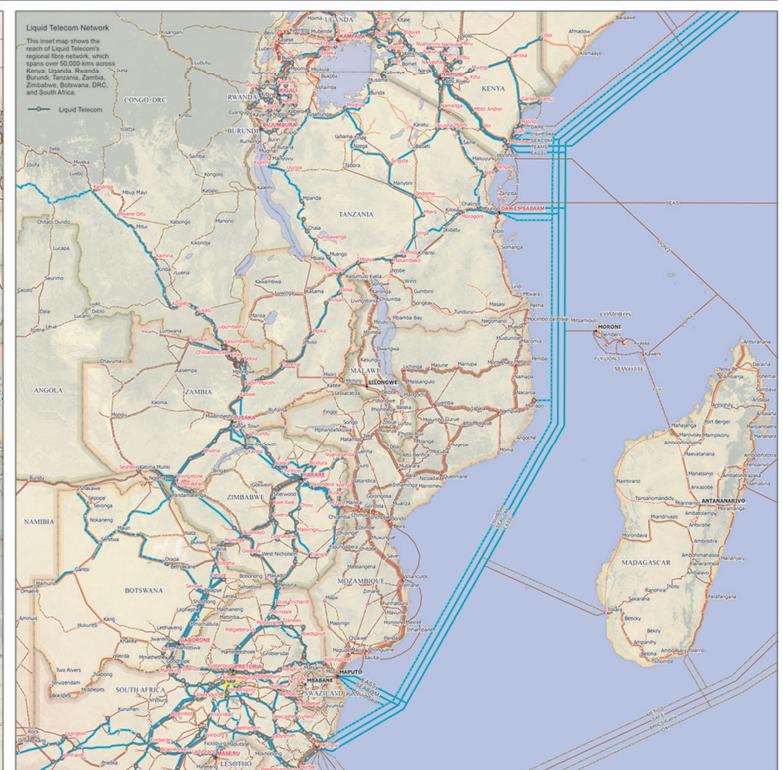
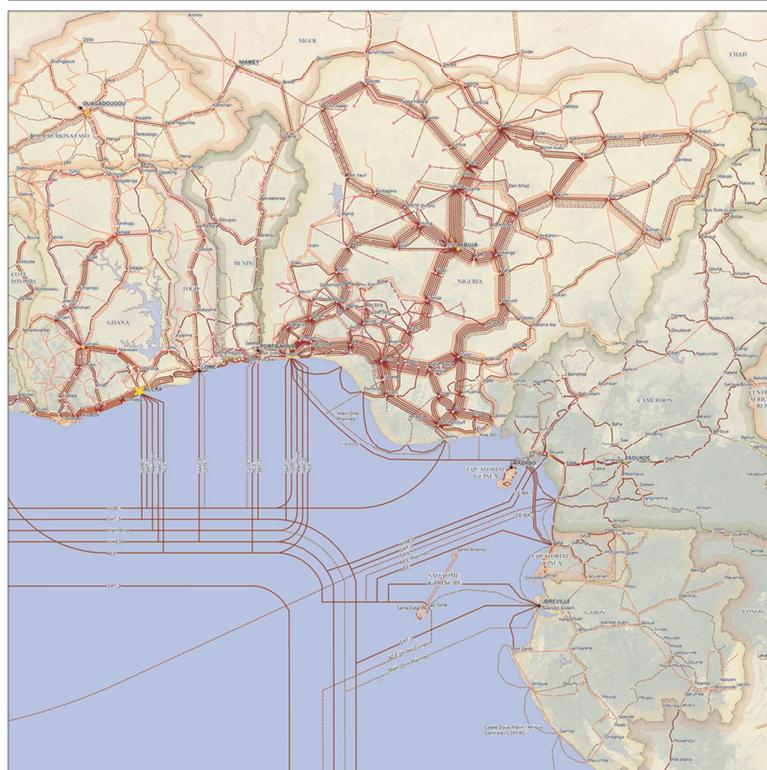
750

1,500 Kilometers

Africa

Bandwidth Maps

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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 Thibaud 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 celco 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

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."



Nic 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." ■

UP TO
12.8 Tb
per second

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.



Technical highlights

- * 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

ACE uniqueness

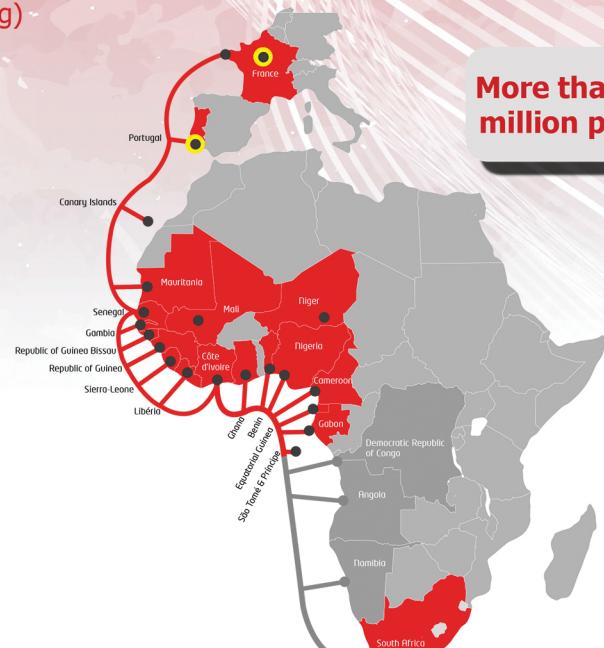
- The only cable which connects 18 countries from Africa to Europe (target 24 countries)
- Consortium environment with SPV members enabling competitive prices
- Aggregate Access Concept (multiple investors in one landing)

- Availability of in-system restoration
- Marine routes with low fault history implemented
- Express and omnibus routes to reduce latency

17,000 km

25 countries

POP
In service
Under construction



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	Liberreville, 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
GULAB SA	Conakry, Guinea
International Mauritania Telecom	
	Nouakchott, Mauritania
MTN	Accra, Ghana
	Lagos, Nigeria
Orange	Durban, South Africa
Orange Cameroun	Premiers, France
Orange Côte d'Ivoire	Kribi, Cameroon
Orange Mali	Abidjan, Côte d'Ivoire
Orange Niger	Dakar, Senegal
Republic of Guinea-Bissau	Suru, Guine-Bissau
SALCAB	Freetown, Sierra Leone
Sonatel	Dakar, Senegal
STP Cable	Sao Tome & Principe, São Tomé and Príncipe
All Parties	Caravals, Portugal
All Parties	Durban, South Africa

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All Parties: Telecom-2, Paris
All Parties: ITevent, Telvent
All Parties: Teletel, Cape Town



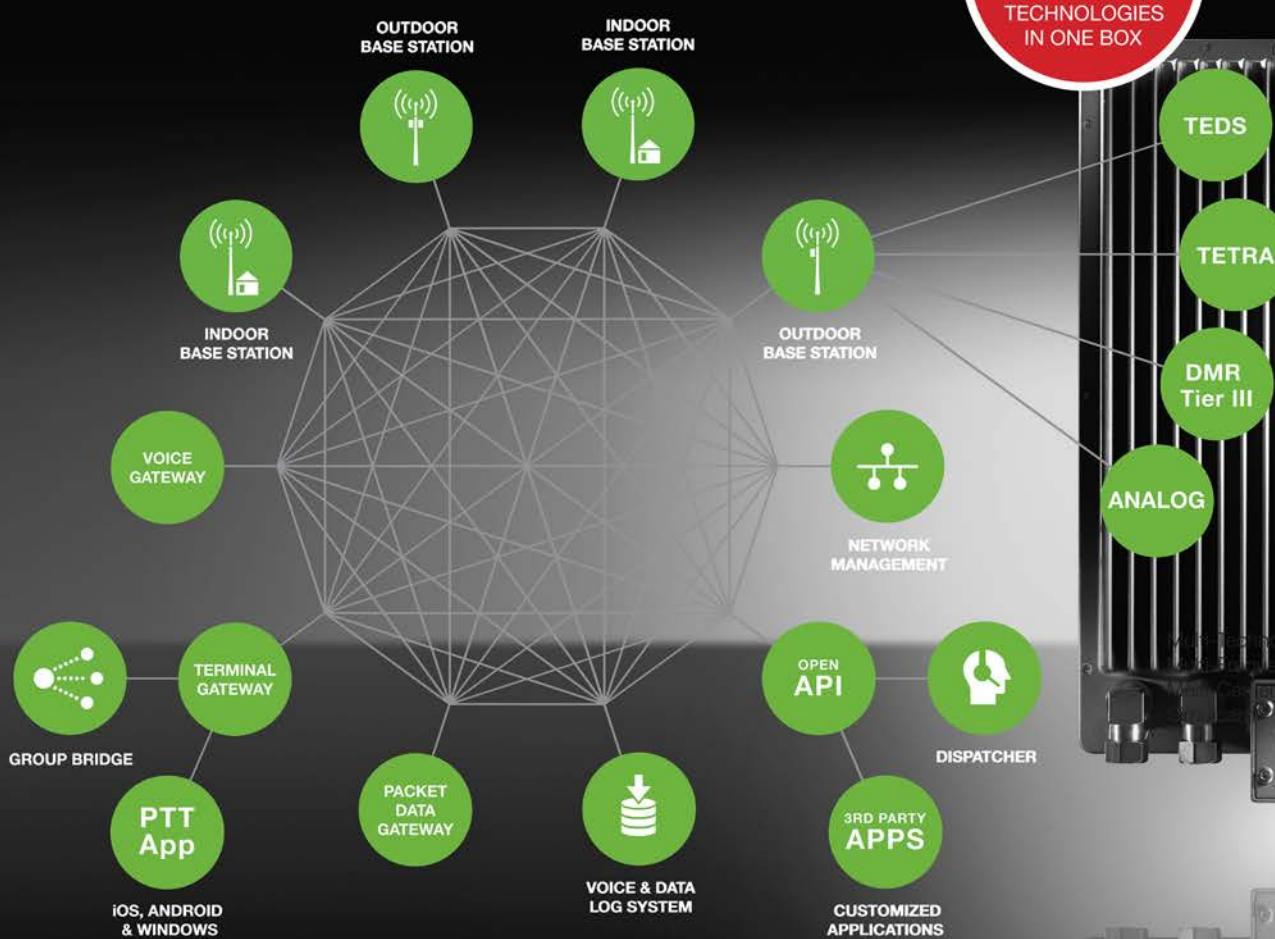
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4

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chapter 8

Critical Communications



**Tony Gray,
Chief executive,
TCCA**

The critical communications landscape in Africa is one of contrasts and huge opportunity. The economic diversity of the continent together with an improving economic outlook have provided the foundations for increasing investment in critical communications infrastructure. This is opening the door to many PMR technologies for a range of users including government public safety and security agencies, utilities and industrial sectors.

Africa's growth outlook is positive. It is boosted by expected increases in commodity prices and domestic demand which continue to drive the region's growth. Better macroeconomic management, increased diversification and an improved business environment should maintain the region's growth resilience in 2018.¹

This strengthening economy has created a good foundation for investment in PMR standards such as TETRA, which outstripped growth of any other technology in 2017 in Africa and saw a doubling of shipments bound for the continent.

Not only has TETRA been successful in the more developed economies of Africa such as Nigeria, South Africa and Angola, it has also made its mark elsewhere. In common with other countries in the region that have experienced war and the subsequent rebuilding of safety and security, states such as Libya, for example, have been recipients of strong investments in TETRA communications.

The cost sensitivity of this region coupled with a large number of legacy analogue users has also resulted in the success of DMR technology over the last few years. DMR solutions provide critical communications for police forces in Uganda, Ethiopia, and Tanzania, in addition to other public safety and security

organisations such as port authorities in Kenya and Tanzania. In other sectors, DMR has been installed in airports across the region, and was also used at the *Africa Cup* in Gabon in 2017.

China's inauguration of its first naval base in the region in Djibouti in 2017 is indicative of foreign direct investment in the region, and will create further demand for digital communications by government agencies and port authorities as security tightens there.

Africa has also been quick to adopt new technologies such as LTE, with countries such as Kenya using it for their public safety networks. In one of the notable successes for TETRA, Angola opted for a nationwide TETRA and LTE convergence solution in 2017 to service its public safety and security apparatus, ensuring the delivery of critical voice communications in conjunction with data rich features of LTE.²

However, LTE is not yet a mission-critical standard bearer. Narrowband mission critical technologies such as TETRA operate on dedicated networks with dedicated spectrum, and are built on standards designed specifically to support critical users. Yet as the Kenya and Angola examples illustrate, LTE is already being used to deliver broadband data services. It is therefore essential that the LTE standards are enhanced to ensure the bearers can meet the specific needs of critical users.

Together with other key stakeholders around the world, TCCA works closely with standards organisations ETSI and 3GPP to ensure the necessary features and capabilities are defined in the LTE standards. This will result in a common global LTE standard that will support mission-critical broadband communications, and that users can trust to support their needs.

The lack of dedicated spectrum for critical broadband is also an issue. TCCA lobbies governments and regulators to try to ensure there is sufficient spectrum for future critical LTE services. The World Radio Communications

Conference has revised Resolution 646 to address broadband spectrum needs and added 694-894MHz as the globally harmonised frequency range to be considered when individual countries undertake national planning for public protection and disaster relief (PPDR) applications.

In 2017, the South African Development Community (SADC) member states agreed a new framework for PPDR to include broadband in 700MHz in addition to the core bands in UHF 400MHz for narrowband. The African Telecommunications Union later adopted their proposal and agreed a common proposal to harmonise the spectrum for PPDR across African states.

The decision was further reflected in the latest revision of the International Telecommunication Union's ITU-R Rec. M. 2015 with harmonised bands for broadband PPDR in the lower part of the harmonised IMT band in the 700MHz band based on 3GPP LTE specifications. For narrowband, the decision includes 380-400MHz as the core band and 410-430MHz as the expansion band base for narrowband land mobile radio systems supporting frequency duplex spacing arrangements of 10MHz and bandwidth of 25kHz.

Such a decision enables public safety agencies that have not yet been allocated spectrum to seek frequencies nationally from within the ranges above and coordinate activities cross border accordingly. A number of administrations in Africa have announced national decisions to reserve a third of the 700MHz spectrum for broadband PPDR (2x10MHz) and will avail the remaining for the commercial deployment of broadband services as soon as digital TV is migrated to the lower band.

The allocation of spectrum for critical broadband is crucial as mission and business critical communications evolve to leverage

¹ <http://www.africaneconomicoutlook.org/en/outlook/africa-s-macroeconomic-prospect>.

² Also see section under *LTE and public safety* on p113.

Critical Communications: Year in Review

LTE to either supplement narrowband services or deliver critical communications over commercial mobile networks. ■

Unless otherwise stated, all statistics are courtesy of TCCA member IHS Markit. Spectrum information is courtesy of TCCA member Motorola Solutions.

TCCA represents all standard mobile critical communications technologies and complementary applications. Members are drawn from end users, operators and industry across the globe.

The TCCA believes in and promotes the principle of open and competitive markets worldwide through the use of open standards and harmonised spectrum. It maintains and enhances the TETRA PMR standard, and drives the development of common global mobile standards for critical broadband.

TCCA is a 3GPP Market Representation Partner and a member of the Mission Critical Open Platform (MCOP) project. Members actively contribute in 3GPP working groups.

To find out more, visit www.tcca.info or contact admin@tcca.info

Motorola Solutions vs. Hytera Communications

The critical comms market in 2017 was overshadowed by an ongoing dispute between **Motorola Solutions** and **Hytera Communications**.

In a complaint filed with the US International Trade Commission (ITC) in late March, Motorola claimed its Chinese rival was "unlawfully" importing and selling two-way radio equipment and systems and related software and components that infringe its patents. It called for an immediate investigation by the ITC, an exclusion order to halt the importation of what it said were "infringing products", and a cease-and-desist order to stop their marketing and sale of in the US.

In a statement issued during the International Wireless Communications Expo (IWCE) held in Las Vegas at the end of March, Hytera said it "embraces competition" and respects the intellectual property rights of others. "Motorola Solutions' new action continues its pattern of legal manoeuvring instead of competing with Hytera in the marketplace," alleged the

firm in its statement. "By waiting to file its ITC complaint on the first day of [IWCE] – the largest US trade show for PMR providers – Motorola Solutions is transparently using its legal filings to generate publicity."

Hytera added that it would defend itself against the allegations and remained "fully confident" of prevailing. But Mark Hacker, general counsel and chief administrative officer of Motorola Solutions, fired back with: "Hytera asserts that it embraces legitimate competition, but there is nothing legitimate about the illegal copying and misappropriation in which it has engaged. We are committed to vigorously defending our valuable intellectual property as we continue to drive innovation for our customers across the globe."

In July, Motorola filed new complaints that targeted Mobilfunk, Hytera's German operation. In documents filed with the regional court of Mannheim, Germany, it alleged that Hytera's two-way wireless communication devices with improved squelch functionality were infringing its European patent number EP1139562 B1.

Airbus' IP-based *Taira Tetra Server* for PMR networks is said to be smaller than a typical switch, and claimed to work more efficiently and economically while still providing high service availability. The *Taira* consists of standard solutions with virtualisation layers. Airbus said this ensures true hot standby redundancy even in extreme situations. It has also been designed to be easily managed as it fits into existing IT environments. The firm believes using modern IT server technology in the framework of a TETRA network enables operators to integrate a TETRA system into their existing data centres. It said the network can then be operated with the same processes and personnel used for other IT services.



According to **Codan Radio Communications**, the *Sentry-HTM* is based on its "proven" Envoy HF SDR platform to deliver an "advanced radio solution at an affordable price point". Featuring high-power voice and data in a single RF unit, the radio is



equipped with second-generation digital voice, frequency hopping, embedded GPS, 3G ALE, and IP/USB connectivity. It is custom-built for mobile and base configurations, thus eliminating the need for an external amp and allowing for quick solutions during emergency situations. The system also features a smart handset and a menu system with multiple language options.



DAMM's *TetraFlex* client app offers TETRA over LTE and provides coverage extension as well as data capacity for videos and pictures. It supports full integration with the Danish company's *TetraFlex* radio systems, and enables PTT in TETRA groups, individual calls, messaging, video streaming and GPR tracking. According to the firm, no radio gateways are required. The app supports *Android*, *iOS* and *Windows* operating systems, and offers a vendor-independent soft terminal for non-critical voice and data communications through Wi-Fi, UMTS and LTE networks.

ETELM claimed its *e-LBS eNodeB* LTE base station has the longest reach ever developed for PMR 4G technology and will help operators

boost their coverage areas from existing locations. It uses LTE's multi-broadcast features to ensure the widest coverage area, including group calls.

The *e-LBS* implements the LTE protocol stack in every base station, thereby allowing radio sites to directly and seamlessly connect to the LTE backhaul. According to ETEL, in the future all operators will use the LTE core network, so having the ability and flexibility to connect onto this industry standard network is important for inter-technology communications.

Hytera expanded its DMR product range with the *PD485* handheld radio. Thanks to what's described as its "robust housing and versatile functionality", it's claimed the *PD485* is the optimal radio for a very wide range of application areas. It features a Bluetooth interface which means it can be used with audio accessories while kept hidden from view, said Hytera. It added that data exchange and convenient programming is also supported via Bluetooth. The *PD485* also has an integrated GPS module and GPS antenna which enables real-time positioning of



Motorola sought an injunction preventing the company from offering and delivering products with this squelch feature in Germany, as well as the recall and destruction of what it described as "infringing" products and various damages.

With these additional actions in Germany, Motorola now had five pending IP litigations against Hytera. As well as the patent infringement and trade secret misappropriation complaints filed with the US authorities as described above, the company also filed a separate complaint with the regional court of Düsseldorf in April.

Hytera went on the counter attack. On 28 August, the firm announced it had filed a lawsuit in a federal district court in Ohio stating that Motorola was infringing its US patent number 9,183,846. This asserted that Motorola "unlawfully misappropriates" Hytera's patented technology for sound adjustment, incorporating it into its *MOTOTRBO* portable radios.

Hytera also alleged that by actively inducing direct infringement by other persons who use products that embody one or more of the claims of the patent, Motorola should have

known "that its actions would induce direct infringement by others, and intended that its actions would induce such direct infringement".

Hytera said it sought damages and that its aim was to pursue further relief "as appropriate". The company added that it currently holds 480 issued patents, including 269 for DMR, TETRA and PDT digital products. Speaking at the time, Andrew Yuan, the company's president of North and South America, said: "Hytera is an adamant advocate of intellectual property rights. We will look to enforce our patents in court in the US and worldwide."

As the year drew to a close, Hytera went on the offensive again, this time with a complaint submitted to a US federal district court in New Jersey on 4 December. The firm alleged that Motorola was preventing it from competing in the US marketplace with its critical communications products. Hytera said: "Motorola Solutions is engaging in anti-competitive practices that are unlawful under the Sherman and Clayton Acts by deliberately and actively foreclosing competition in LMR communications systems, in order to reap billions of dollars on sales at inflated prices to US customers."

Together with its subsidiaries that include US-based PowerTrunk and UK firm **Sepura**,¹ Hytera alleged that by "foreclosing" competition from its DMR and TETRA solutions, Motorola is able to maintain "inflated" pricing in the US on its products that use P25, the standard for public safety communications that is widely used in the country. According to Hytera, TETRA offers similar functionality and features to P25 equipment, and can be "significantly less expensive". It claimed this makes TETRA a "compelling option" for commercial users in the US.

The company further claimed that Motorola was leveraging its dominance of the US public safety market to "impede adoption of newer, less expensive technologies", and forcing LMR dealers to drop its products. "Motorola Solutions is forcing US customers to pay artificially high prices for critical communications," said Tom Wineland, director of sales for Hytera Communications America (West). "It can do this because of its long-standing monopoly. "Customers want a choice, as reflected by the demand by public safety customers and other US customers for DMR, a robust LMR alternative at a fraction of the cost of P25."

Hytera went on to accuse Motorola of engaging in a series of "sham" litigation and regulatory actions. It said this includes suing Hytera for patent infringement on a set of standard essential technologies that industry users have agreed to license on fair,



According to Vodacom, its service supports applications such as real-time video on existing consumer smartphones as well as more rugged LTE devices.

reasonable, and non-discriminatory terms, and for which Hytera has already been paying Motorola Solutions to license.

In response to this latest action, Motorola Solutions issued the following statement: "We believe Hytera's complaint is without merit and a clear attempt to shift attention away from the heart of the dispute – Hytera's brazen theft of our trade secrets and wilful infringement of our patents. We will continue to vigorously pursue our ongoing global efforts to stop Hytera's egregious behaviour and protect our intellectual property."

The dispute between the two companies continued into 2018, and at the time of writing in late February, there seemed to be no resolution in sight.

LTE and public safety

In April 2017, South African mobile operator **Vodacom** claimed it had successfully demonstrated the first broadband multimedia trunking solution for critical comms users on a commercial LTE network in Africa. It used **Huawei's LTE Integrated Trunked Radio Application (LiTRA)** to demonstrate the solution which ran on its nationwide, commercial 4G network.

According to the operator, traditional private mobile radio network technologies (such as TETRA) mainly provide basic voice trunking services such as PTT and cannot support new, innovative, high-speed data services such as video and multimedia services. "These traditional PMR networks are expensive to construct and maintain, the user terminals are expensive and have limited variety, and the network technology is often proprietary and inflexible," stated Vodacom.

The firm believes these issues can be overcome by using a broadband public trunking communications system such as the one it demonstrated. It said LiTRA overcomes the challenges of using a public LTE network for critical communication by prioritising emergency comms with a higher QoS and also ensures encryption and security of these messages. The company claimed that the platform enables its entire LTE network to be leveraged to provide high bandwidth and low latency trunking capabilities to improve the performance of existing mission and business critical services such as PTT.

Vodacom added that, more importantly, LiTRA can support new broadband multimedia trunking services such as push to video, real-time video

subscribers using various AVL applications. The radio also offers a full-sized keypad for simplified programming. For instance, settings such as current frequency, time slot or colour code can be quickly and easily changed via the keypad without needing to connect the unit to CPS.

Motorola Solutions has designed the *SLR 1000* repeater to enable service providers to easily extend their network through dead zones and across remote locations so that everyone is within reach. It can work with both conventional and trunking systems that support voice and data, and has a frequency range of 400-527MHz. Unlike traditional repeaters, the company says its radio can be deployed outdoors or indoors and offers the flexibility to be used in places such as parking garages, subway tunnels, and other potentially damp and wet locations. The *SLR 1000* is IP65 rated for dust and water protection, and its operating temperature is specified at -30° to 60°C. Wherever the device is deployed, Motorola reckons users can put their "maintenance and repair worries aside", as a fanless design means less noise, less particulate intrusion, fewer components and all while delivering more coverage.



¹ Hytera announced its acquisition of Sepura earlier in 2017. See Chapter 1, State of the Markets, Investments mergers and acquisitions table, p10.

Critical Communications: Year in Review

surveillance, high resolution photos and location based services. Furthermore, it said the solution demonstrated was fully compliant with 3GPP standards, is compatible with existing consumer LTE smartphones and new rugged LTE devices, and does not restrict the user terminals to exclusive providers as is the case with traditional PMR network technologies.

Staying in Southern Africa, in June we reported that **Hytera** will deliver a nationwide critical communications system to the Ministry of Interior of Angola under a deal worth around USD31m. The PMR specialist said the turnkey project included TETRA infrastructure, TETRA radios as well as LTE-TETRA multi-mode advanced radios, and convergent dispatching systems.

As part of the government's initiative of modernising public security and safety in Angola, the new mission critical communications system was planned to be used by departments such as police, firefighting, customs, etc. Hytera claimed its platform incorporates feature-rich broadband technologies while ensuring that critically important voice services remain reliably accessible using narrowband technologies such as TETRA, DMR, and PDT.

Despite the move towards using LTE for critical comms, the TCCA (**TETRA and Critical Communications Association**) issued a warning that the security mechanisms being designed into future LTE standards were not currently at a level to match purpose-designed professional mobile radio standards.

In a white paper published earlier in the year,³ the TCCA identified four key focus points for governments to consider if they are looking to implement LTE-based public safety networks.

Among them, it said suitably qualified staff should carry out a review of the security

arrangements available in LTE systems and any commercial network that is used.

The TCCA said that while mobile operators already have the ability to deliver mobile broadband to public safety services which many organisations are taking advantage of, this is only for non mission-critical applications and with the traffic carried by a 'best efforts' commercial service. For safety critical applications – such as dispatching ambulances, passing on details of terrorist suspects, dealing with major incidents, etc. – the association said it is essential to use networks that are suited to mission-critical communication.

The TCCA also pointed out that as with any commercial organisation, mobile networks are subject to being bought and sold. As a result, critical national infrastructure could end up being owned by foreign firms. It advised those responsible for public safety communications to therefore consider national government policy with regard to foreign ownership and operation of telecoms infrastructure.

Spectrum and funding were also highlighted as focus areas in the white paper. The TCCA said the availability of spectrum is essential to enabling choice in the provision of broadband data services. But even if spectrum is secured for public safety agencies, building nationwide infrastructure will be relatively costly in many countries. The TCCA therefore believes that an optimal balance between dedicated and commercial networks will be needed.

In a separate development reported in September, the TCCA formed a new working group to encourage broadband vendor cooperation in the development of common global critical communications solutions. The **Broadband Industry Group (BIG)** planned to drive market adoption of standardised critical communications LTE and subsequent 5G technologies for the benefit of critical communications users and organisations. It also aimed to promote an evolutionary approach towards future solutions.

The TCCA said this work will build on its achievements of driving and supporting open standards and interoperability, and ongoing research into professional users' requirements to protect customer investments for the long term.

"With the formation of the BIG, TCCA has provided industry a home to advance critical service based on broadband, including migration to 3GPP LTE and 5G standard technologies," said TCCA chief executive Tony Gray. "In parallel, we will continue to recognise the importance of narrowband PMR, and model our broadband activities on the success of those technologies in supporting professional users worldwide. This success will be further strengthened by the evolution of interworking between critical narrowband and broadband technologies."

Philippe Agard, Nokia's global public safety and defence segment leader, is chairing the new group. He is supported by Jason Johur, Ericsson's market development director for mission-critical communications, as vice-chair.

According to Nokia, organisations across key vertical markets have been expressing the need for an evolution from narrowband PMR towards broadband. It said that as the first networks are rolled out, BIG will help open up a broader worldwide ecosystem." ■



Ericsson's Jason Johur (left) said BIG will focus on ensuring 3GPP-compliant products and services meet the evolving needs of all critical comms users. Also pictured is the group's chair, Philippe Agard. PHOTO: ERILLISVERKOT



Tony Gray,
Chief executive,
TCCA

The year ahead: Africa is increasingly becoming well served by mobile broadband – according to the GSMA,³ 3G will remain the dominant mobile broadband technology for the foreseeable future, but 4G adoption is rising rapidly as a result of increasing network rollout. There were 97 live 4G networks in 39 countries across sub-Saharan Africa, covering 28 per cent of the region's population, as of March 2017. By 2020, it is predicted around 35 per cent of the population will be covered by 4G networks.

As long as spectrum can be secured, there are significant new business opportunities for mobile network operators to support critical communications. Historically, critical communications services have been based on dedicated narrowband technologies, including TETRA, Tetrapol, P25 and DMR. The service operators for these systems have typically been government organisations.

With the forthcoming generation of critical communications solutions based on LTE technologies and open standards defined by 3GPP, MNOs can leverage their commercial infrastructure to complement existing narrowband services – as in the Angola example mentioned above

– or to deliver critical services solely over a suitably enhanced LTE network.

Africa has a thriving critical communications market. The migration from analogue to digital PMR is gaining pace; IHS Markit projects that the region will be the most digitised in the world by 2021, with more than 90 per cent of users having converted to digital PMR technology.

Combined with the potential offered by critical broadband, Africa promises much for the future of critical communications.

³ <http://www.africaneconomicoutlook.org/en/outlook/africa-s-macroeconomic-prospect>



Mark Zheng
Director of
Southern Africa
region,
Hytera

According to Mark Zheng, 2017 proved to be one of the most significant years for Hytera in Africa. He believes the general political situation across the continent, as well as its economy, public safety environment and international relations are more stable and better than before. Furthermore, Zheng said oil prices are increasing which is a benefit for the region's oil-producing countries.

Looking back over the year, Zheng pointed out that Hytera's channel partners have increased dramatically. "We now have more than 400 partners in Africa, and also established two subsidiaries on the continent, one in Johannesburg and another in Abuja.

"Hytera's business witnessed big growth in Africa in different industries, especially in public safety. For example, Angola's national LTE-TETRA network is the company's first overseas LTE-PMR convergence network; while SAPS (South Africa Police Services) awarded a two year analogue buying contract.

"Other customers are also taking our solutions as well. The international SKA (Square Kilometre Array) project has adopted Hytera's DMR trunking system for communications, and Sappi [South African Pulp and Paper Industries] is using our DMR conventional for a migration from analogue mid-band radio to digital."

When asked how Hytera saw Africa's critical comms market adapt and evolve over 2017, Zheng said the company still regards narrowband voice as the key to wireless communications.

"Narrowband solutions like analogue, DMR and TETRA are still currently the main technologies and offer high security, wide coverage, great performance and at a moderate price.

"But we cannot deny the fact that the market is on the verge of experiencing the change from narrowband to broadband which could offer even more service with strong promotion by a number of manufacturers like Huawei, ZTE, Nokia, etc., especially in public safety sectors. Customers need big data applications, such as video transmission."

Zheng continued by saying while LTE is the future trend, not all sectors need such services. "Hytera released the *LTE-PMR Convergence Solution* to protect existing investment on a DMR/TETRA network, and deliver data services with LTE technology where needed."

He added that it still takes a long time to widely deploy a private broadband network, especially in Africa. There are a number of hurdles that need to be overcome here.

"The application of frequency is a challenge, and in some countries it takes about a year to get the license. For public safety customers, the demand for building digital critical communication networks

is strong, but due to budget or financial issues, funding is still the biggest challenge."

According to Zheng, while the convergence of broadband narrowband has given customers more choices, the industry is becoming more complex and the migration from analogue to digital is slower than expected. "There is still strong demand for analogue products, while the proof of concept [LTE] radios are gaining some attraction in South Africa's commercial market because of their low cost and relatively wider coverage by telecom operators."

Despite his upbeat introduction, Zheng said Hytera is still facing issues of politics, economy, exchange rates, taxation, etc., in some countries. Having said that, the company remains optimistic about the Africa market.

"We will continue to support our partners and customers with our technology and our expert local teams now that we have two subsidiaries on the continent. We aim to establish more offices with local teams in Africa in order to provide better services, and also hope to expand our brand influence to more industries and customers with the Chinese Government's *One Belt And One Road* policy."

First unveiled in 2013, the *One Belt And One Road* initiative is said to be the largest infrastructure project the world has seen. It aims to connect and cover more than 68 countries with roads, pipelines, railways, etc., and is due for completion in 2049. The Chinese Government is reportedly investing USD150bn into projects each year.

Back in Africa, Zheng said key points for Hytera in 2018 are transferring skills and knowledge. He believes cultivating partners and customers with the company's technologies and industry insights is important for growing the market.

"The more familiar they are with all this, the more willing they are to recognise our brand and products. We will introduce more Hytera college training programmes to Africa for our partners and customers, and enable them to better use mission critical communications to cope with their daily challenges."



Tunde Williams,
Head of field
& solutions
marketing for
Europe & Africa,
Motorola Solutions

Tunde Williams began his career with Motorola 18 years ago, starting as a system engineer working in what used to be the company's cellular division. One of his main roles at the time was being part of the team that helped operators optimise their networks using Motorola's *Intelligent Optimisation System (IOS)*.

Williams then changed roles in the company, joining the global marketing team and focusing on TETRA before moving into his current position in November 2014.

So isn't there a huge difference between optimising GSM networks to marketing TETRA/PMR in Africa?

"They're not that different. They both have the challenges of maximising capacity with limited spectrum. What we were doing with the *IOS* was helping operators get the most out of the spectrum they had. There is a similar problem in TETRA where you want to maximise capacity with limited spectrum.

"The customers are obviously a bit different. Cellular is very profit driven so that changes how you design the network. In the cellular world, operators would want to design a network to provide the minimum that they can get away with. That may sound negative, but an operator would not put a base station in the middle of nowhere if it only attracts a man and his dog once a year. There is no business case in such a situation. But in public safety, you almost have a duty to do that. You have to say wherever there could potentially be a problem, my guys need to have coverage because that could be a matter of life or death. That is the key difference."

In recent years, talk in the critical comms industry has focused on broadband networks for the public safety sector and the use of LTE. There is also DMR as an alternative critical comms standard. Where does all that leave TETRA?

"From an African point of view, DMR and TETRA will be the primary digital technologies, as well as P25 (Project 25). There are some technical attributes of P25 that make it suited to Africa. Take Sudan, for example. It is a massive country but its population is quite light in density, so if you are going to cover the country nationwide you really want to think about doing that in the cheapest way possible. A technology like P25 has advantages over other technologies like TETRA because it basically offers higher power to cost-effectively cover fewer sites."

"We are seeing P25 getting some traction in Africa. We have deployed P25 in Africa as we have done with TETRA as well as MOTOTRBO. Within sub-Saharan Africa, we are seeing a lot of potential for all three technologies. So we have a TETRA network in Cape Town and also work with the South African Police Service. There are other countries as well but unfortunately I cannot give you the actual country names, it is too sensitive."

Williams said that there is also a significant installed base of analogue equipment throughout the region and so Africa remains a strategic business for Motorola Solutions in terms of driving growth. "Digitisation is the key thing at the moment and we are seeing growth in terms of analogue systems being replaced."

Motorola Solutions is currently embroiled in legal disputes with Hytera (see *Year in Review*, p112) and while Williams cannot comment about this, he says the company does not feel threatened by relatively new players coming into the market.

Critical Communications: Interviews

"Obviously we want to be in a competitive market because that helps everybody grow. The challenge is that we need to win every battle, and we think we have the technology and track record to do that. One thing you have to appreciate (and I can say this as I am from the continent) is that doing business in Africa is quite different from elsewhere. The way you form relationships and build networks requires experience in this environment – you can't just take a European model and transpose it onto Africa. It does not work. What you need is patience, and we have been in Africa for over 50 years so we are very well-established and that gives us a unique position. We are now starting to see the benefit of that, and have formed long-standing relationships with people within governments and commercial organisations. That is how we're seeing growth."

Williams continued by saying that the company is now trying to grow its partner network in Africa. "So that tells you we see a lot of potential in the market. We are actively driving our *Partner in Power* programme in Africa and that is very important in order to get the penetration. The brutal truth is that we want to be growing the market, selling more digital systems (most likely). That is the end game. We want to establish Africa as a region where we are dominant and that is going to take a lot of investment.

"We are establishing a local presence in a number of countries within the continent (countries which I cannot name). That is an important message because unlike other companies who completely rely on partners we have our own branded presence on the continent. That's an advantage because it brings us closer to the local market; we can adapt a lot faster and our offering can be differentiated because we are more local."

So what are the obstacles that could prevent the company from achieving its ambitions on the continent? Here, Williams said finance could be a challenge, but reckons being flexible in this regard could help overcome this particular issue. What is more important is to offer solutions that can adapt to the local environment. "One area that distinguishes Africa from the developed world like Europe is access to power which you cannot take for granted. In a lot of cases, you are relying on creating your own power, whether from a generator or alternative energy source like solar. So we need to have a solution that will adapt to that environment.

"There are also things like vandalism and theft that you might not experience in a developed market because they are at a different stage from an economic development point of view.

"So to be successful you need to be prepared to address these challenges. And this is another area where we have an advantage because we have been here for over 50 years and have been able to adapt over that period of time. We are therefore better prepared than some of our competitors."



Nicolas Hauswald,
Sales & marketing
director,
ETELM

France-based critical comms specialist ETELM made its debut at AfricaCom in 2016. So in the year or so that has elapsed since then, what progress has the company made across the region?

"ETELM has worked on several projects in Africa in the past year in sectors such as oil and gas, transport and security," said Nicolas Hauswald. "For example, we supported the deployment of a private radio network in Kenya to cover all its national parks. This project, which was part financed by the French government, welcomed Nicolas Hulot, French minister for ecological and inclusive transition, who visited the radio network deployed for Kenya Wildlife Service."

According to Hauswald, the mobile comms sector is witnessing rapid and unprecedented developments. He said technological advancements have never been as important as they are today. "The ability to communicate quickly over a reliable network at any location in the world has become a priority for consumers and users of mission critical communications alike. As a result, providers are facing pressure to keep up with developments like never before.

"ETELM focuses mainly on private networks. We can see increasing demands for private networks, particularly for security and critical national infrastructure (airports, power plants, etc.) The users in these sectors cannot always afford to depend on a third party to manage/operate their network. They have critical needs and missions that can only be successfully achieved when they are in full control of the infrastructure.

"TETRA has been the narrowband technology of choice for mission critical users over the past 15 years. This dominance has come because of its architecture that was built around broadcasting answering the customer needs. On top of that, the radio part was standardised and all vendors went through heavy interoperability test sessions to satisfy the demand of the customers.

"TETRA is still a proven, reliable, and robust solution around the world. But the pressures from technological advancements and the ever-growing needs of mission critical users for data mean that LTE has a place to take. Without a doubt, mission critical LTE will become the preferred solution, but it still has a lot to prove in the field and requires important investment for users.

"We believe that a hybrid approach that includes both TETRA and LTE for mission critical solutions is the best alternative as it allows users to grow step-by-step in terms of coverage, services and investments.

"Arguably, a convergence of TETRA and LTE within the industry should be considered instead of taking the approach that one should replace

the other. A combination of the two technologies could be used as part of a transitional period, over many years. This kind of phased update would allow for complete testing to be carried out, allowing for any issues to be fixed, therefore preventing interruptions to coverage.

"An approach combining the best of both technologies will ensure the robustness and reliability of TETRA works with the additional broadband services and capabilities of LTE, including new streaming and advanced data applications. This can increase situational awareness and further build relationships between users, such as those working within blue light services. The ideal situation would be for a limited number of applications to be released and tested, ensuring applications that are in demand get preference over those that are potentially not relevant or useful."

When it comes to the challenges in Africa, Hauswald said that there are a lot of major infrastructure projects currently running in the transport sector that require secure radio networks but some are being hampered by funding.

"When a company doesn't bring a financing possibility, there can be years and years before effective deployments can be made. Given the nature of the mission critical industry, this process is not something that can be rushed – safety and reliability may be compromised and this is something that is simply unacceptable to those relying on it.

"However, there has been a large increase in major infrastructure developments in the region, and we are very hopeful that this will continue, and that the demand for advanced, secure telecoms in the commercial and private sectors will expand.

"Emergency services are a cornerstone for all developing countries, and with the latest mission critical LTE and TETRA solutions being available from commercial network operators (in addition to private systems) we expect to see a major improvement in public safety and security. This in turn will result in more inward investment and an improved economy."

ETELM is currently actively looking for partners and integrators to enhance its footprint in Africa. Hauswald pointed out that the company has more than 35 years' experience in supplying secure communications around the world, and claimed that it also has a "very good" knowledge of the users as well as "enhanced" field experience in Africa.

"ETELM has developed a range of 4G linked technologies including LTE, TETRA, DMR and analogue base stations which connect directly to any standard LTE core network without any gateways or specific interfaces. The company has the right profile for African companies looking for reliable and experienced partners.

"As the mission critical landscape becomes increasingly complex and challenging ... organisations are increasingly working together, sharing knowledge and specialisms. This kind of collaboration is likely to continue as large-scale issues continue to shape the world in which we live." ■



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T: 20739008/20739211 | www.armniger.org

Nigeria

Nigerian Communications Commission
423, Aguiyi Ironsi Street, Maitama, Abuja, Federal Capital Territory, Federal Republic of Nigeria
T: +234-9-4617000 | F: +234-9-4617514
www.ncc.gov.ng

Rwanda

Rwanda Utilities Regulatory Authority
KN 39 St, Kigali, Rwanda
T: +250 252 584 562 | F: (+250)252584563
info@rura.rw | www.rura.rw

São Tomé & Príncipe

Autorité Générale de Régulation
Avenida Marginal 12 de Julho, 054 São Tome
T: +239 241750 | F: +239 227 361
ager@cstome.net | www.ager-stp.org

Senegal

Autorité de Régulation des Télécommunications et des Postes Rond-Point OMVS, Immeuble Thiargane Mermoz
B.P. 14130 Dakar-Peytavin
T: (221) 33 869 03 69 | F: (221) 33 869 03 70
contact@artp.sn | www.artpsenegal.net

Seychelles

Department of Information Communications Technology
P.O. Box 737, 3rd Floor, Caravel House, Victoria
T: (248) 4 28 66 09 | F: (248) 4 32 27 20
psoffice@ict.gov.sc | www.ict.gov.sc

Sierra Leone

National Telecommunications Commission
13 Regent Road, Hill Station, Freetown, Sierra Leone
T: (+232 22) 235121 | F: (+232 22) 235791
regulator@natcomsl.com | www.natcomsl.com

Somalia

Somalia Ministry of Post and Communications
1 Villa Somalia, Mogadishu, D.R. of Somalia 2525
T: +252 1 5871200/252 6 2389292
F: +252 1 235199 | www.mopc.somaligov.net

South Africa

Independent Communications Authority of South Africa
Blocks A, B, C and D, Pinmill Farm, 164 Katherine Street, Sandton
T: 27 (11) 566 3000/3001 | www.icasa.org.za

South Sudan

Ministry of Telecommunications
P.O. Box 33, Juba, Southern Sudan
info@motps.goss.org | www.motps.goss.org

Sudan

National Telecommunication Corporation
NTC Tower, Buri, North to Manshya Bridge,
P.O. Box 2869, Khartoum, Sudan
T: +249 187171144 | F: 018717144 or 0187171140
customer@ntc.gov.sd or itisalat@ntc.gov.sd
www.ntc.gov.sd

Swaziland

Swaziland Communications Commission
Mbabane Office Park, Fourth Floor North Wing
P.O. Box 7811, Mbabane, Swaziland
info@sccom.org.sz | www.sccom.org.sz

Tanzania

Tanzania Communications Regulatory Authority
Mawasiliano Towers, 20 Sam Nujoma Road
P.O Box 474, 14414 Dar Es Salaam
T: +255 22 2199760 – 8 | F: +255 22 2412009
dg@tcra.go.tz | www.tcra.go.tz

Togo

Autorité de Réglementation des secteurs des Postes et Télécommunications
Boulevard Léopold Sédar Senghor, Tokoin Tamé Côté Est, S.O.S Village d'enfants
T: (228) 22 23 63 80 | F: (228) 22 23 63 94
artp@artp.tg | www.artp.tg

Tunisia

Instance Nationale des Télécommunications
Rue Echabia (Ex:8003), Montplaisir 1073 Tunis
T:+216 71.90.08.68 / +216.71.90.15.26 /
+216.71.90.26.58
F: +216.71.90.94.35 /+216 71.90.48.11
contact@intt.tn | www.intt.tn

Uganda

Uganda Communications Commission
Plot 42-44, Spring Road, Bugolobi, P.O. Box 7376, Kampala Spring Rd, Kampala, Uganda
T: +256 31 2339000 | F: + 256 414 348832
ucc@ucc.co.ug | www.ucc.co.ug

Zambia

Zambia Information and Communication Technology Authority
Plot 4909, Corner of Independence & United Nations Avenue, P.O. Box 36871
T: 260 211 24 6702/ 244424-27
info@zicta.zm | www.zicta.zm

Zimbabwe

Postal and Telecommunications Regulatory Authority (POTRAZ)
Block "A" Emerald Business Park,
No. 30 The Chase, P.O. Box MP843, Mount Pleasant, Harare, Zimbabwe
T: +263 4 333032 | F: +263 4 333041
www.potraz.gov.zw

Buyer's Guide

Your essential guide to the companies manufacturing, installing, supplying and providing wireless communications products and services in Africa

Company location, country, website	Network Technologies		Network Build & Management												Network Applications																			
	Cellular	Satellite	Fixed wireless access	Critical communications	Fibre	Other (TWS, mesh, etc)	RAN	Backhaul	Microwave systems	In-building systems (DAS, femtocells, etc)	Small cells	BTS/masts/towers	Antennas	Power/power efficiency	Fibre systems	Cables & cabling accessories	OSS/BSS	Security	Test & measurement	Network monitoring & optimisation	Network analysis & Big Data	User devices & modules	Broadband/internet	Internet of Things/smart cities/M2M	Remote & rural connectivity	Cloud (NFV/SDN/XaaS)	Data centre services, IPXs	Enterprise network services	Mobile financial services	VAS (mHealth, mCommerce, mLearning, etc)	Messaging & voice services	OTT	Broadcast/DTH	
ABS Suite B01b, 1 st Floor, Block B Ambridge Office Park, Vrede Rd Bryanston, JHB, SOUTH AFRICA info@absatellite.com www.absatellite.com +27 10 594 4621	✓							✓															✓	✓	✓									
	ABS is one of the fastest growing satellite operators in the world, operating a global fleet of satellites. ABS provide capacity to support video and media distribution, cellular backhaul, IP trunking and mobility connectivity. Its extensive teleport network provides												comprehensive coverage to 93% of the world's population across Africa, Asia Pacific, Europe, the Middle East, Russia/CIS and the Americas.												owned by funds managed by the European private equity firm, Permira.									
ACE Consortium C/o France Telecom 61 rue Des Archives Paris, FRANCE www.ace-submarinecable.com		✓																																
	ACE is a consortium of telecom operators from Africa and Europe under the initiative and leadership of France Telecom.												✓	The second phase, which will complete the 17,000 km cable distance to South Africa, is now launched by ACE for potential investment. This plans to provide landing stations in Democratic Republic of Congo, Angola and Namibia with plans to further connect landlocked countries along the way.												ACE will cover a total distance of 17,000km and will allow up to 25 countries for a total of 400 million people to access high speed internet. The segment from Sao Tome & Principe to South Africa and the branch to Guinea Bissau are under construction.								
Advantage 360 10681 Foothill Blvd Rancho Cucamonga CA 91730 USA sales@advantage360.com www.advantage360.com +1 (909) 980 1034 +1 (909) 944 3995	✓	✓	✓	✓	✓	✓											✓	The rapidly evolving requirements of highly competitive markets. This offers an exceptionally adaptive environment that rarely requires customization or programmer intervention.												SOC 1-SSAE 16 Type II and Business Processes Frame Work (eTOM) levels 1 – 3 compliance, a lead-to-cash development philosophy and 250+ mediation and other interfaces guarantee customers a solid and lasting business platform.				
	Advantage 360 Software LLC has provided in-house developed and fully convergent billing, CRM, POS, OSS, mediation and other business-critical software components to more than 200 service providers of the international telecom community since 1984 (32+ years).												Our highly-internationalized multi-lingual and currency solutions, multi-play universal services catalog and order fulfillment interface provide a common and uniform user experience across multiple technologies. These include 4G, VoLTE, VoIP, GSM, CDMA, HSPA+, Content, CAV, IPTV, ISP, WIMAX, M2M, CIBER, TAP, Data, FTTH, FTTB, Fixed, Wireline and Long Distance.												Meanwhile, our reputation for process automation, world-class support, rapid development turn-around and on-time on-budget launches are well-proven elements of customer success stories.									

Company location, country, website	Network Technologies		Network Build & Management										Network Applications																				
	Cellular	Satellite	Fixed wireless access	Critical communications	Fibre	Other (WWS, mesh, etc)	RAN	Backhaul	Microwave systems	In-building systems (DAS, femtocells, etc)	HetNets & small cells	BTSs / masts / towers	Antennas	Power / power efficiency	Fibre systems	Cables & cabling accessories	OSS / BSS	Security	Test & measurement	Network monitoring & optimisation	Network analysis & Big Data	User devices & modules	Broadband / Internet	Internet of Things / smart cities / M2M	Remote & rural connectivity	Cloud (VNF / SDN / XaaS)	Data centre services, IPXs	Enterprise network services	Mobile financial services	VAS (mHealth, mCommerce, mLearning, etc)	Messaging & voice services	OTT	Broadcast / DTH
Altec Alcom Matomo 6 Woodlands Drive Woodmead 2191 Gauteng, SOUTH AFRICA sales@alcom.co.za www.alcommatomo.co.za +27 11 235 7640 +27 086 211 1064	✓	✓		✓						✓	✓	✓	✓					✓	✓				✓	✓									
	Altech Alcom Matomo is a division of Altech Radio Holdings (Pty) Ltd and in turn a member of the JSE Listed Allied Electronics Limited (Altron) group of companies. We have operated across Southern Africa for over 45 years.										As turnkey communication network integrators we offer solutions and support across a wide range of digital voice and data wireless and fibre technologies for the private operator, IT and SCADA markets. Our emphasis is on supporting the Public Safety, Electrical and Water Utility,										Transportation, Communication, Heavy Industrial and Oil & Gas user communities. Strong partnerships, strategic alliances and joint ventures with international principals ensure that we have on-going access to the latest technology worldwide.												
AnaCom, Inc. 1961 Concourse Drive San Jose CA 95131 USA sales@anacominc.com www.anacominc.com +1 408 519 2062 +1 408 519 2063	✓						✓																										
	AnaCom, Inc. sells satellite microwave communication products worldwide to satellite communications systems providers, integrators and end-users, providing complete solutions for satellite communication based networks for broadcast, data and voice communications.										power and size as well as indoor Rack-Mounted Converters. AnaCom's other popular product lines include AnaSat Transceivers, ELSAT BUCs, SSPAs, LNAs and other accessories covering C, Ku and X band frequencies in power levels from 4 to 400 Watts.										In conjunction with Ethernet support, AnaCom equipment also supports HTTP with a built-in web interface, so you can monitor and control your units via any web browser from your own computer. You can also connect via telnet or on an SNMP network, allowing you to monitor your AnaCom unit over your existing Network Management System.												
Avanti Communications Plc Cobham House 20 Black Friars Lane London, UK contact@avantiplc.com www.avantiplc.com +44 207 749 1600 +44 207 749 1633	✓	✓	✓	✓	✓					✓	✓	✓						✓	✓				✓	✓	✓	✓							
	Avanti Communications was the first operator to commercially deliver Ka-band satellite connectivity across Europe with its HYLAS 1 satellite. In 2012, the company launched its second High Throughput Satellite, HYLAS 2, extending coverage across Europe, the Middle East and Africa.										satellite communications across Africa. HYLAS 4 sets a new standard for reliability, flexibility and value for Mobile Network Operators, ISPs, Governments and Satellite Operators.										has the networks and in-country integration expertise and superior satellite network to address communication needs across Africa.												
Bwtech International Klao House 28-30 St Johns Square London, UK hello@bwtech.com www.bwtech.com +55 31 3227 2820			✓		✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
	With the recent launch of its satellite HYLAS 4, Avanti has become the leader of Ka-band										With Ground Earth Stations, data centres and a fibre ring, coupled with regional offices in Kenya, Nigeria, Tanzania and South Africa, Avanti										The Group has invested \$1.2bn into its network, which can be accessed and controlled through a unique patented cloud-based customer interface, giving its customers the ultimate flexibility to profile the network.												

BUYER'S GUIDE

Company location, country, website	Network Technologies		Network Build & Management												Network Applications																		
	Cellular	Satellite	Fixed wireless access	Critical communications	Fibre	Other (WWS, mesh, etc)	RAN	Backhaul	Microwave systems	In-building systems (DAS, femtocells, etc)	HetNets & small cells	BTSs / masts / towers	Antennas	Power / power efficiency	Fibre systems	Cables & cabling accessories	OSS / BSS	Security	Test & measurement	Network monitoring & optimisation	Network analysis & Big Data	User devices & modules	Broadband / Internet	Internet of Things / smart cities / M2M	Remote & rural connectivity	Cloud (VNF / SDN / XaaS)	Data centre services, IPXs	Enterprise network services	Mobile financial services	VAS (mHealth, mCommerce, mLearning, etc)	Messaging & voice services	OTT	Broadcast / DTH
Trans Africa International Telecommunication SA (Pty) Ltd T/a Emcom Wireless 1-5 Adrain Road, Stamford Hill Durban KZN 4001 PO Box 3985, Durban KZN 4000 SOUTH AFRICA sales@emcom.co.za www.emcom.co.za +27 31 312 9288 +27 31 312 9296			✓ ✓	✓ ✓ ✓ ✓ ✓						✓ ✓			✓ ✓	✓ ✓																			
 PROFESSIONAL RADIO COMMUNICATIONS																																	
Flexenclosure Eriksbergsgatan 10 SE-114 30 Stockholm SWEDEN info@flexenclosure.com www.flexenclosure.com +46 510 42 7000																																	
																																	
Gazprom Space Systems 77B Moscow Street Shchelkovo, Moscow Region 141112 RUSSIA info@gazprom-spacesystems.ru www.gazprom-spacesystems.ru +7 495 504 29 06 +7 495 504 29 11			✓																														
																																	
Hellas Sat 63 Peter Place Str. Bryanston 2191 Johannesburg SOUTH AFRICA sales@hellas-sat.net www.hellas-sat.net +27 10 001 3646			✓				✓																										
																																	
HUBER+SUHNER Herisau, SWITZERLAND wwwhubersuhner.com	✓ ✓ ✓ ✓ ✓		✓	✓ ✓ ✓ ✓ ✓			✓	✓ ✓ ✓ ✓ ✓	✓	✓ ✓ ✓ ✓ ✓					✓ ✓	✓																	

BUYER'S GUIDE

Company location, country, website	Network Technologies	Network Build & Management										Network Applications																
MEASAT Global Berhad MEASAT Teleport & Broadcast Centre Jalan Teknokrat 1/2 63000 Cyberjaya Selangor, MALAYSIA sales@measat.com corporate.communications@measat.com www.measat.com T: +60 3 8213 2188 F: +60 3 8213 2233	✓																											
																												
The MEASAT group is a premium supplier of services to leading broadcasters, Direct-To-Home (DTH) platforms and telecom operators. With capacity across six (6) communication satellites, MEASAT provides satellite services to over 150 countries representing 80% of the world's population across Asia, Middle East, Africa, Europe and Australia.																												
The MEASAT satellite fleet includes the state-of-the-art MEASAT-3, MEASAT-3a and MEASAT-3b satellites co-located at 91.5°E, supporting Asia's premium DTH and video distribution neighborhood; MEASAT-2 at 148.0°E; and, MEASAT-5 at 119.5°E. In Africa, the AFRICASAT-1a satellite at 46.0°E provides satellite capacity across the African continent with connectivity to Europe, Middle East, Malaysia and Singapore.																												
Measuretest Pretoria, SOUTH AFRICA www.measuretest.co.za	✓	✓	✓																									
																												
Mobile Mark Europe Ltd 8 Miras Business Park Hednesford Staffordshire, UK enquiries@mobilemarkEurope.co.uk www.mobilemark.com +44 1543 459 555 +44 1543 459 545	✓	✓	✓																									
Mobile Mark is a leading supplier of innovative, high-performance antennas to wireless companies across the globe. They have been in the wireless industry for over 30 years and have roots in the early Cellular trials.																												
The company design and manufacture antennas from 138 MHz-6.0 GHz. Applications include public transit, commercial trains, smart																												
highways, mining, utilities, remote monitoring, machine-to-machine (M2M) and the Internet of Things (IOT). Antenna styles include omnidirectional and directional infrastructure antennas for network rollout; multiband mobile antennas for fleet management; low-profile and embedded antennas for M2M/IOT applications.																												
Mobile Mark antennas are manufactured in the																												
Motorola Solutions 1st Floor, East Wing 22 Kildon Rd, Jindal Bldg Bryanston, JHB SOUTH AFRICA MarketingSSA@motorolasolutions.com www.motorolasolutions.com +27 11 800 7800 +27 11 800 7923		✓	✓	✓																								
																												
Motorola Solutions is a leading provider of mission-critical communication solutions and services for government and enterprise customers. We enable seamless communications among government and public safety customers around the world, helping them carry out the mission-critical tasks that keep our communities safe. Our products also touch every part of the supply chain from the back-end operation to																												
the front-end experience and can be found in a variety of industries including manufacturing, hospitality, law enforcement, fire, EMS, transportation and logistics, healthcare, energy, utilities, and government services.																												
Founded in 1928, Motorola has a history of innovation that has revolutionized communications. From pioneering mobile																												
communications in the 1930s and making equipment that carried the first words from the moon in 1969, to supporting modern-day emergency response, Motorola Solutions has a global footprint that demonstrates unique thought leadership and help our customers be their best in the moments that matter.																												
Oy CompleTech Ltd Espoo, FINLAND www.completech.fi	✓	✓	✓	✓	✓																							

BUYER'S GUIDE

Company location, country, website	Network Technologies					Network Build & Management								Network Applications																		
	Cellular	Satellite	Fixed wireless access	Critical communications	Fibre	Other (TWS, mesh, etc)	RAN	Backhaul	Microwave systems	In-building systems (DAS, femtocells, etc)	HeiNets & small cells	BTS/masts/towers	Antennas	Power/power efficiency	Fibre systems	Cables & cabling accessories	OSS/BSS	Security	Test & measurement	Network monitoring & optimisation	Network analysis & Big Data	User devices & modules	Broadband/internet	Internet of Things/smart cities/M2M	Remote & rural connectivity	Cloud (NFV/SDN/YaaS)	Data centre services, IPXs	Enterprise network services	Mobile financial services	VAS (mHealth, mCommerce, mLearning, etc)	Messaging & voice services	OTT
Parallel Wireless 100 Innovative Way Suite #3410 Nashua, NH 03062 USA info@parallelwireless.com http://www.parallelwireless.com +1 603 589 9937	✓	✓	✓				✓		✓	✓	✓								✓	✓			✓	✓	✓	✓	✓					
	Parallel Wireless is on a mission to connect the 4 billion unconnected people with end-to-end 2G, 3G, and 4G Open RAN innovative solutions by making cellular deployments as easy and as cost-effective as Wi-Fi.					The company is in production on six continents and engaged with many leading operators worldwide.								Parallel Wireless' innovation and excellence in multi-technology open virtualized solutions has been recognized with 40 industry awards. www.parallelwireless.com																		
PCCW Global Ltd Ground Floor, Building 12 Woodmead Estate 1 Woodmead Drive Woodmead, SOUTH AFRICA africa@pccwglobal.com www.pccwglobal.com ++27 11 797 3300 ++27 11 797 3363	✓	✓		✓	✓									✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	PCCW Global is the international operating division of HKT, Hong Kong's premier telecommunications service provider, which is majority-owned by PCCW Limited. Covering more than 3,000 cities and 150 countries, the PCCW Global network supports a portfolio of integrated global communications solutions which include Ethernet, IP, fiber and satellite, voice and a suite of managed services to help customers to optimize communications, simplify operations and drive profitability.					Our advanced security solutions incorporate real-time threat intelligence to identify and combat known and unknown advanced network threats in their infancy.								high speed cloud-based transcoding and a fully integrated hosted online video platform facilitating rapid, low risk, cost-effective entry into the online video market.													PCCW Global maintains regional centers in Hong Kong, China, Japan, Korea, Singapore, the United States of America, the United Kingdom, France, Belgium, the United Arab Emirates and South Africa. To learn more about PCCW Global, please visit www.pccwglobal.com .					
ProComSat Malakoff, FRANCE www.procomsat.com	✓	✓	✓	✓				✓		✓	✓								✓		✓	✓	✓									
RADWIN Rivonia, SOUTH AFRICA www.radwin.com		✓	✓		✓	✓	✓					✓			✓	✓	✓	✓		✓	✓	✓										
Rajant Corporation 200 Chesterfield Parkway Malvern, PA 19355 USA dhayes@rajant.com www.rajant.com +1 484 595 0233 +1 484 595 0244			✓	✓	✓															✓	✓	✓										
	Rajant Corporation is the exclusive provider of private wireless networks powered by the patented Kinetic Mesh® network, BreadCrumb® network nodes, and InstaMesh® networking software. With Rajant, customers can rapidly deploy a highly adaptable and scalable network that leverages the power of real-time data to deliver					on-demand, critical business intelligence. Rajant BreadCrumb can seamlessly integrate with any Wi-Fi or Ethernet-connected device to deliver low-latency, high-throughput data, voice and video applications across the meshed, self-healing network.								With the ability to take private network applications and data everywhere, Rajant networks are used across a broad array of industries, including military, industrial, transportation, utilities, telecommunications, and all levels of governments.																		

Company location, country, website	Network Technologies		Network Build & Management												Network Applications																		
	Cellular	Satellite	Fixed wireless access	Critical communications	Fibre	Other (WWS, mesh, etc)	RAN	Backhaul	Microwave systems	In-building systems (DAS, femtocells, etc)	HetNets & small cells	BTS/masts/towers	Antennas	Power/power efficiency	Fibre systems	Cables & cabling accessories	OSS/BSS	Security	Test & measurement	Network monitoring & optimisation	Network analysis & Big Data	User devices & modules	Broadband/internet	Internet of Things/smart cities/M2M	Remote & rural connectivity	Cloud (VNF/SDN/XaaS)	Data centre services, IPXs	Enterprise network services	Mobile financial services	VAS (mHealth, mCommerce, mLearning, etc)	Messaging & voice services	OTT	Broadcast/DTH
Rohde & Schwarz SA (Pty) Ltd Bld 1, Clearwater Office Park Cnr, Christian de Wet & Millennium Blvd Strubens Valley, Ext 12 1724 Gauteng SOUTH AFRICA sales.za@rohde-schwarz.com www.rohde-schwarz.co.za +27 11 671 8800 +27 11 671 8809	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
																																	
Russian Satellite Communications Company 8 Bld.6, 1st Goncharny perelok Moscow 115172, RUSSIA Pscherbakova@rsc.ru www.rsc.ru +7 (495) 730-0450 +7 (495) 730-0383		✓			✓	✓	✓												✓	✓		✓	✓	✓									
																																	
SatADSL Chaussée de Wavre 1505 1160 Bruxelles BELGIUM info@satadsl.net www.satadsl.net +32 2 351 33 74		✓	✓	✓															✓	✓													
																																	
Siklu Communication Ltd 43 HaSivim St. Petach Tikva 49517 ISRAEL hello@siklu.com www.siklu.com +972 3 921 4015 +972 3 921 4162		✓	✓		✓	✓	✓											✓				✓	✓	✓	✓	✓	✓	✓	✓				
																																	

BUYER'S GUIDE

Company location, country, website	Network Technologies	Network Build & Management										Network Applications															
	Cellular Satellite Fixed wireless access Critical communications Fibre Other (TWS, mesh, etc)	RAN	Backhaul	Microwave systems	In-building systems (DAS, femtocells, etc)	HetNets & small cells	BSTs/masts/towers	Antennas	Power/power efficiency	Fibre systems	Cables & cabling accessories	OSS/BSS	Security	Test & measurement	Network monitoring & optimisation	Network analysis & Big Data	User devices & modules	Broadband/internet	Internet of Things/smart cities/M2M	Remote & rural connectivity	Cloud (WNF/SDN/XaaS)	Data centre services, IPXs	Enterprise network services	Mobile financial services	WS (mHealth, mCommerce, mLearning, etc)	Messaging & voice services	OTT
Sky and Space Global 110 Bishopsgate London EC2N 4AY UK eva@skyandspace.global www.skyandspace.global +44 207 749 1600 +44 207 749 1633	✓ ✓ ✓ ✓ ✓																	✓ ✓	✓ ✓	Cloud (WNF/SDN/XaaS)	Data centre services, IPXs	Enterprise network services	Mobile financial services	WS (mHealth, mCommerce, mLearning, etc)	Messaging & voice services	OTT	
 Sky and Space Global (www.skyandspace.global) is a UK company, listed on the ASX (Australian Stock Exchange) and the first company to successfully use narrowband connectivity provided by nano-satellites to deliver a voice call, text messaging and financial transactions.	Sky and Space Global (www.skyandspace.global) is a UK company, listed on the ASX (Australian Stock Exchange) and the first company to successfully use narrowband connectivity provided by nano-satellites to deliver a voice call, text messaging and financial transactions.										advantage of new market opportunities. Until recently nano-satellites have been predominantly used for earth observation but with advancements in miniature space technology their capabilities have become increasingly sophisticated in recent years. What is unique about the Sky and Space Global model is that it delivers connectivity services at a fraction of the cost of traditional satellite communications providers.														After having 3 operational satellites in space, Sky and Space Global is building a constellation of 200 nano-satellites, which will deliver affordable connectivity to all markets in the equatorial belt by 2020 (Africa, Latin America, South East Asia and parts of Australia). Providing affordable connectivity is key for driving digital inclusion and economic growth in the developing world and for tackling poverty and improving healthcare and education.		
Spatial Technologies Africa (Pty) Ltd Midrand, SOUTH AFRICA www.stgroup.co.za		✓																									
Speedcast 4F, 12 Lord Street Botany NSW 2019 AUSTRALIA info@speedcast.com www.speedcast.com +61 2 953 17 555	✓ ✓ ✓ ✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ ✓ ✓	✓ ✓ ✓	✓	✓	✓	✓	✓	✓	✓	
 Speedcast is the largest provider of remote communications and IT services in the world. Speedcast's fully managed service is delivered via a leading global, multi-access-technology, multi-band and multi-orbit network of 70+ satellites and an interconnecting global terrestrial network, bolstered by extensive on the ground local support from 40+ countries. This global "network of networks" allows customers to fully rely on the most robust, integrated	Speedcast is the largest provider of remote communications and IT services in the world. Speedcast's fully managed service is delivered via a leading global, multi-access-technology, multi-band and multi-orbit network of 70+ satellites and an interconnecting global terrestrial network, bolstered by extensive on the ground local support from 40+ countries. This global "network of networks" allows customers to fully rely on the most robust, integrated										infrastructure available in the market for their mission critical applications. Speedcast is uniquely positioned as a strategic business partner, tailoring communications, IT and digital solutions to meet unique customer needs and enable business transformation. Speedcast extends its managed services through differentiated technology offerings including cyber-security, crew welfare, content solutions,														data and voice applications and network systems integration services. With a passionate customer focus and a strong safety culture, Speedcast serves more than 2,000 customers in over 140 countries in sectors such as Maritime, Energy, Mining, Enterprise, Media, Cruise, NGOs and Government.		
Star Solutions International Inc. Richmond, B.C., CANADA www.starsolutions.com	✓	✓ ✓	✓	✓	✓	✓												✓ ✓ ✓									
Stratosat Datacom (Pty) Ltd 26 Spartan Road, Spartan Ext.21 Kempton Park 1619 SOUTH AFRICA Sales2@stratosat.co.za www.stratosat.com +27 11 974 0006 +27 11 974 0068	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ ✓	✓	✓	✓	✓	✓	✓	✓	✓	
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