Ministry of Information Technology
& Telecommunication

DIGITAL PAKISTAN

NATIONAL BROADBAND POLICY - 2021

Consultation Draft v3.0

DECEMBER 7, 2021

GOVERNMENT OF THE ISLAMIC REPUBLIC OF PAKISTAN
Ministry of IT & Telecom

Ministry of Information Technology & Telecommunication
DIGITAL PAKISTAN

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Acknowledgements

The Government of Pakistan pays its gratitude to all the officials, consultants, facilitators, developers and stakeholders who rigorously and relentlessly participated in the review, drafting, harmonizing and ratification of National Broadband Policy – 2021.

The Ministry of IT & Telecom would also like to especially thank all the stakeholders including the Industry players, PTA, FAB, the World Bank Group, GSMA and other independent professionals for providing with their valuable inputs in the drafting and harmonization process of the National Broadband Policy – 2021, helping the Ministry with an all-inclusive user centric, evidence based, forward looking and agile policy framework for enabling Pakistan towards a digital economy and society.

Foreword

For accelerated digital inclusion and growth of its citizens, the Government of Pakistan is rigorously pursuing the agenda of "**Digital Pakistan**" as envisioned by the Honorable Prime Minister to present an equal opportunity at every doorstep.

The Government of Pakistan is cognizant of the fact that the Telecom Sector is a major contributor and a key enabler of country's GDP growth and a definitive path towards a digital economy. For achieving our National Developmental Objectives sustainably and transparently, connectedness, digitalization and indigenous innovation are the three main drivers under the guidelines of the Sustainable Developmental Goals of the United Nations.

Recent technological developments associated with the 4th Industrial Revolution and the directives laid in the earlier Telecom Policy – 2015 has necessitated a call for action for reviewing the progression of the telecom sector and accordingly streamline the future course with a renewed resolve.

The increasing dependence of economies on the internet has laid the foundation for declaring "broadband as a utility" and this aspect will serve as the underlying principle for the succeeding reformative agenda of the **National Broadband Policy – 2021** a guide towards a digital revolution in Pakistan.

Introduction

Since the enactment of the *Reorganization of the Telecommunication System Act* in 1996[1], the Telecom Sector has undergone two major transitions in a span spread over less than two decades by witnessing the sector deregulation in 2003-04 and release of Next Generation Mobile Services (NGMS) licenses in 2014-15 followed by the Telecom Policy – 2015[2].

The two phases have yielded tangible benefits for the country right from providing basic telecommunication services through fixed and wireless media all the way to high-speed broadband connectivity which was made possible through enabling policies and market centric regulations, opening doors for local and foreign investments.

While understanding the predominant nature of the evolving digital ecosystem, the Government of Pakistan recognizes that there is no single solution for enabling and governing the digital space and that every stakeholder in the value chain has to play its role for reaping desired social and economic outcomes. Out of the lessons learned by analyzing market behavior and the findings of implementation status of the previous policy the following major challenges have emerged:

a. Need to accelerate policy implementation for market enablement.
b. Need to update the market structure inter-alia, the regulatory regime.
c. Need to increase the efficiency of resource redistribution and utilization.

The National Broadband Policy – 2021 is cohesively organized based on following attributes:

a. User centric and technology neutral
b. Evidence based and forward looking
c. Objective and target oriented

For achieving the above, the policy is organized as a journey-based approach keeping the user first and foremost. For keeping the directives generic and agile, the user journey is distributed over four main pillars: inclusivity & accessibility, usability & market enablement, digital trust and transformation & evolution. For having a simple and achievable action course, each guideline is mapped with clear objective(s) and target(s) for timely implementation of the policy.

With the help of National Broadband Policy - 2021, the Government of Pakistan reassures its continued support for timely progression of the industry, seamless adoption of novel frameworks and technologies, attract new investments in the sector and to present the people with new opportunities through an all-inclusive approach for a **prosperous Digital Pakistan**.

[1] https://moitt.gov.pk/SiteImage/Misc/files/telecom_act_170510.pdf
[2] https://moitt.gov.pk/SiteImage/Misc/files/Telecommunications%20Policy%20-2015%20APPROVED.pdf

Market Overview (Registering the Evidence)

Socio-Economic Indicators

The telecommunication sector of Pakistan contributes significantly to the economy of Pakistan; about 5.4% (2019-20) of total GDP and 450,000[3] direct and indirect jobs. According to earlier World Bank research, every 10% increase in broadband penetration can accelerate economic growth by 1.38% in developing countries[4]. Other research by the Global System for Mobile Communications Association (GSMA), suggests that for every new job created in the Pakistani telecom sector, 11 are generated in the wider economy.

i.	Population	223,745,000
ii.	Median Age	22.8 Years[5]
iii.	Overall GDP (FY 2019-20)	US$263.68 Billion[6]
iv.	Telecommunication Sector Contribution (FY 2019-20)	US$ 1.67 Billion

Penetration

Table-1 summarizes the overall performance and achievements of the telecom sector since 2015 which paves the way for identifying gaps and setting future targets.

Market Attribute	Initial State (Feb - 2015)	Current State (Dec - 2021)
Teledensity	137.2 Million (76.5 %)	187 Million (85.33%)
Broadband Penetration	10.4 Million (6.7%)	109 Million (49.53%)[7]
Avg. Connection(s)/Subscriber	1.94	1.87
Unique Mobile/Internet Subscribers	51.34%/19.58% of TD	53.47%/34.5 of TD
Smartphone Penetration	7.66%	44%
Annual Internet Subscriber Growth	80%%	19.2%
Average Internet Speeds (F/M) – DL/UL	1.9/1.1 Mbps	14.41/8.41
Average Internet Consumption/ Subscriber/Month (in GBs)	0.73GB	6.31GB

Table- 1

The first five years of the post NGMS auction phase suggests that, the telecom sector has shown promising results in terms of digital inclusion for improving the access to information through internet and technology adoption. However, there is further room for improvement in terms of optimizing the accessibility and utilization and by offering an enabling environment for new technological advancements via policy support.

[3] https://www.gsma.com/asia-pacific/wp-content/uploads/2020/06/24253-Pakistan-report-updates-LR.pdf
[4] http://documents1.worldbank.org/curated/en/645821468337815208/pdf/487910PUB0EPI1101Official0Use0Only1.pdf
[5] https://www.worldometers.info/world-population/pakistan-population/
[6] https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=PK
[7] https://www.pta.gov.pk/en/telecom-indicators

Revenues & Investments

The revenues of the telecom sector climbed from PKR 459.2 billion in 2015-16 to PKR 551.9 billion in 2018-19 registering a healthy 16.8% of CAGR. The Investments in the sector surged as an initial reaction to the NGMS auction in the first 2 years, however the graph levelled off in the later half which accounted for US$ 3.18 billion in the past 4 years as illustrated in tables 2 and 3 below.

Revenues – PKR (in Millions)[8]				
Telecom Sector Regime	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Cellular Mobile Operators (CMOs)	386,865	382,410	445,652	424,290
Fixed/Wireless Local Loop/Class-VAS	78,439	75,382	69,237	78,193
Long Distance & International (LDI)	30,353	31,063	35,650	34,697
Total	**495,273**	**488,855**	**550,539**	**537,180**

Table-2

Investments – US$ (in Millions)[9]				
Telecom Sector Regime	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Cellular Mobile Operators (CMOs)	801.9	568.1	412	567.8
Fixed/Wireless Local Loop/Class-VAS	153.2	199.9	210.9	135.5
Long Distance & International (LDI)	16.6	24.6	19.1	30.2
Total (also as % of Total Revenues)	**971.7 (20.4%)**	**792.6 (17.02%)**	**642 (15.39%)**	**733.5 (21.85%)**

Table-3

Market Share

The market share in terms of different access services is largely dominated by NGMS providers followed by optic fiber services proliferation due to higher demand of backhaul services which has further enabled local loop service providers to expand FTTH access to residential subscribers. Table-4 below registers the evidence of broadband penetration via fixed/mobile access mediums.

Type of Broadband Access	**Broadband Market Penetration (Subscribers)**	**Avg. Internet Speed (DL/UL) in Mbps**
NGMS	84.81 Million (97.65%)	18.8/12.9 Mbps
LL/CVAS	1.13 Million (1.3%)	10.93/9.51 Mbps[10]

Table-4

Coverage

As a result of the obligations set forth in the NGMS spectrum licenses auctioned in 2014, the service providers were required to extend mobile broadband coverage to 50% of *tehsil* headquarters

[8] https://www.pta.gov.pk/en/telecom-indicators/5
[9] https://www.pta.gov.pk/en/telecom-indicators/4
[10] https://www.speedtest.net/global-index/pakistan

(including 20% *tehsils* headquarters in each province) nationwide in the next six years. As a result of this obligation, the NGMS service outreach has reached over 85% of the total population and service adoption gap between urban and rural population has reduced to less than 5%, however it is further learnt that fewer than 20% of the total handsets owned in the rural areas are smartphones which probably is one of the major concerns hindering digital inclusion.

To reduce the digital divide the Broadband for Sustainable Development (BSD) Program was organized by USF. Approximately 1587 MBB sites and 9773 kilometers of OFC network are currently servicing more than 146 Towns/THQs nationwide. Table-5 presents an overview of the connectivity and readiness situation in the last 5 years.

Connectivity Attributes	Index Scores				
	2014-15	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Infrastructure	28.59	37.56	46.98	46.55	49.12
Affordability	40.56	46.24	45.23	49.82	48.49
Consumer Readiness	27.05	27.40	27.96	28.41	28.82
Network Coverage	41.10	54.80	73	65.40	67
Spectrum	14.02	20.38	21.48	20.14	20.14
Tariff	43.08	50.49	52.27	59.58	60.74
Handset Prices	29.87	34.96	36.42	33.28	35.28
Taxation	9.89	19.53	9.61	26.32	28.93
Mobile Connectivity Index[11]	**31.02**	**35.43**	**38.49**	**39.66**	**40.56**

Table-5

Tariff & ARPU

As the demand weighs in favor of broadband internet, so does the concentration of Service Providers by developing data centric products and service plans. According to global market trends 60% to 65% of the total Average Revenue per User (ARPU) consumed by a subscriber is of the internet services as legacy services dependency on legacy services continues to deplete.

Even though sizable investments have been made by operators for service expansion and enhancements (developing access/long-haul network infrastructure and acquiring spectrum resources), the market response and open competition has led to contained service provisioning either at same or even better tariff offerings. Pakistan has ranked 17th[12] in terms of internet service affordability for 1GB volume of internet per month and ARPU has shown a Compound Annual Growth Rate (CAGR) of 7.6% since 2015. Table 6 explains the tariff and ARPU situation between 2015 and 2020.

[11] https://www.mobileconnectivityindex.com/
[12] https://www.cable.co.uk/mobiles/worldwide-data-pricing/

Tariff/ARPU Attributes	2015	2020
Average Price of 1GB Internet Volume	PKR 555	PKR 42
ARPU/Subscriber/Connection (Mobile)	PKR 198.5 (US$ 1.95)	PKR 213.9 (US$ 1.34)
ARPU Distribution (Legacy/Broadband) in %	75%/25%	65%/35%

Table-6

The government realizes that lower internet costs have not accounted for desired average revenues compared to peer markets and economies and requires further provisions in the policy with respect to consumer awareness, quality of service, infrastructure support and smartphone penetration. These could be the driving factors for affordable and sustainable services.

Policy Challenges

In recognition of the challenges which could not be addressed through earlier interventions or the ones which are in the process of being addressed and finally the ones ahead with respect to digital development requires a renewed commitment. Some of the specific challenges which the National Broadband Policy – 2021 aims to address are:

i. The need for affordable access to broadband for all.

ii. The challenges concerning digital divide including gender digital divide, especially in unserved and underserved areas nationwide.

iii. Impediments in the digital infrastructure rollout, such as; implementation of right of way policy directive, license framework review and efficient spectrum management.

iv. Gaps in awareness for fair and secure use of internet and supporting frameworks.

v. Limitations with consolidation and implementation of service based competition and lack of mechanism for oversighting the market behavior.

vi. Attributes gauging the quality of service of different licensees requires immediate review.

vii. Widening gap between fixed/wireless access penetration and adoption, due to lack of supporting infrastructure and policy/regulatory interventions.

viii. Understanding the impact of Internet in terms of sociocultural developments economic growth and environmental sustainability.

ix. Barriers for investments applied on existing licensees and for new investors in telecom sector and promoting public-private partnerships.

x. Necessitating an agile policy and regulatory environment for an evolving digital ecosystem.

xi. Challenges vis-à-vis accelerated evolution towards adoption of next generation technologies and fiberization, necessary for improving the state of broadband infrastructure.

Policy Vision & Objectives

Policy Vision

For furthering the initiative of Digital Pakistan, it is important to craft a policy vision which is user centric, market oriented, simple to govern and all-inclusive in nature, laying a strong foundation to address outstanding issues expediently and explore new opportunities in the most agile manner. The National Broadband Policy – 2021 aims to offer;

"A Boundless, High Speed, Resilient and Affordable Access to Broadband Internet for All".

Policy Objectives

i. To improve the state of broadband internet through need-based policy interventions concerning the digital access, use of scarce resources and modernization of market structure for equitable distribution of digital dividends.

ii. To promote service based and open competition, rationalize tax regime(s), review barriers to entry for new investors and offer essential incentives for reducing the cost of internet access.

iii. To review and re-organize the use spectrum bands as identified in the IMT-2020/23 for the advent of next technological wave via enabling interventions.

iv. To strategize the satellite communication space by making it more inclusive and receptive to technological developments and market needs.

v. To improve the quality of broadband internet through revitalization of QoS compliance in accordance with the appropriate best practices.

vi. To ensure enforcement of the Right of Ways policy directive in an inclusive and transparent manner, offering a one-window and integrated solution to all stakeholders for the application, utilization of shared resources and resolution of routine matters.

vii. To increase awareness around cyber risks, build resilience, improve safety and establish trust of users for using internet services as an enabling medium.

viii. Review and transform the roles of the regulator and other facilitative bodies of the government for achieving the national broadband targets timely and conveniently.

Policy Drivers

The user centric policy drivers on which the foundation of the National Broadband Policy – 2021 is laid, consists of the following four major pillars.

1st Pillar: Inclusivity & Accessibility

The 1st pillar will focus on the people who are yet to be digitally included and will provide guidelines regarding use of existing fiber resources, facilitating the cloud infrastructure and internet exchange points, reviewing the role of the Universal Service Fund (USF) for sustainable penetration of broadband services, assessing the rolling spectrum management strategy and offering interventions for resource optimization as well as roadmap for inclusion of new mobile spectrum bands, expediting the implementation of right of ways policy directive, plan for commercial use of data satellite and proposal for smartphone adoption manufactured locally.

2nd Pillar: Usability & Market Enablement

The 2nd pillar will help in organizing matters related to enhancing the use of internet and for market enablement such as; roadmap for service based competition, review of licensing framework vis-à-vis market structure, outlining the future course of OTT platforms and content management, consolidating the role of Ignite for internet use, reviewing the quality of service rules for improving user experience, developing and implementing new services and technologies in public-private partnerships, supporting with necessary infrastructure and services for enabling social services in the digital space.

3rd Pillar: Digital Trust

The 3rd pillar will emphasize on the privacy and protection of user consuming internet and will help in creating awareness and propose a framework for securing identity and data online, ease of access for reporting criminal activity online, guidelines for constituting computer emergency response teams (CERTs), standardizing and implementing user privacy, propose common operating environment and standards for internet security, environment protection support, framework for standardizing new technologies and services.

4th Pillar: Transformation & Evolution

The 4th and final pillar of the policy would help users by providing a transformational roadmap for legacy services and technologies, review the role of different public sector organizations responsible for facilitating different telecommunication services, plan for adopting open source technologies and platforms, broadly identify future technologies and make provisions for early adoption, propose broad strategy for the adoption of autonomous networks and last but not the least provide guidelines for international cooperation on digital development.

National Broadband Targets

For enhancing the implementation capacity of broadband plans and strategies through special funding instruments for aiding the economic structure based on thorough market analysis and benchmarking, the ITU Broadband Commission advocates to align National Broadband Targets with international action plan until 2025[13].

For spurring digital development, it is critical to define broadband targets which would help in assessing and strengthening the national broadband agenda and would also harmonize the progress with the seven advocacy targets of the Broadband Commission. The targets furnished below are staggered in to two phases starting from 2021, with 1st phase completing in 2025 and the extended 2nd phase concluding in 2030.

Socioeconomic Targets

Macro indicators reflect the contribution of digital/broadband development on the economy and society. Moreover, with increasing reliance on digital platforms and services it is anticipated that by 2030, the technology and associated digital ecosystem in the country will be substantially advanced.

Socioeconomic Indicators	2016 to 2021	Target 2025	By 2030
Contribution towards GDP	5.4%	7% ~ 8%	≥ 10%
Job Creation (Direct & Indirect)	450K	+250K	+300K
Internet Access to Public Schools & Hospitals	<15%	≥50%	70%
Revenues (in Billion) – US$ (4 Years)	15.3	19~20 (@25% CAGR)	24~25 (22% CAGR)
Investments (in Billion) – US$ (4 Years)	3.13	4.5~5 (@50% CAGR)	7~7.5 (@50% CAGR)

Table-7

For achieving the socioeconomic targets set forth, the demand side and supply side targets proposed in Table-7, would help in realizing overall digital growth.

Inclusivity & Accessibility Targets

Considering the current state of broadband penetration and adoption as per the evidence captured and illustrated in earlier sections, the government with the help of stakeholders aims to set aggressive targets for ensuring expeditious inclusivity and accessibility of broadband internet in the country with a coverage to every pocket of 100 inhabitants.

[13] https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.21-2020-PDF-E.pdf

Inclusivity & Accessibility Indicators	Targets		
	Current (2020)	Before 2025	By 2030
Teledensity/Broadband Penetration – in %	83.4%/43.5%	95%/≥80%	99%/90%
Fixed Broadband Penetration of TD	1.13%	≥5%	≥20%
Unique Internet Subscribers of TD – in %	34.5%	≥50%	≥75%
Smartphone Adoption – in %	44%	≥ 75%	98%
Annual Subscriber Growth Rate (UMS/UIS) – in %	3.75%/9.12%	4.5%/≥10%	≤5%
Avg. Broadband Internet Access Speed – in Mbps	≥14	≥30	≥50
Mobile Connectivity Index	40.56	≥65	≥75

Table-8

i. To ensure that 100% of the population living in tier-2/3 cities should have access to high-speed internet by 2025.

ii. More than 85% of metropolitan areas, districts, towns, *tehsils* and union councils should be connected through optical fiber cable based fixed/wireless access network with an average per user internet speeds of 50Mbps in major cities of Pakistan by 2025.

iii. Every social and welfare service facility such as schools, hospitals, courts, police/fire stations, district/union council offices should have access to broadband internet services with at least 100Mbps connectivity by 2025.

iv. More than 75% of businesses and commercial facilities should have access to high-speed fixed and mobile broadband internet by 2025.

v. Every person over the age of 14 years to have ownership of at least one latest smartphone(s) and/or other digital device(s).

vi. To introduce next wave of fixed and mobile services and ensure coverage in 25% of the cities in Pakistan by 2025 and another 75% cities/towns by 2030 while accommodating technological evolution and resource optimization on the go.

vii. Facilitate 80% of internet users to have access to digital financial services by 2025.

viii. Facilitate the development of Carrier Neutral Data Centers, Internet Exchange Points and Cable Landing Stations via public-private partnerships or any other market driven model.

Usability & Market Enablement Targets

One of the major challenges towards digitalization of communities is the efficient use of internet. For embracing internet as a utility, it is important to make a user understand the time and cost savings they can achieve by relying on transparent, secure and easy to use digital platforms and services. This would not only help in increasing the broadband demand, but will also improve the cost and ease of doing business.

It is broadly realized that the broadband infrastructure already in place is underutilized and requires immediate support in terms of sharing, local content, improved user experience, digital skills and organized service delivery models.

For creating an enabling environment, the following targets in table-9 are articulated to organize the demand side in coherence with the supply side.

Usability & Market Enablement Indicators	**Targets**		
	Current (2020)	**Before 2025**	**By 2030**
Avg. Price/1GB Vol. of Data (in US$) - Affordability	0.26	≥50%↓	≥30%↓
Average Internet Usage (in GBs)	6.3	≥20	≥50
Round Trip Time (RTT) - User Experience (in msec)	35	≤25	≤10
Content Availability (in %)	<35%	≥60%	≥90%
Gross Expenditure on R&D (GERD) of GDP (in %)	0.24%	0.5%	1.5%
Digitally Skilled Users (in Million)	1	5	10
Community Broadband Centers/million population	≤3	≥10	≥25

Table-9

i. Every user should be able to choose between a minimum of two (2) broadband service providers irrespective of their location by 2025.

ii. To increase the use of internet by 200% amongst youth aging between 13 and 25 years by 2025, by offering at least 30% extra volume of internet in same price range as that of a normal user.

iii. Increase the use of internet by at least 300% amongst Women and Persons with Disabilities before 2025, by increasing volume of internet by at least 50% within same price range as that of a normal user.

iv. To make at least 50% of public services available over digital platforms/infrastructure by 2025 and 100% services to be digitally enabled by 2030.

v. To have more than 75% of academic content available online for embracing blended education by 2025.

vi. More than 70% Small and Medium Enterprise to have an internet connection of at least 50 Mbps by 2025.

vii. At least 70% Hotels and Tourists Resorts to have an internet connection of at least 50 Mbps by 2025.

viii. Facilitate schools, hospitals and other public facilities with necessary access devices, tools and platforms for optimally utilizing the internet services.

ix. For promoting indigenous research and innovation, enhance the network of National Incubation Centers in every district headquarters by 2030.

x. To develop at least three (3) smart communities each in Karachi, Lahore and Islamabad by 2025.

Digital Trust Targets

In implementing this strategy and ensuring a safe and transparent digital ecosystem, it will be critically important to address online protection and privacy of users in view of their increasing dependence on the internet. The following targets are set to be realized by 2025.

i. To ensure that every smartphone/internet device is provisioned with necessary data protection and privacy measures as per national guidelines.

ii. To have at least 100 patents registered through local Intellectual Property Organization on annual basis.

iii. To organize and implement Numbering, Naming and Addressing Rules for evolving a resilient internet ecosystem by 2025.

iv. For the protection of the environment, ensure that by 2030, the carbon footprint of the Telecom Sector is in compliance with 1.5°C trajectory of pre-industrialization level (42% reduction in Greenhouse Gases Emission) as defined under ITU recommendation "ITU-T L.1470 'GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement'1" and aligned to the IPCC Special Report on 1.5°C.

Transformation & Evolution Targets

The 4th Industrial Revolution continues to open new avenues of technological evolution which has resulted in overarching services of disruptive nature. This aspect has made it difficult for policy makers to keep up with the transformational process in order to reap long term and sustainable benefits for society and the economy.

It is, therefore, necessary to pronounce targets which can accommodate evolution and offer the policy a ubiquitous outlook.

i. Transform PTA as a full-fledged 5th generation regulator for ensuring timely regulation and introduction of new technologies and platforms of overarching nature by 2025.

ii. To have a more inclusive and integrated role of public sector organizations for allowing contribution of government in the development and viability of digital ecosystem by 2025.

iii. To establish at least three (3) government or collaboration funded research and development centers for harnessing technologies under the umbrella of 4th Industrial Revolution and beyond by 2030.

iv. To organize at least three (3) unique initiatives/programs with international R&D, Standardization Organizations regarding to provide access to latest tools and systems by 2025.

v. To enhance & establish long term cooperation with at least five (5) international policy making, standardization, research & innovation and funding bodies for technological advancement and content localization by 2025.

vi. Formulate and implement at least five (5) branching policies and/or implementation strategies with a focus on disruptive technologies such as Artificial Intelligence, Blockchain, Internet Security and Spectrum Strategy with respect to future networks including Satellite Communications etc. by 2025.

1st Pillar – Inclusivity & Accessibility

1st Pillar - Inclusivity & Accessibility

The first pillar of the policy entails the development and efficient use of digital infrastructure and resources. Key components include access networks, backbone networks, core infrastructure and other strategic resources such as spectrum and satellite networks. Inclusion is the top priority.

1. Digital Infrastructure

1.1. Fiberization

i. The preferred medium for wireline access will be fiber to facilitate delivery of broadband services and connectivity to cellular infrastructure for enabling Xth- generation technologies for the end-user.

ii. To promote fiber deployment, investments and leveraging fiber assets for expedient implementation of Public/Private Right of Way Policy Directive 2021 for addressing the fiberization issues. The Pakistan Telecommunication Authority under this policy shall enforce the said ROW policy directive for effective monitoring & implementation by all licensees.

iii. For the rectification of disputes concerning Right of Way, PTA shall establish a Dispute Resolution Directorate for addressing issues amongst operators and between licensees and Right of Way issuing Authorities swiftly and amicably.

iv. For matters concerning provision of Public & Private Right of Way, determination of fee or to the effect of reasonableness of any condition, application or complains could be submitted to this Directorate in accordance with sub-sections (6) and (7) of section 27A of the Act. Considering the nature of cases, the Directorate shall organize Dispute Resolution Desks at all PTA offices nationwide and if possible to the extent of district level. Establishment of online dispute application and resolution system shall be encouraged.

v. The Directorate shall liaise with aggrieved parties and shall resolve all disputes within sixty (60) days of the receipt of application from any party. All the Federal/Provincial/District Authorities/Administrations shall adhere to the decisions taken by the Dispute Resolution Directorate and shall implement it in true and lateral spirit. This shall be organized as an intermediate step and any escalations (if required), shall therefore be in line with the clause no. 27 sub-clause 7 of the Telecommunication Re-organization Act 1996.

vi. Owing to timely accomplishment of National Broadband Targets, PTA shall formulate a Legacy Infrastructure Transformation Roadmap in consultation with stakeholders, necessary for early sunset (preferably by 2030) of legacy technologies concerning operational efficiency, quality of service and environmental aspects.

1.2. Outside Plant Code

i. An advisory code for local authorities will be developed to ensure that ducts and associated access points are provided in new roads, footpaths and railway tracks, and those that are being rebuilt. A duct sharing scalable model to be formulated and enforced for all new installations.

ii. PTA shall develop a framework with the appropriate authorities for roads to develop a code for the construction of telecommunications ducts to be included in the specification for any road or railway construction or rebuilding program. The code will provide a specification for ducts to carry telecommunications cabling including any necessary related power cabling and voids or spaces to be provided at critical points for the provision of buried or surface mounted equipment chambers.

iii. This code will be required also, to determine the terms on which ducts and voids/spaces are provided to telecommunications license holders, taking account of the need to stimulate and facilitate the provision of telecommunications infrastructure. The tariff for the use of such infrastructure will be determined in manner equivalent to that for rights of way. The building costs for ducts, spaces and voids will be included in the budget for the road, footpath or railway track and will be borne by the budget holder.

iv. Once the outside plant codes for laying and maintaining of optical fiber networks are promulgated, an Inter-Ministerial Working Group may be subsequently organized by MoITT which may include Ministry of Communications, Pakistan Engineering Council, National Highway Authority, Ministry of Housing, Ministry of Railway and other stakeholders for reviewing appropriate laws, rules and regulations being enforced by different Authorities and the Working Group may propose harmonized outside plant codes including duct sharing guidelines along with amendments/supersession (where necessary) in all such statutory orders for timely adoption and enforcement of outside plant codes.

1.3. Wi-Fi Hotspots

i. Provision of Wi-Fi hotspots based on international standards shall be encouraged for public use at airports, railway stations etc. free of cost if service providers deem so without any regulatory enforcement on cost except quality.

ii. Therefore, backhaul for public Wi-Fi hot spots can be provided by any network operator where such services are available. Cellular operators may provide public, fixed or limited mobility

based Wi-Fi services to customers and in this regard the policy directs to use free band unlicensed spectrum for back haul which is further defined in this policy.

iii. Wi-Fi offloading of mobile traffic to a Wi-Fi node linked to a mobile network or to a Wi-Fi hot spot linked to a fixed network may be undertaken by mobile licensees. In the spirit of the license granted to a mobile operator, the Wi-Fi node linked to a mobile network may be used to provide offloading of mobile traffic only from its own subscribers and from those that are roaming on its network.

iv. PTA will ensure that consumer protection and other regulatory arrangements that apply to ISPs more generally apply to Wi-Fi hot spots.

1.4. Neutral Tower Co. Regime

i. To introduce sustainable and efficient business models for broadband infrastructure development, PTA shall organize a new regime of Neutral Tower Co. with provision of first right of refusal for such grantees. The said regime shall be opened by federal government under this policy directive, apart from the existing non-right of refusal licenses.

ii. The price determination of this specific license shall be determined under section 2 of the Telecommunication Re-organization Act 1996 (amended 2006). The number of such licenses as directed by section 8 (2-a) of the Telecommunication Re-organization Act 1996 (amended 2006) and under section 5(2-a) are held dynamic with proper determination of relative licensing fee by the Authority reasonably (as a condition).

iii. This specific licensing regime shall include active and passive infrastructure sharing including Open Source and the licensee may offer active infrastructure as an added value creation.

iv. Neutral Tower Co. license holders shall be obligated to connect the fiber to each tower site.

v. The current Infrastructure Licensees without Right of Refusal shall continue to operate under granted terms and conditions as already specified by the Authority.

vi. In case a Neutral Tower Co. Licensee fails to provide tower sharing infrastructure, it has to be communicated to the other service provider within 30 days from such an application.

vii. Provision of tower services by the Tower Co. licensees may be determined on least cost/commercial terms basis by the applicant and Tower Co. Company.

viii. In case of any dispute between the two licensees (i.e. Tower Co. Company and the other Applicant Licensee), the Authority shall make all efforts to resolve such disputes amicably.

ix. PTA shall issue a Regulatory Enforcement Framework for efficient implementation of tower convergence.

x. The Tower Co. License shall not only be limited to Tower Sharing/Convergence but also includes duct and fiber sharing without provisioning of services. This regime shall be treated as an evolved and updated version of Infrastructure licensing regime already in place and shall not affect the functioning of current Infrastructure Licensees.

xi. The operating model of this new regime shall encourage the service providers to focus on service provisioning instead of investing on infrastructure.

xii. All projects developed under USF are obliged to follow the new regime.

xiii. Section 8(2-a) of the Telecommunication Re-organization Act 1996 (amended 2006) is applied in the said policy, with the duration of Tower Co. Licensing Regime as twenty (20) years.

xiv. Under section 8(2-a) of the Telecommunication Re-organization Act 1996 (amended 2006) the number of licenses shall be awarded with fee determination by the Authority with a licensing condition to invest US$ 1 billion in infrastructure development within five(5) years form the issuance of such exclusive license. Failing to which shall lead to revoking of license after expiration of the stipulated duration. The Authority under section (5) of the Telecommunication Re-organization Act 1996 (amended 2006) has to grant the license with regulatory and rollout framework accordingly.

xv. PTA shall issue a regulatory and enforcement framework within three (3) months from the promulgation of this policy in accordance with this policy directive.

1.5. Infrastructure Sharing Regime

i. To implement cost savings in the telecoms industry and to mitigate the delays incurred in procuring rights of way for new infrastructure, reducing environmental impact, sharing of passive and active infrastructure must be considered before granting a new right of way or space to build towers or for other infrastructure.

ii. All licensees are obligated to share infrastructure on mutually agreed commercial terms. All licensees with significant market power in a relevant market are obliged to share infrastructure on fair and non-discriminatory terms.

iii. Infrastructure sharing (passive and active) shall be provided based on the regulations and guidelines established by PTA, in consultation with MoITT, on the principles of neutrality, non-

discrimination and equal access. The guidelines will take account of established international best practices with focus on ease of sharing infrastructure and under one window operations on fair and non-discriminatory basis.

iv. For encouraging service based competition and simplification of infrastructure in terms of cost and management, PTA shall review the existing infrastructure licensing regime along with stakeholders and shall introduce active infrastructure sharing guidelines for a converged infrastructure sharing licensing regime. PTA shall allow existing as well as new licensees to develop and share all types of infrastructure effectively under this licensing regime. For achieving this, PTA shall also issue guidelines for active/passive infrastructure sharing in line with international best practices.

v. All the licensees shall be obliged to optimally utilize the available shared infrastructure resources and shall provide a roadmap to PTA for converging existing active/passive infra within three (3) years from the promulgation of this policy.

vi. All the licensees shall prefer to use shared infrastructure from Tower Share Companies and other infrastructure service providers on commercially agreed terms.

1.6. National Roaming Regime

i. Mobile licensees will be encouraged to offer nationwide service as expeditiously as possible at mutually acceptable terms especially, in the far flung unserved and underserved areas and where only one service provider is available and to be applicable immediately.

ii. Licensees shall be obliged through licensing obligations to organize National Roaming Agreements for all the long-haul communication networks such as; motorways, highways, other link-roads, railway tracks etc.

iii. For all universal services programs/projects in public private partnerships, it will be mandatory on all licensees/contractors to provision National Roaming Services in unserved and underserved areas including; highways, motorways, railways tracks and other far flung areas.

iv. PTA is empowered under section 22 of the Telecommunication Re-organization Act 1996 (amended 2006) to modify the license conditions with the consent of the licensee for the existing license and under section 8(2) of the Pakistan Telecommunication Re-organization Act 1996 (amended 2006) is directed by this policy directive to include the National Roaming Framework for all new and renewed licenses.

1.7. Carrier Neutral Data Centers and Cable Landing Stations

i. Owing to increasing indigenous demand for local/international content, collection and processing of data and for improving the access to internet, PTA shall organize a study to assess the prevailing market practices concerning co-Locations services, cross/inter connects and cloud services and the impact of carrier neutral data centers and cable landing stations on existing market.

ii. With the help of such a study, PTA shall review the Telecom Infrastructure Provider (TIP) licensing framework and shall reorganize it for the advent of Carrier Neutral Data Centers and Cable Landing Stations infrastructure Service Providers by opening up the market to new entrants as well as existing licensees.

iii. The licensing obligations for interested investors/licensees shall be articulated in accordance with the stipulations of Personal Data Protection Act – 2021 and other appropriate guidelines in practice.

iv. To lower market barriers for new entrants, all telecom infrastructure and services licensees shall be obliged to ensure their presence for cross/inter-connect purposes. PTA shall invite international operators to host their services in such facilities by having inter/cross connect arrangements with local licensees. No international operator shall be permitted to offer their services directly in the market without having a license or a formal arrangement with a legitimate licensee under intimation to PTA.

v. For ensuring necessary compliance, PTA shall visit such facilities periodically and shall ensure maximum transparency of the different services being rendered by the facility owners. Licensees, shall be obliged to establish lawful interception at all such facilities as part of licensing obligation.

vi. All such facilities shall adhere to National Cybersecurity Policy -2021 directives for securing the locations and the same shall apply on all the hosted service providers.

vii. International operators/service providers using such facilities for telephony/internet traffic transit purposes without landing the traffic locally shall be exempted from lawful interception and other obligations applied on local licensees.

viii. In this regard a simplistic encouraging framework shall be developed by PTA in-consultation with respective stakeholders and MoITT to effectively utilize the technology zones/Industrial

zones allocated and available areas already established in Pakistan in addition to other investment model facilitations with redundant commercial power and redundant optic connectivity ecosystems.

1.8. Corporate Networks & Global Digital Connectivity Roads

i. To facilitate digital services & connectivity domestically and globally corporate entities that wish to establish intra-corporate networks will be facilitated using services provided by licensees under this policy. Corporate networks will be permitted to connect to a licensee's public network in one or more places for the purpose of origination and termination of intra corporate traffic. However, a corporate entity may not engage in any commercial activity that enables transit of commercial voice or data across a corporate network between such points of interconnection.

2. Spectrum Management

The Ministry of IT & Telecom in consultation with PTA, FAB and other stakeholders needs to ensure timely and adequate access to spectrum [14]under transparent, reasonable, and flexible use terms and conditions in order to enable the expansion of high-speed broadband access and facilitate the deployment of new and innovative applications.

In conformance to the ITU Radio Regulations[15] and in the national interest, spectrum management must ensure that adequate spectrum is provided over both the short and long term for public service organizations to fulfil their missions for voice and broadband connectivity, for private sector business communications, for broadcasting information to the public and for research/amateur activities.

The policy actions below offer an orderly method for allocating frequency bands, authorizing and recording frequency use, establishing regulations and standards to govern spectrum use, resolving spectrum conflicts, and representing national interests in international fora.

2.1. Recognizing that spectrum is a scarce resource belonging to the State and must be used in public interest, the overriding spectrum policy goals are to:

i. Use spectrum in an efficient and flexible manner.

ii. Maximize social and economic benefits.

iii. Promote stability and transparency.

[14] https://www.pta.gov.pk/assets/media/pak_rolling_spec_strategy_03112020.pdf
[15] https://www.itu.int/pub/R-REG-RR-2020

iv. Support the timely emergence of Xth Generation Telecommunications Services.

2.2. Spectrum Harmonization

i. Whilst spectrum allocation will continue to be, in principle, technology neutral, it will also continue to be harmonized with ITU radio regulations, guidelines, resolutions and recommendations except where national interest warrants a different determination. Pakistan is within the ITU Region-3 and commits itself to play an active role in international fora, through engagement with relevant government departments, to ensure that as far as possible, the international allocation and regulatory framework accommodates Pakistan's specific requirements. A structured and output-based process led by Federal Government will be introduced to this effect by MoITT.

2.3. Technology Neutrality Definition

With the evolution of X-Generation technologies and emerging technologies, a scare resource is defined technology neutral.

"The efficient utilization of scarce spectrum resources on any standard technology within the regulatory framework is defined as Technology Neutrality".

2.4. Spectrum Sharing Regime

i. A new regime of spectrum sharing enables licensee to create a dynamic mechanism in a geographic area where there is no plan to launch the services in their business models and the scare resource is unutilized by any licensee.

ii. In order to ensure efficient utilization of spectrum in far flung areas including underserved and unserved, this regime shall help not only licensee to leverage the unutilized spectrum based on commercial terms with incumbents and other similar licensees for providing NGMS services in that area. Licensee are encouraged to adopt spectrum sharing regime on the concept of use it or share it, for not utilizing the available scarce spectrum resource in designated areas as per the guidelines of PTA.

iii. Spectrum may be shared between any similar licensees (falls under the purview of same licensing regime) and/or between a licensee and an incumbent operator not using the designated resources efficiently in accordance with the stipulations of the Spectrum Sharing Guidelines which is required to be articulated and adopted by PTA in consultation with stakeholders within six (6) months from the promulgation of this policy.

iv. PTA is empowered under section 22 of the Telecommunication Re-organization Act 1996 (amended 2006) to modify the license conditions with the consent of the licensees for the existing license and under section 8(2) of the Pakistan Telecommunication Re-organization Act

1996 (amended 2006) is directed under this policy to include the spectrum sharing framework for all new and renewed licenses.

v. Spectrum will not be traded by any licensee under this regime. Permission to share spectrum will not absolve the assigned licensee from any roll out and payment obligations that are conditions of its license or obliged by regulations.

2.5. Spectrum Strategy

i. MoITT, on recommendations of FAB and PTA, will prepare and publish a Rolling Spectrum Strategy that provides a program for the succeeding three years from the date of publication. The Spectrum Strategy will identify:

ii. For the succeeding period:

a. Plan for existing spectrum allocation audit.

b. Terms of Re-allocation of existing spectrum to legacy licensees.

c. New spectrum bands to be made available through transparent and competitive process.

d. Consequential requirements for spectrum re-farming.

iii. Anticipated longer term developments such as longer-term changes in spectrum allocation and availability for use. While stability is important, the strategy must adapt to the changing needs of the telecommunications sector. Therefore, PTA and FAB will continuously review the environment and spectrum needs and in consultation with stakeholders make recommendations to the Federal Government to update the spectrum strategy to ensure that it remains consistent with evolving demands.

iv. PTA in consultation with FAB shall organize a study for the most efficient and swift utilization of sub 1GHz bands (such as; 450MHz, 920MHz etc.) which could be utilized for X^{th} generation services. The study shall further evaluate the current utilization of such identified bands, its interoperability challenges and provide with a roadmap for acquiring such bands from different users and making it available to IMT-2020 services as per ITU-R recommendations.

2.6. Release of Spectrum

i. Spectrum will be released in a timely manner to meet the requirements of new and existing services in an open transparent manner subject to government policy. This is essential to avoid any constraint on usage or degradation of quality of service arising from lack of spectrum. PTA, will take account of the linkage between economic growth and penetration of services when recommending the spectrum to be released and the timing of release. PTA will also consider the value of spectrum to the economy as well as to the exchequer in determining the details of the mechanism used for valuing and selling spectrum.

2.7. Spectrum Refarming

i. Spectrum will be refarmed where its current use is not in the best social and economic interests of Pakistan, it is underutilized, used inefficiently or its use is inconsistent with international allocations. The refarming will ensure the reassignment of frequencies to uses with greater social and commercial benefits than are attainable from the prevailing assignment of those frequencies. Spectrum to be refarmed will be identified in the rolling spectrum strategy. The requirement of spectrum in the context of national security will be given due consideration as per operational requirements of defense sector.

ii. PTA in consultation with FAB will propose a refarming framework to be approved by the Federal Government.

iii. The Spectrum Refarming Framework will be based on international best practices and market demand scenario. The framework will be a combination of administrative, financial and technical measures aimed at moving incumbent users and hence their equipment out from their spectrum assignments in a particular band either partially or completely so that the band may be allocated to other uses. It will also provide a process for estimating the compensation required, where applicable, through clear criteria.

iv. Federal Government, in consultation with PTA and FAB will decide to refarm any spectrum and such decision will be effected through a policy directive.

v. Upon decision by the Federal Government for refarming of a particular band, a Spectrum Refarming Committee comprising of MoITT, FAB, PTA and incumbent users will:

   a. Estimate the value of the refarmed spectrum using the valuation method to be adopted.

   b. Estimate the compensation cost of refarming (for government users only); and

c. Determine timeline for refarming.

vi. The government users who are required to vacate spectrum identified for refarming, may receive compensation for relocating to new spectrum. FAB will assist these spectrum users throughout their transition to a new spectrum band. Funds for compensation may be raised from fees collected from the issuance of licenses that incorporate spectrum assignments in the refarmed band.

vii. On refarming, compensation costs will be recovered from the license fees paid through the regulatory authority that collects the fees. PTA will create Spectrum Refarming Fund (SRF) and allocate an amount, to be determined by the Refarming Committee, from the fees it collects for this fund. Payment of compensation to the government users from whom the spectrum is refarmed, if required, will be made as approved by the Committee based on predefined criteria for the purpose.

viii. Re-farming includes but is not limited to the bands associated with the uses of telecom cellular service providers only.

2.8. Spectrum Assignment

i. Spectrum will be assigned in a manner that recognizes the value of the spectrum to the prospective licensee and to the economy, and in a manner that is consistent with the Spectrum Strategy. Where spectrum is licensed, a fee will be charged based on the most appropriate of the following methods:

ii. Through Telecom Policy – 2015, three unique modes of spectrum assignments shall continue to prevail for future assignments:

a. ***Auctions*** will be the preferred method of assigning access rights to blocks of spectrum for dedicated use. To the extent possible, these will be technology neutral and include coverage in minimum time frame and quality of service obligations in the license to maximize public benefit. Where a band is to be shared between users and/or applications, blocks of spectrum will be created that reflect these joint uses.

b. ***Administrative Incentive Pricing (AIP)*** reflects the opportunity cost of spectrum to encourage efficient use of spectrum and will be introduced for congested spectrum that has not been subject to an auction, for example microwave spectrum. AIP improves the efficient use of spectrum by setting the price for spectrum at a level that encourages the user to consider alternatives and encourages spectrum use to move to the highest value application.

c. ***Administrative Cost Recovery (ACR)*** will be adopted where auctions and AIP are inappropriate, for example in aeronautical, maritime and amateur radio bands. The fee will be set to reflect the costs incurred in administering spectrum in the band from which frequency is to be assigned. This approach will be applied to spectrum that is not congested and where the risk of interference is low.

iii. There may be instances where following an auction, one or more licensee may require further spectrum to meet demand for its services. Such demand may, in principle, be fulfilled by further planned spectrum auctions of additional spectrum. In this regard, PTA will propose policy recommendations to the Federal Government for the release of further spectrum where available to licensees that have already been assigned spectrum through a legitimate mechanism previously. In doing so, PTA in consultation with FAB, will take account of the availability of relevant spectrum, plans for further planned release of spectrum, the terms and benchmarks of the original auction where applicable and the licenses to which the spectrum will be assigned. The further assignment of spectrum will be fair and will ensure that it does not discriminate against other licensees.

iv. The ASAF will continue as defined in Section 4.4 and Appendix B of the 2004 Mobile Cellular Policy till AIP is introduced consequent to this policy. AIP shall be completely delinked from ASAF regime and an appropriate price determination shall be implemented by Authority in such a way that provisioning of alternate transmission methods are encouraged with a move towards X^{th}-generation technologies and Fiberization considering efficient utilization of back haul spectrum as defined scarce resource under this policy. Moreover, price determination study shall be organized by PTA to include criteria/benchmarks such as audit of already assigned backhaul spectrum usage by CMOs and other operators to determine market share, volume of RF spectrum assigned/held by users etc.).

v. The fee structure will be redefined by the PTA to include additional spectrum assigned to mobile services. The ASAF will not be charged on spectrum assignments subject to ACR. The ASAF will be completely independent & delinked while determining any AIP price. The ASAF will continue to exist other than the AIP regime independently.

vi. The determination of the budgetary elements covered by the ASAF will be fair to all spectrum users and will not discriminate between them. Therefore, a cost allocation study will be conducted by PTA for the purpose of allocating the costs of the FAB Budget to various types of spectrum assignees.

vii. In addition, a percentage of FAB budget shall be assigned from AIP regime apart from ASAF regime to further improve the FAB operational capabilities and inclusion of technologies to overcome the challenges of evolving and emerging technologies faced by FAB.

viii. Any methods of assigning and pricing spectrum used will be consistent with the following principles:

a. Be in accordance with Pakistan Table of Frequency Allocations.

b. Be fair, transparent and non-discriminatory.

c. Encourage fair competition where appropriate.

d. To promote the reutilization of back haul spectrum in an efficient manner.

e. To be charged on frequency channels of back haul either utilized or unutilized by the licensee once allocated.

f. Any spectrum which is a scarce resource and unutilized for eighteen months shall be subject to revoke and withdrawal as scare resource shall not be parked by any licensee without giving any services to the citizens to Pakistan. The policy discourages spectrum hoarding by any licensee after allocation and no spectrum sharing or trading shall be allowed by any hoarding mechanism.

g. Before assignment of spectrum either through a spectrum auction or by any other assignment FAB in collaboration with the bidder shall scan the spectrum mutually to check the interference in the spectrum if any on a large scale that can impact the future deployment of services at the time of buying. In this regard a buyer licensee has to confirm the health of spectrum in writing to FAB and a suitable scanning mechanism to be developed & enforced before competition of the auction process.

h. Take account of any roll-out obligations specified.

i. Be simple to execute.

j. Discourage collusion and predatory behavior.

k. Encourage fiberization in the country as an alternate to backhaul spectrum and leading towards National Broad band targets and X-Generations Technologies.

l. Once the traffic is shifted from airwaves to optic fiber charging mechanism shall be applicable after Authority recommendations with due consultation with stakeholders to this Ministry.

ix. The PTA will propose to Federal Government the methods of assigning and pricing frequency spectrum after consultation with stakeholders.

x. These methods will apply to all assignments, including those for telecommunications, broadcast and for any other use of spectrum to avoid discrimination between prospective spectrum users.

2.9. Spectrum for Digital Microwave Communication

i. Spectrum will be allocated for digital microwave communication to provide backhaul for fixed and mobile services. The roll out of future technologies, in the absence of fiber, is likely to create a bottleneck in backhaul. With this in view, and before the bottleneck arises, the microwave spectrum will henceforth be allocated, assigned and charged for to licensees and other users through Administrative Incentive Pricing mechanism to ensure rational use of spectrum for the purpose and to encourage the alternate of backhaul spectrum and efficient use backhaul spectrum apart from ASAF Regime.

ii. Digital microwave spectrum may be used by the licensees for any point-to-point application including access to customers if they are licensed for the service. For example, it can be used by a LL/ LDI licensee to connect to a customer site or for high throughput backhaul links for X^{th} generation technologies or Enterprise links including B2B & B2C connectivity and services.

2.10. Continuing Spectrum Rights & Obligations

i. Under section 8(2) of Pakistan Telecommunication Re-organization Act – 1996 (Amended 2006);

a. LDI licensees will continue to be entitled to radio spectrum (where available) for point-to-point and/or backbone links, within the parameters of their licenses, on payment of spectrum charges to PTA.

b. Upon expiry of the WLL Licensing tenure i.e. FY 2024-25, the WLL frequency assignments shall not be renewed and the scarce resource shall be returned to FAB for reallocation/refarming purposes in light of the recommendations laid in IMT 2020/23 and local demand. However, the WLL licensees shall be entitled to spectrum for point-to-point

links within the parameters of their licenses on payment of spectrum charges, subject to Federal Government policy issue for the purpose from time to time.

c. The released WLL band shall be subject to auction for X^{th} generation technologies use respectively as directed by this policy.

ii. WLL license regime shall be directed to sunset upon expiry of the license period within the parameters of their licenses, as specified in this policy and shall not be renewed. In this regard the licensee shall be informed immediately after effectiveness of this policy earlier in writing by the regulatory Authority.

2.11. Relinquished Spectrum Rights

i. LL and LDI licensees that receive spectrum will continue to be required to meet defined usage milestones, failing to which they will be required to relinquish their rights to use the assigned spectrum.

ii. Licensees will relinquish rights to spectrum that is no longer needed for their operations. Un-used assigned spectrum will be withdrawn by FAB, if a licensee fails to comply with relevant license conditions.

2.12. License Renewal Where the License Includes Spectrum Assignments

i. Renewal of license and associated spectrum at the end of a license period shall be as per the policy directive of the Government, if any. In case, PTA shall initiate the process in accordance with terms and conditions of the license and the provisions of Telecommunication Re-organization Act 1996.

ii. In case of renewal of licenses, PTA shall make recommendations to Federal Government within the timelines stipulated in the respective licenses.

iii. Other spectrum not subject to license renewal terms will be priced in accordance with the applicable spectrum pricing method specified in Section 2.8.

iv. Where separate payments for microwave and mobile spectrum have been introduced after the initial assignment of mobile spectrum, the spectrum fees associated with the mobile spectrum will be determined under the terms of the applicable license. Any microwave spectrum shall then be charged using the AIP method in place.

2.13. Introduction of AIP for Microwave Spectrum Assignments

i. AIP will be introduced for microwave spectrum assignments. In the past microwave spectrum for backhauling purposes was assigned to operators in line with Federal Government policies

based on the market conditions prevailing at that time. It has been observed that operators are requesting additional spectrum for backhaul transmission instead of utilizing alternate means or utilizing their existing assignments more efficiently. There is a need to introduce an appropriate charging mechanism for the microwave spectrum assignments in order to ensure efficient and economical use of the scarce resource as per international best practices. **The existing licenses will be modified accordingly under this policy.**

ii. Under this policy direction, PTA will establish a regulatory framework for the introduction & enforcement of AIP for microwave spectrum regime for new and existing assignments. Practice hitherto has been to bundle microwave spectrum used for backhauling from base stations with spectrum for fixed and mobile access in a single license fee payment. The introduction of AIP will require payments for microwave spectrum to be made separately. This unbundling of the fee structure will improve the efficiency with which licensees use microwave spectrum. Hence, the framework for the introduction of AIP for microwave spectrum will;

   a. Estimate the value of microwave spectrum on an AIP basis taking account of other means, including fiber, of providing backhaul.

   b. Allow for a phased introduction of AIP that recognizes that licensees will need time to review and revise their use of microwave spectrum, implement alternative methods of providing backhaul and recognizes also the investment that has been made in microwave equipment.

   c. Encourage the implementation of alternative methods of providing backhaul and increased efficiency in the use of microwave spectrum.

   d. Enable operators that keep up with the phased introduction of AIP with focus on alternate backhaul connectivity methods.

iii. PTA will consult stakeholders on the framework for AIP prior to its approval by the Federal Government.

2.14. Unlicensed Access

i. License-exempt spectrum may continue to be used for fixed access and backhaul by Local Loop and CVAS licensees, subject to any restrictions imposed by PTA in line with international best practices and standards.

ii. License-exempt spectrum will be made available in a manner consistent with ITU -R Radio Regulations. Devices will be type approved, conform to international standards or those published by PTA and access will be on a non-interference and non-protection basis.

iii. PTA shall study and make necessary provision for the use of unlicensed spectrum by private networks for non-commercial & commercial use both.

2.15. Test and Development Licenses

i. Temporary Test and Development Licenses will be issued by PTA, as appropriate. The industry and other eligible organizations will be able to test and develop new & emerging technologies & services by the assignment of temporary spectrum with specific conditions of use for research, development, testing and demonstration activities and that such licenses will be made available within three months of application.

ii. PTA may refresh current framework for test and development licenses including criteria for the provision of licenses, license conditions, the duration of the licenses, the terms and conditions of reissuing the licenses on expiry. PTA will consult stakeholders on the framework and then finalize the test and development framework to enable eligible organizations to acquire such licenses. PTA will forward the applications to FAB for allocation of suitable frequency band for any such request as per procedure in vogue. In defining the requirements for an organization to be eligible, PTA will consider the following types of organizations; telecommunications licensees, equipment manufacturers and research & development organizations, in order to encourage the highest level of technology and application innovation in Pakistan as possible.

2.16. Future X^{th}-Generation Spectrum

i. Following the ITU-R and 3GPP recommendations and in order to enable the next generation wireless broadband technologies, FAB in co-ordination with PTA to make available the frequency bands on annual basis for the timely adoption of next generation cellular networks/technologies to be commercially launched, considering that the spectrum offered are technology neutral. In this regard a comprehensive framework for X^{th}-Generation spectrums to be finalized by Q4 – 2022 as per the Rolling Spectrum Strategy to enable spectrum auction process & the commercial launch of next generation services in 2022 as directed under this Policy.

ii. As part of the Rolling Spectrum Strategy, the Federal Government may direct PTA and FAB for timely release/auction of spectrum for X^{th} generation services. In this regard, FAB in coordination with PTA shall propose the availability of spectrum for immediate auction with specific auction benchmarks and timelines. If required, PTA may hire a consultant for timely auction.

iii. The auction for commencement of X^{th} generation services may initially be organized for major metropolises of Pakistan having incremental demand for high-speed internet services in

accordance with the Telecom Reorganization Act 1996. The rollout obligations for the successful licensees may be carried out in a phased approach with clear timelines.

2.17. Global Lighthouse Networks & Small and Mid-sized Enterprises (SMEs) Scale Up

i. Governments recognize the importance of small and mid-size enterprises (SMEs) contribution in the economy and regularly offer incentives, including favorable tax treatment and better access to loans, to help keep them in business.

ii. In Telecom sector, for Small and mid-size enterprises business at least two free band unlicensed spectrums shall be allocated for prompt readiness of business connectivity that enables high-speed broadband deployment promptly.

iii. In this regard PTA and FAB in co-ordination with MOITT will develop a complete framework of free band/unlicensed spectrum within one year from the promulgation of this policy to be available for SME's & Industry.

iv. In addition to SME's, these unlicensed/free bands shall be usable for Global Light House Networks for P2P and P2MP applications including but not limited to; Industrial automation, Internet of Things (IoTs), smart cities, smart education, smart health and safe city projects all over Pakistan under first pillar of Policy initiative, apart from incoming X^{th}-generation Cellular sites back-end connectivity where no high throughput and capacity alternate is available for front & back haul.

v. PTA shall develop an Open Licensing Regime for the maximum facilitation of emerging technologies using free/unlicensed spectrum bands and other such fixed applications.

2.18. Mergers & Acquisitions

i. On merger or acquisition of a company with spectrum assigned under its telecommunications license, spectrum and license rights and obligations of licensees are transferred to the merged or acquiring organization. Where Mergers and Acquisitions are concerned, access to spectrum, and the associated license, is a critical asset of companies that rely on wireless communications.

ii. Whether a merger or acquisition should be allowed to proceed is a competition matter which is outside the jurisdiction of spectrum management, and legitimate mergers should not be impeded by inability to transfer spectrum licenses. Therefore, except where there are overriding technical reasons, or reasons arising out of the national interest, the spectrum rights and obligations of licenses not only limited to active/passive infrastructure will be transferable

to the merged or acquiring organization. PTA to intimate FAB of any merger/ acquisition, in case it involves any frequency assignments.

iii. Mergers and acquisitions shall be encouraged to converge active/passive infrastructure subject to paragraph 2.18.1 and subject to having met all license obligations including payments and roll out obligations.

2.19. Interference Protection

i. Complaints and enforcement: License holders expect the swift resolution of interference issues, which is essential for well managed spectrum. FAB is responsible for investigating interference complaints and the PTA is responsible for undertaking enforcement actions. PTA will attempt to resolve interference issues notified to them within 30 days of notification.

3. Pakistan Telecommunication Company Limited (PTCL) as Incumbent Operator

The incumbent operator had a significant role in successful deregulation of the sector. Although the state of market development and the status of basic infrastructure and competition in the market differs immensely from the last decade, there still remain some avenues where certain elements of previously applied obligations on the incumbent have to be carried forward until the formulation and implementation of Competition Rules.

3.1. PTCL will continue to offer non-discriminatory shared access to its last mile infrastructure with related co-location space for service providers to install their own exchange side broadband equipment in PTCL's exchanges. Access to copper and related co-location space will be at cost-oriented wholesale rates. PTA will monitor the shared access for fair competition.

3.2. PTCL is encouraged to make efficient use of their commercial properties for Future of Work purposes but not limited to; smart incubation centers, software houses, co-working spaces and other ICT development initiatives.

3.3. PTCL is encouraged to transform/replace the legacy copper infrastructure including aerial copper with underground digital infrastructure in the last mile installations as per the Outside Plant Code directives of PTA.

3.4. PTCL is further encouraged to provide enterprise P2P/P2MP services for SME and enterprise scale-up.

3.5. PTA will monitor the services and tariffs provided under Paras 3.1 to 3.2 to ensure fair and non-discriminatory behavior on behalf of the incumbent.

4. Role of Universal Services & Community Based Broadband Networks

The Universal Service Fund (USF) continues to play a pivotal role in connecting remote communities in an expedient manner and has furthered their bid for bridging the digital divide through Broadband for Sustainable Development Program.

Since its inception, USF has deployed more than 1,587 NGMS sites and has laid more than 9,773 km of Optic Fiber Cable[16] for providing equal access to broadband internet services to all by covering more than 146 town/*tehsils* to marginalized section of the society. USF continues to improve the accessibility of underserved areas with an aim to curb the digital divide even in the most challenged areas of the country.

4.1. As per the Telecom Policy 2015, the current USF Regime shall continue to apply to promote policy consistency towards the National Broadband Targets and for timely achievement of Sustainable Development Goals (SDGs).

4.2. All USF Programs under this policy shall include National Roaming to maximize seamless and continuous services for the end-users.

4.3. Spectrum Sharing may be introduced under USF Programs for more efficient use scarce resource and for better services to end-user. All far flung and bordering areas where there is no optical fiber network available, USF shall fetch the backhaul connectivity services via Satellite using PakSat as the first choice.

5. Satellite & Space Communication Networks

Commercial Space & Satellites programs with a "Balanced Space Policy" instead of completely Open Sky Policy with Public Private Partnership is in adoption globally.

Space Incubation Centers followed by commercial space ports are the first step for satellite constellation development including X-Generation Technologies beside Internet of things and space of Things to be encouraged and frame work to be developed by the Authority.

5.1. Balanced Space/Skies Regime

i. Any Satellite service through any space orbit can be provided by any foreign or domestic satellite operator through a satellite service provider duly licensed by PTA under one window operations with country office and on ground operational control mechanism established locally and to be LI compliant within the territorial boundaries of Pakistan & AJK;

[16] https://www.usf.org.pk/

All Satellite traffic uplink and downlink both to be measurable and specific steps to be taken by satellite service providers to report the traffic to PTA as and when required through automated platform or Network Monitoring System.

ii. The satellite service provider will satisfy the licensing requirements specified by PTA for the provision of such services before providing the same to its customers.

iii. Business to Business (B2B) and Business to Consumer (B2C) licenses to be bifurcated and framework to be formulated by PTA upon determination of appropriate license fee.

iv. Any B2C provisioning of bandwidth within the boundaries Pakistan and AJ&K has to be through PTA license or in partnership with already licensed B2C entity. In either case local registration of country office is mandatory with operational control domestically located.

v. Within the territorial boundaries of Pakistan & AJK preference shall be domestic satellite or satellite constellations operator under license of PTA as per balanced sky regime and the policy encourages new entrant and market players to be domestically registered to enjoy the same. This is applicable for both B2B/B2C licenses.

vi. Business to Business and Business to Consumers satellite dishes & ground stations to be type approved by PTA. Local manufacturing plants for development of satellite devices and dishes are encouraged.

vii. No unlicensed uplink & downlink bandwidth provisioning shall be allowed by any domestic or international entity.

viii. C-band, Ka, Ku and U etc. bands may subject to auction or with a base price to be considered by Government after PTA & FAB recommendations to facilitate international satellite services providers in accordance with the recommendations of ITU-R.

ix. Authorization for establishment of space stations, space launch vehicles, space satellite/s or constellations for research, development, startups and academia purpose, shall be granted by through single window operations by the Authority to Public or Private sector or Startup or Incubation center to encourage satellite research and development in Pakistan within fifteen (15) days of the application. Any domestic academia/university/institute shall be encouraged to carry out the research & development program accordingly under a single license with a five (5) years renewable duration.

x. Commercial space programs are encouraged including foreign collaboration after fulfilling License obligation as mentioned in this policy.

xi. A commercial license for Satellite operations shall be granted following this policy to any foreign or domestic entity without any discrimination and within three (3) months of the application.

xii. Internet of Things through satellite framework to be established by Authority in consultation with FAB and the said Ministry & stakeholders.

xiii. Provisioning of X-generation & emerging technologies including space of things to be encouraged with framework to be developed by the Authority after mutual consultation of FAB, Ministry and the stakeholders.

xiv. Import and export of cube or Nano satellites or any other parts including CKD/SKD kits, ground stations used for LEO/MEO/HEO/GEO or any other components may be subject to exempted duties and taxes to promote research and development in this area. In this regard a consultation of MOITT with respective stakeholders to be conducted for framework development.

xv. Domestic production/assembly of Nano or cube satellite or any other or constellation or assembly including launch pad and ground stations shall be encouraged by this policy for which a framework to be developed by the Authority in a simplistic manner to enable technology evolution and collaborations.

xvi. All Government to Government (G2G) Bandwidth provisioning shall be through PakSat International (a subsidiary of SUPARCO) satellite constellation as first right of refusal and to be processed within 30 days' time.

xvii. PAKSAT International is encouraged to increase the footprint in B2B/B2C segments through partnerships and collaborations. PAKSAT is further encouraged to launch mobile satellite vice and broadband services both domestic and international scale, for efficient use of unutilized bandwidth.

xviii. All Universal Services Fund Project where satellite connectivity is required in far flung areas the First Right of Refusal (FROR) shall be with PakSat International & to be incorporated in all USF

contracts after the issuance of this policy directive. In case the SUPARCO/PAKSAT International is unable to provide the required bandwidth/services, NOC shall be issued with 30 days respectively.

xix. National Incubation Centers and other public/private higher education institutions in collaboration with Ignite Technology Fund are encouraged to establish space Incubation Centers for the development of Nano cube satellites (including launch) and for creating a private space program in the Country.

5.2. Access to Electromagnetic Spectrum

i. Access to spectrum and associated orbital resources for satellite services will be managed by FAB in accordance with the applicable ITU-R Radio Regulations, Recommendations and Pakistan Table of Frequency Allocations while keeping in view the protection of existing services/ users to the extent possible with minimum chances of harmful interference.

5.3. Access to Space Segment Capacity

i. Radio transmissions from earth stations have the potential to cause harmful interference to communication satellite systems. The Government of Pakistan has obligations under international ITU Radio Regulations to avoid causing such harmful interference.

ii. Satellite terminal equipment must conform to the relevant ITU guidelines and recommendations.

iii. Satellite service providers will be required to register their Earth Stations with PTA prior to installation.

iv. All relevant technical details of earth stations will be shared with PTA. The same information will be used by FAB for interference mitigation, if reported by foreign or the national satellite operators.

a. For remote unserved and underserved areas which fall under the mandate of USF shall be encouraged for provisioning of Broadband Services using local satellite infrastructure. In this regard, USF is required to devise/include instruments in tendering process and contractual obligations while allocating contracts under its mandate.

5.4. Roaming GMPCS Terminals

i. Use of GMPCS terminals on a roaming basis is subject to provisions being in place with the respective GMPCS operators to provide data concerning traffic originating in, or routed to, Pakistan with the subjected license from PTA & FAB. A list of such 'recognized' operators will

be made available on the PTA website. The PTA website will provide guidance for GMPCS operators to ensure they are included on this list.

ii. Unregistered GMPCS operators shall not be authorized to bring GMPCS terminals in the country.

iii. Aeronautical Terminals

a. Aeronautical terminals will require a license/NOC from the PTA for operation while in Pakistan's Airspace. The license/NOC will set out the conditions of use for the Aeronautical Terminal.

iv. Earth Stations on Vessels (ESV) & Location Based Services (LBS)

a. Earth Stations on Pakistan registered vessels operate under the regulations set out by the ITU or other recognized international standards body. NOC with appropriate conditions, issued by the PTA, will be required for the use of terminals/vehicles/smart devices on foreign registered vessels within the territorial boundaries/waters of Pakistan.

b. Where an ESV operator is required to coordinate the use of the terminal with Pakistan, as determined under the relevant sections of the ITU-R Radio Regulations or other recognized international standards body, FAB will be the point of contact.

c. PTA shall develop and publish processes and requirements relating to registration and granting permission for the use of equipment and services, and licensing of satellite-based telecommunication services and Location Based services (LBS) services to encourage domestic development of LBS technology and services for the future. With a time frame of two (2) years PTA shall review the requirement of LBS services licensing considering domestics retention of location based data within Pakistan considering first priority with servers located within the boundaries of Pakistan. In this regard, a new license regime shall be opened by PTA with appropriate fee determination.

5.5. Satellite Service and Satellite System Spectrum Fees

i. Satellite related spectrum fee shall be calculated on an Administrative Cost Recovery Basis. In addition to Administrative Cost Recovery a suitable mechanism may be defined by Authority for the satellite spectrum auction for commercial business to business and business to consumer provisioning for the satellite service providers.

ii. PTA will review and update Satellite related spectrum fees periodically after consultation with industry stakeholders to ensure they are consistent with international best practice as well as the efficient and effective use of spectrum resources as required by this policy.

5.6. Satellite Terminal Equipment Standards

i. To protect adjacent satellites and terrestrial services, satellite terminal equipment used in earth stations will be regulated by technical standards published by PTA. A technical standard will prescribe the minimum technical requirements to be fulfilled by the satellite terminal equipment intended for sale and use in Pakistan. These requirements will conform to the relevant requirements published by the ITU or other recognized international standards body for satellite earth stations and to the extent possible will be based on existing international equipment standards.

5.7. Installation Standards

i. The operator of an Earth Station or Terminal will be responsible for ensuring that the installation adheres to domestic regulations & international best practices to avoid interference with other services and appropriate health and safety standards.

6. Adoption of Smartphones & Other Internet Devices

Adoption of Smartphones/Smart Devices is an integral part of the digital connectivity value chain. The realization of inclusivity is literally reflected through the adoption of smartphones and all other factors are supplementary. The journey of a user towards digitalization begins only with a smartphone ownership and that is the biggest challenge for embracing digital inclusion.

In Pakistan, the smartphone adoption has picked up in the past two years due to reducing costs which is improving the rate of smartphone adoption in rural communities. However, there is still a sizable gap to cover if Pakistan is to achieve the National Broadband Targets in a timely manner.

6.1. The objective of Smartphone for All Program shall be to improve the buying ability of target audience via interest free short term (micro/nano) financing instruments for prepaid and postpaid customers.

6.2. For orchestrating preferential financing instruments, the Ministry may help to develop an alliance between industry, Telecommunication Authority and financial bodies for reasonable installment's plans and a fool proof mechanism to enable low-cost smart devices availability to citizens of Pakistan on monthly installment basis.

2nd Pillar – Usability & Optimization

2nd Pillar - Usability & Optimization

Until the purpose of using internet remains focused on entertainment and socializing, it is difficult to term internet as a utility. The necessity emerges only when the dependency of a user increases and internet becomes a tool for resolving daily life issues. To achieve this and beyond the 2nd Pillar of the policy focuses on providing an enabling environment through open competition, service optimizations, indigenous research and innovation pertaining local issues, awareness and subsequent facilitative platforms.

Continuous evolution in digital platforms is increasing the demand for bandwidth and internet volumes, which is pushing policy makers to keep abreast with changing needs and to optimize online experiences. From simple social networking sites to integrated communities and from diverting streaming portals to life learning platforms are crafting knowledgeable societies through overarching services.

For achieving National objectives in a multifaceted and multilayered digital ecosystem, assistive policy measures can help in grasping new investments and collaborative models for public-private engagements creating a new wave of demand for affordable high-speed internet.

7. Licensing Framework

Converging platforms, sharing infrastructure, overarching technologies and service led competition has necessitated the need for reviewing and accordingly simplifying the licensing regime for allowing co-existence of conventional as well as unique services in a complimenting manner.

The modernization of licensing framework always has a key role in uplifting the demand for internet use and to allow regulations consistent with international best practices and for promoting services-based competition benefitting the user via industry facilitation.

7.1. The current licensing regime shall continue to apply except WLL license regime upon expiry as directed in this policy. Separate category in class licenses regime associated with satellite & space services is introduced in this policy as balanced sky policy. However, PTA will conduct bi-annual assessment of market absorption capacity and any new licensing in LL & LDI sectors will be subject to such assessment.

7.2. The present licensing regime already distinguishes between those operators that provide infrastructure as well as services and those that provide services alone. Nevertheless, there is a need to further enhance and optimize the licensing regime to cater for emerging

technological and market trends (including Xth-generation Cellular Technologies, Internet of Things etc.).

7.3. PTA shall intimate all licensees for renewal/sunset atleast eighteen (18) months prior to the expiration of their licenses. The licensees shall diligently organize resources and timely seek renewal from PTA. In case of delay in the processing of license renewal from a licensee, PTA after completing necessary lawful requirements shall revoke the license of any/all such licensees within ninety (90) days of such intimation. PTA shall review and update the terms of existing as well as new licenses accordingly.

7.4. Any new licensing regime will be based on international best practices. It will enable new services to be readily provided while meeting service specific requirements (including but not limited to quality of service, customer protection, content acceptability and national security) as they are defined. The licensing regime will continue rights and obligations associated with scarce resources and any obligations on network roll out.

7.5. In developing the new licensing regime *inter alia,* the following should be considered:

i. Section 20 of the Telecom Act, and in particular, which over-the-top services should be licensed under a "general authorization" in which a service provider is deemed to hold a license by virtue of the services that it provides and is then subject to the terms of that general authorization, which may include morality, cultural & national security requirements. The clause 5.2.5, 5.2.6, 5.2.7, 5.2.8 & 5.3 of Telecom Policy – 2015, shall continue to apply under this policy respectively.

8. Customer Services & QoS

Quality of Service has an impeding effect on user experience over digital platforms. Evolving productivity software, streaming platforms, integrated social networks and other such mobile applications are escalating the demand for bandwidth on daily basis and therefore, it is pivotal to align the Quality-of-Service measures for broadband internet access in line with the National Broadband Targets while keeping the quality-of-service regulations for traditional services intact.

Some of the evident challenges faced in improving the quality of service for broadband internet are;

8.1. Customer Services

i. All licensees will provide coverage and pricing information to customers in an easily accessible and understandable form on websites with indoor outdoor coverage maps up to 20-meter resolution & approximate throughput or speed for consumers.

ii. A converged consolidated single web CRM software-based platform shall be extended by all service providers where all citizens' complaints can be lodged as second level of support from the Authority. A mechanism needs to be developed by service providers as this shall not overlap with customer services complaint process already in place with each service provider.

8.2. Quality of Service

i. It is recognized that licensees are subject to quality-of-service parameters specified in their licenses. The following shall be applicable and effective to all service providers to ensure the quality of service for consumers.

ii. All Licensee have to report the network outages to PTA and to its customers for unavailability of services as major and critical with a recovery time frame for which a mechanism has to be formulated jointly by all Telco's. For major and critical outages, a root cause needs to be submitted to Pakistan Telecommunication Authority in a format as prescribed by the Authority.

iii. In this regard, the policy directs to implement by all service providers an automated Network Monitoring outages platform to be extended to Pakistan Telecommunication authority for Network outages and traffic measurement in an automated way followed by auto SMS triggering mechanism to the Authority for major & critical outages in real time. The definition of outages shall be done in consultation with the ministry by PTA based on the number of sites and Hub sites including fiber optic.

iv. The same to be extended to all unserved and underserved areas where contract were or to be awarded by Universal Services Fund as a mandatory requirement.

v. The PTA shall monitor broadband and Telecommunication services quality provided by all service providers against its KPIs & KQI's including committed bandwidth and outage commitments with the customers, will publish the results and take action against service provider for violation of the license condition and consumer contracts.

vi. As a result of Broadband Regulations and Customer Services Regulations, if necessary, amendments in licensing obligations shall be made by PTA.

9. Fair Usage Policy & Acceptable Usage Policy

Fair usage policy and terms of service are matters which are largely unknown to end-users due to awareness issues. Fair usage policy governs the extent of use of the services offered by a service provider, broadly in terms of volume and time.

Similarly, acceptable usage policy is aimed at seeking compliance for using a service for best purposes and not engaging in activities which are harmful for a user or a society or the service provider.

Both factors are important in governing the usage of internet services, however, it shall not be used as a tool to exploit users or to draw discrimination in service utilization.

9.1. Considering the inclusion of emerging and X^{th} generation technologies, a bill shock mechanism has to be introduced by the service providers to the consumers and specifically for data usage after due approval from the Authority. Any bill shock that arises due to the unavailability of service provider controlling mechanism shall be borne by the provider and to be enforced by the authority.

9.2. For effective implementation of FUP and AUP, PTA shall ensure that all licensees shall rollout user awareness campaigns and if required make necessary amendments in licensing obligations accordingly.

10. Role of Ignite and Indigenous Research & Innovation

In accordance with Rule 33(C) & (D) of the Telecommunication Re-organization Act 1996, Research & Development Fund (Ignite – Technology Fund) continues to promote indigenous research and innovation in the field of Information and Communication Technologies for optimizing and enhancing the use of internet. The clause 13 of the TP 2015 shall continue to apply to provide stability to the current running programs in addition the following shall be encouraged under this policy directive.

10.1. For supporting an entrepreneurial culture in the country, ignite may extend the outreach of its National Incubation Center Program in collaboration with public/private sector to embed a micro incubation centers network all over Pakistan in every district at physically located facilities.

10.2. The Industry vertical Incubation Centers focusing on Space Technologies and Satellites to be shall be established to promote the private space programs.

10.3. Ignite shall engage with local Intellectual Property Organization (IPO) for addressing challenges concerning intellectual property rights for having patents and copyrights of indigenously developed technologies to be registered.

10.4. A framework to be developed by Ignite to be forwarded to this Ministry for entrepreneur ship visa category introduction for further consideration by MOFA to attract foreign startups inclusion in Pakistan and clubbed benefits of STZs to be introduced.

3rd Pillar – Digital Trust

3rd Pillar – Digital Trust

There has never been a greater need for governments to develop policies that foster trust in the digital environment. Economies are increasingly relying on financial technology and digital financial services to stay afloat, and demand for services such as mobile and digital payments, telework platforms, food delivery and e-commerce have grown exponentially. In addition, trust is essential for overcoming fake news and conspiracy theories, which spread particularly fast in times of crisis through connected platforms. Data privacy frameworks that protect citizens' data, together with a national digital identity system, can provide a foundation of trust.

Increasing connectivity and data-intensive economic activities, in particular those that rely on large streams of data "big data", the widespread use of fixed/mobile connectivity, and the emerging use of the high-speed Internet to connect computers and sensor-enabled devices (the Internet of Things [IoT]) have the potential to foster innovation in products, processes, services and markets and to help address widespread economic and social challenges.

These developments have been accompanied by a change in the scale and scope of several risks, relating to digital security and privacy, with potential significant impacts on social and economic activities. Furthermore, as new business models emerge to take advantage of new opportunities, it may be more difficult for consumers to navigate through the resulting complexity of the evolving digital ecosystem. This combination underscores the need for an evolution in policies and practices to build and maintain trust.

11. User Privacy & Consumer Protection

User privacy over internet is among the most challenging issues raised by digital services. In a multilayered internet structure, concerns thus relate to the wealth of personal data that online activities generate, which, while enabling organizations to sketch rich profiles about individuals, also bring risks to both the individuals and the organizations. Therefore, careful analysis and rectification is required at each layer of communication for ensuring the privacy of a user leading to enhanced trust in internet adoption and its dependable use.

The article-14 of the Constitution of Islamic Republic of Pakistan guarantees privacy of home alongside dignity of every man and woman as their fundamental right. Therefore, privacy of a common person in the internet ecosystem shall be harmonized based on international best practices.

11.1. By the virtue of Data for Development Program, PTA via local/international consultant of repute shall perform a study for identifying the type of practices adopted by

telecommunication licensees, highly used digital platforms/websites and other business verticals (especially payment gateways and ecommerce platforms) for handling user data and the disclosures offered to the users regarding exact use of their data.

11.2. The outcomes of the study shall further lead to stakeholders' consultation for the harmonization of various user privacy policies in practice by PTA.

11.3. For ensuring consistency in privacy policy of different service providers and platforms, PTA shall formulate "User Privacy Rules" and if required make necessary amendments in the "Telecom Consumers Protection Regulations 2009" for explicating the purpose and use of data being collected by licensees and other digital platforms in purview of the Personal Data Protection Act.

11.4. PTA shall oblige the licensees to protect Caller Data Records and other user identification information in their possession for a stipulated time period as deemed appropriate by the Authority and where necessary, provisions in the licensing conditions may also be reviewed and amended appropriately.

11.5. For effective implementation of enacted regulations and guidelines, PTA may consider embracing an Internet "sweep", which is a systematic screening of websites to identify breaches of consumer law. Sweeps can be domestic in focus or undertaken as part of a coordinated action between cooperating Consumer Protection Enforcement Authorities at intra/inter government levels. Sweeps are undertaken with a view to requiring contravening websites to take corrective actions. A sweep will typically focus on detecting breaches of consumer protection regulation and user privacy guidelines in a particular sector.

11.6. PTA shall further engage with State Bank of Pakistan (SBP) to scrutinize the free-flowing exchange of user data amongst staff of different banks and based on the consultation process may facilitate in the enforcement of user privacy over telecommunication networks.

11.7. PTA shall develop online content (readable/video) for users, organizations and service providers for increasing awareness regarding rights and obligations of user privacy.

11.8. For effective implementation of guidelines, PTA shall orchestrate indicators reflecting overall market situation with respect to user privacy adoption, harmonization and awareness via market assessment study with respect to user privacy and based on its outcomes shall make/improve regulations and/or guidelines.

12. Numbering, Naming & Addressing Resources

Numbering, Naming and Addressing resources are recognized as critical drivers of telecommunications developments and has become a key competitive factor for enabling users in the internet space. Internet organization via effective numbering is an indispensable means to route calls and transport data through the networks in order to identify and reach customers and services while helping service providers in the billing process.

The availability and mode of number allocation could influence the way operators engineer their networks, possibly with consequential costs to both operators and users. These and other reasons make fair and equitable access to numbering resources of vital importance to competition and to ensure the development of a competitive telecommunications market is not disadvantaged on numbering grounds and simultaneously establishing digital trust.

Numbering Allocation & Administration Regulations – 2018 is in effect and allows licensees and users with necessary guidelines for application, allotments, number portability, information on assignment and schematics etc. For Naming part there is no regime, however the Country Code Top Level Domain is organized via PK-NIC and ". gov.pk" is managed by NTC. Finally, the IP Addressing is demand driven and directly managed by ICANN (APNIC). Operators continue to make direct applications and manage their IP schemes.

12.1. Numbering

i. Licensed service providers that offer new voice services whose subscribers may be reached via the PSTN will be provided with suitable number ranges.

ii. The policy supports transition to IPv6 within a reasonable timeline, preferably by 2023. The transition would consider national security requirements.

iii. PTA directly or via onboarding local/international consultant of repute shall formulate "National Numbering, Naming and Addressing Management Plan", identifying the challenges, future demand for numbering, optimization of resources, plan for adoption of new systems (such as ENUM) and roadmap for numbering convention.

iv. The plan shall further be deliberated with stakeholders and the final draft be presented along with recommendations to MoITT for review and approval. MoITT based on recommendation and after thorough review may endorse the plan for further implementation.

v. PTA shall review the current application process with respect to application of UAN/UIN and further optimize it for ensuring expeditious processing via process automation and integration.

vi. PTA shall develop and/or procure a tracking system for Numbering, Naming and Addressing resources for effective management of scarce resources on dynamic basis.

12.2. Naming Resources

i. In consultation with stakeholders, PTA shall develop a "Naming Service Rules" for standardizing, harmonizing, optimizing and evolving naming resolution process in accordance with Data Protection Act- 2021 and based on international best practices.

ii. After necessary consultations and with appropriate recommendations, PTA shall share the said Rules with MoITT for review and finalization. Based on the review process, MoITT may ratify the Rules for further implementation.

iii. The Naming Service Rules shall offer necessary guidelines for providing ".pk" domains in local language, operating environment procedures for web hosting service providers, quality of service guidelines and other such provisions necessary for efficient working of internet.

iv. MoITT may enhance its engagement with ICANN, UN-IGF, IANA, APNIC and other such international multi-stakeholder platforms for addressing matters pertaining to ccTLD, timely allocation of resources and improving the state of participation and contributions towards these organization.

v. PTA shall maintain a database of all the domains hosted in Pakistan by different local hosting services providers.

vi. All such service providers shall be scrutinized by PTA from time to time for evaluating the course of internet security and the service providers shall be obliged to offer their facilities for such audits under Naming Service Rules.

12.3. Addressing Resources

i. PTA shall conduct a brief study on the availability of IP Addressing resources in the country with respect to current and evolving demand patterns, IP blocks availability situation with different licensees, IP management plan, Autonomous System Numbers (ASN) and the requirement in the National Broadband Targets for inclusion and adoption of internet and availability of IPv6 resources with IANA and APNIC for allocation of IP resources.

ii. Based on the outcome of the study, PTA shall engage with stakeholders to discuss their plan for migration to IPv6 and articulate a plan for demand driven and phase-wise adoption.

iii. While anticipating an exponential increase in internet demand and diversified services, PTA shall further evaluate the possibility of organizing service and/or technology centric networks (such as smart city, autonomous vehicles, drones etc.) via AS number pre-assignments.

13. Environmental Protection

Environmental concerns, including climate change, represent some of the most serious global challenges of the 21st century. Advanced information and communications technologies can contribute significantly both to the problems and to the solutions. As a growing, energy-intensive, ubiquitous industry, ICTs have a strong impact on the environment in virtually every country. At the same time, as a field driven by innovation and competition, these technologies present a variety of opportunities to engineer Green alternatives to traditional modes of operation. And ICTs can play a vital role in helping to facilitate research, analysis, awareness raising, and cooperation to address critical environmental issues.

While taking stock from the Paris Accord [17](United Nations Framework Convention on Climate Change [b-UNFCCC PA]) on limiting the Green House Gas Emissions to no more than 1.5° of the pre-industrial temperatures the ITU under its recommendation ITU-T L.1470 [18]advocates the de-carbonization of ICT sector and via ICTs of other Sectors, emphasizes on the resource sharing of Fixed/Mobile wholesale as well as retail networks, using of alternate power sources, limiting electricity budgets etc.

According to EDGAR database created by European Commission and Netherlands Environmental Assessment Agency released in 2018, Pakistan's CO2 emissions have increased by approx. 200% in the past 25 years only, averaging at per land 224 (total CO_2/km^2/year) and per capita 1.0 (total CO_2/capita/year).

13.1. Study of Carbon Footprint and Science Based Target Setting

i. Under the Data for Development Program, PTA shall directly or via local/international consultant of repute, organize a study for "Measuring the Carbon Footprint of Telecommunication Licensees and Associated Services" in the country with an aim to recognize year 2021 as baseline year for setting Science Based Targets for the Telecom Sector.

ii. The study shall analyze the direct emissions of operators, the emissions caused due to service operations in terms of active network equipment, datacenters, power backup systems, impact of the fixed network laying and overall value chain emissions (including manufacturing of equipment and terminal devices).

[17] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement
[18] https://www.itu.int/rec/T-REC-L.1470/en

iii. Similarly, PTA shall organize another study under the purview of Data for Development Program directly or via local/international consultant of repute for "Assessing the Carbon Footprint of Internet Terminal Devices" including smartphones, laptops, computers and any other in use, general life of devices in the market with respect to internationally defined standards, quality of devices being imported (new/refurbished/e-waste etc.) and processes as well as infrastructure in place for e-waste management.

iv. Based on the outcomes of both the studies, recommendations shall be furnished in terms of target setting, standardization of goods and developmental/operational practices being adopted and roadmap for de-carbonization of industry in accordance with the recommendations of ITU-T L.1470 GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement and aligned to the IPCC Special Report on 1.5°C.

13.2. Environment Protection Rules

i. Based on the outcomes of the first study and the subsequent recommendations, PTA shall consult with stakeholders and based on available data and guidelines proposed vide Science Based Targets initiative (SBTi) compatible with the UNFCCC Paris Agreement, identify year-on-year de-carbonization budgets and targets.

ii. Based on the identified targets, PTA shall formulate "Environment Protection Rules" for Telecom Industry and present the same for review and further processing to MoITT.

iii. For effective implementation of Rules and achievement of identified targets, PTA shall develop/procure an "Emission Management System" for the monitoring and evaluation of all the licensees and their performance with respect to identified targets.

iv. PTA shall also expedite the enactment of Outside Plant Code and In-building Cabling Standards for development and operations to ensure efficient environment protection as explained in Policy Action# 21 below.

v. PTA shall liaise with Alternative Energy Development Board (AEDB), Pakistan Engineering Council (PEC) or any other relevant government agency for encouraging licensees/operators to use substitution of diesel generators in areas of no or low grid availability with renewable energy sources (solar, wind, etc.) via special incentives.

13.3. E-Waste & Digital Trash Policy/Rules

i. While referring to the outcomes of the second study and subsequent recommendations, MoITT in consultation with PTA and other stakeholders may articulate E-Waste & Digital Trash

Management Framework/Guidelines for manufacturers, traders, retailers, waste management companies and users.

ii. After necessary consultation and review process, MoITT shall ratify the framework/guidelines for further implementation by PTA.

iii. As part of the E-Waste & Digital Trash Management Framework, MoITT may include a public-private partnership program for establishing E-Waste Processing/Management facilities, owing to meager situation of standardized processing facilities in the country and for achieving identified de-carbonization targets timely.

13.4. PTA will monitor the environmental impact of licensees and the authority to define standards for the sector and issue orders to licensees and take other action on contravention of such standards.

14. Technology & Service Standardization

Standardization and standards ensure a degree of uniformity, fairness, and quality across a wide array of disciplines and processes. Standards are important for diffusing innovation through the economy, ensuring that most firms do not lag too far behind early adopters of new ideas.

Standards can play a vital role in growing the market both nationally and globally. In essence, a standard describes the technical consensus on performance of a product or service. Standards impact on all areas of economic life, e.g., supporting safety regulations, assuring quality and enabling compatibility of products. New standards may emerge through a competitive market process or by accepted use.

14.1. Establishing National Organization for Standardization, Research and Implementation (NOSRI)

i. For creating a link between standardization, the industry and the market, PTA in consultation with MoITT and other stakeholders, shall establish a "National Organization for Standardization, Research and Implementation (NOSRI)" which shall develop technical specifications, common operating environment, implementation and operational manual/guidelines and shall offer any other assistance required for efficient functioning of systems as per international best practices.

ii. The mandate of NOSRI within the ambit of Information and Communication Technologies (ICTs) shall be to standardize new technologies for early adoption, embrace existing standards developed by other international standard developing organization via effective coordination and research, analyze locally developed products and facilitate them in patenting process for standardization, establish guidelines for end-of-life and end-of-support to ensure systematic

sunset of technologies consistent with local market use, conduct studies from time to time to assess the overall market situation regarding technologies and systems in use, technologies in the pipeline and their impact on the market/industry and organize processes for transfer of technology necessary for evolution of the society.

iii. The licensees, distributors, retailers, telecom infrastructure developers and other affiliated stakeholders shall ensure that all the equipment procured, installed, managed and operated, all the infrastructure laid and managed and all the devices manufactured and traded are in accordance with the rules, guidelines and any other advisory issued by NOSRI/PTA from time to time.

iv. In case of ambiguity or omissions regarding standardization, the concerned may approach NOSRI and/or PTA for seeking necessary clarification through proper communication channel as provided on NOSRI/PTA website.

14.2. Telecommunication Standards for Network Equipment

i. In accordance with section 28 of Telecommunication Re-organization Act 1996, NOSRI/PTA in consultation with stakeholders and as per the guidelines provided by international standardization organizations for telecommunication network equipment shall draft the "National Standards for Telecommunication Equipment".

ii. The standards may include, general specifications, industry and code requirements, performance requirements, interoperability requirements, HSE requirements, specific materials requirements (if any), warranty/guarantee coverage requirements, electrical/electronic efficiency requirements, installations and operations requirements and any other requirements as deemed appropriate from time to time.

iii. The purpose of standardization is to facilitate adoption and harmonization of new technologies and standards without drawing any prejudices whatsoever.

iv. After necessary consultations with the stakeholder, PTA shall present the final draft of National Standards for Telecommunication Equipment to MoITT for assessment and further consultations. Based on which the MoITT may endorse the proposed standards for further implementation.

14.3. Type Approval Process of Terminal Equipment

i. The type approval process shall be reviewed by PTA for the purpose of process simplification and inclusion of new terminal types such as; Internet of Things (IoT) devices, 3D printers, Augmented/Virtual

Reality (AR/VR) devices, connected gaming devices, wearable devices, etc. In this regard, PTA shall issue type approval certificates to the applicants within 15 days of application.

ii. Devices for which the samples are imported for the first time, PTA shall issue provisional no objection certificates within the same day of application.

iii. PTA shall provide an online application and dispute resolution platform integrated with the Single Window Platform for type approval of terminal devices and shall also establish facilitation desks at all sea/dry ports for expeditious processing of all such applications for provisional NOCs as well as type approval certificates.

iv. For promoting local manufacturing of IoT communication equipment/devices, the Ministry of IT & Telecom may notify a Committee on "Localization of IoT Manufacturing" with a mandate to study the local IoT market and accordingly formulate a comprehensive set of recommendations for facilitating local manufacturing of IoT equipment/devices. The committee shall analyze the initiatives taken by different peer markets to enable local manufacturing and shall accordingly formulate its proposal for providing a competitive enabling environment to local/foreign manufacturers.

v. The proposal may include but not limited to; incentives on the import bill and other applicable levies of CKD/SKD for local manufacturing of IoT equipment/devices, tax holiday to manufacturers establishing their facilities inside Special Economic/Technology Zones with specific allotments, special incentives to manufactures for establishing System On a Chip (SOC) plants for manufacturing CPUs/GPUs/Controllers and Chipsets locally.

i. MoITT through facilitation from Ignite, may establish atleast two (2) embedded systems research and testing lab for analyzing latest technologies, tools and equipment as per international standards. The lab shall possess the capability for testing and generating reports concerning EMI, EMR, Safety, RF and SAR standards etc., within Pakistan.

15. Secure Biometric Verification of User SIMs

15.1. Considering the fraud and theft issues and to avoid the misuse of customers' biometric data by using evolved advanced techniques, the policy directs all Telecom Service Providers & licensees to upgrade the biometric verification systems to the most appropriate level of security as per current available technologies.

15.2. PTA in consultation with NADRA and the licensees shall articulate a mechanism as per best practice and shall accordingly implement it within one (1) year from the notification of this policy.

4th Pillar – Transformation & Evolution

4th Pillar – Transformation & Evolution

After embracing the first three steps of the journey i.e. digital inclusivity & accessibility, enhanced usability, ensuring online trust, the transformation and evolution of the user is of utmost importance, which also serves as the 4th pillar of the journey in this policy. The digitization of societies and economies are continuously generating record amounts of data which is driven by increased and faster connectivity of people and things.

Fiber to the home (FTTx) and fast mobile networks provide the opportunity to engage in digital activities such as social media, interactive OTT platforms, Omni-channel e-commerce marketplaces, integrated productivity tools, etc., allowing user-generated content and subsequent motivation for it. At the same time, more objects become “smart”, i.e. connected to the Internet to receive and send data. As a result of the explosion of data, new technologies have evolved that help to examine through data and derive value from combining and analyzing large data sets.

The new technologies require policy makers to reconsider the tools they deploy to facilitate fair competition in the ICT sector and protect consumers. New technologies also pose legal, ethical, and macroeconomic challenges. Central banks, consumer protection agencies, competition commissions, and ICT regulators scramble to assess the implications for their fields of responsibility.

The implication is that roles of sector-specific regulators such as for the ICT sector, water, electricity, and banking, and subject-specific regulators such as a consumer protection agency or the competition commission may need to be redrawn and, in some cases, more specialized regulators may need to be established.

Through this pillar, the aim is to streamline the transformational journey of a user by redefining the role of the Authority, enhancing public sector organizations’ agility and market driven technology adoption, in response to cloud computing, AI, Blockchain, big data, and the Internet of Things (IoT). Whereas, the desired outcomes for fair competition, consumer protection and economic development would remain the same.

The transition to an all-IP network means that laws, policies, and regulations need to evolve to maintain fair competition. This has consequences for national regulatory institutions including ICT and broadcasting regulators, competition commissions, and consumer protection agencies. Big data, AI, and the IoT are driving the need for a redesign of the regulatory landscape because these technologies are able to combine, analyze, and utilize disparate sources of data, providing insights that do not only apply to any one sector but across sectors and not only to one jurisdiction but to many.

16. Transforming Legacy Services

Legacy PSTN based services and associated infrastructure imposes substantial recurring costs on the service providers and can be a hurdle for users to embrace high-speed broadband internet. The adoption of next generation infrastructure has significantly increased especially in mobile access networks however, fixed access networks continue to struggle due to higher network transformation costs. IP Transformation is moving the industry from a capital-intensive, technology-focused model to a user-centric service-delivery model.

Software Defined Networks (SDN) enabled via General Purpose Machines (GPMs) has allowed for flexible and optimized infrastructure use and sharing on demand basis, allowing service providers to re-purpose their infrastructure by drastically reduce operational costs, add new revenue streams and most importantly improving the competition situation and transparency for the user.

While understanding the impact of early transformation on market sustainability and that the source of income of service providers would heavily rely on internet centric digital services and subsequent data monetization in the next 20 years or so, therefore, traditional services are seen as threat to the society and requires a multi-stakeholder consensus for timely evolution.

16.1. MoITT may organize a study directly or via local/international consultant of repute for analyzing the current situation of demand/use of traditional telecom services using a bottom-up approach, identifying the challenges at user level, network/service levels, ecological impact and the technology roadmap under the Data for Development Program.

16.2. The findings of the study shall be applied for articulating the “Legacy Service/Network Transformation Strategy” and further be deliberated via multi-stakeholder consultation considering the findings of study and international best practices.

16.3. The Strategy shall identify a cut-off date for switching-off legacy infrastructure, directives to PTA for optimizing appropriate licensing regime(s) for wholesale and retail legacy services by defining clear rights and obligations after service migration to all-IP based infrastructure to avoid service overlap and protecting the interest of each of the respective licensees, necessary review/provisions in the Competition Rules, Quality of Service Regulations, use of Assigned/Auctioned Spectrum Bands, Strategy linkage with Environment Protection Rules and any other measure required for achieving established targets in the Service/Network Transformation Strategy.

16.4. The Legacy Service/Network Transformation Strategy may be ratified by MoITT after necessary consultation, review and approval process, with PTA to be designated as implementation/enforcement organization for the Strategy.

16.5. Within six (6) month from the approval of this policy, PTA shall devise and implement Rules/Regulations with a target to revamp the over the ground legacy infrastructure (such as; copper network and over the ground poles etc.) via services corridors as defined in the Right of Way Policy Directive by 2030 for improving the state of internet, consumer protection and for embracing environmental obligations.

17. Evolution towards 5th Generation Policy & Regulatory Regime

The overarching nature of cross cutting technologies has necessitated for a broader role of regulators from being a simple sector specific regulatory authority to a more user journey centric integrated role by embracing enhanced coordination mechanism, forming new bodies or even is many cases convergence of different regulators for ensuring a simple yet effective regulatory regime for facilitating, enabling and protecting users, promoting investments and allowing government to organize its resources in the best possible manner.

For adopting enabling regulatory frameworks in the digital space, it is crucial that regulators shall avoid the mere extrapolation or expansion of existing, potentially outdated laws and regulations to new players or new topics. As advocated by ITU, the regulators shall adopt measures which may include deregulation or self-regulation or a co-regulatory approach, that will lead to greater innovation, easier deployment of new and emerging technologies, incentivize investment, and focus on inclusivity and collaboration.

17.1. The PTA will undertake its roles as defined in the Telecommunications Re-organization Act 1996 (amended 2006) in a proactive manner and to act accordingly to implement this Policy in areas where Policy has been specified and to adhere to the generally stated principles within this Policy where specific Policy measures have not been specified.

17.2. For undertaking issues/challenges of cross-functional nature enabled through communication technologies and platforms, PTA shall organize an inter-regulator working mechanism with other sectorial regulators for ensuring delivery of simplified services using one-window operations for licensees and other technology companies. In this regard necessary integrated systems shall be developed to improve the situation of ease of doing business in a collaborative environment. PTA in this regard shall devise a strategy and after seeking necessary endorsement from Ministry of IT & Telecom and approval from

appropriate forum shall execute it incrementally within the next two (2) years from the promulgation of this policy

17.3. For the articulation and implementation of Competition Rules for Telecom Industry, MoITT may facilitate collaborative arrangement between PTA (the sectoral regulator) and Competition Commission of Pakistan (CCP) within six (6) months from the issuance of this policy.

18. Open Source

The Networks and associated Technologies are continuously evolving and Software Defined Networks (SDNs) and Open-Source Network including Open-V/RAN are the future of telecommunication systems & services, where service/technology centric hardware platforms will no more be required. General purpose computing in a cloud-based environment installed in different synchronous and asynchronous configurations will serve the purpose of automated service provisioning using programmable multimode systems. Owing to these elements, investments in Open-Source technologies and platforms are inevitable and therefore, research and development of such technologies and services and shall promote local startups to facilitate service providers locally and abroad.

18.1. In realization to the increasing technological convergence and dependency on Software Defined Networks (SDN), Open Source has a critical role in network evolution inter alia network economics.

18.2. In view of these developments, MOITT in consultation with PTA, FAB & relevant stakeholders shall establish an “Open Source – working group” for carrying out research & implementation strategy on available technologies and resources which may be optimized to support network evolution through optimum resource utilization.

18.3. The Open Source – working group, shall take into considerations the following requirements:

i. Research and Development on Multiband/Multimode Radio Technologies.

ii. Feasibility study for the adoption and implementation of Open RAN and Open Core Networks.

iii. Standardization of using Open Source based platforms and services.

iv. Type approval testing of Open-source platforms to be conducted before granting permission.

v. Study and develop standards on Nano & Quantum Computing considering available Open Source based technologies.

vi. For the accommodation of new technologies and services the working group shall organize standardization sandbox framework in relation with cutting edge technologies identified through 4th Industrial Revolution.

vii. Open-Source deployment is highly encouraged in Pakistan for industrial growth and sector development and this policy encourages timely adoption of Open-Source Networks.

viii. The recommendations furnished by the working group shall be adopted and implemented by PTA after seeking necessary approvals within six (6) months of the promulgation of this policy.

19. International Cooperation

The overarching nature of the internet requires focused and delicate approach towards global challenges and opportunities which allows nations and societies to claim their equitable share in the cyberspace. Disruptive and cross functional digital platforms and services needs harmonization with the laws of the land and the laws of the land needs to adopt emerging best practices timely for safeguarding the presence and enhancing the dependency of a user over digital ecosystem. Therefore, the role of international cooperation needs to be orchestrated efficiently for transforming the nation into a digital economy.

19.1. The Ministry may enhance its presence at inter-governmental and multilateral forums for actively participating/contributing in meetings, forums, symposiums, working/study group(s), workshops etc. regarding; articulation of international policy and regulatory recommendations, standardization development and management for adoption of emerging platforms and technologies, efficient resource utilization, infrastructure development, skill development and enhancements and any other activity for embracing international best practices.

19.2. The Ministry may appoint subject matter experts on international cooperation as permanent representative(s)/attaché(s) at inter-governmental forums such as; ITU, APT, ICANN, ITSO, IETF, UN-Broadband Commission and any other organization or forum requiring consistent engagement for staying on top of respective international developments.

19.3. For allowing a futuristic and structured approach towards improving the course of strategy, policy, rules, regulations, frameworks and guidelines issued by the Government, the Ministry

and the Authority for the development of digital ecosystem, the Ministry via its International Coordination Wing may furnish "International Digital Development Report" reflecting emerging challenges, opportunities, advancements taking place globally in the cyberspace and accordingly offer its recommendations, strategic frameworks and proposals for harnessing international best practices.

19.4. The offerings made in the report shall be appropriately adopted in forthcoming policies, regulations, frameworks and other such guidelines issued by relevant forums from time to time.

19.5. In consultation with stakeholders, the Ministry may devise a "Digital Friendship Strategy" for strategically cooperating with counterparts establishments in other international government(s) for cohesively participating at international/regional inter-governmental fora by aligning common interests, harnessing best practices, opening avenues for trade in ICTs, participating in the development of digital infrastructure via public and/or private instruments and other matters of bilateral interests to be amicably resolved for efficient strategic partnerships via organizing formal understandings, frameworks, partnership agreements, inclusion of identified and mutually agreed areas of interest in protocols of joint working/economic committees/groups, establishment of subject specific ICT cooperation committees under formal bilateral forums etc.

19.6. The Ministry may strategically engage global internet/digital conglomerates and international ICT associations having greater impact on society through effective participation in policy making & regulations, opening new avenues for investments, improving research and innovation for improving the course of internet and content availability in the country.

19.7. The Ministry may facilitate international multilateral organization and associations in registration and establishment of local offices in designated Special Technology Zones and IT Parks for effectively participating in the development and evolution of digital ecosystem in the country.

19.8. For expediting the outreach, adoption and use of internet/digital platforms, uplifting indigenous research and innovation and to improve the situation of Ease of Doing Business for ICT sector, the Ministry may from time to time engage international/regional financing and funding institutions for timely embracing National Broadband Targets by devising and implementing sustainable ICT Development Programs via appropriate channels.

Funding/financing generated for such purposes shall only be utilized for identified purposes and possibly through public-private partnerships.

20. Review of Govt. Sector Organizations' Role

20.1. Statutory Organizations such as; National Telecom Corporation (NTC), Special Communication Organization (SCO), Telecom Foundation (TF), Pak Datacom Limited (PDL) etc. working under the purview of Ministry of IT & Telecom directly or via independent Boards shall continue to performs their assigned responsibilities in accordance with the stipulation of the statutes/board resolutions derived from Telecommunication Reorganization Act-1996.

20.2. In order to reduce reliance on the PSDP Program of the Government, these organizations shall formulate a five (5) year development strategy and alternate means of collaboration for achieving organizational objectives while remaining within their stipulated mandates.

20.3. All the organizations shall formulate a comprehensive Cybersecurity framework with immediate effect in accordance with the guidelines of the National Cybersecurity Policy-2021 and shall enhance their network/system security by adopting latest and state-of-the-art cyphering/encryption technologies for providing secure communication platform to the target audience (including Audio/Video Conferencing Systems).

20.4. All the organization are encouraged to organize their services and development initiatives in Public-Private Partnerships as per PPRA-2004 rules after carrying out necessary due-diligence of counterparts.

21. Center for Telecommunication Research & Policy Implementation & Review Roadmap

As per global best practices for the implementation of policies and strategies, high powered councils and committees are organized to monitor progress, evaluate delivered services and outcomes, intervene for expediting and keeping the process of implementation on course (wherever necessary), validate operations, policy directives and subsequent rules, regulations and other guidelines and evolve for the continuity and sustainability of measures emphasized via policy instruments.

For the transparent and effective implementation of the policy, a comprehensive structure needs to be institutionalized for consistent development and achievement of National Broadband Targets.

21.1. The Policy Implementation Cell or Center for Telecommunication/ICT Research shall be the operational support organization to the Working Groups and the Management Committee

organized for managing day to day operations for the implementation of policy guidelines furnished in this document.

21.2. The Ministry in accordance with the assigned targets, roles and responsibilities to the Working Groups, shall orchestrate the objectives, deliverables and targets for the Policy Implementation Cell in consultation with the Working Groups.

21.3. The Policy Implementation Cell shall monitor the progress of policy implementation and work in close coordination with the Authority, The Board, the Funds and the public/private organizations and shall present its monthly progress review reports and subsequent recommendations to the Working Groups and the Ministry on the progress of Policy Implementation.

21.4. A collaboration with international policy making organizations & academia is encouraged to constantly improve and to steer the industry in the evolving fast pace direction with right speed and decisions. It shall also help to do research where policy measures are required to uplift the Telecom industry and to identify the bottlenecks and where further efficiencies can be introduced.

Other Policy Measures

Other Policy Measures

Several policy measures from Telecom Policy – 2015 for which directives were issued from time to time remain relevant under the new framework and shall stay in effect, with review on an as needed basis.

22. Continuing Policies & Rules

22.1. The following Policy Directives will continue to apply:

i. Policy Directive under Section 8 of Pakistan Telecommunications Re-organization Act, 1996 regarding closure of telecom services due to national security concerns.

ii. Guidelines for Mitigating Environmental and Health Related Effects of the Cellular Base Station Antennas.

iii. Policy on Jammer and Disabler Devices for Blocking Cellular Communications and Related Services.

iv. Policy Directive for Mobile Subscriber Documentation and Antecedent Verification.

v. Policy Guidelines on Mobile Network Operators and Mobile Virtual Network Operators.

vi. Policy to Support Technical Implementation of Mobile Banking including Mobile Money Transfers and Remittances.

vii. Policy Directive for inter-operator network redundancies.

viii. VoIP and Other Over the Top (OTT) Services (section 5.5) of Telecom Policy-2015.

ix. Interconnection TP 2015 chapter 5.7 shall continue to apply.

x. Peering and Exchange Points TP 2015 chapter 5.8 shall continue to apply.

xi. International Telecommunications: TP 2015 chapter 5.9 shall continue to apply.

xii. Service Provision: TP 2015 chapter 5.4 shall continue to apply.

xiii. Chapter 16 of TP 2015 shall discontinue after this policy directive.

xiv. Telecommunication and National Disaster Management: TP 2015 chapter 7.8 shall continue to apply.

xv. Competition rules chapter 5.1 of TP 2015 shall continue to apply in this policy.

xvi. Content management 9.8 of TP 2015 shall continue to apply accordingly.

xvii. Lawful Interception 9.9 of TP 2015 shall continue to apply under this policy.

xviii. Continuing Policy & Rules (section 9.11) of Telecom Policy – 2015 shall continue to apply.

Definitions

i. **The Federal Government/Government** means the Federal Cabinet.

ii. **The Policy** means the National Broadband Policy – 2021.

iii. **National Broadband Targets** means the targets identified in this policy for improving inclusivity & accessibility, usability & optimization, digital trust and transformation & evolution journey of a user within digital ecosystem.

iv. **The Ministry** means the Ministry of Information Technology & Telecommunications.

v. **The Authority/Regulator** means the Pakistan Telecommunications Authority established under section 3.

vi. **The Board** means the Frequency Allocation Board established under section 42.

vii. **Technology Neutrality towards Spectrum** means the freedom offered to a licensee to choose the most appropriate and suitable technology for servicing target market within the stipulations advised by the National Regulatory Authority for the use of spectrum, while taking into account the principle of technology neutrality by neither imposing nor discriminating in favor of the use of a particular type of technology.

viii. **Net Neutrality** means the rules and guidelines issued by the Authority to licensees and Digital/Internet service providers (ISPs) for treating all Internet communications equally, and not discriminating or charging the use of internet differently based on user, content, website, platform, application, type of equipment, source address, destination address, or method of communication.

ix. **Internet** means global system of interconnected computer networks that uses the Transmission Control Protocol and Internet Protocol (TCP/IP) suite to communicate between networks and devices.

x. **User** means a person or entity external to the network, which utilizes connections through the network for communication.

xi. **Company** means Pakistan Telecommunication Company Limited established and incorporated in accordance with section 34.

xii. **Corporation** means the Pakistan Telecommunication Corporation established under the Pakistan Telecommunication Corporation Act, 1991 (XVII of 1991).

xiii. **License** means an authorization granted by the Authority for the establishment, operation or maintenance of any telecommunication system or provision of any telecommunication service.

xiv. **Licensee** means the grantee or holder of a license.

xv. **Licensing Framework** means rules, regulations, decisions, orders, policy directive implementation, guidelines, instructions, notices and relevant license terms and conditions issued by the Authority to different types of telecommunication licensees/service providers in accordance with Telecommunication Re-organization Act 1996, for smooth functioning of telecom sector.

xvi. **Rules** means the rules made by the Authority as a result of the policy actions/directives issued in this policy or as directed by the Ministry from time to time, in accordance with the stipulations of Telecommunication Re-organization Act 1996.

xvii. **Regulations** means the regulations made by the Authority as a result of the policy actions/directives issued in this policy or as directed by the Ministry from time to time, in accordance with the stipulations of Telecommunication Re-organization Act 1996.

xviii. **Private Right of Way** means the right of way, which is owned, managed, maintained or repaired by anyone other than a public authority.

xix. **Public Authority** (in relation to right of way), means the local authority, corporations, provincial or Federal Government or any other public body which owns that right of way or which is responsible for its maintenance, repair or management.

xx. **Public Right of Way** means the right of way, which is owned, managed, maintained or repaired by a public authority.

xxi. **Ignite** means the Research and Development Fund established under sub-section (1) of section 33C.

xxii. **Right of Way** means a right belonging to any person or public authority to pass over land or property of other person to provide telecom license services.

xxiii. **Scarce Resources** means radio frequency spectrum, right of way and numbering.

xxiv. **USF** means the Universal Service Fund established under sub-section (1) of section 33A.

xxv. **NTC** means National Telecom Corporation established under section 41.

xxvi. **TF** means Telecom Foundation established under sub-section (1) f section 4 of the Charitable Endowment Act 1890 (VI of 1890).

xxvii. **Broadband Access/Connection** means a high speed internet connection having average minimum of 4 Mb/sec or above of download speeds and 2 Mb/sec or above of upload speeds over fixed and wireless access mediums.

xxviii. **Data** means the information collected and organized by the Ministry and/or Authority for gauging the performance of the telecommunication industry in accordance with National Broadband Targets and International Development Indices.

xxix. **Digital Infrastructure** means the technology, equipment and systems that provide linkages, networks and pathways to connect people and communities with data, products and services.

xxx. **Infrastructure Sharing** means sharing of telecom network components and associated non electronic and physical infrastructure.

xxxi. **National Broadband Network** means a wholesale only, open access communication network organized via public funding (using Investment Trust based model) and/or in public-private partnerships for enhancing the accessibility of broadband internet nationwide.

xxxii. **National Roaming** means the ability for a cellular customer to automatically make and receive voice calls, send and receive data, or access other services, including home data services, when outside the geographical coverage area of the home network, by means of using a visited network within the country.

xxxiii. **Internet Exchange Point** means the physical infrastructure through which internet service providers (ISPs) and content delivery networks (CDNs) exchange internet traffic between their networks (autonomous systems).

xxxiv. **Spectrum** means radio frequencies ranging from 3 KHz to 300 GHz organized as a scarce sovereign asset/resource which is owned by the government and may be used for wireless communication in the most appropriate manner.

xxxv. **Spectrum Management** means is the process of regulating the use of radio frequencies to promote efficient use and gain a net social benefit by rationalizing and optimizing the use of the RF spectrum; avoid and solve interference; design short and long range frequency allocations; advance the introduction of new wireless technologies; coordinate wireless communications with neighbors and other administrations.

xxxvi. **Satellite Communication** means the use of artificial satellites to provide communication links between various points on Earth over designated frequency spectrum.

xxxvii. **Smartphones/Internet Devices** means an interactive terminal/user device used for providing internet access to end user over fixed/wireless telecommunication networks.

xxxviii. **Effective Competition** means the absence of Significant Market Power.

xxxix. **Significant Market Power (SMP)** means the relative ability of a licensee/service provider to manipulate the price of a product or service in a given marketplace by manipulating the level of supply, demand or both (identification of SMP may be included as part of Competition Rules).

xl. **Quality of Service (QoS)** means totality of characteristics (observable and/or measurable) of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service.

xli. **Customer** means a user who is responsible for payment for the services.

xlii. **Service** means a set of functions offered to a user by a service provider/licensee that constitutes a service.

xliii. **Affordability** means the ability of a user to purchase telecommunication services at a certain percentage of GNI per capita as defined and reviewed by the Authority from time to time.

xliv. **Interconnection** means the physical and logical linking of public communications networks used by the same or a different service provider in order to allow the users of one service provider to communicate with users of another service provider, or to access services provided by another service provider.

xlv. **Intellectual Property** means creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce.

xlvi. **Copyright** means the rights that creators have over their creative/unique works including computer programs, databases, maps, technical drawings and different types of content (books, music, paintings, sculpture, films etc.) available in digital form online and/or offline.

xlvii. **Digital Divide** means the gap between individuals, households, businesses and geographic areas at different socioeconomic levels with regard both to their opportunities to access ICTs and to their use of the Internet for a wide variety of activities.

xlviii. **E-Inclusion** means to enable a society to be able to participate in knowledge economy by the virtue of affordable access to technologies, the accessibility and usability of ICT tools and services, and the ability and skills and awareness of all individuals to use these tools for curbing digital divide.

xlix. **Digital Trust** means the trust of a user and the confidence of the Authority in the ability of a service provider/licensee to keep their digital data privacy and security and to handle it with integrity and accountability.

l. **User Privacy** means an individual's claim to control the terms under which personal information (information identifiable to the individual) is acquired, disclosed, and used over internet by service providers and/or licensees.

li. **Cybersecurity** means the protection of computer systems and networks from information disclosure, theft of or damage to their hardware, software, or electronic data, as well as from the disruption or misdirection of the services they provide.

lii. **Standardization** means is the process of implementing and developing technical standards for telecommunication technologies and services based on the consensus of different stakeholders that include users, regulatory authority, standards organizations and the government in order to help maximize compatibility, interoperability, safety, repeatability and quality.

liii. **Environmental Protection** means the practice of conserving natural resources and the existing natural environment and, where possible, to repair damage and reverse trends in accordance with ITU's recommendations (ITU-T L.1470).

liv. **E-Waste** means all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owners as waste without the intent of re-use.

lv. **Carbon Footprint** means the total greenhouse gas (GHG) emissions caused by an individual, event, organization, technology, system, service or product, expressed as carbon dioxide equivalent.

lvi. **Carbon Budget** means the estimated amount of carbon (or CO2) the world can emit before warming will exceed specific temperature thresholds.

lvii. **Technology** means all types of Information and Communication Technologies.

lviii. **Legacy Service(s)** means services relying on old TDM based circuit switched systems, network components, technologies, infrastructure and platforms impounding additional costs on service providers for its continuity in the presence of IP based robust and efficient technologies.

lix. **Transformation** means the evolution of the telecommunications industry from a capital-intensive, technology-focused model to a user-centric service-delivery model.

lx. **Open Source** means source code that is made available to the users and/or developers without cost for possible modification and redistribution. Products include permission to use the source code, design documents or content of the product.

lxi. **Autonomous Networks** means network infrastructure having capabilities of "Zero-X" (zero wait, zero touch, zero trouble) experience based on fully automated lifecycle operations of "Self-X" (self-serving, self-fulfilling, self-assuring) to dynamically accommodate and adapt to customer needs and available resources.

lxii. **Service Provision** means activities associated with the provision of a service by the service provider from the instant an order for a service is contracted to the instant the service is available for use by the customer/user.

lxiii. **National Disaster Management** means the collective organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters for the telecommunication sector and with the use of ICTs.

lxiv. **Management Committee** means a high powered and multi stakeholder committee organized for reviewing the implementation of this policy and making necessary decisions based on evidence-based recommendations as and when required.

Glossary

3G: Third generation mobile telecommunications technology, following International Mobile Telecommunications- 2000 specifications from ITU. 3G supports Internet access, video calls and mobile TV as well as telephony.

4G: Fourth generation mobile telecommunications technology, following International Mobile Telecommunications-2000 specifications from ITU. 4G provides ultrafast broadband access.

Xth Generation: 5th Generation mobile services and technologies beyond.

Access (as an element in a telecommunications network): Transmission from the final distribution point before the CPE to the CPE.

Access (regulatory use): Access to a network or service element provided by a network or service provider to another service provider.

ACR: Administrative Cost Recovery.

AIP: Administrative Incentive Pricing.

Allocation (spectrum): The specification of the services to which a particular spectrum band may be put.

Assignment (spectrum): The assignment of a specified quantity of spectrum to an individual licensee including technical characteristics of specified spectrum.

Backhaul: Transmission from the content source to final distribution point before the CPE.

Bit stream service: often used to mean wholesale DSL. A wholesale broadband service that provides broadband transmission over an access element (copper, fiber or in principle, wireless) of a telecommunications network. To provide a connection to a service provider's services, the bit stream service must be used in conjunction with a suitable backhaul service.

Broadband: Electronic information access at high speed.

CEIR: Central Equipment Identity Register; a register that lists reported IMEIs and can be used to identify stolen or cloned mobile terminal devices.

Content: Information in an electronic format, for example - Websites, TV channels, data, voice etc.

CPE: Customer Premises Equipment. Any piece of equipment that allows the user to convert the sent electronic information into a format that is acceptable by his display unit such as a PC, TV.

DTH: Direct to Home. A link that allows the receiving of broadcast TV channels over Satellite.

Economic Pricing: pricing established through economic principles Government, e-commerce, eLearning, e-Health: The use of the Internet to provided services to support specific functions.

Exchange: Point of Presence of the telephone operator company that allows connectivity and switching between telephone users locally and internationally. In next generation networks, the local exchange is often replaced by concentrators with switching done elsewhere. The local exchange building then provides space for content caching and other functions that are best undertaken near the user, and to provide colocation space for third party service providers.

FAB: Frequency Allocation Board. FAB is the statutory body constituted under Section 42 of the Pakistan Telecom Act 1996 to allocate portions of frequency spectrum to different users.

GDP: Gross Domestic Product. A measure of the economic standing of a country.