

Digital infrastructure: Advances and challenges for universal connectivity

Digital infrastructure in Brazil: The role of NIC.br in the evolution of the Internet in the country

By Frederico Neves,¹ Milton Kaoru
Kashiwakura,² and Julio Sirota³

Introduction

This article briefly reviews the history of the Brazilian Network Information Center (NIC.br), highlighting its origins and its institutional mission. By emphasizing some actions, strategic projects, and multisectoral forms of action, the aim is to provide relevant subsidies for understanding the progress of digital infrastructure in Brazil and the role played by NIC.br in consolidating a resilient, stable, secure, and inclusive Internet in the country.

The strong presence of digital technologies and the Internet in the daily lives of individuals and

organizations is a hallmark of contemporary times and a reality for much of Brazil. However, this large-scale presence is recent and has happened at an accelerated pace. Data from the ICT Households survey, conducted by the Regional Center for Studies on the Development of the Information Society (Cetic.br), a department of NIC.br, shows that, for example, between 2009 and 2024, the proportion of Internet users in the country and households with Internet access jumped from 39% to 84% and from 24% to 83%, respectively (NIC.br, 2009, 2024a) (Table 1). The results also reveal that the ways of accessing the Internet have changed: In 2009, only 21% accessed the Internet via mobile phone, rising to 88% in 2024. Furthermore, nearly all Internet users in Brazil now access the Internet daily: While in 2009, the proportion of daily users was 58%, this figure reached 96% in 2024 (Table 1). In other words, Internet access in Brazil has not only grown exponentially, but its use has also intensified significantly, indicating that Internet access has become a routine activity for practically the entire connected population. This data also underscores the central role the Internet has become in people's daily lives, whether for communication, work, education, access to public services, or consumption of digital

¹ Director of Services and Technology at NIC.br.

² Director of Special Projects and Development at NIC.br.

³ Infrastructure Manager of the Brazil Internet Exchange (IX.br).

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Frederico Neves
Director of Services
and Technology
at NIC.br

Photo: Ricardo Matsukawa



**Milton Kaoru
Kashiwakura**
Director of Special
Projects and
Development
at NIC.br

goods and content. Therefore, the intensification of daily use reinforces the importance of a robust digital infrastructure, capable of sustaining the growing demand and guaranteeing the quality and continuity of access.

Table 1 – HIGHLIGHTS OF INTERNET EXPANSION IN BRAZIL

	2009	2024
Internet users in Brazil	39%	84%
Daily Internet users	58%	96%
Individuals who use the Internet via mobile phones	21%	88%
Households with Internet access	24%	83%
.br domains	1,934,135	5,399,286*

*Collection date: November 1, 2024.
Source: NIC.br (2009, 2024a) and based on data from Registro.br (<https://registro.br/dominio/estatisticas>).

Internet presence has also become robust in the routines of organizations. Recently, 99% of Brazilian enterprises reported using the Internet (NIC.br, 2024b), while 100% of healthcare facilities and state and federal public organizations did so as well (NIC.br, 2024c). In addition, the network’s physical infrastructure has also undergone significant advances over the years. A striking example of this evolution is the wide dissemination of fiber optic technology among Internet access providers: 95% of Internet access providers already offer access via fiber optics to their customers (NIC.br, 2023). This data highlights the modernization of networks and the expansion of data transmission capacity, essential elements to meet the growing demand for high-performance digital services. Furthermore, the expansion of fiber optics directly contributes to improving access quality, enabling higher speeds, greater stability, and lower latency, which are fundamental factors for increasingly data-intensive applications, such as streaming and the use of tools based on Artificial Intelligence (AI).

In this context, infrastructure development has been (and continues to be) essential for the ongoing digital transformation ecosystem in the country. The various actions and projects carried out by NIC.br aim to contribute to this development in different areas, improving key aspects of Internet access and usage in the country.

Historical perspective of the network in Brazil

In 1995, the Ministry of Communications (MCom) and the Ministry of Science and Technology⁴ signed the Interministerial Ordinance No. 147,⁵ establishing the creation of the Brazilian Internet Steering Committee (CGI.br), a multisectoral body

⁴ Current Ministry of Science, Technology and Innovation (MCTI).
⁵ Find out more: <https://www.cgi.br/portarias/numero/147/>

responsible for coordinating and integrating Internet-related initiatives in Brazil. At that time, the .br country code Top-Level Domain (ccTLD) already existed and was under the management of the team involved in building the academic networks at the Research Foundation of the State of São Paulo (Fapesp).

At the time of CGI.br's creation, domain registrations were done manually. However, the demand increase (from 1989 to January 1996, 851 domains were registered, and by December of the same year, this figure exceeded 7,500) led to the decision to automate the registration process and to start the charging process. With this increase, the need to create an executive arm capable of implementing and coordinating the decisions and projects defined by CGI.br became evident. In this context, the idea of creating NIC.br arose, which would operationalize strategic actions focused on developing the Internet in Brazil.

In 2003, NIC.br was formally established as a legal entity, and the format of CGI.br was changed by Decree No. 4.829 (2003) to its current structure. In 2005, NIC.br became the institution that manages the registration of names under the .br domain, besides taking on other responsibilities. NIC.br was created as a private and non-profit civil entity, whose actions and projects are aimed at developing the Internet in the country and its duties include: the management and operation of the .br domain; the distribution of Internet Protocol (IP) addresses; the registration of Autonomous Systems (AS) in Brazil; the development of projects focused on improving the quality of the Internet in Brazil and the dissemination of its use, with special attention to its technical and infrastructure aspects; the promotion of the availability and universalization of Internet services in the country; and, finally, the promotion of courses and public debates in order to raise awareness and train different stakeholders concerning knowledge in specialized areas (NIC.br, 2014).

It is important to remember that, since 1995, CGI.br has recognized that the Internet improvement in Brazil depended on the creation of Internet Exchange Points (IXP), which is why it began to encourage their implementation. Before this, it was common for data exchanged between different networks, even within the same city, to be circulated through other countries before reaching its destination, which increased costs, delays, and security risks.

To guide the development of the Internet in Brazil in a way that its infrastructure and use are increasingly better, NIC.br currently operates six study, research, and operational centers: Registro.br, responsible for registering .br domains; Brazilian National Computer Emergency Response Team (Cert.br), whose mission is to increase the security levels and incident handling capacity of networks connected to the Internet in Brazil; Cetic.br, responsible for producing data and statistics on Internet access and use in Brazil, publishing periodic analysis and information on the network's development in the country; Center of Study and Research in Network Technology and Operations (Ceptro.br), whose objective is to develop projects focused on improving the quality of the Internet and disseminating its use, with special attention to its technical and infrastructure aspects; Web Technologies Study Center (Ceweb.br), whose mission is to conduct actions and initiatives that promote the continuous development of the Web and its original principles, helping to make it an open, universal, and accessible network for all; and IX.br, which promotes and creates the necessary infrastructure for direct interconnection between the networks that constitute the Brazilian Internet. Thus, all of NIC.br's departments

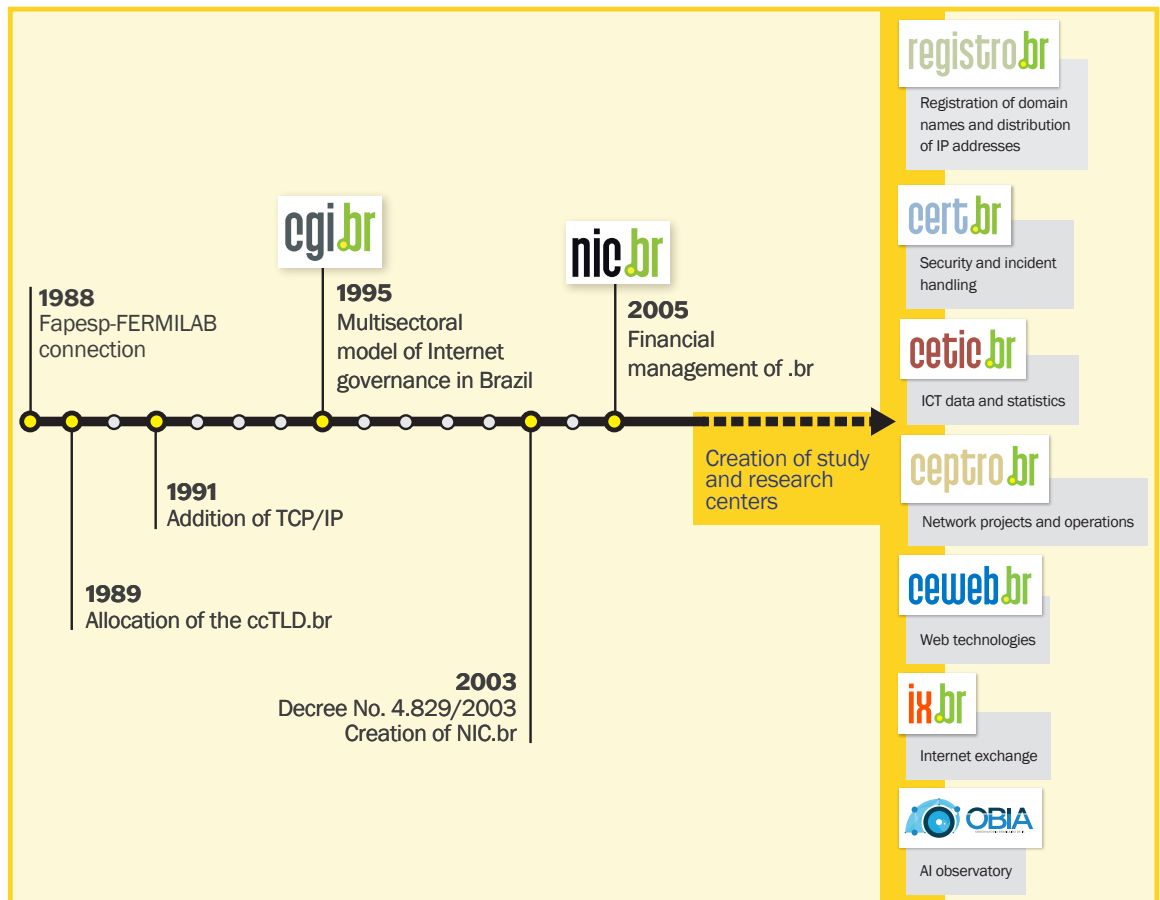


Photo: Ricardo Matsukawa

Julio Sirota
Infrastructure
Manager of IX.br

seek to contribute to the development of the Internet in Brazil. Figure 1 presents the main milestones in the history of the Internet in Brazil and the study, research, and operational centers of NIC.br.

Figure 1 – NIC.BR AND THE INTERNET'S TRAJECTORY IN BRAZIL



Source: Prepared by the authors.

The structure of NIC.br allows it to go beyond the traditional functions of managing domain names and IP addresses in Brazil. Unlike similar entities in other countries, NIC.br reinvests the funds raised from the .br domain registrations into a wide range of strategic actions and projects. These investments have significantly contributed to strengthening the country's Internet infrastructure.

The financial resources of NIC.br come from the functions performed by Registro.br. Figure 2 illustrates the functions and categories of domain names under .br.

Figure 2 – REGISTRO.BR FUNCTIONS AND .BR DOMAIN NAME CATEGORIES

 ▶ Operation of domain name registration under .br; ▶ Allocation of Numbering Resources (ASN, IPv4, and IPv6) in Brazil.	
GENERIC	
COM.BR	Commercial activities
NET.BR	Commercial activities
WIKI.BR	"Wiki" pages
ETC.BR	Enterprises that do not fit into the other categories
CULTURE	
ART.BR	Arts: music, painting, folklore
REC.BR	Entertainment activities, fun, games, etc.
TV.BR	Broadcasting enterprises or transmitting sounds and images via the Internet
AM.BR *	Radio broadcasting enterprises
FM.BR *	Radio broadcasting enterprises
RADIO.BR *	Enterprises wishing to send audio via the Internet
EDUCATION	
EDU.BR *	Higher education institutions
G12.BR *	Primary and secondary education institutions
ENTERTAINMENT	
BET.BR *	Fixed-odds betting operations
ESP.BR	Sports in general
FLOG.BR	Photo logs
QSL.BR	Amateur radio
VLOG.BR	Video logs
TECHNOLOGY	
APP.BR	Applications
DEV.BR	Developers and development platforms
SEG.BR	Security
TEC.BR	Technology
THIRD SECTOR	
COOP.BR *	Cooperatives
ONG.BR *	Individual or associative non-governmental activities
ORG.BR *	Non-profit non-governmental institutions
BUSINESS	
ECO.BR	Activities with an eco-environmental focus
LOG.BR	Transport and Logistics
EMP.BR *	Small and micro enterprises
LEILAO.BR *	Auction houses
AGR.BR	Agricultural enterprises, farms
FAR.BR	Pharmacies and drugstores
IMB.BR	Real estate
IND.BR	Industries
INF.BR	Information media (radios, newspapers, libraries, etc.)
SRV.BR	Enterprises providing services
TMP.BR	Temporary events such as fairs and exhibitions
TUR.BR	Enterprises in the tourism sector
PSI.BR *	Internet service providers
B.BR *	Banks
PERSONAL	
BLOG.BR	Web logs
NOM.BR	Individuals
PUBLIC POWER	
GOV.BR *	Federal government institutions
MIL.BR *	Brazilian Armed Forces
DEF.BR *	Public defenders
JUS.BR *	Institutions of the judicial branch
LEG.BR *	Institutions of the legislative branch
MP.BR *	Public Prosecutor's Office institutions
TC.BR *	Courts of accounts
LOCATIONS	
55 categories related to cities and regions	
PROFESSIONS	
40 professional categories	

* Restricted top-level domain (TLD).
* Mandatory Domain Name System Security Extensions (DNSSEC).

Source: Prepared by the authors.

Since its inception, NIC.br has been dedicated to offering quality services at an affordable price and with excellent customer service. Beyond the aspects directly related to customer experience, NIC.br also plays a strategic role in strengthening the infrastructure and ensuring the proper functioning of the Internet in the country (...).

Functioning of .br

Any person (natural or legal) legally established in Brazil can register a .br domain. The wide acceptance of .br among Brazilians and enterprises established in the country is evidenced by its high adoption rate: 92% of enterprises in Brazil have a .br website (NIC.br, 2024b). Since its inception, NIC.br has been dedicated to offering quality services at an affordable price and with excellent customer service. Beyond the aspects directly related to customer experience, NIC.br also plays a strategic role in strengthening the infrastructure and ensuring the proper functioning of the Internet in the country, whose commitment to the quality and development of the digital ecosystem has directly contributed to the loyalty of its customers over time.

In addition, the longevity, stability, and quality of the services provided offer the necessary security for people who choose to register a .br domain. One example of this security is the rules for renewing registrations. Firstly, it is not in our interest for people to lose their registered domain name, as we are not in the business of making a profit. In this way, a particular feature of our operation is to ensure that the domain remains the property of the customers, so that it does not become an asset liable to speculation or overpricing. For this reason, when a domain expires, it is kept for 90 days in the client's ownership: It stops working but is not available for registration by anyone else. This is a particular characteristic of .br, which has been present since the beginning of our history and which we are very proud of.

This way of operating directly reflects our commitment to quality customer service. We value human contact and make a point of having an attendant available to answer any questions for as long as needed, explaining everything from the very basics (e.g., what a domain name is), to questions about registering a domain, or even topics beyond our direct scope, such as creating a personalized or professional e-mail address. To ensure this quality of customer service, we do not use the number of calls made as an internal performance metric. In this sense, our commitment goes beyond providing one-off answers about the services offered: We have always ensured our clients' clarity and effective understanding. We have made this one of our top priorities, and we will continue to do so.

Another essential aspect in NIC.br's decision since its inception has been the use and promotion of free software and open-source technologies, which are part of our history and a constituent part of the registration service. If it had not been for the advent of free software, we would not have the Internet as we know it today, especially because it guarantees greater autonomy and we are not tied to a strictly commercial solution.

Client diversification (or, in other words, not depending on a single or a few clients) is also part of NIC.br's sustainability scenario. In general, our clients do not have more than one registered domain—there are 5.4 million domains and over 3.5 million clients. In addition to being an aspect that brings security for our operation, by gaining the country's domain name market, we had (and have) sufficient resources to invest in other areas that promote the improvement and adoption of the Internet in the country.

In this context, the free-of-charge training courses offered by NIC.br stand out, which are aimed at different audiences—from industry professionals, government, and Internet technical specialists, to the general population—and have always worked

very well and collaborated with the Internet in the country. The non-repayable funding we provide in many of the IXP, the promotion of Internet technologies as a whole (which includes AS), direct allocations, and support for small providers. Thus, the fact that NIC.br promotes capacity-building for this public and allocated resources for this purpose, providing a good domain registration service, has certainly favored the widespread penetration of the Internet in Brazil.

Next, we will pay particular attention to an important area of NIC.br for digital infrastructure in Brazil: IX.br.

The IX.br and the development of Internet infrastructure in Brazil

As was to be expected, the multiplication of users and uses of the Internet was accompanied by strong growth in the number of .br domains (rising from 1,934,935, in 2009, to 5,399,286, in 2024) and the peak of traffic on the set of IXP of IX.br (between January 2017 and September 2024, it increased from less than 5,000 Gbit/s to more than 30,000 Gbit/s).

The Brazilian Internet infrastructure has supported the growing demand in Brazil. An important aspect in this context is the action of IX.br. Under the responsibility of NIC.br and supported by CGI.br, IX.br uses the income from .br domain registrations to improve infrastructure and strengthen the Internet in the country. Furthermore, the creation of IXP also favors direct interconnection between the networks (or AS) that constitute the Brazilian Internet.

Present in different countries, IXP are usually installed in one or more data centers in a locality and correspond to neutral points for the physical interconnection of access networks (Internet providers) and networks that offer services and contents, such as e-commerce, video streaming enterprises, search engines, social networks, banks, universities, government agencies, and others. This shared infrastructure allows networks to exchange data packets with each other; in other words, it helps to keep data traffic regionalized. In doing so, this infrastructure shortens the route that the data needs to travel, preventing it from traveling to distant locations. In practice, the result is a faster, more efficient, more resilient Internet at a lower cost to end users. Furthermore, in countries with continental dimensions, such as Brazil, IXP are essential if the Internet is to be disseminated throughout the country, as they allow regional providers to bring quality broadband to cities where the big operators have little commercial interest.

As a non-profit organization, IX.br began its work in July 2004, after CGI.br approved a NIC.br initiative called Brazilian Internet exchange points (PTTMetro), which created IXP in metropolitan regions and reintegrated IX.br with the first IXP in Brazil, operated by Fapesp since 1998, along with those that had emerged via academic and private entities after the spread of the commercial Internet in the mid-1990s. While all participants in the IXP of Fapesp were obliged to do an Internet exchange with each other—a requirement that generated resistance on the part of some—in PTTMetro, they were given the freedom to choose with whom they wished to do so. The only requirement was that, in the project's infrastructure, only IP protocol traffic would be allowed. In this way, the IXP attracted an increasing number of content and access providers.

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The dissemination of IXP throughout the country and the ease of participation have made IX.br the largest set of IXP in the world in terms of the number of locations and participants, as well as the amount of Internet exchanged.

Currently, IX.br has 38 IXP distributed in metropolitan areas in the five regions of the country, which are not connected to each other. Only in São Paulo (SP), Rio de Janeiro (RJ), and Fortaleza (CE), the IXP participants are required to pay for their participation; in all other locations, the IX.br port is free of charge for participants. Investments in equipment and operating costs are currently covered by resources from the registration of .br domain names; however, participants may have costs linked to the connection to network interconnection points, the amounts of which are negotiated directly between the IXP participants and the service providers from whom they may eventually need to make the connection viable. The IXP participants can create bilateral agreements for service provisions, such as buying and selling IP traffic, Distributed Denial-of-Service [DDoS] mitigation, IP telephony, etc. In practice, the IXP acts as the “last mile” to reach a customer network.

The dissemination of IXP throughout the country and the ease of participation have made IX.br the largest set of IXP in the world in terms of the number of locations and participants, as well as the amount of Internet exchanged. Together, the 38 Brazilian IXP registered an aggregate of 35 Tbit/s in February 2024. At that time, the São Paulo IXP—the global leader in Internet exchange volume and number of participants—reached 23 Tbit/s on its own. Results as positive as these are not without their challenges. One of them concerns the global lead occupied by IX.br among IXP worldwide. When we were not the first, it was possible to look for useful references from other IXP to address the difficulties encountered. Now, we are much more concerned with creating our own solutions that serve as a model for other IXP. In this context, it is worth mentioning that IX.br needs to continually challenge itself to innovate and find technological solutions that fit within the limits of the budget available to the IXP.

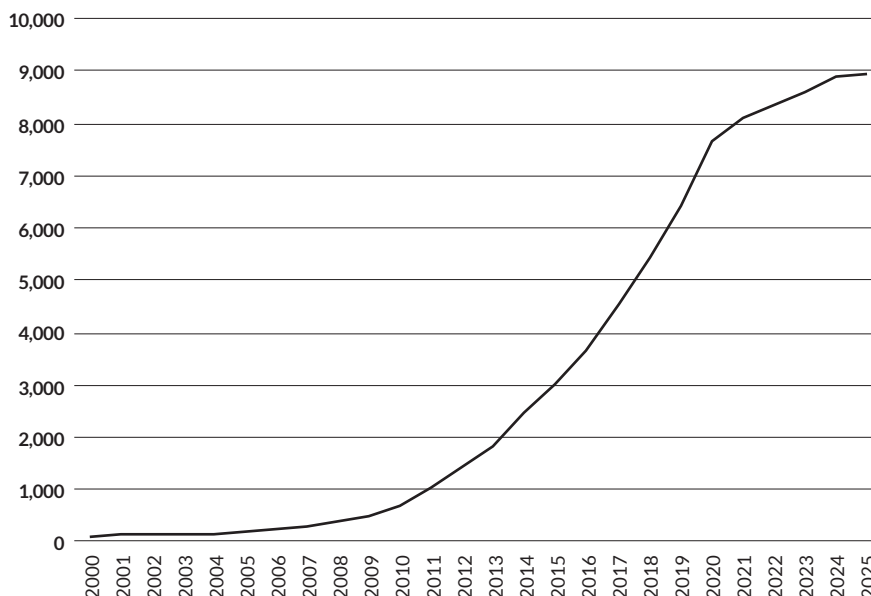
It is also worth mentioning that, in its history of IX.br, the organization had to actively work to disseminate knowledge about its IXP model to overcome the lack of knowledge about it, especially among enterprises. To this end, IX.br has always relied on a strategy of continuous articulation, through dialogue with the different stakeholders involved in the establishment and operation of IXP, as well as their capacity-building.

In this sense, emphasis goes to the IX Forum, the IX Regional Forum, and the different courses offered by NIC.br. The first one is an annual event that, since 2007, has provided an environment for dialogue on the main issues related to the country’s Internet infrastructure and, particularly, to IXP. The IX Regional Forum, in turn, brings together providers, public organizations, academic organizations, and associations, among other important stakeholders involved with the Internet, aiming to encourage dialogue about the network’s infrastructure in different locations in Brazil. Technical topics and issues related to the use of IX.br Internet exchange points and how their participants are interconnected are addressed at the event, with the goal of seeking strategies to promote the development of the Internet in each location. Since 2017, 53 regional events have been held in 38 different cities, which have brought together more than 5,000 participants and 1,100 Autonomous System Numbers (ASN). Finally, the courses offered by NIC.br actively contribute to enterprises interested in participating in an IXP to prepare themselves technically to do so.

One of the critical aspects of participating in an IXP is having an ASN, a unique identifier for an AS, which can be defined as “a network or group of IP networks under a single administration, which determines how to traffic and distribute data packets within it” (CGI.br, 2018, p. 6). By becoming an AS, with a portable allocation, the provider company can make numerous independent transit or interconnection arrangements, generally reducing costs and substantially improving the services offered. It should be noted that, without this designation, a network will be dependent on another network that is already an AS and is, therefore, “also dependent on the IP addresses assigned by that provider and the routing policies it uses” (Moreiras & Patara, 2022, p. 13). In addition to these characteristics, an AS is also defined as a network with a unique routing policy, which implies that it is connected to other networks of the same type and uses the Border Gateway Protocol (BGP) (Moreiras & Patara, 2022). The use of this protocol allows “the routers of each of the networks that constitute the Internet to send each other information about which IP blocks they use and which other IP blocks [linked to other AS] they already know” (Moreiras & Patara, 2022, p. 11), as well as to identify the best route to each of these blocks.

Without promoting the acquisition of portable numbering resources (ASN and addressing) and the technology for their use (BGP), which occurs with much of the courses provided by NIC.br, we would not have the profusion of AS that exist in Brazil. This is a cycle of growth (Chart 1) in which we have played a strong role in stimulating and promoting technology. Without this, we would probably not have reached the current level: Brazil has more than 8,900 distributed ASN, which represents around 65% of the ASN distributed in Latin America and the Caribbean (Patara, 2023). In global terms, the country ranks second, behind only the United States.

Chart 1 – NUMBER OF ASN DISTRIBUTED IN BRAZIL BY NIC.BR



Source: Prepared by the authors.

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(...) NIC.br started the OpenCDN project in 2015: an infrastructure-sharing initiative that creates conditions to reduce the distance between content and its users.

Thus, the training and articulation of stakeholders around IXP are fundamental, because the greater the number of participants, the denser the ecosystem of interconnected networks will be. In other words, an IXP becomes more attractive as the number of participants increases, in a virtuous cycle that positively reinforces itself. However, the attractiveness of an IXP demands attention: This is the case with São Paulo's IXP. Although IX.br has 38 independent locations, São Paulo is responsible for approximately 60% of the traffic—among other reasons, because it concentrates the main Content Delivery Networks (CDN), i.e., the networks of servers that store and distribute content to Internet users. For this reason, AS from different parts of Brazil have to “go” to São Paulo, which can be negative for them (since this connection can be highly costly) and for the São Paulo IXP, since the concentration increases its technical complexity and operating costs.

In an effort to overcome this difficulty, NIC.br started the OpenCDN project in 2015: an infrastructure-sharing initiative that creates conditions to reduce the distance between content and its users. With OpenCDN, CDN can install their cache servers in the initiative's datacenters in different regions of Brazil, always connected to the local IXP of the IX.br. Internet Service Providers (ISP) in these locations can establish an agreement of bilateral Internet exchange with the OpenCDN in the IXP of the IX.br present in the region, to obtain access to the content provided by the participating CDN. With OpenCDN, a single infrastructure of caches is used by several ISP connected to the IXP, helping to rationalize and organize the Internet's infrastructure, and collaborating to make it faster, more resilient, and less costly. In this way, the initiative stimulates the regional development of the Internet, promoting decentralization and, consequently, the distribution of content throughout the country. Thus, the OpenCDN contributes to the main Internet content being present locally in the various regions of Brazil through an open and transparent initiative.

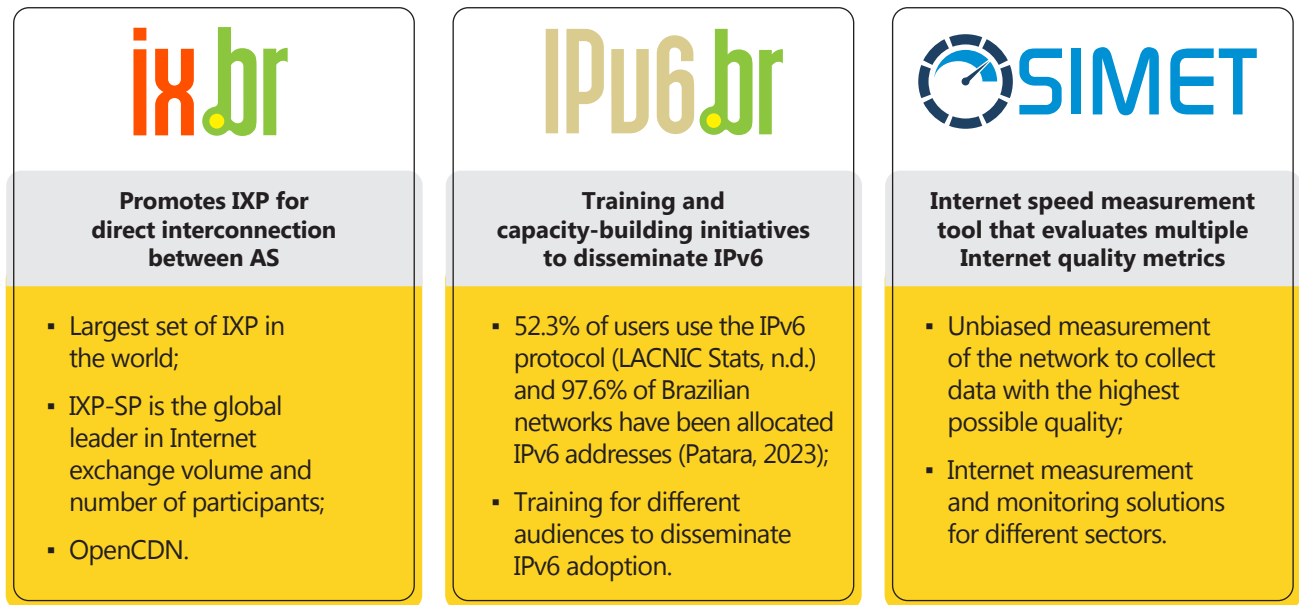
It is worth noting that the trajectory of IX.br is also connected to the growth of IPv6 adoption in Brazil. From the very first stages of implementing the new version of the IP protocol, NIC.br played a central role in encouraging the transition, promoting technical training, producing informational materials, and offering direct support to access providers and other stakeholders in the Internet ecosystem. This proactive action has contributed to Brazil achieving an IPv6 adoption rate consistently higher than the Latin American average, especially among large telecommunications operators.

The importance of IPv6 goes far beyond the technical replacement of the old version of IPv4, which is already exhausted. The IPv6 protocol is a fundamental pillar for the sustainable growth of the Internet, allowing the expansion of emerging services and applications that depend on a massive number of unique IP addresses. Technologies such as the Internet of Things (IoT), vehicular networks, connected homes, smart cities, and new digital health solutions require scalability, security, and performance—characteristics that IPv6 is designed to provide.

Despite the progress made, challenges to IPv6 migration persist, especially among smaller providers, who face technical, financial, or operational obstacles to making the complete transition. In some cases, this results in a partial reversion to IPv4 usage, limiting the potential for innovation and growth in these networks. In this context, NIC.br's ongoing work, through capacity-building, monitoring, and technical support, remains essential to ensure an Internet more resilient, scalable, and prepared for future demands.

Finally, another important initiative for network development in the country is the Internet Traffic Measurement System (SIMET), a tool developed by Ceptro.br to assess Internet quality. The tests, conducted by users in real-time, collect various metrics such as latency, jitter, packet loss, and download and upload speeds. The advantage of using SIMET lies in how the quality of the Internet is measured. Anchored in a methodology that aims to guarantee unbiased and neutral measurements, the tests are performed inside and outside the operator's or access provider's network in order to collect data with the highest possible quality of information. Figure 3 summarizes the work of IX.br, IPv6.br, and SIMET, three fundamental initiatives for the continuous improvement of the Internet infrastructure in Brazil.

Figure 3 – CRITICAL COMPONENTS FOR INTERNET QUALITY IN BRAZIL



Source: Prepared by the authors.

New challenges will arise to guarantee the digital infrastructure necessary for the constant advancement of the Internet in the lives of the population and organizations in Brazil. New chapters and new activities at NIC.br are also expected to emerge with the advent of new technologies that depend on a secure, resilient, and efficient Internet. NIC.br will continue its consistent work, ensuring the quality of the services offered and always striving for an even better Internet in Brazil.

Conclusion: Building a robust and inclusive Internet in Brazil

Throughout its history, NIC.br has established itself as a strategic institution for the development of the digital infrastructure in Brazil. More than just an organization responsible for registering .br domains and managing IP addresses, NIC.br has always stood out for its ability to reinvest its resources in initiatives that promote a robust and inclusive Internet. The combination of public mission and qualified technical management has enabled the organization to make a decisive contribution to the growth and qualification of the Brazilian digital ecosystem.

The creation and expansion of IXP, through IX.br, are emblematic examples of this contribution. By decentralizing the interconnection infrastructure between networks and promoting the direct Internet exchange, IX.br has made it possible to reduce costs and increase the speed and stability of the Internet in Brazil, and contributed to the democratization of access to Internet content, allowing thousands of entrepreneurial ISP to spring up all over the country, as well as stimulating the regional distribution of content. The implementation of the OpenCDN project and ongoing efforts to expand IPv6 adoption reinforce NIC.br's commitment to technological innovation and network sustainability.

In addition to investments in infrastructure, NIC.br has also stood out for its work in areas such as information security, production of data and indicators, dissemination of good technical practices, and capacity-building for different audiences. The free training courses, regional forums, and multisector partnerships show that the organization understands Internet development as a collective process, in which dialogue and the inclusion of different stakeholders are fundamental.

Faced with the challenges brought about by new technologies and the growing demand for connectivity, NIC.br's role has become even more important. By maintaining its work guided by technical excellence, institutional transparency, and commitment to the public interest, NIC.br will continue to be an essential pillar in ensuring an Internet increasingly resilient, democratic, and aligned with the needs of Brazilian society.

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Interview I

Strategies and challenges for universalizing the Internet

In this interview, Hermano Tercius, the national secretary of telecommunications at the Ministry of Communications (MCom), discusses the challenges Brazil faces in achieving digital inclusion, the public policies under development to ensure universal Internet access, the actions aimed at digital literacy and development of digital skills, and the articulation with the private sector to advance the country's digital agenda.

Internet Sectoral Overview (I.S.O.)_ What are the main challenges that Brazil currently faces in terms of advancing digital inclusion, especially in areas where Internet access is more limited?

Hermano Tercius (H.T.)_ The main challenges for digital inclusion in Brazil include expanding the connectivity infrastructure in remote areas, the high cost of deploying networks in hard-to-reach areas, and the need for investment in technologies such as fiber optics and high-speed mobile networks, in addition to the promotion of public policies that encourage connectivity expansion. We also face challenges related to



Photo: MCom Archive

Hermano Tercius
National secretary of telecommunications at MCom and advisor to CGI.br

"The MCom operates on multiple fronts to universalize Internet access and strengthen connectivity infrastructure in Brazil. Among its key initiatives is the National Digital Inclusion Plan (Plano Nacional de Inclusão Digital [PNID]), which structures strategic actions to expand connectivity access, especially in remote areas."

affordability, as many families still struggle to afford devices and data packages. In addition, building the digital capacity of the population is essential to ensure that everyone can fully benefit from the opportunities offered by connectivity, reducing regional and social inequalities in access to information and digital services. Regarding infrastructure, we are accelerating the arrival of fiber optics and expanding mobile coverage in the countryside. Our commitment, aligned with the United Nations (UN) Sustainable Development Goals (SDG),⁶ is to ensure that, by 2030, the cost of basic Internet access does not exceed 2% of the monthly income of the poorest 40%. To make this feasible, we worked with manufacturers and mobilized resources from the Fund for the Technological Development of Telecommunications (Fundo para o Desenvolvimento Tecnológico das Comunicações [Funttel])⁷ to reduce device costs. Digital competencies and skills are complex subjects, which I will discuss later. Security aspects are addressed in collaboration with the National Telecommunications Agency (Anatel), services providers, and relevant entities in the sector.

I.S.O._ What public policies have been developed to ensure universal Internet access and improve connectivity infrastructure, considering different socioeconomic and regional contexts?

H.T._ The MCom operates on multiple fronts to universalize Internet access and strengthen connectivity infrastructure in Brazil. Among its key initiatives is the National Digital Inclusion Plan (Plano Nacional de Inclusão Digital [PNID]),⁸ which structures strategic actions to expand connectivity access, especially in remote areas.

One of the biggest recent advances was the 5G auction, which allocated more than 90% of the BRL 47.2 billion raised for direct investments in the sector. With these resources, programs such as Connected North (Norte Conectado)⁹ are expanding fiber optic networks in the Amazon, bringing connectivity to around 10 million people in 59 municipalities across six states. In addition, the winning operators in the auction have undertaken to install stand-alone 5G networks in all of the country's municipal offices and to extend mobile coverage to more than 8,500 locations in the interior.

Another highlight is the Wi-Fi Brazil Program¹⁰ (Electronic Government Program – Citizen Assistance Service [Gesac])¹¹, which uses satellite connection to reach more than 15,800 locations, including 13,790 schools—81% in the North and Northeast regions. The initiative will also be extended to 1,191 primary healthcare units (PHU), including Indigenous and quilombola communities' territories.

⁶ Find out more: <https://sdgs.un.org/goals>

⁷ Find out more: <https://www.gov.br/mcom/pt-br/acao-a-informacao/acoes-e-programas/programas-projetos-acoes-obras-e-atividades/funttel>

⁸ Find out more: <https://www.gov.br/mcom/pt-br/noticias/2024/novembro/grupo-de-trabalho-para-desenvolvimento-do-plano-nacional-de-inclusao-digital-comeca-em-2025>

⁹ Find out more: <https://www.gov.br/mcom/pt-br/acao-a-informacao/acoes-e-programas/programas-projetos-acoes-obras-e-atividades/norte-conectado>

¹⁰ Find out more: <https://www.gov.br/mcom/pt-br/acao-a-informacao/acoes-e-programas/programas-projetos-acoes-obras-e-atividades/wi-fi-brasil>

¹¹ Find out more: <https://antigo.mctic.gov.br/mctic/opencms/comunicacao/SETEL/gesac/gesac.html>

Combining strategic investments and digital inclusion policies, these actions ensure concrete advances in the country's connectivity, reducing regional inequalities and promoting social and economic development.

I.S.O._ In addition to guaranteeing access to the Internet, which MCom actions aim to promote digital literacy and the development of digital skills, seeking to reduce inequalities in the qualified use of technologies?

H.T._ Guaranteeing Internet access is only the first step toward digital inclusion. The MCom also plays a key role in developing digital skills to reduce inequalities in the qualified use of technologies.

Currently, around 93% of the population has mobile coverage,¹² and 92.5% of households access the Internet.¹³ However, research indicates that a large proportion of users still struggle to take full advantage of digital services due to a lack of basic skills, which impacts their social and productive inclusion.

To address this gap, the MCom develops and supports various initiatives, including:

- National Strategy for Connected Schools (ENEC):¹⁴ Partnership with the Ministry of Education (MEC) to equip all 138,000 Basic Education schools with digital technologies, promoting digital literacy from an early age.
- Computers for Inclusion Program (Programa Computadores para Inclusão)¹⁵ (Computer Reconditioning Centers [Centros de Recondicionamento de Computadores – CRC]):¹⁶ Partnerships with the private and third sectors for digital training, distribution of reconditioned computers, and sustainable disposal of electronic waste.
- Accessible funding: Use of resources from the Fund for the Universalization of Telecommunication Services (Fust)¹⁷ and the Telecommunications Credit Access Program (Programa Acesso Crédito Telecom),¹⁸ enabling investments in digital inclusion.
- Public-private partnerships: Cooperation with large technology enterprises for large-scale digital training.

In addition, the MCom is proposing the creation of a new contribution for digital inclusion, sourced from large Internet enterprises, to guarantee continuous investment in the digital training of Brazilians.

With these initiatives, the aim is not only to connect but also to train the population to make full and safe use of digital technologies, boosting the country's economic and social development.

"(...) MCom is proposing the creation of a new contribution for digital inclusion, sourced from large Internet enterprises, to guarantee continuous investment in the digital training of Brazilians."

¹² Mobile coverage data (all technologies) from Anatel for the period of September 2024, available at: <https://informacoes.anatel.gov.br/paineis/infraestrutura/cobertura-movel>

¹³ Data on access to TV, Internet, and mobile phone in Brazil from the 2023 Continuous National Household Sample Survey (Continuous PNAD), available at: <https://painel.ibge.gov.br/pnadc/>

¹⁴ Find out more: <https://www.gov.br/mcom/pt-br/acao-a-informacao/acoes-e-programas/programas-projetos-acoes-obras-e-atividades/estrategia-nacional-de-escolas-conectadas-enec>

¹⁵ Find out more: <https://www.gov.br/mcom/pt-br/acao-a-informacao/acoes-e-programas/programas-projetos-acoes-obras-e-atividades/computadores-para-inclusao-1>

¹⁶ Find out more: https://antigo.mctic.gov.br/mctic/opencms/comunicacao/SETEL/inclusao_digital/CRCs/CRCs.html

¹⁷ Find out more: <https://www.gov.br/anatel/pt-br/regulado/arrecadacao/fust>

¹⁸ Find out more: <https://acessacreditotelecom.com.br/>

I.S.O._ How does coordination with stakeholders from the private sector, the third sector, and different government organizations contribute to advancing the digital agenda in the country? Could you cite examples of promising partnerships in this regard?

H.T._ Coordination between the government, the private sector, the third sector, and other government organizations is essential to boosting the digital agenda in Brazil, guaranteeing strategic investments, innovation, and capillarity for digital inclusion initiatives.

The private sector plays an essential role in expanding connectivity infrastructure, providing technology, expertise, and investment to reach remote areas. Public-private partnerships have enabled high-speed networks, expanding Internet access and promoting digital training.

The third sector complements this strategy by working directly in communities, implementing digital literacy programs, socioeconomic inclusion, and device distribution. Collaboration with government organizations, such as MEC, strengthens initiatives such as ENEC, which brings connectivity and technological resources to every school in the country.

A promising example is the PNID, coordinated by MCom, with the participation of Anatel and the Civilian House in the Interministerial Working Group.¹⁹ The PNID will rely on the collaboration of government organizations, the private sector, academia, and civil society organizations to structure effective digital inclusion solutions.

In addition, mechanisms such as Fust—along with another possible contribution from Internet enterprises that is being proposed—guarantee sustainable funding for projects that expand access to connectivity and develop digital skills.

This strategic collaboration maximizes the impact of public policies, accelerates digital transformation, and reduces regional inequalities, ensuring that all Brazilians have access to quality Internet and can fully benefit from the digital economy.

Interview II

The role of small providers in universalizing connectivity

In this interview, Percival Henriques de Souza, president of the National Association for Digital Inclusion (ANID) and advisor to the Brazilian Internet Steering Committee (CGI.br), discusses the digital inclusion scenario in the country, the challenges for universal connectivity, and the importance of small providers in this context.

¹⁹ Find out more: <https://www.gov.br/secom/pt-br/assuntos/obrasilvoltou/cuidado/governo-institui-grupo-de-trabalho-interministerial-para-prevencao-a-violencia-nas-escolas>

Internet Sectoral Overview (I.S.O.)_ In your opinion, what are the main challenges that Brazil still faces in guaranteeing meaningful connectivity for the entire population? And which policies should be prioritized in this agenda?

Percival Henriques de Souza (P.S.)_ Ensuring meaningful connectivity in Brazil goes beyond simply providing Internet access. The concept of digital inclusion should be based on the idea of a fundamental tripod: quality Internet access, availability of appropriate devices, and digital literacy. These three pillars are interdependent and essential for the population to fully benefit from the opportunities offered by the digital world.

The first pillar is Internet access, which is still marked by significant regional inequalities. While large urban centers have advanced infrastructure, such as fiber optic networks and 5G coverage, rural regions, riverside and Indigenous communities, and urban peripheries face severe limitations. In these locations, the connection is often nonexistent or of poor quality, which prevents essential activities such as remote learning, telemedicine, and remote work from being carried out. In addition, the high cost of both fixed and mobile Internet plans makes access difficult for low-income families, perpetuating the digital divide.

The second pillar is the availability of appropriate devices. Internet access loses its value if the population does not have the devices, such as smartphones, tablets, and computers, to use it efficiently. In Brazil, the high cost of this equipment poses a significant barrier, especially for the most vulnerable strata of society. Many families share a single device, which limits simultaneous use for different activities, such as study and work. Thus, subsidy programs for device acquisition and initiatives for the reuse and distribution of equipment can help mitigate this problem.

The third pillar, and perhaps the most neglected, is digital literacy. Having access to the Internet and equipment does not guarantee digital inclusion in itself if the population lacks the necessary skills to use these tools productively, critically, and safely. Digital literacy ranges from basic skills, such as browsing and using applications, to more advanced skills, such as cybersecurity, critical thinking in relation to online information, and using technologies for educational and professional purposes. Therefore, investing in training programs, especially in schools and community centers, is essential to transforming access into effective inclusion.

Therefore, public policies that consider these three pillars in an integrated way are essential to guarantee meaningful connectivity. Without this comprehensive approach, Brazil risks deepening existing inequalities and limiting the potential for economic and social development brought about by the digital transformation.

I.S.O._ What is the role of small providers in promoting digital inclusion in Brazil and their importance for the universalization of connectivity in the country, especially in hard-to-reach locations and for the most vulnerable populations?

P.S._ It must be recognized that small providers play a fundamental role in promoting digital inclusion in Brazil. They are often the only agents willing to bring connectivity to regions that are hard to reach or that lack commercial attractiveness for big operators. In rural communities, peripheral urban areas, riverside regions, and



Photo: Marcio Materazzo

Percival Henriques de Souza

President of
ANID and
advisor to CGI.br

"(...) small providers are key to the universalization of meaningful connectivity in Brazil. Valuing and supporting these entrepreneurs is a decisive step towards ensuring that digital inclusion reaches all the strata of society and, consequently, contributes to the country's socioeconomic development."

isolated locations, small providers fill a gap left by large enterprises, which prioritize more lucrative markets.

The importance of these providers for the universalization of connectivity is immense. While large operators concentrate their investments in urban centers and more economically viable regions, small providers operate at the base of the pyramid, ensuring that vulnerable populations also have access to the Internet. This access is not just a matter of convenience: It is a fundamental right that directly influences access to education, health, job opportunities, and citizen participation. However, these providers face significant challenges that make it difficult for them to operate. One of the main obstacles is the cost of sharing infrastructure, such as renting poles. Small providers pay up to 16 times more for the same pole than large operators, creating an inequality generated by regulation and limiting the ability of these entrepreneurs to expand their services. In addition, the cost of equipment and supplies, which is strongly pegged to the dollar, imposes an additional financial burden since most of the devices, such as routers and fiber optic cables, are imported. Another complicating factor for small providers is the presence of organized crime in some regions, which makes installing and maintaining networks risky. Furthermore, geographical difficulties, such as rivers, dense forests, and rugged terrain, increase the cost and complexity of operations.

For these providers to continue fulfilling their crucial role in digital inclusion, it is essential that public policies are implemented. A regulatory review to ensure equitable infrastructure access is urgently needed, as is the creation of subsidies and tax incentives to offset high operational costs. Strengthening public funding programs and implementing security policies to protect infrastructure are also essential measures.

In this sense, small providers are key to the universalization of meaningful connectivity in Brazil. Valuing and supporting these entrepreneurs is a decisive step towards ensuring that digital inclusion reaches all the strata of society and, consequently, contributes to the country's socioeconomic development.

I.S.O._ Considering the role played by ANID, what actions have been developed to improve the business environment for small providers? Why are these actions important?

P.S._ The ANID has played a key role in strengthening the business environment for small Internet providers in Brazil through a series of strategic actions focused on technical training, institutional support, technological innovation, and digital inclusion. Among the main initiatives is the offer of courses, workshops, and specialized training aimed at qualifying professionals in areas such as fiber optic networks, cybersecurity, and business management. Additionally, the association encourages the creation of value-added services, such as online course platforms and the use of Open Educational Resources (OER), enabling providers to expand their portfolios and offer more than just connection, adding value to the communities they serve. Another highlight is the incentive to infrastructure sharing, a practice that reduces operational costs and increases network expansion efficiency, especially in areas where individual investment would be unfeasible. ANID also promotes the active participation of small providers in Internet exchange points (IXP), facilitating

interconnection between networks and improving data traffic quality and speed while reducing international broadband costs.

In the institutional field, the association plays a strong role in defending the interests of small providers in regulatory bodies, such as the National Telecommunications Agency (Anatel). ANID fights for public policies that facilitate access to essential infrastructure, such as the regularized use of poles for installing cables, one of the biggest challenges faced by the sector. In addition, the association also provides legal assistance on issues involving regulation and contractual disputes, offering technical and legal support to ensure that providers can operate safely and regularly. Another important front is support for access to credit and financing. ANID works to ensure that small providers have better financing conditions, facilitating the expansion of their networks and the adoption of new technologies. In this context, the association also encourages the adoption of innovative business models, such as the integration between local providers and community networks. This hybrid model allows a more efficient expansion of the Internet in remote areas and underserved communities, promoting digital inclusion and opening up new markets for providers.

We see these actions as essential to promoting the country's economic and social development and democratizing access to information, new technologies, and digital services in general.

I.S.O._ What is the importance of small providers' participation in IXP? What strategic actions can be taken to increase their participation?

P.S._ The participation of small providers in IXP is a milestone in the history of the Internet in Brazil, which is currently the country with the largest number of enterprises in this sector worldwide, with around 20,000 registered with Anatel. This movement began in 2008, when ANID created a Multiprotocol Label Switching (MPLS) network with the aim of connecting small providers to the IXP of São Paulo. At the time, there was resistance from these providers, as they used little bandwidth, faced high transportation costs, and had to deal with the necessary procedures from the Brazilian Network Information Center (NIC.br) to release Internet Protocols (IP) for Autonomous Systems (AS), which required contracts with at least two operators. ANID solved this problem by presenting itself as the second operator, guaranteeing the necessary IP and connecting providers who used up to 10 Mbps for free.

With the success of this initiative, ANID expanded its actions, promoting campaigns and coordinating the creation of IXP in cities such as Campina Grande (PB), Recife (PE), Natal (RN), Fortaleza (CE), Maceió (AL), Aracaju (SE), Teresina (PI), São Luís (MA), Belém (PA), Belo Horizonte (MG), Campinas (SP), and Palmas (TO). These efforts were driven by events called the "Internet Infrastructure Road Show in Brazil," which were later taken over by NIC.br and were responsible for encouraging the creation of IXP in places where they did not yet exist. As a result of these actions, Brazil has become the country with the second most AS in the world, with approximately 10,000 out of a global total of around 100,000. Between 2008 and 2012, ANID was responsible for including more than 2,000 new providers in this scenario.

NIC.br played an essential role in technical training and in coordinating the providers, directly contributing to the expansion of the Internet exchange infrastructure.

"The participation of small providers in IXP is a milestone in the history of the Internet in Brazil, which is currently the country with the largest number of enterprises in this sector worldwide, with around 20,000 registered with Anatel."

Today, all Brazilian capitals have IXP—except for Macapá (AP), where the implementation process is underway. With the scarcity of IPv4 addresses, promoting the use of IPv6 is a fundamental strategy for the network's sustainable growth. NIC.br has been leading this process, promoting training and guiding providers on the transition to the new protocol.

Thus, local Internet exchange reduces latency, improves the speed and stability of connections, and reduces operating costs since traffic does not have to travel long distances over third-party networks. This increases the resilience of the Internet infrastructure and guarantees a better experience for end users. It is hoped that NIC.br will continue its excellent work in training and governance of Internet exchange, consolidating Brazil as a global reference in Internet infrastructure.

Domain Report

Domain registration dynamics in Brazil and around the world

The Regional Center for Studies on the Development of the Information Society (Cetic.br), department of the Brazilian Network Information Center (NIC.br), carries out monthly monitoring of the number of country code top-level domains (ccTLD) registered in countries that are part of the Organisation for Economic Co-operation and Development (OECD) and the G20.²⁰ Considering members from both blocs, the 20 nations with the highest activity sum more than 95.47 million registrations. In April 2025, domains registered under .de (Germany) reached 17.59 million, followed by the China (.cn), United Kingdom (.uk), and Netherlands (.nl), with 10.95 million, 8.93 million and 6.14 million registrations, respectively. Brazil had 5.42 million registrations under .br, occupying 6th place on the list, as shown in Table 1.²¹

²⁰ Group composed by the 19 largest economies in the world and the European Union. More information available at: <https://g20.org/>

²¹ The table presents the number of ccTLD domains according to the indicated sources. The figures correspond to the record published by each country, considering members from the OECD and G20. For countries that do not provide official statistics supplied by the domain name registration authority, the figures were obtained from: <https://research.domaintools.com/statistics/tld-counts>. It is important to note that there are variations among the date of reference, although the most up-to-date data for each country is compiled. The comparative analysis for domain name performance should also consider the different management models for ccTLD registration. In addition, when observing rankings, it is important to consider the diversity of existing business models.

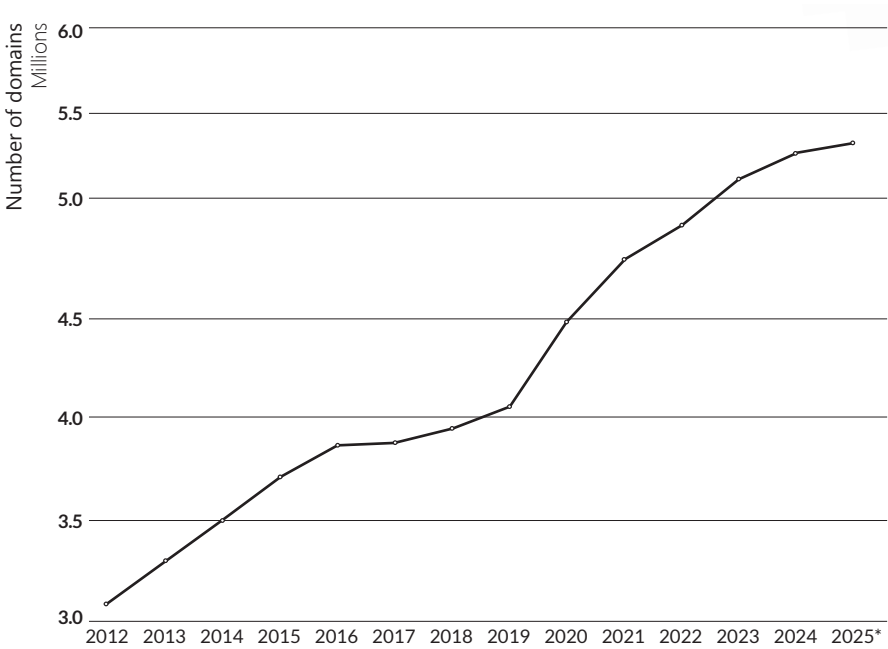
Table 1 – TOTAL REGISTRATION OF DOMAIN NAMES AMONG OECD AND G20 COUNTRIES

Position	Country	Number of domains	Date of reference	Source (website)
1	Germany (.de)	17,597,567	01/04/2025	https://www.denic.de
2	China (.cn)	10,950,145	01/04/2025	https://research.domaintools.com/statistics/tld-counts/
3	United Kingdom (.uk)	8,937,883	28/02/2025	https://www.nominet.uk/news/reports-statistics/uk-register-statistics-2025/
4	Netherlands (.nl)	6,144,488	01/04/2025	https://stats.sidnlabs.nl/en/registration.html
5	Russia (.ru)	5,871,312	01/04/2025	https://cctld.ru
6	Brazil (.br)	5,421,469	31/03/2025	https://registro.br/dominio/estatisticas/
7	Australia (.au)	4,239,222	01/04/2025	https://www.auda.org.au/
8	France (.fr)	4,233,657	30/03/2025	https://www.afnic.fr/en/observatory-and-resources/statistics/
9	European Union (.eu)	3,608,544	01/04/2025	https://research.domaintools.com/statistics/tld-counts/
10	Italy (.it)	3,515,752	31/03/2025	https://stats.nic.it/domain/growth
11	Canada (.ca)	3,426,389	01/04/2025	https://www.cira.ca
12	Colombia (.co)	3,385,418	01/04/2025	https://research.domaintools.com/statistics/tld-counts/
13	India (.in)	3,121,268	01/04/2025	https://research.domaintools.com/statistics/tld-counts/
14	Switzerland (.ch)	2,568,323	15/03/2025	https://www.nic.ch/statistics/domains/
15	Poland (.pl)	2,509,409	01/04/2025	https://research.domaintools.com/statistics/tld-counts/
16	United States(.us)	2,442,321	01/04/2025	https://research.domaintools.com/statistics/tld-counts/
17	Spain (.es)	2,106,718	28/02/2025	https://www.dominios.es/es/sobre-dominios/estadisticas
18	Portugal (.pt)	1,969,966	01/04/2025	https://www.dns.pt/en/statistics/
19	Japan (.jp)	1,792,532	01/04/2025	https://jprs.co.jp/en/stat/
20	Belgium (.be)	1,631,254	01/04/2025	https://research.domaintools.com/statistics/tld-counts/

Collection date: April 1, 2025.

Chart 1 shows the performance of .br since 2012.

Chart 1 – TOTAL NUMBER OF DOMAIN REGISTRATIONS FOR .BR – 2012 to 2025*



*Collection date: March 31, 2025.
Source: Registro.br
Retrieved from: <https://registro.br/dominio/estatisticas>

In April 2025, the five generic Top-Level Domains (gTLD) totaled more than 186.38 million registrations. With 154.85 million registrations, .com ranked first, as shown in Table 2.

Table 2 – TOTAL NUMBER OF DOMAINS AMONG MAIN gTLD

Position	gTLD	Number of domains
1	.com	154,851,668
2	.net	12,401,307
3	.org	11,160,158
4	.xyz	4,156,052
5	.info	3,817,459

Collection date: April 1, 2025.
Source: DomainTools.com
Retrieved from: research.domaintools.com/statistics/tld-counts

What you need to know about the

Global Digital Compact

The Global Digital Compact (GDC)²² is a framework proposed in 2024 by the United Nations (UN) as part of the Summit of the Future.²³ Negotiated by 193 Member States and based on global consultations, the GDC commits governments to implementing concrete measures to ensure the safety and security of the digital environment, while endorsing international law and Human Rights in the digital realm. It outlines a roadmap for global digital cooperation, aiming to harness the full potential of digital technology while addressing digital divides. To achieve these goals, five key objectives have been established, along with their corresponding commitments and actions, as outlined below:



Close all digital divides and accelerate progress across the Sustainable Development Goals (SDG)²⁴

- Universal and meaningful connectivity and affordable access;
- Digital literacy, skills, and capacities;
- Digital public goods and digital public infrastructure.



Expand inclusion in and benefits from the digital economy for all

- Equitable and affordable access;
- Digital inclusion;
- Fair competition and digital entrepreneurship;
- Safe, secure, and resilient functioning of digital systems.



Foster an inclusive, open, safe, and secure digital space that respects, protects, and promotes Human Rights

- Respect, protect, and promote Human Rights in digital spaces;
- Internet governance;
- Digital trust and safety;
- Information integrity.

²² This is an adaptation of the original document Global Digital Compact published by the UN. Available at: <https://www.un.org/global-digital-compact/en>

²³ Find out more: <https://www.un.org/en/summit-of-the-future>

²⁴ Find out more: <https://sdgs.un.org/goals>



Advanced responsible, equitable, and interoperable data governance approaches

- Data privacy and security;
- Data exchanges and standards;
- Data for the SDG and development;
- Cross-border data flows;
- Interoperable data governance.



Enhance international governance of Artificial Intelligence (AI) for the benefit of humanity

- Advanced safe, secure, and trustworthy AI systems;
- Inclusively assess and address the potential impact, opportunities, and risks of AI systems on sustainable development and the well-being and rights of individuals;
- Advance equitable and inclusive approaches to harnessing AI benefits and mitigating risks.

The aim is to implement the GDC within Member States and at regional and global levels, considering different national realities, capacities, and levels of development, while respecting national policies, priorities, and applicable legal frameworks. Furthermore, given the cross-cutting nature of digital technologies, its implementation is expected to be a multistakeholder effort involving governments, the private sector, civil society, and international organizations to shape a fair and inclusive digital future.

GDC notes on the importance of measurement

Aligned with the mission of the Regional Center for Studies on the Development of the Information Society (Cetic.br) at the Brazilian Network Information Center (NIC.br), the GDC underscores the importance of data production and the ongoing monitoring of digital technologies' impact on society. The following statements from the GDC further illustrate this perspective:

- "Strengthen efforts to collect, analyze, and disseminate relevant, accurate, reliable, and disaggregated data for better monitoring and policymaking to accelerate the achievement of the 2030 Agenda, while respecting privacy and data protection";
- "Develop and strengthen targets, indicators, and metrics for universal meaningful and affordable connectivity";
- "Map and connect all schools and hospitals to the Internet";
- "Develop and undertake national digital inclusion surveys with data disaggregated by income, sex, age, race, ethnicity, migration status, disability and geographical location and other characteristics relevant in national contexts, to identify learning gaps and inform priorities in specific contexts";
- "Call on social media platforms to provide researchers access to data".

/Credits

TEXT

DOMAIN REPORT

Thiago Meireles (Cetic.br | NIC.br)

GRAPHIC DESIGN

Thiago Planchart and Giuliano Galves
(Comunicação | NIC.br)

PUBLISHING

Grappa Marketing Editorial

ENGLISH REVISION AND TRANSLATION

Prioridade Consultoria Ltda.: Isabela Ayub,
Lorna Simons, Luana Guedes, Luísa Caliri,
and Maya Bellomo Johnson

EDITORIAL COORDINATION

Alexandre F. Barbosa, Graziela Castello, Javiera F. M.
Macaya, Rodrigo Brandão, and Mariana Galhardo
Oliveira (Cetic.br | NIC.br)

ACKNOWLEDGMENTS

Frederico Neves, Milton Kaoru Kashiwakura,
and Julio Sirota (NIC.br)
Hermano Tercius (MCom)
Percival Henriques de Souza (ANID and CGI.br)
Ricardo Patara (Registro.br | NIC.br)

ABOUT CETIC.br

The Regional Center for Studies on the Development of the Information Society – Cetic.br (<https://www.cetic.br/en/>), a department of NIC.br, is responsible for producing studies and statistics on the access and use of the Internet in Brazil, disseminating analyzes and periodic information on the Internet development in the country. Cetic.br acts under the auspices of UNESCO.

ABOUT NIC.br

The Brazilian Network Information Center – NIC.br (<http://www.nic.br/about-nic-br/>) is a non-profit civil Entity in charge of operating the .br domain, distributing IP numbers, and registering Autonomous Systems in the country. It conducts initiatives and projects that bring benefits to the Internet infrastructure in Brazil.

ABOUT CGI.br

The Brazilian Internet Steering Committee – CGI.br (<https://cgi.br/about/>), responsible for establishing strategic guidelines related to the use and development of the Internet in Brazil, coordinates and integrates all Internet service initiatives in the country, promoting technical quality, innovation, and dissemination of the services offered.

*The ideas and opinions expressed in the texts of this publication are those of the respective authors and do not necessarily reflect those of NIC.br and CGI.br.



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