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Taking Mobile to Rural Africa

The Vital Role of Hybrid Satellite–Microwave Backhaul



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Introduction

Next to Asia, Africa is the world's largest continent, home to more than 900 million people living in 54 countries. It covers more than 20 percent of the total landmass on this planet. Considering its huge size and population, opportunities to expand mobile service are just as enormous especially in remote African communities.

This paper addresses that segment of the African market. Analysys Mason, a global telecommunications advisory firm, and Intelsat S.A., the leading provider of fixed satellite services, teamed up to identify and compare the most cost-effective solutions for delivering mobile service to these outlying communities. The study evaluated microwave, satellite and hybrid backhaul solutions that would optimize network expansion. The findings revealed that mobile network operators and residents in remote African villages would benefit from the use of satellite as part of a comprehensive, backhaul communications infrastructure.

This conclusion is based on the following insights gained during the study:

- There is a positive correlation between the availability of telecom services in a country and its gross domestic product (GDP) or overall economic output. The more people who can access such services, the higher the GDP growth.
- Currently, mobile services are very limited in emerging economies. Overall mobile penetration in Africa is still under 55%. That translates into huge business opportunities for both network operators and backhaul connectivity providers.
- Limited access to financial services also provides creative growth opportunities to use mobile handsets in non-traditional ways.
- Because of its design and functionality, satellite-based backhaul connectivity is a viable, economic solution for establishing mobile service connections over variable distances.
- Emerging services – mobile 2G data and 3G/4G broadband data - will also serve as the catalyst for growth for satellite operators and other backhaul providers.



Mobile Services: The New Growth Engine for Boosting GDP

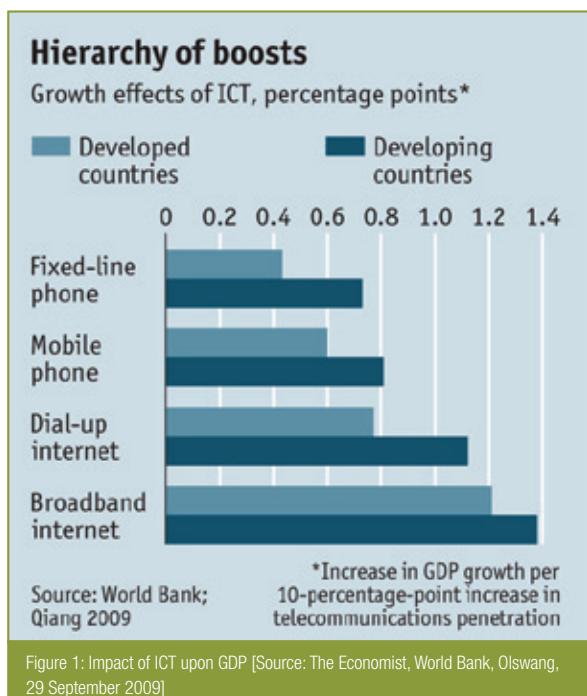
There's little doubt that Africa's instability and turbulent history have negatively impacted the economies of many countries in the continent. According to a 2004 report published by the National Bureau of Economic Research, one half of Africa's population lives below the poverty line.

Still, not all the news or data about Africa's economy is bleak. In 2007, The World Bank reported that some nations either matched or grew faster than global average. Consider Mauritania, whose economy grew by 19.8 percent; Angola at 17.6 percent; Sudan at 9.6 percent; Mozambique at 7.9 percent, and Malawi at 7.8 percent.

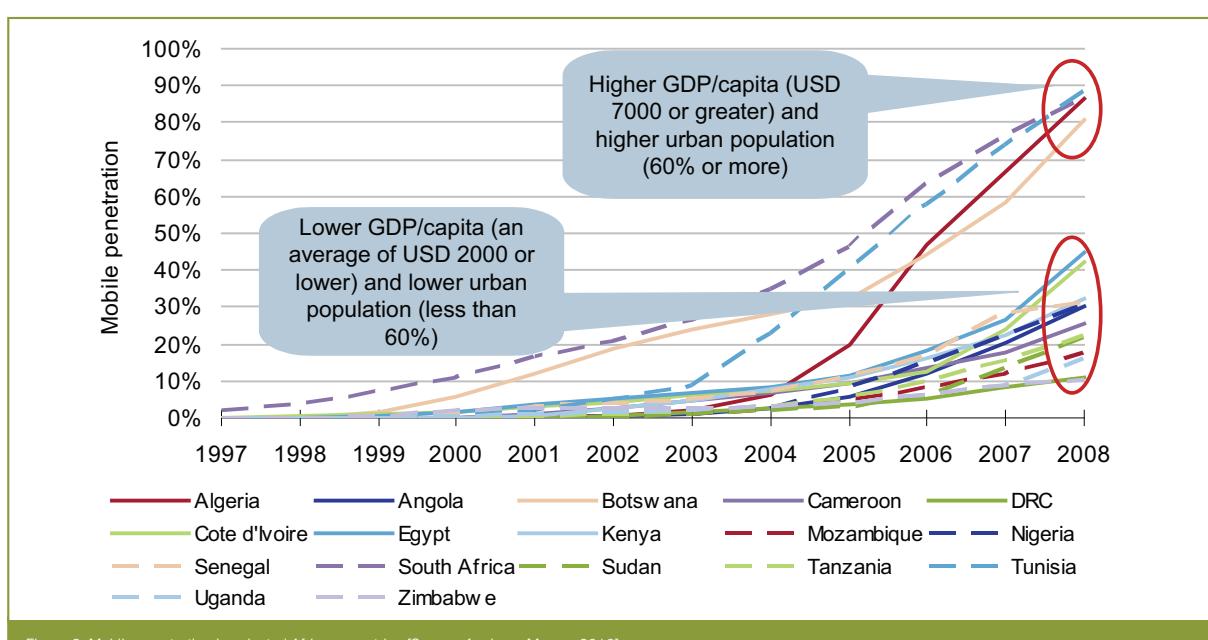
An effective way to help Africa increase its GDP is to grow mobile telecom subscribers. Based on The World Bank Macroeconomic Study, when just 10 percent of people in a developing country use mobile technology or services, that country's GDP jumps by .8 percent. In 2008, Africa's GDP averaged (US) \$1,633.3 billion. Telecom services would have contributed a massive (US) \$13.1 billion growth to its GDP.

Figure 1 shows a direct correlation between mobile phone service and GDP. The more people who use mobile phones, the higher the GDP growth.

Some African nations already understand this relationship first-hand. As Figure 2 indicates, countries like South Africa, Tunisia, Algeria and Botswana have higher concentrations of people living in urban areas than surrounding countries. But unlike their neighbors, they have also experienced rapid growth in the number of mobile phone service subscribers. If you combine those two factors, the result is a higher GDP per capita when compared to other countries.



Meanwhile, the cost of mobile phone technology continues to drop, becoming more affordable to more people. As more subscribers are added on to networks, transaction costs will drop even further, creating added value or a “network effect”. The network effect expands business growth, introduces new commerce opportunities and creates more jobs that lead to self-sufficiency. This chain reaction further boosts a country’s GDP.





The New Frontier: Growth Projected in Rural Areas

To expand the reach of mobile telecom services in rural African communities, local base stations must be connected to fixed wireline or fiber cables, microwave links or satellite backhaul connections.

However, fixed wireline is almost non-existent in many parts of Africa. In most circumstances, microwave links are used because equipment is readily available and spectrum licenses are easy to obtain. Microwave links are most cost-effective when servicing large populations over small distances. Generally, large amounts of bandwidth are needed to transmit voice and data between sites. Direct connectivity between sites is referred to as a single hop. Costs dramatically escalate when connecting communities that are more than 30km away from the core network, requiring multiple hops.

However, satellite technology is not impacted by distance. It's much more efficient and economical to use than microwave links when servicing small populations over large distances, such as those in rural or remote areas.

Figure 3 shows the growth of satellite backhaul in Africa between 2004 and 2008 due to growing mobile services. Although Africa's mobile industry has recently begun using satellite to service its large rural market, untapped opportunities still remain.

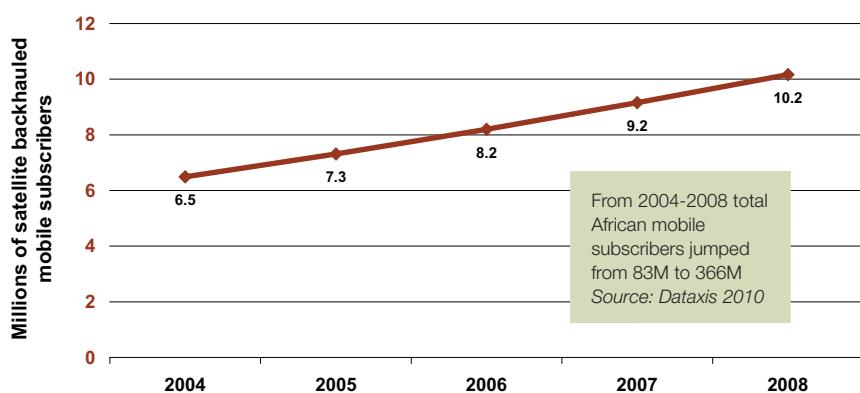


Figure 3: Growth in mobile penetration in Africa vs. growth in satellite backhauled subscribers [Source: Datasix, NSR, 2010]

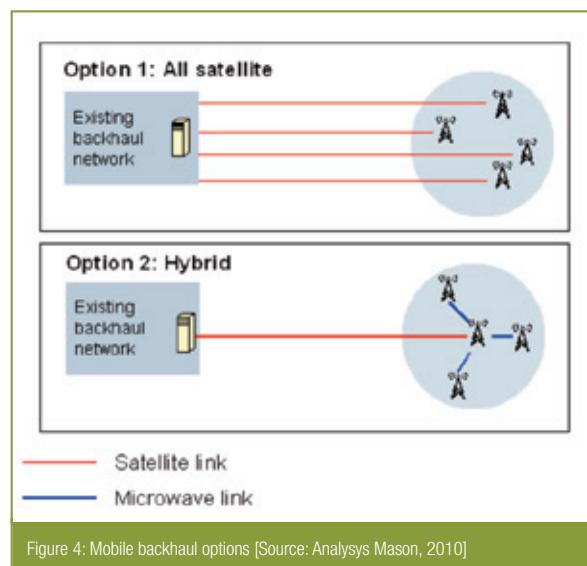


The Best of Both Worlds: Understanding Hybrid Satellite- Microwave Backhaul Economics

Many African communities with large populations are isolated, far away from their closest neighbor.

Under these circumstances, mobile network operators have two options for satellite connectivity that are illustrated in Figure 4:

- Connect each base station to a single aggregation node
- Use a hybrid approach that includes both microwave and satellite technologies. Several base stations serving a community are connected locally with microwave, then the cluster is backhauled via satellite to the operator's core network.



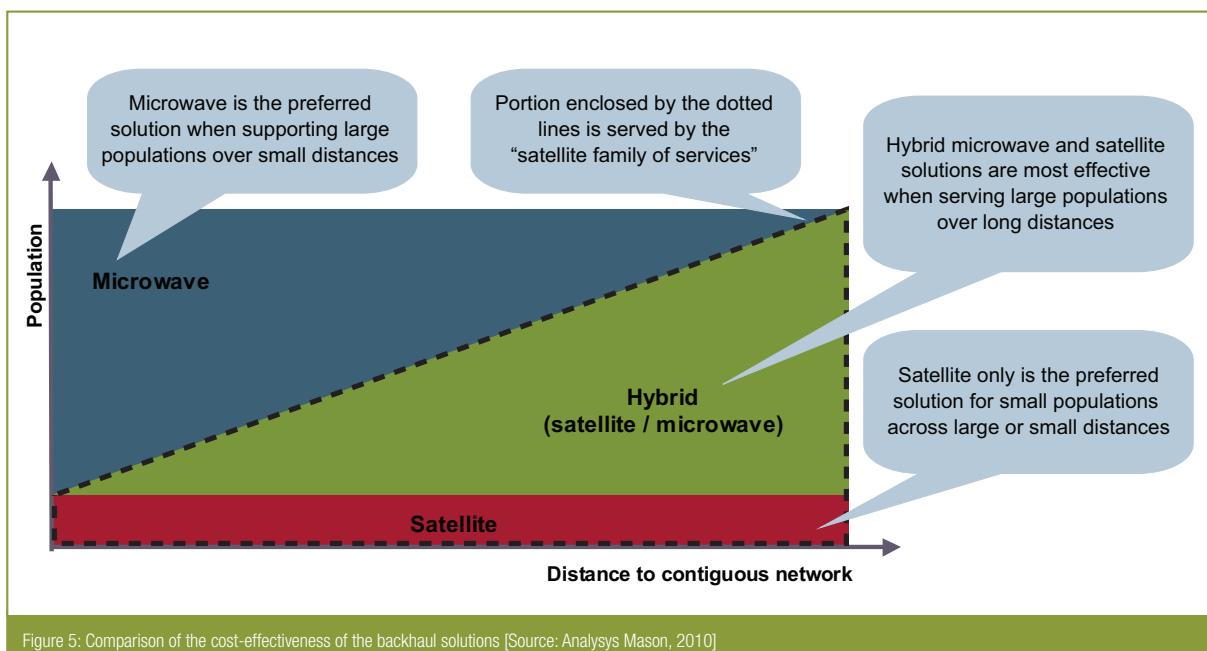
Analysys-Mason developed a model to assist mobile operators with the critical task of assessing costs of various backhaul options. Figure 5 shows a simplified version of sample output.

The model clearly illustrates that in many cases hybrid satellite-microwave combination is economically superior when compared to pure microwave backhaul when a network requires multiple hops. Hybrid backhaul combines the distance advantage of satellite with the bandwidth advantage of microwave.

There are several additional benefits of satellite-based backhaul:

- Minimal infrastructure, rapid deployment: Unlike microwave, satellite doesn't require expensive microwave repeaters or the installation of towers or other physical structures over vast distances. Roll-out is quick.
- Large coverage, few interruptions: Satellite can easily cover the entire African continent and is basically immune to natural disasters, acting as back-up when terrestrial links are cut.

- Low power, built-in security: A single satellite beam covers very large areas. This greatly simplifies power and security requirements. Microwave requires multiple repeater sites to cover large distances. Each microwave site requires maintenance including power, and security to protect the assets in high risk locations.
- Less expensive, same services: Although the cost of satellite backhaul rises when bandwidth is increased, satellite is still cost-effective when properly engineered to transmit voice and broadband data.





Mobile Data: Driving Growth and Building the Mobile Ecosystem

Although fixed lines or the infrastructure needed for traditional phone and fax lines in rural areas don't exist in Africa, people still need to communicate with their family, friends and neighbors, regardless of distance. With the emergence of e-commerce as a leading enabler of economic growth, data services such as Internet access will trump voice as the most needed communications application in rural markets.

The demand for data applications that support e-banking is also driving mobile telecom growth, which currently represents roughly five to 10 percent of the total telecom market.

Consider a top African mobile operator, which pioneered mobile banking and is now the country's leading financial institution and mobile operator.

Conclusion

Considering Africa's lack of fixed lines, its growing demand for a variety of mobile telecom services and technology's increasing affordability and accessibility, there isn't a better time for mobile telecom operators to invest, grow and flourish in the African market.

Due to Intelsat's vast resources, technical strength and expertise, it is uniquely positioned to help operators deliver all satellite and hybrid satellite-microwave backhaul services to this under-served marketplace. As the global leader of fixed satellite services, Intelsat:

- Became the first satellite operator to offer satellite-enabled services in Africa, introducing pan-regional broadband networks and cellular backhaul services.
 - Delivers backhaul services to nearly 60 mobile telecom operators in over 40 countries.
 - Currently supports nearly eight out of 10 mobile groups in Africa, representing 64 percent of the region's subscribers.
 - Supplies video, data and voice connectivity in approximately 200 countries.
- Operates more than 50 satellites, covering 99 percent of the world's population.

As a premier global telecommunications advisory firm, Analysys-Mason can also assist operators with the critical task of assessing and identifying the most cost-effective and efficient backhaul solutions.

There are nearly one billion people globally who can benefit from satellite backhaul technology. The opportunities to service and capitalize on this under-served, untapped, ripe market are unparalleled. Mobile telecom operators can play a vital role in helping the continent shape its future and also impact their own future - expanding their global footprint - by working with Intelsat to produce network effects throughout Africa's rural and remote communities.

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