State of the Internet and Digital Rights in Pakistan (2019–2026)

In the report “The State of the Internet and Digital Rights in Pakistan (2019-2026)” an analysis is given of the development and regulation of the internet sphere in the country. The report examines key aspects, including the growth in the number of internet users, the development of infrastructure, speed and quality of access, as well as the dynamics of the internet service provider market.

Special attention is paid to issues of digital rights and freedoms. Legislation in the field of the internet is analyzed, cases of blocking and censorship, as well as the practice of state surveillance. The document also examines the use of VPN services in the context of ensuring anonymity and access to information.

The report highlights significant events that influenced the digital environment of Pakistan, including public protests and the adoption of laws that caused wide resonance.

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1. General Information

The Islamic Republic of Pakistan is located at the junction of South Asia, Central Asia, and the Middle East. To the east, the country has a long and historically tense border with India; to the northwest it borders Afghanistan; to the southwest — Iran; and to the northeast — China. To the south, Pakistan opens onto the Arabian Sea. An important economic factor is the China-Pakistan Economic Corridor (CPEC), within the framework of which China actively invests in the country's infrastructure.

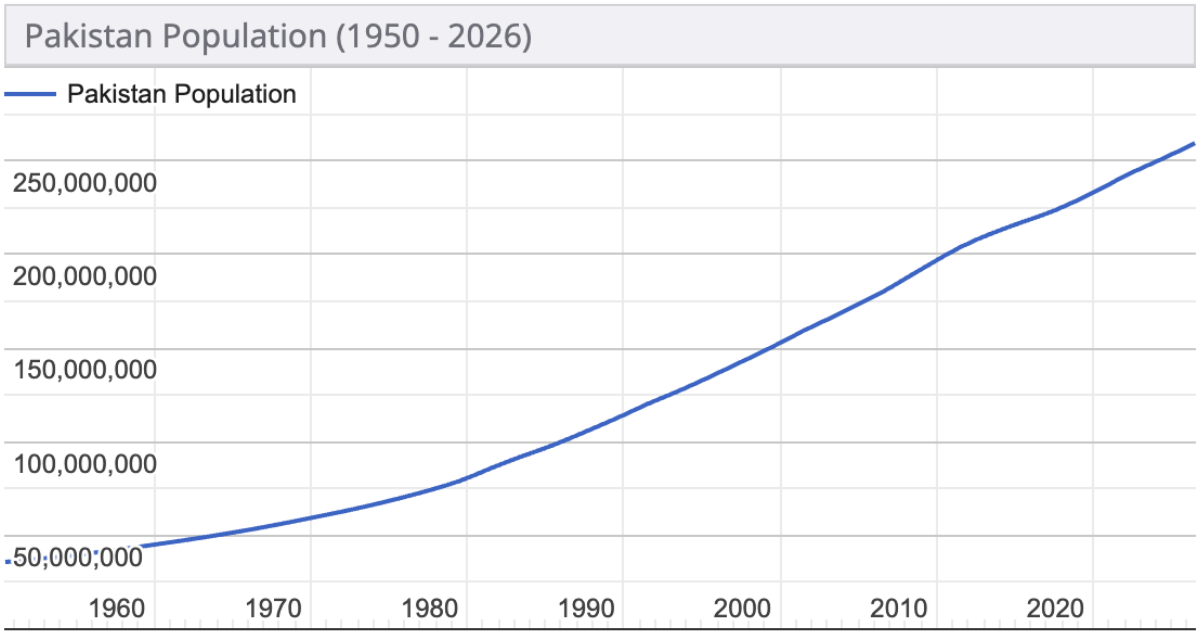
Such a geographical position, combined with constant territorial disputes (primarily around Kashmir) and threats of terrorism, has led to issues of national security occupying a central place in Pakistan's domestic policy. This is directly reflected in the state's approach to internet control: telecommunications infrastructure is largely militarized, and cross-border digital traffic is subject to strict filtering.

1.1. Population

Pakistan is characterized by great demographic potential and one of the highest population growth rates in the Asian region, which makes it a strategically important, albeit complex, market for the development of digital services. The country's demographic structure has a pronounced "youth bulge": the median age is only 20.8 years, which creates an unprecedented domestic demand for mobile broadband internet, e-commerce platforms, and social networks.[1] This phenomenon creates a dual situation: on the one hand, a young, technology-oriented generation stimulates the development of the digital economy and the global freelance sector; on the other hand, it represents a powerful, difficult-to-control political force, which forces the conservative state apparatus to introduce increasingly sophisticated methods of digital monitoring and censorship.[1] Urbanization is also steadily progressing: according to estimates for 2026, about 34.7% of the population (almost 90 million people) lives in cities, which traditionally serve as epicenters for the penetration of fiber-optic networks and the introduction of innovative telecommunications standards.[1]

Population dynamics demonstrate a stable annual increase, varying within 1.52–1.93%, which exerts enormous pressure on the existing physical and digital infrastructure of the country. The state constantly faces the need for exponential expansion of communication channel capacity to prevent degradation of service quality under the conditions of galloping growth in the number of subscribers.

Graph 1: Dynamics of Pakistan's Population (1950-2025)



Source: worldometers.info

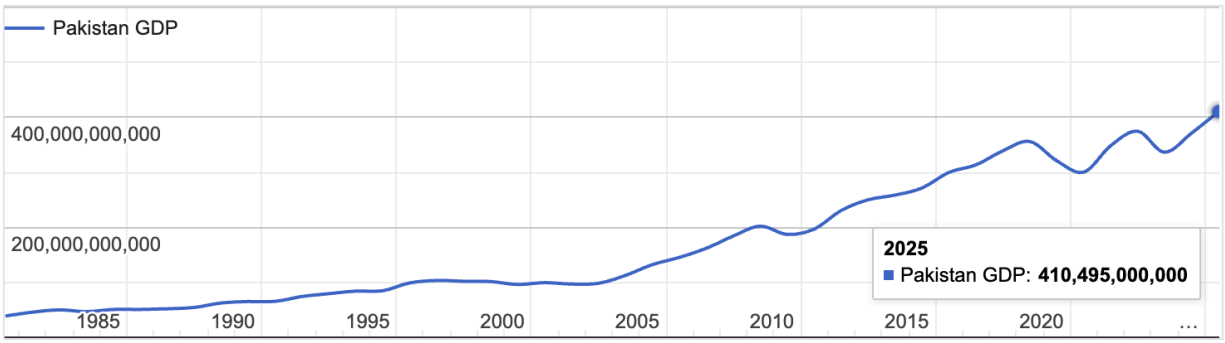
1.2. Gross Domestic Product

Pakistan's economy is classified by international financial institutions as a developing economy with below-average income levels. Throughout the analyzed period (2019–2026), the country's macroeconomic indicators demonstrated extreme volatility. This instability was provoked by a complex of factors: the global pandemic, the catastrophic floods of 2022 that destroyed a significant part of agricultural land and infrastructure, and a protracted political crisis. Saving the economy from default required strict macroeconomic stabilization programs dictated by the International Monetary Fund (IMF), which led to a reduction in state subsidies and an increase in the tax burden.[5] In 2023, the economy experienced a painful recession with a GDP decline of 0.2%; however, by 2025–2026, a fragile trend toward recovery emerged, with the IMF forecasting real GDP growth at 3.2–3.6%.[5]

The fundamental problem exerting a direct negative impact on the technological sector is the chronic devaluation of the national currency — the Pakistani rupee (PKR) — against the US dollar. Since almost all advanced telecommunications equipment (base stations, routers, fiber optics) is imported for hard currency, the fall in the rupee exchange rate leads to a sharp increase in capital expenditures (CAPEX) for communication operators. As a result, despite nominal revenue growth in rupees, the average revenue per user (ARPU) in dollar equivalent

remains critically low, which slows down network modernization and the introduction of expensive communication standards such as 5G.[9]

Graph 2: Dynamics of Pakistan's Nominal GDP (1993-2025)



Source: worldometers.info

The graph shows a long-term positive trend in Pakistan's nominal GDP from 1993 to 2025. Over this period, the country's economy has grown more than 4 times — from approximately 60–70 billion dollars in the early 1990s to 410.5 billion dollars in 2025.

Growth was uneven:

- From 2005 to 2010, the economy demonstrated confident acceleration.
- After 2010, growth continued, although with noticeable fluctuations.
- The most significant declines occurred in 2008–2009 (global financial crisis), around 2018–2019, and especially clearly in 2022–2023.

The decline in 2022–2023 became one of the deepest in the last 15 years and was caused by a severe macroeconomic crisis: record-high inflation (up to 29–30%), acute foreign currency shortage, sharp devaluation of the rupee, energy crisis, and political instability. These factors led to a slowdown in economic activity, a reduction in imports, and a decline in industrial production.

From 2023–2024, a gradual recovery began. By 2025, nominal GDP reached 410.5 billion dollars, reflecting some macroeconomic stabilization thanks to the IMF program, a reduction in inflation, growth in remittances from migrants, and partial recovery of the industrial and agricultural sectors. Nevertheless, growth rates remain relatively modest (about 2.5–3% in real terms), which is insufficient for rapid poverty reduction under conditions of high population growth.

Overall, the graph demonstrates that Pakistan's economy has significant long-term growth potential; however, it remains highly volatile and strongly susceptible to external shocks,

political instability, and structural problems (high public debt, low tax base, dependence on imports of energy and raw materials).

1.3. Main Economic Characteristics

Traditionally based on a vast agricultural sector and the textile industry, Pakistan's economy is undergoing a complex stage of structural transformation. In recent years, the information technology, software, and telecommunications sector has become one of the most important drivers of national growth. At the end of the 2024–2025 financial year, the telecommunications sector generated record revenue exceeding 1 trillion rupees (about 4.5 billion US dollars) and contributed more than 402 billion rupees to the state treasury in the form of taxes and fees.[13] A vital stabilizing factor for the economy remains remittances from Pakistan's eleven-million diaspora, the volume of which reached a historical maximum of 38.3 billion US dollars by 2025. These remittances stimulate domestic consumption, including the population's ability to pay for mobile communication and broadband internet services.[10]

At the same time, the country's macroeconomic framework suffers from deep, chronic structural problems. The key challenges remain a persistent balance of payments deficit, high debt burden, and exhausting inflation, which amounted to 12.6% in 2024.[8] A critical structural vulnerability is the energy crisis, which generates the so-called "circular debt." Regular rolling blackouts (load shedding) force telecom operators to rely on expensive diesel generators to maintain the operation of base stations, which significantly reduces business profitability.[17] The situation is aggravated by the government's inconsistent policy: on the one hand, a course toward digitalization and support for a huge pool of IT freelancers is declared; on the other hand, artificial interruptions in internet operation, the introduction of national firewalls, and sudden blockings of VPN services cause direct multi-million damage to the export of digital services, scaring away transnational corporations and investors.[18]

1.4. General Political Situation

Pakistan de jure is a federal parliamentary republic operating on the basis of the 1973 Constitution. However, de facto, the country's political system is characterized by a complex symbiosis of civilian institutions and the colossal, often dominant influence of the armed forces and influential intelligence agencies (primarily the Inter-Services Intelligence — ISI). The administrative-territorial structure of the state includes four main provinces (Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan), two administrative territories (Azad Jammu and Kashmir, Gilgit-Baltistan), and the federal capital territory of Islamabad. These macro-regions are further divided into 37 administrative divisions and 169 districts, each of which has its own system of local governance.[20]

The political landscape of the country has historically been determined by the confrontation between three largest parties: the center-right Pakistan Muslim League — Nawaz (PML-N), the center-left Pakistan People's Party (PPP), and the populist Pakistan Tehreek-e-Insaf (PTI), founded by the charismatic ex-Prime Minister Imran Khan.[23] The political situation sharply escalated in the spring of 2022 when Imran Khan's government was removed from power as a result of a vote of no confidence. This event provoked an unprecedented political crisis accompanied by mass street protests and a harsh confrontation between PTI supporters and the powerful military establishment, which led to the arrest of Imran Khan and the issuance of guilty verdicts against him.

The general elections in February 2024 were held in an atmosphere of unprecedented administrative pressure. The PTI party was banned from using its official symbols, as a result of which its candidates were forced to run as independents. Despite repression and mass mobile internet shutdowns on voting day, independent candidates affiliated with PTI received the largest number of seats in the National Assembly. Nevertheless, the government was formed by a coalition of PML-N and PPP parties led by Prime Minister Shehbaz Sharif.[23]

At the end of 2024, the ruling coalition passed the 26th constitutional amendment through parliament, which significantly limited the powers of the Supreme Court, causing sharp criticism from the Pakistan Human Rights Commission.[25] The current political situation remains extremely volatile, characterized by deep social polarization, harsh suppression of opposition discourse in the digital space, and active use of anti-terrorism and cyber legislation to neutralize political opponents and independent media.

2. Internet

2.1. National Domain

The top-level national domain (ccTLD) for Pakistan is the .pk zone, the management of which, since its creation in June 1992, has been carried out by the specialized non-profit corporation PKNIC. Historically, domain name registration in this zone was carried out exclusively at the third level (using suffixes such as .com.pk for business, .net.pk for network providers, .org.pk for non-profit organizations, and .edu.pk for educational institutions). However, starting from 2005, the zone administrator opened the possibility of direct registration of second-level names, which significantly increased the commercial attractiveness of the national domain. An important step toward inclusiveness and localization of the digital space was the introduction of an internationalized domain name (IDN) in the Urdu language — .پاکستان. This domain was approved by the ICANN corporation in 2011 and finally integrated into the root servers in 2017 under the management of the National Telecommunication Corporation.[27]

The registration policy in the .pk zone is strictly regulated and aimed at preventing cybersquatting and protecting intellectual property. When submitting an application, the registrant is obliged to legally confirm good faith intention (bona fide intention) and guarantee that the chosen name does not violate registered trademarks of third parties in Pakistani jurisdiction. To resolve possible conflicts, PKNIC uses a modified version of ICANN's Uniform Domain-Name Dispute-Resolution Policy (UDRP), in which priority is given to local Pakistani amendments. Cases are considered by the specialized Domain Name Dispute Resolution Center (DNDRC), as well as the WIPO Arbitration and Mediation Center.[29]

A critically important technological and geopolitical event in the history of Pakistani internet was the completion in mid-2023 of the project to localize (mirror) the root DNS servers of the .pk zone directly on the territory of Pakistan. Through the efforts of the Telecommunication Authority (PTA) and PKNIC, an authoritative mirror server M-2.PKNIC.NET.pk was launched. This solution allowed routing DNS queries to national web resources locally, without the need to contact foreign nodes. This modernization not only radically reduced delays (latency) and increased network resilience in case of damage to submarine cables, but also provided state bodies with an unprecedented level of technical control over the national domain zone in the context of traffic filtering.[32]

2.2. Number of Users

Internet penetration in Pakistan demonstrates phenomenal growth rates, acting as one of the main catalysts for socio-economic transformations. By the beginning of 2026, the country's digital landscape has radically changed: the total audience of internet users exceeded 120 million people, and the total number of telecommunications network subscribers stepped over the 200 million mark. According to comprehensive data from the Pakistan Telecommunication Authority (PTA), the analytical agency DataReportal, and the international research group BuddeComm, broadband internet penetration exceeded 60% of the total population, which is an outstanding indicator for a developing economy in the region.[14]

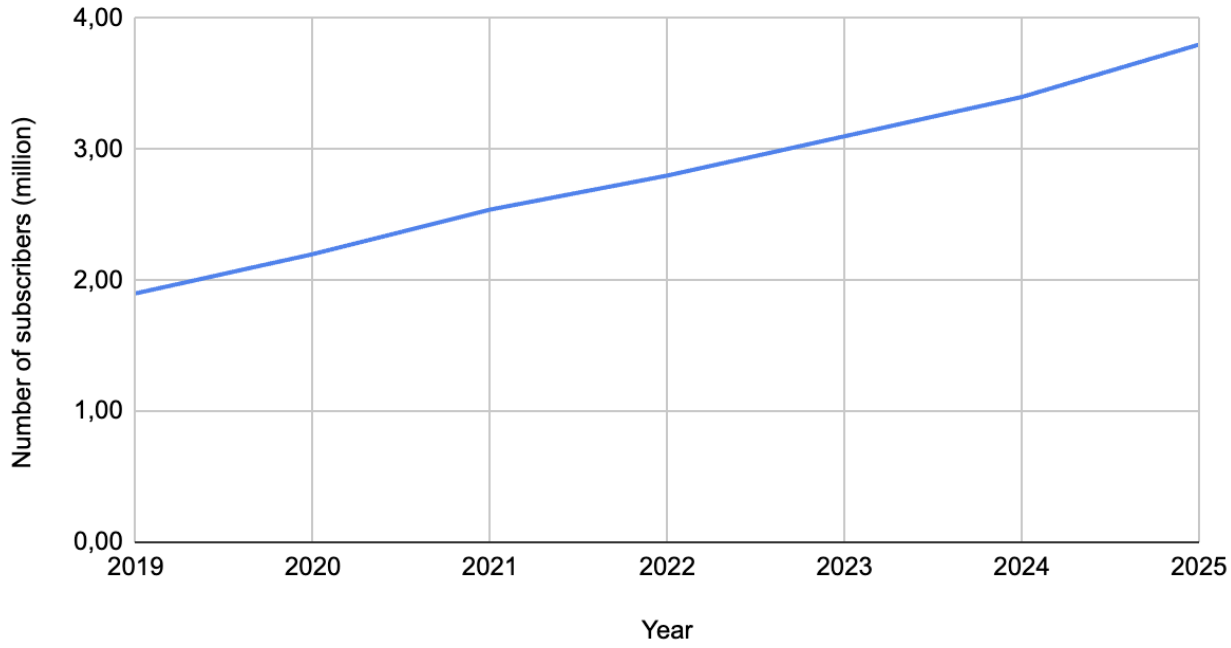
2.2.1 Fixed Internet

The fixed broadband internet access (BB) sector has historically been the weakest link in Pakistan's telecommunications infrastructure. This is due to years of underfunding, degradation of outdated copper telephone networks, mass cable theft, and extremely complex bureaucratic barriers faced by providers when obtaining permits for trenching (Right of Way) in overcrowded megacities. Nevertheless, targeted state programs and private business initiatives have made it possible to break the stagnation. The main driver of growth in recent years has been the aggressive deployment of fiber-optic networks (FTTH), whose subscriber

base reached 2 million connections by 2025, mainly in the urbanized clusters of Punjab and Sindh provinces.[14]

The fixed communication market is characterized by a high degree of monopolization and concentration. The main market leader is Pakistan Telecommunication Company Ltd (PTCL, ptcl.com.pk), controlling 28.2% of the retail market and practically monopolizing the backbone infrastructure. The second position is confidently occupied by the provider Multinet (multinet.com.pk) with a share of 26.5%, focused mainly on the corporate sector. The top three is closed by Wateen Telecom (wateen.com) with a share of 7.4%. The remaining part of the market is fragmented among hundreds of small regional providers.[37]

Graph 3: Dynamics of the Number of Fixed Broadband Subscribers in Pakistan (2019-2026)



The fixed broadband (BB) market in Pakistan demonstrates steady and stable growth throughout 2019–2025. The number of subscribers increased from approximately 1.9 million in 2019 to almost 3.8 million in 2025, showing more than a twofold increase over six years.

Pakistan's fixed internet market remains relatively small in volume but dynamically developing. The main growth is provided by the expansion of optical networks (FTTH/FTTB) in large cities.

The market is characterized by moderate concentration with a noticeable dominance of the state operator PTCL (including the PTCL Flash Fiber brand), which holds about 33% of the fiber

network market as of 2025. Among private players, StormFiber (about 27%) and Nayatel (9%) lead. The remaining share is distributed among smaller regional providers.

Despite the positive dynamics, fixed BB in Pakistan still significantly lags behind mobile broadband access (more than 150 million broadband connections in 2025, the vast majority of which are mobile). The fixed segment remains niche and is concentrated mainly in large cities (Karachi, Lahore, Islamabad, Rawalpindi), while in most regions of the country the main access to the internet is provided through mobile networks.

Such a market structure has both advantages (rapid development of BB in urbanized areas) and risks: low penetration of fixed BB on a national scale, high dependence of the population on mobile internet (with its limitations on speed and stability), and relatively weak competition outside large cities. Further development of the segment will largely depend on the implementation of the National Plan for the Introduction of Fiber-Optic Lines and efforts to attract investment in fiber-optic infrastructure.

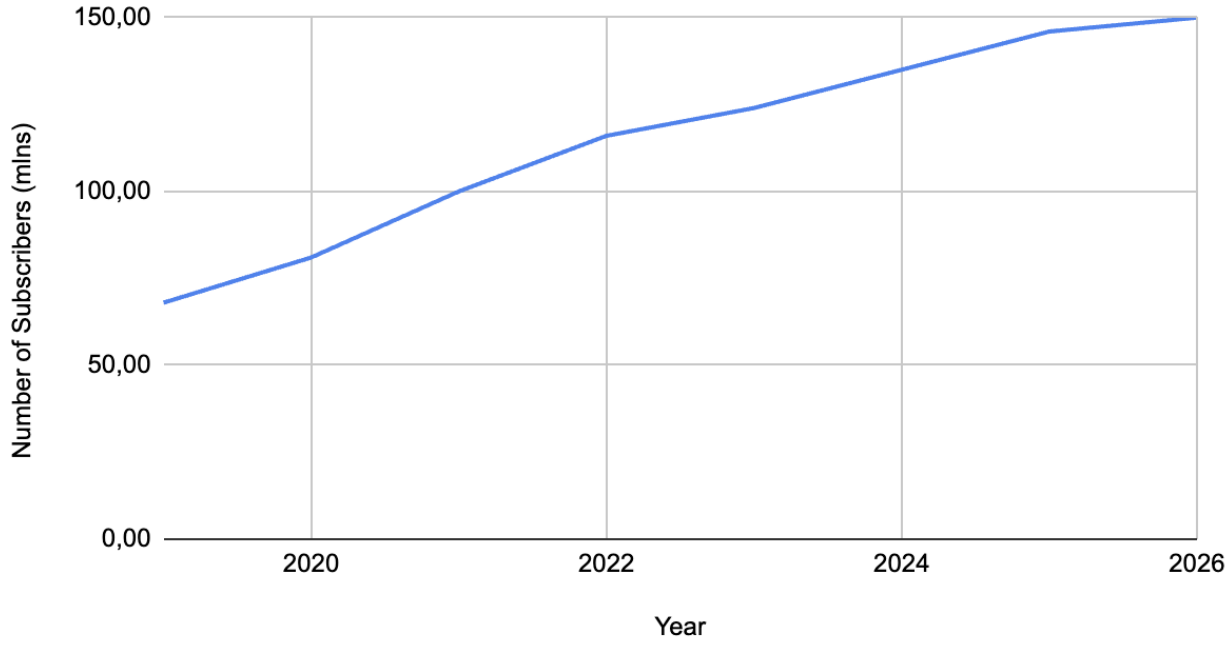
- PTCL Flash Fiber: the main player in the market
- StormFiber and Nayatel: key private competitors

2.2.2. Mobile Internet

Mobile internet acts as the foundation of digital development in Pakistan. In conditions of underdeveloped fixed lines, cellular networks have taken on the role of the main, and often the only, way to access the network for the vast majority of the population. By 2025–2026, about 95% of all internet traffic generated in the country passed through mobile devices. Cellular network coverage reached 92% of the country's population, while 97% of operating base stations were upgraded to support the 4G (LTE) standard. Unprecedented price competition led to the cost of mobile traffic falling to a historical minimum — about 0.1 US dollars per 1 Gigabyte, which caused an avalanche-like growth in data consumption exceeding 27,700 petabytes per year.[9]

The highly competitive mobile communications market is divided by four transnational and state corporations. The leading position is confidently held by the operator Jazz (jazz.com.pk), occupying, according to various estimates, from 37% to 48% of the market and having the best indicators of 4G network availability. Its main pursuer is Zong (a subsidiary of China Mobile Pakistan, zong.com.pk), holding about 26–33% of the market due to aggressive pricing policy and large-scale investments in infrastructure. The remaining market share has historically been distributed between Telenor Pakistan (telenor.com.pk) and Ufone (ufone.com), a state subsidiary of PTCL, which in 2024–2025 initiated the process of acquiring Telenor's business in Pakistan.[13]

Graph 4: Dynamics of the Number of Mobile Broadband Subscribers in Pakistan (2019-2026)



The mobile broadband access market in Pakistan demonstrates rapid and steady growth throughout 2019–2026. The number of mobile internet subscribers increased from approximately 70 million in 2019 to almost 150 million in 2026, that is, more than doubled in seven years.

Pakistan's mobile communications market is characterized by significantly higher competition. As of 2025–2026, four major operators operate in it:

- **Jazz** (formerly Mobilink, part of the global VEON group) — market leader with a share of about 38–40%;
- **Telenor Pakistan** — the second largest player with a share of about 25–27%;
- **Zong** (owned by China Mobile) — an actively growing operator whose share is approaching 23–25%;
- **Ufone** (owned by PTCL) — the fourth operator with a share of about 10–12%.

The particularly noticeable aggressive expansion of Zong and Jazz, which actively compete in the low-price and large-data-package segment. Thanks to fierce competition, Pakistan is among the countries with some of the lowest prices for mobile internet in the world.

However, the high growth in the number of mobile BB subscribers occurs against the background of relatively low service quality and limited speed. Most of the traffic falls on 3G/4G networks, while 5G coverage remains extremely limited and is concentrated only in a few large cities. In addition, a significant part of subscribers uses mobile internet as the main (and often the only) way to access the network, since fixed BB is poorly developed and covers less than 4% of the population.

Overall, Pakistan's mobile internet market can be characterized as highly competitive, fast-growing, but predominantly low-quality and focused on the mass inexpensive segment. Further development will depend on the speed of 5G deployment and the ability of operators to invest in network quality, not just in expanding the subscriber base.

2.3. Internet Access Speed and Quality of Services Provided

Despite impressive subscriber base growth rates, the qualitative indicators of internet access in Pakistan remain at an extremely low level by international standards. According to analytical data from the DataReportal report (based on Ookla measurements) for 2025–2026, the median download speed in the country's mobile networks is a modest 24.32 Mbit/s, and in fixed access networks — only 16.28 Mbit/s.[33] A detailed study from the Opensignal Mobile Network Experience Report, published in February 2025, reveals a significant differentiation between operators: the highest mobile internet speed is demonstrated by Zong (17.3 Mbit/s on average across the sample), followed with a minimal gap by Jazz (16.9 Mbit/s), then Ufone (11.3 Mbit/s), and significantly lagging Telenor (5.6 Mbit/s). A similar picture is observed in upload speed (Upload Speed), where Jazz holds the lead (6.5 Mbit/s).[39]

Chronically low service quality is due to the synergy of structural economic and techno-political factors. The physical infrastructure permanently suffers from the energy crisis: multi-hour rolling blackouts (load shedding) force operators to switch base stations to power from diesel generators and solar panels, which is not always able to ensure stable operation of equipment under peak loads. The situation is aggravated by regular natural disasters that damage backbone fiber-optic lines, as well as the high cost of insuring equipment in unstable regions (for example, in Balochistan).[17]

However, the most destructive impact on communication quality in recent years has been caused by direct state intervention. In mid-2024, the government began large-scale implementation of a nationwide firewall (Web Monitoring System — WMS 2.0), designed for total control and deep packet analysis (DPI). The architecture of this firewall forcibly redirects traffic through internal state monitoring nodes, blocking direct access to local content delivery networks (CDN). As a result of these actions, technical specialists recorded a 40% drop in the overall internet speed across the country, a sharp jump in delays (latency), and large-scale

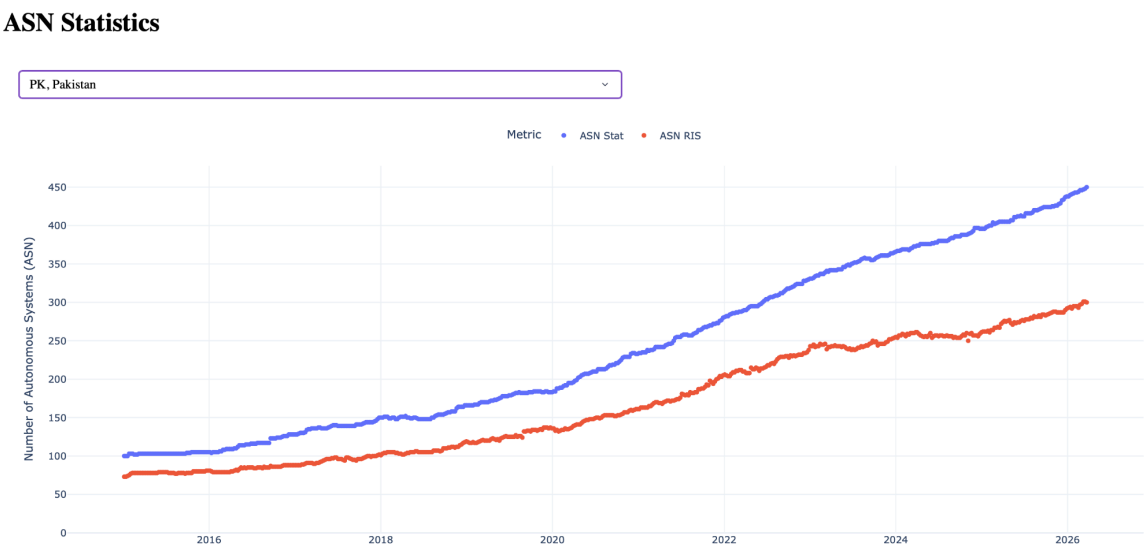
failures in the operation of multimedia exchange services (such as WhatsApp). IT industry associations (including P@SHA) officially warned the prime minister that the artificial degradation of communications is causing colossal losses to the industry, estimated at tens of billions of rupees annually.[18]

2.4. Development of Providers and Autonomous Systems

Pakistan's internet segment is developing under conditions of significant market concentration. The registration and distribution of Autonomous Systems (AS) and IP address pools in the South Asian region is under the competence of the Asia-Pacific Network Information Centre (APNIC), whose delegations are transmitted to global analytical databases such as RIPE Stat. Obtaining your own AS number is a critically important step for any large enterprise, university, or independent internet provider seeking to ensure the resilience of its network through multi-homing BGP routing.[42]

The dynamics of new AS registration in Pakistan demonstrates steady but extremely slow growth compared to global technological leaders. High capital costs for deploying your own BGP infrastructure, monopolistically high tariffs for traffic transit from backbone operators (such as PTCL), and overall macroeconomic instability serve as powerful barriers to market entry. As a result, although the number of autonomous systems is increasing due to large software centers and government institutions, the overwhelming majority of the country's internet traffic is still routed through a narrow pool of dominant telecom monopolists, which creates ideal conditions for the effective implementation of centralized state censorship.

Graph 5: Dynamics of Autonomous Systems in Pakistan (2015-2026)



Throughout 2015–2026, Pakistan has seen steady growth in the number of Autonomous Systems. Both the total number of registered AS (ASN Stat, red line) and the number of actively routed systems (ASN RIS, blue line) demonstrate a stable increase throughout the period.

By 2026, more than 450 autonomous systems are registered in Pakistan, of which about 300 actively announce routes in the global routing table. The gap between ASN Stat and ASN RIS remains relatively stable, indicating that most registered AS are actually used.

Growth rates continue to remain high even in 2024–2026. This indicates the ongoing development of digital infrastructure, the emergence of new providers, data centers, corporate networks, and cloud services.

Total number of AS per 1 million inhabitants: (300 AS / 245 million) × 1 million ≈ 1.22 AS

Active (routable) AS per 1 million inhabitants: (450 AS / 245 million) × 1 million ≈ 1.84 AS

This indicator is very low. Despite the significant absolute number of autonomous systems, their density per capita remains one of the lowest among large countries.

This situation reflects the high degree of concentration of Pakistan's internet market. The main part of traffic and infrastructure is controlled by several large operators (Jazz, Telenor, Zong, PTCL), while the share of independent and small providers is relatively small. The country's large population with a relatively small number of AS indicates that the market is still at the stage of consolidation and centralization.

Overall, the dynamics of Pakistan's autonomous systems shows active development of the digital ecosystem; however, the low density of AS per capita indicates insufficient decentralization and limited competition at the infrastructure level compared to more mature markets.

Table 1: Top 10 Largest Autonomous Systems of Georgia

#	Number of AS	Name	Web Site	Foreign neighbour count	Local neighbour count	Total neighbour count	Foreign neighbours share
1	17557	Pakistan Telecommunication Company Limited	https://ptcl.com.pk	101	90	191	53%
2	38193	Transworld Associates	http://www.tw1.com	91	65	156	58%
3	9541	Cyber Internet	https://cyber.net.	78	17	95	82%

		Services	pk/				
4	38264	Wateen Telecom	https://wateen.com/	0	30	30	0%
5	138423	CMPak	https://www.zong.com.pk	0	28	28	0%
6	58470	Jazz Pakistan	https://jazz.com.pk/	5	19	24	21%
7	135523	Multinet Broadband	https://multinet.com.pk/	0	18	18	0%
8	24499	Telenor	https://www.telenor.com/	2	13	15	13%
9	139820	HG TELECOMMUNICATION	https://hg.com.pk/	0	13	13	0%
10	23750	Gerrys Information Technology	https://gerrys.net/	0	12	12	0%

The internet connectivity market in Pakistan is characterized by **high concentration** and a clear division of roles between operators.

Pakistan Telecommunication Company Limited (PTCL, AS17557) is the undisputed leader with **191 direct connections (101 foreign and 90 local)**. This makes PTCL not only the largest national operator but also the country's key transit hub. The company maintains a relatively balanced peering structure (53% foreign neighbors), which allows it to act as Pakistan's main gateway to the global internet.

Transworld Associates (AS38193) ranks second with 156 connections and a high share of **foreign peers (58%)**. The company traditionally specializes in providing international transit and submarine cable capacities (TW1), acting as an important alternative channel for other operators.

Cyber Internet Services (AS9541) stands out with an extremely high share of **foreign connections — 82%**. This is a typical example of a transit/CDN-oriented operator that mainly focuses on international traffic and content delivery.

The remaining operators demonstrate a noticeably different strategy:

- **Wateen Telecom (AS38264), CMPak (Zong, AS138423), Multinet Broadband, HG TELECOMMUNICATION, and Gerrys Information Technology** have **0% foreign neighbors**. These networks are completely dependent on upstream providers (primarily

PTCL and Transworld) for access to the global internet and are focused exclusively on the domestic market.

- **Jazz Pakistan (AS58470)** and **Telenor (AS24499)** also show a low share of foreign peers (21% and 13% respectively), which is typical for large mobile operators that place the main emphasis on local traffic and interaction within the country.

General Conclusions

Concentration of the market: Pakistan's internet market strongly depends on several key players. PTCL remains the dominant operator both in local and international connectivity, while Transworld and Cyber Net act as important transit providers.
Importance of local peering: Most operators (especially mobile and regional) have an extremely low number of foreign neighbors and rely on internal traffic exchange. This indicates a developed, albeit centralized, infrastructure for local peering.

Potential vulnerability: The high dependence of most networks on a small number of upstream providers (primarily PTCL) creates serious risks. A failure in the operation of key transit operators can lead to a significant deterioration in access to global resources throughout the country.

Overall, Pakistan's internet connectivity market demonstrates a classic model of a developing country: a strong national incumbent (PTCL), several specialized transit players, and a large number of networks that fully depend on them for international connectivity.

2.5. IPv6 Penetration

The implementation of the new-generation internet protocol IPv6 in Pakistan was in a state of deep stagnation for a long time. Despite the fact that the regulator (PTA) formed a special group back in 2010 to monitor the exhaustion of the IPv4 address pool, no real steps were taken by operators for a whole decade. Fixed-line providers preferred to save on core network modernization and customer premises equipment (CPE), massively using Carrier-Grade NAT (CGNAT) technologies, which negatively affected the quality of p2p connections and online games.[46]

The situation changed radically only in the early 2020s, when the explosive growth in the number of mobile subscribers and the introduction of dual-stack architecture in 4G-standard smartphones forced cellular operators to begin a forced migration. According to measurements by APNIC Labs (included in RIPE Stat statistics), by the beginning of 2026, the level of IPv6 penetration (IPv6 Capable Rate) in Pakistan exceeded 21.9%, providing the new-generation protocol with almost 15 million unique connections.[48]

Graph 6: Dynamics of IPv6 Penetration in Pakistan (2015-2026)

Source: stats.labs.apnic.net

Conclusion: The indicator of ~22% achieved by Pakistan indicates a positive shift; however, it is still more than twice behind the global level of IPv6 adaptation, which in the Asia-Pacific region has approached the historical mark of 50%. The main brake on migration remains the fragmented and underinvested fixed BB sector, which requires large-scale updating of end-user equipment.[47]

2.6. Connectivity Index

To assess the level of integration of the internet segment, two key indicators are used, based on the analysis of pairwise connections (peerings) between Autonomous Systems (ASN).

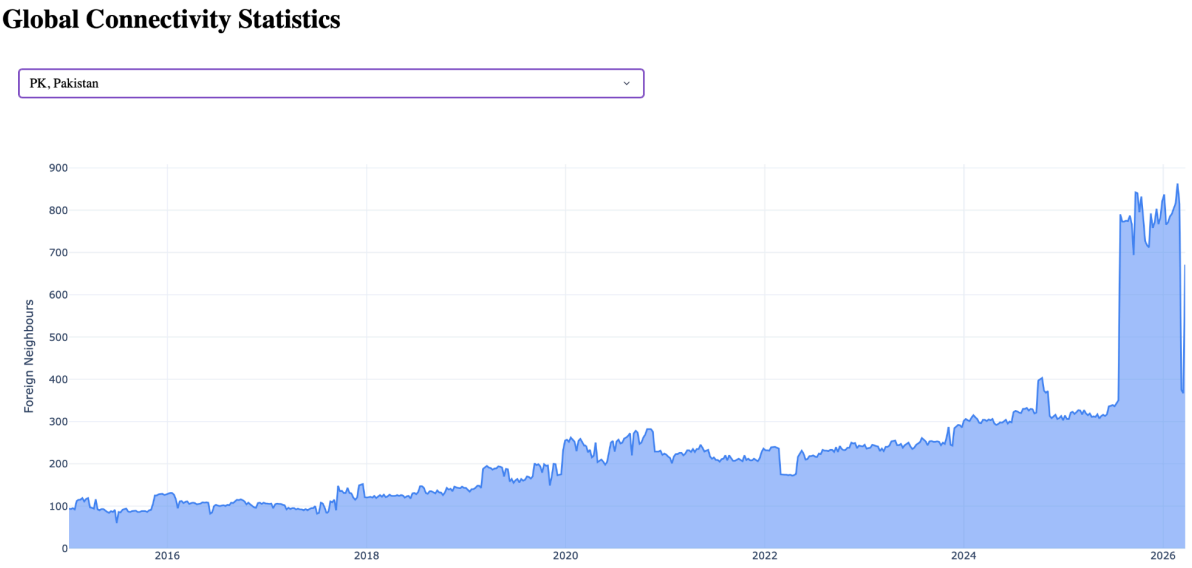
Global Connectivity Index: This index represents the total number of unique connections between each Georgian ASN and each external (foreign) ASN. In essence, it measures how widely and diversely the internet segment is connected to the rest of the world. The higher this indicator, the more “windows” the country has into the global network.

(Note: The original contains a clear typo referring to “Georgian”; the context is Pakistan.)

Local Connectivity Index: This index is calculated as the total number of unique connections between various local ASNs. It reflects the intensity and complexity of the internal internet market, in particular, the activity at traffic exchange points (IXP). A high indicator indicates a developed internal ecosystem that allows efficient traffic exchange within the country, minimizing delays and dependence on external channels for local data.

The analysis of the ratio of these two indices allows us to understand the strategic orientation of the national network: whether it is predominantly self-sufficient or deeply integrated into the global infrastructure.

Graph 7: Dynamics of Global Connectivity of Pakistan's Autonomous Systems (2015-2026)



The graph shows a **steady long-term growth** in the international connectivity of Pakistani Autonomous Systems from 2015 to 2026, which significantly accelerated after 2020. The index of the number of foreign neighbors (Foreign Neighbours), which for a long time fluctuated in the range of 100–150, began to grow actively from 2020, and in 2025–2026 there was a particularly sharp jump — from a level of about 300–350 to peak values of more than **850**.

This growth is of a more gradual and fundamental nature. Nevertheless, the final takeoff in 2025–2026 looks the brightest and most sudden for the entire observation period.

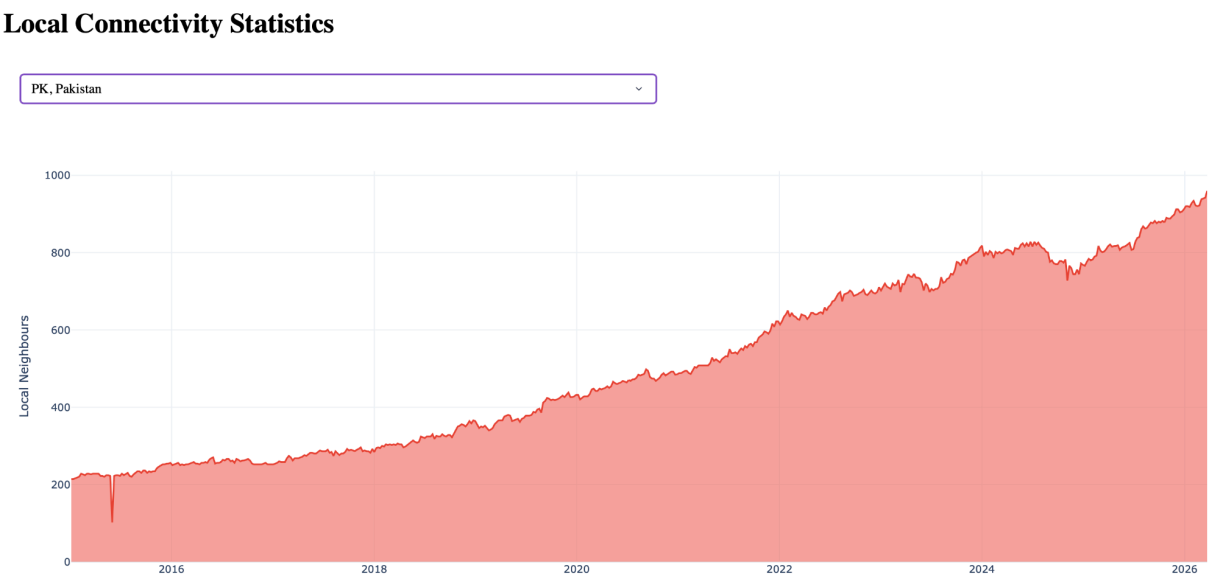
Such a significant increase in international connectivity indicates a serious **breakthrough in the global integration** of Pakistani internet. The main drivers, most likely, were:

- Active development of international traffic exchange points (primarily the Pakistan Internet Exchange — PIE in Karachi and Lahore);
- Launch and expansion of new submarine cable systems (especially SEA-ME-WE-6 and other projects);
- Attraction of large global players (CDNs, cloud providers, and Tier-2 operators);
- The strategy of PTCL and other large operators to diversify international routes.

After 2024, the indicator demonstrates high volatility with sharp peaks and declines, which is typical for the phase of active buildup of peering connections and testing of new routes. By the end of 2025, Pakistan's international connectivity reached a qualitatively new level, significantly exceeding previous maxima.

Overall, the graph reflects the transition of Pakistani internet from a relatively peripheral position to a more confident integration into the global network, although this process is still heavily dependent on several key national operators (primarily PTCL).

Graph 8: Dynamics of Local Connectivity of Pakistan's Autonomous Systems (2010-2026)



Unlike global connectivity, local connectivity demonstrates **planned, sustainable, and accelerating organic growth** throughout the entire period 2015–2026. The number of unique local neighbors (Local Neighbours) among Pakistani autonomous systems consistently increased from approximately 220–250 in 2015–2016 to **more than 950** by 2026. The graph shows a smooth upward curve with a noticeable acceleration in growth rates after 2019–2020 and a particularly intense rise in 2022–2026.

Such dynamics indicate the **gradual complication and maturity** of Pakistan's internal internet ecosystem. The constant increase in the number of local peerings reflects the active development of national traffic exchange points (primarily the Pakistan Internet Exchange — PIE in Karachi and Lahore), as well as the desire of operators to localize traffic within the country. This allows significantly reducing delays when accessing local resources, reducing the load on expensive international channels, and increasing the overall resilience of the national network segment.

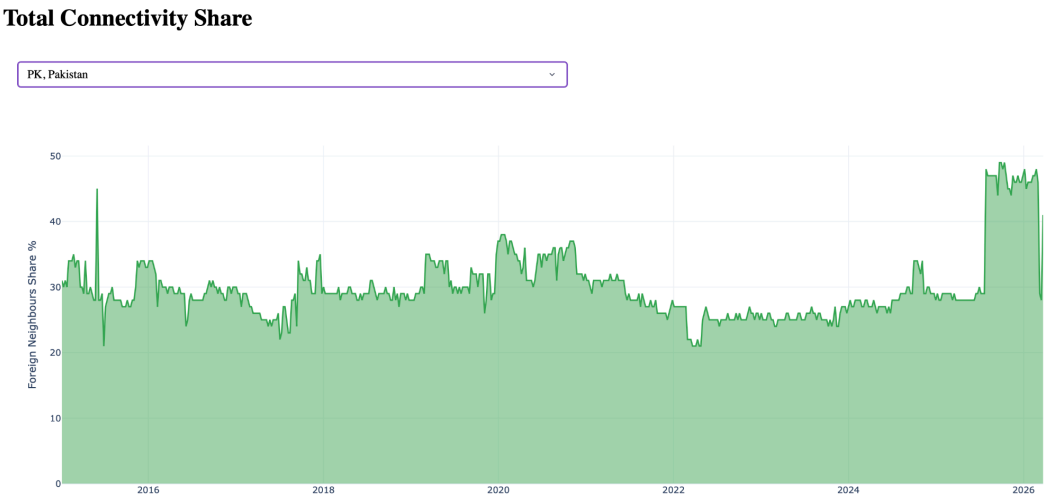
The growth of local connectivity is fueled by several factors:

- Expansion of fiber infrastructure in large cities;
- Active development of 4G/5G networks of mobile operators;
- The emergence of new data centers and cloud services;
- An increase in the volume of internal traffic (streaming, online payments, e-commerce).

Overall conclusion:

Local connectivity in Pakistan is developing dynamically and organically, demonstrating the gradual strengthening of the internal internet ecosystem. However, this growth is still heavily concentrated in large cities, and the level of traffic localization on a national scale is still relatively low.

Graph 9: Dynamics of the Ratio of Global and Local Connectivity of Pakistan's Autonomous Systems (2010-2026)



This graph shows that the share of global (foreign) connections in the overall structure of connectivity of Pakistani Autonomous Systems has undergone noticeable changes over the period 2015–2026.

Until 2022, the share of foreign neighbors fluctuated mainly in the range of 25–32%, demonstrating relative stability with small fluctuations. Local connectivity during this period grew quite confidently but did not radically outpace the global one.

Starting from 2024, and especially clearly in 2025–2026, there was a sharp increase in the share of global connections. The indicator rose from a level of about 25–28% to 45–48%, reaching peak values of almost 50% in certain periods of 2026. This jump indicates a significant strategic shift toward greater global integration of Pakistani internet.

However, after reaching the peak at the beginning of 2026, the share of foreign peers demonstrated high volatility and some decline, which may indicate a period of active “buildup” of international connections followed by stabilization and optimization.

Thus, Pakistan’s internet segment is developing according to a model of active globalization while maintaining a strong internal base. In Pakistan, the global component continues to play an increasingly significant role. This reflects the country’s strategy to become a regional digital hub, simultaneously increasing both international connectivity (through new cable systems and peering) and internal infrastructure.

As a result, Pakistan is moving toward a model of highly integrated but still dependent on global transit internet, where the share of foreign connections is approaching half of all connectivity.

3. Internet Legislation

3.1. Principles of Internet Governance

Internet governance in Pakistan is built on strict state control and the priority of national security over citizens’ digital freedoms.

The state views the internet as a potential threat: on the one hand, it can undermine political stability and the influence of the military establishment; on the other hand, it can spread content that contradicts conservative Islamic values. That is why censorship and surveillance are actively applied in the country, which the authorities justify by protecting state institutions and Islamic values.

At the same time, the government understands that the digital economy is extremely important for the country. It invests significant funds in the development of IT parks, support for startups, and the implementation of the "Digital Nation Pakistan" strategy to increase the export of IT services. However, in parallel with this, security agencies are introducing systems of total monitoring and periodically shutting down the internet, which seriously hinders the work of the same IT companies and freelancers that the state is trying to develop.[18]

3.1.1. Regulation

The legislative framework for regulating the digital environment relies on the scandalously known "Prevention of Electronic Crimes Act" (PECA), adopted in 2016, and a series of subsequent, even harsher amendments. This normative act, conceived as a tool to combat hackers and online fraud, quickly transformed into a universal weapon for suppressing political dissent. It endows the executive branch with the broadest powers to monitor traffic, block resources, and criminally prosecute citizens for expressing opinions.[53]

An additional level of regulation is provided by the "Removal and Blocking of Unlawful Online Content Rules," which oblige transnational technology corporations (social networks, messengers) to localize databases on the territory of Pakistan, promptly remove any content at the request of security agencies, and disclose user identification data without a prior court order. Refusal of platforms to comply with these rules regularly leads to a complete blocking of their services at the national level.[55]

3.1.2. Regulatory Agencies and Responsible Persons

The formation of the state strategy in the field of digitalization and telecommunications is under the jurisdiction of the Ministry of Information Technology and Telecommunication (MoITT).

- **Federal Minister:** Shaza Fatima Khawaja (Shaza Fatima Khawaja). Appointed to the post in March 2024, she oversees initiatives for the introduction of artificial intelligence and the expansion of optical infrastructure.[57]
    - Profile: (https://moitt.gov.pk)

The executive mega-regulator of the industry, possessing quasi-judicial powers, is the **Pakistan Telecommunication Authority (PTA)**. This body issues licenses to operators, manages the national firewall, maintains registers of prohibited sites, and applies sanctions to violators.

- **Chairman:** Major General (retired) Hafeez Ur Rehman (Maj. Gen. (R) Hafeez Ur Rehman), holder of military orders, heading the department since May 2023.[60]
    - Profile: (https://www.pta.gov.pk/category/authority-1663689027-2023-05-30)

3.2. Market Monopolization

Pakistan's telecommunications legislation formally enshrines the principles of market competition and demonopolization, the supervision of which is entrusted to the PTA. In the cellular communications segment, there is de jure and de facto a competitive oligopoly represented by four independent transnational and local players. However, at a deeper infrastructure level — in the segment of fixed communications, optical backhaul, and international gateways — the overwhelming monopoly of the state giant **Pakistan Telecommunication Company Limited (PTCL)** is preserved.

Historically, PTCL was a state monopolist. In 2005, the government carried out partial privatization, transferring 26% of shares and full operational control over the company to the Arab telecommunications conglomerate Etisalat (UAE), while retaining a majority stake for itself. This deal consolidated the company's dominant position: PTCL controls the lion's share of the national cable ducts and has exclusive access to submarine fiber-optic cables connecting Pakistan with the global network. As a result, all other internet providers in the country are forced to lease backbone channels from PTCL, which allows the monopolist to dictate pricing policy and artificially raise barriers for competitors to enter.[37] The monopolization situation worsened in 2024 when PTCL (through its subsidiary Ufone) initiated a deal to buy out the business of the Norwegian operator Telenor Pakistan. Industry experts warn that this consolidation will inevitably lead to a decrease in competition, an increase in tariffs for end consumers, and even greater centralization of the market in the hands of a quasi-state corporation.[17]

3.3. Internet Shutdowns by Order of the Authorities

The practice of state-initiated rolling internet shutdowns (shutdowns) has a formal, albeit extremely vague, legal basis. The key document is the Pakistan Telecommunications Act of 1996 (Section 54), which empowers the federal government to suspend the operation of licenses or order operators to cease the provision of communication services in the event of a state of emergency or the emergence of an abstract "threat to national security." The legal vacuum around the exact definition of such threats allows the authorities to arbitrarily interpret the law, applying shutdowns during ordinary political rallies, religious holidays (for example, Muharram), or even during school exams.[18]

The shutdown procedure is purely directive and administrative in nature and is devoid of any prior judicial control. The initiator, as a rule, is the Ministry of Interior, which sends a secret order to the Telecommunication Authority (PTA). Upon receiving the order, PTA in an ultimatum manner obliges telecom operators to immediately de-energize base stations in specified geo-zones or disable backbone gateways at the level of the entire province. Provider

companies, bound by strict conditions of license agreements, have neither the physical nor legal ability to challenge the order or warn subscribers.[18] Any delay in fulfilling the directive threatens the operator with multi-million fines or immediate revocation of the license, which turns private business into a submissive tool of state censorship.

3.4. Legislation on “Words on the Internet”

Pakistan has formed one of the most repressive legal systems in the world aimed at the total criminalization of freedom of speech in the digital environment. The foundation of this system is the Prevention of Electronic Crimes Act (PECA) of 2016, which at the initial stage was positioned as a means of combating terrorism and pornography, but was quickly reoriented toward suppressing political opposition and independent journalism.[53] The apogee of legal authoritarianism was the adoption at the beginning of 2025 of the PECA Amendment Act 2025, which finally consolidated the practice of criminal prosecution for the dissemination of so-called “fakes.”[63]

The central innovation of the amendments was Section 26-A, which criminalizes “the dissemination of fake news.” The law interprets this concept as broadly as possible: any intentional dissemination, demonstration, or transmission of false information that may “cause fear, panic, or unrest in society” falls under the ban, as well as any behavior related to “mocking, ridiculing, or discrediting state institutions” (implying primarily the army and the judicial system).[63] The absence of clear legal criteria for truth allows law enforcement agencies to classify any journalistic insight into corruption or a critical tweet as “cyberterrorism” or “incitement to rebellion.”

Punishment for “words on the internet” has acquired unprecedented severity. According to the new amendments, the guilty face imprisonment for up to three years and a colossal fine of up to 2 million rupees (about 7,200 US dollars).[63] The most catastrophic for human rights was the transfer of these offenses to the category of “non-bailable” (not subject to release on bail). This means that a citizen accused of writing a post is immediately taken into custody and sent to prison until the start of the trial, which is used as a method of psychological breakdown and intimidation of journalists.[67]

To ensure the uninterrupted operation of the repressive conveyor, the government carried out a large-scale institutional reform. Investigative powers were withdrawn from the Federal Investigation Agency (FIA) and transferred to the newly created, more loyal National Cyber Crime Investigation Agency (NCCIA).[63] Simultaneously with this, the Social Media Protection and Regulation Authority (SMPRA) and special Social Media Protection Tribunals (SMPTs) consisting of three government-loyal members were established.

The main blow to justice was that the 2025 amendments deprived citizens of the ability to file appeals against the decisions of these tribunals in the Provincial High Courts (which historically retained a certain independence). Now appeals must be sent directly to the Supreme Court, which is overloaded with cases and, after the adoption of the 26th constitutional amendment, has become significantly more vulnerable to pressure from the ruling coalition. According to the International Federation of Journalists and human rights defenders, this de facto introduces "digital martial law" in Pakistan, guaranteeing absolute impunity for the state apparatus.[25]

3.5. Legislation on Internet Blockings

The system of restricting access to information in Pakistan is institutionalized. Over the years of its existence, it has evolved from point-by-point blocking of blatantly criminal or pornographic sites to the creation of a multi-level tool of mass political censorship capable of instantly paralyzing the operation of global platforms on a national scale.

3.5.1. Legislation

The legal support for censorship is Section 37 of the PECA 2016 law, entitled "Unlawful Online Content." This article grants the Telecommunication Authority (PTA) exclusive and indisputable rights to remove or block access to any information on the internet if the department considers it necessary in the interests of "the glory of Islam, the security and defense of Pakistan, public order, decency, and morality."[70] The vagueness of these terms makes the power of the PTA practically unlimited. The legality of these powers has been regularly challenged in courts by civil activists (for example, in the high-profile case of the human rights organization Bolo Bhi v. Pakistan); however, the judicial system has invariably confirmed the PTA's right to apply blockings, pointing out only that the Authority is an independent body and should not blindly follow informal instructions from ministers.[56]

3.5.2. Blocking Procedures

The process of blocking resources in Pakistan is completely opaque and takes place outside the public eye. In technological terms, censorship is ensured by a super-powerful hardware-software complex for deep packet inspection (DPI) purchased abroad. Initially, the system relied on technologies from the Canadian company Sandvine; however, in recent years (2024–2025), an updated nationwide firewall WMS 2.0 (Web Monitoring System) supplied by the Chinese subsidiary Geedge Networks has been implemented.[71] This complex works in tandem with the Lawful Interception Management System (LIMS), to which military intelligence agencies (ISI) have direct access.[72] The decision to block is made by an internal closed PTA committee based on complaints from ministries or anonymous informants. After adding a URL address, IP address, or domain name to the database, the WMS 2.0 firewall automatically

resets TCP connections or falsifies DNS responses at the level of backbone gateways, making the resource inaccessible to subscribers of all providers in the country.[41]

3.5.3. Registers of Blocked Internet Resources

The state register of blocked resources in Pakistan has the stamp of strictest secrecy. The PTA categorically refuses to publish a full list of prohibited sites, citing a threat to national security and the impossibility of replicating "blasphemous" content. The public receives only dry statistical summaries post-factum, published in the department's annual reports. For example, in the report for the 2024–2025 financial year, the PTA reported blocking more than 88,035 URLs for "illegal content," as well as detecting and blocking 75,000 IP addresses and 2,400 domains classified as "hostile digital assets."[14] The impossibility of independent auditing of these lists leads to the fact that under the guise of combating extremism, sites of regional political parties, human rights NGOs, and independent news agencies are blocked.

3.5.4. Registers of Blocked Resources (Unofficial)

In conditions of an information vacuum, the only tool for monitoring censorship becomes initiatives of civil society and data leaks. Several years ago, on Reddit platforms and specialized forums, a leaking government list was published containing more than 400,000 blocked URLs; however, due to the dynamic nature of the internet, this list quickly becomes outdated and loses practical value.[74]

Systematic collection of information is carried out by local organizations for the protection of digital rights. The most important resource is the **Digital Rights Monitor** initiative (digitalrightsmonitor.pk), supported by the Media Matters for Democracy organization. The portal aggregates news about blockings, conducts surveys of journalists, and publishes technical confirmations of the inaccessibility of platforms.[75] The non-profit organization Bolo Bhi (bolobhi.org) also maintains archives of campaigns and court petitions, documenting the chronology of the shutdown of such giants as TikTok, Tinder, and Bigo.[56]

Additionally, law enforcement agencies sometimes publish small specialized lists for edifying purposes. For example, in 2024, the NCCIA agency publicly distributed a list of 46 blocked mobile applications and websites related to illegal gambling and CNIC database leaks, threatening criminal liability for their use.[79] Nevertheless, this is only a small, socially approved part of the iceberg of political censorship.

3.5.5. Development of Blockings

The dynamics of the development of blockings demonstrates a vector toward strengthening repression. A digest of reports from the **Open Observatory of Network Interference (OONI)** and the international organization **Freedom House** for 2019–2026 shows the authorities' transition from simple URL blocking to complex methods of protocol degradation. If in 2020–2021 the PTA blocked specific entertainment applications (TikTok, PUBG) under the pretext of protecting morality, then by 2024 the objects of attack became fundamental communication platforms. In February 2024, after controversial elections, the authorities completely blocked the social network X (formerly Twitter) for several months. In the summer and autumn of 2024, the WMS 2.0 system began targeted throttling of WhatsApp and Signal messenger traffic, preventing millions of users from downloading voice messages and media files in order to disrupt the coordination of opposition protests.[40]

Conclusion: The legislative framework and technical infrastructure of blockings in Pakistan have transformed into a highly effective mechanism of digital dictatorship. The opacity of procedures combined with modern foreign DPI technologies allows the authorities to conduct targeted censorship. For external observers, this process is almost imperceptible, but inside the country it seriously violates citizens' rights.

4. Human Rights Violations on the Internet

The situation with respect for human rights in Pakistan's digital environment is assessed by the international community as critical. The authoritative human rights organization Freedom House has for many years in a row assigned Pakistani internet the status of "Not Free," noting a steady degradation of basic freedoms.[40] The state systematically violates citizens' fundamental rights to freedom of expression, unimpeded access to information, and the inviolability of private life. The introduction of total mass surveillance systems, such as LIMS, allows security agencies to collect metadata, intercept electronic correspondence, and analyze the browsing history of tens of millions of Pakistanis with impunity without a court sanction. Such a scale of state control over citizens not only violates the norms of international law but also creates an atmosphere of fear in society. As a result, journalists, dissidents, and representatives of religious minorities are forced to resort to deep self-censorship.[72]

4.1. Internet Shutdowns by Order of the Authorities

The use of shutdowns — deliberate full outages of communication networks and the internet in specified regions or throughout the country — has become a favorite tool of Pakistani authorities for suppressing civil activity. According to data from the global coalition #KeepItOn

(organized by Access Now), Pakistan is among the world leaders in the frequency and scale of application of this repressive measure. Shutdowns are used as a preventive weapon against protests, causing catastrophic damage not only to human rights but also to the national economy. According to expert estimates, only in 2024, 84 days of internet outages and 322 days of social network blockings cost Pakistan's economy a colossal amount from 892 million to 1.6 billion US dollars.[19]

The most resonant precedents:

- **Historical blockade of FATA:** From 2016 to 2021, the government deprived 4.5 million residents of the Federally Administered Tribal Areas (FATA) of internet access under the pretext of conducting anti-terrorist operations. This multi-year blockade effectively destroyed the healthcare and education system in the region at the height of the COVID-19 pandemic.[82]
- **May 2023:** In response to mass unrest that erupted after the forceful arrest of former Prime Minister Imran Khan, the government initiated the harshest four-day nationwide blackout of mobile internet and key social platforms, trying to paralyze the logistics of protesters.[6]
- **2024 Elections:** On February 8, on the day of the general elections, the authorities completely shut down mobile communications and the internet throughout the country. This action, officially explained by "security considerations," deprived observers and the opposition of the opportunity to record massive falsifications of voting results.[25]
- **Autumn 2024:** On the eve of and during the multi-thousand marches of PTI supporters on Islamabad, the authorities again applied a shutdown, disconnecting internet services in the capital and adjacent areas.[40]

4.2. Criminalization of Statements on the Internet

Pakistan's state machine has put on stream the criminal prosecution of citizens for any manifestations of political or religious dissent on social networks. The use of the PECA law allows the authorities to imprison people without the right to bail for ordinary publications, classifying them as "cyberterrorism" or "discrediting the army." According to official admissions of government agencies, more than 1,200 criminal cases have been initiated only within the framework of combating so-called "fakes."[83]

The brightest examples of persecution:

- **Case of Khalid Jamil (August 2025):** The well-known independent reporter and analyst Khalid Jamil was arrested by operatives of the new NCCIA department in Islamabad. A protocol (FIR) was registered against him under the heavy articles 20 and 26-A of the PECA law. The official reason was his publication on the X network (Twitter), in which the

authorities saw “deliberate conduct, including mockery, ridicule, and discrediting of state institutions with a clear intention to provoke public discontent.” The journalist was deprived of liberty solely for criticizing civil servants.[66]

- **Cases of Wahid Murad and Farhan Malik (March 2025):** Journalist Wahid Murad was forcibly taken from his home by investigation agency employees for posting “frightening and misleading” content on the internet. In the same month, Farhan Malik, the founder of the media agency Raftar, was arrested in Karachi on an absurd charge of broadcasting “anti-state” content on his YouTube channel.[66]
- **Persecution of Asad Toor and Bilal Farooqi:** Well-known journalists with a critical position were arrested and charged with “incitement to rebellion” for publishing materials that the military establishment considered offensive. The investigation is often based on banal screenshots, while the accused are sent to pretrial detention (judicial remand) until an independent digital examination is carried out.[53]

4.3. Persecution of Media and NGOs

Repression has fallen not only on individual bloggers but also on institutional mass media and non-governmental organizations. The authorities are methodically destroying the islands of independent journalism, using the PECA law to paralyze the work of entire editorial offices.

A flagrant precedent demonstrating the complete erasure of boundaries between public space and private life was the 2025 criminal case against a group of women journalists. Pakistani law enforcement agencies initiated criminal cases under the PECA law against four journalists, one of whom held the post of secretary of the National Press Club in Islamabad (NPC). The “crime” of the women was that they discussed a controversial incident involving another club member in a **closed, private WhatsApp** messenger group. The International Federation of Journalists (IFJ) and the Federal Union of Journalists of Pakistan (PFUJ) issued a joint statement in which they categorically condemned this act of arbitrariness, emphasizing that the state uses the cybercrime law for illegal intrusion into private correspondence and targeted terror against female journalism.[85]

5. Civil Society in the Field of Internet Governance

Civil society in Pakistan working in the field of digital rights protection is forced to function in a hostile environment. Human rights defenders, lawyers, and activists are subjected to continuous pressure from the state repressive apparatus, risking becoming figures in criminal cases of “cyberterrorism,” and also face brutal online harassment campaigns organized by

right-wing religious radicals and pro-government trolls. Despite these extremely difficult conditions, Pakistan's non-governmental sector demonstrates outstanding resilience and a high level of professional self-organization. The main methods of struggle are strategic court cases (Public Interest Litigation) in the Supreme and High Courts, the publication of in-depth analytical studies, international advocacy at UN platforms, and the provision of direct legal and psychological assistance to victims of digital violence.[86]

A special focus of Pakistani civil society is directed toward protecting the most vulnerable segments of the population — women and gender minorities. In a patriarchal society, these groups suffer disproportionately from specific forms of cybercrimes, such as the dissemination of intimate images without consent (image-based abuse), blackmail, and coordinated campaigns of gender disinformation (TFGBV), the goal of which is to push women out of public political and journalistic discourse.[88]

5.1. Organizations

The leading role in shaping the architecture of digital rights protection in the country is played by the following authoritative non-profit organizations:

- **Digital Rights Foundation (DRF)** (digitalrightsfoundation.pk) Founded by the world-famous human rights activist Nighat Dad, DRF is the flagship of the fight for a safe internet in Pakistan. The organization focuses on privacy issues, the protection of women online, and legislative lobbying. DRF's key project is the "Digital Security Helpline," which over 8 years of its existence has provided assistance to victims in more than 20,020 cases of cyberbullying and blackmail (of which over 3,100 cases only in 2024). The foundation also publishes critical reports deconstructing authoritarian laws such as PECA.[90]
- **Bolo Bhi** (bolobhi.org) An organization whose name translates from Urdu as "Speak," founded by activist Farieha Aziz. Bolo Bhi specializes in radical advocacy for freedom of expression, gender rights, and transparency of state governance. The NGO actively challenges the actions of the regulator (PTA) in court instances, seeking the cancellation of unconstitutional platform blockings. Together with the George Washington University School of Law, the organization created a massive "Digital Rights and Privacy Resource" (DPRR) for training lawyers in methods of countering digital authoritarianism.[56]
- **Media Matters for Democracy (MMfD)** (mediamatters.pk) A non-profit organization whose mission is to support independent journalism, the development of digital democracy, and the improvement of media literacy. MMfD manages the news portal "Digital Rights Monitor," which has become the main aggregator of information about blockings and censorship in Pakistan. The organization conducts large-scale trainings for journalists on the basics of digital security, organizes hackathons on fact-checking (TruthSprint), and fights political disinformation.[75]

5.2. VPN and Means of Bypassing Blockings

In the realities of total state censorship and the operation of the national firewall WMS 2.0, Virtual Private Networks (VPN) and proxy servers have ceased to be just niche technologies for IT specialists, turning into a basic survival tool for millions of Pakistanis. Journalists, businessmen, the multimillion army of freelancers, and ordinary citizens critically depend on VPN to bypass artificial blockings of communication platforms (such as X/Twitter or WhatsApp), ensure the security of banking transactions, and maintain connection with the global market.[18]

However, the state apparatus perceives encrypted traffic as an existential threat. Since VPN hides the content of transmitted data, it makes ineffective the multi-million deep packet inspection (DPI) systems and disrupts the operation of the state interception system LIMS, depriving security agencies of the monopoly on reading citizens' correspondence.[72]

5.2.1. Status of VPN Services

The legal status of VPN use in Pakistan balances on the brink of a complete legislative ban. In the autumn of 2024, the Ministry of Interior officially demanded that the PTA block all "illegal" VPNs, groundlessly equating their use with aiding terrorism and financial fraud. This political directive was ideologically reinforced: the Islamic Council (an advisory body of the clergy) issued a fatwa declaring the use of VPN "un-Islamic" because it allegedly opens access to immoral content (later the authorities clumsily tried to justify this statement as a "typo").[95]

The regulator (PTA) introduced rules for the "mandatory registration" (whitelisting) of VPN tunnels. Companies, software centers, and freelancers are required to submit online applications, disclosing their passport data, legal entity details, IP addresses, and purposes of using encrypted channels. At the beginning of 2025, the screws were tightened even further: the PTA issued a decree obliging the international VPN providers themselves to obtain a special "Class License for Data Services" to operate in Pakistan — a requirement that is knowingly impossible for foreign services focused on privacy and without representative offices in the country.[97]

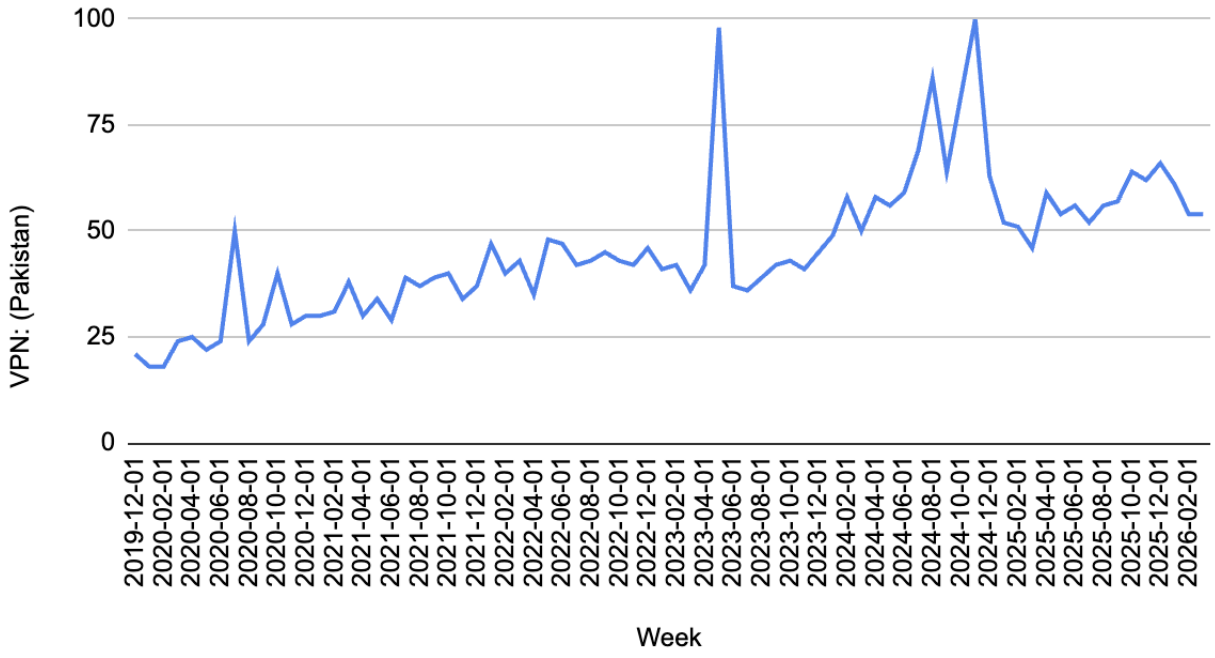
Links to regulatory documents:
(https://www.pta.gov.pk/category/vpn-registration-process-55198854-2024-11-18).[97]

5.2.2. Number of VPN Users

Attempts to ban VPN have only led to an explosive growth in their popularity. According to the results of a nationwide representative study conducted by the Gallup Pakistan agency at the beginning of 2025, **18% of all internet users in the country regularly use VPN**. The most

active users of censorship bypass tools are men (23% of respondents) and the young generation under 30 years old (24%).[99] Dynamics of demand for VPN (based on aggregated data from global trackers and social surveys):

Graph 10: Dynamics of Search Queries about VPN in Pakistan (2020-2026)



Source: trends.google.com

State blockings of VPN services themselves are carried out at the technological level. The WMS 2.0 firewall uses heuristic analysis to recognize signatures of popular VPN protocols (OpenVPN, IPsec, WireGuard) in the data stream. After detection, the system artificially reduces bandwidth (throttling) or completely resets TCP packets, making the use of unregistered VPN a мучительным “lottery test” with constant connection drops.[72]

5.2.3. Cases of Persecution for Using VPN

Although mass criminal convictions of individuals solely for installing a VPN application on a smartphone have not yet been recorded, the state has launched an economic terror campaign against businesses using unauthorized encryption. In November 2024, at the height of the political crisis, the authorities applied total jamming of unregistered VPN traffic throughout the country. This led to the collapse of the IT industry: call centers, software exporters, and freelancers lost the ability to securely connect to the servers of their foreign clients. Such collective punishment put many companies on the brink of bankruptcy and dealt an irreparable

blow to Pakistan's reputation as a reliable outsourcing hub, forcing part of the business to begin transferring legal registration to Dubai.[18]

5.2.4. Blocking Monitoring

Foreign research centers and developers of anti-censorship software continuously monitor VPN anomalies in Pakistan, publishing shocking data on demand surges over the past 5 years:

- **Top10VPN (2020–2025):** The tracker regularly records explosive growth in VPN client downloads by hundreds of percent during periods of political instability. Particularly large surges were observed in February 2024 during the blocking of the X network (Twitter) and during the periods of arrests of opposition leaders. Project analysts emphasize that Pakistan is copying the censorship model of China and Iran.[95]
- **Proton VPN and Surfshark (2024):** In November 2024, against the background of the Ministry of Interior's statements about a complete ban on "illegal" VPNs and the start of aggressive traffic jamming, the Swiss provider Proton VPN recorded an anomalous, panicky surge in the use of its service in Pakistan by 350% in just one day. People massively searched for alternative, yet unblocked protocols to maintain communication.[95]

6. Conclusion

A comprehensive analysis of infrastructure, legal, and political data for the period from 2019 to 2026 allows us to draw an unambiguous and disappointing conclusion: **in the Islamic Republic of Pakistan, a rigid system of systematic violation of human rights in the field of access to information, freedom of speech, and the inviolability of private life has been built and is functioning**. The digital space of the country is managed from the positions of ensuring total control by the military-political establishment. The creation of an expensive, echeloned surveillance infrastructure (the introduction of the WMS 2.0 firewall and the LIMS interception system), the adoption of draconian amendments to the PECA law of 2025 that criminalize journalism with prison terms without the right to bail, as well as the practice of punitive rolling internet and VPN service shutdowns — all this indicates the state's transition to full-fledged digital authoritarianism. This course is being implemented despite the country's acute economic need for the development of the IT sector and the attraction of foreign investment.

Forecast of the development of events (3 scenarios):

1. **Neutral (Preservation of the status quo).** The government will continue to maneuver between the economic needs of the IT sector and the paranoia of the security agencies. The state will ensure the operability of "whitelists" of VPN for large businesses but will continue to mercilessly jam censorship bypass tools for ordinary citizens.

Blockings of global social networks will remain politically motivated and regular, and the overall internet speed will permanently suffer from WMS 2.0 filtering. Legislation (PECA) will be applied pointwise but harshly — to intimidate key journalists and activists, maintaining a high level of self-censorship in society.

2. **Positive (Forced liberalization).** The least likely scenario. Under the threat of complete economic collapse, harsh pressure from the IMF, and ultimatums from transnational technology corporations (through the Asia Internet Coalition), the government of Pakistan will be forced to make concessions. The authorities will cancel the most repressive articles of the PECA 2025 law, return judicial control over the decisions of the SMPT tribunals, and make the blocking process transparent. The rejection of total DPI jamming will allow unlocking the export potential of the IT sector, attracting direct investments in telecom infrastructure, and stabilizing the national economy.
3. **Negative (Isolationist censorship).** Escalation scenario. The military-civilian establishment will complete the construction of a national intranet similar to the Chinese and Iranian models. All unregistered VPNs will be blocked at the provider level. Global platforms (YouTube, Facebook, X) that refuse to store data on servers inside the country and provide backdoors to security forces will be subjected to indefinite blocking. Arrests for publications on the internet and discussions in closed messengers will take on a mass character. This will provoke a catastrophic brain drain, the final flight of IT business to freer jurisdictions (Dubai), and the deepest stagnation of Pakistan's economy under conditions of digital isolation.

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