DECEMBER 2024

HILDA BARASA
EMMA RUITERS
TEDDY HUMPHREY

Bridging the Digital Divide in Africa: The Promising Role of LEO Satellites

TONY BLAIR
INSTITUTE FOR
GLOBAL CHANGE

Contents

01

Executive Summary

Digital infrastructure is the backbone of the modern world, underpinning everything from communications and commerce to digital governance, education and health care. Subsea cables and terrestrial fibre-optic networks have long been the workhorses of global connectivity, transmitting vast amounts of data across continents and countries. In Africa, the significant growth in total inbound international bandwidth over the past decade can be largely attributed to the 74 subsea cables currently active or under construction.[1]

However, despite this progress, significant connectivity gaps persist across the continent. The high cost of laying and maintaining subsea cables, often requiring specialised equipment and expertise, remains a major barrier to deployment, particularly in remote and underserved regions. This lack of investment leads to limited diversity of access routes and infrastructure, further hindering connectivity. Additionally, limited robust middle-mile and last-mile infrastructure – which refers respectively to the networks that connect core internet hubs to regional distribution points and the connections that link those points to individual users – exacerbates the digital divide. Existing infrastructure tends to be concentrated in urban areas, leaving rural regions with limited connectivity and widening the gap in access to digital services.

Low-Earth orbit (LEO) satellite constellations offer a promising solution to these connectivity challenges by complementing existing subsea-cable networks, terrestrial fibre infrastructure and traditional geostationary (GEO) satellites. Unlike GEO satellites, which operate at an altitude of approximately 36,000 kilometres and provide wide coverage but high latency, LEO satellites orbit closer to Earth at 500–2,000 km. This reduces latency and allows for more responsive internet connections. While they might not match the bandwidth capacity of subsea cables – partly due to uplink limitations (challenges in sending data from the ground to satellites) and spectrum constraints (restrictions on the available frequencies for satellite communications) – their adaptability and scalability make them well suited for extending coverage to remote and underserved areas. In regions where terrestrial infrastructure is too costly or difficult to deploy, LEO satellites offer a flexible and innovative alternative to help bridge the digital divide.

Without creating the right mix of options for connectivity, African nations risk leaving swathes of their populations behind and will not be able to deliver on key national priorities. If they are to make full use of the potential of technology to help reimagine the state, connectivity for all is a must – yet we are now at risk of taking a key part of that mix off the table.

The deployment of LEO satellites providing connectivity services has faced opposition from several African governments, reflecting broader global concerns about sovereignty, security, competition and licensing. Key issues raised include fears over the potential loss of control over national communication infrastructure, the risk of monopolistic practices by dominant players and the challenges posed by cross-border data privacy and regulatory compliance. In contrast, non-connectivity LEO satellites – such as those used for Earth observation, environmental monitoring and disaster response – face fewer regulatory obstacles, often operating within frameworks that emphasise scientific collaboration, environmental protection and international data sharing.

The LEO-satellite sector is expanding rapidly, with new providers expected to enter the market in the coming years and drive innovation that will revolutionise global connectivity. This growth presents a unique opportunity for African governments to harness the potential of this technology to address longstanding connectivity challenges. However, realising these benefits will require a strategic and forward-looking approach to regulation and deployment.

In this paper, we set out recommendations to help governments navigate this fast-growing sector and position themselves to benefit from the opportunities ahead, balancing innovation with regulatory oversight. These recommendations serve as a guide for addressing key challenges and maximising the socioeconomic potential of LEO connectivity satellites: They include:

- Establishing adaptive regulatory frameworks for licensing, spectrum allocation and taxation to ensure seamless and affordable satellite connectivity.
- Leveraging public-private partnerships (PPPs) to drive satellite deployment and adoption aligned with national priorities.
- Investing in local capacity building and creating equitable market conditions to enhance regulatory expertise, foster innovation and ensure fair competition in the satellite sector.
- Balancing data privacy and security with flexible policies to enable affordable and adaptable satellite solutions.
- Promoting international collaboration to address orbital congestion, manage space debris and harmonise spectrum allocation.

African governments can leverage the rapid growth of the LEO-satellite sector to drive digital transformation and create a long-term strategic advantage across the continent. A proactive, balanced regulatory approach that supports innovation, competition and sustainability will position LEO satellites as key enablers of economic growth, improved connectivity and greater resilience in sectors such as education, agriculture and health care among others. Thoughtfully deployed, LEO technology offers transformative improvements that would otherwise be financially or logistically unfeasible, unlocking opportunities to bridge the digital divide while safeguarding national sovereignty.

02

Africa's Connectivity Infrastructure Has Grown, But Significant Gaps Persist

Africa's connectivity infrastructure has seen significant investment and improvement in recent years, driven by a combination of public and private investment, regional initiatives and international partnerships. Notable advances include the expansion of subsea-cable networks as almost all African coastal countries, excluding Eritrea, have at least one subsea-cable landing. Key cables such as the West Africa Cable System (WACS), the Eastern Africa Submarine Cable System (EASSy), and the newer Equiano and 2Africa cables, have significantly boosted total inbound international bandwidth to 36.7 terabits per second and reduced latency.

This improved connectivity has also led to broader socioeconomic benefits across the continent. According to research by RTI,[2] South Africa experienced a 6.1 per cent increase in GDP per capita between 2009 and 2014, directly tied to economic activities sparked by enhanced connectivity from subsea cables. Similarly, Kenya saw an 8.4 per cent increase in skilled employment following the landing of the TEAMS cable in 2009.

Countries such as Kenya, South Africa and Nigeria continue to make strides in development of middle-mile capacity. Between 2009 and 2023, terrestrial fibre-optic transmission networks grew by an average of 150 km a day,[3] with more than 1.389 million km currently rolled out.[4] While mobile technology has been transformational in its impact across Africa – serving as the primary means of internet access for many – it is important to note that mobile networks still rely on physical infrastructure. Cell towers are typically connected to the broader network via fibre-optic cables or microwave links, which ultimately connect to larger subsea-cable systems. GSMA[5] estimates that the coverage gap – the percentage of the population not living within the footprint of mobile-internet connectivity – in Africa had reduced from 56 per cent of the population in 2012 to 13 per cent in 2022.

03 Despite Advances, Connectivity Issues and a Widening Digital Divide Prevail

Although broadband coverage has expanded significantly across the continent, substantial variations in internet access, broadband penetration and network reliability persist. Sub-Saharan Africa faces greater connectivity challenges compared with Northern Africa, with lower mobile-internet penetration, wider urban-rural divides and less developed infrastructure. Of the 23.8 terabits per second international bandwidth reaching sub-Saharan Africa, three countries – South Africa, Kenya and Nigeria – account for two-thirds of all volume.[6] Additionally, less than half of sub-Saharan African countries have an Internet Exchange Point (IXP),[7] further exacerbating disparities in local traffic routing and network efficiency across the continent.

Many landlocked and less developed countries still struggle with limited infrastructure, compounding existing digital divides. Fewer than a third of Africans have access to mobile broadband connectivity and 300 million people live more than 50 km from a fibre or cable broadband connection.[8] Furthermore, usage and consumption remain closely tied to income levels. GSMA estimates that the usage gap in sub-Saharan Africa has grown from 41 per cent in 2015 to 59 per cent in 2022;[9] this represents 680 million people who are covered by broadband networks but are not actively using them due to challenges including affordability, gaps in digital literacy, concerns about digital safety and security, and the lack of relevant digital content, products and services. While fibre connections remain more expensive than mobile connectivity, users across Africa also face the highest prices for mobile data relative to average monthly income.[10] Fibre-to-premises connections to homes and offices remain limited and tend to be concentrated in a few capital cities. For example, South Africa's fibre-based broadband subscriptions account for almost half of all such subscriptions in sub-Saharan Africa.[11] As a result, despite the cumulative progress made so far, the pace of closing the overall digital divide remains slow.

Over the past decade, Africa has experienced multiple subsea-cable cuts that increasingly highlight the vulnerability of the continent's connectivity infrastructure. As most countries have only one landing station for subsea cables, there is an overreliance on single-path connectivity solutions, making networks highly susceptible to disruptions caused by accidents, natural disasters or intentional actions. While this centralised setup might provide certain governments with greater control over internet access, the broader economic and societal risks of such vulnerability far outweigh the perceived benefits. Limited cross-border connectivity and terrestrial infrastructure exacerbate these challenges during network disruptions. Without sufficient alternative routes to reroute data through neighbouring countries or land-based networks, these nations face prolonged outages when their primary connections, such as subsea cables, are disrupted. These disruptions have significant economic impact, widely affecting businesses and public services reliant on stable internet connections. For example, recent failures in international submarine cables - including WACS, South Atlantic-3, MainOne and Africa Coast to Europe[12] – led to widespread connectivity disruptions in both West and East Africa in January, April and May of this year. As older subsea-cable systems start to reach the end of their lifespan, building a more resilient and diverse infrastructure with robust redundancy is critical to mitigating future disruptions.

04 LEO Satellites Can Complement Subsea-Cable Networks to Bridge the Connectivity Gap

Recent technological advancements have made LEO satellites more viable and cost-effective, transforming them into a scalable, high-performance solution for delivering high-speed, high-bandwidth internet. Key breakthroughs include lower launch costs, driven by reusable rocket technology that has reduced satellite launch expenses from between $300 million and $400 million to approximately $60 million per launch,[13] and the miniaturisation of satellite components,[14] which has cut production costs. Declining costs of solar panels and advances in AI have further enhanced the efficiency of managing large satellite constellations.

LEO satellites further offer quicker deployment compared to traditional infrastructure such as cable, copper and pre-5G fixed wireless systems.[15] Deploying new subsea cables from South Africa to Europe, for example, that connect multiple countries would cost approximately $1 billion[16] and would require almost ten years to implement from design to delivery. For many countries, especially those struggling with connectivity gaps, LEO satellites can provide a crucial foundation for redundancy and backup connectivity.[17]

While the initial cost of developing and deploying LEO-satellite constellations remains high, these systems are increasingly economical compared with other connectivity solutions. For instance, baseline 5G deployment, inclusive of networking requirements and spectrum licensing, is estimated to cost between $3 billion and $8 billion per country.[18] In rural and low-density areas, where demand is low, such investments are economically unfeasible and slow down network expansion.

The LEO-satellite industry is experiencing rapid growth, with major players such as Starlink, AST SpaceMobile, Eutelsat's OneWeb and Amazon's Project Kuiper making significant progress[19] in deploying satellite constellations to provide global connectivity. AST SpaceMobile, backed by leading American telecom companies, recently launched the largest commercial communications array, comprising five BlueBird satellites.[20] These satellites are designed to deliver direct-to-device high-speed cellular broadband,[21] targeting areas with little or no cellular and internet coverage. Despite launch delays in 2024, Amazon's Project Kuiper[22] has secured the largest commercial satellite-launch agreements globally, partnering with multiple providers to deploy a constellation of 3,236 satellites aimed at delivering fast, affordable broadband to unserved and underserved communities worldwide. Meanwhile Eutelsat OneWeb[23] is already providing connectivity to digital banks in South Africa, supporting both operational and customer-facing processes. The company plans to expand its services to reach more specialised and underserved businesses and communities across southern Africa.

Since 2020, the number of payload launches has increased roughly four- to five-fold, driven primarily by commercial activity. As of November 2024, Starlink alone had 6,805 satellites in orbit,[24] accounting for about two-thirds of all active satellites and about a third of satellites launched in all of history.[25] With significantly lower latencies (10–40 milliseconds) compared with traditional geostationary satellites (600 milliseconds), LEO satellites are increasingly enabling innovations for new applications such as direct-to-smartphone satellite connectivity.[26] Military and government agencies are also showing significant interest in commercial LEO-satellite services to meet their connectivity needs, especially in remote areas. The European Union, for example, is seeking to develop a €6 billion Infrastructure for Resilience, Interconnectivity and Security by Satellite (IRIS2)[27] constellation consisting of 170 LEO satellites[28] alongside other systems in both medium-Earth and geosynchronous orbit to secure communication capabilities for EU governments and open up new commercial broadband services to underserved areas between 2025 and 2027.

05

LEO Satellites Are Already Making a Difference in Africa

LEO satellites deployed across a number of countries in Africa are being used to address critical challenges and support development across various sectors. From enhancing connectivity and health care to improving agricultural practices and disaster management, the impact of LEO satellites has been far reaching.

FIGURE 1

Sector	**Example**	**Impact**
Internet connectivity	Starlink by Space X	Provides high-speed internet access to remote and underserved areas, enabling online education, telehealth services and economic opportunities.Country applications: Rwanda, Nigeria, Mozambique, Kenya
Agricultural development	Agritech solutions by Planet Labs	Offers satellite imagery for optimising farming practices, increasing yields and managing resources efficiently.Country applications: South Africa, Kenya
Disaster response and management	Sentinel-1 by the European Space Agency	Provides real-time data for early-warning systems and disaster-response coordination, mitigating the impact of natural disasters.Country applications: Kenya, Zambia, Central Africa, Cape Verde, Namibia, Ethiopia, Madagascar, South Sudan, Lesotho
Wildlife conservation	Sateliot	Uses satellite data to track wildlife, detect poaching and manage protected areas effectively, aiding in biodiversity preservation.Country applications: South Africa
Banking	Eutelsat OneWeb	Provides connectivity to digital banks in South Africa, supporting both operational and customer-facing processes.

CASE STUDY

How TBI Works With Starlink to Deliver Connectivity

TBI has been working with Starlink to deliver connectivity solutions that enable governments to achieve their national priorities. Through pilot projects across three African countries, TBI and Starlink have demonstrated the transformative potential of LEO-satellite internet.

In Rwanda, a lack of connectivity was hampering the country's ability to harness the internet in education. TBI partnered with the Ministry of Education, the Ministry of ICT and Innovation, and the Rwanda Space Agency to connect 50 schools, allowing more students to benefit from online resources. Now, these learning tools enable students to conduct virtual experiments – more than 18,000 students can access a cutting-edge digital laboratory – and learn scientific methods, fostering engagement. The success of this pilot has led to its expansion into the health sector, with 40 health centres newly connected.

In Malawi, TBI's work with the Malawi Communications Regulatory Authority brought critical connectivity during Cyclone Freddy, which affected more than 500,000 citizens. Our pilot project enabled first responders to communicate effectively with affected communities and allocate resources appropriately. In the health-care sector, medical staff in select facilities were able to share materials centrally, facilitate telemedicine appointments and access critical information to improve diagnoses.

These pilots highlight how satellite technology can transform connectivity in underserved communities, driving progress in vital areas such as education and health care.

06 The Widespread Adoption of LEO Satellites Offering Connectivity Services Faces Significant Hurdles

Several African governments have opposed the deployment of LEO satellites across the continent, reflecting broader global concerns about sovereignty, security, competition and licensing. These concerns have led to outright bans or stringent regulatory requirements in a number of countries.

As private companies leading LEO-satellite deployment gain unprecedented global influence over internet access and communications, sovereignty has become a key issue. While LEO satellites can help close the digital divide, they also challenge the ability of national governments to exercise control – whether in a more authoritarian manner, by censoring content, restricting information and controlling access to the internet within their borders, or more benignly, by regulating ICT services or ensuring quality standards. Access Now, a digital-rights watchdog, reported that 2023 saw the highest number of internet shutdowns ever recorded.[29] Satellite internet also increases the influence of private companies and individuals,[30] raising concerns about a lack of accountability and the potential prioritisation of commercial interests over national-security needs. This mirrors concerns raised with social-media companies, where platforms such as Facebook and X (formerly known as Twitter) have been criticised for wielding outsized influence over public discourse, data privacy and even election security. Consequently, many governments fear a potential loss of autonomy over their communications networks.

The entry of LEO satellites into new African markets disrupts existing market dynamics for telecommunications ecosystems. Traditional telecommunications operators, who have invested heavily in terrestrial infrastructure, now face competition from LEO-satellite operators who often lack physical infrastructure or an official presence in the countries they serve. This is particularly evident for LEO operators offering B2B (business-to-business) and B2C (business-to-consumer) services, as their business models allow them to offer connectivity without adhering to the same regulatory requirements as terrestrial operators. For example, LEO operators often bypass tax obligations, regulatory fees and local-ownership-percentage requirements, which are standard for traditional telecom companies. These have been significant issues for several African countries that have so far imposed outright bans and/or licensing restrictions on Starlink.

LEO satellites also require spectrum allocation for wireless communication.[31] The increasing demand for limited available spectrum raises the risk of over-congestion, which could impact on service quality. Despite regional efforts by the African Telecommunications Union to harmonise spectrum-allocation policies across the continent,[32] many African countries are still in the process of developing comprehensive regulatory frameworks for spectrum allocation. As a result, the rapid deployment of LEO satellites has outpaced policy development, leading to discrepancies in allocation practices, misalignment with international standards and concerns about equitable spectrum access and control.

The LEO operating environment is further complicated by non-homogenous pricing and inconsistent regulations across different jurisdictions, which significantly impact affordability and accessibility. The costs of satellite-internet services vary widely between countries, influenced by factors such as regulatory requirements, licensing fees, taxation policies and local market dynamics. For instance, pricing for similar LEO-satellite services differs substantially between Rwanda, Nigeria and Kenya, reflecting these operational complexities. However, even at the lower end of these pricing variations, upfront cost – starting at approximately $300 – combined with monthly subscription fees remains prohibitively high for many consumers. This is especially true in rural and underserved areas, where affordability is a critical barrier.

This lack of uniform and accessible pricing increases the risk that LEO-satellite services will be disproportionately adopted in urban areas, where users with higher purchasing power are better positioned to capitalise on the more affordable, alternative connectivity solutions they offer. This underscores the broader issue of regulatory fragmentation and highlights the challenge of delivering cost-effective, scalable connectivity solutions across multiple countries.

07

Strategic Recommendations for Optimising LEO-Satellite Growth in Africa

To take full advantage of the rapid evolution of the LEO-satellite sector, political leaders need to find the right balance of innovation, fair competition, affordability and access. African governments have a unique opportunity to shape this emerging ecosystem through a collaborative approach that supports the delivery of national priorities.

1. **Harmonise the regulation of LEO satellites through flexible regional frameworks and place them under regular review.** The current lack of regulatory alignment between countries has hindered critical partnerships between satellite providers and telecom operators, creating uncertainty and delaying the expansion of LEO-satellite services across the continent. Without decisive action, these regulatory gaps will continue to limit the transformative potential of satellite technology.Continental initiatives like the African Union's Policy and Regulation Initiative for Digital Africa (PRIDA) provide a robust foundation for creating continent-wide standards while respecting national priorities. African governments must work together to implement clear, consistent and harmonised guidelines for spectrum allocation, licensing and taxation.Regional frameworks should comply with international standards, facilitating seamless internal and cross-border operations. Critically, they must remain flexible and adaptive and should be regularly reviewed to keep up with rapid advances in satellite technologies.
2. **Make full use of collaboration with the private sector to scale LEO-satellite adoption, from high-priority pilots to implementation at scale.** Given the wealth of private-sector expertise in this space, countries that strategically leverage public-private partnerships (PPPs) to align LEO-satellite deployment to national development priorities will reap the greatest benefits, improving connectivity in underserved areas and addressing critical infrastructure gaps.As a first step, they should identify priority sectors where LEO satellites can provide immediate, high-impact

solutions through pilot projects. Structuring these pilots as PPPs – led by government and supported by private-sector expertise – can help accelerate satellite adoption and refine deployment models while building out proof that the technology is invaluable to the delivery of national priorities. Examples of priority policy areas might include facilitating remote learning in education, expanding telemedicine in health care and strengthening emergency communication networks in rural and underserved regions.The pilots should be designed from the start to support scale-up activities if they prove successful. This means that LEO satellites need to, in parallel, be integrated into national broadband strategies so that large-scale deployment complements terrestrial infrastructure, with each channel serving its own purpose and set of users. Setting up sandbox environments – controlled settings to test and refine innovations like direct-to-smartphone satellite connectivity – will ensure technologies are optimised before full-scale implementation.

3. **Build local capacity that will foster fair markets for LEO-satellite integration.** Capacity building is essential to create fair markets that support the successful integration of LEO satellites into the Africa telecommunications landscape. Investing in local regulatory expertise through targeted training programmes and knowledge-exchange partnerships with international organisations will equip local agencies to create and maintain equitable market conditions.This expanded capacity is necessary to deliver policy interventions that balance fair competition, incentives for targeted service expansion and a cost-efficient model for operators' contribution to national connectivity goals, including:
   - **Usage-based taxation**. Governments should adopt taxation models that tie LEO operators' contributions directly to their user base or bandwidth consumption. This ensures operators with larger market footprints bear a proportional financial responsibility, fostering fairness and accountability. Unlike flat fees, this approach prevents overburdening smaller or emerging providers while encouraging market diversity and innovation, including through pilots. By aligning contributions with market activity, this model ensures operators contribute meaningfully to national connectivity goals while maintaining a competitive and sustainable ecosystem.

- **Universal Service Funds (USF) support**. USFs are critical to expanding connectivity in underserved areas, and LEO-satellite operators should be integrated into these frameworks so they can contribute alongside traditional telecom providers. These contributions should target ground stations, last-mile infrastructure, and community access programmes to ensure satellite connectivity does not inadvertently become concentrated in urban areas, where multiple connectivity options exist. This will help align satellite deployments with national connectivity goals, ensuring equitable access and reducing the rural-urban divide. Such contributions also position LEO satellites as complementary to terrestrial networks, promoting sustainable and inclusive growth while maintaining their cost-efficient operating models.
- **Performance-based incentives for rural expansion**. Governments should establish performance-based incentives that encourage LEO-satellite operators to prioritise underserved regions. These incentives should include tax credits or reductions directly tied to measurable outcomes, such as expanding coverage in rural areas or partnering with local providers to enhance last-mile connectivity. By linking financial benefits to demonstrable social impact, this approach ensures LEO operators actively contribute to reducing the digital divide and aligning their operations with national connectivity objectives. Here, too, a pilot approach can help align initial deployments with immediate government priorities.

4. **Ensure data-privacy and national-security considerations are addressed alongside supporting innovation.** Robust data-protection laws and effective monitoring mechanisms are important for the sustainable growth of the LEO-satellite industry and should be designed in a way that does not actively interfere with realising the value of expanded connectivity.Policies such as mandating the routing[33] of satellite data traffic through domestic ground stations, rather than allowing cross-border transmission from ground stations in other countries, can impose significant infrastructure costs. These requirements can increase deployment costs to a degree that limits affordability and slows the adoption of LEO-satellite connectivity in areas that align with national priorities. National policies on data privacy and national security should be regularly reviewed to understand their impact

on emerging industries such as satellite connectivity, creating and maintaining a balanced regulatory framework that keeps pace with technological advancements.

5. **Play an active role in international space collaboration through global forums to ensure the technology can address the needs of African governments.** The deployment of large LEO constellations that are required to provide continuous coverage introduces significant regulatory and operational complexities, including increased risks of space debris and harmful interference. Harmonising spectrum allocation and orbital-slot assignments is essential to facilitate cross-border satellite services and prevent future congestion.

Given the significant potential value of LEO-satellite connectivity to African governments and their ability to deliver for their citizens, African political leaders should play an active role in the international debate on how to address these types of issues. Active participation by African governments in global forums such as the International Telecommunication Union can secure the benefits of LEO technology while ensuring long-term environmental and operational viability.

Endnotes

1 https://blog.telegeography.com/introducing-the-2024-africa-telecommunications-map

2 https://www.rti.org/impact/analysis-economic-impact-subsea-internet-cables-sub-saharan-africa#:~:text=In%20Democratic%20Republic%20of%20Congo,since%20TEAMS%20landed%20in%202009

3 https://s3.eu-central-1.amazonaws.com/afc-assets/afc/AFC-State-of-Africas-Infrastructure-2024.pdf

4 https://www.whitecase.com/insight-our-thinking/africas-digital-infrastructure-transformation

5 https://www.gsma.com/subsaharanafrica/wp-content/uploads/2023/10/USF-Africa.pdf

6 https://s3.eu-central-1.amazonaws.com/afc-assets/afc/AFC-State-of-Africas-Infrastructure-2024.pdf

7 https://paradigmhq.org/building-a-stronger-africas-internet-infrastructure/

8 https://www.whitecase.com/insight-our-thinking/africas-digital-infrastructure-transformation

9 https://www.gsma.com/r/wp-content/uploads/2023/10/The-State-of-Mobile-Internet-Connectivity-Report-2023.pdf?utm%5Fsource=website&utm%5Fmedium=button&utm%5Fcampaign=somic23

10 https://qz.com/africa/1878749/how-much-do-africans-pay-for-voice-calls/

11 https://www.whitecase.com/insight-our-thinking/africas-digital-infrastructure-transformation

12 https://www.economist.com/middle-east-and-africa/2024/03/21/damage-to-undersea-cables-is-disrupting-internet-access-across-africa

13 https://www.american.edu/sis/centers/security-technology/small-satellites-and-international-security.cfm

14 https://www.atlanticcouncil.org/wp-content/uploads/2022/05/Small%5Fsatellites-Implications%5Ffor%5Fnational%5Fsecurity.pdf

15 https://www.spacerl.com/wp-content/uploads/2020/09/The-new-age-of-Large-Low-Earth-Orbit-Satellite-Constellations.pdf

16 https://leadership.ng/internet-outage-1bn-needed-for-new-cables-repairs-to-take-8-weeks/

17 https://www.adb.org/news/features/five-ways-low-earth-orbit-satellites-impact-asia-pacific#:~:text=Landlocked%20developing%20countries%20and%20small%20island%20developing%20states%20may%20

18 https://www.ericsson.com/en/press-releases/2022/11/ericsson-report-highlights-potential-economic-benefits-of-5g-in-emerging-markets

19 https://www.weforum.org/agenda/2022/02/explainer-how-low-earth-orbit-satellite-technology-can-connect-the-unconnected/

20 https://www.fierce-network.com/wireless/lot-people-want-be-ast-spacemobiles-orbit

21 https://www.businesswire.com/news/home/20241203338855/en/AST-SpaceMobile-and-Cadence-Collaborate-to-Advance-the-World%E2%80%99s-First-and-Only-Planned-Space-Based-Global-Cellular-Broadband-Network

22 https://www.aboutamazon.com/what-we-do/devices-services/project-kuiper

23 https://developingtelecoms.com/telecom-technology/satellite-communications-networks/17624-eutelsat-oneweb-q-kon-expand-leo-services-under-new-deal.html?utm%5Fsource=related%5Farticles&utm%5Fmedium=website&utm%5Fcampaign=related%5Farticles%5Fclick

24 https://planet4589.org/space/con/star/stats.html

25 https://www.esa.int/Safety%5FSecurity/Space%5FDebris/Space%5Fdebris%5Fby%5Fthe%5Fnumbers

26 https://www.forbes.com/sites/moorinsights/2024/01/26/is-2024-the-year-of-low-earth-orbit-satellite-services/

27 https://defence-industry-space.ec.europa.eu/eu-space/iris2-secure-connectivity%5Fen

28 https://www.euspa.europa.eu/newsroom-events/news/new-iris2-constellation-will-be-beneficial-eu-citizens-several-ways-find-out-5

29 https://www.accessnow.org/wp-content/uploads/2024/05/2023-KIO-Report.pdf

30 https://www.newamerica.org/planetary-politics/blog/starlink-and-sovereignty/

31 https://bipartisanpolicy.org/blog/leo-satellites-broadband-access/

32 https://atuuat.africa/african-spectrum-allocation-plan-afrisap/

33 https://www.adb.org/sites/default/files/publication/696521/sdwp-076-digital-connectivity-low-earth-orbit-satellite.pdf

TONY BLAIR INSTITUTE FOR GLOBAL CHANGE

Follow us

facebook.com/instituteglobal
x.com/instituteGC
instagram.com/institutegc

General enquiries

info@institute.global