Working Paper 10

January 2022

The Fixed Broadband Challenge

BUILDING THE RUNWAY FOR PAKISTAN'S ECONOMIC TAKE-OFF

Aliza Amin   Umar Nadeem   Navid Qazi

TABADLAB

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Bismillah irr Rahman irr Rahim

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The Fixed Broadband Challenge:
Building the Runway for Pakistan's Economic Take-off
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Centre for Digital Transformation at Tabadlab

Tabadlab established the Centre for Digital Transformation as its first dedicated centre in 2019 with the aim to become a pivotal actor in digital journey of Pakistan by using Tabadlab's approach to understanding change. This framework for change uses three foundational factors:

1. Data and Evidence: generating, synthesizing and producing world-class research and analysis to inform policy and business decisions

2. Strategic Communication and Persuasion: clear, innovative and tailored suite of communications products to deliver information and messages in a contextually optimal manner

3. Engagement: broad-based engagement to influence outcomes through anchoring support across quarters – political, bureaucracy, technocrats, direct policy and decision-makers, and beneficiaries

In its brief two-year history, CDT has worked with federal and provincial governments in Pakistan to inform and shape Covid-19 recovery across a range of sectors through formal and informal advisory engagements. In addition, a portfolio of Thought Leadership products including Policy Roundtables with notable local and international experts, publications on policy analysis, industry and ecosystem analysis has been published along with a rich pipeline in the works.

CDT aims to work with government, industries and businesses, development partners, non-profits, and civil society as an independent and non-partisan forum that works towards developing the digital ecosystem in Pakistan and gear it towards a transformation that improves outcomes for all. CDT has been designed to focus on overarching areas of interest, existing challenges and crafting of roadmaps that help in leapfrogging. We plan to take a systems approach to strengthen and create pillars that support not just digital verticals but focus on cross-linkages to embed digital in daily lives. Our mandate will cover analysis and engagement on the economy and society alike. While the economic incentives for fast-tracking digital are obvious, its spillovers and repercussions on the society and how we need to evolve to be able to not only better understand but also equip and enable communities, households and individuals to embrace the digital future.

Acknowledgments

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List of Abbreviations

3G	third-generation
4G	fourth-generation
5G	fifth-generation
ADP	Annual Development Programme
CAGR	compound annual growth rate
CDMA	Code Division Multiple Access
CERT	Computer Emergency Response Team
CPE	client-premises equipment
DSL	Digital Subscriber Line
EVDO	Evolution-Data Optimized
FAB	Frequency Allocation Board
FTTH	fibre-to-the-home
FTTx	fibre-to-the-x
GB	gigabytes
ICT	information and communications technology
IT	information technology
IP	Internet Process
IsDB	Islamic Devel
Kbps	kilobits per second
LDI	long distance and international
LTE	Long-Term Evolution
Mbps	megabits per second
MoITT	Ministry of IT & Telecom
NBI	National Broadband Initiative
NBP	National Broadband Policy
NBS	National Broadband Strategy
NFCP	National Fiberisation and Connectivity Plan
NTC	National Telecommunication Corporation
PSN	Public Switched Network
PTA	Pakistan Telecommunication Authority
PTC	Pakistan Telecommunication Corporation
PTCL	Pakistan Telecommunication Company Ltd.
QoS	Quality of Service
RoW	Right of Way
RPI	Indonesia Broadband Plan
SBP	State Bank of Pakistan
SMEs	small- and medium-sized enterprises
UAE	United Arab Emirates
USF	Universal Services Fund
VPN	virtual private network

Executive Summary

You may remember it like it was yesterday, the sound of the dial tone as the modem engaged your phone line, the apocalyptic crackle as the modem tried to connect to a world just beyond the computer screen, and the long waits for a single website to load. That's what it was like in the good old days, but the 'world wide web' has come a long way since then.

No longer a technological novelty, the internet today is an essential requirement for economic activity, service delivery, communications and social media and, of course, education and entertainment. In fact, so much of every day life depends on a reliable connection to the internet that it seems impossible to imagine a life before we could go online.

But unless fixed line broadband is recognized as a utility, at par with power, water, heating and other essentials, Pakistan may not be able to keep up with the pace at which the global economy is switching to digital rather than physical interactions.

The digitisation of most day-to-day tasks and activities – from shopping for a toothbrush to attending a lecture on trigonometry – meant that anyone who didn't have an internet connection during the worst phases of the lockdown has been 'left behind'. A great analogy for being internet-dark during the pandemic would be of 'lost tribes' that have had no contact with the outside world for years; if they are to try and integrate with modern society, they have a lot of catching up to do.

The power of the internet as an engine for economic growth can only be harnessed if there is universal access and Quality of Service is ensured. This is also why the 100 million or so mobile broadband users of Pakistan do not represent a firm base for a digitisation of the economy; because mobile broadband depends on fixed-line for its bandwidth and has a reduced user experience (in terms of quality of service, connectivity and speed) than the more stable fixed-line connection.

But it isn't possible to roll out next-generation technologies on existing and (in many cases) outdated infrastructure, which is why investment into a fibre optic infrastructure is essential. Such an infrastructure would not only connect major urban centres and metropolitan areas, but also tier 2 and smaller towns, at equivalent speeds to those enjoyed by users in tier 1 areas, levelling the playing field and making it easier for innovations and ideas to come out of places that may not have the most resources.

One of the primary factors that will dictate Pakistan's ability to position itself for success in the digital age is ease of access, i.e. how easy is it for citizens, firms and institutions to get on and cruise the information superhighway.

Fixed broadband provides the backbone for just that; it is how end-users connect to high speed internet. The transition to next-generation 5G technology will require fibre optic technology for deployment of high-speed data services without compromising the quality of the connection. In a country where existing copper telephone wires have been repurposed for use with DSL, 3G and 4G networks, this will be quite an ask.

We have seen that internationally, a 10% increase in fixed broadband penetration can lead to an increase of at least 1.38% in GDP growth in developing countries such as Pakistan.

High-speed connectivity can power Pakistan's digital economy by producing social and economic impact in three key areas:

- Individual-critical connectivity required for entertainment, service delivery requiring remote/ digital access to education, skills, health, financial services, public services, employment and more
- Family-critical connectivity for instant and reliable communication between families with increasing preference for rich media use-cases like video calling especially for diaspora
- Enterprise-critical connectivity to power communication, collaboration, access to data, information and knowledge, and other business-critical applications for organisations across the globe

However, the challenges characterise the growth of fibre coverage in Pakistan are manifold:

- Low demand since price conscious users rely on mobile data plans with capped usage and slower speeds
- Limited competition with the market being restricted to a handful of service providers and little to no infrastructure-sharing
- An unfavourable policy and regulatory environment with high fees and levies, right-of-way issues, slow-moving administrative processes and complicated jurisdictional overlaps
- Sub-optimal levels of investment by service providers to expand to a scale that can drive mass fixed connectivity

The Ministry of IT & Telecom (MoITT) has been prolific when it comes to introducing new policies. Over the past two years alone, we have seen the introduction of the Rolling Spectrum Strategy and the Right of Way Policy Directive in 2020. The National Broadband Policy 2021 and update to Digital Pakistan Policy (for 2021) are current under development.

With the policy landscape bustling with activity, it is high-time that a coherent approach towards realising the dream of a 'Digital Pakistan' be adopted, which will require greater attention to detail in the following areas:

- A sharp focus on clearly-defined objectives and longer-term outcomes that are citizen-centric

- Policy frameworks that are devised based on a sound understanding of the ecosystem, current challenges, roles of actors and a convergence for net positive impact
- Robust implementation and accountability structure that enables relevant agencies to execute with speed, precision and high quality
- More coherence among different policies and a re-centring to sharply focus on outcomes enabled through digital

Countries like Malaysia, Bangladesh and Vietnam have done well to expand their infrastructure and services. Their examples can provide Pakistani leaders with key insights on how important the role of fibre expansion can be for the digital transformation of countries.

According to estimates, an investment to the tune of at least USD 6 billion is required to capture the potential target pool of 10 million house passes, a massive undertaking that is beyond the current capacity and intent of existing service providers.

These considerations are now being evaluated by Ministry of IT and Telecom in light of industry feedback regarding the National Broadband Policy 2021, with the view towards re-drafting the policy to make it more responsive to market needs. Targeted policy interventions with clearly defined objectives and targets are required in the following priority areas:

01 **Priority Area One:** Raising the importance of fixed broadband

- Increase awareness of the centrality of fixed broadband to economic growth
- Establish broadband as 'critical infrastructure'

02 **Priority Area Two:**

Developing a national broadband strategy

- National fibre plan with timebound targets for long-haul fibre capacity coverage in all second and third tier cities in Pakistan, with a focus on the local manufacturing of the fibre being laid, and an enhanced accountability regime for quality of service
- Regulatory measures to improve the licensing regime for fixed broadband providers, reduce barriers for expedited rollout and improving access to consumer and enterprise services
- Improving spectrum allocation and utilisation at affordable fees and improved mobile broadband adoption
- Boosting demand through increased awareness and offerings specific to use-cases for the unconnected, especially digitally disadvantaged demographic groups, such as women
- Enhancing security and resilience for consumers, businesses and national infrastructure in the cyber space

03 **Priority Area Three:**

Raising investment and financing

- Improving the investment climate that impacts licensing, operational requirements, and administrative oversight across the technology and digital ecosystem
- Improved availability of financing by synergising public and private funding opportunities including targeted funding programmes for fibre expansion
- Promotion of development and usage of shared infrastructure to reduce costs, improve certainty and allow for rapid expansion of services
- Rationalisation of the broadband taxation regime to make the business case for investment more favourable

04 **Priority Area Four:**

Improving administration

- Improving administrative capacity at all tiers of the government to ensure fair, smooth and proactive policy implementation in a business-friendly manner

01
Understanding the Connectivity Conundrum

The evolution of the Internet from a novelty to an essential utility can directly be correlated to advancements in the sophistication and speed of connectivity, enriching, and sometimes replacing, real-life interactions between individuals, families, businesses and societies. While Covid-19 may have accelerated the world's shift to online-only interactions, two decades of altered social and economic experiences demonstrate that the technology to facilitate this rapid changeover already existed. Broadband penetration was already rising at a rapid and unprecedented pace and cellular networks were crucial to accelerating internet access through mobile broadband services.

But mobile broadband has its limitations: it cannot support the growth of digital ecosystems on its own. It is powered by the same fibre optic infrastructure used by fixed broadband, which offers higher speed, lower latency and a greater experience than alternative fixed line technologies.

Over the past five years, internet penetration in Pakistan more than doubled, from 22% in 2016 to 54% in 2021[1], and the country currently has over 100 million broadband subscribers relying primarily on mobile broadband to access the Internet.

But what lies ahead for a country with over 100 million broadband subscribers: transformational growth driven by digital economy start-ups that can digitise economic transactions and daily-life experiences, or an uncertain technological future in which global developments in blockchain, artificial intelligence and 'big data' advance faster than Pakistan can keep pace?

The answer hinges on many variables, perhaps none more central to the ability of a country to position itself for success in the digital age than ease of internet access, i.e. how easy is it for citizens, firms and institutions to get on and use the information superhighway. In short, Pakistan's success in the digital age will hinge enormously on the quality of its internet infrastructure, in particular the balance of its connectivity equation: technology (broadband and fibre), quality (speed and experience) and affordability (price and value).

Given that Pakistan's current fixed line penetration is just over 1%, there is evidence to suggest that the country faces a significant opportunity to harness its demographic dividend through focused and impactful decision-making around digital connectivity.

To be clear, this opportunity has existed, at one level or another, since the turn of the century. But translating it into sustainable advantage requires a critical examination of the obstacles to making fixed broadband more pervasive: clear vision, decisive policy actions and swift implementation can help Pakistan make up that lost ground.

1.1 Fixed versus Mobile Broadband

Broadband refers to high-speed and wide-bandwidth internet connectivity. This is substantially faster than dial-up internet because it transports data signals at a wide range of frequencies[2]. Fixed broadband is characterised by data transmission speeds of at least 256 kilobits per second (Kbps) to a fixed location, such as a residence or business.

Table 1: Average fixed broadband speeds by technology

Technology	Downstream/Upstream Rate
Digital subscriber line	24/3 Mbps to 240/40 Mbps
Cable modem	1 Gbps/200 Mbps
Fibre-to-the-x	10/10 Gbps +

Source: European Commission

Today, broadband connections deliver speeds in excess of several megabits per second (Mbps). There are two overarching categories of fixed broadband: wireless and wired. Wireless includes mobile radio, fixed radio and satellite technologies[3], while wired broadband can be further classified into the following[4]:

- **Digital subscriber Line (DSL)** utilises the copper telephone lines already installed in homes and businesses to provide data transmission speeds ranging from several hundred Kbps to Mbps.
- **Cable modems** allow cable operators to transmit data to end-users through coaxial cables that are also used to deliver pictures and sound to television sets.
- **Fibre-to-the-x (FTTx)** uses fibre optic technology to convert data, transmitted through electric signals, into light through transparent, ultra-thin glass fibres. Its speeds surpass those of DSL or cable technologies by tens or hundreds of Mbps. In recent years, fibre optic infrastructure has been prioritised as the preferred technology for fixed broadband due to its higher speed and lower probabilities for electromagnetic interference.[5]

Mobile broadband, on the other hand, works by transmitting signals to mobile phones via cell sites. It allows end-users to access data from outside a fixed location in any area their mobile network allows. Due to its lower latency, fixed broadband typically offers better speed and a more reliable connection than mobile broadband. Mobile broadband propositions also typically offer usage limits and are relatively more expensive compared to equivalent packages offered by fixed line service providers for households or enterprises, which include the option of connecting multiple devices.

Fixed-line infrastructure also plays a central role in enabling mobile broadband by connecting cell sites to mobile switching centres over a backhaul network. For instance, mobile networks may use copper lines to connect cell sites when offering second-generation (2G), 3G and 4G services. On the other hand, 5G is an advanced protocol offering greater bandwidth and higher download speeds than 3G or 4G networks. It relies on fibre optic technology for the deployment of these high-speed data services without electromagnetic interference or a compromise in quality when network density increases, and offers higher bandwidth connecting potentially millions of devices beyond simply handsets.

1.2 Significance of Fixed Broadband

The importance of a strong national connectivity profile, with fixed broadband as its mainstay, can be encapsulated in the following statistic: a 10% increase in fixed broadband penetration can increase GDP growth by 1.2% in developed economies, and at least 1.38% in developing countries such as Pakistan.[6]

Digital connectivity, in many cases, offers an alternative for the physical connectivity that road and highway networks once had a monopoly on and countries are now increasingly relying on high-quality broadband offerings to define and secure their position in the global digital economy. The benefits of broadband penetration for an economy range beyond the impact of efficiently connecting individuals and businesses. It creates more jobs, both directly and indirectly, acting as a key enabler of social and economic development.

More than ever, Covid-19 has highlighted the importance of digital connectivity and increased the demand for high-speed broadband as businesses, governments and individuals increasingly adopt digital means of staying in constant communication. Between February and mid-April 2020, global internet traffic surged by almost 40%, highlighting the impact of pandemic on the way global economies operate.[7] During Covid-19 lockdowns, daily internet usage increased by 5%, while urban areas saw an overall 10% increase in daily internet usage since the beginning of the Covid-19 crisis.[8]

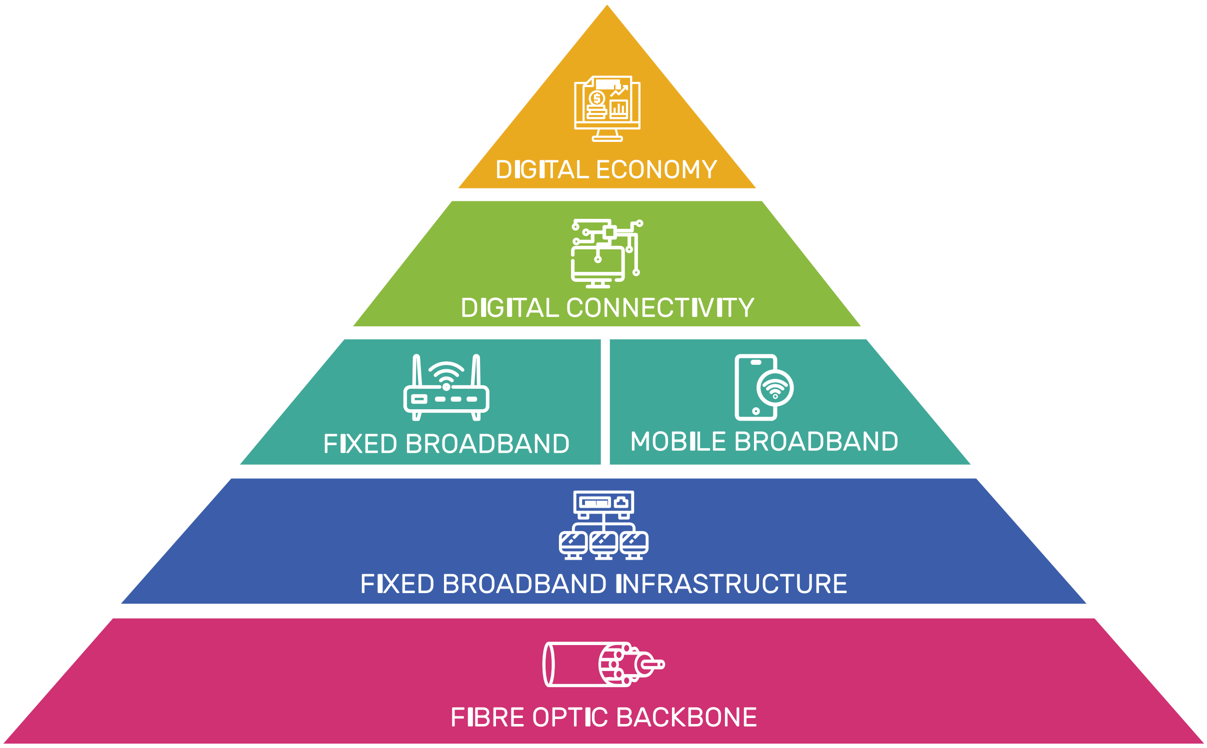


Figure 1: Pakistan's Digital Pyramid

Amidst pandemic-induced digitisation, a growing information and communications technology (ICT) sector and a youth bulge in which 59% of Pakistan's population are between the ages of 15 to 59, connectivity is increasingly acknowledged as a key pillar supporting Pakistan's economy.[9] Broadband access also increases opportunities for civic participation, especially among the youth, and adds to the number of opportunities available for engagement with young and/or marginalised groups.

From digital governance to financial services and tele-health to remote education, the pandemic has permanently altered the traditional model of the citizen-state relationship. Investing in broadband and taking our economy online can not only expand public service delivery and increase employment opportunities for individuals in smaller cities but can also level the playing-field vis-à-vis the urban-rural divide.

High-speed connectivity can power Pakistan's digital economy by producing social and economic impact in three key areas:

1.2.1 Individual Critical Connectivity

Broadband has transformed possibilities for social opportunities, entertainment and other forms of recreation for individuals, and today, is even considered the mainstream source for recreation – ahead of cable television – in the wake of the Covid-19 pandemic.

Fixed broadband is also an emerging requirement for service delivery: remote/digital access to education, skills, health, financial services, public services, employment and more. Internet access has altered how individuals interact with the world around them, an unescapable reality that the public and private sectors must prioritise in their approach to modern telecommunications.

1.2.2 Family Critical Connectivity

Use cases for fixed broadband go far beyond economic returns, since it is central to communication practices between individuals and families. With an estimated nine million Pakistanis living overseas[10] (the sixth largest diaspora population in the world) connectivity is integral for maintaining relationships over long distances. Greater access to overseas scholarships, as well as course and employment opportunities can also be a benefit of increasing broadband penetration. Limited mobility and safety precautions during Covid-19 have increased the need for instant connectivity amongst friends and families locally, with increasing preference for rich media use-cases such as video calling.

1.2.3 Enterprise Critical Connectivity

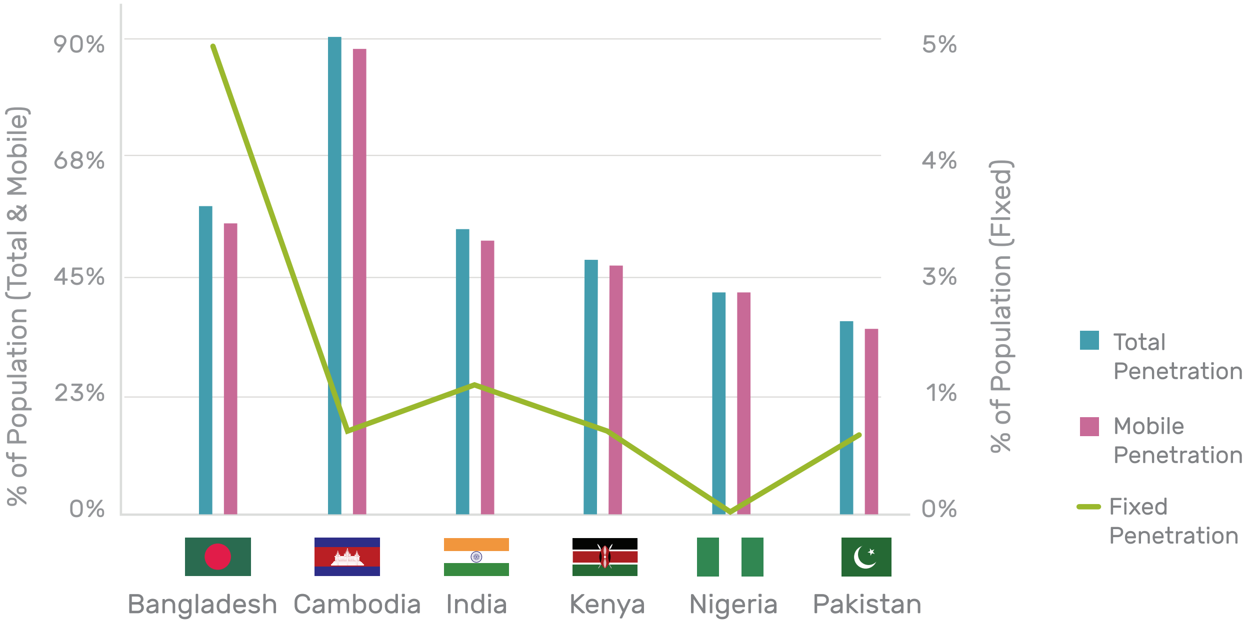
Powering communication, collaboration, access to data, information and knowledge, and other business-critical applications for organisations across the globe requires a connectivity experience that is more effectively serviced through fixed-line broadband. In addition to its successes enhancing productivity and optimising work-flows, high-speed connectivity has increased competitiveness and lowered barriers to entry for countless businesses and small- and medium-sized enterprises (SMEs) to allow them to pivot to digital business models. As of 2019, only 27% of Pakistanis are employed in the formal economy,[11] and expanding access to broadband is crucial for access to entrepreneurship and resources that will help nourish innovative ideas and increase citizens' participation in the formal economy.

As the world continues to digitise, Pakistan must also follow suit and evolve in order to generate social and economic returns and accelerate its pace of development. The Inclusive Internet Index 2021 ranked Pakistan 90 out of 120 countries due to a range of factors, particularly low-quality networks and infrastructure. In order to power our digital economy, it is critically important that Pakistan significantly revamps the broadband value chain to improve experience without compromising affordability for users. Increased awareness, a growing population of digital natives, improved access to smart devices and an ever-expanding bouquet of digital services will result in exponential growth of Pakistan's digital footprint. This will require robust connectivity that is commensurate with future requirements. Mobile broadband proliferation has served well to increase access, but deepening usage will require a much more promising experience which can be offered by fixed broadband with a fibre backbone.

1.3 Global Context

The massive surge in domestic data traffic and the consumption of digital media associated with Covid-19 lockdowns has increased the market demand for broadband exponentially. While service providers have largely managed to cope with this rising demand as a result of existing investments in ICT infrastructure, the pandemic has underscored the importance of fixed networks and has compelled stakeholders to significantly enhance and accelerate their expansion plans. Although some markets are on a similar footing in terms of fixed broadband, Pakistan can draw inspiration from the models implemented by counterparts in the Asia Pacific region.

Chart 1: Broadband Penetration of Comparable Markets (% of population)



Source: ITU 2020

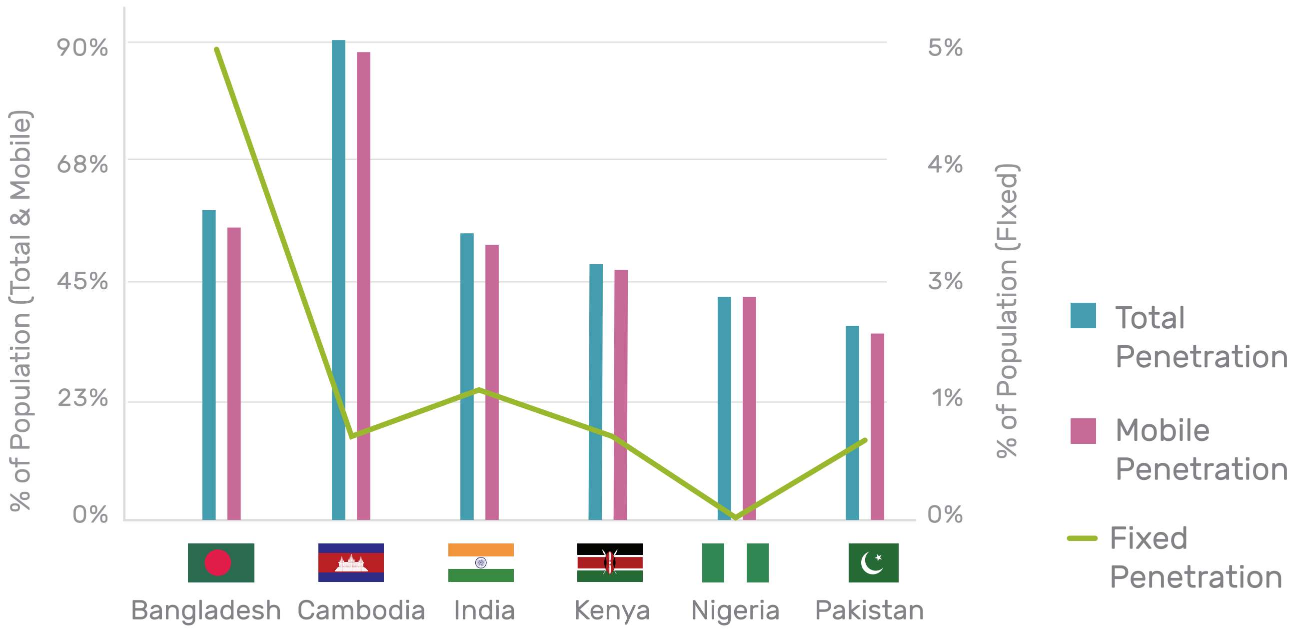
1.3.1. Comparable Markets

Pakistan's challenges, such as a rural-urban divide, a dependence on connectivity via mobile broadband, high taxes and a low demand for high-speed broadband have all been overcome by other countries in the past. Despite having one of the lowest price points for mobile broadband in the world (USD 0.48 per 1.5 GB of data), Pakistan suffers from lower mobile and total broadband penetration when compared with other comparable countries.

Fixed broadband adoption is low amongst all members of Pakistan's peer group: at less than 5% penetration, and an average of almost 2% penetration. Regardless, certain countries have, over the past decade, been taking steps to expand their infrastructure. For instance, India currently has a 2.8 million km fibre optic network and a fibre-to-tower ratio of 32%. The 2019 National Broadband Mission intends to grow this to a 5 million km network with a fibre-to-tower ratio of 70% by 2024.[12]

This ratio stands at 40% in Malaysia, 32% in India and 27% in Bangladesh, but only 9% of mobile towers in Pakistan are connected to fibre.[13]

Chart 2: Broadband Prices (USD)



Source: ITU 2020

Higher penetration of fixed broadband, better mobile internet experience (possible when more towers are connected via fibre optic networks), and lower broadband prices enable and improve the adoption of digital services locally, as well as contribute to a boost in exports which can leverage these newfound digital capabilities. A case in point is India whose information technology (IT) exports – including freelancers and tech start-ups – reflects the impact of an enabling connectivity landscape on the creation of a stronger digital economy.[14,15]

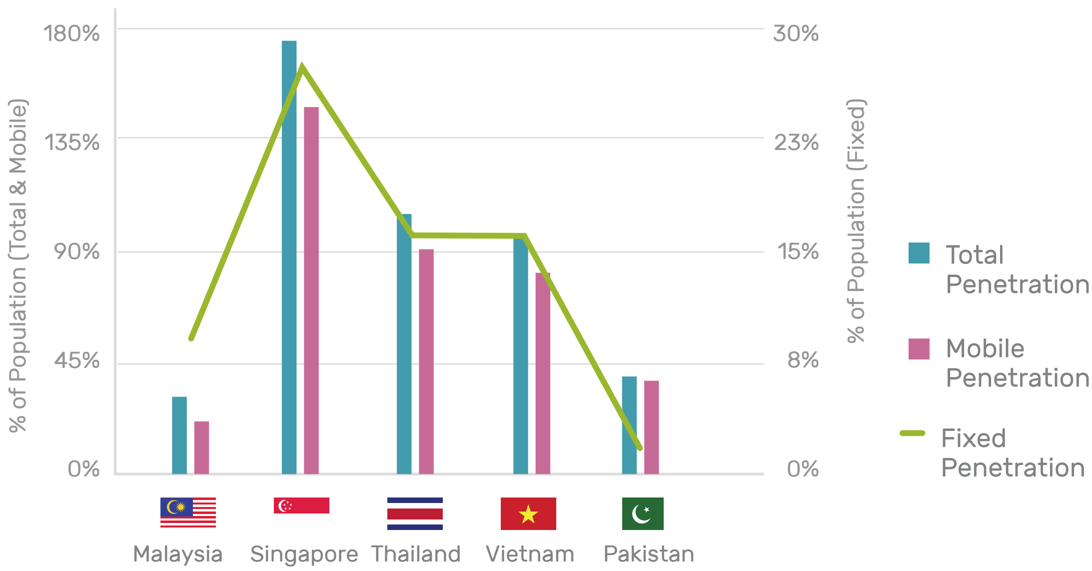
1.3.2. Successful Markets in the Asia Pacific

Economies in the Asia-Pacific region with an advanced fixed network base, in which penetration is greater than 10% and is as high as 27%, demonstrate what Pakistan can aspire to achieve over the next decade. Factors that have improved fixed broadband coverage in this region include new fixed-line entrants and increased competition in the market, open access and whole sales agreements under a national broadband network with a structural separation framework, the resurgence of 4G/5G fixed wireless access technology and the emergence of satellite broadband Internet as an alternate source of coverage.

As a result of large-scale fibre rollouts combined with the aforementioned efforts, fixed broadband subscriber penetration is projected to grow from 16% in 2020 to 21% in 2025 with over 2.5 billion users.

By 2025, the market is also expected to be dominated by FTTx at a 90% share, with China and Singapore having the highest fibre-to-the-home (FTTH) subscriber penetration.[16]

Chart 3: Broadband Penetration in Asia Pacific (% of population)



Source: ITU 2020

Case Study: What's Happening in Vietnam?

In August 2021, Vietnam announced that it would aim for the digital sector to represent 20% of the country's GDP by 2025 and 30% by 2030. Currently, Vietnam's digital economy accounts for only 8.2% of its GDP while its e-commerce market represents just 3% of its total retail market. However, this does not mean that Vietnam is poised for failure. Over 50% of its population owns smartphones while mobile broadband penetration stands at 80%. While fixed broadband is dominated by DSL, over the past five years the government has focused on expanding solely fibre infrastructure.[40] The country presently ranks greater in terms of internet users than any other Southeast Asian country.[41] Furthermore, Vietnam received almost USD 2.9 billion of investment in its digital sector between 2016 and the first half of 2020. The country's digital economy is projected to grow by almost 30% each year.[42] Vietnam has also become a major attraction for technology investors such as Goodwater Capital LLC and Alibaba Group Holding Ltd.

02
State of Broadband in Pakistan

2.1 Pakistan's Connectivity Profile

Like the rest of the world, Pakistan has benefited from exponential growth in digital connectivity and usage since the introduction of mobile broadband services. Handheld devices and mobile broadband connectivity define the average Pakistani's digital experience, as over 160 million Pakistanis connect to the Internet using their mobile phones. During the Covid-19 pandemic , Pakistan witnessed a significant 17% rise in broadband subscriptions from 71 million subscribers in 2019 to 83.1 million in 2020, which stands at over 100 million subscriptions as of June 2021.

The government's plans to rollout 5G services by December 2022, while ambitious, are indicative of their acceptance of the fact that connectivity is a lifeline for an aspiring digital economy, and improving the digital experience for millions of Pakistanis must be a priority area. The government's focus on a roadmap for the transition to 5G is also a welcome step. However, there are fundamental concerns around optimising the deployment and utilisation of 4G services. Market players will need to assess the readiness of Pakistan's broadband infrastructure and ecosystem before 5G services can be successfully deployed as the current fibre optic infrastructure running 3G and 4G services has been deemed inadequate to service next-generation technology.

Despite 96% of the population having Internet awareness[17] and 87% using mobile broadband services,[18] just over half of all Pakistanis have an active internet connection.[19] The pandemic has highlighted the rapidly-increasing need for shifting service delivery online and making most things accessible via mobile phone. Barriers to affordability, adoption, infrastructure and efficiency persist and heavily impact internet usage. This is reflected in the fact that 54% of Pakistanis who are covered by broadband networks do not subscribe to them, which limits the adoption of use cases that require higher bandwidths and provide a better user experience.

2.1.1 Affordability

High taxation rates on telecommunications extend to internet services as well, which eventually affects coverage and affordability for end-users. Sales tax on Internet packages ranges from 16% in the Islamabad Capital Territory to 19.5% in the provinces. Despite this, Internet usage is becoming cheaper over time. Since 2015, the average price of one gigabyte of data has decreased from PKR 300 to PKR 110 in 2020.[20] However, as the number of subscribers on the network increases due to such promotional tactics, it will reduce overall experience and connectivity speeds.

2.1.2 Adoption

Average data usage in Pakistan has more than doubled over the past five years from 0.9 GB per subscriber per month in 2015 to 1.91 GB per subscriber per month in 2020, indicating a growing reliance on digital resources among citizens.[21] This is supported by the exponential growth of mobile broadband, which has increased at a compound annual growth rate (CAGR) of 98.7% since its rollout in 2014, that too from a very low baseline.

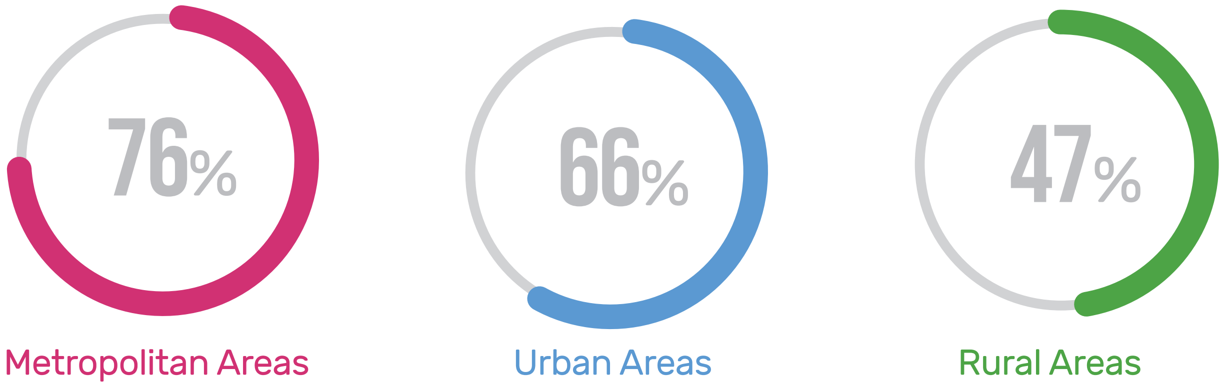
However, the majority of Pakistanis still view broadband Internet as a means of communication, whether person-to-person via messaging apps, or reaching out to a network of contacts via social media, or as an entertainment platform to consume content for recreational purposes.

Historically, this has contributed to a negative perception of internet access and has overshadowed the more productive avenues that online opportunities have to offer. However, the pandemic has begun to change these trends. This is demonstrated by the 35% increase in online shopping and the 107% increase in mobile banking recorded in 2020.[22,23] Adoption also remains contingent on literacy and digital literacy; Pakistan's literacy rates have hovered around 60% and fare poorly compared to other lower-middle income countries.[24]

2.1.3 Infrastructure

Access to broadband services in Pakistan varies by physical location and the dispersion of internet services is heavily skewed towards tier 1 or metropolitan areas. Directionally, this trend does not vary widely from other comparable markets. Tier 2 cities, remote regions and rural areas have a limited footprint when it comes to fixed broadband services, thereby compromising stable digital connectivity. Availability of quality broadband services also varies significantly within major cities depending on the socioeconomic profiles of individual regions; for example, high-income areas receive better access than urban slums. Low spectrum allocation and high license fees prevent telecom operators from expanding infrastructure to areas that generate lower returns. The index score for spectrum availability has remained stagnant since 2015, having decreased by 0.24 points from 20.38 to 20.14 as per the most recent data.[25]

Chart 4: Internet Penetration Per Region in Pakistan in 2020 (% population)



Source: Kantar and Google 2020 Survey

2.1.4 Efficiency

Internet speeds have more than quadrupled over the past five years with download and upload speeds at 18.8 megabytes per second (MBps) and 12.9 MBps in 2020, compared to 1.9 MBps and 1.1 MBps in 2015, respectively.[26]

However, the average download speed across both mobile and fixed broadband is below 17.3 MBps, the South Asia average.[27] Pakistan intends to roll out 5G mobile broadband in December 2022, and according to claims this may accelerate current download speeds by 1000% to one gigabyte per second (GBps).[28] This, however, will depend on a variety of factors, including spectrum availability and quality of backhaul infrastructure based on fibre and bandwidth availability.

2.2 Fixed Broadband Landscape in Pakistan

Fixed broadband subscribers have grown at snail's pace in Pakistan with a CAGR of 29% since 2005, peaking in 2017 at 2.7 million subscriptions.[29] As of 2021, the estimated number of FTTH house passes offering fixed broadband services stands at less than quarter of a million. Fibre subscriptions remain confined to major cities and constitute just 15% of the fixed broadband market. The value of fibre in improving network capacity and creating use cases for 4G/5G should prompt action for aggressive expansion of fibre optic networks. However, the following challenges characterise the growth of fibre coverage in Pakistan:

2.2.1 Low Demand

While reliance on mobile broadband services has increased exponentially, demand for fixed line services has been minimal over the past five years. Mobile broadband offerings, while prevalent, are mostly volume-based. This pricing model limits adoption of high-volume usage. As economic and social interactions go digital, inconsistent speed, variable user experience and coverage gaps will drive increased demand for fixed broadband in the long-term.

2.2.2 Limited Competition

Pakistan's fixed broadband market has seen limited competition until recently, with Pakistan Telecommunication Company Ltd. (PTCL) being the only real nationwide player. Holding an estimated 70% to 75% of the market share until 2020, PTCL still remains the dominant service provider in Pakistan despite fixed line licenses opening up for other companies about 15 years ago. Although the Telecommunications Policy 2015 attempted to develop the market by requiring PTCL to offer shared access to last mile infrastructure, competitive pressures have remained low. Owing to a lack of competitiveness in the market, the combined capacity of fixed broadband operators can only cater to less than half a million fibre house passes, which is roughly 4% of the total FTTH market.

2.2.3 Unfavourable Policy & Regulatory Outlook

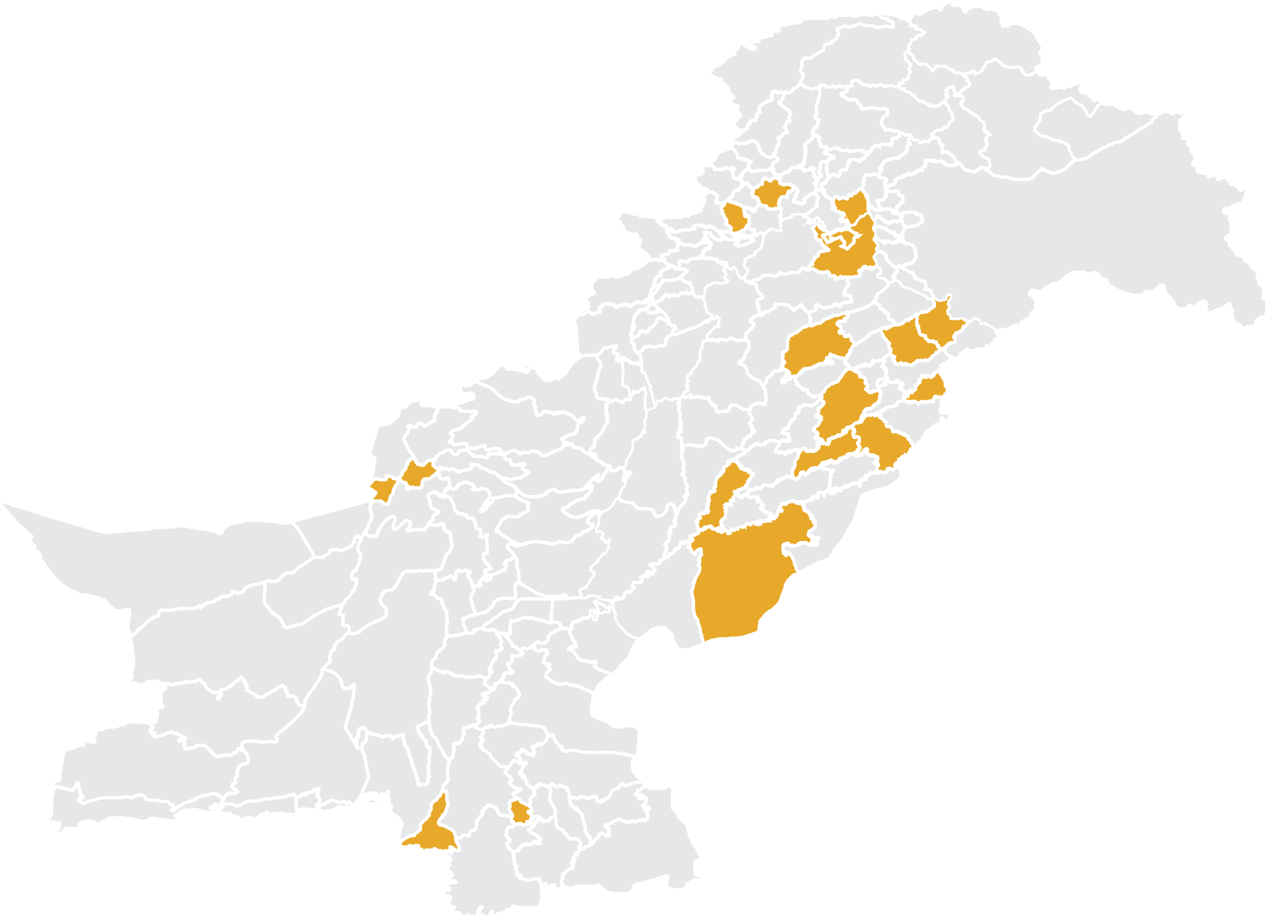
The government still treats telecommunications as a commercial service as opposed to a utility, resulting in high license fees and duties. Licensing fees, including spectrum acquisition costs, constitute a significant chunk of capital with diluted returns. Other regulatory issues around approval timelines also impede growth in the sector, for example, operators having received permission for local loop services still face impediments when applying for licenses to provide long distance and international services.

Furthermore, difficulties with Right of Way (RoW) and dependence on multiple government and municipal stakeholders such as the Pakistan Telecommunication Authority (PTA), city governments and real estate developers, lengthen project timelines and create barriers to laying fibre.[30] Exorbitant fees paid to multiple government agencies and housing societies, lack of service corridors, lack of approvals and poor dispute resolution systems have been central issues for service providers prohibiting expansion of fibre optic infrastructure. Long lead times result in tied up capital and financial costs for service providers for years before receiving approval from RoW owners.

2.2.4 Sub-optimal Investment Levels

Investment into fixed broadband remains critically low. Our estimates reveal that a meagre USD 150-250 million are channelled into this segment per annum despite the requirement being around ten times higher than existing investments if market requirements are to be met. Currently, most investment into telecom focuses on the expansion of mobile broadband services in response to a higher demand, leaving fixed broadband by the wayside. In addition to costs arising from regulatory demands, client premises equipment (CPE) and active and passive infrastructure also limit the resources for expansion and up-gradation of fibre networks.

Districts with FTTH coverage in Pakistan



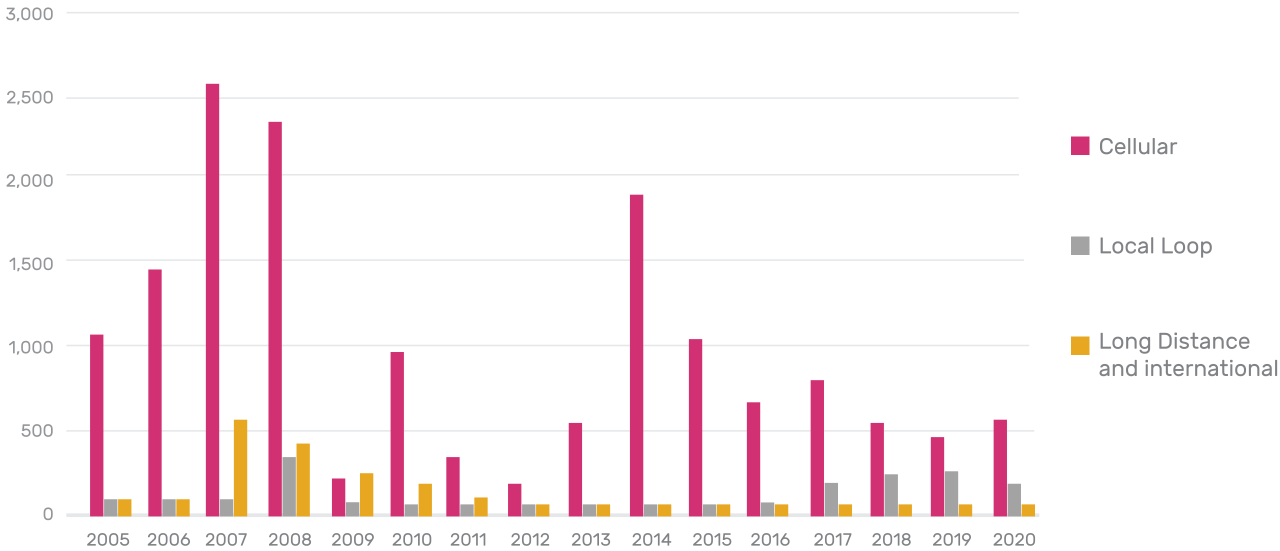
Source: Company websites of key players[31]

On its part, the government is advocating steps to accelerate fibre rollout through public-private partnerships under the Universal Service Fund (USF), with a mandate towards expanding telecom services in remote and rural areas.[32]

In the previous year alone, PKR 32 billion was used to increase broadband penetration to underserved areas in Pakistan, utilising subsidies from the MoITT. USF has covered over 1,800 km of un-served road networks and there were plans to lay more than 10,000 km of fibre optic cable between 2018 and 2022. The fund has spent PKR 10 billion on extending fibre coverage to Balochistan province, PKR 2 billion to extend coverage to remote parts of Khyber Pakhtunkhwa province and PKR 12.8 billion for expansion in interior Sindh. Every USF award has a mandatory requirement to increase fibre penetration in the areas covered.

Furthermore, fibre investments in underdeveloped areas by USF are often dedicated to thinly populated areas that generate low returns and have high service costs. But while commercial players prefer to focus on metropolitan areas, there are still segments of densely populated urban areas that continue to lack adequate coverage, indicating the need for a change in approach.

Chart 5: Net Foreign Direct Investment in Telecom by Sector (USD million)



Source: PTA Annual Reports

2.2.5 Infrastructure and Technology

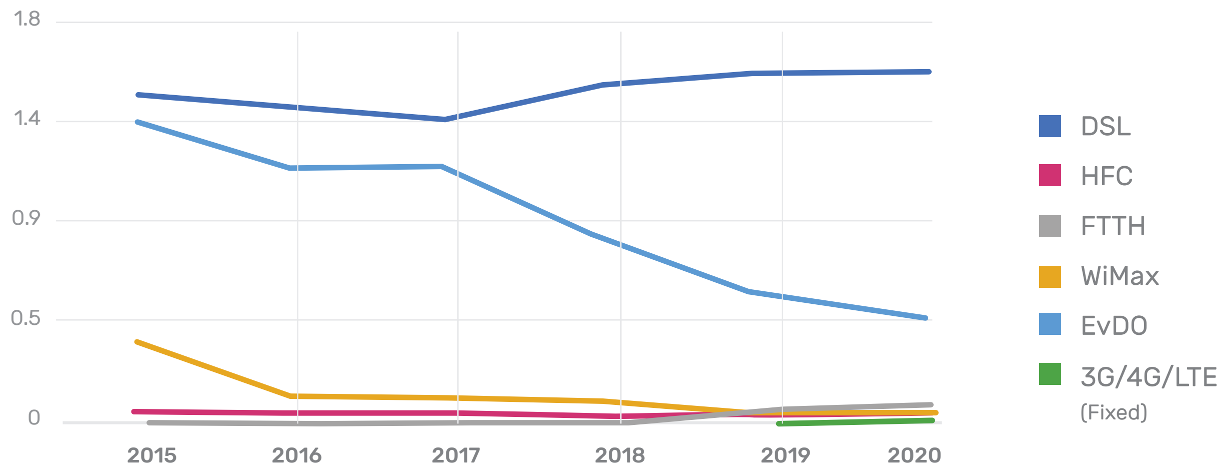
Pakistan's fixed line industry is dominated by DSL, which is cheaper to install since it utilises existing telephone lines. This comes at the cost of lower bandwidth and higher risk of interference. DSL services have also been recognised as corporate client services due to the high subscription charges associated with them.[33] The total length of long-haul fibre optic cable that has been laid out in Pakistan stands between a paltry 130,000 km to 150,000 km, while only 9% of telecommunication towers are connected to fibre.

As demonstrated in Chart 6, DSL subscribers grew by 0.3 million between 2017 and 2018 before growth started to decrease due to a steady substitution of FTTx and fixed LTE connections. Code Division Multiple Access (CDMA)-based Evolution-Data Optimized (EVDO) services have also declined over time from 1.4 million in 2014 to less than 0.3 million in 2020, being largely replaced by 3G/4G. While FTTx subscriptions demonstrate a 30% year-on-year increase since 2015, the overall numbers are still miniscule.

Critically, Pakistan lags in sharing of infrastructure and does not utilise the lease model found in other countries, where a single autonomous body controls a fibre duct system and leases it to interested parties. This exponentially increases the capital investment required for establishing and maintaining fibre-backed networks to provide fixed broadband services.

Installation of new infrastructure also requires physical overhauling that can damage existing infrastructure and thereby increase costs. Much of Pakistan's long-haul infrastructure was laid over fifteen years ago, resulting in low bandwidth capability for current active users and diminishing capacity due to frequent fibre cuts. While the cable infrastructure is also integral to connectivity, the local cable manufacturing landscape has limited capacity while imported cables face high duties.

Chart 6: Fixed Broadband Subscribers by Technology (millions)



Source: PTA 2020

As demonstrated in this section, Pakistan's broadband adoption currently rests on high mobile broadband usage and limited smartphone penetration. The rapidly increasing digitisation of services, especially during the Covid-19 pandemic, have highlighted the limitations of mobile data especially in high density urban centres as well as rural areas where spectrum limitations create obstacles for cellular providers to ensure stable quality of service. While Pakistan has one of the lowest mobile broadband tariffs in the world, the volume-based nature of mobile connectivity increases consumer costs as data demands rise.

Fixed broadband, on the other hand, is driven by a different business model that focuses heavily on unlimited volumes. This makes fixed broadband more attractive for households with multiple users and for SMEs. Nevertheless, supply remains low. With spectrum challenges and a slow progression towards next-generation connectivity, the importance of a more widespread fixed infrastructure and a more robust fibre backbone – for direct consumers and for mobile operators – cannot be overstated.

The present challenges to fixed broadband sit in the wider context of the trajectory of telecommunications growth and policy.

Timeline of Telecommunications in Pakistan

1947
Pakistan Post & Telegraph (P&T) established

1990
PT&T converted to Pakistan Telecom Corporation (PTC) Mobile Licenses for Instaphone (Millicom) and Paktel (C&W)

1992
Mobile license for PMCL Mobilink Dial-up email service launched

1993
First dial-up ISP

1995
PTCL starts offering dial-up internet services

1996
Pakistan Telecommunications Reorganization Act. Pakistan Telecommunications Authority, Frequency Allocation Board, Pakistan Telecommunications Company Limited, National Telecommunications Corporation

1998
Licenses for PTCL subsidiaries: Ufone – Mobile & Paknet ISP

2001
Micronet offers DSL-based broadband services

2003
De-regulation Policy – Local Loop (LL) and LDI

2004
Cellular Mobile Policy – New licenses to Telenor and Warid. Auction of Local Loop and LDI licenses. USF and R&D fund set-up

2006
Privatization of PTCL giving 26% stake with management control to Etisalat

2007
Acquisition of Instaphone by China Mobile (Zong) Wateen launches commercial WiMAX services

2014
NGMS auction in 1800, 2100 & 850 MHz

2015
Formation of new Telecom Policy which focuses on spectrum, infrastructure sharing and e-services with USF

2016
Jazz acquires Warid

2017
Jazz and Telenor secure NGMS

2019
Cellular mobile license renewal under litigation

03
How Pakistani Broadband Got Here

3.1 The Evolution of Telecommunications Policy

Since the global wireless revolution of the 1990s, developments in the telecommunications sector in Pakistan can be divided into three main phases.

3.1.1 1990 - 2002: First Wave of Deregulation

In the 1990s, the government of Pakistan embarked on a set of economic reforms and structural changes that also reflected an overarching policy of liberalisation and deregulation, impacting multiple public sector departments, including telecommunications. In order to attract economic growth and investment and reduce government control, the Pakistan Telephone & Telegraph department was converted into Pakistan Telecommunication Corporation (PTC) – a state-owned corporation with a separate legal identity – through an Act in 1991. The change in statute resulted in an accelerated expansion of local and international telecommunication infrastructure and subscriptions. By 1996, telephone lines in Pakistan had more than doubled to a total of two million.

The Pakistan Telecommunication Ordinance 1994 and the Telecommunication (Re-Organization) Act 1996 were soon introduced to produce a regulatory framework for the telecommunications sector and to establish the PTA, the Frequency Allocation Board (FAB) and the National Telecommunication Corporation (NTC). It also converted PTC into PTCL, allowing it to be listed on Pakistani stock exchanges. PTCL continued to maintain a monopoly in the market through the 1990s despite significant expansion of facilities, resulting in a non-competitive environment that eventually had an adverse impact on management and quality of service.

Licensing for mobile telecommunications was also launched during this period, with Instaphone and Paktel receiving the first two licenses. The arrival of Mobilink in 1998, and the PTCL subsidiary Ufone in 2001, marked the first wave of competition in the cellular mobile market. In the year 2000, PTA established the Calling Party Pays regime, which accelerated voice traffic by placing the cost of services on the caller instead of the receiver.

The late 1990s also witnessed the emergence of dial-up internet services through operators such as the PTCL-owned Paknet, Micronet and Nayatel, as well as the launch of PTA's internet service provider licensing.

3.1.2 2003 - 2007: Second Wave of Deregulation

In 2003, the Deregulation Policy for the telecommunications sector was introduced to allow foreign companies to invest in the local telecommunications market and allowed issuance of licenses for fixed services, local loop, long-distance and international connectivity.

PTCL underwent another round of privatisation in 2006 and sold 26% of its shares as well as management control to Etisalat, a United Arab Emirates (UAE)-based telecommunications company, while 12% of shares were sold to the general public. However, unresolved issues from the transaction have impacted PTCL's performance and limited its ability to leverage its leading market position in the fixed broadband segment by rolling-out fibre infrastructure and expanding their footprint.

As competition in mobile telecommunications and cellular coverage and usage continued to expand with new players like Telenor and Warid, the MoITT issued the Mobile Cellular Policy in 2004. The policy aimed to encourage private investment and competition, to promote efficient use of radio spectrum and to establish a regulatory framework for mobile services.

At this stage, fixed and wireless broadband dominated internet services, with wireless broadband growing at a faster rate after acquiring Wireless Local Loop licenses and the requisite spectrum. While wireless broadband helped expand coverage to an extent, obsolete technology and a lack of appetite from sponsors ultimately curbed the up-gradation and expansion of its infrastructure.

3.1.3 2014 and Onwards: Introduction of Mobile Broadband and Internet Growth

Pakistan was late to the game with regards to 3G and 4G mobile broadband compared to neighbouring countries, as spectrum auctions were delayed time and time again due to a lack of investor readiness and the absence of a regulatory framework.[34] Internet coverage in Pakistan was finally transformed in 2014 by the introduction of mobile broadband and the auction of 3G/4G spectrum, which accumulated an aggregate total of USD 1.1 billion. Four of the five major mobile operators (Mobilink, Telenor, Ufone, Zong) bid in this auction, whereas Warid did not participate and instead chose to utilise their existing spectrum to launch 4G Long-Term Evolution (LTE) services. In 2017, Telenor and Jazz (formerly Mobilink) acquired Next Generation Mobile Services (NGMS), with Telenor receiving 850 MHz bands and Jazz receiving 1800 MHz bands.

Presently, mobile broadband is the most prevalent form of internet access with a market penetration of over 97%[35] and a subscriber base of 100 million.[36] This has encouraged a boost in digital services such as digital payments, e-commerce, last-mile logistics and ridesharing as well as an increase in exports of IT and IT-enabled services, which surpassed the USD 2 billion mark in the last fiscal year.[37]

On the other hand, the growth of mobile broadband has outstripped that of fixed broadband, which has experienced limited growth since the second wave of deregulation in the mid 2000s. While the market is divided between 4 to 5 operators who seek to expand to tier-2 and tier-3 cities, the supply of fixed broadband continues to remain limited, despite high market potential.

The first effort to establish a coherent information technology and ICT policy was made in the late 1990s and culminated in the National IT Policy and Action Plan of August 2000. A number of policies have been devised since.

In this next section we assess the impact and effectiveness of the most recent policy frameworks and propositions, beginning with the Telecom Policy of 2015.

3.2 The Current Policy Landscape

The MoITT has been prolific with regards to introducing new policies over the last two years. Since the publication of the Telecommunications Policy in 2015, the telecom industry has already witnessed the introduction of the Rolling Spectrum Strategy and the Right of Way Policy Directive in 2020. The National Broadband Policy 2021 and a 2021 update to the Digital Pakistan Policy are currently under development.

In addition to these broadband-focused policies and directives, the MoITT has also introduced the Mobile Device Manufacturing Policy 2020, Removal and Blocking of Unlawful Online Content Rules 2020 and National Cyber Security Policy 2021. The Personal Data Protection Bill 2020 is in its final stages of approval while a Pakistan Cloud First Policy is also in the pipeline. The key features of policies and directives that aim to impact broadband supply and demand are illustrated in Table 4.

Current and Upcoming Policies

Telecommunications Policy

2015

Regulating and improve ICT infrastructure for greater connectivity and diffusion of services, to transform Pakistan into a knowledge-based economy

Universalising efficient telecommunications services and ensure that it is open, competitive and well managed to ensure adoption

Promoting fibre and wireless networks by fast tracking processes for RoW, building cabling, using utility infrastructure, allowing shared infrastructure, developing standards for fibre deployment and developing a fibre rollout plan

Rolling Spectrum Strategy

2020

Providing a future roadmap for spectrum-related policy anticipated between 2020-2023

Promoting spectrum sharing, trading and adoption of spectrum pricing

Addressing future frequency spectrum outlook for broadband services, broadcast services, fixed services, aeronautical and maritime services, public safety and land communication systems, satellite services, and unlicensed bands for short range devices

Right of Way Policy Directive

2020

Installing telecommunication equipment in order to promote telecommunication services by regulating RoW

RoW in developed areas for buildings and structures such as roads and regions where electric railway infrastructure has been installed

RoW in non-developed areas such as on overground and underground as well as wireless networks

Introducing processes for provision of RoW for the installation, maintenance and expansion of telecommunication infrastructure and equipment

Guaranteeing Public Switched Network (PSN) licensees the privilege to install, establish and maintain telecommunications networks in licensed areas.

National Broadband Policy

DRAFT 2021

Ensuring that more than 75% of businesses and commercial facilities should have access to high speed fixed and mobile broadband internet by 2025

Addressing lack of access to the internet by fast tracking penetration of digital access, equitable distribution of digital dividends and optimising the use of existing infrastructure by implementing need-based policy interventions

Improving digital infrastructure; promoting fibre optic as the medium for fixed line broadband services due to its efficiency

Digital Pakistan Policy

UPCOMING 2021

Creating of a digital ecosystem with institutional frameworks for the rapid delivery of innovative digital services, applications and content

Promoting e-commerce and e-banking by creating an environment that allows Payment Service Providers (PSP's) and Payment Service Operators to run smoothly

Promoting e-governance to establish Pakistan as a frontrunner through IT enablement by ensuring efficiency and accountability

Generating entrepreneurship and innovation, improving the ease of doing business and creating an enabling environment to facilitate digitisation

3.2.1 Assessment of the Policy Landscape

The criteria below is used to analyse the effectiveness of government policies, strategies and regulations that impact Pakistan's fixed broadband, and in particular, its fibre deployment landscape.

Objectives: Does the policy successfully lay out its objectives? Is the purpose of the policy clear and coherent?

Although some policies have clearly identified goals and objectives, the overall landscape is still characterised by a moderate degree of ambiguity due to unclear and vague objectives, overlapping or unclear purposes and outdated goals. The most prominent example is the National Broadband Policy 2021, which targets many of the same issues as the Telecommunications Policy 2015, some of which have already been addressed. While a broadband policy is necessary, its objectives must be well-conceived from an outcomes perspective in order to be effective.

Policy Framework: Does the policy provide appropriate measures and recommendations to support its objective? If implemented, how will these measures impact the ecosystem?

Strategic considerations and frameworks for these policies draw their inspiration from countries that have been successful in devising policies for similar issues, such as India, Bangladesh and Vietnam. While the policy frameworks employed are generally adequate, The National Broadband Policy remains particularly problematic in terms of its process, design, implementation and outcomes to be achieved. However, the MoITT has recognised industry feedback and is in the process of re-drafting the policy. While the intent of the Rolling Spectrum Strategy is to facilitate spectrum needs, its framework needs to be updated to reflect the considerations and positions of the industry, and should lead to a spectrum allocation and utilisation process that best serves the interest of Pakistanis while creating convergence in government and industry stances.

Implementation Mechanism: Does the policy consist of a clear implementation plan or framework? To what degree has the policy been implemented since its approval? Was the policy document itself delivered as per schedule?

Poor implementation is one of the most definitive characteristics of broadband-related policies and remains the largest obstacle to an effective enabling and regulatory regime. Implementation faces regular delays and is slowed down by issues such as a lack of financial or administrative resources, a multiplicity of implementing bodies with overlapping mandates that complicate the process further rather than speed it up, poor monitoring and evaluation, and a lack of capacity and incentives for enforcement. While these policies may have forward-looking goals and strategies, they are entirely futile if not followed up by robust implementation. This is perhaps best illustrated by the Right of Way Policy Directive, which has progressive clauses and positive intent, but poor enforcement, slowing down the resolution of RoW disputes and issues.

Strategic Alignment: Does the policy align with the government's stated digital agenda and the country's socioeconomic needs? Is there strategic alignment with other policies?

Pakistan's policy landscape needs a refresher that will infuse urgency into the process of improving connectivity and developing the fibre-backed fixed broadband segment, recognising it as critical national infrastructure which is pivotal to Pakistan's digital trajectory. While some of the policies build on past efforts and lay emphasis on necessary requirements to boost connectivity, more coherence is required across policies, alongside a strategic re-centring to sharply focus on outcomes enabled through digital. The Rolling Spectrum Strategy and in-process Broadband and Digital Pakistan policies should be aligned to an overarching strategy that connects and strengthens nodes of the digital ecosystem for better outcomes in the longer-term rather than focusing on short-term gains at the cost of losing industry confidence.

3.3 Lessons from Around the Globe

Despite other emerging markets having similar socioeconomic and development indicators as Pakistan, many have nonetheless been able to accelerate the development of their digital infrastructure through national broadband initiatives. Notable examples below – from Africa, Europe, and particularly the Asia Pacific region – demonstrate the need for urgent action across a range of priorities and implementation modalities. Some countries such as Bangladesh adopted a formal broadband policy as early as 2009. These policies and national plans can help establish targets for broadband penetration and affordability, private sector investment, promotion of digital literacy, shared infrastructure, and facilitation of the ICT sector. Specifically, they emphasise the central role that fibre optic infrastructure plays in guaranteeing universal high-speed broadband access.

India

Objectives

The National Broadband Mission (NBM) 2019 intends to:

- Bridge the connectivity divide across class and geographical lines
- Promote e-governance, transparency, financial inclusion and ease of doing business in addition to improving overall socioeconomic development.

Highlights

- Create a digital fibre map of the broadband networks and infrastructure, including fibre optic and towers, across the country
- Stakeholder collaboration with regards to implementation models for RoW, strengthening existing 4G networks and rolling out 5G networks
- PMGDISHA initiative to promote digital literacy to tackle lack of awareness around device usage
- Promotion of new business models such as hiving off fibre assets via the Infrastructure Investment Trust (InvIT) model, which will vhelp reduce capital expense requirements and allowing telecom operators to focus on top-line growth opportunities.

Indonesia

Objectives

Indonesia Broadband Plan (RPI) 2014 – 2019 intends to:

- Address the need for affordable broadband in accordance with the Medium-Term National Development Plan 2015-2019
- Notable targets included:
  - Fixed broadband coverage for 71% of urban and 49% of rural households
  - Mobile broadband coverage for 100% of urban and 52% of rural households
  - A national fibre optic backbone connecting all districts
  - A broadband price of no more than 5% of average monthly income

Highlights

- The RPI envisaged significant contributions from private telecom players in addition to government ministries, including a commitment of USD 3.7 billion from Indonesian incumbent player PT Telkom.
- Six flagship programs supported by regulatory interventions and institutional reforms:
  - Expansion and financing
  - Establishment of e-government networks and data centres
  - Passive infrastructure and shared ducts, expansion of rural wireless terrestrial broadband, reform of the Universal Service Obligation, and increased national digital literacy programming.

Kenya

Objectives

The National Broadband Strategy (NBS) 2018-2023 intends to:

- Increase access to 3G coverage to 94% of the population by 2020
- Increase digital literacy in schools to 85% and in workplaces to 50%
- Leverage the NBS to deliver both its Vision 2030 flagship projects and its Big Four Agenda.

Highlights

- Proposed budget for the NBS, sourced through public-private partnerships and private investment, is estimated at 1.5% of the GDP spread over five years with increase as the contribution of ICTs to GDP increases.
- Open access to national optical fibre broadband infrastructure for all operators
- Ensuring status of broadband as a critical infrastructure
- Promoting access to digital content and services including emerging technologies at all government levels
- Encouraging device manufacturing, maintenance and recycling among the local industry
- Promotion of private sector investments, joint ventures and public-private partnerships through tax and regulatory incentives for investments, particularly where initial capital outlay is higher
- Ensuring data protection and cybersecurity

Malaysia

Objectives

The National Broadband Initiative (NBI) 2010 intends to expand internet access, device ownership and cellular coverage.
The National Fiberisation and Connectivity Plan (NFCP) 2019-23 aims to:

- Provide a strategic direction for the implementation of broadband-related initiatives
- Notable targets:
  - An entry-level fixed broadband package at 1% of GNI by 2020
  - 100% broadband availability in high impact areas by 2021 and 20% availability in lower impact areas by 2022 with a minimum speed of 500 Mbps
  - Fibre network passes for 70% of public institutions by 2022
  - Average speed of 30 Mbps in 98% of populated areas by 2023

Highlights

- Under the NBI 2010:
  - Malaysia set up broadband community centres and internet centres that catered to over a million users across the nation.
  - It also deployed 873 new telecommunication towers all across country, dedicating over half of them to underserved areas.
  - One million devices were also distributed to students from low-income categories, a programme facilitated by Telekom Malaysia through the introduction of broadband packages at reduced rates.
- The NFCP 2019-23 outlined broad strategies for expanding broadband and encouraging an enabling environment through job creation and harnessing opportunities offered by the migration of tech and tech-enabled businesses.

Turkey

Objectives

The 2017-2020 National Broadband Strategy and Action Plan (NBSA Plan) intends to:

- Improve fibre infrastructure
- Expand the scope of intermachine communications
- Execute 5G development
- Increase demand
- Encourage business in the broadband sector and to remove Go-to-Market impediments.

Highlights

- Reduction in taxes and other financial liabilities.
- The Broadband Strategy Monitoring Board was also defined by the plan to ensure ownership across public and private sectors. With representation of relevant public entities, service providers and private sector organisations, the board intends to ensure execution against mandated action.

04
Charting a Path Forward

4.1 Characteristics of a Future-Ready Fixed Broadband Regime

A successful fixed broadband regime equipped to support Pakistan's economic agenda and boost social wellness should centre defined goals aligned with strategic priorities for the country as an emerging contributor to the Fourth Industrial Revolution. Such a regime should draw on global practices to overcome challenges and drive rapid growth in the accessibility and adoption of digital infrastructure. Case studies from around the world, such as those from Kenya and Malaysia, demonstrate the need for establishing a people-centred, access-oriented fixed broadband regime. The country's fixed line connectivity landscape will not be future-ready without first identifying who should benefit from it, how the regime will be propelled or enabled, and what systems will be in place to ensure that the regime stays on track. This requires a framework outlining these characteristics to define the intended outcomes of the proposed policy actions.

4.1.1 Principles

The underlying principles that help frame and design policy objectives and priorities should be anchored in the following core principles:

- **Universal access:**
  Ensuring access that bridges divides across dimensions including gender and geography, and offers an environment conducive to the inclusion of all demographic groups. This will open up opportunities for increased economic and social participation.
- **Affordability:**
  Making FTTx affordable to ensure that Pakistanis from all income groups can use connectivity as a means for digital inclusion across a range of services – financial, education, health, commerce etc.
- **Safety:**
  With more users – especially younger ones – going online, it is critical to ensure safety at multiple tiers. This means instituting a range of measures from system-level safeguards like data protection and cyber security, to creating the awareness and administrative capacity necessary to make the internet safe for young children.

4.1.2 Drivers

In order to ensure outcomes of inclusion, affordability and safety, an environment that focuses on connected drivers to improve outcomes is essential.

- **Demand:**
  Broadband adoption can be increased by stimulating demand, which will first and foremost necessitate increased access to broadband-enabled devices, such as laptops and smartphones. This also requires universal literacy and digital literacy so that users are able to engage with internet content. Digital skills are also part of this foundation, leading to both more productive engagement on the internet, while also encouraging aspiring technology sector entrants and creating an environment that can scale and support innovative entrepreneurship.
- **Financing:**
  Achieving optimal fibre coverage will require sustained higher levels of investment. This cannot be achieved in the absence of a conducive framework that aligns the interests and incentives of the industry, financial service providers and the government. There are also wider linkages like taxation that require harmonisation to effectively factor into the investment and returns equation. Policies that affect financing directly or indirectly should be devised with a long-term mindset that balances returns, affordability and tax/levy collections by the government without compromising outcomes.
- **Conducive Policy:**
  To create an enabling environment for the expansion and operation of the fixed broadband landscape, it is necessary to develop a set of comprehensive policies that have clear objectives, coherent strategies, and are aligned with each other as well as with the government's growth vision and industry interests. These policies should cover strategies for broadband technologies with a focus on fibre, and include (but not remain limited to) RoW, spectrum, adoption, data protection, cybersecurity, investment and taxation issues.
- **Collaboration:**
  A decision-making structure that serves and protects Pakistanis and supports innovation and growth by the industry will require proactive collaboration from all stakeholders. Public-private partnerships to build infrastructure, develop innovative financing schemes, and usher the adoption of more sophisticated use-cases for broadband, will require establishing and maintaining trust and transparency among all partners.
- **Technology Neutrality:**
  The government must uphold technology neutrality by allowing the market to define which technologies should be widely adopted, as opposed to favouring selected technologies for adoption. This will enable the success of efficient, cost-effective and scalable tech.

4.1.3 Systems

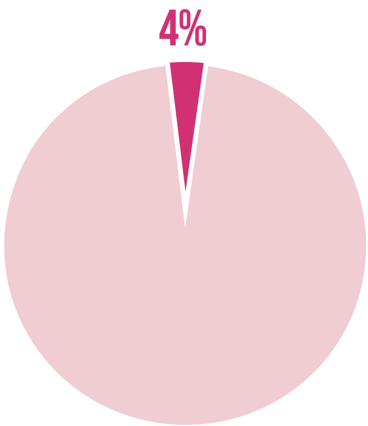
Systems that support implementation must supplement higher level strategic and policy choices and decisions.

- **National data systems:**
  Data that measures fixed broadband indicators pertaining to access, supply and uptake should be made available through an open-data regime. This will enable better accuracy in research and will accordingly improve the design and implementation of policies and programmes.
- **Broadband quality:**
  A structure of active and instantaneous experience logging that is propagated through public and private websites and apps should make speed tests available, which subscribers can use frequently to report their broadband quality. Such a dashboard depicting the national quality of service can help improve public understanding of fixed broadband offerings, and will incentivise service providers to maintain and improve their service quality.
- **Policy monitoring and implementation:**
  Monitoring and implementation have a critical role to play in policy interventions by linking policies to outcomes through accountability measures. A strategic monitoring and implementation system will have clear milestones for all implementation plans with robust data and information and feedback loops to enable timely and effective implementation.
- **Federal-provincial coordination:** In order to streamline processes for both service providers and end-users, federal-provincial coordination is imperative. Doing so will reduce the redundancy of bureaucratic processes, improve civic relationships and create more efficient governance structures.

4.2 The Way Forward

For Pakistan to shape its economy into one that competes globally and isn't excluded from the growing knowledge-economy, universal access to high-speed, reliable, affordable and secure broadband internet is imperative. Despite a subscriber base of 100 million, mobile broadband is not a sustainable source of broadband access to support economic activity, especially given the limitations of spectrum allocation and utilisation, and how this translates into a patchy user experience with respect to speed and pricing. The only logical way forward is to build on the progress made thus far to enrich Pakistan's broadband suite by strengthening its fibre optic backbone. At a cost of approximately USD 300 billion,[38] a 10% increase in fixed broadband penetration can generate around USD 4-5 billion at a meagre 1.38% impact. While Pakistan struggles with an extended 'draft' stage of the broadband policy, the lagging landscape requires urgent and high priority action to resolve process-related challenges and drive focus on delivering outcomes. Experience from countries that are decades ahead of us should provide insights to fast-track progress domestically.

Chart 7: Market Penetration of FTTH House Passes in Pakistan



Source: Expert Consultations

Lessons from global experience demonstrate the pronounced impact of fibre optic infrastructure in ensuring high-speed broadband access that is cost-effective in the long term. An ambitious fibre plan is all the more urgent, not only for 5G-readiness but also to fast-track the digitisation of the economy. This requires initiating major high density fibre projects to ensure adequate connectivity at last-mile cell towers and sites. Current trends put fibre optic adoption at an estimated 0.4 million active house passes, a fraction of the potential market. Pakistan has over 35 million households – a third of which can be classified as middle-income households or higher – that are potentially part of this target market pool. This suggests a conservative estimated market size of 10 million house passes.

Another important structural change that impacts digital transformation at large is the adoption of cloud services – a key enabler in accelerating and mainstreaming digital applications in the public and private sector. Its significance has been enhanced because of the value proposition highlighted during the Covid-19 pandemic. It is estimated that by 2024, public cloud's share of the total IT workload will grow to 40% from its current level of 27%.[39] In a nascent ecosystem with limited presence of international cloud service providers and very few local providers (PTCL and Rapid Compute are key players), a strong internet backbone is required for hosting services outside Pakistan. In many cases, this requirement is fulfilled through international internet backbones, strengthening the case for improving fixed broadband that can handle these country-critical transformations.

While major service providers are trying to accelerate their rollout in new cities, their combined capacity is severely limited and can cater to only an estimated 250,000 house passes. According to estimates, an investment of at least USD 6 billion is required to address the potential target pool of 10 million house passes. An investment of this magnitude is beyond the current capacity and intent of existing service providers who are investing around USD 100 to 150 million per annum on fixed broadband. At this rate of investment and corresponding increase in supply, the target of 10 million house passes may not be realised for another 20 years.

With rising data usage that currently stands at 8 to 10 gigabytes per user, there is a risk that meeting consumer requirements may prove even more expensive in the future. In order to increase fixed broadband uptake, supply will need to increase by a massive margin. This can lead to a potential tenfold increase in FTTx subscriptions over the next five years. An increase of broadband supply also has the added benefit of reducing the cost of individual house passes, thereby expanding the capacity of service providers to meet the demands of the catchment population.

These considerations are now being evaluated by the MoITT in light of industry feedback regarding the National Broadband Policy 2021, with a view to re-draft the policy in a way that is responsive to market needs. In order to build on this momentum, realise our broadband potential and grow our digital economy, policy interventions with clearly defined objectives and targets are required in the following priority areas:

1. Establishing the importance of fixed broadband
2. Developing a national broadband strategy
3. Increasing investment
4. Improving administrative capacity and attitudes

4.3 Priority Area One: Establishing the Importance of Fixed Broadband

First and foremost, both government actors and the general public must be made to realise how central fixed broadband is to Pakistan's economy and its digital future. This should be tackled through two main strategies:

4.3.1 Establishing the Status of Broadband as Critical Infrastructure

The pandemic has demonstrated that mobile and internet services are a necessity not a luxury. Following Kenya's example, the government of Pakistan should classify broadband as part of critical infrastructure so that it is perceived as a necessary utility rather than a commercial service. This can help drive appropriate policy measures and improve digital adoption.

4.3.2 Organising Digital Awareness Campaigns

The mobile broadband-dependent public currently has little to no awareness of the significance of fixed broadband in both supporting mobile broadband, and in its own ability to transform the digital user experience. A digital campaign that focuses on the importance of access to fixed broadband is integral to awareness raising, and should focus on universal access. These campaigns can be designed in collaboration between the MoITT, telecommunication companies, civil society networks and non-government organisations.

4.4 Priority Area Two: Developing a National Broadband Strategy

In order for the MoITT to produce a robust National Broadband Policy (NBP), they must first develop a sound National Broadband Strategy that serves as the foundation for the design and implementation of the NBP, as well as for future policies pertaining to the expansion of broadband in Pakistan. As per MoITT practice, the National Broadband Strategy should be devised based on consultations with a representative group of stakeholders through meaningful engagements, avoiding over-bureaucratic procedure and ensuring a sharpness of focus on country-level strategic objectives. A successful National Broadband Strategy should consist of:

4.4.1 A National Fibre Plan

In order to optimise the expansion and deployment of digital infrastructure nationwide by increasing fixed broadband access and improving infrastructure on which mobile broadband can rely, Pakistan must create a National Fibre Plan and set benchmarks for the next 5, 10 and 20 years. The plan should consist of the following measures:

- Access to long-haul fibre capacity should be improved so that service providers can roll out fibre and fixed broadband services to tier 2 and 3 cities.
- Laying of fibre in populous yet underserved areas – such as urban and metropolitan slums – that can generate returns and reduce the overall cost of services, should be equally prioritised along with remote or rural areas.
- Local fibre manufacturing should also be encouraged to lower prices, reduce impact from import duties and stimulate the local economy.
- Service corridors with fixed pricing and enforcement of QoS obligations will ensure the privileges allowed to telecom providers under the Public and Private Right of Way Policy Directive and improve overall connectivity

4.4.2 Regulatory Measures

The National Broadband Strategy should provide a set of regulatory measures that will address systemic gaps and improve the broadband environment. These will include:

- Removing barriers to licensing in order to facilitate service providers who have already committed investment, and to reduce delays, particularly with regards to cable television and Long Distance & International (LDI) licenses
- Encouraging infrastructure-based competition through the extension or redefinition of regulatory holidays
- Encouraging new fixed broadband entrants by considering a new set of licenses focusing on fibre networks
- Open access and wholesale agreements with a structural separation framework
- Bringing unregulated telecom players, who drain the profits and therefore capacity of licensed operators, into the net by establishing entry criteria for cable operators.
- Ensuring consumer data protection, network security and cyber security
- Streamlining procedures for corporate connectivity, virtual private network (VPN) access and whitelisting.

4.4.3 Spectrum

Unallocated spectrum holds a negative economic value by depriving the public of efficient broadband services. Spectrum allocation needs to be liberalised to facilitate service providers and enhance their rollout plans to improve coverage and quality of services. The government should take a holistic view on spectrum pricing by rationalising prices and balancing short-term revenue considerations with impacts on mid- and long-term value through enhanced economic activity, that will in turn generate higher contributions for the national exchequer.

4.4.4 Demand

Demand needs to be stimulated by continuing to revise the taxation regime in order to improve the affordability of devices and services, and by increasing broadband and digital literacy — these areas should align with targets for affordability and awareness defined in the Digital Pakistan Policy 2021 currently in draft phase. Present and potential demand should also be aggregated to forecast bandwidth requirements. This will include requirements from federal, provincial and district governments for sectors such as education, healthcare, public safety and security, digital land records, smart cities and communities, public sector enterprises and private businesses, in addition to Next Generation Mobile Services (4G/5G) backhaul projections. This will ensure that demand side projections are well documented and service providers have clarity regarding the ambition and corresponding goals.

4.4.5 Security and Resilience

In order to secure infrastructure and resources amidst increasing digital adoption, and due the evolving nature of technology, it is crucial that priorities on the cybersecurity front align with the objectives of the National Cyber Security Policy 2021. This includes forming the stipulated national Computer Emergency Response Team (CERT), and integrating the telecommunications CERT within its body. At the same time, informed decision making is also necessary to ensure that cyber security mechanisms do not inhibit growth opportunities for businesses through arbitrary measures like blocking Internet Process (IP) addresses and VPNs that impact business continuity in Pakistan for both local and international players.

At a technology policy level, the continued usage of outdated, pirated or unlicensed software presents a major challenge that needs to be dealt with firmly through appropriate regulatory and administrative measures. Business and operational continuity for technology infrastructure including appropriate disaster recovery mechanisms have to be mandated to boost connectivity.

In the past, outage or malfunctioning in sub-marine cables connecting Pakistan have also impacted business continuity, thereby creating major setbacks for the IT industry. At the national level, we need to take a holistic view of our global connectivity – including sub-marine, terrestrial and satellite – to ensure we have optimum, resilient connectivity to support individual and business requirements. Addressing this may require developing alternative connectivity channels including exploration of terrestrial connectivity with China

4.5 Priority Area Three: Raising investment and financing

As discussed, a major limitation to fixed line infrastructure expansion is limited supply, which will require high levels of investment in order to meet rising broadband needs and can be addressed by the following:

4.5.1 Improving the Investment Climate

There is an urgent need to address the lack of significant private investment into the telecom sector. While fostering a healthier investment climate and improving the ease of doing business, Pakistan needs to protect existing investors and prevent situations such as the license renewal dispute between PTA, Jazz and Telenor. Frequent bans on platforms such as TikTok also discourage foreign investors from collaborating with players. For instance, the recently announced partnership between Facebook and Nayatel in building fibre infrastructure and providing wholesale capacity to mobile operators and Internet service providers is an unprecedented yet positive development. In order to scale such collaborations, the government must create a favourable investment environment for both local and international players.

4.5.2 Improving the Availability of Financing

Funding to bridging the investment deficits facing fixed broadband growth should be managed from multiple sources, such as:

- Annual Development Programmes of federal, provincial and district governments
- Financing schemes from the State Bank of Pakistan, commercial banks and other non-banking financial institutions. The SBP in particular should provide financing schemes for fibre, FTTx and ICT projects at attractive rates (similar to its recent construction subsidy).
- Development financing from multilateral and bilateral agencies, as was observed in Bangladesh's partnership with the Islamic Development Bank (IsDB) in which USD 60 million were provided for the launch of a submarine fibre optic cable project.
- The USF budget, which has already contributed greatly to the development of broadband infrastructure, should be expanded as well as restructured. While it should continue to cover critical gaps such as serving areas with low population density and broadband penetration, it should also direct attention towards underserved yet high-density areas in major cities that generate a higher return on investment. Furthermore, while it prioritises fibre optic for its fixed broadband projects, it should also expand its total number of fibre optic projects.
- Incumbent service providers should also be facilitated with committed investment for service rollout expansion, with necessary fee adjustments against incremental licensing requirements and/or targeted tax breaks.

4.5.3 Shared Infrastructure

Sharing of fixed broadband infrastructure between service providers is necessary to ensure that fixed broadband services are being deployed in a cost-effective manner. Clear guidelines for an Infrastructure Sharing Framework should be included in the revised NBP which will remove barriers to shared infrastructure, ensure monitoring and establish a dispute resolution system for service providers.

4.5.4 Taxation

The taxation regime should be revised to improve the business case of further investments by service providers. Rationalising the tax structure can help improve investment in the networks and enable the provision of better quality services, resulting in opportunities for wider economic growth that in turn generate taxes. The government should maintain a progressive mindset with regards to taxation by providing tax holidays or concessions for accelerated rollouts.

4.6 Priority Area Four: Improving administration

Currently, as many as eight different government agencies are involved in approvals and/or collection of fees from fixed broadband providers. In order to address supply constraints, government and regulatory bodies must first and foremost enable telecom operators to generate higher returns on investment, especially given the telecom sector's status as an under-monetised market. This will require the following:

4.6.1 Improving Administrative Capacity

Technical capacity at all government levels should be strengthened to ensure smooth and proactive policy implementation. Administrative modalities such as those pertaining to licenses, public financing, complaint addressal and approvals should be overhauled to make then business-friendly. Federal, provincial and district coordination should also be streamlined to simplify bureaucratic processes that may otherwise delay approvals or incur unnecessary explicit and implicit costs. Synergy between service providers, municipal authorities such as housing societies, district governments and regulatory bodies is especially required for facilitation of fibre development.

The MoITT must oversee the implementation of the Right of Way Policy Directive and establish monitoring and evaluation practices to ensure that telecom providers are being given their due privileges, and that municipal bodies are complying with RoW guidelines. Accordingly, they must set up a dispute resolution system for complaints related to RoW at the federal, provincial and district levels. Furthermore, the PTA must ensure that RoW owners allow operators who have already been granted RoW permission to lay infrastructure.

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