

AFRICAN WIRELESS COMMUNICATIONS YEARBOOK 2017

From the publisher of

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wireless
COMMUNICATIONS

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COMMUNICATIONS



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AFRICAN WIRELESS COMMUNICATIONS YEARBOOK 2017

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Getting the balance right



Rahiel Nasir
Editorial director,
The African Wireless
Communications
Yearbook 2017

I have been watching the continent's wireless communications market grow and develop for more than 10 years now, and one thing that seems to characterise it is an 'all or nothing' approach.

Before continuing, I should stress that my aim is not to homogenise Africa with that comment – I am merely noting what I regard as a common observation.

For example a few years ago, and as has been well documented, those in the satellite industry often spoke about a "capacity crunch" in Africa. They warned that there were not enough satellites covering the continent to satisfy the booming demand for connectivity.

But since then, new spacecraft have been launched and new operators have come into the market. So there are now whispers of potential capacity glut.

Similarly, in the cellular market, mobile operators have saturated Africa's populous urban areas to such an extent that they are now constantly looking at new and innovative value-added services to help prop-up flagging ARPUs. Meanwhile there are still billions in remote unconnected areas still waiting to make their first voice calls let alone experience the wonders of the world wide web for the first time.

Then there's fibre. While there's plenty of it washing up on Africa's shores, the mission now is to pull it further deep into landlocked parts of the continent where there is still nothing.

When will any of this happen? Or perhaps the real question to ask is will any of this happen?

To exacerbate matters, the market dynamics that have been playing out across the continent over the last few years seem to have taken their toll in 2016. The global slump in oil prices, continuing security threats, foreign exchange issues and the economic climate in general have all hit the bottom lines of many players in Africa's wireless communications space in one way or another.

But what is perhaps worth noting is that all this has led to some rollout projects only being delayed or put on hold – not cancelled altogether. In the many conversations I had with companies as part of putting together the 2017 edition of *The African Wireless Communications Yearbook*, many spoke of light at the end of the tunnel. Even in countries ravaged by years of internal conflict, such as Libya, attention is now apparently beginning to turn to rebuilding the infrastructure and re-connecting.

That certainly sounds hopeful. And the good news is that whether from space, on the ground, or in the ground, there are certainly plenty of technology options to connect what the UN calls the Least Developed Countries (LDCs), the majority of which are in Africa.

So in answer to the above question of whether any of this will actually happen, the problem is certainly not one of technological constraints. Technology is

actually only part of a solution. Funding and political will also play their parts. And so the ultimate answer to the question depends on how those technology options can be leveraged by a combination of parties that include governments, enterprises, service providers, investors, and all the stakeholders who stand to gain from connecting Africa.

So why should any of that matter? Well the answer to that particular question lies in the pages ahead.

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chapter 1

State of the market

Don't lose your head

2016 proved to be financially tough for many companies working on the continent, with the MTN Group and Ericsson particularly coming under pressure.

At the start of the year, Africa's biggest mobile operator was still searching for a new CEO following Sifiso Dabengwa's resignation because of the multi-billion dollar fine imposed by the Nigerian Communications Commission. The penalty related to MTN Nigeria's late disconnection of 5.1 million improperly registered subscribers in August and September 2015. The commission originally issued a fine of NGN1,040bn (around USD5.2bn), but later reduced this to NGN674bn (around USD3.4bn).

In February 2016, MTN Nigeria made a "good faith" payment of NGN50bn (USD250m) to the country's government. A few months later in June, the celco agreed to pay a total cash amount of NGN330bn (USD1.671bn) over the next three years as a full and final settlement.

With the dispute resolved, the MTN Group resumed focus on its operations. Earlier in 2016, it had announced a review of its operating structure in a bid to strengthen business oversight, leadership, governance and regulatory compliance across all its operations. The new reporting structure comprises three regions: West and Central Africa (WECA); South and East Africa (SEA); and Middle East and North Africa (MENA). And in June, the group announced Rob Shuter as its new president and CEO. He is due to take up the position later in 2017 after completing his current tenure as CEO of the European cluster at Vodafone Group.

The year also saw the departure of Hans Vestberg who stepped down as Ericsson's president and CEO with immediate effect

on 27 July. His resignation came amidst shareholders reportedly calling for him to go following poor results for the second quarter of 2016. Vestberg left Ericsson after 28 years, the last seven of which saw him at the company's helm. Board chairman Leif Johansson said: "In the current environment, and as the company accelerates its strategy execution, the board of directors has decided that the time is right for a new leader to drive the next phase in Ericsson's development."

In late October, that "new leader" was named as Börje Ekholm, the former CEO of Patricia Industries. He went on to take up his new position with Ericsson in January 2017.

The company's figures for the second quarter of 2016 revealed an 11 per cent drop in year-on-year sales. Writing what turned out to be his final CEO comments in an earnings report for Ericsson, Vestberg said: "Negative industry trends from the first quarter have intensified, impacting demand for mobile broadband, especially in markets with a weak macro-economic environment."

In sub-Saharan Africa, sales for the company's Networks, Global Services and Support Solutions divisions slumped by 13 per cent year-on-year. Ericsson said the fall was mainly due to a reduced level of investments impacted by lower oil prices, and the ramping down of a "sizeable" mobile broadband project in South Africa. It added that the floating of the Nigerian currency resulted in a devaluation of more than 40 per cent in June, and this also impacted investment decisions negatively.

The Swedish vendor's woes continued into the third quarter. It said results for the period will be "significantly lower" than expectations and issued a profits warning. Its quarterly earnings report stated: "Negative industry trends from first half 2016, with weaker demand for mobile broadband, especially

in markets with weak macro-economic environment, have further accelerated."

Commenting at the time, Jan Frykhammar – Ericsson's EVP and CFO who had been appointed interim CEO following Vestberg's ousting – said continued progress in the company's cost reduction programmes had not been able to offset lower sales and gross margin. "More in-depth analysis remains to be done but current trends are expected to continue short-term," he said. "We will continue to drive the ongoing cost programme and implement further reductions in cost of sales to meet the lower sales volumes."

Earlier in October, Ericsson had announced job losses for around 3,000 employees in Sweden as part of its 2016 restructuring target of SEK4.5bn. The company employs around 16,000 people in its home country, and proposed cutbacks included redundancies of approximately 1,000 positions in production, 800 in R&D, and 1,200 in other operations such as sales and admin. Ericsson added that the lay-offs will be a combination of voluntary and "forced reductions", as well as other measures such as outsourcing.

Another big name infrastructure vendor also began the process of reducing its workforce last year.

In January, Nokia completed its acquisition of Alcatel-Lucent after buying nearly 80 per cent of the latter's outstanding shares through a public exchange offer. Plans for the merger were first announced in 2015 in a deal which, at the time, valued Alcatel-Lucent at EUR15.6bn. Nokia Corporation – the name given to the merged entity – is headed by Rajeev Suri who continues as president and CEO, while Risto Siilasmaa continues as chairman.

In April 2016, Nokia launched headcount reductions as part of what it described as its "global synergy and transformation

programme". It said the job losses will occur over the next two years, largely in areas where there were overlaps between the merged companies, such as R&D, regional and sales organisations, and corporate functions.

As part of the programme, Nokia said it was shifting resources to future-oriented technologies such as 5G, cloud and the IoT. Worldwide savings in real estate, services, procurement, supply chain and manufacturing will also continue to be targeted.

Market dynamics

The global macrocell mobile infrastructure market declined 18 per cent during the first quarter of 2016, according to IHS Technology. It said the global macrocell mobile infrastructure market was worth USD10bn during 2Q16. That compares to around USD11bn for 1Q15 – an eight per cent downturn year-over-year.

As a result, IHS believes the market has entered the "post-LTE peak era" with infrastructure for the technology seeing a year-on-year decline of six per cent. It said that for the first time since commercial LTE deployments were introduced in 2012, all generations of mobile technologies experienced a sharp decline.

Despite Ericsson's recent quarterly performances, IHS said the vendor retained its leading position in the macro 2G/3G/4G radio market in 1Q16, sustained by its mix of geographically distributed large Tier 1 accounts. It was followed by Huawei at number two and then Nokia, including Alcatel-Lucent's share (*see chart below*). All three companies also lead the global LTE infrastructure market, according to the analyst.

In a separate study published at the World Economic Forum held in Kigali in May 2016, IHS said the telecoms sector is likely to emerge as a leading source of capital expenditure for East Africa. For instance, it believes Tanzania presents cellcos with a "favourable" operating environment due to competitive licensing agreements, while in Uganda, the recent rollout of a regulatory framework for mobile and agency banking services provides new opportunities.

Kenya is particularly noteworthy. IHS said the government's commitment to encourage growth in the sector should improve competition and interoperability among existing MNOs and stimulate MVNO activity.

The firm added that Kenya's telecoms infrastructure is largely concentrated in the south-east and west, but new projects could potentially drive 600,000 people to emerging areas of economic activity in the north-west, particularly in the Lake Turkana region, with consumer spending on mobile services expected to increase as a result.

By forecasting population change and analysing population demographics, IHS identified potential tower locations in three towns in the Rift Valley Province likely to benefit from the largest net increase in population: Lokichar, Kitale and Eldoret. Speaking at the time, Natznet Tesfay, director of Africa analysis at IHS' Economics and Country Risk division, said: "These projects would create new centres of economic activity and employment opportunities. This example highlights how companies might miss faster growth and attractive opportunities in medium-sized cities if they only focus on the traditional major cities."

She added that the refurbishment and expansion of the Lokichar-Kitale-Eldoret highway into neighbouring South Sudan will also increase opportunities for wholesale and retail trade, as will the UK-owned Tullow Oil's concession close to Lokichar which is due to start production by 2020.

Standard Bank also believes Africa is set to see accelerated investment and innovation in telecoms, media and technology (TMT), and predicts increased M&A activity across the continent. The company, which claims to be one of Africa's leading TMT banks as well as the largest by assets, was a partner for the inaugural TMT Finance Africa conference that was held in Lagos last September.

Speaking in the run-up to the event, Standard Bank's global head of TMT Nina Trantis said: "Investment and M&A in TMT continues to be especially active in Africa, with many companies across the continent considering strategic options, growth along diverse verticals, private debt

and equity financing rounds, M&A, and public listings."

She also said that the debt markets continue to be supportive for the right companies in Africa. "[This is] despite macro challenges in many countries as well as global uncertainty, though the funding currency and medium will inevitably reflect these challenges."

Sales and investments

In July, Standard Bank went on to prove its point by upsizing Helios Towers DRC (HTD) syndicated term loan facility. The deal was also backed by German development finance institution DEG (Deutsche Investitions- und Entwicklungsgesellschaft).

HTD's portfolio now includes around 1,800 towers with a growing pipeline of new builds for various operators. It planned to use the new USD105m funding facility to partly finance its 2015 acquisition of Airtel's tower portfolio, and to invest in power technologies to help reduce its reliance on diesel.

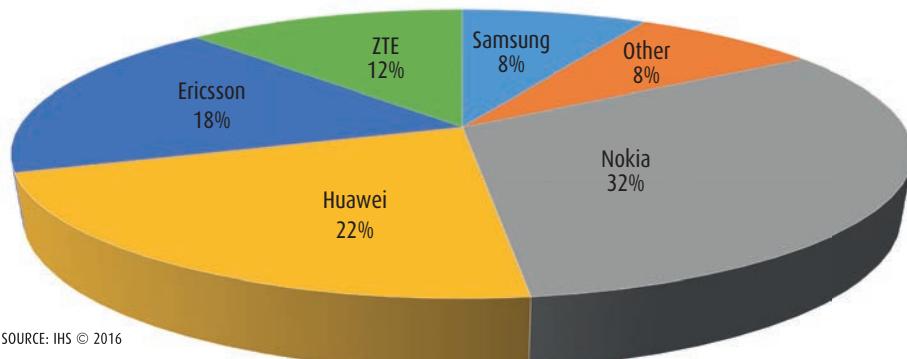
The firm said that since 2010 it has pioneered the independent towerco model in the DRC through commercialising Tigo's former towers and building out new ones to which it will add around 950 towers as a result of the Airtel deal. This latest debt facility from Standard Bank for Helios Towers Africa follows the closing of a USD95m financing deal for its subsidiary in Tanzania earlier in 2016.

In February, South Africa's Competition Tribunal approved the disposal of Altech Autopage's post-paid GSM subscriber bases to Cell C, MTN and Vodacom.

Autopage was responsible for selling phone contracts on South Africa's mobile networks. But towards the end of 2015, its parent company Altron announced that it planned to shut down Autopage and sell off its subscriber bases to local operators for ZAR1.5bn. Altron said the decision was based on various factors, but mainly because of the impact of ongoing mobile termination rate reductions in South Africa, in addition to continued industry and consumer deflationary pressures.

In the meantime, Cell C scotched rumours that its Autopage subscriber base had been acquired by GloCell Retail which is owned by Seventy2 Telecommunications. The operator said that it had in fact appointed GloCell as an official agent to service customers being transferred from Autopage, following approval by Altech. Established in 2011, the GloCell Group supplies network products and services to thousands of channel partners. It was also expected to take over and rebrand many of Autopage's stores nationally from March 2016.

In August, Saffelberg Investments announced that it had become a strategic



SOURCE: IHS © 2016

INVESTMENTS, MERGERS & ACQUISITIONS IN 2016

Date	Buyer	Seller	Item	Price	Notes
12/1/16	Orange Côte d'Ivoire	Cellcom Telecommunications	Cellcom Liberia	NA	Orange will acquire 100% of Cellcom's Liberia subsidiary which is said to be the country's leading mobile operator. Orange said the deal will "strengthen" its positions in Africa. Continent described as a "strategic priority" for the group.
3/2/16	Amadeus & MTN	Travelstart	Investment	USD40m	Sweden-based Travelstart claims to be Africa's leading online travel agency & operates in the continent from Cape Town. Plans to grow into new markets & also develop a strategic partnership with MTN to leverage its mobile network.
4/2/16	Cisco	Jasper Technologies	Company	USD1.4bn	Cisco said the proposed acquisition will mean it can offer a complete IoT service solution that is interoperable across devices, & works with IoT service providers, application developers & an ecosystem of partners.
8/2/16	Orange	Millicom	Tigo DRC	USD160m	CEO Mauricio Ramos said proceeds from the sale will strengthen Millicom's balance sheet, enable it to reinvest in existing Latin American & African markets, thus improving earnings & cash flow, & reducing leverage.
9/3/16	KORE Wireless Group	Wyless Group Holdings	Company	NA	According to KORE, its all-cash transaction to buy Wyless creates the only truly global, independent, multi-platform, IoT services company.
4/4/16	Brocade	Ruckus Wireless	Company	USD1.5bn	Brocade said acquisition will mean it can add Ruckus' higher-growth wireless products to its enterprise networking portfolio.
11/4/16	Telit Communications	Novatel Wireless	Various assets	USD11m	The IoT specialist will buy several cellular module product lines, related IP & related assets for an initial cash price & conditional earn-out consideration, which is expected to be non-material.
29/4/16	SES	O3b Networks	50.5% stake	USD20m	SES increases its fully diluted ownership of O3b from 49.1%, bringing its aggregate equity investment in the company to date to USD323m.
9/5/16	Global Eagle Entertainment	Emerging Markets Communications (EMC)	Company	USD550m	Following the merger, GEE says its global satellite-based connectivity platform will service more than 700 planes, 1,600 vessels, 100,000 cruise ship cabins, & several thousand land-based sites.
26/5/16	Flexenclosure	European Investment Bank	Finance deal	EUR7.5m	Loan will support expansion of Flexenclosure's R&D activities in intelligent power management systems & prefab modular data centres. Swedish firm's key markets include sub-Saharan Africa, Latin America, & central & South East Asia.
13/6/16	Microsoft	LinkedIn	Company	USD26.2bn	Microsoft believes acquisition of "world's largest & most valuable" professional network will complement its line-up of enterprise products & services.
22/6/16	Orange Group	Airtel	Burkina Faso & Senegal operations	NA	Orange's takeover of Airtel's Burkina Faso & Senegal operations has now met all approvals & has been finalised. In January 2016, Airtel agreed to sell 100% of its operations in the countries to Orange. It did not disclose a price although a sum of around \$900m was subsequently reported. Consolidated revenue for the two Airtel companies was said to be around €275m.
4/7/16	SES	O3b Networks	Shares	USD730m	SES has now received all regulatory approvals to acquire the remaining shares and warrants of O3b. Its fully diluted ownership has now increased from 49.1% to 100%, and followed a capital raising of €908.8 million to fund the move.
13/7/16	Helios Towers DRC	Standard Bank of South Africa & DEG	Loan	USD105m	Funding facility will partly finance both the acquisition of Bharti Airtel's tower portfolio & HTD's organic growth & operational programme across the DRC.
18/8/16	Singtel	Temasek	Shares in InTouch & Bharti Telecom	USD2.47bn	Will acquire 21% of Temasek's shares in InTouch Holdings & 7.39% of its shares in Bharti Telecom. InTouch is biggest shareholder in Thailand's largest cellco, Advanced Info Services (AIS). "Thailand, India and Africa continue to be attractive, high-growth markets for us," said Singtel CEO Chua Sock Koong.
22/8/16	InfoVista	Ascom	TEMIS	USD45m	TEMIS is claimed to be the most widely used mobile network testing, monitoring & optimisation platform. InfoVista, which is now owned by the private equity investment firm Apax Partners, hopes the acquisition will give it the lead in the network performance orchestration software market.
8/8/16	SpeedCast International	Eutelsat	WINS Limited	EUR60m	SpeedCast said acquisition of Eutelsat's 70 per cent stake in WINS gives it a "strong local presence in Germany, a major maritime market, as well as expertise in the cruise industry in Europe".
14/9/16	Amdocs	Pontis; Vindicia; & Brite-Bill	Companies	USD260m	Amdocs says the three similarly priced companies were acquired for a combined cash amount of around \$260m. Israeli-based Pontis offers "contextual digital engagement solutions"; US firm Vindicia provides SaaS; while Brite-Bill is a BSS specialist from Ireland.
20/10/16	Wipro	Appirio	Company	USD500m	Wipro claims its take-over of the US-based global cloud services company will create one of the world's largest cloud transformation practices in today's 'as-a-service' & digital economy.
1/11/16	SpeedCast	Harris CapRock	Company	USD425m	SpeedCast says acquisition strengthens its "already strong" position in maritime industry, in which Harris CapRock has a leading position in the fast-growing cruise sector. The combined entity will service more than 6,200 vessels, hundreds of rigs & platforms, as well as enterprise & government customers around the world.

investor in global mobile virtual network enabler Effortel. The Brussels-based firm provides turnkey solutions for non-telcos and brands that want to launch their own mobile services. It claims to be the only MVNE worldwide that operates a centralised real-time Intelligent Network system.

The firm is currently integrated with mobile operators in seven countries. In Africa, they include Equity Bank in Kenya which became the continent's first bank to become an MVNO after launching services on Airtel's network in July 2015.

Speaking at the time, Saffelberg Investments CEO Jos Sluys said: "Effortel's success in launching, developing and running efficient mobile virtual operators around the globe, as well-proven technology and ability to operate in high-growth developing markets, attracted our attention."

Saffelberg is said to be one of Belgium's largest and most active private equity funds. It did not disclose the value of its backing for Effortel, but Sluys said his company will provide the MVNE with an opportunity to grow and expand even faster: "The pipeline of opportunities looks good, and Effortel's technology proves both highly competitive and differentiating in its specialised markets."

While many in the ICT sector struggled in 2016, the year was good for one company in particular: Liquid Telecom. As well as continuing to win various industry awards and accolades throughout last year, the company proceeded to expand its reach across the continent.

For instance, under a joint venture agreement signed in October, the Botswana Power Corporation (BPC) will lease excess fibre from its network to Liquid. BPC owns and operates an optical fibre cable network that is embedded on some of its high voltage transmission lines. The corporation's board approved the commercialisation of this network in March 2016 and, following a period of competitive bidding, chose Liquid Telecom as their preferred partner. The joint venture will operate as Liquid Telecom Botswana.

BPC's network is being commercialised for the first time in order to provide network services in Botswana. The use of its infrastructure will be granted to Liquid Telecom Botswana under an Indefeasible Right of Use Agreement (IRUA). Rather than taking any rental payments, the capital value of the IRUA will be used to purchase BPC's equity stake, which is 42.5 per cent. Liquid will be the majority stakeholder in Liquid Telecom Botswana.

The year ended with Liquid receiving unconditional regulatory approval for its acquisition of South African telco Neotel,

adding to the approval it had already received from the country's Competition Commission in October 2016.

Neotel's owners – Tata Communications together with minority shareholders led by Nexus Connexion – agreed a sale price of ZAR6.55bn (USD4.28bn). Investment group Royal Bafokeng Holdings (RBH) has partnered with Liquid and will have a 30 per cent equity stake in the venture. The transaction was expected to close during the first quarter of 2017.

Neotel runs a converged communications network which offers tailored services to enterprise users based on voice, internet and data. As well as fibre, the company operates data centres in Johannesburg and Cape Town, and directly connects South Africa's major centres to the world via all five undersea cables.

Originally, Vodacom had announced plans to acquire Neotel in 2015 but met with criticism from rival operators in South Africa. In its end-of-year results statement published in June 2016, Vodacom Group CEO Shameel Joosub said: "The proposed acquisition of Neotel lapsed in March due to regulatory complexities and certain conditions not being fulfilled."

Liquid and RBH then entered into an

agreement to purchase Neotel at the end of June 2016. Liquid claimed the acquisition would create the first pan-African fibre player, and that the combination of the two companies will result in the continent's largest broadband network, comprising 40,000km of cross-border, metro and access fibre.

"For the first time, African companies will be able to connect with each other in a cost-effective and reliable way, all on a single fibre network," said Liquid Telecom CEO Nic Rudnick. "We will also be increasing investments into Neotel to cater for rapidly accelerating mobile and enterprise traffic, enabling us to launch new products and services."

Africa's place in the telecoms world

Each year, the ITU publishes a benchmark of the level of information communication technology development in 175 member states. Its ICT Development Index (IDI) ranks these countries according to their level of ICT access, use and skills.

In 2016, the Republic of Korea topped the IDI rankings for the second consecutive year (see table: *IDI 2016 – Global Top 20 below*). As in previous years, there are no African countries in the top 50, but seven African nations are

ICT DEVELOPMENT INDEX (IDI) 2016 – GLOBAL TOP 20

IDI 2016 RANK	ECONOMY	IDI 2016 VALUE	IDI 2015 RANK	IDI 2015 VALUE	RANK CHANGE
1	Korea (Rep.)	8.84	1	8.78	-
2	Iceland	8.83	3	8.66	▲
3	Denmark	8.74	2	8.77	▼
4	Switzerland	8.68	5	8.50	▲
5	United Kingdom	8.57	4	8.54	▼
6	Hong Kong, China	8.46	7	8.40	▲
7	Sweden	8.45	6	8.47	▼
8	Netherlands	8.43	8	8.36	-
9	Norway	8.42	9	8.35	-
10	Japan	8.37	11	8.28	▲
11	Luxembourg	8.36	10	8.34	▼
12	Germany	8.31	13	8.13	▲
13	New Zealand	8.29	16	8.05	▲
14	Australia	8.19	12	8.18	▼
15	United States	8.17	15	8.06	-
16	France	8.11	17	7.95	▲
17	Finland	8.08	14	8.11	▼
18	Estonia	8.07	18	7.95	-
19	Monaco	7.96	20	7.86	▲
20	Singapore	7.95	19	7.88	▼

SOURCE: ITU ICT DEVELOPMENT INDEX (IDI) 2016

ICT DEVELOPMENT INDEX (IDI) 2016 – AFRICA*

IDI 2016 RANK	ECONOMY	IDI 2016 VALUE	IDI 2015 RANK	IDI 2015 VALUE	RANK CHANGE
73	Mauritius	5.55	73	5.27	-
87	Seychelles	5.03	85	4.77	▼
88	South Africa	5.03	86	4.7	▼
95	Tunisia	4.83	95	4.49	-
96	Morocco	4.6	98	4.26	▲
97	Cape Verde	4.6	99	4.23	▲
100	Egypt	4.44	97	4.26	▼
103	Algeria	4.4	112	3.74	▲
108	Botswana	4.17	109	3.79	▲
112	Ghana	3.99	111	3.75	▼
120	Namibia	3.64	121	3.20	▲
124	Gabon	3.12	126	2.81	▲
129	Kenya	2.99	129	2.78	-
132	Côte d'Ivoire	2.86	139	2.43	▲
133	Zimbabwe	2.78	132	2.73	▼
134	Lesotho	2.76	138	2.47	▲
136	Swaziland	2.73	136	2.49	-
137	Nigeria	2.72	137	2.48	-
139	Sudan	2.6	134	2.56	▼
141	Senegal	2.53	140	2.41	▼
143	Gambia	2.46	141	2.4	▼
147	Zambia	2.22	148	2.05	▲
148	Cameroon	2.16	146	2.07	▼
149	Mali	2.14	149	2.00	-
150	Rwanda	2.13	158	1.79	▲
151	Mauritania	2.12	154	1.90	▲
154	Angola	2.03	152	1.95	▼
156	Liberia	1.97	161	1.73	▲
157	Uganda	1.94	155	1.86	▼
158	Benin	1.92	156	1.83	▼
159	Togo	1.86	159	1.78	-
160	Equatorial Guinea	1.85	157	1.82	▼
161	Djibouti	1.82	160	1.73	▼
162	Burkina Faso	1.8	163	1.60	▲
163	Mozambique	1.75	164	1.60	▲
165	Guinea	1.72	166	1.57	▲
166	Madagascar	1.69	165	1.57	▼
167	Tanzania	1.65	167	1.54	-
168	Malawi	1.62	168	1.49	-
169	Ethiopia	1.51	172	1.29	▲
170	Congo (Dem. Rep.)	1.5	169	1.48	▼
171	Burundi	1.42	173	1.16	▲
172	South Sudan	1.42	170	1.36	▼
173	Guinea-Bissau	1.38	171	1.34	▼
174	Chad	1.09	175	1.00	▲
175	Niger	1.07	174	1.03	▼

SOURCE: ITU ICT DEVELOPMENT INDEX (IDI) 2016

Indices for African ITU member states. The region's top-ranking nations are listed at the top. (*Note while we have added Algeria, Djibouti, Egypt, Mauritania, Morocco, Sudan and Tunisia to the table above, the ITU does not include them in its Africa region and instead categorises them as Arab states.)

ranked in the top 100: Mauritius, Seychelles, South Africa, Tunisia, Morocco, Cape Verde and Egypt (*see IDI 2016 – Africa, left*).

The ITU found that nearly all countries improved their IDI values over the last year. Algeria is notable in this respect, having moved up the rankings from 113 in 2015 to 103 in 2016.

The average IDI value rose by 0.20 points to 4.94 points (out of 10), with smaller increases at the top and at the bottom of the list. However, of the 44 African economies included in the regional index, only three are above this average.

One measure of the digital divide is the gap between the highest and lowest performing countries. The ITU said this has remained almost unchanged at 7.76 points – table leader South Korea's rating is 8.86 while at the bottom is Niger with 1.07. In fact, of the 20 economies that bring up the rear, 18 are African.

Globally, the ITU said that there has been relatively little change in the rankings for most economies between 2015 and 2016. There was only one change in the composition of the ten lowest-ranked countries, where Guinea has replaced Madagascar. Only eight (St. Kitts and Nevis, Myanmar, Algeria, Dominica, Grenada, Rwanda, Côte d'Ivoire and Bolivia) climbed more than five places in the rankings, and only two (Saint Lucia and Saudi Arabia) fell by more than five places.

In the lowest quartile, only four countries (Côte d'Ivoire, Myanmar, Rwanda and Liberia) improved their position in the rankings by five or more places, while two (Sudan and Kiribati) fell by five places.

Of the 44 countries ranked as least connected countries (LCCs), 30 are in Africa while four are in the Arab States region (three of which are on the African continent), one in the Americas and nine in Asia-Pacific.

The union pointed out that there has been greater improvement worldwide in ICT 'use' rather than 'access'. It said the use sub-index rose by an average 0.37 points, compared with an increase of 0.13 points in the access sub-index, making ICT use a greater factor of change in IDI outcomes between 2015 and 2016.

The increase in the IDI use sub-index was mainly a result of strong growth in mobile-broadband subscriptions across the world. In most regions, the ITU said that increase in ICT access mainly related to progress made in connecting more households to the internet, while in Africa improvements in mobile-cellular penetration had a greater impact on the value of the IDI access sub-index.

According to ITU data, Africa has the lowest international connectivity of all

ITU AFRICAN COUNTRY REPORTS 2016

COUNTRY	POPULATION				SUBSCRIPTIONS PER 100 INHABITANTS				PERCENTAGE OF:		
	TOTAL	DENSITY	GNI PER CAPITA	INTERNATIONAL INTERNET BANDWIDTH PER INTERNET USER (bps)	FIXED-TELEPHONE	MOBILE TELEPHONE	FIXED BROADBAND	ACTIVE MOBILE BROADBAND	HOUSEHOLDS WITH A COMPUTER	HOUSEHOLDS WITH INTERNET ACCESS	INDIVIDUALS USING THE INTERNET
Mauritius	1,253,581	621.97	9,610	33,896	30.31	140.57	15.74	37.03	57.00	60.00	50.14
Seychelles	93,754	204.18	14,760	38,395	22.76	158.12	14.31	19.14	66.76	59.44	58.12
South Africa	53,491,333	45.30	6,050	147,629	7.72	159.27	7.72	59.47	23.35	50.58	51.92
Tunisia	11,235,248	71.50	3,970	33,811	8.40	129.93	4.34	62.63	38.70	36.09	48.52
Morocco	33,955,157	77.03	3,040	18,316	6.55	39.28	3.38	39.28	54.80	66.50	57.08
Cape Verde	508,315	129.16	3,290	17,148	11.50	127.15	2.99	72.93	34.2	27.00	43.02
Egypt	84,705,681	91.93	3,340	11,317	7.36	110.99	4.52	50.66	50.79	41.84	35.90
Algeria	40,633,464	16.65	4,870	30,119	8.04	113.03	5.57	40.11	37.02	31.88	38.20
Botswana	2,056,370	3.99	6,510	11,379	7.80	169	1.79	67.31	16.00	19.60	27.50
Ghana	26,984,328	120.46	1,480	2,841	1.02	129.74	0.28	66.82	43.50	34.15	23.48
Namibia	2,392,370	2.99	5,210	22,546	7.63	102.1	1.72	62.07	17.66	24.50	22.31
Gabon	1,751,199	6.70	9,210	8,505	1.07	168.92	0.63	33.12	13.70	18.00	23.5
Kenya	46,748,61	80.91	1,340	40,067	0.18	80.68	0.28	15.5	13.09	19.60	45.62
Côte d'Ivoire	21,295,284	71.39	1,410	5,194	1.30	119.31	0.52	40.39	8.80	17.22	21.00
Zimbabwe	15,046,102	40.33	850	6,380	2.22	84.79	1.09	39.03	11.78	18.07	16.36
Lesotho	2,120,116	70.32	1,330	3,862	2.14	105.52	0.10	37.7	7.53	11.50	16.07
Swaziland	1,285,519	74.82	3,230	2,053	3.34	73.20	0.47	17.04	19.8	22.30	30.38
Nigeria	183,523,432	200.05	2,820	2,986	0.10	82.19	0.01	20.95	9.84	11.40	47.44
Sudan	39,613,217	22.13	1,840	2,189	0.30	70.53	0.07	29.41	17.94	33.5	26.61
Senegal	14,967,446	78.58	1,000	6,931	2.01	99.95	0.67	26.42	12.88	15.7	21.69
Gambia	1,970,081	196.73	460	13,342	2.28	131.26	0.18	10.02	8.92	13.30	17.12
Zambia	15,519,604	21.81	1,500	3,187	0.75	74.47	0.15	13.79	7.39	12.70	21.00
Cameroon	23,393,129	49.38	1,330	992	4.51	71.85	0.07	4.27	12.7	8.58	20.68
Mali	16,258,587	14.42	790	1,279	1.04	139.61	0.02	18.84	3.32	8.25	10.34
Rwanda	12,428,005	470.6	700	5,661	0.14	70.48	0.17	25.88	4.00	6.72	18.00
Mauritania	4,080,224	3.95	1,370	1,451	1.26	89.32	0.24	23.10	4.70	15.60	15.20
Angola	22,819,926	20.07	4,180	6,518	1.25	60.84	0.67	19.33	11.10	10.20	12.40
Liberia	4,503,439	46.75	380	7,522	0.20	81.09	0.16	20.52	2.40	2.73	5.90
Uganda	40,141,262	194.66	670	4,633	0.82	50.37	0.32	18.31	6.70	7.20	19.22
Benin	10,879,828	96.49	860	3,002	1.79	85.64	0.67	4.24	5.10	5.38	6.79
Togo	7,170,797	134.3	540	7,310	0.73	64.95	0.92	6.02	3.40	6.20	7.12
Equatorial Guinea	799,372	30.13	7,790	1,320	1.42	66.72	0.48	0.04	19.26	8.94	21.32
Djibouti	899,658	38.3	N/A	10,255	2.56	34.68	2.33	5.56	19.14	8.10	11.92
Burkina Faso	17,914,625	66.17	660	2,862	0.42	80.64	0.04	15.44	5.20	12.48	11.39
Mozambique	27,121,827	35.58	580	6,145	0.33	74.24	0.08	9.37	6.08	13.20	9.00
Guinea	12,347,766	51.31	470	930	0.00	87.17	0.01	13.93	2.62	3.70	4.70
Madagascar	24,235,390	41.66	420	12,420	1.04	46.02	0.07	9.01	5.34	5.79	4.17
Tanzania	52,290,796	60.36	910	4,107	0.27	75.86	0.20	3.19	4.00	4.51	5.36
Malawi	17,308,685	182.6	350	2,429	0.26	35.34	0.00	16.59	5.80	9.10	9.30
Ethiopia	98,942,102	99.39	590	1,959	0.90	42.76	0.66	11.95	3.52	9.80	11.60
Congo (D. R.)	71,246,355	34.08	380	369	0.00	52.99	0.00	8.47	2.29	2.40	3.80
Burundi	10,812,619	435.32	260	5,702	0.20	46.22	0.03	7.56	1.20	4.00	4.87
South Sudan	12,152,321	N/A	790	28	0.00	23.86	0.00	1.42	11.65	11.20	17.93
Guinea-Bissau	1,787,793	65.59	590	2,923	0.00	69.27	0.06	0.00	2.70	2.06	3.54
Chad	13,605,625	11.15	880	2,575	0.13	40.17	0.08	1.38	3.50	3.08	2.70
Niger	19,268,380	15.71	390	2,688	0.57	46.50	0.06	1.84	2.66	2.60	2.22

SOURCE: ITU ICT DEVELOPMENT INDEX (IDI) 2016

The ITU's ICT Development Index measures ICT access, use and skills. The above table shows some of the indicators for selected African countries.

regions. The union said there is twice as much bandwidth per inhabitant available in Asia and the Pacific, four times as much in the CIS region, eight times as much in the Americas, and more than twenty times as much in Europe.

Mobile subscriptions

Ericsson's *Sub-Saharan Africa Mobility Report* published in November 2016 revealed that while total mobile subscriptions penetration in the region is currently 85 per cent, this number is expected to reach 105 per cent by 2022 with more than one billion mobile subscriptions. This makes sub-Saharan Africa the region with highest growth rate in mobile subscriptions globally.

The GSMA Association (GSMA) largely corroborates this. In *The Mobile Economy Africa 2016* report published last July, the association said there were 557 million unique subscribers in Africa at the end of 2015, accounting for 965 million connections. And while the continent is the second-largest region behind Asia Pacific in terms of unique subscribers (12 per cent of the global base), the GSMA pointed out that it is also the least penetrated.

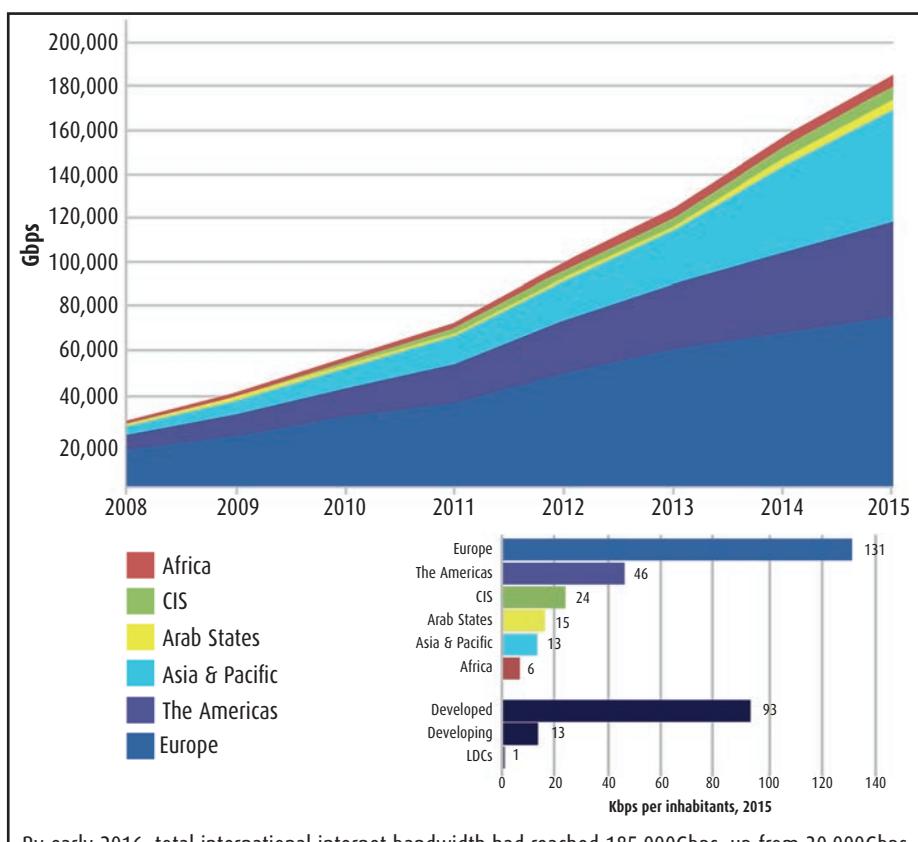
"At the end of 2015, less than half of the population subscribed to mobile services, well below the global average of 63 per cent, and lower than that of the Middle East (58 per cent), Asia Pacific (62 per cent) and Latin America (65 per cent)," stated the report.

The GSMA continued by saying that African subscriber growth was less than nine per cent in 2015. However, it predicted that average annual growth between 2015 and 2020 will be six per cent compared to a global average of four per cent – the fastest growth rate of any region.

The association forecasts that an additional 168 million people will be connected by mobile services across Africa over the next few years. Eight markets will account for the majority of this growth, most notably Nigeria, Ethiopia and Tanzania, which will together contribute more than a third of new subscribers.

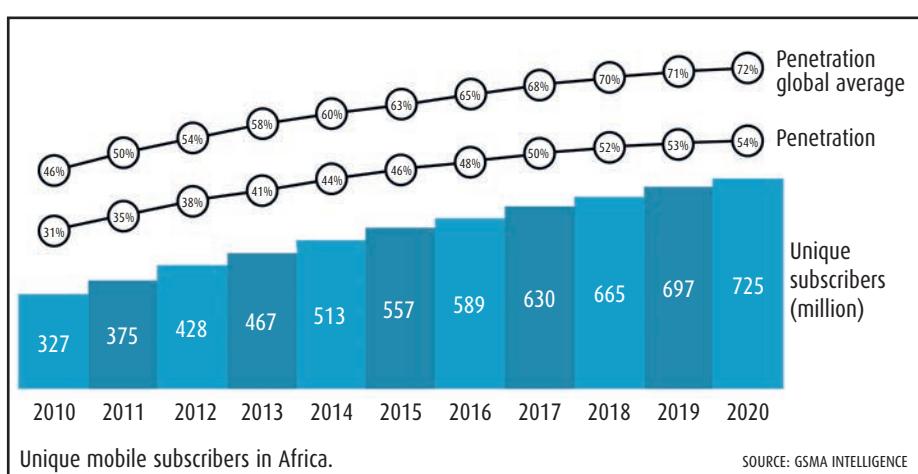
According to the *Africa Market Outlook* by market analyst Ovum, Nigeria has the continent's largest mobile market in terms of users, with 150.22 million mobile subscriptions as at 2Q16, up from 147.94 million a year earlier. Africa's next biggest mobile markets by subscriptions are Egypt, South Africa, Algeria and Morocco.

However, while Africa will exhibit the fastest subscriber growth rate of any region over the next five years, penetration will still be the lowest, at 54 per cent in 2020.



By early 2016, total international internet bandwidth had reached 185,000Gbps, up from 30,000Gbps in 2008. But internet bandwidth remains unequally distributed across the world, and the ITU said lack of international connectivity is a major bottleneck in the internet infrastructure of least developed countries (LDCs).

SOURCE: ITU.



SOURCE: GSMA INTELLIGENCE

TOP TEN AFRICAN OPERATORS BY MOBILE SUBSCRIPTIONS AS AT 2Q16				
OPERATOR	COUNTRY	MOBILE SUBSCRIPTIONS END-2Q16 (MILLIONS)	SHARE OF COUNTRY'S MOBILE SUBSCRIPTIONS END-2Q16 (%)	MOBILE BROADBAND END-2Q16 (MILLIONS)
MTN	Nigeria	58.98	39.26	12.89
Ethio Telecom	Ethiopia	45.99	100.00	6.54
Vodafone	Egypt	39.04	40.77	12.10
Vodacom	South Africa	37.63	40.62	16.30
Globacom	Nigeria	36.32	24.18	13.06
Orange	Egypt	33.64	35.13	9.08
Airtel	Nigeria	31.98	21.29	10.09
MTN	South Africa	29.81	32.18	16.97
Safaricom	Kenya	25.62	68.52	6.35
Etisalat	Egypt	23.08	24.10	3.30

Note: Mobile broadband is comprised of W-CDMA, HSPA and LTE

SOURCE: OVUM

Getting smarter

According to GfK, emerging markets are powering smartphone sales – so much so, that analysis of the latest sales trends prompted the market researcher to upgrade its forecast for 2016. Last August, it increased the full year global smartphone sales value from USD400.7bn to USD426bn, up five per cent year-on-year. GfK said this was caused by strong sales of mid-range to high-end units which has reversed the previous trend of low-end, sub-USD100 share gains.

Commenting at the time, Kevin Walsh, GfK's director of trends and forecasting, said: "Volume growth is coming from many emerging markets, especially a resurgent China, but also emerging Asia and Africa. We need to look beyond sales in the major cities and the shipments of global manufacturers to reveal this strong growth, since it is consumers in rural areas driving this demand."

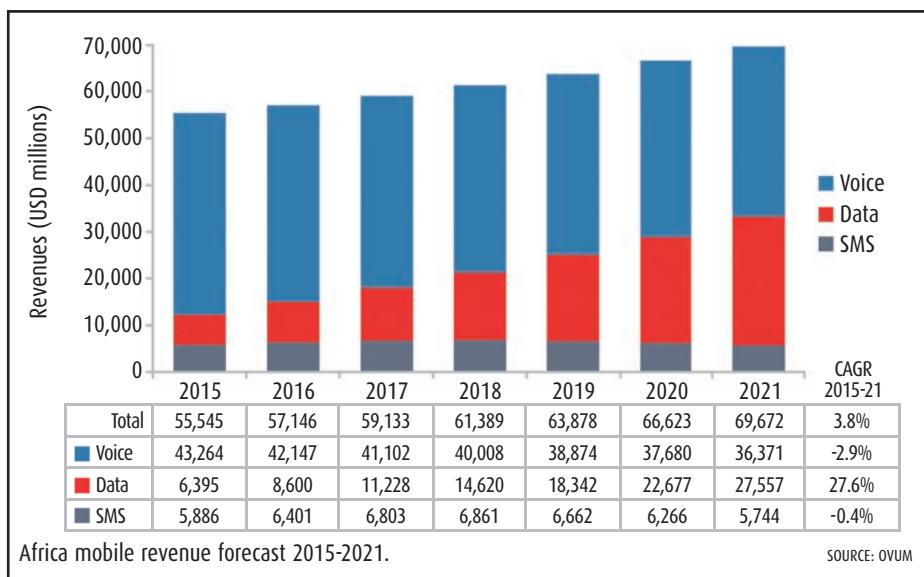
GfK forecasts end-demand consumer purchases rather than manufacturer shipments. It said market sizes are built up by point-of-sale tracking in more than 90 markets with updates on a weekly and monthly basis.

In Africa and the Middle East, the company said smartphone demand reached 41 million units in 2Q16, down two per cent quarter-on-quarter, whilst year-on-year growth slowed to five per cent. Saudi Arabia's 24 per cent year-on-year decline in 2Q16 offset growth of 19 per cent in Egypt and 15 per cent year-on-year in South Africa. GfK forecasted that smartphone demand in the region will grow to 176 million units in 2016, up nine per cent year-on-year.

The GSMA's *Mobile Economy Africa 2016* report revealed that the number of smartphone connections on the continent had grown almost two-fold since 2014 to reach 226 million. That represents 25 per cent of all connections in the region.

According to the association, growth has been driven by robust uptake in more sophisticated mobile markets like Egypt, Kenya, Nigeria and South Africa, along with some comparatively new 3G markets, particularly Algeria, Cameroon and DRC.

Ericsson has found that affordability is also driving the increase in mobile broadband uptake in sub-Saharan Africa. Alongside declining data prices, which is stimulating traffic, it said there is an increase in the accessibility of smartphones due to lower prices as a result of subsidies and access to purchase plans. This is reflected in



REGION	UNITS SOLD (IN MILLIONS)			SALES VALUE (IN BILLION USD)		
	2Q15	2Q16	Y/Y % CHANGE	2Q15	2Q16	Y/Y % CHANGE
Western Europe	30.2	29.8	-1%	11.7	12.2	4%
Central & Eastern Europe	15	16.8	12%	3.2	3.7	16%
North America	44.5	41.9	-6%	17.8	16	-10%
Latin America	25.4	23.4	-8%	6.3	6.9	10%
Middle East & Africa	39.1	40.9	5%	10.4	10.7	3%
China	88.8	109.7	24%	26.9	32.4	20%
Developed APAC	16.7	16.6	-1%	9.5	9.6	1%
Emerging APAC	49.1	51.0	4%	8.1	8.2	1%
Global	308.8	330.1	6.9%	93.9	99.7	6.2%

SOURCE: GFK, AUG 2016



Percentage of smartphone connections in Africa and globally. The GSMA said Africa will add a further half a billion smartphone connections by 2020, taking the adoption rate to more than half of total connections, driven largely by the increasing availability of low-cost devices.
SOURCE: GSMA INTELLIGENCE

various models by local operators, handset providers and financial institutions. As an example it refers to a "leading" operator in Nigeria which currently offers two smartphones selling at under USD50.

Technology shift

From 2016 to 2022, Ericsson forecasted that sub-Saharan Africa will dramatically shift from a region with a majority of GSM/

EDGE-only subscriptions, to around 83 per cent of all subscriptions on WCDMA/HSPA and LTE.

In its *Sub-Saharan Africa Mobility Report*, the company said WCDMA/HSPA subscriptions will rise by 15 per cent each year from 2016 to 2022, as basic GSM/EDGE-only connections fall. It added that although LTE subscriptions will also show strong year-on-year growth, WCDMA/HSPA will remain the dominant mobile broadband access technology in sub-Saharan Africa through 2022.

In statistics published at the end of January 2017, the Global mobile Suppliers Association (GSA) said that 581 LTE networks have now been commercially launched in 186 countries worldwide. Africa has 34 countries where commercial LTE services have so far been launched, or where deployments are either in progress or planned.

As at 3Q16, Asia Pacific had a 58 per cent share of LTE subscribers worldwide with around 980 million connections. It was followed by: North America with 16.8 per cent (around 290 million subscribers); Europe with 13.9 per cent (around 230 million); Latin America and the Caribbean with 5.8 per cent (around 100 million); and Middle East and Africa just behind at 5.5 per cent (around 100 million). Ovum predicts that as at end 2021, there will be 1.33 billion mobile subscriptions in Africa, of which 3G will account for 64.9 per cent of connections and LTE for 11.8 per cent.

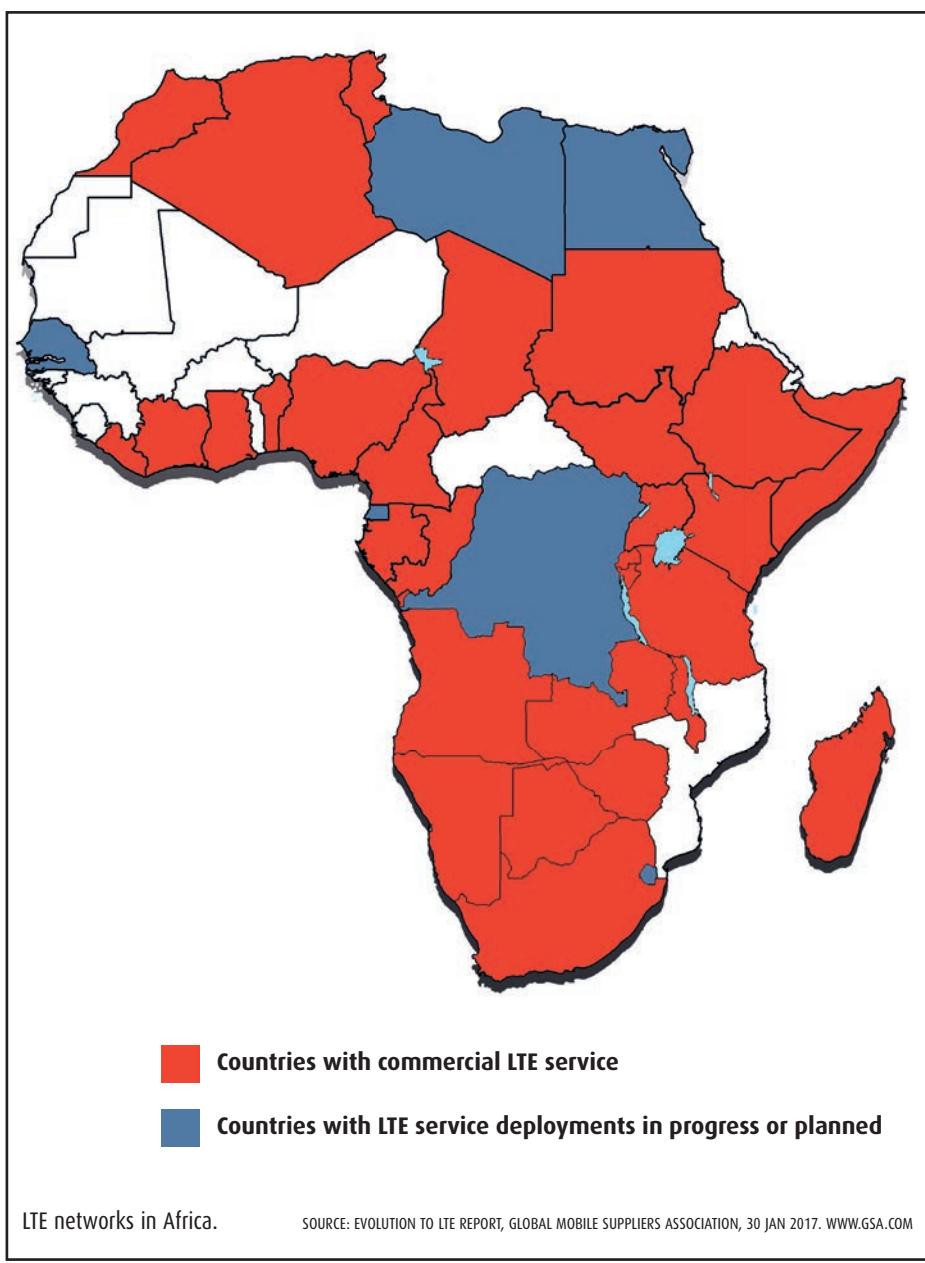
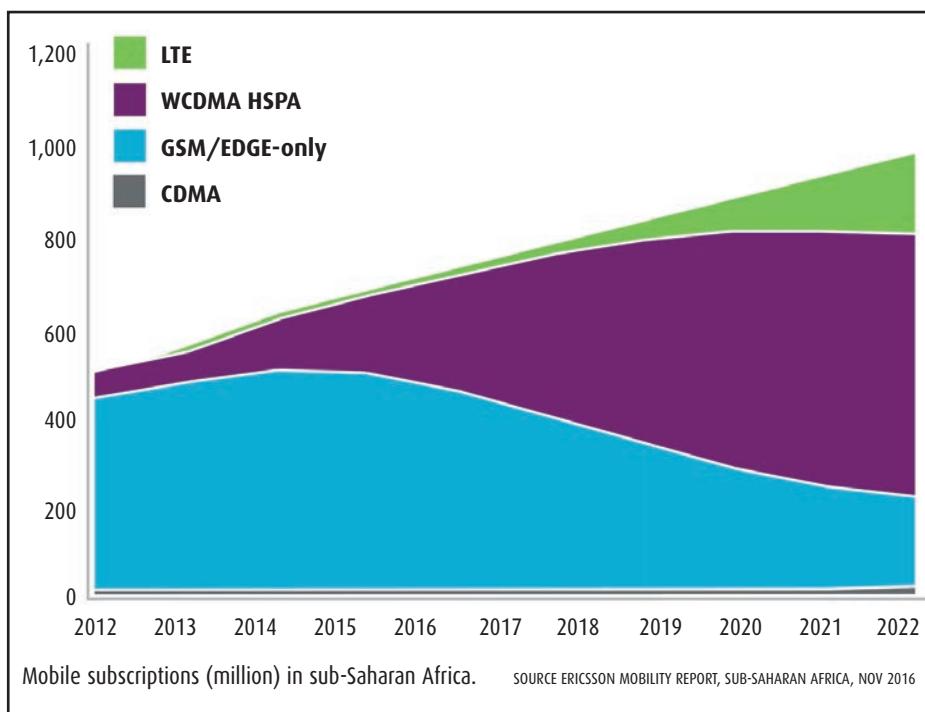
Mobile revenues

In its *Africa Market Outlook*, Ovum forecasts that total mobile revenue will rise from USD55.55bn in 2015 to USD69.67bn in 2021, a CAGR of 3.8 per cent. Mobile voice revenue on the continent will decline over the forecast period, from USD43.26bn in 2015 to USD36.37bn in 2021.

Although overall growth has slowed and the basic mobile services of voice and SMS are set to fall, Ovum said data revenue in the African market is growing strongly, driven by the rollout of 3G and 4G, growing affordability of smartphones, and changing consumer behaviour.

It predicts non-SMS mobile data revenue on the continent will increase over the next few years from USD6.40bn in 2015 to USD27.56bn in 2021, a CAGR of 27.6 per cent. Ovum forecasts that data services will account for 39.6 per cent of total mobile revenue in Africa in 2021.

In terms of mobile broadband, the GSMA said connections will increase almost three-fold from 2015-2020,



overtaking 2G in 2019 and reaching 60 per cent of total connections by 2020 (up from just over a quarter in 2015). For example, citing company reports, the association said MTN Cameroon experienced a 62 per cent rise in data traffic in 2015, while MTN Nigeria and Vodafone Egypt recorded data traffic increases of 59 and 73 per cent respectively for 1Q16.

"As a result, data revenue as a share of total revenue is rising rapidly across the region, reaching 15 per cent on average and considerably higher for mobile operators in the more advanced markets such as South Africa and Egypt," said the GSMA.

It added that data revenues across Africa accounted for around 15 per cent of total service revenues in 2015. This is around five percentage points below the developing world average. But the GSMA believes that the ongoing growth in data traffic, driven by the accelerating migration to mobile broadband and operator initiatives to further stimulate and monetise data traffic, will boost this to 20 per cent by 2020. This roughly aligns with Ovum's prediction that data services will account for 39.6 per cent of total mobile revenue in Africa in 2021.

Annual studies published by Cisco and Ericsson often serve as benchmarks for the industry. For instance, in its 2016 *Visual Network Index* forecasts, Cisco said mobile data traffic will grow 16-fold from 2015 to 2020 across Middle East and Africa (excluding Saudi Arabia), from 257PB per month in 2015 to more than 4EB per month by 2020. This represents an average annual growth rate of just under 75 per cent, much higher than the global average of 53 per cent.

Meanwhile, Ericsson predicts that mobile data traffic volume in sub-Saharan Africa will increase more than 10 times between 2016 and 2022. It said that in 2020, monthly mobile traffic in the region will surpass 1,000PB while Wi-Fi traffic on cellular devices is forecast to reach almost 400PB per month.

Mobile economy

In its *Mobile Economy Africa 2016* report, the GSMA said mobile technologies and services generated 6.7 per cent of GDP in Africa in 2015, a contribution that amounted to around USD150bn of economic value. The association expects this to increase to more than USD210bn (7.6 per cent of GDP) as countries benefit from the improvements in productivity and efficiency brought about by increased take-up of mobile services.

It added that the region's mobile ecosystem supported 3.8 million jobs in 2015. This includes workers directly employed in the ecosystem and jobs indirectly supported by the economic activity generated by the sector.

The GSMA also pointed out that the mobile sector makes a substantial contribution to the funding of the public sector, with USD17bn raised in 2015 in the form of general taxation. It predicts that the number of jobs supported will increase to 4.5 million by 2020, while the tax contribution to public funding will rise to USD20.5bn.

In a similar study for the Middle East and North Africa, the GSMA said that the mobile industry contributed more than USD150bn to the region's economy. (The GSMA defines MENA as: Algeria, Bahrain, Comoros, Djibouti, Egypt, Iran, Iraq,

Israel, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, Turkey, UAE and Yemen.)

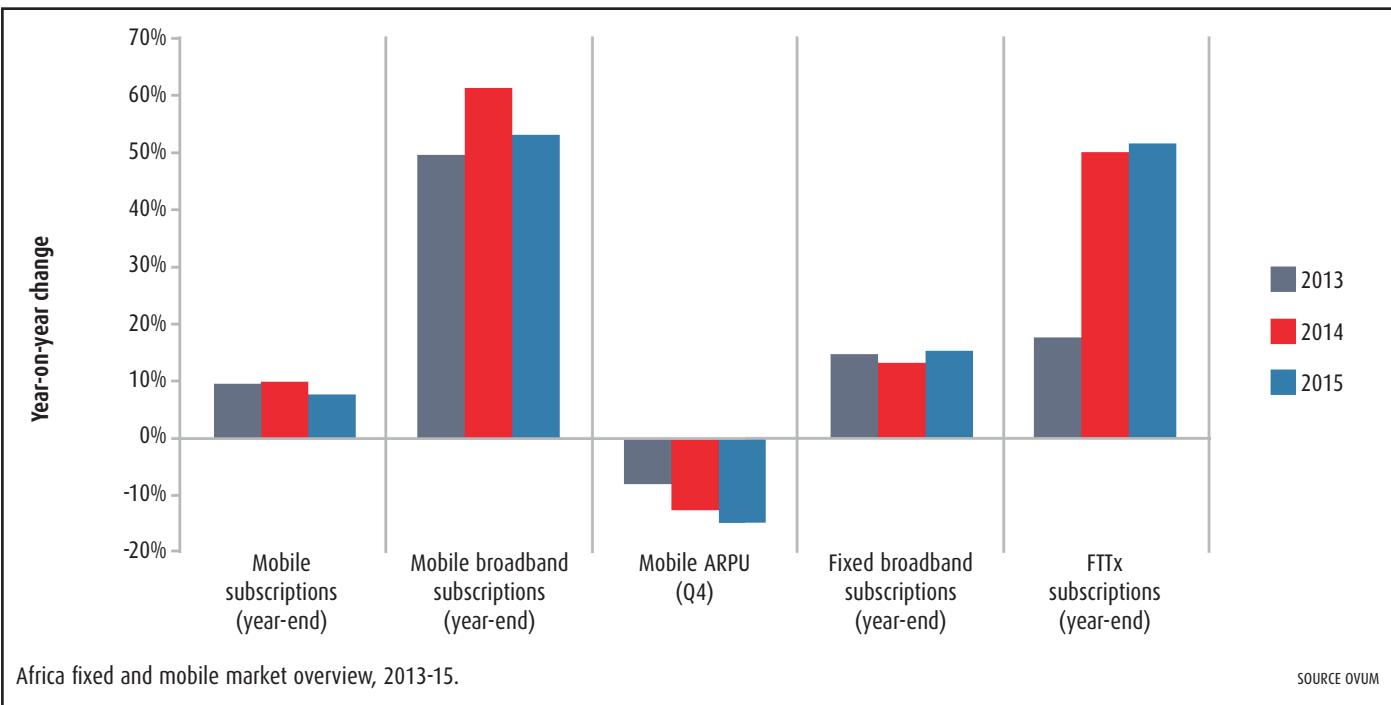
Across MENA, it found that the industry contributed four per cent of the region's GDP, and forecasts that this will grow to almost USD200bn by 2020. The industry also supported the local economy with more than one million jobs in 2015, and contributed USD15bn as part of general taxation.

The global satellite market

Last October, Ethiopia hosted the first *FutureSat Africa Summit*. Over three days in Addis Ababa, policy-makers, end-users, representatives from civil society organisations and satellite technology and solutions providers met to discuss the key role satellite technology plays in providing connectivity across the continent.

The summit was supported by the Global VSAT Forum (GVF). Following the event, it said that it was very clear that access to space services is considered by African administrations as a strategic asset which has to be carefully managed by those who are already using the limited spectrum resources. The forum also noted "clear advocacy" of many different stakeholders – current users of satcoms as well as potential future users – of the need to establish new innovative business and value propositions between satcoms providers and the users.

Dr. Julián Seseña, GVF Correspondent for Europe, said: "The future successful developments of satellite value propositions will undoubtedly require the establishment



of sustainable alliances both in the vertical and horizontal business value chains. The satcom industry has to cooperate with their future users to ensure close and mutual trust in highly evolving scenarios due to technology trends and new business routes."

There will certainly be plenty of opportunities for the industry to do this. Euroconsult anticipates that 145 satellites will be launched on average each year by 2025 for government agencies and commercial organisations worldwide. That figure excludes spacecraft smaller than 50kg and the massive low Earth (LEO) fleets planned by the likes of LeoSat and OneWeb. Factor those in, and Euroconsult predicts that the total for the decade will grow to 9,000 units compared to 1,480 in the past ten years.

However, in its *Satellites to be built and launched over the next 10 years* report published last September, the analyst stated that this huge growth does not automatically point to a large market: "As the price of the 7,550 future additional satellites is intrinsically low, the very reason for their existence, their market significance is small; they should represent no more than eight per cent of the USD270bn to be spent

building and launching the total of 9,000 satellites."

According to Euroconsult, more than three quarters of the global market remains with government satellites. In the commercial space sector, it forecasts a total of 560 satellites to be launched over the decade by 40 companies. Most of these will be for the replacement of the communications capacity currently in orbit.

For instance, among some of the major global operators, Eutelsat is planning to launch five orbiters over the next four years of which at least three will cover Africa; Intelsat's schedule over the next three years includes seven satellites of which two will beam services to the continent; SES is planning six launches in 2017, although none will cover Africa; and O3b has signed a contract with Arianespace for the launch of four more satellites in 2018 which will add to its fleet of 12 medium Earth orbit (MEO) spacecraft currently in orbit.

In its separate *Satellite Communications and Broadcasting Markets Survey* report also published last September, Euroconsult forecasts that global satellite traffic will reach almost 3.5Tbps by 2025, with a 16 per cent CAGR over the ten-year period.

The company said this corresponds to an upward revision of its previous forecasts which also take into account the expected huge increase in capacity over the next coming years. However, it warned that the leasing of larger capacity volumes will be at the expense of lower pricing, set against a backdrop of growing competition and falling fill rates.

"While regional situations will remain diverse, we estimate that the global average capacity ARPU could be halved when expressed in MHz by 2025," said the company. "This combination of higher volumes and lower pricing leads us to a capacity market value that would stand at around USD14bn by 2025 compared to USD11bn in 2015."

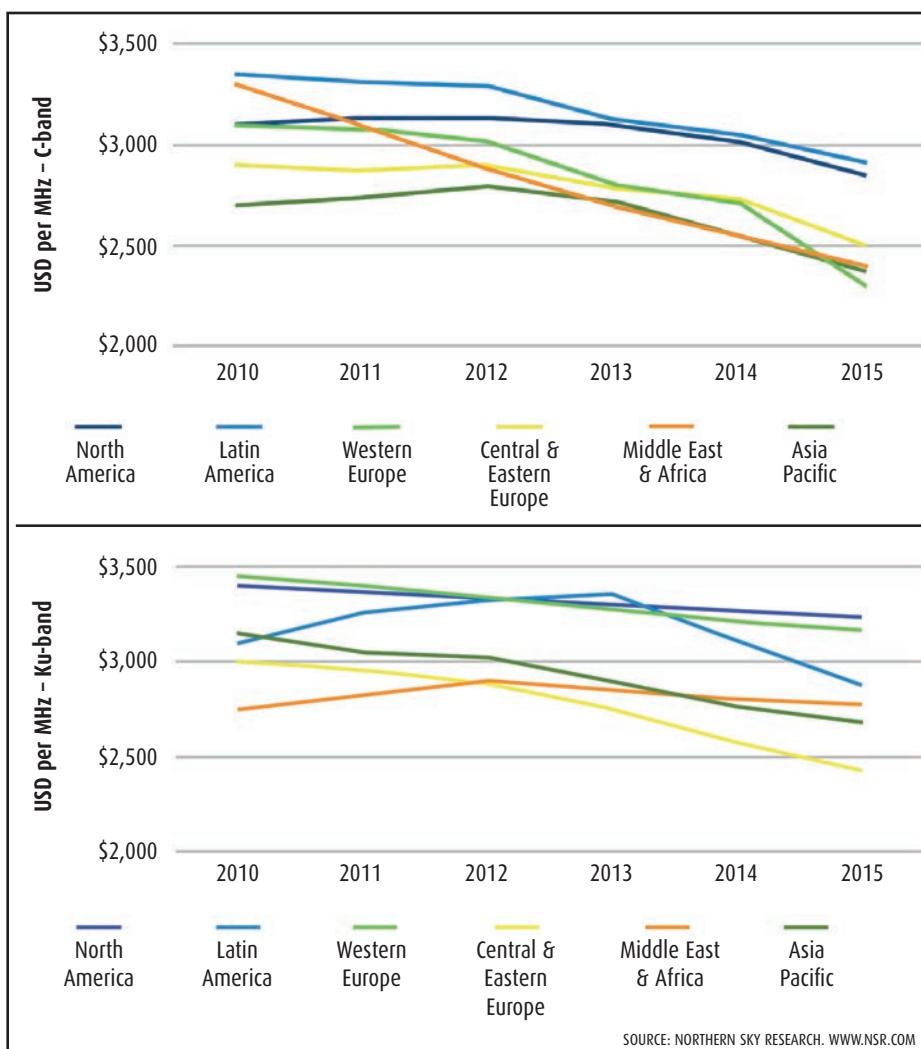
But according to Geoff Daniell, the GVF's correspondent for sub-Saharan Africa, affordability is equally applicable to all parts of the value chain. Speaking at the *FutureSat Africa Summit* last October, he said: "VSAT licensing and the fees associated with VSAT services in a number of African countries are a stumbling block with respect to the delivery of affordable VSAT and other satellite services."

High throughput, high earnings?

In its analysis, Northern Sky Research (NSR) projected that the number of in-orbit communications satellites will be fairly constant at around eight per cent of the 2016 total. But like Euroconsult, it said this will feature the progressive replacement of end-of-life FSS (fixed satellite service) spacecraft with hybrid and HTS (high throughput satellites). As a result, NSR reckons that by 2025 there will be a 318 percentage point growth in the number of hybrid and HTS compared to the current number.

The Global VSAT Forum (GVF) said that amongst the many advantages that HTS brings over traditional FSS satellites is a considerable reduction in the average cost per Gbps of bandwidth in orbit. It said NSR's analysis of the period 2010-2020 revealed average costs per Gbps of: USD98.48m for FSS; USD25.23m for hybrids; and USD12.22m for HTS.

Speaking at the *High Throughput Satellite 2016 – Enabling a Brave New World of Opportunity* roundtable event organised by the GVF in London last December, NSR president Chris Baugh said that while pricing pressures are not new, they are accelerating. He said pricing recently has been flat to slightly negative, and that while pricing pressures have not been felt equally across regions, all regions have seen recent declines.



According to NSR's research, average revenues have fallen from a mean value of USD2m per transponder per year in the 2006-2010 period, to USD1.88m for 2011-2015.

Baugh added that global satellite capacity – including C-, Ka- and Ku-band from GEO and non-GEO spacecraft – will increase from around 1800Gbps in 2015 to almost 14,000Gbps in 2025. Most of this is expected to be lower-cost GEO-HTS capacity which, said Baugh, will need new applications to soak up supply, or lead to a “sky falling scenario”. Non-GEO HTS is predicted to be less than 50 per cent of total capacity by 2025.

Globally, NSR forecasts significant GEO revenue growth across applications such as broadband access, mobility, government/military, enterprise data and DTH. These are expected to bring in USD6bn for satellite operators by 2025. But losses in contribution and occasional use TV, telephony and carrier services, and the distribution sectors will amount to USD910m during the same period.

Furthermore, NSR said that the revenue growth will not be evenly spread. It said that from 2015 to 2025, traditional FSS will decline by more than USD1.3bn, with earnings from C-band leasing losing USD1.3m and Ku-band USD23.9m.

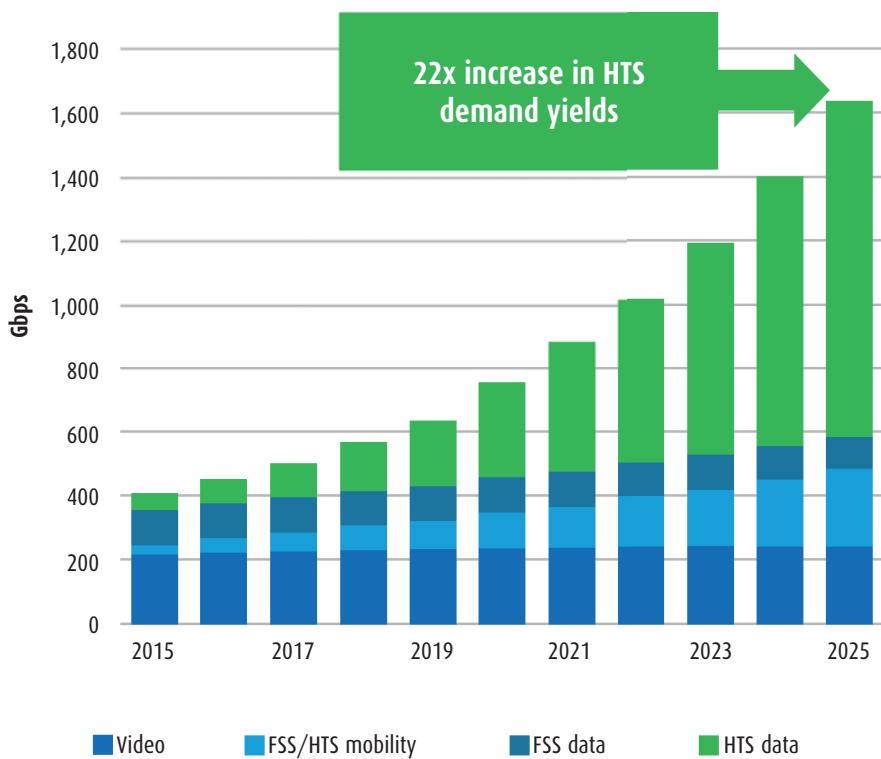
The GVF's Julián Seseña pointed out that satellite-based solutions should not be bound to last mile or rural environments. Instead, he said they should be part of the overall landscape of the telecoms offering for all type of users and all locations.

At the *FutureSat Africa Summit* he said: “African countries have developed their national plans towards enhancing the penetration of the telecommunication services, broadcast and broadband. In their efforts, the satcom industry should contribute to ensure that the value of the satellite component is fully appreciated when designing and implementing the national plans.”

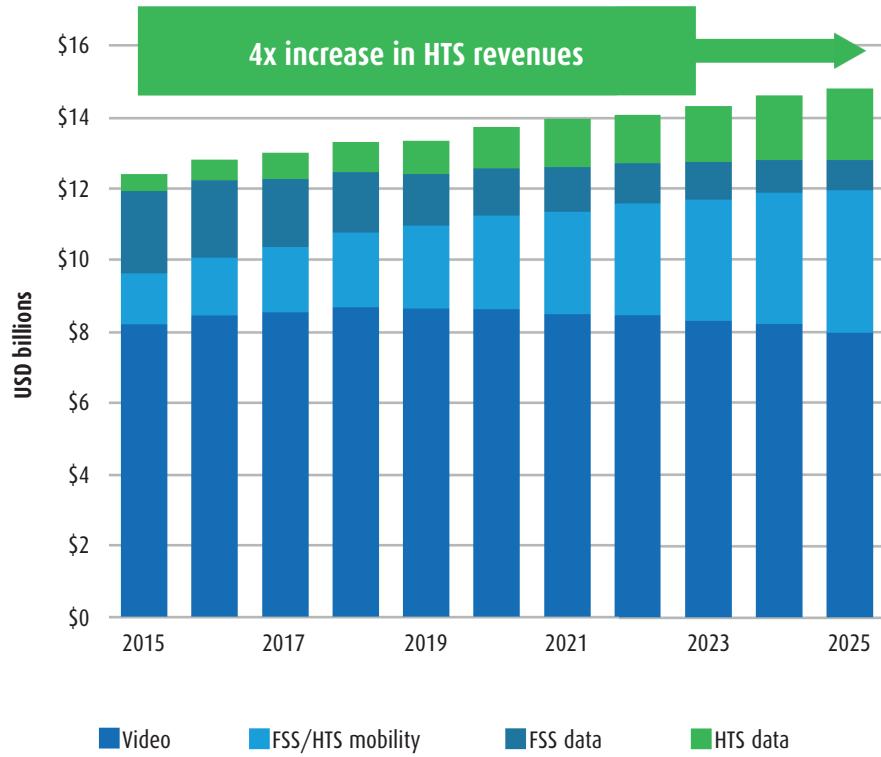
The GVF highlighted the changing structure of satellite terminal equipment and service pricing frameworks in recent years. It said this was due to many technological advances, such as the continued launching of bandwidth-efficient high throughput satellite capacity to geostationary orbits, together with plans for new LEO satellite constellations.

NSR supports this outlook and said there will be more than USD7bn in new HTS revenues by 2025. This will be led by GEO, while non-GEO is expected to provide what NSR described as a “solid” market of around USD2bn over the next eight years. ■

Satellite capacity demand by application (excluding broadband), 2015-2025



Satellite capacity revenues by application (excluding broadband), 2015-2025



SOURCE: NORTHERN SKY RESEARCH. WWW.NSR.COM

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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eSite x10 - The future of hybrid power is here

- Sealed, tamper-proof unit
- Suitcase-sized form factor for simplified logistics and installation
- Reliable network data for highest sustained performance



Flexenclosure's eSite x10 is the world's first hybrid power system purpose-built to withstand the most challenging outdoor telecom site environments.

Designed as a single unit for all site types, eSite x10 greatly simplifies logistics and delivers 24/7 uptime and industry-leading OPEX reductions.

eSite x10 is patented and delivers a number of ground-breaking technical innovations including passive cooling, protective soft power switching and no need for maintenance.

The future of hybrid power has arrived.



www.flexenclosure.com/eSite

eSite The eSite logo, consisting of the word "eSite" in a bold, sans-serif font next to a green leaf icon.

chapter 2

Cellular networks

The unstoppable rise of LTE



**Joe Barrett,
President,
GSA**

LTE is the fastest developing mobile system technology ever, and had 1.683 billion subscriptions by 3Q16. LTE connects almost one in four mobile users worldwide (22.4 per cent), and new subscriptions increased by more than 204 million in 3Q16. The *GSA Evolution to LTE* report updated in January 2017 identified the following facts:

- ❖ 790 operators investing in LTE in 201 countries
- ❖ 764 operator commitments to LTE in 196 countries
- ❖ 26 pre-commitment LTE trials in five more countries
- ❖ 581 commercially launched LTE or LTE-A networks in 186 countries, including 95 LTE TDD (TD-LTE) launched in 54 countries
- ❖ 183 launched networks are LTE-A or

LTE-A Pro in 87 countries

The GSA forecasts there will be more than 635 commercially launched LTE networks by the end of 2017. Mobile operator focus is moving to LTE-A and LTE-A Pro – 233 operators are investing in LTE-A in 100 countries and 17 operators have commercially launched LTE-A Pro networks.

VoLTE is another major technology initiative with 165 mobile operators in 73 countries investing in it, and many are also testing Video over LTE (ViLTE).

Interest in LTE-A continues to grow in Africa with operators in nine countries deploying commercial networks. As yet, there are no LTE-A Pro networks commercially available on the continent of Africa. [Editor's note: Namibian operator MTC claimed a first in 2016 with its LTE-A Pro trial – see p.24.]

LTE is also gaining traction in unlicensed bands, and LTE-U, LAA (Licensed Assisted Access) LWA (LTE-WiFi link Aggregation) and MulteFire are technologies that are addressing the unlicensed band access requirements.

Most LTE deployments globally use paired spectrum (FDD). The LTE TDD mode is complementary and the best choice for providing high-speed mobile broadband access in unpaired spectrum. Both FDD and TDD LTE networks are deployed in Africa matching operator spectrum assets and the different regulatory environments that prevail in the region.

Looking at the global scene and referencing GSA data, the most popular frequency bands are:

LTE-FDD: 1800MHz
2600MHz
2100MHz
800/850MHz
AWS – Band 4
APT700 (band 28) and 700MHz (band 12) are also growing strongly

LTE-TDD: 2300MHz (band 40)
2600MHz (band 38)
2600MHz (band 41)
1900MHz (band 39)

Devices

The GSA *LTE Ecosystem* report in January 2017 identified 7,037 LTE user devices launched in the worldwide market by 517 manufacturers, an increase of 2,621 or 59.3 per cent higher than the number of devices reported in February 2016.

Smartphones represent the largest segment (65 per cent) of all devices, while the LTE tablet segment is also growing with 570 devices identified.

Devices in User Equipment (UE) Category 4 (Cat-4) offer an enhanced user experience and a theoretical peak downlink rate up to 150Mbps with peak uplink up to 50Mbps on compatible networks. LTE-A

Algeria	Angola	Benin	Botswana	Burkina Faso
Burundi	Cameroon	Cape Verde	Chad	Comoros
Côte d'Ivoire	D.R. Congo	Rep. Congo	Djibouti	Egypt
Equatorial Guinea	Ethiopia	Gabon	Gambia	Ghana
Guinea-Bissau	Kenya	Lesotho	Liberia	Libya
Madagascar	Malawi	Mauritius	Mayotte	Morocco
Namibia	Nigeria	Réunion	Rwanda	Senegal
Seychelles	Somalia	South Africa	Sudan	Swaziland
Tanzania	Togo	Tunisia	Uganda	Zambia
Zanzibar	Zimbabwe			

47 countries in Africa are deploying LTE networks.

SOURCE: GLOBAL MOBILE SUPPLIERS ASSOCIATION. WWW.GSAM.COM.COM

Gabon	Kenya	Mayotte	Morocco	Namibia
Nigeria	Réunion	South Africa	Tunisia	

LTE-Advanced networks in Africa.

SOURCE: GLOBAL MOBILE SUPPLIERS ASSOCIATION. WWW.GSAM.COM.COM

deployment is a major trend with wide-scale commercialisation of carrier aggregation to combine different spectrum bands for greater bandwidth. Many operators have launched or are deploying networks supporting UE Cat-4 devices, and 3,726 devices (i.e. 52.9 per cent) of all LTE devices support speeds up to Cat-4.

Deployment of LTE-A systems for Cat-6 (300/50Mbps) or Cat-7 (300/100Mbps) user devices is a major trend. 544 devices support speeds up to UE Cat-6 (516 devices) or Cat-7 (28 devices) across most form factors.

GSA is also tracking Cat-9 and above UE devices. 74 Cat-9 devices have already been launched, supporting download/upload speeds of 450/50Mbps.

In addition, higher bandwidth devices are also starting to appear, and at the time of writing in mid-February 2017, 61 devices have already been launched, including:

- 1 Cat-10 (upload/download: 450/100Mbps)
- 16 Cat-11 (600/50Mbps)
- 18 Cat-12 UE (600/100Mbps)
- 24 Cat-13 UE devices (390/150Mbps)
- 1 Cat-15 (up to 750Mbps download)
- 1 Cat-16 (up to 1Gbps download)

In 2016, GSA introduced a new vendor-led Spectrum Group comprising spectrum and regulatory-standards experts from Ericsson, Huawei, Intel, Nokia and Qualcomm. The group is supporting work leading up to the World Radiocommunications Conference meeting in 2019 (WRC-19), and in Africa the GSA-SG African Telecommunications Union team is supporting and replying to regional consultations and enquiries on spectrum usage and availability. ■

The grandmasters of data"

It wasn't just a rise in SIM card shipments for LTE, African operators were rolling out new launches and network expansions to satisfy the consumer demand for faster mobile connections.

At the beginning of 2016, Smile Telecom claimed it had launched East Africa's first VoLTE service. It had initially been introduced last November in Kampala, Entebbe and Mukono. Rollouts in other towns and cities, including Jinja, Mbale, Soroti, Tororo, Lira, Gulu, Masindi, Kasere, Fort Portal, Kabale, Mbarara and Masaka happened over the remainder of the year.

As well as in Uganda, Smile also operates LTE networks in Nigeria and Tanzania, both of which also launched the *SmileVoice* and *SmileUnlimited* LTE voice services later in 2016.

Despite Smile's progress in East Africa, it was a Southern African outfit that pushed the boundaries for even faster connections. April saw Namibian operator MTC commercially launch LTE-A in several parts of Windhoek, and also claim to have inaugurated the continent's first 4.5G trial which delivered "unprecedented" mobile speeds of almost 1Gbps.

During the closed trial which was attended by dignitaries such as the country's president, Dr. Hage Geingob, the operator worked with Huawei to demonstrate 4.5G or LTE-A Pro. According to the vendor, 4.5G is the natural evolution of 4G and a necessary transition to 5G. Compared to 4G, it said 4.5G has much better network performance in terms of bandwidth, capacity and latency, and will allow for

speeds of up to 1Gbps over mobile and latency of less than 10 milliseconds. Huawei added that 4.5G will be better for developing the IoT with its ability to support up to 100,000 connections per cell.

As well as trialling LTE-A Pro, MTC also successfully demonstrated LTE-A with speed tests reaching close to 300Mbps.

In October, Nigerian operator Globacom claimed it had become the first in the country to launch 4G services. The rollout covered nine cities including Lagos, Port Harcourt, Abuja, amongst others. Barely a month later, another eight locations had been added to its *Glo 4* branded network: Okada (Igbinedion University); Ekpoma (Ambrose Alli University); Bonny, Escravos, Forcados, Abraka (Delta State University); Agbor (College of Education); and Sapele (Western Delta University).

Describing Globacom as the digital network for both the present and future generations, Kamaldeen Shonibare, head of corporate sales, said: "We're the next generation network, the grandmasters of data. That is why we have taken the lead in providing 4G LTE nationwide with mobility for Nigerians."

Algerian operators also talked up their new LTE offerings. Djezzy, a subsidiary of VEON (formerly VimpelCom) and Global Telecom Holding, announced its launch of LTE services in the country in early October in bombastic style: "Djezzy's 4G/LTE roll out is not simply an evolution, it's a revolution for Algeria and will change the way we interact with our customers through the digital world," claimed Djezzy CEO Tom Gutjahr.

The operator said its 16 million subscribers would benefit from the largest

JANUARY 2016

Tanzania's regulator has accused the country's operators of ignoring repeated requests to secure their networks against malicious and spoof callers. The Tanzania Communications Regulatory Authority (TCRA) claims consumers are being endangered by fraudsters sending deceitful and misleading messages aimed at tarnishing the targeted person's reputation or extorting money.

Over a two-month period towards the end of 2015, 42 incidents are said to have been reported to the regulator and the police, including one case where a victim stood to lose around TZS25,000,000 (USD11,435). An investigation was carried out in mid-December 2015 after which the authority said the country's operators were still not complying with statutory regulations by implementing measures to safeguard against the use of their networks in sending spoofed messages.

FEBRUARY

MTN has teamed up with Spain's Telefónica as part of a strategic agreement that will see the two companies work together to benefit from their joint scale, combined expertise, and market access. The initial aim is to improve their appeal to enterprise users. This will include services to multinational companies in each other's footprint, collaboration in M2M, and new digital products and services targeting the B2B segment.

Under a separate signed strategic agreement with Switching House, MTN has launched a cashless payment solution and claims to have bridged the divide between large enterprises and informal merchants. The solution leverages MTN's *Mobile Money* platform and will enable informal merchants and traders to pay for goods using basic SMS or USSD on smart or feature phones, and without the need for a formal bank account.

MARCH

ZTE has completed the upgrade of Airtel Uganda's 3G network. As part of the upgrade, the vendor says it deployed the country's first nationwide commercial UMTS900 system, and claims this has increased network performance by 20 per cent. The project consisted of Airtel swapping out a total of 674 3G sites. It involved the adoption of ZTE's multi-mode ultra band and integrated SDR 2.0 solution which is designed to support a "smooth evolution" towards LTE/LTE-A networks.

APRIL

The Independent Communications Authority of South Africa (ICASA) launched an enquiry into the existence of some licensees that are not traceable. This follows a number of futile attempts to trace the activities of four companies, and their non-compliance with the terms and



Sales head Kamaldeen Shonibare – seen here with some of his colleagues – said Globacom is committed to giving citizens access to 4G wherever they are in Nigeria.

coverage across Algeria as well as the fastest mobile digital service.

Not to be left behind, rival operator Ooredoo Algeria successfully completed its pre-launch phase for 4G and started introducing services last year.

However, the path to LTE didn't always run smoothly. Operators in Egypt weren't ready to sign on the dotted line until the issue of available spectrum had been satisfied. Following months of pre-sale discussions, the National Telecom Regulatory Authority's (NTRA) deadline for the sale of the licenses ended on 22 September. But only new mobile entrant, fixed line incumbent Telecom Egypt, accepted a license for a fee of EGP7.08bn (USD797m). In the words of the NTRA, the country's three other cellcos – Vodafone, Orange and Etisalat – "shunned" the opportunity to acquire licenses.

Vodafone explained its decision by releasing a statement which said: "The license does not offer sufficient spectrum to operate 4G services efficiently and in a way that would allow the Egyptian user to experience significantly higher speeds. Furthermore, the lack of available 4G spectrum could also impact the quality of 2G and 3G services

being enjoyed by over 40 million existing customers. Accordingly, the board has decided to decline the 4G license in its current form."

Orange Egypt supported this view. Even NTRA president Mustafa Abdul Wahid reportedly agreed that the amount of spectrum on offer was "not enough" for Egypt's 90 million users.

After the 4G sale failed to attract any bids from the three mobile operators, the GSMA called for renewed dialogue between the authorities and the country's mobile industry. Based on its own international experience, the association said the total amount of spectrum assigned to each operator for 4G needed to be in the range of 2 x 30MHz to 2 x 60MHz. It added that this had to be across a range of coverage and capacity bands, with a minimum contiguous bandwidth of 2 x 10MHz in each band to enable efficient network economics.

As a result of the rejections, the NTRA withdrew its original offer and considered alternatives, including offering the licenses in an international auction. But following restarted talks with local operators in early October, the regulator revised its terms. It took less than a couple of weeks for all three of the other cellcos to sign up for 4G licenses.

Regulators to the rescue

Healthy competition can be a force for good, but sometimes regulators need to step in to help things along. For example, the Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) started working with local operators in an effort to lower prices for mobile data services.

According to reports, Zimbabwe had the third-most expensive data tariffs in Africa, and this was hindering both consumer access and businesses. POTRAZ said it hoped its discussions with the country's mobile operators would lead to the introduction of cheaper data services within the first few months of 2017.

The bulk of internet access in Zimbabwe is via mobile networks, with the country of more than 13 million people home to only around 100,000 fixed broadband subscribers at mid-2016. According to statistics published by the regulator earlier this year, a total of 1.8 million gigabytes of mobile data were consumed in the second quarter of 2016 – a 23 per cent increase from the 1.5 million gigabytes in the previous quarter. All three mobile operators – Econet Wireless, NetOne and Telecel – experienced an increase in internet and data utilisation, with Telecel experiencing the largest growth.

The data also showed that mobile penetration rate increased to 97 per cent in 2Q16. However, national traffic declined by 3.6 per cent despite the numerous mobile voice promotions that were available during the quarter. POTRAZ attributed this in part to declining consumer demand due to economic downturns.

conditions of their electronic communications licenses. The firms include: Sundial Telecom; Karel Greef; Mystic Blue Trading 55; and SBS Telecoms. They were each given a deadline of the end of April 2016 to inform the regulator that they were active licensees.

MAY

Sudan's National Authority for Communications released news that it is partnering with Sudatel (Sudanese Telecommunications) to help build towers in the country. The agreement is part of a project to expand telecoms services in Sudan, and will eventually see the creation of more than thirty towers in remote areas with funding from the universal access fund. In a deal worth SDG18m (USD2.9m), Sudatel will work with local contractors to build nine towers in the Blue Nile and central areas of Darfur, as well as in southern, western and northern Kordofan.

JUNE

Zambia's regulator confirmed that Vodafone will not be entering the market as a voice provider. Zambia Information and Communications Technology Authority (ZICTA) says there had been "rising speculation" and that it had received "numerous enquiries". A press statement from ZICTA issued earlier this year said: "The Authority wishes to dispel the perception that Mobile Broadband Zambia, trading as 'Vodafone Zambia', is entering the market as a voice provider". It added that the company's license was only for providing data services to the public.

JULY

Airtel, Millicom and Vodacom have launched what they say is East Africa's first active infrastructure sharing initiative. Working with the GSMA, the operators will launch six 3G

pilot sites to test the sustainable provision of mobile broadband services to 13 million underserved people across rural Tanzania. The GSMA says operators have so far been able to deploy their 2G networks to up to 85 per cent of the country's population, while 3G network deployment is mostly limited to urban areas. This has resulted in only 35 per cent of Tanzania's people being able to access the mobile internet.

AUGUST

Communication Regulatory Authorities in Southern Africa (CRASA) and the GSMA ran a workshop on spectrum pricing and auction. Hosted by the Communications Regulatory Authority of Namibia, the event took place in Windhoek on 18-19 August. The focus was on bridging the skills and knowledge gaps in spectrum valuations and auctions and

In South Africa, all wireless service providers will be required to return their previously assigned spectrum under a new framework outlined in a policy whitepaper that was approved by the Government. The move is an attempt at levelling the playing field for operators.

The National Integrated ICT policy paper, which has been in development since 2012, called for the establishment of a wireless open access network (OAN) that places spectrum previously assigned to wireless operators in a pool. The paper stated: "This will ensure that operators with significant market power do not leverage access to their infrastructure and critical resources to maintain dominance and deny market access to competition."

Following the adoption of the whitepaper, the Independent Communications Authority of South Africa (ICASA) was required to conduct an industry-wide consultation process to determine the terms and conditions, as well as the timeframe, under which the currently exclusively/individually assigned high demand spectrum will be returned to the regulator.

ICASA will be addressing spectrum issues when it co-hosts the Dynamic Spectrum Alliance's (DSA) Global Summit that will be held in Cape Town in May 2017. The alliance said it was going to put spectrum sharing opportunities at the top of the agenda and that ICASA will play a "significant" role following its discussion paper on the framework for dynamic and opportunistic spectrum management. The consultation document covers a proposal to authorise license-exempt access to TVWS frequencies.

Paul Garnett, DSA chairman and also director of affordable access at Microsoft, said: "The spectrum sharing technologies and

policies that the [alliance] began promoting almost four years ago are now central to discussions about current and future spectrum access and emerging 5G scenarios."

During late 2016, the DSA welcomed 11 new members including several from Africa. They included Project Isizwe which had been rolling out free public Wi-Fi in South Africa, and C3 which was building a wireless network across Malawi. Other new African members included AirJaldi Networks and Ekovolt.

Defending the networks

There are many challenges that mobile network operators have to face. One of the key problems is lost revenue. Djibouti Telecom signed up to use a variety of solutions from Syniverse to gain visibility into and manage its end-users' experiences, while protecting the network from fraud.

The state-owned mobile operator is using the vendor's *Roaming Data Analysis-Visibility Services* for real-time access to roaming performance data through what's said to be an "easy-to-use" window that aggregates all subscriber data into a single view.

Djibouti Telecom has also deployed the *Forecasting and Budget Management-Optimizer*. Syniverse promised that its product would automate the planning, forecasting and budget process to help make the operator's roaming inter-operator tariff discount negotiations more profitable.

The firm also said that *Roaming Fraud Protection* would offer Djibouti Telecom a managed service which includes an analyst team and a cloud-based application that monitors roaming data globally for suspicious behaviours 24 hours a day, seven days a week.

In Mozambique, however, the danger was coming from a glut of unregistered SIM cards. The National Institute of Communications of Mozambique (INCM) started taking steps to block the millions of unregistered SIMs in the country.

At the start of September 2016, the regulator said three million phone numbers issued by Mcel, Movitel and Vodacom would be affected as part of a phased deactivation that would run until November. It said that the move was in compliance with the provisions of the Rules of Registration and activation of Subscriber Identification Modules Mobile Telephone Service that was approved in August 2015.

The INCM said that despite joint industry campaigns carried out to make consumers aware of the importance of SIM registration, many subscribers are still not "regularised". As a result, each MNO was ordered to lock a million SIMs that had not been properly registered. "This action is critical to [ensure that] the entire telecommunications system is regulated and operates safely," stated the INCM.

This came in spite of an announcement back in March 2015 where the three operators said that they had disconnected one million unregistered accounts.

The physical infrastructure that powers the cellular networks can also come under attack. In the past, copper cables have been a tempting item to steal from operators because of the metals' worth. It was hoped that the move to fibre would stop such thefts, but sadly vandalism is still an issue.

On 2 August 2016, thousands of mobile and fixed line customers in the South African province of Limpopo were left without connectivity following a serious incident of sabotage to the Telkom network. The operator

how these can be used to achieve policy objectives. Participants were also provided with insights into how license conditions, reserve prices and regulatory policy impact spectrum values, auction participation and outcomes.

SEPTEMBER

The GSMA and the World Customs Organisation (WCO) announced that they will partner in the fight against the counterfeiting and fraudulent trading of mobile devices. The GSMA's mobile device database and the WCO's IPM mobile platform will be integrated. This will give customs officers global, real-time product information on devices, enabling them to assess the authenticity of device shipments as they cross borders. The

move is intended to improve cross-border trade procedures, assist with the rapid detection of counterfeit goods, and secure the international trade supply chain.

OCTOBER

In mid-October, a Nigeria Communications Commission (NCC) operation unit backed by security forces reportedly arrested six men in Kano for being in possession of hundreds of pre-registered SIM cards. They were arrested in two separate raids in the GSM village located at the farm centre and the Yankura market in the metropolis. Selling pre-registered SIMs is a criminal offence in Nigeria, and the NCC said it would continue to raid markets across the country in order to stamp out the problem.

NOVEMBER

The Communications Authority of Kenya (CA) says its decision to license MVNOs two years ago is beginning to pay off.

In its statistics for the last quarter of the 2015/2016 financial year (April-June 2016), the regulator reported a significant increase in mobile subscriptions and usage of voice minutes. It said mobile subscription grew by 9.9 per cent to 39.7 million while the penetration level hit 90 per cent, having grown by 6.1 percentage points.

In April 2014, CA granted MVNO licenses to Finserve Africa, a subsidiary of Kenya's Equity Bank, and two Kenyan mobile money transfer services, Tangaza Mobile Pay and Zioncell Kenya. Sema Mobile Services also gained an MVNO license during in the 2015/16 financial year.

immediately sent its engineers to the sites where fibre cables had been cut. They worked through the night to restore connectivity. "Three significant cable breaks occurred, but this was not cable theft," said Telkom Group spokesperson Jacqui O'Sullivan. "This was the targeted and considered action of a person or persons who knew where to go, how to access the fibre, and how to do the most damage. This was sabotage."

She added that South Africa's Criminal Matters Amendment Act has created a new offence to criminalise damage to essential infrastructure or interfering with the functioning of basic services through criminal activity.

Telkom investigated and cooperated with the authorities to share all information that could be used to identify the saboteurs. As a precautionary measure, security was immediately bolstered at key communication points by state security services. The operator also announced a ZAR250,000 reward for information leading to the successful prosecution of the perpetrators. This was subsequently raised to ZAR1m.

The company said that since the start of a strike by members of the Communication Workers Union (CWU) in July, it had experienced an increase in acts of sabotage on its network, especially in Gauteng, Limpopo and the KZN province. In late August, Telkom said more than around 85 of its street cabinets had been damaged in the past few weeks and fibre and copper cables cut.

Strengthening the backbone

The backbone of any cellular network is the networking equipment that pipes all the data between the base stations. Backhaul capacity bottlenecks can be a key problem

that affects the overall success of a cellco's operations. In a trailblazing move, Orange's mobile operation in Egypt became the first operator worldwide to deploy Ericsson's *MINI-LINK* 6352 microwave radio – an outdoor unit for E-band frequencies (70/80GHz) which supports 5.5Gbps capacity over 750MHz channel.

Rafiah Ibrahim, head of Ericsson MEA, said: "The advantages of E-band are its wide spectrum and channels that enable very high capacities. An enhanced customer experience is the key to differentiation for operators to succeed in competitive markets such as Egypt."

According to the vendor, E-band spectrum will experience major growth globally and represent up to 20 per cent of new deployments in 2020, with traditional bands still accounting for 70 per cent. It believes the spectrum is instrumental in supporting microwave to meet the capacity increase for backhaul as well as fronthaul, and claimed the deployment of *MINI LINK* will improve Egypt's readiness for widespread LTE adoption, and enable Orange to become a data centric operator.

Over in Ethiopia, Ethio Telecom chose ZTE to construct its new high-bandwidth backbone transmission network covering the country's western and southern regions.

The 100G dense wavelength division multiplexing optical transport network (DWDM/OTN) promised to increase capacity by ten times.

According to ZTE, the network integrates an intelligent WDM automatic switch optical network (WASON) and uses polarisation-division multiplexing quadrature phase shift keying (PM-QPSK) modulation, coherent reception,

and software decision forward error correction (SD-FEC) technologies. It said the transmission backbone network will be built to achieve a large-capacity OTN for cross connects, optical network intelligent scheduling and ultra-long distance transmission. The aim of the project was to provide Ethio Telecom with the capacity it needs to evolve its 2G, 3G, LTE, fixed-line voice and broadband services in the future.

In the quest for speed, South Africa took another leap forward. ADVA Optical Networking successfully conducted a trial to transmit data rates of 200, 300 and 400Gbps over Cape Town's metro network. The test was also one of the first field demos of DP-8QAM to achieve interim capacity of 300Gbps. The trial made use of the city's existing WDM infrastructure which stretches over more than 100km across the entire metropolitan area.

The meshed network is built on ADVA's *FSP 3000* modular optical networking platform. This was combined with its *CloudConnect* technology to connect the townships of Nyanga and Mitchells Plain.

To achieve the high capacity, the demonstrators created a two-wavelength super-channel. ADVA said data rates were then switched between 200, 300 and 400Gbps to show how capacity can be automatically adjusted according to the network's shifting traffic and transmission quality requirements.

The company added that successfully transmitting a 300Gbps channel at a modulation rate of just DP-8QAM is a "significant milestone". It claimed this format can handle lower signal-to-noise ratios for increased reliability, yet optimised fibre utilisation.

DECEMBER

Vodacom has completed the commercial deployment of a Dual-Carrier High-Speed Uplink Packet Access (DC-HSUPA) network solution in South Africa.

DC-HSUPA offers an uplink peak rate twice as much as single-carrier uplink peak rate on UMTS networks. The operator claims a doubled peak rate puts it in a better position to deliver a "superb" mobile internet experience by combining advanced 4G networks with the fastest 3G networks.

It adds that an overall DC-HSUPA deployment not only offers higher uplink data rate services with shorter delays, but also helps balance traffic loads between carriers to improve the uplink capacity of HSPA+ networks. Vodacom worked with Huawei on the implementation.



Luke Taylor,
Deputy CEO & CCO,
Neural
Technologies

The year ahead: It is no longer enough to provide a communication line. Telcos need to start thinking outside the box and offer more features, more benefits, more reliable provision and a wider range of services in order to attract and retain customers and avoid becoming a 'dumb pipe'.

Further consolidation is needed, since diminishing margins and stretched profitability causes shareholders and investors to look at their possible returns as the market matures.

In order for African CSPs to break out of stagnation and increase their competitiveness,

we will see an increase in mergers and acquisitions as companies seek to obtain the key features of complimentary companies. Such mergers and acquisitions will become more common as CSPs continue to look at new lines of business to maintain profitability and show increasing share value.

By upskilling existing staff and offering apprenticeships and work programmes to school leavers, African telcos could realistically keep quality of service and fraud management up, whilst keeping costs down. I would hope to see an increasing trend towards training and aspiration rising over the next 12-24 months, as we have already seen this with our own customers in the region of undertaking academies and education/apprentice type initiatives.



Babak Fouladi,
CTO,
MTN Group

Babak Fouladi joined MTN early last year. Prior to that, he was CTO of Vodafone Spain and held a similar role at Vodafone Romania.

In 2016, he says MTN's focus ranged from the deployment of networks to improve quality and capacity, to connecting subscribers

to the world and enabling greater digital inclusion through connectivity and services.

"We are aware of the impact and potential of connectivity, and have made extensive investments in the past year across our operations in order to provide superior customer experience and a competitive data network. This in turn aims to better support the increasing demand for data and digital services."

On the network side, he says MTN increased its capital expenditure by 19.6 per cent to ZAR34,920m, and rolled out almost 2,500 2G sites, more than 8,200 3G sites, and almost 7,700 LTE sites across its footprint.

In particular, Fouladi says the company's South African operation was part of an "aggressive network rollout" which focused on 3G and LTE, as well as the rollout of FTTH connections. Key to MTN SA's FTTH rollout was the acquisition of Smart Village in December 2016. This added to MTN's existing fibre subscriber base, resulting in a total of 7,000 homes now connected.

Nigeria also benefited from substantial network investments by MTN. The company increased its capex in that country by more than 100 per cent in 2016 to roughly ZAR8.7m, and rolled out close to 1,800 3G sites and more than 1,800 LTE sites during the year. MTN also successfully launched its 4G network in Ghana, obtained LTE and fibre licenses in Congo Brazzaville, as well as a spectrum license in Nigeria.

"Recognising that ICT-enabled solutions not only connect people, but furthermore, improve economic participation, lead to social development, and make life better in many different ways, we also continue to drive digital services in our markets," adds Fouladi.

Of particular importance to MTN, is bridging the financial divide. With estimates showing that 326 million people living in sub-Saharan Africa do not use banks, he says there is evidence of the need for such services. In 2016, MTN's mobile money services evolved from offering basic transfers and micro-payment services to savings and loan products. In Uganda, for example, customers can now remotely open a *MoKash* account using their phones and access micro saving and loan services.

In addition, by the end of 2016, MTN had established 28 mobile remittance corridors between countries in Africa. The company is also making strides in its lifestyle offerings, says Fouladi.

In its *Mobile Economy Africa 2016*¹ report, the GSMA stated that mobile has emerged as the platform of choice for creating, distributing and consuming innovative digital solutions and services in Africa. Fouladi says it has therefore become essential for operators to stay ahead of the curve in catering to customers' needs.

With four million paying subscribers on its streaming product, he claims MTN is a leading distributor of digital music in Africa. The company has also launched a gaming offering in nine markets.

"In the past year, the industry continued its rapid evolution in both the traditional connectivity business and in non-traditional businesses such as mobile financial services and content-based services.

"We have also seen big shifts in terms of technology, with a distinct move from 2G to 3G in many markets, and even from 3G to 4G in some markets. Almost half of MTN's subscribers (112 million) are data users. Looking at how the industry is evolving and customer needs are changing, we continue to develop our offerings, with a strong focus on improving our network and driving smartphone penetration in our markets so that customers can benefit from our lifestyle, m-health, m-education, enterprise and MFS services, among others. Importantly, we now connect businesses as well as consumers.

"However, while the potential of mobile continues to be a driving force on the continent, it is not without its challenges. According to the GSMA: 'Mobile internet adoption in Africa continues to grow rapidly. The number of mobile internet subscribers tripled in the last five years to 300 million by the end of 2015, with an additional 250 million expected by 2020. However, by 2020, 60 per cent of the population will still be unconnected.'

"Affordability is a major barrier to adoption, with many low-income groups unable to experience the benefits of digital inclusion, because they cannot afford internet-enabled phones and devices. For its part, MTN has made low-cost devices available in many of its markets, enabling customers to access basic services such as application downloads and social media platforms. In 2016, 400,000 low-cost smart

phones were made available in Cameroon, Nigeria, Congo and Liberia.

"Linked to smartphone penetration, however, is availability of the necessary spectrum, which continues to pose a problem for operators on the continent. Connectivity is dependent on mobile networks, with capacity of the network determined by the available radio frequencies.

"We understand how people across the continent stand to benefit from connectivity, and digital services. This is why we continue to drive affordable smartphone penetration in many of our markets. However, as customers move to smartphones, data usage increases. To meet these needs operators require spectrum, which is not available. At present, the spectrum available in most of Africa is good for 2G and 3G, and we are serving 4G on top of that spectrum as well."

Fouladi continues by saying that a point reaffirmed by the GSMA is that the shortage of appropriate spectrum for mobile operators, caused largely by the slow progress in the switch over from analogue to digital terrestrial television, must be addressed with haste. Its report states: "If policymakers across the region step up efforts to allow mobile operators to have access to the spectrum they need, Africa will enjoy major social and economic benefits. Spectrum has no intrinsic value, but can be a valuable resource when put to productive use."

Despite the challenges, Fouladi remains optimistic about the future. "Connectivity is central and has always been at the heart of who we are as MTN. It is a pillar of our mission to connect people, enable the unbanked to become banked, the unconnected to become connected and those who are banked and connected to be part of the digital inclusion journey. This includes businesses.

"We continue to make pan-African investments, connecting countries across the continent and enabling enterprises and businesses to work beyond borders. We want to continue to drive innovation to address social needs and enable greater digital inclusion.

"I am super-excited about where this industry is headed, where MTN is headed, and the potential we have to continue to impact lives for the better through our connectivity and digital services."

Further reading: MTN Group 2016 Sustainability Report (www.mtn.com/en/mtn-group/sustainability/more-on-sustainability/Pages/Report-archive.aspx)

¹ The Mobile Economy Africa 2016 (www.gsma.com/mobileeconomy/africa/)



**Yves Bellego,
Director of
technical &
network strategy,
Orange**

With its growing footprint of 21 markets across the region, Yves Bellego says Orange sees itself very much as a partner and facilitator of the continent's digital transformation that is now well under way.

"Our aim is to deliver an unmatched customer experience and therefore the network and technology choices we make play a fundamental role in helping us achieve this goal.

"But navigating this diverse region presents many unique opportunities and challenges for us and the industry as a whole.

"Among the market trends we have seen over the last twelve months, the growth in data consumption is clearly the main one shaping our own network strategy for the region. With a 70 per cent growth in data traffic across the region there is clearly a need to anticipate and keep pace with this growing demand. As a result, there are now subscribers in Africa with very similar data usage statistics as their European counterparts.

"Coupled with this uptake of data services has been the increased adoption of smartphones, a growing proportion of which is 4G. Orange itself has seen a 40 per cent increase in LTE smartphone sales across the region in 2016, with the largest growth coming from sub-Saharan Africa at a staggering 350 per cent increase.

"Nonetheless, unlike Europe, a large proportion of the population are still using feature phones, particularly on 2G. This is because the 2G network is still the predominant network outside of cities where 4G is becoming commonplace (in countries where we have launched 4G). Serving populations with such diverse usages therefore presents a significant network challenge for operators which we do not have in Europe.

"As a result, Orange's focus for its network deployments in the region over the past year has concentrated on the deployment of mobile broadband access for customers using 3G and LTE. We started with 3G and now have that in all of our territories. The goal now is to do the same with 4G. So far, we have achieved this in 10 out of our 21 countries, including four added in 2016.

"Currently, 4G is rare outside of cities so our challenge (as is the rest of the industry's) will be to extend and improve 4G broadband coverage into rural areas. As we look ahead to the next twelve months, the rollout of 4G mobile broadband will undoubtedly continue to be a key focus. However, the pace of

this deployment is dependent on obtaining licenses. With little harmonisation across the region and the discussions made on a country-by-country basis, this is a challenge that the whole industry faces as it strives to deliver faster mobile broadband for our customers.

"Another key area of focus for Orange in the region during 2016 was improving the backhaul through fibre connectivity in order to plan for progressive increases in data traffic.

"We began by upgrading international backbones through submarine and terrestrial fibre deployments. This gave international connectivity to many countries that were previously not connected and, crucially, gave them multiple connections to provide security, should one connection be cut. We are now upgrading national backbones, evolving them from pure microwave to a combination of microwave and fibre. To this end we are progressively bringing fibre closer to the mobile switches and radio sites. Roughly half of our countries now have national fibre backbones, which is encouraging progress as we look to ensure a good throughput across the country. This is a specific issue to Africa because in Europe there is a strong existing network of fibre.

"We have also witnessed the market evolve from one where the main services were just voice, money transfers and SMS. Today, we need to ensure QoS for video streaming and for increased data consumption more generally. This adds a new complexity to operators' network management plans.

"At Orange we have put a lot of effort in the last 12 months into improving and optimising the quality of service to support our goal to deliver an unmatched customer experience. To this end we launched two new global network operation centres in 2016; in Abidjan in the Ivory Coast and Dakar in Senegal.

"Having two large GNOCs ensures that we have the same tools to manage the network at our disposal as we do in Europe. They enable us to measure what the current quality levels are and, crucially, we now have the tools to optimise and improve the quality to get it to the level we want. Having experts with the right competencies in just two locations rather than being spread out has made the management of QoS much more efficient.

"Orange expanded its footprint in 2016 with operations in three new countries – Sierra Leone, Liberia and Burkina Faso. The GNOCs will play a key role in terms of improving quality of service in these markets going forward. Naturally, it remains an ongoing challenge to master the quality, and as data levels rise this is going to be an increasing area of focus for the entire industry in the region.

"In the coming years we will see Africa becoming a continent with its own content and services which will need to be hosted locally. Today, there is a lot of effort on access network and the challenge for the industry going forward will be to develop local or regional data centres on the continent that will propel its digital transformation to the next level.

"Finally, although 5G is still some distance off, it needs to be anticipated. We are one of the operators pushing for the requirements for the MEA region into the 5G standardisation process. We believe 5G could be an important solution for the region in the next decade that enables the deployment of wide high broadband coverage at low cost. That is why we are pushing for this to be part of the standards.

"The next twelve months will undoubtedly be full of challenges and opportunities for operators in the region. But we anticipate a steady growth and adoption of new data-intensive services that will continue to challenge and shape the operators' networks and technology choices."



**Paul Marshall,
Co-founder &
chief customer
officer,
Eseye**

Eseye is an M2M connectivity provider for Internet of Things devices. The UK-headquartered company claims to take the risk out of large IoT deployments through the design and delivery of customer specific SLAs and managed services. The firm says it delivers this on its secure global "network of networks" which encompasses more than 440 operators.

Eseye co-founder and chief customer officer Paul Marshall reckons Africa presents a prime example of how connectivity is allowing mobile-enabled utility services to be delivered in the most remote locations.

"In the western world, utilities are often taken for granted. The majority of citizens live in a house with water, electricity and gas automatically connected and monitored on meters; very few will even consider the prospect of life without what they see as basic necessities.

"There is no starker contrast to the western world's approach to utilities than in Africa. 115 people on the continent die every hour from diseases linked to contaminated water,² while 589 million habitants live without electricity.³

"However, mobile technology is already starting to change the shape of utilities across the continent – so much so that other regions

could learn from the IoT deployments which are already changing lives."

Marshall says accessing utilities in the western world is relatively straightforward. "For instance, if you want to connect a phone line to your home, you contact a local phone company, give them your address, bank details, etc. and the provider runs a credit check on you. If you pass, the company connects you to the network. It understands that you have credit in place to pay for the service in advance, as you have an address and are associated with a bank, and have a measurable credit rating.

"However, if you are one of the millions of people across Africa who are 'unbanked', the process is not nearly as easy. Without credit, how do you show a provider it is worth building a phone line and connecting you to its service? How can you guarantee its investment in you and in your phone line is going to pay off?

"More importantly, it is staggering to see how this system for phone connectivity is the same as issues faced when looking at essential infrastructures such as water, waste disposal, electricity, or any utility the western world now takes for granted.

"If this problem was faced in the UK, various organisations would compete to build roads, infrastructure or whatever was required to allow the service to be sold and delivered. However across Africa, organisations don't have this option. Instead they are forced to find alternative solutions to solve the problem and drive innovation as they do so.

"Most are turning to the one universal infrastructure that exists across the world – the mobile network. As with the mobile expansion across Europe in the 1990s, Africa saw the same expansion, giving the continent its only universal utility service. In fact, more than double the population⁴ in sub-Saharan Africa has mobile phone access compared with access to paved roads.

"Therefore, businesses looking to deliver utilities in African countries are surpassing their western world counterparts,

² UN Water for Life Decade 2005-2015:
<http://www.un.org/waterforlifedecade/africa.shtml>

³ The Borgen Project – Top 10 poverty in Africa facts blog, Jordanna Packtor, Nov 2014:
<http://borgenproject.org/10-quick-facts-about-poverty-in-africa/>

⁴ World Bank, Mobile connectivity in Africa has already arrived, Borko Handjiski, Mar 2015:
<http://blogs.worldbank.org/africancan/mobile-connectivity-in-africa-has-already-arrived>

maximising the mobile network to deliver innovative utility services to millions."

Marshall says that one such business delivering utilities in innovative ways is M-KOPA. The Nairobi-based company has provided light to more than 400,000 homes across Kenya, Tanzania and Uganda by offering solar-power home systems for low income and rural residents without electricity. Customers can light their homes by paying for their system through mobile money transfers. After finishing the payment plan, the customer owns the product and can then access more cost-effective financing for a range of other products, including further lights, televisions, stoves, smartphones, and water storage tanks.

To achieve all this, M-KOPA had to build mobile connectivity into its technology. In Kenya, for example, it partnered with Eseye and Safaricom to deliver solar-powered lighting and mobile charging to rural Kenyans on a pay-as-you-go basis, with payment via *M-PESA*. This requirement to integrate with *M-PESA* and exploit its distribution channel meant that a Safaricom-enabled product had to be used.

Eseye worked with the teams to design the platform, run the back office data processing, and integrate it into the Safaricom network. Eseye is now the only dedicated M2M service provider to integrate directly with the Safaricom network.

"Therefore, by utilising the mobile network, M-KOPA is delivering services to 'unbanked' people who would have not had access to finance services," said Marshall.

He cites another example of a business successfully innovating in Africa: "EWaterPay in West Africa has developed a sustainable solution which allows local water distribution schemes to become self-sustaining. It's a business model which also has the potential to be implemented on a wider scale across the continent. Mobile money, NFC, RFID tags and cellular communication all play a part by allowing secure financial transactions, the delivery of clean fresh water, and trained local engineers to be paid to manage and maintain the system.

"Innovations such as these are allowing mobile connectivity to have a wider impact. By ensuring people have access to credit and services, organisations can open further access to infrastructure, increase job opportunities and deliver a boost to local and national economies.

Africa is therefore at the beginning of its own industrial revolution – a revolution that will not be driven by steam and coal but by mobile and innovation.



Avi Kachlon,
CEO,
FTS

FTS specialises in convergent billing, charging, customer care, policy control and payment solutions. It claims to be the first billing company to provide policy management, analysing every transaction from a business standpoint, and reckons its solutions result in a dramatically lower total cost of ownership for CSPs.

The firm was involved in a number of activities in Africa during 2016, including a major upgrade for one of its long-standing customers: Zimbabwean national fixed line operator TelOne.

"TelOne is significantly modernising its network in order to keep pace with its aggressive growth plans," says FTS CEO Avi Kachlon. "A key component of this is the upgrade of its supporting systems and FTS has been replacing its years-old billing system with a new one."

The company also won a new project for what it describes as a "sizeable" African operator with a few million subscribers. Kachlon was unable to reveal further details at the time of writing but expects further information to be released later in 2017.

According to the CEO, FTS' overall activities in Africa now involve larger and bigger projects than it has previously undertaken in the region.

"We provide a greater number of turnkey, end-to-end solutions for mobile or mobile virtual network operators and enablers.

"We have also expanded our activities. We are not only an independent software vendor with our own solutions, but we are also acting as a systems integrator, bringing in solutions from different vendors including mobile network elements, value added services and other related software, and managing as one project. This is in part due to our experience on the supply side and we've found that on the demand side, certain operators want to work with a single operator. This is not an isolated incident – we're finding a demand for this service in other geographies, too."

In addition, Kachlon says FTS is also seeing many more opportunities to participate in mobile money and mobile financial services platforms.

"Our latest project involves a mobile money platform as part of a larger billing project, and we are also involved in many standalone mobile money platform opportunities across the continent. In many cases, the requirement is for more than just a mobile app, and we are using FTS technologies, including transaction management and billing. In some cases,

BSS / OSS Price vs Cost

There are two very important amounts associated with the purchase of any business-critical software. They are the purchase "Price" and the total operating "Cost" (TOC). In the case of billing, POS, CRM, OSS and other enterprise software, these amounts can be quite large, and are often vastly different. Furthermore, once the price is paid, if TOC gets out of hand, migration to replacement solutions can be expensive and painful. Heads may even roll. However, the opposite of this scenario is software that results in a negative TOC. In other words, it quickly pays for itself and returns TOC dividends throughout its lifecycle (often 10 years or more). Here are some thoughts in this regard:

Functionality First – Price Second

If you need to move a lot of earth, you buy a bulldozer, not a shovel. While the price difference may sting at first, if the bulldozer immediately nets a negative TOC, who cares? By way of comparison, the right BSS/ OSS solution is the one that best fits the vast range of a user's daily operations, with the least amount of staffing and on-going expenses. This can usually be determined through an initial RFI, followed-up with a detailed RFP and scoring system, a detailed GAP analysis, customer reference checks, social media and on-line, on-site and hands-on demonstrations. Compliance with eTOM (www.tmforum.org/business-process-framework) and/or other industry standards are additional possible measuring sticks.

"Best of Breed" vs Single Source Solutions

There is no "one size fits all" BSS / OSS solution on the market today. However, some cover their short falls with a vast array of third-party bolt-on modules for functionality like CRM, POS, mediation, trouble ticketing, etc., and call it a "best-of-breed" offering. Translated, this means that users must deal with the support, future roadmaps and business continuation of multiple vendors. This can be very shaky ground that often requires extra staffing and the "swivel chair" method of data entry (i.e.: re-typing the same data into multiple applications). By contrast, some vendors offer a mostly all-inclusive solution, where any entered or edited data gets simultaneously updated everywhere and automatically "talks" to all components in real time (i.e.: lead tracking passes contact data to account creation, fulfillment, etc.). If such an application is market-wise and mature, mostly inclusive functionality makes the most sense from the standpoint of TOC.

A Successful Launch vs a Train Wreck

The best software in the world still requires certain steps to launch successfully. The most important is user buy-in. Users must be absolutely comfortable with the great unknown, as well as with management's commitment to their involvement in the end result. This all-important building block can be achieved through pre-launch demonstrations, training and both one-on-one and department level inter-action with the vendor's team. At the same time,

management needs to free up time from staff's normal duties to achieve this end. Management must also be fully aware of each step in the end-to-end process at the onset. A well-conceived and realistic project plan supported by as many other details as possible is essential. Some examples can be found at www.advantage360.com/resource-library/.

Two Sides of a Budget

In most cases, the team that uses all of the often-exhausting investigative processes to vet a potential software implementation is not the same team that watches the budget expense line. So, when finance gets involved in vendor selection negotiations, their focus often tends to be on purchase price and not on the elements that are beneficial to TOC. As a result, while the total budget of the software, hardware, support and related products and services is simple addition, and easy to compare among potential

vendors, finance may not be aware of tangible benefits that separate one solution from the next in the technical evaluation process, and that can add up to significant TOC dividends on other budget lines. These include reduced staffing dependencies and training costs, reduced churn through improved billing accuracy, improved communication channels and more professional customer support, competitive marketing functionality that grows subscriber counts and increases revenue, and process automation that reduces costly mistakes and revenue leakage, to name a few.

At the end of the day, both sides of the budget equation are very important and need to be openly shared among everyone involved in the acquisition. However, while the purchase price may quickly become a forgotten line item, the TOC (good or bad) can equate to big numbers that impact the budget long afterward.



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network elements are required to deliver a mobile money platform so we are working with other vendors to provide a single solution.

"FTS has also expanded its reach in terms of sales, and we now have many more representatives working in the region. We are working more closely with our parent company Asseco Group's Nigerian branch, which is assisting us with our marketing and sales efforts on the continent."

With such varied experiences in Africa, how has FTS seen the continent's wireless communications market adapt and evolve over the last 12 months? Kachlon identifies two elements here.

"The first is the increasing demand for wireless data services. In other markets worldwide today, OTT messaging has surpassed text messaging, and OTT voice applications are causing traditional voice revenues to decline.

"In Africa however, operators have continued to grow revenues from traditional voice and text, but the growth of OTT messaging platforms is starting to have an impact. African operators are responding by offering bundles that are tailored to users' data requirements, such as social media bundles.

"The fast-growing penetration of smartphones in Africa – which up until now was not a problem – is finally starting to have an effect on the market. The more smartphone users there are, the greater the number of OTT applications. Both grow together. So the region's operators now need to offer different bundles and packages in order to encourage use of mobile data services.

"The second market evolution is that of mobile money and mobile financial services, which are growing exponentially. There are three drivers behind this growth.

"The first is mobile network operators, who have been providing mobile money services in Africa for years.

"The second is the continent's banks and financial institutions. While Africa has an unbanked population it also has around 100 per cent mobile phone penetration. So banks are utilising the mobile networks. The banks themselves now feel the need to join the party and so they are creating their own mobile money services.

"Thirdly, a group of different entities, including technology companies and retailers, are serving the refugee and diaspora communities in Europe – Ghanaians, Nigerians and other African communities based abroad – who want to establish relations including money transfer between countries."

According to Kachlon, the African MVNO market is not as successful compared to the rest of the world, and there are less than 20

virtual operators across the entire continent (of which the majority are in South Africa). But he believes that the MVNO market is starting to find its own niche, thanks to the growth of mobile money.

"MVNOs do not support the regulatory environment, nor do MNOs need them: margins and prices are so low anyway that there isn't much room for MVNOs as well.

"But the banks have no mobile infrastructure of their own which presents them with two opportunities: either to work with MNOs or create their own infrastructure to provide mobile financial services. Banks need this infrastructure so they are becoming a kind of MVNO that provides financial services only."

Kachlon goes on by saying that mobile money goes beyond simple fund transfers between two individuals. "Service providers are able to use the mobile money platform to transfer money or airtime, make bill payments (such as utilities), access banking services, loans and micropayments, enable mobile commerce, e-commerce, salary payments, international remittances and much more. A good platform will provide many services beyond straightforward money transfer.

"Revenue sharing schemes are complex business ventures and FTS provides customised tools that foster cooperation between mobile network operators and banks. Even when there are varying business objectives and different mindsets, FTS' partners and settlements solution ensures that mobile operators can deploy sophisticated revenue sharing and commissioning plans in a variety of ecosystems, defining transaction-based revenues rather than commonly used upfront payments."

What other challenges does Kachlon envisage for MNOs in Africa over the next 12 months? "The need to offer different wireless bundles and packages so as to encourage the use of mobile data services is not only an opportunity for the African market, but also a challenge. That's because it is taking place without voice LTE being widely deployed; indeed, in many markets, it is only at trial stage. Opportunity and challenge go hand-in-hand.

"The same is true for the development of mobile money and mobile financial services which, whilst already starting to experience strong growth, must be underpinned by flexible, scalable and reliable solutions to ensure consumer confidence and continued growth."

In 2017, Kachlon is hoping and expecting to see more demand for mobile financial services platforms, as well as a requirement for billing systems that enable operators to offer data-first products and plans that respond in real-time to subscriber requirements.

He says FTS also expects to grow its partner network across different countries, and is aiming to add a number of significant new upgrades and projects with new providers over the year.



Luke Taylor,
Deputy CEO & CCO,
Neural
Technologies

Neural Technologies specialises in revenue management

software, supporting fraud, credit/application risk, collections and revenue assurance strategies for communication service providers. Based in the UK, the firm reckons its risk management solutions analyse billions

of transactions daily, and provide protection for one in seven of the world's mobile users.

In Africa, Neural Technologies works with Safaricom Kenya, MTN, Telkom South Africa, Meditel Morocco and Zain Sudan. Luke Taylor says the continent's wireless communications market has come a long way over the past couple of years, and is starting to show real signs of market maturity as some countries are heading towards mobile saturation.

"For example, Botswana, Mali and Mauritius have reached more than 70 per cent mobile penetration, and in South Africa, many reports cite over 100 per cent penetration as people are carrying more than one mobile phone. In countries where the penetration rates are highest, operators are beginning to focus on customer retention rather than new acquisitions – it costs far more to win a new customer than to retain an existing one.

"Africa is an incredibly large and diverse continent. South, West, East, North, Central and sub-Saharan Africa all host very unique demographics. Whilst countries in the North and South have reasonable network infrastructure, the 'middle' countries continue to face challenges typical of emerging markets.

"Research has shown that only a small percentage of phone users on the continent own smartphones. For example at Safaricom, our customer and the leading telecommunications company in Kenya and East Africa, a mere six million out of their 26 million subscribers own smartphones while the vast majority have feature phones."

Taylor continues by saying that reliable energy continues to be a problem across Africa. He says in some countries, less than 10 per cent of the populations have access to electricity at all, such as Burundi, Chad, Liberia, Malawi and South Sudan.

"Overall, 625 million people are without power in sub-Saharan Africa alone – that's

Système d'Information Commerciale Prix vs Coût

Il existe deux montants très importants associés à l'achat de tout logiciel essentiel au fonctionnement d'une société. Il s'agit du «Prix d'achat» et du «Coût» total de gestion (CTG). Dans le cas de la facturation, PDV, CRM, OSS et d'autres logiciels d'information commerciale, ces montants peuvent être importants, et sont souvent très différents. En outre, une fois que le montant est payé, si le CTG devient excessif ou incontrôlable, la migration vers des solutions de remplacement peut coûter très cher et être très pénible. Des carrières peuvent même s'en trouver ruinées. Cependant, le contraire de ce scénario est un logiciel qui produit un CTG au négatif. En d'autres termes, il se paye rapidement et génère les dividendes du CTG tout au long de son cycle de vie (généralement 10 ans ou plus). Voici quelques idées à cet égard:

Fonctionnalités en premier – Ensuite le Prix

Si vous devez déplacer beaucoup du sable, vous achetez un bulldozer (tracteur), et non une pelle. Bien que la différence de prix peut initialement faire mal, si le bulldozer produit immédiatement un CTG au négatif, on s'en fou! À titre de comparaison, le bon système d'information commercial est celui qui convient le mieux à l'ensemble des opérations quotidiennes de l'utilisateur, avec moins de personnel et de dépenses encourues. Cela peut généralement être déterminé à l'aide d'une demande initiale d'information, suivi d'un système d'évaluation et d'un appel d'offre détaillé, d'une analyse précise GAP, des vérifications de référence client, média sociaux et internet, et des démonstrations élaborées sur site. Le degré de conformité d'une solution au modèle eTOM (www.tmforum.org/business-process-framework) et / ou d'autres normes de l'industrie sont des critères de mesure additionnelles.

Solutions "Best of Breed" vs. source unique

Il n'y a aucun système d'information véritablement «prêt à porter» sur le marché aujourd'hui. Cependant, certains fournisseurs couvrent leurs lacunes avec un ensemble de modules importés de tierce partie pour des fonctionnalités telles que le CRM, les PDV, la médiation, tickets de dérangement, etc., et appellent ça «best of breed». En d'autres mots, cela signifie que les utilisateurs doivent gérer le support, les futurs roadmaps et les évolutions de plusieurs fournisseurs. Cela peut être un terrain miné qui nécessite souvent plusieurs personnel supplémentaire et une méthode redondante de saisie des données (c'est-à-dire: ressaisir les mêmes données dans multiples applications). Par contre, il y a des fournisseurs qui proposent une solution tout à fait complète et intégrée, où les données saisies ou éditées sont mises à jour simultanément dans tout le système, et qui automatiquement communique avec tous les modules en temps réel (Par exemple : le Suivi d'un prospect transfère les données de contact à la création du compte, ensuite à la mise en service, etc.). Si une telle application est orientée vers le marché et assez intelligente, c'est beaucoup plus rentable du point de vue du CTG.

Une mise en production réussie vs. une catastrophe potentielle

Le meilleur logiciel dans le monde nécessite certaines étapes pour une réussite de mise en production. Une des plus importantes est l'acceptation de la solution par les utilisateurs. Les utilisateurs doivent être absolument à l'aise avec le grand inconnu à venir, ainsi que leur engagement de la direction à participer au résultat final. Cette

pierre angulaire peut être mise en place grâce à des démonstrations de pré-lancement, à la formation et à l'interaction individuelle et départementale avec l'équipe du fournisseur. En même temps, la direction doit libérer ce même personnel d'une partie de leurs tâches habituelles, afin d'accomplir cet objectif. La direction devrait au préalable être totalement consciente de chaque étape du processus de bout en bout. Un plan de projet bien conçu et réaliste, aussi détaillé que possible, est essentiel. Vous trouverez des exemples sur www.advantage360.com/resource-library/.

Deux faces d'un budget

Dans la plupart des cas, l'équipe qui analysera et évaluera l'implémentation d'un logiciel n'est pas la même équipe qui surveille les dépenses budgétaires. Cependant, lorsque la direction financière s'implique dans les négociations sur la sélection des fournisseurs, leur objectif tend souvent à être sur le prix d'achat et non sur les éléments qui sont bénéfiques pour le CTG. En conséquence, alors que le budget total du logiciel, du matériel, du support

et des produits et services connexes est simple, et facile à comparer entre les fournisseurs potentiels, le département de finance (DAF) peut ne pas être conscient des avantages tangibles qui diffèrent une solution d'une autre dans le processus d'évaluation technique et qui peuvent produire des dividendes de CTG significatifs sur d'autres lignes budgétaires. Il s'agit notamment de la réduction des besoins de personnel et des coûts de formation, de la réduction de la perte de clients grâce à une meilleure facturation fiable, à des canaux de communication améliorés et à un support client plus professionnel, une fonctionnalité de marketing compétitive qui augmente le nombre d'abonnés et des revenus, et une automatisation accrue des processus qui réduit les erreurs coûteuses et les fuites de revenus.

En fin de compte, les deux côtés de l'équation budgétaire sont très importants et doivent être ouvertement partagés entre tous ceux qui participent à l'acquisition. Bien que le prix d'achat peut être rapidement oublié, le CTG (bon ou mauvais) peut devenir un facteur majeur qui impact le budget dans les années à venir.



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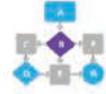
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about 50 per cent of the entire continent's population. This incredibly poor power infrastructure is the key limiter in these emerging markets.

"It is not really surprising, considering this intra-continental dichotomy, that most of the simpler mobile money transactions in the country are still SMS-focused. Even in this area, however, we are seeing developments in usage from simple money movement to more widespread banking functions, such as loans, and this is a prime example of how the telco industry is always evolving – even in what we might consider underdeveloped markets.

"Africa has, and is seeing, rapid urbanisation but today 70 per cent of the population still resides in rural areas. This means that *M-PESA*-like money remittance services that enable digital transfers between family members are crucial for an unbanked population that stands at more than 80 per cent. These mobile money services have made serious strides in progressing the global strategy of decreasing the aforementioned unbanked African populations. The change in Kenya alone, with more than 75 per cent of the population now using *M-PESA* and similar products, has helped the steady progress toward financial inclusion across the continent.

"Nonetheless, the African market has never been more fickle. Customers are expecting more – more features, more apps, more services. And as the smartphone market grows, operators must be able to deliver this as well as quality of service with as little downtime as possible, all for the minimum cost.

"At the same time, margins are being squeezed as prices have been lowered to attract customers to the point where there is very little ARPU for voice and SMS usage."

Taylor says these thin margins are encouraging operators to merge in order to amplify their offerings and share costs such as base stations. Furthermore, he believes African operators must look at standardising their internal systems. As opposed to using more traditional legacy systems that work in silos, he advises operators to find one platform that can handle all the user data, and then analyse these data to find additional revenue potential and secure existing revenue flows.

"In order to be more than a 'dumb pipe', telcos must look to change their business models, monitor services and discover what their customers want and how to give it to them. They must be able to interrogate their user data like never before and understand [them] intuitively.

"Many companies use data scientists, but these tend to be an import from places like the USA or UK and are expensive since in-country resources for such roles are low.

It therefore makes sense for companies to use smarter technologies which can do the complicated data science for them and display simple, usable insights to their staff. By training staff and empowering them, companies will be able to add value internally without importing contractors at a greater expense. This will also assist with the skills gap in many of the emerging countries and encourage aspirations, as the local workforce becomes more invested and highly skilled.

"By simplifying processes and adding transparency through data, African telcos can also help the countries in which they operate to trade more freely with the West. In order to trade with the USA and EU, countries must be able to show that they are on top of any potential crime (money laundering) and terrorism threats within their borders. The data available to telcos makes them one of the best positioned to spot terrorism and crime and help law enforcement to stop these threats, enabling greater trust and better trading potential."

Taylor concludes by saying that whilst there have been a great many changes in African telcos throughout 2016, these are likely to come "thicker and faster" over 2017-18.

"It will be interesting to see which African countries and operators step up to the plate and diversify, and which will fade into the background. One thing is for sure: the traditional ways are 'out'. So it will be up to the most innovative and adaptable to drive the market forwards, and we at Neural are looking forward to assisting operators in moving onwards and upwards."



**David King,
CEO,
Flexenclosure**

Since 1989, Sweden's Flexenclosure has built a name for itself, first with its pre-fabricated *eCentre* data centres, and then *eSite*, its innovative hybrid power system for off-grid and bad grid base station sites.

Over the last year, the company has announced several deals for *eCentre* projects in Africa. These included a second deployment for MTN in Côte d'Ivoire, one for Angola Comunicações e Sistemas in Luanda, Chad's first data centre which was commissioned by Millicom, as well as Flexenclosure's first contract in Ethiopia.

So does all that mean there is now greater activity in the continent's data centre market? Flexenclosure CEO David King says he has been working with *eCentre* for nearly five years, and can now really feel it picking up pace. "When we started, we were still getting clear on what it was that we were offering in terms

of a prefabricated data centre concept. And then we hit a wave of telecoms modernisation. I would say that all of the early deals that we did were with telcos who had expanded well in the first few years of the century with the mobile wave coming to Africa and then needing to upgrade those facilities. That was a very typical scenario for us."

Since then, King has seen the advent of colocation companies in Africa which has led to three different things. "One is that as the telcos modernise, they are creating additional space so they can rent racks to enterprises. MTN who worked with us in Côte d'Ivoire did exactly that, as did Millicom who worked with us in Chad.

"The second thing is home-grown colocation companies, such as Kenya's Kooba and icolo.io, which have realised that there is a world of opportunity as data comes back onto the continent.

"And then the third thing that we see is some of the big colo players from around the world taking a hard look at Africa. That includes both household names in data centres, as well as some of the big internet players, whether that be Google or Facebook, waiting to see what they do here.

"Africa is moving forward all the time, but progress is inevitably uneven. That's the nature of the beast. If you asked me will there be more data centres in 10 years' time or less, I'd say there will be lots more. That is the opportunity we are going to take."

King mentioned the prospect of telcos taking data centre rack space to sell more services to enterprise users on the continent. But some big name MNOs have previously stated that they have found the enterprise market difficult to crack in Africa.⁵ So does he see the rise of local data centres as a market driver?

"I very much agree with this idea of 'ecosystem economics'. That's a phrase I picked up from a venture capitalist friend of mine, and it's a very good phrase because it gives us this idea that if you can think about what's good for everybody then the pieces start coming together. *eSite* is a good example here. We're trying to create something, both in terms of product and commercial offering, that is really attractive for tower companies so that they buy more and then the network gets better and everybody gains.

"If, on the other hand, we step back and say we can't solve some of your problems, that's for you to solve, the ecosystem stays broken.

"In the consumer experience, people have linked together cloud, software and hardware.

⁵African Wireless Communications Yearbook 2013, Chapter 1, p19, Marc Rennard, Orange; Kanagaratnam Lambotharan, MTN, ibid. p21.

It's the same with us. Which is why when people ask me, 'why are you in prefab data centres and power systems, where do they fit together?', I say they fit together under the umbrella of internet infrastructure. That's what we are trying to do."

In 2016, Flexenclosure launched the *x10*, the latest incarnation of *eSite*. It's claimed to be the world's first hybrid power system that is purpose-built for outdoor telecom sites and to outdoor telecom standards. The firm adds that the patented, sealed, tamper-proof unit features passive convection cooling, no filters, no moving parts and requires no maintenance.

When Flexenclosure first started selling its "green" *eSite* base station systems in Africa in 2011, its main customers were MNOs. But since then, have the company's conversations with the industry in Africa rapidly moved to tower companies? King says: "The short answer is 'yes'. In 2013/14, because the towercos were in the process of acquiring their portfolios, they weren't really interested in the likes of us. But by the end of '14, early '15, the picture changed. They said okay, now we have got our portfolios we need to start making these sites economical.

"The conversation was different because the towercos tend to be faster in their decision-making and they're very focused around site economics. It's not that the MNOs aren't interested in that – they have got so much more on their plate. So we found that the larger and faster deals, coming from tower companies.

"But the answer isn't a simple 'yes' because I see this swinging back a bit. The towercos are buying up all the sites that are attractive from a portfolio perspective – sites that will typically attract more than one tenant. There are still a lot of sites that won't attract more than one tenant. The MNOs have sold some sites but are left with lots that are less attractive.

"So our feeling now is that we have made a big impact on the tower world, we're known around there and we've got a couple of big deals. But we're also going to come back and re-address the MNO world and say look, we know you weren't ready to do this before because you were thinking about selling the sites, but now you need a really good bit of kit to drive down those costs. And that's where we think the *x10* will come in."

King says Flexenclosure could do such deals directly but added that one advantage of the *x10* is that it can also be sold indirectly through a channel. He adds that the firm could also team up with a big generator company that's already selling to MNOs and get it to bundle the new system with its own products.

But in either event, King says if Flexenclosure's early involvement with Africa was firmly with the telcos, it then moved

firmly onto towercos, and now the future is a blend of the two. So has that been the story of the company on the continent over 2016?

"The last 12 months for us have been very tower focused. We have been in the middle of a large deployment for IHS Towers together with our partner in Nigeria, MPI. It's been a big undertaking and, from an operational, project perspective, taken a lot of effort. None of these things are without challenges – if you put 1,200 *eSites* around Nigeria you are going to get challenges! But the installation has gone well, and when I met with the COO at IHS recently he was very positive about our product.

With *eCentre*, King says Flexenclosure has been finishing off a number of deployments around the continent, although its more recent data centre deployments have all been in Latin America, specifically Paraguay and Colombia.

Flexenclosure builds all its *eCentres* at its factory in Vara, Sweden and then ships the custom made parts ready for assembly at the client's location. Would the company ever manufacture in Africa? King says he remains open to everything that makes economic sense, adding that he is a firm, long-term believer in sub-Saharan Africa.

"I come here a lot and there is an energy and drive here that I really like. I have studied the demographics that tell me that this is the youngest continent in the world. So there is no reason why you can't do all these things here at the right time. I don't have a short-term view on Flexenclosure. It is for the long-term.

"So we are going to keep doing what we do – we're going to get data centres all around Africa and build the infrastructure for the continent. And when it makes sense for us to be putting the pieces together in Kenya or Nigeria, [etc.], then we will."

But that will require local expertise. Are skills, training and the transference of specialist ICT knowledge to Africans a key part of the 'ecosystem economics' King referred to earlier on? He says the company's subsidiary in Nigeria already has a team of 10 service engineers and praises them for their great experience, adaptability and diligence. But returning to demographics, he points out that Africa is going to be the continent with the largest working population in a very short period of time.

"I think there will be enough skills here, it's really just a matter of time. At a large scale, when we are training groups of people to roll out *eSites*, then you can get skill challenges. But at the sort of scale that we need to work – such as when we were building our Nigeria team – for us to get 10 really good people was not difficult. We found them relatively quickly and are extremely happy with them. They have all got bachelors and masters degrees."

So what about other hurdles, such as dealing with the MNO who is locked into its long-standing, big name technology vendor for all its infrastructure needs? "I have this sort of personal mantra which says we should never look at ourselves as a victim. It's all about making our proposition better. For example with the *x10*, I'm now thinking about how we can structure the deals in such a way that we create some very attractive propositions in terms of replacement cabinets. So for me, it's about getting that proposition right.

"The launch of the *x10* is a major step forward because it is a truly fit for purpose product. We designed this with Africa in mind. We have learned enough here and we have got great, battle-hardened engineers who have been out here and know what to do. So the resilience of that product is going to help us a lot.

"And it's the same with *eCentre*. There is nothing overly complicated about our strategy with this – all we are trying to produce are high-quality, customisable data centres at very competitive prices. That's it. If we can keep getting better at that, we won't have to worry about the Huaweis or the Ericssons, etc."



Mariam Abdullahi,
Telco industry
lead,
SAP Africa

Despite ongoing economic challenges and some tricky regulatory issues, Africa is fast approaching the one billion mobile subscriptions landmark, says Mariam Abdullahi.

"The continued rollout of 3G and 4G networks, as well as an influx of low-cost smartphones, is changing the face of the African telecoms market by making the latest mobile innovations accessible and available to citizens.

"This is particularly significant in light of the continent's often underdeveloped broadband infrastructure as it finally brings African citizens into the global mobile fold, where anyone from business leaders and diplomats to smallholder farmers and school children can access the internet and increase their knowledge and economic opportunities.

"Africa has also often played a leadership role in mobile innovation: its mobile money products – such as *M-PESA* – are among the most successful of any around the world, and the continent often finds innovative ways to work around its infrastructural challenges by finding new uses for feature phone tech such as USSD and SMS.

"However, the continent is undergoing a process of broad and sweeping digital transformation which, in the telco industry, is being driven by three key forces.

"Firstly, there are OTT services putting pressure on the operator's traditional revenue streams. Globally, more than 1.8bn people use OTT mobile services, which is why Ovum predicts a USD293.4bn loss in the telco industry due to OTT VoIP services. In fact, it predicts that by 2020 there will be 2.7bn OTT VoIP users, which will upend the entire traditional telco industry as providers seek new ways to increase revenue.

"Telcos have already begun to incorporate OTT services as part of value-add packages to consumers. Of such telco-OTT partnerships, a quarter involve video content, 22 per cent offer music services, and a further 19 per cent offer social media to consumers at reduced rates.

"Secondly, consumer demand for online videos is forcing data costs down. According to recent stats, 62 per cent of mobile users consume online video content. In 2014 already, 50 per cent of all *YouTube* traffic came from mobile devices, and analysts estimate that video will account for 70 per cent of all mobile traffic by 2021.

"The continued growth of data consumption – fuelled in part by the demand for online video content – is creating robust revenue growth for operators. An Ovum report estimates that mobile data in Africa will grow from USD6.40bn in 2015 to more than USD27bn in 2021. As revenue from traditional voice services continue to be disrupted by OTT players, and consumers increasingly shift consumption habits to more data-intensive media such as video, operators will need to be in a position to innovate quickly and accurately or risk losing customers (and revenue).

"Thirdly, there is hyper connectivity from M2M and IoT devices creating opportunity for new revenue streams. Despite strong mobile revenue growth predicted for Africa over the coming years (from USD55.55bn in 2015 to USD69.67bn in 2021) it is the emergence of the Internet of Things that will make the biggest impact on the African telco industry. The World Economic Forum estimates there will be more than 50bn connected devices by 2020, creating what McKinsey estimates to be a USD6.2trillion industry by 2025.

"Telcos have a natural advantage in Africa as their infrastructure is often quite advanced, potentially making it easier for IoT devices to be connected to a single network with big data capabilities. As a company, we have also made a strategic decision to take advantage of the opportunities on offer around IoT: in September, SAP announced it will invest USD2.2bn in IoT by 2020.

"Telcos will need to navigate these forces if they are to create the new revenue streams they need to replace traditional voice income

streams. The emergence of big data is likely to be the single biggest tool in their attempts in this regard, with a recent Ovum report identifying it as the top strategic investment among African telcos in the next 18 months. Building on that, through real-time analytics that allow for better decision-making and enable a deeper level of personalisation that opens the door to new digital services, will give telcos the opportunity to transform their business models.

"With a continent-wide mobile penetration rate of over 83 per cent, Africa is well-poised to take advantage of the immense socio-economic and technology benefits promised by connected IoT devices.

"For example, telcos could merge data from commuters' phones with smart sensors to determine traffic patterns and provide accurate insights to city planners in an effort to improve integrated transport plans. Up-to-date weather information could be merged with agricultural sensors to provide African farmers with critical insights that can boost crop productivity and minimise risks to crops.

"The telecom operator's advanced infrastructure and data-processing capabilities can bring these benefits to life: by delivering personalised and accurate information to mobile users, telcos are uniquely poised to discover new opportunities for value-added digital services that bring true benefit to the end-user while creating entirely new revenue streams for the telcos themselves.

"To thrive on the continent, telcos need to find innovative new partnerships with OTT partners, video providers, and others to drive monetised traffic on their networks. Simultaneously, there is an urgent need for operators to modernise their networks and IT infrastructure to ensure they are capturing all revenue opportunities, such as releasing new digital services including connected cars, home automation, and more."



Oluwole Babatope,
Senior regional
analyst West
Africa,
IDC

// Africa still holds promise for growth but it's not without challenges and we have seen telcos such as Zain, Etisalat, Airtel, Orange, etc., partially or completely exit some markets.

"So although the continent is rightly touted as the next frontier for growth in telecoms services, it is not proving to be a walk in the park with respect to maximising revenue opportunities and maintaining profitability, especially as most markets grow towards maturity.

"Telcos are faced with the reality that business models that excelled about 20

years ago when mobile voice services were introduced to the continent, can no longer deliver expected returns on investment. More markets now have independent regulatory bodies that have introduced market liberalisation policies, driven competition by encouraging new market entrants, and also forced down tariffs by cutting interconnection rates. It is therefore becoming increasingly challenging for telcos to maintain the same levels of profitability as before without a long-term strategic approach.

"Most African markets have three to four operators, while some markets like Nigeria and Ghana actually have five. There is therefore increased competition across the continent that has led to fierce battles to retain and attract new subscribers.

"This in turn has resulted in increased customer retention and acquisition costs for telcos. Customers are becoming more aware, demanding more for less, and the large pre-paid subscriber bases in most markets have resulted in high levels of churn.

"Increased competition coupled with increasing market penetration have recently driven consolidation across the continent. Telcos and ISPs with weak financial positions are finding it difficult to remain profitable and run sustainable operations. IDC therefore expects more market consolidation as has been witnessed recently in Nigeria, Kenya and Tanzania.

"Depreciation of currencies such as the rand and the naira against the dollar has impacted telcos severely across Africa, especially as network investment costs continue to be in US dollars.

"For regional and multinational telcos who still have to repatriate some of their earnings to home countries, currency devaluation or depreciation has had a net negative impact on the bottom line. This is even more worrisome as emerging market risk continues to increase on the back of weak commodity prices, so-called 'Brexit' in the UK, and insular protectionist policies in the US adding greater strain on most African currencies.

"Further compounding the situation is the continued decline in ARPU negatively affecting revenue even as costs escalate.

"Telecom operations in some parts of the continent, particularly sub-Saharan Africa, are capital intensive because significant investments are required for infrastructure to cater for the lack of public infrastructure, i.e., electricity and roads. Telcos have therefore become responsible for ensuring the availability of critical infrastructure necessary for seamless network operation.

In Nigeria for example, public power

supply is so unreliable that all telcos depend strictly on power generators and green energy solutions like solar power. Diesel generators, solar panels, battery banks, etc., add significant costs to an MNO's network expansion and operation. As a consequence, power is a basic requirement for the functioning of network equipment and is a major threat to the overall profitability of Nigerian telcos.

"Reinvestment due to theft and vandalism of equipment also negatively impacts the bottom line. In addition, obtaining right of way permits for fixed network deployments have been used by local municipalities to unfairly extract more money from telcos in some countries. Telcos are subjected to multiple levies and taxation when deploying fibre cables. All these high capital and operational expenditure cumulatively affects the bottom lines of telcos and in contributes to erosion of profits."

Price war strategy

"This is a strategy usually implemented by new entrants to attract subscribers. However, it is not sustainable, especially in predominantly pre-paid markets where one or two dominant players exist. In the long term, lower tariffs hurt the revenue of the new entrant. Moreover, it is not a sustainable strategy to gain market share if there is no other value proposition for further differentiation.

"Airtel and Cell C are two particular cellcos that have tried implementing a price war strategy, but both have ended up being saddled with debt burdens and are currently contemplating various restructuring or acquisition options.

"Telcos across the continent are faced with diverse challenges with respect to profitability, however IDC believes the following strategies are able to guide them to sustain revenue generation and ultimately lead to profitability.

"Firstly, operators need to have a differentiation strategy. The need to focus on segmenting niche markets and invest in differentiating themselves from the competition. Key areas for differentiation include seamless network service, excellent customer service, competitive SLAs, reward or appreciation for loyal customers, etc.

"Operators need to transform into brands that target specific subscriber segments. For example Lebara, an MVNO in Europe and the Middle East, differentiates itself by offering competitive tariffs to home countries of immigrants. It has branded itself as the 'network for immigrants'. African telcos need to step up and elaborate on their uniqueness.

"Secondly, telcos need to invest in understanding their current subscribers through analytics to be able to retain and attract new customers effectively as several markets move towards saturation.

Churn is a major challenge in the region because the market is predominantly pre-paid. Therefore, telcos need to invest in understanding and retaining each customer by creating unique experiences. For example, they can provide directed promotions and rewards to specific users based on their usage pattern – heavy data users who regularly spend above the target data ARPU can be offered free gigabytes, or those who spend more on voice above voice ARPU can be rewarded with free minutes.

"Similarly, advertising can be further segmented depending on user profiles. For example, health tips could be more relevant to a specific demographic while sports scores and highlights or entertainment updates could be applicable to certain user profiles.

"Finally, telcos need to focus on the enterprise market as the margins in the consumer segment are declining. They need to invest in understanding the unique requirements of each vertical and develop capabilities to be the go to telco for solutions.

"For example, a telemedicine solution deployed in partnership with organisations in the health sector and targeted at, say, antenatal sessions for pregnant women in rural communities, will suddenly open up a niche market of millions of women annually.

"Furthermore, it is imperative telcos completely outsource network deployment and maintenance to third-party infrastructure providers so that they focus on services and growing their respective businesses as their key objectives.

"Operators will also need to transform internally to become digital transformation partners for their clients. Consolidation of internal and client facing IT systems will further lead to cost efficiencies and enable them to improve the customer experience."



Joseph Habib,
VP of wireless,
CommScope,
MEA

Looking back at the market in 2016, Joseph Habib says Africa has been driven by an unprecedented increase in wireless traffic especially in countries such as Algeria, Egypt, Ghana, Libya, Kenya, Nigeria, Morocco, and Tunisia, etc.⁶

The number of internet users during the middle of 2016 was more than 340,000. iPass says Africa and the Middle East has massively increased the number of commercial Wi-Fi

hotspots from 38,000 in 2014 to 62,000 in 2016, and the number is expected to jump to 102,000 by 2018.⁷

"There are many emerging markets in Africa and we see a lot of potential to deploy new fibre networks in the region. We are in the early stages of what may be the greatest transformation of networking yet, driven by mobility, video consumption and cloud.

"Consumer behaviours and technology trends are also straining networks in Africa and require new thinking regarding infrastructure requirements of the future. Fibre is the most efficient technology to transport large amounts of data quickly and reliably."

Habib believes that among some of the main challenges CommScope faces on the continent is the cost of deploying fibre networks as well as a scarcity of qualified technicians. He reckons this is where the *FACT Optical Distribution Frame* can help.

"Minimising the number of technicians needed and the amount of time they spend onsite is critical. Not only does the CommScope solution reduce typical installation time by 50 per cent but, with factory pre-testing, it also reduces the likelihood of future field visits to replace failed components. With simplified installation and no need for field testing, operators save on labour costs and can deploy workers to perform other network maintenance and troubleshooting tasks as needed.

"With the rising expenses to deploy such networks, another area that network operators can explore is network sharing. This will lead to all the operators benefiting from the networks, as well as the end consumer seeing the cost of fibre going down, ultimately driving faster adoption of fibre. Another way to mitigate the high cost involved is by working with network operators to provide additional services on these networks generating more revenue out of the given network."

Over the course of 2017, Habib says CommScope's aim is to bring fibre deeper into the network, and reduce total cost of ownership while accelerating time-to-market. "We see high-speed fibre networks supporting the demands of the future's mobile population. CommScope is well positioned to address bandwidth needs through a convergence of network technology, including outdoor cellular towers infrastructure, small cells, distributed antenna systems, fibre optic connectivity and data centre infrastructure."

⁶ Internet World Stats, 30 Jun 2016:
www.internetworldstats.com/stats1.htm

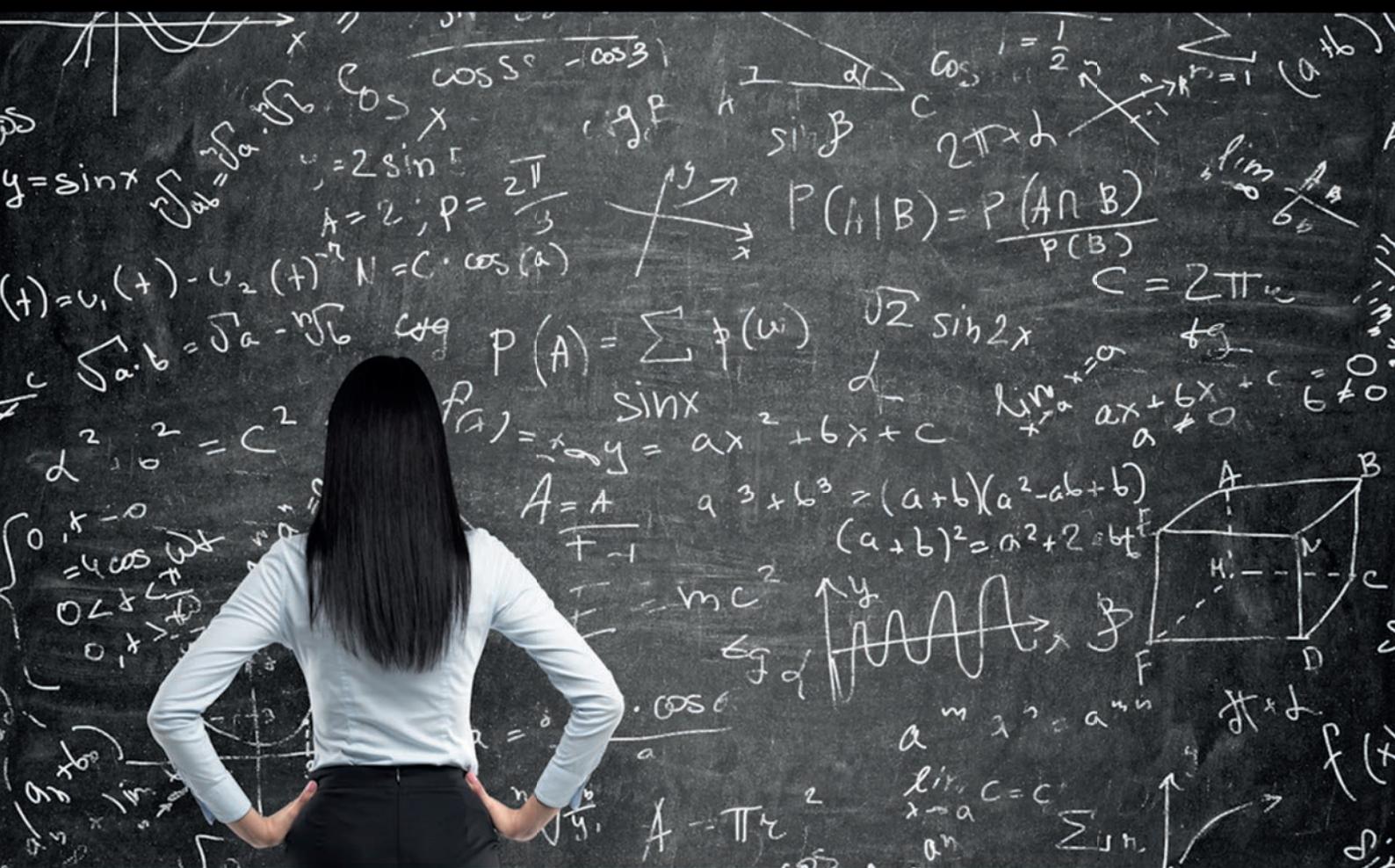
⁷ iPass Wi-Fi Growth Map:
www.ipass.com/wifi-growth-map/

1 + 1 = 3

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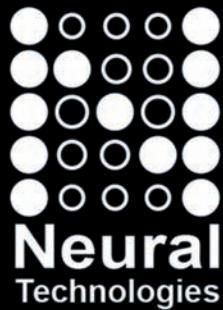
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chapter 3

Value-added services

The broader view of VAS in Africa



Björn Wigforss,
Global head of
marketing &
communications,
Tecnotree
Corporation

When talking about value-added services, we often refer to the must-have traditional voice and messaging applications. But the ongoing transformation of the industry and the activities in different markets show that a number of new customer-facing services are gaining ground. They are all designed to add customer value and for that reason

VAS goes beyond just voice and messaging.

It is important to note that African operators are no different to their counterparts in other parts of the world. Macro-economic factors are also generally similar in many countries.

On a more granular level, it is safe to say that the differences between the network and virtual operators within African markets are as large as anywhere else, so it is not possible to generalise and draw conclusions on a continental basis. So once you start to study the continent's markets, patterns that are reminiscent of developments in many Asian and Latin American markets begin to emerge.

Voice and messaging services: The growth in the number of subscribers is gradually slowing down and some markets are clearly peaking with individual operators even losing significant shares. In this environment we can see a clear trend towards finding solutions that manage the all-important 'classical' VAS in the most cost-effective manner possible.

New messaging solutions are gradually taking over from SMS which was earlier so dominant. Having said that, SMS continues to be a massively important communication

method, especially since much of the B2C models – for instance, financial services – rely on text messages for strong authentication. SMS remains an important marketing channel and will continue to be so.

Over 2017-18, more operators are expected to challenge vendors to deliver consolidated and combined VAS solutions in order to manage these all-important services with greater effect. Also expect these services to be increasingly cloud-based and often delivered via SaaS.

Charging and billing solutions: This is another area that is witnessing change. Contrary to the traditional VAS, where the trend is to solely focus on having the most cost-effective solution in place, here we start to see requirements for more versatility in the solutions' ability to deal with tickets and bill creation. Still, it's not an area where operators can afford to spend large resources.

The underpinning driver for this change is the perception from operators that the types of charging events (and the billing to follow) will become more versatile over time. This relates to the introduction of new connectivity services, targeting both organisations and consumers.

Over the next year or so, more operators are expected to swap out legacy billing and charging systems in favour of new robust and cost-efficient charging systems that have faster and more versatile processing of charging records. Bill creation will also become more multi-faceted and significantly faster than before.

Omni-channel customer engagement solutions: The rapid growth of e-commerce with service providers that really deliver great purchasing experiences including fast delivery times are putting pressure on mobile operators to up their game in terms of service levels and mindset.

Consumers increasingly expect and even demand higher-quality services, and this has forced operators to come up with ways to deliver a better service experience well beyond call quality and data throughput. Operators are now required to continuously engage with their subscribers, and the target is to exceed the customer's expectations – every time. Getting this right means higher retention and more upselling opportunities.

So what have operators been doing to improve in recent times?

Firstly, much effort is put into identifying *who* the customer actually is. In some instances, regulations have forced operators to take action here, for example in Nigeria, but it should be in every operator's own interest to gather this information. Once you know who your pre-paid subscribers are, you can immediately start serving them better. The best business is made when the customer feels taken care of. Their willingness to stay with you and to even spend more goes up if the services they receive are top-notch.

Secondly, many operators are starting to unify their commercial and support channels. They are simplifying their customer services pages – which includes the introduction of self-service solutions that are easier to use and are linked to the commercial pages – thereby enabling an easier journey between service acquisition and management of the services.

When doing this, while at the same time delivering an intuitive experience, the usage and satisfaction of the service pages can increase dramatically. Related to this, many service providers have focused more on loyalty systems and offer discounts on products that can be payable in full or in part with loyalty points.

Thirdly, new tools to engage with customers through social media are

emerging. The ability to engage and follow up immediately with unhappy customers (both those that you serve and those served by competitors) can make a big difference in how your company is received.

Fourthly, modern analytics are put in place to monitor marketing campaigns and usage in real-time to drive more accurate business decisions and boost customer satisfaction.

A greater focus on identifying and engaging with pre-paid customers (in an omni-channel model) can be expected over 2017-18. Operators are now building up competence and investing in capabilities to deliver modern call-to-action marketing for their customers with fast campaign rollout and better lifecycle management.

More service providers will therefore unify their sales and customer care pages, and partner loyalty programmes (either operator-owned or developed with third parties) are also set to continue to increase.

Mobile banking and fintech: Mobile banking continues to be a big bet for many mobile operators, and why wouldn't it be? There is a big demand for this in under-served markets. Stickiness is a huge driver too: a well-functioning mobile payment system can retain customers like few other services.

Continued hyper focus on mobile banking is anticipated over the next year or so. MNOs should also monitor innovations in the financial technology space as many new initiatives could offer potential for mobile banking as add-on solutions. Traditional banks and credit card companies are also expected to increase their efforts to grab a slice of the action.

The integration of loyalty programmes into the mobile banking system continues to be an opportunity worth addressing. A an article published last year by Bloomberg¹ discusses why brands can benefit from

having integrated mobile wallets and loyalty systems. Mobile operators are in a great position to take things forward here.

The fourth industrial revolution and multiplay re-defined

First we had triple and then quadruple play. Now multiplay, the latest buzzword, is about to be redefined with the rise of new consumer and B2B connectivity solutions.

The IoT or Internet of Everything will lead to an increased amount of automation. We'll see more solutions that don't have a screen, or where the access to the content depends on a separate device. Think of home security or entertainment solutions, fleet tracking and management, health monitoring, and so on.

While the size of the market will initially be small, the early adopters will be those whose ability to spend is among the greatest. Over time, as with many other technology advancements, there will be mass market adoption. The challenge will be how to package these solutions and to bring them to market in a fast and intuitive way.

The opportunity for operators is that practically all of these solutions rely on some kind of connectivity. In other words, operators have a chance to play a central role in this new emerging ecosystem. For that to happen they need to have the ability to add new types of partners, create new types of bundles, and deliver campaigns, delivery as well as support all in one go.

The future will be bright for those who decide to be the market makers. ■

¹ Olga Karif, Oct. 2016, *Mobile Wallets Are the New Loyalty Program*, www.bloomberg.com/news/articles/2016-10-20/mobile-wallets-are-the-new-loyalty-program

Africa leads in mobile money services

The year kicked off with the announcement that Africa and South East Asia were leading the world in mobile money implementation.

According to risk management and analytics firm Neural Technologies and its *Telecoms Risk Management Global Survey 2016*, 61 per cent of African telcos were running one or more mobile money service, while in South East Asia it was 75 per cent. Globally, the figure was only 63 per cent, and it was just 30 per cent in Western Europe. Eastern Europe reported the highest implementation of money transfer services, at 67 per cent.

The GSMA said that there were more than one billion mobile money transactions in December 2015, with 100 million new registered accounts becoming active during 2015. "It was encouraging to see 45 per cent of global respondents recognising mobile money as a channel for new services and revenues," said Neural Technologies' CCO and deputy CEO Luke Taylor. "In Africa, the Middle East and South East Asia, this rose to over 50 per cent of respondents, which gives us an indication on where these markets will be heading in the next 12 and 24 months and beyond."

The year then went on to demonstrate why Africa is becoming a hotbed of mobile money solutions. In what was claimed to be the most extensive digital rollout of its kind in Africa by an international bank, Standard Chartered promised to bring its latest mobile and online banking platform to a million clients across eight countries on the continent. It launched the new platforms in Botswana, Ghana, Kenya, Nigeria, Tanzania, Uganda, Zambia and Zimbabwe. Users are able to check balances, transfer money and pay bills

costs, increase revenue by cross selling, and enhance both customer experience and loyalty. Tecnotree adds that *Agility* will give the operator a consolidated view for managing all subscribers irrespective of their products, payment modes, contract types and technology.

APRIL

The MTN Group has selected UK-based cloud specialist BCSG to deliver Software-as-a-Service (SaaS) and Infrastructure-as-a-Service (IaaS) solutions to enterprise customers. Using BCSG's *Cloud Management Platform*, the operator has initially launched its *Business Cloud Services* platform targeting SMEs in Swaziland, Rwanda, Uganda, Ghana and Cameroon. All the applications and services are available from a

JANUARY 2016

Tigo starts offering free WhatsApp messaging services to its 10 million users in Tanzania. "This of course, is for customers with data enabled devices," said GM Diego Gutierrez. "We want to encourage our non-smartphone user customers to acquire highly discounted smartphones sold in Tigo shops to be able to enjoy this new offer." He added that the new service will be available on iPhone, BlackBerry, Android and Nokia Symbian60 phones.

FEBRUARY

Facebook says 16 million people in Nigeria now access its network every month, and all of them do so via mobile. Speaking on 'Friends Day' (4 February), or Facebook's 12th

birthday, Nicola Mendelsohn, the company's EMEA VP, said: "We're only one per cent done in Nigeria and inspired to do even more in this fast-moving, mobile first country." Facebook also said that 2016 was the year it will "deepen" its partnerships with Nigerian businesses. It plans to work with them to develop initiatives to deliver personalised mobile marketing at scale.

MARCH

Tecnotree says a "leading operator in West Africa" has deployed its *Agility* convergent billing platform. The unnamed customer will use the system to manage its end-to-end subscriber lifecycle across different business lines, reduce operational and maintenance

securely via their mobiles, laptops or tablets. The bank said the launch is central to its strategy of using digital technology to deliver the future of banking to clients in Africa.

Transferring money to and from abroad was also receiving its fair share of launches. The Co-operative Bank of Kenya partnered with SimbaPay to offer international money transfer services to customers living overseas. Co-op said the new service would enable the diaspora to send money home without “suffering” the cost of making the cash transfer. According to the World Bank, Kenyans abroad currently send home an estimated USD2.5bn annually, making remittances Kenya’s largest foreign exchange earner.

Similarly, Orange launched its mobile money service in France. Users can not only make fund transfers via their handsets to other *Orange Money* customers in metropolitan areas of the country, but also to those in Côte d’Ivoire, Mali and Senegal.

The operator said the launch came in response to “strong demand” from its customers with family or friends in Africa. It said the service will develop gradually and that it intends to increase the number of points of sale in France.

Content providers and retailers across Africa also had an infrastructure launch that would help them to invoice and charge their customers. Airtel deployed IMImobile’s *Tap2Bill* billing platform and claimed that its customers now had access to services and content that were previously unavailable.

The operator said *Tap2Bill* will enable content producers and merchants on the continent to share and benefit from its scale, market and technology. It claims this will help them grow their businesses across Africa without the need to invest in costly billing and payment capabilities.

single web portal and will be offered across a variety of MTN channels. The operator says there will be one log-in to access all the services, managed through a “user-friendly” dashboard.

MAY

Astellia’s onsite telecom data scientists are working closely with Airtel Madagascar to improve network performance and ensure excellent QoS and QoE to high value customers. The France-based network and subscriber intelligence specialist says the aim is to prevent any service degradation and pinpoint the root cause of issues that jeopardise customer loyalty and revenue growth. The firm is also monitoring the *Airtel Money* service to ensure that it is functioning well.

Internet challenges

Things have come a long way in Africa but there’s still work to be done. For example, it appears that African countries need to get better at offering their own services locally. Simply having internet access and availability are not enough to get people online, according to research carried out by the Internet Society.

In its *Promoting Content in Africa* report published at the end of August 2016, the society said that while significant improvements had been made in internet infrastructure, especially in mobile networks, internet adoption rates were slowing in many countries because users lack compelling reasons to connect.

The study revealed that content and services are the main factors in making the internet desirable, especially when the subject matter is relevant and in a language that users can easily understand. It said that in sub-Saharan Africa in particular, local language content is key to bringing new users online, as many are not comfortable reading in English or French.

The countries studied by the Internet Society included Rwanda, Kenya, Tanzania, Nigeria, Senegal and Ghana. It found that the majority of international and locally developed content is hosted outside these countries, typically overseas in Europe and the US, resulting in slow internet speeds and higher access costs. In Rwanda for example, the study said that of all websites using the .rw domain name, only a small fraction are hosted locally in the country.

The society also pointed out that monetising mobile content remains a major challenge. It said the region faces a combination of barriers, including the inability to pay and receive payments for mobile apps, which serve as a major channel for content distribution in most African countries.

JUNE

Vodacom will end its *M-Pesa* mobile money services in South Africa with effect from 30 June 2016. The company says the decision follows a “thorough review” and the fact that the business sustainability of *M-Pesa* is predicated on achieving a critical mass of users. “Based on our revised projections and high levels of financial inclusion in South Africa there is little prospect of the *M-Pesa* product achieving this in its current format in the mid-term,” said Vodafone CEO Shameel Joosub.

JULY

Carrefour, the world’s second-largest hypermarket chain, has become the first retailer in Kenya to fully integrate Safaricom’s payments service –

Minister Patricia Kaliati said Malawi cannot tackle cyber crime on its own as the problem is borderless.



Despite this report, there are countries who are having to deal with the rise of the internet and the problems it can bring. Malawi’s culture minister Patricia Kaliati, spoke in July at a workshop aimed at developing a national cyber security strategy. She called for collaboration in securing the country against cyber threats because as Malawi opens up to increasing numbers of online transactions, it is now more prone to cyber crime. She pointed out that the nation cannot tackle cyber crime on its own as the problem is borderless, and criminals threaten the country from across the world.

“We have heard stories of how we lost some of our young girls and boys through human trafficking initiated over cyberspace,” said Kaliati. “We have experienced attacks on government departments’ websites by some unscrupulous hackers causing interruption to the smooth flow of information for vital services.”

She told the high level gathering of more than 100 participants from academia, civil society organisations, telecom operators, banks, security agencies and government departments that it was now time to tackle cyber crime head on and make Malawi one of the most secure places in the world to conduct online business.

Mobiles to boost health

Mobile networks offer unparalleled flexibility to power health initiatives, as exemplified by the Kenya Red Cross Society (KRCS) which claimed it had launched the most advanced

Lipa Na M-PESA. It paves the way for the retailer to fully adopt *M-PESA* as a payments channel in the country. Safaricom says customers at the store will now be able to complete payments without having to show evidence of an *M-PESA* message to staff, resulting in a faster and more efficient cashless transaction at the till. Carrefour joins more than 44,000 merchants actively using *Lipa Na M-PESA* in Kenya.

AUGUST

With the recent receipt of Electronic Money Establishment (EME) licenses in Senegal, Mali, Côte d’Ivoire and Guinea, Orange claims it has further strengthened its position as a major player in Africa’s mobile financial services (MFS) sector. Orange says its EME ensures

humanitarian aid app available in the world today. KRCS is a voluntary organisation operating through a network of eight regions and 64 branches nationwide.

While the majority of humanitarian apps can only perform a specific function, KRCS said its platform includes more than 10 vital features such as emergency alerts, requesting ambulance services, and locating the nearest blood donation centres. Available for *iOS* and *Android*, the app was developed in partnership with UK-based Connectik which used its unique multi-tiered infrastructure to build the platform. This now enables the KRCS to engage users, provide services, mobilise volunteers, collect donations and send emergency alerts (and much more), at the touch of the button.

The society said that since its launch, the app has been downloaded and engaged with far beyond initial expectations. KRCS said that this has allowed it to increase its ability to alert people in Kenya about emergency situations, cut down on its crisis response time, and build a much larger pool of donors and partner companies. On the back of this success, The Red Cross began looking at deploying the app across 60 countries worldwide as the next phase of the rollout.

Mobile technology is also providing the backbone to support ViiV Healthcare, a global specialist HIV company, which launched the Mobilising HIV Identification and Treatment (MHIT) programme in Lesotho. MHIT is a multi-million dollar, three-year initiative led by the Vodafone Foundation, with financial contributions from the private and public sectors. Its supporters include the Elton John AIDS Foundation,

ELMA Philanthropies and USAID.

The programme's goal is to double the number of children in Lesotho in care and on treatment within three years, thereby ensuring that their health and futures are not compromised or cut short through lack of access to HIV services.

The Vodafone Foundation is deploying mobile clinics to rural areas and hard to reach communities, providing primary care services including antenatal checks and immunisation. The clinics are also searching for individuals living with HIV to provide them with better access to treatment, using mobile money-based transport vouchers so they can reach clinics or hospitals.

The use of mobile technology is powering the management, coordination of services, and communications to support the implementation of the health programme.

Using mobiles to shake up payments has also brought benefits, in this case to Kenyans. Safaricom, the PharmAccess Foundation, and CarePay introduced a new mobile payment platform that aims to broaden access to healthcare in Kenya.

At the beginning of 2016, donors were responsible for around 30 per cent of all health payments in Kenya, but they were often unable to track the use of their funds. *M-Tiba* delivers a mobile health wallet that channels donor funds meant for health services directly to recipients.

Donations are placed in specialised health wallets through *M-PESA*, and their use will be restricted to conditional spending at select healthcare providers who form part of a nationwide *M-Tiba* network. Donors receive real-time access to monitor fund usage.

"We are extending the capability of the mobile phone to make a tangible difference in the way healthcare is delivered in Kenya," said Safaricom CEO Bob Collymore.

"M-Tiba will allow services to reach previously inaccessible areas to transform the way healthcare is delivered."

Safaricom trialled the service at 44 clinics, and has so far reached 10,000 beneficiaries. The Pfizer Foundation was the first donor partner to utilise the *M-Tiba* platform which it is using to help people in Nairobi's slums. Safaricom is hoping to develop similar solutions with other public and private partners. PharmAccess suggested that in the future, *M-Tiba* could include public and private health insurers, and also offer low cost micro-insurance products to those that couldn't be reached before.

Power to the people

Safe drinking water is a crucial resource and one of the places where it can be obtained are at Grundfos' water kiosks throughout Tanzania and Kenya. These automated and connected kiosks (also known as water ATMs) dispense safe drinking water. But across rural Africa, 50,000 supply points have failed, mainly due to lack of funds and capacity for operations and maintenance.

Ericsson's M-Commerce Interconnect (EMI) service is being used to simplify mobile money payments and cash collection between Vodafone's *M-Pesa* system and businesses. The first deployment under the deal was to connect the mobile money platform with the growing network of Grundfos safe water kiosks.

the issuance, management and distribution of electronic money for *Orange Money*, and manages the compliance policy (previously, Orange's partner banks were responsible for the latter). The EME also coordinates requests to the Central Bank for the launch of new functionalities and monitors overall activity.

SEPTEMBER

Orange Egypt will use Nokia's *Subscriber Data Management (SDM)* platform to enable the faster launch of new and customised services. Based on the vendor's *One-Network Directory Server (One-NDS)*, SDM will consolidate Orange Egypt's customer data – which were previously distributed across different systems in its network – into a single database. It's claimed this will enable the operator to access subscriber data instantly across multiple applications. In addition, Nokia says it will

help significantly reducing operating costs, as well as maintaining and evaluating subscriber data on one system instead of several.

OCTOBER

App2Chat, unveiled by UK-based The Pink Telephone Company at the end of 2015, is now to be distributed in Africa. So far, it has been launched in Spain, Cyprus and Germany. The expansion into Africa will be the first time it has been distributed outside of Europe. *App2Chat* is an office telephone system on a mobile. Pink Telephone claims the service has all the features of a PBX system, and offers the full functionality of a desk phone including voicemail, call forwarding and transfer, recording, conferencing and more.

NOVEMBER

Video traffic on mobile networks in Africa

has doubled in the last year, increasing from 8.6 to 18.1 per cent, according to research from Sandvine. For its latest *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. Sandvine predicts the rapid growth of video in Africa will make it the top app on the continent within the next 18 months.

DECEMBER

All three mobile money providers in Madagascar are rolling out interoperable mobile money services nationwide. *Airtel Money*, *mVolta* and *Orange Money* joined forces with the GSMA's *Mobile Money* programme to increase financial inclusion in the country. The launch makes Madagascar the second market in

Ericsson believes Grundfos' use of *M-Pesa* simplifies the payment process by taking cash out of the equation, and that the solution removes the need for water service providers to integrate with every mobile wallet provider in a country. It suggested that with EMI, any mobile wallet service from any service provider in any region can be used to provide payment.

It wasn't only purchasing water that's been revolutionised in Africa. 2016 saw Gemalto announcing that it had modernised Guinea's voter register on behalf of CENI, the country's National Independent Electoral Commission. The aim had been to ensure that millions of eligible voters were enrolled accurately and reliably ahead of the elections that took place in October 2015.

The digital security specialist said it provided CENI with the benefits of a single source, end-to-end secure solution that had upgraded Guinea's existing voter registration system and processes. 5,000 operators were hired and trained to successfully conduct the enrolment of voters across the country and abroad.

As part of the process, they used *Gemalto's Coesys Mobile Enrollment* (sic) portable biometric citizen registration kits. 2,500 units were used throughout Guinea, reaching even the remotest parts of the country where there is limited infrastructure. The company also delivered a back-end solution comprising an automatic fingerprint identification system to ensure unique and verifiable registration of citizens.

Africans have often suffered from problems accessing financial services such as insurance or loans. Tigo worked hard throughout 2016 to open these up to the populace. In March,



Grundfos' automated and connected water kiosks – known as water ATMs – dispense safe, clean water (left) and accept payment via *M-Pesa* (above).

PHOTOS: GRUNDFOS

Tigo Tanzania added what was described as an easy to access nano lending product to its range of mobile financial services (MFS).

Tigo Nivushe offers immediate access to unsecured small loans to *Tigo Pesa* users.

At the launch, head of MFS Ruan Sawnepoel said that *Tigo Nivushe* had been designed to encourage responsible lending: "Previous mobile behaviour is used to determine suitable limits for loans and customers will only be able to have one loan at a time. Protection against life shocks is included as everyone will be automatically insured for the loan amount against death or permanent disability."

He added that because the product is fee-based, no interest can be accumulated in the event of default, and acquiring a loan will not affect mobile or *Tigo Pesa* accounts in any way.

Tigo reported that the average amount loaned using the service is TZS10,000

(USD5) and the funds are transferred directly to the customer's mobile wallet within minutes.

Meanwhile in July, Tigo announced that its mobile insurance service – available in Ghana, Senegal and Tanzania – had now reached around 2.7 million active users across Africa. The insurance products are designed specifically to give lower income segments of the population access to life, hospitalisation and personal accident insurance.

Reporting on the milestone, Tigo said 99 per cent of its insurance customers in Africa live on less than USD10 per day, and that around 73 per cent are new to insurance. The operator believes *Tigo Insurance* has "positively disrupted" the continent's traditional insurance industry, driving financial inclusion and bringing mobile micro insurance to customers who otherwise would not be able to afford it.

Africa, following Tanzania, where all mobile money providers are making their services interoperable, allowing transactions to flow seamlessly across their platforms. The GSMA's chief regulatory officer John Giusti says there are now more mobile money accounts than bank accounts in Madagascar and Tanzania.



The year ahead:

After two years of extensive consultation, the International Telecommunication Union's Focus Group on Digital Financial Services (DFS) has now published its policy recommendations to drive greater financial inclusion for the estimated two billion people around

the world who remain unbanked. The 85 recommendations offer guidance in areas such as digital liquidity, consumer protection to enhance DFS usage, data privacy, digital identity and e-KYC (Know Your Customer), as well as interoperability and fair access to the communication channel.

Among some of the core suggestions, it is recommended that:

- Policymakers and regulators support the growth of an open ecosystem for DFS that promotes innovation and ensures robust competition
- Regulators should standardise definitions of fraud types and require standardised, electronic and timely fraud reporting from providers
- Access criteria for interoperability schemes should be clear, objective, publicly disclosed and allow new participants, banks and

authorised/regulated non-banks to join

- Policymakers should promote initiatives and incentives that encourage merchants and other payment acceptors (e.g. utilities, farmers, government entities) to accept electronic payments
- Regulators should standardise digital identity registration, and ensure interoperability between DFS operators and service providers relying on digital identity
- DFS operators should build in customer privacy measures, compliant with current or anticipated national legislation

While the work of the focus group is complete, we now need to move from theory to implementation. The work we have done has resulted in a set of very operational policy recommendations. Their value will be dependent on their systematic application in markets that need guidance and support.



**Silvio Kotic,
CEO,
Infobip**

Croatia-based Infobip is a global provider of cloud-based mobile messaging and payment platforms. It was established in 2006 but first came to our attention in 2014 when it launched what was claimed to be South Africa's first end-to-end business messaging system². The company has certainly been busy on the continent since then, as founder and CEO Silvio Kotic explains.

"Throughout the last 12 months, our focus has been placed on large enterprises and financial institutions, which currently constitute the majority of the company's client portfolio and revenue. Infobip's messaging technology has now been deployed in more than 40 African banks, for which the company provides full technical support and ongoing development."

In addition to working with large enterprises, Kotic says Infobip has been developing and fortifying partnerships with MNOs across the continent. "Some of the most recent alliances include Maroc Telecom and Meditel Morocco. This opened up Infobip's access to all of the country's mobile operators, and further established Morocco as one of our African hubs. New partnerships in DRC, Ghana, Cameroon, Niger and Tanzania, as well as with MTN Zambia, have also added to our pan-African footprint.

"Offices were opened in Lusaka, Zambia, and others in Abidjan in Côte d'Ivoire, further strengthening the organisation's position in Francophone Africa. Infobip also hosted high-profile tech events in Kenya, Ghana and Morocco, attracting banking professionals specialised in mobile and communications solutions in enterprise environments from across Africa. The events addressed the challenges and issues facing banks and financial institutions in Africa as they undergo digital transformation and seek to implement multi-channel and mobile-first consumer communications."

Kotic reckons Africa has overcome many challenges associated with lack of infrastructure and access to technology in recent years. "The continent has since made great strides forward and is now adopting and adapting the latest mobile engagement technologies – widespread usage of A2P SMS and mobile money are just two most salient examples of this. Infobip has been a major part of this transformation, bringing new mobile

solutions that mirror the global developments and the requirements of its users.

Kotic says the end-to-end business messaging solution that was launched in South Africa three years ago has been very successful. "It's a unique technical concept and, to our knowledge, the only solution of that kind on the market. It is a comprehensive telecoms and IP system, built and designed for business users that require top performance and security of their critical messaging projects."

Infobip developed the system by establishing an architecture in which it develops, maintains and controls all the products and infrastructure used in message delivery – from its origin, all the way to an end user's mobile phone. Kotic claims the result was a solution that remains the "preferred choice" of many local African and larger international companies in need of reliable, enterprise-grade messaging solutions.

"Enterprises in Africa have often been the pioneers and agents of mobile innovation, but even then they were motivated by consumers as mobile users who are the ones that ultimately drive change, making enterprises, telecoms and specialist companies realign and adapt. This is a continuing trend, and one Infobip has found occurring ever since the launch of its services in Africa.

"Growth of smartphones and related mobile services leads to enterprises being faced with the need to deploy multiple services over multiple communications channels. And that's where a solution that combines several channels, reduces integration efforts, and enables a more efficient customer communication is vital, in Africa as elsewhere."

But of course, plenty of challenges remain, and when asked what the continent's biggest issues are over the next 12 months, Kotic says the main hurdle remains the same: expanding telecoms infrastructure to provide high-speed mobile and wireless data. "This is a crucial element in truly providing user-friendly mobile and digital services. The needs and expansion plans of African enterprises are often thwarted by these issues, which limit the reach of modern mobile services to large portions of the population. From extensive experience, Infobip believes that further developing established technologies such as SMS is a way to lay solid foundations for adding other mobile and digital services.

All of the company's products and services rest on its proprietary messaging and communications platform which Kotic said is easy to integrate and start using by any company or individual developer.

"We are continuously developing new solutions for the enterprise and operator segments and are rolling them out in Africa simultaneously with other markets, taking into account the specifics of the market and the requirements of clients. This will continue in the coming year as Infobip looks to support further developing countries.

"A primary focus will be to provide not only high-quality A2P SMS connectivity and services, but also roll out an omni-channel solution that combines SMS, voice, push notifications, chat apps integration and email. 2017 is set to be the breakout year for omni-channel communications, and Infobip sees this as the next step in customer communications. The company has already had very positive feedback from its partners in Africa, who have a real need for such a unified solution.

Infobip is also hoping to boost its presence in Africa with new offices planned for Casablanca and Johannesburg. And at the time of writing in early 2017, Kotic said the company was planning to host an internal pan-African conference in Tanzania in March. The aim is to focus on strategic alignment and consolidation of Infobip's operations across the continent.



**Fabien Delanaud,
General manager,
Myriad Connect**

Part of Switzerland-based Myriad Group, Myriad Connect describes itself as an expert in mobile software and telecom networks. It has been involved with more than 50 operators worldwide in deploying USSD services and infrastructure, and claims 220 million users are now active on a monthly basis on its USSD platforms. In Africa, it said USD5bn of mobile money was processed via its systems in 2015, corresponding to more than 80 million financial transactions per month.

Fabien Delanaud is responsible for the overall direction of the company's mobile business unit which works to support digital and mobile transformation, particularly in Africa. "With Myriad's 15 years experience in the African market, it has seen how big enterprise and entrepreneurs alike have used technology to accelerate growth. With its Communications Platform-as-a-Service (PaaS), Myriad sees the potential to bridge one of the existing gaps and address the challenge of reaching populations with limited or no access to data in South Africa."

In 2016, Delanaud says he witnessed the impact of mobile in Africa, highlighting the region as one of the most exciting and promising markets in the world for mobile

² Southern African Wireless Communications, Mar-Apr 2014, News, p9.

innovation. He believes the continent is one of the most forward thinking regions when it comes to the use of mobile technology in everyday life. "Entire ecosystems are being built around mobile connectivity which has already drastically improved access to services for disadvantaged populations. This is very interesting for us."

Over the past year, Myriad Connect has primarily focused on the South African market but Delanaud says further expansion is very much on the horizon. "We've put a great deal of resource into field studies to ensure we understand the local markets and their needs. As a result of this, our *Connect* solution is right for a number of key verticals and functions."

Connect is a communications PaaS made up of various USSD, analytics, authentication and other API tools developed by Myriad. It is designed to enable enterprises to connect in the cloud in order to quickly and easily develop new services, collaborate with third-party providers, and serve all mobile users regardless of whether they have access to data.

The wireless comms market in Africa has undoubtedly adapted and evolved in the past 12 months, and Delanaud says he has seen the effects of this, particularly in the mobile commerce space which is "huge" in Africa with more people owning smartphones than bank accounts.

But while the region has become dependent on mobile payment gateways to buy and sell goods, this is not without its challenges as Delanaud raises concerns around security. "Even though security is an issue in every economy and ecosystem globally, it is a real problem for consumers in Africa. In the West, fraudsters will often use technology and process loopholes to illegally access funds or data. In Africa, it is more human driven, using insiders' collusion to either access information and customer accounts or setup fake financial accounts instead."

"For example, a number of inherent weaknesses exist within the 'Know your Customer' requirements for financial services in South Africa. Such are the flaws that the South African Reserve Bank has requested that all bank accounts are re-authenticated, in person, by the account holders, every two years."

As a result, Delanaud reckons there is a significant opportunity here for technology to support secure digital re-authentication, driving down costs to banks and improving the process for customers. He adds that similar potential exists to authorise and authenticate, *ad-hoc* direct debits, credit agreements or any financial transaction. "Myriad has worked on innovations to

deliver secure authentication services, and one area of particular focus has been around the SIM-swap trend, a major issue in South Africa. It often involves operator and bank employee collusion to target high net worth individuals. One of our main goals over the next year is to provide a solution for this issue, powered by USSD. The *Myriad Connect Authentication API* provides a real-time check on the SIM in a way that cannot be tampered with via third parties on handset, within the operator network or at the bank."

With the amount of resource the company has dedicated to understanding the opportunities in Africa, Delanaud believes it is now ready to really begin providing consistent and reliable ways for enterprises and operators to engage with customers via mobile. "We have developed a cloud-based platform that enables businesses to quickly develop and deliver reliable, secure, and cost-effective mobile services on any device anywhere in the world. As a key market in the global mobile economy, Myriad will take what we have learnt in South Africa into Europe and the Americas."



**Stavros
Cosmetatos,
Corporate
communications
& marketing
director,
Upstream**



**Jesus Kalergis,
Senior marketing
executive,
Upstream**

Upstream has developed a mobile commerce platform which it claims enables around 1.2 billion people across 43 emerging markets to pay and receive relevant and valuable business services over their mobile.

Founded in the UK in 2001, the company began in mobile marketing and believes it has gained expertise here and understands consumer needs. It initially focused on western markets but quickly realised these were saturated and that there was greater potential in emerging regions. It started in Latin America before moving into sub-Saharan Africa, the Middle East, North Africa and South East Asia.

"However, I would say Africa is our strongest foothold at the moment and a key focus point," says corporate

communications and marketing director Stavros Cosmetatos. "Currently, we have 10 offices around the world which include Johannesburg and Lagos with South Africa and Nigeria being the two most important markets for us in Africa at the moment."

"So we know emerging markets very well and are in a very good position to help western brands as well as our partners, which are local mobile operators, to tap into the huge opportunity that there is for digital consumption in these markets."

Upstream used to develop and offer its own products but now offers third-party digital services, such as insurance for example, localises them, and then works with local MNOs to monetise and deliver these through relevant channels.

"What we have learned all these years is that in order to be able to effectively address the needs of digital consumers in emerging markets you need to be able to address three basic challenges.

"Firstly, your offering needs to be relevant. That includes the content of the service, its pricing, and it being accessible to the consumer, taking into account their mobile device, internet connection, etc. We have great expertise in localising the content, both in terms of the language and categories of services, and also in helping with pricing and making sure that the service is deliverable from a '0G to 4G' distribution method."

"The second key challenge is to be able to actually acquire customers. So it is very important to be able to optimise and make the best use of digital marketing channels, combining local and regional channels as well as global ad networks."

"The third challenge is actually being able to offer consumers in emerging markets the ability to pay. Card payment use is very low in these markets (we found it to be under 10 per cent). In fact, mobile airtime is a very strong digital currency in emerging markets and can be used to pay and access the services."

"So in collaboration with mobile operators we are able to effectively address all these challenges."

Upstream has been in Africa since 2010. It initially worked on mobile marketing and promotion projects, such as supporting the MTN Group's operations in Nigeria, Ghana and Benin as part of the cellco's official FIFA World Cup sponsorship activities. In 2016, Upstream launched its *CoverNow* mobile microinsurance system which was rolled out with Vodafone in Egypt and backed by insurance providers AXA and Chubb. The firm has also developed a language lesson service which is now live in more than 14 African countries, such as Nigeria, South

Africa, Zambia, amongst others, as senior marketing executive Jesus Kalergis explains.

"The service offers language lessons for English, French, and we recently added Spanish. It follows our '0G to 4G' delivery strategy, and is a mix of data and interactive content depending on the consumer segment and the available technology of devices within the operator's subscriber base. It has more than 3,000 questions across seven levels enabling consumers to learn and test their knowledge about basic vocabulary and grammar. It has been most successful and engaging in segments at the 'bottom of the pyramid'.

In terms of creating what Cosmetatos previously described as locally relevant services, does he believe Africa has the talent and ecosystem required to develop such mobile products and apps?

"The initial starting point for most western brands is localising language. That's the first step and it seems like the easy way. Obviously language is important but what is also important is the category of service that people want localised. It is not the same across-the-board. So for example, for news or financial services, people seem to want strong local content coming from local providers as well. That's opposed to something like gaming where making such apps locally relevant doesn't seem to be that important."

In February 2016, Upstream carried out research³ based on a study of 5,215 consumers in Brazil, Egypt, Indonesia, Nigeria and South Africa. Its aim was to gain an insight into the user's mobile habits and understand how brands can maximise opportunities within emerging markets.

"In our survey, when asked which categories of services would they want to have more digital offerings for, the top ones were education and health (and fitness). These are very important and kind of make sense because consumers can use them to complement less adequate offerings from elsewhere or other organisations [outside Africa] that would perhaps be available in the West.

³ <http://www.upstreamsystems.com/2016-mobile-commerce-market-research/>

⁴ VNI Mobile Forecast Highlights, 2016-2021: in Middle East & Africa, mobile video traffic will grow 17.6-fold from 2016 to 2021, a CAGR of 77%. www.cisco.com/c/dam/assets/sol/sp/vni/forecast_highlights_mobile/index.html

⁵ Sub-Saharan Africa, Ericsson Mobility Report, Nov. 2016. *Access to video content continues to increase*, p5 - www.ericsson.com/assets/local/mobility-report/documents/2016/ericsson-mobility-report-november-2016-issa.pdf

"Utility services for mobile phones were also found to be very important for people who have lower end mobile devices – memory boosters, anti virus systems, etc."

What about mobile video services? If the forecasts from Cisco⁴ and Ericsson⁵ are to be believed, video traffic will account for much of the global boom predicted for the coming years. Cosmetatos agrees that video services are also very important in Africa and have to be localised. But he also highlighted affordability and data download charges as important factors for operators to take into consideration. "Until African infrastructure improves, Upstream can offer technology-friendly services such as lite versions of apps or products that use less data (that's our 0G to 4G approach, again)."

Kalergis believes mobile commerce and digital services at large will not be able to flourish if there isn't a way to pay for them over mobile. "We are very strong advocates of developing payment over mobile. Our research found that billing through an operator ranked top above any other online solution. There are examples where Google Play and Apple are enabling operator billing apps. In our view, airtime balance is a very potent digital currency.

"Because of regulatory constraints and all the many organisations that have to get involved for mobile money solutions, mobile money has not taken off [across Africa] and we are still talking about it. But that hasn't stopped our growth and we have found that all our services have been very successful."

Cosmetatos says that while digital wallets are on the rise as a payment method, 88 per cent of the respondents in Upstream's survey stated that they preferred digital wallets to be offered by local providers – and from these, mobile operators scored the highest. "So this shows how important mobile airtime and direct carrier billing is as a mechanism, and how it can actually be a ubiquitous payment method."

Kalergis also believes this also offers convenience and that it can easily scale – as opposed to mobile money which he says really needs to start from scratch because of the complexities involved.



Leonard Kore,
Senior regional
analyst for Africa,
IDC

Originally developed for cryptocurrencies such as bitcoin solutions, telcos and other industries such as the financial sector have realised the huge benefits and gains blockchain technologies can offer their respective sectors. For example in Africa, one of South Africa's largest banks,

Absa, joined forces with the R3 Consortium to determine relevant use cases and potential adoption of the technology locally.

Blockchain is a trusted public registry of who owns what and/or who transacted what. It is a shared and immutable database of a history of transactions and assets that have been executed. These transactions are spread across a network of computers using high-level cryptography and only viewed by users with right of access. Once the transactions or data is committed to the network, the distributed database is prevented from being altered or manipulated by unscrupulous third parties. It also eliminates the need for a third-party verifier. Security, data integrity and trust are therefore the key value propositions of blockchain solutions.

In the telco sector, complex authentication setup is required between people and systems especially more so with emergence of the Internet of Things (IoT). This requires verification of numerous aspects such as customer data, registries, databases, interconnection with other networks and third-party services. Blockchain offers solutions for some of these traditional telecoms transactions.

African telecoms operators can use blockchain in a number of ways.

Mobile money and digital payments

transactions: Already being used for digital currencies such as bitcoin, blockchain can also help telcos in reducing transaction costs, enhancing security and in billing. It can also be used in cross-border remittances. Local mobile remittance companies such as BitPesa are already successfully using blockchain while globally, companies such as Abra, Rebit, TransferB, among others, have also deployed it.

IoT: Blockchain enables cost-effective and secure ways of improving IoT networks through shared blockchain platforms. IoT devices generate huge volumes of data; privacy and security of these data is a key concern for both suppliers and end users.

Blockchain technologies can solve this challenge by decentralising IoT networks, thereby eliminating single points of failure or attacks. The networks and devices cannot be hacked by third parties, and information will remain secure/private which is already a key concern in the IoT ecosystem.

End users will also be able to ascertain that data transmitted through widespread sensors are incorruptible and genuine. Further, blockchain provides easier scalability of IoT networks. Other use cases in IoT include smart cities and the healthcare sector.

Call data integrity and identity

management: Here, the technology ensures that the information and identity details of subscribers being transmitted is accurate.

This can be used in law enforcement and also help users ascertain their own billing histories. This will also especially become important as eSims become a reality in the future.

Operational efficiency and cost savings: Blockchain will help in simplifying and improving billing, number portability, roaming etc., in internal operations in telcos. Other use cases include smart contracts provisioning to ensure faster and cheaper ways to auto-complete transactions and business processes.

Although revenue potential is not a very key priority right now for both players in telecoms and the financial services, blockchain can unlock new revenue streams for telcos that enable them to offer services such as identity management solutions to other providers/partners. This can be in the form of telcos having superior blockchain platform capable of providing trusted data management, storage and verification as-a-service solutions to users.

This is already being done by vendors such as Microsoft. Other revenue sources include implementations in mobile money (micro-payment) solutions, cross-border remittances, smart contracts, IoT, etc.

Other key advantages of deploying blockchain solutions is the ability of businesses to use a pay-as-you-go business model enabling users to only pay for blockchain services used. This enables them to save on costs.

As telcos in the past have been disrupted by new waves of technology, they are now forced to innovate and stay ahead of the curve. The financial services industry has been first to experiment and derive the benefits of blockchain technologies. This will motivate telcos to follow in their footsteps in order to improve their own internal processes and benefit from the numerous use cases provided by blockchain.

Africa. The unnamed client was described as a “leading African operator” and selected Elitecore to replace its existing BSS platforms for fixed and mobile networks with a single system. Since then, the vendor has added more unnamed African customers to its client list.

In September 2015, India’s Sterlite Technologies announced its acquisition of Elitecore. Sterlite develops and delivers optical communication products and system integration services. Prashant Nazare, the company’s associate vice president and head of international sales, described the thinking behind the buyout.

“Over the past 12 years or so, Sterlite has been a product company focusing on optical fibre. The acquisition of Elitecore has enabled us to offer a complete end-to-end solution. Previously, customers were only looking to us as a passive supplier or passive integrator – we did not have anything on the software side or on the active side. In Nigeria, we’re doing very good business with Sterlite, and for Elitecore that was a major reason to have them with us. They are doing much better in this region and have a good customer base here.”

“On the fibre side, Nigeria is a big market for us, and with Globacom and MTN we are doing almost 70 per cent of the rollouts there. In South Africa in 2010 to 2012 we did very good business with Vodacom and also with Neotel – almost 10,000 to 15,000km on the rollout. Then there was a gap in South Africa and we went back and re-launched ourselves.

“So we now have an office in Johannesburg and have recruited a local person who will be taking care of the African market. The major customer will be Vodacom; Vodafone wanted us to be present in Africa because we are one of the global vendors that they have approved.”

Nazare believes Sterlite’s “innovative” range of cable products and installation expertise gives it the edge when it comes to rival vendors. He reckons the addition of Elitecore will sharpen that edge. “We can now go to customers and offer an end-to-end, one-stop shop. So Elitecore sells the OSS, Wi-Fi and critical online solutions, and Sterlite supplies the passive side. The customer then sees us from a different perspective: as a cable company as well as a solutions provider.”

When asked which companies Sterlite is planning to target in Africa, Nazare says the top major telcos were the immediate priorities. “We have identified the top seven to eight telcos where we want to be present. Vodafone, Orange, MTN, Liquid... these are among those on our target list. We are already doing business with Airtel in Africa, and in South Africa, very soon, we’ll be present in Vodafone and MTN.”

Sterlite has identified around 11 African countries where it wants to do business

immediately. Among these, Nazare named South Africa, Nigeria, Kenya, Côte d’Ivoire Coast and Ghana, adding that the company will also soon be in Mozambique, Zimbabwe, Zambia and Tanzania. So how optimistic is he of success given the slump in oil prices and security concerns in many parts of the region?

“The global demand for fibre has not come down. In every region – whether it is Europe, Africa, the Middle East, India – the demand has continuously moved up because the world is moving towards data. Everything is on the mobile. And what’s needed for carrying data is better bandwidth and a better backbone. So people are investing in fibre. And today is the period with the highest demand that has been seen over the last three or four decades.”

At this point, Jitendra Jain, Sterlite Tech’s vice president of MEA business for Elitecore, joins the conversation. “If we really look at what we are focusing on in Africa right now, LTE is one big area that we see. We see a lot of operators coming in as well as existing ones that want to upgrade.

“The second big thing is Wi-Fi. All the operators want to have their hotspots, they want to provide Wi-Fi services to customers. That’s part one of Wi-Fi. Part two is how to monetise it. If there is Wi-Fi, the customer expectation most of the time is that it will be free. While that is good for the consumer it is certainly not very good news for the operator who has spent a lot of money on the network. It’s early days but the concept of carrier Wi-Fi in Africa will pick up. And when it does, we will be ready to help the operator monetise it.”

According to Jain, the operator’s top priority today is to move from a legacy to a next-generation network. With its single platform that supports multiple technologies, such as WiMAX, LTE, VoLTE, etc., he claims Sterlite can help customers deal with the challenges of managing their complex network scenarios.

“The second priority is that in a heterogeneous network operators are looking at one pipe along with the traditional network,” says Jain. “So here, we are helping with our Wi-Fi service management platform. Even if you have an OSS/BSS component, we are actually creating a solution that enables the operator to match its requirements.

“Those are the two best ways for us to move forward. We want to replicate the success of our business in South East Asia and India in Africa, because we consider Africa to be a huge market. Selling solutions is one part. But another part is making sure the customer gets the value out of that solution and that they are delighted with it and they stay with us forever. People can copy product capabilities and features, and they can reduce prices. But what they can’t copy is your passion for it.”



Prashant Nazare,
Associate VP
& head of
international
sales,
Sterlite Tech



Jitendra Jain,
VP MEA business,
Sterlite Tech -
Elitecore

Elitecore is an India-based global provider of BSS, packet core and carrier Wi-Fi solutions. While all of its early deployments were for service providers in its home country and South East Asia, in February 2013 it announced its first win in

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Fixed wireless access

4

The connectivity challenge in 2017: a cry for a more African-centric spectrum policy



**Prof. H. Sama Nwana,
Executive director
emeritus,
Dynamic Spectrum Alliance**

Africa (particularly sub-Saharan Africa) needs a different spectrum policy to bridge the connectivity divide. It should focus on: low frequency spectrum (VHF/UHF) for terrestrial networks; satellite spectrum for remote areas; unlicensed spectrum to complement licensed spectrum for internet connectivity; and dynamic spectrum use of both low frequency and satellite bandwidth. The continent should not be distracted by the current 5G craze either.

At the inaugural ICT Indaba¹ held in Cape Town in 2012, ministers responsible for ICT said: "We declare access to broadband communication as a basic human right in Africa and commit to increasing broadband penetration to approximately 80 per cent of the population by 2020. This common vision draws its basis from the positive impact exerted on economic growth through increasing accessibility, affordability and availability to broadband by all."

Three years later, the UN General Assembly approved a new set of 17 'Sustainable Development Goals' (SDGs). While eliminating poverty is the top priority, among the 169 goals the UN hopes to achieve by 2030 is SDG Target 9c.

¹ 'Indaba' is a Zulu word for a council or meeting of indigenous peoples of Southern Africa who gather to discuss an important matter.

Echoing the Cape Town declaration above, this calls upon nations to "significantly increase" ICT access and "strive to provide universal and affordable" internet access in least-developed countries by 2020.

However by late 2016, according to GSMA data, sub-Saharan Africa could still only boast of 42 per cent unique mobile voice users despite more than 700 million subscriptions, thanks to multi-SIM ownership. Furthermore, 75 per cent of people in Africa are offline, according to the latest ITU figures.

So who in Africa believes that the Indaba proclamation of 2015 or SDG Target 9c will be achieved on the continent any time soon? There are three root causes of the profound digital divide gap in Africa: (i) accessibility to connectivity in terms of infrastructure (Africa is a vast continent to cover with wireless signals); (ii) affordability due to poverty (most sub-Saharan Africans earn less than USD1.25 per day); and (iii) lack of awareness of the benefits of being online.

The DSA believes that the spectrum policies needed to achieve these goals/targets for Africa are not the same as those that have so richly connected OECD economies. Africa has been wrongly applying OECD spectrum policy/priorities for too long, thus inadvertently contributing to the digital divide.

The key strands of an African-centric spectrum policy should focus on the following:

1. Low frequency spectrum (sub1GHz) for terrestrial accessibility
2. Spectrum for affordable satellite connectivity, such as C-, Ku- and Ka-bands, particularly for remote areas without terrestrial infrastructure
3. Unlicensed spectrum access, including Wi-Fi, as more than 80 per cent of

wireless data goes over Wi-Fi

4. Dynamic spectrum use: (a) for low frequency spectrum bands (e.g. VHF, UHF) by utilising dynamic spectrum access regulations like TVWS (TV white spaces); (b) dynamic spectrum access of mid-band satellite frequencies such as C-band

Licensed sub-1GHz spectrum

China Mobile is the world's biggest mobile operator and is currently reported to have more than 816 million subscribers. While it expects to have 1.4 million LTE base stations in China², a much-larger sub-Saharan Africa, which comprises more than 40 countries, can only afford a total of 250,000 base stations. Elementary physics clearly points to the use of low frequency spectrum (sub 1GHz, if not even sub-700MHz) since their propagation is much better.

It is important Africa exploits 900MHz, 800MHz and the recently-won 700MHz frequencies speedily and efficiently. However, even in addition to these frequencies, 450MHz LTE should now also be a consideration by all African regulators. But sadly, very few countries even know about this band as the vendors do not promote selling low-frequency equipment when they can sell higher frequency equipment multiple times more (>3 typically).

Satellite spectrum

Africa is just so big that it will never be fully geographically covered by only terrestrial base stations. Satellite can usefully and viably complement terrestrial solutions in order to provide much-needed ubiquitous

² www.rcrwireless.com/20160317/carriers/china-mobile-expects-1-4-million-lte-base-stations-year-end-tag23

coverage demanded by the “connectivity is a human right” imperative. The continent has been a big defender of C-band³ satellite services for broadcast services as well as for backhaul applications.

Unlicensed spectrum and Wi-Fi

Unlicensed rather than licensed spectrum and TVWS technology are arguably more important to bringing internet connectivity to the almost billion unconnected people in Africa. The continent must revisit its arguably sclerotic spectrum policy of the last decade and adopt dynamic spectrum allocation in both TV and satellite bands.

Unlicensed spectrum is the predominant and preferred way people access the internet with more than 80 per cent of traffic going over Wi-Fi. It already offers an invaluable complement to licensed spectrum: the European Broadcasting Union estimates that 71 per cent of all wireless data to mobile devices in the European Union was delivered using Wi-Fi. For smartphones and tablets in particular, Cisco has found that daily data consumption over Wi-Fi is four times that of cellular.

Unlicensed spectrum, and particularly Wi-Fi, has:

³ C-band generally refers to the RF band from 4 to 8GHz. However, the range of C-band satellite transmission frequencies of 3700-4200MHz are typically used in Africa to receive TV and radio channels using larger satellite dishes. The 6GHz satellite uplink, given its primary use of transmitting video content, has far fewer sites than even the 3700-4200MHz that is used for distribution to more satellite dishes.

⁴ Dynamic Frequency Selection, Dedicated Short Range Communications, Earth Exploration Satellite Services, Fixed Satellite Services & Intelligent Transportation Systems.

- ❖ Put internet and information access within reach of everyone
- ❖ Driven significant economic development in OECD economies
- ❖ Provided a clear sandbox for innovation Because Wi-Fi networks are inexpensive, flexible, and scalable, they can be deployed rapidly to meet consumer demand for internet access.

However, unlicensed spectrum has so far played second fiddle by a long mile to licensed spectrum in Africa as in most other developing countries. Unlicensed spectrum has a major role to play in driving broadband deployment and economic development, yet many broadband plans in most countries on the continent do not even mention unlicensed spectrum and/or Wi-Fi.

Regulators must make unlicensed spectrum a key part of their broadband strategy by ensuring that there is sufficient unlicensed spectrum available and that it remains open for innovation. Indeed, the DSA would encourage two key further actions for Africa beyond prioritising unlicensed spectrum access and Wi-Fi.

Firstly, the region's spectrum regulators and policy makers must make themselves aware of the emerging new globally harmonised channel plan for Wi-Fi applications, particularly how sharing would happen with incumbent technologies/services in different parts of the band (e.g. with DFS, DSRC, EESS, FSS, ITS⁴, Radiolocation). Some African voices must be heard in these discussions.

Secondly, African spectrum regulators and policymakers must also make themselves aware that there are moves afoot to increase the amount of spectrum available to Wi-Fi, particularly with newer standards such as 802.11ac and .11ax which

can work with up to 160MHz channels. To get more 160MHz channels requires more allocation to Wi-Fi or sharing. DSA is therefore supporting the goal enabling Wi-Fi in the 5925-6425MHz range using dynamic spectrum access technology to share with incumbents which, in OECD countries, include microwave and satellite uplink users.

Dynamic spectrum allocation

This is a must-have consideration particularly across key bands such as VHF/UHF (using TVWS regulations) and C-band

Spectrum sharing – or more broadly, dynamic spectrum allocation – is an approach that allows secondary users to access the abundant spectrum holes or white spaces in licensed spectrum bands.

What does this really mean? Let us consider the two highly contended bands of UHF (470-694MHz) or satellite C-band (3700-4200MHz)/6GHz uplink.

The UHF band is internationally harmonised via ITU regulations across all of Africa and is allocated for terrestrial TV broadcasting.

However, as explained earlier, these low frequencies allocated for TV broadcasting in Africa are exactly the type of frequencies needed to provide broader coverage for internet access – indeed, this is why they were chosen for TV in the first place.

However, there is not much terrestrial TV on air in Africa, leading to most of this extremely important spectrum lying fallow. But the preparatory process for WRC-15 rejected calls to allocate these frequencies to mobile use on the continent and maintained the current allocation to terrestrial TV until 2023.

JANUARY – JUNE 2016

Celeno Communications will supply video grade Wi-Fi chips to help Altech UEC deliver a range of high-end 802.11ac capabilities to HD gateways and set-top boxes. Altech UEC specialises in developing digital technology for the converged broadcast and broadband industries in Africa. It says the use of the chips will enable it to offer Wi-Fi networking that delivers reliable throughput as well as the high QoS needed for data and HD video distribution across the home to multiple portable devices.

VAST Networks claims it has launched South Africa's first truly open access Wi-Fi network. The company continues to grow and says it currently offers thousands of hotspots throughout the

country. As an open-access wireless network infrastructure provider, VAST says it is delivering carrier-grade Wi-Fi in Southern Africa. Over the coming years, VAST plans to expand by firstly consolidating the networks it inherited through Internet Solutions and MWEB, and then grow into public spaces where there is high Wi-Fi demand, such as schools. Since launching last November, the company says it now offers internet access at more than 2,200 locations around South Africa, including transport hubs, shopping centres, hotels, hospitals and restaurants. These are provided using infrastructure inherited from the AlwaysOn and MWEB networks.

In what's believed to be the first technology solution of its kind, Cisco and Dimension Data

have teamed-up on an initiative aimed at dramatically reducing the number of rhinos being poached in South Africa. As part of the *Connected Conservation* project, the two companies are deploying a sophisticated monitoring system in a private game reserve adjacent to the Kruger National Park to track individuals from the time they enter until they exit.

During phase one, which has now been completed, Cisco and Dimension Data gathered information from the game rangers, security personnel, and control centre teams. They then installed wireless hotspots around key points to create a secure, point-to-point radio ‘Reserve Area Network’ (RAN) using Cisco's Wi-Fi and LAN technology combined

Therefore, the only other option left is to share the band, leaving the way open for a globally-harmonised transition to digital television and the continued secondary usage of this high-quality spectrum for TVWS applications.

TVWS regulations would allow this unused spectrum to be used to provide more widely accessible internet by accessing this spectrum on a secondary basis, since the primary usage remains terrestrial broadcasting. Effectively, such TVWS regulations would allow for other variants of Wi-Fi which have been innovated for the TV bands.

To date, unlicensed technologies using high frequency spectrum have been limited to short range communications. However, access to the unused TV white spaces has the potential to extend the unlicensed revolution to long range uses.

The potential applications are nearly limitless and TVWS-enabled technologies can play a critical role in extending internet access. Successful trials have taken place in Africa in South Africa, Ghana, Morocco, Kenya, Tanzania, Malawi, Namibia, *et al*, and rural users are already being connected in many countries including the USA, Ghana and the Philippines.

In the many TVWS rural broadband initiatives taking place around the world, smartphones are already being connected using the technology with Wi-Fi as an intermediary. However, new revisions of Wi-Fi (802.11af) will allow smartphones direct access to this technology. There are likely to be many implications here.

First, a user's home Wi-Fi network will no longer stop abruptly at their front door, instead extending into their local area. Second, the provision of Wi-Fi over large

areas such as university campuses and even whole cities is likely to become easier to deploy and more ubiquitous.

Smartphones which can function in remote forests and natural reserves also become a distinct possibility. Over time, mobile network operators are likely to be large-scale users of TVWS, adding the technology to their current GSM and Wi-Fi-based networks.

As noted above, Africa has been a big defender of C-band for satellite use. However, other regions are pushing for this band for 5G and other services.

Once again, the answer for Africa would be dynamic access. The DSA can and should work with the satellite industry to promote sharing using dynamic spectrum access regulations and technologies that provide reasonable protection to the incumbent satellite services.

In the US, the Federal Communications Commission has already pioneered regulations using an approach that allows incumbent access the highest priority, followed by licensed priority access users and lightly licensed general authorised users. This approach already enables sharing with satellite operations in the extended C-band. Such an approach could be used to share C-band in Africa, thus allowing for satellite services to be protected while enabling the critical broadband services of tomorrow.

Broader C-band spectrum also includes the 5925-6425MHz frequencies typically used for satellite uplink and microwave. As mentioned above, new Wi-Fi technologies need additional spectrum channels to be allocated. The DSA believes that dynamic spectrum sharing would allow for sharing of these uplink satellite and/or microwave links with Wi-Fi. ■

Enterprising wireless

In what turned out to be another quiet year for WiMAX, the technology lost out again when Internet Technologies Angola (ITA) deployed a national network using RADWIN's point-to-multipoint solutions in the 2.2GHz to 2.3GHz band.

ITA CEO Rolf Mendelsohn said: "We sought a solution in the unique 2.2-2.3GHz band that could co-exist with the high transmit power of the 3G cellular network in our capital Luanda and other cities."

He said ITA evaluated several technologies, including WiMAX, before opting for the bespoke carrier-grade wireless broadband solution provided by RADWIN. "Today we can provide high-speed connectivity of 50Mbps and upwards with low latency and guaranteed SLAs."

RADWIN said ITA has deployed "hundreds" of its 5000 JET PtMP radios to provide a WiMAX replacement in a "tough" radio band. The firm claims the devices offer fibre-like connectivity and scalability at a price point that beats other technologies, including fibre.

ITA provides business-class services to many of Angola's largest corporations. Earlier last year, it opened its new state-



ITA said its new, multimillion dollar HQ means it is now totally independent from an infrastructure perspective.

with Dimension Data's range of remote network monitoring, routing and switching, and managed services.

Liquid Telecom provided the Wi-Fi at the inaugural *Space for Giants* summit that was held at the end of April in Laikipia, Kenya. The event aimed to help raise the profile of elephant conservation across the continent, and was one of the largest gatherings of African political leaders, philanthropists, celebrities and conservationists. Liquid Telecom Kenya's broadband services supported live video links with global celebrities such as Leonardo DiCaprio and Lupita Nyong'o, and also helped the international media to deliver uninterrupted streaming of events.

JULY – DECEMBER

Telkom supplied the ICT services that supported South Africa's municipal elections held in August. The solution included access for the IEC's WAN through Telkom's VPN services platform. This uses multiple access technologies such as satellite, metro LAN, ADSL, amongst others. As part of a disaster recovery and business continuity solution, all data activities at the IEC's HQ were replicated at Telkom's data centre in Centurion in real time. This ensured that in the event of a disaster at IEC HQ, the recovery site would take over all activities allowing the elections to proceed uninterrupted. In addition to the services it provided for the electoral commission, Telkom also setup a network

of open access free Wi-Fi hotspots in almost 1,000 voting stations nationwide.

The Overseas Private Investment Corporation (OPIC) has disbursed its first funds to Mawingu Networks which specialises in delivering affordable internet into rural Africa. OPIC is the US Government's development finance institution and has committed to financing a USD4.1m loan to Mawingu Networks which is providing solar-powered wireless internet across rural Kenya. The Nanyuki-based company was able to establish its current operating model using an initial grant in 2013 from Microsoft's 4Afrika initiative and USAID. Using a network of solar powered 'nomadic' wireless internet stations, Mawingu says it provides last-mile connectivity access

of-the-art head office building at Lar do Patriota in Luanda which makes it totally self-sufficient in its infrastructure. Covering an area of 2,300m², the USD12m facility includes: a data centre with systems for redundancy; a network operations centre; a teleport; and a transmission and a power room. The new headquarters also has two fuel tanks with a total capacity of 20,000 litres, and three 700kVA generators.

RADWIN was also the provider of choice when AfricaOnline boosted the broadband service it offers to corporate clients in Ghana with the launch of a new network.

The new symmetrical fixed wireless broadband network was initially designed to cover greater Accra. AfricaOnline Ghana MD Kwadwo Ohemeng Asumaning said: "We plan to leverage our existing customers to encourage them to increase capacity, follow up on clients who churned due to the instability of the previous unlicensed network, as well as target newly established business looking for reliability through a superior service."

While the popularity of 4G and LTE technology is increasing in the region, Asumaning claimed the RADWIN network allows more tailoring of solutions to ensure greater value for money, and is well-suited to companies with several branches that need dedicated uncapped symmetrical bandwidth.

Enterprise customers were the target in another launch that saw Comsol Networks using terminals and relevant hub site equipment supplied by Intracom Telecom. The deployment used the latest generation of the vendor's point-to-multipoint wireless system available at the time, along with its *uni|MS* network management platform.

As well as providing B2B wireless services in South Africa, Comsol said that it offers the country's first and only nationwide open access high-speed carrier grade data network.

Under a five-year deal worth USD9m, the firm will use Intracom Telecom's *WiBA-*

OSDR radio at 28GHz. It's claimed this will enable it to offer "superior" open access Layer 2 last-mile connectivity services to its growing number of corporate customers in more than 200 towns in SA.

Intracom boasted that its product was the only one available worldwide to make full use of Comsol's expanded spectrum assets, reaching up to 56MHz channel, and advanced networking features.

Wi-Fi for the masses

VAST Networks partnered with the City of Cape Town to deploy Wi-Fi to all MyCiTi buses. The first stage of the project involved ten buses across various routes, with commuters being able to benefit from 50MB of free data per day.

The initiative is part of the metropolitan authority's efforts to improve the attractiveness of the public transport system and encourage residents to minimise the use of their cars.

According to VAST Networks, Wi-Fi connectivity is the next step in making Cape Town a "truly smart city". Speaking at the time, mayor Patricia de Lille said: "This is indeed an exciting time for the City of Cape Town as we take another innovative step towards becoming the 'Digital Capital' of Africa. Internet access is also a key part of our strategies to build an opportunity city where we connect residents to resources and economic opportunities."

Elsewhere, Wireless-G said it would use VAST's open access network to grow its own business and brand. The company, which is said to be one of the oldest players in Wi-Fi in South Africa, said that all its *G-Connect* customers would now be able to use their Wi-Fi bundles on almost 2,000 VAST hotspot locations throughout the country.

In yet another deployment, VAST Networks successfully launched what was claimed to be the largest shopping centre

Wi-Fi installation on the continent. The company said consumers and retailers could now benefit from "a reliable and fast Wi-Fi experience" throughout the 130,000m² Mall of Africa in Johannesburg which opened towards the end of April 2016.

Formed in 2015, VAST Networks brought together the Wi-Fi assets of MWeb and Internet Solutions. The company collaborated with partners including Ruckus Wireless on the Mall of Africa deployment. They planned the rollout for more than a year, with technicians working on the site for nearly six months to make sure the Wi-Fi network would work without any glitches once the mall opened for business.

VAST said the teams installed more than 1,000 "highly advanced" APs together with the network backbone to deliver a solution that could not only handle the capacity requirements of more than 300 shops and thousands of anticipated daily visitors, but also cope with ever growing data demand.

VAST Networks CEO, Grant Marais, added that a deployment of this scale is a "massive undertaking by world standards and an African first".

The internet of things hits the big time

2016 saw IoT (Internet of Things) connectivity enabling Shell Nigeria to monitor its remote infrastructure in the Niger Delta.

The Digital Oilfield (DOF) solution now provides pipeline surveillance and wellhead monitoring. It was implemented for Shell by KONČAR, a Croatia-based producer of industrial electronics and power electronics devices and systems.

The company used end-point devices enabled with RPMA (*Random Phase Multiple Access*) network technology from US machine-to-machine specialist Ingenu. This provided Shell Nigeria with field data

to areas that cannot economically access the internet. OPIC's loan will allow the company to expand connectivity and provide off-grid internet access using TV white space (TVWS) technology.

South Sudanese ISP RCS-Communication plans to double its bandwidth capacity over the next two years, despite most service providers in the country scaling down operations due to economic and other challenges. RCS was one of the first companies in Africa to sign up with the MEO satellite operator in 2013, and uses *O3bTrunk* to connect its WiMAX and high throughput point-to-multipoint networks in

Juba to the internet. The ISP will use additional satellite capacity from O3b as it is said to have now almost exhausted its contracted capacity as demand for bandwidth continues to increase.

Botswana Fibre Networks (BoFiNet) connected the National Stadium in Gaborone and the Francistown Sports Complex with Wi-Fi as part of the country's celebrations of 50 years of independence in September. The operator said its *BOT50 HOTSPOT* provides good coverage within the parameters of the stadiums, allowing users to connect to a speed of 2Mbps even when the venues are at full capacity.



Kalpak Gude,
President,
**Dynamic Spectrum
Alliance (DSA)**



Steve Song,
Network Startup
Resource Center,
DSA member

The year ahead: The last ten years has seen an explosion of investment and growth in



The M2M ‘Digital Oilfield’ system means Shell Nigeria can monitor its remote pipelines and wellheads.

about pipeline pressure, temperature and flow. KONČAR’s remote terminal units and wireless pressure and temperature transmitters were installed in flow stations, manifolds and wellheads to provide connection to the back office, ensuring reliable information transmission.

According to Ingenu, RPMA uniquely enables devices to connect more efficiently and cost-effectively in both the uplink and downlink. It claims the technology requires fewer towers to provide coverage to large areas – 1:10 compared to 1:30 needed for cellular.

Unlike alternative communications solutions such as satellite, PI to SMS, and GPRS, the company added that its LPWA network technology can be installed using minimal infrastructure, which resulted in a total project cost savings of more than USD1m for Shell Nigeria over the alternatives.

The system was integrated and supported by technology services company Upland Consulting Nigeria. Its president and CEO Bola Awobamise said: “The key criteria for selecting a solution were the technology’s ability to cover difficult terrain, power performance, and long-range transmission as well as network scalability, two-way communications, and secure data transmission. RPMA offered all of these

attributes and eclipsed the competition with its connectivity, network capacity, and exceptional value.”

Later in the year, however, Comsol launched what it claimed was now the continent’s largest Internet of Things network in South Africa.

The *Comsol IoT* is enabled by Actility’s carrier-grade *ThingPark* platform. The operator said it will offer broad nationwide coverage, including urban and rural areas, to create an ecosystem that supports the connectivity of millions of devices.

Comsol IoT was deployed on the back of the operator’s ZAR1.5bn open access Layer 2 national network, and was due to be available for sensor service termination by February 2017 in major cities. The open architecture, low power wide area network (LPWAN) is claimed to be the “ideal” solution for applications where power-constrained devices are distributed over large geographical areas.

Comsol said that sensors and devices used for utility meters or agricultural monitoring, for example, could achieve a battery life of up to 15 years due to the relatively small data sets and transmission rates enabled by its IoT.

It added that the high costs associated with manual monitoring, replacement of

African telecommunications. Access to high-capacity undersea fibre optic infrastructure has gone from one to more than a dozen undersea cables now reaching most countries in sub-Saharan Africa. This is likely to continue with new undersea cable initiatives planned for launch in the next two years, including the Djibouti Africa Regional Express (DARE) cable, the South Atlantic Cable System (SACS), Africa-1, and Liquid Sea projects.

This trend is unlocking capacity for service providers seeking to expand from 2G and 3G services to 4G capacity; bringing true broadband to citizens. However, a digital

urban-rural divide is growing. While national governments embrace strategies calling for universal telecommunications service, operators are required to use existing networks. In the coming two years, we will also see increased pressure on regulators to make wireless spectrum available in a timely and affordable manner to service providers.

Regulators will have the choice of following the old path of long-term licenses destined to raise the cost of providing service to the same urban areas, or leverage an unlicensed future to enable alternative technologies like WiFi and connectivity opportunities to those



Watly 3.0 was developed after the successful trial of a smaller machine in Abenta Village, Ghana.

batteries and GPS devices were also no longer factors for organisations wanting to run a smart operation.

Furthermore, because the Comsol IoT is an open access, open protocol network, the operator said any IoT applications that are developed will be “seamlessly enabled” to the devices and sensors they are meant to support. It believes this will create a “diverse” ecosystem that will serve to take African IoT to the “next level”.

Going green

In early 2016, a clean-tech start-up company claimed to have developed a solar-powered machine that could bring internet connectivity, clean water, and electricity to communities across Africa.

Watly uses a combination of photovoltaic and thermal energies to power the *Watly 3.0* thermodynamic computer which, according to its developers, can sanitise more than 5,000 litres of contaminated water (including ocean water) a day, as well as generate electricity and Wi-Fi connectivity. The machine uses solar heat collected by super efficient vacuum-tubes to vaporise and therefore sanitise the water. This process also includes the use of graphene

who are still waiting for their on-ramp to the connected future. The last two years have seen dozens of announcements of public and private WiFi services across the continent. This trend will only increase as operators seek to leverage their investments in fibre through the deployment of this low-cost but robust access technology.

Finally, dynamic spectrum access, including TV White Spaces, will come into its own with a number of countries already having draft regulations in place and product manufacturing is likely to reach mass market during that period.

technology. Photovoltaic panels located on the roof generate off-grid electricity to power *Watly*'s internal electronics, and can also be used for recharging external devices.

Each *Watly* can be deployed as standalone infrastructure, but multiple machines can also be used as part of a, "Energenet" which, it's claimed, "can power entire cities and countries". They can all communicate with each other and be controlled with the Central Network Management platform via radio links, existing 3G or 4G networks, and/or satellite.

Watly was funded from Horizon 2020, the European Union's programme for innovation. The development of the system follows the successful trial of a smaller machine, *Watly 2.0*, in the village of Abenta, Ghana. The firm launched a crowd funding campaign with the aim of raising funds to create another *Watly 3.0*, with contributors being allowed to decide where the first model will be placed, with the options being Nigeria, Ghana, or Sudan. Sadly the fund didn't even reach a quarter of its target before the closing date and there's been no reported progress on the creation of another *Watly 3.0*.

Solar power is still not only an ecological solution to powering communications networks, but sometimes also the only realistic option. As part of its ARTES Partner programme, the European Space Agency (ESA) is contributing up to EUR10.7m in funding to support satellite operator Avanti Communications in bringing rural communities across Africa online.

Starting in September 2016, ESA aims to provide affordable satellite broadband connectivity to 1,400 community sites across sub-Saharan Africa over the next two years using Avanti's recently launched *ECO Wi-Fi* hotspot initiative.

The solar-powered hotspots will be hosted at schools that will benefit from subsidised internet access. Consumers and local businesses within range of a hotspot will use the newly developed *ECO* mobile payment app to make micropayments for broadband credits which convert to data usage.

Avanti has partnered with Newtec and a group of leading service providers, combining satellite, Wi-Fi and solar power, to deliver the programme. *ECO* MoUs have been signed with South Africa's Sentech and Ministry of Communications; Wananchi, Intersat and Imarasat in Kenya; and the Tanzania Education Authority.

Many other governments, service providers and other partners are said to have expressed support for the initiative. They include World Bank International Finance Corporation, Telkom Kenya, Internet

Solutions, Safaricom, iWayAfrica, iSat Africa, MainOne, Nynex, TelOne, Quantis, and Discovery Learning Alliance.

Powering connectivity for schools and hospitals

Following the signing of an MoU with the Ministry of Communications, Works and Infrastructure in July 2016, Tigo will help connect Tanzania's schools as part of a partnership that represents the first time the country's government and a mobile operator are cooperating on an ICT project of such scale and scope.

The ministry is identifying and providing a list of schools without computer labs to be connected, while Tigo will facilitate the rollout of internet access points over the following two years. It is sponsoring the infrastructural development that will include wiring classrooms and the installation of WLANs.

Tigo's agreement with the government is part of its *e-Schools Project*. Under this social investment initiative, the operator said it has been able to deliver internet connectivity to 31 public secondary schools in Tanzania, and plans to connect 50 more in the latter half of 2016.

In a separate announcement, Millicom's Tigo operations and Zanzibar Telecom (Zantel) joined the GSMA's *Connected Women Commitment Initiative*. The GSMA's aim is to reduce the gender gap in mobile internet and mobile money services. Tigo said its operations in Chad, Senegal, Tanzania, Ghana and Zanzibar would now follow the lead of Tigo Rwanda which became the first African operator to commit to the initiative in February.

In Madagascar at the end of the year, the Ministry of Posts, Telecoms and Digital Development (MPTDN) announced a project under which wireless broadband infrastructure would be deployed to connect schools and hospitals, while also serving remote and rural areas of the country.

In a press release outlining its plans, the MPTDN said that once the project (which is known simply as 'Wireless Broadband') is complete, access to the infrastructure may be offered for free, or at least at low cost.

A number of local government departments are involved with the initiative, including the Ministry of Education, the Ministry of Public Health, and the Ministry of Finance and Budget. In mid-October, Andrew Rugege, ITU regional director of Africa, and Jean-Jacques Massima-Landji, the representative of the ITU for Central Africa and Madagascar, were in the country to help mobilise the funding required for the venture. ■



Kamal Mokrani,
Global VP,
InfiNet Wireless

Malta-headquartered InfiNet Wireless has been doing business around the world for 23 years now, but 2016 marked the first time it exhibited at AfricaCom in Cape Town. The fixed broadband wireless specialist used the event to launch the *InfiLINK*

XG 1000, claimed to be the fastest point-to-point wireless radio currently available, as well as the *InfiMAN 2x2 Qmxh*, a smart antenna base station sector unit that is said to use spectral efficiency to deliver twice the performance of rival products.

But that's not to say InfiNet is an African newbie – far from it. The company has worked the length and breadth of the continent, listing deployments in Algeria, Cameroon, Egypt, Gabon, Kenya, Zanzibar, and many others, as part of its African success stories.

Global vice president Kamal Mokrani highlights the diverse nature of the African continent, not only in terms of its geography, but also in its political, economic, social, technological and environmental outlook, with each country and region having its own set of unique challenges and advantages. As a result, he believes you cannot have a "blanket statement" to cover what it is like to do business in the region.

"We have to adapt almost on a country by country basis. Just to give you a rough idea in terms of Africa and what we have done so far, take a country like South Africa, for example. Here, there are two specific sectors that we are focusing on: mining and the WISPs. But go to Egypt, completely the other side of Africa, and it's a different ballgame for us. There today, we are almost entirely focused on homeland security for reasons that we all know. The government is trying to attract back tourists so they've got to secure every single tourist site and they have to make sure that from the minute you land to the minute you take-off again you have a good experience."

Does that mean to say business is beginning to improve again in Northern Africa following the 'Arab Spring' uprisings of a few years ago?

"It's picking up and [governments] are creating what's known as safe city programmes. Border controls in some areas, such as Nigeria with Chad because of Boko Haram, are a sad thing. But for us, from a business point of view, they are actually creating opportunities for working

with different companies such as those specialising in face recognition technology.

"It is not as bad in Africa as it is in the Middle East. Jordan, Lebanon, Syria, Iraq and surrounding countries are much bigger opportunities for us, and we work with business partners in such countries. It's a niche. Around four or five years ago, one of our particular competitors from Canada focused on the oil and gas sector. Okay, so at the time, maybe that was the right decision. But now, because of the oil price having gone so far down, no one is spending on wireless communications, so they are struggling."

"Africa fortunately is so dynamic that anything can happen anywhere, anytime. Take Libya for example. We were doing so well and then overnight everything changed. We were wiring-up the WISP world in Libya so quickly that we could not make products fast enough. And then the political situation changed and everything has been destroyed from every aspect, all the infrastructure."

"I haven't been to Libya for many years and for good reason. But just the other day I had a phone call from one of our old Libyan partners who is a refugee in Dubai today and he said, 'I think things are getting better now, can I count on your support?' And I said, of course, let's sit down and start doing some serious radio planning so that we can rebuild as we go along. So yes, it will come around."

"I also talk to a lot of people in Algeria. It is a stable country today but the president is unwell – so will that be the next to see an Arab Spring revolution? It's a huge country and strategic as well, the gateway between Africa and Europe."

"So that's the big step approach you have to monitor. But that's what I love about Africa. In Europe you go to France, Italy, UK, Spain – it's almost the same. There's not much diversity and you know what to expect, the culture is almost similar. But here in Africa, it is different."

Key markets in Africa

Mokrani identifies Algeria, Egypt and South Africa, as currently the top three Africa countries for InfiNet in terms of sales. With regard to strategic value, he views Western Africa as significant.

"Certainly Cameroon is important because basically you have two big cities there and everything else is rural. So the digital divide is even bigger. We work with a couple of ISPs in the country to really reach even beyond the MTN network (MTN is, to a large extent, also becoming an ISP)."

"We have other markets like Senegal which has one of the biggest ports in the world. We provide the management company, Dubai Port World, security of the port, controlling assets, monitoring movements of goods and containers. And even before they dock, the boats are provided with one of our units just to give them television or internet access because they could be waiting two or three kilometres offshore for three or four days."

When asked which African markets are on InfiNet's target list for 2017, Mokrani said he does not like a "scatter-gun" type of

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approach, preferring instead to consolidate what the firm already had and ensuring it has a good solid foundation.

"Certainly, the countries that I have mentioned already are the ones where we are going to be spending more time and marketing dollars to establish an even stronger presence. But there are other countries, such as Central African Republic or Congo which are potentially a gold mine – and I literally mean a gold mine as they have so much wealth under the ground. But they're too busy doing other things like killing each other."

"Eventually, those countries may come around, realise that the potential is huge, and say let's develop the resources we have. And every single project in those countries will require communications. You can't have people coming to mine and take the gold out without having airports for them to land at or hotels for them to stay in. And all that infrastructure will be developed with foreign direct investment and we'll come in basically to establish the links."

But coming back to the more foreseeable future, Mokrani explains that the first strand of InfiNet's strategy is to strengthen what it has, specifically the WISPs and the homeland security market which is something that he wants to develop much more.

"In parallel to that, of course, we want to develop all the sectors in the industry. In South Africa, probably 60-70 per cent of our business comes from the mining industry. I want to repeat that experience in other countries which also have a lot of resources.

"So in 12 months time I would love to say to you, 'guess what? Mining has reached the same as our WISPs'. Or if we see some significant steps, for example, LTE being deployed, I would also like to be here in 12 months time and tell you we work with all the operators to provide them backhauling which is what our *XG 1000* is exactly designed to do. It is a sector of the industry in Africa that is relatively new for us. We do a little bit in Africa but we do a lot more in other countries. For example in China, backhauling for China Mobile and China Unicom is perhaps our core business."

Not just about being a "box shifter"

While on a global basis InfiNET offers different solutions for different sectors (for example, it is going to Latin America for the backhauling side as many operators are still migrating to 3G), Mokrani says the aim is to stay diversified but offer the same products with just the application side tailored to the relevant industry sector.

Enterprise fixed broadband wireless will remain the company's core business as Mokrani sees huge growth potential in this area. But he points out that if a vendor cannot add value, it simply becomes a "box shifter".

"It's not about just asking the customer 'how many do you want and what colour do you want?' That's not what we do. When I travel across Africa and I see villages completely isolated, it just makes me wonder. So we are working with a lot with ISPs in different parts of the world and Africa specifically to really bridge that gap between the have and the have-nots, the rural and the urban."

One of the opportunities Mokrani hopes to capitalise on is the demise of previously deployed wireless technologies. For example, he said WiMAX has reached the end of its life and none of its manufacturers are now pouring money into R&D. "So everybody is migrating which is music to our ears. We are not a WiMAX manufacturer but we can actually migrate every single WiMAX network onto our platforms."

Mokrani said WiMAX had played its role but ultimately lacked the capacity to bridge the digital divide. Having said that, he supported the technology when it first emerged. "Around 10 years ago, I was a great believer in WiMAX. I used to work for Marconi in the UK and we were party to the ITU in those days, influencing the specs and doing a lot of work. WiMAX's key principle was interoperability. Rather like Wi-Fi, you could have a base station from one vendor, and the CPE or remote sites from any other.

"But that never happened because Samsung or Tranzeo or whatever other manufacturer of WiMAX would only allow their base stations to work with their CPEs, and that defeated the whole purpose. And then came Mobile WiMAX but again, that never really took off."

Of course it's not easy, and few would disagree with Mokrani when he says that no single technology can provide the universal solution to Africa's digital divide. WiMAX – along with LTE, microwave, satellite, fibre, etc. – represents just one piece in the huge and complex jigsaw puzzle of providing ubiquitous connectivity across the continent.

"Our solutions are in the fixed broadband arena. We do support mobility up to a point. We cover from 2.4GHz to 6.4GHz, and we're even developing new frequencies. For any wireless vendor, keeping abreast of all these changes, refarming all frequencies, etc., is a nightmare. To do R&D when things are literally changing on a daily basis is therefore challenging."

"For example, about a year-and-a-half ago, the Mexicans opened the 3.0-3.3 frequency band for commercial use. It wasn't there before. I contacted our R&D guys and said there is a huge opportunity in Mexico, we need to do this. Which we did.

"So your business case has to stack up for you to do R&D. Thankfully, we are pretty strong financially, and if we see a niche or a big market, we would be crazy not to go out and develop products. For instance, I was approached by someone to do 26GHz not long ago and my first question was: how big is the market? If it is big enough, we will do it. Of course, nobody can develop everything. You get a lot of small players who say 'no, we will stay at 700MHz because that is our core business and we don't have the resources to do anything else'. And you have the E-band guys at the lower levels who stay there and target the mobile operators who have an interest in that. Would we do E-band? I would not say that we don't have an interest in that. We monitor everything."

According to Mokrani, fibre optics will ultimately be everywhere. But he admits that will take many years, and may not even happen in our lifetime.

"Perhaps Africa will reach the stage where Europe was 20 years ago in 20 years time from now. Or is it a 50-year time window or 100? I don't know. A country like Ghana, for example, is pretty well fibred-up – it is probably one of the most advanced countries in Africa in terms of availability of fibre. But you take countries like Algeria, it is impossible to fibre; the country is huge, the terrain is impossible."

But then these are all part and parcel of the challenges in Africa that drive Mokrani. "I was talking to an oil and gas company in Northern Africa and they said they wanted connectivity and we said we can do that. But then they pointed out a challenge and said: today I have line of sight, tomorrow I have a sand dune, how do I fix that?"

Physics presented the solution for InfiNet, as Mokrani explains: "The atmosphere has different layers and we can actually use our products and have different portables that can reflect signals. Normally, you have two units point to each other for line of sight, and we can put them in such a way that they find the right layer for your frequencies to reflect and connect back to everything. We try and understand as much of the physics as possible so that we can offer what to others seems like black magic."

Ultimately, it's all about giving access to information for Mokrani: "If we provide that link to the outside world, the world will be a better place. I want my tombstone to say: *Here's the guy that made the difference.*"



**Nick Ehrke,
Sales director,
Southern Africa,
RADWIN**

Though primarily focused on its carrier business, RADWIN saw growth across all of its segments in 2016, according to Southern Africa sales director Nick Ehrke.

"This included big growth in providing key solutions for Africa's largest utility (mobility for first responder vehicles and mission critical CCTV backhaul), as well as providing mission critical communications to the continent's largest integrated energy and chemical company based in Johannesburg."

Ehrke was unable to name the clients here. He went on by saying that RADWIN's carrier business continues to go from strength to strength, with a "major" tier 1 mobile operator having already deployed more than 700 of the company's point-to-multipoint (PtMP) Jet base stations throughout South Africa for broadband connectivity.

So how has the firm seen the wireless communications market adapt and evolve on the continent in 2016? Ehrke says: "Operators are having more difficulties with the lack of suitable and affordable spectrum. Many have turned to ISM band, while many more are following suit as the demand for affordable, reliable internet service, and especially high-capacity internet is growing. These operators are seeing fibre, PtMP, copper, LTE and satellite as tools in their toolkit to address the ever growing need for internet services."

Ehrke also believes that real economic growth is a major stumbling block in Africa and represents a significant challenge for the region in 2017. "The problem is exasperated by the real lack of broadband even in dense urban centres. Contracting economies, negative growth, lack of capital liquidity, poor regulatory framework, lack of skills and the high cost of infrastructure are some of the major challenges Africa faces."

Despite all this, he says RADWIN remains very optimistic. Perhaps because of the challenges mentioned before, Ehrke reckons the company will continue to see its business grow exponentially every year. "This is primarily due to our pedigree in carriers – we deliver what the carriers/operators need. They see through marketing hype very quickly, and we have a legacy of delivering solutions that are easy to scale and future proof, that continue to give our customers a competitive edge in their markets."

Ehrke adds that RADWIN will continue to innovate following the addition of its new AIR series to its products portfolio. "Built on our PRO range, with the same scalability, reliability and interoperability, the new products introduce cutting edge innovation so that we are able to drive down costs even further for our customers," he claimed.



**Chris Mason,
EMEA sales
director,
Rajant Corp.**

US-based Rajant was setup in 2001 to deal with what it describes as "significant shortcomings" in traditional wireless mesh technology, particularly when it came to mobile voice and data networks used by first responders. Its answer was *Kinetic Mesh* – a more robust mesh technology that aims to allow first responder networks to be fully mobile and mobility-enabled, and operate reliably in even the most demanding environments.

In Africa, EMEA sales director Chris Mason claims Rajant's position is growing both in terms of the number of deployments but also in the size of the networks in operational sites.

"Our main footprint in the region has always been in mining, but our expanding channel of authorised distributor and reseller partners are helping Rajant to extend into new markets, such as oil and gas, ports,

municipalities, security and defence.

"Africa remains a buoyant market for Rajant. Sales are increasing, partners are being trained on all aspects of successfully planning, designing and deploying *Kinetic Mesh* networks, and customers are reaping the real benefits and ROI of a properly deployed Rajant network."

Mason says a recent and particularly notable deployment involved the ability to deploy an autonomous drilling rig in a mine in South Africa, controlled and monitored across the Rajant network. "We're hoping to be able to publicise this activity soon but in summary, this could only have been achieved with the ability of the Rajant network to support high-bandwidth and more importantly low-latency to guarantee safety of operations."

As in many other regions across the world, Mason says users in Africa are increasingly requiring highly reliable, resilient wireless networks. "It can't be underestimated how mission critical sophisticated applications are becoming more essential to the management and survival of industrial organisations. The growth in the use of data from operations to drive efficiencies, prevent downtime and derive insights into business processes needs both high bandwidth and low-latency."

"Furthermore, automation and associated video imagery requires increasing amounts of bandwidth, adaptable to the demand and locations of operational use. This automation trend is across all industries and is essential to take personnel out of harm's way, and to drive efficiencies."

According to Rajant, global organisations face several challenges across their territories, not least of which is a legacy of multiple systems in different locations and the number of personnel required for support. Mason says this becomes a problem when the drive for efficiencies seeks to centralise and standardise on technologies such as wireless networks.



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"We've seen an increasing requirement across organisations for a single wireless standard technology – one that, when an upgrade or expansion is required, doesn't require the disposal of previous generation equipment. Rajant can seamlessly integrate with Wi-Fi or any Ethernet connected device. This integration is becoming increasingly more important as network operators look to add more functionality and mobility to their existing infrastructures."

Mason reckons Rajant is "uniquely positioned" to support this growth or adaptation. So what obstacles need to be overcome on the continent in order for the company to achieve such objectives?

"Africa's 12 month challenges are a subset of its longer term challenges. These include a growing population and the need to feed, house, educate and find work for that population. Added to this escalating growth is the need to ensure appropriate stewardship of natural resources, and to assure the economy can develop and utilise those resources responsibly for future generations as well as to generate non-natural resource opportunities.

"Urbanisation of the population and an expanding middle class are two additional drivers creating unprecedented demand to manage transport, infrastructure and government services ever more efficiently."

As a result, Mason says the potential for significant growth of technology adoption across the continent is "immense". He believes the exploitation of data from within organisations' operations is stretching from the consumer and enterprise sectors into industrial environments.

"The Industrial Internet of Things (IIoT) is extending into every industry and further underlining the requirement for all assets, devices and people to be connected. Organisations that fail to make use of their own data are wasting an asset they already own and which can directly contribute to making them a more efficient and therefore resilient business.

"There are challenges indeed in infrastructure, investment and not least commodity pricing, but with increasing political stability, national and international collaboration, Africa's growth potential shouldn't be underestimated."

When it comes to dealing with such obstacles, Rajant's view is to 'bring it on'. Mason says: "Rajant's challenges in Africa are those we welcome: how to ensure we satisfy the increasing demand for our networks and associated management software."

He adds that in 2017, the company is also aiming to consolidate and expand its existing networks, expand its sub-Saharan Africa

footprint and penetrate new markets. "Whilst we have a strong user base in South Africa, our aspirations extend into countries such as Botswana, Ghana, Mozambique, Namibia, Swaziland, Tanzania and Zambia, so we'll be working with our partners to target these areas.

"For Rajant to continue to grow across Africa, we need to secure partners addressing the new geographies and markets identified. We'll be concentrating on the tasks of identifying the key markets and recruiting and training a strong set of channel partners in each country and supporting them in the associated processes of homologations and import permissions.

"There are also a number of key product developments in the pipeline which will be announced in due course that will add to the appeal of Rajant capabilities across multiple markets."

One of the company's recent development areas is the deployment of its wireless network capabilities on unmanned aerial systems or drones. Mason says this provides a "third dimension" to the *Kinetic Mesh Network*, extending coverage into otherwise difficult to reach coverage areas, longer distances and for longer durations.

"Rajant enables organisations to build private wireless networks that support the industrial IoT," he says. "We refer to those 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."



Lux Maharaj,
Strategic account
manager,
Intracom Telecom

Intracom Telecom is a global telecom systems and solutions vendor and has been present in Africa since 2010, as strategic account manager Lux Maharaj explains.

"The Intracom Telecom Group has enhanced its presence in Africa with the establishment of subsidiaries in South Africa and

Morocco. The company started its expansion plan from the South African market. It is now the supplier of choice for large WISPs and telcos in several countries, such as Nigeria, Ghana, Ivory Coast, Liberia and Morocco, especially with *WiBAS*, its broadband point-to-multipoint radio product line.

According to Maharaj, Intracom saw "significant" demand for *WiBAS* in

2016 with new deployments in Liberia, Ghana, Nigeria, Ivory Coast, Mali, Egypt, Equatorial Guinea, South Africa, and others.

WiBAS represents the firm's flagship product range. Maharaj claims it delivers "state of-the-art" IP connectivity, backhaul of hetnets, and premium broadband and legacy access networks at an aggregate rate reaching 1Gbps per carrier at the hub site. "It also enables a wide range of profitable business plans providing a key differentiator to operator success," he says.

Intracom has also introduced *WiBAS-Connect*, a CPE terminal for residential and SMB subscriber access. "It operates in the 10.5, 26 and 28GHz bands, and provides broadband connectivity, featuring leading capacity up to 500Mbps per carrier, to subscribers who presently are constrained by the digital divide. This product enables access to information and entertainment services for subscribers on the continent, and enhances the competitiveness for the operators against legacy fibre/copper technologies due to faster rollout rates with high QoS."

Maharaj continues by saying that the company has now established new local and global partnerships, and has grown its base of skilled and trained engineers as well as trainers across Africa. In terms of the region's technical trends, he says there has been sudden uptake of the ITU PMP spectrum, particularly at 10.5GHz, 28GHz and 26GHz.

Maharaj also points out that mobile and fixed operators continue to migrate enterprise customers on wireless networks from unlicensed bands to licensed bands. He says Intracom has been engaging various operators in Southern, Central and Western Africa, and has helped them to build strong business cases for addressing the enterprise segment within their markets.

"Operators who previously focused on the mobile voice and data markets have now increased their focus on the strong enterprise market – typically served by the ISPs or incumbent fixed line providers.

"Some operators have attempted to target the enterprise market using their existing LTE investments. However, following their concerted efforts, these operators tend to come to the same conclusion that LTE architecture is primarily designed around mobile users, and creating a fixed user service tends to be complex and prone to operational challenges.

"In particular, as LTE is a L3 network, turning LTE into a L2 network for metro Ethernet type services was found to be doable but extremely complicated. The promise of a lower cost LTE CPE is often thwarted by the fact that an indoor CPE often tends to require an external antenna and the operator is faced

with challenges in obtaining the link statistics and matching the subscriber IDs at EPC, eNodeB and the customer CPE."

Throughout this year, Maharaj says Intracom expects to significantly grow its PMP business throughout the continent in order to address the constantly increasing bandwidth demand, frequency spectrum congestion, and what he describes as the "failure" of currently used unlicensed technology to meet the required quality of service.

"The company is now a familiar brand for the region's Tier-1 operators and WISPs, and this will be used as the foundation of the promotion strategy for the new generation of ultra broadband products, such as the new series of E-band *Ultralink* radios.

"The company has also developed a unique, self-aligning, aesthetically-appealing, microwave and millimetre wave solutions ideal for deployment in municipalities and high traffic areas for the backhaul of small-cells or Wi-Fi hotspots.

"A developing need by governments is for solutions to help alleviate road traffic congestion and improve security and surveillance monitoring, and the company is looking forward to meeting this need with its unique *StreetNode* offering.

"Furthermore, in line with the latest technology trends and specifically the smart city concept, Intracom Telecom has developed a comprehensive portfolio of smart solutions including smart parking, smart lighting, surveillance, traffic management and monitoring, waste management, smart metering and energy management, and unparalleled integration capabilities with any IoT device."

Maharaj reckons these offerings offer the "best fit" for municipalities, gated communities, universities/campuses, business parks, shopping malls, etc. At the same time, he claims Intracom's innovations, successful track record and expertise can contribute towards the modernisation of network, IT and public infrastructure.



Christian Jonsson,
Sales director
Middle East/Africa,
Aptilo Networks

There comes a time in all technologies when they take a giant leap beyond what was originally envisioned," declares Christian Jonsson, MEA sales director for Aptilo Networks. "You can recognise the leap when you look back and say, wow, of course that's where this was going all along."

According to Jonsson, Wi-Fi reached that turning point in Africa in 2016. "The focus has rapidly moved from providing simple

public hotspot services with vouchers to a more holistic Wi-Fi services approach. We can see that from all our operator customers and prospects in Africa. Operators are now looking to utilise Wi-Fi in a much broader way and to squeeze every penny out of it, both directly and indirectly."

To illustrate the point he starts by talking about indirect monetisation: "In the industrial world, the largest source of Wi-Fi monetisation is customer retention – offer Wi-Fi and keep your subscribers.

Mobile operators typically spend 15-20 per cent of their revenues just to have the same number of subscribers on 31 December as they had on 1 January. Reducing this spending just a few percentage points can reap hundreds of millions from indirect monetisation of Wi-Fi.

"But, this retention effect is not as relevant in Africa with the vast majority of connections being pre-paid, right? Wrong! Most people have multiple pre-paid cards and they use the one that is offering the most attractive data deals at any given moment.

"The best way for you to ensure that the user has your SIM card in their phones most of the time is to offer attractive and affordable Wi-Fi services. So, the indirect monetisation of Wi-Fi in the form of 'customer retention' is just as relevant in Africa, even if it may be more difficult to measure."

Jonsson says Aptilo has also seen an increasing interest among operators to do automatic Wi-Fi offload with secure and seamless authentication of the users through SIM authentication. He believes this is another huge opportunity for indirect monetisation of Wi-Fi.

"Generally, the cost (TCO per bit) of producing data in Wi-Fi is eight per cent of doing so in 3G macro cells and 32 per cent of 4G macro cells⁵. In Aptilo's experience, we find that it is possible to offload 30 per cent of the data traffic to Wi-Fi with the right Wi-Fi deployment strategy. No wonder that Wi-Fi offload is a highly interesting value proposition in Africa where a lot of networks are still on 3G – just do the maths. In fact, many networks may use Wi-Fi as a bridge between 3G and 5G, and not deploy 4G at all."

Operators in Africa are also becoming increasingly creative when it comes to direct monetisation of their Wi-Fi services. Jonsson says that the continent's MNOs, along with those elsewhere in the world, have identified the "huge potential" in selling Wi-Fi as B2B and B2B2C services.

"Providing managed guest Wi-Fi services to businesses such as hotels, healthcare providers, enterprises, stadiums and retailers

is a growth opportunity. At the same time, operators gain important indoor Wi-Fi coverage and Wi-Fi offload footprint.

"If they play this right, operators have a competitive edge over the many cloud players offering guest Wi-Fi services on top of the existing Wi-Fi infrastructure at the different businesses. Operators with a systems integrator arm can move in and replace the often-times mediocre Wi-Fi infrastructure with a carrier-class one. They can also sell a more complete solution to the businesses, as this solution can include internet backhaul and even end-user support.

"Best of all, they can take a more holistic view when calculating the profitability of each individual project. If the operator factors in upsell effects of other products and services and the possibility of reserving their own SSID for Wi-Fi offload, then they can offer a very competitive price.

"There are many possibilities in the African market that go beyond the traditional public Wi-Fi hotspots. But, to realise this potential, operators need the right tools. To scale their B2B Wi-Fi services they need a flexible and scalable Wi-Fi service management platform built for the task. It must offer a multi-tenancy architecture which allows hundreds of businesses to share the same platform while remaining totally separated from one another. Operators must also allow these business customers to modify parts of the captive portals themselves even down to a single location.

"Operators must offer tools that enable the businesses to get analytics from the Wi-Fi service in a hierarchical fashion. The management of a large hotel chain may be more interested in general trends while the manager at one of the local hotels may want actionable insight about his/her visitors. This is one reason why insights about the users through, for example, Facebook login to the Wi-Fi service, has become as important as the Wi-Fi service itself. Managers may also want to engage directly with their visitors through the portal, mail and SMS."

Jonsson says flexibility in the systems and being able to support many business models is key. But he pointed out that even more important is robustness and proven interoperability with all leading Wi-Fi vendors. "The operator that can provide a managed guest Wi-Fi service that is always up and running and that works with everything will be the true winner."

⁵ *The economics of small cells and Wi-Fi offload*, by analyst Monica Paolini of SenzaFili

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chapter 5

Broadband

Fresh approaches to connecting the next billion



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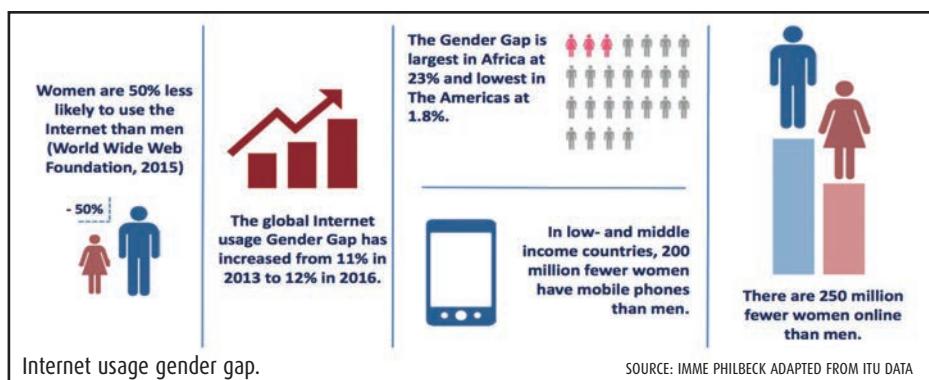
There are still some 3.9 billion people, more than half the world's population, who have never been online and are therefore excluded from all the knowledge and opportunities that are so readily accessible to nearly half the world.

Moreover, the offline population is disproportionately female, rural and poor; among those still unconnected, some 58 per cent are female and roughly 60 per cent are rural. These data must translate into future national connectivity action plans that ensure gender equality (in terms of access, skills and opportunities) and that the rural poor are fully included.

Therefore, global leaders must urgently accelerate progress toward universal and affordable access to ICTs if the world is to meet the UN's Sustainable Development Goals (SDGs) by 2030. During a Special Session co-organised with the World Economic Forum held in Davos, Switzerland in January 2017, the UN Broadband Commission for Sustainable Development called on governments around the world to prioritise broadband connectivity in countries and regions under their influence.

Speaking at the time, ITU secretary-general Houlin Zhao told government ministers, UN leaders and C-suite industry executives that fresh investment models were needed to unlock the power of ICT connectivity that fuels growth in today's digital economy.

"Without more innovative public-private partnerships and leadership, we will miss our opportunity to fast-forward progress on



SOURCE: IMME PHILBECK ADAPTED FROM ITU DATA

the SDGs," said Zhao. "We will miss the chance to improve lives for everyone, no matter who they are or where they live."

The leaders in attendance identified and addressed several key areas. These included: new financing models for broadband infrastructure; new last-mile business models; new country partnership models; and new approaches to ending the gender digital divide.

They also discussed the critical role of responsive leadership to drive progress in each of these key areas, and how they could work together to lead the charge to connect the world's next billion people. "Broadband access is about leadership," said Irina Bokova, UNESCO director-general and Broadband Commission co-chair.

The ITU contributed a discussion paper, written by independent consultant Imme Philbeck, to the Davos Special Session. It stated that the regions faced with the most significant challenges in overcoming internet adoption barriers are Africa and Asia-Pacific.

According to Philbeck, Africa still faces challenges in relation to all internet adoption barriers, including affordability and relevance, capability and infrastructure. She wrote: "Africa is the region with the highest rural population at 62 per cent¹. It also shows the lowest levels of income and education² as well as the highest internet usage gender gap.³"

The report continued by saying that while at the country level there is very high variability in the data for a range of ICT indicators, women fare poorly across almost all regions and development levels.

The GSM Association estimates that 1.7 billion women in low and middle income countries do not own mobile phones, and that women are on average 14 per cent less likely than men to own one.³ In terms of access, women are 50 per cent less likely than men in the same age group and at similar education and income levels to be connected to the internet than men.

¹ ITU research shows that 33 out of 46 African countries have a proportion of rural population of 50% or more, and 23 out of 46 African countries have a rural population in excess of 60%.

² Alliance for Affordable Internet (A4AI) *Affordability Report 2015-2016*, p.14 & 18. The report shows that most African countries are within the lower half of the 51 countries that have been examined as part of the Affordability Development Index. A large proportion of African countries have literacy rates of less than 70% (19 out of 37 countries that data was available for).

³ GSMA 2016, www.gsma.com/newsroom/press-release/results-of-new-mobile-phone-gender-gap-survey/

The key socio-economic drivers of internet access for women are education and age.⁴ In terms of use, women are half as likely to speak out online and a third less likely to look for work than men.⁵ In this regard, Philbeck said the *A4AI Affordability Report* highlights lack of knowhow and technical literacy, as well as the high costs to connect as the key reasons for not being online for women who live in urban areas.⁶

The ITU's *Measuring the Information Society Report 2016* report highlights a persistent gender gap⁷ in relation to internet use, which is largest and has widened between 2013 and 2016 in Africa (from 20.7 to 23 per cent) and the Arab States (from 19.2 to 20 per cent).⁸

ITU research reveals that, based on current population and connectivity trends, the next billion to come online by 2020 are most likely to be: urban; from Asia-Pacific and the Americas; and live in areas that are already within reach of wireless and wireline infrastructure; and not among the poorest.

Connecting the next billion is not just an infrastructure issue, according to the paper. The research uncovered the importance of driving demand, including increasing the affordability of online services and, notably, increasing the availability and relevance of local-language applications and content.

On the supply-side, the key areas in which to focus investment for connecting the next billion include new 'last-mile' technologies, network expansion or upgrade, and broadband rollout. Moreover, for the remote and rural populations of the next billion, new financing models for connectivity are needed

to cover so-called 'uneconomical' areas where return on investment proves more challenging.

"Without pathways to connectivity, we will not achieve sustainable economic growth," said Paul Kagame, Rwanda president and Broadband Commission co-chair. He added that Rwanda aims to achieve universal access to broadband by 2020. ■

⁴ A4AI *Affordability Report 2015-2016*, Chapter 4, p.32.

⁵ World Wide Web Foundation, *Womens' rights online: Translating Access into Empowerment*, 2015, <http://webfoundation.org/docs/2015/10/womens-rights-online21102015.pdf>

⁶ A4AI, p.32. Also, women earn on average 30% to 50% less than their male counterparts, see www.researchictafrica.net/publications/Evidence_for_ICT_Policy_Action/Policy_Paper_13_-Lifting_the_veil_on_ICT_gender_indicators_in_Africa.pdf

⁷ Gender gap is defined as the difference between the internet user penetration rate for males and females in relation to the internet user penetration rate for males, expressed as a percentage.

⁸ At the global level, it has also widened from 11% to 12.2%; at the developing level from 15.8% to 16.8%; and LDC level from 29.9% to 30.9%. The gender gap has slightly narrowed in Europe (9.4% to 6.9%), CIS (7.5% to 5.1%), and at the Developed Country level (5.8% to 2.8%). The Americas has the lowest gender gap at 1.8%. It is the only region where more women were online than men in 2013. See ITU, *Measuring the Information Society Report*, Chapter 6, 2016.

The insatiable desire for capacity boosts

By the end of 2016, 3.9 billion people around the world will still remain cut-off from the internet, according to ITU data. In its latest *ICT Facts and Figures 2016* report published in July, the union said that while almost one billion households in the world now have internet access, 84 per cent of them are connected in Europe compared to 15.4 per cent in Africa. So what were companies doing to solve this? Increasing coverage and capacity, of course.

SES played its part by boosting broadband connectivity in East Africa with the launch and support of new services. In November 2015, it unveiled *SES Broadband* for Ethiopia, Ghana, Kenya, Nigeria and South Africa. The satellite operator said it would offer up to 1Gbps for both customisable data rates and fixed packages. It claimed the new service would have more than 99.5 per cent availability and be supported by a "highly responsive" round-the-clock operations team.

In a separate deal, Intersat said it would expand its internet services to East Africa using Ku-band capacity on SES's NSS-12 via the Djibouti teleport. The firm said it would offer shared and dedicated internet services delivered via iDirect VSAT technology, with a capacity of up to 70Mbps. "Intersat is in the business of breaking down the price barrier that has held back the majority of Africans from benefiting from the internet," said Subrata Roy, CTO, Intersat.

Uganda saw a new broadband service launch. ISP iWayAfrica used Yahsat's

JANUARY 2016

The second phase of expanding ACE has now begun. It will extend the subsea cable network 5,000km from São Tomé and Príncipe to South Africa. The development of the second phase was originally announced in 2015. When it is completed by the end of 2016, ACE will cover a total distance of 17,000km, enabling access to high-speed internet services for up to 25 countries. As well as São Tomé and Príncipe and South Africa, phase II will connect DRC, Congo-Brazzaville, Angola and Namibia. An extension to Cameroon is also included.

FEBRUARY

The AAE-1 cable consortium will use Xtera's high-capacity, long-haul optical transport solutions to equip the three terrestrial segments in its 25,000km network connecting Asia, Africa and Europe. They comprise crossing Egypt to connect the Mediterranean and Red Seas; crossing the

Thailand peninsula to minimise the latency for the landing sites in East Thailand; and crossing Malaysia to connect the cable landing station north of Kuala Lumpur to Singapore. All three are based on two physically diverse fibre routes in order to maximise network availability.

MARCH

Casablanca-based cloud services provider N+ONE Datacenters has launched Morocco's first neutral IXP (internet exchange point). With support from France-IX and offering the promise of improving in-country connectivity, the CASIX IXP aims to give ISPs and content delivery networks (CDNs) a neutral location for peering. According to N+ONE, this means less reliance on international IP transit and its associated costs, and also eliminates the possibility of the IXP owner, which is often a carrier, of having influence over the peering community or their customers.

APRIL

PCCW Global will build an undersea cable system connecting Africa with the Middle East and South Central Asia. The Hong Kong based telco has signed agreements with MTN, the Saudi Telecom Company, Telecom Egypt and Telkom South Africa to build the *Africa-1* cable. As a minimum, the system will feature a three-fibre core that stretches more than 12,000km across Africa's east coast, with up to a further 5,000km for additional branches. The consortium plans to launch commercial services in 2017.

MAY

iWayAfrica Zambia has launched fibre-to-the-premises (FTTP) services for enterprises and consumers. The firm says the new service has already been successfully deployed to major corporates seeking to establish dual-links for redundancy purposes. Ulrich Lassen, head of business at iWayAfrica Zambia, says: "The



Intersat will expand its services to East Africa using Ku-band capacity on SES's NSS-12 via the Djibouti teleport. YahClick service to provide broadband coverage across the country. The two companies are providing user equipment, installation, and customer care services. They say they are offering packages designed to cater to the needs of business and home users, and claim subscribers can now instantly connect to the internet from anywhere in Uganda using a small dish and satellite modem. iWayAfrica said satellite technology is providing reliable internet services, even in the remotest places, without the need for terrestrial infrastructure.

"The partnership will enable iWayAfrica to offer Ka-band VSAT connectivity in areas within Uganda not currently covered by other service providers," said iWayAfrica's Uganda CEO, Godfrey Sserwamukoko.

Elsewhere on the continent, Botswana Fibre Networks (BoFiNet) inaugurated its 32km Kachikau-Parakarungu fibre network. Speaking at a ceremony to mark the occasion in mid-October 2016, company chairman Ratsela Mooketsi said villages in the region now have the capacity and capability to host high-speed access

network stations. He said the project offers the country's established service providers, such as BTCL, Mascom, Orange, *et al*, a platform to deploy broadband technologies. "This will greatly assist in the upgrading of existing infrastructure which was becoming obsolete and no longer capable of supporting today's bandwidth hungry users," said Mooketsi.

BoFiNet spent around BWP12.8m (USD1.2m) on the civil and cable works, as well as BWP5m (around USD477,000) on the transmission terminal equipment, shelters and power complete to the project. The implementation started in March 2016 and was completed at the end of May 2016.

High-end users were the target market for Malawian ISP Skyband. The operator is now using RADWIN's point-to-multipoint (PMP) platform to serve major corporate customers in Blantyre and Lilongwe.

RADWIN specialises in sub- 6GHZ wireless systems, and Skyband has deployed its *JET Beamforming* PMP solutions in licensed 3.4 GHz band for its enterprise users which include banks and government organisations.

Skyband said the major challenge during implementation was the high interference in the cities where many of its customers operate. The ISP said *JET's Smart Beamforming* technology mitigated interference, enabling it to maximise frequency planning and channel reuse.

"[The] solutions allow Skyband to stay ahead of the competition and provide valued enterprise clients with ultra-capacity SLA service," claimed Skyband CTO Asif Kassam.

launch offers customers a full turnkey solution for their communication needs. This extends from dedicated internet, IP transit, MPLS, VSAT backhaul and redundancy, to numerous value added services such as mail hosting and backup."

JUNE

Epsilon will deliver a complete communications hub for BringCom, providing interconnection with more than 500 operators across the globe. BringCom manages the Djibouti Teleport through a joint venture with Djibouti Telecom, and its MPLS network connects 17 countries in Africa. With an outsourced solution, Epsilon says the operator will be able to focus on developing its satellite and fibre infrastructure in emerging markets in Africa, the Middle East and the Caribbean.

JULY

Huawei has joined the Smart Africa Alliance (SAA) as ICT advisor and 'Platinum' member.

Smart Africa is a commitment from African heads of state and government to accelerate sustainable socioeconomic development on the continent through affordable access to broadband and ICT usage. Huawei has been working in Africa since 1998. It will support Smart Africa through the deployment of flagship projects, experience sharing, and talent cultivation.

AUGUST

The Communications Authority of Kenya has advertised the initial infrastructure tenders to increase access to broadband services in the country. The initial findings of a study commissioned to provide a roadmap for its universal service fund (USF) strategy were released 21 January 2016. It revealed that around 94.4 per cent of the population has access to ICT services while 5.6 per cent remain unserved, accounting for around 2.66 million people. Of the KES2.94bn USF collected so far, KES1.5bn

Feeding the last mile

The capacity for operators to provide a good broadband service will ultimately rely on the fibre networks that connect Africa to the rest of the world. There were a variety of new cables and upgrades during 2016.

One such project comes from Liquid Sea, a wholly-owned subsidiary of Liquid Telecom. The firm is building a new submarine cable that will run approximately 10,000km from South Africa to the Middle East with onward connectivity to Europe.

The system will connect to the operator's pan-African terrestrial network to offer what's claimed to be a "reliable and affordable" international connectivity service to landlocked and coastal countries in Africa. Liquid said the project will also include landing stations in several ports that are currently not served by existing undersea cables.

Liquid Sea promised it would offer speeds of 20-30Tbps which are said to be up to 10 times the capacity of existing submarine cables in the region. The project is already fully funded and will take around two years to complete.

Another new cable announcement came from Angola Cables and NEC who will build the southern hemisphere's first subsea



Angola Cables CEO António Nunes said SACS will support the region's expanding data requirements both for today as well as into the future.

has been set aside for projects focusing on voice and broadband. The full report was completed in March and released in April. The authority had said the tenders were likely to start appearing in September but August saw a tender to bring broadband to selected secondary schools being advertised on their website.

SEPTEMBER

In a project valued at INS29m (USD7.6m), Israel-based MER Group has been contracted to deploy a 330km long optical fibre communications network in an African country. MER is a specialist supplier of communications, security, intelligence and cyber solutions. This latest deal, announced in late September, is its third optical fibre project on the continent. While the company has not named the country it will work in, it says the project is for a new client and will provide a broadband high-speed internet connection for residents of a West African nation.

fibre optic cable system to link Africa and South America. The USD160m *South Atlantic Cable System (SACS)* will connect Luanda to Fortaleza in Brazil 6,200km away. From there, it can join the 17,800km *America Movil Submarine Cable System-1 (AMX-1)* which stretches to Miami, enabling Africa to connect directly to the USA.

It's claimed the system will feature the latest optical technologies to provide the most advanced submarine telecoms system. It will also be integrated with a control plane based on SDN technology to serve bandwidth-intensive applications. *SACS* will have an initial design capacity of 40Tbps (100Gbps x 100 wavelengths x four fibre pairs) and is expected to go live by mid-2018.

Cameroon's broadband connectivity was improved thanks to the Nigerian-Cameroon Submarine Cable System (NCSCS) which went live in 2016. Work on the NCSCS started in June 2015 following a partnership between Cameroon's Ministry of Post and Telecommunications, MainOne, and Huawei Marine Networks.

The new cable connects Kribi in Cameroon with Lagos. MainOne said the six-pair, 1,100km repeater system has been lit with 40GB capacity from day one and will deliver capacity of up to 12.8Tbps in Cameroon. It is expected to boost the country's extremely low fixed broadband penetration which was estimated to be around five per cent.

David Nkoto Emane, GM of Cameroon Telecommunications (Camtel), said: "The NCSCS enables us to provide users with faster bandwidth connectivity at a significantly lower cost. By providing direct connection to Nigeria, [it] will also serve to enhance Cameroon's position as the major bandwidth hub in the region and to Europe and beyond."

It wasn't only new cables that were making (or promising to make) broadband ever faster and accessible. Several upgrade projects were also carried out over the year

For instance, MainOne enhanced its submarine network between Nigeria, Ghana, and Portugal to a 100G wavelength system. The upgrade was carried out using Xtera's *Nu-wave Optima* optical networking platform. The system now has an upgradable capacity of more than 10Tbps.

In other news, MENA (Middle East and North Africa) announced it had also upgraded its submarine cable system and could now rapidly deploy bandwidth in increments of 100Gbps. The operator is using Infinera's *DTN-X XTC Series* transport platform to integrate its subsea network connecting the Mediterranean and Middle East regions with its existing Infinera terrestrial network. The vendor said its platform allows MENA to deliver 100Gbps of coherent transmission capacity via 500Gbps 'superchannels' today, while supporting scalability to provide terabit superchannels in the future.

The links between North Africa and Europe received an expansion when the Libyan International Telecommunications Company (LITC) and Sparkle, the international services arm of Telecom Italia Group, upgraded their jointly owned cable. As a result of increasing demand for advanced services between Libya and Europe, the 570km long cable connecting Libya to Europe through Sicily has been fitted with 100Gbps technology.

The challenging road to staying connected

Offering broadband services is not always a smooth road to travel. South African operator Telkom said it was ramping up efforts to migrate customers to wireless and fibre technologies in an effort to tackle cable theft syndicates.

Speaking in May 2016, the company said more than 6,000 incidents of theft

had occurred across its copper network during that past year, and that thieves were becoming more sophisticated.

Telkom spokesperson Jacqui O'Sullivan said: "These criminals now target our manholes armed with customised heavy duty vehicles, allowing them to hitch the cable to the vehicle and drive out kilometres of cable, cutting off thousands of customers in a single incident."

O'Sullivan said that dealing with the crimes is challenging. For example, she said there are areas in the Western Cape where gang violence sometimes makes it dangerous for the company to send in technicians to replace stolen cables. "In many high-theft areas, cable is repeatedly stolen, sometimes within days after replacements or repairs," she added.

For the 2015 financial year, Telkom spent ZAR100m on cable theft repair costs and an additional ZAR107m on security services. The company said it was now looking at migrating customers in high copper theft hotspots to alternative technology platforms such as Wi-Fi and fibre which are not so desirable for criminals. For instance, Telkom said 4,000 customers had already switched to its wireless *Waya Waya* service which does not rely on a copper network. Using a mains-powered GSM device, subscribers could retain their landline numbers while also benefiting from SMS functionality and other features.

Earlier in the year, Telkom had also launched a trial giving customers an opportunity to upgrade their copper-based connectivity to fibre for free (see *Broadband taking off*, p64). As part of its ongoing efforts to reach more people and places across South Africa, the operator is now using Vumate's open access fibre network to complement its own cable infrastructure.

It's not only cabling on land that suffers from problems. On 17 October 2016, SEACOM announced that it had identified a 'shunt fault' in the Mediterranean Sea between Egypt and France. A shunt fault

OCTOBER

Tunisie Telecom (TT) has successfully completed a series of tests of G.fast access technology with ADTRAN. G.fast stands for 'fast access to subscriber terminals' and is standardised as part of the ITU-T G series of recommendations (hence the letter 'G'). It is a DSL protocol and aims to deliver between 150Mbps and 1Gbps over local loops shorter than 500 metres. However, using ADTRAN's 500G series testing equipment, it's claimed TT's G.fast experiments saw high-speed services reaching more than 800Mbps at a distance of about 100m on an existing copper infrastructure.

NOVEMBER

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). Omantel says the system provides onward connectivity to Ethiopia and will connect Kenya, Mogadishu and South Africa in later phases. SRG-1 connects Oman to Pakistan with onwards connectivity to Afghanistan, China, Iran, Turkmenistan and Tajikistan.

DECEMBER

Regulatory approval comes through for Liquid Telecom for its move to create what's claimed to be the "first pan-African fibre player". Liquid Telecom will acquire South African converged communications operator Neotel. Liquid partnered with investment group Royal Bafokeng Holdings (RBH) which has a 30 per cent equity stake in the venture. Neotel's current owners had agreed a sale price of ZAR6.55bn (USD4.28bn). Liquid said the acquisition will create the continent's largest broadband network comprising 40,000km of cross-border, metro and access fibre.

occurs when a submarine fibre cable's insulation becomes damaged, creating a short circuit when seawater comes into direct contact with the metallic core.

SEACOM said all transmission traffic on the East Coast of Africa to and from Europe was affected as a result of the incident. It said that while customers with IP services remained unaffected, they could experience higher latencies with possible degradation of service, as traffic was predominantly rerouted via WACS and SEACOM's network to the Asia gateways.

The company mobilised a vessel to facilitate the necessary repair work, which affected services whilst being carried out. A smooth operation with no delays due to weather or sea conditions meant that the fault was successfully repaired on the target date of 28 October.

Services are on cloud nine

The success and maturity of Africa's broadband infrastructure can be gauged by how far cloud services have come. Offering services via the cloud is only really an option when you have stable, fast connections.

Last year saw Burkina Faso claiming to have become the first West African nation to use cloud networking. The country is using the cloud to enable connectivity between public departments and municipalities via an e-government platform.

The project is part of an ambitious ICT strategy being administered by the country's Ministry of Development of the Digital Economy and Posts (MDDEP), and forms an integral element of Burkina Faso's Economic and Social Development Strategy.

Financing for the project was facilitated by the Danish government through the Danida Business Finance agency which is contributing EUR30m. Under an agreement with the ministry, Alcatel-Lucent is supporting network and infrastructure operations.

It will supply its NFV, *Cloudband* and IP platforms which will be integrated into the government's 'G-Cloud' infrastructure. This is being built around virtualised network resources from cloud nodes in Ouagadougou and five provinces. Around 400 buildings in 13 regional urban centres will be connected via a 513km fibre optic IP/MPLS WAN. Alcatel-Lucent will also provide a training and development programme for more than 100 government staff.

Backhaul is being provided by an 800km fibre transmission system that will become part of Burkina Faso's National Fibre Optics Backbone.

South Africa also boasted progress into the world of cloud. Vodacom claimed it would become the first company in the country to offer cloud managed enterprise products such as IaaS and SAP-certified PaaS.

The operator now hosts a fully redundant IBM *CMS Cloud* delivery centre for Africa in its Midrand and Roslyn data centres. This is the first *IBM Cloud* centre to be rolled out in the Africa and Middle East region. The cloud services are linked via Vodafone's global IP VPN network to IBM's CMS platform in multiple locations in Europe.

Vodacom said customers will benefit from "significant" savings in investment costs and skills as the partnership with IBM will deliver a solution offering the same world-class standards, skills and services as other IBM Cloud centres across the world.

The operator added that the new service will enable businesses to run critical applications in the cloud with integrated access to a broad array of applications, such as enterprise mobility, security and IoT. It said that the service will also offer faster network speeds along with improved performance and reach to end users.

Vodacom Business chief officer Vuyani Jarana suggested the upsurge of enterprise cloud computing on the continent was being



MDDEP minister Nébila Amadou Yaro (pictured second from right) said the G-Cloud project will lead to micro and macro economic growth in Burkina Faso.

driven by large enterprise and multinational organisations expanding their presence and IT requirements across Africa.

Within weeks of Vodacom's announcement, the MTN Group revealed it had selected UK-based cloud specialist BCSG to deliver SaaS and IaaS solutions to enterprise customers.

Using BCSG's *Cloud Management Platform*, the operator has initially launched its *Business Cloud Services* platform targeting SMEs in Swaziland, Rwanda, Uganda, Ghana and Cameroon.

All the applications and services are available from a single web portal and will be offered across a variety of MTN channels. The operator said there will be one log-in to access all the services, managed through a "user-friendly" dashboard, wherever the business has an internet connection and by using any device.

Speaking at the tie, Debbie Minnaar, acting executive of MTN Group's enterprise business unit, said the platform was developed to address some of the "pain points" experienced by its business customers, especially SMEs.

"While the benefits of cloud services for SMEs are numerous, the process of accessing and purchasing such services can be daunting," she said. "Through the MTN



Rahiel Nasir,
Editorial director,
The African
Wireless
Communications
Yearbook 2017

The year ahead: As I write this in mid-March, the UN's Broadband Commission for Sustainable Development has just held its Spring meeting and committed to what it said were "concrete actions that will spur the roll-out of broadband around the world".

Once again, the commission's co-chair and president of Rwanda Paul Kagame highlighted the

importance of broadband for the "betterment of economies and societies", while ITU secretary-general Houlin Zhao once again spoke about how critical it was for the UN to achieve its Sustainable Development Goals.

Year in, year out, the UN/ITU invests a great deal of time and resources in international talking shops only to bang out the same message every time. We all know broadband is a much needed utility, and if there is one thing for sure in 2017 it is that we will continue to hear that from the Broadband Commission.

In Africa, things continue to move on the broadband front. With more satellites, 4G and

fibre on the way, technology will continue to enable greater broadband access across the continent. The means to gain that access, such as smartphones, will also continue to grow.

But in order to be a truly mass market proposition and reach those at the so-called 'bottom of the pyramid', prices for connectivity as well as for all the necessary equipment have to be significantly lower. Failing that, Africa runs the risk of seeing a new divide between an urban and predominantly middle class 'digerati', and those who lack the means to buy and run the devices needed for broadband.

Business Cloud Services platform, the emphasis is on simplifying this process and meeting customers' needs – essentially we are putting control in our customers' hands."

Broadband taking off

Algeria will see the first commercial rollout of an eLTE system at an airport in Africa. Following its successful bid, Huawei announced in July that it would be responsible for the broadband trunking project at the Houari Boumediene Airport in Algiers. Under the contract, the company would provide an eLTE core network, base stations, trunking terminals, multimedia dispatching, and other devices and systems.

At the time, Houari Boumediene used TETRA for routine scheduling and dispatch. But its narrowband system was said to be insufficient for broadband data transmission, mobile video surveillance, or multimedia dispatch. Furthermore, ground handling services are performed in a complicated and noisy environment, making voice dispatch error-prone and increasing security risks.

Huawei planned to provide a system capable of interworking with the existing TETRA platform to improve the accuracy and efficiency of ground dispatch. The vendor said its real-time, large-bandwidth eLTE platform would enable the airport to carry out multimedia trunking dispatch, video surveillance, and other applications on a single network that covers both indoor and outdoor working areas for the ground staff.

To cope with noise in the airport, Huawei promised its system would support throat vibration mic earpieces, noise-cancelling headphones, and additional accessories to guarantee voice trunking performance.

The company added that eLTE can offer complete video dispatch and real-time monitoring services through backhaul of onsite images to the command centre. It will also provide an open eSDK for interconnection with third-party airport applications.

South Africa continues to be a hotbed of progress for broadband. At the beginning of February 2016, Telkom gave its DSL customers the opportunity to upgrade their copper-based connectivity to a fibre network. South Africa's incumbent telco said that more than 11,000 DSL subscribers living within its fibre footprint would be able to experience the technology at no additional cost.

As part of the trial, customers were allowed to choose to migrate their copper-based 2, 4 or 8Mbps DSL service to an equivalent fibre-based service. During the two-month trial they would be able to test the 10Mbps and 20Mbps line options. At the end

of the period, customers could then decide which fibre package to adopt, or they could return to their original DSL service, although their line will have been permanently upgraded to fibre. Telkom consumer MD Attila Vitai said that the unique trial offer was a "win-win" for customers.

The country also boasted a global exclusive. In November 2016, MTN became the world's first mobile operator to deploy and test the *Voyager* open optical packet transport platform, after joining the Telecom Infra Project (TIP) earlier that year.

The TIP initiative had been launched in February 2016 by Facebook, Deutsche Telekom, EE, Globe Telecom, Intel, Nokia, SK Telecom, amongst others. Their aim was to develop fresh approaches to building and deploying telecoms network infrastructure, while at the same time reducing costs and accelerating the rollout of internet connectivity.

MTN is part of the Open Optical Packet Transport project group, and worked closely with the TIP community to field-test the *Voyager* next-generation technology in its South African data centres between 14th Avenue in Fairlands and Soccer City in Soweto.

The tests were carried out at the end of October and the operator claimed the results showed the highest performance with zero packet loss, and potential for significant overall cost savings.

"We are excited about the possibility of bringing more than 19Tbps of connectivity to the community using open optical networking technology," said MTN Group CTO Navi Naidoo. "Open platforms move away from the vendors' proprietary platforms which usually come at a huge cost."

This means that the roll out of the *Voyager* platform will enable operators to install a network at a lower cost, which in turn will result in cheaper connectivity for customers."

The results of the test were presented at the TIP summit held in the US at the start of November. At the time, the next steps were to obtain necessary approvals and explore commercial rollout of the platform. ■



Houari Boumediene airport handles 10 million passengers each year, but the government is building a new terminal to increase its capacity to 14 million.



**Frank McCosker,
GM affordable
access & smart
financing,
Microsoft 4Afrika**

Microsoft is on a mission to empower the continent's communities. In 2013, it launched its 4Afrika initiative, focusing on three critical areas of development for the continent: skills; access to technology; and innovation. It has had many success stories since then, from seed funding startups and mentoring app developers, to providing technical support to public sector organisations and building experimental wireless networks.

"It has been four years since 4Afrika launched its first TV white spaces connectivity pilot in Kenya," says Frank McCosker. "*Project Mawingu* sought to use unused television frequencies to deliver high-speed, low-cost broadband to last-mile areas. Now, sitting in 2017, Microsoft 4Afrika has 15 TV white spaces connectivity pilots running across six countries in Africa, and *Project Mawingu* continues to expand. There are currently 26 schools connected to the technology, and the commercial side of the project has grown from 15 Wi-Fi hotspots to more than 500, serving roughly 100 customers per hotspot."

During 2016, McCosker said Mawingu Networks has received a USD4.1m financing loan from the Overseas Private Investment Corporation. "With this financing, we expect to see exponential growth and rapid deployment over the next year, with affordable access reaching an additional three million people in the short term. All this in an area where, prior to *Project Mawingu*, only 17 per cent of adults and nine per cent of teenagers in the coverage area reported using the internet."

"In February 2017, we also joined forces with Liquid Telecom which operates the largest independent pan-African fibre network, spanning more than 40,000km across 12 countries. Together, we will work to improve and accelerate the use of cloud services across Africa – particularly for SME growth and development – and enable TV white spaces technology and the partner ecosystem to provide further connectivity across the continent. Through better connectivity, faster internet and secure cloud offerings, we hope to help more local businesses scale and succeed."

"Four years on, our commitment to TV white spaces technology remains unchanged. We still believe in the power of wireless technologies to make access to the internet truly affordable in Africa."

Over the last 12 months, McCosker says he has seen a lot of organisations, who were previously invested in fibre and satellite, start to opt for wireless. He reckons this is because wireless technologies, such as TV white spaces, have proven their ability to make access to the internet affordable.

"In emerging markets, the United Nations has set the affordability threshold at five per cent of average income. *Project Mawingu* has come very close to achieving this, currently providing access for only USD3 a month. Wireless is also the most effective technology for achieving affordable last-mile access.

"Governments in Africa are also becoming increasingly open to technology like TV white spaces – albeit some faster than others. The challenge for us has been delivering on the existing demand. Deregulating the markets and scaling the projects takes time.

"Our strategy here has been to take a step back and see what we can do within the existing ecosystem. In May 2016, through our *Affordable Access Initiative*, we awarded grants and technology support to help scale five African companies who are working to bring low-cost internet access and/or cloud-based services to underserved markets. These include VistaAfrica, who are leveraging TV

white spaces, cloud and mobile technology to bring e-health services to outlying communities; and New Sun Road in Uganda, who design, build and install *SolPower* micro-grid systems with broadband internet.

"In December 2016, we renewed this fund for a second round and are currently assessing more than 200 local applications. As we continue to deregulate and democratise the market, we hope to see more of these local technologies, services and locally-relevant business models bubble to the surface and thrive."

In the connectivity space, McCosker says last-mile infrastructure, opening up of regulations to allow more competition and reap the benefits of the 'digital dividend', and affordability continue to be challenges.

"But these are challenges where we see opportunities in Africa. Microsoft 4Afrika hopes to scale its current TV white spaces pilots, expanding them into countrywide projects.

"A key element in ensuring this scalability – and sustainability – is in commercialising each project and continuing to deregulate and democratise the markets. We've managed to do this in our connectivity pilot in Ghana. In 2015, the National Communications Authority of Ghana became the first regulator in Africa to issue a commercial license,

enabling our partner SpectraLink Wireless to use TV white spaces technology to deliver internet access to students. For as little as two Ghana cedi per day, students can now buy internet bundles, as well as devices on a zero-interest financing plan.

"Microsoft never entered this space to be a connectivity provider. Rather, we are here to be a connectivity *enabler*. We will continue to create enabling markets, invest in local partners, and work with public and private entities to accelerate the development of low-cost internet access solutions. We are in this space to achieve affordable access in its truest sense."



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

The continent's fibre optic market has doubled in size over the last five years. By December 2016, the amount of operational fibre optic network in Africa had more than doubled to 790,067 route kilometres, compared to 393,502km in 2011. There was a further 119,690km of fibre network under construction, 100,182km planned, and 51,304km proposed.

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There are now 276 terrestrial network operators across the continent, including 107 operators providing a total of more than 400 operational metro/FTTH/FTTB network deployments across the region.

The landing of new submarine cables and expansion of terrestrial transmission networks is bringing additional countries, regions, cities and towns within reach of fibre networks for the first time. In the last five years, network expansion has brought 156 million more people within access to national and international fibre optic backbone networks.

By June 2016, 48.1 per cent of the population in sub-Saharan Africa (469 million people) lived within a 25km range of an operational fibre optic network node

Roughly one-fifth of the total fibre inventory is within cities: out of 790,067km of operational terrestrial fibre in December 2016, at least 130,610km was metropolitan fibre rings and FTTH/B networks. In addition, there was at least a further 44,051km of metropolitan fibre networks under construction. These metro rings distribute bandwidth from fibre optic nodes to districts and suburbs around each city. FTTH/B networks provide the last-mile access, delivering fibre bandwidth right to the door. Certainly, the deployment of FTTH/B is a significant driver in the growth of international internet bandwidth, with business and residential customers subscribing to broadband packages with speeds of up to 20Mbps, 50Mbps or 100Mbps.

2016 saw a growing number of FTTH/B rollouts in sub-Saharan Africa, with the number of homes and buildings passed double during the year to more than one million. Kenya, Mauritius and South Africa are the leading countries by number of FTTH/B deployments, homes or buildings passed and subscribers.

There are now at least 132 operational FTTH/B deployments in more than twenty countries, with recent deployments in Congo (Brazzaville), Côte d'Ivoire (Abidjan), Gabon (Libreville), Ghana (Accra and Tema), and Namibia (Finkenstein Estate). Other FTTH/B networks have been deployed in Angola, Cameroon, The Gambia, Lesotho, Mali, Mozambique, Nigeria, Réunion, Rwanda, São Tomé and Príncipe, Seychelles, Zambia and Zimbabwe.

Whilst the inventory of fibre optic transmission networks in Africa has doubled in the last five years, international bandwidth capacity has increased almost ten-fold. Africa's international internet bandwidth reached 4.555Tbps by December 2015, compared to 3.015Gbps in 2014 and 497Gbps in 2010. At current growth rates,

a CAGR of 55.8 per cent from 2010-2015, the continent's international bandwidth will have reached 7Tbps by the end of 2016. The total of 4.555Tbps in 2015 was split between sub-Saharan Africa which increased by 64 per cent to reach 2.759Tbps, and North Africa which increased by 35 per cent to reach 1.796Tbps.

Of the total bandwidth of 2.759Tbps in sub-Saharan Africa by December 2015, 2.594Tbps (94.1 per cent) was supplied directly by submarine cable. There is plenty of room for future growth: 2.594Tbps is still just a fraction of the total design capacity of at least 64Tbps that is potentially now available on the 18 submarine cables serving the region in December 2015. The total design capacity has increased both with the introduction of new submarine cable systems, and with the upgrading of capacity on existing systems from legacy 2.5G wavelength technology to 10G, and from 10G to 40G and 100G and potentially 400G. As a result, the total design capacity has increased from 59Tbps in 2014, 26Tbps in 2013, and 13Tbps in 2011.

While 469 million people lived within a 25km range of an operational fibre optic network node in June 2016, only 55 million lived within a 25km range of a submarine cable landing point. A look at the map of metro/FTTH/B deployments⁹ clearly shows that the pattern of deployment of FTTH/B reflects and is underpinned by the fibre transmission infrastructure to support it. Nearly all deployments are in cities which are either directly connected to submarine cables, or are connected with multiple high-capacity national and regional fibre networks connected to submarine cables.

In the same way that the capacity which is activated on submarine cables is stepped up in line with demand, this is true also of national backbones and terrestrial cross-border links. Domestic network operators have incrementally increased capacity on their networks in line with demand, typically from STM-4 (622Mbps) to STM-16 (2.5Gbps) and STM-64 (10Gbps).

For example in Botswana, BOFINET has been expanding the reach of its national fibre transmission network from 6,000km to 7,000km during 2015/6. It is deploying FTTx networks in Gaborone, Kasane, Kazungula, Maun and Francistown, and has upgraded transmission capacities on parts of its national backbone, notably those carrying international traffic from STM-16 (2.5Gbps) to STM-64 (10Gbps).

In a growing number of cases, operators are upgrading their terrestrial fibre networks from

10G to 100G, typically along major trunk routes serving submarine cable landing points. There are several examples here.

In 2011, SEACOM deployed 100G on its fibre route in South Africa from the Mtunzini landing station to Gauteng, and in 2015, 10G and 100G WDM solutions on new metro networks in South Africa and East Africa and its East African regional backbone.

In 2012, GBI announced it had deployed 100G on Telecom Egypt's terrestrial fibre route across Egypt connecting the submarine cable landing stations on the Red Sea (Zafarana) and Mediterranean (TE Transit Corridor).

In 2013, Liquid Telecom awarded a contract to Ekinops for its new long-haul 2,500km DWDM network across South Africa, Zimbabwe and Zambia. The new network carries multiple 10G wavelengths, can scale to support many more 10G and 100G services, and was built to accommodate the growing demand for bandwidth in the region.

In a separate deal in February 2017, Ekinops also won a contract to upgrade the transmission capacity of Orange Côte d'Ivoire's fibre network along main strategic routes from 10G to 100G without changing the network's existing infrastructure.

Meanwhile further east in Kenya, by September 2016 Safaricom had upgraded 70 per cent of its national fibre optic backbone to 100G, compared to 30 per cent by 2015.



Nic Rudnick,
CEO,
Liquid Telecom

According to Nic Rudnick, Liquid Telecom is the only company to provide access to 12 countries across the continent through a single fibre network. He claims the company is continuously exploring ways to expand its network reach, and says there were several "exciting" developments in this respect last year.

"There is, of course, our agreement to acquire South African communications network operator Neotel, which received unconditional approval from the Independent Communications Authority of South Africa (ICASA) in December 2016. The combined network assets and service platforms gives Liquid Telecom unrivalled reach across Eastern, Central and Southern Africa, enabling it to offer access via a single connection to more than 40,000km of cross border, national and metro fibre networks across 12 countries.

"In October, Liquid Telecom also entered into a telecoms joint-venture with utility company Botswana Power Corporation (BPC) in Botswana. The joint venture will commercialise existing optical ground wire

⁹ See <http://www.africabandwidthmaps.com/ftth/>

(OPGW) cable installed alongside BPC's power lines that form part of the country's national grid. This will provide Liquid Telecom with 1,500km of additional fibre across the country, including long distance routes between the Botswana capital of Gaborone and the north-east city of Francistown. The new network will improve telecom infrastructure across Botswana, increasing internet speeds and access for local businesses and consumers.

"In December, Liquid Telecom also received the final regulatory approval to close its latest transaction in Tanzania and has become the majority stakeholder of Raha, Tanzania's leading ISP. Raha today serves over 1500 businesses as well as a growing number of retail customers with a range of connectivity solutions, including fibre, satellite, WiMAX and Wi-Fi. The acquisition provides Liquid Telecom's enterprise and wholesale customers with direct and faster access to Tanzania."

Rudnick says Liquid is driven by bringing high-speed fibre optic services to as many people in Africa as possible. He believes fibre is the future of internet access for the continent's people and businesses, providing a platform for digital growth and innovation.

As well as connecting more of Africa, Rudnick said the company is also committed to improving the quality of service and range of solutions offered to enterprise and carrier customers across the region.

"For example, we were the first operator to build a sizeable FTTH service in Africa, starting in Rwanda, Zambia and Zimbabwe before being further developed in Kenya, Tanzania and Uganda. This provides up to 100Mbps internet access to households and small and medium-sized enterprises. That's among the fastest broadband speeds in Africa and comparable to what's found in the US and Europe. It's a breakthrough service in sub-Saharan Africa, offering speeds that were until now reserved only for the largest multinationals at a premium price.

"In the short term, Liquid Telecom aims to double its FTTH network, with an additional 100,000 connections. In some cases, we are delivering fibre to areas where reliable internet connections were previously virtually non-existent, enabling local communities to reap the full benefits of digital services for the first time.

"We are also focused on connecting Africa to the rest of the world. Liquid Telecom is about to start building a new 10,000km subsea cable linking Africa to Europe, the Middle-East and Asia, called 'Liquid Sea'. This will create a more reliable

route, additional capacity of 20,000 to 30,000Gbps, and will further help remove bottlenecks."

Of course, none of that will be easy. As Rudnick knows only too well, Africa presents a combination of enormous geographical challenges and regulatory hurdles.

"The distances alone present a unique problem, but our network must also navigate through difficult terrain and hold its own against wildlife – our fibre has been attacked by everything from elephants to giant rats!"

"Crossing borders with new telecoms links has been immensely challenging at

ACE

Africa Coast to Europe (ACE) submarine cable

ACE submarine cable

- In service
- - Under construction or planned

- France – Sao Tome & Principe : In service since Dec. 2012
- Sao Tome & Principe – S Africa: Target RFS Dec 2017
- Upgrade 1 - In service since 30 Sep 2016
- Design capacity upgraded to from 5.12T to 12.8T

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ACE

times, as has been obtaining the licenses and authorisations to build national fibre infrastructure.

"Despite this, Liquid Telecom has often managed to breakthrough into markets before any other carrier. For example, we were the first to establish continuous fibre connections between South Africa, Zimbabwe, Zambia and DRC."

Rudnick reckons Liquid has accomplished far more than it originally expected since it began life in 1997 as Econet Satellite Services, a subsidiary of Econet Global specialising in satellite and voice services. After rebranding as Liquid Telecom in 2004, the group now employs more than 2,000 people operating over 40,000km of fibre networks in 12 sub-Saharan countries.

"We were recognised as Best African Wholesale Carrier at the Global Carrier Awards for the fifth year in a row – no other company has ever won so many times consecutively before," says Rudnick.

"Moving forward, Liquid Telecom will continue to build on its biggest strategic advantage, which is that we enable people and businesses to connect using a single fibre network covering more than 12 countries. It means an enterprise can connect to another branch on the other side of the continent as seamlessly as if it were located just across the road.

"We will continue to look for further opportunistic acquisitions and partnerships, while at the same time supporting African companies with the highest quality and most extensive connectivity on the continent."



Mike Last,
CMO & VP
international
development,
WIOCC

Djibouti Telecom; Gilat Satcom; Lesotho Communications Authority; Libya's LPTIC; ONATEL Burundi; Seychelles Cable System Co.; TDM Mozambique; Telkom Kenya; TelOne, Zimbabwe; U-COM Burundi; Uganda Telecom; and Zantel in Tanzania.

According to Mike Last, the company's mission is to make an "enduring contribution" to Africa's communications. To achieve this, he believes WIOCC must constantly evolve its capabilities to align

with changing industry needs and end-user demands. "With terrestrial backhaul networks now in place across many parts of Africa, it is becoming increasingly vital to offer carriers and ISPs more cost-effective access to their business customers' premises. This will enable them to deliver high-capacity, seamless, end-to-end connectivity solutions at more affordable prices by reducing the cost of local loop delivery.

"In 2016, WIOCC created the largest metropolitan area network in Africa. The Johannesburg MAN offers cost-effective, direct access, over a protected network, to more than 2,000 business premises across 95 business parks and shopping centres in Johannesburg and Pretoria. There has been rapid initial take-up of connectivity and additional MAN infrastructure investments are in the pipeline."

In Somalia, Last says WIOCC has been offering local carriers and ISPs "dramatically increased" international capacity, with transformational latency reductions of up to 80 per cent and improved diversity options. Working with local partner Dalkom Somalia, WIOCC expanded access to international connectivity in the country last year. Last says: "Fibre optic connectivity was extended through a metropolitan area network in Mogadishu, making it easier for an increasing number of residents, businesses, government ministries and embassies to access direct, high-capacity, low-latency, international fibre connectivity for the first time."

Last year also saw the company create international internet exchange points in Europe and the US. "In early 2016, WIOCC established new remote peering internet exchange points in Virginia, New York, Amsterdam and Frankfurt. This not only gave WIOCC's customers enhanced access to the global internet, it also improved WIOCC's network redundancy."

Back in Africa, the company has also scaled up its workforce in Kenya and internationally to serve the needs of an ever-growing customer base. Last hopes all this will put WIOCC in good stead to overcome the foreseeable challenges on the continent in 2017 and beyond.

"Continued investment in network infrastructure is essential if an increasing percentage of Africa's 1.1 billion population are to be able to take advantage of the many benefits that access to high-speed international connectivity offers.

"For WIOCC this means enhancing the reach, capacity and reliability of international connectivity in Africa, whilst continuing to make it ever more cost-effective, through continuing to invest in both submarine and terrestrial cable infrastructure.

"Keeping pace with the rapidly evolving needs of industry and the demands of end-users in Africa is a challenge for all. WIOCC is constantly evolving its capabilities to align with these changing needs. In the early days, carriers and ISPs were looking for pure point-to-point international bandwidth, which then changed to include the need for built-in protection. This has moved on again, with carriers and ISPs now requiring support in delivering the more complex network solutions that their customers are now demanding.

"Over the next 12 months many of our carrier customers will look to extend their own networks into new geographies, and will also seek help in taking their multinational corporation customers further into Africa – at a cost and level of performance that matches their needs and expectations.

"Delivering expert solutions that enable carriers, ISPs, content providers and OTTs to overcome their complex international connectivity challenges is at the heart of what we do at WIOCC. Enabling our wholesale customers to get closer to their own customers is a key objective moving forward, and we see the deployment of further metropolitan networks as a key element in making this happen.

"We will continue to evaluate and pursue opportunities to create additional metropolitan networks, to increase our in-country coverage, and to further extend our network to new African markets."



Yves Bellego,
Director of
technical &
network strategy,
Orange

Most of the African countries that Orange operates in are backed by fibre networks, says Yves Bellego. He explains that Orange's need for fibre begins where it has the highest need for capacity, and that's coming from international connectivity.

"Fundamentally, we bring fibre closer to the radio sites. We invested a lot in deploying submarine cables for adding connectivity to the bigger international route, and are now deploying national backbones using pure microwave or a combination of microwave and a fibre. So progressively, we are bringing fibre closer to the different mobile switches and radio sites."

Bellego believes there are two aspects to fibre. One is FTTH and connecting customers. This is very different to the other aspect – creating the backbone networks which include the submarine, terrestrial and international systems.

"Around two thirds of African countries with Orange networks already have national backbones using fibre. That includes our own deployments but we do also rent fibre connectivity. Also, there are still some networks and countries where the national backbone is almost all microwave."

Bellego is keen to point out that microwave is not a temporary solution that gets replaced as soon as fibre becomes available. "For me, fibre, terrestrial microwave and satellite are all technologies that are evolving, costs are going down, capacity is increasing, and we will still need the three of them.

"For us, the latest generation satellites represent a new opportunity, not a threat, because we need to have different technical solutions and use the best one depending on the geography and the level of traffic. Satellite will never be able to compete with fibre into the big cities, but fibre will never be able to compete with satellite into remote areas. So there is a business case for each technology in each area.

"We still need satellite for more remote areas and to connect radio stations that are quite remote; microwave is evolving and is capable of handling the capacity for 4G; and when we have the really huge need for capacity, specially in the big cities, fibre remains the most efficient. So we'll keep all three, although the ratio may vary.

"For example DRC is one of the countries where we have almost full microwave and a bit of satellite. While we don't do many long-term predictions, we plan to upgrade our microwave there as the technology has evolved and now has the capability to carry the traffic for some time.

"So we may not need fibre for a very long time in such areas; in the short- or mid-term fibre will not reach those areas. It is very expensive and we have better and more cost-effective solutions for remote areas with microwave."

Orange is part of the consortia behind the LION 1

(Lower Indian Ocean Network), LION 2 and ACE (African Coast to Europe) subsea fibre systems.

Bellego says it's important not only to have fibre international connectivity but also to have different routes so that services can continue in case one route goes down. And once the global connectivity was in place, Orange could support mobile broadband.

"The deployment of mobile broadband is really the driver for the fibre backbone. The real need came when we started to see take-up of 3G, and it is even more obvious with 4G. So the volume of traffic and the speed

that we need to deliver 3G and 4G drives the increase of capacity and performance of the backbone and backhaul networks.

"But it is a step-by-step process. We did international connectivity, we are doing the national backbones, and to have fibre more closer to the radio sites and backhaul will come later because that is really dependent on the increase of traffic."

Editor's note: the above interview with Yves Bellego was originally conducted for the *Digging for glory* feature published in the Aug-Sep 2016 issue of Northern African Wireless Communications magazine.

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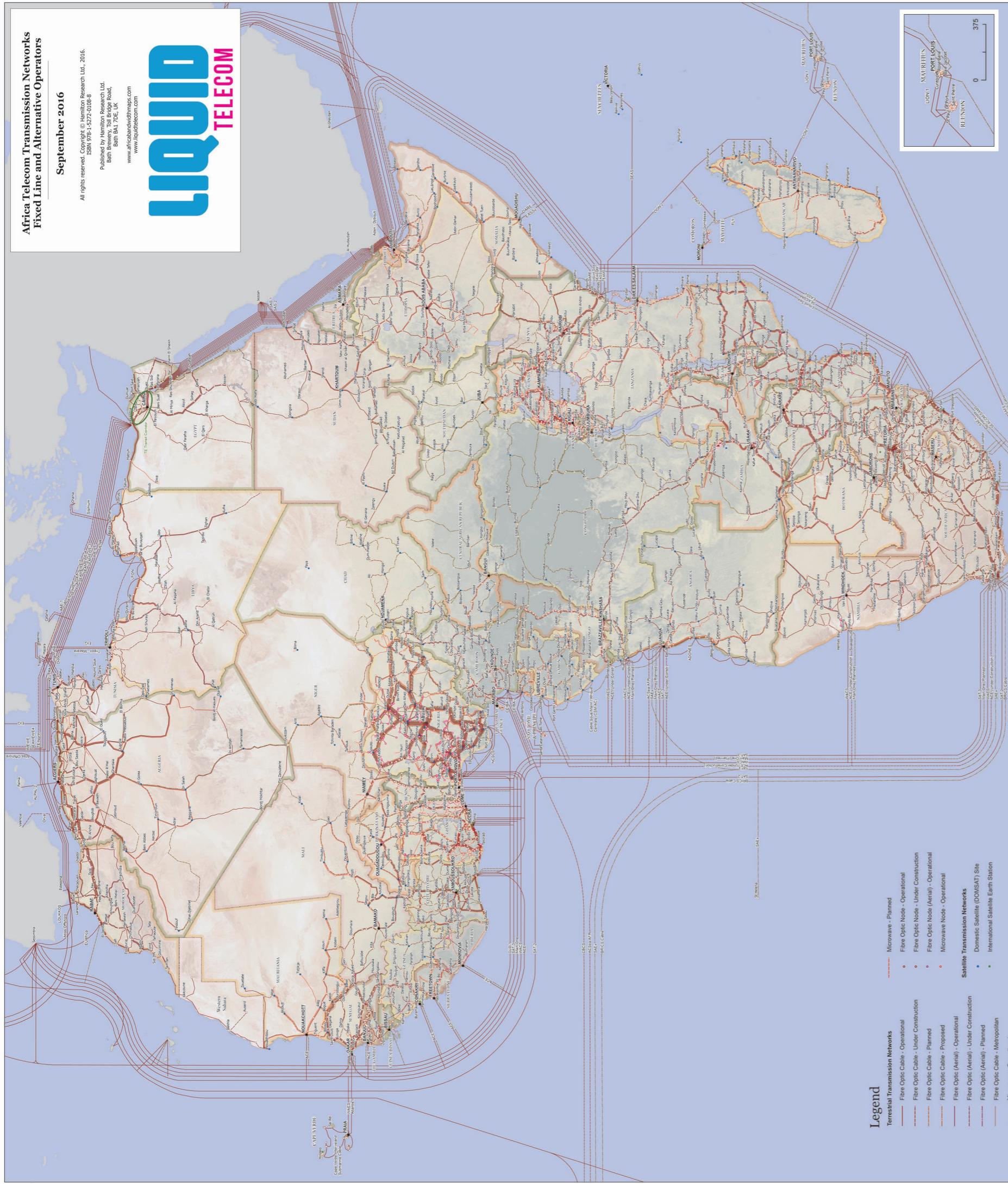
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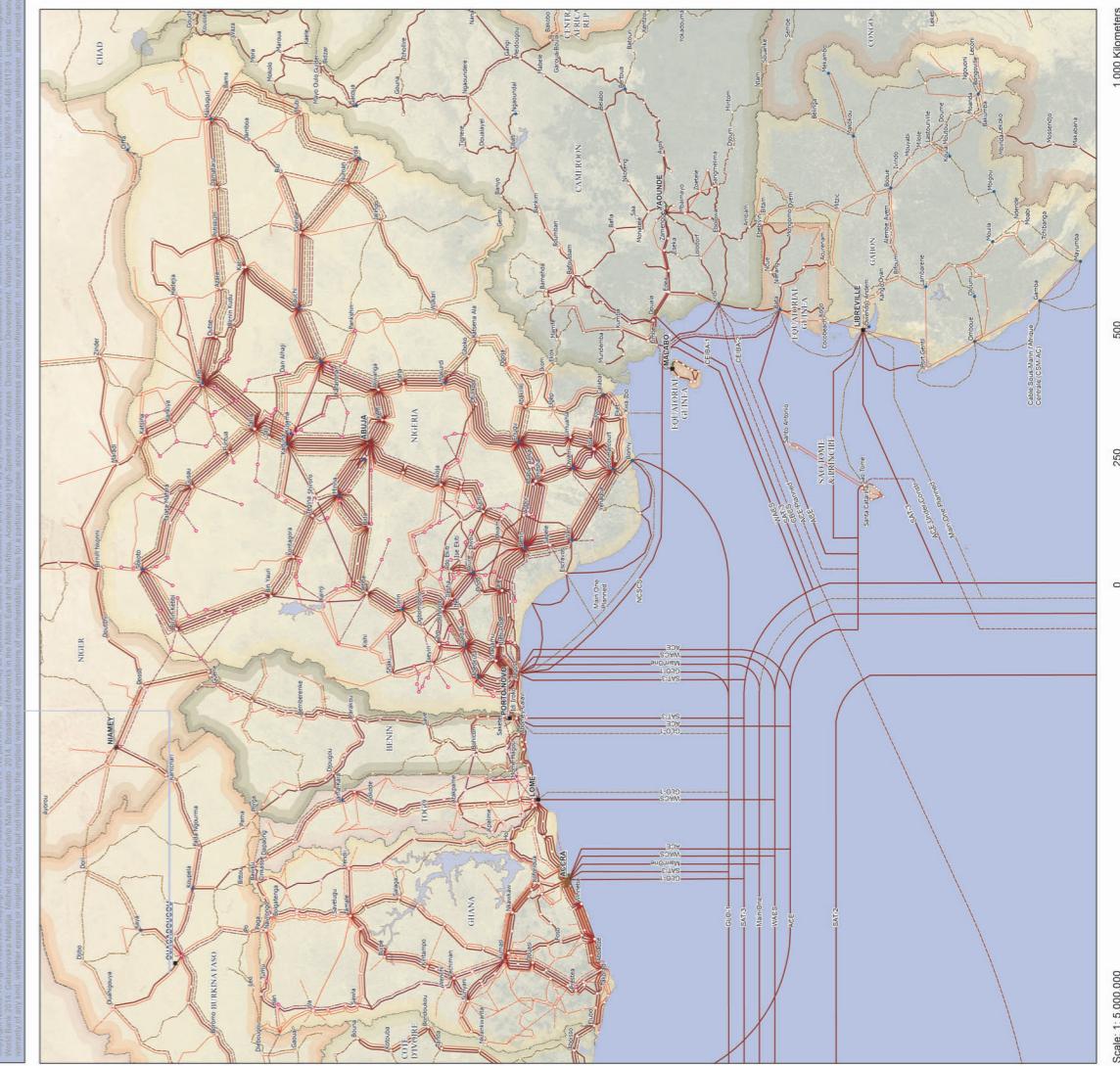
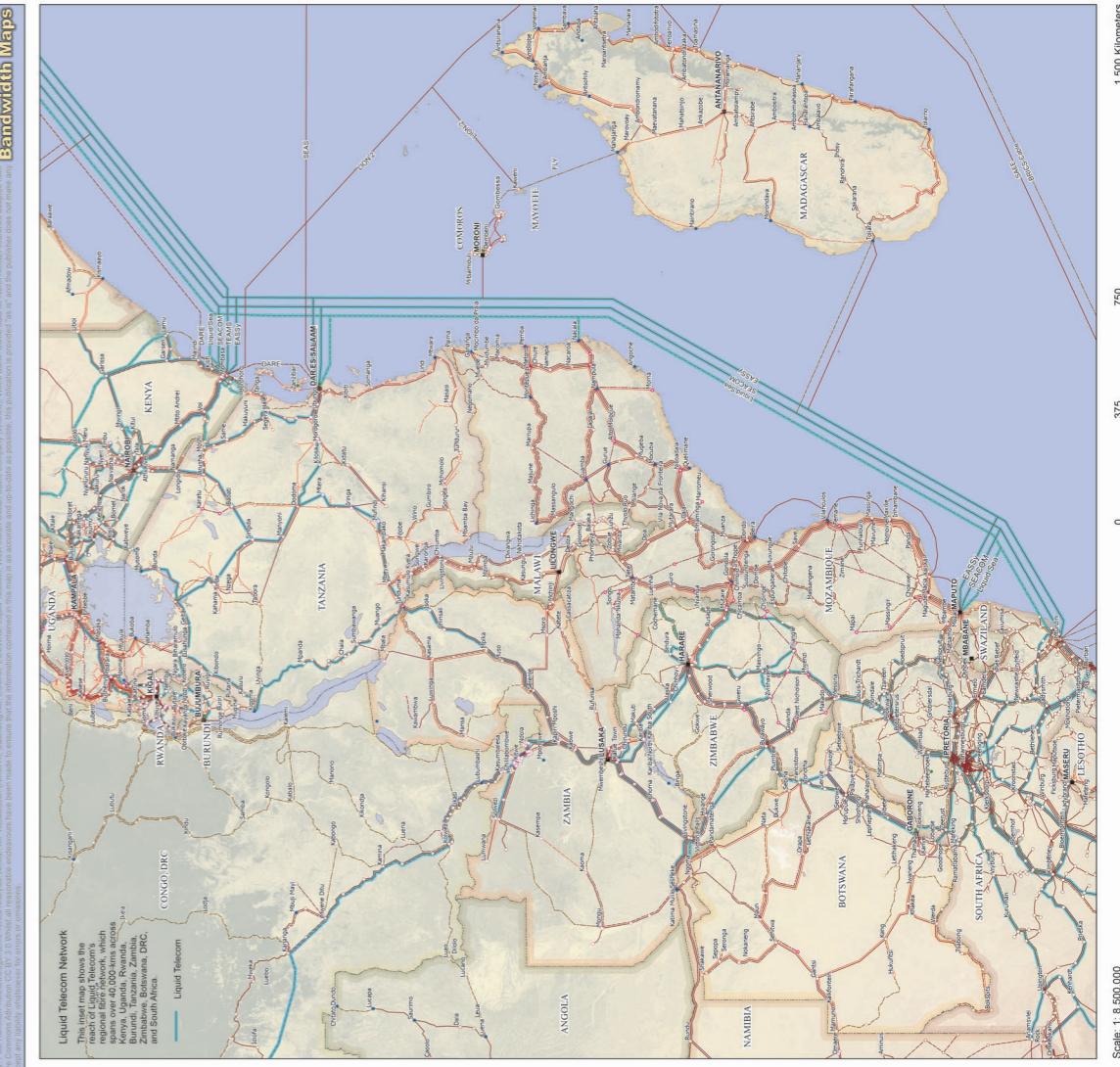
Legend

- Terrestrial Transmission Networks**
- Fiber Optic Cable - Operational
- Fiber Optic Cable - Under Construction
- Fiber Optic Cable - Planned
- Fiber Optic Cable - Proposed
- Fiber Optic (Aerial) - Operational
- Fiber Optic (Aerial) - Under Construction
- Fiber Optic (Aerial) - Planned
- Microwave - Operational

- Microwave - Planned
- Fiber Optic Node - Operational
- Fiber Optic Node - Under Construction
- Fiber Optic Node - Planned
- Fiber Optic Node (Aerial) - Operational
- Domestic Satellite (DONSAT) Site
- International Satellite Earth Station

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Scale: 8,500,000

Scale: 1,500,000



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chapter

Satcoms

6

Africa enters a new space race in 2017



Michèle Scanlon,
New business
development,
Gondwana
International
Networks

African telecoms has always typified the view that first to market often brings success. The world of satellite is no different, and as such satellite connectivity in Africa is facing a new race in 2017.

The ultimate prize is giving the continent full coverage with high throughput satellite (HTS) services. Long thought destined to be obsolete as mobile and fibre networks have grown in footprint, satellite services are making something of a commercial comeback.

This new era has been driven by HTS Ka-band spot beam services with the likes of Avanti and YahSat providing cost-effective solutions for markets previously unable to afford space connectivity. Based on spot beam coverage, these services are typically deployed using smaller antennas from 74cm delivering consumer grade services to new audiences.

However, these Ka-band services have not yet been able to deliver ubiquitous coverage of the continent, focusing instead on key areas. Both Avanti and YahSat have strong East and Southern Africa footprints, but are limited beyond that until their respective new satellites are launched. Although delayed by funding, Avanti's *HYLAS-4* appears back on track with an estimated launch by Q317; and YahSat's *Al Yah 3* is due to be launched by June 2017 to provide coverage to Africa and Brazil through 58 spot beams.

Not to be outdone, global satellite leader Intelsat has focused on the launch of *IS-33e*, part of its *EpicNG* series of high throughput

satellites that feature high Ku-band spot beams with full continental coverage.

Like most battles of competing technologies, first to market also needs to be accompanied by a viable commercial proposition. Think CDMA versus GSM, or Betamax versus VHS. First to market brings market attention, but a commercial proposition brings long-term sustainability. The combination of the two will drive market success.

So what does this mean for the internet satellite service provider and end-user? Ultimately, the launch of ubiquitous spot beam coverage, regardless of technology band, should lead to more cost effective satellite services delivering faster speeds with more user-friendly dimensioned equipment.

New market dynamics

The traditional satellite project typically took 20 years from design conception to end of its lifecycle in space, while terrestrial projects and technology evolve and are adapted significantly quicker. Yet, as the final race is on for market penetration of every remote corner of Africa, new dynamics are emerging among traditional and new satellite players.

For example earlier in 2017, Intelsat announced a merger with OneWeb [also see p80], while global OTT players like Facebook and Google also see satellite as key for extending broadband services and for their own continued service dominance in a connected world.

The loss of Spacecom's *AMOS-6* in September 2016 seriously set back Facebook's planned expansion of its free *internet.org* services via satellite to Africa. Founder Mark Zuckerberg has previously said: "Connectivity changes lives and communities. We're going to keep working to connect the entire

world – even if that means looking beyond our planet." At the annual *Satellite 2017* conference in Washington D.C. in March 2017, Facebook re-affirmed its commitment to satellite as a means of access when Wesley Wong, head of strategic technology partnerships and sourcing, noted the company's "belief that the space industry can play a very important role in reaching every last individual out there".

Eutelsat's *Broadband for Africa* initiative (now branded *Konnect*) also suffered setbacks from the loss of *AMOS-6*. But following a capacity deal with YahSat, the service will still launch in 2017 based on the current Ka-band footprint of YahSat's *Y1B* satellite and is to be complemented by further Ka-band spot beams on the company's *Al Yah 3* later this year.

Meanwhile, SpaceX and Tesla founder Elon Musk is planning to launch more than 4,000 satellites to provide blanket internet coverage across the planet. Whilst pursuing its own low-orbiting service, Google has backed Musk's plans with a USD1bn investment. Putting that ambition into perspective, the United Nations Office for Outer Space Affairs noted that in August 2016, there were more than 4,256 satellites in space with the most launches in any annual period being 240 in 2014, followed by 221 in 2015. A third of these are considered operational with 50 per cent focusing solely on providing communication services.

60 years ago in October 1957, the then-Soviet Union launched *Sputnik 1* as the world's first artificial satellite sparking a space race for what was considered the final frontier. However in 2017, the real frontier for new market share is back on Earth in pursuing HTS spot-beam satellite services for broadband connectivity to the furthest reaches of the African continent. The race is on.

The importance of satellite

The year kicked off with the satellite industry breathing a sigh of relief as delegates at the ITU's World Radiocommunication Conference 2015 (WRC-15) agreed to preserve spectrum that is primarily used for satcoms.

The most controversial item on the agenda for 2015 had been the possible re-assignment of C-band spectrum. Terrestrial wireless operators had lobbied for additional frequencies in C-band that include the 3.4GHz to 4.2GHz spectrum used for satellite receive/downlinks.

Naturally, the satellite industry opposed this. In rallying its supporters earlier last year, the Global VSAT Forum (GVF) said operation of IMT in the C-band could cause "excessive" levels of interference, and might preclude future use by broadcasters and many other industries that depend on satellite services supported by C-band.

At WRC-15, representatives from the world's governments overwhelmingly agreed that satellite provides vital and irreplaceable services. Among the key decisions made during the conference, delegates reconfirmed the need to protect critical fixed-satellite service (FSS) services throughout the world using C-band.

But the lower 200MHz of the C-band downlink frequencies (3400-3600MHz) were identified for IMT in ITU Region 1 (EMEA) and Region 2 (Americas). In Region 3 (APAC), some countries will sign a footnote allowing potential IMT use of 200MHz, although the vast majority of the region will continue using this band for satellite.

Anywhere that IMT is deployed, it will be subject to adherence to strict protection requirements with neighbouring countries. WRC-15 declined to consider a proposal for IMT systems in the C-band uplink frequencies (5925-6425MHz).



Delegates at WRC-15 acknowledged the global importance of satellite services. Around 3,300 participants, representing 162 out of the ITU's 193 member states, attended the month-long conference held in Geneva in November 2015.

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Despite campaigning for the use of C-band spectrum for terrestrial mobile broadband, the GSM Association welcomed the decisions taken at the conference. John Giusti, the association's chief regulatory officer, said that he believed global harmonisation of spectrum bands through the WRC process was key to driving the economies of scale needed to deliver low-cost, ubiquitous mobile broadband around the world.

Satcoms received another boost later in 2016 when the Global VSAT Forum (GVF) said that satellite-based solutions should not just be bound to last-mile or rural environments. The pronouncement came during the inaugural *Future-Sat Africa Summit* held in Ethiopia on 4-6 October. Delegates heard how satellite communications should be part of the overall landscape of the telecoms offering for all types of users and all locations.

According to the GVF, satellite offers a crucial and core element of the connectivity solution needed to meet Africa's application needs. Speaking at the two-day summit,

GVF correspondent for Europe Julián Seseña called upon the industry to cooperate with their future users to ensure "close and mutual trust" in highly evolving scenarios due to technology trends and new business routes. He said: "African countries have developed their national plans towards enhancing the penetration of telecom services, broadcast and broadband. The satcom industry should contribute to ensure that the value of the satellite component is fully appreciated when designing and implementing the national plans."

But the GVF warned that for many countries, the big challenges lie with policies and regulations that do not adapt and evolve as fast as the technology they relate to. It said that Africa's networks need to make use of all available technologies, fully integrated and operating seamlessly.

Disaster strikes

At 0.07 EST on 1 September 2016, Spacecom suffered a blow as the SpaceX Falcon 9 rocket that was due to carry its *AMOS-6* satellite into orbit exploded on lift-off.

While the launch vehicle and the satellite were both lost, the pad was clear and no human injuries were reported. On 5 September, the company issued a press statement which said that it was developing a plan of action following the loss of the satellite. CEO David Pollack said: "Our programme includes, among other measures, exploring the possibility of procuring and launching a replacement satellite. Working quickly and efficiently, management is engaging with current and potential partners to move forward."

He added that Spacecom will serve all of its current and future financial

JANUARY 2016

ISP iWayAfrica is using Yahsat's *YahClick* service to provide broadband coverage across Uganda. The two companies say they are offering packages designed to cater to the needs of business and home users, and claim subscribers can now instantly connect to the internet anywhere in the country using a small satellite dish and satellite modem. iWayAfrica says satellite technology is providing reliable internet services, even in the remotest places, without the need for terrestrial infrastructure.

FEBRUARY

Eutelsat has signed a three-year deal with the Broadcasting Authority of Zimbabwe (BAZ) for Ku-band capacity on *EUTELSAT 3B*. It will be

used to deliver 12 free-to-view channels to a nationwide network of 48 DTT transmitters so that viewers in the country can benefit from improved picture quality and programme choice. The service is currently being tested and is due to launch during 1Q16. BAZ is working with Zimbabwe's national signal carrier Transmedia, state broadcaster ZBC, and Huawei for sourcing digital equipment. Huawei will also uplink the digital multiplex from BAZ's teleport in Harare to *EUTELSAT 3B*.

MARCH

SpeedCast International will use capacity on Gazprom Space System's *Yamal-402* to provide high-performance services to global oil and gas companies across Africa.

The company claims customers will benefit from the Russian Ku-band satellite's "high-performance" and "excellent look angles" for the region. SpeedCast adds that with the uplink based in Germany, customers will be able to land their traffic directly into Europe and take advantage of high-speed interconnection throughout that continent.

APRIL

Ooredoo and Arabsat will work together to develop new satellite services for customers. Under the terms of a strategic partnership agreement signed around mid-April, the two companies will review the current satellite projects they have in progress. They will then collaborate on technology and design, and on

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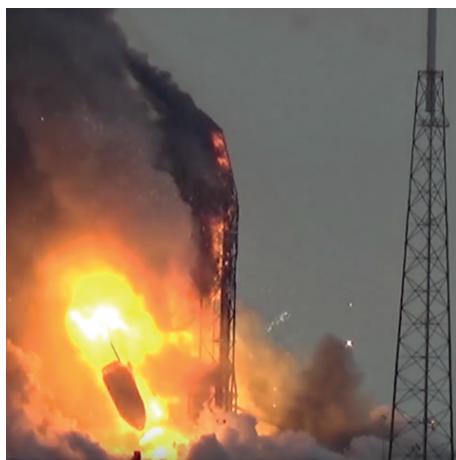


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commitments. Some of the company's current Ku-band clients on *AMOS-2* that were to be relocated to *AMOS-6* were moved to *AMOS-3*. For others, the company said it was planning to help find capacity on other satellites or possibly on a satellite that will be relocated, either permanently or temporarily, to 4°W.

In collaboration with Facebook, Eutelsat had contracted a multi-year deal to lease *AMOS-6*'s Ka-band payload covering sub-Saharan Africa, with a view to launching broadband services from early 2017.

Following news of the loss, Eutelsat said it remained committed to growing broadband in Africa and will explore other options to serve the needs of key clients ahead of the launch of its own full high throughput African broadband satellite in 2019. Facebook also started to look for alternative connectivity options.



An "anomaly" caused SpaceX's *Falcon 9* rocket to explode on the launch pad. Both the vehicle and its cargo – Spacecom's *AMOS-6* – were lost in the inferno that rapidly engulfed the rocket just moments after it was cleared for lift-off.

The future is bright

Spacecom's SpaceX *Falcon 9* explosion delayed Iridium's plans for its *NEXT* launch. The satellites had been tested and transferred to Vandenberg Air Force Base and were being processed by SpaceX before their launch, which was originally targeted for 12 September.

The explosion put pay to that timeline and it was actually on 13 January 2017 before the satellites went into orbit when the *Falcon 9* rockets resumed active service.

"After more than seven years of effort, the first of our next-generation satellites are finally ready for space," said Iridium CEO Matt Desch. "This programme replaces the largest commercial satellite constellation in space with state-of-the-art technology and new capabilities, allowing Iridium to support the connectivity needs of today, as well as those yet to be imagined."

NEXT will comprise 66 cross-linked satellites in low-Earth orbit (LEO) to deliver mobile voice and data coverage over the planet's entire surface, including oceans, airways and polar regions.

Each satellite will link-up with four others to ensure a continuous and ubiquitous meshed connection. Iridium said the large number of fast-moving spacecraft with multiple overlapping spot beams minimises missed connections and dropped calls. It added that with each satellite orbiting at just 476 miles (780km) away from the surface, transmission paths are shorter and signal attenuation is reduced.

All 66 orbiters are expected to be launched by late 2017. Starting in 2018, Iridium said the constellation will enable Aireon's satellite-based system to provide global aircraft surveillance in real time.

Not to be left out, Thales Alenia Space and LeoSat Enterprises moved into the second phase of their project to develop a low Earth orbit satellite constellation. The signing of their phase B contract in September 2016 followed the initial stage which resulted in the preliminary definition of the constellation. The companies said this validated the technical feasibility of the system and its compatibility with other Ka-band services.

Phase B concerns the definition of the overall system architecture and performance specs, including both the ground and space segments. It will finalise the manufacturing plan, paving the way for the production and deployment of the entire constellation of 78 to 108 high-power Ka-band satellites.

LeoSat's programme brings together a range of tried and tested systems for the first time. They include optical inter-satellite links, gigabit class onboard processors, flexible steerable antennas, and RF over printed circuit boards.

On 24 August, Intelsat launched the first bird for Africa that uses its *EpicNG* high throughput satellite (HTS) system. Built by Boeing, *Intelsat33e* is equipped with what's claimed to be the "most advanced" digital payload on a commercial spacecraft. It has extended Intelsat's high throughput capacity in both C- and Ku-band from the Americas to include Europe, Africa, the Middle East, Asia Pacific, the Mediterranean and Indian Ocean regions. The company said *IS-33e* is the first multi-spot beam, Ku-band HTS to serve these regions, and will be its second to use *EpicNG* following *IS-29e*'s launch earlier this year for coverage across the Americas and North Atlantic.

Initially due to go into service Q4 2016, *IS-33e* suffered a malfunction in its primary

future projects to deliver cutting-edge satellite services, particularly VSAT. Qatari-based Ooredoo offers mobile, fixed, broadband internet and corporate managed services across markets in MENA and South East Asia. Its mobile operations in Africa include Algeria and Tunisia.

MAY

Arianespace will design, qualify and supply 21 payload dispenser systems for the deployment of OneWeb's satellite constellation. The systems will first secure the spacecraft during their flight to low Earth orbit and then release them into space. They are designed to accommodate up to 32 spacecraft per launch, allowing Arianespace to deliver the bulk of the OneWeb constellation over a period of 18 months, starting in 2018. Swedish firm RUAG

Space will be the prime contractor in the development and production of the systems.

JUNE

The Centre de Dépistage et de traitement de l'Ulcère de Buruli (CDTUB) in the remote area of Allada in Benin has deployed SES' *SATMED* telemedicine system. It will be used by Fondation Follereau Luxembourg (FFL) to communicate with doctors and medical experts globally, access online training tools, and establish facilities such as video conferencing, data collection and analysis. The deployment is part of FFL's efforts to establish a consultation office at CDTUB to improve communication between patients and medical staff, raising further awareness of tropical diseases.

JULY

Arabsat has exclusively launched the Mauritanian TV bouquet in the Middle East, North Africa and Europe on board *BADR-4*. Thanks to its "excellent" footprint which covers the entire region on the same frequency and using a minimum receive dish size, Arabsat says the satellite will contribute to the delivery of Mauritanian broadcasting to large numbers of viewers. *BADR-4* was launched in 2006 and orbits at 26°E from where it delivers services via Ku-band.

AUGUST

Metro Telworks is using a GPS-based tracking system provided by Econz Wireless to monitor its engineers. The bulk of Metro Telworks' work is performed by field engineers who are

thruster which meant that the orbit raising took longer than planned. It eventually started commercial operations on 29 January 2017.

Connecting remote villages

Being able to connect the unconnected can be particularly challenging across Africa's diverse and challenging terrain. One solution came from Gilat Satcom which launched services to bring voice and high-speed data to 10 villages in the states of Adamawa, Borno, Kano, Katsina, Oyo and Yobe in Nigeria. The company's *Village Island* was used to provide a full communications system that includes VSATs, Wi-Fi routers, solar power, two communal tablets per village, and service management.

Gilat Satcom also supplied the satellite connectivity to its VSATs in each village. The integrated Wi-Fi networks then provide local connectivity for data and VoIP to the tablets as well as to devices already owned by villagers and local businesses. The entire setup is housed in the 'Community Hub', a purpose-built communications block in each village.

Nigerian systems integrator Total IT Solutions rolled out the networks using *Village Island* as the infrastructure and service platform for these hubs. The company's CEO Muhammad Yahya Sanda said: "Village Island is an extremely well-designed, self-contained system and key to the success of this project. [It] enables us to build low-cost networks which can easily scale with demand."

In a separate deployment, Dizengoff selected Gilat Satellite Networks (GSN) to implement a turnkey solution for the delivery of broadband and cellular services via satellite throughout rural Ghana. Dizengoff Ghana is a subsidiary of Balton CP, a UK-based international

corporation that provides products and solutions in communication technology, agriculture and electro-engineering.

GSN deployed various platforms to meet the rural communications requirements of the Government's Ghana Investment Fund for Electronic Communications (GIFEC) initiative. The company supplied its *SkyEdge II-c* hub which is capable of supporting multiple applications, and *Gemini* VSATs which now deliver broadband services to schools. GSN's *Capricorn* VSATs, in conjunction with its solar-powered *CellEdge* small cells, were also implemented to extend cellular services for several leading mobile operators in Ghana.

"Gilat was the only company capable of providing us with a full turnkey solution for the delivery of broadband to schools, as well as cellular service expansion, all on a single platform," explained Patrick Attia, general manager, communication at Dizengoff Ghana in July 2016. "The demanding rollout calls for installation and operation by November."

Underserved areas also received a boost with Solarkiosk and SES Techcom Services teaming up to deliver high-quality connectivity to communities around the world. Under its agreement with SES Techcom, Solarkiosk is using satellite connectivity to provide internet access to underserved areas, initially in Africa. This is being done via Solarkiosk's *E-HUBB* structures which use solar technology to provide electricity to all systems, including the satellite dish. The company said *E-HUBB* could then enable a wide range of connectivity services to the local community.

The two partners said their deal was the first of many steps to deliver off-grid connected solar infrastructure solutions for communities worldwide, targeting



The 'Community Hub' is a dedicated comms block used for Gilat's *Village Island* system in each Nigerian village.

individual users, businesses, schools, medical centres and farms. Prior to its agreement with SES, Solarkiosk had already deployed several *E-HUBBs* in Ethiopia. They include two kiosks in the villages of Belela and Mero Qebado which are in the country's southern Awassa region. The *E-HUBBs* were manufactured locally in Addis Ababa and are run by local women who were trained by Solarkiosk.

Power to the people

As well as providing services like internet and voice connectivity, satcoms has been powering other solutions across Africa. For example, TerniEnergia is using Ka-band satellite technology from Avanti Communications to provide high-speed broadband connectivity to its photovoltaic renewable energy plants in South Africa.

Part of the Italeaf Group, TerniEnergia claims to be Italy's first smart energy company operating in the renewables and efficiency market. It is using Avanti's

driven each day along specific network routes to check signal strength for 2G, 3G, and 4G on behalf of operators such as Vodacom and Cell C. Metro needed to know where they were, if they used the correct route, and which hours they worked. Other issues for the company involved speeding, robberies of expensive equipment from the vehicles, misreported hours worked, damage to vehicles, and accidents.

SEPTEMBER

Yahsat and VT iDirect are working together to introduce VNO services across the existing footprint of *YahClick*, Yahsat's satellite broadband service. Based on what's claimed to be the "industry changing" capability of VT iDirect's *Evolution* platform, Yahsat

says the VNO offering will leverage the "high-speed and economical capacity" of *YahClick*'s Ka-band network. It says service partners will be able to purchase their own bulk capacity which they can then fully manage and configure themselves to offer differentiated services. They will also be able to commission, control and monitor their own remote sites, while designing and configuring their end-to-end IP network.

OCTOBER

The African Telecommunications Union (ATU) has welcomed two new associate members. They include Germany-headquartered radio monitoring and spectrum management consultant LS telcom. Its MD Jean-Paul Chaib said: "As the leading provider of solutions to

regulators, it is a natural step for LS telcom to join the ATU." The second new member is satellite operator Iridium. It will help the ATU prepare for ITU assemblies such as WRC 19, as well as satellite policies and other relevant matters.

NOVEMBER

Angola Telecom's business unit, INFRASAT, says it will invest to improve signal coverage for mobile and fixed telephony operators and provide internet service in the most remote regions of the country. While the company pointed out its turnover of USD27m in 2015, it did not say how much it planned to invest. But as part of efforts to contribute to the development of ICT in Angola, INFRASAT said it aimed to become a satcoms leader in the country.

satellite service to provide high-speed broadband connectivity to its solar power plants in Paleisheuwel in the Western Cape, and Tom Burke in the Northern Province. The sites cover a huge area ranging from 195 to 240 hectares, and are being constructed for a major Italian utility firm.

TerniEnergia deployed a VPN using Avanti's *HYLAS 2* satellite which offers complete coverage of South Africa. It now delivers high-speed internet connectivity that facilitates vital data exchanges between the photovoltaic plants, whilst providing operational support and remote reporting capability.

Satellite technology is also being used for the regular and timely monitoring of Kenya's forests. Working with local company Ukkal and the UK's University of Leicester, the Ministry for Environment, Natural Resources and Regional Development Authorities and the Kenya Forest Service (KFS) are developing a prototype for a near-real-time forest monitoring service using data from the European Space Agency's *Sentinel-1* and *Sentinel-2* satellites.

The measurement, reporting and verification (MRV) service will be delivered directly in an easily accessible reporting format via a smartphone app. It will help Kenya in its preparations for REDD+ (Reducing Emissions from Deforestation and forest Degradation), the UN's framework on climate change.

The University of Leicester's Professor Balzter said the initial prototype of the monitoring system will focus on a national forest reserve in Kenya: "Our aspiration is to support participatory forest management strategies to enable Kenya to manage its forests more sustainably and achieve its national forest cover target of minimum 10 per cent by 2030."

DECEMBER

Eutelsat is planning a new satellite for the key 5°W orbital position. It has contracted Airbus Defence and Space to build the payload while the platform will be manufactured by Orbital ATK. To be launched in 2018, *EUTELSAT 5 West B* will replace *EUTELSAT 5 West A* which predominantly targets the French, Italian and Algerian broadcast markets. *EUTELSAT 5 West A*'s C-band mission, serving mainly data customers in sub-Saharan Africa, will be discontinued. The company says service continuity will be provided by similar C-band capacity available on its other resources, thereby optimising capacity utilisation rate across the group's fleet.



The 400 cyclists covered over 400km of remote and harsh terrain where mobile communications are either limited or non-existent, making satellite the only reliable option.

Satellites have also been supporting desert races across the continent. The organisers of the 2016 Titan Desert event, said to be the toughest mountain bike race in the world, used *SPOT Gen3* satellite trackers to enhance the safety of the 400 competitors.

The eleventh Titan Desert race took place in late April. It saw extreme cyclists ride more than 660km across Morocco's cold Middle Atlas mountains followed by vast expanses of searing hot desert. Mobile comms in this remote and harsh terrain are either limited or non-existent, making satellite the only reliable option.

Each competitor carried a small and robust *SPOT Gen3* tracker, enabling organisers, support teams, family, etc., to precisely track their location via the internet. Athletic gear and tracking specialist WAA Tracking provided the customised online solution.

Morocco is also the location for the Rallye Aïcha des Gazelles. Taking place in March every year, the competition is a women-only race which attracts more than 120 teams from 30 countries. It covers 2,500km in six legs across the Western Sahara Desert in Morocco, making reliable satellite and radio comms services a top priority for both logistics and safety.



Michèle Scanlon,
New business
development,
Gondwana
International
Networks

The year ahead: As always in a technological race for market share, the technology itself may not actually be the key differentiator. Instead, access to local markets via licensed operators on the ground, speed to market, and deployment in rural Africa, is the ultimate aim.

With strong competition and increasing capacity, satellite broadband pricing is expected to decline faster over 2017/8 than in previous periods. Supply and demand will dictate new price points, bringing affordable broadband.

A deal saw Marlink, which has been the event's turnkey communications provider for 25 years, signed up to provide critical comms to the event for another five years.

The company said its engineers ensured the smooth functioning of all comms services deployed in the field, with Marlink satellite links used to enable internet access for the organisers and media working in the camps. Satellite connectivity was also used to provide VoIP at the control centre. As well as enabling recreational services, this allowed competitors to stay in touch with family and friends.

Organisational vehicles, such as those used by medical and support teams, were equipped with radio receivers so that they could communicate with HQ and be dispatched for prompt assistance to injured or stranded competitors.

Marlink also provided airborne radio networks for communications between field staff and the local control centre. Two helicopters covered each leg, transmitting duplex radio to fixed terrestrial relay stations.

Tracking and safety services were provided by the company's satellite-based *Iritrack* system. This enables real-time tracking of competitors, and also enables them to send alarms to HQ in the event of an emergency.

At *Satellite 2017* held earlier this year in Washington, Wesley Wong, Facebook's head of strategic technology partnerships and sourcing, hinted at the social media giant's potential involvement in lowering that cost per unit. He reiterated the need for standardisation and mass scale to enable those without connectivity to achieve this with satellite services.

However, prices of the satellite modems required by end users typically start from USD170, with full price kit from USD400 inclusive of antenna and RF unit. Then there is a further USD300 to pay for consumables and installation fees. So until the market sees reductions in pricing or innovative financing approaches for all this, the utopian goals of mass-scale broadband penetration in Africa may be limited.



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NOVEMBER 4

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will be possible tomorrow”

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Jean-Philippe
Gillet,
VP, EMEA sales,
Intelsat

In the 2016 edition of *The African Wireless Communications Yearbook*, Jean-Philippe Gillet spoke at length about the need for the economics of the industry to change.¹ He called for the industry mindset to switch from selling megahertz to megabits. So has he seen any progress since then?

"The vision for Intelsat is all about making it more affordable for the consumer. You will not capture the growth if you are not able to make it more affordable. And I am not only talking about the affordability of the bits or 'package of data' – it's also about the affordability of the equipment that you have on the ground."

Gillet believes it is therefore important to look at the strategy around all of that and companies such as OneWeb which was setup by O3b Networks founder Greg Wyler a few years ago. OneWeb's mission is to develop and launch hundreds of LEO satellites in its quest to fully bridge the digital divide by 2019,² and when it was announced in 2015 its investors included Airbus, Hughes Network Systems, Intelsat, Qualcomm, amongst others. At the end of February 2017, Intelsat announced a merger agreement with OneWeb.

"If you don't think the business in a different way then you don't change the accessibility and affordability. Why is it important for all these companies to be involved with OneWeb? Because they do things in a different way. If you get Qualcomm involved you also think about chips, and Qualcomm doesn't think thousands, they think hundreds of thousands or millions. Airbus is thinking about building a satellite a week. So we are re-thinking the way we do business – instead of producing a satellite every two years you produce one every week."

"If you want to unlock new opportunities for the satellite industry you need to look at it in a different way. You need to have an approach which is not about how you do a bit of squeezing here and a bit of squeezing there. Of course, this is important and has to be part of your basic day-to-day business. But satellite is now more about how you're going to be able to reach thousands of schools, or how you're going to have a dish that will be deployed on a brand-new Toyota. The dish won't have any movable parts. This is exactly what Kymeta³ is doing. When they look at their product they look at mass production – the antenna is going to be produced in a way such as the mass

production of TVs is done. So the whole logic is shifting."

"Yes, we need to address the market as it is, and yes we need to squeeze as much as possible to deliver broadband in a more cost-effective way. But at the same time we need to focus on the applications of the future. How do we go to the Internet of Things? How do we think 5G? How do we connect a car? How do we provide a service that mobility customers are really looking for?"

Intelsat has been successful as a satellite operator for more than 50 years. So why does the company feel that things should change now. Gillet said that the market's fundamental requirement is about being connected all the time and consuming more bandwidth. "We believe there is going to be a constant explosion of demand. We also believe the technology is ready because all of the innovation is there to make it affordable. It's as simple as that."

"You must also time your innovation in the right way – even if the customer is not ready for it today, you need to develop the right product that can carry gigabits or terabytes of capacity in the future."

When asked if the African market is tough for Intelsat at present, Gillet retorts by saying those who do not want to be challenged should not work in any developing countries.

"This comes with the territory. In Africa, the middle class is evolving and I think 70 per cent of the population is below 25 years old. So all of the fundamentals of market demand are there. We didn't decide to come to sell services in Africa last week; it was part of the foundation of Intelsat to provide services into developing countries. So okay, we might have a little bump in the road, but if you are in it for the long run then you have to deal with that little bump in the road."

Last August, Intelsat launched two satellites for Africa including *IS-33e*, its first spacecraft for the region to use the *EpicNG* high throughput system. The satellite is a replacement for *IS-94* which will be redeployed.

"It's a combination of C-band and spots, Ku-band and spots, so it serves a number of different applications. At the same time, we're working with a number of customers in other regions where we have more traditional applications. I am a great believer in rural connectivity. The challenge here is to deliver services in a cost-effective way and this is where we offer something that is different. You need to make it more affordable. So in order to do this is via a high throughput satellite is to bring a higher efficiency."

IS-33e was Intelsat's second *EpicNG* satellite and joined the first, *IS-29e*, which was launched for the North and Latin America and North Atlantic region in January 2016. Gillet said that the "beauty" of having the second satellite is that you can use the first one to do a lot of testing. "So we tested with existing equipment to see what the additional efficiency was. At the end of the day that doesn't really mean anything except that if before you were able to transmit 1.2 bits in 1Hz and now you can transmit 1.5 bits in the same Hertz, you save money. And if you keep your own equipment, you gain 15 to 30 per cent. We worked with all the major equipment providers and had told them what we were launching, and advised them to get their acts together and develop the right products. And the results are new products that can double the efficiency."

"The second challenge you have in rural connectivity is access to power. Very often, the main constraint for mobile operators is how to provide the fuel into the tower in order to deliver continuous service. One of the great things about next-generation satellites is that you can reduce the size of the kit, and the minute you do that you reduce the requirement of power. And at that point, you can put in solar panels, wind turbines, or whatever you want, but you're not going to have to rely on having diesel generators."

"So you can't just look at the satellite as one component. As the operator, we have done our bit in terms of the innovation on the satellite which is good, but then after that you have to look at the power, what is the best option for the customer, what is the overall cost. I heard from one customer in Africa that 30 per cent of their operational expenditure is fuel – and that is one of the large telcos operating in 20 countries. If you can save 10 per cent of this, you are not talking about megahertz, megabits, you are really looking at the total cost for the customer. So if you find a way to save them 10 per cent, the service you provide adds value for them."

¹ African Wireless Communications Yearbook 2016, p68.

² Southern African Wireless Communications, May-Jun 2015, News pp12-23: *Digital divide will be "fully bridged" by 2019.*

³ Editor's note: Kymeta specialises in leveraging satellite network capacity for high bandwidth communication access while on the move. On 7 March 2017, Intelsat announced that it had acquired an unspecified equity stake in Kymeta. Additionally, Intelsat CEO Stephen Spengler has joined Kymeta's board of directors.

So does that mean to say that working in partnerships is key here for Intelsat in Africa? Here, Gillet said different satellite operators have different philosophies, and Intelsat decided to adopt an open system. “An open system means that we want to be able to work with all the technologies; it means we want all of the teleports and all of the value-added resellers to be able to use our system. It’s a bit more work for us. For instance, right now we have been having discussions with Newtec. We visit them and tell their team about our plan and the design of our satellite, and that it’s all confidential and that they can’t share that with our competitors. And then we do the same with iDirect, Comtech, UHP and Gilat, etc., because we want all of them to develop the technology to deliver the additional efficiency of what we provide.

“We do not want to do the deployment by ourselves and have no intention of being on the equipment side. We want our value added reseller to integrate that in their offering. So it is all about how you partner and how you select the right partner; it is about them challenging us at the same time as we challenge them.”



2016 was a pivotal year for RSCC's business in Africa, according to Andrey Kirillovich. “Our recently launched satellites, Express-AM6, AM7 and AM8 in 14°W, 40°E

and 53°E, respectively, have been loaded with enterprise, cellular backhaul, IP trunking, maritime and consumer broadband customers from Africa, or doing business there.

“We prepared our entry into this new regional market very thoroughly and those preparations started bringing real value last year. The number of the telecom and broadcasting projects that

we've been involved in rose dramatically. Some of them ended successfully with new contracts and some of them not. But now we feel that RSCC has become an integral part of an African satcoms landscape, and we have been fully integrated into satellite telecom and broadcasting infrastructure on the continent.

“RSCC has now been working in the sub-Saharan region for two years, and the market conditions have been improving since we entered in 2015. Customers have got used to operating and expanding networks under lower budget conditions.

Plus, an overall drop in bandwidth and equipment pricing was of great help to them for obtaining new clients and entering new verticals. The broadcasting business remains strong and we also see some rise in the backhaul and corporate sectors.”

According to Kirillovich, the challenges in Africa in 2016 remained the same as in previous years: lack of qualified engineering staff at the customer's side; payment collections; overall slowdown of business activities in the oil-dependent economies; and total instability in the region. But it was not all doom and gloom, and he says “good signs”

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of recovery appeared in 2016 which leads to hopes for a new rise of satcoms in Africa.

"Some networks that we gained in 2016 were migrations from other satellites, but there were also a few new networks deployed from scratch. Moreover, existing customers are slowly but steadily expanding their networks. With the continuous penetration of fibre more backup is required, and we have seen some good satellite backup deployments last year."

"In 2017, RSCC plans to enhance its marketing and sales activities in the West and Southern Africa regions. We want to get more deeply involved in ground segment integration and offer turnkey solutions to a few verticals, such as maritime, enterprise and cellular backhaul. We also plan to continue supporting our customers throughout Africa and meet their requirements of building cost-effective satellite networks across the continent."

"Besides that RSCC, being one of the world's first satellite operators established in the market, is celebrating a tremendous milestone in November 2017: its 50th anniversary."



Dmitry Sevastyanov,
Director general,
Gazprom Space
Systems

Gazprom Space Systems (GSS) has been active in Africa's telecoms market since 2013. At present, the Russian company's orbital constellation includes four satellites: *Yamal-202* located at 49°E; *Yamal-300K* at 183°E; *Yamal-402* at 55°E; and *Yamal-401* at 90°E. All operate in C- and Ku-bands, and the fleet's total capacity is about 9GHz.

Dmitry Sevastyanov explains that while this capacity is increasingly used on the Russian market, the *Yamal* satellites' footprints not only cover the territory of that country and its neighbours, but also Europe, the Middle East, Southeast Asia, the northern Pacific, and a significant part of the African continent.

"Approximately one third of total capacity is concentrated in the beams serving the areas outside Russia. About fifty foreign service providers use this capacity, providing services in more than 100 countries. A significant part of GSS' international business is focused on emerging markets in Africa and the Middle East."

For instance, Sevastyanov said *Yamal-402* was designed to serve Africa. Launched in December 2012, he describes the Thales Alenia Space manufactured spacecraft as a

"modern, powerful and reliable satellite".

"The wide Southern beam of this satellite offers high-energy performances (EIRP 46-51dBW) and covers a significant region of the continent, particularly sub-Saharan Africa, Madagascar and neighbouring areas of the Indian Ocean. The European beam provides coverage for North Africa, the Middle East and most parts of Europe. There are also inter-beam connections between the European and Southern beams."

"In addition, there is a more powerful steerable beam which can also connect with Europe covered by the Northern beam. The steerable beam is focused on the countries of central Africa (DRC, Angola, Tanzania, Zambia) to meet the needs of clients in addition to the Southern beam."

Sevastyanov said *Yamal-402*'s capacity can be used to setup different kinds of communication links, TV services, broadband internet access, etc. He added that quality of service for customers is determined by the satellite's high performance characteristics and good elevation angles under which the satellite is visible from Africa.

"Despite strong competition on the African market in recent years due to the appearance of a large number of new satellites, *Yamal-402* is very popular. In 2016, many GSS customers operating through the satellite, increased capacity utilisation volume and, consequently, the amount of satellite services for their users."

"The Southern beam is much in demand for Angolan TV broadcasting services, Cameroon and Lesotho TV channels. About a dozen African TV channels broadcast via Telemedia, a well-known provider of television services from South Africa."

"*Yamal-402*'s capacity is widely used by broadcasters to organise television reports (SNG services). Optimal coverage of the continent together with the Africa-Europe inter-beam connection enables broadcasters to arrange TV news reports as well as transfer content quickly and qualitatively both in Africa as well as from Africa to Europe."

"For example, in early 2016, the contract was signed with a major German telecom operator that provides occasional use *Yamal-402* capacity for the transmission of television and other content in Nigeria. At the beginning of 2017, a Cameroonian TV company broadcast the 2017 Africa Cup of Nations hosted by Gabon via the satellite."

Sevastyanov continued by saying that in 2016, major service providers offering satcoms services for global companies in the energy, and oil and gas industry in Africa extended their contracts and increased the amount of leased capacity on *Yamal-402*.

"Many telecom operators use the European beam to provide services to large oil and gas enterprises being situated in the Middle East, as well as communications with vessels in the Mediterranean Sea. The most popular trend is connectivity from Europe to Africa, and the most popular application here is providing internet for remote regions of Africa."

An example here is UK-based NSSL Global which is leveraging *Yamal-402*'s power. "Responding to new market needs, it significantly expanded the coverage of its global network in 2016, and increased its capabilities to provide more stable services using the Southern beam. In particular, it is focused on telecom services for cruise ships in the Indian Ocean, and for customers on the continent which it regards as a strategically important region."

Also during last year, Gilat Satellite Networks began to use the Southern beam capacity for services in sub-Saharan Africa based on its *SkyEdge II-C* technology. During the first stage, the company used the capacity to provide broadband internet access in schools as well as services to mobile network operators in rural areas of Ghana.

As in recent years, Sevastyanov said the African market was quite difficult for satellite operators in 2016.

"There are plenty of satellites from different global and regional operators. As a result, the market is highly competitive."

"The situation is complicated by political and economic instability, significant currency fluctuations, and falling energy prices. These are the factors that have a negative impact on the business activities of consumers of satellite services worldwide, especially in the corporate segment – one of the main consumers of satellite services."

"Capacity oversupply and drop of demand caused significant competition and a sizeable decrease (20 to 30 per cent) in prices for satellite capacity and telecom services."

"But despite all the difficulties, Africa's telecommunications market demonstrates the potential for growth. It gives optimism, and Gazprom Space Systems hopes for the further filling of the beams serving this region. We are confident that as soon as the positive trends in the economy appear, *Yamal-402*'s capacity will be contracted completely."

"GSS believes that its position in these markets has increased significantly thanks to the development in 2016 of partnerships with major service providers working here, and cherishes these partnerships. Looking to the future, the company plans to launch a new satellite to the 55°E orbital position to expand its business in the region."

"Finally, in 2017 Gazprom Space Systems is going to celebrate the 25th anniversary of its business. The company confidently entered the year, continuing to show stable growth of income. In 2016, revenue amounted to RUB5.5bn – nine per cent more than the previous year. Thirty six per cent of the total revenue was received from the sales of satellite capacity in international markets outside Russia."



Farhad Khan,
Chief commercial
officer,
Yahsat

In his view, Yahsat is the "go-to" resource for satellite broadband internet in Africa.

"By investing in the uniquely designed and technologically advanced *Al Yah 3* satellite, we will expand our commercial Ka-band coverage to an additional 19 markets in Africa, reaching 60 per cent of the population, and offer cost effective high-speed satellite broadband service, even in the remotest of areas. Additionally, on-ground relationships with partners will also provide premium service and support to customers directly in-market."

Partnerships are crucial for Yahsat and indeed, Khan's predecessor David Murphy, previously stated that they are a key for the company's success.⁴ Last year therefore saw a raft of partnership agreements for the company, as Khan explains.

"2016 has been an exciting year for us, our partnerships with industry peers went from strength to strength. We signed a multi-year capacity agreement with Eutelsat

Farhad Khan joined UAE-based Yahsat in October 2016, having

previously worked with big name cellcos such as Airtel Africa where he was also CCO, as well with MTN.

Communications, giving *Konnect Africa*, Eutelsat's African broadband venture, access to high-performance commercial Ka-band capacity for broadband services across sub-Saharan Africa.

"We also partnered with UK-based teleport, satellite and terrestrial network operator Talia, providing them capacity on *Al Yah 3* alongside existing services on the *Y1B* satellite. This unique arrangement will provide Talia's customers in the Middle East and Africa with a tightly integrated offering and a tailor-made solution to fit the changing demands of their customers.

"Earlier in 2016, we signed an MoU to explore the possibility of new joint opportunities with an existing partner, IEC Telecom Group. IEC Telecom is one of the world's leading mobile and fixed satellite communications service providers and the MoU has enabled us to explore ways to offer *YahClick* broadband products, services and value-added solutions to users in Africa.

"We also partnered with VT iDirect for the introduction of VNO services across *YahClick*'s existing footprint. The VNO offering is based on the industry changing capability in VT iDirect's *Evolution* platform.

The advertisement features a large image of a rocket launching into space, with a map of the Indian subcontinent and Australia overlaid. The text includes:

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⁴ African Wireless Communications Yearbook 2016, p72, David Murphy, Yahsat.

It allows service partners to purchase their own bulk capacity which they can fully manage and configure themselves to offer differentiated services. This will facilitate our partners in the provision of broadband across the region."

While African internet penetration has historically been lower than many other markets worldwide, Khan said data demand has exhibited an unprecedented increase on the continent as a result of the prolific growth of affordable smart devices.

"Africa's internet penetration is expected to reach 50 per cent by 2025 as smartphones hit a forecasted 360 million, increasing significantly from 16 per cent and 67 million, respectively, in 2013. However, there is still room for sub-Saharan African governments and ICT regulators to participate in global discussions to ensure regulations and processes are in place for facilitating connectivity for the users."

Khan's view is that the market has definitely become more competitive with telcos and broadband providers diversifying their offerings and launching products such as multi-vendor IT services and internet packages. "Due to the availability of multiple options, customers now have the choice to select preferred services based on pricing and experience. This is in addition to the increased investment telecoms operators are committing into rural areas, hence extending broadband reach beyond urban borders."

Furthermore, Khan said the rollout of Ka-band services and the development of more innovative, high-speed solutions has opened up the consumer space, particularly in regions like South Africa, Angola, Nigeria and East Africa.

Africa has experienced significant growth over the past few years, and Khan cited Nigeria as a good example where more than 94 million users are connected to broadband internet. But even though the region's mobile telecoms and broadband market is one that exhibits immense growth potential, he said it is also intertwined with unique regional challenges.

"In terms of telecoms infrastructure, Africa still faces a significant struggle to connect all the population with quality broadband in the suburbs of major cities, smaller towns and rural areas. Hence, there are opportunities for satellite broadband providers to cater to the increasing internet demand from a growing population. Satellite broadband providers can deliver high-speed broadband, at reduced service cost, by commercial exploitation of higher frequency bands.

"Other challenges that can put pressure on markets include currency fluctuations and lack of regulations that govern business practices. That said, markets are adaptable at overcoming such challenges, and we're seeing the development of a business conducive environment.

"On a macro-level, the rate of socio-economic development can pose further challenges that are unique to the region. *YahClick* is present in multiple African countries and works together with service providers in those markets, to not only deliver reliable broadband services but to also accelerate the pace of development. We've also launched campaigns in South Africa and Nigeria where we provide broadband services to allow remote communities to access basic facilities such as education, healthcare, and financial services.

"Africa is a high-priority for us as we will expand into new markets later this year with our third satellite, *Al Yah 3*. With its launch, we will triple our existing presence in Africa serving home and business users as well as government entities, and NGOs. We will continue to work closely with our existing service partners to expand our satellite broadband services across Africa and to focus on bringing connectivity to people living in remote areas where there is still no connectivity. We also have plans to further expand *YahClick*'s VNO services in Africa, which will benefit our service partners and end users."



Ahmed Gettani,
Head of African
& Middle Eastern
sales,
Anacom Inc.

Africa poses unique challenges and opportunities for a satcom market that combines both settled infrastructure as well as myriad growth opportunities, according to Ahmed Gettani.

He believes that there are many opportunities still expanding in Africa with a fast-growing population, combined with continually increasing domestic and foreign investment. "The growth in wireless communications and massive landlocked territories in Africa mean there will be a continued and increasing demand in satcom development. Anacom is well positioned to be one of the prominent suppliers of equipment."

Internet and broadband demand exists along a wide range of different industries and users – from local businesses and the oil and gas industries, to home and small offices. The continent's size makes satellite

the only feasible way to meet this demand across the entire continent. As countries in the interior continue to grow in population and industry, satcom development will have to increase to meet the needs of all facets of African life and community.

In addition to its vast geography size, the continent provides unique challenges due to different, sometimes clashing, cultures. The one thing in common throughout the region is the need for people to stay connected to each other and to the rest of the world. Locally grown businesses and industry, as well as outside corporations and foreign investors, depend on reliable communication to compete in the global economy.

Gettani says one such major challenge is the potential danger to economic infrastructure due to instability and violence. "[They] will negatively impact the African economy in some areas, destabilising some regions, with millions of refugees potentially streaming from one area to another."

The need for stability in the face of potentially volatile circumstances provides another reason why Africa is posed for continued opportunities in satcom investment, and the continent is Anacom's largest addressable market due to the urgency of building satcom infrastructures.

The company has partnered with the State of California's Office of Emergency Services with their emergency service networks, giving them a personal insight into the need for reliable network communications across a variety of terrain and weather climates. This is a necessary goal for any satcom plans due to Africa's own wildly varied climates and topography. Potential health and regional emergencies necessitate a clear and reliable plan for communication between emergency responders, NGOs, and local governments.

As world culture continues to shape and be shaped by global networks, reliable satcom infrastructure allows African countries to have the opportunity to add their unique voices to online communities via social media and various online communities on the internet.

Major satellite operators have provided the opportunity for Satcom manufacturers such as Anacom, Inc. to expand their reach in the African markets. With an unprecedented number of satellites having been launched in recent years, satcom development still has plenty of room to grow throughout the continent.

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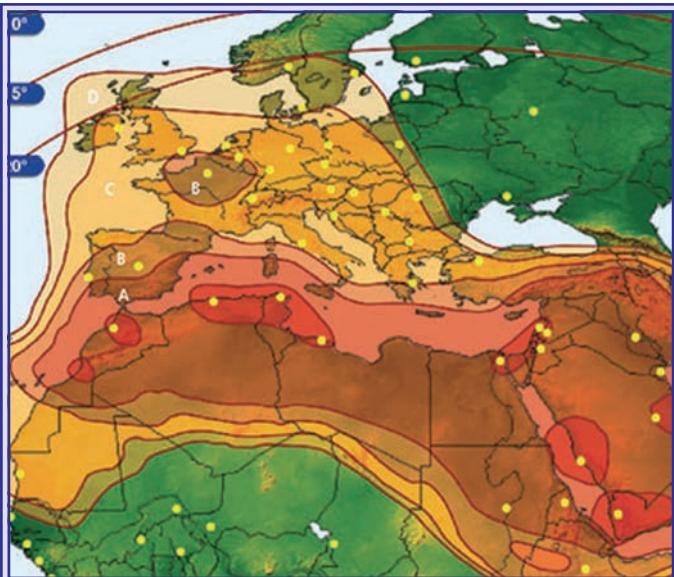
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Arabsat BADR-4: 26°E

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

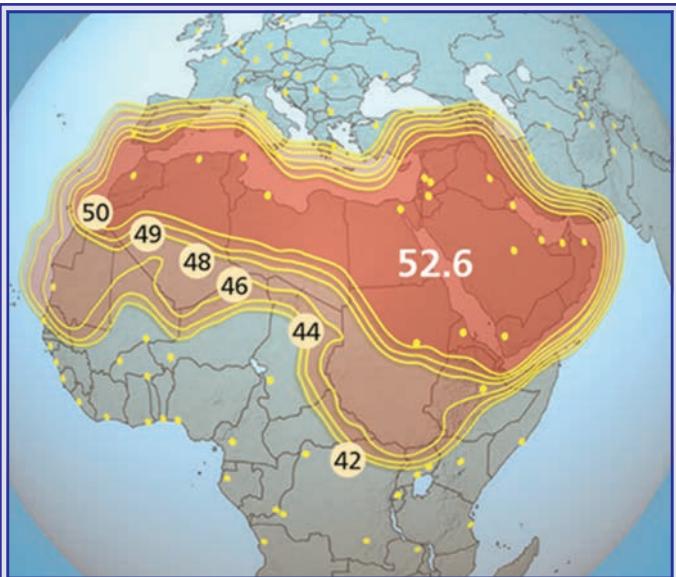
Frequencies: Ku/FSS: 13.75 to 14.00GHz (uplink); 12.50 to 12.75GHz (downlink)
Ku/BSS: 17.30 to 18.10GHz (uplink); 11.70 to 12.50GHz (downlink)

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

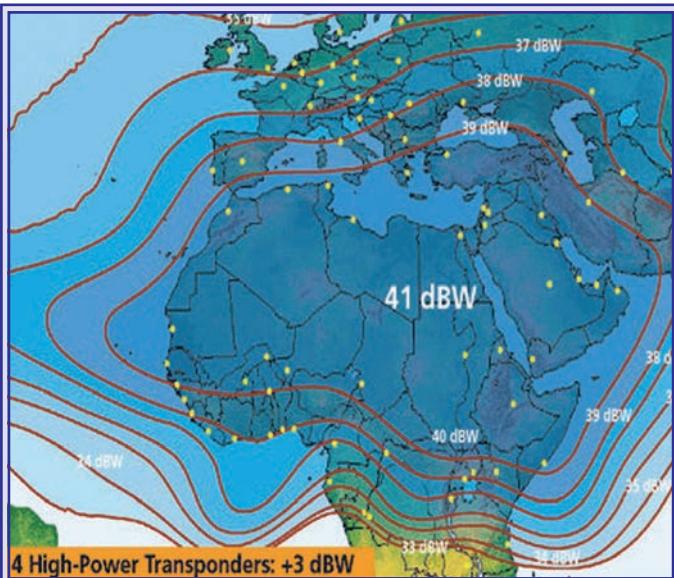
Frequencies: Ku-band/FSS MENA Uplink: 13.75-14.00GHz
Downlink: 12.50 to 12.75GHz
Ku-band/FSS Apx-30B MENA Uplink: 13.00 to 13.25GHz
Downlink: 10.70 to 10.95GHz

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

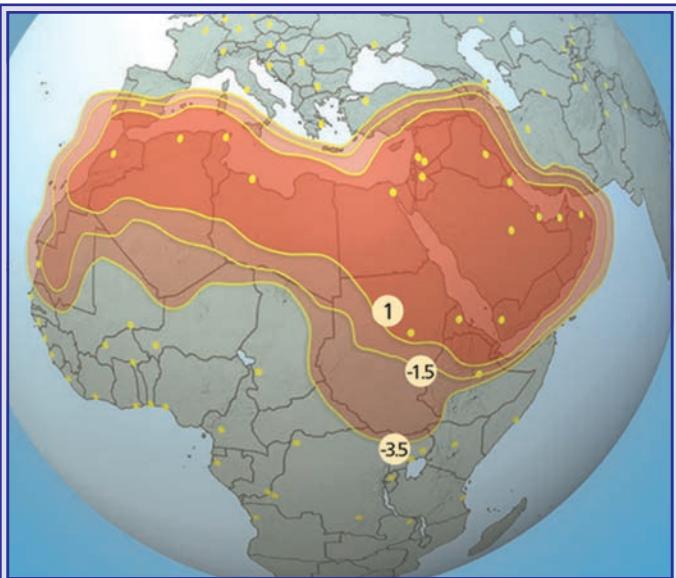
Frequencies: Ku/BSS: 17.30 to 18.10GHz (uplink); 11.70 to 12.50GHz (downlink)
C-band: 5.925 to 6.425GHz (uplink); 3.700 to 4.200GHz (downlink)

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

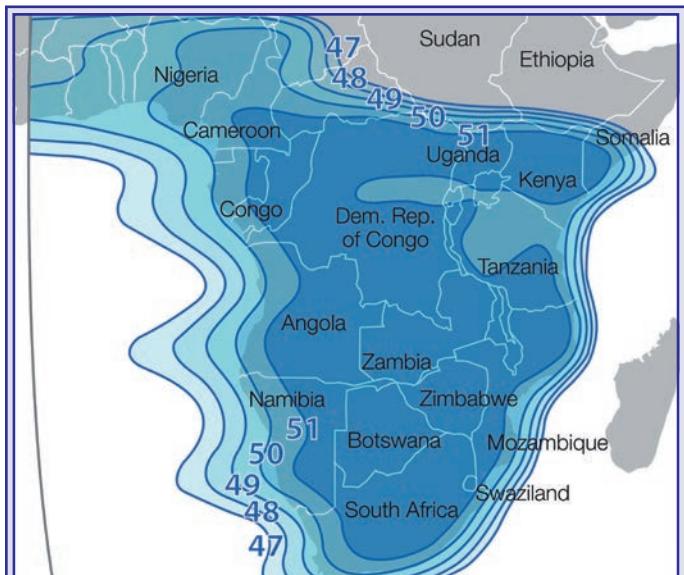
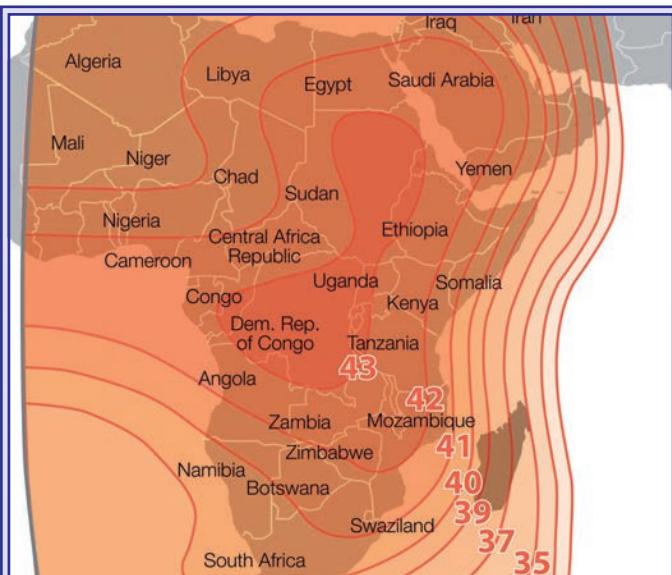
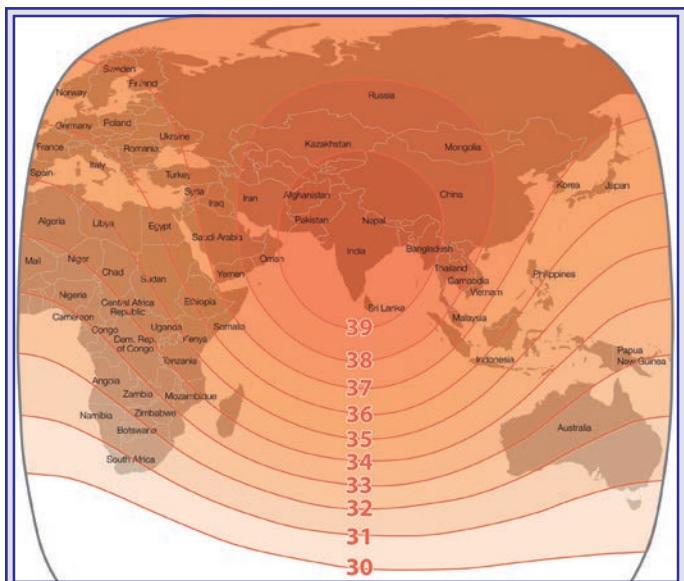
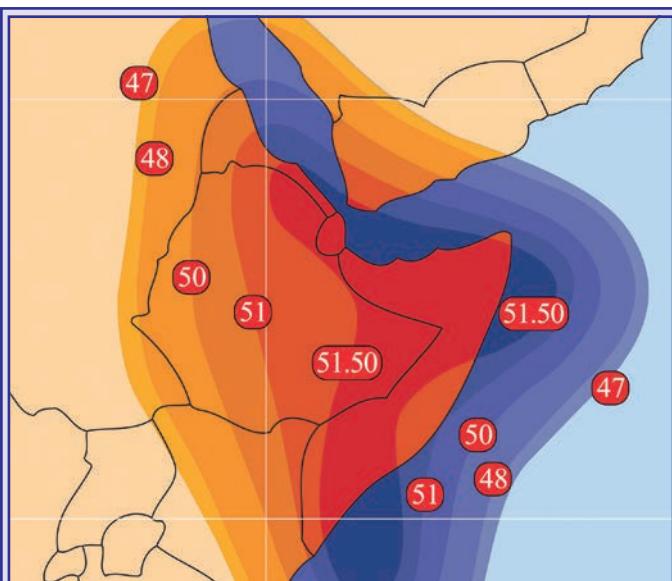
Frequencies: Ku-band/FSS uplinks: 14.00 to 14.25GHz; 14.25 to 14.5GHz
Downlinks: 10.95 to 11.20GHz; 11.45 to 11.70GHz
Ku-band/FSS Apx-30B uplinks: 13.00 to 13.25GHz/12.75 to 13.00GHz
Downlinks: 10.70 to 10.95GHz/11.2-11.45GHz

Polarisation: Linear

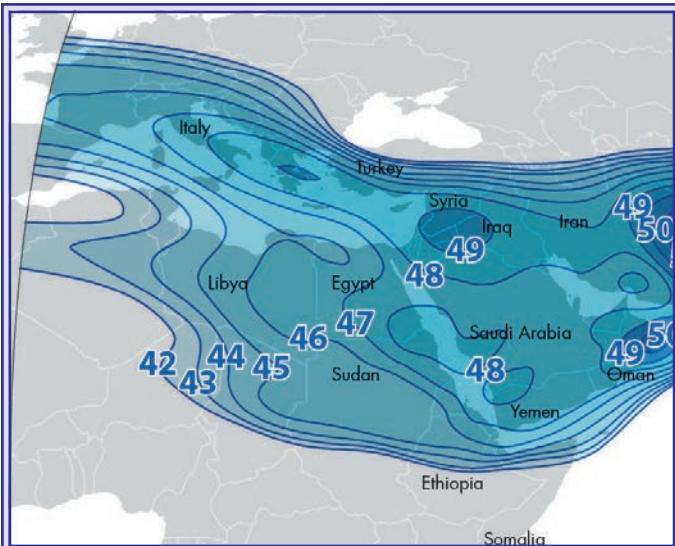
Transponders: 12 x 36MHz

Typical G/T: 5.1dB/K

Typical EIRP: 51.5dBW; 52.4dBW

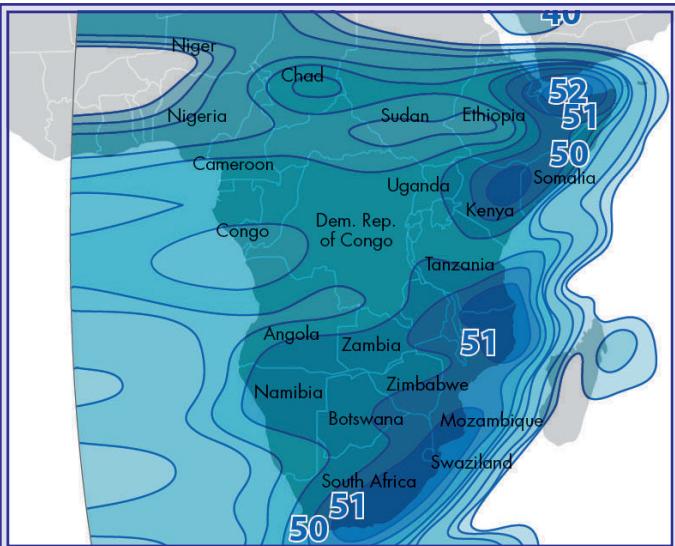


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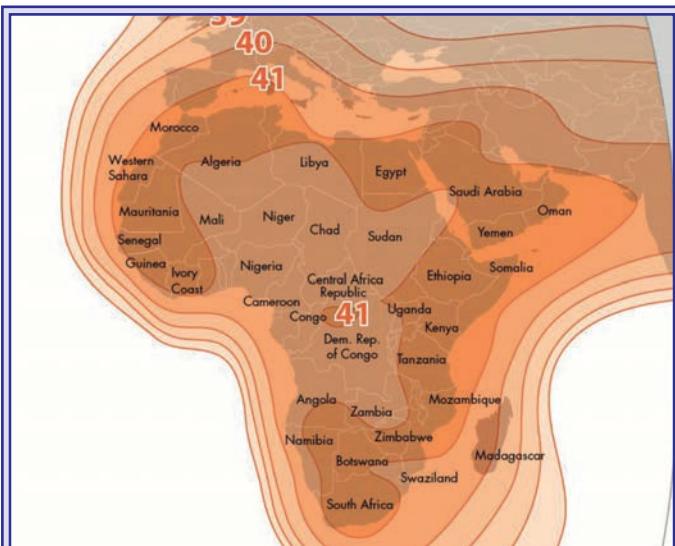
Asia Broadcast Satellite ABS-2A: 75°E – MENA Ku-band beam

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



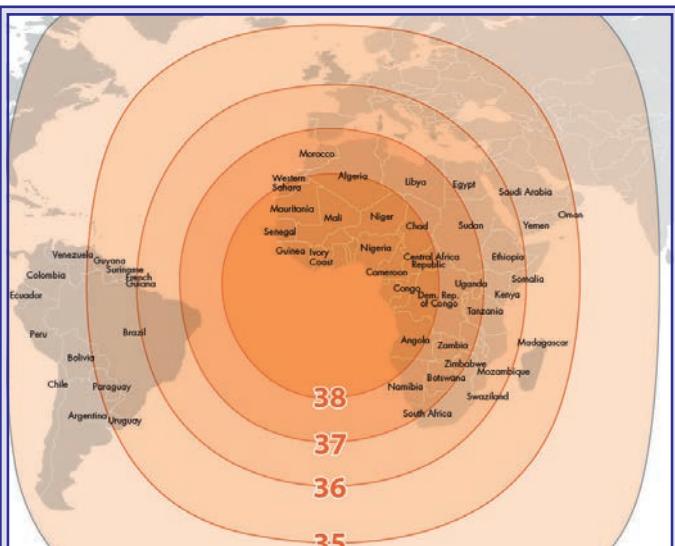
Asia Broadcast Satellite ABS-2A: 75°E – Africa Ku-band beam

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



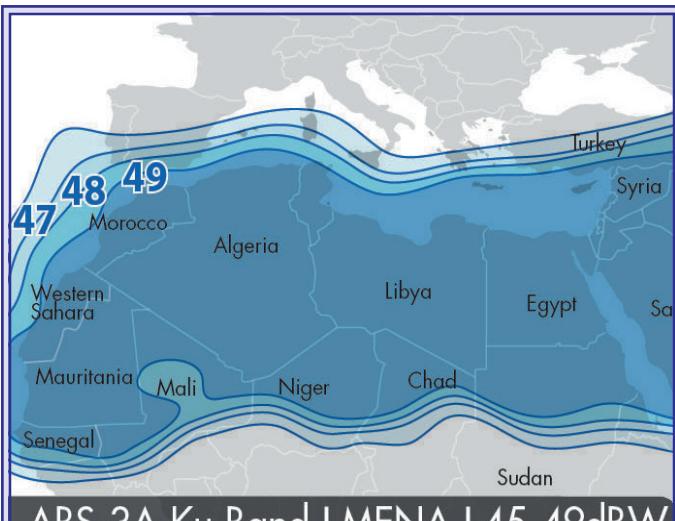
Asia Broadcast Satellite ABS-3A: 3°W – East Hemi C-Band beam

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	

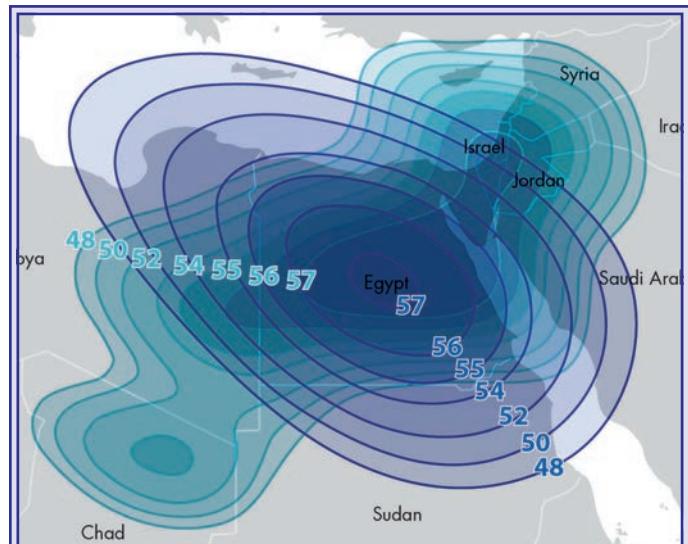


Asia Broadcast Satellite ABS-3A: 3°W – Global C-Band beam

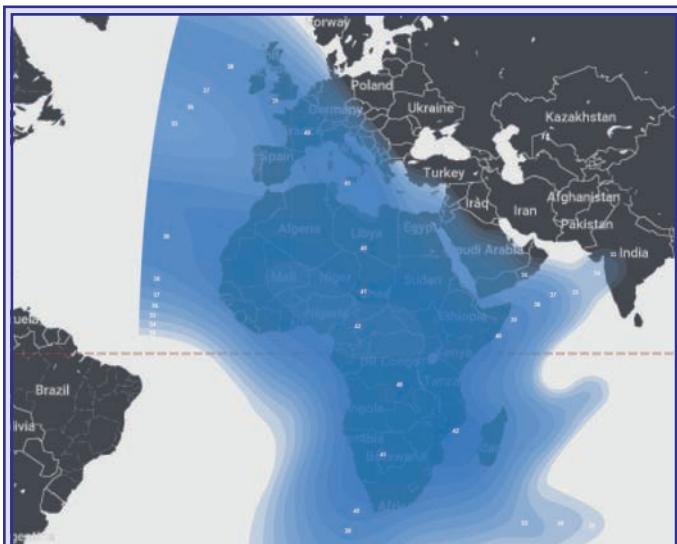
Launch date:	March 2015	
Transponders:	24 C-band 72MHz; 24 Ku-band 72MHz	
C-band uplink/downlink:	5.850 to 6.425GHz/3.625 to 4.200GHz	
Ku-band uplink/downlink:	13.750 to 14.750GHz/10.700 to 11.200GHz 11.450 to 11.700GHz, 12.500 to 12.750GHz	
EIRP (peak value) (dBW):	C-band: 39 (global) 41 (east hemi) 42 (west hemi) 51 (Americas)	Ku-band: 49 (Europe) 50 (MENA) 49 (SAF)
TWTA size:	70W	150W
Polarisation:	Linear horizontal/vertical	

**Asia Broadcast Satellite 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: Ku-band: 39 (global) 49 (Europe) 41 (east hemi) 50 (MENA) 42 (west hemi) 49 (SAF) 51 (Americas)
TWTA size:	70W 150W
Polarisation:	Linear horizontal/vertical

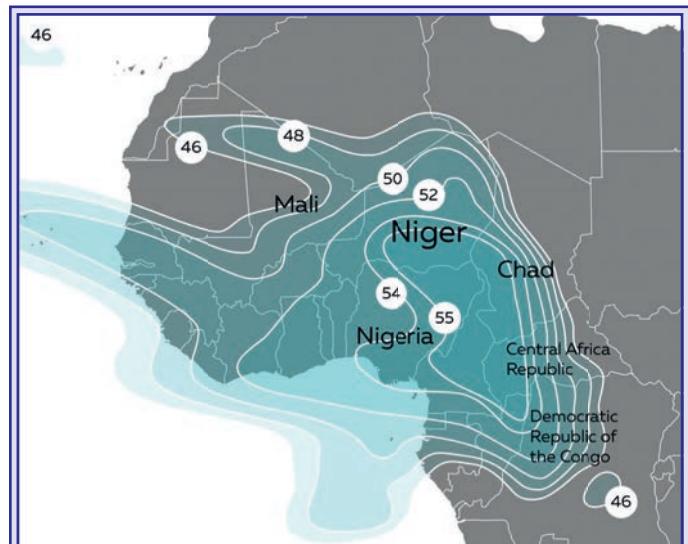
**Asia Broadcast Satellite ABS-4/Mobisat-1: 3°W –**

Launch date:	March 2004
Transponder bandwidth:	25MHz
Uplink/downlink:	13.824 to 13.849/12.214 to 12.239GHz
Signal polarisation:	Linear
EIRP (peak value) (dBW):	57 (East Beam) 57 (West Beam)
TWTA (Watts):	150 (East Beam) 130 (West Beam)
TWTA redundancy:	2:1 (East Beam) 2:1 (West Beam)
Uplink SFD (dBW/m²):	-105 ~ -85 at 7.2 dB/K G/T (East Beam) -105 ~ -85 at 11.0 dB/K G/T (West Beam)
G/T (peak value) (dB/K):	14.5 (East Beam) 14 (West Beam)



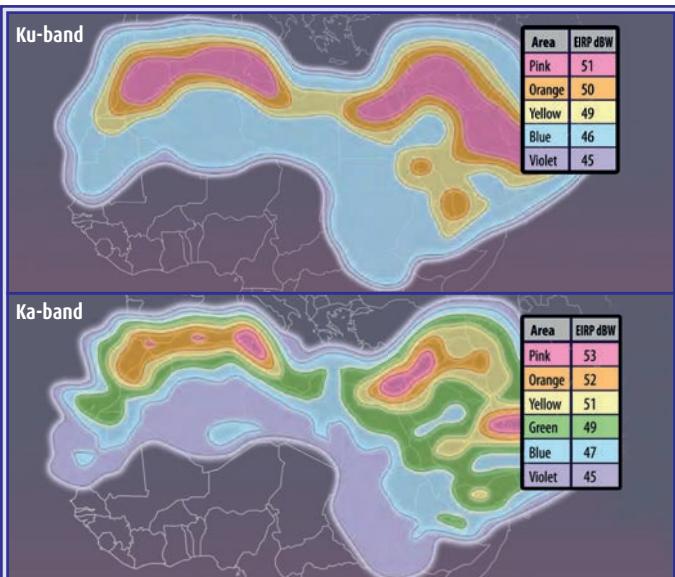
Launch date:	February 2013
Active transponders:	24 (36MHz each)
Uplink:	5925 to 6425MHz
Downlink:	3700 to 4200MHz
Beams:	Central Asia & Europe beam, Africa & Europe beam
Polarisation:	RHCP/LHCP and V/H relatively
TWTA power:	65W

All uplink and downlink channels are 4-block channel cross strap switchable between Central Asia & Europe and Africa & Europe beam.



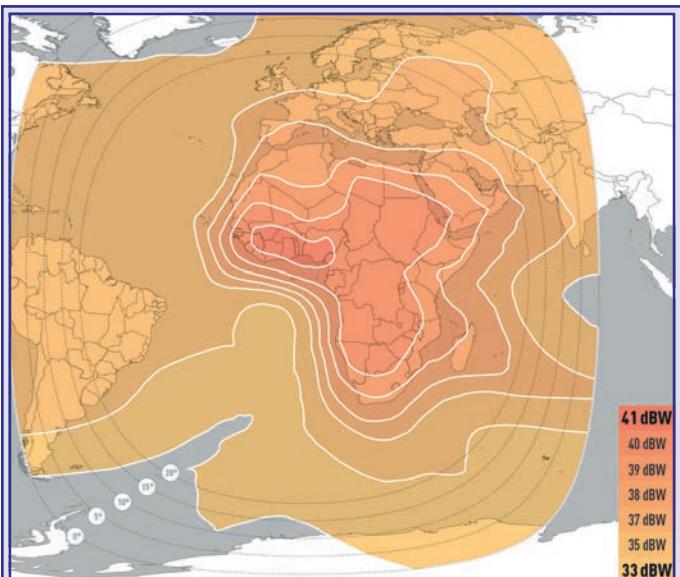
Launch date:	Expected 2017
Manufacturer:	Space Systems/Loral
Bus platform:	SSL-1300
Launch vehicle:	Ariane-5ECA
Active transponders:	35 (36, 54, 72, 76MHz)
Uplink:	14000 to 14750MHz
Downlink:	11450 to 12750MHz
Beams:	Europe & Asia, Pakistan & Afghanistan, West Africa and Central Africa
Polarisation:	Linear
TWTA:	150W

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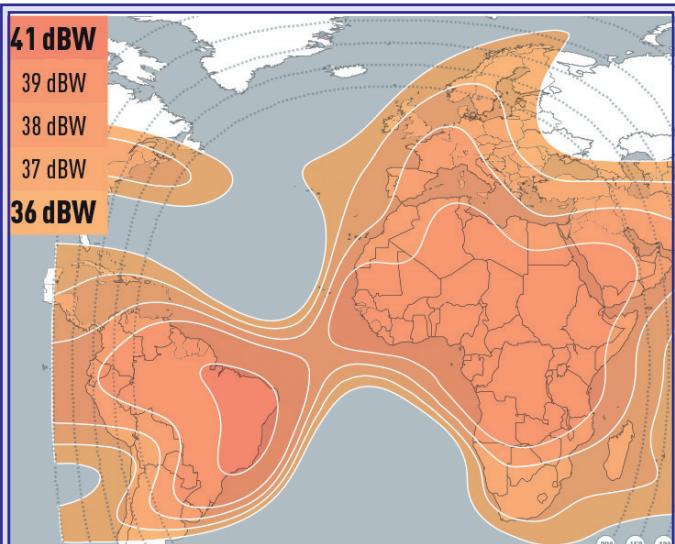
Es'hailSat-1: 25.5°E

Launch date:	August 2013
Parameter:	Ku-band
Coverage:	MENA
Number of transponders:	Up to 8
Transponder bandwidth:	33MHz and 50MHz
Polarisation:	Dual linear
Uplink frequencies:	Standard 14GHz band
Downlink frequencies:	Standard 10/11GHz band
EIRP (peak):	51-52dBW
G/T (peak):	+5dB/K
Uplink sfdf:	-95 to -65 dBW/m ² (location dependent, 22dB dynamic range)



EUTELSAT 3B: 3°E

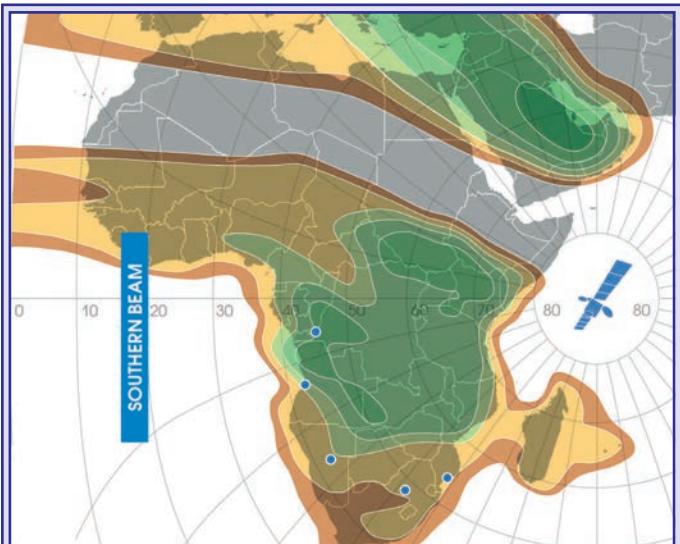
A tri-band satellite for Europe, Africa, the Middle East, Central Asia and South America, EUTELSAT 3B offers resources in Ku-, C- and Ka-band connected to fixed and steerable antennas for flexibility. It enables users to select the most relevant frequency band.
Eutelsat says the Ku- and C-band capacity 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



EUTELSAT 8 West B C-band: 8°W

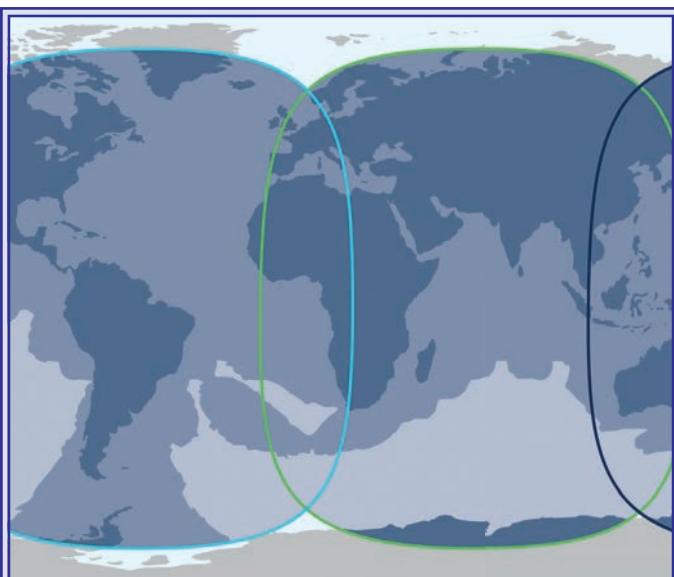
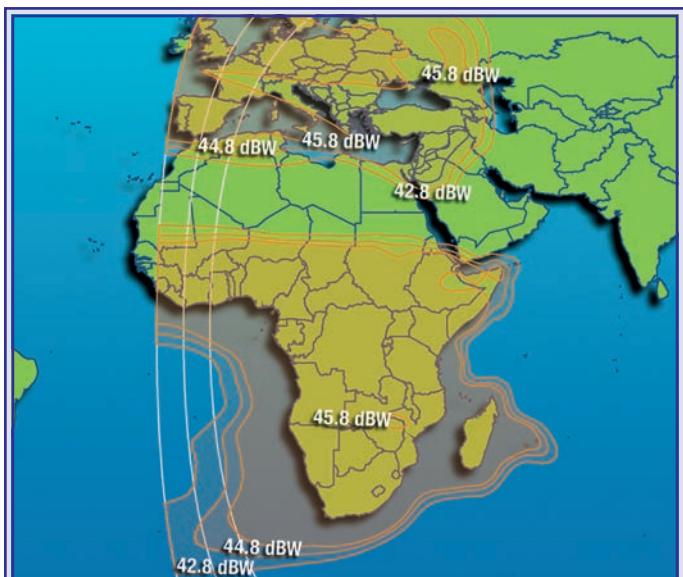
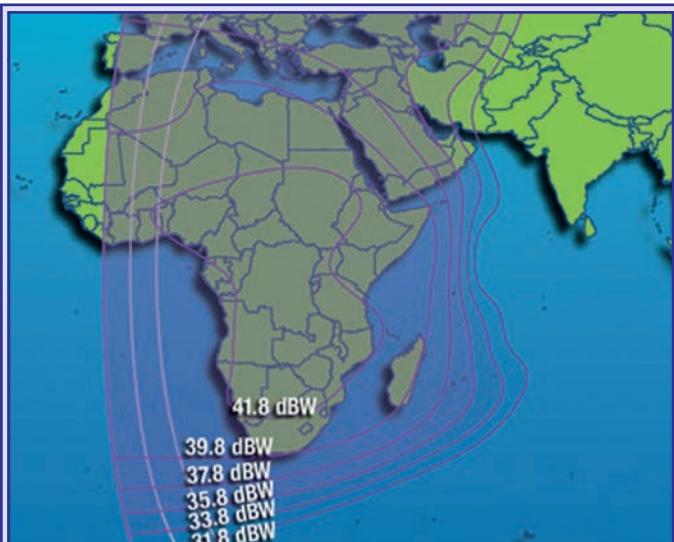
EUTELSAT 8 West B is a new high-capacity spacecraft equipped with 10 C-band transponders connected to footprints covering the African continent and reaching west to South America.

Launch date:	August 2015
Manufacturer:	Thales Alenia Space
Operational life:	Over 15 years
Launch craft:	Ariane 5
Operational transponders:	40 Ku-band, 10 C-band
Frequencies:	Ku-band, C-band



Gazprom Space Systems Yamal-402: 55°E

Launch date:	December 2012
Frequency:	Ku
Operational life:	15 years
Transponders:	12 x 72MHz; 18 x 36MHz; 16 x 54MHz
Transmitter output power:	120 to 150W
Beams:	Four fixed: Russian, Northern, European, Southern, and one steerable. Eight 54MHz transponders are operating in a wide South beam that covers sub-Saharan Africa.
Payload power:	10,800W

**Inmarsat Global Xpress 63°E****Satellites:** I-5 F1; I-5 F2; I-5 F3**Launch dates:** Dec 2013; Feb 2016; Aug 2015**Launch site:** Baikonur Cosmodrome**Launch vehicle:** Proton M**Launch mass (kg):** 6070**Manufacturer:** Boeing (Hughes)**Model (bus):** BSS-702HP**Orbit:** GEO**Operational life:** 15 years**Intelsat IS-20: 68.5°E****Launch date:** August 2012**C-band total transponders:** 8 x 54MHz; 16 x 27MHz; 12 x 36MHz**C/Ku cross-strap:****Polarisation:** Linear horizontal/vertical**Uplink:** 5850 to 6425MHz**Downlink:** 3700 to 4200MHz**EIRP (typical edge of coverage):** > 30.7dBW**G/T range:** > -10.6dB/K**Edge of coverage SFD range:** -97.0 to -68.0dBW/m² (at G/T = -10.6dB/K)**Ku-band total transponders:** 48 x 36MHz, 6 x 72MHz**Ka-band total transponders:** 1 x 500MHz**Intelsat IS-22: 72°E****Launch date:** March 2012**Transponders:** C-band: 24 x 72MHz

Ku-band: 12 x 36MHz, 6 x 72MHz

Polarisation: circular right/left hand (C-band); linear horizontal/linear (Ku-band)**Downlink frequency:** 3625 to 4200MHz (C-band)

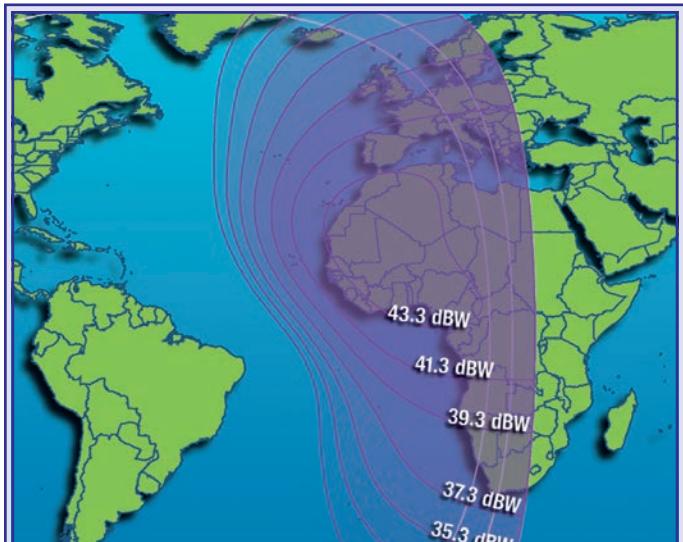
11.45 to 11.70GHz (K-band)

C-band G/T range (edge to beam peak): -3.3 up to 2.6dB/K (East Hemi)

-1.9 up to 3.6dB/K (West Hemi)

Ku-band G/T range (edge to beam peak): -1.5 up to +4.9dB/K (MEA)

-0.9 up to +2.3dB/K (Mobility)

**Intelsat IS-23: 307°E****Launch date:** October 2012**C-band total transponders:** 24 active in combination of 36, 41, 72MHz channels (up to 46 equivalent of 36MHz units)**Polarisation:** circular - right/left hand**Downlink frequency:** 3700 to 4200MHz**Edge of coverage EIRP:** West Hemi: > 32.6dBW; East Hemi: > 33.2dBW

Global: > 31.7dBW

Uplink frequency: 5925 to 6425MHz**Edge of coverage G/T range:** West Hemi: -8.4dB/K

East Hemi: -7.6dB/K

Global: -9.6dB/K

Edge of coverage SFD: -97.0 to -76.0dBW/m

SATCOMS: FOOTPRINTS



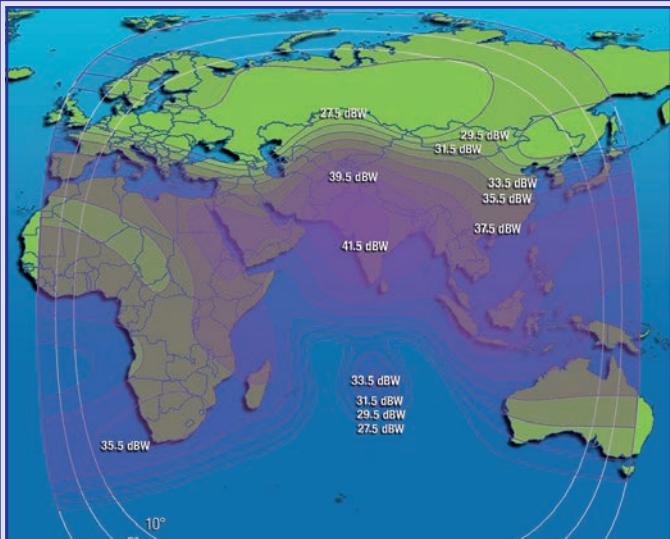
Intelsat IS-33e: 60°E – Ku-Band Multi-Spot & Eurasia Beams

Launch date: August 2016
Configurable capacity: 268 (in equivalent 36MHz units)
Polarisation: Linear horizontal/vertical
Typical edge of coverage EIRP: Multi-spot: 48.7 up to 61.6dBW
 Eurasia Beam: 43.6 up to 45.3dBW
Uplink frequency: 5925 to 6425MHz
Typical G/T range: Multi-spot: 7.0 up to 17.0dB/K
 Eurasia Beam: -3.3 up to -0.7dB/K



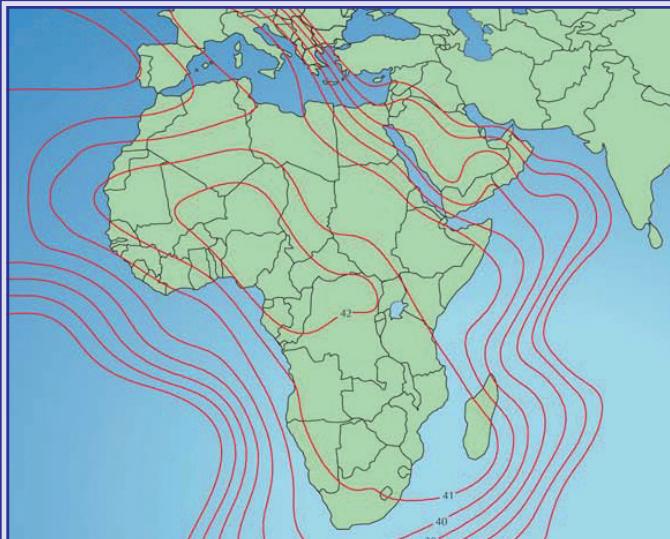
Intelsat IS-33e: 60°E – C-Band Sub-Saharan & Spot Beams

Launch date: August 2016
Configurable capacity: 79 (in equivalent 36 MHz units)
Polarisation: Linear horizontal/vertical
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 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



MEASAT AFRICASAT-1A/AZERSPACE-1: 46°E

Africasat 1a/Azerspace-1 is the result of a USD300m, three-year collaboration between Malaysia-based MEASAT Satellite Systems & the Azercosmos Joint Stock Company set up by the Government of the Republic 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)

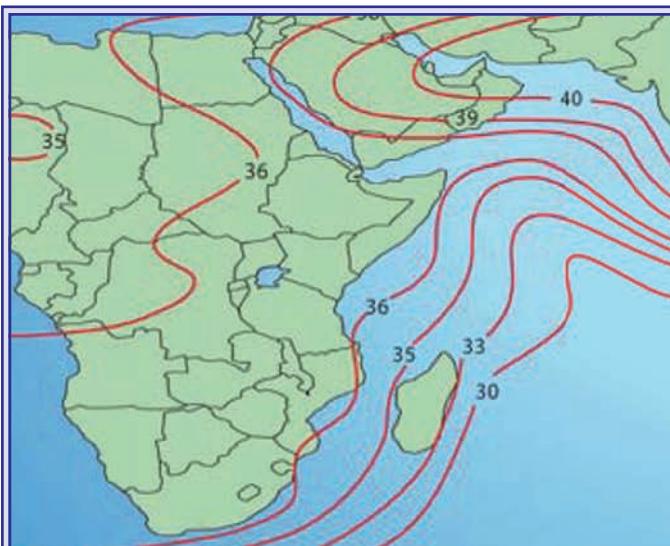
TWTA power: 65W

Polarisation: linear

**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 MEO 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.

Launch dates:	June 2013 (first set of four); July 2014 (second set of four); December 2014 (third set of four)
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 3a: 91.5°E**

MEASAT-3a carries 12 Ku- & 12 C-band active transponders along with three antennas. It covers Asia, the Middle East & Africa, serving C-band markets throughout the region with a global beam, & Ku-band beams that support broadcasting markets in southeast Asia. MEASAT-3a generates approximately 3.6kW of payload power.

Launch date: June 2009

Manufacturer: Orbital Sciences Corporation

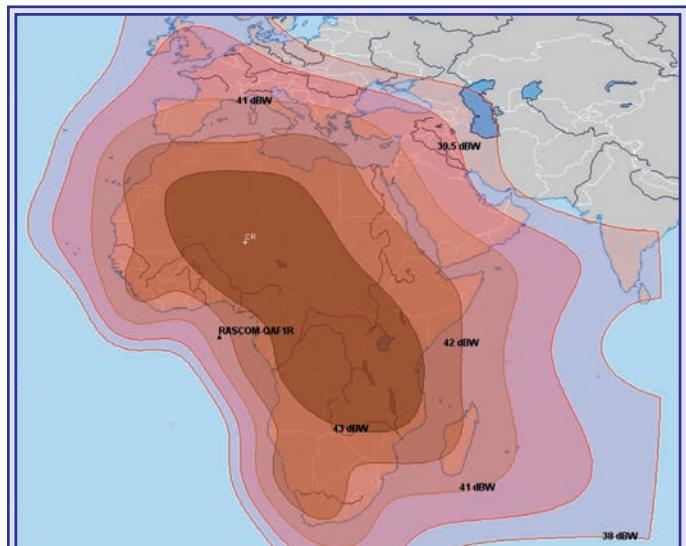
C-band transponders (36MHz equivalent): 12

Typical EIRP beam coverage (C-band): 42dBW

G/T (dB/oK) (C-band): +1.3 (max)

TWTA power (C-band): 60W

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

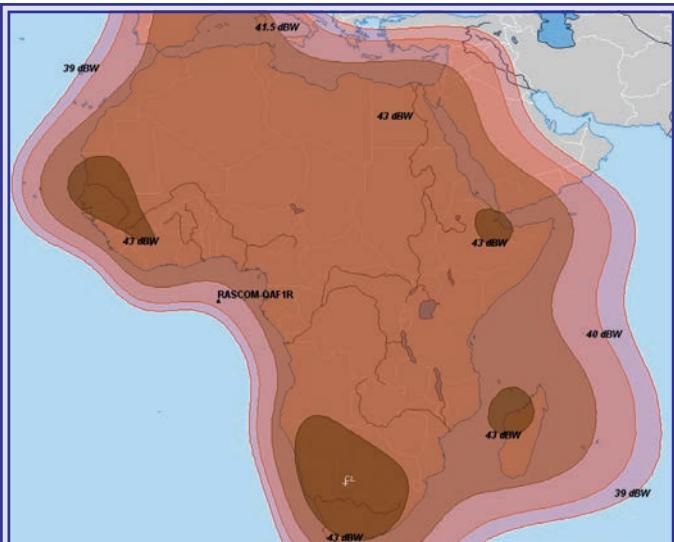
C-band beam peak EIRP (dBW): 45

Uplink (MHz): 6190 to 6425

Downlink (MHz): 3965 to 4200

Polarisation: Circular

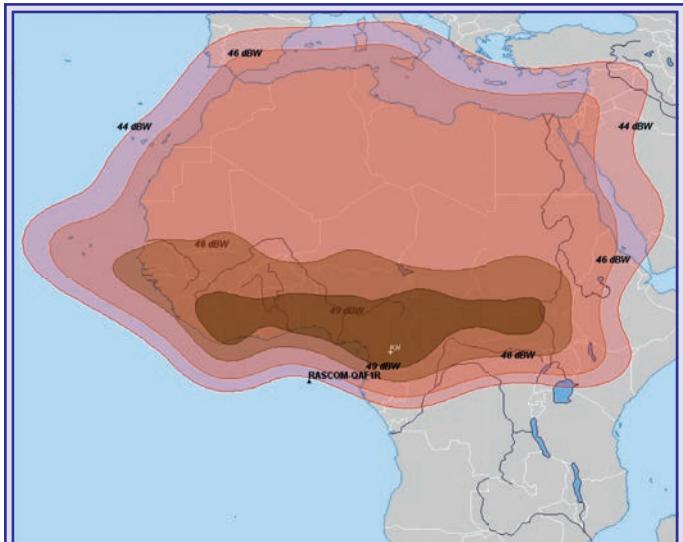
SATCOMS: FOOTPRINTS



Rascomstar-Q1R: 2.9°E – Planned C-band EIRP

Launch date: August 2010
Launch vehicle: Ariane 5
Platform: TAS Spacebus 4000B3
Bands: C-band standard & planned;
 Ku-band planned

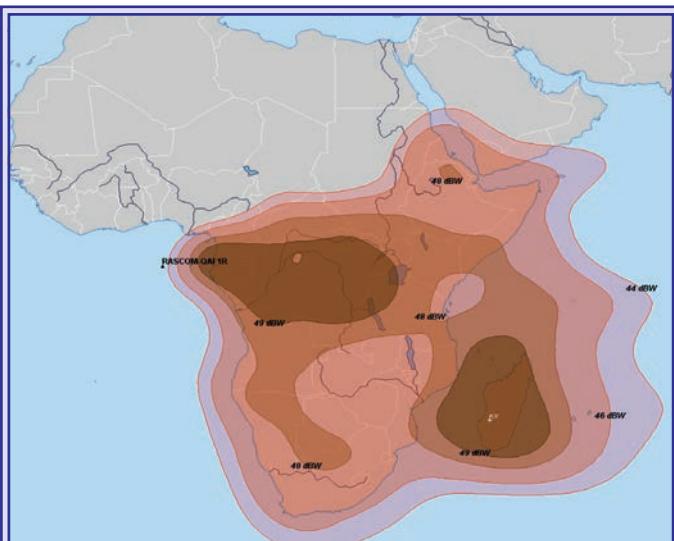
C-band beam peak EIRP (dBW): 44
Uplink (MHz): 6725 to 7025
Downlink (MHz): 4500 to 4800
Polarisation: Circular



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

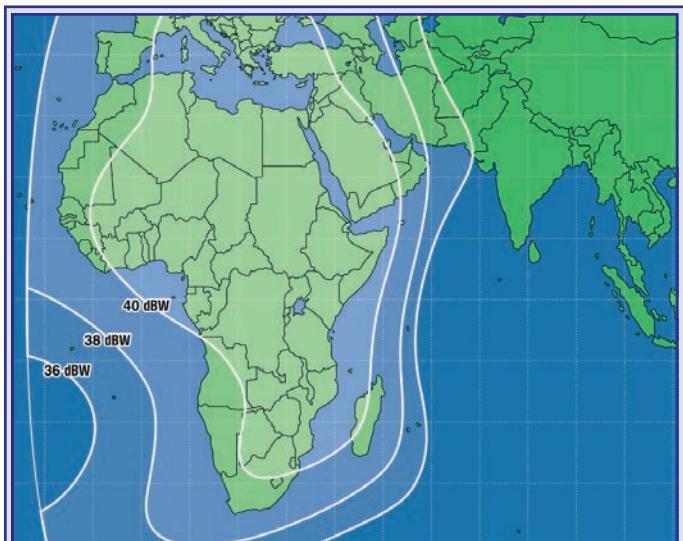
Ku-band North Beam peak EIRP(dBW): 49.4
Uplink (MHz): 12750 to 13250
Downlink (MHz): 10270 to 11450
Polarisation: Linear



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

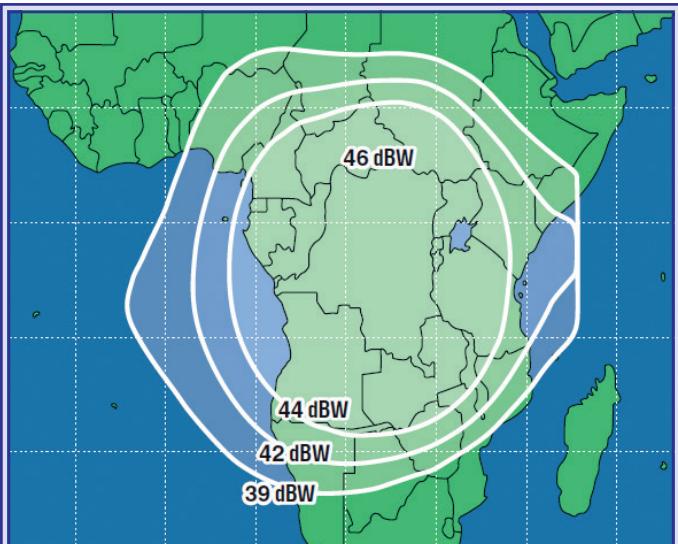
Ku-band South Beam peak EIRP(dBW): 50
Uplink (MHz): 12750 to 13250
Downlink (MHz): 10270 to 11450
Polarisation: Linear



RCC 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



RSSC 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



RSSC 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.

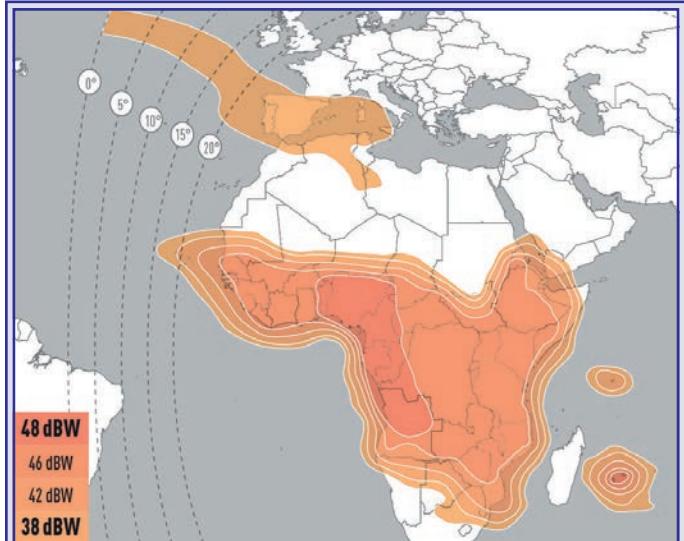
Launch date:	March, 2015
Coverage:	Europe, Middle East, sub-Saharan Africa, Russia, South-East Asia
Operational life:	15 years
Operational transponders:	C, Ku, L



RSSC 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

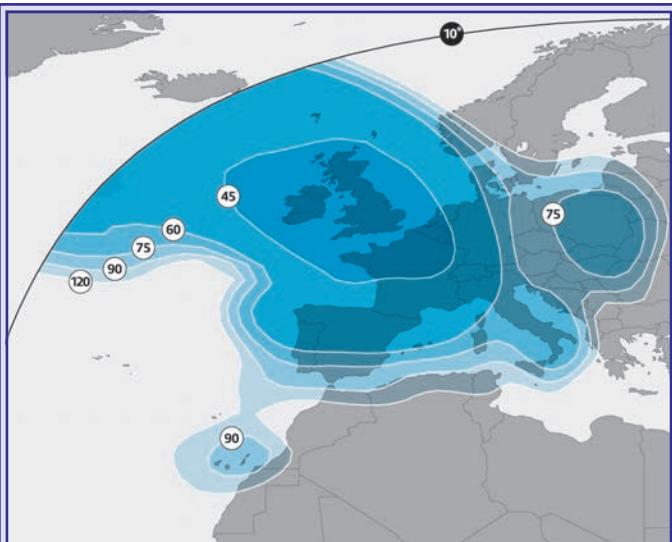


RSSC Express-AMU 1/Eutelsat 36C: 36°E

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

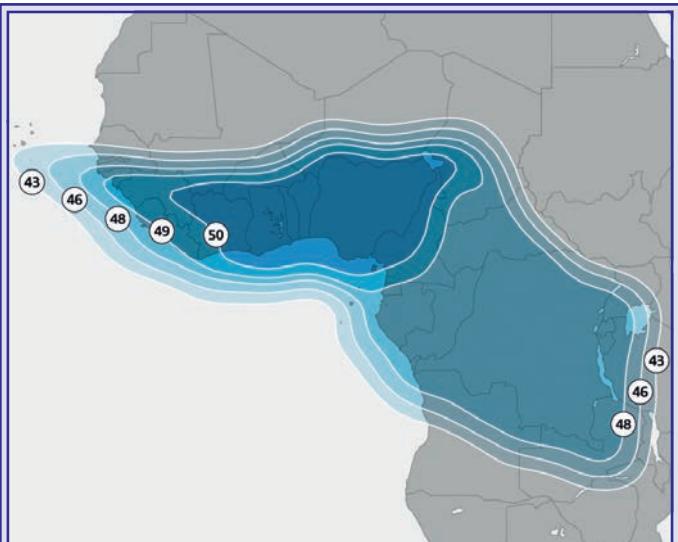
SATCOMS: FOOTPRINTS



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.

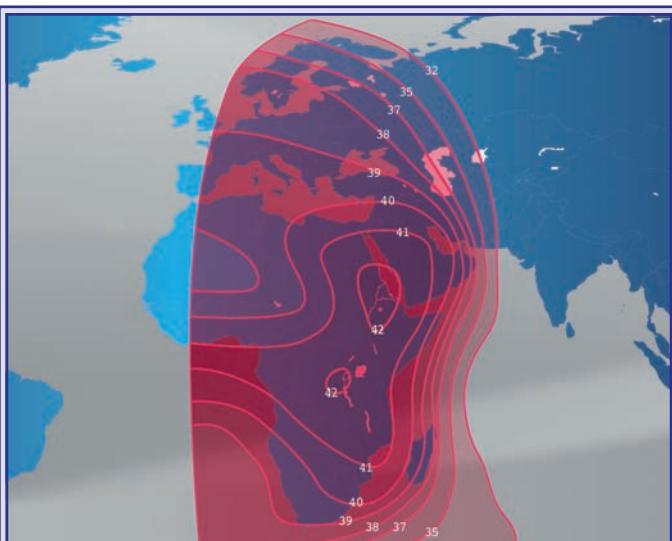
Launch date:	September 2013
Coverage:	Middle East , North Africa, Europe
Launch vehicle:	Proton
Operational life:	15 years
Manufacturer:	EADS Astrium
Polarisation:	Ku-band: linear; Ka-band: circular
Total transponders:	Ku-band: 42 (Europe); 12 (Middle East). Ka-band: 4 (250MHz, 500MHz and 600MHz)



SES ASTRA 2F: 28.2°E/28.5°E

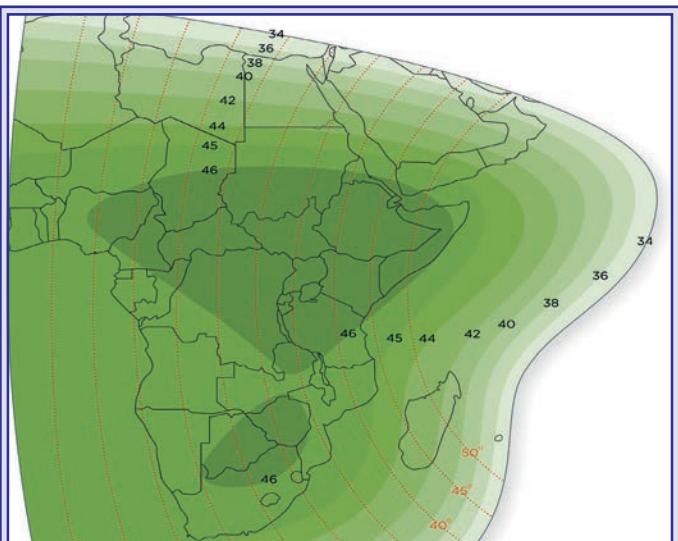
Serves to deliver next-generation broadcast, VSAT and broadband services in Europe, Middle East and West Africa, and carries Ku- and Ka-band payloads.

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

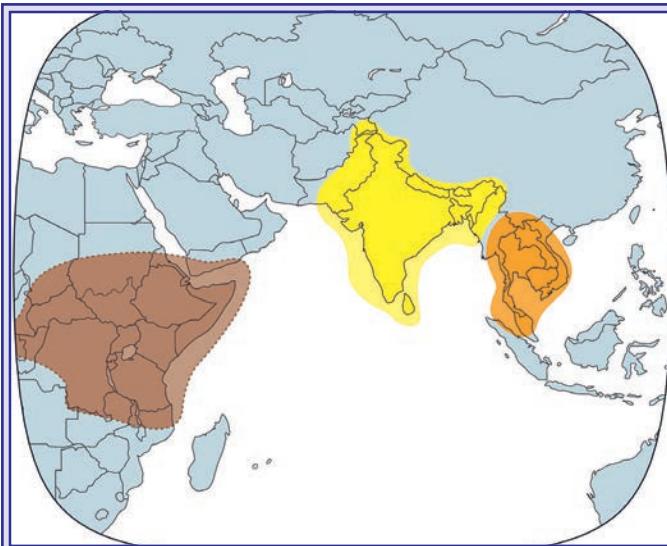
Launch date:	February 2014
C-band Payload:	13
Frequencies:	Uplink: 5.950 to 6.385GHz Downlink: 3.680 to 4.200GHz
Transponder bandwidth (MHz):	36 & 72
Polarisation:	Dual linear
Cross-polarisation separation (dB):	Better than 27
EIRP (peak value) (dBW):	45
TWTA size:	62W
TWTA redundancy:	34 for 26 primary TWTA
G/T (peak value) (dBi):	+6



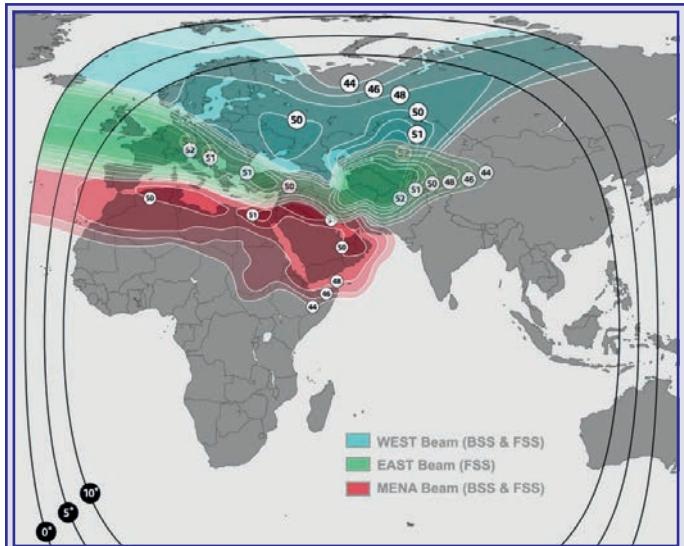
Thaicom 6/Africacom-1: 78.5°E - C-Band Africa Beam

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

**TürkmenAlem 52E/MonacoSat: 52°E**

38 active Ku-band transponders shared over 3 beams. Turkmenistan Minister of Communications owns 26 TPs and the rest 12 TPs with Middle East/North Africa coverage are fully leased to SES.

Launch date: April 2015

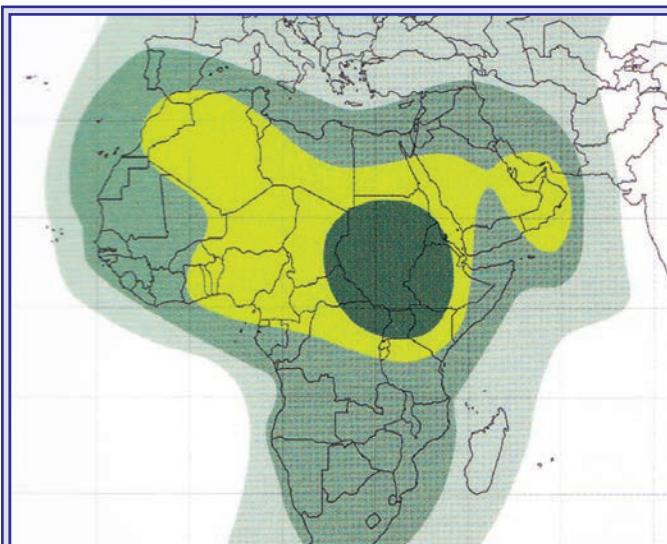
Manufacturer: Thales Alenia Space

Operational life: 16+ years

Launch vehicle: Falcon 9 v1.1

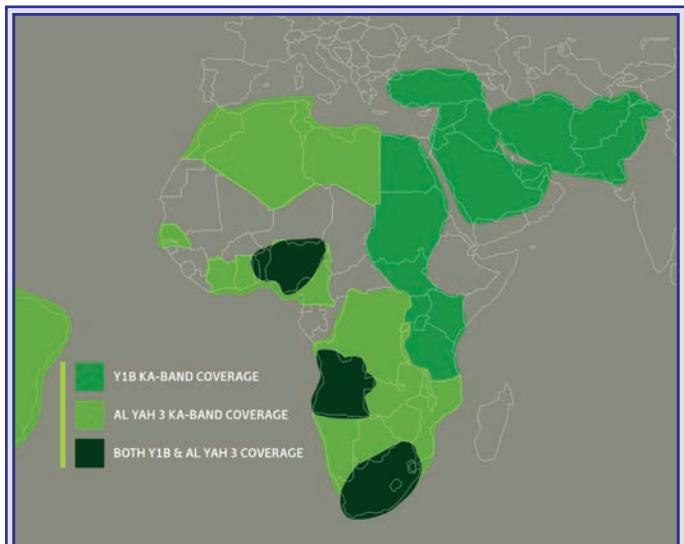
Number of Ku-band transponders: 38

Beacons: 11201, 11449

**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

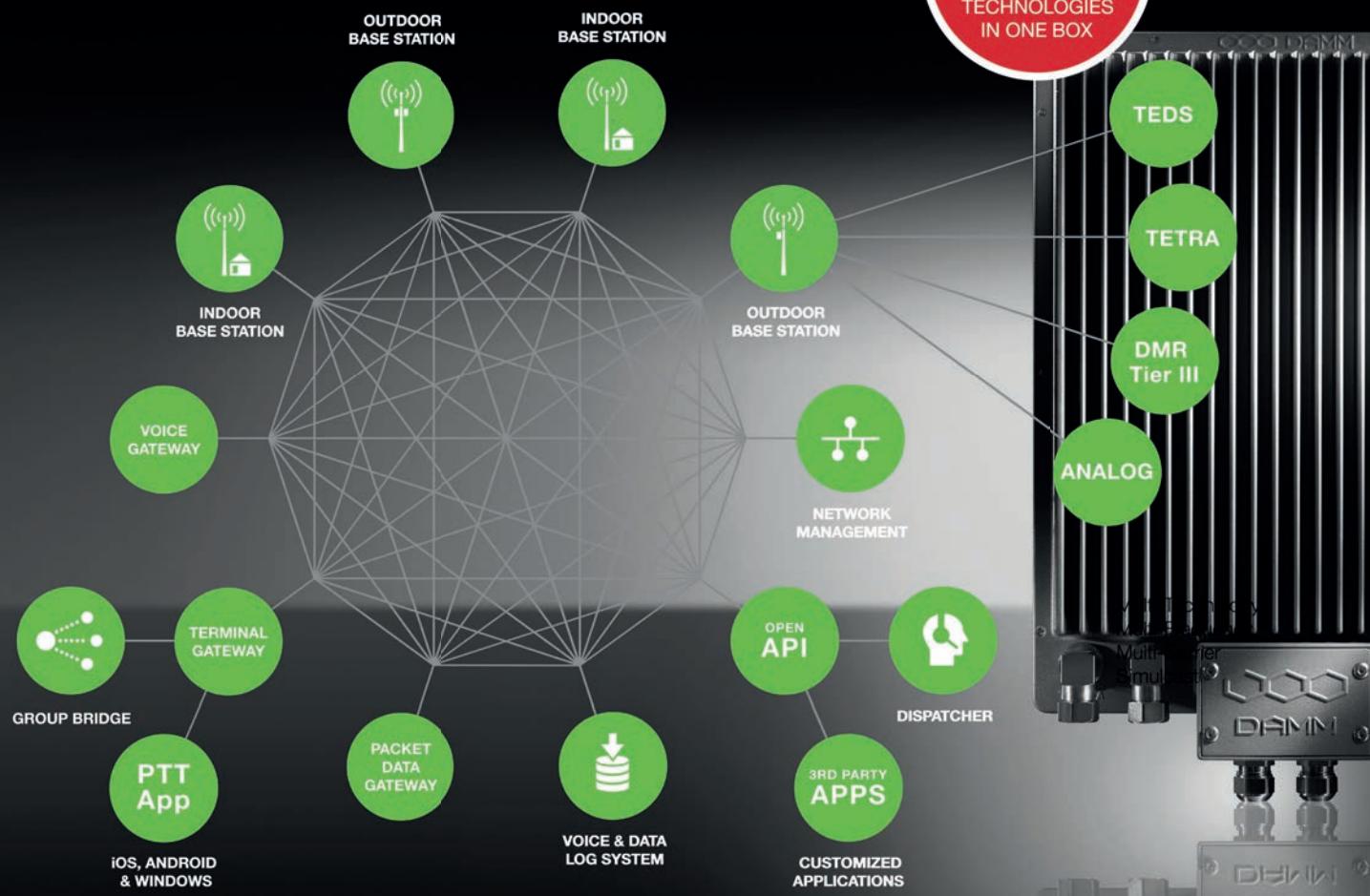
**Yahsat Y1B: 47.5°E**

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



4

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chapter 7

Critical Communications

Promoting the power of open standards



Mladen Vrtonjic,
Chair,
TCCA

Although a unique continent in terms of its resources and cultures, Africa shares with the rest of the world the need for critical communications – particularly for public safety, given that the region faces increasing threats from unstable political regimes, terrorism, and cross-border organised crime. With the African Union having 55 country members, international cross-border security is as important as that of national homelands. It is therefore essential that public safety and security services can collaborate effectively and seamlessly.

To that end, many African nations have implemented PMR Public Protection and Disaster Relief (PPDR) systems in the 380-470MHz spectrum band, in accordance with the ITU-R Resolution 646 on critical communications.

Among its key recommendations, the resolution states that an approach based on global and/or regional frequency ranges may enable administrations to benefit from harmonisation while continuing to meet national planning requirements. It says this will enable them to recognise the benefits of spectrum harmonisation, such as: increased potential for interoperability; clear guidance for standardisation; increased volume of equipment resulting in economies of scale, more cost-efficient equipment and expanded equipment availability; improved spectrum management and planning; more effective international aid during disasters and major events; and enhanced cross-border

coordination and circulation of equipment.

Open standards narrowband PMR systems have been implemented in the spirit of the ITU Resolution, with TETRA being the technology of choice for a wide range of public safety users and vertical market implementations. These include the manufacturing, mining, oil and gas, transportation and utilities industries. African countries where TETRA is in use include Botswana, Chad, Djibouti, Egypt, Somalia, Kenya, Algeria, Angola, Mozambique, Nigeria, Senegal, Guinea Conakry, DRC, Tanzania, Uganda, Lesotho, Botswana, Swaziland, Namibia, and South Africa. In the latter, the technology supports the South African Police Service and other critical users.

However, catalysed by the widespread availability of mobile broadband, users are looking for broadband data capability that narrowband PMR alone cannot provide. The TETRA standard is unrivalled for secure and resilient voice and narrow/wideband data, but was not designed to be a broadband bearer. Critical communications users are therefore looking to LTE technology.

Although LTE can provide the broadband bearer, the standard requires additional development to deliver and support the specific security features and availability and resilience required by critical communications users. This issue was originally highlighted by the TCCA's Critical Communications Broadband Working Group (CCBG) which, in common with all the TCCA's working groups, is comprised of volunteers who are experts from across the critical communications market.

Collaborating with other key stakeholders around the world, the TCCA is working closely with standards bodies ETSI and 3GPP to define the features and capabilities

necessary to establish a commonly accepted, global LTE standard that will support mission-critical communications in the future.

In parallel, the TCCA is active in lobbying governments and regulators to ensure there is sufficient spectrum for future critical LTE services – unlike today's PMR systems, mission critical LTE does not have its own dedicated frequencies.

The latest World RadioCommunications Conference has revised Resolution 646 to address broadband spectrum needs. It has added 694-894MHz as the globally harmonised frequency range, from within which parts are to be considered when undertaking national planning for PPDR applications.

To date, the African Telecommunications Union has not yet implemented a harmonised band for broadband PPDR, but sub-regional groups such as SADC have started revision of the framework. Some administrations that are considering critical broadband are deciding nationally within 700-800MHz on the amount of spectrum needed for broadband PPDR. For example, a number of North African Arabic states are harmonising broadband PPDR frequencies in the 700MHz band, and others are yet to implement nationally their decisions.

As an organisation, the TCCA only exists because of its members and their commitment to the development and promotion of standardised critical communications. We are therefore concerned to see a push by some manufacturers to promote broadband systems in a manner contrary to the spirit of the ITU Resolution.

A few such systems have been introduced without consideration of the existing arrangements and systems deployed, and with no studies that support compatibility between broadband channel and narrowband

arrangements. The introduction of these broadband systems in 380-470MHz can cause issues with existing PMR systems nationally. They can also create cross-border interference issues with other services that are allocated in the same frequency range, such as Meteorological Satellite, Global Maritime Distress and Safety System (GMDSS).

As a result, should critical communications be required to work internationally to support aid for emergencies, major events, incidents or disasters, the ability of first responders to carry out their work could be severely impacted.

Another issue is the use of proprietary technologies that can also affect system interoperability, stifle economies of scale, and prevent the healthy competitive environment that standards-based mission critical communications have delivered across the world for decades.

Safety and security are two of the key tenets that support society. The ability to communicate effectively is critical in ensuring governments can build and preserve national and international stability. As we move towards a future where standardised critical LTE for broadband will be implemented, it is important to keep the ITU Resolution recommendations and 3GPP standards front of mind.

The critical communications industry

needs to continue to develop in the spirit of openness and co-operation to maximise the effectiveness of the services. TETRA's open standard has been the key to its market success and longevity. The addressable market is small – there are less than 50 million critical users worldwide, compared with nearly five billion commercial mobile subscribers.

However, those relatively few critical users are the people that we all depend on in a crisis. They are crucial to society globally, and open standards support them, driving innovation forward and keeping costs down, which is an acutely relevant issue where government funds are concerned.

To influence governments, regulators and stakeholders on the development of the future of critical communications, the stronger the voice of the industry, the greater the impact will be. We are a niche market but we must strive to ensure that as many organisations as possible from Africa – everyone with an interest in ensuring a safe and cohesive continent – plays their part in joining us as we continue to promote the power of open standards. ■

The TCCA (TETRA and Critical Communications Association) would like to thank member companies Airbus, Motorola Solutions and Sepura for their help with this article. www.tandcca.com

Emcom deploys DMR for Swaziland police

South Africa-based PMR solutions specialist Emcom Wireless announced that it had completed a multi-million rand digital mobile radio (DMR) network for the Royal Swazi Police Service (RSPS).

The company said it worked closely with various stakeholders from the police and government in designing, developing and deploying the system in a way that is best for the unique operations of the Swazi Police Services.

The firm added that one of the reasons DMR was chosen by the RSPS was because it offered a quicker return on investment compared to other and more traditional technologies. While Emcom was unable to give details of all the equipment used for the network, when the company was originally awarded the RSPS contract in March 2015 it said it would implement a Tait DMR Tier III system.

During a handover ceremony held at Hlatikulu in southern Swaziland in early February 2016, senior members of the police service were given a field demonstration of DMR's capabilities, such as its clear voice quality and secure SMS feature.

Mr. Mabuza, head of the RSPS' research and planning unit, said: "We particularly

Sepura enhances TETRA picture messaging solution

Sepura launched IMAGE 3.0, an enhanced version of its critical comms application that allows the transfer of pictures from a control room to field personnel using TETRA mobiles.

IMAGE now has a new modern interface that is said to be intuitive to use and includes drag and drop functionality. Sepura said this reduces training time, and crucially increases the speed at which an operator can react in an emergency.

According to the firm, the app is scalable for use in any sized network, and can be accessed simultaneously by multiple client apps and multiple users in different geographic locations.



Hytera DMR handsets support RFID

Hytera expanded its portfolio of critical comms devices with two compact handsets, the PD405 and the PD415, which both support conventional DMR as well as analogue radio.

One of the key features of the series is an RFID reader module. The radios can then be used in Hytera's Patrol system, enabling users to scan distributed checkpoints in a building and send their current location to a control room where their positions are monitored in real-time on a digital map.

Both the PD405 and the PD415 support pre-programmed text message transmission, and feature TDMA direct mode which allows up to two simultaneous calls, even without repeaters.

Emergency comms in 10 minutes with compact TETRA

The Claricor Cell from Airbus Defence and Space (ADS) is a compact communications network based on TETRA technology. The small system has been designed to be quickly set up for vehicle convoys, firefighters or rescue operations in remote regions. There are several options for voice and data transmission when using the base station and the TETRA switch in Claricor Cell, including fixed line, IP radio link, LTE and satellite.

The system comes in rugged boxes to enable easy transportation and works in rolling vehicles. ADS said it can be setup by end-users within ten minutes, and that the tap-proof TETRA system is pre-configured and has a plug-and-play functionality.



like the fact that we will be able to use the trunking features to host multiple talk groups, prioritise calls, and make use of GPS features." He added that GPS will enable the monitoring of officer locations in real time, as well as the secure management of incidents from a new command and control centre in Mbabane.

Mission-critical TETRA for Stellenbosch

Public safety personnel working in the South African region of Stellenbosch and its municipal area have been equipped with TETRA radio terminals from Airbus Defence and Space (ADS).

The company made the announcement in May 2016 and said that over the next five years it will provide various devices that will enable users to communicate "more safely and efficiently" in an area that covers around 830km².

Stellenbosch's administration chose different terminals for each public safety service: fire brigades will use Airbus' *P8GR* and *THR9Ex*; traffic police will be equipped with the *TH1n*; while the cleaning department will have the *THR880i*.

In contrast to standard analogue paging devices, ADS said the *P8GR* enables secure two-way communication between the control centre and operational units.

The *THR9Ex* is described as a robust radio designed for explosion-prone environments. ADS said it also offers the best protection against physical and environmental exposure.

The slimline *TH1n* is claimed to be the thinnest and lightest TETRA terminal in the world, while the intrinsically safe *THR880i* offers unique features such as multiple ways to communicate.

Emcom sets up DMR system for Lesotho Electric Company

April saw the announcement that the Lesotho Electricity Company (LEC) had taken delivery of a nationwide digital mobile radio (DMR) system, designed and deployed by Emcom Wireless.

Prior to implementing DMR, LEC's communication system was said to be not only costly but often cumbersome. The company had previously used a combination of standalone analogue repeaters, cellular systems and landlines for communications between its management, centres and field staff that are all scattered across the mountainous kingdom.

Emcom's project team began by carrying out a detailed field study that involved extensive travel across the entire country. The company said: "Our initial scoping days involved trekking up some of the wildest terrain in Africa in search of suitable summits to mount repeaters, and we had to face snow, lightning and rain as challenges in determining the best locations."

These experiences are said to have given Emcom a valuable insight into what LEC needed as a solution. The company selected DMR Tier 3 products from Tait Communications, and then spent a year designing, building and testing the system under different conditions.

One notable aspect of LEC's DMR network is its integration with a RediTALK dispatcher loaded with *Google Maps*. This enables the operations team at head office to have real-time location visibility of all radios and vehicles on the network, talk to specific radios when required, and monitor elements such as standing time, speed and distance from an incident, all on one screen. ■



Paul Ward,
International
sales director,
ETELM



Nicolas Hauswald,
Commercial sales
director,
ETELM

Founded in 1981, ETEL's PMR products are fully developed and manufactured in France, and the company states that more than 50 per cent of its systems are exported globally.

The company regards itself as "a visionary expert" in critical communications, and in 1995 it claimed a first by becoming one of the first companies to develop TETRA solutions. It now also considers itself to be a pioneer in applying LTE technology to PMR solutions. At AfricaCom last November, ETEL unveiled the *eLBS*, a new eNodeB LTE base station which integrates the company's own LTE technology with TETRA.

While highly experienced in the critical comms market, ETEL is a relative newcomer to Africa. Commercial sales director Nicolas Hauswald admits that up until around 18 months ago, the company's main focus was on the French and European markets and that Africa was not part of its strategy. So why come to the continent now?

"There are a lot of needs regarding critical communications in Africa today, as well as great expectations from customers because they know what is available. They look at LTE as well, but budget is an issue nowadays. For the oil and gas sector, the



Phil Kidner,
CEO,
TCCA

The year ahead: According to IHS*, Africa and the Middle East will experience the fastest rate of digitisation in the world. Shipments of LTE technologies (incorporated within other technology by IHS) to the region increased by more than 300 per cent in 2015** compared with a global average growth of

26 per cent. PMR remains a robust market in the region, with TETRA shipments more than doubling, and other PMR technologies combined increasing by 149 per cent in Africa alone.

Today, LTE can and does provide broadband support for critical communications users,

enabling applications such as the transmission of incident details, images and video clips, and high-speed internet access to social media, which is becoming a valuable tool to the public safety services. But this is not LTE for critical communications. The standard continues to be worked on and equipment is not yet available, so these applications are carried over the commercial networks and users are likely to have no greater priority than people accessing Facebook or YouTube.

In addition, the rollout of LTE is limited in Africa which presents an obvious barrier to any widespread mobile internet use, and mobile broadband networks currently only cover around 50 per cent of the population (source: *The Mobile Economy, Africa 2016*, GSMA).

If networks do not provide coverage and availability, they cannot support critical communications. We see continued opportunities for the growth of purpose-designed PMR standards and for the continued use of PMR capabilities for voice even as LTE becomes more widely available and standardised for critical support.

However, there is no doubt that in the future, critical LTE will form a key part of critical communications solutions throughout Africa.

*Statistical information on the critical communications market supplied by TCCA member IHS Markit.

**The latest full year for which data is available at the time of writing.

cost of such a solution is not that big for them, so this sector is not in crisis for us; it still works fine. But when we talk about transport or security, it takes more time for a sale to get through. So price is still an issue. But there is a lot to do because there are not that many solutions deployed today, or they are old solutions that are 15-20 years old."

Since coming to Africa, ETELM has been working mainly with oil and gas companies in several countries such as Congo, Nigeria and Algeria. Total is mentioned as a key customer here.

It also has some clients in the transport sector. Hauswald says: "We cover bus, tramway and metro networks, because they cannot depend so well on the mobile operator networks – when you go underground, there is no coverage so you need to have a dedicated network that can be controlled. So we have several networks deployed mainly in North Africa, Algeria and Morocco.

"We are also working in the security sector. For example, we are working with the Kenya wildlife security company which covers all the national parks, so we have deployed a solution there."

So what is ETELM bringing that's different? Here, international sales director Paul Ward says that one of the things that the company really identifies with Africa is that there is a big opportunity for MNOs.

"Mobile operators are looking at what they term 'enterprise networks' and are really starting to focus their energies and their marketing on mission critical as an addition or complement to their traditional commercial networks. And one of the big advantages that we offer is all of our base station technologies – TETRA, DMR, analogue, and of course the eNode B – can be deployed on their existing transmission networks.

"So the price point for an operator to deploy mission critical in areas that have got vast geographical territories starts becoming viable. For Africa, we feel there is a big market that operators could open up for us."

Work on the eLBS first began around six years ago, and Ward considers LTE to be a major component of its future product portfolio. "We see an ecosystem of different technologies and LTE is a big part of that. All of our products are based on the LTE core network, so what we envision, certainly in the next five, possibly 10 years, is a single network which is LTE-based on the LTE standard with different types of technologies all seamlessly connected and sat on that network.

"That's what we have developed. So we have got TETRA base stations directly connected to LTE, obviously eNode B via the eLBS, and then you've got PMR and analogue

base stations. Different technologies, but all using single transmission networks."

The role of LTE in critical communication networks continues to be the subject of some debate within the industry. Many users are still waiting to see how it will all play out and as a result, ETELM will continue to focus on both TETRA and LTE, as commercial sales director Nicolas Hauswald points out: "We do not believe LTE will replace TETRA; they will work together. LTE and TETRA both have drawbacks financially and technically in terms of deployment so there is room for both."

So where does that leave the user in Africa who is deploying to a greenfield site – what type of network would Hauswald recommend for them? "A hybrid solution. Why? Simply because in Africa you have wide territories with very low density in terms of population or in terms of coverage requirements. LTE is adapted to more dense areas but is more expensive than TETRA. So with TETRA you could have wider coverage, with LTE you can have better bandwidth as you can have more applications running. You can find a balance between in a hybrid solution so the cost will not explode if you need to cover full territory."

So what about the foreseeable future – what are the challenges ETELM envisages in the African market over the next 12 months? For Hauswald, there are two things. "What we expect in a year's time is to have several networks deployed and we would hope to have at least one nationwide network (that would be more for the blue light services). We are working on it, and have targets in South Africa and in Central Africa.

"Secondly, budgets are limited in Africa and investment is limited, and I would say that is the main challenge we are facing. But we hope to get through this and increase our presence in Africa in 2017."



Shimon Dick,
VP, sub-Saharan
Africa,
Motorola
Solutions

Motorola Solutions describes itself as a creator of "innovative" mission-critical communication solutions and services that help public safety and commercial customers build safer cities and thriving communities around the world.

Vice president of sub-Saharan Africa, Shimon Dick, says the company has been supporting the public safety community and other verticals in need for mission critical solutions for more than 85 years, providing customers

globally with public safety solutions, integrated command and control communications, and managed and support services.

According to Dick, Motorola Solutions considers Africa to be a strategic market that is robust and dynamic, with high potential and growth rates in many countries.

"Motorola Solutions began its operation in Africa in 1960 as one of the first global companies on the continent. Today, our activities span across more than 48 African countries, with many customers in the government, public and private sectors.

"In recent years, the world of radio communication has shifted from analogue to digital. This global trend has not skipped the African continent where we have implemented many tens of digital radio systems from our TETRA, ASTRO and MOTOTRBO portfolios."

Over the past year or so, Dick says the company has been helping many of its customers, such as those in the public safety, and oil and gas industries, to continue their migration to the digital era. And as Africa is seen as a strategic region, he says the firm also expanded its partner network to help extend its reach across the continent.

"Our digital radio systems implementations in Africa have proven very successful, and we believe they represent a huge leap forward compared to the analogue systems which are still used by many public safety entities in the region. Many of the transitions were to TETRA systems, which are perfect for public safety use, along with ASTRO systems, which provide superb coverage in wide and complex terrain."

Like many other countries around the world, Dick says African nations face rising challenges in the area of public safety: natural disasters, crime, terror and the need for better border controls.

"Our core technologies address exactly these challenges, as we provide advanced communication systems, command and control solutions, video analysis and other smart public safety solutions. We serve public safety and commercial customers in industries including law enforcement, fire, emergency medical services, utilities, mining, manufacturing and education.

"In conjunction with the global trend, in 2016 we've witnessed more organisations adopting digital radio systems and we expect that trend to continue in 2017. Moreover, we expect to see organisations adopt new technologies like LTE, and utilise bandwidth for data applications."

According to Dick, a good example here would be voice over IP, such as Motorola Solutions' *WAVE* which is a push-to-talk

platform for work group communications. "WAVE enables PTT communication between disparate networks such as radio, cellular, Wi-Fi, and telephony. Our public safety-grade system, WAVE 7000, is used for projects that require highly critical communications such as the UK's new Emergency Services Network."

As organisations, especially those in public safety, strive to enhance efficiency in challenging times, Dick says demand for LTE technologies as a means of enhanced data communication is likely to increase. "We also expect to see more data-based applications, either over LTE networks or other existing digital networks. These applications could be evidence management solutions, enhanced command centres, and new application associated with Industrial IoT.

"These applications connect with one of the key trends we see in many countries, which is the proliferation of new kinds of data. Massive volumes of data are being generated 24/7, and there's a critical need to harness the information to improve an organisation's work, especially in the world of public safety."

Dick says Motorola Solutions is helping many public safety agencies around the world to take advantage of the Internet of Things (IoT) and Big Data. "We are doing this by connecting the dots among multiple databases, social media networks and evidence libraries, and in minutes rather than days through cloud-based software and services. We also analyse the vast collection of real-time data coming from sensors and other IP-enabled devices (drones, wearables, etc.) and act upon it.

"We believe that, very soon, these trends will also come to African countries, helping them face new public safety challenges. At Motorola Solutions we see this data trend as key for developing new services for our customers. In the past year we've invested heavily in innovation, developing new abilities on the software side, in order to utilise all the data around us."

To support all this, Motorola Solutions made a number of acquisitions in 2016. They include: public safety software company Spillman Technologies; Gridstone, which develops mobility solutions for public safety agencies; and the Mobile Assets Communications System (MACS) from Cyfas Systems to enhance the command and control solutions portfolio for the UK's emergency services users.

When looking ahead at the world of public safety, Dick believes radio technologies like TETRA and ASTRO will continue to serve many countries in

the coming years as they transition from analogue to digital networks. "We see these technologies as part of the path that will lead gradually to LTE systems. While public safety agencies will always need a fail-safe option to communicate by voice, the need for additional applications will drive adoption of LTE as a complementary technology, allowing sharing of photos and videos among officers, command centres and the public.

"Government agencies around the world have already begun to integrate LTE as part of their public safety communication networks. The UK government's Home Office is moving towards a new public safety LTE based network provided by Motorola Solutions, expected to be relied on by more than 300,000 emergency and public service users at more than 300 agencies across the country. And earlier this year in the United States, the Los Angeles Regional Interoperable Communications System and Motorola Solutions successfully demonstrated the LTE and LMR networks for the first time during the Roses Parade in Pasadena, California, which attracted 750,000 spectators.



**Phil Kidner,
CEO,
TCCA**

The TETRA MoU Association was established in 1994 to create a global forum to act on behalf of all parties interested in TETRA technology.

In 2012, in order to reflect its broader remit of promoting the development and adoption of common standards for critical communications worldwide, the organisation changed its name to the 'TETRA and Critical Communications Association' and is now known simply as the 'TCCA'. It said the change was in response to the growing demand from PMR (professional mobile radio) users for mobile broadband services. Here, the TCCA believes the industry should leverage the capabilities of complementary technologies such as LTE, rather than develop completely new ones.

Today, the association represents more than 160 organisations across the world, and since 2006 it has been headed by former UK police officer Phil Kidner.

According to Kidner, a lot of African critical communications is still analogue so users have to decide whether they're going to go to digital PMR or whether they are going to go straight to broadband.

"There are companies in Africa that

are encouraging [users] to go straight to broadband. I don't believe that's the answer for them. I believe they've got to get at least a lifetime's use out of PMR which today will provide them with a wide area, private (encrypted if they want), voice and narrowband data solutions.

For example, some parts of Australia are very similar to parts of Africa where there are wide-open spaces and mining is big business. They all use PMR and are piloting broadband, but their day-to-day, mission-critical business is done on PMR.

"So what I would say to users in Africa is don't be seduced by the hype. Broadband will be part of your future but it is not there yet. Take this step into a PMR, digital PMR, and you'll see it will deliver 99.x per cent of everything that you need."

Kidner is keen for the TCCA to become more active on the continent. In February 2016, he organised two events, one in Cape Town and another in Gaborone, Botswana.

"The event in Cape Town (which was about TETRA in South Africa) was standing room only. So I thought we've got to do two things about this. One was to broaden the event so the focus is not just on TETRA but on critical communications; and the second thing was to decide whether it should be in Cape Town or Johannesburg."

Working with event organiser Knect365, TCCA looked through the database for AfricaCom 2015 and found that there were more than 500 public sector attendees. Kidner therefore saw an opportunity to run an event alongside AfricaCom 2017, and points out that this will be about critical communications, not just a single technology.

"The TCCA is focused on all standard communications. We come from a TETRA heritage and we are never going to lose that, that's part of our being. But we are now interested in delivering what the users want, so if they want a particular standard that is not TETRA, that is fine by us."

The second thing the association is focusing on is how it migrates those users towards broadband. In its view, current mobile broadband technologies are not yet ready to provide the sole platform for critical communications.

"We believe that PMR – whatever brand of PMR it is – has an ongoing role for many years yet," says Kidner. "I am confident that if you went out and bought a TETRA or even a P25 network today, you will get a lifetime's use out of it before you thought broadband communications is now ready and moved across to it. So the future as far as I can see is hybrid; its PMR and broadband working together. Some

people tell me that I am just an old guy and broadband is here and that we should all move to it. I don't believe that."

LTE & critical comms

When it comes to working with mobile broadband, LTE is the technology the TCCA has put its weight behind. "There are only 40 million PMR users in the whole world but there are 7.6 billion cellular phone users. So all the investment is clearly going into the cellular market and we need to be part of that. But 40 million versus seven billion has been a tough struggle. We are now market representation partner in the 3GPP and have succeeded in getting a group within that process dedicated to critical communications.

"We want the LTE standard to include functionality for critical communications. We don't want to go down the road that some technologies have gone down of just being like LTE – that is a disaster because you pay a premium. We want to be a part of the mainstream standard, and that is what we are focused on doing for our users regardless of what they are currently using today. That is going to take a long time. There are products available today, but if you're a public safety user you don't take risks with your communications. You need proven technology. So I believe that using PMR and broadband together is the answer.

"If you are another type of critical communications user, let's say an airport, you've got different issues. Perhaps you can use broadband more easily than a widespread nationwide system. But then the issue is where do you get 1.4MHz of spectrum and how much is it going to cost you? So the airport still needs PMR but that is their decision."

Kidner continues by explaining that TETRA uses four slots in 25kHz while LTE is looking to use a minimum of 1.4MHz of spectrum. So does TETRA's narrowband technology present limitations for users?

"When you buy a TETRA network, you primarily buy a voice network but get a data network for free. Yes, it is narrowband but there's such a lot you can do with that – you can do all the usual database enquiries, send your resources, know where they are, know when they have arrived, know when they have finished, all the easy stuff, on narrowband. You can send and receive colour pictures on your radio's screen to show missing children or wanted people. That's a really powerful tool being used today.

"But there are some functions – video and some of the more interactive applications,

for instance – that need to be enhanced by broadband. Critical communications users are choosing to do that on broadband today; they are using their mission critical data applications on TETRA, and their more 'nice to have' applications on broadband.

"Of course at some point, those nice to have applications will become mission critical. But whilst they are using public networks they are not going to become mission critical overnight because, as we know, they are not designed to be there all the time or every time

"If a site goes down on the cellular network, there might be another one nearby that people can use, or perhaps it will get fixed whenever the operator can get resources.

"That is not good enough for mission critical. For mission critical, when you press that button it's got to work first time, every time, whether you are inside or outside."

Release 13 of the LTE standard published in March 2016 features mission critical voice which means, in theory, you can have an LTE mission critical product, says Kidner. "Release 14 is due in 2017 and will include data and video, and then there is some more which will be in Release 15. So the standards are there and we are going through the processes.

"The bullish manufacturers say we are just waiting for the standards to be ticked off, we've got the products, we will roll them out within months of the standards completing. But other bearish manufacturers say no, it takes two years after the standards. I think the launch of products will come somewhere in between."

But Kidner goes on to warn that that would not be the end of it, as all first adopters take a big risk with any technology, not just LTE. "There is an adage within public safety that says you want to see somebody else have all the blood and problems and you will follow on when it's sorted. We are a conservative industry and we will take it one step at a time."

But is he worried that it will then be time to talk about 5G? Kidner admits that at present, it is difficult to understand what's in and not in 5G. But he adds that the TCCA is reassured by the 3GPP that it will be an evolutionary process for critical communications, and talks will continue between the two organisations to ensure that remains the case.

Digital Mobile Radio

So what about DMR – where does that fit into all this? Like TETRA, Kidner explains that DMR was a standard written by the European Telecommunications Standards Institute (ETSI) for global adoption.

"TETRA was designed for public safety and high-end critical communications; DMR was for lower use and then there was dPMR.

"DMR has pushed the boundaries. DMR II and III has come along and so users have a choice between those and TETRA. What you use depends on what you need, functionality, etc. DMR and TETRA are both growing technologies but DMR is going to grow a lot. I see some of the users in Africa adopting DMR and I don't see that as a problem if that suits their needs.

"The step from analogue to digital can be achieved with DMR and you can also achieve it with TETRA, of course. TETRA is mission critical through-and-through, and DMR has evolved into that."

Inevitably, Kidner believes TETRA has the edge, and enthuses about it as being the "best technology in the world" for critical communication users.

"As we sit here today, there are 3.6 million critical communication users using TETRA radios. That is 3.6 million policemen, firemen, medical services. These aren't radios stuck in the cupboard; they are being used in life and death situations around the world."

Citing forecasts from IHS, Kidner says six million people will be using TETRA radios by 2020, and that the market is expected to grow 37 per cent in the next three or four years.

"So we see TETRA as growing and don't see it dropping. DMR is also emerging because, up until recently, two thirds of all PMR radios in the world were analogue. A lot of those mainstream critical communication users have already gone or are going to TETRA, while DMR seems to be picking up a lot of the analogue to digital movements for lesser demanding requirements."

Where does Kidner expect to see that growth in Africa come from?

"The Cape Town authorities put in their TETRA network in around 2000/2001, but what you can buy today is significantly upgraded because of what we have done during that period of time.

"What you have is a virtuous circle – new and existing users feed all the developments into us, we take them to ETSI, we get them standardised, it comes out of ETSI, and we include them in our interoperability process. That means you can then go and buy, for example, a Hytera radio and use it on your Motorola network.

"So we have kept the technology up-to-date. Even as we speak, we have several groups working on the latest additions to the TETRA standards. It continues to be an evolving virtuous circle."



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chapter 8

Wireless Users

cellular

Nokia helps Vodacom Tanzania deliver the need for speed

Nokia Networks claims its 4G deployment for Vodacom Tanzania represents one of the most “significant” developments of a commercial LTE network in Africa, and says it continues to show “outstanding performance” since going live last year.

Vodacom has used FDD-LTE for its 4G network in Tanzania which went commercial on May 2016. While it was not the first to be deployed in country, Nokia reckons it was certainly the “most impressive”. The company deployed 278 sites in less than three months across Dar es Salaam which then offered blanket coverage from day one – unlike the less than 60 sites offered by competitors, said the company.

Furthermore, Vodacom Tanzania’s network is open for every subscriber who has a 4G capable device and is therefore not restricted just to selected subscribers.

Nokia believes Vodacom’s LTE network is triggering a “massive change” in the country’s mobile market. “So far, all operators offering 4G connectivity were covering just a part of Dar es Salaam,” it said. “Some were actually deploying WiMAX and calling it 4G, which is not wrong, but they’re relying on the power of 4G marketing for effect rather than for its real performance.”

The vendor added that the network consistently offers a peak rate above 70Mbps (see graph, below). “It is by far the fastest mobile broadband access network in Tanzania with outstanding QoS. Vodacom TZ is ready for a massive 4G adoption in Dar es Salaam as coverage and capacity were thought big from day one.”

Nokia continued by saying customers can enjoy “stable, continuous and real” 4G access. It said the network has been progressively loaded with more than 13TB handled every day without quality degradation. The average throughput is said to be “stable and very strong” with a peak download throughput consistently above 70Mbps.

Network availability is reported as being more than 99.8 per cent on average in Dar es Salaam which basically has blanket coverage. “In other words, any Vodacom Tanzania subscriber in Dar es Salaam can download any internet page in less than two seconds,” said Nokia.

4,400 subscribers apparently adopted the operator’s 4G service during the first week of its launch. Nokia said this was more than some of the local MNOs who had already been offering 4G services for more than a year. More than 100,000 users are now said to be using the service.

According to the firm, all major cities in Tanzania can expect to have Vodacom’s 4G network rolled out soon, while the rest of the country will start to benefit once spectrum is released by the regulator.

“*Hapa Kasi Tu!* (Swahili for ‘it’s all about speed’) is the slogan for Vodacom TZ’s LTE marketing campaign,” said Nokia. “Vodacom and Nokia Networks are partners to ensure that the best of the 4G LTE technology reaches Tanzanian subscribers.”



RascomStar – adapting to the “system of life”

RascomStar was established as a private company in Mauritius 15 years ago. It claims to be unique in that its service and product focus is “precisely geared” to meet the needs of the continent.

By developing and deploying satcoms infrastructure across Africa, RascomStar provides national and international connectivity to supplement licensed telecom operator networks. It says its teams have the expertise to deliver telecom services in remote and underserved areas, as was proved during a recent deployment of a GSM network in the DRC.

According to the company, transportation in underserved areas is the first challenge, and you have to start by finding an experienced person that knows the location.

Furthermore, travelling conditions can be harsh and risky, especially on sandy, muddy or rocky roads, or by boat in bad weather conditions (boat is often the only way of getting to a remote village).

“Common sense and field expertise is the recipe to overcome the various stumbling blocks along the way,” said RascomStar. “The key is to plan, anticipate and prepare all the needed material, like satellite phones, spare parts such as tyres and batteries, and provisions for fuel, oil and technicians. And of course, there is no electricity or garage along the way.”

The company added that working in rural areas requires teams to be very flexible and ready to adapt to local conditions. “It can be a nightmare but also thrilling. Simple things like food can be a challenge: be ready to eat just once a day, due to the fact that there is no shop, no grocery. So you must be ready to experiment with all kinds of food, living places, forms of entertainment and language of communication.

“In cross-cultural perspectives, be prepared to meet with people with communication and language issues, lack of respect, lack of education and abnormal behaviour, and finally be ready to adapt to the system of life.”



When travelling to install networks in remote parts of countries such as the DRC, you need to go prepared and pack a lot of supplies.



RascomStar’s deployment team had to endure some difficult conditions, such as sleeping under tents or on a boat after heavy rain soaked the tents and mattresses. Long-drop toilets and bucket showers using dirty river water from the Congo added to the experience.

During field installations, operations and maintenance, work usually starts at 7am and can run until 11pm depending on the type of activity which can become very complex in the case of troubleshooting. Again, preparation is key here. RascomStar said don’t ever think a simple screwdriver or an Ethernet cable can be found locally, or that you can charge your electronic devices – you have to take your own generator (and fuel) until solar panels are mounted and operational.

Security is another major issue. You need to keep an eye on your work tools and personal belongings all the time and be wary of theft and pick-pocketing. RascomStar said that you should also watch out for double dealing, and advises team members to be “humble and very smart” when they deal with people.

“Despite all these challenges, you have to keep constantly in mind that the main goal of the mission is to activate the various satellite and GSM sites as per the original project plan and deliver according to the customer expectation,” stated the company.

“Once the site is operational, the reward of witnessing the joy of the inhabitants able to talk to their cousin in Kinshasa or

Engineers install the omni antenna at the site to help achieve their ultimate goal.



in the US, for example, helps you forget all the difficulties faced in the past days. Just remember that a mobile phone in these remote places suddenly has the ability to reach seven billion users worldwide.”

Timecard helps Metro keep an eye on its staff

Formed in 2004, Metro Telworks primarily specialises in providing RF services and in-building solutions to OEMs, NEMs and telcos. Its South African branch covers several countries on the continent and has approximately 80 employees.

The company is said to provide a valuable service to network operators such as Vodacom and Cell C, but also undertakes large projects which it manages from end-to-end.

The bulk of Metro’s work is performed by field engineers who are driven each day along specific network routes to check signal strength for 2G, 3G and LTE networks, thus allowing mobile operators to deliver seamless and reliable signals for millions of their users. Each team consists of a vehicle, driver and engineer. They are dispatched to check signal strength along requested routes, as well as in-building/campus signal stability and strength.

"Because the teams are out in the field for long periods of time, we needed to know where they were, if they used the correct route, and which hours they worked," said Tajuddin Mohammed, human resources manager at Metro Telworks, South Africa.

Other pain points for the company involved its drivers speeding, thefts of expensive equipment from the vehicles, misreported hours worked (especially overtime), and damage to vehicles and accidents.

"We needed a solution that would solve all these issues and give us management reports so we could issue reprimands for speeding and causing accidents," said Mohammed. "We needed to check on the locations where robberies were occurring and provide this information to our insurers, when the team clocked in and out, and whether they actually did work overtime."

"As the engineers use their own phones, we also needed a solution that would run on a variety of mobile device brands, including iPhones and Android devices."

The solution came in the form of *Timecard GPS* from Econz Wireless, a South Africa-based specialist in hosted enterprise mobility applications.

Metro Telworks' teams comprise two employees – a driver and an engineer. One of the features in Econz's *Timecard GPS* solution is *Team Services* which allows the engineer to clock both himself and the driver in and out using a single mobile device. This saves Metro the costs of individual subscriptions for two separate phones. Econz said *Team Services* can support up to 45 members in a team on one device.

Another feature, *Speed Trigger*, enables head office to see speeding reports, location, and if any speeding incidents led to an accident. These reports fulfil insurance requirements and mean Metro can penalise the driver involved and recoup speeding and

accident costs. The feature also activates an email to the office so that managers can take immediate action by contacting the driver.

After using the system for over a year, Mohammed said Metro was "extremely happy" with it. "*Wireless Timecard GPS* was accepted quickly and willingly by the field teams as we can provide them with immediate assistance in the case of a breakdown or accident. It has been a tremendous help in disciplining our drivers, even terminating [their employment] if necessary."

"We have saved on fuel costs due to *Speed Trigger* and *Breadcrumb* trails. Speeding fines, vehicle damage, and robberies have decreased exponentially."

He added that Econz is quick to resolve any reported issues with the system, and provides regular updates that meet Metro's needs.

One such update is the *Alert Admin* feature. This provides management with a new *Clock In/Out Exception Report*. Admin teams need to know if someone is late, actually working or absent. This also allows field management to decide whether it is necessary to send a temporary worker from nearby. Using *Admin Alert*, they can configure specific time limits for clocking in, and follow up to see if the person is sick or constantly late, before taking action.

Mohammed said: "We used to have such a problem discovering whether overtime was true and justified but now we can track this easily with our reports."

Value-added services

MTN gives its staff a voice

With around 250 million customers and 22,000 staff working at its 22 country operations across Africa and the Middle East, listening to everyone's views is a challenge for the MTN Group.

Every year, the company invites its 300-strong leadership team to its head office in Johannesburg. It says this two-day gathering helps fix strategic priorities and provides everybody with an update on how the company's vision of 'leading Africa into a bold new digital world' is progressing. However, to be successful in this ambitious aim, MTN knows it needs to engage all of its staff, not just the leaders.

As employees are working across such a broad region, extending from Nigeria and Ghana to Iran and Afghanistan, this was not a straightforward call.

"We wanted to bring the voice of the staff into the meeting," explained Dane Osborne, MTN's senior manager of culture, change and environment. "Candour is



MTN says having *Speak-Out* as a mobile link between its staff and leaders helped "bring business to life".

one of our hallmark behaviours and we recognised that only when we engaged everybody in the ongoing dialogue about our strategic plans would we be able to move forward and demonstrate that everyone's opinion matters."

With an average employee age of around 35 and a policy of keeping with their digital vision, MTN decided that a mobile app would be the most appropriate way to reach out to staff. It hadn't used an engagement app before and ended up choosing *Lumi Say* from UK-based real-time audience engagement technology specialist Lumi.

According to Osborne, it was selected over other solutions because of its intuitive user interface and the fact that the platform could be customised with MTN's branding. But she pointed out that Lumi's support was the main reason for the choice.

"They were a very agile and service-orientated team. They quickly got their head around our business requirements and were able to respond to us in a very short space of time. In fact, they were able to accept and customise our content in what we felt was record time."

Osborne added that Lumi also understood MTN's information security and corporate governance requirements and was able to satisfy these "effortlessly".

MTN rebranded *Lumi Say* as *Speak-Out*. It claims this underlined the importance the company attaches to both honesty and engagement. While the company's footprint embraces many languages, it decided to stick to using English for the app as this was "more straightforward".

MTN invited all staff to use *Speak-Out* and share their views and sentiments about the company's strategic direction using polls, rankings, as well as qualitative questions which could be answered using voice clips. It said the two-day meeting was all the more lively and valuable for including everybody's views.



Metro Telworks' field engineers are driven along network routes to check mobile signal strength. Each team consists of a vehicle, driver and engineer.

Lumi's event app, *Lumi Show*, was used to give leaders a chance to interact, too. They were able to pose questions to speakers and add pop-up comments throughout the conference. MTN said leaders could move around between breakouts seamlessly because of the up-to-date info and announcements received via *Lumi Show*.

The app's live voting and discussion facility ensured that they could give their opinions in the moment and when it mattered most. Logistical information, such as bus transfer schedules and travel documents, was also loaded into the app for users to refer to.

MTN said *Speak-Out* further promoted its digital vision and helped engage the leadership team before, during and after the conference. The company took all the data received from the app, animated them and presented the results to the conference. "This gave the leaders an important context for considering our future direction," said Osborne. "It helped them to understand our current position and make better-informed decisions about where we want to be in the future."

But she added that it was really the voices of employees that stole the show. "It meant we really extended the reach of the meeting beyond the leaders and, by using more than one Lumi solution, we got so much more value from our investment in the event.

"When you think about it, the scope of this engagement was huge, giving thousands of employees the chance to have their say and be taken along the same journey as our leadership team."

TelOne jumps ahead with Leap Billing

TelOne is Zimbabwe's national telecoms service provider and is wholly owned by the government. It provides a wide range of services to residential, business and government customers, including national and international telephony, internet, leased lines, satellite communications and mobile via CDMA. TelOne's next-generation network also operates as the hub for Zimbabwe's national and international commercial transactions and business communications.

The company was looking for a solution to support its billing and charging, customer management, order management and network management needs. This was required to provide customers with a single bill, summarising all the services they use from their subscription packages and offering a single point of contact for all their queries. In addition, TelOne needed to

ensure accounting accuracy of its growing interconnection revenues.

Moreover, the operator wanted a reliable, accurate and flexible solution that would meet its current and future needs, while providing a seamless migration from its legacy systems to a new infrastructure environment. TelOne's ultimate goal was to leverage its broad portfolio of offerings and be able to introduce new and advanced mobile and broadband services.

FTS was awarded the project. The Tel Aviv-based BSS specialist says it was chosen for its ability to provide a "true" end-to-end and convergent solution fully adapted to TelOne's requirements. During the negotiation process, the company said that it developed strong contacts with TelOne's management and technical staff. In particular, they were impressed with the flexibility of FTS' *Leap Billing* platform, and with the idea of being able to quickly launch new pricing plans, services and promotions.

The implementation included *Leap Billing*'s customer management, interconnect and settlements, convergent billing and charging, and network management platforms. Based on the company's *DO Tree* technology, it's claimed FTS' platform enabled TelOne to develop new revenue opportunities via enhanced customer support and experience. To implement the mediation part of the solution, FTS partnered with Packetware, an India-based mediation software vendor. FTS acted as the prime contractor with Packetware filling a subcontractor role.

The project consisted of two phases, the first of which covered mediation and interconnect billing. Phase 2 encompassed convergent charging and billing (including credit control), invoicing, customer management, order management system, fault management and accounts receivable, followed by infrastructure and network management.

FTS said TelOne is now delivering new services to its customers while implementing creative billing schemes. The key benefit to the telco's customers was a single, unified bill that outlines the different services they used from across the package that they subscribe to. The invoice details all the services they have been charged for, from wireline telephony and internet services to CDMA usage. The customer management module also provides all TelOne's customers with a single point of contact for all their queries.

In addition, using *Leap Billing*'s interconnect solution enabled TelOne to turn its interconnect and settlements policies into a revenue stream, with an almost immediate ROI.

Fixed wireless access

Kukua keeps an Eseye on Africa's weather

Based in the Netherlands, Kukua aims to provide accurate weather data and forecasts to smallholder farmers, commercial farmers and other stakeholders throughout Africa. Its overall mission is to "close the continent's weather information gap" by leveraging new weather station technology and mutually beneficial partnerships.

One such partnership is with UK M2M specialist Eseye. It has enabled Kukua Weather Services to offer its customers reliable and securely connected weather stations. These are used to provide a much needed improvement in accuracy in weather predictions. The stations give Kukua the ability to create constantly updating weather maps of sub-Saharan Africa to ensure that the frustrations of uncovered areas are a thing of the past.

The Institute for Climate and Society in Mali has concluded that crop yields can



Kukua has installed 60 of its solar powered, internet-connected weather stations in Nigeria, and has 19 additional units operating across five African countries.

be increased by up to 20 per cent when smallholder farmers have access to advice based on weather conditions. But rural areas in sub-Saharan Africa have a lack of weather monitoring infrastructure due to the associated costs.

Kukua said its “thrifty” weather stations collect information on the local weather including wind speed, wind direction, solar radiation, rainfall, temperature, humidity, and much more. The design is said to use a specifically created frame that can accommodate a range of different sensors to suit the precision and price point required by the customer.

The World Meteorological Organisation-standardised sensors inside a Kukua weather station are attached to a small solar panel, which is then attached to a battery, two micro-controllers, modem, and an Eseye *AnyNet* SIM card. Using Eseye’s connectivity, the collected data are sent off at regular intervals to be analysed and interpreted after which they are presented and used to inform and advise farmers using precise weather predictions. The raw data are used by scientists in yield models and other research projects helping to nourish Africa.

With the Kukua team focused on the collection and interpretation of the information, Eseye was brought in to manage the connectivity. Within a week of first contact, the *AnyNet* SIMs were inside the Kukua stations on their way to being deployed in-country.

Eseye manages the relationships with the local MNOs to ensure the *AnyNet* SIM is always within network coverage. Customers are invoiced using easily understandable zonal tariff and bundles which allows Kukua to ship products anywhere in Africa.

Building upon the universality of weather conditions, Kukua Weather Services is currently partnering with large NGOs to establish networks of weather stations across the continent. The data are used for NGO research purposes, and plans are being made to sell the data to both commercial and smallholder farmers in order for Kukua to become financially sustainable. The service will also be provided to disaster relief charities, renewable energy firms, transport and logistics companies, as well as event organisers.

One of Kukua’s current partners is using the weather information to help understand the difference in yields across groundnut plantations in Tanzania. Comparing the farming techniques with the weather conditions allows the partners to find the best farming techniques for the conditions. This in time can enable accurate and useful yield improving training to help the farmers.



The main campus building of the University of the Free State in Bloemfontein.

Through its partnership with Eseye, Kukua has ensured that its weather stations have been quickly deployed in multiple nations, and all within a fixed monthly connectivity cost. Eseye added that with its ongoing support, farmers in sub-Saharan Africa can be sure the information that assists them in harvesting success is in safe hands.

State-of-the-art Wi-Fi at University of the Free State

With the proliferation of Wi-Fi connectivity in companies and organisations, many workers now expect to be able to connect their personal mobile devices to their employer’s corporate network. This has given rise to the so-called ‘Bring Your Own Device’ (BYOD) trend.

In 2012, when the University of the Free State (UFS) saw BYOD start to gain traction, it decided to update its wireless network with the help of Aruba (now owned by Hewlett Packard Enterprise).

Aruba partner Khipu Networks handled the planning, Wi-Fi surveying and installation, with the first phase rolling out at the university’s south campus, and the main campus in Bloemfontein following suit a year later. Several years down the line, UFS’s QwaQwa campus has rounded out Wi-Fi deployment across the sites, while the main campus’s wireless network has now been densified.

All campuses also enjoy wireless connectivity in outside, open space locations, with Wi-Fi being deployed in all residences as well. Gareth Trollip, head of technical SA at Khipu Networks, said: “There are also ongoing requests for us to come and plan for Wi-Fi in new buildings as the university continues to grow. They want to have a completely connected campus.”

Currently, a total of 2,000 Aruba access points along with eight of its *Mobility Controllers* effectively serve UFS’s 33,000-strong student base and 4,500 staff.

The mixed environment network makes use of 802.11ac for high density areas and 802.11n for lower density areas, although there are plans to roll out 802.11ac across the entire university.

The university’s assistant director Renier Sonnekus said that having Wi-Fi deployed across all parts of each of the campuses is essential for students who want to be able to connect using their tablets and phones wherever they are. “Ensuring that we have the latest technology not only in the lecture halls, but also in the residences and outside areas means they can continue learning and interacting with each other with no constraints.”

As well as enabling ubiquitous connectivity for students, Aruba said it is equally important to manage their access to the wireless network effectively. Here, the vendor said its authentication server, *ClearPass Policy Manager*, helps simplify access for the thousands of users accessing the network.

“*ClearPass* is the authentication server to which all wireless connections in all locations are sent,” explained Trollip. “It’s in the data centre at the main campus in Bloemfontein, making it easy to manage authentication requests from the south campus or QwaQwa campus in one central place. All policies and rules are centrally managed there by the university’s IT team, along with Khipu.”

Sonnekus added that *ClearPass* has made it possible for the university to manage the network across all its campuses. “It has also been useful to us in dealing with students misusing the network. With the tool we were able to pick up those instances of intrusions and misuse immediately and act accordingly.”

The policy management solution was also an integral part of the deployment of ‘eduroam’ at the university. This is the service educational institutions use to ensure their staff and students can easily connect to the wireless network at all connected universities.

"It works by broadcasting the eduroam service on campus, which staff and students can connect to," said Trollip. "If *ClearPass* identifies that they attend UFS, it dynamically provisions their access to local UFS resources."

"Alternatively, if a student or staff member is visiting a UFS campus from another university, the authentication request is sent from the UFS *ClearPass* system to eduroam's centrally managed RADIUS environment, and on to the student or staff member's home campus authentication system. This enables the user to access their home resources from a UFS campus. Our 'eduroam-in-a-box' deployment method allowed UFS to setup eduroam quickly with minimal resources."

UFS is utilising *Aruba AirWave* to fully manage its wireless and wired network. It also uses the platform for remote deployments and managing bandwidth. As a network monitoring and troubleshooting tool, Aruba said *AirWave* provides UFS with helpful visuals when any APs or switches go down. It said that all Wi-Fi controllers are also managed at one central point on the main campus which simplifies the task and saves time and cost for the IT team. Furthermore, UFS uses *AirWave* to manage and prioritise VoIP for the students across the campus.

Another key feature is the platform's ability to detect and identify each device and therefore enhance physical security. "UFS can locate and track devices which have been reported 'lost' within the campus, which is hugely beneficial. This alone has saved UFS a lot of money by reducing device thefts on campus," said Aruba.

Broadband

Mining firm digs and finds its needs more than just fibre

Fast and reliable broadband connectivity is transforming mining operations across Africa.

Liquid Telecom is working alongside mining customers such as Metorex to provision networks that can support future



Metorex's Kinsenda mine in the DRC has one of the world's highest grade copper deposits. It has declared mineral resources of 20.7 million tonnes at a grade of 5.6 per cent copper.

high-bandwidth applications, while allowing employees to communicate, collaborate and make decisions in real-time far more easily and effectively.

Metorex is an established mid-tier mining company with two sites in the DRC and one in Zambia. Its African HQ is in Johannesburg while its corporate base is in Hong Kong. The company is a subsidiary of the Jinchuan Group which was ranked 32nd in China's top 100 multinational enterprises in 2015.

Four years ago, Metorex completely re-organised its ICT infrastructure and functions to create a central management platform for employees to work more productively. However, although the platform was well received internally, it soon became clear that the company needed to review its connectivity.

Despite spending USD40,000 per month on C-band VSAT connectivity into its African operations, Metorex was only receiving 4Mbps shared between all of its sites. All traffic had to transit via South Africa, resulting in latency of more than 600ms. To make matters worse, expensive truck rolls were required to fix issues in the field. This situation could not support Metorex's new way of working, particularly as it was now using VoIP and video conferencing, as well as transferring large files whilst doing live transactions on ERP systems.

Fast and reliable links were essential between its three mines, and offices in South Africa and Hong Kong. Metorex knew it needed connectivity with guaranteed SLAs and QoS. Not only did it want to centralise around one full-service supplier responsible for connectivity across Africa and into Hong Kong, it wanted one that would be a long-term partner.

Metorex is technology-agnostic and understands that sometimes it isn't economical to connect a site with fibre – in fact, because the airwaves are uncluttered in mining areas, the optimum network can be provided through a combination of fibre and wireless.

Following detailed research into its options and after recommendations from industry experts, Metorex chose Liquid Telecom to provide a single solution for all its connectivity requirements. As part of the ongoing build of its pan-African fibre network, Liquid included the mining areas of Southern Africa into its plans from the beginning.

MPLS is of particular importance for mining companies as it provides flexibility for those who run legacy systems. Liquid said it is the only MPLS provider on the continent, and therefore the only company able to provide such technology within a mine.

Liquid restructured Metorex's network topology and calculated that the most cost-effective way of connecting each site was by using an MPLS EP-LAN solution.

In Zambia, new fibre was laid to the Chibuluma mine from Liquid's existing fibre network, and it was connected within just one week of the operator being appointed.

Next came the two mines in the DRC: Ruashi was connected using a 5.8GHz point-to-point wireless link to cover the 4km from the existing Liquid POP at Lubumbashi airport (which connects to Liquid's pan-African fibre network); Kinsenda was then hooked-up with a 5.8GHz link covering the 20km from an existing POP at Kasumbalesa.



Hong Kong-based Metorex claims to be "uniquely positioned" in the southern African base metals mining industry as a pure copper and cobalt investment.

Metorex's HQ in Rosebank, Johannesburg was also connected by Liquid's fibre, while Hong Kong was linked using the Liquid network via Fujairah in the UAE which, according to the operator, provides "very aggressive" latencies from Africa to the Far East.

Metorex now has a fully integrated network with no third-party dependencies. All five connections receive 10Mbps, enabling 'Big Data' transfer. The network is said to offer almost 100 per cent availability which means Metorex no longer needs a backup VSAT service. Liquid said that a multitude of new services have been made possible, including the creation of a new VLAN and global video conferencing over private IP and the internet.

As a result, Metorex has been able to standardise and develop its ERP system to improve the user experience, drive costs down and introduce standard reports and financial processes. It has also achieved cost savings by centralising various tools for planning, geology, engineering, surveying, maintenance, etc. In short, the firm now has a network that can support future high-bandwidth applications which are being developed for the mining industry.

Satellite

Connecting readers and listeners

As a satellite operator, UAE-based Yahsat says it is seeing at first-hand the benefits that technology is bringing to communities and individuals across Africa, enhancing business, healthcare and educational opportunities.

"African economies are set to continue growing, allowing more people to grow their disposable income and consequently, a better standard of living," said the operator. "The correlation between investment in broadband connectivity and the growth in economic

activity has been well established, with research suggesting that for every 10 per cent increase in broadband connectivity, the GDP of developing nations rises by 1.38 per cent."

The Eastern Cape in South Africa covers 65,000 square miles. Outside of the major cities, the province is diverse in terms of landscape, and home to many rural communities. These remote communities rely on local resources to stay informed and educated with community libraries playing a key role. But traditionally, these libraries have been underserved in terms of connectivity, meaning library-to-library communications and public internet access has been unreliable.

The National Library of South Africa is a custodian and provider of the nation's key knowledge resource. Mandated to ensure that knowledge is not lost to posterity and that information is available to all, South Africa's Department of Arts and Culture, which oversees the library, decided to undertake an ambitious project to improve access to its services in 2010.

Given South Africa is the 25th largest country in the world and home to nine provinces (of which the Eastern Cape is the second largest), connecting the libraries and rural communities, was a significant challenge due to the lack of nationwide infrastructure.

In an effort to support the National Library project and to help drive knowledge across South Africa, Johannesburg-based independent telco Vox Telecom and Yahsat joined forces to provide satellite broadband internet services to all public libraries in the Eastern Cape. *YahClick* – Yahsat's satellite-delivered broadband service – was chosen due to its ease of installation, with no terrestrial restrictions. Yahsat claimed the service has proved to be the ideal solution to connect libraries with each other and with

the outside world in a more affordable and reliable way.

Today, the company said its partnership with the National Library project has given communities easier access to information and knowledge, enhancing the learning experience even in the most remote locations by connecting 207 remote libraries. In addition, the company said it has given individuals a renewed interest in reading with libraries seeing an increase in footfall.

As well as readers, Yahsat has also been helping to connect listeners. There are said to be an estimated 15.4 million radio sets in South Africa, with community radio attracting almost half of that listenership per week. Post-apartheid deregulated broadcasting led to an upsurge of community radio stations across the country.

"South Africa now has more than 200 community stations, broadcast in a number of languages with content as diverse as the country itself," said Yahsat. "Their scope and reach varies enormously from Eurocentric Cape Town, to traditional farmers in the Free State Province."

Staying connected, especially over such a diverse geography, is essential. And with radio, often the prime means of communication – particularly in rural areas – radio stations need access to events as they happen.

The Brand Connection, a South African media company, provides outside broadcast (OB) facilities to government and NGOs, allowing events to be broadcast as they happen. The company allows community radio stations to cover live events from election rallies to commercial brand activations. Without a satellite link, many of these broadcasts would not be possible.

Typically, it is difficult to broadcast live from hard-to-reach places due to a lack of communications infrastructure. Terrestrial telecommunications lines take several



The Brand Connection uses *YahClick* to give radio stations what it claims is an "almost instant" outside broadcasting solution.



PHOTOS: AL YAH SATELLITE COMMUNICATION COMPANY (YAHSAT)



Above left: SpeedCast trained members of Save The Children's staff as VSAT installers at its teleport in Germany. Above right: Save The Children's new satellite service provides connectivity to a network of C-band VSAT systems across multiple sites in Africa.

days to set up, and are therefore often too prohibitive for breaking news stories.

Vox Telecom was again called upon for its assistance. Working with The Brand Connection, it deployed *YahClick* to provide what's described as an "almost instant" OB solution. Yahsat said the OB team can be deployed anywhere in the country and, after submitting GPS information, broadcast live.

As a result, it's claimed *YahClick*'s uninterrupted satellite service has ensured that community radio stations in South Africa are able to keep their more than 8.6 million listeners up-to-speed with the latest news as it happens.

SpeedCast connects multiple sites for NGO with no downtime

Save The Children is an international NGO with its central office in the UK. In 2015, it required a connectivity network for 35 sites across Africa. The rollout of the new service was particularly complex, as it involved the migration from an existing service provider to SpeedCast. This process required work across multiple countries and had to be completed in a highly efficient manner, due to a tight deadline to complete the rollout before the previous provider switched off the existing service.

SpeedCast said its network design team worked directly with the customer to optimise the design to meet Save The Children's specific requirements. The new service was set up for the customer as a virtual network operator. SpeedCast said the VNO allows Save The Children to allocate pooled bandwidth efficiently and allows the flexibility to make changes quickly.

For example, QoS was used to prioritise certain types of traffic over the network. To ensure that staff can communicate effectively, Save The Children prioritised Microsoft's *Skype* and *Lync* services. Augmenting this, SpeedCast said its portal and associated *Android* application proved

to be "extremely useful and informative tools which allow Save The Children to monitor the VNO performance at anytime from anywhere.

The company trained members of the NGO's staff as VSAT installers at its teleport in Germany. This was said to be a great investment as one of the team members was able to quickly apply the training and completed the installation of a number of VSAT units in Sierra Leone during the Ebola crisis.

"I spent two months connected to the SpeedCast service, and the connection quality was better than some places in Europe," said Mark Hawkins, global field technology manager at Save The Children. "I was able to participate in conference calls with other parts of the world and some people were surprised that I was communicating over a VSAT link."

SpeedCast also supported Save The Children in Somalia. Here, the charity's staff re-pointed all of the VSAT systems to the new network. This flexible and collaborative approach was particularly helpful to Save The Children as Somalia can be a challenging place to find satellite engineers.

During the migration process, SpeedCast said its technical support team also proved to be a critical factor, helping to rapidly mitigate problems that Save The Children encountered. During such major deployments, SpeedCast said its support staff have well-defined processes in place to prioritise requests from the Emergency Response Team, as efficient communications are essential to successful rollouts.

Save The Children engineers said that they appreciated the direct access to SpeedCast technician via SMS as well as voice. SpeedCast said they also reported that it was far more efficient than the usual 'call centre' queues they had encountered with other VSAT service providers.

The new satellite service provides connectivity to a network of 35 C-band

VSAT systems across 35 sites in Africa. SpeedCast says all sites were successfully deployed ahead of the deadline, and as a result there was no disruption of service for the customer.

With the new network, Save The Children expects to be able to significantly reduce its operating costs. It's claimed this will allow for a full-cost recovery as SpeedCast reckons its service delivers "greater performance at a lower price point".

Furthermore, all this is said to have enabled Save The Children to provide an "excellent service" to its sites which could not be matched by the old system, where each site had individual contracts with a range of different suppliers. "Following the success of migrating our core C-band network, we have now worked with SpeedCast to expand the network to 51 sites," said Hawkins. "By replacing Ku-band equipment with C-band systems, we have been able to provide our field sites with a better service for a lower monthly cost."

SENTECH upgrades with Newtec

According to satellite equipment innovator Newtec, broadcasters and service providers today face numerous challenges. These include more complex workflows, introduction of new services, increased user expectations for always-on connectivity, and pressure on efficiency in both the space and ground segments.

With these challenges in mind, South African state-owned broadcasting signal distributor SENTECH was looking to deploy a scalable solution that enabled it to move with the rapidly evolving broadcast industry.

SENTECH opted to upgrade its satellite ground segment at 800 of its sites across South Africa. For this substantial project, it engaged African Union Communications (AUCom) as its primary contractor, and its long-term certified partner supplier Newtec to provide the necessary platforms and modems.

Working closely with the end-customer to establish its requirements, Newtec provided its *Dialog* multiservice platform, including the *MDM2500 IP* satellite modem. It's claimed this provided SENTECH with the efficient modulation it needed within the platform.

Newtec said the primary driver for developing *Dialog* is reducing a client's opex and capex, as well as increasing operational flexibility. It describes *Dialog* as a "single multi-service platform designed to support and automate mixed occasional use live and file broadcast workflows, in combination with always-on data and voice services".

Newtec reckons the flexibility of its platform enabled SENTECH to tailor it for the services it required while still receiving guaranteed optimal modulation, bandwidth allocation and service availability, along with reliable automation of link setups and flexible workflow support.

It also provided the company with the ability to utilise Newtec's *Mx-DMA* return link technology. This is claimed to deliver the efficiency of SCPC with the dynamic bandwidth allocation of MF-TDMA in a cost-effective manner.

By deploying *Dialog* across its sites, SENTECH is said to have expanded its capabilities for DTT signal monitoring, IP multicasting, radio backhaul, point of sale support and government disaster recovery connectivity. Using standard Ku-band capacity, it has been able to expand its current service offering while retaining the ability to scale up its operations within the current *Dialog* setup.

Creating Village Islands in Nigeria

Citing a report published by Twinpine¹ last August, Gilat Satcom said less than half of Nigeria's population of almost 185 million people have active phone numbers. More recent figures from Nigeria's Universal Service Provision Fund (USPF) state that around 36.8 million people in the country live in areas that are more than 5km from a BTS and are therefore considered underserved or unserved.

According to Gilat, these extraordinary statistics illustrate why connecting the unconnected is still a huge challenge in Nigeria. But in the country's north east, around 50,000 people now have voice and data services, thanks to what it said is pioneering work carried out by local telecom specialist Total IT Solutions. It is rolling out networks on behalf of the USPF, which was established to facilitate the extension of ICT and network services to rural, unserved and underserved areas of the country.



Gilat's system was specifically developed to provide internet, VoIP and Video over IP connectivity over a private satellite network with low prices for connectivity for individual villagers.

Total IT Solution has chosen Gilat Satcom as its equipment supplier for the networks. Gilat Satcom says its *Village Island* portfolio provides all the components required to build "extremely efficient and cost-effective self-contained networks". It was specifically developed to provide internet, VoIP and Video over IP connectivity over a private satellite network with low prices for connectivity for individual villagers.

It's claimed the *Village Island* networks can easily be scaled to service hundreds of users with a variety of disposable incomes. The system has been deployed in ten villages so far with the service available to around 50,000 people.

Gilat Satcom has installed VSATs in each village with connectivity provided over its satellite network. The VSATs, Wi-Fi routers and other equipment are powered by solar and housed in a purpose-built communications block (the 'Community Hub') in each village with data available up to 100m away.

The service is pre-paid with people able to buy vouchers in the village. All funds raised are ploughed back to cover opex.

Muhammad Yahya Sanda, CEO of Total IT Solutions, said: "These networks have already exceeded the expectations of the villagers. We all have friends and family in rural areas and now they are connected to us and to education, medical services, commerce and so much more."

Following the success of these networks, Total IT Solutions plans to rollout hundreds more across rural Nigeria.

Critical communications

Huawei & Kenya Police

In the remote areas of Kenya, the wireless emergency communication network used by the national Kenyan Police used an old analogue trunking system and out-of-date equipment.

As well as high O&M costs, Huawei said the trunking system was vulnerable to external signal interference so that officers on patrol and manning the command centre were unable to hear each other clearly.

Although TETRA has been used in cities such as Nairobi, Huawei said the system only supports voice and not video and broadband data services.

To make citizens and their work environment safer, and to attract more foreign investments, the Kenya Police realised it needed an emergency communications network with better features and advanced technologies to be able to employ video dispatching, video surveillance, and high-speed data backhaul services.

What's more, in its plan for 2030, the country's government said the information industry is one of three key areas that needs to be focused on.

The emergency communications network used by the Kenya Police is constructed and maintained by Safaricom. It worked with Huawei to deploy an eLTE emergency communications network in Nairobi, suburban areas up to 10km distant from the city, and in the urban areas of Mombasa, the country's second-largest city.

When emergencies occur, on-duty personnel at the Nairobi Police Station can send on-site, real-time high-definition videos to a large screen at the command centre by pressing the shortcut buttons on their trunking handsets. The command centre can then deliver these videos to police cars equipped with voice and video stations. As a result, all on-duty personnel at headquarters, the command centre, and in police cars can conduct a visible, coordinated, three-pronged operation.

Huawei said it also provided a unified solution that integrates intelligent video surveillance, IP contact centres, telepresence video conferencing, and a geographic information system. The solution is used on the eLTE emergency network to deliver voice, video, and data services.

This is said to have improved the Kenya Police's ability to cooperate with medical departments, municipal administrations, and other departments, as well as enhance the efficiency of its emergency response.

In 2016, Safaricom planned to continue to work with Huawei to speed the construction of Kenya's eLTE emergency communications network and extend it to other major cities and roads in the country.

¹<http://techcabal.com/2016/08/04/mobile-is-eating-nigeria-according-to-the-2016-twinpine-mobile-trends-report/>.

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T: 00 242 05 510 72 72
contact@arpce.cg | www.arpce.cg

Congo (Dem, Rep.)

Autorité de régulation de la poste et des télécommunications du Congo

Boulevard du 30 juin Building Gécamines, 5ème Niveau Gombe, Kinshasa
T: +243 81 03 85 910 | F: +243 81 26 10 047
www.arptc.cd

Côte d'Ivoire

Agence des Telecommunications de Cote d'Ivoire

18 BP 2203 Abidjan 18, Côte d'Ivoire
T: +225 20 34 43 73/74 | F: +225 20 34 43 75
courrier@artci.ci | www.artci.com

Djibouti

Ministère de la Communication, chargé des Postes et des Télécommunications

P.B. 32 Boulevard Georges Pompidou,
Djibouti Rep de Djibouti
T: (+253)21 35 39 28 | F: (+253)21 35 39 57
info@communication.gov.dj | mcpt@intnet.dj

Egypt

National Telecom Regulatory Authority

Smart Village, Building No. 4, Km 28 Cairo, Alex Rd
T: (+202) 3534-4000 | F: (+202) 3534-4155
info@tra.gov.eg |
www.tra.gov.eg / www.ntra.gov.eg

Equatorial Guinea

Órgano Regulador de las Telecomunicaciones

Malabo, Malabo, Bioko Norte Equatorial Guinea
T: +240 333 096166 | info@ortel-ge.org
www.ortel-ge.org

Eritrea

Eritrea Telecommunication Services Corporation

Communications Department, Sematat Street 11,
P.O. Box 4918, Asmara
T: +2911123 692 | F: +2911126 966
www.eritel.com.er

Ethiopia

Communication and Information Technology Standardization and Regulation Directorate

Tegene Building 4th Floor, Debrezeyt Road,
Addis Ababa, Ethiopia, P.O. Box 9991
T: +251(0)114 656011 | F: +251(0)114 655763
tele.agency@ethionet.et | www.eta.gov.et

Gabon

Autorite de Regulation des Communications Electroniques et des Postes

Haut de Gué Gué BP. 50 000 Libreville, GABON
T: +241 01446811/12 | F: +241 01446806
arcep@arcep.ga | www.arcep.ga

Gambia

Gambian Public Utilities Regulatory Authority

94, Kairaba Avenue, Fajara, KSMD, P.O. Box 4230,
Bakau, The Gambia, West Africa
T: +220 4399601/4399604 | F: +220 4399905
info@pura.gm | www.pura.gm

Ghana

National Communications Authority

P.O. Box CT 1568, Cantonments, Accra Ghana
T: +233 (0) 302 -776621/ 771701 / 762823
info@nca.org.gh | www.nca.org.gh

Guinea Republic

Regulatory Authority for Posts and Telecommunications

7 Avenue Bis, BP 5000, Conakry,
T: 657 66 66 31 | arpt@arpt.gov.bn
www.arpt.gov.bn

Guinea-Bissau

Autoridade Reguladora Nacional das Tecnologias de Informacio e Comunicatino

Avenida Domingos Ramos, n°53
CP 1372, Bissau, Republic of Guinea-Bissau
T: 245 204 873 | F: 245 204 876
icgb@mail.bissau.net | www.icgb.org/

Kenya

CAK – Communications Authority of Kenya

P.O. Box 14448, Nairobi, 00800
T: +254 (20) 4242000 2441081-4
info@ca.go.ke | www.ca.go.ke

Lesotho

Lesotho Communications Authority

30 Princess Margaret Road, Maseru, Lesotho
T: +266 2222 4300 / 5222 1300
admin@lca.org.ls | www.lca.org.ls

Liberia

Liberia Telecommunications Authority

12th Street Sinkor, Tubman Boulevard, Monrovia
T: +231 273 020 12 / +231 273 02018 /
+231 77 051 051
info@lta.gov.lr | www.lta.gov.lr

Libya

General Post and Telecommunication Company
Al Zawia St, GPTC Tower, Tripoli, Libya,
P.O. Box 886 Libya

Madagascar

Office Malagasy d'études et de Regulation des Telecommunications
Rue Ravoninahitriniarivo Alarobia,
101 Antananarivo, MADAGASCAR
T: +261 20 22 421 19 | artec@artec.mg
www.omert.mg

Malawi

Communications Regulatory Authority
Salmin Amour Road, Private Bag 261, Blantyre,
Malawi
T: +265 (0) 1 883 611 | F: +265 (0) 1 883 890
dg-macra@macra.org.mw / info@macra.org.mw

Mali

Comité de Régulation des Télécommunications du Mali
ACI 2000 Hamdallaye, BP: 2206, Bamako, MALI
T: (+223) 20 70 57 00 / 20 23 14 90 / 44 97 65 21
F: (+223) 20 23 14 94
amrtp@amrtp.ml | www.amrtp.ml

Mauritania

Autorité de régulation de la Mauritanie
BP: 4908, Nouakchott, Mauritanie
T: 00 222 529 12 70 | F: 00 222 529 12 720
www.are.mr

Mauritius

Information and Communication Technologies Authority
Level 12, The Celicourt Tower, Sir Célicourt
Antelme St, Port Louis, Mauritius
T: +230 211 5333 | F: (+230) 211 9444
icta@intnet.mu | www.icta.mu

Morocco

Agence Nationale de Réglementation des Télécommunications
Centre d'affaire, Boulevard Ar-Ryad
T: 05 37 71 84 00 | F: 05 37 20 38 62
www.anrt.ma

Mozambique

Instituto Nacional das Comunicações de Moçambique
Praça 16 de Junho, No. 340, Bairro da Malanga
C.P. 848
T: +258 21 227100 | F: +258 21 016 211
info@incm.gov.mz | www.incm.gov.mz

Namibia

Communication Regulatory Authority of Namibia
Private Bag 13309, Windhoek, Namibia, 9000
T: +264 61 222 666 | F: +264 61 222 790
communications@cran.na | www.cran.na

Niger

Autorité de Régulation Multisectorielle
64, Rue de Batisseurs, Niamey, NIGER, 13179
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

Sao Tomé & Principe

Autorité Générale de Régulation
Avenida Marginal 12 de Julho, 054 Sao 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
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Uganda

Uganda Communications Commission
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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	Technology	Infrastructure	Operations	Outsourcing & Ancillaries	Network Services & Applications	
ABS Blk B, Suite B101B, 1st Floor Ambridge Office Park, Vrede Road Bryanston, JHB SOUTH AFRICA info@absatellite.com www.absatellite.com +27 10 594 4621	Cellular Wireless Access Critical Comms (PMR/DMR/TETRA) Satellite M2M/Internet of Things Fibre Networks Radio Access Networks Masts, Antennas, Tower Products Wi-Fi & Access Points Optical Fibre, Network Cables & Accessories Power Products & Accessories Network Cables and Accessories Test & Monitoring Equipment Network Security (Hardware & Software) Backhaul	✓	✓	OS/BSS - Churn Management & CRM Fraud Detection & Revenue Assurance Traffic Analysis & Management Network Planning & Optimisation Inventory Management Energy Efficiency	Network Build Managed Services Consultancy & Training Data Centre Services SIM Cards Wireless handsets & End User Devices	Broadband Broadcast Enterprise Services Mobile financial services Mobile Apps Other VAS
 Accutronics 48 Bram Fischer Drive Blairgowrie Randburg 2194 SOUTH AFRICA info@accutronics.co.za www.accutronics.co.za +27 11 782 8728 +27 86 666 2645	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	ABS are one of the fastest growing satellite operators in the world, operating a global fleet of 7 satellites. ABS provide capacity to support video and television distribution, cellular backhaul, broadband trunking and maritime connectivity. Its extensive teleport network provides comprehensive coverage to 93% of the world's population including Africa, Middle East, Asia Pacific, Russia/CIS and the Americas. ABS have strategic alliances and partnerships with state-of-the-art communication hubs to deliver the best innovative satellite solutions. Headquartered in Bermuda, ABS have offices in the US, UAE, South Africa and Asia. ABS are majority owned by funds managed by the European Private Equity firm Permira.	For more information, visit: www.absatellite.com			
 ACE Consortium c/o France Telecom 61 rue Des Archives Paris, FRANCE www.ace-submarinecable.com +220 437 8028 or 437 8031	✓	Accutronics specialises in supplying electronic components to industries that demand quality, reliability and class-leading performance. Products offered include a complete range of RF and Microwave components, SATCOM systems, Fiber Optic components and Electromagnetic Field monitoring equipment. Additionally, we offer a comprehensive range of Power Supply products and Transducers for remote sensing applications. With quality and reliability as core values, Accutronics only represents manufacturers with like-minded philosophies. As a result, the company has become a key supplier to customers utilising the class-leading products and services offered. The customer base includes renowned OEM's, Integrators and End Users typically working in the Military, SATCOM, Wireless and Industrial sectors.				
		ACE is a consortium of telecom operators from Africa and Europe. The Consortium has recently launched segments one, two and three of the ACE submarine cable for commercial service since 19th December, 2012. These segments being the first phase stretched from France to Sao Tome connecting 15 coastal countries and 2 landlocked countries, namely, Mali and Niger. The supply contract for the second phase, which will complete the 17,000 km cable distance to South Africa, has been signed and the construction is underway. This plans to provide landing stations in Congo Brazzaville, Democratic Republic of Congo, Angola, Namibia and South Africa, with the desire to further connect landlocked countries along the way. In the end, 23 countries will be connected to the ACE submarine system. The ACE system that is being upgraded to the 100G technology, will increase its design capacity from 5.12 Tbps to 12.8 Tbps. The system is supported by wavelength division multiplexing (WDM) technology that would accommodate tomorrow's ultra-broadband networks.	The ACE submarine system has positioned itself as a key driver of Africa's social and economic growth. The 19 members of the ACE Consortium are Benin, Cable Consortium of Liberia, Canalink, Cote d'Ivoire Telecom, Dolphin, Orange France, Gambia Submarine Cable Company, GUILAB, International Mauritania Telecom, Republic of Cameroun, Orange Mali, Orange Niger, MEO, Republic of Equatorial Guinea, Republic of Gabon, Sierra Leone Cable (SALCAB) Limited, Sonatel and STP CABO ". The consortium is pleased to announce the formal launching into operations of the Benin, Lagos and Tenerife branches by June 2015.			

Company location, country, website	Technology			Infrastructure			Operations			Outsourcing & Ancillaries			Network Services & Applications																						
	Cellular	Wireless Access	Critical Comms (PMR/DMR/TETRA)	Satellite	M2M/Internet of Things	Fibre Networks	Radio Access Networks	Masts, Antennas, Tower Products	Wi-Fi & Access Points	Optical Fibre, Network Cables & Accessories	Power Products & Accessories	Network Cables and Accessories	Test & Monitoring Equipment	Network Security (Hardware & Software)	Backhaul	OSS/BSS - Churn Management & CRM	Fraud Detection & Revenue Assurance	Traffic Analysis & Management	Network Planning & Optimisation	Inventory Management	Energy Efficiency	Network Build	Managed Services	Consultancy & Training	Data Centre Services	SIM Cards	Wireless handsets & End User Devices	Broadband	Broadcast	Enterprise Services	Mobile financial services	Mobile Apps	Other VAS		
Cobbett Hill Earthstation Ltd Guildford, Surrey UK www.cobbeithill.com	✓	✓	✓												✓			✓					✓	✓	✓	✓	✓	✓							
Comtech EF Data Tempe, AZ, USA www.comtechefdata.com		✓			✓										✓		✓	✓																	
Concilium Technologies (Pty) Ltd 3 Highgrove Office Park 50 Tegel Avenue Highveld Technopark Centurion, SOUTH AFRICA info@concilium.co.za www.concilium.co.za +27 12 678 9200 +27 12 665 4160	✓	✓	✓	✓	✓	✓								✓																					
 Concilium Technologies Real Alliances Real Solutions																																			
Controllis Limited Compass House Vision Park, Histon Cambridge, UK sales@controllis.com www.controllis.com +44 1223 393 516	✓	✓	✓											✓					✓																
 Controllis Perpetual Power																																			
Coral-i Solutions Gauteng, SOUTH AFRICA www.coral-i.com	✓	✓			✓										✓			✓																	
CSG International Wells Court, Albert Drive Woking, Surrey, UK heidi.halliday@csgi.com www.csgi.com +44 1483 745 800 +44 1483 745 860				✓													✓	✓																	
 CSG INTERNATIONAL																																			
CXR Wireless Abondant, FRANCE www.cxr-wireless.com	✓	✓	✓		✓	✓	✓								✓																				

Company location, country, website	Technology	Infrastructure	Operations	Outsourcing & Ancillaries	Network Services & Applications
Eutelsat SA 70 rue Balard 75015 Paris FRANCE infomaster@eutelsat.com www.eutelsat.com +33 1 53 98 47 47 +33 1 53 98 37 00	Cellular Wireless Access Critical Comms (PMR/DMR/TETRA) Satellite M2M/Internet of Things Fibre Networks Radio Access Networks Masts, Antennas, Tower Products Wi-Fi & Access Points Optical Fibre, Network Cables & Accessories Power Products & Accessories Network Cables and Accessories Test & Monitoring Equipment Network Security (Hardware & Software) Backhaul	OSS/BSS - Churn Management & CRM Fraud Detection & Revenue Assurance Traffic Analysis & Management Network Planning & Optimisation Inventory Management Energy Efficiency Network Build	Managed Services Consultancy & Training Data Centre Services SIM Cards Wireless handsets & End User Devices	Broadband Broadcast Enterprise Services Mobile financial services Mobile Apps Other VAS	
 FG WILSON 1 Millennium Way Springvale Business Park Springfield Road, Belfast County Antrim NORTHERN IRELAND web_editor@fgwilson.com www.fgwilson.com +44 28 9049 5000 +44 28 2826 1111	Eutelsat is one of the world's leading operators of communications satellites. Through our global fleet of 39 satellites, we broadcast 6300 TV channels, to over 274 million cable and satellite homes in Europe, the Middle East and Africa and have become an essential source of high performance and flexibility for telecommunications operators and companies in five continents. The Group is based in Paris and has offices and a worldwide network of teleport. Eutelsat employs a workforce of 1000 people representing 37 different nationalities.	✓			
 Flexenclosure Eriksbergsgatan 10 SE-114 30 Stockholm SWEDEN info@flexenclosure.com www.flexenclosure.com +46 510 42 7000 +46 510 42 7000	Founded in 1966, FG Wilson was among the first to bring mass-scale production to generator sets, launching self-contained generator sets which were simple to operate and were easy to install. The brand is now a major player in the global market for generator sets installing over 600,000 since 1990 alone, with a total installed capacity of almost 90 GW - more than the total installed mains electricity capacity of a country like the UK. In Africa, we've installed over 130,000 units with a total capacity of over 12 GW, double the total installed mains electricity capacity of Nigeria. With that number of machines operating across the world, we take no risks with quality or	✓			
 Gazprom Space Systems Moscow Street, Bld. 77B Shchelkovo, Moscow region 141112 RUSSIA info@gazprom-spacesystems.ru www.gazprom-spacesystems.ru +7 495 504-29-06 +7 495 504-29-11	Flexenclosure provides sustainable Internet infrastructure for emerging markets - designing and manufacturing prefabricated data centres and intelligent power management systems for the ICT industry. The company provides systems that are fully integrated, modular, factory tested for reliability, adaptable to local conditions and quick to install. eSite x10 is the world's first hybrid power system purpose-built for outdoor telecom	sites and to outdoor telecom standards. It is a patented, sealed, tamper-proof unit with passive convection cooling, no filters, no moving parts and it requires no maintenance. eSite x10 is the future of hybrid power. eCentre is a state-of-the art, custom-designed, prefabricated and pre-integrated data centre building that is fast to deploy, energy efficient and fully future proofed. With its flexible and easily expandable white space, eCentre enables	✓	✓	highly capital efficient data centre deployments and has been certified up to Tier IV level.
 Gilat Satcom Petah Tikva, ISRAEL www.gilat.net	Gazprom Space Systems (GSS) is a Russian non-governmental satellite operator. GSS operates four "Yamal" satellites and advanced ground telecommunications infrastructure. Yamal-402 (55E) has 4 fixed Ku-band beams covering Russia, Europe, Sub-Saharan Africa,	and a steerable beam pointed over DRC and neighboring countries and cross-strapped with Northern Beam. Yamal-202 (49E) has a good semi global coverage in C-band over Middle East, North Africa, Europe, South and South-East Asia.	✓	✓	Yamal-401 (90E) C and Ku-band beams cover the major part of Russia and its neighbours. Yamal-300K (183E), provides Ku-band over the Far East, North Pacific and Alaska. Steerable beam is also available for Australia, Philippines or Indonesia.
	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓		✓ ✓ ✓	✓ ✓ ✓	

Company location, country, website	Technology	Infrastructure				Operations		Outsourcing & Ancillaries		Network Services & Applications		
Intelsat Johannesburg South Africa www.intelsat.com	Cellular Wireless Access Critical Comms (PDR/DMR/TETRA) Satellite M2M/Internet of Things Fibre Networks Radio Access Networks Masts, Antennas, Tower Products Wi-Fi & Access Points Optical Fibre, Network Cables & Accessories Power Products & Accessories Network Cables and Accessories Test & Monitoring Equipment Network Security (Hardware & Software) Backhaul	✓						✓				
Intracom Telecom 19.7 km Markopoulou Ave 19002 Peania Athens, GREECE info@intracom-telecom.com www.intracom-telecom.com +30 21 0667 1000 +30 21 0667 1820	✓ ✓	✓	✓ ✓ ✓	✓	✓	✓	✓	✓	✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	
	Intracom Telecom is a global telecommunication systems and solutions vendor operating for 40 years in the market.				competitive portfolio of revenue-generating telco software solutions and a complete range of ICT services, focusing on big data analytics, converged networking and cloud computing for operators and private, public and government clouds.				Over 100 customers in more than 70 countries choose Intracom Telecom for its state-of-the-art technology. The company operates subsidiaries in Europe, Russia and the CIS, the Middle East and Africa, Asia and North America. In the African continent, Intracom Telecom operates subsidiaries in South Africa and Morocco under the name Inratelecom SA.			
KATHREIN AFRICA LIMITED 40 King George VI Avenue Floreal 74112 MAURITIUS info@kathrein.mu www.kathrein.mu +230 697 2600 +230 696 2070	✓	✓	✓ ✓ ✓ ✓	✓	✓		✓ ✓		✓			
	Intracom Telecom innovates in the areas of small-cell backhaul, wireless transmission and broadband wireless access and has successfully deployed its industry leading point-to-point and point-to-multipoint packet radio systems worldwide. Moreover, the company offers a				The company invests significantly in R&D developing cutting-edge products and integrated solutions that ensure customer satisfaction.							
MEASAT Global Berhad MEASAT Teleport & Broadcast Centre Jalan Teknokrat 1/2 63000 Cyberjaya MALAYSIA sales@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.				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, the Middle East and Southeast Asia.				television programming to pay television platforms, and by telecommunications operators to support remote connectivity, cellular backhaul, IP trunking and corporate VSAT networks.			
		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				The MEASAT fleet supports leading DTH platforms in Malaysia, Brunei, India and Indonesia, providing DTH multi-channel television services to over 20 million subscribers.				Working with a select group of world-class partners, MEASAT also provides a complete range of broadcast and telecommunications solutions. Services include UHD/HD and SD video play-out, video turnaround, co-location, uplinking, broadband and IP termination services.		
Mobile Mark Europe Ltd 8 Miras Business Park Hednesford Staffordshire, UK iclark@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.				mining, utilities, remote monitoring, machine-to-machine (M2M) and the Internet of Things (IoT). Antenna styles include omni-directional and directional infrastructure antennas for network rollout; multiband mobile antennas for fleet management; low-profile and embedded antennas for M2M/IOT applications.				USA and UK. Their responsive manufacturing capabilities and production controls ensure that antennas are delivered on time and to spec. Their experienced engineering design group can take a project from initial concept through to final production. They also offer in-house engineering design and RF testing facilities for custom designs.			
Mobile Mark antennas are manufactured in the												

Company location, country, website	Technology				Infrastructure				Operations				Outsourcing & Ancillaries			Network Services & Applications																	
	Cellular	Wireless Access	Critical Comms (PMR/DMR/TETRA)	Satellite	M2M/Internet of Things	Fibre Networks	Radio Access Networks	Masts, Antennas, Tower Products	Wi-Fi & Access Points	Optical Fibre, Network Cables & Accessories	Power Products & Accessories	Network Cables and Accessories	Test & Monitoring Equipment	Network Security (Hardware & Software)	Backhaul	OSS/BSS - Churn Management & CRM	Fraud Detection & Revenue Assurance	Traffic Analysis & Management	Network Planning & Optimisation	Inventory Management	Energy Efficiency	Network Build	Managed Services	Consultancy & Training	Data Centre Services	SIM Cards	Wireless handsets & End User Devices	Broadband	Broadcast	Enterprise Services	Mobile financial services	Mobile Apps	Other VAS
Motorola Solutions Motorola Solutions South Africa 33 Fricker Road, Illovo Sandton 2196, SOUTH AFRICA MarketingSSA@motorolasolutions.com www.motorolasolutions.com +27 11 800 7800 +27 11 800 7923	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
 MOTOROLA SOLUTIONS	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.				Founded in 1928, Motorola has a history of innovation that has revolutionized				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.				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.																				
Neural Technologies Ltd Ideal House, Bedford Road Petersfield Hampshire, UK info@neuralt.com www.neuralt.com +44 1730 260 256 +44 1730 260 466	✓	✓	✓	✓												✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
 Neural Technologies	Neural Technologies is one of the world's leading providers of Revenue Management, Digital Transformation and Data Integration tools. The company has built an international reputation over 25 years for providing award-winning quality business solutions.				The company's innovative Optimus platform brings accord and insight to enterprise data. Its technology simplifies the complexity of Big Data for clients worldwide, with products addressing the challenges of Fraud, Revenue Assurance, Collections, Credit Risk, Dunning, Rating, Charging,				Order Orchestration, Mediation and more.				Neural Technologies is active in over 45 countries and has a presence in Africa, North America, Latin America, Europe, India and Asia Pacific.																				
PCCW Global 33/F, PCCW Tower Taikoo Place, Quarry Bay HONG KONG marketing@pccwglobal.com www.pccwglobal.com +852 2888 6688 +852 2962 5388		✓	✓				✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
 PCCW Global	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.				Our global IPX network supports a one stop solution for next generation of voice, video, messaging, roaming solutions, enabling MNOs to deliver a high quality seamless mobile experience.				Our media and entertainment solutions include fast, efficient video contribution and distribution, 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.								
RADWIN PO Box 3554, Rivonia Johannesburg 2128 SOUTH AFRICA sales@radwin.com www.radwin.com +27 74 114 2805	✓	✓		✓	✓										✓								✓	✓									
 RADWIN	RADWIN is a leading provider of wireless Point-to-Point, Point-to-Multipoint and FiberinMotion® solutions for broadband-in-motion. RADWIN's solutions deliver voice, video and data with unmatched high-capacity for long ranges.				Deployed in over 150 countries, RADWIN's solutions serve the needs of service providers, mobile carriers, governments, enterprises, public and private security companies and transportation organizations.				RADWIN's solutions power applications including backhaul, broadband access, private network connectivity, video surveillance transmission as well as wireless mobile in motion for trains and metros.																								

Company location, country, website	Technology	Infrastructure										Operations		Outsourcing & Ancillaries			Network Services & Applications																															
		Cellular	Wireless Access	Critical Comms (PNC/DMR/TETRA)	Satellite	M2M/Internet of Things	Fibre Networks	Radio Access Networks	Masts, Antennas, Tower Products	Wi-Fi & Access Points	Optical Fibre, Network Cables & Accessories	Power Products & Accessories	Network Cables and Accessories	Test & Monitoring Equipment	Network Security (Hardware & Software)	Backhaul	OSS/BSS - Churn Management & CRM	Fraud Detection & Revenue Assurance	Traffic Analysis & Management	Network Planning & Optimisation	Inventory Management	Energy Efficiency	Network Build	Managed Services	Consultancy & Training	Data Centre Services	SIM Cards	Wireless handsets & End User Devices	Broadband	Broadcast	Enterprise Services	Mobile financial services	Mobile Apps	Other VAS														
Rajant Corporation 400 East King Street Malvern, PA 19355 USA info@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.										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.																						
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 epolischuk@rsc.ru www.rsc.ru +7 (495) 730-0450 +7 (495) 730-0383		✓	The Russian Satellite Communication Company (RSCC) is Russia's national satellite communications operator, whose spacecraft ensure a global coverage. RSCC belongs to the ten largest world satellite operators in terms of satellites and orbital slots.										✓	Europe, Middle East, Africa, Asian-Pacific region, North and South America, and Australia. RSCC provides a full range of communications and broadcasting services using its own terrestrial technical facilities and satellite constellation, which includes 12 up-to-day Express-series spacecraft. The company's satellites provide ample opportunities for the broadcasting organizations,														✓	✓	✓	✓	✓																
SatADSL Chaussée de Wavre 1505 1160 Bruxelles BELGIUM info@satadsl.net www.satadsl.net +32 2 351 33 74		✓	✓	SatADSL provides cutting edge communication solutions to remote companies and business professionals in Europe, Africa, Middle East & Central Asia.										installed more than 3,000 VSAT in more than 40 countries. The specificity of SatADSL is to offer tailor-made solutions based on customer's specific requirements and flexible service plans that meet customer budget. SatADSL provides VSAT networking solutions directly to the most demanding End Users. Through its carrier-grade Service Delivery Platform (SDP) integrating the most advanced														technologies, SatADSL provides custom-made networking solutions, tailor made service plans and value added services including: hierarchical service control & monitoring, traffic prioritization and on line billing and payments. SatADSL SDP is an open platform connected to multiple satellites Hubs operating at various frequency bands (C, Ku and soon Ka-band) with various access technologies (Newtec and soon iDirect).				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

BUYER'S GUIDE

Company location, country, website	Technology	Infrastructure	Operations	Outsourcing & Ancillaries	Network Services & Applications
Sterlite Tech Sterlite Technologies Limited Block 6, Magnet Corporate Park Nr. Sola Flyover, Thaltej Ahmedabad, 380059 INDIA sales@sterlite.com www.sterlitech.com +91 79 660 65 606 +91 79 264 07 640 	Cellular Wireless Access Critical Comms (PMR/DMR/TETRA) Satellite M2M/Internet of Things Fibre Networks Radio Access Networks Masts, Antennas, Tower Products Wi-Fi & Access Points Optical Fibre; Network Cables & Accessories Power Products & Accessories Network Cables and Accessories Test & Monitoring Equipment Network Security (Hardware & Software) Backhaul	Sterlite Technologies Ltd is an integrated telecom solution provider. It designs, builds and manages smarter networks through its optical communication products, network and system integration services and OSS/BSS software. Adhering to TM Forum and 3GPP standards its OSS/BSS software is compatible to large vendor ecosystem supporting CSP's digital transformation journey across all IP networks including 3G/LTE, Wi-Fi, Cable, ADSL, FTTH to launch high speed data, digitization of customer lifecycle and rapid monetization. Sterlite Tech has over 145 patents, presence in more than 100 countries across 6 continents and	OSS/BSS - Churn Management & CRM Fraud Detection & Revenue Assurance Traffic Analysis & Management Network Planning & Optimisation Inventory Management Energy Efficiency Network Build	✓ Managed Services Consultancy & Training Data Centre Services SIM Cards Wireless handsets & End User Devices	Broadband Broadcast Enterprise Services Mobile financial services Mobile Apps Other VAS
Stratosat Datacom (Pty) Ltd 26 Spartan Road, Spartan Ext.21 Kempton Park 1619 SOUTH AFRICA alan@stratosat.co.za www.stratosat.com +27 11 974 0006 +27 11 974 0068 	✓ ✓ ✓ ✓ ✓ ✓	Stratosat Datacom Group is a South Africa based technology company that specializes in the supply of innovative satellite, wireless communication, IP Video Surveillance, Mobility vehicle tracking, astronomy products, services and customer specific infrastructure solutions for the fast-growing African Markets and multinational operators. Stratosat Datacom currently has the largest selection of converged communication hardware	✓ in our inventory throughout the continent. This allow us to be the only company that can react fast to the demands of operators and multinational companies, for equipment in country and technical support to assist our customers with high quality installation and managed services. Stratosat Datacom portfolio includes solutions and products from all major SATCOM equipment manufacturers, including wireless broadband	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	providers, enabling us to provide "Best of Class" products and services through our various subsidiaries, in Nigeria, DRC and Mozambique. Differentiating Stratosat Datacom from the rest of the market is our unique ability to offer our customers complete transmit and receive chain products together with turn-key installation and managed service offerings.
Telecoms Academy London, UK http://telecomsacademy.com/	✓ ✓ ✓ ✓ ✓			✓	
Telegaertner Karl Gaertner GmbH Steinenbronn, GERMANY www.telegaertner.com	✓	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓		
Upstream 4 Kastorias & Messinius Street 15344 Gerakas Athens GREECE global-sales@upstreamsystems.com www.upstreamsystems.com +30 210 661 8500 +30 210 661 8555 	✓	Upstream is a leading mobile commerce platform, accelerating m-commerce in high growth markets. Our software and infrastructure platform already enables 1.2 billion people to effortlessly receive and pay for the most relevant and affordable digital subscription services on their mobile devices. We have 80 million paying subscribers in 45+ countries, making purchases worth \$237 million in 2016 alone.	Upstream's single, integrated platform, offers unrivalled capabilities in localisation, customer acquisition, service delivery, payment and subscription management services. Our product portfolio includes services ranging from infotainment and micro-insurance, to gaming, video portals, cloud storage, antivirus and mobile security, app stores, m-education, and award-winning marketing promotions.	✓ ✓ ✓ For mobile operators, we are a strong partner that leverages their assets to become key players in the mobile commerce space. For developers, publishers and service providers, we offer a shortcut to the next 3 billion consumers. For more information, please visit www.upstreamsystems.com	✓ ✓ ✓

Company location, country, website	Technology	Infrastructure										Operations			Outsourcing & Ancillaries			Network Services & Applications																
		Cellular	Wireless Access	Critical Comms (PMR/DMR/TETRA)	Satellite	M2M/Internet of Things	Fibre Networks	Radio Access Networks	Masts, Antennas, Tower Products	Wi-Fi & Access Points	Optical Fibre, Network Cables & Accessories	Power Products & Accessories	Network Cables and Accessories	Test & Monitoring Equipment	Network Security (Hardware & Software)	Backhaul	OSS/BSS - Churn Management & CRM	Fraud Detection & Revenue Assurance	Traffic Analysis & Management	Network Planning & Optimisation	Inventory Management	Energy Efficiency	Network Build	Managed Services	Consultancy & Training	Data Centre Services	SIM Cards	Wireless handsets & End User Devies	Broadband	Broadcast	Enterprise Services	Mobile financial services	Mobile Apps	Other VAS
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		Vertiv operates throughout Middle East & Africa through 4 sub-regional head offices: United Arab Emirates (Dubai), South Africa (Sandton), Nigeria (Lagos) and Morocco (Casablanca) as well as having an extensive network of in country Distributors. Please refer to our website contact section for full details.										Vertiv designs, builds and services critical infrastructure that enables vital applications for data centres, communication networks and commercial and industrial facilities. Formerly Emerson Network Power, Vertiv supports today's growing mobile and cloud computing markets with a portfolio of power, thermal and infrastructure management solutions including										the ASCO®, Chloride®, Liebert®, NetSure™ and Trellis™ brands. Sales in fiscal 2016 were \$4.4 billion.					For more information, visit https://www.vertivco.com/							
VNL Haryana, INDIA http://www.vnl.in	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
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		Willcom is a 100% South African owned company with Level 1 B-BBEE Contributing recognition, founded in 2003.										With the use of SDN and NFV these technologies allow network operators to break free from expensive, vertically integrated legacy network architectures and deliver the multi-vendor software control, service automation and orchestration that operators have been demanding for years.										through the wealth of knowledge our team has gained through many years of personal experience in Telecommunications and ICT.					Our RF and Optical division leads in the supply and support of RF Handset Test equipment with on and off site calibration for all our RF and Fibre testing tools.							
		We provide Optical Network, OTN to Access, SDN, GPON and NFV solutions that assure full-lifecycle service quality, network-wide. From service activation to ongoing performance monitoring and optimization, our solutions offer the most granular precise tools available for service operators deploying and maintaining performance-critical applications and integrated solutions can be tailored to assure a wide range of QoS-critical applications, effective data traffic conditioning establishes quality of service (QoS) at the service edge, traffic conditions can be enforcing per-flow performance policies, to optimize and prioritize bandwidth utilization across the entire network.										Willcom also provides Test and Measurement solutions, Network monitoring from an end user experience, active and pro-active, synchronization audits and synchronization equipment for TDM, Sync E and PTP1588, and Transmission SLA verification and reporting, to the African Telecommunication Industry. We supply Mobile and Fixed line service providers, national and international operators and independent ISPs throughout Africa.										We have permanently based engineers on some customer sites, providing product support and writing and developing scripts for our Monitoring solutions installed in the networks.					We maintain a high ratio of professionally qualified personnel as part of our workforce enabling us to provide extensive consultation facilities and a high level of on-going support.							
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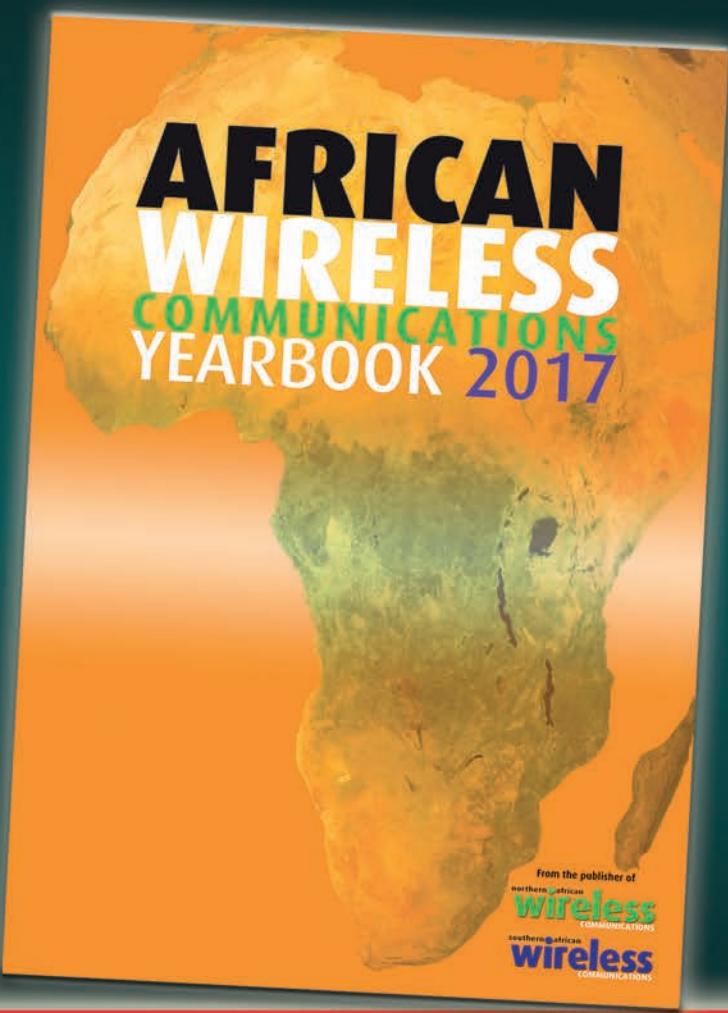
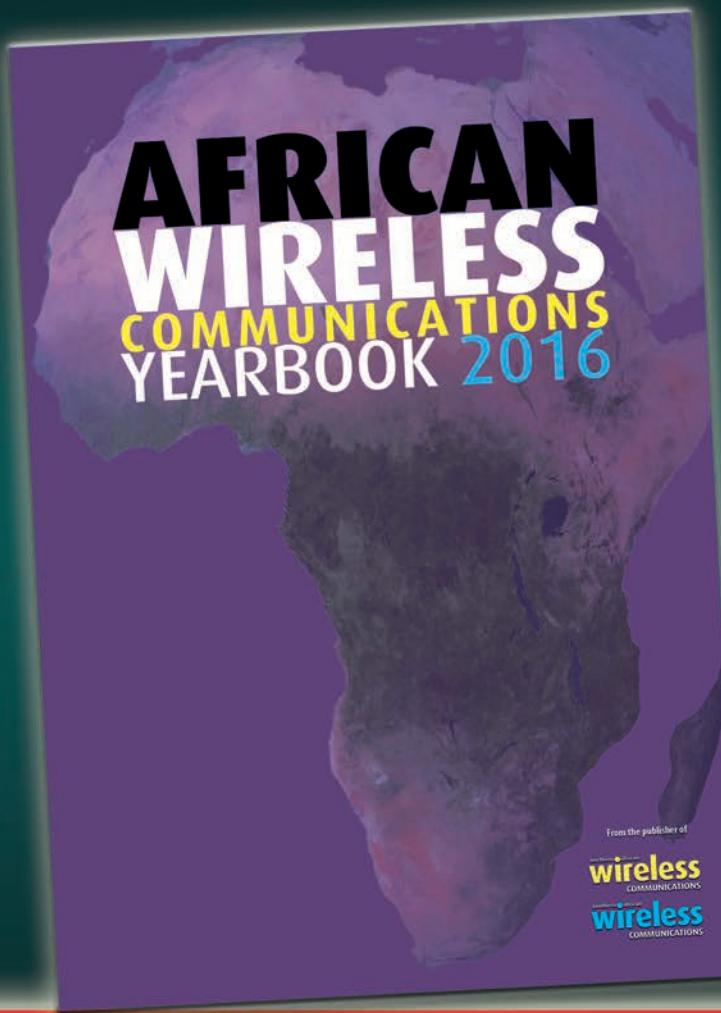
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