Annual Report 2015

Pakistan Telecommunication Authority

VISION

"Create a fair regulatory regime to promote investment, encourage competition, protect consumer interest and ensure high quality ICT services"

Pakistan Telecommunication Authority

PTA Annual Report 2015

Disclaimer

The data contained in this report represents the first generation data product delivered by the Telecom Operators that meets all the specifications for accuracy and quality. PTA makes no guarantees, representations of any kind, express or implied arising by law or otherwise, including but not limited to, content, quality, accuracy, completeness, effectiveness, reliability, and fitness for a particular purpose, usefulness, use or results to be obtained from this information. In no event will PTA be liable for any damages, including loss of data or other pecuniary loss that might arise from the use of these PTA Data.

Published by
Pakistan Telecommunication Authority
Headquarters, F-5/1,
Islamabad, Pakistan
Website: www.pta.gov.pk

Cataloging-in-Publication Data
Pakistan Telecommunication Authority
PTA Annual Report 2014-15
ISBN: 978-969-8667-54-2
1. PTA - Annual Report 2014-15

Contents

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

AJ&K	Azad Jammu and Kashmir
ALF	Annual License Fee
APC	Access Promotion Contribution
ARPU	Average Revenue Per User
ASR	Approved Settlement Rate
BTS	Base Transceiver Station
BVS	Biometric Verification System
CMO	Cellular Mobile Operator
CM Pak	China Mobile Pakistan Ltd.
CNIC	Computerized National Identity Card
CPE	Customer Premesis Equipment
CSC	Customer Service Center
CVAS	Class Value Added Services
DSL	Digital Subscriber Line
EVDO	Evolution Data Optimized
FAB	Frequency Allocation Board
FBR	Federal Board of Revenue
FDMA	FATA Disaster Management Authority
FIA	Federal Investigation Agency
FDI	Foreign Direct Investment
FED	Federal Excise Duty
FLL	Fixed Local Loop
FTTH	Fiber-to-the-Home
FY	Fiscal Year
GB	Gilgit Baltistan
GDP	Gross Domestic Product
GST	General Sales Tax
GVA	Gross Value Added
ICH	International Clearing House
ICT	Information & Communication Technology
IDP	Internally Displaced Person
IM	Information Memorandum
IMEI	International Mobile Equipment Identity
IN	Intelligent Network
ISP	Internet Service Provider
ITU	International Telecommunication Union
KPIs	Key Performance Indicators

KPK	Khyber Pakhtunkhwa
LDI	Long Distance & International
LEA	Law Enforcement Agency
LIBOR	London Interbank Offered Rate
LL	Local Loop
LTE	Long-Term Evolution
M&RITT	Monitoring and Reconciliation of International Telephone Traffic
MCS	Military College of Signals
MHz	Mega Hertz
MNP	Mobile Number Portability
MoU	Memorandum of Understanding
NADRA	National Database and Registration Authority
NGMS	Next Generation Mobile Services
PCO	Public Call Office
PKR	Pakistan Rupee
PMCL	Pakistan Mobile Communication Limited (Mobilink)
PTCL	Pakistan Telecommunication Company Limited
PPRA	Public Procurement Regulatory Authority
PTML	Pakistan Telecommunication Mobile Limited (Ufone)
QoS	Quality of Service
SBP	State Bank of Pakistan
SCO	Special Communications Organization
SIM	Subscriber Identity Module
SMRA	Simultaneous Multiple Round Ascending
SMS	Short Messaging Service
SOP	Standard Operating Procedure
TB	Terabytes
USF	Universal Service Fund
VAS	Value Added Services
WiMAX	Worldwide Interoperability for Microwave Access
WHT	Withholding Tax
WLL	Wireless Local Loop

The Authority

The Authority

Dr. Syed Ismail Shah
Chairman

Mr. Tariq Sultan
Member
(Finance)

Mr. Abdul Samad
Member
(Compliance & Enforcement)

Chairman's Note

I am pleased to present the Annual Report of Pakistan Telecommunication Authority (PTA) for the fiscal year 2014-15, which provides a comprehensive review of the regulatory activities undertaken by PTA and performance of the telecom sector in Pakistan during the year.

As a regulator, PTA is playing an important role to facilitate development of innovative applications of telecom and ICT for social and economic development in Pakistan. Spectrum auction for Mobile Broadband (3G and 4G) services was the first crucial step towards creating a critical mass of broadband infrastructure for sustainable development in Pakistan. Both industry and people of Pakistan have shown an outstanding response with an exponential monthly growth in mobile broadband subscribers. Pakistan has more than 21.6 million broadband subscribers at the end of November, 2015, as compared to only 3.8 million at the end of FY 2013-14. Rapid rollout of 3G services in more than 200 cities is providing huge growth potential for industry players including operators, device manufacturers, application developers and distributors, and is also boosting growth and efficiency in all sectors of the economy. In recognition of PTA's significant achievements in driving the growth and innovation in telecom sector, Pakistan has been conferred with various international awards such as GSMA Spectrum for Mobile Award 2015, winning of ITU Council seat and election of Chairman PTA as Vice President of APT. PTA is also striving to capitalize on new trends in telecom and ICT such as big data analytics, internet exchange points, development of innovative applications and increasing human resource capacity to keep up with rapidly changing technologies.

PTA is providing favorable regulatory environment for telecom business, due to which, telecom operators are continuously investing in the expansion and up-gradation of their networks for the provision of advanced telecom services in the county, despite that the sector is undergoing a challenging phase in which cut throat competition and technological shifts have narrowed the profit margins and also dried some of the traditional revenue streams of telecom networks.

The year 2014-15 was not without challenges. The nationwide verification of millions of SIMs was a huge challenge for the regulator and cellular mobile operators. Re-verification of existing SIMs was an important part

of National Action Plan devised by the Government of Pakistan to counter terrorism in Pakistan. PTA took some radical steps in collaboration with Law Enforcement Agencies and the industry, and successfully completed this huge task in a record time. I believe PTA's commitment and successful engagement with all the stakeholders was a key factor in achieving this milestone. With the same spirit, PTA has also undertaken several other regulatory measures during the year including protective measures for telecom consumers, improving quality of telecom services and deregulation of international telephony services.

PTA has a challenging role to play in an environment of rapidly changing telecom technologies and markets. We constantly assess the emerging needs of the society and the industry, and accordingly adapt our regulatory approaches. We are continuously working for sustained investor confidence by facilitating business friendly environment, encouragement for innovations, promoting healthy competition and effective public-private sector collaboration.

The Annual Report 2014-15 provides details of PTA's initiatives and telecom market development during the year. I hope you will find the report informative and useful.

Syed Ismail Shah Ph.D.
Chairman, PTA

Executive Summary

Pakistan Telecommunication Authority (PTA) regulates the telecommunication sector of Pakistan with a reconciliatory approach, seeking balance between protecting consumer rights and legitimate business interests of the operators. The geographical and technological expansion of the telecom sector also produces new kinds of challenges and opportunities for the regulator. PTA carried out its functions and responsibilities with professionalism and dedication, ensuring provision of high quality telecom services to the people of Pakistan. A brief review of PTA's activities during the fiscal year 2014-15 is given in the ensuing paragraphs.

PTA performed its role in the 'National Action Plan' to counter terrorism by planning, implementing and monitoring the project of biometric re-verification of SIMs. A total of 215.4 million SIMs were re-verified under this drive, out of which 114.9 million SIMs against 44.7 million unique Computerized National Identity Cards (CNICs) were identified to have correct antecedents, while 98.3 million SIMs (including 26.7 million active SIMs) were blocked because their antecedents were not available, were incorrect or could not be verified. As a result, all active SIMs are now mapped to their respective owners through biometric signature.

After the successful spectrum auction for the Next Generation Mobile Services (NGMS) in April, 2014, cellular mobile operators speedily rolled out commercial services in the major cities of Pakistan. The uptake of 3G and 4G services has been tremendous as the demand for mobile broadband multiplied every month. In its efforts to provide best quality telecom services to the public, PTA carried out the quality of service surveys of cellular mobile operators' 3G and 4G services in the major cities of Pakistan. Comprehensive testing of the predefined network parameters revealed that by and large the operators' network quality is satisfactory. Similarly, to ensure health and safety of the citizens exposed to cellular mobile signals, PTA along with Frequency Allocation Board conducted an extensive survey in major cities of Pakistan and found that the power levels of Base Transceiver Stations (BTSs)/Towers installed by CMOs are much below the prescribed danger limits. PTA also took swift cognizance of the issue of the frequency interference in the 3G band by DECT 6.0 Cordless Phones. Extensive surveys were carried out in 15 cities across Pakistan and the shops selling the DECT 6.0 cordless phones were warned in addition to serving public notices in the media for general public awareness.

Continuing the efforts to deal with the grey/illegal telecom activities, PTA conducted 65 raids in various cities of Pakistan, arresting 57 persons and confiscating 250 gateway equipments. Among the regulatory steps, PTA re-introduced full competition in the LDI sector by deregulating Approved Settlement Rate (ASR). The Access Promotion Contribution (APC) charges were also brought down to zero by Government of Pakistan. This landmark decision will improve the traffic trends and also discourage the illegal termination of international traffic in Pakistan. Moreover, PTA carried out survey in major cities of Pakistan to ensure that only PTA's type approved handsets are being sold in the markets. During the survey, 953 samples of handsets were checked and 256 warning notices issued to the outlets selling unauthorized handsets.

Taking a step forward towards ICT development in Pakistan, PTA launched "Smart-Pakistan" (www.smartpakistan.pk) which is a web portal aimed at providing a central platform to develop and host applications related to m-services. In order to facilitate the effective security of medical and educational institutions, PTA in collaboration with Islamabad Police developed Mobile Emergency Alert System for Schools (MEASS). This application will help the administrative staff at different schools, colleges, universities and hospitals in Islamabad to contact the Police in case of any emergency.

In recognition of its efforts for the promotion of telecom and ICT in Pakistan, PTA has been bestowed with various international awards during FY 2014-15. The GSM Association awarded Pakistan with the prestigious 'Spectrum for Mobile Broadband Award' at the Mobile World Congress 2015 held in Barcelona, Spain. Pakistan also won the seat at the ITU Council at the 19th ITU Plenipotentiary Conference held in Busan, South Korea. Pakistan will now be able to contribute effectively in devising the global strategies for the proliferation of telecom and ICT in the world. In another honour for the country, Chairman PTA, Dr. Syed Ismail Shah, has been elected as Vice President of General Assembly of Asia Pacific Telecommunity (APT) during the 13th Session of the APT General Assembly held at Yangon, Myanmar. APT is considered the apex telecommunication conglomerate of the 38 Asian countries. PTA also represented Pakistan at the various international forums held in Bhutan, USA, Qatar and Thailand. As an important member of the ITU, PTA held training session for the delegation from Afghan Telecom Regulatory Authority (ATRA) on the various aspects of regulatory, law and spectrum management.

In order to generate buzz about the mobile application development after the successful roll out of 3G and 4G services in the country, PTA organized an open competition named 'The Pakistan Mobile App Awards' in April, 2015. More than 100 mobile applications were evaluated and winners announced in a ceremony presided by the Honorable Minister for IT and Telecom, Ms. Anusha Rahman Khan. Recognizing the need to capitalize on the potential of broadband opportunities in Pakistan, PTA organized the National Broadband Forum in collaboration with CISCO Systems in June, 2015. Broadband and telecom stakeholders exchanged their ideas and success stories in an open panel discussion for tapping the huge development opportunities available in Pakistan. PTA also arranged a seminar on the "Practicalities and Challenges around Network Rollout and Quality of Service" in collaboration with Anite (NEMO) Finland and Saybi Pakistan on 14th March 2015. Experts from the regulator and telecom industry discussed and reviewed the benchmarking, optimization and regulatory compliances for assuring QoS and customer handset safety.

As part of the PTA's Vision, PTA also undertakes various activities to protect the rights of the consumers. In this regard, PTA carried out billing verification of the CMOs to cross-check the advertised tariff against the actual charging to consumers. It was found that most of the operators are charging as per their announced package plans. PTA also established dedicated cells for the grey call reporting and the BVS related complaints. During the FY 2014-15, the Complaint Management System (CMS) installed at PTA received a total of 40,445 consumer complaints related to telecom services out of which 99% complaints were successfully resolved.

In lieu of the IMEI blocking facility for stolen/lost handsets, PTA blocked 108,031 cellular mobiles as reported by the consumers during the FY 2014-15.

The biometric re-verification drive has affected the overall telecom statistics as more than 26 million active SIMs were blocked as a result of this activity. Therefore, teledensity of the country dropped to 61.8% at the end of FY 2014-15 as compared to 79.6% last year i.e. 20% decline. Telecom revenues for the FY 2014-15 are estimated to be Rs. 449 billion while the telecom sector contribution to National Exchequer amounted to Rs. 126.26 billion. Telecom investment reached US$ 951 million during FY2014-15 while FDI inflow remained US$ 908 million as operators continued investment in extending the coverage of 3G and 4G services across Pakistan.

In the cellular mobile sector, re-verification of SIMs brought the penetration down to 60.7% with 114.7 million subscribers at the end of June 2015 as compared to 139.9 million subscribers at the end of corresponding period last year. Mobilink leads the subscriber shares with 29.2% followed by Telenor (27.5%), Zong (19.3%), Ufone (15.5%) and Warid (8.6%). Cellular cells sites have increased to 40,704 covering more than 92% of the land area of Pakistan. The operators are also focusing on tower sharing as a viable option to improve coverage and network efficiency. The decrease in the cellular subscriber base due to re-verification of SIMs registered or an increase in the Average Revenue per User (ARPU) and Average Revenue per Active SIM of the cellular industry. The ARPU of cellular segment increased to Rs. 440 during FY 2014-15 as compared to Rs. 432 last year while the Average Revenue per Active SIM in Pakistan stands at Rs. 203 for FY 2014-15. Total outgoing national cellular traffic increased to 393.5 billion minutes at the end of FY 2014-15 as compared to 345.7 billion minutes in FY 2013-14 while 393.1 billion SMS were exchanged over cellular networks during FY2014-15.

Broadband sector is experiencing a true revolution since the introduction of mobile broadband. Broadband penetration rose to 8.97% at the end of FY 2014-15 as compared to just 2.07% in the previous year. Subscriber base took a huge jump of 345% to reach 16.89 million at the end of FY2015. The whole sector dynamics have drastically changed as the broadband market leaders in terms of subscriber shares are now Telenor (24.7%), Mobilink (21.7%), CMPak (17.8%) and PTCL (15.8%). Mobile broadband has complete dominance on the broadband technology share as almost 80% subscribers are using 3G and 4G LTE services to access the internet. Mobile broadband will be clearly the main driving force behind broadband statistics as the data consumed over mobile broadband networks in June, 2015 (9,860 TBs[1]) was six times more than the data usage over cellular networks in June, 2014.

Local loop sector took a plunge in terms of subscribers as the teledensity dropped to 2.1% at the end of FY 2014-15 mainly due to closure of PTCL's WLL services in the major cities of Pakistan. Looking at the breakdown of subscribers, fixed line services have a subscriber base of 3.14 million at the end of FY 2014-15 as compared to 3.17 million as of June 2014. On the other hand, wireless local loop subscribers declined to just 0.80 million at the end of FY 2014-15 as compared to 2.54 million at the end of FY 2013-14. After the abolishment of APC and deregulation of ASR, total international traffic on LDI networks increased to 9,514 million minutes during FY 2014-15 as compared to 8,440 million minutes during the corresponding period last year depicting 12.7% growth in the year.

[1] TBs = Tera Bytes

Chapter-1

Regulatory Review

The Telecommunication sector of Pakistan underwent a lot of changes from the regulatory and market perspective during FY 2014-15. Innovation and growth opportunities were opened up in the telecom sector with the commercial launch of Next Generation Mobile Services (NGMS), commonly known as 3G and 4G LTE services. As a next step, PTA is also under the process of expansion of NGMS in AJK & GB regions. Nationwide drive of biometric verification of each and every cellular mobile subscription (connection) was a huge challenge not only for the regulator but also for mobile operators whereby they were required to verify every SIM with the NADRA database. Keeping the ICT development agenda on priority, PTA reinvigorated the discourse on the way forward for broadband and application development in Pakistan. The Authority also put special emphasis on raising the ICT profile of Pakistan on the international arena. PTA's efforts for the proliferation of advanced telecom technologies in Pakistan have been well recognized by international forums, for example, GSMA Spectrum for Mobile Award 2015, winning of ITU Council seat and election of Chairman PTA as Vice President of APT. A brief account of PTA's regulatory activities during the period under review is given in the following pages (specific initiatives undertaken for consumer protection, are provided in Chapter 3).

Key Regulatory Initiatives

Biometric Re-verification of SIMs

Pakistan has witnessed phenomenal increase in mobile subscribers' base in the last 15 years i.e. from 0.27 million in 1999 to 139.97 million in 2014. However, the substantial increase in subscribers' base not only posed a challenge for PTA but also raised concerns for the Law Enforcement Agencies (LEAs) and the general public, in terms of not only effectively managing authentic subscribers' antecedents but also defining a secure SIM sale procedure. To overcome the challenge, PTA took some radical steps in collaboration with the LEAs and devised a comprehensive strategy to produce a clean, updated and verified pool of active SIMs. The implementation of Biometric Verification System (BVS) for issuance of SIMs in August 2014 was the first step in the drive to streamline SIMs sale process. However, there was a need to re-verify SIMs that were issued in pre-BVS era. So a consultation process was started in November 2014. The Joint Working Group (JWG), comprising of members from Ministry of Information Technology (MoIT), Ministry of Interior (MoI), PTA, NADRA, Federal Investigation Agency (FIA), Intelligence Bureau (IB) and CMOs, was constituted for the implementation of BVS and to finalize the modalities of the project. Re-verification of existing SIMs was an important part of National Action Plan (NAP) devised by the Government of Pakistan to counter terrorism in Pakistan.

Modus Operandi

Under the re-verification drive, each mobile phone user was required to go to a service centre, franchise or retail outlet of his/her respective mobile operator and re-verify his identity by matching his/her thumb impression with NADRA's database, thus ensuring that the owner of the registered SIM is indeed the legitimate CNIC holder against which the SIM is registered. Realizing the magnanimity of the task in hand, PTA took following steps to carry out smooth execution of the project:

- CMOs were allowed to use multiple re-verification models as per their system readiness. After verification of primary number through BVS, secondary numbers were allowed to be verified through SMS from BVS verified number.
- A total of 95,000 BVS machines were deployed by CMOs for the project.
- CMOs were allowed to perform door to door and kiosk activities at different institutions, corporate offices, markets or re-verification through mobile vans to facilitate the exercise.
- Extensive consumers' awareness campaigns were run through SMS, print (newspapers), electronic (TV & Radio) and digital media.
- Dedicated email address and helpline were set up for lodging consumer complaints and taking remedial measures.
- Extensive monitoring of re-verification points (sale channels) was carried out to ensure identification of violations and initiating corrective action. More than 1850 verification points located in more than 80 cities / towns were inspected.
- Alternate process was laid down for individuals who were unable to get their SIMs verified through biometric verification. The process, which was allowed only at Customer Service Centers (CSCs) and franchisees, included seeking additional information from NADRA for verification.
- Overseas Pakistanis using SIMs on International Roaming were given the facility of temporary verification by providing certain information on email/SMS or through USSD code.
- With a view to avoid misuse of subscriber data and their biometric information, two (2) hours buffer between consecutive BVS transactions against a CNIC was introduced.
- Sale of new SIMs through retailers was banned and access of information was restricted at the Franchisees.
- Progress review meetings were held at regular intervals to keep the drive on track.

With a view to cope up with the challenge of completing the task in 91 days (the time allowed by GoP), following timelines were followed, according to the number of SIMs registered against a CNIC:

Table 1 : Phases of Re-verification Drive		
Phase	**Segregation of Subscribers**	**Timelines**
i	Grey List (3 or more SIMs per CNIC per operator)	12 January – 26 February 2015
ii	White List (1 or 2 SIMs per CNIC per operator)	27 February – 12 April 2015
iii	Extreme White List (1 SIM per CNIC per operator & in continuous use for last two years)	13 April – 15 May 2015

Consumer Awareness Campaigns

Creating awareness among consumers was a daunting task as each and every mobile user was required to visit the nearest outlet of respective mobile operator for finger prints. Therefore, an extensive media campaign was launched by PTA SMS messages were sent to the target subscribers, advertisements were published in the leading newspapers, 5,000 radio spots were aired followed by individual CMO advertisements, 7,059 TV commercials were aired and a on-line awareness campaign was run by Facebook advertisements etc.

BVS Re-verification Results and Impact

Table 2 : BVS Re-Verification Drive Results (As of 15th May, 2015)	
Parameter	**Count (Millions)**
BVS Verified SIMs	114.9
Total SIMs Blocked (active SIMs blocked)	98.3 (26.1)
BVS Exclusions*	2.2
Total SIMs	**215.4**
Unique CNICs Verified	**44.7**
*Includes Corporate SIMs, Foreigners, SIMs used in Machines, etc	

The re-verification drive required multi-faceted approach and coordination among the GoP, PTA, LEAs and the telecom operators. The trend of re-verification i.e. counts of CNICs and SIMs was monitored on daily basis till the completion of the exercise. At the end of the exercise on 15th May 2015, 114.9 million SIMs were verified against 44.7 million unique CNICs at the CMO outlets. As a result of non-verification, 98.3 million SIMs were blocked out of which 26.1 million were active, as depicted in Table 2. It is pertinent to mention here that the blocked SIMs are also being unblocked for subscribers who were not able to get their SIMs re-verified within 90 days. They were allowed to get their antecedents verified at the CMO outlets through BVS. Pakistanis who were travelling during the re-verification exercise or were studying and working abroad were given one year to get their SIMs issued in Pakistan, re-verified.

The re-verification drive was completed successfully all over the country achieving the set targets. However, the exercise had major impact not only on the CMOs but also the whole telecom industry. The major telecom statistics plummeted due to the closure of millions of subscribers. Teledensity dropped to 62.9% in June 2015 as compared to 79.9% in June, 2014. The roll out of innovative services after 3G and 4G launch also got less prominence due to the top most priority of the re-verification drive. From the industry perspective, CMOs invested a significant amount of money in terms of procuring new BVS devices, strengthening of backend systems, recurring verification fees, mobilization & training of staff and lastly, in consumer awareness campaigns. CMOs also lost revenue streams due to blocking of active SIMs and reallocated funds reserved for 3G and 4G LTE roll out to the re-verification campaign.

On the other hand, re-verification is also a landmark in the telecom history of Pakistan because each SIM is now identifiable to a real owner through biometric signature which can be utilized in a variety of applications such as mobile banking and legitimate e-commerce activities. It is also apparently an unprecedented exercise in the history of telecommunication across the globe. It is expected that, Average Revenue per User (ARPU) will increase and will become a major attraction for the potential investors. Biometric verification can also be utilized for other engagements like electioneering and population census. CMOs can provide verification services to banks, tax authorities or other regulators who may need to verify mobile number and CNIC relationship in order to perform their functions and increase efficiency.

Deregulation of International Telephony Rates

Prior to International Clearing House (ICH) Policy 2012, the prevailing ASR was US Cents 6.25 per minute whereby LDI share and APC were 5.0 Cents and 1.25 Cents per minute respectively. Under ICH Policy 2012, there was significant increase in ASR from 6.5 Cents to 8.8 Cents per minute. As there was no competition among LDI operators, the ASR became the sole market rate. International incoming traffic decreased to 1 billion minutes in the month of October 2012 compared to 2.1 billion minutes in August 2012 and gradually reduced to 368 million minutes in November 2014. Most overseas Pakistanis shifted to Over the Top (OTT) services such as Skype, Viber and Whatsapp etc due to the higher rates and Grey traffic also increased significantly.

Keeping in view the excessive international incoming call rates, lack of competition in LDI sector, traffic diversion to OTT and increase in Grey traffic, MoIT issued revised ICH Policy in August 2014, whereby APC was set to zero and PTA was directed to determine ASR in accordance with the Act, Rules and Regulations. However, few LDI licensees challenged the revised ICH Policy 2014 in the Court of Law and were granted relief through stay order. On 24th February 2015, the Honourable Supreme Court of Pakistan set aside the stay orders. Resultantly, PTA deregulated ASR and APC was set to zero, and LDI operators started to bring their respective international incoming traffic for termination.

The deregulation of ASR has brought very positive results in the international telephony market. The incoming international traffic has increased almost three times i.e. to 1.4 billion minutes in the month of July 2015 from 0.45 billion minutes in the month of February 2015.

Monitoring the Quality of Service

PTA continuously strives to ensure that the consumers of telecom services get the best quality telecom services. PTA has already issued the Cellular Mobile Quality of Service Regulations, 2011 and the Broadband Quality of Service Regulations, 2014 to set the minimum QoS standards that are required to be met by the CMOs. Therefore, in order to monitor the compliance status of the PTA Regulations, QoS surveys are conducted every year by PTA and CMOs as well. For the first time this year, 3G and 4G network parameters were also tested in Lahore, Islamabad/Rawalpindi and Peshawar from May to June, 2015 using NEMO Invex 7 which is a state of the art Quality of Service

measuring tool. Key Performance Indicators (KPIs) of the voice, SMS and 3G/4G services were tested and results are given in succeeding paras:

Voice and SMS KPIs

The quality of voice and SMS exchange on the cellular mobile networks has been measured for all the CMOs under several indicators. It can be observed that Telenor after only one indicator, Warid and Zong have fallen short of meeting the minimum QoS standard. The tested indicators and their results are given in Table 3.

Table 3 : Voice & SMS KPIs

Category	Key Performance Indicators (KPIs) With Threshold	Operators				
		PMCL *(Mobilink)*	PTML *(Ufone)*	Telenor Pakistan	Warid Telecom	CMPak *(Zong)*
Voice	Network Down Time Threshold < 1%	0.23%	0.87%	0.45%	0.53%	0.26%
	Grade of Service (Service Accessibility, end to end blocking) Threshold: ≤ 2 %	0.77%	1.06%	0.55%	1.06%	0.84%
	Service Accessibility Threshold: ≥ 97%	99.34%	97.96%	99.56%	98.72%	99.28%
	Call Connection Time Threshold: ≤ 6.5 Sec	5.04 Sec	6.16 Sec	5.24 Sec	6.58 Sec	5.81 Sec
	Call Completion Ratio Threshold: >98 %	98.95%	98.77%	98.95%	99.54%	99.33%
	Mean Opinion Score Threshold: >3	3.51	3.62	3.78	3.61	3.50
	Inter System Handover of CS Voice Threshold: > 94%	95.63%	100%	87.50%	100%	66.67%
SMS	SMS Success Rate Threshold: > 99 %	100%	100%	100%	100%	100%
	End to End Delivery Threshold: < 12 Sec	9.25 Sec	5.48 Sec	4.58 Sec	3.10 Sec	4.28 Sec

3G and 4G KPIs

The commercial success of the 3G, 4G/LTE services has put enormous pressure on the CMOs to maintain the highest level of quality on their networks. The tested KPIs and their results are a testimony of the fact that the operators having more spectrum resources have considerably higher data throughput than the other operators.

Table 4 : 3G KPIs						
Category	KPIs With Threshold		Operators			
			Mobilink	Ufone	Telenor Pakistan	Zong
3G	User Data Throughput (Threshold: 3G > 256 kbps)	Data Throughput - HTTP Download	4,044.57	1,271.33	2,226.53	3,664.50
		Data Throughput - FTP Download	3,174.15	1,052.35	1,000.90	2,932.25
	Signal Strength Received Signal Code Power (RSCP) – 3G (Threshold: -100dBm)		-72.89	-72.81	-74.41	-77.32

Table 5 : 4G KPIs				
Category	KPIs With Threshold		Operators	
			Warid Telecom	Zong
4G	User Data Throughput (Threshold: 4G > 2Mbps)	Data Throughput - HTTP Download	5.9 Mbps	9.4 Mbps
		Data Throughput - FTP Download	2.9 Mbps	6.2 Mbps
	Signal Strength Received Signal Code Power (RSCP) – 4G (Threshold: -100dBm)		-80.35	-85.69

The survey results revealed that the CMOs are not only meeting but in some cases for exceeding PTA's defined QoS standards except for a few shortcomings. The operators have been notified of the survey results as well along with instructions to improve the network services in the marked areas.

Efforts to Curb Grey/ Illegal Voice Termination

Illegal Voice Termination has been a constant nuisance for the Government of Pakistan as it deprives the National Exchequer of billions of rupees every year. PTA remained determined to tackle this issue by introducing a number of important measures over the years. Some of them include the Monitoring and Reconciliation of International Telephony Traffic (M&RITT) system, heavy caller analysis, monitoring of IP bandwidth and raids against the illegal exchanges in all parts of the country. Recently, PTA has also de-regulated the LDI sector by driving the Access Promotion Contribution (APC) charges down to zero and de-regulating the Approved Settlement Rate (ASR). This significant step will be a key factor in mitigating the illegal traffic termination and help in diverting more international traffic through legal channels into Pakistan.

Raids against Illegal Exchanges

During the period under review, PTA and FIA jointly conducted a total of 65 raids in various cities of Pakistan including Islamabad, Lahore, Karachi, Peshawar, Rawalpindi Faisalabad,

Hyderabad, Multan, Gujrat, Jhang, Wah Cantt, Kasur, Toba Tek Singh, Chaman, Lower Dir, Bhakkar, Fateh Jhang, Larkana. The successful raids resulted in arrest of 57 persons besides confiscation of 250 Illegal Gateway equipments.

Blocking of Mobile Numbers

In another mode of eradicating the menace of illegal call termination, PTA regularly identifies the mobile SIMs being used in termination of grey traffic in Pakistan. In this connection, over one million mobile numbers have been identified terminating grey traffic and subsequently blocked.

Type Approval of Telecom Equipment

Type Approval is a process under which an authorization i.e. NOC is granted to terminal equipment that meets a minimum set of regulatory, technical and safety requirements. Type Approved Terminal Equipment and cases of type approval are processed by PTA as per Section (29) of the Act and clause (4) of the Type Approval Regulations, 2004. Type approval of the telecom terminal equipment is a mandatory requirement before a product is allowed to be sold in Pakistan. During FY2014-15, Type approval of 1,048 terminal equipments has been carried out by PTA. Moreover, 3,408 NOCs for already type approved equipments have also been issued to different consumers/operators.

Survey of Non-Type Approved Mobile Handsets and Tablets

PTA carried out a survey to check type approval of mobile handsets being sold in the market. A methodology was prepared for carrying out the said survey. The survey was conducted from 24th December, 2014 to 31st January, 2015 across the country. Details of the survey is given in Table – 6.

Table 6 : Survey Results of Non-Type Approved Mobile Handsets and Tablets

Zone	Total Shops Visited	Total Samples Checked	Type Approved Devices as per Services List	Regulatory Seal Available?	Non-Type Approved Devices with Regulatory Seal	Type Approved Devices without Regulatory Seal	Warning Notice given to Shops	Violators after re-survey
Quetta	34	109	74	42	5	37	25	14
Muzaffarabad	8	35	24	35	11	-	8	3
Karachi	124	-	-	-	-	-	124 *	124
Lahore	24	334	253	227	24	52	24	24
Rawalpindi	46	-	-	-	-	-	46 **	46
Peshawar	44	475	445	445	25	5	29	22
Total	**280**	**953**	**796**	**749**	**65**	**94**	**256**	**233**

* Forwarded through post.
** Handed over to Union representatives.

The inspected outlets were served warning notices in case violation was found and also given verbal instructions to follow the Standard Operating Procedures (SOPs) of PTA. The list of

violators was also shared with the FIA and Custom Authorities so that the telecom terminal equipment may not be released by the relevant authorities unless it is type approved by PTA. As a result of this initiative, there is an improved influx of type approval requests to PTA which ensures:

- Provision of good quality and safe telecom user equipment
- Abiding by the Rules and Regulations and deterrence from use of grey channels.
- Increase in Government revenue

Market Survey – Availability of DECT 6.0 Cordless Phones

DECT 6.0 Cordless Phones cause interference in the 3G band allocated to the operators which causes quality of service issues and difficulty in carrying out the network operations smoothly. Therefore, PTA carried out surveys in 3G covered cities to assess the ground situation about the sale points of these cordless phones. The survey results are given in Table 7.

31 Outlets were found selling different brands of DECT 6.0 Cordless phones. The inspection teams issued Legal Notices to all those involved in sale of cordless phones on the spot. The shopkeepers/sellers were also informed that in case of non-receipt of undertaking, further proceeding under Section 31 of Pakistan Telecommunication (Re-Organization) Act, 1996 would be initiated. Out of these 31 outlets/shops, 21 have stopped selling the cordless phones after issuance of legal notice while the remaining cases have been referred to FIA for further action. PTA has also issued public notices in the media to warn all the importers, distributors, sellers

Table 7 : Results of Survey on Availability of DECT 6.0 Cordless Phones

S.#	City	Outlets Visited	DECT Phone Sellers	Legal Notice Served	Selling Stopped	Cases with FIA
1	Karachi	34	11	11	11	-
2	Lahore	31	-	-	-	-
3	Rawalpindi	27	3	3	-	3
4	Islamabad	54	7	7	-	6
5	Peshawar	25	2	2	2	-
6	Quetta	19	2	2	2	-
7	Gujranwala	10	1	1	1	-
8	Gujrat	12	-	-	-	-
9	Sukkur	14	-	-	-	-
10	Abbottabad	35	-	-	-	-
11	Sargodha	6	2	2	2	-
12	Hyderabad	10	3	3	3	-
13	Mardan	21	-	-	-	-
14	Nowshera	31	-	-	-	-
15	Chaman	18	-	-	-	-
Total		347	31	31	21	9

and users of DECT 6.0 cordless phones, to refrain from such illegal activities. All those who are involved in the use of DECT 6.0 cordless phones have been advised to voluntarily deposit /surrender their DECT 6.0 cordless sets at the nearest PTA zonal offices.

Resolving Cross Border Interference of Mobile Signals with Oman

A delegation of Telecommunication Regulatory Authority (TRA) of Oman visited Pakistan from 29th – 31st December, 2014. Several meetings were held between the delegations of TRA Oman, PTA and FAB at PTA Headquarters, Islamabad, highlighting the efforts made to date to resolve cross border spillover of signals and interference between the two administrations. Briefings were given to Oman delegation by DG (Licensing), PTA and ED (FAB) on various issues pertaining to telecom licensing, spectrum monitoring and optimization. Technical representatives of operators also joined the discussion sessions and shared their stance to eliminate interference/spillover issues to the extent possible.

Technical agreement/proposal shared by TRA Oman was also deliberated between the two administrations. It was agreed that concerned operators from both the countries will optimize their network and share the survey details for finalizing the technical proposal.

Mobile Emergency Alert System

PTA in collaboration with Islamabad Police and mobile application developer "Pure Push" developed Mobile Emergency Alert System for Schools (MEASS) to ensure effective security of schools, colleges, universities and hospitals situated in Islamabad Capital Territory.

Through this project, the access of Android based Smartphone application will be given to the administrative staff at different schools, colleges, universities and hospitals in the Capital city who will be able to send emergency alerts to get timely help from the Police. Islamabad Police will have direct control over the system and will ensure better use of latest technology in

managing such matters. The triggers can be activated in situations like terrorist attacks, bomb blast, kidnapping, fire, and other suspicious activities.

Launch of Smart Pakistan Portal

As part of its effort to encourage the use of mobile broadband, PTA has launched a web portal named "Smart-Pakistan" (www.smartpakistan.pk). This web portal is providing one stop repository and directory of mobile applications focusing on different thematic areas such as m-Education, m-Health, m-Government, etc.

It provides an easy to use platform where a user can search for applications related to their requirements. The aim of 'Smart-Pakistan initiative' is also to engage the application developers and give them an opportunity to showcase their apps through this portal. The emphasis of this initiative is to promote mobile applications and services that are relevant to the Pakistani society and at the same time to encourage operators, Original Equipment Manufacturers (OEMs) and local developers in promoting innovative ideas.

In collaboration with professionals from the industry, PTA has also set up a 'Smart Pakistan m-Lab' at its headquarters to provide mentoring and coaching services for young mobile applications developers and entrepreneurs. It will provide start up, acceleration and launch services to the developers.

Proliferation of Next Generation Mobile Services

PTA concluded successful spectrum auction for NGMS (3G and 4G LTE) on 23rd April 2014 and thereafter 3G and 4G LTE services were commercially launched by all the cellular mobile operators in major cities of Pakistan.

All four successful winners of spectrum auction for NGMS launched their commercial services of 3G and 4G at reasonable tariffs for both pre-paid and post-paid customers. Ufone and Telenor started 3G services in May 2014, followed by Zong in June 2014 and Mobilink in July 2014. The technological advancement continued with the commercial launch of 4G LTE services by Zong on 27th September, 2014. Shortly after, Warid also started offering 4G LTE commercial services on 26th December, 2014 in major cities of Pakistan. Hence, Pakistan has proudly joined the illustrious list of countries that have commercial 4G LTE services available to their citizens. The long anticipated availability of broadband speeds on cellular handsets became an immediate phenomenon as the number of 3G subscribers spiked instantly. According to latest available statistics, over one million 3G subscriptions are being added by the CMOs each month since the commercial launch of these services in Pakistan. The coverage area of 3G and 4G LTE services has also increased to the major cities of Pakistan which means that the subscriptions will also expand in parallel with expanding coverage. Currently, coverage of 3G services is available in more than 200 cities of Pakistan and continuously increasing every month. More details on the proliferation of NGMS are provided in Chapter 6 on Broadband.

With the expanding broadband services and increasing demand for data in the country, availability of spectrum is the basic requirement. During the auction in April 2014, the unsold spectrum of 10 MHz in 1800 MHz band with a base price of US $210 Million and 7.38 MHz spectrum in 850 MHz band with a base price of US $291 Million accounts for at least a total of US $501 Million. As per Government's Policy Directive dated 17th March 2014, no further related auction was to be carried out for another 18 months from the date of the auction. However, for any spectrum which remained unsold in NGMS spectrum auction in April 2014, PTA could auction the same as deemed appropriate. In this regard, PTA is in the process of hiring international consultants for the market assessment of unsold spectrum and will plan the auction accordingly.

International Recognition

PTA's efforts for proliferation of telecom and ICT services in Pakistan have been appreciated by prestigious international forums. Since the auction of NGMS spectrum in April 2014, PTA has won many accolades within and outside Pakistan for not only conducting fair, transparent and efficient auction of NGMS spectrum but also for being proactive in meeting the present day challenges of the telecom industry.

GSMA Spectrum for Mobile Broadband Award 2015

In recognition of significant achievement of the Government of Pakistan and PTA in driving the growth and socio-economic impact of the mobile industry in the country, Pakistan was awarded with the prestigious 'Spectrum for Mobile Broadband Award' at the Mobile World Congress 2015 held in Barcelona, Spain. This award recognizes the government that demonstrates the most transparent and stable long term spectrum policy roadmap. After successful auction of 3G and 4G spectrum in April 2014, there has been a rapid uptake of 3G services, bringing significant benefits to consumers and the national economy thus providing huge growth potential for industry players including operators, device manufacturers, application developers and distributors. The rapid roll-out of 3G and 4G services is expected to boost growth and efficiency in all sectors including education, banking, media, health and retailing, and is a key enabler for innovative e-services such as e-medicine and e-education in rural and remote areas of Pakistan. At the event, more than 1,200 key government and regulatory representatives from around the world met with industry leaders to discuss specific regulatory issues relating to innovation and development of mobile communications at the event.

Pakistan Wins ITU Council Seat

Pakistan has won a seat on the ITU Council at the 19th ITU Plenipotentiary Conference held in Busan, South Korea which decided 12 members of the Radio Regulations Board (RRB) and 48 members of the ITU Council through an election. In the Asia and Australasia region, Pakistan secured its position with a total of 101 out of 167 votes.

The ITU Council is the nucleus of ITU's strategic and policy framework and its members are elected every four years. As a member of the ITU Council, Pakistan will be able to make substantial contributions towards shaping the future of information and communication technologies.

Chairman PTA Elected as Vice President of APT

Chairman PTA, Dr. Syed Ismail Shah, has been elected as Vice President of General Assembly of Asia Pacific Telecommunity (APT) for three years during the 13th Session of the APT General Assembly held from 25-26 November 2014 at Yangon, Myanmar. Mr. Tariq Sultan, Member Finance, PTA, Mr. Muhammad Arif Sargana, director Economic Affairs, PTA, and Mr. Muhammad Aslam Hayat, Chief Corporate Affairs Officer and Chief Strategy Officer, Telenor also participated in the 13th Session of the General Assembly of APT and 38th Session of the Management Committee of the APT. APT is an Intergovernmental Organization that operates in conjunction with telecom service providers, manufacturers of communications equipment, and research and development organizations active in the field of communication, information and innovation technologies. The APT comprises of 38 member countries, with 4 associate and 131 affiliate members.

Representing Pakistan at the Global ICT Arena

PTA is contributing in the intellectual discourse on the present burgeoning telecom issues and upcoming regulatory challenges by actively participating at various international forums. PTA has been widely considered as one of the progressive and dynamic regulators in the world and PTA officers mostly get international sponsorships / fellowships to participate in international and regional telecom events. The engagement of PTA officers with renowned international forums helped in understanding, developing and implementing best practices in telecom regulations, keeping abreast with the latest technological advancements, enhanced cooperation

among telecom regulators and projecting Pakistan's achievements to the telecom world. A brief account of such participations/events, during the period under review, is given below:

15th SATRC Meeting, Bhutan

15th South Asian Telecommunication Regulator's Council (SATRC) meeting was held from August 5-7, 2014 at Paro, Bhutan. The meeting was organized by the APT and hosted by Bhutan

Infocomm and Media Authority (BICMA). Mr. Tariq Sultan, Member (Finance), PTA chaired Session 6 (PLENARY) of the meeting and also submitted proposals for two working groups i.e. Policy Regulation & Services and Spectrum. The SATRC also nominated Mr. Abdul Samad, Member (Compliance & Enforcement), PTA as Vice Chairman of the Working Group on Policy Regulation and Services. At the meeting, senior officials from member countries reviewed the outcomes of the implementation of SATRC Action Plan Phase IV and considered adopting new phase of SATRC Action Plan (Phase V). The telecom regulators of the SATRC shared their experiences and dwelled on collaboration opportunities for ICT development in the region.

ICT Trade Mission to USA

Chairman PTA, on the invitation of the Honorable Ambassador of the United States of America to Pakistan, participated in the "Information and Communication Technology (ICT) Trade Mission to the United States" held from 14-17 October, 2014 in Washington, USA. The purpose of the Trade Mission was to boost commercial ties and increase ICT trade and investment between the United States and Pakistan. The event was organized following the commitment of both countries in connection with US Trade and Investment Framework Agreement Council meeting in May, 2014. The Chairman shared the vision of PTA for ICT driven economic and social development in Pakistan and the collaborative opportunities in the ICT sector between USA and Pakistan.

ITU Telecom World, Qatar

ITU organizes the ITU Telecom World annually which is the global platform to accelerate ICT innovations for social and economic development through exhibiting solutions, sharing knowledge and making meaningful connections. This year, a delegation headed by Ms Anusha Rahman Ahmad Khan, Minister of State for the Ministry of Information Technology (MoIT) and Dr. Syed Ismail Shah, Chairman PTA represented Pakistan at the event which was held from

7-10 December, 2014 at Doha, Qatar. The participants discussed the emergency telecommunications system planning, cross border partnership, the disruption of convergence and developments such as artificial intelligence, big data analysis, prospective business strategy, policy and regulations.

ITU NBTC-International Satellite Symposium, Thailand

The ITU with the collaboration of National Broadcasting and Telecommunications Commission (NBTC), Thailand organized the 'International Satellite Symposium 2014' from 18-19 September, 2014 at Bangkok, Thailand. Dr. Syed Ismail Shah, Chairman PTA along with Mr. Muhammad Hassan, AD (Licensing) PTA represented Pakistan at the event. The symposium was aimed at building human capacity of the relevant stakeholders in the satellite industry of the Asia Pacific Region as well as strengthening the international cooperation among the telecom organizations and Regulatory bodies in the region.

Asia Pacific Information Superhighway and Regional Connectivity, Bhutan

The Economic and Social Commission for Asia and Pacific (ESCAP) organized "Expert Consultation on the Asia-Pacific information superhighway and regional connectivity" held from 1-2 October 2014 in Thimpu, Bhutan. The event was organized in collaboration with the Ministry of Information & Communications, Royal Government of Bhutan. Mr. Abdul Samad Member (C&E) PTA shared the best practices from Pakistan, especially PTA, to identify the inter-country telecommunications connectivity in Central Asia and surrounding countries. The purpose of the Expert Consultation was to bring together international and regional ICT policy makers and experts to analyze case studies on regional ICT connectivity leading to roadmap towards creation of the Asia Pacific information superhighway. The participants discussed opportunities to expand interconnectivity in Central Asia and surrounding counties to spur strategies for global and regional telecommunications investment in Central Asia.

Visit of Deputy Minister, Sri Lanka at PTA

Deputy Minister Provisional Councils and Regional Development of Sri Lanka and the famous cricketer, Mr. Sanath Jayasuriya visited PTA on 24th July, 2015. Chairman PTA Dr. Syed Ismail Shah welcomed the dignitary and briefed him about working of PTA and telecom sector of Pakistan. Mr. Sanath Jayasuriya also met with the representatives of cellular mobile operators to seek information on investment opportunities in the telecom sector of Pakistan. He also attended a

presentation of ITU Regional Advisor Mr. Sameer Sharma. Chairman PTA presented a memento to the honourable dignitary on this occasion.

United States Telecommunication Training Institute (USTTI) Training Plan

The United States Telecommunication Training Institute (USTTI) is the world's renowned nonprofit training institute established with the aim to provide training opportunities and sharing ICT knowledge to make the modern communications a reality throughout the developing world. PTA has been coordinating with USTTI to utilize the institution's expertise for training of its officers in emerging fields of technology i.e. Spectrum, Economic & Regulatory affairs, ICT, Telecom's changing environment and Telecom's Rule of Law. During the bilateral meeting between Chairman PTA and Chairman USTTI, it was agreed that USTTI will provide capacity building support to PTA by training its manpower to boost the telecom sector of the country. Mr. Joseph L. Gattuso, Attorney-Advisor, Commercial Law Development Program, US Department of Commerce, visited PTA in February, 2015 to analyze the training needs assessment for the PTA, MoIT and FAB manpower. USTTI agreed to provide training opportunities to PTA, MoIT and FAB officers for its 2015 training programs in the following areas:

i. Introduction to Rule of Law
ii. Managing effectively in the changing Telecommunications environment
iii. Policy and regulation sequence
iv. Mobile broadband
v. Spectrum management

25 Officers of PTA, Cabinet Division and FAB attended the training in USA. A 2 day training session was also held in Pakistan which 24 officers from PTA, 04 officers from PTCL, 03 officers from FAB, 1 officer from Cellular Operators Advisory Council and 10 officers of the Cellular Mobile Operators participated. The training programs have been highly beneficial in improving the technical as well as regulatory knowledge of the officers. The skills acquired through successful completion of these courses will contribute to the better working of the young officers and lead towards better management of the telecom sector dynamics in Pakistan.

Capacity Building Measures through ICANN, APNIC and ISOC

In order to enhance knowledge of modern technologies and developments in the IT industry, PTA is coordinating with international organizations like International Cooperation for Assigned Names and Numbers (ICANN), Asia Pacific Network Information Center (APNIC) and Internet Society (ISOC).

In April 2015, PTA, with the help of ICANN, arranged training sessions on "Deployment and Management of Domain Name System Security Extensions (DNSSEC)" and "Internet Governance" at PTA Headquarters, Islamabad. Participants from IT and telecom industry, academia and PTA officers attended the training. The participants appreciated the quality of

training and emphasized to continue such training sessions for the capacity building of the industry. These sessions are helpful in deployment of advanced technologies and enhanced security of the Internet infrastructure in Pakistan.

Telecom Events arranged by PTA

ITU Training Course for Afghan Telecom Regulatory Authority

PTA in collaboration with International Telecom Union (ITU) organized a training program on regulatory matters for Afghan Telecommunication Regulatory Authority (ATRA) and Ministry of Communication, Afghanistan from 20th July, to 23rd July, 2015 at PTA Headquarters, Islamabad. During the training, senior officers of PTA as well as Telenor, Mobilink and Pakistan Mobile Number Portability Database Limited (PMD) delivered detailed presentations on Pakistan's telecom regulatory regime and briefed the Afghan delegation about various aspects of law, licensing and service regulations. Afghan participants appreciated the rich content of the program and PTA's hospitality. Chairman PTA also briefed the visiting delegation and termed it an honour for Pakistan to be selected by ITU for imparting training to neighboring countries. The Chairman said that more of such events will be organized by PTA in the future. Later on, ITU representative Mr. Sameer also delivered a presentation on "ITU: platform for smart partnership & sustainable development in Pakistan", on 24th July, 2015 at PTA, which was attended by representatives of telecom operators, academia and PTA.

Establishment of Internet Exchange Point (IXP)

Internet Exchange Points (IXPs) are vital elements of Internet infrastructure that enable networks to exchange traffic with each other. Multiple Internet Service providers (ISPs) can connect at a single IXP, creating the potential for a range of technical and economic benefits for the local Internet community. By keeping local traffic local and avoiding international links, local

operators and users can reap substantial cost savings, provide substantial local bandwidth, and significantly improve local Internet performance. [ITU]

In Pakistan some of the operators are peering with each other in major cities of Pakistan and PTCL has also created Pakistan Internet Exchange (PIE). However, it does not fulfill the requirement of neutral IXP. Therefore, PTA took the initiative in early 2015 to work towards creation of Pakistan IXP.

PTA in collaboration with APNIC and ISOC organized introductory session on Internet Exchange Point (IXP), which was attended by relevant stakeholders including ISPs, cellular mobile operators, Government departments and academia. Later on working groups were established to study all aspects of establishment of IXP in Pakistan. Working Groups have finalized report on Pakistan IXP and hopefully, IXP will be operational in the current fiscal year. Establishment of Pakistan IXP will help in lowering bandwidth expenditure, reduction in Internet tariff, enhancing quality of Internet service and development of local content in Pakistan.

Pakistan Mobile App Awards

PTA believes in harmonized efforts for the uplift of ICT Industry of Pakistan in partnership with the operators and solution providers. In this context, PTA organized 'The Pakistan Mobile App Awards' to further strengthen the relationship between the academia, industry and the relevant government organization.

More than 100 applications were received from different circles of the society which were scrutinized and evaluated by a committee of IT and Software experts. All submissions to the competition were subject to pre-defined criteria including uniqueness, value to public, functionalities, sustainability and quality of the mobile application under the categories of agriculture, entertainment, kids, security, community and business. PTA announced the winners of the competition in a prestigious ceremony held at Islamabad where Federal Minister of State for IT and Telecom Ms. Anusha Rahman Khan presented awards to the winners on 27th April, 2015. Chairman PTA, Dr. Syed Ismail Shah, Member (Finance) PTA, Mr. Tariq Sultan and Member (Compliance & Enforcement), PTA, Mr. Abdul Samad were also present on the occasion. Pakistan Mobile App Awards competition was well acknowledged by all the academia and ICT industry, reflecting a lively evolution of innovation in Pakistan.

National Broadband Forum

Broadband is a revolutionary technology having vast implications in every aspect of a country's digital and economic progress. The successful roll out of 3G and 4G (LTE) services in the country paved new ways of data centric opportunities for the people of Pakistan. However, statistics reveal that there is a lot of potential in broadband sector that has not been tapped so far.

In this context, PTA in collaboration with CISCO Systems organized a multi-stakeholder forum to find out ways and means to truly capitalize on the huge potential of broadband services in Pakistan. In his opening remarks, Dr. Syed Ismail Shah, Chairman PTA who was the Chief Guest on this occasion, said that the wide spread adoption of broadband can be truly instrumental not only in the technological advancement but also for the sustained economic development of Pakistan. Hence, it is imperative that the benefits of broadband should reach the grass root level in the form of e-services e.g. e-health, e-education, e-commerce, e-governance etc. Broadband and telecom experts from the Policy maker, regulator, operators, development agencies, academia, vendors and other stakeholders expressed their views on how to make full use of the immense broadband prospects in Pakistan. The open house and panel discussion among the experts and the participants generated effective, workable and forward looking ideas for proliferation of broadband services in Pakistan.

National Workshop on Telecom Reporting

PTA organized "3rd National Workshop on Telecom Reporting" for the capacity building of telecom reporters and analysts on 4th April, 2015 at PTA Headquarters Islamabad. Chairman PTA, Dr. Syed Ismail Shah presided over the event while Member (Finance) PTA, Mr. Tariq Sultan, Member (Compliance & Enforcement) PTA, Mr. Abdul Samad, officers of PTA and representatives from print and electronic media participated in the

workshop. The workshop was aimed at apprising the media persons on the mandate and responsibilities of the telecom regulator as well as on the current telecom regulatory environment in Pakistan. Chairman PTA, Dr. Syed Ismail Shah briefed the participants on PTA's future plans and strategic changes in the telecom industry to bring the country at par with technologically more advanced countries of the world. Senior officers of PTA also delivered presentations on different topics concerning telecom sector of Pakistan and touched upon new initiatives from PTA for consumer protection. This was followed by an interactive session where the performance of the industry and PTA was discussed by the reporters with the Authority.

Seminar on Practicalities and Challenges around Network Rollout and Quality of Service

PTA organized an awareness seminar on "Practicalities and Challenges around Network Rollout and Quality of Service" in collaboration with Anite (NEMO) Finland and Saybi Pakistan at Islamabad on 14th March 2015. The seminar encompassed the Quality of Service (QoS) challenges associated with new technologies being integrated within existing infrastructure. During the seminar, practicalities and challenges involving benchmarking, optimization and regulatory compliances were discussed in detail from an operator perspective and type approval for assuring QoS and customer handset safety. The event also presented the best practices around the globe for benchmarking of 3G and 4G (LTE) Mobile Networks. Chairman PTA, Dr. Syed Ismail Shah, and Member (Compliance & Enforcement) Mr. Abdul Samad were also present on the occasion. The event was attended by the senior officers of PTA, representatives from telecom industry and academia.

Chapter-2
Licensing Regime

Pakistan Post and Telegraph Department was established in 1947 to provide postal and telegraph services in Pakistan. In 1962, the sector was reformed by formation of Pakistan Telephone and Telegraph (PT&T) Department through separation of Postal and Telecom services. However, due to the centralized structure, merely 922,000 telephone lines could be made operational by 1990. With a view to deregulate the sector, PT&T was converted into Pakistan Telecommunication Corporation (PTC) on 5th December, 1990, and then in 1996 to a public limited company called Pakistan Telecommunication Company Limited (PTCL) and was listed on Karachi Stock Exchange. This change resulted into increase of telephone lines to 2,127,344 by 1996 and to 2,660,898 by 1998. PTA was created as an independent regulator for the Telecom Sector in 1996 and the sector was fully deregulated by January 2003.

PTA is the regulator of Telecom Sector with a vision to "Create a fair regulatory regime to promote investment, encourage competition, protect consumer interest and ensure high quality ICT services". The functions of Authority are to regulate the telecom sector, create fair competition, promote modernization, receive / dispose Radio Spectrum Applications and make recommendations to the Government on Policy formulation. PTA grants and renews licenses for any telecommunication system and services as well as modifies the licenses if needed, under the law. PTA also processes radio frequency spectrum applications and issues regulations for licensing of different basic and value added telecom services.

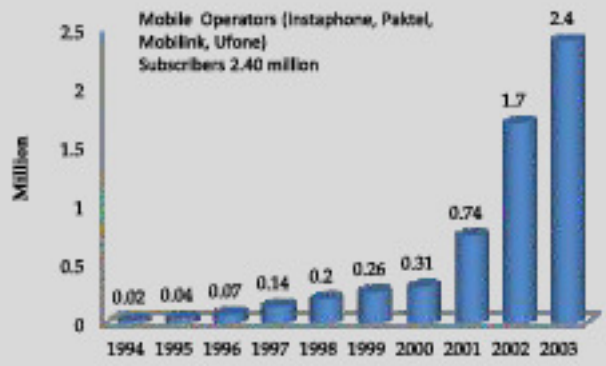
Pre Deregulation Era

The period from 1996 to December 2002 is known as Pre Deregulation era. Only two fixed line operators i.e. PTCL and NTC (for the provision of services to government only) were operational, with a total of 3.6 million fixed line subscribers (teledensity of 2.49) in 2002. Similarly, four cellular operators (Instaphone, Paktel, Mobilink and Ufone) were operational during this period with a total subscriber base of 1.7 million in 2002.

Figure 1 : Pre Deregulation

Fixed Line Subscribers and Teledensity

Cellular Mobile Subscribers



Deregulation Policy 2003

Government of Pakistan issued De-Regulation Policy in 2003 and opened the fixed line segment to technology neutral licensing with license terms of 20 years for fixed line operators under an open licensing regime. According to the policy Pakistan was divided into fourteen (14) Telecom regions and two types of licenses were introduced i.e. Local Loop (LL) license with Initial License Fee (ILF) of US $ 10,000 per region and Long Distance & International (LDI) license with ILF of US$ 500,000. The policy also introduced Access Promotion Contribution (APC) and Universal Service Fund (USF) contribution to promote the local loop segment telecom facilities in unserved and underserved areas of Pakistan.

Fixed Line Segment

The Fixed Line Segment of Pakistan consists of LL, LDI, Class Value Added Services (CVAS) (i.e. Data, Voice), Telecom Infrastructure Provider (TIP) and Telecom Tower Provider (TTP) licensees. It also includes CVAS Registration.

Long Distance & International

An LDI license authorizes the licensee to construct LDI network facilities, and to offer LDI services, anywhere in Pakistan. LDI service covers the provision of end to end communication between points that are located in different regions, not in the same Local Calling Area, or located more than 25 Km apart and located in Pakistan with other end located outside Pakistan. A total of 14 LDI licensees are operational in Pakistan.

Fixed & Wireless Local Loop

The LL can be either fixed or wireless (spectrum auctioned) and its scope is to construct local network facilities in the licensed region and to provide basic public telephone access and other telecommunication services in that particular region. Fixed LL services cover access to the Public Switched Network and allow users to make and receive local, long distance and international real time voice telephone calls. FLL with spectrum assignment are Wireless Local Loop (WLL) operators. So far, a total of 84 FLL and licenses have been issued to 38 companies and 92 WLL licenses have been issued to 16 companies.

Class Value Added Services

Class Value Added Licensed Services (CVALS) regime consists of only two types of licenses i.e. Data and Voice. 'Data' CVALS provider may provide any one or more services allowed to its customers e.g. Vehicle Tracking, Data service, Internet service, or as added by PTA from time to time. 'Voice' CVALS provider may provide Card Payphone service and Premium Rate services or other services added by PTA from time to time. CVALS licenses are valid for a period of 15 years. The ILF is Rs.100,000 per province. Nationwide CVALS ILF is Rs. 300,000 only. For companies in the province of Balochistan, these fees are Rs.50,000 and Rs. 150,000 respectively i.e. 50% of the fees in the rest of Pakistan.

A new regime for Class Value Added Registration Services (CVARS) was also introduced for some applications and services e.g. Voice Mail, SMS Aggregator, Content Service Provider Video Conferencing, etc. CVARS applicants have to pay Rs. 10,000 only as processing fee. No ILF or annual fee applies for the period of the registration. The registration is for a period of five years only. At the expiry of the registration a fresh registration is required.

Telecom Infrastructure Providers

Telecom Infrastructure Providers (TIP) license authorizes the licensee to establish and maintain the infrastructure facilities (Earth Stations, OFC, Radio Communication links, Towers, Poles etc.) in Pakistan to lease, rent out or sell end to end links to telecom operators licensed by PTA. TIP cannot operate the infrastructure. The ILF for TIP license is US$100,000.

Telecom Tower Providers

Telecom Tower Providers (TTP) license authorizes the licensee to establish and maintain the telecom tower infrastructure facilities in Pakistan to lease, rent out or sell end to end links to telecom operators licensed by PTA. TTP cannot operate the infrastructure. The ILF for a TTP license is Rs. 100,000 at national level.

Eligibility Criteria

The eligibility requirements for obtaining LL / LDI License to be fulfilled by an applicant include:

- The applicant shall be a company incorporated or registered in Pakistan under the Companies Ordinance, 1984.
- The applicant has to submit all the documents mentioned in respective Information Memorandum (IM) available at PTA's website.
- The applicant has to pay the required initial fees to PTA by the applicable deadlines referred to in respective IM.
- The applicant has to submit a satisfactory Technical plan and business plans; it has to demonstrate that it has adequate financial resources available to implement the business plan; and the applicant's key management personnel demonstrate the minimum degree of required experience.

Number of Licenses

Currently, total number of licensees of Fixed Line services is 699, the category wise detail of which alongwith the number of licenses issued in year 2015 is listed in the Table 8 .

Table 8 : Types of Licenses for Fixed Line Services

S. No.	License Type	Total Licenses	License issued in 2015
1	Data Class Value Added Services	274	34
2	Voice Class Value Added Services	59	2
3	Class Value Added Services Registration	158	32
4	Long Distance & International	14	-
5	Fixed Local Loop	84	-
6	Wireless Local Loop	92	-
7	Telecom Infrastructure Provider	10	1
8	Telecom Tower Provider	8	1
	Total	699	70

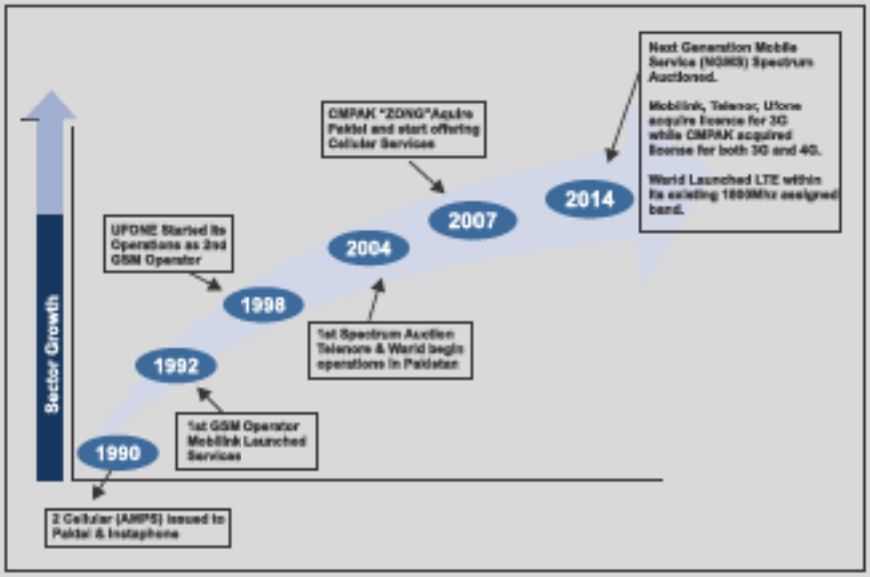
Cellular Segment

In Pakistan, Cellular Telephony services started in 1990 when two Advanced Mobile Phone System (AMPS) licenses were awarded to Paktel and Instaphone. Later, two Global System for Mobile (GSM) licenses were awarded to Mobilink in 1992 and Ufone in 1998.

Cellular Mobile Policy 2004

Government of Pakistan issued Cellular Mobile Policy in 2004. Deregulation of the cellular sector in 2004 gave a whole new dimension to the mobile services with the introduction of two new players i.e. Telenor and Warid. The licenses were awarded for a period of 15 years, with rollout obligation of 70% of Tehsil headquarters within 4 years. Since then, cellular segment has seen many highs. In 2007, CMPak (Zong) acquired Paktel and started offering cellular services. The policy has created fierce competition in this segment with tremendous growth. Mobile Teledensity increased from negligible in 2002 to 64 percent in 2015.

Next Generation Mobile Services (NGMS) Licensing



Telecom world is evolving fast and new technological developments take place rapidly. Two such developments were introduction of high speed mobile internet through 3rd Generation (3G) and 4th Generation (4G) mobile services. To reinvigorate the cellular mobile segment of Pakistan, PTA provided the perfect catalyst by auctioning the spectrum for NGMS in April, 2014. The advent of 3G and 4G services in Pakistan has opened new avenues of telecom activities that the operators can utilize to provide innovative services, attract customers, generate revenues and stabilize their market position. Resultantly Mobilink, Ufone and Telenor acquired license for 3G while CMPak acquired licenses for both 3G and 4G services. Warid launched Long Term Evolution (LTE) services by carving out some of its existing spectrum assigned in 1800 MHz band.

Cellular Coverage

Coverage of a Cellular Base Transceiver Station (BTS) is the geographic area where the Mobile Station (MS) can communicate. Coverage Maps are prepared to indicate the area which is

covered by services. It depends on several factors, such as terrain, technology, radio frequency and perhaps most importantly for two-way telecommunications the sensitivity and transmit efficiency of the consumer equipment. Some frequencies provide better regional coverage, while other frequencies penetrate better through obstacles, such as buildings in cities. The ability of a mobile phone to connect to a base station depends on the strength of the signal. Almost 90% of the population of Pakistan has 2G mobile coverage. With the award of NGMS licenses, provision of 3G and 4G mobile coverage has also accelerated.

Radio Based Wireless Services

PTA also awards different categories of wireless licenses, i.e. High Frequency (HF), Very High Frequency (VHF) & Ultra High Frequency (UHF), Aeronautical Services, Maritime Services, Amateur Radio, Inmarsat and Microwave, as per section 20 and 43(5) of Pakistan Telecommunication (Re-Organization) Act, 1996.

Table 9 : Types of Licenses for Radio Based Wireless Services

S. No.	License Type	Total Licenses
1	HF, VHF, UHF , Wireless License	517
2	Microwave links	16
3	Inmarsat	13
4	Aeronautical Services (Aircrafts)	81
5	Amateur	180
6	Telemetry System	3
Total		810

So far, approximately 1200 such licenses have been issued by PTA since its establishment, including some of the licenses handed over by Department of Telephone & Telegraph and Pakistan Wireless Board from pre-PTA establishment era. As different licensing regimes were in place, the Authority shifted all previous licenses to the present regime after fulfilling all legal and codal formalities, in line with the FAB's decisions. This exercise has been successfully completed and all the licenses have been shifted/converted to new regime and presently there are 810 active licenses of various services as mentioned in Table 9.

Licensing in Azad Jammu & Kashmir and Gilgit Baltistan

Special Communications Organization (SCO) started operations in 1976 with a total of 400 lines. It had exclusivity in Azad Jammu & Kashmir and Gilgit Baltistan(AJ&K and GB) till the deregulation of cellular segment. The operator owned all the long haul and access network resources in the area. It was hoped that SCO shall play a pivotal role in the boom of telecommunication infrastructure in the region and SCO provides telecom services in AJ&K and GB region with a population of 3.5 million in AJ&K and 1.5 million in GB, covering a combined area of 158,289 Sq. kilometers.

The earthquake of 8th October, 2005 in Northern Pakistan caused a lot of damage and disrupted life and services in the affected areas. In four districts of AJ&K and five in Khyber Pakhtunkhwa (KPK), public and private housing, social service delivery, governance structures,

communication etc. was either severely damaged or completely destroyed. Until the catastrophic earthquake, SCO maintained its monopoly being the only telecommunication network provider in AJ&K and GB. However, later on, subsequent to Cabinet's decision for de-regulation of the sector in these areas in 2006, PTA issued Cellular, FLL and WLL licenses in AJ&K and GB. The deregulation of the telecom sector in AJ&K and GB brought about a revolutionary change which saw huge increase in subscriber base, teledensity and coverage area in the region.

Chapter-3

Consumer Protection and Complaint Management

PTA has been continuously making efforts to protect consumer interests and ensure the redressal of consumer complaints against telecom companies through effective regulatory framework. Telecom industry of Pakistan has evolved substantially in terms of subscribers, technologies, services and coverage. Consequently, the number of issues faced by telecom users also increased substantially over the past decade. PTA gives a high priority to proactive consumer protection measures. PTA has also established a special Directorate which looks after the consumer complaints, submits summarized complaints information to the Authority and also liaises with the operators for better handling of consumer complaints.

Complaints Management System

PTA launched a comprehensive Complaints Management System (CMS) in October 2010 that enables telecom consumers to lodge their complaints regarding telecom services online and receive prompt response. PTA has also given limited access of CMS to the operators where they can view and update the complaint status using dedicated logins. Online CMS is accessible to general public through "Online Complaint Form" at PTA's website which is a convenient, efficient and user friendly interface for lodging complaints as well as keeping track of its outcome. Complainant is kept informed through auto generated email notification to his/her email address. As per procedure, first the complainant has to register the complaint to the telecom operator. If the issue is not resolved by the operator within a prescribed time frame, the complainant can lodge the complaint through PTA toll free number, fax, email, post, or online through PTA's website. On receipt of the required information, complaint is pursued with the concerned operator within three days of the receipt and complainant is notified of the proceedings at each redressal step. Complaints are to be resolved / redressed within fifteen working days. In case of a deadlock situation, a personal hearing can also be arranged.

Analysis of Consumer Complaints

During FY 2014-15, a total of 40,445 complaints were received against telecom service providers including CMOs, PTCL, LDIs, WLL and ISPs as compared to 36,092 complaints during the corresponding period last year. The reason for this increase was the rise in complaints regarding CMO verification issues and PTCL faults in service. As shown in the Table 10, cellular mobile operators constitute major part of overall complaints (24,510) followed by PTCL

(15,593). All the complaints were taken up with the concerned operators well in time and PTA successfully resolved 99% of these complaints through effective and efficient follow up with the concerned operators.

Table 10 : Summary of Consumer Complaints Received and Resolved FY2014-15

Service Providers	Received Complaints	Resolved Complaints	Resolved (%)
CMOs	24,510	24,189	98.7
PTCL	15,593	15,495	99.4
Long Distance International (LDIs)	158	158	100.0
Internet Service Providers (ISPs)	97	97	100.0
Wireless Local Loop (WLL)	87	84	96.6
Total	40,445	40,023	99.0

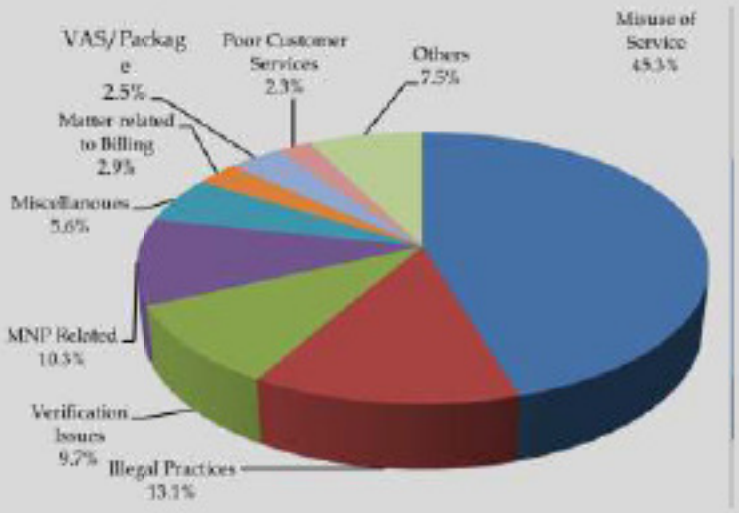
Consumers Protection Measures

Cellular mobile related complaints

During the FY 2014-15, PTA received 24,510 complaints against CMOs, out of which 98.7% were successfully resolved. As depicted in Figure 2, most complaints pertain to the misuse of service (45.3%) such as obnoxious, fraudulent and undesired communication in addition to blocking of SIMs involved in sending SPAM messages. Illegal practices, MNP and issues related to verification are the major problem areas being faced by the consumers which are expected to reduce now that the biometric re-verification of all the SIMs has been done.

Figure 2 : CMO Complaints

FY 2014-15



The operator-wise complaints analysis given in Figure 3 shows that the highest number of complaints was received against Telenor (28%) followed by Mobilink (22%) and CMPak (22%). Ufone (17%) and Warid (11%) had relatively less consumer complaints.

Figure 3 : Breakdown of CMO Complaints FY 2014-15

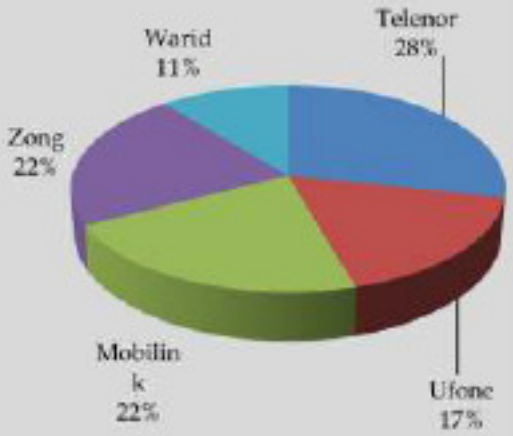
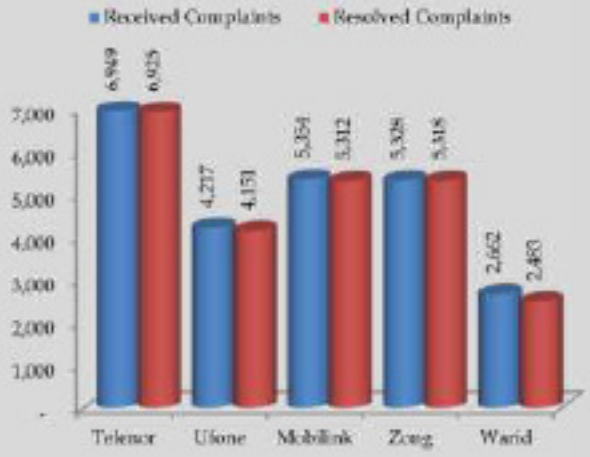


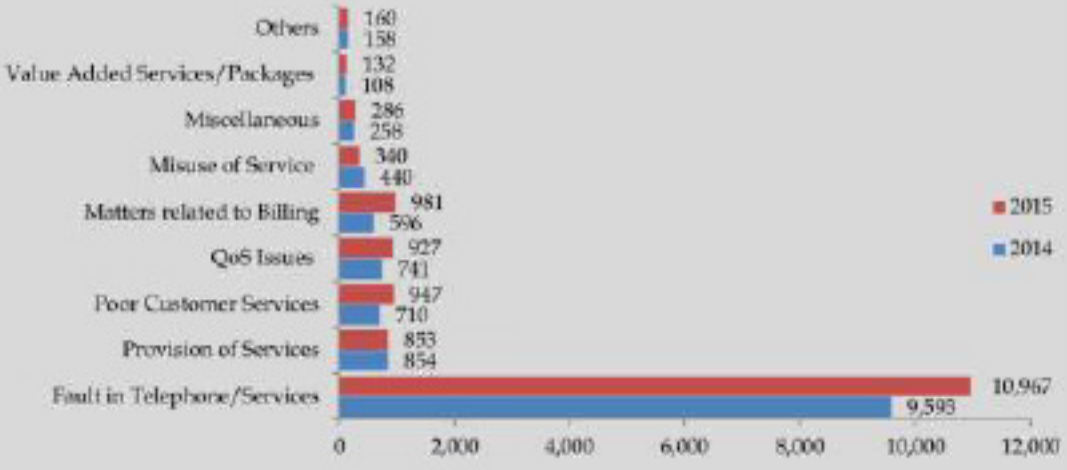
Figure 4 : CMO Complaints Received and Resolved FY 2014-15



PTCL related complaints

PTCL has the largest fixed line infrastructure and serves 3.2 million subscribers in the local loop sector. During the period under review, PTA received 15,593 complaints as compared to 13,458

Figure 5 : Analysis of PTCL Related Consumer Complaints (FY 2013-14 and FY 2014-15)



Note: *Others include non-provision of services, illegal practices, refund of amount, verification issues, misleading statements and withdrawal of services*

complaints received during previous year. PTCL managed to redress 99.4% of the total complaints referred by PTA. The major chunk of complaints against PTCL was related to faults in telephone/service. Most of PTCL's infrastructure is decades old, therefore, the disruption in services has become a major problem for the incumbent. Investment in fiber deployment coupled with efficient field services can help reduce number of faults. PTA is vigorously pursuing PTCL to overcome these shortcomings. Issues in provision of services and poor customer services are the next big areas of concern.

Joint Monitoring Cell for BVS Complaints

PTA established a Joint Monitoring Cell (JMC) with the Ministry of Interior to deal with consumer complaints regarding Biometric Verification System (BVS) in November 2014. Consumers can launch any complaint regarding BVS process at PTA's usual complaint helpline/fax or to a dedicated email account. A total of 1,086 complaints have been received on various SIM issues e.g. updating (668) record, overcharging, old age, overseas Pakistanis, out of which 955 have been resolved.

Regulatory Framework for Prize/Inami Schemes

In the recent past, PTA has been receiving large number of complaints regarding various prize schemes (commonly known as Inami Schemes) being offered by the cellular mobile operators. Consumers regularly complained about being scammed by fraudsters posing as mobile company representatives offering rewards. These are in fact fake promises and if a consumer proceeds with the instructions given in the text message, he/she is asked to call a certain number and is eventually made to transfer certain airtime balance to them. The Honourable Supreme Court of Pakistan also took cognizance of the issue and ordered PTA to take up the matter and protect the consumers from frauds. Therefore, PTA is in the process of introducing the Telecommunication Consumer Protection (Amendment) Regulations, 2015 in order to further strengthen the regulatory framework to deal with prize/Inami schemes.

Billing Verification of Cellular Mobile Operators

In order to ensure that CMOs are charging consumers as per advertised tariffs/packages, PTA verifies the accuracy of billing on regular basis. For the purpose, all prepaid packages of CMOs were checked during the billing verification exercise as majority of cellular subscribers have prepaid connections. On-net and off-net calls of different durations were made so that all types of callers can be brought into the scope of activity, as shown in Table 11.

Table 11 : Call Sample

Call Type	Call Duration
On-net & Off-net	50 seconds
	70 seconds
	110 seconds
	130 seconds
	170 seconds
	190 seconds

The talk time (call duration) was calculated compared with the call duration as per operators' Call Data Records (CDRs) to find the variance. The call charges were calculated on call duration as per CDRs against operators' advertised tariffs (including taxes) and then compared with actual deduction in credit balance to assess undercharging and overcharging by respective mobile operator. Different services/parameters were also checked such as on-net & off-net SMS, IVR charges, helpline charges, balance enquiry charges, actual amount received on Rs. 100 recharge. The results of the activity revealed that operator billing against most of the offered packages was correct and according to the advertised rates. However, few discrepancies related to overcharging were found in some operators billing procedures. PTA is taking strict action against such operators as per the provisions in the law.

Monitoring the Health Related Effects of Radio Base Station Antennas

The well being of the general population covered under cellular mobile signal has been a priority of PTA. In this regard, PTA issued "Protection from Health Related Effects of Radio Base Station Antennas Regulations" in 2008 and conducts regular surveys to check the compliance of these Regulations by CMOs.

During the period under review, PTA conducted an extensive survey at Lahore, Karachi, Muzaffarabad, Peshawar, Quetta and Rawalpindi/Islamabad along with FAB to check the emission of power level from transmitters and receivers of Base Transceiver Stations (BTSs)/Towers installed by CMOs. The results revealed that power level of radio waves of all BTSs surveyed is much below the prescribed danger limits and in line with the policy directives of Ministry of IT & Telecom, World Health Organization (WHO) and International Commission on Non- Ionizing Radiation Protection (ICNIRP) guidelines.

IMEI Blocking

International Mobile Equipment Identity (IMEI) number is a unique 15 digit number embedded in every mobile phone, GSM modem or device with a built-in phone / modem by the manufacturer. IMEI is used to identify each mobile handset including information about its model, make, manufacturer etc. PTA uses the IMEI number to block a snatched, stolen or lost handset when requested by its legitimate owner. In case the handset is recovered, its IMEI number is unblocked by PTA after necessary verification of the ownership. During the FY 2014-15, 108,031 mobile handsets were blocked over the cellular mobile networks in Pakistan while 3,962 sets have been unblocked by PTA.

Figure 6 : IMEI Blocking and Unblocking

Chapter-4

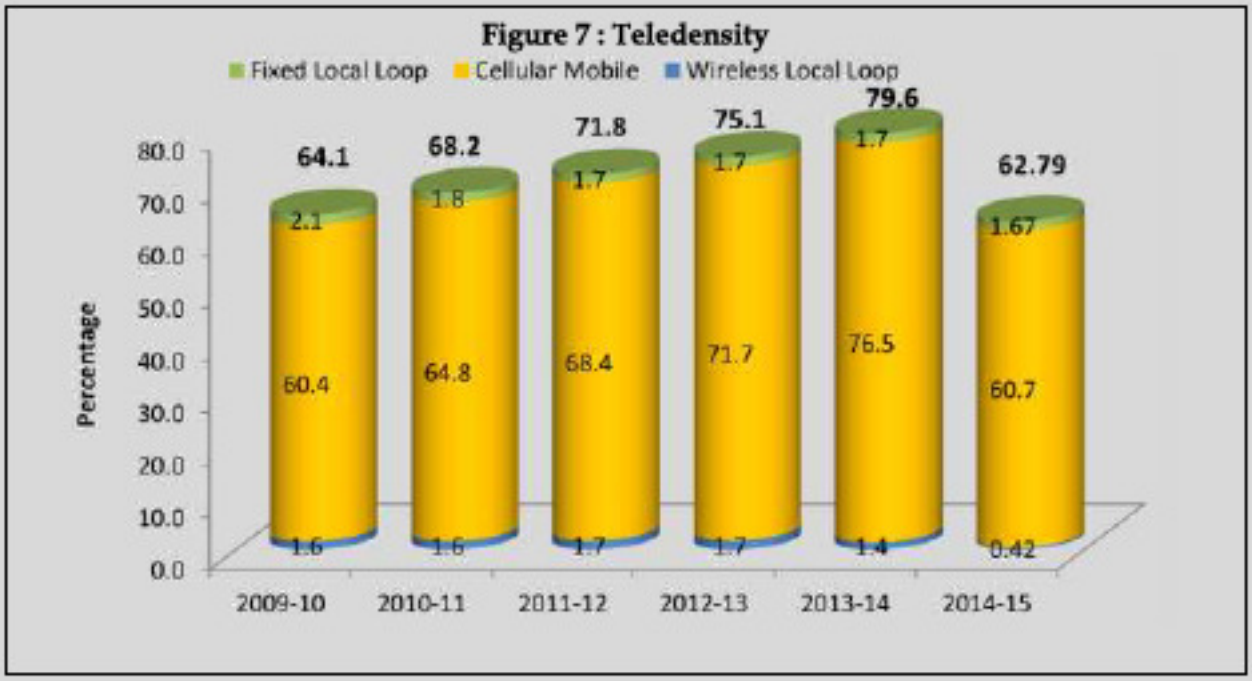
Telecom Sector Economy

The telecom sector of Pakistan is undergoing a challenging phase in which cut throat competition and technological shifts have narrowed the profit margins and also dried some of the traditional revenue streams of telecom networks. During FY 2014-15, overall telecom teledensity dropped significantly owing to blocking of unverified SIMs by mobile operators and subscribers churn in the local loop market. Telecom revenues also could not show any growth during the year under review. Nonetheless, the investment profile in both cellular and LDI sector remained good and operators have invested in the up-gradation of their networks. The subscriber base is gradually reviving in cellular sector as operators are adding back their customers, which were lost due to blocking of SIMs due to biometric re-verification. It is expected that in the coming months improvement will be seen in major telecom indicators.

Teledensity

The extraordinary developments on account of streamlining the SIM sales and biometric verification of issued SIMs resulted in blocking of millions of unauthorized / unverified SIMs during FY 2014-15. These activities have impacted the cellular penetration significantly and the overall teledensity including cellular mobile, Local Loop (LL) and Wireless Local Loop (WLL) declined to 62.8 percent at the end of FY 2014-15 compared to 79.6 percent previous year, showing a year-on-year decline of 21 percent. Cellular penetration has also shown negative

Figure 7 : Teledensity

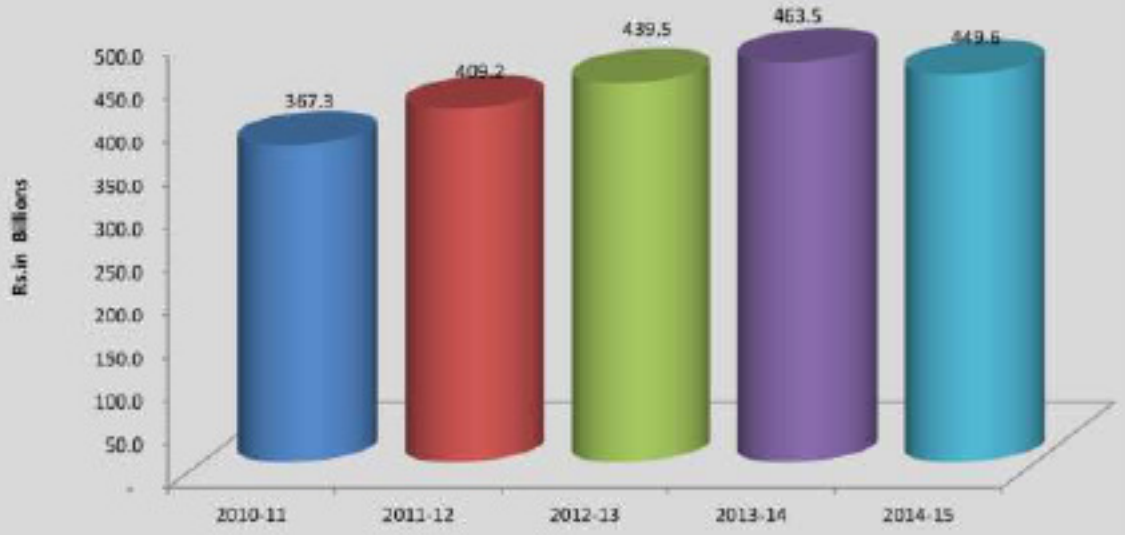


growth (-20.6 percent), reaching at 60.7 percent at the end of FY 2014-15 from 76.5 percent a year earlier. In the WLL sector, a substitution effect has been witnessed from cellular services, in particular, 3G and 4G LTE services. During FY 2014-15, a sharp decline in WLL subscribers has also contributed to lower WLL teledensity i.e. 0.4 percent compared to 1.4 percent in the previous year.

Telecom Revenues

During FY 2014-15, annual revenues of telecom sector reached estimated Rs. 449.6 billion, showing a decline of 3.0 percent over the last year. This is the first time in the history of telecom sector in Pakistan that the sector revenues have declined from previous year. The WLL segment has been hit hard with almost 40 percent decline in the revenues of small WLL companies except PTCL. Even the cellular segment showed a decline of almost 2 percent in its revenue stream from previous year mainly on account of biometric verification drive and resultant loss in subscriptions i.e. blocking of unauthorized / unverified SIMs, which also offset the revenue generation avenues opened up with the launch of 3G and 4G services. The sale of new connections also remained suspended at the retailers and temporary outlets during the re-verification drive for a period of 91 days. However, it is expected that data services will give impetus to revenue streams of the cellular mobile operators in coming years.

Figure 8 : Telecom Revenues



Note: Figures for the FY 2013-14 are revised and FY 2014-15 (4th quarter) are estimated.

Telecom sector is one of the most dynamic sectors of the economy, where technology is continuously and rapidly changing, opening up new avenues of growth and healthy returns, and making some of the traditional ones less profitable. At the same time, telecom operators are

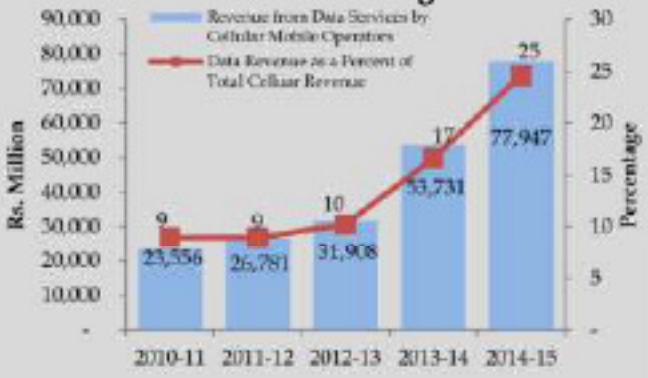
facing a new phase of competition from Over the Top (OTT) services such as Skype, WhatsApp, etc., replacing part of their voice revenue. These changing dynamics are closely reflected by the trends in voice and data revenues: data revenues are now 25.6 percent of the total telecom revenues, compared to 12.4 percent in FY 2009-10. Total data revenues in telecom sector have more than doubled during the last five years, reaching Rs. 115 billion in FY 2014-15.

Data revenues of the cellular mobile sector have also shown a substantial increase in recent years i.e. more than three times increase during the last five years. In FY 2014-15, mobile data revenues were Rs. 77.9 billion which is 25 percent of total cellular revenue. During the last two years, cellular mobile internet and broadband usage has had a significant impact on data revenue streams of mobile sector. It is expected that this trend would continue in coming years as subscription to data connections is increasing and data usage is expanding in the country.

Figure 9 : Data Revenues of Telecom Sector

Note: Estimated data revenues of LL and LDI

Figure 10 : Data Revenues of Cellular Mobile Segment



Note: Estimated revenues for the year 2014-15

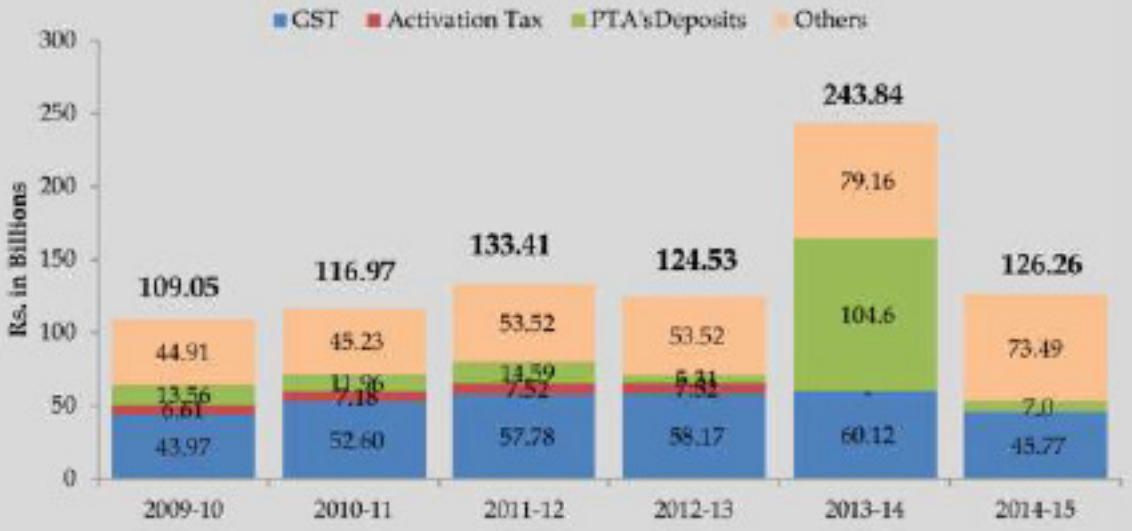
Telecom Sector Contribution to the National Exchequer

Telecom sector is a significant source of revenue generation for the GoP in terms of initial and annual license fees, initial and annual spectrum fees, Universal Service Fund (USF) and Research and Development (R&D) fund contributions, Access Promotion Contribution (APC) for USF, Numbering Charges, license application fee etc., and taxes including General Sales Tax (GST)/Federal Excise Duty (FED), SIM Activation Tax, Advance/Withholding tax (WHT), sales tax on mobile handsets, custom duties and other taxes. During the last five years, telecom sector has contributed a total of Rs. 745 billion in terms of the above regulatory duties and taxes. In FY 2014-15, telecom sector has contributed Rs. 126.6 billion in the national exchequer in terms of above mentioned regulatory duties and taxes. A higher contribution of Rs. 243.8 billion during FY 2013-14 was due to PTA's extraordinary deposits of Rs. 96.5 billion out of the total value of 3G and 4G spectrum auction in April 2014.

Overall telecom sector taxes and levies in Pakistan are considered higher compared to taxes on telecom services in comparable countries. Further, GST (19.5% in Punjab and Khyber

Pakhtunkhwa, 18% in Sindh and 18.5% in rest of Pakistan) and WHT (14%) on telecom services are much higher compared to average 16% GST and 10% WHT in other sectors.

Figure 11 : Telecom Sector Contribution to National Exchequer



Source: Federal Board of Revenue and Pakistan Telecommunication Authority.

Note: Figures for 2014-15 are estimates.

PTA's contributions comprise of all its receipts including Initial and Annual License Fees, Annual Radio Frequency Spectrum Fee, Annual Spectrum Administrative Fee, USF and R&D Fund Contributions, APC for USF, Numbering Charges, License Application Fee, etc.

Others include custom duties, WHT and other taxes.

In addition, in FY 2015-16 budget, Governments of Punjab, Sindh and Khyber Pakhtunkhwa have imposed GST on data /internet services in the range of 18-19.5%. This tax may have negative impact for the proliferation of data services in Pakistan where Pakistan lags far behind when compared with similar economies. The Government of Punjab has recently indicated to withdraw internet tax in Punjab that would have positive impact and it is expected that rest of the provinces will also follow suit. PTA and the telecom industry believes that rationalization of taxes on telecom sector will result in enhanced sector growth which may lead to better collections for government levies in the long run. In this regard, telecom industry has submitted following tax proposals to the Government of Pakistan for consideration:-

- Withholding Tax: Government is currently charging WHT @ 14% from telecom consumers, which is unjustified because most of the consumers are poor and below the minimum threshold requirement of Rs. 400,000 for filing a tax return and hence non-tax filers. They are, therefore, unable to claim advance income tax at the end of fiscal year. Therefore, WHT tax deduction system on telecom services needs to be reviewed by FBR and rationalized in order to save the poor people from undue taxation.

- Activation Tax on Issuance of SIMs: Government charges Rs. 250 as activation tax that was imposed in lieu of Custom duty back in the year 2000. However, currently Government charges custom duty on import of mobile handsets in addition to activation tax. The cellular operators are of the view that activation tax should be abolished to avoid double taxation.

- Industrial Undertaking Status: Telecom sector has still not been granted the industrial undertaking status by FBR. In the absence of industrial status, mobile operators are unable to adjust the income tax paid at the time of import of telecom equipment, which is treated as a final tax liability. Therefore, Industrial undertaking status needs to be given to the telecom sector, which was also agreed by FBR and Ministry of Finance.

Telecom Investment

Under liberalized investment policies of the Government of Pakistan, foreign investors in the telecom sector are allowed to own 100% shares in a company and repatriate 100% of the principal and/or profit. Such investment friendly policies, conducive regulatory environment and dynamic telecom market of Pakistan have attracted significant investment in the sector. In terms of overall investment in the telecom sector, the momentum that was started in FY 2012-13 for the up-gradation of telecom networks for 3G and 4G services is continued. In FY 2013-14, telecom companies invested a total of US$ 1,815.6 million mainly on account of acquiring spectrum for 3G and 4G services. Up-gradation of networks is continued as operators are expanding their next generation networks in additional cities, for which, operators have invested a significant amount of US$ 1,001.0 million during FY 2014-15. Revival of investment in the LDI segment is also evident, as LDI investment increased to US$ 12.2 million in FY 2014-15 compared to US$ 1.8 million in the previous year.

Table 12 : Telecom Investment
US$ (Million)

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	Total (FY 2009-10 to 2014-15)
Cellular	908.8	358.6	211.8	570.4	1,789.7	977.6	4,817.0
LDI	240.3	131.6	13.3	1.9	1.8	12.2	401.2
LL	22.5	18.5	5.0	16.1	14.2	3.9	80.2
WLL	23.0	10.2	7.3	11.9	10.0	7.2	69.6
Total	1,194.72	518.9	237.5	600.3	1,815.6	1,001.0	5,368.0
Note: 2014-15 figures are estimates.							

According to World Bank [2], FDI in country A is a cross-border investment by a resident of country B, having control or significant degree of influence on the management of an enterprise

[2] http://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD

that is resident in country A.[3] For example, China Mobile has significant influence on the management of CM Pak (Zong) in Pakistan. FDI includes equity capital, reinvested earnings, and other capital from parent company. State Bank of Pakistan compiles FDI data in Pakistan and reports three FDI indicators: FDI inflows, FDI outflows and net FDI. Net FDI is calculated by taking out FDI outflows from FDI inflows.

Spectrum for 3G and 4G services in April 2014, with a total value of US$ 1.11 billion, also brought significant further FDI in the telecom sector. During FY 2013-14, FDI inflows in telecom sector were US$ 904.6 million mainly on account of acquiring 3G and 4G spectrum. In particular, China Mobile gave capital to CM Pak to purchase 3G and 4G spectrum. This increased FDI inflow trend in telecom sector is continuous as cellular mobile operators are expanding their 3G and 4G networks, and require additional foreign capital. As provided in Table 13, FDI inflows in telecom sector were US$ 908 million during FY 2014-15, which are 57.9 percent of the total FDI inflows in Pakistan during the period.

Table 13 : FDI Inflows in Telecom

(US$ million)

	2012-13	2013-14	2014-15
FDI Inflows in Telecom	160.8	904.6	908
Total FDI Inflows in Pakistan	2,665.3	2,816.4	1,567.0
%age of Telecoms FDI inflows	6.03%	32.12%	57.95%

Source: State Bank of Pakistan

The position of net FDI in telecom sector is shown in Table 14. Purchase of 3G and 4G spectrum resulted in US$ 429.9 million net FDI in telecom sector during FY 2013-14. In FY 2014-15, net FDI of US$ 121 million was reported in telecom sector. Telecom sector has also been a significant source of total net FDI in Pakistan, i.e. 25.8 percent in FY 2013-14 and 22.9% in FY 2014-15.

Table 14 : Net FDI in Telecom

(US$ million)

	2012-13	2013-14	2014-15
Net FDI in Telecom	-404.1	429.9	121.0
Total Net FDI in Pakistan	1,456.5	1,667.6	529.0
%age of Telecoms Net FDI	-	25.80%	22.90%

Source: State Bank of Pakistan (SBP)
Note: SBP reports FDI inflows, FDI outflows and Net FDI. Net FDI is calculated by taking out FDI outflows from FDI inflows.

Moreover, with the increasing cost of business, the cellular companies are moving more and more towards sharing the infrastructure, particularly the telecom towers. They are also exploring and availing the options of sale and lease back, and renting towers. Due to this trend, there has been some increased interest in the Infrastructure license and in Towers license. It is therefore probable that some FDI may also be witnessed in future if any foreign company, such as, Axiata Group of Malaysia, which recently took Towers license from PTA, invests in this segment.

[3] Ownership of 10 percent or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship.

In order to encourage investment in the manufacturing and assembly of telecom and IT equipment, Federal Government has extended incentives to all new manufacturing units set up between July 1, 2015 and June 30, 2018 i.e., exemption from income tax for five years, first year depreciation allowance of 90pc on the plant and machinery installed and exemption from customs duty and sales tax on the import of plant, machinery and assembly line equipment.

Telecom Imports

With the rapid expansion of mobile broadband networks and adoption of smartphones in the society, the telecom import burden has gradually increased over the last five years. In the FY 2014-15, Pakistan imported US$ 1.2 billion worth of telecom equipment, in which a record import of US$ 629.9 million was on account of cellular mobile handsets imports. According to International Data Corporation (IDC), Pakistan remained one of the fastest growing markets for smartphones shipments in 2015 - 123% growth was registered in smartphone shipments to Pakistan between Q1 2014 and Q1 2015. Currently, almost 31% of the cellular mobile handsets imported in Pakistan are smartphones, which were only about 7% in 2012. In order to tap the potential of over US$ 1.2 billion market of telecom equipment (including handsets) in Pakistan, Govt. is encouraging foreign investment in this area and has announced fiscal incentives for manufacturing and assembly of telecom equipment as mentioned in the previous section.

Table 15 : Telecom Imports

US$ (Million)

	2010-11	2011-12	2012-13	2013-14	2014-15
Cellular Mobile sets with Battery	218.2	465.3	511	564.2	629.9
Other Telecom Apparatus	548.1	488.7	430	652.3	595.2
Total Telecom Imports	766.3	954.05	941.0	1,216.6	1,225.1

Source: State Bank of Pakistan
Note: Imports for the FY2012-13 and 2013-14 are revised and for the FY 2014-15 are provisional.

Chapter-5

Cellular Mobile Services

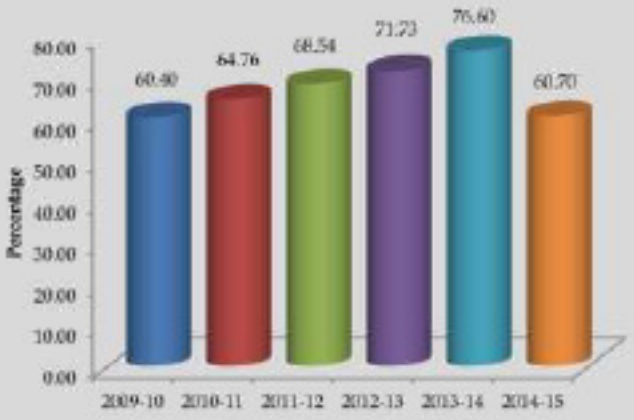
Cellular mobile services have become an indispensable part of the daily life of more than 7 billion subscribers worldwide (ITU, 2015). Historically, mobile services were being used as a substitute medium of communication for fixed line phones, but with radical advancement in cellular networks, mobile services have become much more than just a call or text device. With the introduction of high speed data services, enabled by the 3G and 4G LTE, mobile services are becoming the backbone of interconnected devices, platforms and applications.

Historically, cellular mobile services in Pakistan had been relying on voice and value added offers due to lack of necessary spectrum to roll out data intensive services. Spectrum auction for 3G and 4G services last year opened up a new dimension for operators and subscribers. The uptake of mobile broadband is increasing the demand for more bandwidth every day. On the other hand, streamlining the SIMs sale procedure and re-verification of SIMs resulted in imposition of stringent measures to counter use of unauthorized SIMs. Therefore, cellular industry is yet to maximize the potential impact of 3G and 4G (LTE) services. Now that the biometric re-verification of SIMs has been completed, the availability of broadband on mobile phones, development of local content and influx of affordable smart phones will provide a growth momentum in the cellular industry of Pakistan.

Cellular Mobile Penetration and Subscriptions

Cellular penetration and subscription had been rising steadily over the past few years due to conducive regulatory environment and intense competition among the cellular operators. However, blocking of over 26 million active connections under the biometric re-verification of SIMs brought the mobile teledensity down to 60.7% in June 2015 as compared to 76.6% a year earlier. The cellular mobile subscriptions (No. of active SIMs) also dropped

Figure 12 : Cellular Penetration



to 114.7 million at the end of June 2015 compared to 139.9 million in June 2014, showing a decline of 18% during the year, which depicts the magnitude of re-verification impact on cellular industry. CMOs are unblocking SIMs on regular basis as and when requirements of PTA's defined SOP are fulfilled by a claimant. The facility of new SIM sales at CMO outlets in addition to Customers Service Centers has also been restored which will provide further impetus to the addition of subscribers in the future and ultimately improve teledensity figures. An advantage of biometric re-verification is that there is a readily available database of 114.7 million subscriptions, which can be used for providing various services by different stakeholders all over the Pakistan with relatievely lesser signing on/registration requirements.

Market Share

The impact of re-verification drive has been evident in the teledensity and subscriber figures, however, there has been no drastic change in the market position of CMOs: Warid, Ufone and CMPak have slightly lost their market share whereas Mobilink's and Telenor's shares have improved by a small margin. At the end of FY2014-15, Mobilink is still leading the cellular market with 29.2% (33.4 million subscribers) share as compared to 27.7% market share at the end of June 2014. Telenor has improved its market position by attaining a 27.5% (31.5 million subscribers) market share as compared to 26.1% share at the end of corresponding period last year. Market share of CMPak remained almost the same as it stood at 19.3% share (22.1 million) as on June, 2015 as compared to 19.4% in June, 2014. Ufone's market share experienced the highest decline from 17.4% last year to 15.5% (17.8 million) at the end of FY 2014-15. Warid also moved down from 9.3% to 8.6% (9.8 million).

Figure 13 : Cellular Mobile Subscribers

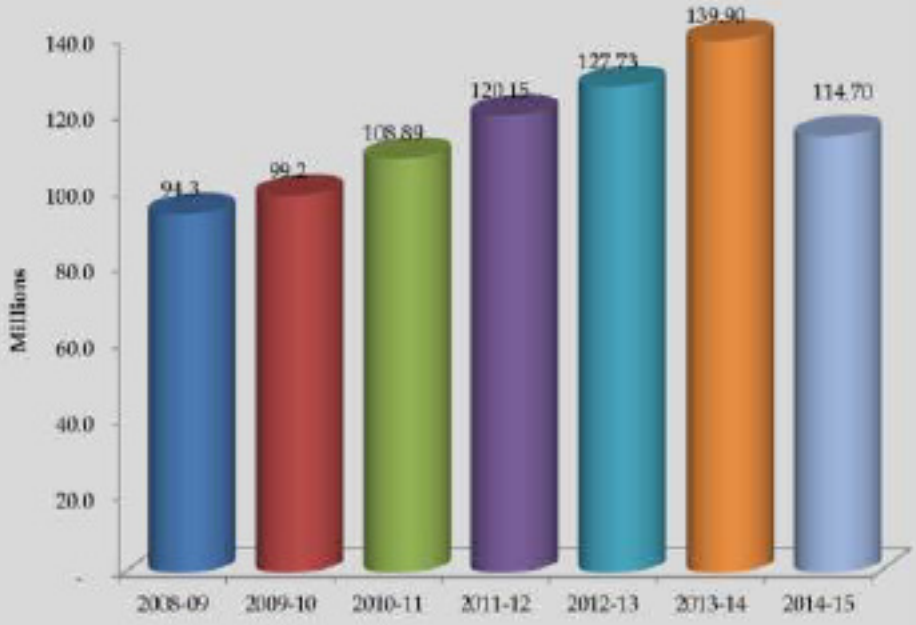
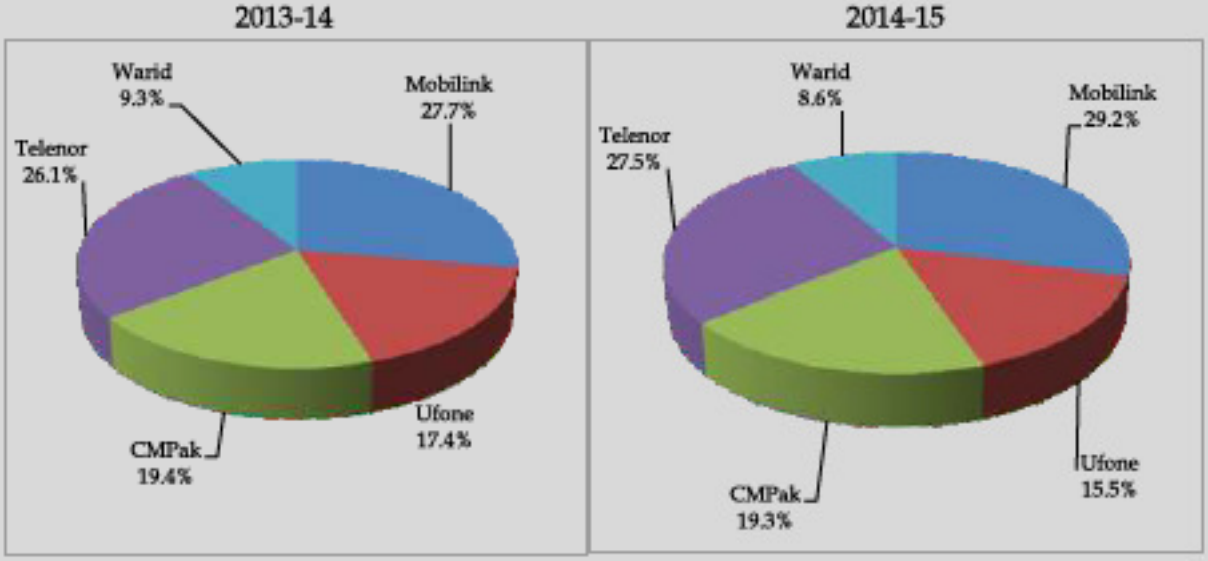


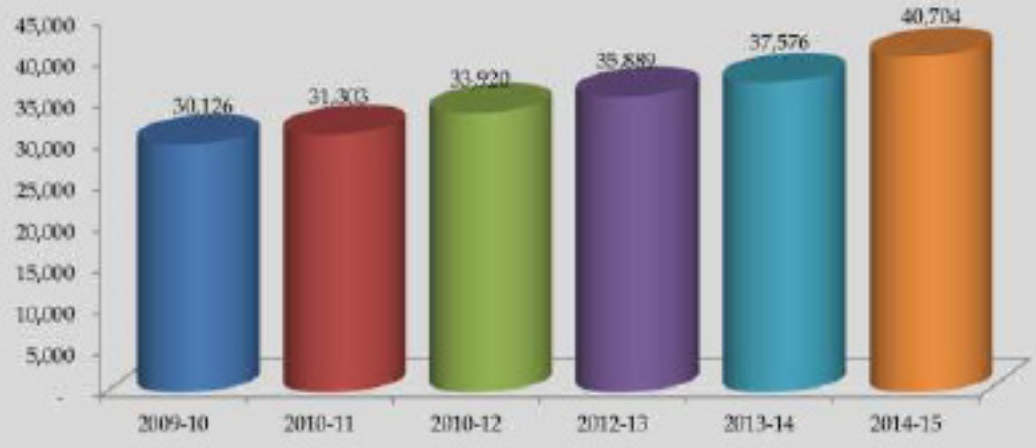
Figure 14 : Cellular Subscriber Share



Network Extension

Cellular mobile network covers more than 92 percent of the land area of Pakistan. The number of cell sites has been increasing at a steady pace over the last few years as operators realized that the quality of service and tapping the uncovered areas are the pre-requisites to win customer loyalty. The cellular companies are moving more and more towards tower sharing and exploring the option of sale and lease back, renting of towers. Therefore, the focus is more towards increasing efficiency rather than the number of towers. As shown in Figure 15, total cell sites of CMOs reached at 40,704 at the end of FY 2014-15 as compared to 37,576 last year (an increase of 8.3%). Cellular operators have been focusing on extending their reach after

Figure 15 : Cellular Mobile Cell Sites

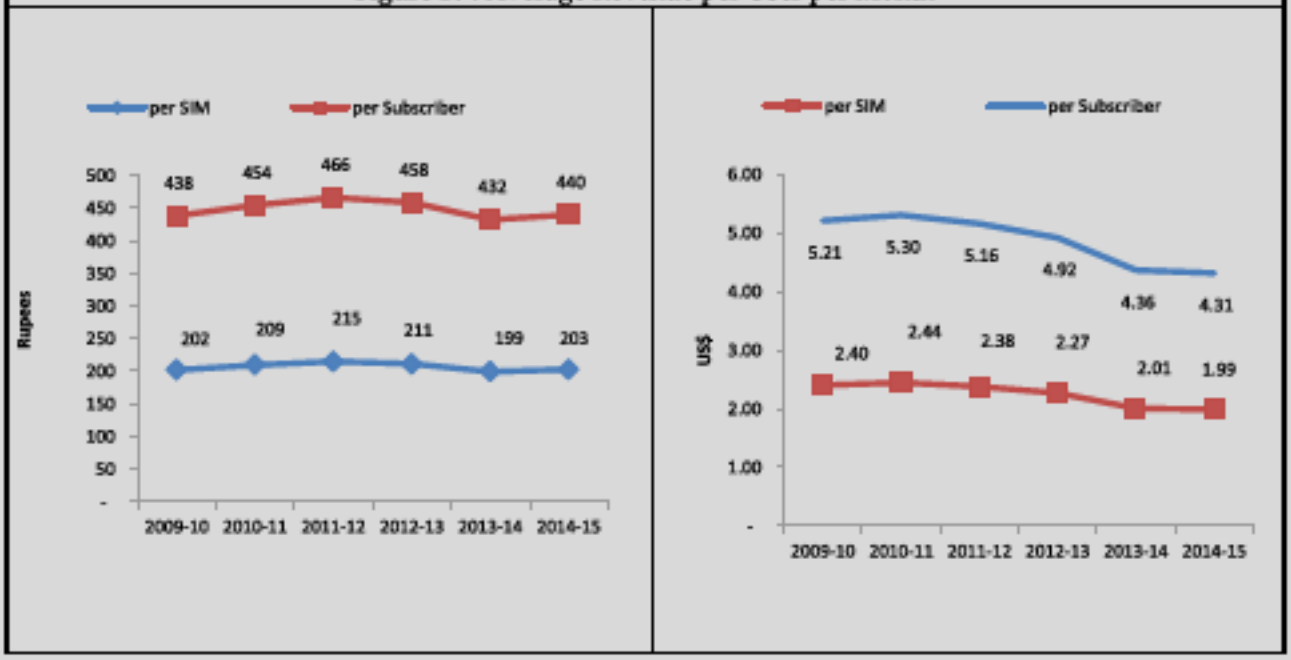


successful launch of 3G and 4G LTE services. Therefore, a notable increase in the cell sites figures is evident during the last year. At the end of FY 2014-15, Mobilink has considerable advantage over the rest of the operators as it now has 9,902 cell sites across Pakistan while its nearest competitor CMPak has 8,651 cell sites. Telenor is almost at par with Ufone with 8,321 and 8,318 towers respectively. Warid has the least number of subscribers and also the lowest number of towers i.e. 5512 by end June, 2015.

Average Revenue per User (ARPU) per month

ARPU is the average revenue being generated by cellular companies from a user on their network service in a given month. According to GSMA's market analysis[4], users of the cellular mobile service in Pakistan have on the average 2.17 SIMs. Based on this factor, ARPU of cellular mobile segment has increased to Rs. 440 during FY 2014-15 compared to Rs 432 last year. BVS campaign by PTA helped to clean subscribers' data in Pakistan which resulted in true representation of ARPU in Pakistan. The Average Revenue per SIM in Pakistan stands at Rs 203 for FY 2014-15. The SIM re-verification drive boosted the ARPU of cellular mobile industry which is a good sign for the telecom outlook of the country. The potential investors and the existing companies consider high ARPU a major attraction for investment in a telecom market. ARPU is expected to rise in the coming months as more subscribers are added into the 3G and 4G (LTE) services, generating more data revenue for operators. The rising share of data revenue in the overall operator revenue figures also points towards the fact that data will be the new cash cow for the cellular industry.

Figure 16 : Average Revenue per User per Month

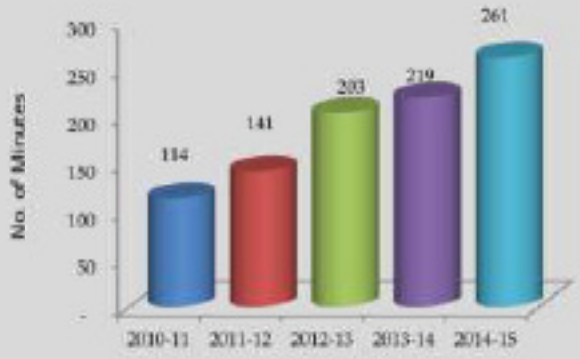


[4] GSMA's Report on 'Greening Telecoms: Pakistan and Afghanistan Market Analysis", October 2013

Traffic

Cellular mobile operators strive hard to win customers from each other by offering attractive packages of voice and SMS including free calls and unlimited SMS. After the success of mobile broadband, Over-the-top (OTT) services are becoming a major challenge for the operators to keep up with the traditional voice traffic and corresponding revenues. Availability of high speed data on mobile networks has enabled the smooth provision of voice services through OTT channels. However, there is still a vast area of population still to be covered by the 3G and 4G LTE signals. Therefore, there is large dependency on the GSM services, as the OTT services require a smart device and usage skills in addition to the high speed internet access. Moreover, attractive tariff packages customized to the need of different segments of the society and age group provide sufficient utility to telecom users in Pakistan to keep using cellular voice and SMS services. The average outgoing minutes used by subscribers per month has increased by 19.2% from 219 minutes in 2013-14 to 261 minutes in 2014-15.

Figure 17 : Average Outgoing Minutes /Subscriber/Month (National & International)



In terms of voice traffic, total outgoing national cellular traffic (to fixed and mobile networks) increased to 393.5 billion minutes during FY 2014-15 as compared to 345.7 billion minutes during the same period last year. There has been a significant rise in the cellular to cellular traffic as the operators continue to provide more minutes per rupee due to competition and threat of OTT services.

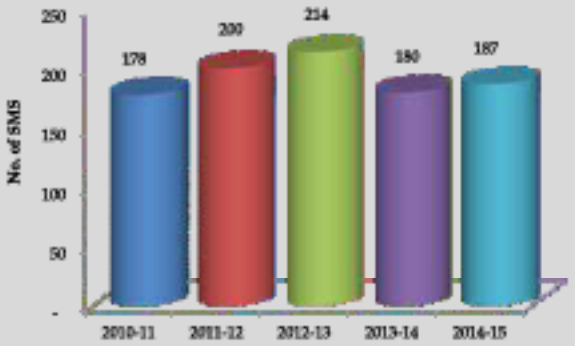
Figure 18 : National Cellular Mobile Outgoing Traffic

In terms of SMS statistics, total of 393 billion SMSes were exchanged during the FY 2014-15, as compared 301.7 billion during FY 2013-14 (30.3% increase). Accordingly, average SMS per subscriber per month during the FY 2014-15 also increased to 187 as compared to 180 in the previous year.

Cellular mobile services are the backbone of the telecom industry of Pakistan which underwent revolutionary changes during the last year. On one hand, the introduction of 3G and 4G LTE services provided a much needed boost to the cellular sector, creating new revenue opportunities for the operators. On other hand, the BVS re-verification drive immediately after the 3G and 4G launch downgraded the potential subscriber pool by millions. The operators not only had to exert time and manpower towards the BVS activity but also incurred huge expenses on the project. The BVS project has been concluded successfully. The cellular industry can capitalize on the immense potential in the data services. Informative marketing campaigns, well researched offers and packages, best quality network backed by affordable smart devices and useful application development will define the future of cellular mobile services in Pakistan.

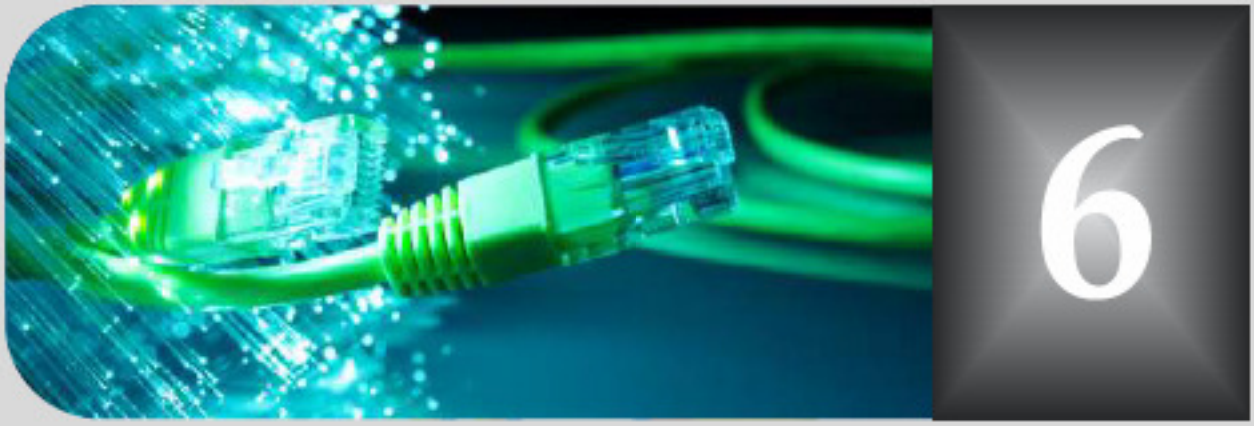
Figure 19 : Average SMS/Subscriber/Month

Figure 20 : SMS by Cellular Mobile Operators



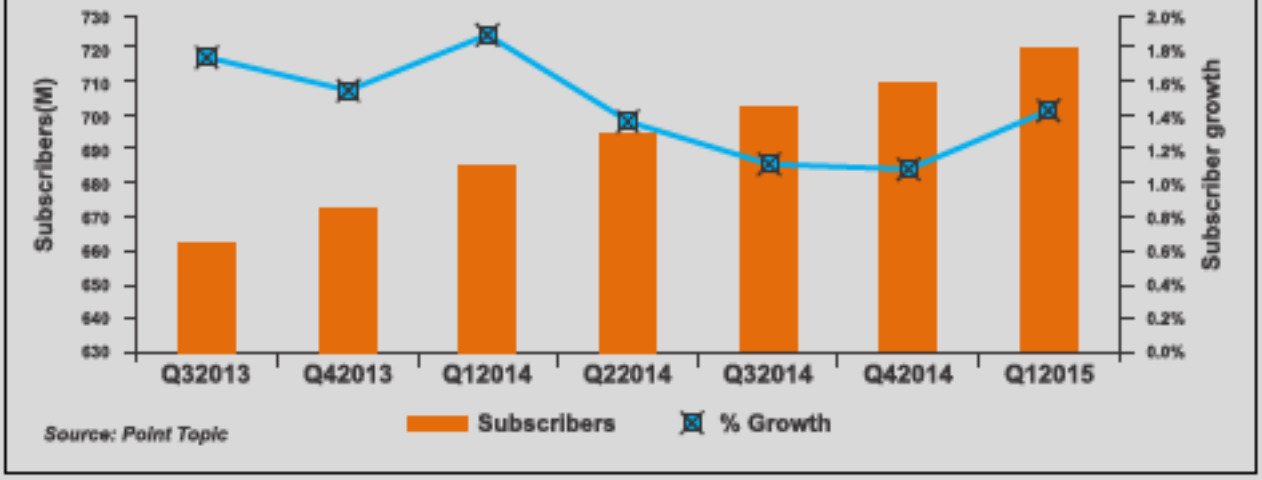
Chapter-6

Broadband



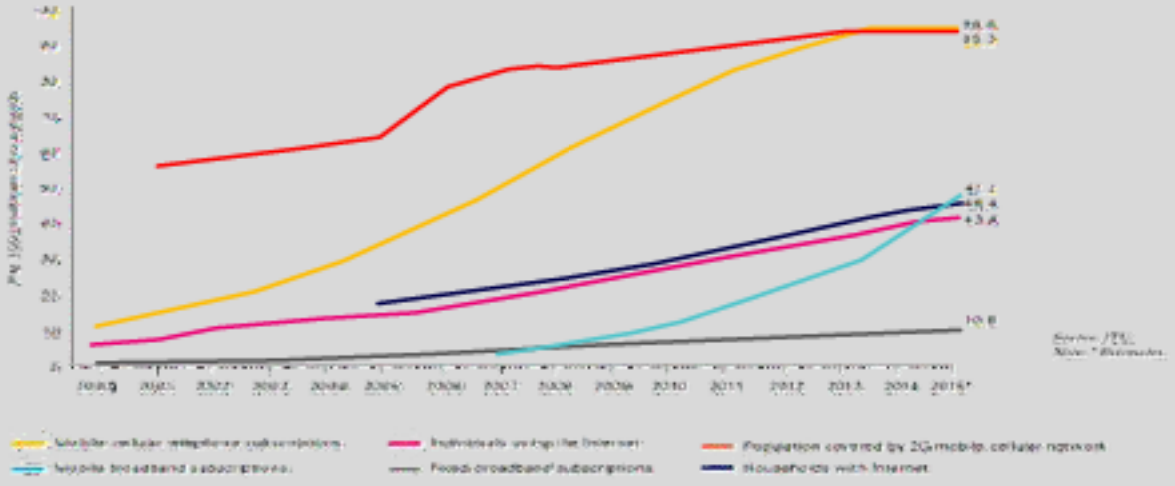
Broadband plays a pivotal role in the technological advancement of a country by enabling the delivery of high speed data services to the consumers. The rising trend of digitizing the products/services and creating a rich online experience is becoming the primary focus of the new age content providers. New kinds of data services and online portals are being developed by the service providers requiring more bandwidth, pushing the broadband technologies towards more innovation. For decades, broadband connectivity remained dependent on the fixed line solutions and limited to the geographical boundaries that were deemed profitable by the operators. A true revolution began with the introduction of wireless internet connectivity over the hand held devices, particularly, 3G, 4G/LTE (mobile broadband) in the last decade or so. Mobile broadband is the most dynamic market segment as global mobile broadband penetration reached 47% in 2015, a value that increased 12 times since 2007 (ITU).

Figure 21 : Global Broadband Trends



According to latest available statistics, World broadband subscribers have reached at 720 million at the end of March, 2015 as compared to 685 million at the end of corresponding period last year. Hence, 35 million new subscribers got broadband in the last year, translating into 5.1% growth during the last year.

Figure 22 : ITU World Telecommunication/ICT Snapshot



Broadband Evolution in Pakistan

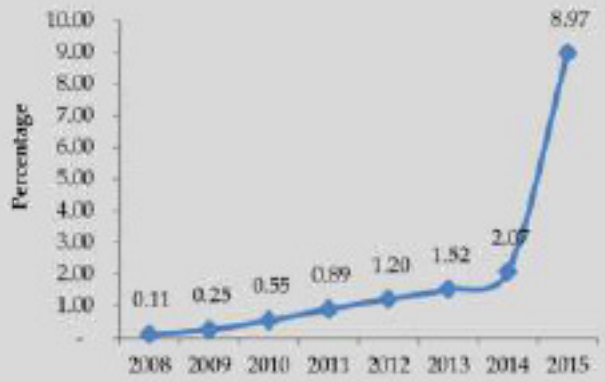
The basic email and internet services were introduced in Pakistan in the early 1990s but the broadband services were first introduced in 2001 by Micronet with Pakistan's first ever DSL service. Pakistan implemented Broadband Policy in 2004 with the optimistic targets for next five years. In 2006, NayaTel started offering FTTH services bringing fiber into the broadband sector. The next year, Wateen rolled out the first WiMAX broadband service in Pakistan. Internet users in Pakistan experienced 3G speeds of upto 3.1 Mbps with the launch of PTCL's EvDO service in 2009. Despite the introduction of new technologies such as WiMAX, EvDO, and FTTH etc, the broadband penetration remained on the lower side. Broadband services were mainly confined to the metropolitan cities. PTA kept on facilitating the broadband sector with technology-neutral licensing, easy barriers to entry, and formation of Broadband Stakeholders Group etc. The introduction of WiMAX and success of EvDO showed the glimpse of the potential of mobile broadband in Pakistan. At the same time, Pakistan made huge strides in the cellular mobile arena in terms of subscribers, coverage, mobile phone penetration, tariffs etc. The pool of almost 140 million subscribers could serve as the perfect enabler for broadband proliferation in Pakistan. PTA provided necessary spectrum for mobile broadband through NGMS spectrum auction. The introduction of broadband on cellular mobiles/handheld devices has changed the entire landscape of the broadband sector, in terms of statistics and adoption of internet in Pakistan. The rapid uptake of mobile broadband is a testimony of the fact that there exists a huge demand for internet connectivity on smart devices. According to a recent report published by Grappetite on the smart phone usage trends in Pakistan, smart phone adoption has reached around 8 to 10 percent of the population. As the demand for mobile broadband increases, the influx of smart phones will also increase and vice versa. If we add the ancillary effect of the

local content development, OTT popularity, decreasing cost of service/device etc, the future of broadband proliferation in Pakistan becomes much more optimistic.

Penetration

The enormous impact of mobile broadband can be seen in the broadband penetration trend given in the figure 23. Currently, broadband penetration of the country stands at 8.97% as compared to 2.07% at the end of corresponding period last year. The huge spike in total broadband penetration is due to the fact that the mobile broadband leads the way in the total broadband subscriber base. The current penetration of mobile broadband is 7.2% which shows that the mobile broadband will continue to form the major chunk of the broadband market in the future.

Figure 23 : Broadband Penetration



Subscriber Mix

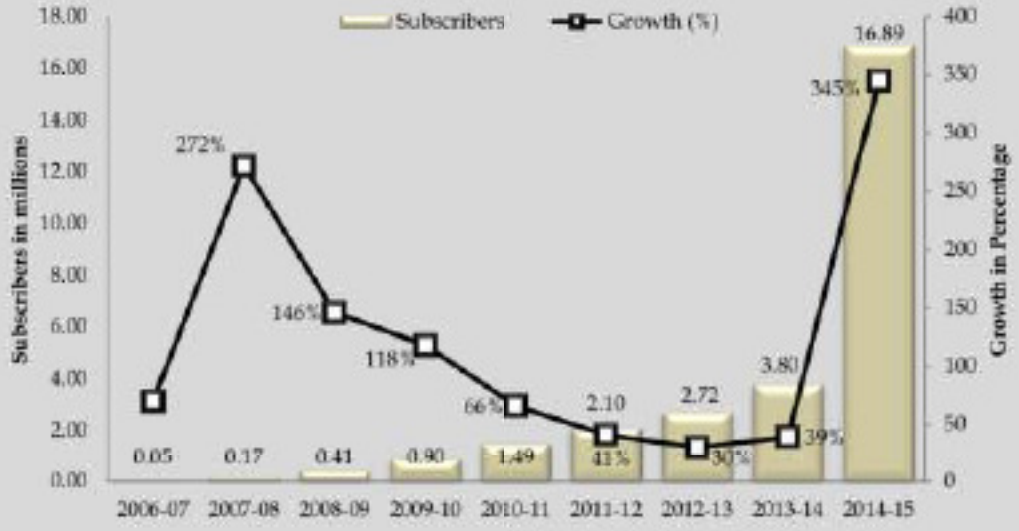
Broadband subscriber base soared exceptionally high during the FY 2014-15. At the end of FY 2014-15, broadband subscribers stood at 16.89 million as compared to 3.8 million at the end of last fiscal year depicting a staggering 345% growth over the last twelve months. The number of net subscriber additions in the FY 2014-15 stood at 13 million which is more than four times of the entire broadband subscriber base till June, 2014. Most of the net additions are due to mobile broadband subscribers which collectively form the figure of 13.5 million while the fixed broadband subscribers (DSL, HFC, FTTH, Others) have also added 160,618 subscribers during the period under review. On the other hand, wireless subscribers (WiMAX, EvDO) dropped by 569,700 during the FY 2014-15. This disparity in subscriber addition highlights the substitution effect of mobile broadband on the other wireless broadband technologies. In order to further provide impetus to the broadband sector, synergy of various elements is required. Therefore, external factors are also needed to be addressed which include affordability, computer literacy, religious and cultural views regarding objectionable content on internet and lack of local content.

Major Broadband Players

Broadband market has undergone some drastic changes since the introduction of mobile broadband. Telenor is the leader in terms of broadband subscribers followed by Mobilink and

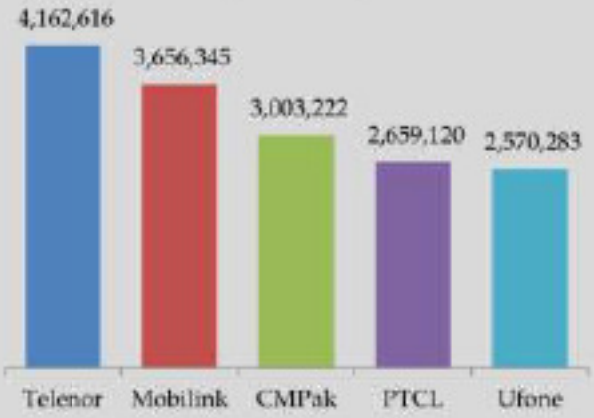
CMPak. Historically, broadband sector of Pakistan remained to be the sole domain of PTCL, both in the fixed and wireless segments. Even after promising starts by new broadband operators such as Wateen, Wi-Tribe, Qubee etc, PTCL still had 80% of the total broadband subscribers as on June, 2014 due to its presence across the country. However, things have changed drastically during the FY 2014-15 with the entry of mobile broadband operators into the broadband arena. PTCL is not the leader in broadband market anymore rather the incumbent has slid down to the fourth spot.

Figure 24 : Broadband Subscribers



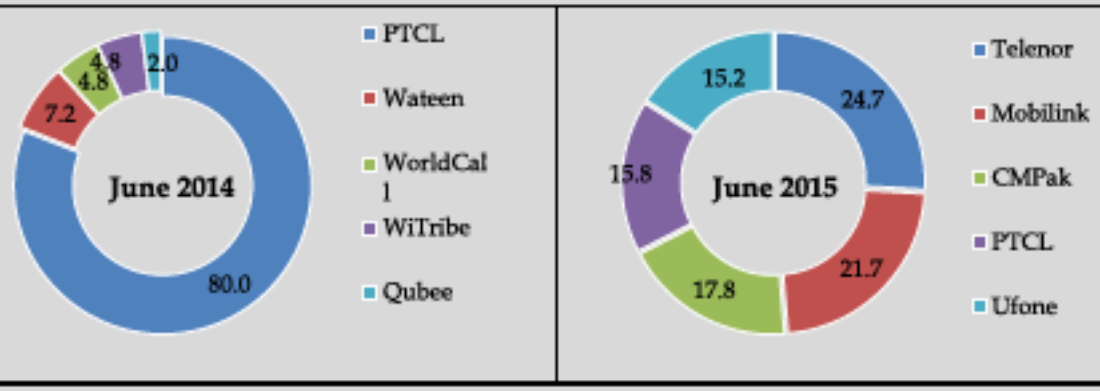
Broadband subscriber share presents a clear view of the change in the segment dynamics over the last year. What looked like a virtual monopoly of one operator last year, broadband segment now looks competitive. Telenor (24.7%) leads the market followed by Mobilink (21.7%), CMPak (17.8%), PTCL (15.8%) and Ufone (15.2%) at the end of June, 2015. The competition in broadband market is expected to intensify as mobile broadband operators continue to expand the coverage across Pakistan. Consumers will be the ultimate beneficiary of the heavy

Figure 25 : Broadband Subscribers – Top Five Operators (June 2015)



competition in the form of tariff reduction, availability of abundant broadband platforms and improved quality of service.

Figure 26 : Broadband Operators - Market Share (Top Five)

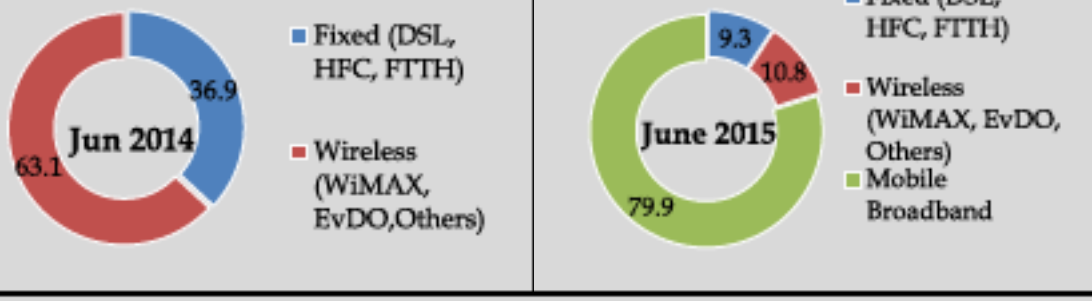


Broadband Technology Trend

Broadband technologies in Pakistan are an amalgamation of the fixed and wireless networks being deployed by different operators. PTA's technology-neutral licensing has been the key factor behind the introduction of latest technologies such as 3G/4G, WiMAX and EvDO running parallel to the primitive fixed line technologies like HFC, FTTH and DSL. Mobile broadband has been highly influential in giving a new shape to the market structure and emerged as no match for the existing technologies.

Figure 27 shows overall subscriber-wise technology share of the major broadband technologies in Pakistan. Mobile broadband had a 79.9% share in the technology market at the end of June, 2015 while wireless and fixed technologies share stood at 10.8% and 9.3% respectively. Mobile broadband has completely taken over the market which was primarily the domain of EvDO, WiMAX and DSL until June, 2014. Currently, mobile broadband has a total of 13.5 million subscribers, 1.5 million DSL, 1.3 million EvDO and 0.49 million WiMAX subscribers among the major broadband technologies by subscribers.

Figure 27 : Broadband Technology Trend (by Subscribers)



Mobile Broadband Data Usage

The advent of mobile broadband services is often characterized by the change in data usage trends by the subscribers. The consumption of the data on mobile broadband networks is an indication of the massive popularity of on-the-go broadband solutions. The mass acceptability of data services is also an encouraging sign for the operators as they can now capitalize on a new revenue stream and improve return on their investments.

Figure 28 : Mobile Broadband Data Usage

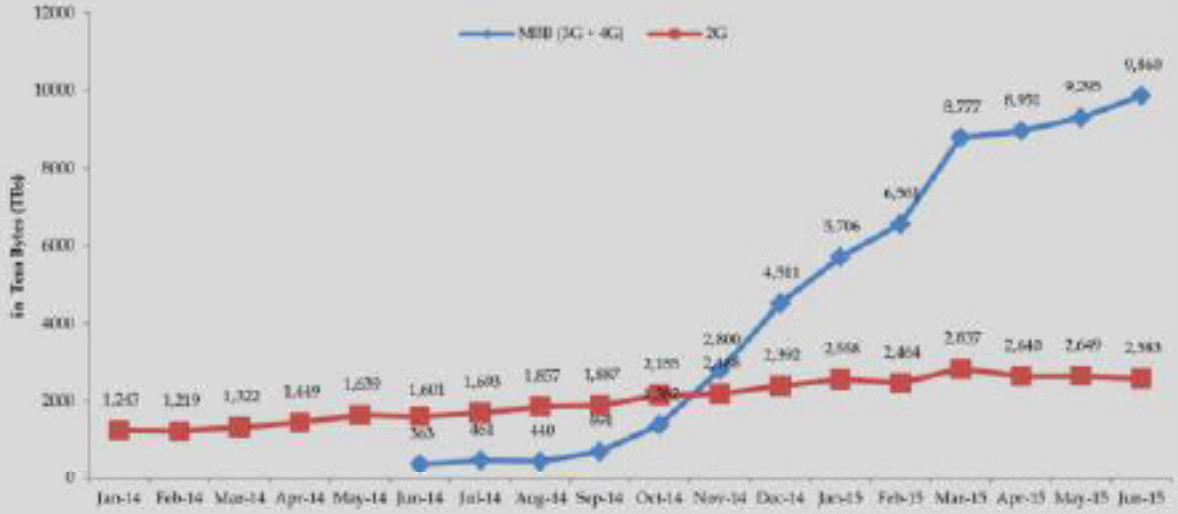
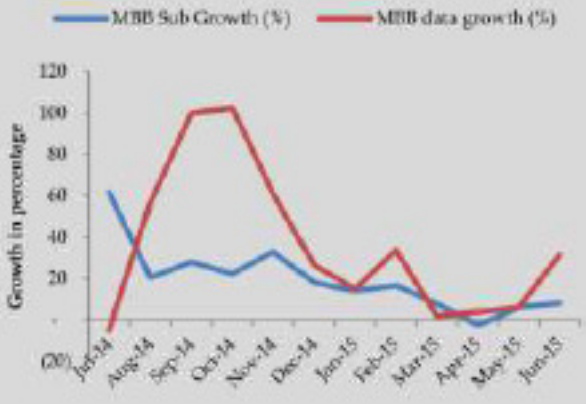


Figure 28 shows month-wise mobile data usage over 2G and mobile broadband networks before and after the commercial launch of 3G/4G services. It is evident that the data usage over the mobile broadband networks has increased by manifolds during the last fiscal year. For example, data consumed over mobile broadband networks in June, 2015 (9,860 TBs[5]) is six times more than the data usage in June, 2014. The trend of mobile broadband (including 3G and 4G) clearly shows that mobile broadband data usage is rising substantially with every passing month. Mobile Broadband subscribers account for just 7.2% of the overall cellular subscriber base, yet their data usage now surpasses the total data usage by 2G

Figure 29 : Mobile Broadband Subscribers Vs Data Growth



[5] 1 TB = 1,000,000,000,000 bytes = 10^{12} bytes = 1000 Gigabytes

subscribers every month. This fact shows the potential of mobile broadband services to open new avenues of data-centric growth and economic activity. With expanding 3G/4G coverage, the number of subscriptions will also grow leading to more data usage in the future. Figure 29 shows that the growth of mobile broadband subscribers is synonymous with the data usage in the recent months. At the start of mobile broadband services, data usage was considerably higher than the subscriber growth due to lower customer awareness about data usage and free trial periods offered by operators. But for the last six months, the subscriptions and data growth are running in parallel. This shows that in order to generate more revenue from data services, operators must expand their coverage to raise the mobile broadband subscriptions. If allied factors such as internet awareness, smart phone influx, local content development etc are dealt with by relevant stakeholders, data will become the new cash cow for cellular mobile operators.

Broadband Tariff Analysis[6]

Broadband sector of Pakistan is now a highly competitive market. Operators are running extensive marketing campaigns on print and electronic media regarding their data packages with the expectation of attracting maximum number of customers. Almost every mobile operator has given special attention to the social media services such as Facebook, Whatsapp, and Twitter etc. On the other hand, fixed and wireless broadband operators are banking on promotions and incentives to compete with the mobile broadband operators. The influx of low-cost smart phones coupled with the presence of endless social platforms is driving the subscribers towards more and more demand for bandwidth. Each operator came up with their own marketing and pricing strategy to become the early leader in mobile broadband arena.

Mobile broadband operators are offering wide range of internet packages, segregated on speed and volume basis. Zong is the only operator in Pakistan which acquired one block of 10 MHz each in both 3G and 4G spectrum. Therefore, the company has excellent technological space to offer best possible combination of speed, volume and tariff. Zong has announced 13 different mobile internet packages in daily, weekly and monthly buckets at prices ranging from just Rs. 4 per day for 4MB up to Rs. 3,500 per month (equal to Rs. 117/day) for 30GB. Mobilink also won a block of 10 MHz in 3G spectrum. Mobilink has announced 10 different service/tariff bundles categorized as daily, weekly and monthly packages starting from just Rs. 8 per day for 1 GB up to Rs. 1,195 per month for 12,000 MB with no speed limit. Telenor won a block of 5 MHz in 3G spectrum and holds first spot in the overall mobile broadband subscriber share. Telenor is offering an array of different packages in daily, weekly and monthly offers ranging from Rs. 9.56 per day for 1GB up to Rs. 1,195 for 10GB. Ufone acquired a block of 5 MHz and became the first operator to commercially launch 3G services in Pakistan. Ufone has 10 different daily, weekly and monthly packages and tariffs start from Rs. 10 per day for 40 MB and goes up to Rs. 1,000 per month for 10GB. The default tariff is Rs. 20 for the first MB and the user will get next

[6] Source of this section is the official websites of the operators. Tariffs and offers may vary from time to time.

19 MBs free, then will get charged for the 21st MB and will get the next 19 MBs free and so on. Warid also launched commercial LTE services in Pakistan on 26th December 2014. Warid is currently offering 9 different hourly, daily, weekly and monthly packages ranging from Rs. 10 per 4 hours/100 MB volume of data to Rs. 800 for 8GB volume of data. On the other hand, PTCL has also rolled out a lot of offers and different packages targeting existing and potential customers for fixed and wireless broadband services. PTCL announced huge price cuts of DSL services with the price of basic 1 Mbps package set at Rs 599/month. Similarly, PTCL has recently revised its packages and respective charges for its EvDO (Evo, Nitro and Chaarji) services, giving more bandwidth at lesser prices.

Chapter-7

Basic Services

7

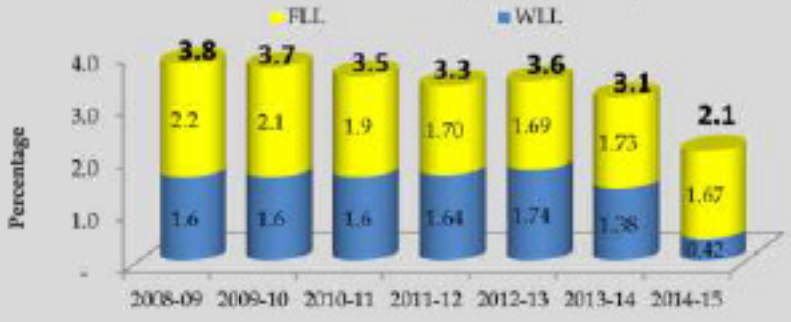
Basic Services are an important constituent of the telecommunication sector of Pakistan. It includes the Fixed Local Loop (FLL), Wireless Local Loop (WLL) and Long Distance & International (LDI) services. These services have been the main medium of communications before the rise of cellular mobile and internet services in Pakistan. PTCL had monopoly over the basic services since the independence of Pakistan. However, Government of Pakistan deregulated the Local Loop and LDI segments and also brought meaningful competition in the cellular mobile market and abolished the monopoly of PTCL in 2004. Over the course of time, cellular mobile services experienced substantial growth while the Local loop business could not flourish due to lack of coverage, expensive roll out and no mobility facility. The drop in the Local Loop figures continued with PTCL announcing the closure of its WLL services in the major cities of Pakistan, resulting in a huge drop in WLL figures, which also affected the overall local loop teledensity. Long Distance & International traffic improved significantly after two years of decline. The abolishment of ICH regime by the Government of Pakistan in 2014 and deregulation of International Telephony by PTA has revived the international telephony segment as PTA continues to work closely with the licensees on industry matters.

Local Loop

Teledensity

Teledensity of fixed Line (FLL and WLL) services stood at 2.1% as of June, 2015 as compared to 3.1% a year earlier. Teledensity of FLL sector has dropped to 1.67% as compared to 1.73% a year ago. On the other hand, WLL teledensity has

Figure 30 : Local Loop Teledensity



Note: Figure for FY 2014-15 is provisional. Figures for FY 2013-14 have been revised

dropped down to 0.42% at the end of FY 2014-15 due to decline in subscriptions of almost all the WLL operators. However, the biggest impact on WLL teledensity drop is due to the phase-wise closure of PTCL's Vfone services in major cities of the country. The incumbent is now focussing on the expansion of its EvDO services by optimizing the existing spectrum resources.

Subscribers

The subscriber base of local loop segment has reached 3.9 million at the end of June, 2015 as compared to 5.7 million as of June, 2014. The overall subscriber base has decreased by 31% with 1.77 million connections churned off during the last fiscal year. FLL subscriber base has been relatively steady as 3.14 million subscribers (June, 2015) are reported as compared to 3.17 million (June 2014). However, the WLL subscriber base dropped by 1.74 million during the last fiscal year and now stands at 0.8 million as compared to 2.54 million a year earlier. The closure of huge number of WLL connections indicates that cellular mobile services are preferred choice of consumers for voice and data connectivity.

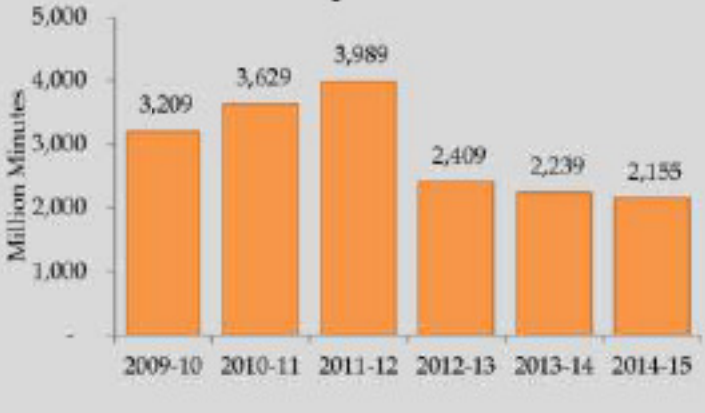
Figure 31 : Local Loop Subscribers

Note: Figure for FY 2014-15 is provisional. Figures for FY 2013-14 have been revised

Long Distance and International (LDI) Services

LDI operators have an important role in the overall telecommunication landscape of Pakistan. The right to bring and deliver the international traffic to and from Pakistan has been given to LDI operators. However, some mischievous elements bypass the designated legal gateways in order to evade Government dues (called as Access Promotion Contribution) and other taxes and regulatory

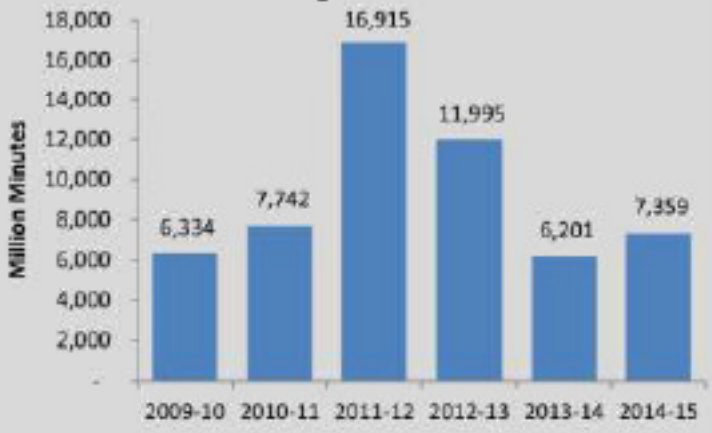
Figure 32 : International Outgoing Minutes by LDI Operators



fees, thus causing substantial loss to the National exchequer. The efforts of the Government of Pakistan to channelize the international traffic through one operator under the International Clearing House (ICH) regime could not achieve the desired results. Hence, the market was opened to full competition as ICH Policy Directive was revoked on 17th June, 2014 APC charges were reduced to zero. Thereafter, PTA also deregulated the Approved Settlement Rates (ASR). Now the segment dynamics are driven by market forces and the international traffic patterns are improving with every passing month.

The total international traffic (incoming + outgoing) stood at 9,514 million minutes during the FY 2014-15 as compared to 8,440 million minutes during the FY 2013-14. The growth of 12.7% during the FY 2014-15 is an encouraging sign for the LDI segment where the traffic was declining for the previous two years. Breakdown of traffic shows that international incoming minutes registered significant annual increase of 18.6%, with a total volume of 7,359 million minutes during FY 2014-15. The increase in international incoming traffic is expected to improve substantially in the next year with the re-introduction of competition in LDI segment that will further reduce international call rates to Pakistan. On the other hand, total international outgoing traffic minutes dropped by 3.7% during the FY 2014-15. The total international outgoing traffic minutes were reported to be 2,155 million during the FY 2014-15 as compared to 2,239 million in the previous year. The declining trend in the international outgoing minutes can be attributed to the rising trend in using Over-the-top (OTT) services for international calls such as Skype, Whatsapp, Viber, Facetime, Line etc.

Figure 33 : International Incoming Minutes by LDI Operators



Chapter-8

Changing Ways of Communications

In the fast-changing world of telecom and IT technologies, the face of communications has changed drastically. Voice services are no more the mainstay of telecom business, and operators are fast moving towards the provision of data /internet and innovative ICT services. Telecom operators in Pakistan have also quickly adapted to these changes, and are now offering extensive range of data and value added services including financial services, education, health, social and government services. In order to meet the challenges of everyday changing method of communications, telecom operators need to work smart and invest in advanced technologies.

Internet Usage and Trends

Internet has been at the heart of the digital revolution, gaining substantial growth in terms of access, usage and utility in the economic and social development of the world. Internet connectivity has become the integral part of resource utilization, information and service delivery, entertainment and business models across the world. The remarkable growth in global internet adoption has been well depicted by ITU's comparison of internet users during the past decades. From a mere 400 million internet user base in 2000, the global internet users have jumped to 3.2 billion in 2015. Moreover, the global proportion of households with Internet access at home increased from 18% in 2005 to 42% in 2015. However, there is still a big gap between the internet connectivity of nations, as 4 billion people in the developing countries still remain offline. In terms of geographical distribution, North America and West Europe have the highest internet penetration levels (88% and 81% respectively), while the African and South Asian countries are lagging far behind i.e. only 19% internet penetration in South Asia, even lesser than 26% of Africa[7].

Internet Trends 2000-2015	Global Internet Penetration
	

Source: We are social.sg (Jan 2015)

[7] Source: Wearesocial.sg (Jan 2015)

Internet Trends in Pakistan

Just like the rest of the South Asia, internet in Pakistan is yet to reach high penetration levels. Concerted efforts have been made by the Government, regulator and operators to promote the internet adoption in Pakistan. In the past decade, Usage of internet in the country has been gaining momentum in terms of access, subscriptions and roll out of content and services. Introduction of high speed internet and the recent introduction of mobile broadband (3G and 4G LTE) have put the internet influx into the urban and rural areas on the fast track. However, some major technical and social challenges need to be addressed by the stakeholders. These include infrastructure development, fresh Policy guidelines, rationalizing the cost of service, availability of local content, provision of more spectrum, refinement in quality of service and the socio-cultural barriers (language, objectionable content, literacy rate, income levels) to internet adoption. Moreover, the rapid increase in mobile broadband subscriptions (13.5 million as of June, 2015) has magnified the demand of high speed internet in Pakistan and the trend is expected to gain further momentum as more and more services and content are delivered online by the local developers/business entities. Looking at the internet usage trends in Pakistan, the use of social media platforms and search engines are the favorite activities of internet users. Facebook is the most popular social platform/website which handles more than 3 billion connections per day. Google is the second most accessed website in the country with over 2.5 billion connections per day. Twitter and Instagram are also among the toppers in the list of most online hits per day. The blocking of YouTube means that dailymotion.com and tune.pk are the most accessed video portals from Pakistan. Moreover, online business is also flourishing with more and more e-commerce websites/portals being rolled out directly in competition with the international giants like Amazon.com, ebay.com etc.

Another big factor in the fast adoption of internet is the exponential use of Over the Top (OTT) services such as Skype, WhatsApp, Viber, Tango, Facetime, Facebook etc. The traditional means of voice communication are in tough competition with the OTT services. Skype is one of the most popular OTT services in Pakistan in terms of connections per day. Skype is highly successful because it delivers free voice and live video of the session participants from anywhere in the world. Therefore, the relatives/friends living abroad prefer to use Skype in order to communicate with their families in Pakistan.

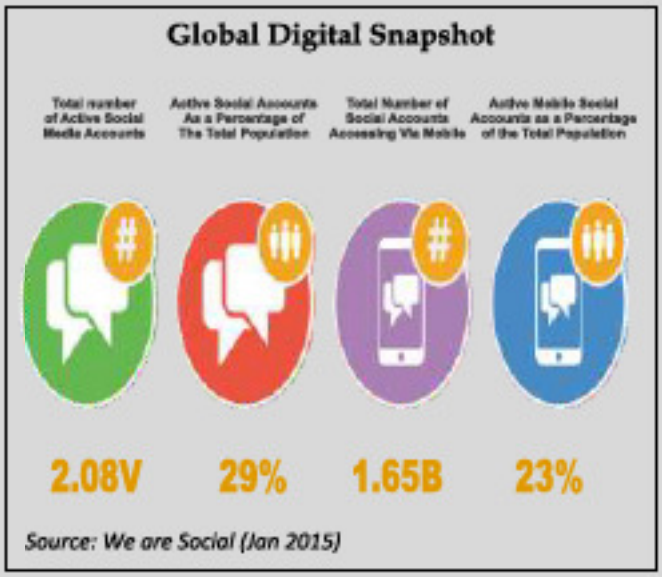
Internet Usage Trends
(Ranking by Connections per day)

Source: PTA

The Government of Pakistan and PTA have been highly active in promotion and facilitation of the internet in Pakistan. The Government of Pakistan has emphasized on the provision of high speed internet access to citizens in the Telecom Policy 2015. There are specific provisions in the Policy document for the establishment of local peering and Internet Exchange Points as well as provision of broadband internet services to the unserved and underserved community at large through Universal Service Fund (USF). PTA has already facilitated the internet access by providing necessary spectrum for mobile broadband (3G and 4G LTE) services, and is continuously working to meet any additional spectrum requirements to facilitate industry growth; for example, PTA is currently in the process to award WLL spectrum in AJK and GB for the proliferation of next generation wireless data services in the region. Moreover, PTA is working with the local manufacturers, developers and service providers to create a more enabling environment for internet proliferation in the country.

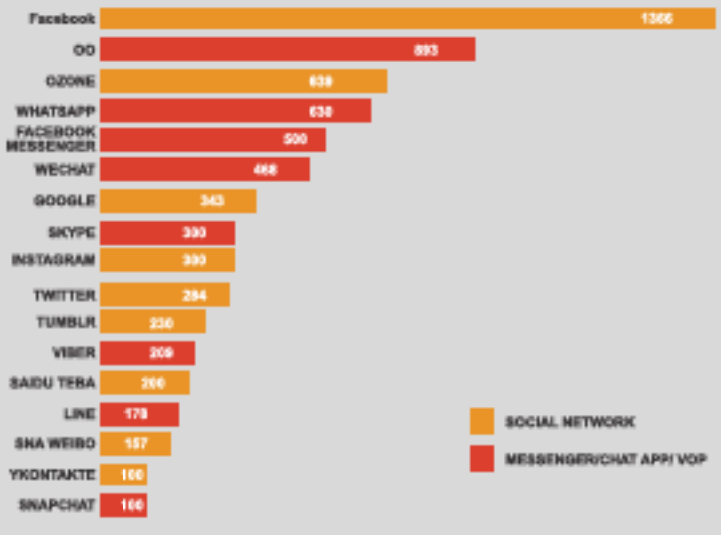
Social Media Trends

The widespread adoption and impact of the social media on the everyday lives of billions of people around the world is as evident as the rise of the personal computer, mobile phones and the Internet in the past few decades. People interact, communicate, run business, social and share their lives on the socialize media. Platforms like Facebook, Twitter, and Instagram etc are part of the core outreach programs of the Governments, the politicians, the companies, entertainment industries, online businesses etc. According to the statistics by wearesocial.sg, there are more than 2.1 billion active social media accounts in the world i.e. 29% of the entire world population. Out of the 2.1 billion active social media accounts, 1.685 billion are the active mobile social accounts. The major brands of the world take the pulse of market through the social media barometers and also consider feedback directly from the customers via social media channels.



Among popular social media platforms, Facebook is way ahead with more than 1.3 billion active monthly user accounts, the largest virtual nation of the world. It has close to 1 billion daily active users. QQ is the second largest social media application with 829 million active user accounts. It is a chat messenger with major user base consisting of the Chinese population. Qzone and Whatsapp are the next two largest social platforms with 629 and 600 million active user accounts. Figure 34 depicts the ranking of the world's popular social media sites/chat apps by active user base.[8]

Figure 34 : Active Users by Social Platform

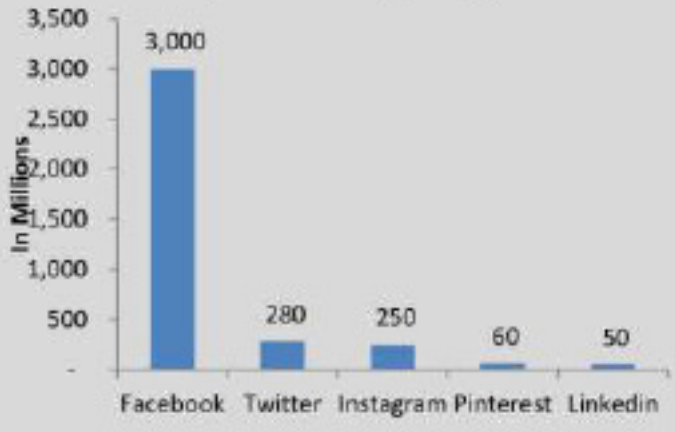


Social Media Trends in Pakistan

Social media has been gaining vast popularity among the masses in Pakistan mainly due to Facebook, Twitter, Skype, Instagram etc. The introduction of mobile broadband coupled with the influx of affordable Smartphones had a catalytic effect on the use of social media in Pakistan. People turn towards social media to voice their opinions, experiences, suggestions and feedback on any topic or constituent of the society. Among the most popular social platforms, Facebook leads the way with more than 3 billion connections per day. It is by far the most popular social media platform in Pakistan as more than 17.2 million user accounts are estimated to be from Pakistan. Twitter is also fast becoming the preferred social media portal with more than 280 million connections per day.[9]

Social media is not just a communication platform but it has become a symbol of online presence for companies and individuals alike. It has become a must for every business, celebrity, institute, media outlet, general public and even the Government to create and operate

Figure 35 : Social Media Trends (Connections per day)



Source: PTA

[8] Wearesocial.sg
[9] PTA, Facebook Ad

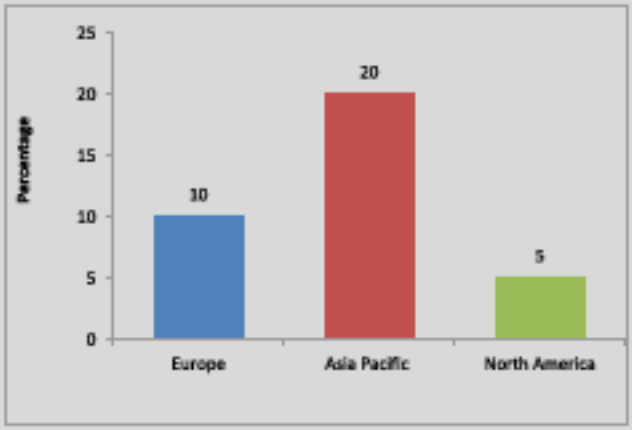
accounts on popular social media sites/apps. Public engagement and open interaction with the masses is the new trend in the Government circles around the world. The Federal and state Governments, various regulatory authorities, military public relations, civil governments, and political parties make use of the Twitter and Facebook to make announcements, deliver messages and get first hand public feedback. Pakistan has also been actively engaged in using social media such as Pakistan Army's official twitter updates, political parties' campaigns through social media, Punjab Food Authority (PFA)'s posts about inspections at various food outlets, DCO Rawalpindi's regular updates about governance matters of the city, etc. The use of social media in Pakistan has some inherent barriers and challenges to face that require collaborative efforts from all the stakeholders. Low internet penetration, lack of local content and language barriers are some of the general problems that also affect the social media adoption in Pakistan. On top of all, it is becoming a constant nuisance for the Government to deal with the rising complaints of managing content, controlling illegal access, keeping up with the new trends and deal with the social, cultural and religious apprehensions on the social media.

Mobile Applications

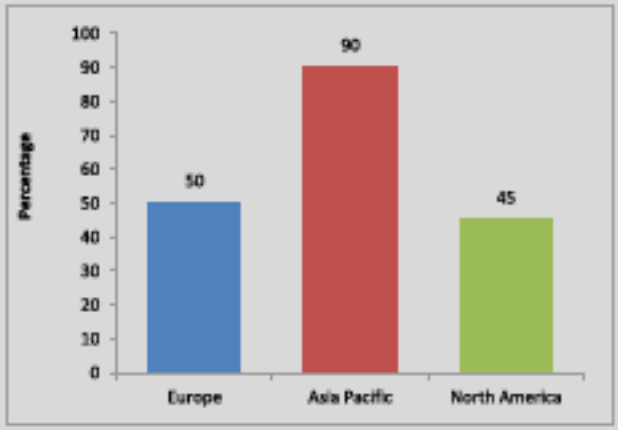
The unprecedented success of the mobile phones has been instrumental in creating new dimensions in the ICT development as well. The recent GSMA facts reveal that there are 7.5 billion cellular mobile connections, more than the entire population of the world. From the mobile application development context, 47 out of 100 cellular mobile connections have broadband internet enabled on their phones. These simple facts depict the potential and impact of the mobile phones and associated mobile application development in our everyday life. According to statista.com, the number of mobile app downloads worldwide are expected to reach 268.7 billion by 2017. There are more than 1,600,000 apps available in Android's Google Play Store while Apple's AppStore has 340,000 apps with the overall mobile app revenue has estimated to be US$ 34.9 billion. If we take a look at the Asia-Pacific region, GSMA reveals that this region has the highest growth in app downloads and revenue while 92% of the handset models released in 2014 came from Asia-based vendors[10]. Hence, the Asia Pacific region has a pivotal role in the mobile application development. Pakistan can also play its part, and benefit from app development.

[10] GSMA Intelligence

Figure 36 : Growth in App Downloads and Revenues



Combined iOS and Google Play App downloads (2013-14)
Source: GSMA



Combined iOS and Google Play App revenue (2013-14)

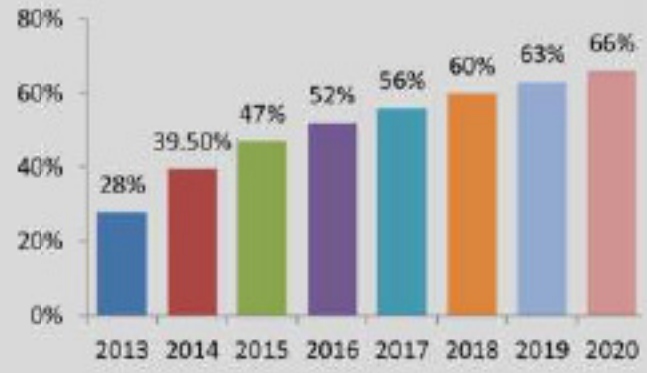
In Pakistan, a surge in the mobile application development is expected after the availability of mobile broadband last year. The operators and developers are joining hands to bring localized content to the general public while the major websites are also deploying the app version of their services to capitalize on the benefits of mobile broadband. The general trend in the country is to download a free application which is understandable as buying an application online usually requires a credit card account. According to Grappetite - a mobile application firm, 16% of Pakistan's Smartphone users buy paid apps while remaining 84% download free apps. Although at its nascent stage, Pakistan has also started developing apps and some of them have also received international recognition recently. At the Internet Governance Forum held on 10-13 November, 2015 in João Pessoa, Brazil, four awards were given by the Information Society Innovation Fund (ISIF) Asia to the creative apps, out of which two awards were won by young Pakistani developers. In the innovation and access provision category, 'DocHERS' developed by Ms. Sara Saeed, won the award which aims to connect a home-based doctor online with the patients by upgrading the existing clinics with specialized software. In the Innovation on learning and localization category, Jaroka Mobile-Based tele-healthcare developed by Ms. Shamaila Keyani, won the award which provides affordable, accessible and quality healthcare to far flung and disaster heat communities in Pakistan using mobile based technologies. Google picked up 'Groopic', a Smartphone application developed by Eyedeus labs in Pakistan. Moreover, two mobile apps from Pakistan (Chutti.pk, Place SMS) won the mBillionth Award 2015 in India and one app (e-novatRx) earned Special Mention. Chutti.pk provides useful travel information to the Muslim travelers coming from Pakistan. Place SMS is a mobile app that informs about the location of the user by sending an automated location triggered SMS to the recipients. e-novatRx provides access to the e-medical records, quality medicines, and e-prescriptions to low-income workers affiliated with corporate value chains in Pakistan.

Cellular mobile operators are also using ingenious methods to attract customers by making their own mobile app portals. One such example is 'Telenor Apps' where a user can download any application upon payment, which can be directly deducted from user's balance rather than

the requirement of a credit card. Similarly, Telenor holds an annual application development contest titled 'Apportunity' to promote the local content and application development in Pakistan. All of the cellular mobile operators have developed customer facilitation applications as well.

The provision of mobile broadband to the general public must be coupled with enough demand for services, applications, incentives and affordable pricing in order to raise the ICT penetration levels of the country. The mobile application development in Pakistan will be among the key factors that define the future ICT landscape of the country. PTA has also put efforts to encourage mobile application development in Pakistan. In April, 2015, PTA held a competition for upcoming mobile application titled 'Pakistan Mobile App Awards', to foster innovative ideas and interest in the students and prospective developers. Furthermore, PTA has launched a web portal named "Smart-Pakistan" (www.smartpakistan.pk) that provides one stop repository and directory of mobile applications focusing on different thematic areas such as m-Commerce, m-Education, m-Health, m-Agriculture m-Government, etc. Moreover, PTA has also set up a 'Smart Pakistan m-Lab' at its headquarters to provide mentoring and coaching services for young mobile applications developers and entrepreneurs.

Figure 37: Smartphone penetration in Asia Pacific Region (%)



Source: GSMA

Smartphone Penetration and Adoption

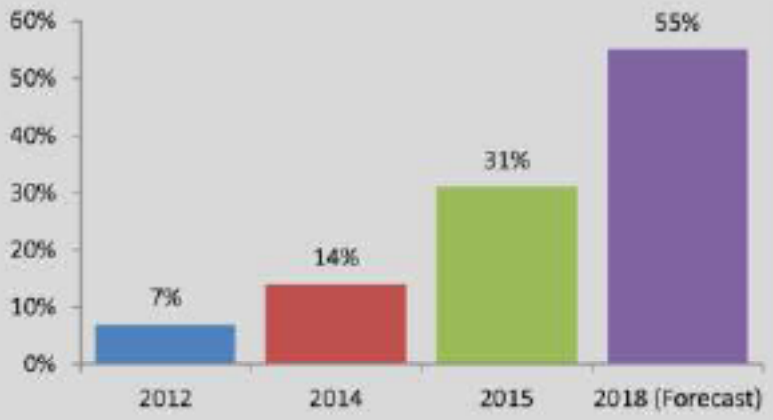
Smartphone has become a major source for innovation and new age of enhanced mobile phone use in personal life. With the introduction of larger screen-sizes, consumers are finding smartphones a convenient way to complete many activities what they used to do manually or through desktops. Therefore, larger screen phones are an accelerator for increasing adoption of smartphone. Companies are developing their mobile websites, which will further enhance consumer experience on smartphones. Greater functionality, rich features and enhanced interfaces make the consumer experience on smart phones much more attractive than the features available on a desktop.

The share of internet activities through smart phones will grow in the near future. Smart phones are more convenient to use and the younger generation has quickly adapted to the use of smartphones. The fall in smartphone prices and mobile data cost has also increased the

adoption of smartphones in developing countries. According to GSMA Intelligence data forecast, global smartphone adoption is expected to increase massively in the coming years, particularly in developing markets: smartphone penetration in Asia-Pacific region has reached around 40% in 2014, and forecast is that this will rise to 65% by 2020. Similarly, worldwide smartphone penetration was 50%, which is expected to increase to over 73% by 2020.

Availability of next generation mobile services after the auction of 3G and 4G spectrum in Pakistan in April 2014 has rapidly increased the adoption of smartphone in the society. In Q1 2015, 123% increase in smart phone shipment to Pakistan was recorded, which is one of the fastest growth in the Middle East and Africa region (IDC Report, 2015). Currently, 30% of the cellular mobile devices imported in Pakistan are smartphones, which were only 7% in 2012. In the next two years, smartphones are expected to cross 55% of mobile phone imports. Smart phone adoption in Pakistan is expected to grow due to expanding 3G and 4G networks (currently 3G services are available in more than 200 cities and towns) and more affordable smartphones are available in the market. Moreover, according to Grappetite Research (July 2014), 77% of the smartphone users are between the ages of 21-30 years, which is the most adaptive segment for the use of smartphones.[11] Cellular mobile operators have also collaborated with the smartphone manufacturers to promote smartphone usage in Pakistan. Companies have also started developing mobile apps and mobile websites keeping in view the fast adoption of smartphones in Pakistan, which will increase the smartphone usage in future.

Figure 38 : Smartphone shipments to Pakistan (% of total no. of mobile phones)



Note: Based on International Data Corporation (IDC) Report 2015
Data corresponds to first quarter of each year.

Big Data Analytics

With the increasing digitization of economic and social activities, large datasets are now available and technologies are evolving to make better use of this big data. The term "Big Data" is referred to large and complex data, and as per ITU, there is no standard university accepted definition of "Big Data". The term can be defined as "data sets whose volumes, velocity or variety is very high compared to the kinds of datasets that have traditionally been used".

[11] https://grappetite.com/blog/smartphone-usage-in-pakistan/

Volume is in terms of vast amounts of data through digitization of information and may range from terabytes to petabytes and up, velocity is a speed at which data is generated and analyzed and variety is an expanding universe of data types and sources. Social media, electronic records, commercial transactions and information from telecom devices are the main sources of big data as described in Table 16.

Table 16 : Big Data Sources

Sources	Some examples
Administrative data	• Electronic medical records • Insurance records • Tax records
Commercial transactions	• Bank transactions (inter-bank as well as personal) • Credit card transactions • Supermarket purchases • Online purchases
Sensors and tracking devices	• Road and traffic sensors • Climate sensors • Equipment and infrastructure sensors • Mobile phones • Satellite/GPS devices
Online activities/social media	• Online search activities • Online page views • Blogs and posts and other authored and unauthored online content and social media activities • Audio/images/videos

Source: Measuring the Information Society Report, ITU, 2014.

With the increasing digitization of economic and social activities, large datasets are now available and technologies are evolving to make better use of this big data. The term "Big Data" is referred to large and complex data, and as per ITU, there is no standare university accepted definition of "Big Data". The definition can be defined as "data sets whose volumes, velocity or variety is very high compared to the kinds of datasets that have traditionally been used". Volume is in terms of vast amounts of data through digitization of information and may range from terabytes to petabytes and up, velocity is a speed at which data is generated and analyzed and variety is an expanding universe of data types and sources. Social media, electronic records, commercial transactions and information from telecom devices are the main sources of big data as described in Table 16.

World Telecommunications/ICT Indicators Symposium considers that big data has great potential for development as it provides real time data.[12, 13]

The size of digital universe was around 4.4 trillion gigabytes in 2013, growing 40% every year, and by 2020 is estimated to reach 44 trillion gigabytes. This exponential growth in data provides opportunities for the enterprises. However, realizing this opportunity requires information security, next generation technologies, for example, cloud computing, virtualized datacenters, modern tools for real-time data analytics, and an overall aptitude towards data and software

[12] https://itunews.itu.int/en/4848-Big-data-big-deal-big-challenge.note.aspx

[13] Report of the Secretary General on Big data and modernization of statistical systems, United Nations Statistical Commission, 2013

driven business models.[14] Companies are also developing intelligent big data technologies to get better results from big data. Teradata is one of the World's largest big data warehousing solutions provider and has its operations in 40 countries including Pakistan. Teradata provides solutions for big data analytics and use machine and sensor data to create new knowledge base. According to IBM, companies that use big data analytics to strategize their business have a competitive advantage on their competitors. Organizations need to capitalize on big data to create value from the abundance of available data and information from digital society.

In Pakistan, data generated by the services on ICT and telecom networks is one of the richest sources of big data, which can be used for policy analysis, development agenda and monitoring of ICT growth. Internet and mobile data records are and can be further used for socio-economic analysis, social structures, disaster relief activities, transportation and many more areas of activities. Exploiting the potential of data available with telecom operators can be beneficial for government and development agencies. For example, bio-metrically verified SIMs, NADRA database and operators' network usage data are rich data sources in Pakistan, with millions of records to do analysis and finding solutions for identifying various opportunities and finding solutions to many socio-economic issues in Pakistan. Nonetheless, big data analytics comes with the challenges of privacy, information security, standardization, interoperability across big data platforms and the enhancement of required skills, such as, data mining and generating algorithms.[15] International organizations such as ITU and UN Statistical Commission have also formed working groups to deliberate on these issues and to work on the promotion of better use of big data.

[14] http://www.emc.com/leadership/digital-universe/2014iview/executive-summary.htm
[15] Measuring the Information Society Report, ITU, 2014.

Big data comes with big opportunities for the young graduates in emerging countries like Pakistan. The graduates can be trained to benefit from opportunities of big data analytics from the developed world. According to McKinsey research, by 2018, the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills and 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions.[16] Data analysts in Pakistan can get jobs in this area all over world and can become a source of export earnings by working abroad or providing their services offshore.

In order to explore the opportunities provided by Big Data Analytics for Pakistan, PTA arranged an awareness session for PTA's officers and the industry in October 2015, at the PTA Headquarters, Islamabad. During the session, Prof. Dr. Murtaza Haider of Ryerson University, Toronto, Canada explained how institutions in Pakistan can benefit from the growing demand in analytics. The participants were also introduced to bigdatauniversity.com, an IBM-led university that is offering free training in big data analytics.

Innovation Centre

PTA in collaboration with Big Data University (Initiative of IBM) and PLUMgrid Inc. has launched an Innovation Center at its office in Islamabad. Highly skilled professionals at the center will help individuals to design and deliver specialized IT services including private cloud and data analytics. This will enable local enterprises to take on their most critical business challenges and enhance the end-user experience for their employees, partners and clients.

The innovation center will also conduct training workshops across Pakistan during next 12 months on the following topics: A view of the Cloud, from the Clouds; OpenStack: The OS to manage the Cloud; OpenStack: Components and Overview; A live demo of network formation; Hands-on training on Amazon Cloud for OpenStack Implementation.

Another component of innovation center is to create awareness and train professionals on Big Data and analytics. The trainings on Big Data are offered online by Big Data University portal www.bigdatauniversity.com. PTA will be helping professionals by assigning mentors on requirement basis and arranging testing center all across Pakistan for Big Data certification and helping certified individuals by providing internship opportunities in the local industry.

[16] http://www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation

Annexure-1

Annexure 1 : Audited Financial Statements of PTA for the year 2014-15

Pakistan Telecommunication Authority
Balance Sheet
As at June 30, 2015

	Note	2015 Rupees	2014 Rupees
Due to Federal Consolidated Fund		**11,164,364,032**	10,033,633,917
Due from Public Account	5	**(5,830,646,397)**	(5,821,313,112)
Due to Government of Pakistan, related party		**5,333,717,635**	4,212,320,805
Non-current liabilities			
Long term payable to AJK and GB Council	6	**319,801,474**	538,107,168
Deferred grant	7	**12,014,361**	45,635,059
Deferred liabilities	8	**520,110,719**	547,617,467
		851,926,554	1,131,359,694
Current liabilities			
Unearned revenue	9	**3,486,151,250**	2,172,151,250
Payable to AJK and GB Council - net	10	**343,830,192**	287,791,157
Income tax payable	11	**540,302,127**	693,657,799
Accrued and other liabilities	12	**218,356,148**	181,841,577
		4,588,639,717	3,335,441,783
		10,774,283,906	8,679,122,282
Contingencies and commitments	13		

	Note	2015 Rupees	2014 Rupees
Non-current assets			
Property and equipment	14	**373,916,461**	398,354,243
Initial License Fees receivable from operators on behalf of AJK and GB Council	15	**101,700,000**	345,625,000
Deferred tax asset	16	**123,529,764**	141,942,727
Loans and advances	17	**230,626,411**	227,211,853
		829,772,636	1,113,133,823
Current assets			
Fee receivable	18	**974,766,484**	429,508,357
Advances, deposits, prepayments and other receivables	19	**274,046,007**	454,064,238
Bank balances	20	**8,695,698,779**	6,682,415,864
		9,944,511,270	7,565,988,459
		10,774,283,906	8,679,122,282

The annexed notes 1 to 27 form an integral part of these financial statements.

Member (Finance)

Chairman

Annexure -1

Pakistan Telecommunication Authority
Income and Expenditure Account
For the year ended June 30, 2015

	Note	2015 Rupees	2014 Rupees
Revenue	21	**15,493,464,302**	106,041,136,852
Expenditure			
General and administrative expenses	22	**781,009,898**	1,282,975,820
(Reversal of provision)/provision for doubtful fee receivable	18.2	**(40,850,727)**	543,124,903
Audit fee		**700,000**	400,000
Financial charges		**5,506**	3,467
		(740,864,677)	(1,826,504,190)
		14,752,599,625	104,214,632,662
Amortization of deferred grant	7.2	**33,620,698**	33,620,698
Other income	23	**1,021,093,627**	560,605,116
		1,054,714,325	594,225,814
Surplus for the year before taxation		**15,807,313,950**	104,808,858,476
Less: Provision for taxation	24	**(7,071,723,397)**	(3,714,723,951)
Net surplus for the year transferred to Federal Consolidated Fund		**8,735,590,553**	101,094,134,525

The annexed notes 1 to 27 form an integral part of these financial statements.

Member (Finance) **Chairman**

Pakistan Telecommunication Authority

Cash Flow Statement

For the year ended June 30, 2015

	Note	2015 Rupees	2014 Rupees
CASH FLOWS FROM OPERATING ACTIVITIES			
Surplus for the year before taxation		**15,807,313,950**	104,808,858,476
Adjustments for:			
Depreciation		**49,908,708**	55,418,384
Provision for employee's gratuity scheme obligation		**72,167,609**	47,920,991
Provision for pension obligation		**1,206,818**	801,585
Reversal of provision for accumulating compensated absences		**(26,414,569)**	226,121,862
Profit on bank deposits		**(487,677,937)**	(549,150,615)
(Reversal of provision)/provision for doubtful fee receivable		**(40,850,727)**	543,124,903
Amortization of deferred grant		**(33,620,698)**	(33,620,698)
Gain on sale of property and equipment		**(222,436)**	(4,353)
		15,341,810,718	105,099,470,535
Changes in assets and liabilities			
Decrease / (increase) in assets			
Loans and advances		**(14,174,839)**	(194,697,066)
Advances, deposits, prepayments and other receivable		**(514,774)**	(21,412,493)
Fees receivable including initial license fee - net		**(260,482,400)**	242,383,955
(Decrease) / increase in liabilities			
Unearned revenue		**1,314,000,000**	-
Accrued and other liabilities		**38,455,537**	16,058,960
Contributory provident fund payable		**17,521,595**	21,479,446
Payable to AJK & GB Council		**(61,532,837)**	(32,690,203)
		1,033,272,282	31,122,599
Cash generated from operations		**16,375,083,000**	105,130,593,134
Income taxes paid		**(7,307,399,928)**	(7,118,895,944)
Accumulating compensated absences encashed		**(70,605,147)**	(2,832,188)
Gratuity and pension paid		**(23,324,020)**	(7,289,461)
Net cash generated from operating activities		**8,973,753,905**	98,001,775,541
CASH FLOWS FROM INVESTING ACTIVITIES			
Purchases of property and equipment		**(25,560,030)**	(6,727,203)
Profit on bank deposits received		**678,971,223**	266,931,367
Proceeds from sale of property and equipment		**311,540**	33,020
Net cash generated from investing activities		**653,722,733**	260,237,184
CASH FLOWS FROM FINANCING ACTIVITIES			
Contribution to Federal Consolidated Fund (FCF):			
- Payment made to Frequency Allocation Board		**(371,980,994)**	(319,368,097)
- Payments made to FCF		**(7,017,836,115)**	(96,484,720,107)
- Federal excise duty paid / adjusted during the year		**(215,043,329)**	(967,391,349)
Movement in Public Account		**(9,333,285)**	1,254,951,224
Net cash generated from financing activities		**7,614,193,723)**	(96,516,528,329)
Net increase in cash and cash equivalents		**2,013,282,915**	1,745,484,396
Cash and cash equivalents at beginning of the year		**6,682,415,864**	4,936,931,468
Cash and cash equivalents at end of the year	20	**8,695,698,779**	6,682,415,864

The annexed notes 1 to 27 form an integral part of these financial statements.

Member (Finance) **Chairman**

Annexure 2 : Telecom Sector's Revenues

(Rs. in Millions)

	2010-11	2011-12	2012-13	2013-14	2014-15
Cellular	262,761	298,509.7	311,145	322,683	317,016
Local Loop	58,342	63,805.3	80,661	86,512	80,813
LDI	34,195	32,675.0	38,572	43,901	40,765
WLL	4,978	5,861.1	5,617	6,278	3,874
CVAS (Estimated)	7,052	8,394.0	3,526	4,123	7,078
Total	367,327	409,245.1	439,521	463,497	449,546

Note: Figures for the year 2013-14 revised and 2014-15 estimated.

Annexure 3 : Foreign Direct Investment

(US$ in Millions)

Year	2012-13			2013-14			2014-15		
	Inflow	Outflow	Net FDI	Inflow	Outflow	Net FDI	Inflow	Outflow	Net FDI
Telecomm	160.8	564.9	-404.1	904.6	474.7	429.9	908	787	121
Total	2,665.30	1,208.90	1,456.50	2,816.40	1,148.80	1,667.60	1,567	1,038	529

Source: State Bank of Pakistan
Note: Figures for the year 2013-14 are updated.

Annexure 4 : Telecom Investment

(US$ in Millions)

	2010-11	2011-12	2012-13	2013-14	2014-15
Cellular	358.6	211.8	570.4	1,789.7	977.6
LDI	131.6	13.3	1.9	1.8	12.2
LL	18.5	5.0	16.1	14.2	3.9
WLL	10.2	7.3	11.9	10.0	7.2
Total	**518.9**	**237.5**	**600.3**	**1,815.6**	**1,001.0**

Annexure 5 : Cellular Mobile Subscribers

(Numbers)

	2010-11	2011-12	2012-13	2013-14	2014-15
Mobilink	33,378,161	35,953,434	37,121,871	38,768,346	33,424,268
Ufone	20,533,787	23,897,261	24,547,986	24,352,717	17,809,315
Zong	10,927,693	16,836,983	21,177,156	27,197,048	22,102,968
Telenor	26,667,079	29,963,722	32,183,920	36,571,820	31,491,263
Warid	17,387,798	13,499,835	12,706,353	13,084,823	9,830,620
Total	**108,894,518**	**120,151,235**	**127,737,286**	**139,974,754**	**114,658,434**

Note: Cellular Mobile Subscribers Base for the Year 2014-15 after BVS Verification

Annexure 6 : Cellular Mobile Broadband Subscribers (3G and 4G LTE)

(Cumulative Numbers)

Operator	CMPak		Mobilink	Telenor	Ufone	Warid	
Technology	3G	4G	3G	3G	3G	LTE	Total
Jul-14	417,814		425,992	895	1,052,095		1,896,796
Aug-14	682,397	1	706,000	388,337	1,285,123		3,061,858
Sep-14	947,363	26	730,000	650,094	1,365,259		3,692,742
Oct-14	1,222,641	744	1,081,133	923,783	1,497,438		4,725,739
Nov-14	1,534,920	1,437	1,443,527	1,182,548	1,611,369		5,773,801
Dec-14	1,661,286	2,242	1,795,549	2,268,860	1,952,584		7,680,520
Jan-14	1,850,309	5,023	2,177,533	2,741,234	2,254,156	44,075	9,072,330
Feb-14	2,116,616	7,261	2,600,904	3,147,117	2,470,293	60,923	10,342,191
Mar-15	2,921,021	31,582	2,860,079	3,530,421	2,662,310	66,140	12,071,553
Apr-15	3,408,508	61,964	3,086,956	3,857,265	2,540,921	79,213	13,034,827
May-15	2,807,892	82,102	3,378,570	3,812,146	2,550,326	90,937	12,721,973
Jun-15	2,898,094	105,128	3,656,345	4,162,616	2,570,283	106,211	13,498,677

Annexure 7 : Fixed Local Loop Subscribers

(Numbers)

	2010-11	2011-12	2012-13	2013-14	2014-15
PTCL	2,881,684	2,847,597	2885144	3,034,361	3,007,807
NTC	105,954	107,095	107631	106,738	110,957
Nayatel	1,649	2,860	3,699	3,773	3,699
WorldCall	10,085	9,830	8977	8,887	1,977
Brain Tel	13,280	14,076	14,662	14,410	14,410
Union Communication	4,200	4,175	4,175	4,175	2,150
Total	**3,016,852**	**2,985,633**	**3,024,288**	**3,172,344**	**3,141,000**

Note: Brain subscribers are as of 2014-15

Annexure 8 : Wireless Local Loop Subscribers

(Numbers)

Year	2011-12	2012-13	2013-14	2014-15
PTCL	1,424,051	1,233,793	1,152,635	249,000
TeleCard	588,056	763,330	258,001	8,321
Mytel	32	32	32	33
WorldCall	518,340	519,148	33,500	45
NTC	9,165	12,231	11,998	10,717
Wateen	294,056	281,053	308,122	265,313
Sharp	74,148	74,148	80,597	80,597
Wi-Tribe		199,786	199,886	182,257
Link Direct	39,135	25,074	60	60
NayaTel			14,630	14,630
Total	2,946,983	3,108,595	2,059,461	810,793

Note: Figures for the year 2013-14 are updated and 2014-15 estimated

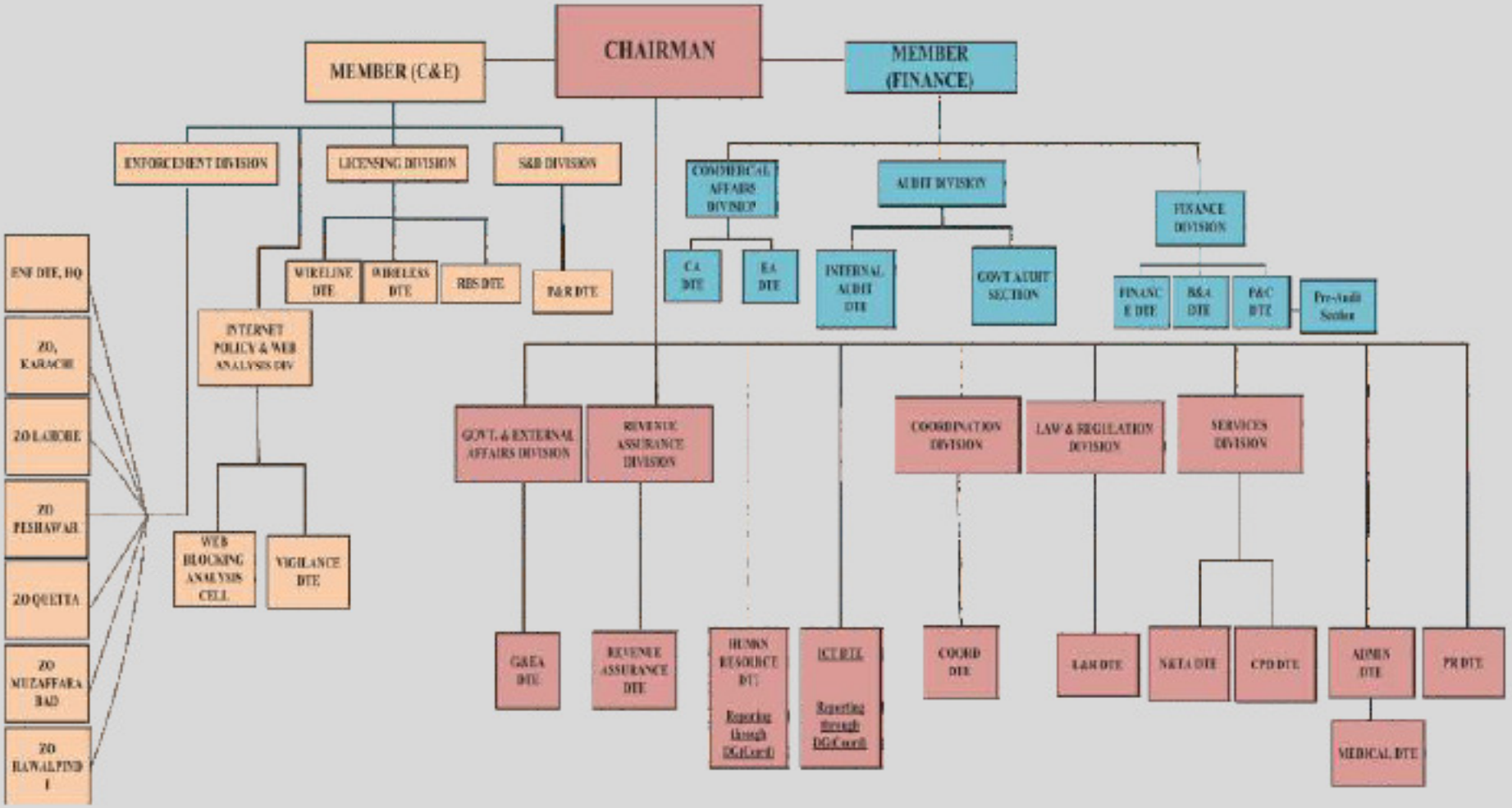
Annexure 9 : Broadband Subscribers by Technology (Fixed and Mobile)

(Cumulative Numbers)

Technology	DSL	HFC	WiMax	FTTH	EvDO	Others	Mobile Broadband	Total
2005-06	26,611							**26,611**
2006-07	44,669			484				**45,153**
2007-08	102,910	42,760	19,612	2,800				**168,082**
2008-09	262,661	36,201	88,477	3,967	22,503			**413,809**
2009-10	476,722	49,110	257,616	5,002	111,194	1,004		**900,648**
2010-11	695,245	34,274	428,523	6,346	325,140	1,963		**1,491,491**
2011-12	880,071	35,520	589,887	8,444	584,459	2,934		**2,101,315**
2012-13	1,064,003	33,184	575,939	11,152	1,033,513	3,868		**2,721,659**
2013-14	1,346,817	37,011	530,889	14,848	1,861,118	5,240		**3,795,923**
2014-15	1,480,672	43,362	487,582	19,490	1,334,725	6,089	13,498,677	**16,885,518**

PTA's
Organization Chart

PTA Organogram



PTA's Organization Chart

Pakistan Telecommunication Authority
Headquarters, Islamabad

Economic Affairs Team

Dr. Muhammad Saleem, Director General
Mr. Muhammad Arif Sargana, Director
Dr. Shahbaz Nasir, Deputy Director
Mr. Abdul Rehman, Assistant Director
Mr. Waqas Hassan, IT Officer
Mr. Muhammad Riaz, Admin Officer