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SATELLITE Markets & Research

MARKET BRIEFS

Executive summaries of market trends and opportunities in key market segments and regions worldwide

Cellular Networks

Highlights

- **According to the GSMA at the end of 2016, there were 4.8 billion unique mobile subscribers in the world. In the developed regions, this equates to over 80% penetration of the population.**
- **The GSMA is predicting 5.7 billion subscribers by 2020, generating US$1.14 trillion in revenues. Much of this growth will come from the less developed regions.**

by Virgil Labrador, *Editor-in-Chief*
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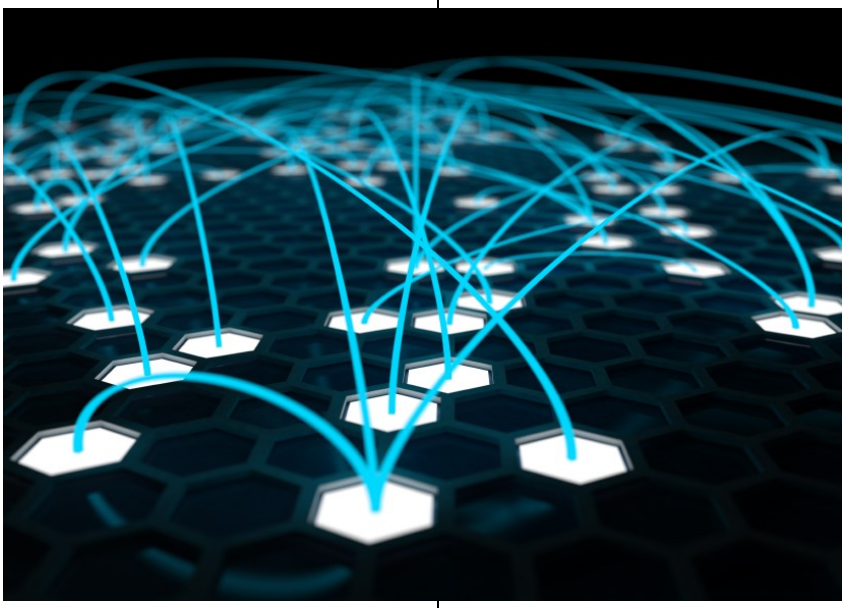
In the developed world, cellular is as pervasive as electricity. 2G gave way to 3G, now 4G and LTE, with 5G waiting in the wings. According to the GSMA at the end of 2016, there were 4.8 billion unique mobile subscribers in the world. In the developed regions, this equates to over 80% penetration of the population. However, in parts of Africa and Asia, the figure is much lower: 44% in Sub-Sahara Africa and 54% in India for example. These figures will grow. The GSMA is predicting 5.7 billion subscribers by 2020, generating US$1.14 trillion in revenues. Much of this growth will come from the less developed regions. For example, subscriber penetration in Sub-Sahara Africa is predicted to rise to 50%. More importantly, during the same period, globally, penetration of smart phones, will increase from 51% to 65%, and 41% of networks will use 4G technology, an increase of 18% from 2016. In sub-Sahara Africa alone, smart phone penetration will rise to 55% from 28%. These last two factors in particular, point to a significant growth in data usage and therefore backhaul.



For the satellite industry, the problem is, that historically, as far as the mobile operators are concerned, satellite has been perceived as the "last resort" technology, and consequently used only where there was no viable terrestrial alternative. The rationale behind this opinion were sound: satellite was inflexible, necessitating over provisioning and therefore expensive. Put these all together and it's not surprising that the mobile network operators (MNOs) only use satellite where they are absolutely forced to: in regions where either there is no terrestrial alternative, or the alternative would be even more expensive than satellite.

However, the environment in which the MNOs operate is changing. Firstly as 2G cedes to 3 and 4G, revenues shift from voice to data, which by its very nature is much more bursty than voice. It also consumes more bandwidth, potentially overloading a backhaul connection, that was only provisioned for 2G.

Secondly, in the developing parts of the world, the average revenue per user (ARPU) tends to be very low, maybe a few dollars per month, compared to around US$45-50 in the US and Japan. This makes major capital expenditure hard to justify.

Thirdly, even in more developed regions, Universal Service Obligations (USO) mean that networks have to be extended out to the less densely populated areas, and therefore the relative capital expense of installing terrestrial backhaul equipment rises. ARPUs in the rural areas may also be significantly lower.

Finally, where there are areas of highly variable demand, a sports stadium or a seasonal resort for example, the time taken to recoup the investment in terrestrial backhaul equipment is correspondingly longer. So, shifting expenditure from Capex (capital expenditure) to Opex (operating expenditure) is an extremely attractive proposition.

These factors are combining to make MNOs extremely price sensitive and more risk adverse. They are therefore more open to new business models that minimize the upfront investment (Capex), in return for operating costs (Opex) more closely aligned to traffic patterns.

This opens up opportunities for the satellite industry. Opportunities, which the industry is well placed to take advantage of.

Thanks to technology innovations both on the ground and in the satellites, high throughput satellites (HTS) are significantly more efficient in converting MHz to Mbps, than legacy wide-beam satellites. This translates to a lower cost per bit, which is obviously attractive to the MNOs.

At the same time, operators and ground systems providers alike, are innovating with new products and service models, designed to shake off the negative reputation of the industry, and to address this growing market.

Historically, where satellite has been used for backhaul, the usual model is for the MNO to simply buy the bandwidth, and employ its own staff to install the equipment and manage the network. In order to respond to the needs of the MNOs for an Opex, rather than a Capex based model, equipment providers and operators are now offering a fully managed service.

An early example of this service model, is the agreement in 2015, between Erics-

son and MTN Benin, for Ericsson to provide mobile connectivity as a service, in parts of Benin where connectivity was previously unavailable. Satellite transmission and solar energy are used to minimize costs and emissions. Managed Rural Coverage from Ericsson enables operators to provide mobile coverage for a set period according to service level agreements (SLAs) and defined key performance indicators (KPIsP). In this case, Ericsson and MTN Benin signed an agreement for five years. Under the terms of the contract, access will be provided via low-power consumption Ericsson radio base stations running on solar energy and transmission will be provided via satellite to avoid the high costs and civil works associated with building a microwave backhaul network in remote villages. These factors combined to make it possible to create a business model to provide mobile coverage to parts of Benin where people have to survive on less than 2 dollars a day.

Another more recent example comes from Speedcast, which earlier this year signed an agreement with Wasel Telecom to provide connectivity to remote villages in Afghanistan. Connectivity will be provided through a fully managed, off-grid small cell end-to-end solution that includes satellite communications, solar panels, base transceiver stations (BTS) and accompanying towers. Connectivity was provided to three villages for proof-of-concept. Following its success, the two companies are bidding for a project from the government to extend the connectivity to 200 remote villages.

Single Channel per Carrier (SCPC) and Time Division Multiple Access (TDMA) are the two traditional data transport technologies used by satellite. SCPC is ideal for continuous access and high volumes, but since, by definition the link has to be provisioned for the worst-case scenario (in terms of demand and weather), it is an expensive solution for variable or low volume traffic. TDMA, in contrast, shares the channel between multiple users, but this too, has its disadvantages. The equipment is more complex and therefore more expensive. The bandwidth is shared between the users on a contested basis, so heavy demand from one site can seriously impede other sites. The ideal solution for cellular operators, particularly those carrying the majority of their traffic as data, is a system that combines the best of both of these. All of the major ground equipment manufacturers have risen to this challenge, and developed their own hybrid systems.

As well as flexible hubs, high-speed modems are also needed to accommodate the demands of 4G and LTE services, and nearly of the equipment manufacturers now have modems, capable of providing over 100Mbps.

One product that's ideal for cellular network deployments is ND Satcom's SKYWAN modem. SKYWAN is a highly flexible and versatile MF-TDMA VSAT system for establishing wide area networks. Acting either as IP routers or Frame Relay switches - or both at the same time - the SKYWAN network integrates seamlessly. It enables mobile and transportable applications with the smallest antennas and highest performance. Through its fully dynamic bandwidth allocation scheme SKYWAN provides instant bandwidth-on-demand for superior voice and high definition video quality. SKYWAN transmits traffic bursts with dynamic data rates from 64 Kbit/s up to 100 Mbit/s per site and enables high speed, hub-less communication between all sites. Any site can be reached via a single satellite hop connection supporting fully meshed network topologies.

Greater efficiencies leading to lower prices per bit, providing backhaul as a fully managed service, transitioning to an opex from a capex model, all these factors, coupled with the spread of cellular networks and increased mobile data consumption, open up opportunities for satellite. According to Euroconsult's latest report, "High Throughput Satellites: Vertical Market Analysis and Forecasts", Cellular backhaul and trunking is projected to to reach over 475 Gbps by 2025, dominated by low-cost 3G & 4G backhaul solutions.

NSR in its report "Wireless Backhaul via Satellite, 11th Edition" projects that capacity revenues will increase from US$1.1 billion in 2016 to over US$3.4 billion by 2026.

"2016 was an inflection year for backhaul. Lower capacity pricing, together with smart ground segment, unlocked tremendous opportunities. Satcom won very large deals last year and more importantly is no longer perceived as a last-resort solution, but rather a key enabler for broadband networks," states Lluc Palerm-Serra, NSR Senior Analyst and report author. "New use cases are appearing, which generate demand not only in emerging countries, but also in developed economies. Beyond extending network coverage to remote locations, satellite is now used for network resiliency, traffic offload, network densification, sporadic traffic and first-responder networks."

The NSR report also projects that there will be over 188,000 satellite backhaul sites by 2026. These will provide US$1.2 billion in cumulative CPE revenues between 2016-26.

With falling bandwidth prices, satellite is becoming a more competitive solution. However, when the capital costs of terrestrial networks are factored in, satellite becomes an even more attractive proposition. The chart below from NSR shows the crossover points between terrestrial and satellite networks.

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