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 cellco 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

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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.

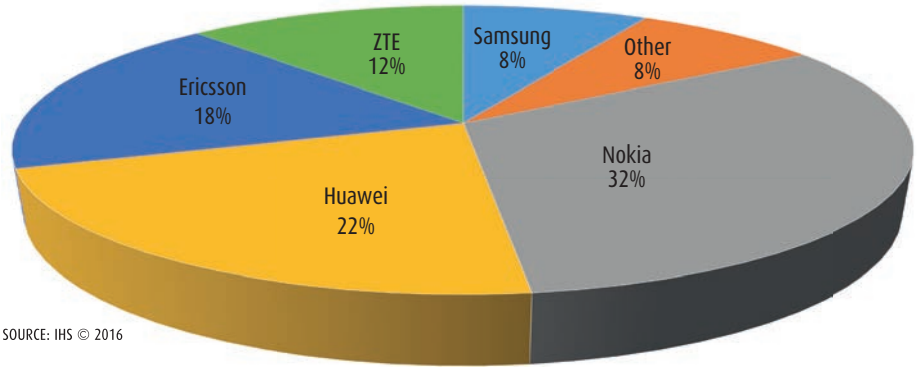
By forecasting population change and analysing population demographics, IHS identified potential tower locations in three towns in the Rift Valley Province likely to benefit from the largest net increase in population: Lokichar, Kitale and Eldoret. Speaking at the time, Natznet Tesfay, director of Africa 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."



SOURCE: IHS © 2016

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

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-Sahara 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	TEMS	USD45m	*TEMS* 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

	POPULATION				SUBSCRIPTIONS PER 100 INHABITANTS				PERCENTAGE OF:		
COUNTRY	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	HOUSE-HOLDS 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 GSM 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.

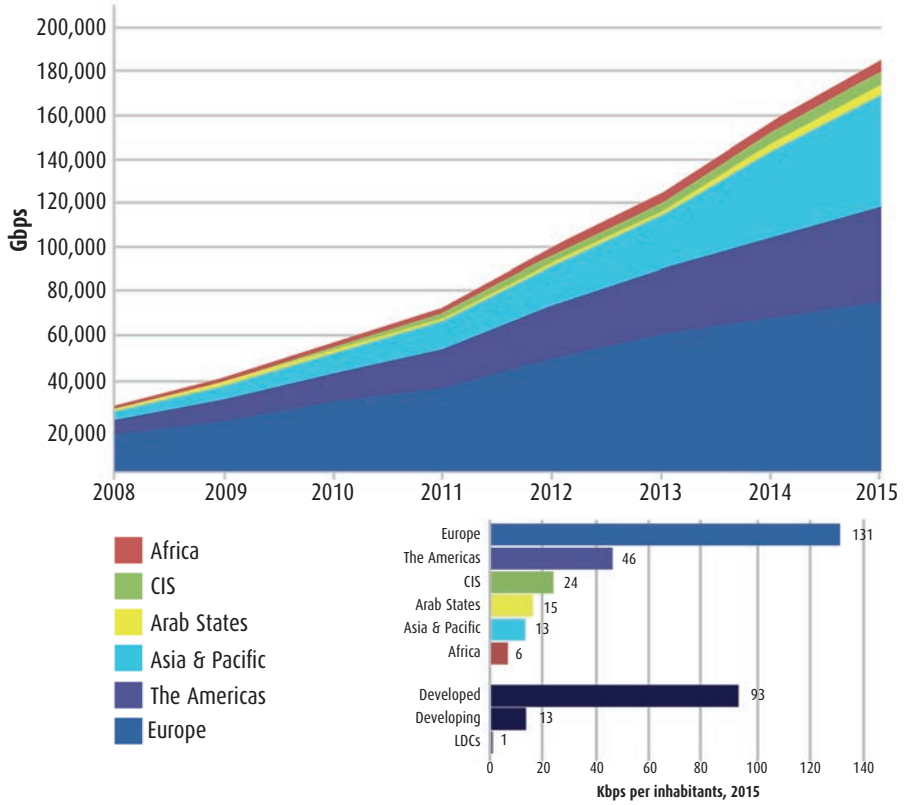
"At the end of 2015, less than half of the population subscribed to mobile services, well below the global average of 63 per cent, and lower than that of the Middle East (58 per cent), Asia Pacific (62 per cent) and Latin America (65 per cent)," stated the report.

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.

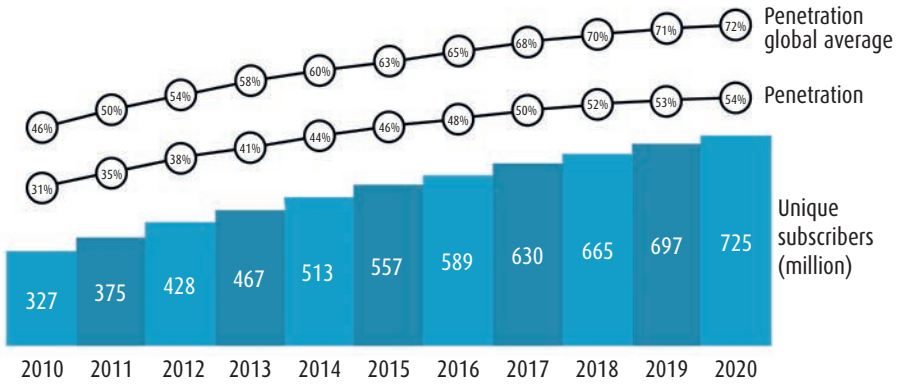
According to the *Africa Market Outlook* by market analyst Ovum, Nigeria has the continent's largest mobile market in terms of users, with 150.22 million mobile subscriptions as at 2Q16, up from 147.94 million a year earlier. Africa's next biggest mobile markets by subscriptions are Egypt, South Africa,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



Unique mobile subscribers in Africa.

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."

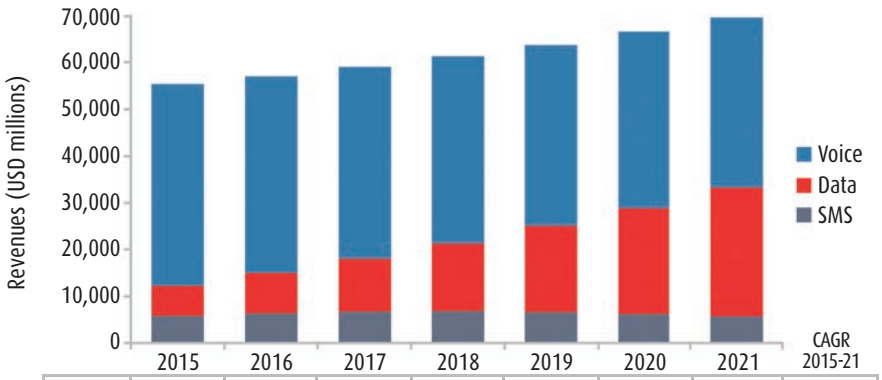
GfK forecasts end-demand consumer purchases rather than manufacturer shipments. It said market sizes are built up by point-of-sale tracking in more than 90 markets with updates on a weekly and monthly basis.

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 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.



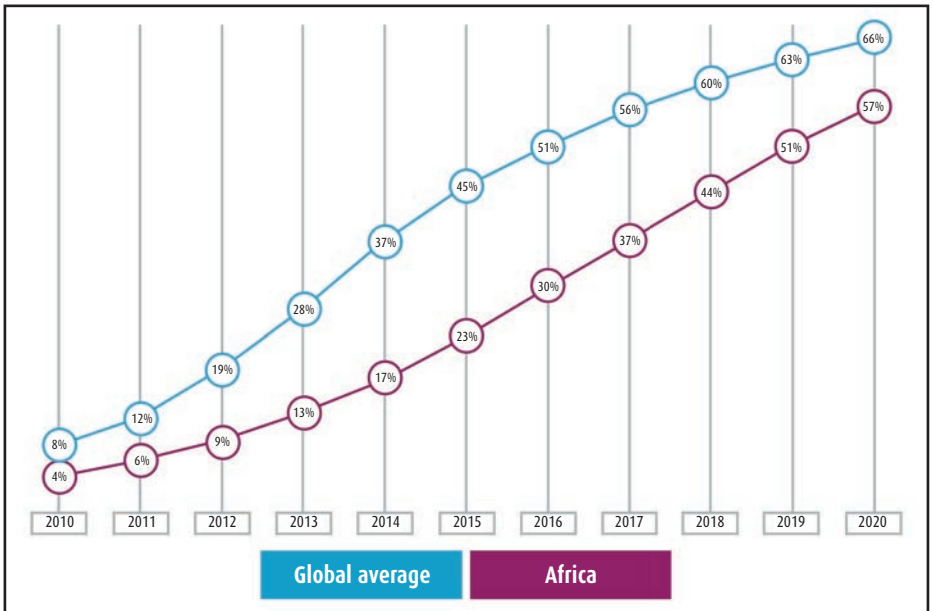
	2015	2016	2017	2018	2019	2020	2021	CAGR 2015-21
Total	55,545	57,146	59,133	61,389	63,878	66,623	69,672	3.8%
Voice	43,264	42,147	41,102	40,008	38,874	37,680	36,371	-2.9%
Data	6,395	8,600	11,228	14,620	18,342	22,677	27,557	27.6%
SMS	5,886	6,401	6,803	6,861	6,662	6,266	5,744	-0.4%

Africa mobile revenue forecast 2015-2021. SOURCE: OVUM

REGIONAL SMARTPHONE SALES FOR 2Q16

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

Technology shift

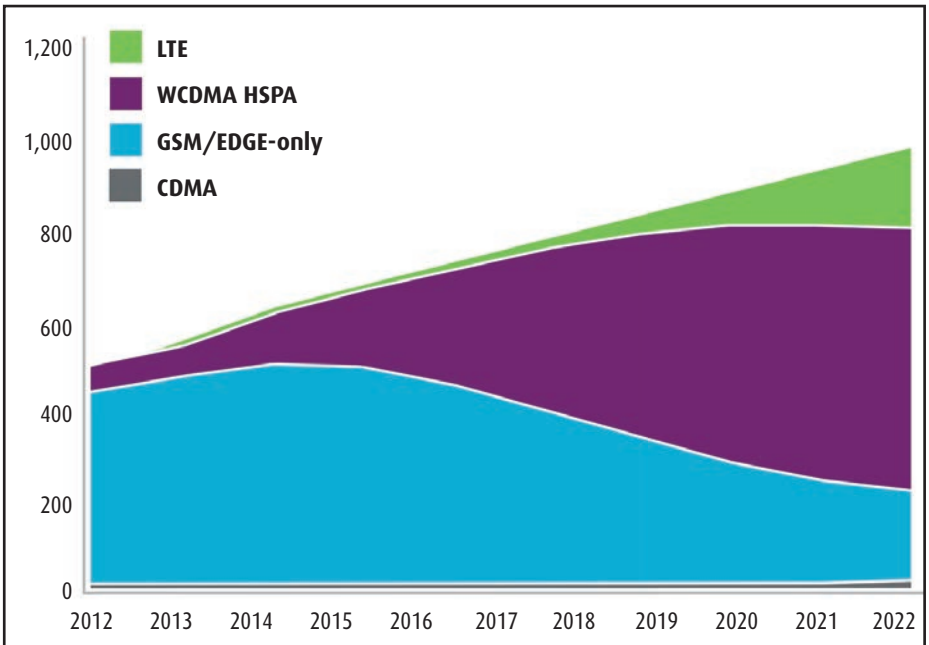
From 2016 to 2022, Ericsson forecasted that sub-Saharan Africa will dramatically shift from a region with a majority of GSM/

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 subscriptions (million) in sub-Saharan Africa. SOURCE ERICSSON MOBILITY REPORT, SUB-SAHARAN AFRICA, NOV 2016

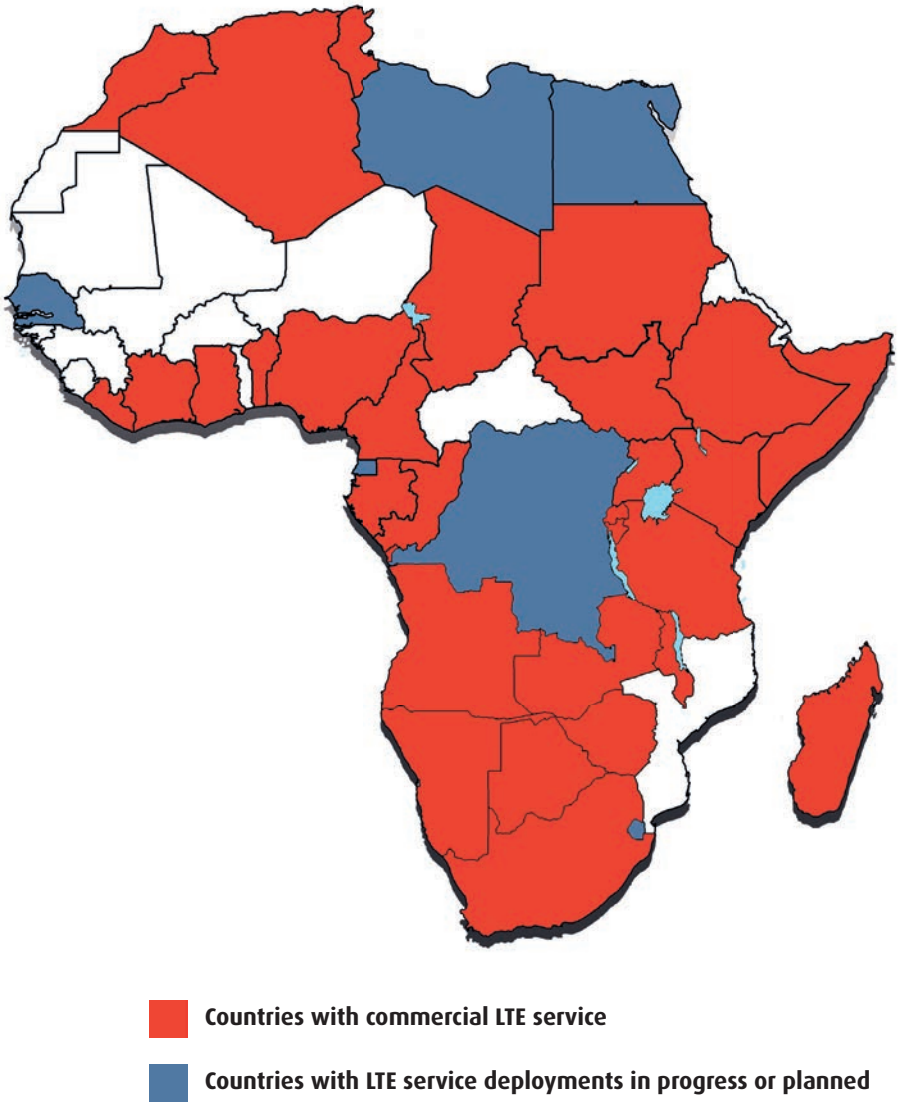
Mobile revenues

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 UD36.37bn 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,



LTE networks in Africa. SOURCE: EVOLUTION TO LTE REPORT, GLOBAL MOBILE SUPPLIERS ASSOCIATION, 30 JAN 2017. WWW.GSA.COM

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 UD210bn (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.)

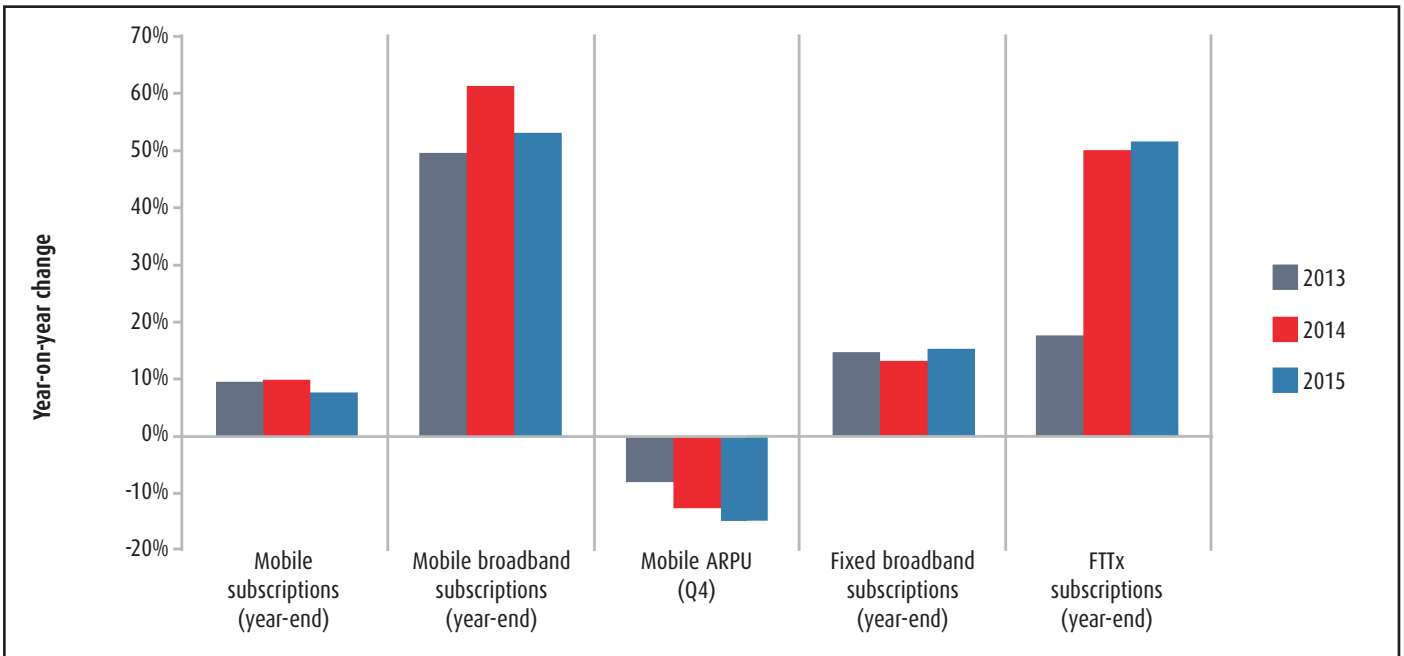
Across MENA, it found that the industry contributed four per cent of the region's GDP, and forecasts that this will grow to almost USD200bn by 2020. The industry also supported the local economy with more than one million jobs in 2015, and contributed USD15bn as part of general taxation.

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



Africa fixed and mobile market overview, 2013-15. SOURCE OVUM

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."

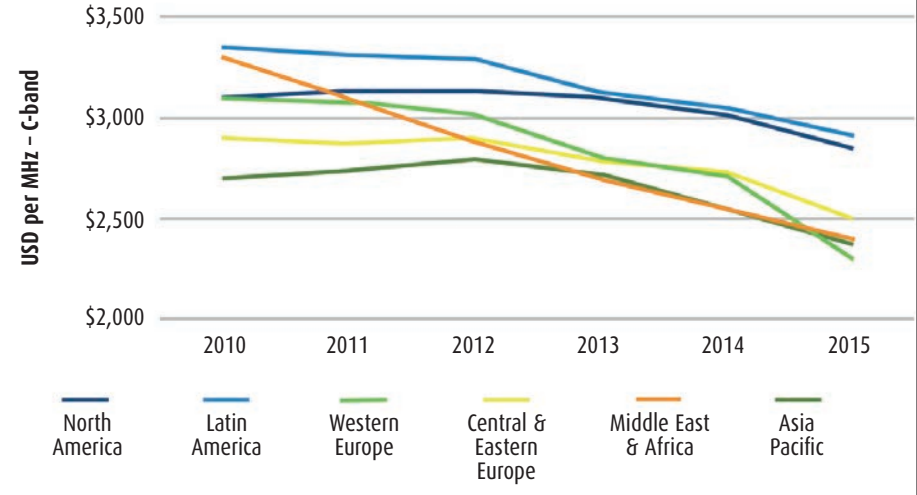
There will certainly be plenty of opportunities for the industry to do this. Euroconsult anticipates that 145 satellites will be launched on average each year by 2025 for government agencies and commercial organisations worldwide. That figure excludes spacecraft smaller than 50kg and the massive low 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.

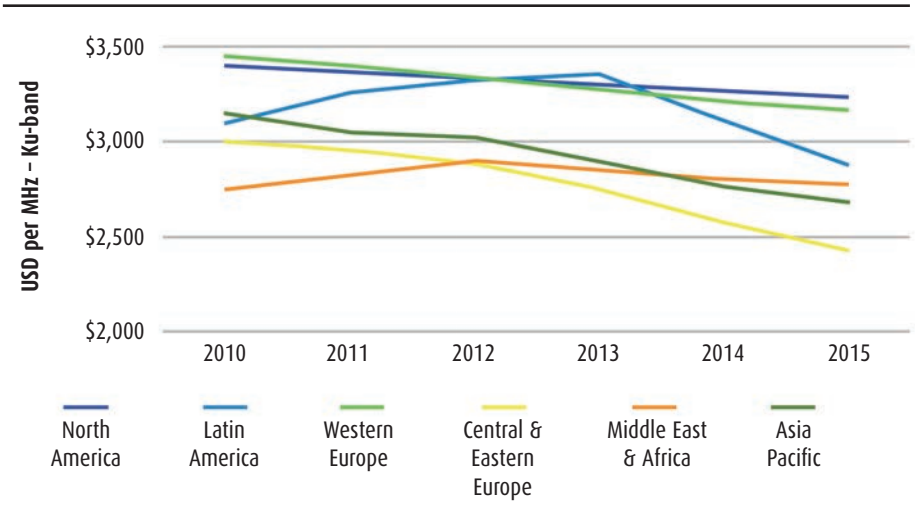
However, in its *Satellites to be built and launched over the next 10 years* report published last September, the analyst stated that this huge growth does not automatically point to a large market: "As the price of the 7,550 future additional satellites is intrinsically low, the very reason for their 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.





SOURCE: NORTHERN SKY RESEARCH. WWW.NSR.COM

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.

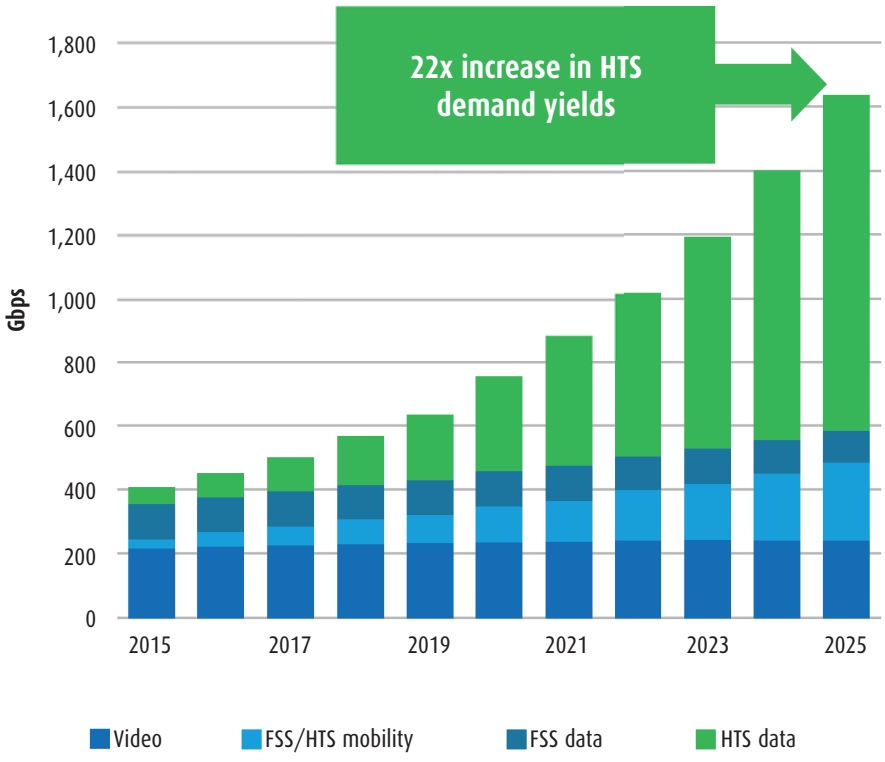
The GVF's Julián Seseña pointed out that satellite-based solutions should not be bound to last mile or rural environments. Instead, he said they should be part of the overall landscape of the telecoms offering for all type of users and all locations.

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."

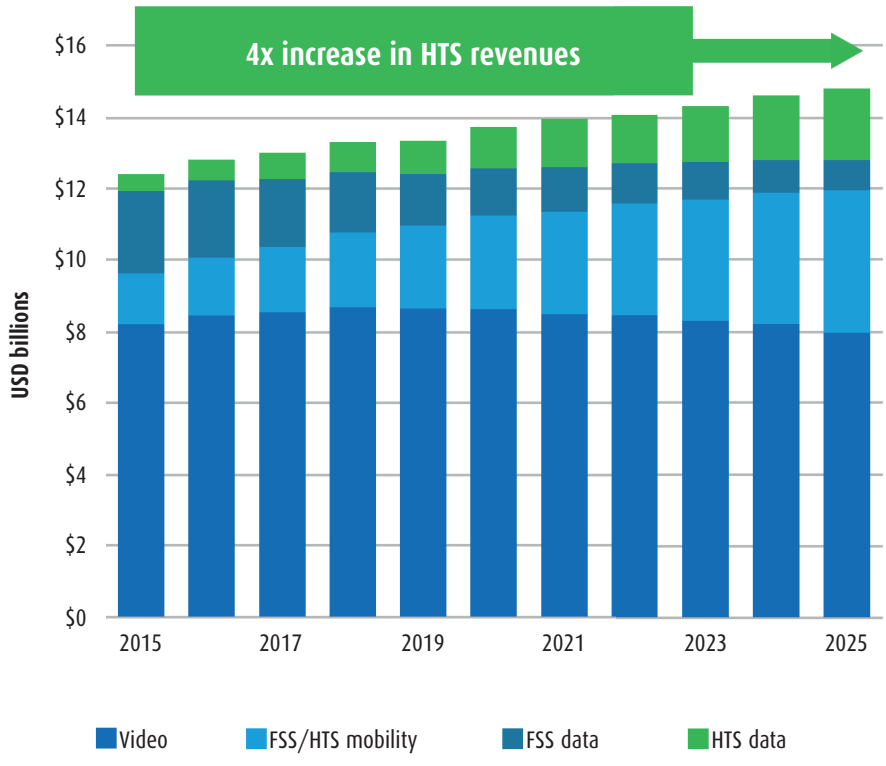
The GVF highlighted the changing structure of satellite terminal equipment and service pricing frameworks in recent years. It said this was due to many technological advances, such as the continued launching of bandwidth-efficient high throughput satellite capacity to geostationary orbits, together with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

MobileMark
antenna solutions

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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