



Profitable & scalable

Satellite technology is an important part of enabling mobile operators to broaden their customer base as they try to expand their business into more remote and rural regions of the world. Satellite Evolution EMEA focuses on satellite cellular backhaul to see how it is helping communities and making revenue for mobile operators.

Mobile operators all over the world are fighting tooth and nail to ensure that their businesses remain profitable. To do this, they constantly have to differentiate themselves from the competition and also go out and find new customers to extend their service base. To do this, operators need to move out from their usual habitat of towns, cities and the areas around them to the more remote areas that house smaller populations. For the operators this is expensive. There are less people, therefore less revenue and higher operating costs. However, the use of satellite technology to backhaul cellular traffic has enabled them to reach new subscribers, coverage expansion and grow despite the move away from their natural stomping ground – all in a cost-effective way.

The past few years have seen a boom in the growth of mobile

subscribers. Mobile expansion has been exponential with many people owning more than just one phone. The initial boom in mobile subscriptions came from the developed world – the US and Europe. However, now it is the turn of the emerging markets such as Asia, Africa and Latin America. The popularity of the mobile device in these regions is often fuelled by the fact that there is no adequate fixed infrastructure for communications and therefore the mobile device offers practical and affordable access to voice and data. This will often be the first experience that many have of reliable communications. With this comes the ability to reap socio-economic benefits such as access to educational resources.

From the operator's point of view, capturing the rural population is a dream come true. A vast portion of the world's population lives in



hard-to-reach areas where it is either too expensive or too impractical to roll out terrestrial solutions. Mobile operators can also keep customers engaged and reduce churn by introducing innovative and useful services to their subscriber packages such as free minutes and SMS and mobile banking services. Many people living in these areas will not have had access to banking services, so this can be a life-enhancing tool for them.

So, how does satellite cellular backhaul work? There are three principal components that make up the system – MSC, BSC, and BTS. Firstly, there is a Mobile Switching Centre (MSC) that is the interface from the Base Station Controller (BSC) to the external networks such as the PSTN or mobile network. Secondly, the BSC provides all the control functions between the MSC and Base Tower System (BTS).

Finally, the BTS handles radio interface to the mobile stations and provides the radio equipment that is required to service each cell in a network. The interface located between the BSC and BTS is known as Abis. The acronym EDGE stands for Enhanced Data Rates for GSM Evolution. This is a digital technology that allows increased data transmission rates and improved data transmission reliability. When mobile operators wish to expand their footprint, they must expand the network between the BSC and the BTS.

Satellite is not the only means of achieving cellular backhaul. Other methods including wireless, Ethernet/IP/MPLS are also options. Like in all other networks, backhaul service providers are trying to achieve as many efficiencies as possible and to optimise the network, enabling the operator to save money.

In terrestrial networks, a microwave radio link is often adequate to reach its destination in a single hop. However, this link will not reach more remote areas. This very much depends on the radio frequency and whether it has line-of-sight. However, if satellite is used to provide this link, there is no issue with location or obstacles and it provides a perfect alternative to installing connections that would require a large amount of time and money to realise.

Solutions

Gateway Communications, the largest provider of carrier solutions in Africa, is launching CellDirect, a new addition to its Africa Direct product line. CellDirect will improve satellite utilisation for mobile network operators (MNOs), increasing efficiency and reducing costs. Satellite tests for the service began on August 12th and the product was formally launched at Capacity Africa in Nairobi on the 21st September.

The new CellDirect solution uses Demand Assigned Multiple Access (DAMA) technology, which makes use of a sophisticated bandwidth manager to allocate satellite capacity – based on time, frequency and which type of capacity is available in order to meet demands. Any MNO who uses satellite to connect cell sites can now do so more cost effectively, whilst also being able to monitor each link from a single platform, something few were able to do previously.

"The technique will better allow customers to match scarce satellite capacity with actual revenue earning traffic," says Peter Gerrard, Gateway Communications' Product Manager.

"These CellDirect solutions can provide an array of full mesh, mini hub or larger hub installations to meet the requirement of just one site through to hundreds of sites or more. CellDirect addresses existing high volume networks but also provides lower traffic density opportunities for those operators looking to expand their networks."

Benefits come because customers are charged at an average data rate per link instead of the more usual peak data rate, meaning that any users will immediately see the benefits in their monthly bill. Gateway Communications has fully invested in the technology removing the difficult issue for MNOs of making the large commercial commitment and having to wait several years before seeing any return on investment. Gateway Communications anticipates that CellDirect will have more and more applications in the African mar-

ket as MNOs increasingly look to address the needs of a lower ARPU customer base.

Altobridge lite-site

Altobridge has developed a new and green concept in satellite cellular backhaul and has called it the 'lite-site'. The lite-site is a satellite backhauled solar powered GSM solution for remote communications. The environmentally friendly site enables Mobile Network Operators to bring mobile connectivity to isolated areas at low cost. The solution is designed to meet the needs of communities from 100 to 1,500 subscribers and can be used alone or as part of a cluster of lite-sites. The solution has been specially designed to optimise satellite bandwidth and minimise power consumption. The site uses up to 50 percent less backhaul than other optimised solutions and is also quickly and easily deployed.

The lite-site requires only 4kbps of bandwidth per active call. No bandwidth is required with the altoPod in idle mode during off-peak traffic periods or at night time. The altoPod is an outdoor, passively cooled BTS with built-in 10 Watt carrier, providing up to 10km coverage radius. Altobridge's Local Connectivity switches local calls at the BTS, thereby eliminating backhaul requirement for all local calls. Local Connectivity meets ETSI Lawful Intercept requirements and enhances subscriber call quality by removing double satellite hop. The Altobridge Local Connectivity platform removes the expense of a double satellite hop for local mobile-to-mobile calls by switching them at the remote site rather than backhauling them to and from the network. Channel Quenching and Ringtone Suppression reduces the satellite backhaul requirement by allocating the calling party's audio path only when the called party answers. In addition, Data-at-the-Edge technology from Altobridge provides 3G user experience via GPRS and EDGE technology. The altoPod Radio Resource Management eliminates latency, significantly improves call drop rates and increases mean holding times. With a 90 Watt average power consumption and intelligent dormancy of non-traffic bearing TRX during off-peak periods, the altoPod is the most efficient, solar powered solution of its kind for remote communities.

iDirect – promoting TDMA

iDirect has developed an advanced IP-based D-TDMA solution that enables carriers to share network capacity across multiple platforms, allocating bandwidth on demand to maximise efficiency while reducing costs. This has enabled mobile operators to pursue customers in rural markets. The platform is scalable and compatible with all major cellular infrastructure solutions whilst providing high quality voice communications and offers features such as the constant re-prioritisation of applications to avoid network congestion and service degradation.

Telespazio Argentina chooses iDirect

The iDirect D-TDMA solution has been applied in Argentina to help those living in rural areas to use cellular communications. The solution is more cost-effective than SCPC satellite links that are always sized for peak bandwidth levels and therefore unsuitable for low-volume rural sites.

Telespazio Argentina turned to iDirect for help. Pablo Recalt, Regional Sales and Marketing Director at Telespazio Argentina said: "We tried for almost half a year to get another solution going, and in less than one month, we had an iDirect system in operation."

In 2006, Telecom Personal, one of Argentina's leading cellular operators, looked to expand its coverage to new rural markets. The operator was already using SCPC links to backhaul traffic, but sought a more cost-effective way to reach far-flung towns and villages. Telecom Personal leveraged a longtime partnership with satellite operator Telespazio Argentina to test new developments in satellite communications technology that promised to overcome the current limitations and improve the return on investment of satellite cellular backhaul.



After extensive investigation, Telespazio Argentina decided that a shared bandwidth satellite platform would be the most cost-effective backhaul system. The operator designed and installed a new satellite IP network configured to allocate bandwidth across multiple distributed locations based on local demand. But after six months of effort, Telespazio Argentina's engineers determined that the test network was not viable.

Faced with a lost opportunity, Telespazio Argentina called iDirect, who rushed its own IP networking technology to the operator's offices. In just 48 hours, Telespazio Argentina had the iDirect network up and running. Within 10 days, it had successfully tested the network in Telecom Personal's environment without any of the problems the satellite operator experienced with the previous test network. And just five days later, Telespazio Argentina received approval to implement the iDirect solution.

Recalt said, "For us it was a great day. We were able to deliver a definitive solution to our client, and iDirect was the key factor in winning their business."

The iDirect cellular backhaul network was deployed in Telespazio Argentina's Buenos Aires earth station. It delivers several technical advances that differentiate it from the SCPC network Telecom Personal was using and from the alternative system Telespazio Argentina had initially tested.

According to Telespazio Argentina, the iDirect network performs on all fronts — bandwidth efficiency, quality of service, reliability and seamless integration with Telecom Personal's cellular network.

"It is transparent for the end customer, and that provides the confidence and peace of mind that Telecom Personal requires to grow its business," says Diego Pazos, Telespazio Argentina's Direc-

tor of Engineering and Operations. The iDirect network has been in place since 2006 providing a cost-effective way for Telecom Personal to expand its business. After an initial deployment of 15 BTS sites, Telespazio Argentina is executing a plan to grow the network to 100 total sites.

With the satellite backhaul network in place, Telecom Personal is adding thousands of new subscribers, providing a new line of revenue in an otherwise saturated mobile service market. The new network expands Telecom Personal's coverage in Argentina's southern region, where it previously lacked a strong presence. This reduces the need for Telecom Personal to sign roaming agreements with competitive providers in order to serve their customers.

The satellite network is also driving increased connectivity between Argentina's rural and urban areas. While rural regions comprise only one-tenth of the country's population, they are responsible for more than half of the national revenue from exports and comprise more than one-fifth of Argentina's Gross Domestic Product.

"A stronger communication network across Argentina is a critical factor for sustained economic growth," says Javier Purriños, Director of Integration and Implementation for Telecom Argentina, the parent company of Telecom Personal. "Telespazio Argentina has now made it profitable for us to extend our network to rural populations who have long awaited cellular access. And their choice of iDirect as the technology platform ensures we can deliver a reliable customer experience and manage bandwidth very efficiently."

The iDirect network also creates an additional source of revenue for Telespazio Argentina. "This solution is very important because it establishes a new line of business for us in the Latin American region and proves there's an alternative, cost-effective solution



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for cellular backhaul," says Recault. "We see immediate opportunities in Paraguay, Chile, Bolivia and Uruguay."

The technology

The iDirect cellular backhaul network comprised an iDirect Series 15000 Universal Hub and iNFINITI 5000 Series Satellite Routers. The network leverages the advanced features of the iDirect platform to surpass SCPC systems and overcome the challenges in providing reliable backhaul over a TDMA network.

The network enabled real-time bandwidth allocation. SCPC networks statically allocate satellite space segment based on a BTS' maximum, or busy-hour, bandwidth requirement. When bandwidth is not being fully used, it is wasted and cannot be recovered. By contrast, iDirect's TDMA system pools bandwidth onto a shared platform and assigns it dynamically to meet the actual real-time needs of each BTS. This dramatically lowers operating expenses and enables cellular operators to profitably pursue rural markets.

The technology also reduced jitter. A key to providing good voice quality is to minimise jitter, which is the variation in the time of arrival of voice packets. Using patented algorithms, the iDirect platform converts variable length time slots into fixed time slots, which are "feathered" across the transmitted frame structure so that they arrive at evenly spaced intervals.

In a cellular backhaul system there are many parallel channels for different types of traffic such as voice frames, GPRS frames, EDGE traffic and signalling channels. Each of these channels has different requirements in terms of the quality of service. iDirect's Group QoS system enables these different streams to be prioritised so they can be concurrently supported while protecting the network against service degradation.



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Crucial connections and revenue generators

The innovative approach taken by satellite service providers has enabled mobile network operators to make the move to rural areas and to offer their new subscribers many new applications and services in a cost-effective way. Without the use of satellite backhaul there would often be no solution to the problem of connecting geographically dispersed communities. Solutions need to be easy to deploy and scalable if required. Access to cellular communications, however basic, can change the fortunes of a community. Access to other applications such as banking, education and healthcare can take it to a different level. In an age where the majority of us cannot bear to be parted from our mobile devices, and where the next generation of the population is going to be very familiar with the digital age, it is important that these connections are made. The increase in the use of mobile broadband will see more migration to IP and the mobile operators will certainly be looking to accommodate this.

Although there are many ways that a mobile operator can go when choosing a cellular backhaul solution, use of satellite can help control CAPEX and OPEX to a great degree enabling them to introduce a profitable and scalable service to the people who need it most.

