

SECTORAL REPORT FOR
INTERNATIONAL INVESTORS



Technology / Telecommunications



Why invest in Argentina?

Argentina is the third largest economy in Latin America, with a GDP of USD 445 billion, and the third largest recipient of Foreign Direct Investment (FDI) in the region. With a population of 45 million people, 60% of which is under 35 years old, it has preferential access to the main South American markets, which altogether have about 295 million inhabitants.

At the global level, it is the eighth largest country, with over 50% of arable land. It has the second largest unconventional gas reserve and the fourth largest unconventional oil reserve in the world, as well as an extensive maritime platform of over 1.78 million km², which is rich in energy and fishing resources.

In terms of renewable resources, it is among the six countries with the highest wind consistency, with an annual average capacity factor of 20%. It also has great potential for the development of solar energy, especially in the Andean and sub-Andean regions, where global horizontal irradiation (GHI) ranges between 2,400 and 2,700 kWh/m².

Moreover, it has great potential for mining development due to its over 705,000 km² of promising mining areas, its long tradition in the production of gold, silver, lead, aluminium and copper, and its positioning as a new global leader in the exploitation of lithium—the country has the third largest global lithium reserve and is the fourth largest global producer.

Argentina is characterised by a diversified economy that produces and exports agrifood, manufactured products, minerals and energy, knowledge-based services, culture and art, among others. Throughout the country, multiple activities with a high potential for investment and growth have been developed.

The country is internationally renowned for its leadership in the production and export of products such as soybean oil, yerba mate, utility vehicles, maize and wheat grains, raw peanuts, insecticides, powdered milk, beef, lemon essential oils, black tea, shrimp, pears, sunflower oil and combed wool.

Argentina does not only stand out for its natural resources. With a dynamic scientific community, its human talent has shown its capacity in a wide range of sectors. Among Latin American countries, it ranks third in the number of academic articles published, third in patent applications and first in the Global Skills Index¹ ranking for Data Science.

¹ The Global Skills Index (GSI) 2019 is the first index conducted by Coursera, an online education platform with a large skills database of 38 million students and over 3,000 courses, specialisations and undergraduate courses of the main universities available. For each country, Coursera calculates a GSI that measures the average skills expertise of the platform's students.

Economic activities by region

NOA •

- Sugar
- Tobacco
- Viticulture
- Bovine meat
- Mining
- Petroleum and refinery
- Textile and metal-mechanic industry
- Automotive and trucks industry
- Inbound tourism

NEW CUYO •

- Viticulture
- Stone fruits peach, plum and, to a lower extent, pome fruits
- Olive
- Mining
- Manufacturing
- University education
- Inbound tourism
- Domestic tourism

PATAGONIA •

- Pome fruit, apples, and pears
- Viticulture, Alto Valle del Río Negro
- Fine fruits
- Ovine, wool, and meat
- Mining
- Textile, aluminum, and other industries
- Oil and gas, mainly
- Alternative energies
- Inbound tourism

NEA •

- Yerba mate and tea
- Citrus fruit
- Bovine meat
- Forestry and paper industry
- Oil and gas (weak)
- Inbound and domestic

AMBA

- Food industry
- Textile industry
- Automotive, metalworking
- Refinery
- Petrochemical, chemical and plastic
- Financial services
- Business services
- Logistics trading
- Software
- University education
- Inbound and domestic tourism

CENTRO •

- Cereals and oilseeds
- Beef, poultry, and pork
- Citrus fruit
- Iron and steel, automotive, metal-mechanic industries
- Refinery, petrochemical, chemical and plastic industries
- Software
- University education
- Biotechnology
- Business services
- Logistics trading

Infrastructure

 Railway network	 Maritime container traffic	 Flight departures	 Airports and ports	 National and provincial routes	 Ducts
17,866 km N.º 2 in LATAM N.º 13 in the world	~2 M TEU N.º 6 in LATAM	163,000 flights all over the world . N.º 4 in LATAM	Airports: 55 Ports: 101	500,000 km National routes: 37,500 km	Gas pipeline: 16,000 km Oil pipeline: 1,200 km

With longstanding policies of universal access to education and local scientific development, Argentina is the second country in the region with the highest public spending on Education (6% of GDP) and Science & Technology (0.6%). It should also be noted that Argentina is the second country in Latin America with the most unicorns (a total of 11) and the region's leading software exporter (50% of the sector's exports are destined to the USA).

The country offers benefits in terms of human resources and cultural and gender diversity policies for investors:

- The Knowledge Economy Act promotes activity in the sector through income tax reliefs (60% for micro and small companies, 40% for medium-sized companies and 20% for large companies).
- Every year, more than 150,000 professionals graduate from college.
- It is the Latin American country with the highest English language proficiency, which represents a comparative advantage in terms of service exports.
- It ranks ninth in the World Economic Forum's global ranking for leading efforts to encourage inclusiveness, equity and creativity in firms.
- It has the lowest gender gap in South America, and it ranks fifth in Latin America and the Caribbean.

Moreover, Argentina is a member of the selected group of countries that harness atomic energy for peaceful ends, building small and medium-sized modular reactors.

Thanks to these developments, Argentina can export to 170 countries around the world, achieving strong brand recognition for the quality of its products (meat, wine, oil, etc.), technology (satellites, turbines, reactors, etc.) and services (software, professionals, etc.). The country is also the main tourist destination in South America, with 7.4 million international arrivals in 2019.

Lastly, the development of maritime, aerial, rail and road infrastructure offer advantages that allow the country to access any part of the world as a competitive economy.

The AAICI has prepared these sectoral reports in order to facilitate access to essential information as well as to advantages, benefits and opportunities for those investing in Argentina—one of the countries with the greatest potential to attract FDI in the world.

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3i	Inclusive Internet Index
AI	Artificial intelligence
ALADI	Latin American Integration Association
ARCAP	Argentine Association of Private Equity, Venture, and Seed Capital
Cabase	Argentine Internet Chamber
CATEL	Chamber of Telecommunications Cooperatives
CESSI	Chamber of the Argentine Software Industry
EIU	Economist Intelligence Unit
ENACOM	National Communications Agency
FDI	Foreign Direct Investment
FONPEC	Trust Fund for the Promotion of the Knowledge Economy
GHI	Global horizontal irradiance
GXI	Global Interconnection Index
ICT	Information and Communications Technologies
IoT	Internet of Things
LATAM	Latin America
MTEySS	Ministry of Labour, Employment and Social Security
MVO	Mobile Virtual Operator
M&A	Mergers and Acquisitions
RDI	Research, Development and Innovation
REFEFO	Federal Optical of Fiber Network
SaaS	Software as Service
TMT	Technologies, Media and Telecommunications
UNCTAD	United Nations Conference on Commerce and Development
USD	United States dollars
VoIP	Voice over Internet Protocol

In Argentina,
telecommunications
are in constant
evolution and
generate great
investment
opportunities as well
as new sources of
income.

Information and Communication Technologies (ICTs) are essential to carry out multiple daily activities in the productive, social and human spheres. Access to and use of this technological infrastructure, as well as the use of ICT resources as services, provide new opportunities for employment, social interaction and integration, both for communities and for third, public and private sector organisations.

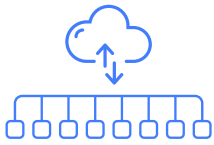
- Argentina offers a great opportunity for investment in telecommunications and technology infrastructure. At the regional level, it is well-positioned and has a competitive cost structure, a solid infrastructure and extensive resources. The existence of a comprehensive digital agenda should be highlighted.
- The Global Interconnection Index (GXI), published by Equinix, shows that the convergence of key global trends and the recent pandemic creates unexpected pressures on organisations' ability to achieve digital transformation. Digital service providers foresee a fivefold increase in private connectivity.
- The largest global telecommunications, media and technology companies operate in Argentina. Furthermore, thanks to the characteristic entrepreneurial spirit of the country, there is a growing number of success stories leveraging the system, as evidenced by the emergence of new unicorns.
- A solid digital public and private infrastructure is expanding in the wake of the growing demand for telecommunication services, particularly since the COVID-19 pandemic, which proved the importance of connectivity.
- The telecommunications industry is characterised by a sustained technological advancement over time, which does not happen in other industries. Therefore, it requires constant investment in new technology. Argentina has significant potential to attract the investments required to meet the continuous need for evolution and connectivity.

Regional hub of mass data centres

Argentina has potential to turn into a regional hub and to consolidate its technological leadership.



BigTechs can expand and take advantage of the strong digitisation demands of local companies.



Knowledge-Based Economy Act

Legislation that strengthens and supports companies in this sector.



Fiscal revenue

Based on estimations, there will be a net fiscal revenue of about

1 billion dollars over ten years of operation.



Employment

According to Argencon, employment associated with promoted activities will reach

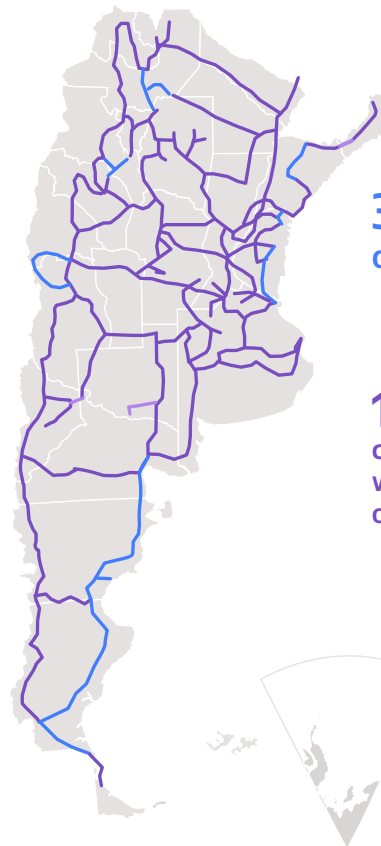
336,000 jobs positions.

Last mile services

12,000 SMEs, cooperatives and retail companies throughout the country deploy last mile networks to provide connectivity to end consumers.

Federal Network of Optical Fibre (REFEFO)

The REFEFO allows to provide service to public institutions as well as retail ICT service providers, with the aim of bridging the digital divide between large urban centres and small towns in Argentina.



31,526 km of lit fibre.

1,083 connected locations, which represents 33% of the total.

Solid infrastructure



Argentina has what it needs to consolidate its infrastructure and shows great growth potential.



Large projects that generally consist of mass network installations caused by growing demand.



Continuous improvement in quality and speed of national communications as well as external data exchange.

Production conditions

In Argentina, 64.2% of urban households have access to at least one computer. In addition, 88 out of 100 people use mobile phones and 87 out of 100 use internet services, according to data from INDEC.

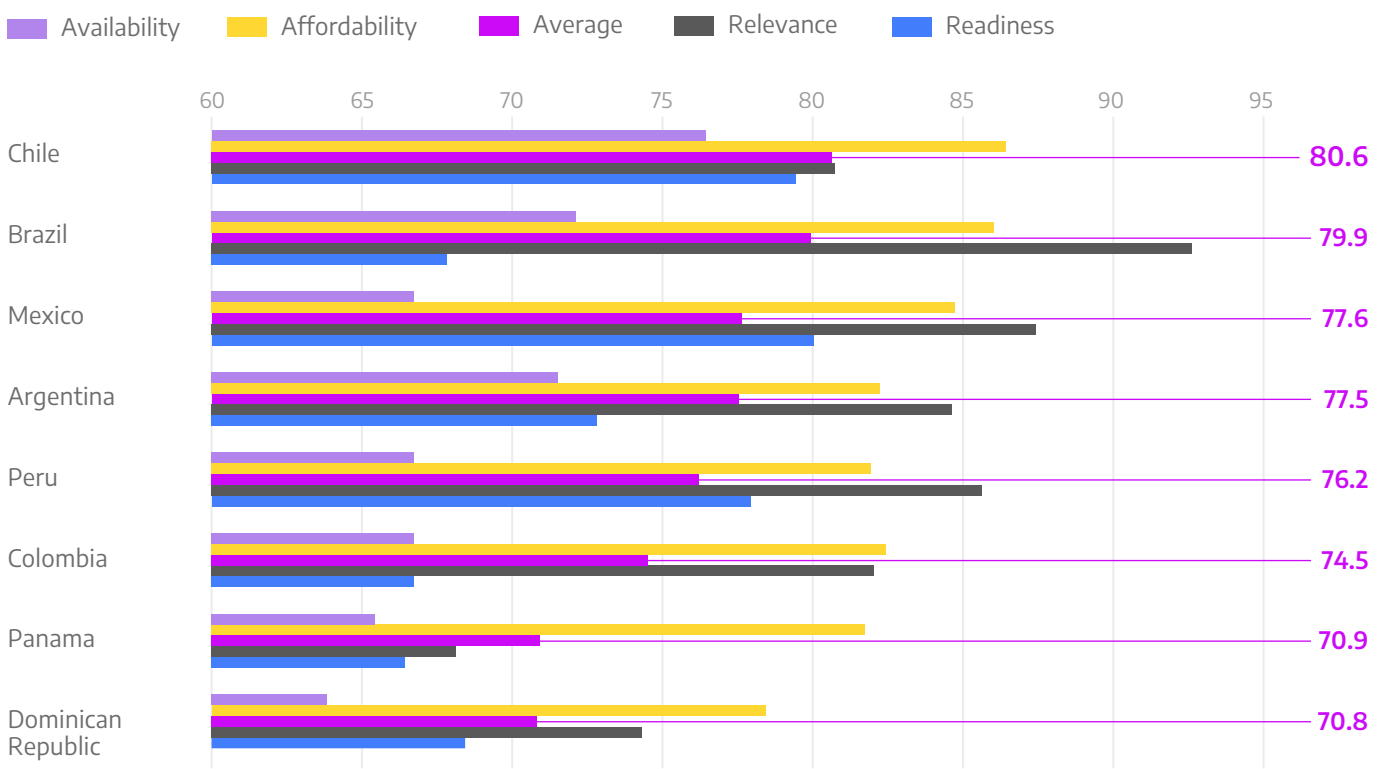
The Inclusive Internet Index (3i) 2022, developed by the Economist Intelligence Unit (EIU) with the support of Meta, ranks Argentina as the fourth country in the region with better network penetration in Latin America, after Chile, Brazil and Mexico. The index relies on four pillars to measure countries' internet inclusion: availability, affordability, relevance and readiness. Its 2022 edition, which reports information for the year 2021, highlights the changes that have arisen since the COVID-19 pandemic.

Argentina leads in other indicators in the region as well. It ranks first in infrastructure—where public and private initiatives on Wi-Fi access and on the educational level of the population stand out—and second in internet usage and fixed telephone subscriptions, as well as in security associated with e-commerce.

The largest global telecommunications, media and technology companies operate in Argentina. Recently, one of the leading global companies (Amazon) installed a new datacenter through Amazon Web Services.



Inclusive Internet Index 2022, Latin American countries



Source: Economist Intelligence Unit (EIU) in collaboration with Meta.

In addition, in Argentina, more and more companies are becoming unicorns, which are recently created tech start-ups that reach a valuation of USD 1 billion in the financial markets. As of 2020, five Argentine companies had reached this valuation: MercadoLibre, Globant, Despegar, OLX and Auth0. In recent years, the list expanded and seven new unicorns emerged in 2021: Vercel (web design), Aleph (online marketing and advertising), Mural (teleworking solutions), Bitfarms (cryptocurrency mining), Ualá (fintech), Tienda Nube (e-commerce) and Satellogic (aerospace company). More recently, in 2022, two other new names have joined the list: Technisys (technology for banks and fintech) and Moolec Science (biotech).

On the other hand, the country has a solid public and private digital infrastructure. The Federal Network of Optical Fibre (REFEFO), created in 2010 as a part of the national telecommunications plan “Argentina Conectada”, was conceived as a network that would provide service to

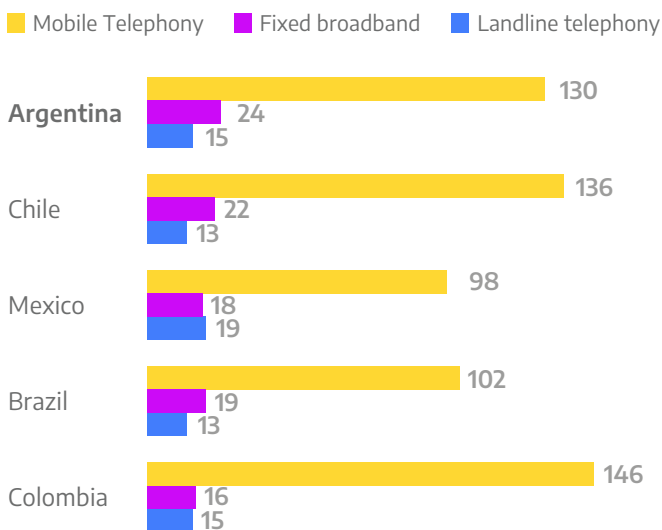
public institutions as well as retail ICT service providers, with the aim of bridging the digital divide between large urban centres and small towns.

The REFEFO consists of 32,585 km of lit fibre that connect 1,118 locations and 20,750,904 citizens throughout the country. The plan is to reach 38,808 lit kilometres and connect more than 22 million citizens to the grid by 2023.

The network is composed of a federal backbone organised in thirteen geographical regions and interconnected provincial networks. It is in charge of transporting IP traffic between provincial access points and the national access point, which is located in the National Data Centre at the Benavídez Ground Station (REFEFO’s km 0). From there, it connects to local providers—mainly telecommunications SMEs and cooperatives—, which provide the last mile service, that is, to the end consumer. It is estimated that there are 1,200 SMEs and cooperatives in the sector, the vast majority of which are nationally owned.

Telecommunication indicators in Latin America

SUBSCRIPTIONS EVERY 100 PEOPLE (2021)



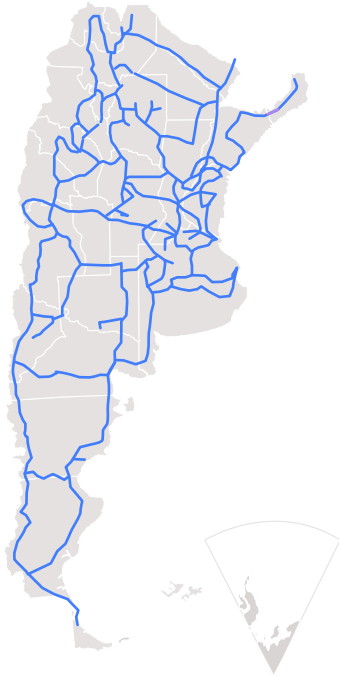
PERCENTAGE OF THE POPULATION THAT USES THE INTERNET

Argentina and Mexico (2021); Chile, Brazil and Colombia (2020).



Source: World Bank.

REFEFO current coverage



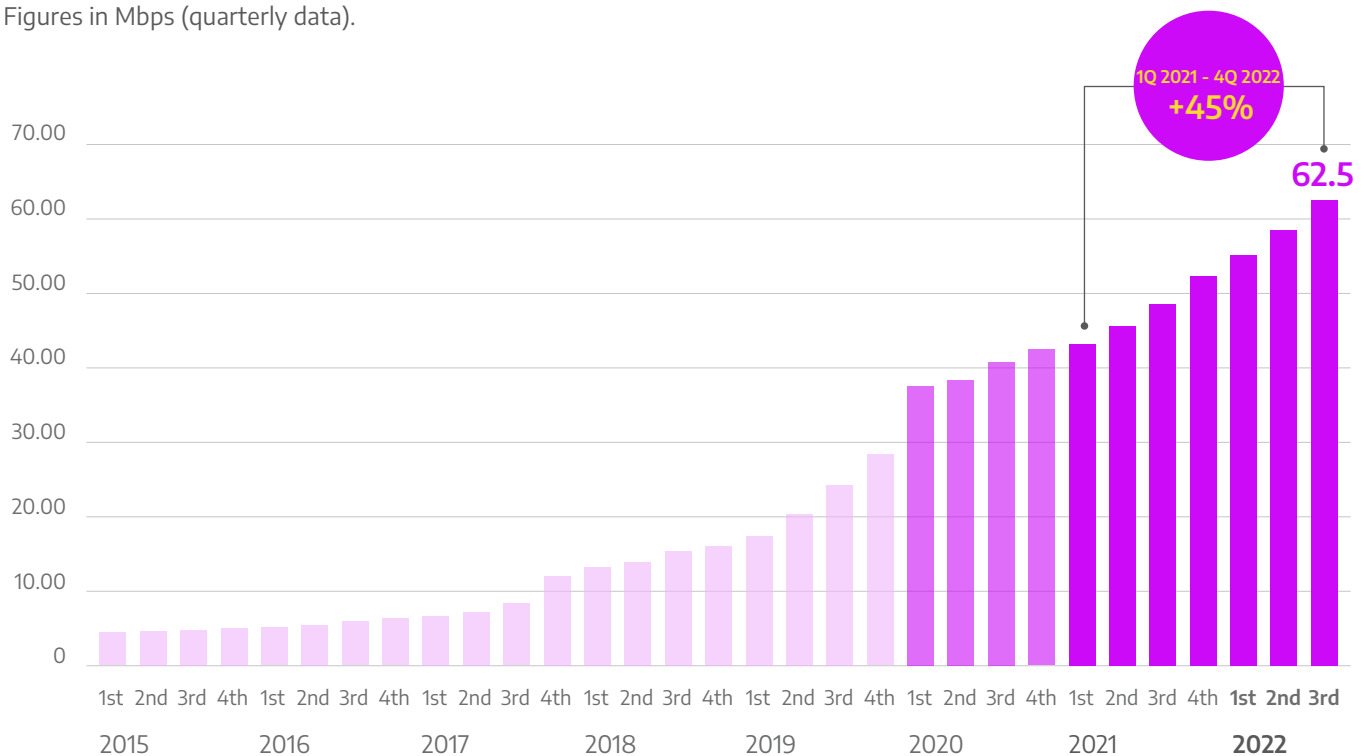
Source: argentina.gob.ar

Lately, there has been a sharp increase in the speed of hardwired internet. In Buenos Aires and CABA, 70% of existing fixed broadband connections reach speeds above 50 Mbps—this percentage drops to 33% if the rest of the country is considered. Moreover, in the third quarter of 2020, the average speed of hardwired internet connections reached 62.5 Mbps at the national level, which shows a 120% increase with respect to the average speed registered in the fourth quarter of 2019.

As a consequence of the COVID-19 pandemic, a sharp increase was registered in download speeds, especially at the beginning of 2020, when the number of connections with speeds over 30 Mbps began to increase. In December 2019, these connections represented 37% of the total national and, by September 2022, they reached 65%. On the other hand, connections of more than 100 Mbps went from 16% of the total to almost 30% in little more than two years.

Average download speed - Fixed internet access

Figures in Mbps (quarterly data).



Source: ENACOM.

MAIN CHARACTERISTICS OF THE SECTOR

In turn, there has been a significant decrease in connections with speeds below 30 Mbps—they went from 60% in December 2019 to 32% in the third quarter of 2022. Considering a long-term view, there is a noticeable downward trend in connections below 6 Mbps: they currently represent only 7% of the total, whereas, in December 2015, they accounted for 89% of total connections.

Regarding the type of fixed broadband connection, the most common technology is mainly cable modem (54.4%), followed by optical fibre (25.9%), ADSL (12.6%), wireless (5%) and others (2.1%). The trend is the same as in previous years: a sharp drop in ADSL accesses (-42.2% between the fourth quarter of 2019 and the third quarter of 2022) in favour of a sharp growth in optical fibre—which tripled in the period—, followed by wireless (+63.8%) and cable modem (+23.5%) connections.

Based on the idea that connectivity is an essential tool for the community, there are numerous free Wi-Fi hotspots distributed throughout the 23 Argentine provinces.

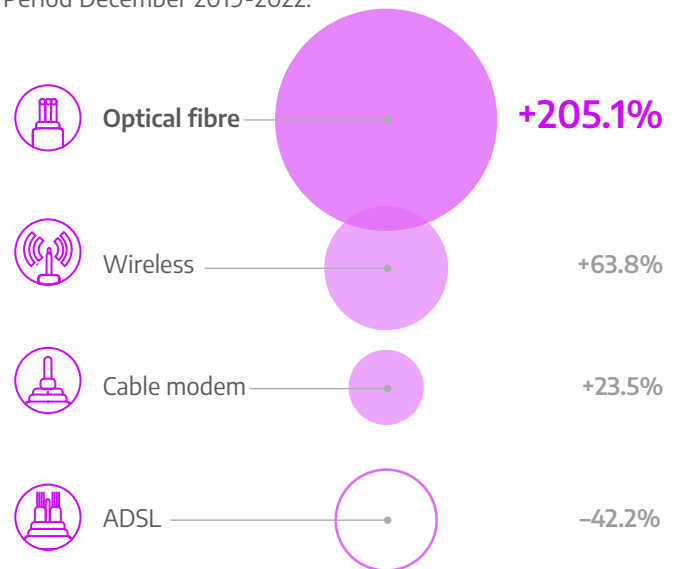
Working conditions

The telecommunications sector employs a qualified workforce and offers above-average salaries.

In 2021, there were 73,141 registered jobs in the private sector, which accounts for 1.2% of the total registered private employment.

Total connections for each technology - Annual percentage variation

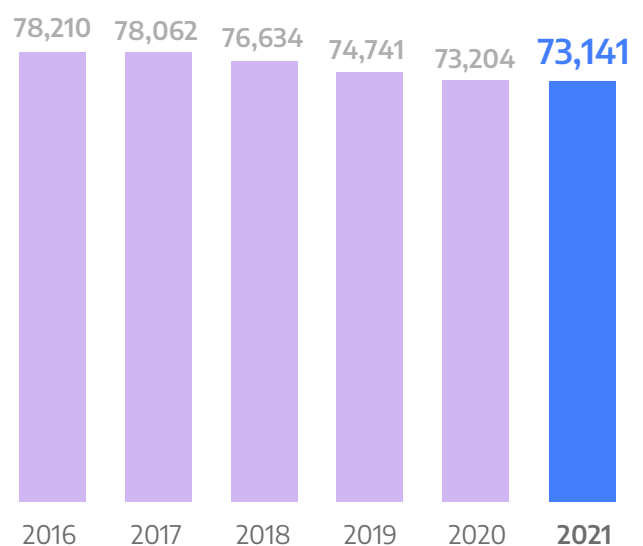
Period December 2019-2022.



Source: ENACOM.

Private jobs in telecommunications

Figures in number of registered jobs.



Source: Employment and Business Dynamics Observatory, MTEySS.

Main players

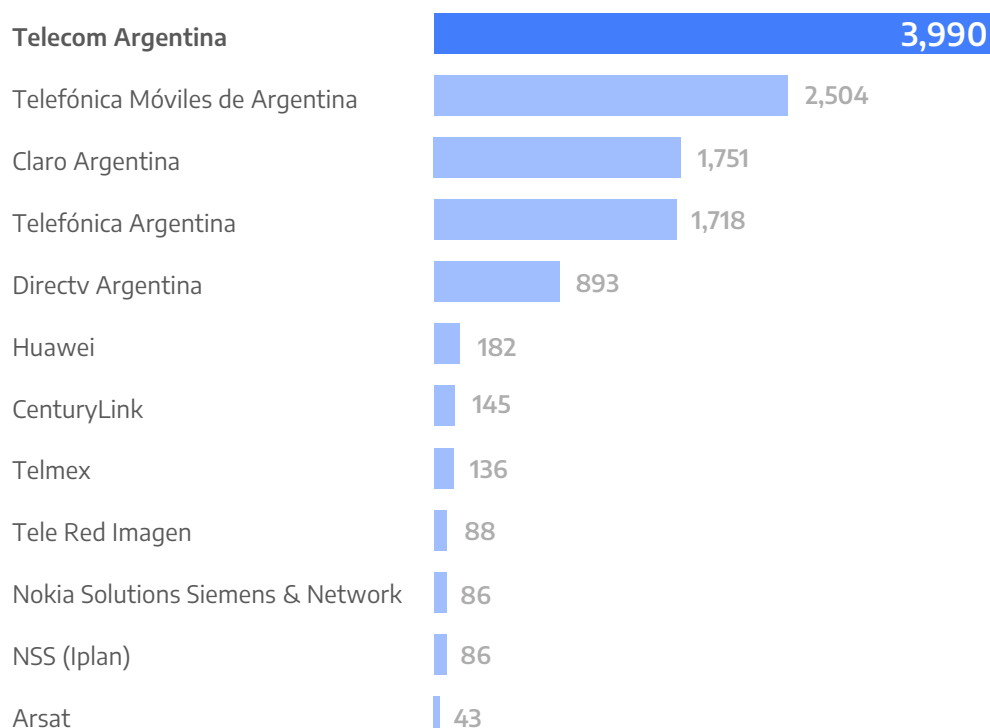
The main players in this sector are large national and transnational companies—such as Telecom, Telefónica and Claro—and smaller companies and cooperatives which operate in different locations and offer landline telephony, internet or cable TV, among other services. The demand comes from the the private and public sectors as well as households. The main full-service operators have the highest turnover in the Argentine market. In 2020, the top four leading companies made USD 10 billion altogether and were among the top 25 companies with the highest turnover in the country. Telecom, Telefónica and Claro are at the forefront.

Competitive and market conditions

Telecommunications and audiovisual services have concentrated in large economic groups. The two main ones, Cable Visión Holding—which includes Cablevisión (pay TV), Telecom (fixed telephony), Personal (mobile telephony) and Fibertel (internet), among others—and Telefónica—which includes Telefónica Móviles (mobile telephony) and Telefónica (fixed telephony, internet and pay TV)—are among the top 5 economic groups with the highest sales in the country.

Telecommunications companies' turnover

Figures in million dollars. Year 2020.



Source: Mercado Magazine.

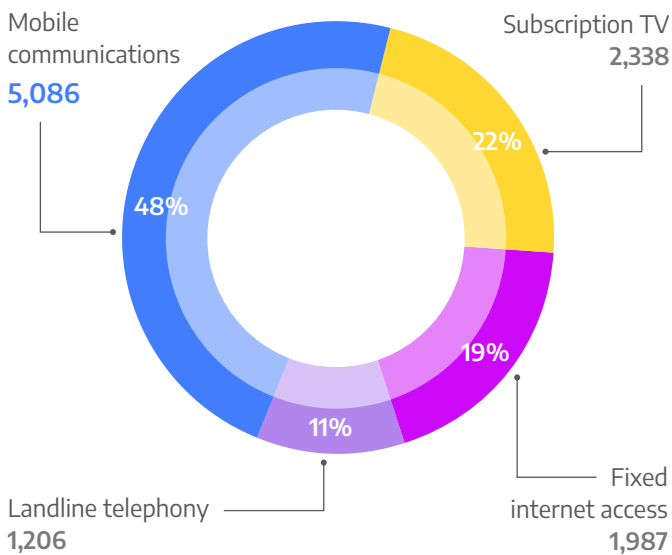
Market shares

Mobile communications

In Argentina, the Mobile Virtual Operator (MVO) market is still being developed, and there are only three players: Nuestro, Tuenti and IMOWI, the MVO from the Chamber of Telecommunications Cooperatives (CATEL), which was launched in January 2022. There have been announcements from other MVOs—including cable operator Supercanal Arlink, Virgin Mobile Argentina, media group Teledifusora and, based in Buenos Aires, Telecentro—, but they have not launched their services yet. MVOs have only 1% of the market, while the three mobile network operators—Telecom Argentina, Movistar (Telefónica) and Claro—hold the remaining 99%. The largest share is held by Claro (37%), followed by Telecom (34%) and Movistar (28%).

Turnover by type of service

Figures in million dollars (Q3 2022).



Source: ENACOM.

Landline telephony and fixed broadband

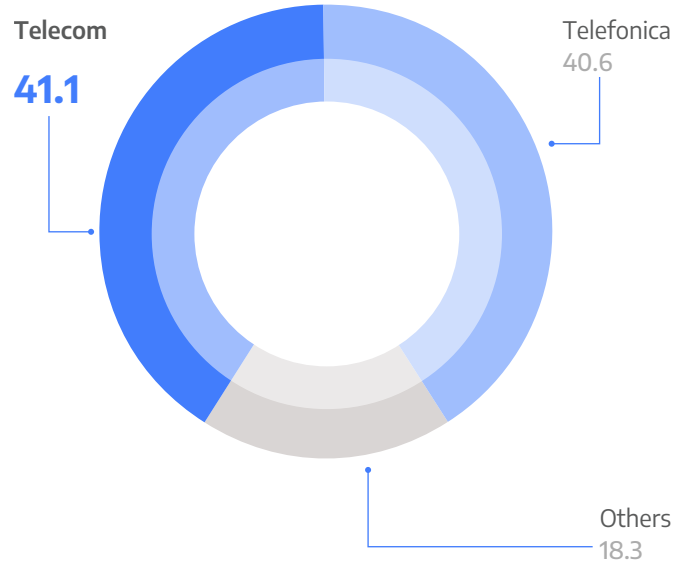
In the third quarter of 2022, landline telephony reached a total of 7.53 million subscribers, with a year-on-year increase of 7.5%.

Subscriptions peaked in 2017 and declined thereafter. This trend may be attributed to the success and growth of mobile services.

However, operators' deployment of fixed broadband services and increased convergence could help stabilise the market through VoIP technology services that enable the voice signal to travel over the internet using protocols.

Landline telephony market share

Figures in percentages (Q4 2020).

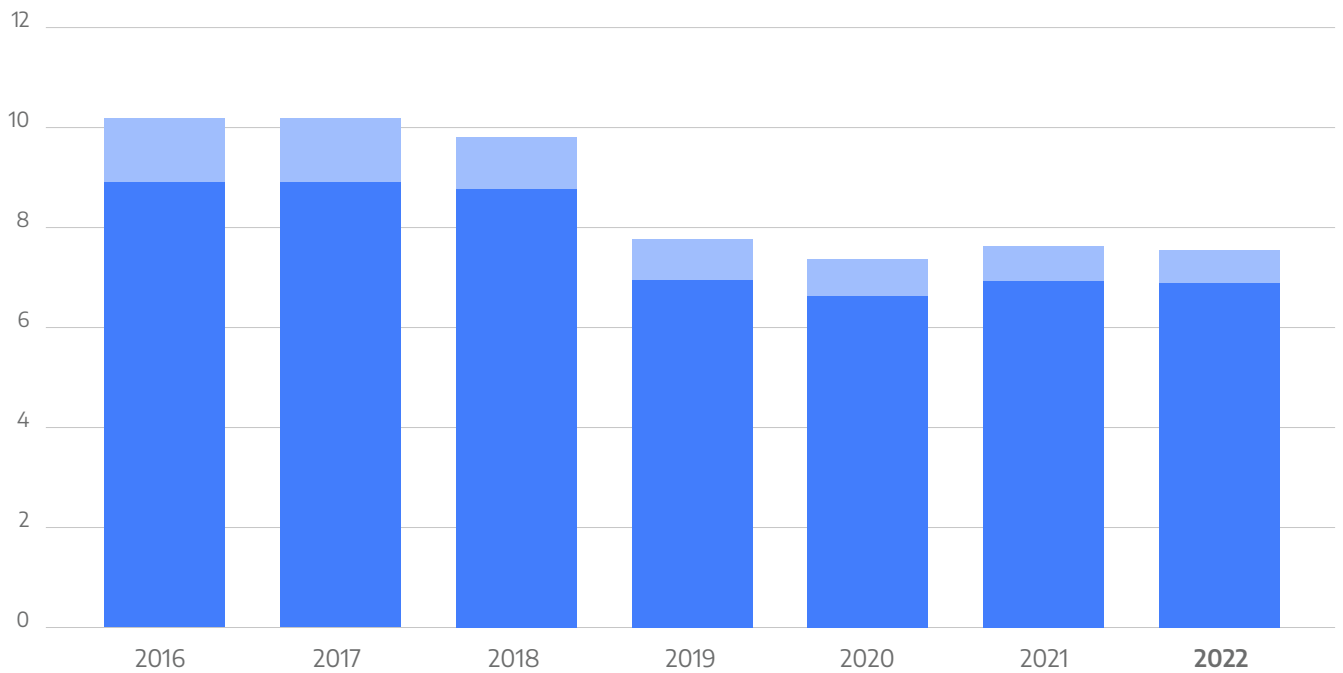


Source: Enacom, Telefonica, Telecom.

Landline telephony access

Figures in millions. Annual data (except for 2022, Q1-Q3).

■ Landline telephony for households ■ Landline telephony for businesses and government



Source: ENACOM.

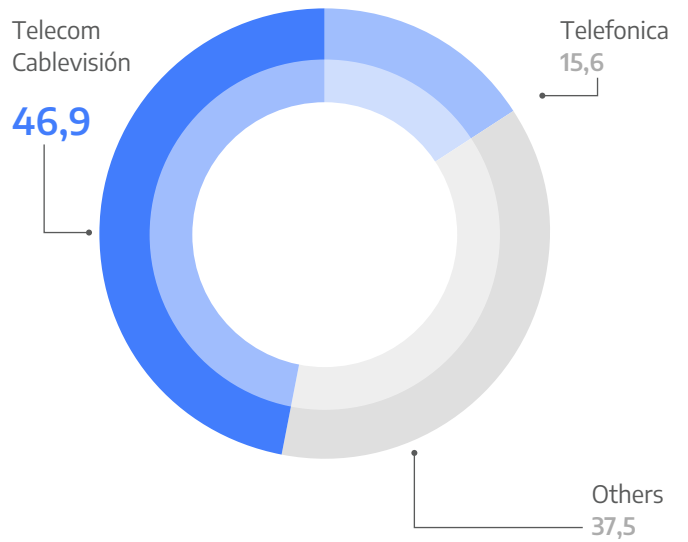
Broadband

The deployment of advanced technologies for broadband service has increased in recent years thanks to public and private investments. According to data from the National Communications Agency (ENACOM), at the end of the third quarter of 2022, there were a total of 11.1 million broadband subscriptions—an increase of 10% compared to the same period in 2021.

The main broadband operator in the country is Telecom Cablevisión, with 47% of the market. It is followed by Telefónica, with 16%, and the remaining 37% corresponds to regional and local operators, comprised of telecommunications cooperatives and SMEs. The latter operate in smaller Argentine towns—far away from major urban centres—, where large operators have not invested in those services.

Market share by broadband operator

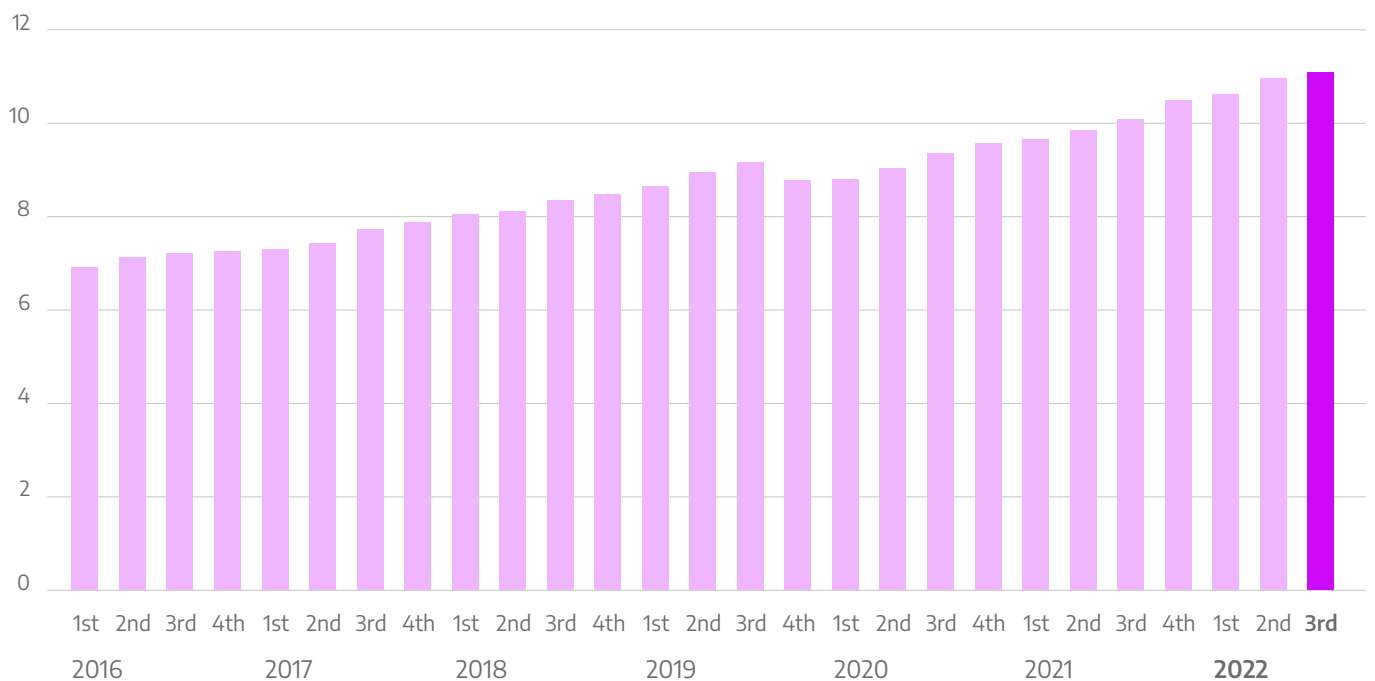
Figures in percentages (Q4 2020).



Source: Operators.

Fixed broadband and narrowband internet access

Figures in millions (quarterly data).



Source: ENACOM.

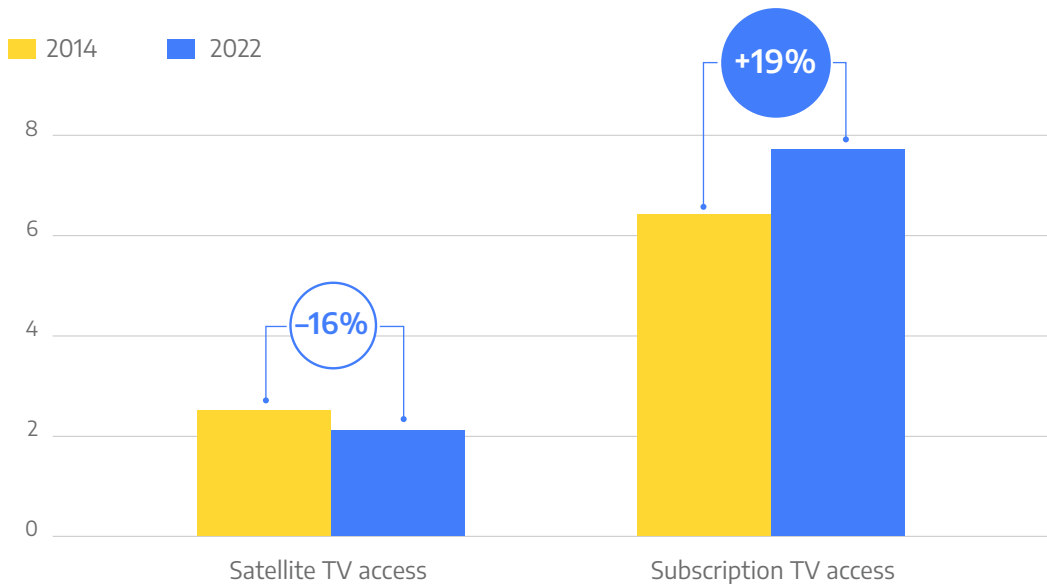
Subscription TV

In 2022, the Argentine pay-TV market reached 9.73 million subscriptions. Most subscribers received the service via cable, rather than satellite—79% cable versus 21% digital, according to data from ENACOM. Between the third quarter of 2014 and the third quarter of 2022, pay-TV access increased by 19%, while satellite TV access decreased by 16%. The market is dominated by fixed service provider Cablevisión—owned by media conglomerate Grupo Clarín (60%) and by Mexican holding company Fintech (40%)—, with 3.54 million subscribers in the second quarter of 2021 and an estimated 37% of the market. Satellite TV provider DirectTV has the second largest market share in the country, followed by many local and regional SMEs and cooperatives.

Until 2017, operators were not allowed to offer convergent services, which means Movistar, Claro and Telecom Personal could not offer pay-TV services nor quadruple play services (cable TV, internet, and landline and mobile telephony). The telecommunications law reform enabled players to offer convergent services as of January 2017, but with the following limitation: mobile operators can only offer cable pay-TV services as of 2018—not satellite—and only in the main urban centres (city of Buenos Aires, Greater Buenos Aires, Córdoba and Rosario).

Subscription and satellite TV access

Figures in millions (Q3 data).



Source: ENACOM.

Investment conditions: Foreign direct investment

The telecommunications industry is characterised by a sustained technological advancement over time, which does not happen in other industries. Therefore, it requires a constant investment in new technology.

According to the United Nations Conference on Trade and Development (UNCTAD), the increase in global FDI flows in 2021 will be driven by mergers and acquisitions (M&A), especially those related to technology and medical care, which were the least affected industries by the pandemic.

In 2019, before the pandemic started, the highest number of projects and costs—both announced and completed—materialised.

During 2020, a USD 199 million investment in technology, media and telecommunications (TMT) was announced in Argentina, along with the creation of more than 460 new jobs.

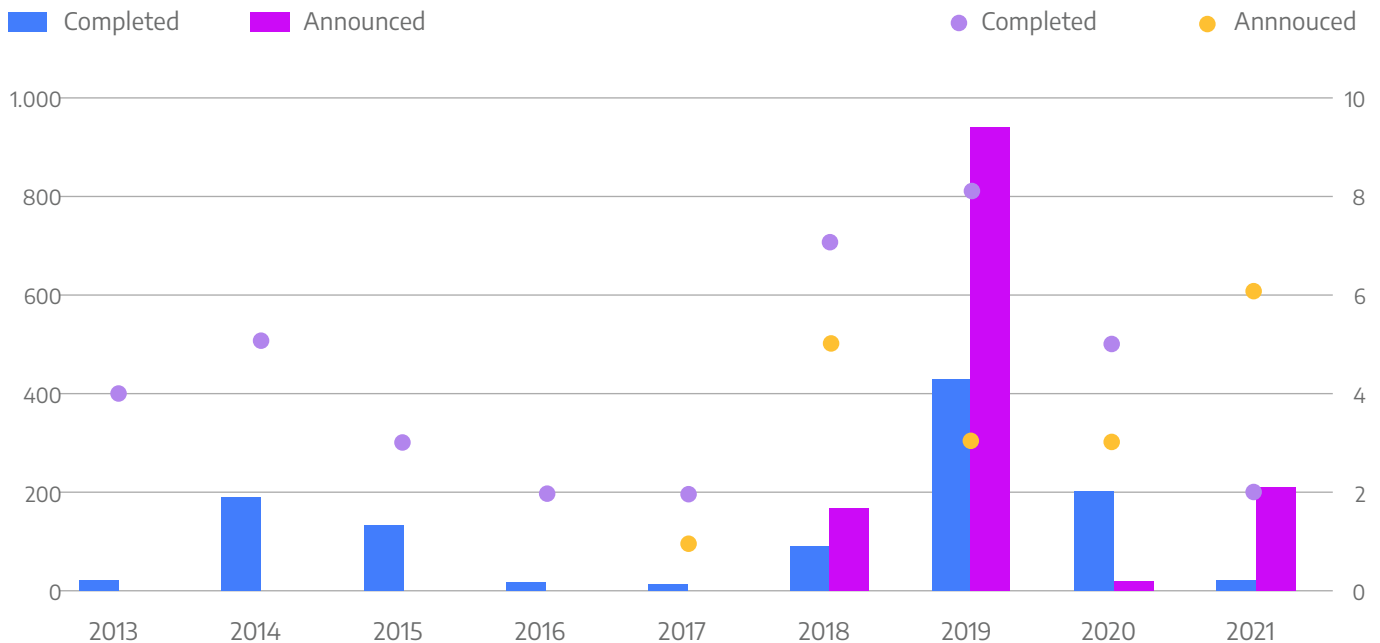
In addition, plans for future investments totalling USD 209 million were announced in 2021, with a projected creation of more than 467 jobs.

Operator investment announcements in the country 600 million investment by Telecom in 2021. In the last four years, Telecom has invested more than USD 4.3 billion to further enhance the capacity and coverage of its infrastructure for both fixed and mobile networks.

Announced and finalized investment projects in Argentina

Project Budget, in million dollars (left)

Number of Project (right)



Source: Orbis.

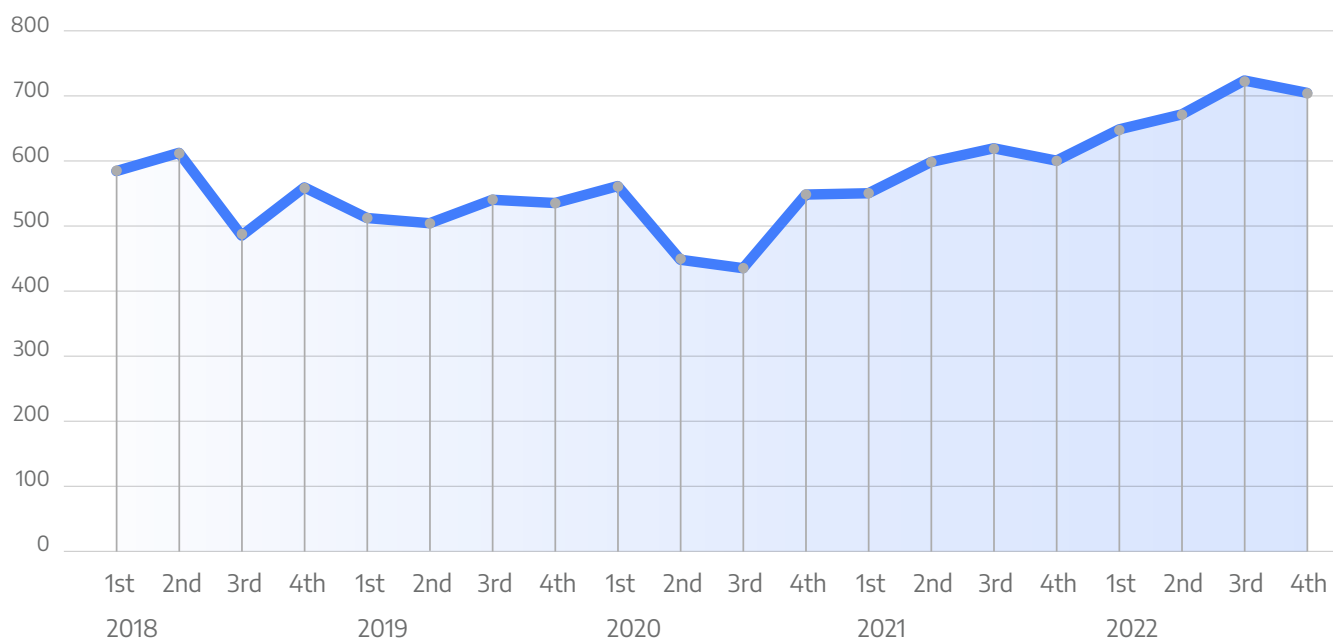
Foreign Trade

Even though the telecommunications services industry does not have free-flowing international trade, there is one device that relies on this infrastructure. Exports of information and communication technology (ICT) services were greatly affected in 2020 as a result of the pandemic, mainly in the second and third quarters of that year, with declines of 11% and 29%, respectively. However, unlike other services that felt the full effects of the pandemic and mobility restrictions, by the end of 2020, ICT exports started to recover and, by 2021, they had surpassed pre-pandemic levels. The year 2022 saw record exports totalling USD 2.7 billion and a surplus trade balance of USD 606 million. The main destination for external sales is the USA, which accounts for 42% of exports, followed by Brazil (12%) and Uruguay (5%).

The telecommunications sector has shown significant growth in the last years and its prospects are positive.

Information and communication technology services exports

Figures in million dollars (quarterly data).



Source: INDEC.

Advantages

Abundance and availability of strategic resources. Due to its strategic geographical location in the region, Argentina has potential to capture the growth of local and regional digital traffic, with a clear opportunity to meet the growing demand, improve the quality and speed of connectivity, and make room for new technologies such as 5G.

With regard to resource availability, the country has clear advantages. There is a wide availability of renewable energy, particularly the wind farms located in the south of the province of Buenos Aires, with low average temperatures, flat terrain, low flood risk and no seismic activity, unlike Chile. These advantages are considered by global companies when it comes to making large telecommunications investments.

In addition, Argentina has the advantage of being close to data consumption centres such as São Paulo, Río de Janeiro, Lima and Santiago de Chile.

Gender in Technology Centres

The G+T Centre is a space where public sector, private ICT companies and civil society organisations gather to promote their programmes and initiatives regarding gender issues, with the aim of reducing the gender gap in technology.

It aims to promote short- and long-term actions to achieve greater gender inclusion and equality in the technological sector, including the integration, education and training of women and dissidents in Science, Technology, Engineering and Mathematics (STEM).

Research, Development and Innovation Institutions RDI. National Agency for the Promotion of Research, Technological Development and Innovation. Decentralised body that depends on the Ministry of Science, Technology and Productive Innovation. Through subsidies and tax credits, it promotes scientific research, development and technological innovation.

National Space Activities Commission - CONAE. Decentralised body dependent on the Ministry of Foreign Affairs. It executes and controls space activities, especially satellite earth observation devices.

Federal Council of Science and Technology - COFECYT. Interinstitutional body that brings together the science and technology authorities of the Argentine provinces and the Autonomous City of Buenos Aires.

Interinstitutional Council of Science and Technology - CICYT. Agency created by Article 14 of Act No. 25,467. It serves as a coordination space for national organisations that carry out scientific and technological activities: conicet, cnea, inta, inti, conae, segemar, inidep, ina, citefa and anlis.

Observatory of Discrimination in Radio and TV. Institutional space that assists the ENACOM Board of Directors in international treaties, laws, agreements and regulations related to the protection of human rights in terms of media treatment: cases of violence, gender, health, discrimination, xenophobia, childhood and adolescence. It acts in coordination with the National Institute against Discrimination, Xenophobia, and Racism (INADI) and with the Ministry of Women, Gender and Diversity.

Network of public and private institutions that put the sector into the national and international agenda



Infrastructure

Argentina has big projects regarding telecommunications infrastructure. Most of them refer to mass network deployment to improve national communications and external data exchange.

The Argentine government announced a plan to destine USD 500 million to different projects to be carried out by the national telecommunications company (ARSAT). Almost half of the budget will be allocated to the construction of the ARSAT-SG1—the third Argentine satellite—and another significant part will be used for the expansion, modernisation and extension of the Federal Network of Optical Fibre (REFEFO). Funding for these projects comes from the Universal Service Trust Fund, from ARSAT’s own resources and from contributions provided by national entities, such as CAF, the Development Bank of Latin America.

REFEFO. Currently, there are 34,500 km of optical fibre available, 32,585 km of which are lit and operating. Thanks to the expansion, it was possible to include the pending provinces, like Tierra del Fuego.

ARSAT-SG1 (third Argentine satellite). ARSAT released some details on the ARSAT-SG1, which is expected to launch in 2023. It will bring high-quality satellite broadband to rural areas with full coverage in Argentina and partial coverage in neighbouring countries. There will be

a technological leap, as it is the first satellite with electrical propulsion. This means that the total weight in liquid fuel will be replaced, leaving more space for useful load. Additionally, the ARSAT-SG1 is the first high-throughput satellite (HTS).

Installation of the Malbec submarine cable. Meta and Globenet’s new Malbec submarine cable is now operating. Its 2,500 km extension links the Brazilian cities of Rio de Janeiro and São Paulo with Buenos Aires. The system will expand high-speed internet access: it will travel through GlobeNet’s cable connection stations in Las Toninas and Playa Grande and it will connect the main data centres and interconnection facilities via various terrestrial and metro networks, providing a fully diverse route.

Argentina has potential to become a regional mass data centre hub and be a consolidated technological leader in the region. Its strategic geographical location, its climate and the availability of renewable energy sources make the country the best option to hold a regional data hub. Given the growing necessity for the region to incorporate technology at a corporate level, Argentina constitutes one of the areas where BigTechs can expand to take advantage of the strong digitisation demands of local companies.

Tax exemptions and benefits

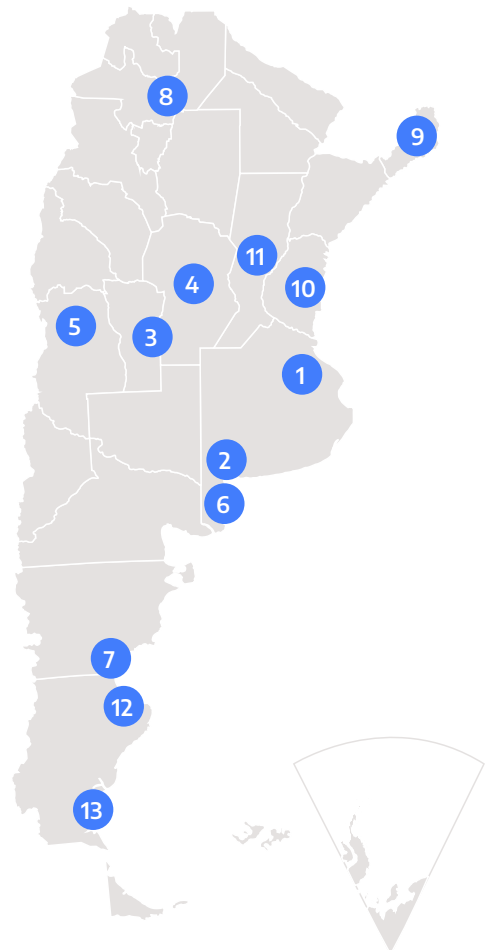
Tax exemption in the country's free zones are extremely attractive for investors, especially the exemption of taxes on international trade and basic services (telecommunications, gas, electricity, water, sewers and stormwater).

The free zone of Bahía Blanca Coronel Rosales (BBCR) offers tax benefits on productive activities for companies that settle there:

- 100% off on provincial taxes, municipal fees and turnover tax.
- 46% off on electricity and 42% in gas.
- 26% off in phone and internet services.
- 100% off on export duties and taxes on supply imports.- Subsidised rent.

Free zones in Argentina

1. La Plata
2. Bahía Blanca
3. Justo Daract
4. Cordoba
5. Lujan de Cuyo
6. General Pico
7. Comodoro Rivadavia
8. Salta
9. Iguazu
10. Concepcion del Uruguay
11. Villa Constitucion
12. Caleta Olivia
13. Rio Gallegos



Source: AFIP.

Benefits

Knowledge Economy Act

The Knowledge Economy Act has been effective in Argentina since December 2020. This regulation offers significant tax benefits, which will be used to create a re-launching platform to enable a 15% growth in employment in the sector—according to the Chamber of the Argentine Software Industry (CESSI).

Among the main benefits offered by this promotion regime are a discount of up to 70% on employer's contributions, payment exemption on service export duties and the segmented reduction of income taxes, depending on the size of the company.

This act had an antecedent—the Promotion of Software Act—, which was voted in 2004 and offered similar benefits. The period while the law was effective, employment in the software sector experienced significant growth: 70,000 job positions, which constituted a constant annual growth of the 8%. Moreover, exports went from USD 170 million to USD 1.8 billion, and there was a federal deployment of the industry with over 30 new IT hubs across the country. According to Argencon, the software sector was the Argentine economic sector that grew the most in the current century.

Main benefits of the Knowledge Economy Act

1	2	3
<p>EMPLOYER'S CONTRIBUTIONS</p> <p>Rebate of 70% on employer's contributions over salaries destined to the promoted activities and 80% for new recruits from certain groups (women, transgender, people with disability, postgraduates, residents of unfavourable or less developed areas, or beneficiaries of social assistance).</p>	<p>INCOME TAXES</p> <p>Reduction on tax income, differentiating applicable percentages for small, medium and large companies in a staggered manner, receiving a 60%, 40% and 20%, respectively.</p>	<p>EXPORT DUTIES</p> <p>Exemption of payment on export duties for service providers.</p>

Source: Own elaboration.

Trust Fund for the Promotion of the Knowledge Economy (FONPEC)

The FONPEC offers incentives—ARS 230 million plus the contributions made by the companies participating in the promotion regime—to:

- Fund training activities all over the country.
- Support productive investments.
- Fund working capital.
- Encourage the development of sustainable companies.
- Promote the international commercial inclusion of companies, productive innovation activities and entrepreneurship.

Credit bonus programme for MSMEs and ICT cooperatives

The formal agreement involves ENACOM's rebate of 12 percentage points per year on the 24% interest rate of the credits issued to the beneficiaries, who can apply for loans of up to ARS 15 million.

The goal of this programme is to favour investment in projects that intend to acquire new fixed assets and capital goods to operate physical cable networks and/ or that contemplate the last mile access network. The total budget for this programme is ARS 500 million.

In Argentina, the network business is in constant evolution and generates great investment opportunities as well as new sources of income.

The Global Interconnection Index (GXI), an annual market study by Equinix, shows how the convergence of key global trends and the COVID-19 pandemic put unexpected pressures on the ability to get organised to achieve digital transformation. Digital services providers foresee a fivefold increase in private connectivity between 2019 and 2023.

Adopting fully digitised services has become more important than ever. 70% of the value created during the next decade will be based on digital business models.

Digital transformation, artificial intelligence, 5G mobile networks and the Internet of Things (IoT) are macrotendencies. Companies can leverage the inter-connection to meet their needs and solve information technology (IT) challenges.

In Argentina, the sector—measured in turnover—has been growing uninterruptedly for over the last ten years. While the landline telephony sector has been the most affected by the growth of new technologies, businesses related to mobile telephony development and new 4G spaces have great opportunities.

Network optimisation and cloud services

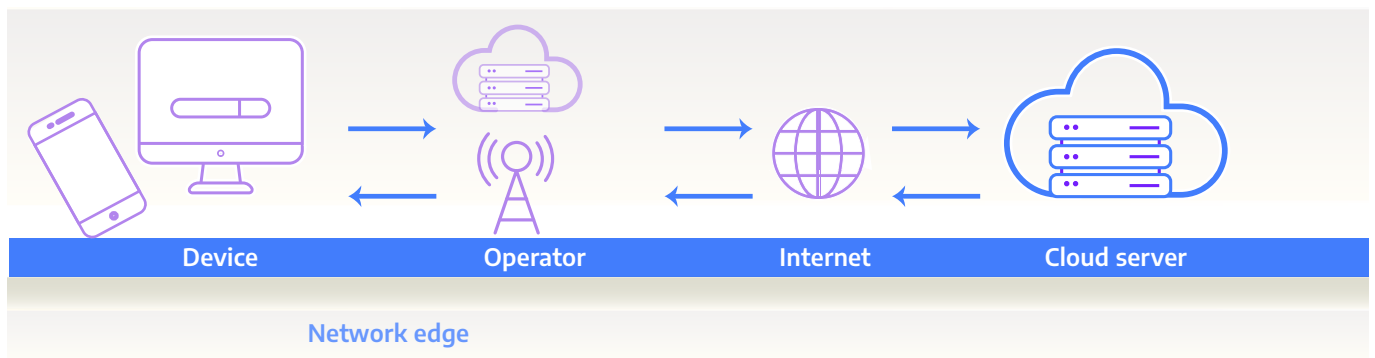
Argentina has a growing demand of global providers of clouds, content and network services. Cloud services have become one of the pillars of digital transformation at a global scale, and Argentina is not the exception: providers have huge opportunities in store.

The expansion of the digital market drives the need for network optimisation. Thus, it is essential to transform its architecture while distributing the digital infrastructure in strategic locations to support local interconnectivity between user services, data, clouds and the members of the ecosystem.

In 2019, EdgeConneX—in partnership with Silica Networks—launched its first data centre, in Pilar, province of Buenos Aires. This centre, which is the company’s

first in Latin America, enables interconnectivity between multiple networks and other service providers by supporting and offering local connectivity solutions, interconnectivity and internet exchange points of the main network providers, such as Metrotel, Silica Networks, CenturyLink, among others. EdgeConneX serves as a connectivity and technology centre that helps facilitate the Argentine government’s digital transformation initiatives and attract investments by global providers that look for independent local data centres.

Macrotendencies aim to transform the WAN architecture, eliminate the distance through the initial implementation of the hub, take capacities to the edge and optimise last mile connectivity.



Launch of a state-owned, next-generation hybrid cloud

Aligned with the digital transformation happening across all sectors and accelerated by the pandemic, cloud infrastructure services became a huge investment opportunity.

Cloud compute services are one of the main strategies to guarantee the administration, security, scalability and management of information.

In the next three years, investments in cloud services are expected to duplicate compared to the budgets that organisations allocate to information technology.

ARSAT will have USD 5,6 million available to renovate, update and expand the national data centre

This initiative was created to maintain continuity of the services which the operator already provides as well as expand the offer for the public sector, the private sector and cooperatives. According to estimations, 20% of the national data centre's clients come from the private sector and the remaining 80%, from the public sector.

A new window of opportunity opens up for the private sector to add value and thus expand its participation in the cloud services business.

Fifth-generation technology (5G)

In Argentina, the possibilities enabled by fifth-generation technologies are closer than ever. This investment will allow for better connectivity and innovations associated to smart cities, the Internet of Things, connected cars and homes, home automation and artificial intelligence.

In February 2021, Telecom launched the first 5G network in the country, with ten mobile antennas operated by Personal to use the service with devices that have this technology. Five mobile sites with Huawei technology were set up in the city of Buenos Aires and another five sites with Nokia technology in the city of Rosario. In March, the public sector held "Muestra 5G" in Argentina, where official tests and demonstrations of fifth generation technology (5G) for mobile broadband connections were performed.

The event took place at ENACOM's headquarters and

was carried out by Ericsson, Huawei and Nokia, three of the world leaders in Information and Communications Technology.

Internet of Things

The Internet of Things (IoT) is a great opportunity for the TMT sector to develop technologies, projects and services related to smart cities, Industry 4.0, healthcare, transport, security, among other fields. In countries such as Argentina, which have a large primary sector of the economy, a smart management of agriculture is a significant business opportunity. Farmers and the agro-industry are searching for new smart and efficient ways to improve food production and profitability while increasing sustainability. Many agricultural processes can be tracked, monitored and controlled remotely in order to improve production and efficiency, so food producers resort to the Industrial Internet of Things (IIoT) for support.

Applications:

- Monitor soil temperature.
- Collect air and soil temperature data to determine the best moment for reaping.
- Track pests and plant diseases as well as plant health.

The Knowledge Economy Act started as an extension of the Software Industry Promotional Regime—created in 2004 and effective for over a decade—with the purpose of including other key activities with significant potential for economic development. This law, enacted in October 2020 and regulated by the Executive Power in December of the same year, aims to promote new technologies, generate added value, encourage quality employment, facilitate the development of SMEs and increase exports for companies specialised in Knowledge-Based Services.

The main benefits offered by this promotional regime are the segmented reduction of income tax rates according to company size, a 70% discount on employer's contributions and a 0% aliquot on service export duties. The implementation of the regime is responsibility of the Undersecretariat for Financing and Regulation of the Knowledge Economy, which is part of the Secretariat for Knowledge Economy of the National Ministry of Economy.

The promotional regime covers the following activities and sectors:

- a) Software and informatic and digital services.
- b) Audiovisual production and post-production.
- c) Biotechnology, bioeconomics, biology, biochemistry, microbiology, bioinformatics, molecular biology, neurotechnology and genetic engineering, geoengineering and its trials and analyses.
- d) Geological and prospection services and other services related to electronics and communications.
- e) Export of professional services.
- f) Nanotechnology and nanoscience.
- g) Satellite and aerospace industry, spacial technologies.
- h) Nuclear engineering.
- i) Manufacturing, tuning, maintenance and introduction of goods and services oriented to Industry 4.0 solutions (artificial intelligence, robotics and industrial internet, Internet of Things, sensors, additive manufacturing, augmented and virtual reality).
- j) Activities in engineering, natural sciences, agricultural sciences and medical sciences linked to research and experimental development (e.g., development and improvement of electromobility systems, renewable energy and environmental technology).

ENACOM and the regulatory framework for MVOs

The National Communications Agency (ENACOM) is the enforcement authority of Act. No. 27,078—Telecommunications and ICTs “Argentina Digital”. It is the regulatory agency responsible for communications and for ensuring that all users of the country have to access good quality services. It is in charge of regulatory activities, such as approving and revocating licenses, auctioning and assigning frequencies, intervening in pricing and approving negotiations between operators. So far, the ENACOM has issued 21 MVO licenses to encourage competitiveness and better services.

Current regulations allow companies to offer mobile connectivity through third-party network operators, that is, Movistar, Personal and Claro. Cooperatives and small telecommunications companies can provide virtual mobile telephony.

Thus, Argentine SMEs and cooperatives have the opportunity to provide the quadruple play services: television, internet, and landline and mobile telephony. The firm Nuestro, which belongs to the Federation of Telephone Services Cooperatives of the South (FECOSUR), operates on the Telecom Personal network. The Chamber of Telecommunications Cooperatives (CATEL) offers the quadruple play services. Finally, Tuenti (a Telefónica subsidiary) operates through Movistar’s network.

ENACOM and health emergency

The ENACOM is an autonomous and decentralised agency which works under the wing of the National Cabinet of Ministers. Its purpose is to guide the technological convergence process and create stable market conditions that ensure internet, landline and mobile telephony, radio, postal and television services to every Argentine citizen.

In the context of the 2020 health emergency, the Government announced—through the Necessity and Urgency Decree (DNU) No. 690/2020—the addition of article 15 to the Information and Communications Technologies Act No. 27,078, where “it is established that Information and Communications Technology (ICT) services as well as access to telecommunications networks for and between ICT services licensees are essential and strategic in competitiveness. The enforcement authority will ensure its effective availability.”

The DNU allows companies to set the prices of their services, but, immediately after that, it states that “the prices of the essential and strategic ICT public services in competition, those provided as a function of the Universal Service and those determined by the enforcement authority for reasons of public knowledge, shall be regulated by it”.

Optical fibre

There has been a considerable shift from copper systems to optical fibre services at a global scale. This should not come as a surprise, since the performance and the speed of pure Fibre to the Home (FTTH) networks are significantly better than any other technology—except in terms of the difficulties that arise from handling fibre optic cables, as they are made of a fragile glass strand that is not very malleable, but is extremely resistant to external noise. Thus, the technological benefits of fibre-based information transmission—coupled with its low manufacturing costs, as silicon is considerably cheaper than copper—place this system at the forefront of data transport technologies.

How it works:

Optic fibre cables contain at least two silicon layers of different densities (a core and an optical cladding). A light beam is inserted into the cable and bounces from one end to the other, where it's received by a modem that re-constructs the information carried on the light beam sent by the transmitting equipment. Optic fibre systems have interesting characteristics in terms of data transport, since they use passive equipment (GPON: Gigabyte Passive Optical Network). This means that, in order to amplify the signal and cover large territories, there is no need to deploy different pieces of equipment that depend on an electrical energy source throughout the network. Finally, the optic fibre cable reaches the customer's home and is connected to an optic fibre modem.

ADSL Broadband (Asymmetrical Digital Subscriber Line)

ADSL is the current broadband internet access provided by telephone service providers, among other companies. It stands out because it uses the same telephone cable for both data traffic and voice transmission, but in different frequency bands, thus making both types of communication possible at the same time. The evolution of ADSL enabled a substantial increase in the internet speed offer, allowing for a wide variety of uses of the internet at home, such as livestreams, transferring of large amounts of data, better online communications, among others.

How it works:

In this kind of internet access, the telephone line is connected to an ADSL modem—this is different from a Dial Up modem, as it does not need to dial a telephone number to establish the connection. In turn, the ADSL modem is connected to the computer through a network interface controller. Then, at the telephone exchange, the line is digitised by connecting it to communications equipment (DSLAM: digital subscriber line access multiplexer), which “splits” the traffic received so that voice communications go through one channel and internet access goes through another.

Wireless connection

Mobile phone networks

Although transferring data through mobile phone networks was already possible with third generation mobile technology (GPRS, EDGE), data transfer rates and the cost of using such technology were a huge obstacle in developing this method of internet access. For that reason, the emergence of UMTS (Universal Mobile Telecommunications System) technology, which later evolved into HSDPA (High Speed Downlink Packet Access) technology, was revolutionary and marked a turning point for internet access via mobile phone networks, as these technologies allow for data transfer rates over one megabyte per second.

How it works:

In our country, these systems transfer data through the same frequency bands for both mobile phones—those that have the necessary features—and laptops or similar devices. They connect to a 3G modem that has a SIM card used exclusively to provide this service, which means that a USB 3G modem's chip cannot be used to provide mobile telephony services. This service has given us the possibility to take video calls, watch livestreams, download audiovisual content and more, all through a mobile device. As this technology is still developing and expanding, it is advisable to check the different providers' coverage maps before hiring a service.

Cable modem

This service is provided by cable television companies that have a core optic fibre network within their infrastructure. This network distributes the signal to the client through the same coaxial cable by which the CATV (Community Antenna Television) service is provided. Just like telephone lines, coaxial cables contain stranded copper.

How it works:

At the customer's home, a cable similar to the one used for televisions is connected to a modem. In the same way that voice and data are divided in the ADSL service, TV channels and data transfer use different frequency bands of the same signal.



Technology / Telecommunications

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