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"Ensuring meaningful connectivity to the Internet for landlocked developing countries (LLDCs)"

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About Derechos Digitales

Derechos Digitales[1] is an independent non-profit Latin American organization founded in 2005, whose mission is the defense, promotion, and development of fundamental rights in digital environments in Latin America. Our organization has ECOSOC status and has actively contributed to the U.N and different of its thematic rapporteurs regarding the impact of digital technologies on human rights.

About TEDIC

TEDIC[2] is a non-profit organization based in Paraguay, working both locally and across the Latin American region. Our mission is to defend and promote human rights in digital environments, with a strong focus on gender inequalities and their intersections. TEDIC holds ECOSOC consultative status and has contributed to international advocacy efforts and special rapporteurships.

Summary

[1] More information at https://www.derechosdigitales.org/
[2] More information at https://www.tedic.org/en/who-we-are/

Landlocked Developing Countries (LLDCs) face unique challenges and structural barriers to achieving meaningful connectivity. In the Americas, only two countries are classified as LLDCs, the Plurinational State of Bolivia and the Republic of Paraguay. Both nations face multidimensional connectivity challenges resulting from their geographic location and socio-economic context. These obstacles intersect with broader regional connectivity issues prevalent across Latin America, including low digital literacy rates, persistent gender digital divides, uneven internet access distribution, significant urban-rural disparities, and high broadband costs.

In this joint contribution we argue that meaningful connectivity is an enabler for the exercise of human rights such as freedom of expression, association, education, health among others.

Therefore, we begin by contextualizing connectivity in Paraguay and Bolivia as the Americas' only LLDCs. Then, we highlight a set of human rights-aligned strategies to achieve meaningful connectivity through three key areas: Net neutrality vs. zero rating; Protection and strengthening of community networks and other initiatives to internet access in remote areas; and Intersectional digital literacy strategies. We address challenges in achieving connectivity alongside measures that could be taken and policies that could be shaped to tackle them. And finally, we propose human rights-based recommendations for advancing meaningful connectivity in Bolivia and Paraguay, advocating that, when anchored in social justice and human rights principles, connectivity policies can transcend technical metrics like broadband speed and stability to also actively incorporate inclusion imperatives like affordability, digital literacy, and multilingualism.

1. Introduction

Landlocked Developing Countries (LLDCs) face unique challenges and structural barriers to achieving meaningful connectivity. Their lack of territorial access to the sea, isolation from world markets and high trade costs impose serious constraints on robust information and communication technology (ICT) infrastructure. These challenges are reflected in limited internet access, insufficient telecommunication services, high broadband costs and weak regulatory frameworks for digital technologies[3]. Beyond connectivity barriers, LLDCs also face broader developmental challenges related to economic growth

[3] See https://www.un.org/ohrlls/sites/www.un.org.ohrlls/files/en_larrm_information_note.pdf

and stability, as well as regional integration, all exacerbated by their landlocked geography[4].

In the Americas, only two countries are classified as LLDCs, the Plurinational State of Bolivia and the Republic of Paraguay. Both nations face multidimensional connectivity challenges resulting from their geographic location and socio-economic context. These obstacles intersect with broader regional connectivity issues prevalent across Latin America, including low digital literacy rates, persistent gender digital divides, uneven internet access distribution, significant urban-rural disparities, and high broadband costs. This general situation undermines the provision of available, affordable, and accessible internet services for all. Addressing these challenges requires targeted interventions and differentiated policy approaches to achieve meaningful connectivity, a priority explicitly recognized in the United Nation's Vienna Programme of Action (VPoA)[5].

According to the International Telecommunication Union (ITU) in Bolivia and Paraguay in particular, 70% and 78% of the population were using the internet by 2023, respectively[6]. Nevertheless, meaningful internet access extends beyond physical connectivity, it requires a comprehensive rights-based approach. Meaningful connectivity exists not just when individuals can go online, but when they can fully understand, shape, and integrate technology into their daily lives[7].

Following the Inter-American Commission on Human Rights (IACHR)[8], digital technologies, particularly internet access, have become indispensable for States to fulfill their obligations in guaranteeing economic, social, and cultural rights. For example, meaningful connectivity holds unprecedented potential for the effective realization of the right to seek, receive, and impart information; furthermore, it enables communities to exercise their freedom of expression, and other fundamental rights, such as education and freedom of association. When anchored in social justice and human rights principles, connectivity can transcend technical metrics such as broadband speed and stability to actively

[4] See https://www.un.org/en/landlocked/about-landlocked-developing-countries
[5] See https://www.un.org/ohrlls/content/vienna-programme-action
[6] See https://datahub.itu.int/data/?i=11624&v=chart&e=2
[7] See https://www.context.news/digital-divides/opinion/how-can-latin-america-bridge-the-digital-divide
[8] See https://www.oas.org/es/cidh/expresion/docs/informes/2014_04_08_Internet_WEB.pdf

incorporate inclusion imperatives like affordability, digital literacy, and multilingualism. This approach is especially critical for Latin America's LLDCs.

In this joint contribution we begin by contextualizing connectivity in Paraguay and Bolivia as the Americas' only LLDCs. Then, we highlight a set of human rights-based strategies to achieve meaningful connectivity in these countries, while also addressing key challenges and exploring measures and policies that could help overcome them. Finally, we propose human rights-based recommendations for advancing meaningful connectivity in LLDCs, addressed to States and ITU members.

2. Brief overview of connectivity in Paraguay and Bolivia

Bolivia is a landlocked developing country with an approximate population of 11.3 million people[9]. Due to its lack of direct access to submarine cables, internet coverage in Bolivia relies primarily on two main infrastructures: radio base stations, which are key for providing mobile phone and internet access, especially in rural and remote areas; and an optical fiber backbone network of nearly 26 thousand kilometers[10]. According to research conducted by Derechos Digitales and Internet Bolivia[11], since the introduction of the internet in Bolivia, the expansion of connectivity has been shaped by the reproduction of pre-existing inequalities and disproportionately high service costs compared to neighboring countries. As a result, connectivity growth remains uneven across the population. For example, access to connectivity and higher-quality service is significantly greater among urban residents, higher-income groups, and younger demographics.

According to Bolivia's Transport and Telecommunications Authority (ATT)[12], by the end of 2023 the country had surpassed 11.08 million mobile connections, reflecting sustained growth since 2016. However, there were only 1.3 million fixed broadband connections, indicating that fixed broadband coverage reached just 56% of households, a figure also reported by the National Institute of Statistics (INE). Between 2019 and 2020, the COVID-19 pandemic generated a

[9] See https://censo.ine.gob.bo/resultados/
[10] See https://publications.iadb.org/es/publications/spanish/viewer/Conectividad-digital-en-Bolivia-analisis-brechas-y-plan-de-accion.pdf
[11] See https://www.derechosdigitales.org/wp-content/uploads/DD_Amazonia_1_Bolivia.pdf
[12] See https://att.gob.bo/uploaded/documentos/Estado%20de%20Situaci%C3%B3n%20Actual%20del%20Internet%20en%20Bolivia%202023.pdf

notable increase in connectivity. Nonetheless, fewer than 4% of connections offered speeds above 2 Mbps, meaning that 96% could be classified as low speed. According to Internet Bolivia this transfer rate, below typical 4G technology standards, severely limits access to advanced services and audiovisual content[13].

According to research[14], the Bolivian Amazon is a key area for analyzing meaningful connectivity in the country, as it constitutes a significant portion of Bolivia 's territory. This area extends across the north and west side of the country and is home to diverse indigenous groups including the Tacana, Leco, Esse Eja, Yaminahua, Machineri, Araona, Pacahuara, Moré, Yuki, Aymaras and Quechuas[15]. Its geographical and sociodemographic characteristics present distinct challenges to achieving meaningful connectivity. Historically, Amazonian communities have experienced limited access to essential public services, such as energy -key for internet access-, drinking water, and sanitation. Telecommunications and internet access, while unevenly distributed across this territory, are often expensive and of low-quality, exacerbating existing social and political inequalities.

Paraguay has a population of approximately 7 million people[16]. According to research conducted by TEDIC[17] and data from the National Institute of Statistics[18], significant progress in connectivity has been recorded since 2017. During this period, the percentage of the population that uses the internet increased 21 percentage points, from 61.1% in 2017 to 81.6% in 2024. This means that around 4 million people in Paraguay were using the internet in 2024. It is important to note, however, that this data excludes the departments of Boquerón and Alto Paraguay, indigenous communities, and collective households.

According to Paraguay's telecommunications Authority (CONATEL), optical fiber network connects districts across the territory[19], with mobile internet connections remaining prominent in the country with a penetration rate of 84.4%

[13] See https://internetbolivia.org/file/2024/11/fdd_01.pdf?ref=en.boliviajournal.com
[14] See https://www.derechosdigitales.org/wp-content/uploads/DD_Amazonia_1_Bolivia.pdf
[15] See https://www.derechosdigitales.org/wp-content/uploads/DD_Amazonia_1_Bolivia.pdf
[16] See https://www.ine.gov.py/noticias/2262/el-ine-presenta-100-anos-de-estimaciones-y-proyecciones-de-poblacion-en-paraguay
[17]See https://www.tedic.org/wp-content/uploads/2025/02/QDTD_Paraguay_2024-WEB.pdf
[18] See https://www.ine.gov.py/noticias/2436/8-de-cada-10-personas-utiliza-internet-en-paraguay
[19] See https://www.conatel.gov.py/conatel/wp-content/uploads/2021/10/pnt_21-25_-_res._dir._2246-2021.pdf

in 2023 primarily through 2G/3G technologies[20]. In contrast, fixed broadband subscriptions reached only 12.8 per 100 people during the same period[21]. Notably, in 2023, CONATEL licensed Starlink, an initiative supported by the Ministry of Information and Communication Technologies (MITIC). The ministry stressed the satellite internet's critical role in advancing national connectivity and received its first equipment in November of that year, with the promise of extending access to the country's most isolated regions[22]. The impacts of implementing this technology will be addressed later in this contribution.

Significant inequalities also characterize internet access in Paraguay. To begin with, there is a pronounced territorial gap: in 2023, 73.4% of urban households had connectivity, compared to just 27.9% in rural areas[23]. Years of schooling is another critical factor influencing internet usage. The highest usage rates in 2023 were among those with 13 to 18 years of schooling (97.2%), followed by individuals with 7 to 12 years of schooling (89.3%). The lowest usage was recorded among those with 1 to 6 years of schooling (54.2%)[24]. This layer of inequality is further reflected in Paraguay's indigenous population, which totals 140,206 people and is made up of 19 communities belonging to five linguistic families: Guaraní, Mataco-Mataguayo, Zamuco, Lengua Maskoy, and Guaicurú. The indigenous population faces a significant educational gap, with an average of only 3.3 years of schooling among individuals over the age of 15, well below the national average of 8.4 years[25].

3. What strategies can be adopted to ensure meaningful connectivity to the Internet for LLDCs?

Taking into account the contexts outlined above, we will identify strategies to advance meaningful connectivity across three key areas:

a. Net neutrality vs. zero rating

[20] See https://www.conatel.gov.py/indicadores/
[21] See https://datos.bancomundial.org/indicador/IT.NET.BBND.P2?locations=PY
[22] See https://www.tedic.org/en/starlink-in-paraguay-are-there-risks-or-concerns-about-this-technology/
[23] See https://www.ine.gov.py/noticias/2037/como-esta-el-acceso-a-las-tecnologias-de-la-informacion-y-comunicacion-en-el-paraguay
[24] Ibid
[25] See https://www.ine.gov.py/censo2022/documentos/Revista_Censo_Indigena.pdf

Net neutrality, a foundational principle for an open and non-discriminatory internet, enables access to and dissemination of content, applications and services without any form of distinction or restriction. According to regional[26] and international[27] human rights frameworks, States must adopt and promote public policies that support necessary infrastructure for universal access, while avoiding arbitrary forms of social exclusion such as those generated by zero-rating. Zero-rating refers to the practice by which mobile operators offer access to certain applications, such as Facebook or WhatsApp, without deducting data from users' mobile plans. As a core principle of internet access, net neutrality is crucial for achieving meaningful connectivity in LLDCs:

Paraguay

In Paraguay, net neutrality is not well-protected under the law. Currently, it is addressed only in Article 26 of CONATEL's Administrative Resolution No. 190/2009, which lacks the status of law and offers no clear mechanisms for enforcement or accountability. This regulatory gap leaves the digital ecosystem vulnerable to practices that undermine competition, technological development, and digital rights, such as zero-rating.

Although zero-rating may appear to expand connectivity, it actually creates unequal treatment of data traffic and distorts users' ability to freely access diverse online content. A 2016 regional study led by Fundación Karisma[28], with the participation of TEDIC, revealed that all mobile providers in Paraguay engaged in zero-rating, favoring dominant platforms and harming free competition, local innovation, and users' digital autonomy. In an environment lacking robust legal safeguards, such business models reinforce monopolistic dynamics that threaten both the digital ecosystem and sustainable development.

These impacts are particularly harmful to groups in vulnerable situations such as indigenous, farmers, and rural communities, who often cannot afford postpaid Internet plans. As a result, they are confined to a limited, "free" version of the Internet that restricts their freedom of expression, access to diverse information, and capacity for civic participation. This precarious form of digital access deepens existing inequalities, fuels misinformation, and weakens these groups'

[26] See https://www.oas.org/es/cidh/expresion/informes/Inclusion_digital_esp.pdf
[27] See https://docs.un.org/en/A/HRC/RES/47/16
[28] See https://www.tedic.org/neutralidadenlaredenamerica/

ability to critically engage with the information that shapes their lives and territories[29].

Using zero-rating as a substitute for universal access poses serious risks: it fragments the Internet and undermines its role as a space for inclusive development. It also shifts the burden of infrastructure investment toward discriminatory models that primarily benefit dominant tech platforms, while sidelining public interest and human rights. Rather than adopting low-ambition, short-term solutions, Paraguay must commit to a strong, legally binding framework that guarantees net neutrality, promotes infrastructure investment, and ensures an open, competitive, and rights-respecting Internet. This approach is essential to advance the United Nations Sustainable Development Goals (SDGs), particularly those related to digital inclusion, equality, education, and universal access to information.

Bolivia

Internet service in Bolivia remains among the most expensive and slowest in the region. According to the Inter-American Commission on Human Rights (IACHR), the high cost of mobile and fixed internet plans creates significant barriers to access for groups in vulnerable situations, including low-income households as well as indigenous and rural communities. This situation has contributed to the spread of "free" internet traffic offers -known zero-rating practices- which limit user's access to a plurality and diversity of information.

These dynamics stand in contrast to Bolivia's legal commitments. Article 20 of the Bolivian Constitution establishes that all people have the right to universal and equitable access to telecommunications and assigns the State responsibility for ensuring its provision. Likewise, the General Telecommunications Law enshrines universal access and technological neutrality as guiding principles for internet deployment in the country[30].

However, the structure of Bolivia's telecommunications market poses ongoing challenges to achieving these guarantees. According to the Inter-American Development Bank[31], competition in the telecommunications sector is

[29] See https://www.tedic.org/zero-rating-es-una-forma-de-precarizar-internet/
[30] See https://www.minedu.gob.bo/files/documentos-normativos/leyes/ley_164___ley_general_de_telecomunicaciones_tecnologias_de_informacin_y_comunicacion.pdf
[31] See https://publications.iadb.org/en/publications/spanish/viewer/Conectividad-digital-en-Bolivia-analisis-brechas-y-plan-de-accion.pdf

concentrated in two dominant mobile broadband providers: ENTEL and TIGO. Due to the high cost of mobile data, these companies increasingly offer special packages limited to social media platforms. As a result, many users primarily access the internet to browse Facebook, Instagram, YouTube, and more recently, tele education and teleworking platforms. These zero-rating practices undermine net neutrality and distort the internet's potential as a tool for the exercise of human rights. According to Fundación InternetBolivia.org, such practices have favored Meta (Facebook), positioning its Marketplace as the country's main e-commerce tool, reinforcing platform dominance while weakening alternative marketplaces and digital spaces[32].

It is essential that the government and the telecommunications authority strengthen compliance with existing legal frameworks, applying a perspective of equity and human rights. In line with international standards, they must ensure that internet service providers do not establish measures that privilege certain data, applications or content to the detriment of others. A report by the Inter-American Development Bank[33], in line with the latest report by the IACHR's Special Rapporteur for Freedom of Expression on digital inclusion[34], noted that when a small number of companies dominate the telecommunications sector, it limits opportunities for smaller providers to emerge and remain sustainable, while also restricting competition in innovation and the development of new technologies. This concentration negatively affects the diversity of telecommunication's infrastructure and undermines users' rights to freedom of expression and access to information online.

If national Internet access strategies to bridge the digital divide for individuals and communities in vulnerable situations rely solely on provider's zero-rating practices, it restricts users' ability to fully benefit from the Internet. These practices limit access to diverse sources, perspective and knowledge, undermining users' capacity to discern and combat misinformation.

b. Advancing community networks and other initiatives for internet access in remote areas

[32] See https://internetbolivia.org/nota-de-opinion/el-acceso-a-internet-una-tarea-pendiente-para-el-desarrollo-del-pais/
[33] See https://publications.iadb.org/en/publications/spanish/viewer/Conectividad-digital-en-Bolivia-analisis-brechas-y-plan-de-accion.pdf
[34] See https://www.oas.org/es/cidh/expresion/informes/Inclusion_digital_esp.pdf

Community networks play a unique and essential role in advancing meaningful connectivity and bridging the digital divide. These community-managed infrastructures offer low-cost internet access, often providing better affordability and coverage than large telecommunications companies, and can serve areas that are not reached, or are not profitable by main internet providers. Community networks are synonymous with social management and the collective ownership of infrastructure. They are not merely a technical solution for expanding connectivity in LLDCs, but also an expression of collective organization and technological self-determination. Below, we take a closer look at how these networks operate in Paraguay and Bolivia:

Paraguay

In Paraguay, community networks only began to emerge in 2022, marking an important milestone in the struggle for digital autonomy in historically excluded territories. Currently, the CONATEL is in the process of developing a regulatory framework to legally recognize these networks as juridical entities. This step is essential not only to ensure internet access in remote areas, but to do so through autonomous and sustainable management models aligned with the social, cultural, and economic needs of each community.

Between 2023 and 2024, the "Nanum, Women Connected[35]" initiative promoted the installation of two community networks in the Paraguayan Chaco, benefiting 14 Indigenous communities -mainly from the Nivaclé people- with the support from ISOC-Paraguay[36]. As part of the project, computer equipment was delivered to four network nodes, including schools and community centers, with technical and financial assistance from the ITU in partnership with CONATEL. These go beyond mere connectivity; they promote a *meaningful* connectivity model, where women lead community-based innovation to overcome isolation, increase income, adapt to climate change, and build resilience in the face of emergencies.

Despite these achievements, the challenges remain significant. Network maintenance demands local technical capacity, which is still limited. Extreme weather conditions, such as storms and heavy rainfall, frequently damage installed hardware, leaving communities disconnected for long periods. The lack

[35] See https://gruposunu.org.py/2024/02/22/se-inaugura-red-comunitaria-de-internet-nivacle-en-el-chaco-paraguayo/
[36] See https://isoc.org.py/proyecto-guaira-conectada-impulsa-la-conectividad-comunitaria/

of resources to replace equipment or access specialized technical support poses a serious threat to the sustainability of these networks. For this reason, any public policy or international cooperation aimed at promoting community networks must include sustainable funding mechanisms, local technical training, and emergency response protocols, ensuring truly inclusive and resilient connectivity.

Due to the operational and sustainability challenges faced by community networks, ISOC-Paraguay shifted their strategy and adopted satellite technology through Starlink to expand internet access in remote areas[37]. This solution reduces the technical burden on communities, as it requires fewer resources for maintenance. While satellite technology offers the advantage of easy setup and minimal upkeep, its medium-to-high monthly cost poses a significant barrier for many low-income communities.

Although this approach helps bridge the connectivity gap in the short term, civil society organizations such as TEDIC have raised concerns about its long-term social, economic, and structural implications[38]. Starlink operates through a highly centralized and proprietary system with no local presence in Paraguay. This model can undermine efforts to build community-driven infrastructure and limit the potential for generating local value through skills development and economic circulation - as will be further explored in question 4.

Bolivia

In Bolivia, rural and remote areas remain underserved in terms of internet connectivity[39]. In addition to the limited coverage provided by mobile and fixed service providers, particularly in regions such as the Bolivian Amazon, many indigenous communities located far from urban centers lack access to electricity and, when they do, it is often scarce and expensive[40]. In response to this scenario, autonomous municipal governments (GAM) and indigenous communities have taken action by formally requesting improved internet access under the General Telecommunications Law. Within this framework, the National Telecommunications Program for Social Inclusion (PRONTIS), has implemented various projects aimed at expanding rural broadband. These include the

[37] See https://isoc.org.py/proyecto-guaira-conectada-impulsa-la-conectividad-comunitaria/
[38] See https://www.tedic.org/en/starlink-in-paraguay-are-there-risks-or-concerns-about-this-technology/
[39] See https://internetbolivia.org/wp-content/uploads/2021/11/guia_acceso_internet.pdf
[40] See https://www.derechosdigitales.org/wp-content/uploads/DD_Amazonia_1_Bolivia.pdf

installation of 4G mobile technology radio base stations and the deployment of connectivity in educational centers through community telecenters[41]. The State internet provider ENTEL has been in charge of these projects within the framework of PRONTIS.

Approaching internet access from a self-determination perspective[42], it is essential to review and reform the current telecommunications governance framework within indigenous and rural territories. Such reforms should enable regional and local governments, as well as communities, to manage their internet and digital services connectivity more easily and independently[43]. Notably, community networks are recognized in Article 3 of the General Telecommunications Law, which acknowledges the role of public, mixed, cooperative and community entities in the provision of telecommunications services.

A report by Fundación InternetBolivia.org[44] emphasizes the importance of developing a sovereign technological infrastructure to facilitate internal connectivity and reduce communities' dependence on large internet providers' corporations and geopolitical interests. This is particularly relevant for a LLDC like Bolivia, which heavily relies on both domestic and neighboring governments and telecommunications companies for access to the submarine fiber optic cables that carry internet traffic[45]. One key approach is to facilitate the registration and operation of community networks, which are built and governed by local communities themselves, providing low-cost and resilient connectivity. Supporting such networks could help ensure the long-term sustainability of various ICT massification projects implemented under PRONTIS, given their strategic role in closing the digital and social gap.

It is worth noting that community networks face many challenges to implementation including spectrum allocation, legal recognition within jurisdictions, licensing procedures, among others. These barriers highlight the

[41] See https://www.itu.int/dms_pub/itu-d/opb/pref/D-PREF-EF.CS_BOLIVIA-2017-PDF-S.pdf
[42] See https://www.derechosdigitales.org/wp-content/uploads/Contribucio%CC%81n-completa-final-FID-1.pdf
[43] See https://internetbolivia.org/file/2024/11/fdd_01.pdf?ref=en.boliviajournal.com
[44] Ibid
[45] See https://www.itu.int/dms_pub/itu-d/opb/pref/D-PREF-EF.CS_BOLIVIA-2017-PDF-S.pdf

need for comprehensive policy frameworks and proactive State support to enable their development[46].

c. Refrain from internet shutdowns

While States must take actions, formulating and implementing adequate public policies to ensure connectivity, they must also refrain from taking actions that hinder internet access, such as promoting internet shutdowns.

Internet shutdowns are defined as "an intentional disruption of internet or electronic communications, rendering them inaccessible or effectively unusable, for a specific population or within a location, often to exert control over the flow of information"[47]. The UN's Special Rapporteur on peaceful assembly and association has emphasized that such disruptions to connectivity, especially during mobilizations, constitutes a disproportionate violation of the right to freedom of expression and access to information, further undermining the capacity of affected communities to take action[48].

Paraguay

The UN Special Rapporteur on Freedom of Expression has warned that connectivity gaps deepen structural inequalities by limiting access to crucial information and restricting the exercise of freedom of expression, particularly among historically marginalized communities[49]. These digital barriers not only perpetuate social exclusion but also hinder these populations' ability to actively defend their rights and territories.

Ensuring internet access that is high-quality, affordable, safe, non-discriminatory, and grounded in an intercultural approach is essential for the full realization of human rights. This need becomes even more urgent in contexts like Paraguay, where research done by TEDIC has documented connectivity restrictions in areas experiencing socio-environmental conflict[50]. These limitations are not isolated incidents but rather reflect deep-rooted structural

[46] See https://www.derechosdigitales.org/wp-content/uploads/Contribucio%CC%81n-completa-final-FID-1.pdf
[47] See: https://www.accessnow.org/no-internet-shutdowns-lets-keepiton/
[48] See: https://documents-dds-ny.un.org/doc/UNDOC/GEN/G21/149/66/PDF/G2114966.pdf?OpenElement
[49] See https://docs.un.org/es/A/HRC/44/49
[50] See https://www.tedic.org/en/research-cybersecurity-among-human-rights-defenders-in-paraguay/

deficiencies, including a lack of institutional transparency and practices that directly impact indigenous and rural communities[51].

One of the most critical issues highlighted by TEDIC is how lack of connectivity becomes a tool of exclusion and control. In northern regions of the country, such as the departments of Concepción, San Pedro, and Amambay, there have been reports of deliberate internet and mobile phone service disruptions during times of conflict or repression.

These connectivity disruptions particularly impact community journalists, land defenders, and activists seeking to document abuse or mobilize. Digital disconnection hinders fundamental rights such as freedom of expression, access to information, and the ability to report violations.[52]

d. Intersectional digital literacy strategies

Finally, in addition to physical internet access, digital literacy is a key pillar of meaningful connectivity, making it essential to promote educational measures aimed at promoting the ability of all people to make autonomous, independent and safe use of the internet. According to Derechos Digitales' research[53], digital literacy refers to the set of skills and strategies used to search for, critically evaluate and share information from different online sources. These skills enable individuals to exercise digital rights, fostering civic participation and strengthening democratic engagement through the use of digital technologies. For example, digital literacy allows people to assess whether information is reliable and appropriate to share, and/or to gain knowledge about how broadband infrastructure works, an essential component to achieve technological appropriation by the communities.

Bolivia

Digital literacy measures in Bolivia only fully achieve their objective if they incorporate human rights education, gender and ethnic perspectives, and specific accessibility approaches. Notably, Bolivia is home to 36 indigenous people, each with their own language, and cultural context, underscoring the need for intercultural approaches in the design of digital literacy strategies.

[51] See https://www.tedic.org/wp-content/uploads/2023/07/Connectivity-and-digital-appropriation.pdf
[52] See https://www.tedic.org/en/internet-shutdowns-report-northern-zone-paraguay-2023/
[53] See https://www.derechosdigitales.org/wp-content/uploads/DD_Amazonia_5_General-3.pdf

These efforts should align with a decolonial vision of the internet that seeks to preserve and promote the knowledge, practices and customs of the communities within their territories.

Civil society organizations have played a key role in developing digital literacy strategies from a human rights' perspective in the country. For example, Fundación InternetBolivia.org designed and implemented a digital literacy curriculum for young people between the ages of 13 and 20, which complements the National Education System, and incorporates international standards along with the intercultural, gender and multilingual approach established in Bolivia's education system[54]. Strategies such as this respond to the needs and demands of a multicultural society, to effectively integrate the internet as a cultural and social tool that enables the exercise of fundamental rights and freedoms.

A key element to be included in digital literacy strategies is linguistic diversity. According to UNICEF, 30 out of 34 native languages in the country are in danger of extinction due to the lack of practice and transmission[55]. The internet plays a pivotal role here; according to the IACHR Special Rapporteur for Freedom of Expression, in Latin America and the Caribbean less than 30% of Internet content is in the local languages[56]. The scarcity of online content in indigenous languages widens the digital language gap for these populations. This gap not only reinforces social marginalization but also heightens the risk of language loss. For internet access to truly function as a tool that fosters informational pluralism and cultural diversity, it is crucial to ensure the participation of linguistic minorities, as well as the availability of local content on the internet[57]. Digital literacy initiatives should include dedicated modules on the design, creation and dissemination of digital content in native languages[58], supporting both cultural preservation and meaningful connectivity.

Gender should also be a core consideration in the development of digital literacy strategies. Bolivia continues to experience a significant digital gender gap that disproportionately affects women, particularly those in rural, peri-urban, and indigenous communities, as well as those from economically precarious sectors.

[54] More information at https://internetbolivia.org/generaciones-futuras/
[55] See https://www.unicef.org/media/103336/file/Native%20language%20education%20paves%20the%20way%20for%20preschool%20readiness%20(Bolivia).pdf
[56] See https://www.oas.org/es/cidh/expresion/informes/Inclusion_digital_esp.pdf
[57] Se https://unesdoc.unesco.org/ark:/48223/pf0000133171.page=76
[58] See https://internetbolivia.org/wp-content/uploads/2023/10/marco-de-inclusion-digital-intercultural.pdf

These groups face increased barriers to meaningfully accessing the internet[59]. According to 2020 data, internet use was higher among men (61.91%) than women (58.04%). The disparity becomes even more pronounced at demographic extremes: 72% of high-income urban men accessed the internet, compared to just 14% of rural women[60].

Technology-facilitated gender-based violence (TFGBV) is another critical dimension that must be addressed in digital literacy strategies in order to advance comprehensive protection and reparation frameworks, and to promote a digital environment that is free from violence and discrimination. TFGBV refers to any "act of violence perpetrated by one or more individuals that is committed, assisted, aggravated and amplified in part or fully by the use of information and communication technologies or digital media against a person on the basis of gender"[61].

The experiences of women and LGBTQIA+ people in digital spaces require differentiated approaches aimed at raising awareness of this evolving and multifaceted form of violence, while also supporting affected individuals in claiming their rights and demanding accountability. In Bolivia, targeted strategies are urgently needed to confront the normalization of TFGBV, as well as to address the lack of clear, accessible and standardized information about its manifestations and reporting mechanisms. It is essential to promote information campaigns with materials adapted to local contexts and in accessible formats, such as indigenous languages as well as accessible reading formats [62]. Fundación InternetBolivia.org has contributed significantly to this goal through the creation of S.O.S. Digital Center[63], a helpline that, among other areas of focus, works to strengthen digital care skills for free and fearless use of technologies.

4. Unique challenges faced by LLDCs in achieving meaningful connectivity and key policy responses:

[59] See https://internetbolivia.org/wp-content/uploads/2023/07/Junior-Fellowship-2022_Mas-alla-de-la-brecha-digital_Esp-11.pdf
[60] See https://internetbolivia.org/file/2024/11/fdd_01.pdf?ref=en.boliviajournal.com
[61] See https://www.unfpa.org/TFGBV
[62] See https://www.derechosdigitales.org/wp-content/uploads/cciddhh.pdf
[63] See https://www.derechosdigitales.org/wp-content/uploads/LineasAyuda-ENG-Portadillas-2.pdf

a. Affordability

Paraguay

According to TEDIC's research, in 2014, accessing an internet service package represented around 15% of an individual's monthly income[64]. More recent data from the Alliance for Affordable Internet (A4AI) shows that in 2021, the cost of 1GB of broadband data was nearly 9.3 USD, equivalent to approximately 3% of the average monthly[65]. However, this affordability applied to only 30% of the population, reflecting huge inequalities within Paraguayan population[66]. A study by The Economic Commission for Latin America and the Caribbean (ECLAC) showed that Paraguay ranks as the fourth least affordable country for internet access in Latin America, with tariffs representing approximately 2.2% of average income, a high charge compared to peoples' average income[67].

Satellite technology, which has been expanding internet access in remote areas, has a medium-to-high monthly cost and poses a significant barrier for many low-income communities, who are allegedly the ones who would benefit the most from this technology. The equipment necessary to access this network costs around 500 USD, followed by a monthly payment of around 52 USD for the connection. These costs raise important questions about the long-term sustainability of such technology.

Bolivia

Internet access remains significantly expensive in Bolivia, with average-speed connectivity packages representing 8 to 10% of the minimum wage. Globally, the country ranks 121st on the ITU's fixed broadband affordability index, reflecting some of the highest prices both regional and worldwide. The Alliance for Affordable Internet (A4AI) underscores the severity of this problem and rates Bolivia's Internet cost environment at 5.4 out of 100[68]. In this context, income level is a key determinant of the digital gap. The high cost of Internet services continues to widen socioeconomic inequalities and exacerbates existing territorial and gender gaps.

[64] See https://www.tedic.org/como-es-internet-en-paraguay-whyb/#sdfootnote12sym
[65] See https://a4ai.org/affordable-internet-journey-from-1-to-5/
[66] See https://www.itu.int/itu-d/reports/statistics/affordability2024/
[67] See https://repositorio.cepal.org/server/api/core/bitstreams/3959a268-68fd-466d-bbd8-f7b9b8ea801d/content
[68] See https://internetbolivia.org/file/2024/11/fdd_01.pdf?ref=en.boliviajournal.com

b. Quality of bandwidth or communications

Paraguay

A study by the ECLAC[69] showed that, in 2018, Paraguay was among the Latin America's countries with the least high-speed internet connections. At the time, only about 0.2% of connections exceeded 10 Mbps and roughly 0.1% reached speeds above 15 Mbps. By 2022, the same study reported that the average speed for high-speed technologies like 4G reached 16.94 Mbps, marking national-level progress. However fixed broadband connections remains notably low, with only 12 fixed broadband subscriptions per 100 people[70]. It is also worth noting that these studies do not address the rural-urban gap in internet access.

Paraguay is considered one of the countries with the highest percentage of rural population in Latin America, with a 37% in total. Rural areas struggle with public services access and still lack basic internet connection, while 73.4% of urban households had connectivity in 2023, only 27.9% did in rural areas[71].

As previously mentioned, community networks, as a low cost and self-determined connectivity option, are still relatively new in Paraguay and are not legally recognized yet as juridical entities. Besides, local technical capacity to maintain these networks is still limited and extreme weather conditions often damage installed hardware, leaving communities in rural areas disconnected for long periods. Initiatives like Starlink, thought to bridge the connectivity gap in rural areas in the short term, operate through a highly centralized and proprietary system with no local presence in Paraguay. This model can undermine efforts to build community-driven infrastructure and limit the potential for generating local value through skills development and economic circulation[72]. Moreover, Starlink's "plug-and-play" terminals do not require specialized installation or allow for local repair, limiting job opportunities and the chance to build technical capacity within rural communities, and reinforcing dependency on a single global provider.

[69] See https://repositorio.cepal.org/server/api/core/bitstreams/3959a268-68fd-466d-bbd8-f7b9b8ea801d/content
[70] See https://datos.bancomundial.org/indicator/IT.NET.BBND.P2?locations=PY
[71] See https://www.ine.gov.py/noticias/2037/como-esta-el-acceso-a-las-tecnologias-de-la-informacion-y-comunicacion-en-el-paraguay
[72] See https://www.tedic.org/en/starlink-in-paraguay-are-there-risks-or-concerns-about-this-technology/

Ultimately, according to previously quoted TEDIC's research, in northern regions of the country, such as the departments of Concepción, San Pedro, and Amambay, there have been reports of deliberate internet and mobile phone service disruptions during times of conflict or repression. Digital disconnection hinders fundamental rights such as freedom of expression, access to information, and the ability to report human rights' violations.[73]

Bolivia

Bandwidth quality in Bolivia is directly related to its status as a landlocked country[74], which creates a strong dependence on neighboring countries for access to submarine fiber optic cables to route Internet traffic. This reliance poses a significant barrier to achieving high-speed internet access under favorable affordability conditions. According to Fundación InternetBolivia.org, the country's internet cabling infrastructure remains the greatest challenge to ensuring sustained and high-quality internet access in the country[75]. Additionally, electricity coverage in Bolivia still does not cover the entire territory, especially in the Bolivian Amazon.

In this scenario, it appears that only ENTEL and TIGO are currently investing in expanding fixed internet coverage, though without any clear expectation of reaching the entire country. Mobile connectivity remains far more widespread than fixed connections, which still require additional equipment such as modems, routers and repeaters to deliver service to cell phones, laptops and other devices[76]. Territorial gaps persist: urban areas, particularly in the central axis (La Paz, El Alto, Cochabamba, Santa Cruz) account for over 77% of fixed internet connections, while rural areas remain the most underserved due to limited infrastructure and lack of services. According to National Statistics, 70% of urban households have Internet access, compared to just 21% in rural areas[77]. Furthermore, Internet Bolivia notes that even after the significant expansion in

[73] See https://www.tedic.org/en/internet-shutdowns-report-northern-zone-paraguay-2023/
[74] See https://publications.iadb.org/es/informe-anual-del-indice-de-desarrollo-de-la-banda-ancha-brecha-digital-en-america-latina-y-el-0
[75] See https://internetbolivia.org/nota-de-opinion/el-acceso-a-internet-una-tarea-pendiente-para-el-desarrollo-del-pais/
[76] See https://internetbolivia.org/nota-de-opinion/el-acceso-a-internet-una-tarea-pendiente-para-el-desarrollo-del-pais/
[77] See https://att.gob.bo/uploaded/documentos/Estado%20de%20Situaci%C3%B3n%20Actual%20del%20Internet%20en%20Bolivia%202023.pdf

connectivity during the COVID-19 pandemic, transfer rates remain below the standards of typical 4G[78].

A shared challenge for both Paraguay and Bolivia is their exposure to climate change. According to the High-Level Latin America regional review meeting of the Vienna Programme of Action for LLDCs (2014–2024)[79], they are the only Latin American countries classified as being at extreme risk in CAF's Climate Vulnerability Index[80], which underscores connectivity challenges especially in remote areas.

c. Investment and infrastructure

Paraguay

The Universal Service Fund (FSU) in Paraguay is managed by CONATEL and is primarily financed through 20% of the contributions paid by telecommunications service operators as part of the Commercial Exploitation Fee. One of the fund's main objectives is to expand mobile connectivity infrastructure and improve internet access in the country.

However,research by TEDIC[81] revealed that FSU resources were misused to acquire facial recognition systems, despite the fact that many rural and marginalized communities in Paraguay still lack basic internet access. CONATEL, the entity responsible for administering the fund, diverted resources originally intended to expand connectivity in underserved areas, towards the financing of mass surveillance technologies. These decisions were made without public consultation, transparency, or adequate accountability mechanisms.

There is no justification for allocating FSU resources to surveillance technologies. The fund's mandate is clear: to improve internet access, support health and education services, and expand telecommunications infrastructure, none of which are related to surveillance or security technologies.

Bolivia

[78] See https://internetbolivia.org/file/2024/11/fdd_01.pdf?ref=en.boliviajournal.com
[79] See https://www.un.org/ohrlls/sites/www.un.org.ohrlls/files/en_concept_note_vpoa_larrm.pdf
[80] More information at https://scioteca.caf.com/bitstream/handle/123456789/509/caf-vulnerability-index-climate-change.pdf?sequence=5&isAllowed=y
[81] See https://www.tedic.org/wp-content/uploads/2018/12/La-enajenaci%C3%B3n-continua-de-nuestros-derechos_TEDIC_2018-2.pdf

According to a report by the Inter-American Development Bank report[82], Bolivia does not have a dedicated a dedicated Universal Service Fund for telecommunications. Instead, it relies on the multi-sectoral National Fund for Regional Development (FNDR), a decentralized public financial institution, created by Law 926 of 1987, and operating under the Ministry of Development Planning (MPD), which finances governors' offices, municipalities and other public entities for the implementation of productive and social development projects.

While such projects may include investments in telecommunications and electricity infrastructure, recent allocations to telecommunications has been minimal. In the Institutional Budget of Resources and Expenses of the FNDR for 2021, the item specifically dedicated to telecommunications, channeled through PRONTIS, represented only 0.03% of the total budget.

For Fundación InternetBolivia.org, the biggest challenge to meaningful connectivity continues to be limited coverage, resulting from underinvestment in last-mile infrastructure. Based on the organization's experience, private service providers frequently neglect smaller, less profitable towns. To address this gap, greater decentralization of competencies is needed, enabling subnational governments to invest in connectivity as a public good, particularly in areas where large telecommunications providers fail to reach. However, the current telecommunications governance structure remains highly centralized. While municipal governments are responsible for managing services, decision-making power over infrastructure is still concentrated at the national level[83].

d. Security and resilience

Paraguay

TEDIC's research evidences that community and rural defenders[84], journalists[85], women in politics[86], and members of civil society organizations face

[82] See https://publications.iadb.org/en/publications/spanish/viewer/Conectividad-digital-en-Bolivia-analisis-brechas-y-plan-de-accion.pdf
[83] See https://internetbolivia.org/file/2024/11/fdd_01.pdf?ref=en.boliviajournal.com
[84] See https://www.tedic.org/en/research-cybersecurity-among-human-rights-defenders-in-paraguay/
[85] See https://www.tedic.org/en/digital-gender-based-violence-against-journalists-in-paraguay-research/
[86] See https://www.tedic.org/en/research-technology-facilitated-gender-based-violence-against-women-politicians-in-paraguay/

cybersecurity threats such as personal data leaks by authorities or pro-corporate media, stigmatization and disinformation on social media, and targeted cyberattacks aimed at silencing human rights advocates. These risks are compounded by the absence of a national cybersecurity strategy grounded in human rights, leaving groups in vulnerable situations exposed[87].

Paraguay also lacks a comprehensive legal framework for personal data protection aligned with international law standards. TEDIC has long advocated for a democratic digital agenda that ensures data protection[88], safe internet access, and citizen participation in technology policymaking. The absence of a data protection law heightens risks, especially for women and gender diverse individuals, who have limited legal means to safeguard their rights. As UN Women underscores, protecting personal data is crucial for ensuring autonomy and safety, particularly amid gender-based violence and surveillance[89].

Bolivia

Once internet access is guaranteed, several critical issues come into play. One of the most pressing is the protection of users' privacy and personal data, a cornerstone concern in the context of increasingly widespread access to the internet, the massive use of social networks and the digitization of public and private services. Large-scale connectivity involves the collection of personal data, which, if misused, can violate people's rights and compromise their security.

Bolivia lacks a comprehensive and adequate legal framework for personal data protection. Although privacy is recognized in Article 21 of the Bolivian Constitution, a dedicated and robust legislation is needed to establish a data protection authority as well as define, for example, mechanisms for individuals to exercise control over their data, obtain reparation when their rights are infringed and access clear measures for protection and remedy, among others. Given the reliance on personal data by both governments and private entities in service delivery and policy design, it is essential to safeguard these rights. These include: the right to access information on which private or public entity holds or

[87] See https://www.tedic.org/en/the-evolution-of-cybersecurity-in-paraguay-mitic-as-a-strategic-pillar/ and https://www.tedic.org/en/cybersecurity-in-paraguay-between-urgency-and-legislative-improvisation/
[88] See https://www.tedic.org/en/paraguay-needs-a-robust-personal-data-protection-law-with-international-standards-and-real-safeguards/
[89] See https://www.unwomen.org/sites/default/files/2022-12/EP.12_Dhanaraj%20Thakur%20and%20Asha%20Allen.pdf

processes one's personal data; to correct and update personal data stored in databases; to its deletion from the files, records, files or systems; and to oppose its collection or processing[90].

TFGBV represents a further critical threat that demands urgent attention. According to research by Derechos Digitales[91], Bolivia lacks a comprehensive approach to address TFGBV within a human rights-based and gender responsive framework. In the absence of specific legislation, the various forms of gender-based digital violence remain invisible in the statistical records of gender-based violence in the country[92]. Civil society, through initiatives such as Internet Bolivia Foundation's helpline: S.O.S Digital Center, have worked to raise public awareness about the impacts of TFGBV on the physical and psychological well-being of survivors, while also pushing the public agenda to demand government action against this extension of gender-based violence.

5. What can ITU Membership, governments and other stakeholders, including those from transit countries, do to ensure meaningful connectivity to the Internet for LLDCs?

Recommendations

a. In line with the United Nations Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression[93] and the Global Digital Compact, States need to adopt effective and concrete policies and strategies for internet access and meaningful connectivity, developed in consultation with individuals and organizations from all sectors, especially with civil society and community based organizations. They must be designed considering the differentiated need to guarantee stable, affordable, and rights-based internet access in rural and environmentally sensitive territories and should establish specific actionable adequate targets for rural and indigenous broadband deployment.
b. Ensure full connectivity in rural areas and historically marginalized communities as an enabler for exercising rights and participating in

[90] See https://internetbolivia.org/wp-content/uploads/2021/11/guia_proteccion_datos.pdf
[91] See https://www.derechosdigitales.org/wp-content/uploads/LineasAyuda-ENG-Portadillas-2.pdf
[92] Ibid
[93] See https://docs.un.org/en/A/HRC/17/27

climate policy discussions. In order to do so, policies should involve the coordination of efforts between sectors to guarantee the availability of electricity as a basis for connectivity, prioritizing clean and sustainable energy sources; increase investment in infrastructure to improve internet coverage in rural and hard-to-reach areas; and prioritize investments in infrastructure resistant to extreme weather conditions.

c. Adopt comprehensive, rights-based, and gender-responsive strategies to close the gender digital gap, recognizing it as a structural barrier to equality and meaningful connectivity. These strategies must be developed with the meaningful participation of women, girls and LGBTQIA+ groups, especially those from vulnerable communities such as indigenous and rural, and must ensure equal access not only to infrastructure, but also to affordable devices, quality broadband and relevant content in local languages.
d. Promote policies that aim the technology appropriation of vulnerable groups, notably rural and indigenous communities, by implementing training programs on the proper use of digital devices, focusing on security and privacy, and conducting periodic diagnostics on the training needs of vulnerable communities; promoting the creation of content in native languages and related to local culture in order to maintain cultural identity; and facilitating access to digital tools to encourage the creation of digital content that supports community cultural identity and to promote local economic activity.
e. Alongside, promote sustained, human rights-based and gender responsive digital literacy strategies so women, girls and LGBTQIA+ groups can engage with the internet and digital technologies autonomously, safely, responsibly, and with independence. This will contribute to bridge the digital gap, which is not only related to the lack of internet infrastructure available, but also to the quality, information and know-how needed to make Internet access useful, safe and beneficial to users[94].
f. Regulate the services of internet providers to guarantee universal access while respecting the principle of net neutrality, thus promoting access to plural and diverse information, gradually putting an end to zero-rating practices and the packages offered by companies.
g. Recognize and actively support community networks that facilitate internal connectivity and reduce communities' dependence on large internet providers' corporations and geopolitical interests, and are

[94] See https://www.oas.org/es/cidh/expresion/informes/Inclusion_digital_esp.pdf

supported by sustainable funding, local technical training, and emergency response protocols, to ensure truly inclusive and resilient connectivity. This can be done by legally recognizing them as non-profit, autonomous actors eligible for special regulatory regimes that reflect their social function; simplifying licensing procedures for community networks; reserving dedicated spectrum bands for community networks, and facilitating shared, unlicensed, or lightly licensed spectrum access for non-commercial use; and providing fiscal incentives, including import duty exemptions for community network equipment, and facilitate affordable access to critical infrastructure.

h. Ensure private operators meet binding coverage obligations, service quality standards, and fair pricing structures, especially in rural, indigenous and other marginalized regions.
i. Prohibit connectivity disruptions and refrain from internet shutdowns, enacting binding legal bans on the use of internet shutdowns, service throttling, or platform blocking, especially during protests, land conflicts, or environmental disputes, and ensuring that telecommunications companies are legally prohibited from collaborating with state agencies to suspend or degrade connectivity in affected areas without independent judicial authorization.
j. Following the joint declaration of International Mechanisms for Promoting Freedom of Expression[95], States must create an enabling environment for the exercise of the right to freedom of expression on the internet. The United Nations General Assembly has recognized that surveillance practices that don't meet strict legality, proportionality and necessity standards, and the unlawful or arbitrary interception and collection of personal data affects not only the right to privacy and freedom of expression but also the principles of a democratic society. States, therefore, should refrain from doing so.
k. Prevent the diversion of public funds destined for expanding connectivity towards financing mass surveillance technologies, such as facial recognition.
l. Design and implement comprehensive and sufficient legislative frameworks to personal data protection with meaningful participation of stakeholders like civil society and historically marginalized groups.
m. Develop comprehensive human rights-based, survivor-centered and intersectional legal frameworks for combatting TFGBV, explicitly

[95] See https://www.oas.org/en/iachr/expression/showarticle.asp?artID=849&lID=1

recognizing TFGBV as both gender-based violence and a human rights violation; and adequately enforcing existing legal frameworks, recognizing their application to TFGBV cases.

n. Meaningfully include civil society, grassroots organizations and communities in the formulation of digital and connectivity policies, ensuring transparency, access to information, and accountability mechanisms. Such inclusion should be led by an intercultural perspective, assuring these groups' right to self-determination in their relation with digital technologies and the internet.
o. Incorporate principles of environmental and digital justice into national digital inclusion strategies, ensuring that the most climate-vulnerable communities are also connectivity priorities.