



Mega-constellations - the answer to connecting Africa?

As Africa begins to see the first services rolled out from mega-constellations of LEO satellites, what are the impacts for users, the economy, and the connectivity ecosystem?

In the not-so-distant past, satellite connectivity was seen as a solution primarily for governments, military, and enterprises due to its high cost and specialised infrastructure requirements. However, recent advancements in satellite technology are changing this view, bringing it within reach of a wider audience for the first time.

With more satellites being launched and more users signing up, operators are beginning to benefit from economies of scale, enabling them to reduce cost per user. Similarly, as constellation projects advance, innovations in ground stations and user terminals abound, cutting costs while driving up quality. Supportive government policies and regulatory frameworks, too, can facilitate the deployment of satellite services and reduce

operational costs.

Despite falling costs, however, affordability remains a significant source of contention.

"At this point, the services on offer in Africa by the likes of Starlink are far too expensive for the average African – and getting even more expensive across many countries in the region, like Rwanda and Zambia," asserts Tim Kravchunovsky, founder and CEO, Chirp. "This is because Starlink is a centralised telecom structure, which is a model that simply cannot support affordable services for the average African person (unlike decentralised solutions)."

Kravchunovsky says that Zambian users, for example, will see their monthly fees for the 'Mobile – Regional' service more than double to ZMW2,500 – but the average monthly salary in Zambia is

around ZMW6,000, so this price is unrealistic for all but the upper classes and enterprise users.

Dawie de Wet (Pr. Eng. M.Sc. Eng.), group CEO, Q-KON, however, disagrees: "satellite is certainly an option for the general African market – both the business market and the consumer market, even at the current rates of \$1-2/GB, which will improve further as the next generation GEO services and the emerging LEO services start rolling out at a large scale."

Mobile first?

Despite Africa's identity as a mobile-first continent, there is genuine demand for satellite communications among consumers, especially in areas where mobile coverage falls short.



Highlighting the shortage, de Wet comments that "mobile data connectivity is predominantly the current choice; not that it's the preferred option, it's more like the only option. For example, in 2018, fixed broadband subscribers in South Africa were close to 3.9 million according to ICASA; then fixed ADSL service was discontinued; and as of 30 September 2023, the fixed broadband subscriber base is only about 1.8 million. At the same time LTE grew from 59 million to 65 million. This means that about 2 million fixed subscribers are not being serviced, probably due to the limitations of fibre rollouts, while the LTE growth supports the affordability of the market. It also means that, should more effective fixed broadband services be available, then there is a demand of 2 million subscribers, and that refers to South Africa alone."

It's certainly true that, while mobile networks, and particularly high-speed 4G and 5G technologies, continue to spread across Africa, there remains a significant coverage gap,

especially for mobile generations beyond 3G. And it's not just availability – network reliability and resilience leave a lot to be desired in some regions, being vulnerable to natural disasters, political instability, and disruptions like the widespread cable outages of March 2024. Additionally, even in areas with mobile network coverage, satellite can serve as a backup to ensure uninterrupted service.

"Africa has consistently remained the least connected continent across the globe. In fact, internet usage dropped from 40% in 2022 to just over one-third in 2023, according to the International Telecommunication Union (ITU)," says Kravchunovsky. "Satellite-based telecommunications can be a game-changer to bridge this connectivity gap. The demand we've seen for Starlink's services – often despite regulatory constraints, such as in South Africa – shows that there is interest from the general population. But if the introduction of satcoms to Africa is botched, users will lose faith in

this alternative."

As satellite technology continues to evolve and become more affordable, it is likely to play an increasingly important role in connecting the unconnected and enhancing overall connectivity across the continent, particularly as consumers become more aware of the possibilities. This will be helped in no small part by the distinct advantages LEO constellations have to offer when compared with the existing fibre, terrestrial, and other competing technologies.

"The main advantage of satellite mega-constellations, like those being developed by SpaceX, OneWeb or Amazon, is the increased connectivity they can provide in rural and remote areas, where the cost of installing fibre optic cables or terrestrial infrastructure can be prohibitively expensive," states Kravchunovsky.

Connectivity can also be delivered much more rapidly than terrestrial infrastructure thanks to quick plug-and-play VSATs and 'satcoms in a box' products, which hold immense value in times of disaster or turmoil where existing infrastructure may have been damaged.

"LEO satellites are also immune to natural disasters on Earth, like floods, earthquakes, and storms, making them an increasingly preferable choice as the effects of climate change intensify," adds Kravchunovsky. "They offer many advantages, from advancements in agricultural monitoring and emergency healthcare provision in remote areas, to the expansion of internet coverage to underprivileged populations. However, the cost of these services must be affordable to make mass expansion possible. Otherwise, they will remain a technology only available to governments, mass corporations, and the elite."

The advantages of satellite for mobility, disaster recovery, emergency services, IoT/M2M, and critical infrastructure redundancy applications, are well-known and often touted, and indeed, the coming mega-constellations are poised to complement and, in some cases, outperform existing technologies.

As these constellations become operational, they will likely play a critical role in expanding global internet access and improving connectivity on the continent in places where traditional methods fall short.

de Wet reminds us that "it is not about being better: the hierarchy of choice will still be fibre as a first choice, then wireless, and finally satellite. The issue is that each of these technologies has specific constraints and positioning for rollout and can't service the full spectrum of demand alone. It is more a question of being a market ready option to service the subscribers beyond the feasible fibre rollout areas."

The connectivity ecosystem

With the launch of the first sets of mega-constellations to the African marketplace underway, the connectivity ecosystem is expected to undergo significant transformation.

Consumers stand to gain from competitive

Eutelsat OneWeb comes to South Africa

In November 2022, OneWeb announced a distribution agreement with Q-KON Africa to offer broadband connectivity services in Africa. The OneWeb LEO satellite network would provide Q-KON Africa's Twoobii customers access to high-speed, low-latency broadband to connect even the most rural or remote communities across several African countries, including South Africa, Lesotho, Swaziland, Namibia, Botswana, Zimbabwe, Zambia, Malawi, and Mozambique.

The five-year deal will enable Q-KON Africa to utilise OneWeb's network to provide vital internet service and WiFi backhaul to connect schools, hospitals, civil government and other fixed enterprise and fintech services throughout the continent including banking, mining, and backhaul solutions.

"At OneWeb, we believe that connection everywhere changes everything and that's why we are thrilled to be partnering with the engineering experts at Q-KON Africa to further our mission to connect those hardest to reach to the internet. Q-KON Africa's strong industry understanding, flexibility, agility and local support will help us see OneWeb's LEO satellite network create opportunities to benefit unconnected and underconnected areas across Africa for today's digital environment. This agreement is another example of OneWeb's continued momentum, as we remain on track to activate coverage solutions in Africa and globally in 2023," said Ben Griffin, VP mobility and AMEA at OneWeb.

In February 2024, the first operational Eutelsat OneWeb Low Earth Orbit (LEO) satellite service was launched on the continent. The solution provides a reliable backup internet connection for a leading digital bank in South Africa, ensuring uninterrupted service even in case of terrestrial network disruptions.

The undisclosed bank has been provided with consistent internet speeds of 50Mbps with minimal latency, guaranteeing seamless operations regardless of ground-based infrastructure challenges.

This collaboration between Eutelsat, Q-KON, and the South African digital bank paves the way for broader adoption of LEO-based solutions within the African banking sector.

pricing and lower connectivity costs, with some finding satellite communications affordable for the first time. Additionally, this enhanced connectivity will support the growth of IoT and M2M applications, enabling smart agriculture, environmental monitoring, and logistics tracking – a very real benefit for all Africans, and in line with the digitalisation policies many of the continent's governments have announced in recent years.

However, Starlink and Kuiper, which have adopted direct-to-consumer models, will drastically reduce opportunities for resellers and others in the value chain, and the resulting limited number of resellers could lead to market saturation in certain regions, impacting profit margins and business sustainability. Traditional internet service providers (ISPs) will need to adapt by either integrating satellite services into their offerings or focusing on areas where they have a competitive advantage, such as local customer support and bundling services.

“The go-to-market model for the mega-providers remains a concern and the final market success will be determined by how these mega-providers find a balanced model between the on-the-ground Africa market requirements, versus the global business case demands,” cautions de Wet.

Kravchunovsky additionally highlights that the concern with this direct-to-consumer model is that end users are forced to buy hardware and sign up for contracts, with no guarantee that services will remain affordable.

“When prices see sudden exponential increases, these people are left with hardware they cannot afford to use and cannot resell,” warns Kravchunovsky. “If this trend continues, the likes of Starlink and Kuiper may struggle to achieve the mass adoption they are hoping for in underprivileged communities and low-income areas, which often tend to be the remote areas they are trying to service. After all the hype around this innovative technology, we may be in for an anticlimax in the near future.”

However, not all the mega-constellations are targeting the B2C model. Eutelsat OneWeb, for instance, supplies low Earth orbit (LEO) connectivity through a trusted network of distribution partners in carrier and enterprise markets. This will prove a boon for local economies, with money continuing to circle through local hands, rather than being offshored to the large multinational conglomerates. ■

An indigenous constellation

TRL Space Rwanda announced in April 2024 that it is spearheading an ambitious initiative to establish Africa's first satellite and equatorial constellation hub.

TRL Space's plan in Rwanda is to cultivate indigenous capabilities for developing nanosatellites and equatorial constellations, laying the foundation for a thriving space ecosystem on the African continent. TRL Space plans to invest over US\$2 million in this endeavour.

The first milestone will be the development of a 6U Cubesat at the Rwandan branch – the launch is scheduled for the second quarter of 2025.

TRL Space has already initiated identifying and nurturing local talent through the recent CubeSat Makerthon, which enabled the company to recruit a diverse pool of skilled individuals across Africa. This initiative aims to build a robust space community that contributes to establishing Africa's Satellite and Equatorial Constellation Hub in Rwanda.

“Our intention is not just to deliver these technologies to Rwanda. We bring added value to the region. Our goal is to introduce new space technologies that increase the economic and living standards of the entire region,” said TRL Space's CEO, Petr Kapoun.