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How Starlink Has Impacted Connectivity Initiatives in Africa

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Introduction

Africa endures the most profound impacts of the global digital divide, grappling with severe connectivity challenges. According to the International Telecommunication Union (ITU), 23% of individuals in rural areas in Africa use the Internet, the lowest percentage of any other region as of 2023. Comparatively, 57% of Africa's urban population is connected to the Internet. As reported by the ITU, Africa's 2.49 urban-to-rural Internet access ratio is the largest disparity out of any other region.[2] The ITU's figures display that providing Internet access to rural African regions is a key challenge in any global effort to connect the world to the Internet. Despite these access problems in rural areas, affordability has consistently been identified as the primary obstacle to connecting Africa's population to the Internet. In two surveys by Research ICT Africa, affordability is a "longstanding challenge".[3] The GSM Association (GSMA), a non-profit organisation working with mobile network operators to support innovation and increase connectivity, discovered that in Sub-Saharan Africa, an entry-level device costs 95% of the average monthly income for the poorest 20% of the population. A different study by the GSMA showed that in 2022, over half of Sub-Saharan African countries did not meet the affordability baseline

1 Fellow, Trusted Internet Summer School on Internet Governance and International Law, Poland.

2 International Telecommunication Union, *Statistics*, 2024. Available at: https://www.itu.int/en/ITU-D/Statistics/pages/stat/default.aspx (accessed: 21/10/2024).

3 Ch. Chair, Internet Use Barriers And User Strategies: Perspectives from Kenya, Nigeria, South Africa and Rwanda, *Research ICT Africa, Beyond Access Policy Paper*, 2017, 1; Internet Use Barriers And User Strategies: Perspectives From Kenya, Nigeria, South Africa And Rwanda, *Research ICT Africa, Beyond Access Policy Paper* 2017, p. 7.

when averaging the income of the whole population. When averaging the income of the bottom 40% of the population, the GSMA finding revealed that over 60% of countries in Sub-Saharan Africa met this target.[4] Any effort to connect the world's population to the Internet must focus on Africa. More specifically, this effort must prioritise the service's affordability and access in rural areas in Africa.

Since the late 1990s, there have been attempts to utilise satellites to provide global high-speed, affordable Internet connectivity. In many early iterations, such as Hughes Network Systems (Hughesnet), the speed was slower than that of a terrestrial connection, so their clients preferred terrestrial networks.[5] Most early efforts placed their satellites in Geosynchronous Earth Orbit (GSO), meaning they were orbiting 35,786 km from Earth's equator.[6] For satellite Internet companies to offer a connection comparable to terrestrial Internet Service Providers (ISPs), their satellites must be in Low Earth Orbit (LEO), from 80–100 km to 2,000 km.[7] This is where Starlink deployed its space-based infrastructure and emerged as a formidable competitor in the market. Some experts suggest that Starlink's entry into the ICT (Information and Communications Technology) market coincides with a period when monopolistic structures were producing undesirable effects in the telecommunications markets of several countries.[8] Starlink and other LEO satellite broadband companies can create competition in this market, and a competitive market can benefit consumers by making Internet access more affordable. Therefore, LEO satellite technology can potentially solve critical connectivity challenges in Africa by connecting rural areas to the Internet and competing with entrenched monopolies.

Numerous connectivity initiatives in Africa are looking at creative ways to bring connectivity to the continent. This chapter examines two connectivity initiatives geared toward achieving the same goal and represents different approaches. One is led by United Nations (UN) agencies, and the other by a consortium of private companies. These heavily funded initiatives represent private and intergovernmental models. Starlink, a private company that relies heavily on government

4 M. Shanahan, K. Bahla, *The State of Mobile Internet Connectivity 2024*, Global System for Mobile Communications Association, London 2024, p. 5. Available at: https://www.gsma.com/r/wp-content/uploads/2024/10/The-State-of-Mobile-Internet-Connectivity-Report-2024.pdf (accessed: 21/10/2024).

5 J.V. Evans, The Proposed Ku-Band Non Geostationary Communication Satellite Systems, *Space an Integral Part of the Information Age*, 2000, 47(2), pp. 171–182, https://doi.org/10.1016/S0094-5765(00)00057-6; S. Liu, Z. Gao, Y. Wu, D. W. Kwan Ng, X. Gao, K. -K. Wong, S. Chatzinotas, B. Ottersten, LEO satellite constellations for 5G and beyond: How will they reshape vertical domains? *IEEE Communications Magazine*, 2021, 59(7), pp. 30–36, https://doi.org/10.1109/MCOM.001.2001081

6 A. Capannolo, S. Silvestrini, A. Colagrossi, V. Pesce, *Chapter Four—Orbital Dynamics*, [in:] V. Pesce, A. Colagrossi, S. Silvestrini (eds.), *Modern Spacecraft Guidance, Navigation, and Control*, Elsevier, 2023, pp. 131–206, https://doi.org/10.1016/B978-0-323-90916-7.00004-4

7 H. Riebeek, *Catalog of Earth Satellite Orbits*, National Aeronautics and Space Administration, Washington D.C. 2009. Available at: https://earthobservatory.nasa.gov/features/OrbitsCatalog (accessed: 02/02/2025).

8 S. Liu et al., *op. cit*.

support, falls between these two approaches. In this context, this essay aims to answer two key questions raised by the growing number of initiatives aimed at expanding global Internet access and the capability of LEO satellites to provide worldwide connectivity. First, why have more connectivity initiatives and countries not adopted Starlink? Second, what impact has Starlink had on LEO satellite Internet services in African nations?

Background: Achieving Universal Meaningful Digital Connectivity by 2030

The goal of the International Telecommunications Satellite Organization (ITSO) is to "ensure that poor and underserved «lifeline connectivity» nations remain connected to the outside world".[9] In fulfilling this goal, at the Geneva 2004 World Summit on Information Society (WSIS) summit, the ITSO proposed its Global Broadband Satellite Infrastructure Initiative (GBSI). The ITSO envisioned the GBSI following the same model as the European Global Standards for Mobile Communications (GSM). Therefore, the ITSO would coordinate a public-private partnership to combine resources and reduce regulatory requirements to develop one constellation of satellites and user hardware to promote closing the digital divide.[10] If executed correctly, it would lead to collectively creating and maintaining one infrastructure for satellite broadband services that would reduce the cost to users and regulatory requirements for the companies. This collective focus eventually diminished, and the ITSO's GBSI has been eclipsed by private ventures such as Starlink.

In 2021, a multistakeholder consultation on the UN Secretary-General's Roadmap for Digital Cooperation resulted in a document titled *Achieving Universal and Meaningful Digital Connectivity: Setting a Baseline and Targets for 2030*.[11] This document, written by the Office of the Secretary-General's Envoy on Technology (OSET) and the ITU, outlines steps the UN will take to ensure everyone has "safe and affordable access to the Internet by 2030." As the data shared in the introduction section shows, Africa requires special attention in any global connectivity

9 K. Katkin, The global broadband satellite infrastructure initiative, *SSRN*, 2006, pp. 1–49. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2103932*The Global Broadband Satellite Infrastructure Initiative,* The 34th Research Conference on Communication Information and Internet Policy, 2006, p. 2. Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2103932 (accessed: 02/02/2025).

10 *Ibidem*.

11 International Telecommunication Union & Office of the Secretary-General's Envoy on Technology, *Achieving universal and meaningful digital connectivity: Setting a baseline and targets for 2030*, United Nations, 2021. Available at: https://www.itu.int/itu-d/meetings/statistics/wp-content/uploads/sites/8/2022/04/UniversalMeaningfulDigitalConnectivityTargets2030_BackgroundPaper.pdf (accessed: 02/02/2025).

vision. The ITU's analysis of the urban-rural gap states that it has barely improved from 2020 to 2023 and the "digital divide across income groups is magnified in rural areas".[12] In 2023, an ITU press release concluded that "current trends are not strong enough to guarantee that the objective of universal, meaningful connectivity will be met by 2030".[13] The lack of sufficient progress on their objectives to achieve Universal Meaningful Connectivity by 2030 implies that there should be shifts in the ITU and OSET's strategies for achieving this target. Given the ITU's stated intent to collaborate with the private sector, should the ITU integrate Starlink and its emerging competitors in its efforts to reach its target? This is explored in Section V concerning Starlink's policy and regulatory challenges.

Connectivity Initiatives in Africa

A project led by Meta and a consortium of seven other ICT companies from various countries, 2Africa's goal is to "significantly increase the capacity, quality, and availability of Internet connectivity between Africa and the rest of the world".[14] The consortium explained that it focused on Africa because its Internet penetration consistently fell below the global average. Additionally, they state that this project will help African countries meet many of the Sustainable Development Goals (SDGs) that rely on Internet connectivity.[15]

This project's stated intentions appear altruistic, yet its critics perceive it as an attempt by companies to exploit developing countries for profit rather than provide genuine assistance. Mwema and Birhane associate this project with "The new frontiers of digital colonialism".[16] These authors see 2Africa as a ploy to create "Infrastructure Debt," where African countries continually pay for connection to the Internet through private infrastructure. They have found that these companies can construct this cable and provide this service "with no oversight and little transparency".[17] Ultimately, these authors argue that 2Africa is exploiting the international push for universal digital connectivity for its financial gain and hiding behind the guise of SDGs.

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12 International Telecommunication Union, *Statistics*. Available at: https://www.itu.int:443/en/ITU-D/Statistics/pages/stat/default.aspx (accessed: 02/02/2025).

13 International Telecommunication Union, *Population of global offline continues steady decline to 2.6 billion people in 2023*, 2024. Available at: https://www.itu.int/en/mediacentre/Pages/PR-2023-09-12-universal-and-meaningful-connectivity-by-2030.aspx (accessed: 02/02/2025); International Telecommunications Union, *Population of Global Offline Continues Steady Decline to 2.6 Billion People in 2023*, "Press Release", Sept. 12, 2024. Available at: https://www.itu.int:443/en/mediacentre/Pages/PR-2023-09-12-universal-and-meaningful-connectivity-by-2030.aspx (accessed: 02/02/2025).

14 2Africa, About |. 2Africa Cable2Africa Deployment Is Underway. 2Africa Is Now Landing across 3 Continents and Will Be Ready for Service in Most Places as Early as 2023, *2Africa Cable*, 2022. Available at: https://www.2africacable.net/about (accessed: 02/02/2025).

15 *Ibidem*.

16 E. Mwema, A. Birhane, Undersea Cables in Africa: The New Frontiers of Digital Colonialism, *First Monday*, 2024, 29(4), p. 1.

17 *Ibidem*.

The ITU & OSET-led initiative, 2Africa, and numerous other initiatives stem from a shared vision for the continent and a recognition of the urgent need to bridge the digital divide. The former includes more stakeholders and must comply with internationally established statutes and standards. The latter shows how it is not beholden to as much red tape but receives heavy pushback from scholars and activists. Starlink should be seen as an attempt to navigate between these two different types of initiatives, aiming to reap the benefits of both.

Overview of Starlink

Starlink, a division of Space Exploration Technologies Corp. (SpaceX), is a satellite Internet service that utilises LEO satellites to deliver high-speed, low-latency Internet to users worldwide. Technically described as a constellation, Starlink consists of thousands of inter-operating satellites orbiting 550 km from Earth. According to Astronomer Jonathan McDowell, who tracks and publishes the constellation on his private website, there were 6,441 total working Starlink satellites in this low earth orbit as of October 24, 2024.[18] Due to the low altitude of these satellites, information communicated between ground stations, satellites, and users leads to lower latency and faster Internet.[19] Starlink's speed and low latency are comparable to commercial terrestrial Internet service providers.

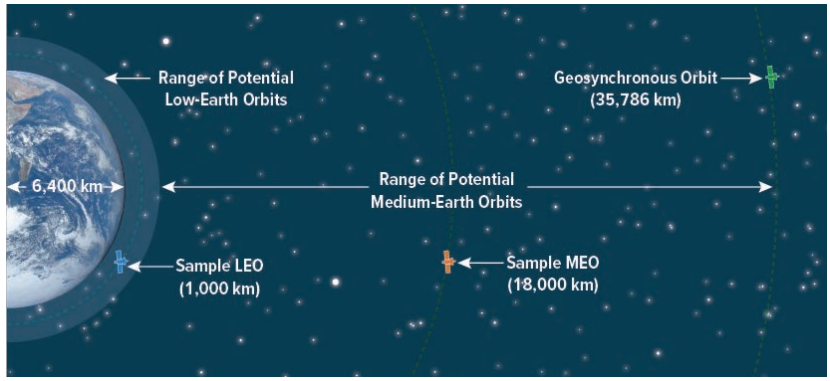

Fig. 1. Low Earth Orbit (LEO), Medium-Earth Orbits (MEO), and Geostationary Orbit (GEO) Satellite Communications System
Source: M. Bennett, C. Kramer, *Large Constellations of Low-Altitude Satellites: A Primer*, Congressional Budget Office, 2023. Available at: https://www.cbo.gov/publication/58794 (accessed: 02/05/2025).

18 J. McDowell, *Jonathan's Space Pages: Starlink Statistics – Starlink Launch Statistics*. Available at: https://planet4589.org/space/con/star/stats.html (accessed: 24/10/2024).

19 A. Yadav, A. Manthan, A. Somya, V. Sachin, *Internet From Space Anywhere and Anytime – Starlink,* 2nd International Conference on "Advancement in Electronics & Communication Engineering", 2022, pp. 480–487. Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4160260 (accessed: 24/10/2024).

LEO Internet satellites serve as a junction transmitting information to and from user hardware and a ground station connected to fibre optic cables. Due to the constellation being relatively low in altitude, the satellites orbit Earth at faster speeds.[20] Therefore, to provide consistent coverage, LEO Internet constellations must coordinate their trajectory so that when one satellite falls out of range, another satellite can support that connection. This means constellations, such as Starlink, require thousands of satellites orbiting at all times.

Data transmission through satellite broadband networks is conducted through uplinks, downlinks, and crosslinks. When a user transfers information through an Internet search to a satellite, it is called an uplink. Satellites transferring information to one another are called crosslinks. Finally, the downlink is the ground station and satellites' response to the user's request.[21] The speed for information to travel between these links is characterised by megabits per second (Mbps).

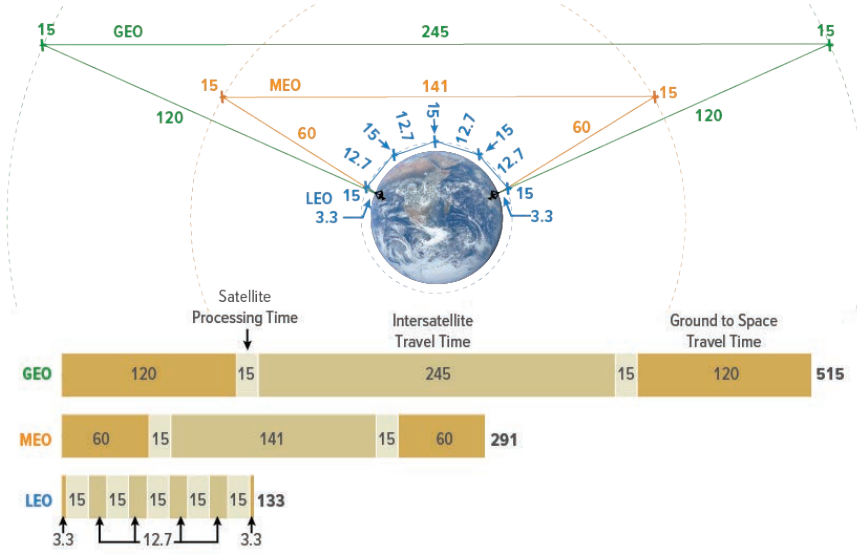

Fig. 2. Time to Transmit a Signal 13,000 Kilometers Across Earth's Surface (in Milliseconds)
Source: M. Bennett, C. Kramer, *Large Constellations of Low-Altitude Satellites: A Primer*, Congressional Budget Office, 2023. Available at: https://www.cbo.gov/publication/58794 (accessed: 02/05/2025).

20 The speed at which LEO satellites travel subsequently requires multiple satellites to coordinate while providing network connection to its users. Starlink satellites, for example, move at around 17,000 miles per hour and circle Earth in ninety minutes (Feldstein, 2024)

21 S. Weston (ed.), *Small Spacecraft Systems Virtual Institute: Small Spacecraft Technology State-of-the-Art Report*, NASA Ames Research Center, Moffett Field 2024, pp. 243–251. Available at: https://www.nasa.gov/wp-content/uploads/2024/03/soa-2023.pdf?emrc=8ad1a1 (accessed: 24/10/2024).

Figure 2 illustrates the inter-satellite travel time for GEO, MEO, and LEO satellites. This figure shows that LEO satellites have a considerably faster Internet connection than GEO and MEO satellites. LEO satellite constellations are moving so fast that a satellite can connect to a fixed point on Earth for only ten minutes before it moves out of range. Once a satellite moves out of the user's connection range, a new satellite must carry over the duties of the older satellite's information requests from various users.[22] This means that satellites within a constellation must be able to communicate large amounts of information to each other constantly.

Starlink's Global and Regional Rollout

Figures 3 and 4[23] show that Starlink is authorised and licensed to operate in 108 countries and territories.[24] This data shows that Starlink has moved quickly to comply with national regulatory requirements in numerous countries.

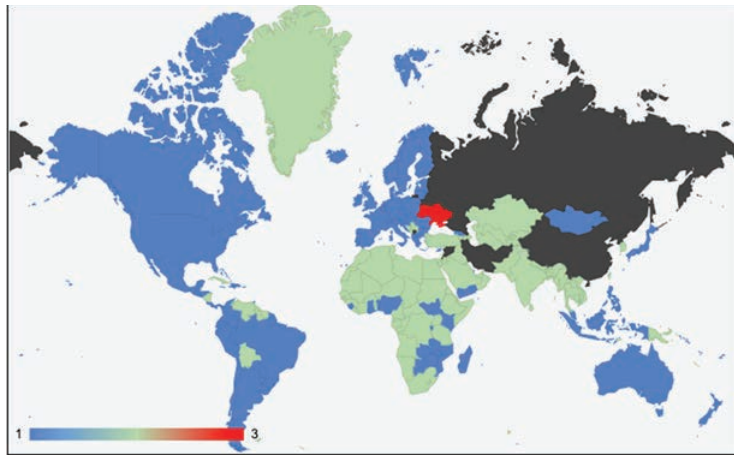

Fig. 3. Map of Starlink Coverage
Source: Starlink, 2024; United Nations Economic Commission for Europe, *UN/LOCODE code list by country and territory*, UNECE, 30 July 2024. Available at: https://unece.org/trade/cefact/unlocode-code-list-country-and-territory; Legend: Covered= Blue, Coming Soon= Green, Waitlist = Red, No Coverage = Black.

22 B. Akcali Gur, J. Kulesza, Equitable Access to Satellite Broadband Services: Challenges and Opportunities for Developing Countries, *Telecommunications Policy*, 2024, 48(5), pp. 1–10, https://doi.org/10.1016/j.telpol.2024.102731; M. Bennett, C. Kramer, *Large Constellations of Low-Altitude Satellites: A Primer*, Congressional Budget Office, 2023. Available at: https://www.cbo.gov/publication/58794 (accessed: 02/05/2025).

23 Waitlisted Countries and Territories include Ukraine, Pitcairn, Saint Helena, Bouvet Island and Singapore.

24 Starlink, *Availability Map*. Available at: https://www.starlink.com/map (accessed: 27/10/2024); UNECE, *UN/LOCODE Code List by Country and Territory*, Jul. 30, 2024. Available at: https://unece.org/trade/cefact/unlocode-code-list-country-and-territory (accessed: 26/10/2024).

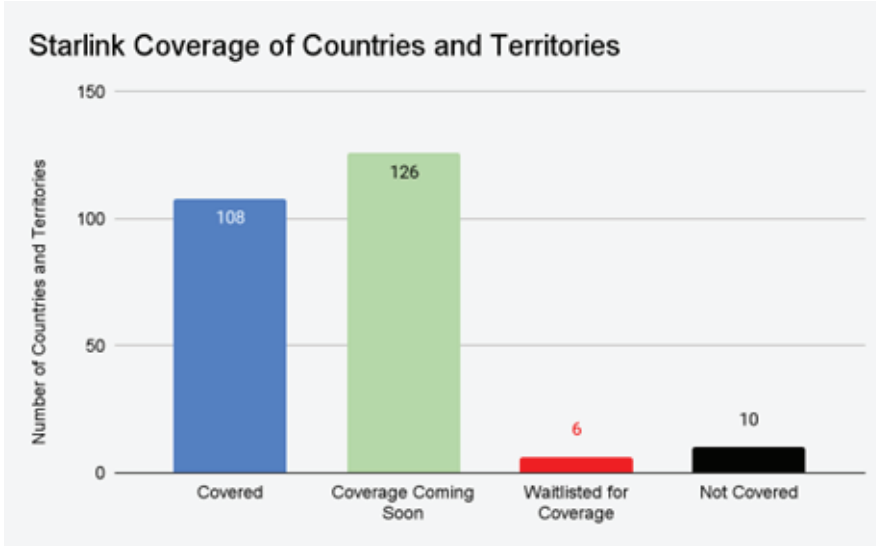

Fig. 4. Starlink Coverage of Countries and Territories
Source: Starlink, *Availability Map*. Available at: https://www.starlink.com/map (accessed: 27/10/2024).

Within Starlink's *Availability Map*, the company explains why a specific country or territory is classified as "Coming Soon," which informs potential customers when they might be able to expect the service and explains why there is a delay in coverage. For each of the one hundred twenty-six countries classified within this map as "Coming Soon," four standard explanations were given for the delay in coverage. These explanations were quantified on how frequently they appear in Figure 5 below and speak to the complexity of these regulatory barriers.

Thirty-eight of these countries and territories listed under the "Coming Soon" classification state that their coverage will begin in 2024, suggesting that the "Coming Soon" classification might not be completely accurate.[25] Furthermore, these figures reveal the regulatory complexity and challenges of obtaining the ability to provide an Internet connection to the world.

25 Five of the thirty-eight countries and territories listed within this classification have additional information explaining that their coverage will begin in "Q4" of 2024. This represents the fourth quarter of the fiscal year, which runs from October 1st to December 31st, meaning that this research took place during this "Q4" period of 2024.

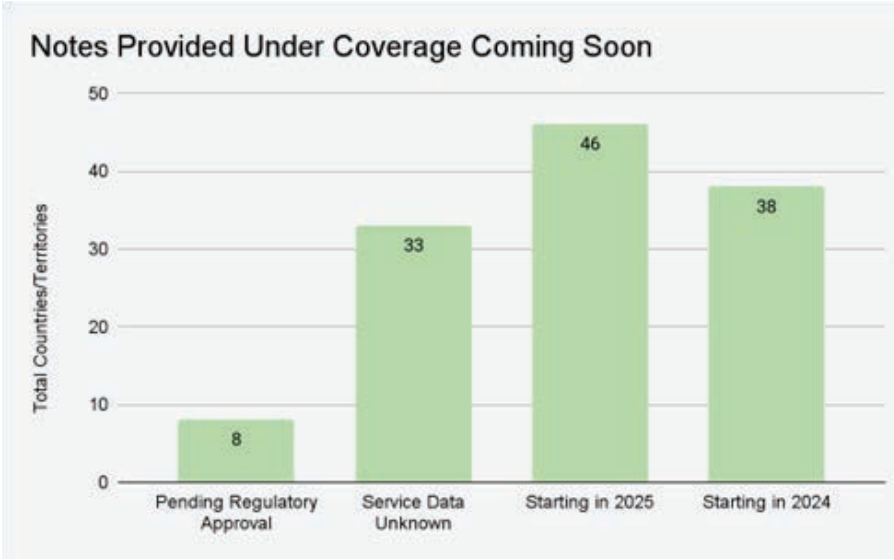

Fig. 5. Notes Provided Under Coverage Coming Soon
Source: Starlink, 2024.

Starlink's Impact on Internet Connectivity in African Countries

Starlink has quickly emerged as a major global Internet service provider (ISP) capable of competing with terrestrial ISPs worldwide. The demand for Starlink's service in Africa can be seen in Starlink's availability map, which shows that they have sold out of their kits in large cities within Nigeria, Zimbabwe, Kenya, Zambia, and Madagascar.[26] Additionally, in April of 2024, Starlink reached an agreement with Jumia, the largest e-commerce platform in Africa, to allow their residential kits to be purchased on Jumia's platform.[27] This example illustrates Starlink's willingness to work with other actors in the African market to increase ease of access to its services. Starlink's speeds, being between 25 and 220 Mbps, significantly outperform the average broadband speed for Northern Africa (12.52 Mbps) and Sub-Saharan Africa (14.99 Mbps).[28] Starlink's Internet speed and coverage speak to its ability to satisfy many key "connectivity enablers" in the UN's meaningful connectivity standard for infrastructure.[29]

26 *Ibidem*.

27 F. Awowede, *To win in Nigeria, Starlink cuts price to ₦40k,* "Technology Times", Nov. 4, 2024. Available at: https://technologytimes.ng/starlink-cuts-price-in-nigeria/ (accessed: 09/11/2024); Jumia, *Starlink and Jumia Collaborate to Expand Internet Service in Africa*, Oct. 2, 2023 (accessed: 09/11/2024).

28 D. Howdle, *Worldwide Broadband Speed League 2024,* Cable.co.uk, 30 June 2024. Available at: https://www.cable.co.uk/broadband/speed/worldwide-speed-league/ (accessed: 30/10/2024).

29 International Telecommunication Union & Office of the Secretary-General's Envoy on Technology, *op. cit.*

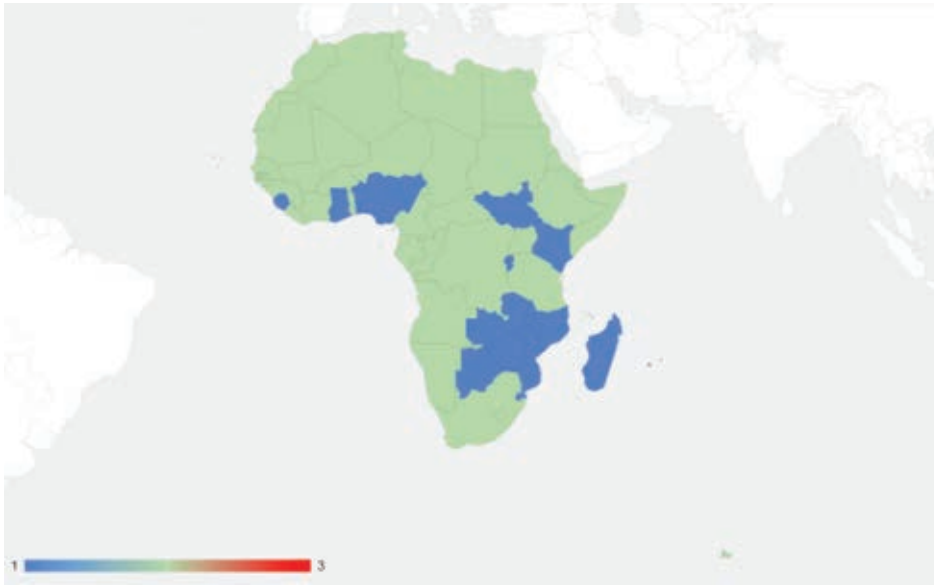

Fig. 6. Starlink Coverage of African Continent; Legend: Covered= Blue, Coming Soon Green, Waitlist = Red, No Coverage = Black.
Source: Starlink, *Availability Map*. Available at: https://www.starlink.com/map (accessed: 27/10/2024).

Starlink's *Availability Map* reveals that out of the fifty-seven African countries and territories, Starlink covers fifteen and is coming soon to the other forty-three. The explanation for the delay in coverage on the availability map stated that "service date is unknown" for all forty-three countries and territories within the "Coming Soon" category.[30] This reveals SpaceX's ambition and commitment to providing coverage across the continent. Nevertheless, the explanation also speaks to various obstacles the company must overcome.

Affordability and Economic Feasibility of Starlink in Africa

When comparing Starlink's average monthly service charge in Africa to the average monthly broadband plan in Africa, as seen in Figure 7, Starlink appears to be addressing the lack of affordability of Internet services in the continent. For example, Mozambique has one of the world's highest average monthly broadband costs, equivalent to $118.26.[31] Starlink, on the other hand, offers its monthly service for the equivalent of $46.96.[32] Comparing these two costs at face value, the choice is evident to a user in Mozambique. A user wanting to establish Starlink as their Internet service provider must also pay for Starlink's hardware. Figure 8 combines

30 Starlink, *Availability Map*.
31 D. Howdle, Global Broadband Pricing League Table 2024.
32 Starlink, *Availability Map*.

the price for a month of Internet service and the hardware cost for each African country that Starlink covers.

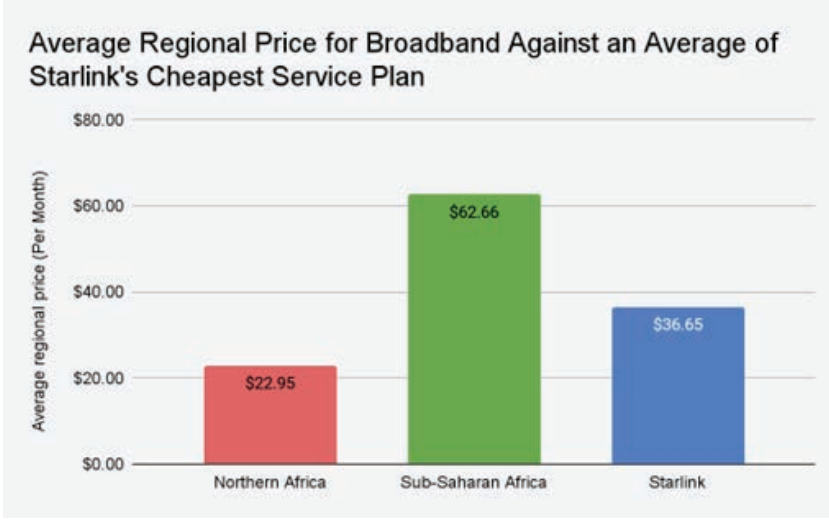

Fig. 7. Average Regional Price for Broadband Against an Average of Starlink's Cheapest Service Plan
Source: Starlink, *Availability Map*. Available at: https://www.starlink.com/map (accessed: 27/10/2024); D. Howdle, *Worldwide Broadband Speed League 2024,* Cable.co.uk, 30 June 2024. Available at: https://www.cable.co.uk/broadband/speed/worldwide-speed-league/ (accessed: 30/10/2024).

Furthermore, consideration must be given to the lifespan of the Starlink hardware, which is all purchased equipment that establishes the customer's internet connection. According to Starlink Specifications, customers should be able to expect their hardware to connect them to the Internet and remain intact and operable for a minimum of 12 or 24 months.[33] These specifications reveal a new reality for users connecting through satellite broadband. Satellite broadband users have intrinsically obtained some responsibility for maintaining a significant part of the infrastructure they rely on to connect them to the Internet. By comparison, users utilising terrestrial ISPs have most of their network connection maintained by the provider, which is factored into their monthly subscriptions.

Therefore, users who see the initial difference in monthly broadband prices advertised in Figure 7 must consider two factors of this coverage. First, users assume responsibility for infrastructure maintenance that would be factored into a monthly subscription to an ISP run through fibre-optic cables. Second, this is an investment in hardware that, according to Starlink, might last one year before it needs to be replaced, even if appropriately maintained.

33 *Ibidem*; Starlink, *Specifications*. Available at: https://www.starlink.com/specifications?spec=5 (accessed: 11/11/2024).

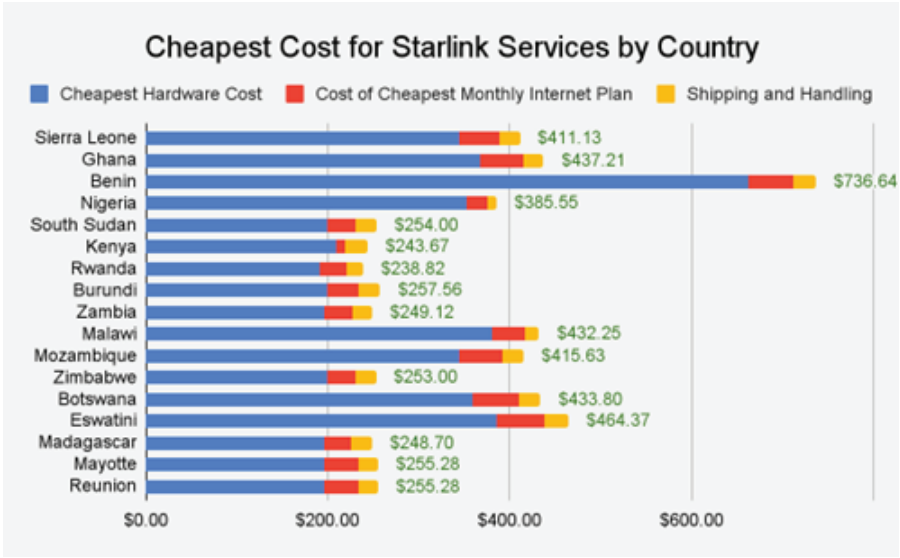

Fig. 8. Cheapest Cost of Starlink Services by Country
Source: Starlink, *Availability Map*. Available at: https://www.starlink.com/map (accessed: 27/10/2024).

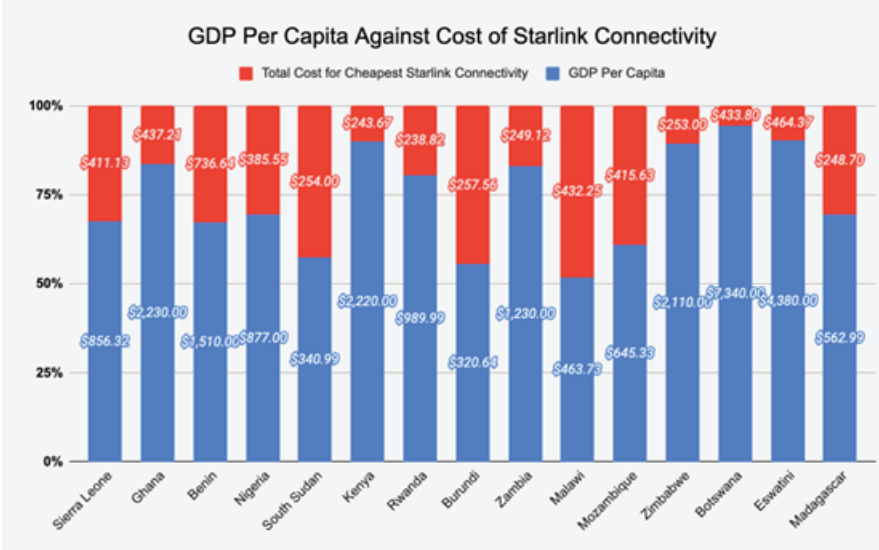

Fig. 9. GDP Per Capita Against Cost of Starlink Connectivity
Sources: Starlink, *Availability Map*. Available at: https://www.starlink.com/map (accessed: 27/10/2024); International Monetary Fund, World economic outlook (October 2024) – GDP per capita, current prices, 2024. Available at: https://www.imf.org/external/datamapper/NGDPDPC@WEO (accessed: 27/10/2024).

To reveal Starlink's economic feasibility to African users, we must compare the GDP per capita of each African country covered by Starlink against the cheapest Starlink coverage option. Since GDP per capita reflects the country's average yearly income, Figure 9 displays the level of investment Starlink is for households in various countries. This final comparison reveals that Starlink's pricing is not focused on the average income of the population where they offer their service. Most importantly, it demonstrates that for the average person in some African countries, the initial cost of Starlink coverage is almost their entire yearly income. This observation suggests that despite Starlink's low average monthly broadband prices, factoring in their hardware expense is not economically feasible for some African countries.

Starlink's Impact on Local ISPs and Existing Initiatives

The demand for Starlink kits and the competition it has created in the telecommunications market has forced dominant African ISPs to respond by lowering their prices. An example of this can be seen with Safaricom, a telecommunications company (telco) with a significant market share in Kenya. In April 2023, Elon Musk stated his intention to enter the Kenyan Market, which led Safaricom to cut the cost of some Wi-Fi routers by half. When Starlink subsequently entered the market, they offered a 50 GB monthly data plan for Ksh1,300 ($10.16), which is more data and significantly cheaper than Safaricom's 45 GB plan for Ksh2,500 ($19.53). In September of 2024, Safaricom unveiled a new 1000Mbps (1 Gigabit per second) package in addition to increasing the speed of all of their lower speed packages, with their 40Mbps bundle now having its speed doubled to 80 Mbps.[34] This example illustrates two things: first, that competition between ISPs is great for consumers, and second, Starlink's entrance into the African market has created competition among ISPs.

This competition has led large ISPs in African countries to lobby their government to place new mandates and regulations on Starlink. Internet service providers in Kenya, Zimbabwe, Nigeria, and Cameroon have all raised concerns that Starlink is not being regulated fairly and suggest that they cannot compete with its services and pricing. In Kenya, a leaked letter Safaricom wrote to the Communication Authority of Kenya's director general suggested new regulations on Starlink. This letter stated that since satellites cover multiple countries, there can be unauthorised use, causing harmful interference in Kenya. Therefore, Safaricom argued that the Communications Authority of Kenya should require satellite

34 Safaricom, *Safaricom Increases Internet Speeds For Home And Business Customers, Introduces The New 1000Mbps Platinum Package For Customers*, 23 September 2024. Available at: https://www.safaricom.co.ke/media-center-landing/press-releases/safaricom-increases-internet-speeds-for-home-and-business-customers-introduces-the-new-1000mbps-platinum-package-for-customers (accessed: 30/10/2024); B. Okinda, Why Safaricom is panicking after Starlink's arrival in Kenya, *Afcacia*, 22 August 2024. Available at: https://afcacia.io/why-safaricom-is-panicking-after-starlinks-arrival-in-kenya/ (accessed: 30/10/2024).

providers to operate as "infrastructure providers" to operators like Safaricom.[35] With Starlink's *Direct to Cell* offering, this would not be the first time Starlink has partnered with operators as an infrastructure provider.[36] This regulation would importantly prevent Starlink from competing with Safaricom. Discussing competition in Kenya's telecommunications market, Kenyan President Ruto said that this competition makes all players better and has urged existing telcos to welcome new entrants.[37] This example illustrates Starlink's positive impact on affordability through the competition it offers but also reveals the enemies it is making within the African market that are wielding their influence against Starlink.

Starlink for Universal Meaningful Digital Connectivity

In their document outlining *Universal Meaningful Connectivity*, the ITU and OSET acknowledge that there cannot be a "one-size-fits-all policy mix that can be prescribed to all countries," alluding to their need to be open to all potential solutions.[38] Furthermore, in Resolution 71, titled *Strategic Plan for the Union for 2024–2027*, the ITU committed to working collaboratively with "the full range of other organisations and entities around the world committed to advancing the use of telecommunications/ICTs for a connected world by 2030."[39] This resolution reflects a commitment by the ITU to work with private companies that can help them achieve their target of universal, meaningful digital connectivity by 2030. To honour this commitment, the ITU has created the Partner2Connect initiative. This initiative comprises over four hundred fifty cross-sector entities that pledged to contribute over $50 billion towards global connectivity.[40] SpaceX is not included in this initiative.

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35 A. Ross, Kenya's Safaricom urges new requirements for satellite providers like Starlink, *Reuters*, 23 August 2024. Available at: https://www.reuters.com/business/media-telecom/kenyas-safaricom-urges-new-requirements-satellite-providers-like-starlink-2024-08-23/ (accessed: 30/10/2024).

36 Starlink, *Specifications*; Starlink, *SpaceX Sends First Text Message Via Its Newly Launched Direct to Cell Satellites*, 10 January 2024. Available at: https://api.starlink.com/public-files/DIRECT_TO_CELL_FIRST_TEXT_UPDATE.pdf?_gl=1*1xtmfc*_ga*MTE1NDY0MDE4NC4xNzI2MDYyMzk0*_ga_S07SYD5D4F*MTczMDMwMTc4MC4xMi4wLjE3MzAzMDE3ODAuMC4wLjA. (accessed: 09/11/2024).

37 L. Yieke, Starlink's Aggressive Push in Africa Keeps Telcos on High Alert, *African Business*, 1 November 2024. Available at: https://african.business/2024/11/technology-information/starlinks-aggressive-push-in-africa-keeps-telcos-on-high-alert (accessed: 02/05/2025).

38 International Telecommunication Union & Office of the Secretary-General's Envoy on Technology, *op. cit.*, p. 4.

39 The Plenipotentiary Conference of the International Telecommunication Union, *Resolution 71: Strategic plan for the Union for 2024-–2027,* Bucharest 2022, p. 368. Available at: https://www.itu.int/en/council/Documents/basic-texts-2023/RES-071-E.pdf (accessed: 11/11/2024).

40 International Telecommunication Union*, ITU's Partner2Connect tops USD 50 billion for global connectivity at WSIS+20 Forum High Level Event: Digital Coalition surpasses half its USD 100 billion goal for closing the digital* divide, Geneva 2024. Available at: https://www.itu.int/en/mediacentre/Pages/PR-2024-05-27-Partner2Connect-global-connectivity.aspx (accessed: 11/11/2024).

Starlink's ability to provide 25–100 Mbps worldwide satisfies the ITU and OSET's infrastructure target and more than doubles their 10 Mbps speed target to qualify as meaningful connectivity. Within the document's *School Connectivity* connectivity enabler, the ITU and OSET set a target for all schools to obtain a minimum download speed of 20 Mbps by 2030. Starlink currently can exceed this ITU and OSET target. Furthermore, Starlink's *Direct to Cell* service would be able to exceed the ITU and OSET's stated target for its "Mobile network coverage" connectivity enabler.[41]

Therefore, according to the ITU and OSET's universal, meaningful connectivity document, Starlink is poised to satisfy three of eight infrastructure targets for 2030. Moreover, Starlink states on its website that there are numerous ways to procure equipment, including commercial and government channels. One then must ask: Why has Starlink not participated in multistakeholder initiatives led by the ITU or OSET?

One explanation could be competing geopolitical issues within international regulatory bodies, leading to gridlock. Starlink's violation of Iran's jurisdiction is an excellent example of how geopolitics is a significant obstacle preventing Starlink from cooperating with the ITU and OSET in their Universal Meaningful Connectivity targets for 2030. This case before the ITU Radio Regulations Board led to the decision requiring Starlink to cooperate with Iran to remove its hardware from the country.[42] This case, and Starlink's close cooperation with the US government in providing coverage to Iran, makes it hard for the ITU and OSET to collaborate with Starlink due to geopolitical tensions.

Comparative Analysis: Starlink vs. Other Satellite Broadband Companies

SpaceX's Starlink has achieved many important landmarks in the LEO satellite broadband market. Other LEO satellite Internet companies have significant differences. In their 2024 article detailing the competition in the LEO satellite Internet market, Pedram and Georgiades stated that Starlink, Project Kuiper, and OneWeb "are the salient projects in the LEO constellations industry".[43] Since OneWeb presents a much more significant divergence from Starlink and Kuiper's market

41 International Telecommunication Union & Office of the Secretary-General's Envoy on Technology, *op. cit.*, p. 4.

42 A. Akbari, Shutting down the internet is another brutal blow against women by the Iranian regime, *The Guardian*, 9 September 2022. Available at: https://www.theguardian.com/commentisfree/2022/sep/26/elon-musk-iran-women-mahsa-amini-feminists-morality-police (accessed: 04/11/2024); D. Psaledakis, S. Lewis, U.S. adjusts sanctions to help Iranians evade online surveillance, censorship, *Reuters*, 23 September 2022. Available at: https://www.reuters.com/world/us-expands-sanctions-exceptions-help-provide-internet-iranians-2022-09-23/ (accessed: 04/11/2024); International Telecommunication Union, *Document RRB24-2/12-E: Summary of decisions of the 96th meeting of the Radio Regulations Board*, Geneva 2024, pp. 13–15. Available at: https://www.itu.int/dms_pub/itu-r/md/24/rrb24.2/c/R24-RRB24.2-C-0012!!PDF-E.pdf (accessed: 11/11/2024).

43 M. Pedram, E. Georgiades, The Role of Regulatory Frameworks in Balancing Between National Security and Competition in LEO Satellite Market, *Journal of National Security Law & Policy*, 2024, 14(2), pp. 179–212.

strategies and is the only other functional LEO satellite internet constellation, this section will explore the differences between OneWeb and Starlink. This contrast will illuminate alternative strategies within the LEO satellite broadband industry. Additionally, it will provide parallels between the private and intergovernmental approaches to connecting the rest of the world to the Internet.

As of October 2024, OneWeb is the second-largest operational LEO constellation with over 600 satellites, working with a fleet of thirty-six GEO satellites. Initially created in 2012, OneWeb eventually filed for bankruptcy and was bought out in a joint purchase by the UK government and Indian conglomerate Bharti Global Ltd. in 2020. In 2023, Eutelsat, a French geostationary satellite business, merged with OneWeb to form the Eutelsat group, which became the first GEO-LEO integrated satellite group. The mission statement of this group states that they will "anticipate future needs with cutting-edge satellite technology, opening ways to new forms of communication which enable all to connect across the globe".[44] OneWeb is not owned by one company or individual.

The user hardware is separated into three offerings and differs based on its intended use. Among their offering are a foldable dish, a dish designed to be mounted on a car, and a large dish capable of connecting a small community to the Internet, offering speeds up to 195 Mbps.[45] Eutelsat Group's infrastructure connects businesses, ships, planes, existing telecom operators, governments, and organisations supporting universal service commitments. The group does not offer plans to individual users, a key difference from Starlink. This means that OneWeb does not directly compete with African telecommunications markets for users and functions more as an infrastructure provider.

Overlap and Differentiation

According to Pedram and Georgiades, the LEO satellite Internet market can be split into two stages. "Stage One" is described as the satellite launch phase. "Stage Two" is the satellite constellation signifying the LEO space that a company's satellites occupy and the capabilities of their satellites.[46] Within this division of the market, the authors warn about the creation of the vertical integration of these two stages that can then lead to companies being gatekeepers to the market. As gatekeepers, these companies could raise the entry price and subsequently reduce the

44 Eutelsat Group, *About. Eutelsat Group*, 2023. Available at: https://www.eutelsat.com/en/group/about-us.html#:~:text=OUR%20MISSION,-Enabling%20all%20to&text=Eutelsat%20Group%E2%80%99s%20mission%20is%20to,to%20connect%20across%20the%20globe (accessed: 11/11/2024). Eutelsat Group, *About \ Eutelsat Group*, Paris 2023. Available at: https://www.eutelsat.com/en/group/about-us.html#:~:text=OUR%20MISSION,-Enabling%20all%20to&text=Eutelsat%20Group%E2%80%99s%20mission%20is%20to,to%20connect%20across%20the%20globe (accessed: 11/11/2024).

45 Eutelsat OneWeb, *Carrier & Enterprise. World Leading Partners in User Terminal Technology*, Eutelsat Group, Paris 2024. Available at: https://oneweb.net/solutions/carrier-enterprise (accessed: 05/11/2024).

46 M. Pedram, E. Georgiades, *op. cit.*

competition. Therefore, this chapter's analysis of the overlap and differentiation of the two competitors will focus on their competencies in these two stages. By building upon the work of Pedram and Georgiades, this analysis reveals not only differences in market strategies but also Starlink's potential to become a gatekeeper that restricts competition.

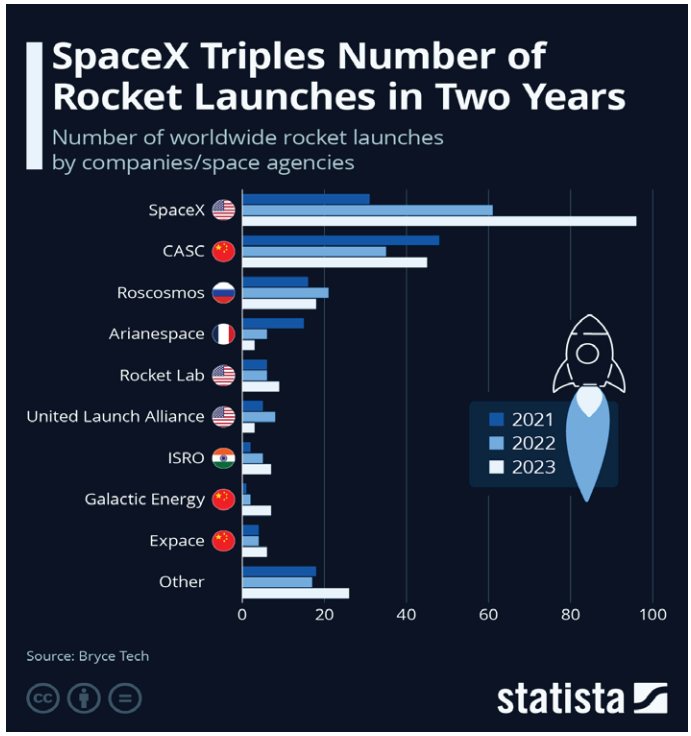

Figure 10. Number of Worldwide Rocket Launches by companies/space agencies
Source: F. Zandt, Infographic: SpaceX triples number of rocket launches in two years, *Statista*, 14 October 2024. Available at: https://www.statista.com/chart/29410/number-of-worldwide-rocket-launches-by-companies-and-space-agencies/ (accessed: 06/11/2024).

What can be ascertained from recent figures is that SpaceX has a dominant position over Stage One of the satellite broadband market. As illustrated in the figure above, SpaceX has facilitated over 50% of private launches in 2023.[47] SpaceX's success in this stage can be attributed to the affordability of its launches.[48]

47 F. Zandt, Infographic: SpaceX triples number of rocket launches in two years, *Statista*, 14 October 2024. Available at: https://www.statista.com/chart/29410/number-of-worldwide-rocket-launches-by-companies-and-space-agencies/ (accessed: 06/11/2024).

48 P. Lionnet, SpaceX and the categorical imperative to achieve low launch cost, *SpaceNews*, 7 June 2024. Available at: https://spacenews.com/spacex-and-the-categorical-imperative-to-achieve-low-launch-cost/ (accessed: 11/11/2024); D. Chow, To cheaply go: How falling launch

Whereas other space companies focus on saving money by cutting material or personnel costs, SpaceX has achieved its savings primarily through reusing the same rocket and integrating more robotics in production.[49] This capture of Stage One of the market has been critical in Starlink becoming the largest LEO constellation and enabled SpaceX to capture large swaths of the consumer base.

OneWeb, on the other hand, does not have its own launch service; instead, it has opted to launch its satellites with various actors, ranging from NewSpace India Limited to SpaceX. The diversity of partners OneWeb has integrated into its launches speaks towards its divergent path and collaborative nature.

Starlink has highly advanced satellites.[50] Quilty Space research analysts have stated that SpaceX has significantly improved its satellite's capacity to process and relay data in its new V2 satellite and projected more advancements in its V3.[51] Quilty Space research director Caleb Henry reportedly stated that their satellite mastery comes from its "aggressive vertical integration and high-volume production".[52] Henry noted that SpaceX can avoid many costs associated with external suppliers. This vertical integration also expresses Starlink's desire to control the "Stage Two" market.

According to its CEO, Eva Berneke, OneWeb's multi-orbit satellite infrastructure provides them with increased resiliency, which is particularly enticing for military and government users. Berneke included that the benefit lies in fitting a multi-network offering with a mobile backhaul on the go within a single piece of hardware that can fit into a tight space such as a plane.[53] The constellation is working to achieve 90% global connectivity by the end of 2024. OneWeb's divergence

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costs fueled a thriving economy in orbit, *NBC News*, 4 April 2022. Available at: https://www.nbcnews.com/science/space/space-launch-costs-growing-business-industry-rcna23488 (accessed: 06/11/2024).

49 N. John, Raise the Space Bar: As SpaceX provides some of cheapest satellite launches, what can ISRO do to reclaim cost advantage?, *The Economic Times*, 3 November 2024. Available at: https://economictimes.indiatimes.com/news/science/raise-the-space-bar-as-spacex-provides-some-of-cheapest-satellite-launches-what-can-isro-do-to-reclaim-cost-advantage/articleshow/114889658.cms?from=mdr (accessed: 06/11/2024).

50 Starlink, *Satellite Technology*, 2024. Available at: https://www.starlink.com/technology (accessed: 11/11/2024).

51 S. Clark, SpaceX Pausing Launches of New-Generation Starlink Satellites, *Spaceflight Now*, 23 March 2023. Available at: https://spaceflightnow.com/2023/03/23/spacex-pausing-launches-of-new-generation-starlink-satellites (accessed: 11/11/2024).

52 S. Erwin, Starlink soars: SpaceX's satellite internet surprises analysts with $6.6 billion revenue projection, *SpaceNews*, 9 May 2024. Available at: https://spacenews.com/starlink-soars-spacexs-satellite-internet-surprises-analysts-with-6-6-billion-revenue-projection/ (accessed: 11/11/2024); *Starlink soars: SpaceX's satellite internet surprises analysts with $6.6 billion revenue projection*, SpaceNews, May 9, 2024. Available at: https://spacenews.com/starlink-soars-spacexs-satellite-internet-surprises-analysts-with-6-6-billion-revenue-projection/ (accessed: 11/11/2024).

53 J. Rainbow, Making the case for multi-orbit broadband, *SpaceNews*, 4 June 2024. Available at: https://spacenews.com/making-case-multi-orbit-broadband/ (accessed: 11/11/2024).

from Starlink's approach is also seen within this stage. Rather than focusing on vertical integration, the service provider has sold its stake in a satellite production facility and focused on collaboration. Eutelsat OneWeb is now looking for a manufacturer to build a second-generation LEO constellation to increase capacity and enhance the performance of their Gen 1.[54]

Policy and Regulatory Challenges in Africa

As explained in the sections above, Satellites provide Internet connectivity primarily through radio spectrum. However, radio spectrum is a limited resource. Entities that use this spectrum, such as ISPs, television stations, or radio stations, must be permitted to use it by each country where they wish to provide their service. Since multiple companies and industries need to use radio spectrum to operate, many existing companies and industries are hostile to Starlink and other LEO satellite broadband entry into the market. The ITU Radio Communication Sector (ITU-R) presides over international regulations and disputes. The ITU-R manages the spectrum coordination between countries to prevent interference, and countries authorise and license the spectrum allocation within their borders. Therefore, Starlink must obtain permission from each country to utilise the radio frequency within their borders.

Spectrum and Licensing Issues

At the World Communication Conference 2023 (WRC-23) held in Dubai, terrestrial telecommunications companies, GEO and GSO satellite-based companies, and LEO satellite broadband companies fought over international guidelines for spectrum allocation. On one side of the argument, GEO and GSO satellite-based companies claimed that LEO satellites caused interference. On the other side, LEO satellite broadband companies are pushing to update the rules to permit non-geostationary satellite systems (NGSO) to increase the equivalent power flux density (EPFD). EPFD measures a radio signal's power when it reaches Earth's surface. NGSO companies argue that current limits are outdated and are restricting the ability to make Internet access more affordable.[55] These arguments speak to strains placed upon regulatory bodies to determine what is best for various industries effectively.

54 J. Rainbow, Eutelsat scales back OneWeb Gen 2 upgrade plan, *SpaceNews*, 16 February 2024. Available at: https://spacenews.com/eutelsat-scales-back-oneweb-gen-2-upgrade-plan/ (accessed: 11/11/2024).

55 S. Dalledonne, *From WRC-23 to the next cycle: How to make everyone happy? (Hint: You can't)*, Policy Brief 66. European Space Policy Institute, 21 March 2024. Available at: https://www.espi.or.at/briefs/from-wrc-23-to-the-next-cycle-how-to-make-everyone-happy-hint-you-cant/ (accessed: 11/11/2024).

Geopolitics and sovereignty are also tied into the spectrum and licensing constraints. For example, the United States' National Spectrum Strategy states, "America's security, safety, technological leadership, and economic growth depend, in no small measure, on sufficient access to spectrum".[56] Starlink's illegal use in Iran illustrates the ability of private companies to disregard independent states' spectrum rights, but most importantly, their ability to influence the flow of information within and outside of its borders. Another important connection is to Internet shutdowns. According to AccessNow, in 2023, there were 283 Internet shutdowns in 39 countries, the highest since they began monitoring in 2016, with many of these being African countries.[57] The report indicates how Internet shutdowns are a tool increasingly being deployed by many African countries that desire to have control over information flow from within and outside of their country.

Public-Private Partnerships

There have been multiple instances where private companies have partnered with LEO satellite broadband. Africa's leading digital and infrastructure service provider, Bayobab, has agreed to work with OneWeb to help deliver fixed connectivity services and improve coverage of rural areas throughout Africa.[58] Additionally, OneWeb signed an agreement with Airtel Africa to achieve full coverage across all of Airtel Africa's markets, which includes fourteen African countries. Subsequently, in August of 2024, Airtel Nigeria announced the successful installation of a OneWeb dish at a site in Lagos, stating that it would help governments and businesses connect rural areas.[59] Within the "Overlap and Differentiation" section above, it was established that OneWeb's market strategy diverged significantly from Starlink. This section represents a continued focus from OneWeb on prioritising collaboration and partnerships with outside businesses and industries.

Starlink is also actively working with other providers to assist rural communities in connecting to the Internet. It should be noted that Starlink has just introduced its "Community Gateways" package for local providers. This package offers up to 10 Gigabits per second (Gbps) of download and 10 Gbps of upload with less than 99 milliseconds of latency. By utilising last-mile fibre, fixed wireless and mobile wireless providers

56 The White House, *The National Spectrum Strategy*, 13 Nov. 13,ember 2023, pp. 9–10. Available at: https://www.ntia.gov/sites/default/files/publications/national_spectrum_strategy_final.pdf (accessed: 11/11/2024).

57 Z. Rosson, C. Tackett, Felicia, The Most Violent Year: Internet Shutdowns in 2023, *Access Now*. Available at: https://www.accessnow.org/internet-shutdowns-2023/ (accessed: 06/11/2024).

58 Bayobab, *Eutelsat and Bayobab Collaborate on OneWeb Constellation for Fixed Services throughout Africa*, 23 August 2024. Available at: https://bayobab.africa/eutelsat-and-bayobab-collaborate-on-oneweb-constellation-for-fixed-services-throughout-africa/ (accessed: 05/11/2024).

59 S. Nyangi, Airtel Nigeria Successfully Installs Eutelsat OneWeb Dish, *Space in Africa*, 23 August 2024. Available at: https://spaceinafrica.com/2024/08/23/airtel-nigeria-successfully-installs-eutelsat-oneweb-dish/ (accessed: 05/11/2024).

would be given enough throughput to serve thousands of new customers.[60] This option is tailored to work for hard-to-reach communities such as the ones in Africa. Yet, it costs $75,000 per Gbps monthly and $1.25 million upfront, which might not be feasible for some existing African telecommunications companies.

Case Studies: Early Starlink Deployment in Africa

For years, experts have recognised Africa's development potential and claimed it to be the fastest-growing consumer market in the world.[61] Starlink's arrival on the continent has elicited strong pushback from many countries and telecommunications companies. Oniosun, the CEO of a Nigerian media and analytics company focused on the African space and satellite industry, stated: "We have a foreign company coming in, doing the bare minimum, and then taking market share from companies that have invested heavily in the continent and are providing jobs for thousands of people".[62]

Others, such as Kenyan President Ruto, say that this competition makes all players better and has urged existing telcos to welcome new entrants. Furthermore, industry operators, such as South Africa's MTN Group, see Starlink as an opportunity to allow for higher digital penetration rates.[63] Therefore, in this section, we will explore Starlink's impact through its coverage in Nigeria and its challenges in offering coverage in South Africa.

South Africa

The birthplace of SpaceX founder Elon Musk and the most advanced economy in the continent, South Africa, is a focus for Starlink's coverage expansion. Independent Communications Authority of South Africa (ICASA), the body responsible for assigning the country's spectrum, banned Starlink from operating in South Africa. This ban is based on South Africa's Electronic Communications Act, which requires spectrum

60 P. Lipscomb, Starlink Unveils Community Gateway Offering Aimed at Plugging Coverage in Remote Areas, *Data Centre Dynamics*, 18 January 2024. Available at: https://www.datacenterdynamics.com/en/news/starlink-unveils-community-gateway-offering-aimed-at-plugging-coverage-in-remote-areas/ (accessed: 11/11/2024).

61 L. Signé, Africa's Consumer Market Potential, *Brookings*, 12 December 2018. Available at: https://www.brookings.edu/articles/africas-consumer-market-potential/ (accessed: 07/11/2024); African Development Bank Group, Africa Dominates List of the World's 20 Fastest-Growing Economies in 2024—African Development Bank Says in Macroeconomic Report. *Press Release*, African Development Bank Group. 16 February 2024. Available at: https://www.afdb.org/en/news-and-events/press-releases/africa-dominates-list-worlds-20-fastest-growing-economies-2024-african-development-bank-says-macroeconomic-report-68751 (accessed: 07/11/2024).

62 L. Yieke, *Starlink's* Aggressive Push in Africa Keeps Telcos on High Alert, *African Business*, Nov. 1, 2024. Available at: https://african.business/2024/11/technology-information/starlinks-aggressive-push-in-africa-keeps-telcos-on-high-alert (accessed: 11/11/2024).

63 *Ibidem*.

licensees to have 30% equity ownership by persons from historically disadvantaged groups.[64] Starlink's refusal to abide by this regulation is consistent across numerous African countries. Kenya and Zimbabwe have this same law, but Starlink made deals with the countries' leaders to have SpaceX forgo this regulation. This provides more context to Kenyan ISP Safaricom's claims that Starlink is being regulated unfairly.[65]

One ICASA councillor, Charley Lewis, believes satellite broadband connectivity is not the solution to the digital divide. Lewis stated that equipment and monthly service costs put it "out of the reach of poor individuals".[66] Despite its being illegal, South Africans still bought Starlink hardware and utilised its roaming capabilities. Through this process, thousands of users in South Africa could use the service without official government authorisation. On October 25, 2024, Starlink users in South Africa noticed that Starlink removed its roaming subscription options.[67] South African President Ramaphosa talked with Elon Musk at a UN General Assembly, where he told him, "I want you to come home and invest here".[68] South Africa's Minister of the Department of Communications and Digital Technologies (DCDT), Solly Malasti, then announced his intentions to amend the Electronic Communications Act. Malasti stated he wanted to "significantly expand access to broadband connectivity to poor South Africans and people living in remote parts of the country".[69] Powerful South African officials, such as Malasti and Ramaphosa, are therefore willing to adjust their regulatory policy on the radio spectrum to accommodate Starlink and similar companies. This speaks to a position of leverage that Starlink, and potentially other LEO satellite operators, have, and in Starlink's case, is exercising over African countries. Additionally, it provides some credence to claims made by African ISPs explored in this chapter's case study analysis of Safaricom.

Nigeria

Nigeria is the most populous nation within the continent and was the first African country to sign a spectrum licensing agreement with Starlink in January of

64 M. Akuchie, South African authorities ban importation of Starlink kits as users face possible blackout, *Technext*, 22 August 2023. Available at: https://technext24.com/2023/08/22/sa-starlink-ban-kits-import/ (accessed: 11/11/2024).

65 A. Ross, *op. cit*.

66 S. Quadri, Elon Musk's Starlink shakes up competition in Africa, *Semafor*, 23 September 2024. Available at: https://www.semafor.com/article/09/23/2024/elon-musks-starlink-shakes-up-competition-in-africa (accessed: 14/10/2024).

67 H. Labuschagne, Starlink says South Africa will be a top 10 country for its service, *MyBroadband*, 25 October 2024. Available at: https://mybroadband.co.za/news/broadband/566758-starlink-says-south-africa-will-be-a-top-10-country-for-its-service.html (accessed: 11/11/2024).

68 L. Yieke, Starlink's Aggressive Push in Africa Keeps Telcos on High Alert, *African Business*, 1 November 2024. Available at: https://african.business/2024/11/technology-information/starlinks-aggressive-push-in-africa-keeps-telcos-on-high-alert (accessed: 11/11/2024).

69 M. Sehloho, South Africa could amend law blocking Starlink entry, *Connecting Africa*, 8 October 2024. Available at: https://www.connectingafrica.com/regulation/south-africa-could-amend-law-blocking-starlink-entry (accessed: 11/11/2024).

2023.[70] Since 2023, Starlink has become the third-largest ISP in Nigeria by subscriber count.[71] Moreover, Starlink has been actively working to make the service more affordable and connect rural and hard-to-reach regions in the country. After signing a deal with Starlink, Africa Mobile Networks (AMN) could use Starlink terminals for low-latency satellite backhaul to its multi-carrier radio access node, the ARN. With this deal, AMN can accommodate large data volumes and ensure affordability. AMN reported a 45% increase in Internet traffic across its 100 rural base stations following this implementation.[72] Additionally, Starlink is facing such a high demand in big African cities that they had to halt new subscribers in dense cities to adjust to the high demand, impacting five cities in Nigeria alone.[73] This shows that Starlink is being used in certain areas to address the two most significant barriers to connectivity in Africa, which are affordability and coverage, as revealed in this chapter's introduction.

Starlink's success in Nigeria has drawn the ire of many who argue that the NCC should utilise its regulatory capacity to even the playing field. Leaders of African ISPs, such as eStream Network CEO Muyiwa Ogungboye, have expressed frustration with the NCC's lack of recognition of the investments already made by Indigenous people in ICT infrastructure. Gbolahan Awonuga, the head of operations at the Association of Licensed Telecoms Operators of Nigeria (ALTON), has gone further, stating that Starlink might lead to the extinction of ISPs.[74] Even the head of a Nigerian pan-African digital inclusion NGO, Gbenga Sesan, argues that achieving universal coverage through Starlink is not the best use of the country's collective resources. Sesan explained that Nigerians could use their collective resources to help establish terrestrial connectivity through the numerous subsea cable landing points in the country.[75] Therefore, NGOs and telcos in Nigeria have expressed concern about relying on foreign companies to supply critical infrastructure.

In October 2024, The Nigerian Communication Commission commenced "pre-enforcement action" against Starlink for its 97% price hike to their standard service subscription that Starlink stated was due to high inflation. According to the NCC, Starlink violated sections 108 and 111 of the Nigerian Communications Act in conducting this high price increase without the NCC's approval. These sections specifically relate to the protection of consumers and the requirement

70 A. Onukwue, Starlink puts halt on new customers in Africa, *Semafor*, 5 November 2024. Available at: https://www.semafor.com/article/11/05/2024/elon-musk-starlink-halts-africa-customer-sign-ups (accessed: 11/11/2024).

71 Nigerian Communications Commission, *Internet Service Operator Data: Quarter 4-2023*, 2024. Available at: https://www.ncc.gov.ng/statistics-reports/subscriber-data#internet-service-operator-data (accessed: 09/11/2024).

72 S. Nyangi, *op. cit.*

73 Starlink, *Availability Map*.

74 J. Adejumoh, More Troubles for Telcos, ISPs As Starlink Deepens Operations in Nigeria, *Independent*, 26 August 2024. Available at: https://independent.ng/more-troubles-for-telcos-isps-as-starlink-deepens-operations-in-nigeria/ (accessed: 11/11/2024).

75 S. Quadri, *op. cit.*

of the licensee to provide information to the NCC that justifies their rate increase so the NCC can assess whether the adjustments are justifiable.[76] Since this time, Starlink has claimed to reverse the price hike; yet, according to The Guardian, sources stated that the NCC would serve a query to Starlink to ask the company why the NCC should not take disciplinary action. The source further noted that "the sanction is needed to set the record straight and ensure licensees in the sector don't flout regulatory orders".[77] This act illustrates not only the power governments can hold over satellite broadband operators such as Starlink but also the first time any country's communications authority has taken such action. Therefore, the Nigerian Communication Commission has become an early indicator of how Starlink will navigate these regulations and be a worldwide blueprint for spectrum regulatory bodies.

Lessons from Early Developments

We can conclude from these two case studies that Starlink has gained a large following in Africa and has experienced immense growth in subscribers. These case studies also illustrate Starlink's strategy and proven ability to have countries adapt their policy around the company's aims. This strategy also provides some credence to the complaints of some African ISPs claiming Starlink is being regulated unfairly.[78] The decision of the Nigerian Communication Commission to take action against Starlink's price hikes might lead to a shift in countries' regulatory approach to Starlink and other LEO satellite ISPs. Starlink's ability to drastically increase Internet penetration, make connectivity more affordable, and deliver high-speed Internet to rural areas is undeniable and widely recognised. By focusing on the regulatory barriers to Starlink's expansion, this case study reveals that a lack of collaboration with countries' regulations may create space for more collaborative competitors.

Future Prospects and Conclusion

Groundbreaking developments led by SpaceX through their Starlink LEO satellite constellation have made it possible to achieve the goals of many connectivity initiatives in a time frame that would have been significantly prolonged with terrestrial infrastructure. Several roadblocks still stand in the way of attaining historic goals set in place over decades ago. However, Starlink's close association with the United States is a geopolitical roadblock that it may never overcome in some countries.

76 M. Iderawumi, NCC initiates pre-enforcement action against Starlink over price hike, *Space in Africa*, 8 October 2024. Available at: https://spaceinafrica.com/2024/10/08/nigerian-communications-commission-responds-to-starlinks-unapproved-price-hike/ (accessed: 07/11/2024).

77 A. Adepetun, NCC may sanction Starlink over price hike, despite reversal, *The Guardian*, 28 October 2024. Available at: https://guardian.ng/news/ncc-may-sanction-starlink-over-price-hike-despite-reversal/ (accessed: 11/11/2024).

78 A. Ross, *op. cit.*

The importance of a country's ability to control the flow of information within its borders will continue to grow. The significance placed on the ability to control the flow of information might cause some African countries to prefer terrestrial connectivity methods.

Incumbent telecommunications companies and ISPs within Africa have voiced considerable opposition to the entrance of Starlink into their market. While such a reaction is expected, the opposition from NGOs signals potential challenges for Starlink's future. A coalition of local telcos and NGOs lobbying against Starlink and other LEO satellite operators could wield significant influence to block Starlink from entering new markets. Therefore, LEO satellite operators in Africa that prioritise collaboration with local ISPs to create affordable connectivity solutions seem to be the best long-term strategy for connecting most of the African market. If executed properly, this collaborative approach diminishes the chances of local telcos and NGOs lobbying against the company's operation since everyone stands to benefit from the arrangement. African telcos, such as Safaricom, are already pushing for these collaborations, and by building up local ICT infrastructure and providing more local jobs, they would be addressing concerns voiced by advocates and NGOs.[79] Effective cooperation between actors in the African telecommunications market would lead to a mutually beneficial arrangement that benefits all actors.

The potential of LEO satellite broadband technology is evident and provides Starlink with its current position of leverage in negotiations with countries over spectrum allocation. Regulatory bodies are still adjusting to LEO satellite broadband's entrance into the market. Therefore, if regulatory agencies in African countries exercise their control over radio spectrum allocation to Starlink more strictly, which is currently playing out in Nigeria, it may present a chance for Starlink's more collaborative competitors to gain a stronger foothold in the market.

SpaceX's achievements through Starlink have changed the global ICT landscape forever, but perhaps most so in Africa, where Internet penetration and affordability are the lowest.[80] Starlink's ability to provide global coverage and competition to the ICT market is evident and widely discussed. The evolving regulatory environment can drastically change market positions. OneWeb has taken a divergent approach from its competitor, Starlink, and has opted for more collaborative development in its launch and satellite services. Given the intense backlash Starlink has experienced from African ISPs and NGOs and their collective ability to impact regulatory bodies, a collaborative approach may be the best long-term strategy. Therefore, the domestic regulatory responses, especially those related to spectrum policies, are key considerations when addressing how Starlink has impacted connectivity initiatives in Africa.

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79 *Ibidem*.

80 International Telecommunication Union, *Facts and figures 2023 – Internet use in urban and rural areas*, 2024. Available at: https://www.itu.int/itu-d/reports/statistics/2023/10/10/ff23-internet-use-in-urban-and-rural-areas (accessed: 30/09/2024); International Telecommunication Union, *Statistics*; M. Shanahan, K. Bahla, *op. cit.*

Whether Starlink fits within the mould of a private connectivity initiative like 2Africa or one led by an intragovernmental organisation with a global vision reveals Starlink's singularity. Starlink's goal to provide Internet coverage for the whole world and openness suggests it is similar to the UN's initiative. Yet, Starlink's ability to work around regulations in some African countries resembles the 2Africa example of the private connectivity initiative. Due to the geopolitical nature of space and the importance of Internet infrastructure, Starlink is the nexus of technologies of great interest to individual states. LEO satellite ISPs have the capacity to amplify the ability to control global information to the whole world rather than within one country. Starlink's close cooperation with the United States in its foreign policy objectives indicates the power of this technology. Therefore, Starlink is paving the way for a new type of global connectivity initiative backed by individual states and utilised to fulfill the geopolitical aims of that particular state. Ultimately, when comparing this current state of satellite broadband to the aims of the ITSO established by the Tunis Agenda, it reveals Starlink's most significant impact on the shifting telecommunications market.

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