

Paradigm Technologies

Broadband Subscribers Survey

Estimating Broadband End-Users and their Experience of Service and its Performance

Survey Performed for

Pakistan Telecommunication Authority



Survey Report

Contents

Chapter	Page
Background	03
Executive Summary	04
Introduction	06
Objectives & Methodology	16
The Survey	18
Survey Analysis	33
Conclusion	46
Annex	
Glossary	47
Survey Questionnaire	48

Background

Broadband has the power to evolve economies, not just through faster browsing of Internet and downloading multimedia files, but also by providing a rapid communication highway of increasing productivity and competitiveness of businesses and residential consumers through e-enabled platforms. For businesses a broadband connection enables a range of opportunities like effective distance communication via video conferencing, access to financial details of multiple locations and a direct link to suppliers. For residential consumers it opens an excellent supply of private sector services and applications in commerce, telecommunication, banking, etc as well as public sector services and applications in education, health, community development.

Though in Pakistan, we observe an overall slow adoption pattern of broadband, reasons for which are not part of this report. However, statistics for last three years reveal an astonishing growth of broadband subscription in metropolitan areas. Broadband has started to receive popularity as the demand for a high speed Internet connection is increasing between businesses and residential consumers. The country could be rated among the economies where almost all technological versions of broadband are being offered. Wired broadband in shape of xDSL, HFC, and FTTx over GPON whereas wireless broadband in form of WiMax and EVDO are among these technological versions. Mobile broadband through GPRS and EDGE is also being offered but is not part of this survey study.

Benchmarking behind calculating broadband penetration and adoption levels is based upon the number of connections / subscribers. This means that actual number of population having an access to a broadband experience is much more. In order to estimate this number, Pakistan Telecommunication Authority (PTA) has instigated this survey assignment. The survey report provides important insights into broadband service experiences for both business and residential customers, and in particular estimating an approximate figure of total number of broadband users in the country.

About Us

Paradigm Technologies is a dedicated software development & research company providing outsourcing services in Market research, ERP and E-commerce solutions. Led by a team of dynamic industry experts, Paradigm leverages its survey model to provide its

clients with high value market research. We produce research with the goal of helping our customers to better understand their markets and gain insight from the market data and analysis that is provided. Paradigm Technologies also strives in delivering its research content in inventive ways to meet the demands of different audiences within an organization.

Executive Summary

Internet and Mobile Phone technologies are considered as leading innovations of 90's. Similarly broadband can also be rated as a significant development towards high speed communication; the world has experience during last one decade. Policy makers and Regulators of developed broadband markets are focusing on provision of next generation high speed services whereas regulators of developing broadband markets are centering more increase of penetration levels. Telecommunication sector of Pakistan has experienced a swift growth during recent years especially in mobile segment. Broadband is in early stages of progress and present dispersion rate is merely 0.x per 100 inhabitants.

Pakistan Telecommunication Authority is taking a keen interest towards broadband development in the country and this survey report targets the current situation of broadband in terms of approximate numbers of users and their interest behind broadband usage. Key findings of the survey include:

Research & Education stands as priority broadband function for households

The responses of survey participants reveal that majority (60%) of the home broadband users primarily utilizes high speed broadband Internet for research and education purposes. This indeed is a positive sign towards reaping the associated benefits of broadband Internet as Internet is considered a vast array of information and knowledge.

Broadband Tariffs are acceptable for households

Generally the present broadband tariffs are acceptable to home broadband users, 60% of the respondent said that they are satisfied with the monthly broadband cost. Further reduction in tariffs would be bringing further increase in the acceptance level of consumer.

Broadband is Important for Family members

Survey results show that among the home users, broadband is not only a single member exercise rather it is essential for the whole family members. 78 % of the responses rated broadband as an important utility for the family.

Broadband considered as critical for business operations

67% of the business users rated broadband significant for their day to day business operations while the primary usage of broadband among business users was e-mail (51%) followed by Information gathering (25%).

Broadband assists Businesses to increase sales

Broadband is providing opportunity to business towards increasing sales. 42% of the business users believe that broadband is a medium to improve market outreach and increase overall sales.

Introduction

Broadband Definition

Broadband is generally defined as a range of high-speed access technologies enabling an always-on connection to choice of services including Internet and multimedia entertainment. However, various countries and organizations have rated broadband differently on the basis of bandwidth speeds. In Pakistan, broadband policy announced in 2004 by Ministry of IT defines broadband as

'Always On internet connection with a minimum downloads speed of 128 kbps connectivity'

The survey will be carried out benchmarking minimum 256kbps as broadband connection, the rationale behind which is present broadband package offerings by the operator. An interesting fact revealed during the initial survey study is that broadband operators are now shifting towards a minimum speed offer of 512kbps meaning that in near future we may not observe any 256kbps broadband connection offerings in the market.

Revolution of Broadband

Telecommunications are historically characterized by steady growth with a continuous advancement. We are by now familiar with the historical success of the telegraph, telephone, fax and e-mail, each one of which improved our communication approach. A distinctive approach of ICT convergence technologies has given birth to a unifying services platform for three converging industrial sectors: computing, communications and broadcasting. This uniform platform has given birth to and revolutionized broadband technologies globally.

Broadband has proven to be a technology which means different for consumer groups like industry, businesses and end-user. From a business prospective broadband is a high-speed Internet access to the corporate office. For the information and communication technologies (ICT) sector and for the telecommunication industry in particular, broadband

has all together a different meaning. For a Telecommunication investor broadband is an incremental improvement, offering Internet access that is faster, more convenient and (per Megabyte downloaded) much cheaper than ever before. Moreover, broadband does provide a platform for the development of content services. For a residential end-user, broadband is what enables him to subscribe and enjoy a range of triple-play (data, voice, video) services.

As the broadband revolution continues to happen, technologists continue their pursuit for developing fast and simple broadband standards, increasing competition in the broadband service market has forced broadband service providers to plan their strategies for delivery of “triple play” services, providing voice, data and video through a single connection. Over recent years, requirements for bandwidth intensive applications such as peer to peer file sharing; video conferencing, multimedia streaming, online entertainment and tele-working have resulted in persistently increasing demands for higher and higher broadband bandwidth provisioning.

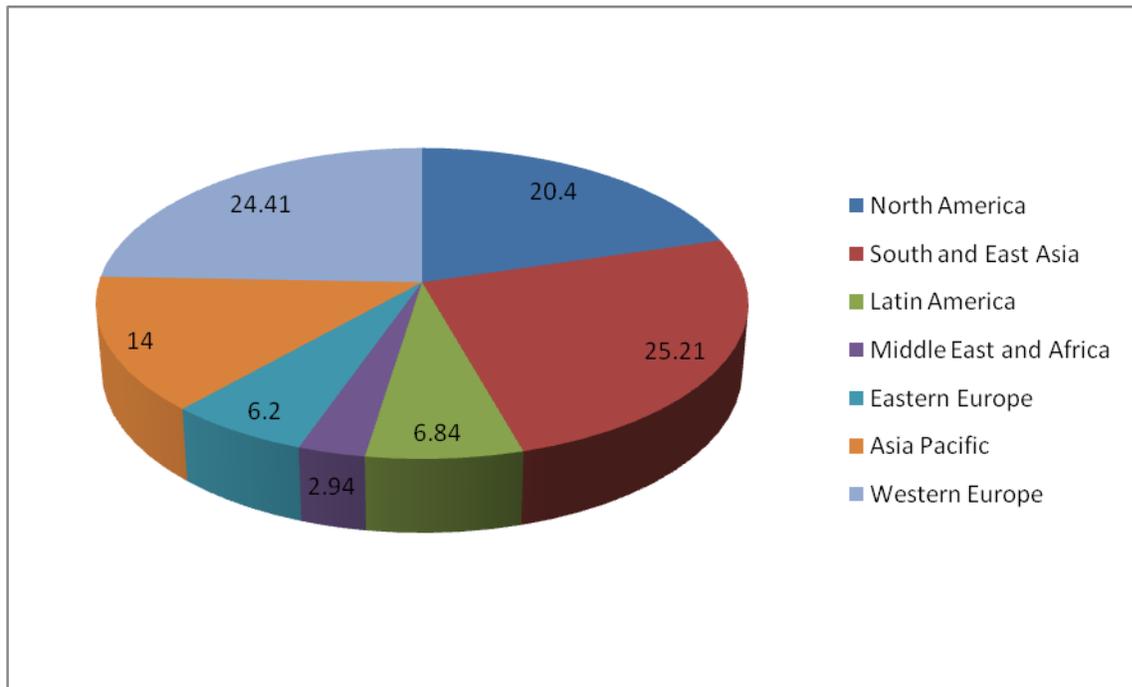
In general broadband solutions are classified into two groups: fixed-line technologies and wireless technologies. Fixed line broadband technologies come in various forms of a direct physical connection to the subscriber’s residence or business. Popular fixed-line technologies are xDSL (digital subscriber line), HFC (Hybrid Coaxial Cable) or cable modem, FTTH (Fiber to the Home) and broadband power line. Wireless broadband technologies provide a wireless mode of access in various forms to the subscriber’s residence or business. Popular wireless mode of access is WiMAX, EVDO, LMDS and Satellite.

This broadband revolution has changed the global landscape of measuring performance of an economy; terminologies like ‘knowledge-base’ and ‘information-base’ societies have emerged to rate productivity and competitiveness of an economy. Broadband particular impact on information based society lies in two areas: first, its wide capacity to support multiple applications (voice communications using IP telephony, Internet applications, and video / audio applications) over a single network. Second, the associated economic gains, which result in offering low cost for consumers, plus the increased data transfer and reduced delays as well as the effects of competition among, service providers.

International Snapshot

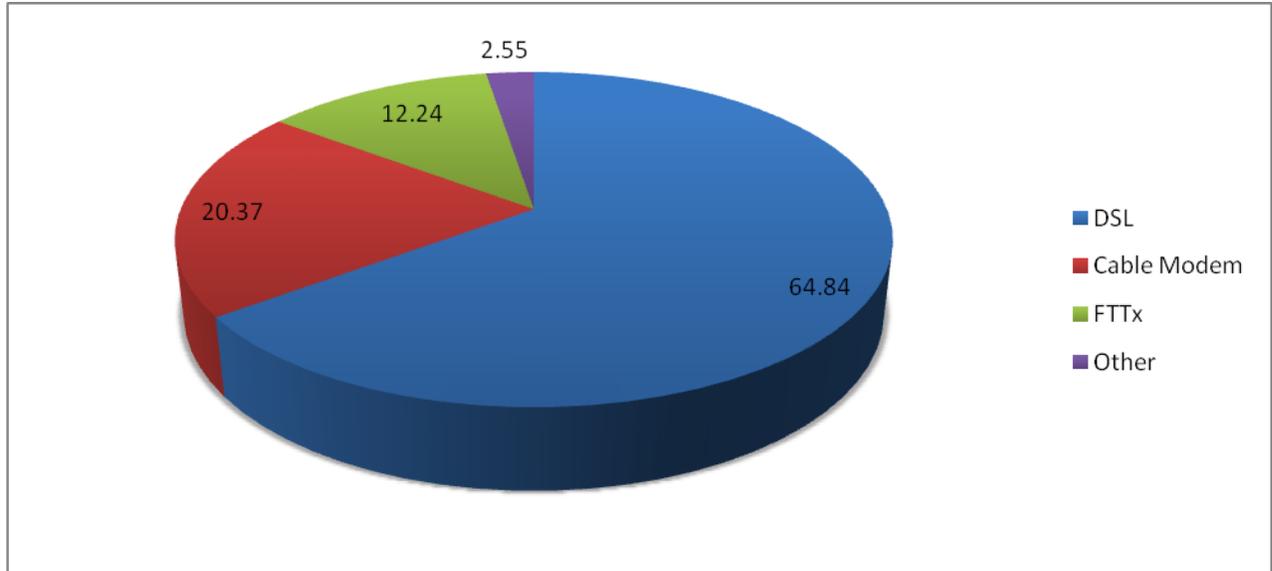
Global statistics reveal that by the end of 2009 there were 466.59 million broadband subscribers with a population penetration of 8.1 percent. The broadband subscribers divided by region are shown in the pie below. South and East Asia (25.21 per cent) and Western Europe (24.41 per cent) have the largest shares of the world broadband market.

North America had the third largest share at 20.40 per cent and followed by Asia Pacific with a 14.00 per cent share.



Source: World Internet Statistics

Exploring the technological trends and choices of broadband at the international arena, DSL remains the most popular and largely used mode of broadband access. This popularity of DSL has an inherited reason of dominance of fixed-line copper telecommunication infrastructure worldwide. Cable modem stands as the second largest broadband technology, primary reason of which is strong cable infrastructure of North America where cable modem serves majority of the population. Though use of Fiber at the access side is gaining popularity and demand, however the associated high deployment cost still remains a major hurdle behind common availability of FTTx technologies. The following chart depicts the overall share of broadband technologies.

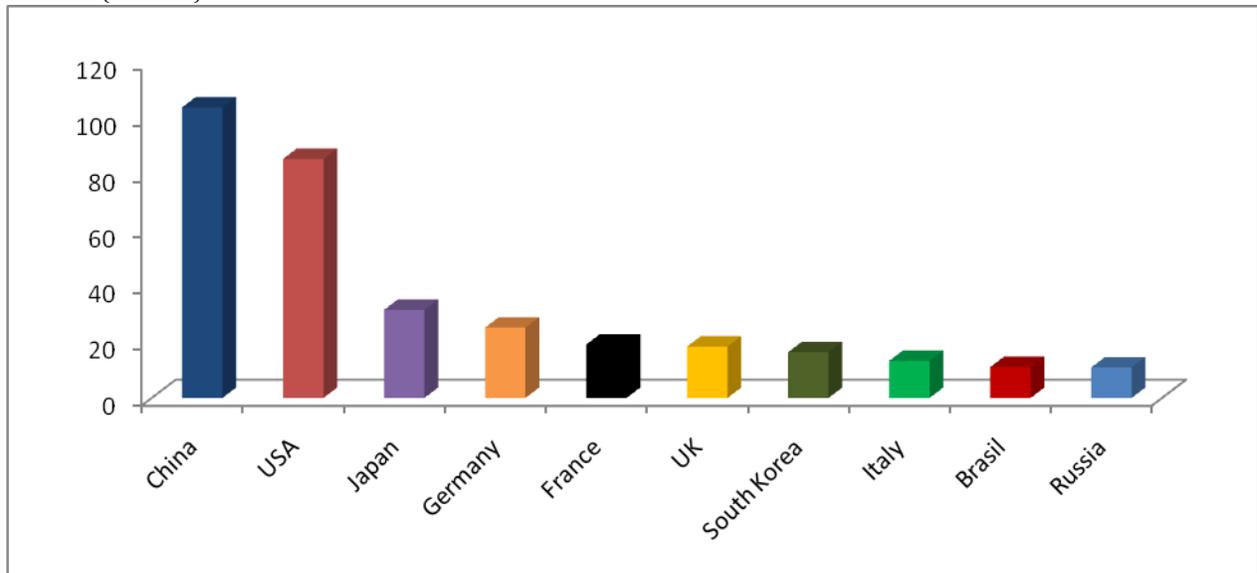


Source: World Internet Statistics

Wireless technologies have been recently introduced at broadband scene and are gaining rapid adoption due to their ease of usage and mobility features. The 'others' legend in the pie represents wireless broadband choice in form WiMAX, GPRS, EDGE and 3G.

China with a subscriber base of 103.664 million stands as the top country for broadband followed by United States with 85.28 subscribers. Collectively, China and the US control over 40 per cent of the worldwide broadband market. The following bar chart highlights the top ten countries in terms of broadband.

Subscribers (In millions)

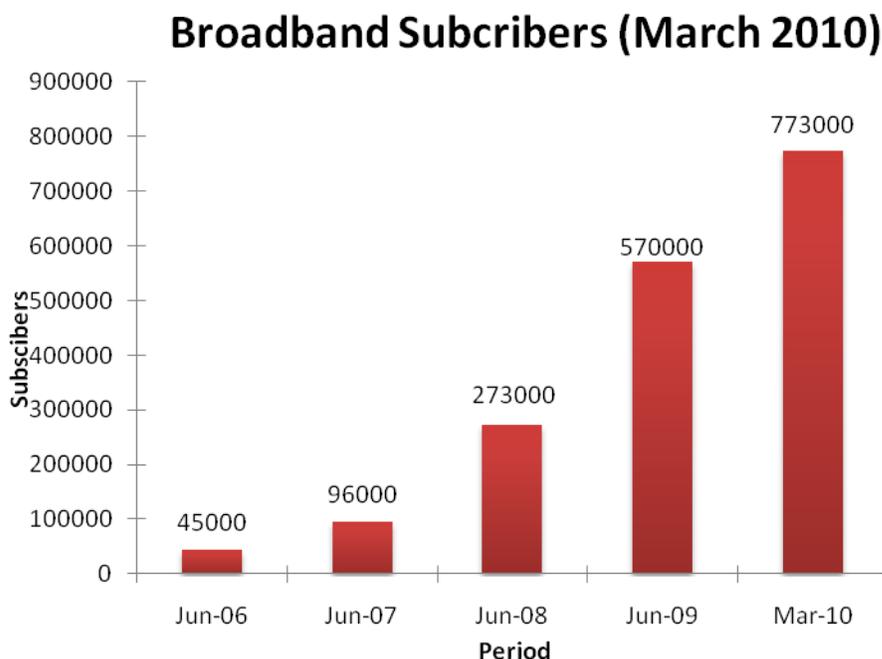


Source: World Internet Statistics

Broadband and Pakistan

In Pakistan, Broadband made its entry when private operator began offering HFC based broadband Internet services in 2000. This was followed by introduction of DSL services in 2002. In order to instigate a sustainable roadmap for broadband proliferation in the country, Ministry of Information Technology announced first National broadband policy in December 2004. The policy targeted four important components of broadband value chain. They were content facilitation, backhaul facilitation, broadband delivery facilitation and end-user terminals facilitation. Despite being an all-inclusive policy structure, defined broadband milestones were not achieved. However, a real progress for broadband adoption both at residential and businesses level has been observed during last three years. According to PTA, by March 2010 there were approximately 728,000 broadband subscribers in the country.

The growth pattern observed recently is a result of two important factors. The first of which is the launch of DSL services by PTCL. PTCL started its DSL services in June 2007 offering low tariffs for home users with free installation service. This has affected the overall cost of service regime for DSL thus adding more and more subscribers. The second factor is the introduction of wireless broadband services in the form of WiMAX and EvDO. This development provided an excellent replacement to wired broadband services, adding more convenient to subscribers in shape of limited mobility and ease of use.



Source: PTA

The above column chart highlights the swift growth in terms of broadband subscribers rising from 45,000 to 773,000 in less than four year's time marking a continuous annual growth of above 100%.

On a technological prospective, Pakistan has proven to be a rich market both in terms of wired and wireless broadband technologies. These technologies are competing hard with each other to attain better market share. Brief note on the available broadband technologies is as under.

Digital Subscriber Line (DSL)

DSL is a family of technologies that provide digital data transmission over the wires of a local telephone network. It is a powerful tool for fast information transmission; however, its popularity is highly dependent on the quality of wire line infrastructure in the country. In accordance with the global trend, DSL leads the market share of Pakistan as well. According to PTA, by March 2010 there were total numbers of 434,959 DSL subscribers in the country.

Worldwide Interoperability for Microwave Access (WiMAX)

WiMAX is a telecommunications technology that provides wireless transmission of data using a variety of transmission modes, from point-to-multipoint links to portable and fully mobile internet access. The technology provides up to 3 Mbit/s broadband speeds without the need for cables. Pakistan holds the unique honor of having the first commercial roll out of WiMAX based network in the world by Wateen Telecom (Pvt) Ltd in December, 2007. By now there are two other commercial WiMAX deployments carried out by WiTribe and Mobilink respectively. According to PTA, WiMAX technology has attracted almost 229,385 subscribers by March 2010.

Hybrid Fiber Coaxial (HFC)

HFC is a telecommunication technology being utilized mostly by CableTV providers. It allows optical fiber cable and coaxial cable to be used in different portions of a network to carry broadband content, such as video, data and voice. There were 34,018 subscriptions for HFC service by March 2010.

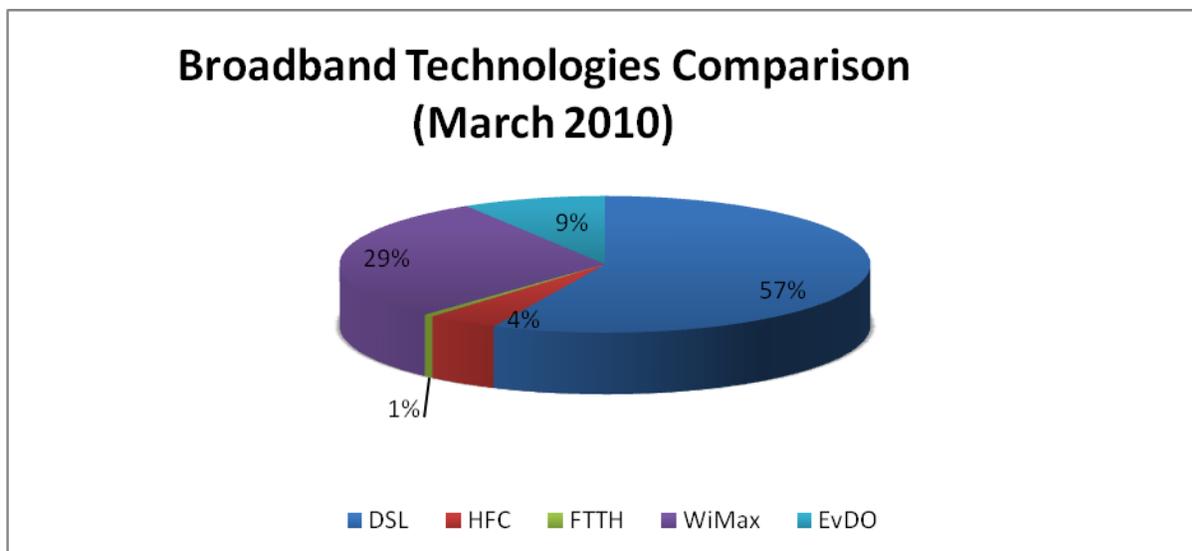
Evolution-Data Optimized (EvDO)

EvDO is a telecommunication standard for the wireless transmission of data through radio signals, typically for broadband Internet access. EvDO is a relatively new technology which is showing a potential for becoming an instant hit. At present there are two (PTCL, WorldCall) operators offering EvDO to subscribers. Total number of EvDO subscribers was 68,490 by end of March 2010.

FTTH (Fiber to the Home)

FTTH is a broadband technology that uses optical fiber to replace all or part of the usual metal local loop used for last mile telecommunications. FTTH is a high speed connection capable of carrying huge IP traffic volumes. NayaTel has been providing Triple play Services (Voice, Data, and Video) via FTTH technology to customers in Islamabad. Recently it has expanded its services to few areas in Rawalpindi city. Numbers of subscribers enjoying FTTH services have reached to 4,716 by March 2010.

The following chart shows an insight view of present broadband technology share of Pakistan.



Source: PTA

OVERVIEW OF SURVEY

The 2010 Broadband Subscribers Survey will be conducted through face-to-face interaction, telephone medium and online resources. The survey will be performed in three segments; each of which will be performed in a prescribed timeline. The first part will target the collection of required subscriber's data. The data will be gathered keeping in view the required survey objectives i.e. catering cross section of users, variety of different geographic locations and different types of broadband services including:

- Digital Subscriber Line (ADSL)
- Cable Broadband (HFC)
- FTTx
- WiMax
- EvDO

The data will be gathered by giving a balance approach between technologies, service providers, user groups and geographies. Following list of tables depict the details:

TARGET GEOGRAPHIES, SERVICE PROVIDER, TECHNOLOGIES AND SUBSCRIBERS

Geography	Operator	Technologies	Subscribers
Karachi	Cyber Net, World call, PTCL, Mobilink Infinity	DSL, HFC, EvDO, WiMAX	200,200,100,100
Lahore	LinkDotNet, Wateen, PTCL, WiTribe	DSL, HFC, EvDO, WiMAX	150,150,75,75
Islamabad	MicroNet, Nayatel, PTCL, WiTribe	DSL, FTTH, EvDO, WiMAX	150,150,100,75
Rawalpindi	PTCL, WiTribe, Wateen	DSL, WiMAX	150,35,35
Peshawar	LinkDotNet, WiTribe,	DSL, WiMAX	25,25
Quetta	PTCL, Wateen	DSL, WiMAX	25,15
Hyderabad	PTCL, Wateen	DSL, WiMAX	20,20
Mardan	PTCL	DSL	15

Gujranwala	PTCL, Wateen	DSL, WiMAX	15, 15
Multan	PTCL, Wateen	DSL, WiMAX	15, 15
Sialkot	PTCL, Wateen	DSL, WiMAX	15, 20
Sukhur	PTCL	DSL	15

Since the Survey is to target both residential and business consumer groups, a careful approach will be followed to target both consumers groups in geographies which are more relevant for receiving the broadband usage perceptions.

TARGET GEOGRAPHIES AND CONSUMER GROUP

Geography	Total Targeted Subscribers	Targeted Consumer Group(s)
Karachi	600	Business, Universities & Residential
Lahore	450	Business & Residential
Islamabad	475	Business, Universities & Residential
Rawalpindi	220	Residential
Peshawar	50	Business & Residential
Quetta	40	Residential
Hyderabad	40	Residential
Mardan	15	Residential
Gujranwala	30	Business
Multan	30	Residential
Sialkot	45	Business
Sukhur	15	Residential

Keeping in view the widespread availability of broadband technologies, the survey would tend to target all of them in relation with the present market share.

TARGETED TECHNOLOGIES, SUBSCRIBERS AND OPERATORS

Technology	Targeted Subscribers	Targeted Operator(s)
DSL	795	PTCL, LinkDotNet & MicroNet
WiMax	430	Wateen, WiTribe & Mobilink Infinity
HFC	350	WorldCall & Wateen
EvDO	275	PTCL
FTTH	150	NayaTel

The second segment would cover the execution of the survey. The survey would be performed in view of the required objectives i.e. Primary mean of collecting information would be via detail survey forms, these forms would be distributed and filled by means of Internet, Telephone or face-to-face interaction with survey respondent. The detail survey questionnaire is attached with this report as Annex-2.

The third and the last segment would address the featured analysis of gathered survey data. This segment will portray the key findings, conclusions and estimate numbers of broadband users with regards to calculated 'multiplying factors'.

Objectives & Methodology

Survey Objectives

- a) The overall objective of our survey research is to gain an estimation of number of broadband users behind a business and residential connection and gain some performance perceptions. The survey research has two components: collection of data and the consumer survey.
- b) The rationales of data collection are:
 - To have a balance between available technologies.
 - To have a balance between type of broadband connection (business & residential).
 - To have a balance between different geographical locations.
 - To have only those details of subscriber's record, adequate to survey execution.
- c) The objectives of the consumer survey are as follows:
 - To measure overall satisfaction with broadband provision, speeds and other individual service factors, and identify reasons for dissatisfaction.
 - To estimate potential broadband users utilizing a single connection. The estimation targets both business and residential users.
 - To judge primary utility gained over a broadband connection.
 - To evaluate the importance of broadband for businesses and general public.
 - To assess the average monthly spending for a broadband service.

Survey Methodology

Market research Company Paradigm Technologies is selected by Pakistan Telecommunication Authority through a defined selection procedure to commission the survey.

The broadband subscriber's survey would follow a statistical methodology where by definition survey purposes are administered by the respondent, the respondent will be outreached by a

questionnaire. As part of this process, respondents will answer a series of questions on their broadband awareness, use and satisfaction.

The respondents will be present broadband subscribers of various service providers, technologies and geographies. In this regard, necessary assistance and support of the client (Pakistan Telecommunication Authority) would be requested since demanding required subscribers data directly from the service providers is not probable. This would also add obligatory authenticity, integrity and legitimacy behind the exercise of estimated broadband users in the country.

The questionnaire will gather general information for technology and service provider. Moving ahead the questionnaire would seek precise facts related to businesses and residential broadband subscribers.

Statistical estimates would be reported after consideration of the accuracy of estimates as measured by 90% confidence intervals. The confidence interval is a statistically derived range calculated from the standard deviation (which is itself calculated from the sample size and the variation within the sample). Annex 3 will provide further detail on significance differences and statistical techniques used for estimation.

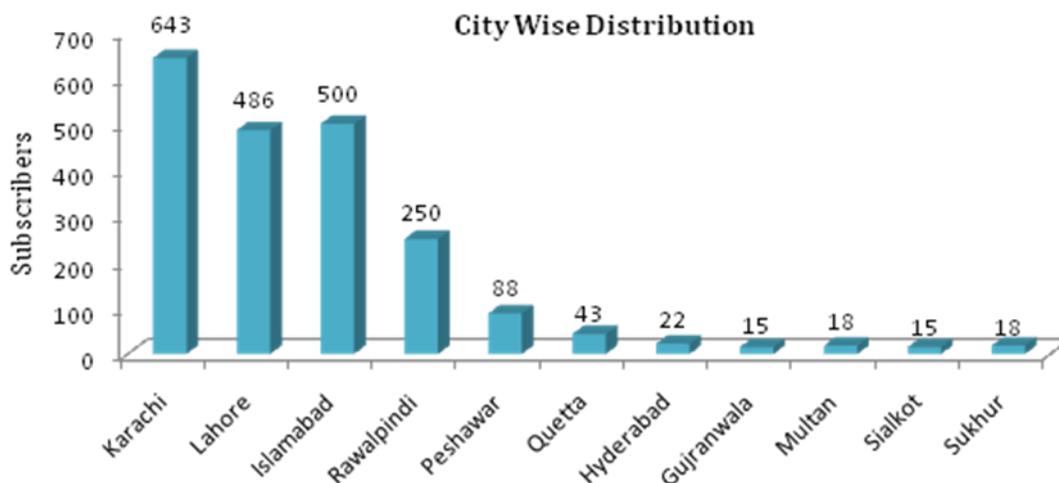
The survey is more of a theoretical type so there will not be any technical methodology to be chosen to present the broadband performance picture. The performance measurement will all depend on the responses received via the survey questionnaire.

The Survey

The survey participant's data was collected from the broadband operators through required support of PTA, it was kept in mind that the targeted balance approach between technologies, service providers, user groups and geographies is ensured. However, a variance factor of 10-15% was observed while the final data was received by the operators. Few operators were unable to deliver the requested subscribers data while some responded with partially less subscriber numbers.

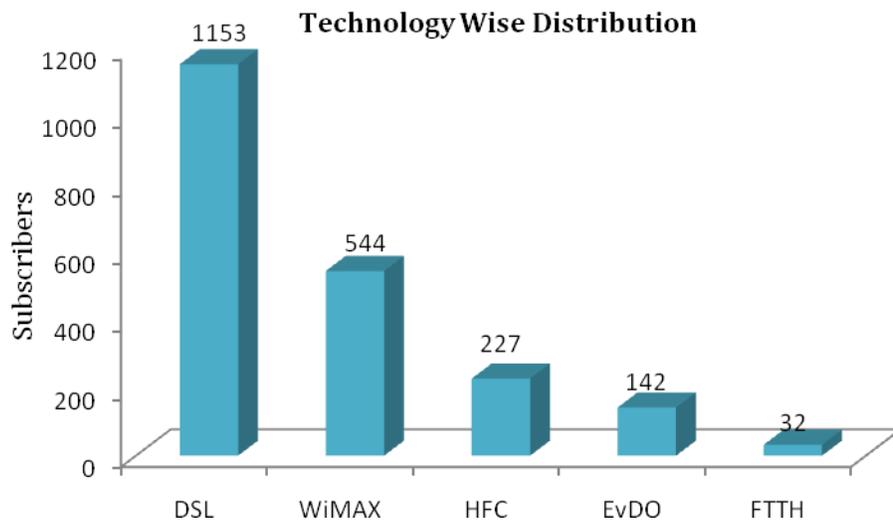
The survey was carried out via telephone calls, face-to-face interaction (where possible) and inviting responses by e-mails. The received responses were stored in a database application in order to carry out required analysis and survey deliverables. General response of the participants was found quite affirmative as they appreciated the conduct of such survey.

Keeping in view the general availability and popularity of broadband services in the country, the survey targeted subscribers from various geographies, majority of respondents were residing in major metropolitans. The following bar chart shows the city wise distribution.

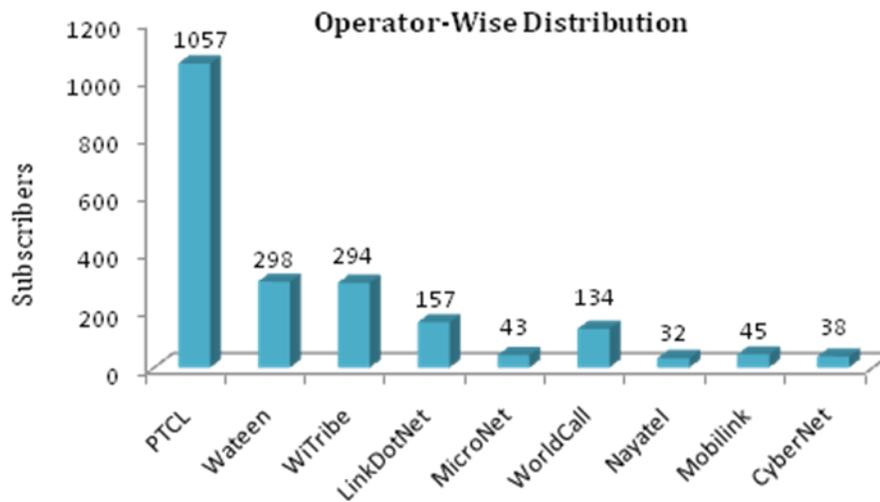


The market is quite rich for the availability of different broadband technologies; both wireless and wired flavors are being offered to the subscribers. The survey covers all

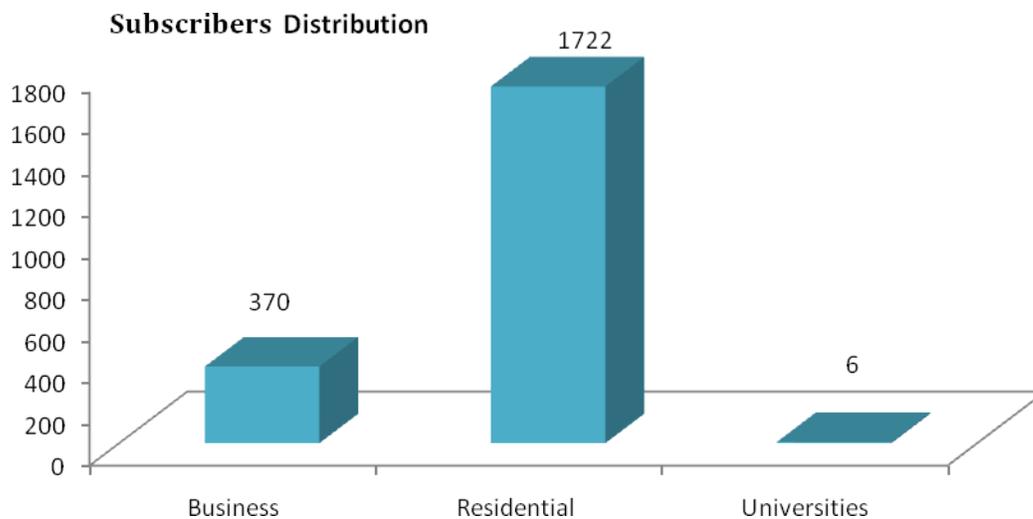
available technologies taking in consideration relevant market shares. The bar chart shows the technology-wise distribution of the survey respondents.



The incumbent operator holds the major market share with offerings in both xDSL and EvDO technologies since it has the largest broadband service coverage. Some operators are presently operating in all major cities while few service providers have stick themselves to specific cities. The survey covers key broadband operators in view of technologies offered and overall market share. The details are graphed below:



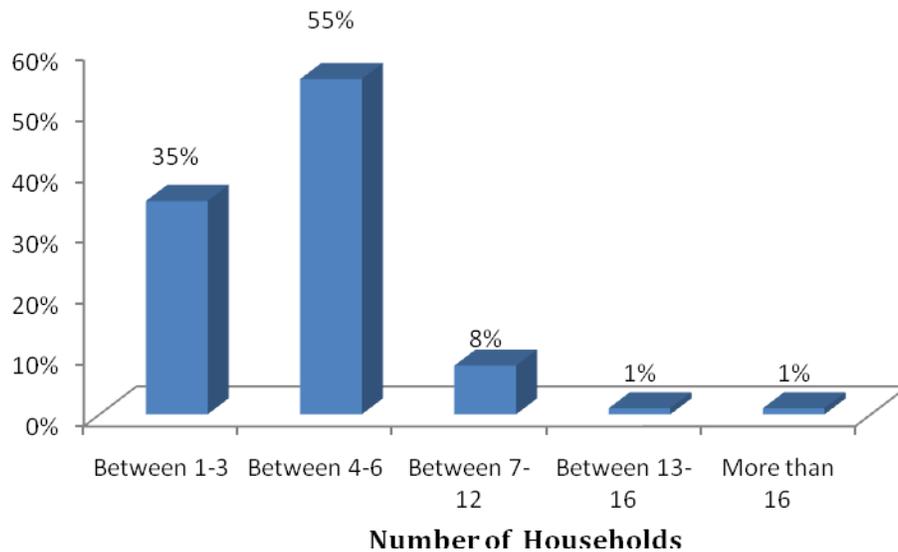
The survey also took in consideration the two segments of the broadband subscriber's market i.e Home and Business. Home users were typical residential subscriptions whereas business subscribers included Organizations, Universities, Industries and small businesses. The following chart highlights the distribution of survey respondents. Though the primary targeted subscribers segments were home and business subscribers. However, to seek views of educational institutes about Broadband, 6 Universities were also included in the survey.



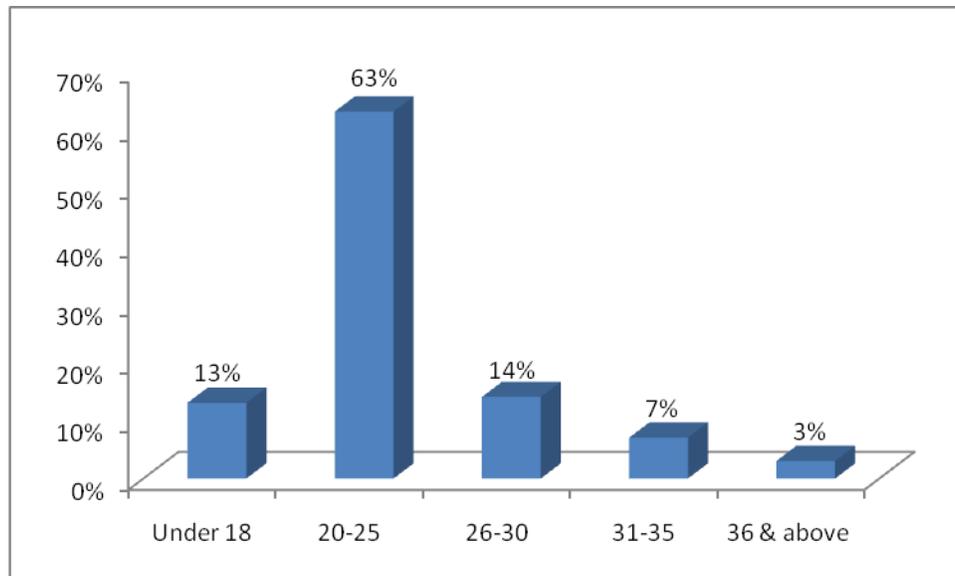
Two different questionnaires were prepared for both subscriber segments with some common set of questions. The graphical representation of the survey responses is elaborated as follows:

Home Subscribers

55% of the respondent had 4-6 family members, whereas only 10% had more than 6 household members.

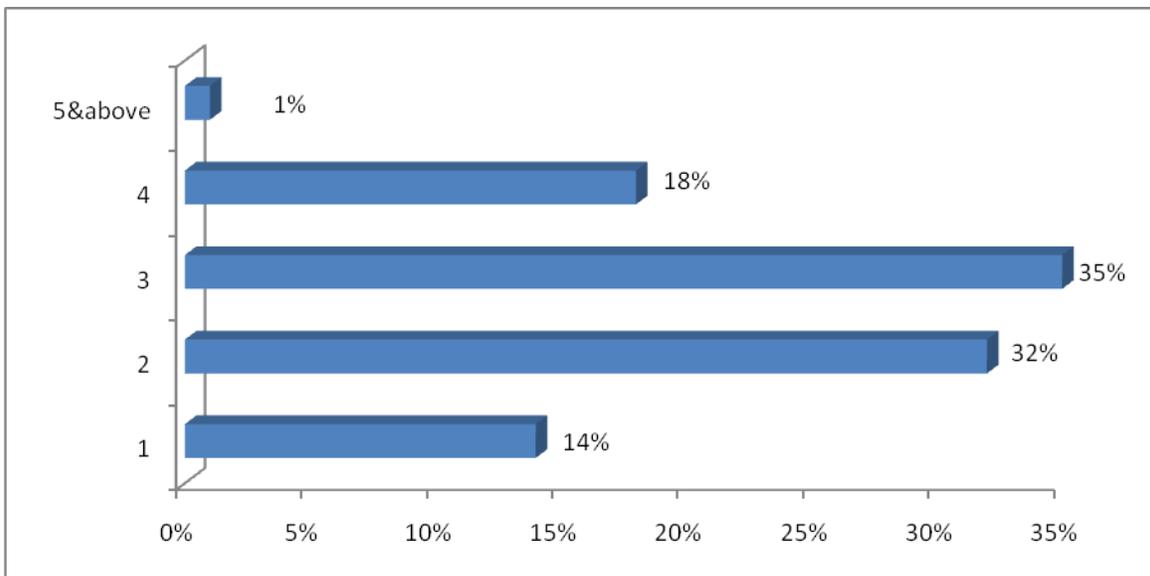


Interestingly, majority of the respondents had family members belonging to 20-25 age groups. 77% of the participants had family members between 20-30 age groups.



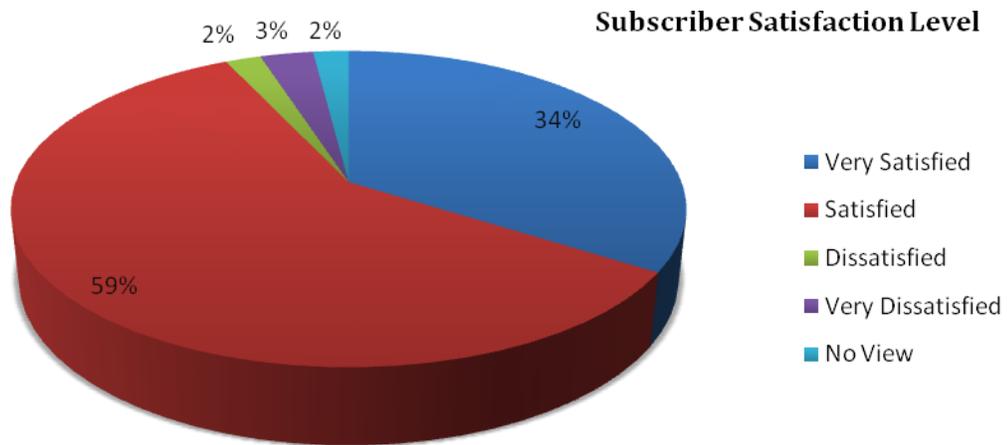
Age Groups

The core question of the survey surrounds among the estimation of number of broadband users, the answers reveal that 35% of the home broadband connections are in use of 3 family members whereas 19% of the respondent had 4 members behind a single broadband subscription.

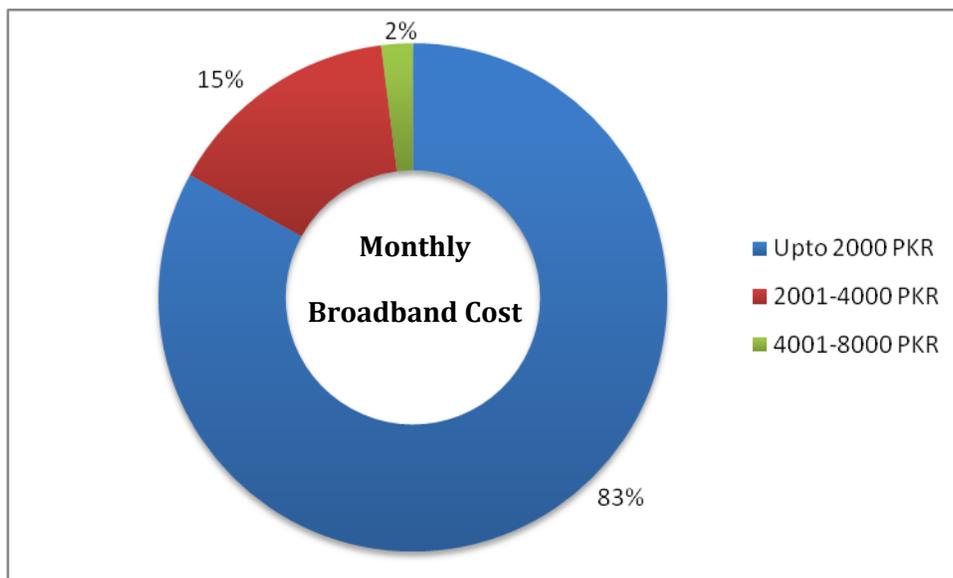


Number of Households Users

93% of subscribers expressed general satisfaction with their broadband connection where as only 5% showed some level of dissatisfaction.

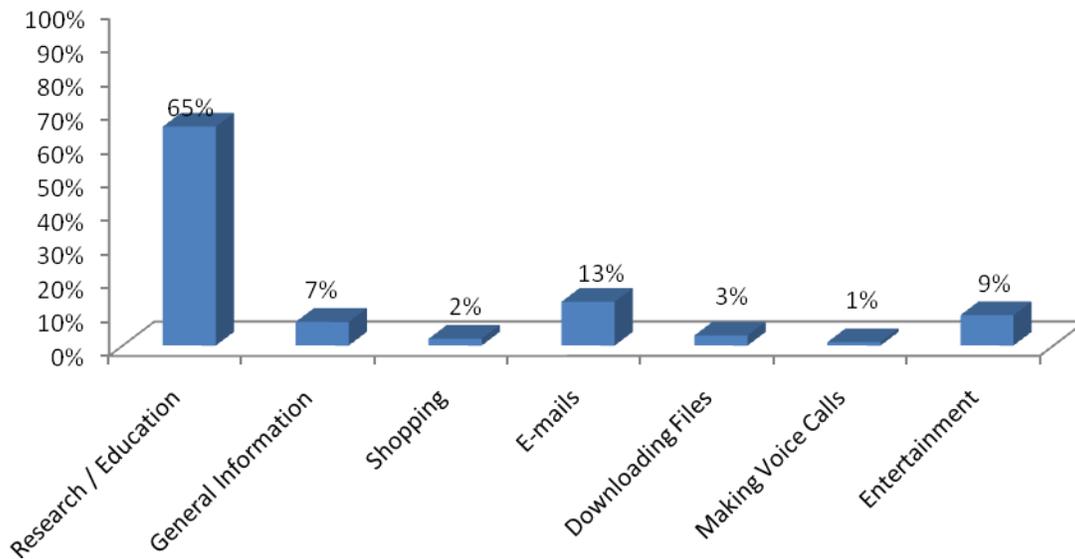


Monthly broadband expenditure pattern reveal that 83% of the subscribers spend up to PKR 2000 for their broadband usage where as only 2% bear more than PKR 4000 per month on broadband.



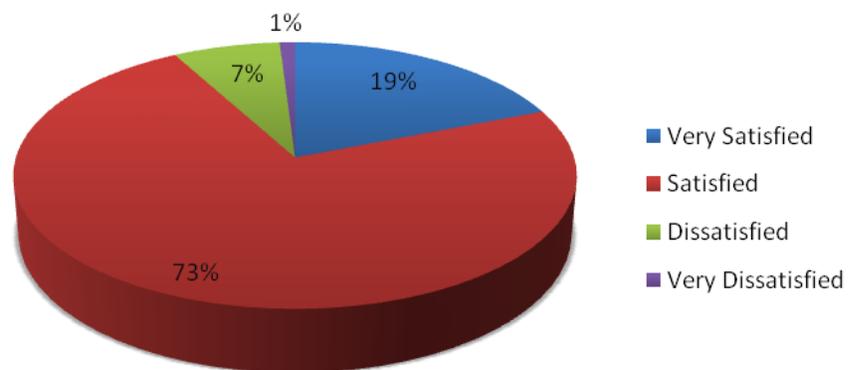
Principle priority area of consuming a broadband connection is research and education followed by e-mails. Only 2% of the home subscribers consider online shopping as primary reason of utilizing broadband.

Primary Broadband Usage

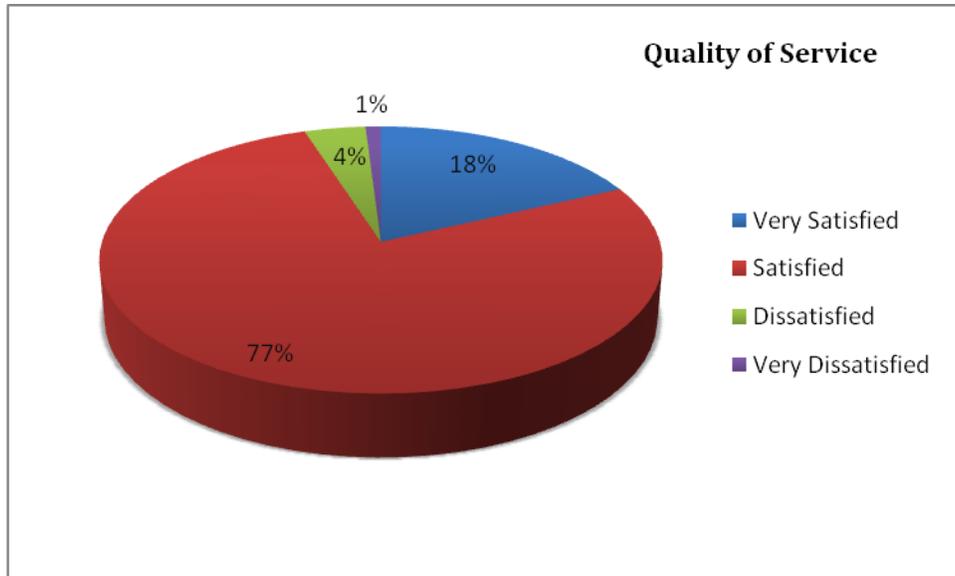


Connection speed is considered as the most important aspect of a broadband service, 73% of the survey respondent answered that they are satisfied over the consistency of their broadband connection speed.

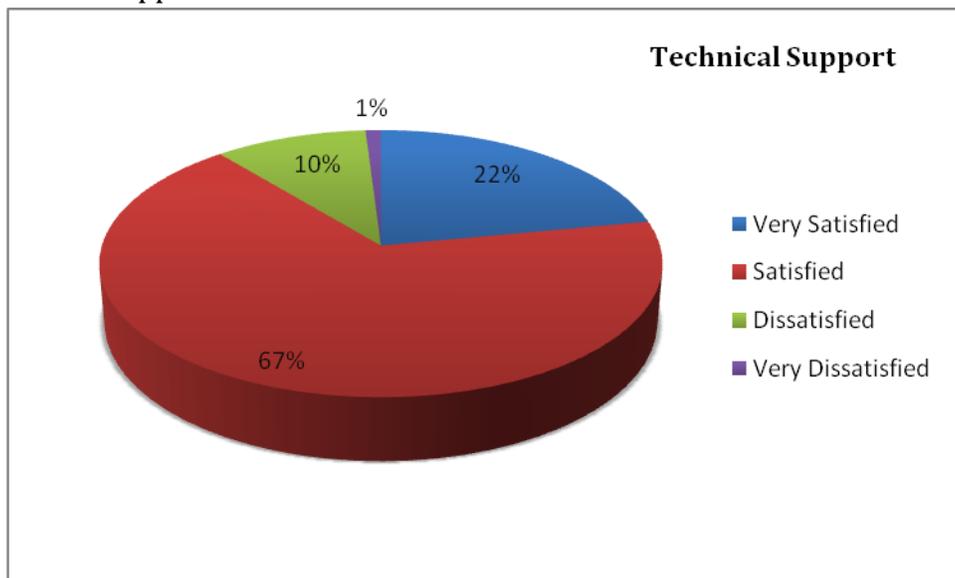
Consistency of Speed



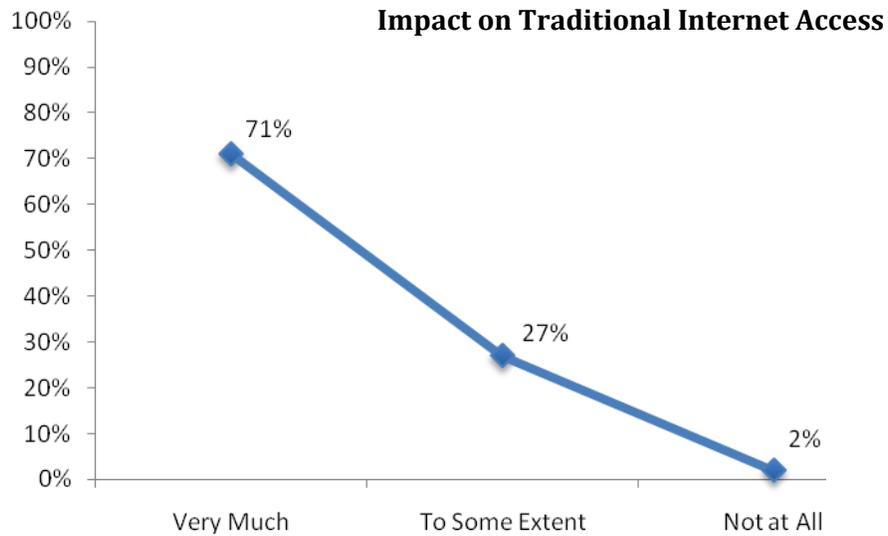
Similarly a large segment of survey respondent expressed their satisfaction over the quality of their service. This again shows a positive sign of consumer perception regarding the broadband connection.



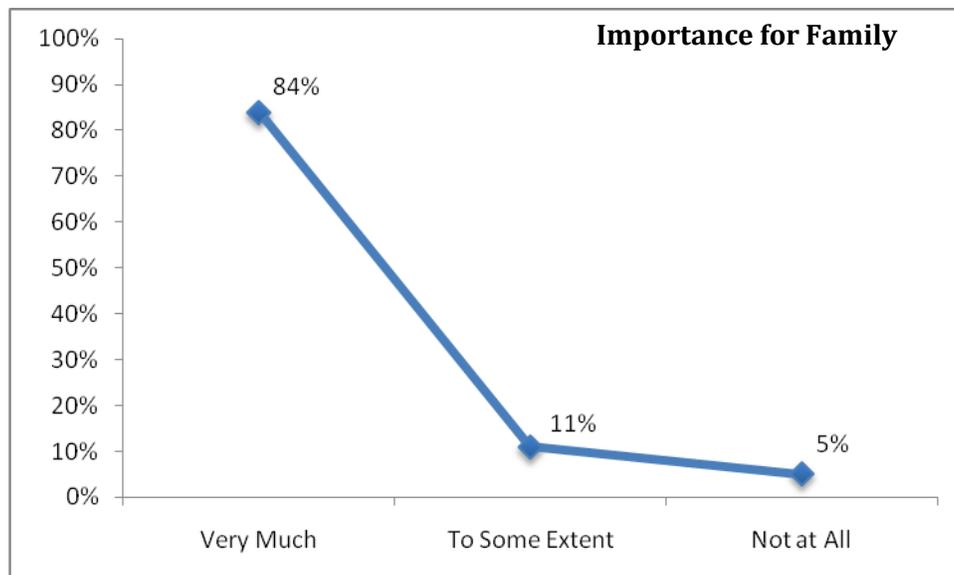
We asked the consumer for their views on the technical support provided by their broadband service provider. Results show that 89% of them were satisfied with the present technical support level.



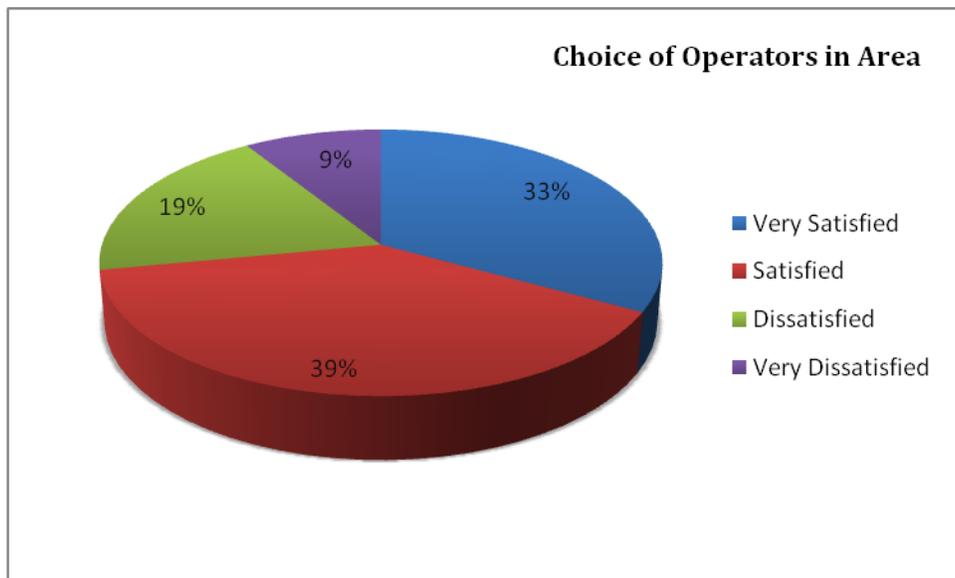
In order to assess the change experienced by broadband users while accessing Internet especially in the context of traditional dial up Internet access, the survey participants were asked as to what extent broadband has shown an impact on traditional Internet access. The result shows that 27% subscribers rate it to some extent while 71% rate this impact as a noteworthy one.



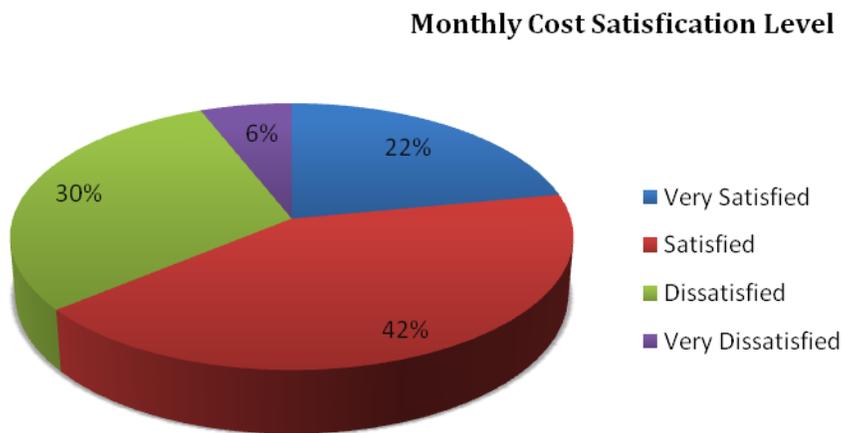
Home subscribers were also questioned to what extent is the broadband important for their families. 84% of the respondent were of the view that broadband has now become an important part of their family life.



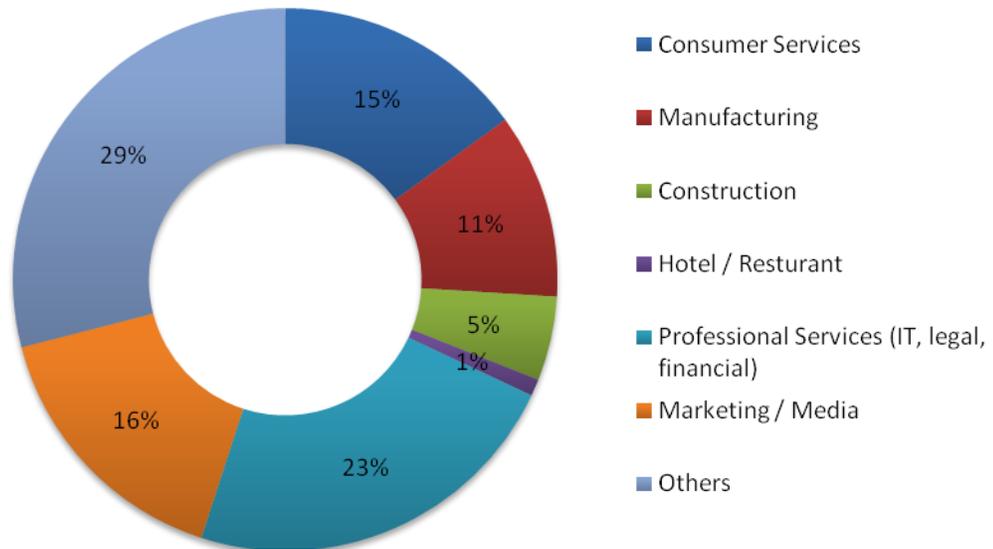
In reply to a question asked to assess the availability of alternative service providers, survey respondent expressed some level of dissatisfaction, 28% of them were either dissatisfied or very dissatisfied over the present choice of operators in their respective geographies.



On the same patten, in order to assess the satisfaction trends for monthly broadband tariff, participants were asked to present their views on monthly expenditure for broadband subscription. 64% were either very satisfied or satisfied while 36% were not satisfied.

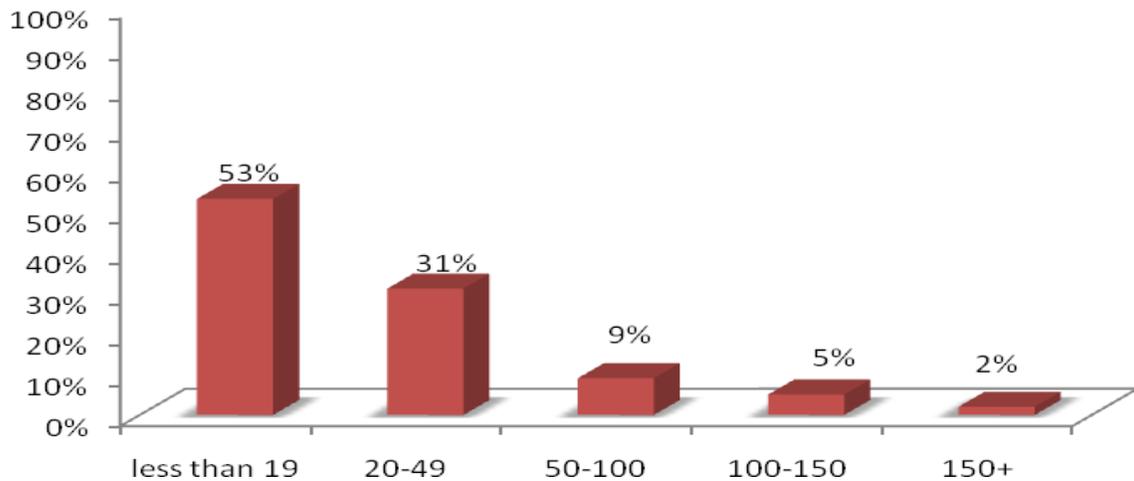


Business Subscribers



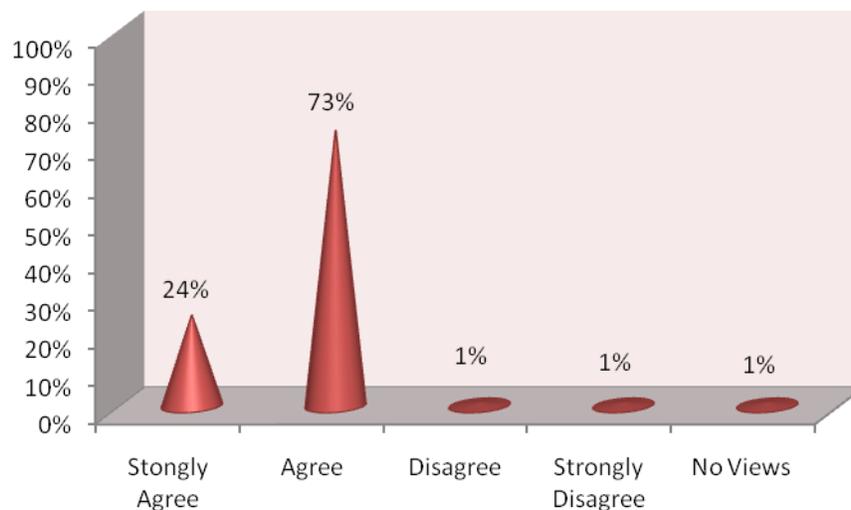
Business Segments

The doughnut chart above shows the associated business segments of the survey participants. Others category included various business categories and Universities. 29% of the businesses subscribers were engaged in other services followed by 23% professional service companies.



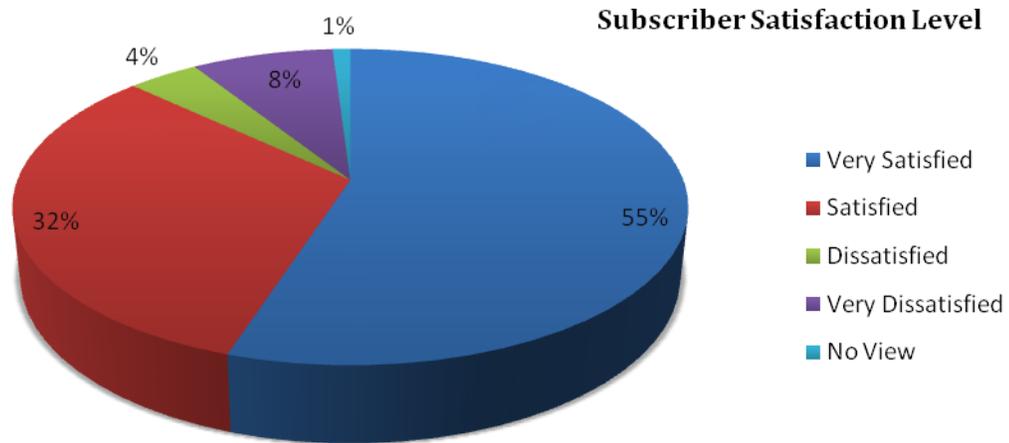
Staff Members with Broadband Access

While the estimated numbers of broadband users were to be calculated, business subscribers as a part of the entire broadband market are also made part of this approximation. Majority of the businesses (84%) revealed that 49 or less staff members have access to use Broadband.

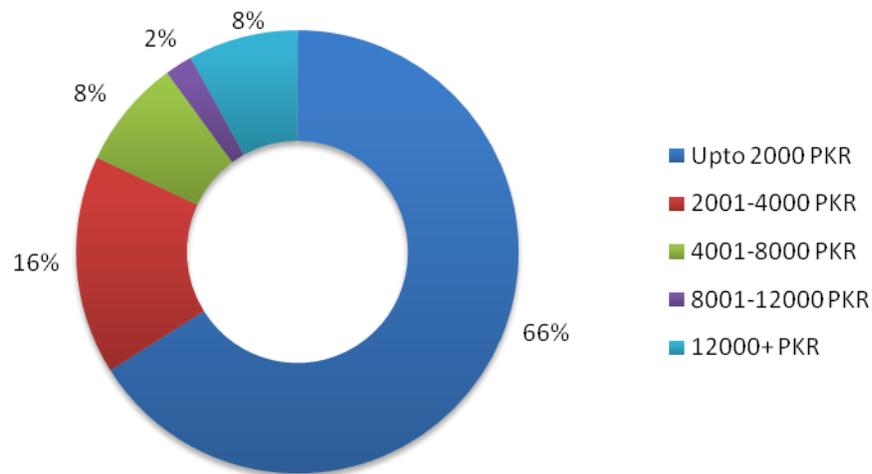


Broadband is critical for Business Operations

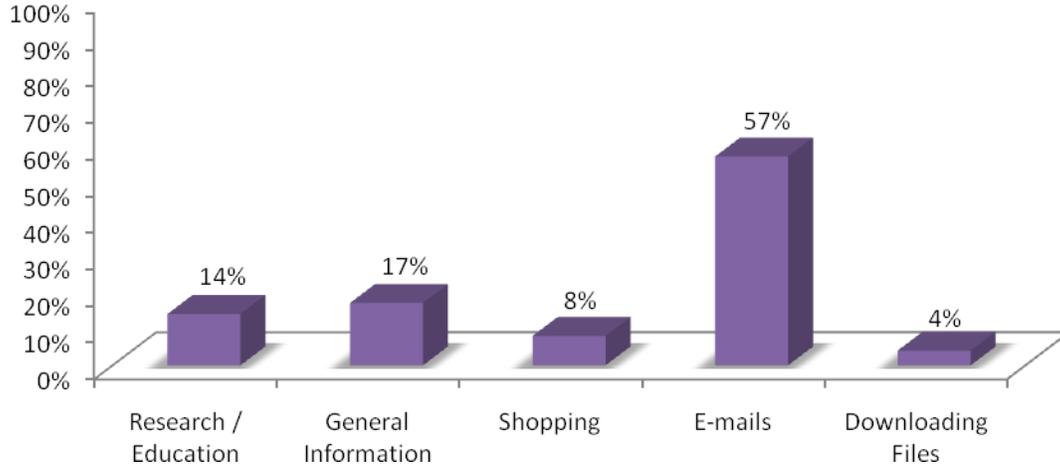
73% of the business respondents admitted that broadband is critical to execute business operations while only 2% denied any decisive role of broadband.



Likewise the residential subscribers, the business subscribers also expressed quite a good level of satisfaction over the broadband connection, 87% were either very satisfied or satisfied.

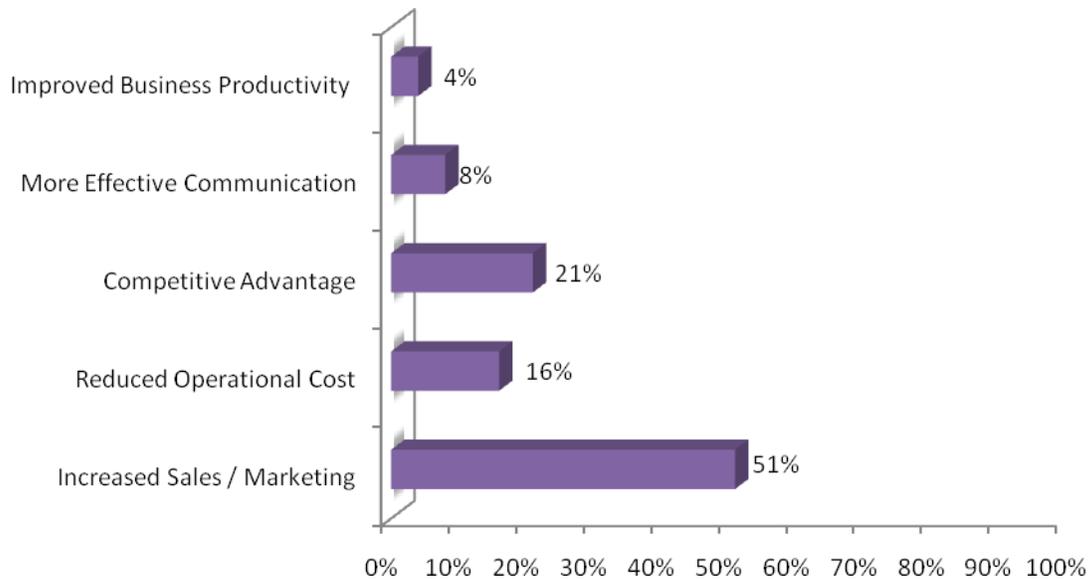


8% of the business respondents told that their monthly broadband cost exceeds 12000 PKR, however still the majority of business respondents (66%) were spending up to 2000 PKR.



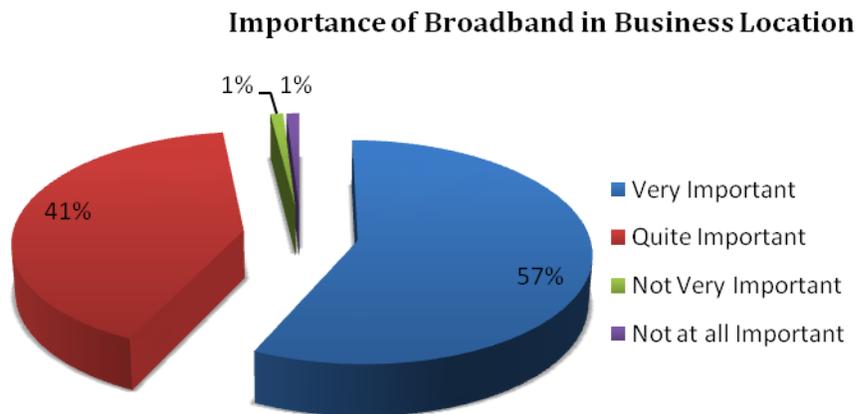
Primary Broadband Function

E-mails remained the primary broadband function performed by business subscribers, followed by general information and research / education. In comparison with home subscribers 8% of the business users were performing online shopping via Broadband connection.



Perceived Business Advantage

51% of the business subscribers consider that broadband has resulted in general increase in sales and marketing activities whereas 21% perceived it as a competitive advantage for their business.



In response to the last question of importance of broadband availability while choosing their business location, 98% considered broadband imperative for their business area.

Survey Analysis

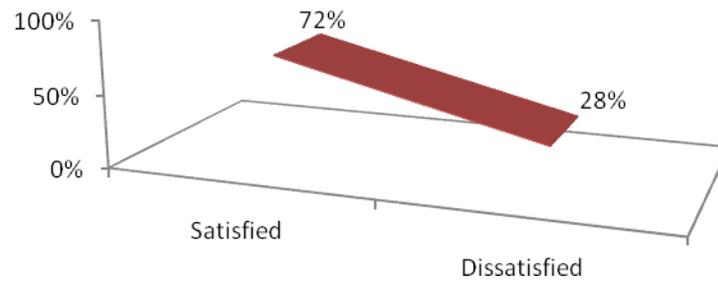
The broadband subscriber's survey has resulted in portraying some very interesting facts about the present market status, consumer perception, broadband service performance and approximation regarding the number of broadband users in the country. This part of the report elaborates the key analysis statements which could be drawn on the basis of the received responses.

Connections, Choices & Cost

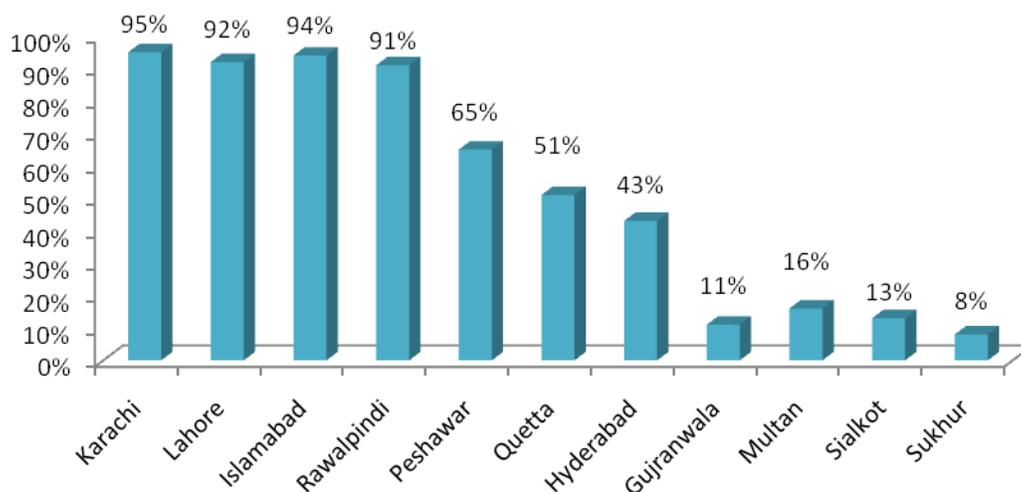
The recent rise in home broadband adoption, in the era of severe economic recession, may seem startling, as affording an additional cost of a high speed connection might be difficult if discretionary income is tight. On the other hand this rapid adoption clearly represents availability of a hale and hearty broadband market.

Some four years ago home broadband access generally came in two flavors – cable or DSL services provide by few service providers. Since then the range of options has expanded. Even though most home broadband users still have DSL, wireless access has made a significant dent among home broadband users, and fiber-to-the-home also registers as a high-speed access path for users.

To explore the extent of choice available to consumers for selecting different broadband connections (technologies), all home users received this question: “**How satisfied are you with the choice of Broadband connection in your area?**” The replies of 28% home subscribers were against the contentment level. This means that though the broadband market has gone mature in the technological aspect but still part of consumer segments are yet to reap benefits of choosing among a mixture of technologies in their locality. This statement strongly comes into play for smaller cities and towns.



In order to assess the detail pattern of this dissatisfaction, responses received from all cities were analyzed to verify the statement. The following graph highlights the present predicament of 'no other choice' situation for subscribers in surveyed cities.

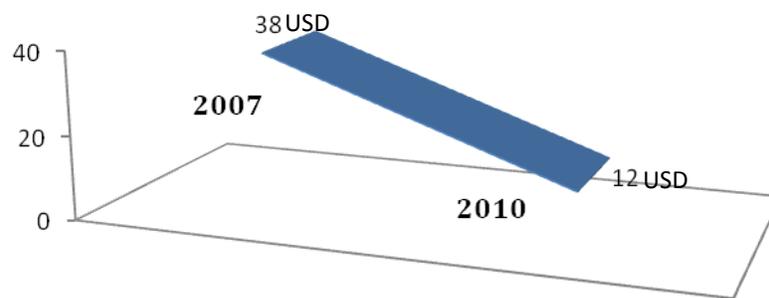


Satisfied with Operator Choice in your Area

A ground factor of establishing niche market by the service providers could probably be the prime reason behind it. Several operators have limited their operations within a specific city or even in a specific area of a city. Broadband is a last mile access technology which gives an open freedom to an operator to restrict the service offerings inside specific vicinity. The only exception has been the incumbent operator covering almost 130 cities with broadband services. This indeed is natural in view of its massive fixed line and wireless infrastructure throughout the country, providing the opportunity to enjoy its monopoly status for broadband market as well.

The market of services like broadband is dependent on a number of socio-economic aspects in order to proliferate. Cost of service being the foremost important one especially in economy like Pakistan where majority of population is at the 'Bottom of Pyramid', unable to subscribe for a service despite having little know how about computers and Internet.

Statistics for last three years demonstrate an optimistic change in broadband tariffs, average minimum per month tariff lowering from USD 38 to USD 12 as per the present exchange rate for US dollar. The above comparison is for an unlimited download connection with 512kbps speed. It may also be noted that present per month capita income for Pakistan stands as USD 91; present minimum tariff of broadband is 13% of the per month income. This spares further reduction in broadband cost for inclusion of general population. Furthermore, the concern of dissatisfaction over monthly broadband cost was revealed by 36% of the survey respondents. Keeping in view the minimum tariff of USD 12, the percentage of dissatisfaction state that further reduction in tariff could result in astonishing growth of broadband among home subscribers.



Overall, 83% of home and 66% of business respondents were spending up to PKR 1200 (USD 14) for their monthly broadband usage. The rates for broadband in more matured subscriber base markets are quite high. To put the comparative analysis of Pakistan's average monthly broadband bill of USD 12 into context, an assessment of prices across countries for OECD finds an average monthly broadband bill of USD 38 (source OECD).

Interestingly, major portion of business subscribers (66%) is spending within the same slab of under PKR 1200 as observed for home subscribers (83%). This trend may also indicate that very few broadband operators are defining exclusive tariff plans business subscribers. Since general view about business broadband is a high cost and high speed

dedicated connection. Only 7% of the business subscribers were spending more than PKR 4000 (USD 47) per month for broadband service including the Universities.

The above mentioned trend is second by another survey result that shows 39% of the business broadband had an access to less than 19 employees. While, the general broadband accessibility remains low in businesses, the monthly expenditure is roughly as same as home broadband subscriber.

Broadband & the Community

Despite the fact that core objective of the consultancy surrounds the estimation of broadband users in the country, questions asked from the subscribers have also assisted in generating various dynamics of broadband market in the country. How do the community members rate the importance of broadband and what interest they pose behind subscribing to a high speed broadband Internet are among those dynamics.

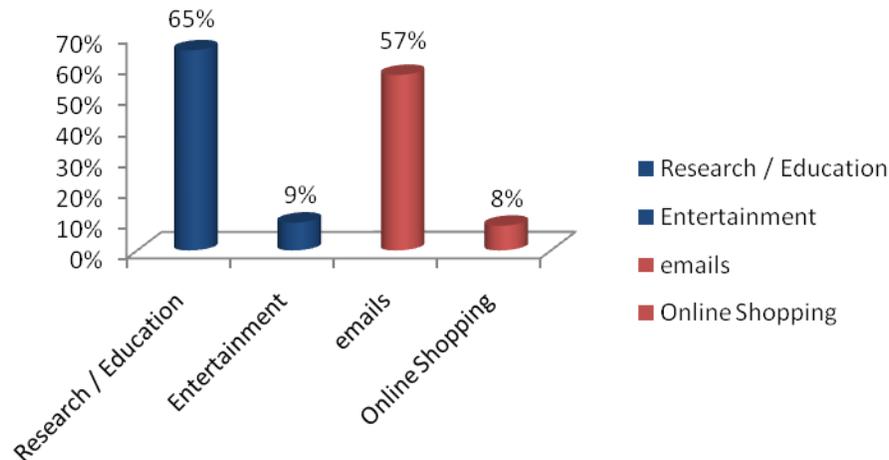
As a public issue, broadband has taken on a higher profile in recent time because of various activities performed by policy maker and regulator. Moreover, the introduction of USF (Universal Service Fund) to fund broadband proliferation in almost all part of the country. Because of the increased prominence of broadband in public debate, this survey queried broadband users about the impact of broadband on traditional Internet access, importance of broadband in their daily lives.

Most broadband subscribers believe broadband is at least “somewhat important” for their families. 84% ranked broadband “very much” important with only 4% rating it “Not at All” important. This shows a positive impact of broadband value in home market, broadband has acquired meaningful place in daily lives of subscribers. Sharing information among each other remains a basic part of our society hence this trend would assist in further increase of broadband acquisition as well.

Fruitful information was received with respect to primary broadband usage priority for home subscribers. Home users are performing almost all sort of different activities over a broadband connection. Starting from sending e-mails, performing shopping, downloading files to gathering information, performing research and general entertainment. 1% of the respondents were having a broadband connection primarily to make voice calls over Internet. Similarly business subscribers also disclosed their top usage priorities; the following bar chart highlights a comparison of broadband usage pattern between home and business users. Blue bar represents the home segment whereas red shows the business.

65% of the home subscribers opting broadband to carry out research and educational activities is indeed an attractive indication, however 57% of the business subscriber were

utilizing e-mails as primary activity. This point towards a sort of under-utilization for a broadband connection by majority of business users. 8% of the business users rated online shopping as their prime reason for paying for broadband. Though not a significant number nevertheless in view of overall trend of online shopping in the country the figure is quite fine.

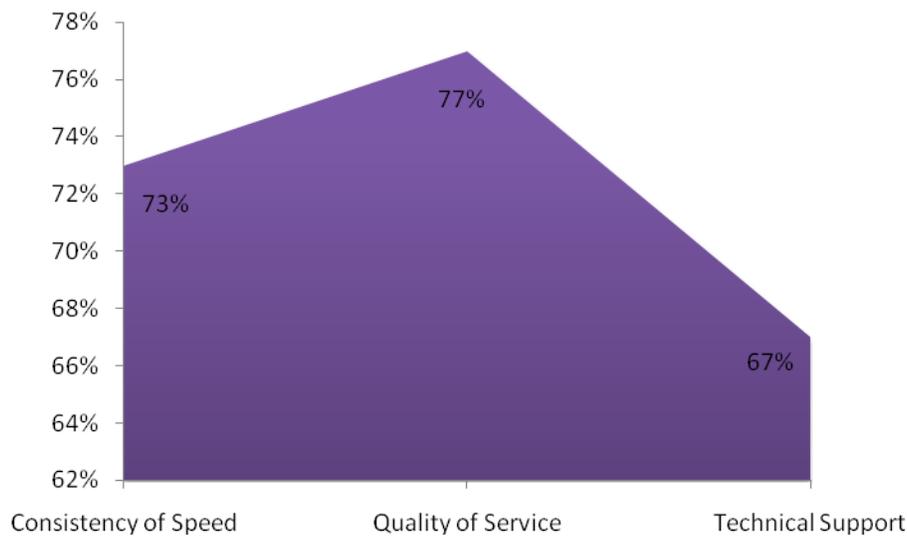


Going further in analyzing as how broadband has affected the business operational activities, a question on perceived business advantage was asked from the business subscribers. The response of 51% of the respondent state that broadband is supporting them to increase sales & marketing activities. 21% think that broadband is providing them a competitive advantage whereas 16% believe that broadband has reduced their operational cost. All these three factors surely verify that businesses are considering broadband as an important tool towards their day to day business activities.

71% of the home respondents believed that broadband had 'very much' impact on the traditional Internet access. It has given them a large window access where they are now able to effectively utilize Internet as compared with traditional dialup service. This judgment also affirms the subscribers view on their experience of virtually all types of internet use over high speed connection speed and this has become even more important as the use of bandwidth-hungry applications such as downloading video and audio has grown.

Broadband Service Performance

To help us understand attitudes towards broadband service metrics, we surveyed consumers on their satisfaction with broadband service, focusing on various issues in particular. The overall responses portray that home and business subscribers are fairly satisfied with broadband services metrics. The following bar chart shows what percent of respondents were satisfied for speed consistency, quality of service and technical support provided for their broadband connection.



This high ranked contentment from the subscriber is certainly a testimony of an excellent broadband service provision from the operators. Although, the aspect of speed consistency and quality of service very much rely on the available load on the broadband network but the responses received are of high standard in any situation.

The operators have set an excellent technical support level for their customers, 67% of the respondent were satisfied with the customer support services. These high standards of support also specify the concentration being given by service providers in customer relationship management.

Estimating Broadband Users

This section of survey analysis answers the principal objective of the broadband subscriber's survey, estimation of probable number of broadband users in Pakistan. The estimation methodology consist various factors to forecast number of broadband users,

both home and business users were calculated separately. However, the total numbers of broadband users on a whole were estimated by combining the both segments.

Central tendency in accordance to the received survey data was supposed to be most critical factor for the estimation. Other factors like respondent's age groups, households and geographies were also taken as part of computing 'multiple factor'. The 'multiple factor' remained the most important result to answer the total number of broadband users in Pakistan.

The central tendency for home subscribers was calculated on the percentages of data received against the question no 2 i.e. '**How many households use broadband and what are their ages**'? The following table depicts the percentage of received responses with regards to number of broadband users against a single broadband subscription. Total sample size of 2098 subscribers was surveyed, 1722 (82%) of them were home broadband subscribers.

Number of Broadband Users	Percentage of Responses	Total count out of 1722
1	14%	241
2	32%	551
3	35%	603
4	18%	310
5 or more	1%	17

Before going along the statistical calculation on a broad scale, a realistic figure of broadband users emerged from the survey could be gathered to have some initial notion. The following table calculates the home broadband users for the survey respondents.

Subscriber Count	Number of Users	Total Number of Users
241	1	$241 \times 1 = 241$
551	2	$551 \times 2 = 1102$
603	3	$603 \times 3 = 1809$
310	4	$310 \times 4 = 1240$
17	5	$17 \times 5 = 35$
Total Broadband Home Users		4427

While organizing the calculation of required multiple factor, several International practices were also studied for similar kind of broadband user's estimation. Though not a single example matched the kind of estimation being performed through the survey. However, general preview illustrates requirement of carrying out survey to gain consumer data and then apply necessary calculation to produce various kind of information.

According to Computer Industry Inc. (a renowned Internet research company), the best method to make an estimate and forecast of Broadband users would be based on comprehensive survey resulting in sample data. This sample data could then be applied on large scale to estimate some realistic figure of users.

In order to calculate the average number of users per broadband connection, statistical formula for adding the sum of the means times percent represented was followed. This calculation formula was found the most reliable one to figure out a mean value for broadband users per subscription. The nearest possible approximation will be applied to overall broadband subscriber's data in the country to estimate the number of broadband users in Pakistan.

The following calculations were performed on the received data to obtain the required 'multiple factor' for home broadband subscriptions on the basis of the following respondent data.

Number of Broadband Users	Percentage of Responses
1	14%
2	32%
3	35%
4	18%
5 or more	1%

$$(1 \times .14) + (2 \times .32) + (3 \times .35) + (4 \times .18) + (5 \times .05) = 2.8$$

The survey results represent an average mean of 2.8 broadband users utilizing a single home broadband connection.

The same pattern of estimation is followed to calculate the average number of broadband users against a single business broadband subscription. The central tendency for business subscribers was calculated on the percentages of data received against the question no 2 i.e. '**How many staff members of your company have broadband access?**' The following table depicts the percentage of received responses with regards to number of business users against a single broadband subscription. Total sample size of 2098 subscribers was surveyed, 370 (18%) of them were business subscribers.

Staff Members with	Percentage of Responses	Total count out of 370
--------------------	-------------------------	------------------------

Broadband Access		
1-19	53%	196
20-49	31%	115
50-100	9%	33
100-150	5%	19
150-200+	2%	7

Since the responses received for staff members behind a single connection were given specific ranges, the first step in approximation would involve calculation of median for every range value since the individual number of users is not available. The following table shows the median for each range.

Range	Median
1-19	10
20-49	34
50-100	75
100-150	125
150-200	175

Before going along the statistical calculation on a broad scale, a realistic figure of broadband users emerged from the survey could be gathered to have some initial notion. The following table calculates the business broadband users for the survey respondents.

Subscriber Count	Number of Staff Member with Broadband Access (median value)	Total Number of Users
196	10	$196 \times 10 = 1960$
115	34	$115 \times 34 = 3910$
33	75	$33 \times 75 = 2475$
19	125	$19 \times 125 = 2375$
7	175	$7 \times 175 = 1225$
Total Broadband Business Users		11945

In order to calculate the average number of users per business subscription, the same statistical formula for adding the sum of the means times percent represented was followed. This calculation formula was found the most reliable one to figure out a mean value for broadband users per subscription. The nearest possible approximation will be applied to overall business broadband subscriber's data in the country to estimate the number of business broadband users in Pakistan.

The following calculations were performed on the received data to obtain the required 'multiple factor' for business broadband subscriptions on the basis of the following respondent data.

Number of Staff Members with Broadband Access (Median Value)	Percentage of Responses
10	53%
34	31%
75	9%
125	5%
175 or more	2%

$$(10 \times .53) + (34 \times .31) + (75 \times .09) + (125 \times .05) + (175 \times .02) = 32.34$$

The survey results represent an average mean of 32.34 broadband users utilizing a single business broadband connection.

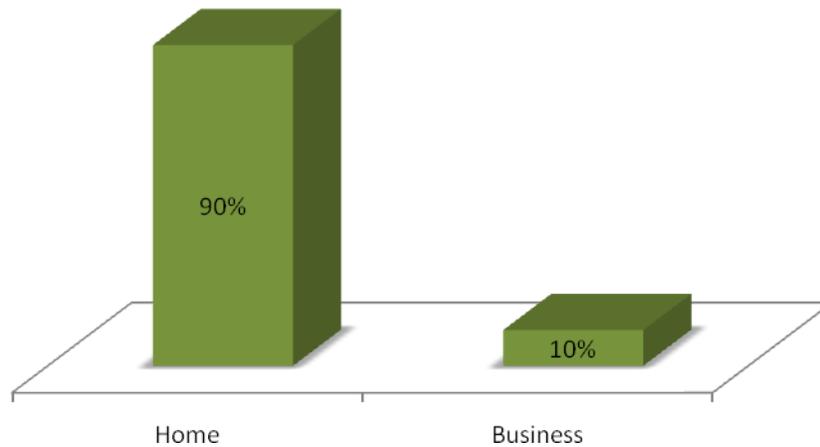
Margin of Error

Before going to find the key answer for this survey, a reference to keep in the element of margin of error may be made. Margin of error is a statistic expressing the amount of random sampling error in a survey's results. The larger the margin of error, the less faith one should have that the reported results are close to the "true" figures; that is, the figures for the whole population.

According to available information, a sample size of 2000 can have a 3 percent margin of error with more than 95 percent of level of confidence.

Estimated Number of Broadband Users in Pakistan

During the course of this survey, the overall broadband subscription growth rate remained at high side. By March 2010, the subscription was recorded as 773,000. Since at present no authentic statistics are available for differentiating the percentage share of home and broadband subscription respectively. However, general view predicts that 90% of the whole broadband subscription belongs to home level whereas 10% are from business segment.



Predicted Broadband Market Share

The multiple factor calculated above would be used to estimate the number of broadband users in both segments separately. The following table attempts to gauge the present number of broadband subscribers segment in the country.

Market Segment	Predicted Share	Market	Number of Subscriptions (March 2010)
Home	90%		695,700
Business	10%		77,300

The survey respondent data gave a hand to perform necessary analysis and figure out a rough number of broadband users per subscription. The number came up as **2.8** for home broadband and **32.34** for business broadband.

The number of home broadband subscription (as per prediction of 90% market share) was recorded as 695,700 by March 2010. If we multiply the factor of 2.8 users per subscription with the total number of 695,700, the following numbers of home broadband users in Pakistan show up.

$$695700 \times 2.8 = 1947960$$

In order to follow the margin of error concept and retain the maximum possible accuracy for the estimation of total number of user, the 3 percent margin of error rate against a sample size of 2000 is calculated below.

$$1947960 \times .03 = 58440$$

The final figure for predicting the total number of home broadband users is as below.

$$1947960 - 58440 = 1889520$$

The estimated number of broadband home users in Pakistan as of March 2010 is 1,889,520.

The number of business broadband subscription (as per prediction of 10% market share) was recorded as 77,300 by March 2010. If we multiply the factor of 32.34 users per subscription with the total number of 77,300 the following numbers of business broadband users in Pakistan show up.

$$77300 \times 32.34 = 2499882$$

In order to follow the margin of error concept and retain the maximum possible accuracy for the estimation of total number of user, the 3 percent margin of error rate against a sample size of 2000 is calculated below.

$$2499882 \times .03 = 74996$$

The final figure for predicting the total number of home broadband users is as below.

$$2499882 - 74996 = 2424886$$

The estimated number of broadband business users in Pakistan as of March 2010 is 2,424,886.

The key question of the consultancy 'Total number of Broadband users in the country' is hereby answered as.

“

As of March 2010 broadband subscribers data and on the basis of necessary calculation carried out on a nationwide survey with a sample size of 2097 broadband subscribers. The total number of broadband (home + business) users in Pakistan is 4,314,406 or 4.3 Million.

“

Conclusion

This survey report is a result of a consultancy carried out by Pakistan Telecommunication Authority examining the consumer broadband market in Pakistan. The survey was performed at various broadband available cities of the country using telephonic, online and face-to-face methods. While the survey followed various methodology and approach to data collection and presentation, it does offer a wider range of insights into the broadband market and the experiences of subscribers in Pakistan.

Access to broadband services will continue to impact on how population interact with society, as an example accessing information on government services, social interaction, entertainment, general information gathering, research and education, and online shopping among others. Addressing consumer awareness and understanding of the benefits of broadband will go together, ensuring that broadband is available nationwide to a receptive and engaged base of consumers, which can in turn benefit from a wider range of broadband services.

The responses of the respondent reveal that the three key factors affecting the recent broadband take-up in Pakistan are intensified competition, high availability of broadband in highly dense metropolitans and increased User interest on using Internet. This survey report has is a representative snapshot of estimated broadband users in the country by March 2010. The broadband market is changing rapidly, driven by consumers growing demand for faster broadband. Operators, in turn, are continuing to bring in faster version of broadband networks.

The survey has given us valuable insights into consumer's perception of and experience of their broadband services. The survey and performance results suggest that service providers are performing up to satisfaction level of subscribers. Elements of technical support, quality of service, monthly cost and speed consistency were all given a sign of contentment by the subscribers. Our survey findings – particularly those relating to the level of consumer dissatisfaction in relation to choice of broadband operators - indicate that there is both consumer demand for subscribing to different broadband technologies and room for further improvement in such areas.

Finally the most promising result achieved through the survey is the usage advantage for the home broadband subscribers, education & research stands as the most primary reason of subscribing to a broadband connection. Subsequently, the subscribers are also considering broadband for their families and day to day affairs.

The detail online data and reports for the survey can be found on:

<http://para-digm.com/survey/admin/default.php>

Glossary

DSL Digital Subscriber Line. A family of technologies generally referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as 'twisted copper pairs') into high-speed digital lines, capable of supporting advanced services such as fast Internet access.

Backhaul The links by which data are transmitted from a local telephone exchange back to the core or backbone of the operator's network.

Bandwidth The maximum amount of data that can be transmitted along a channel.

Broadband A service or connection generally defined as being "always on" and providing a bandwidth greater than narrowband.

Broadband speed The speed at which data are transmitted over a broadband connection, usually measured in kilobits per second (kbps) or megabits per second (mbps).

Local loop The access network connection between the customer's premises and the local PSTN exchange, usually a loop comprising two copper wires.

Hybrid fibre-coaxial (HFC) is a telecommunications industry term for a broadband network which combines optical fiber and coaxial cable. It has been commonly employed globally by cable TV operators since the early 1990s.

WiMAX (Worldwide Interoperability for Microwave Access) is a telecommunications protocol that provides fixed and fully mobile internet access. The current WiMAX revision provides up to 40 Mbit/s[1][2] with the IEEE 802.16m update expected offer up to 1 Gbit/s fixed speeds.

Evolution-Data Optimized or Evolution-Data only abbreviated as EV-DO or EVDO and often EV, is a 3G telecommunications standard for the wireless transmission of data through radio signals, typically for broadband Internet access.

Broadband Subscriber Survey Questionnaire

General Information

What type of customer are you?

- Business or Commercial (Respond to Part 1)
 Residential (Respond to Part 2)

Which Broadband Technology is subscribed by you?

DSL WiMax HFC FTTx Satellite EVDO

Name of your service provider(s):

PART 1**Business/Commercial Subscriber**

What is your primary business activity? (Please check only one option)

Consumer Services Manufacturing Construction Hotel/Restaurant
Others

Marketing/Media Professional services (IT, legal, financial, consulting)

How many staff of your company has broadband access?

1-19 20-49 50-100 100-150 150-200 200+

To what extent do you agree or disagree that broadband is critical for you business operations?

Strongly agree **Agree** **Disagree** **Strongly disagree** **No view**

How satisfied are you with your broadband connection?

Very satisfied **Satisfied** **Very dissatisfied** **Dissatisfied** **No view**

What is your average monthly cost for broadband service?

Which of the following functions do you conduct over the Internet?

Sales / Marketing **Business Operations** **Purchasing** **General Information**

E-mail **Others**

What benefits do you perceive as a business subscriber to a Broadband connection?

Increased Sales / Marketing **Reduced Operational Cost** **Competitive Advantage**

More Effective Communication **Improved Business Productivity** **Don't Know**

How important is the Broadband access in your choice of business location?

Very Important **Quite Important** **Not Very Important** **Not At All Important**

PART 2
Residential Subscriber

How many households' members reside at home?

How many of them use broadband and what are their ages?

Under 18 20-25 26-30 31-35 36-40 over 40

How satisfied are you with your broadband connection?

Very satisfied Satisfied Very dissatisfied Dissatisfied No view

What is your average monthly cost for broadband service?

Which of the following functions do you conduct over the Internet?

Research / Education General Information Shopping E-mails

Downloading Files Entertainment Making Voice Calls

How satisfied are you with the following aspects of your Broadband connection?

Monthly Cost Very Satisfied Satisfied Dissatisfied Very
Dissatisfied

Consistency of Speed Very Satisfied Satisfied Dissatisfied Very
Dissatisfied

Quality of Service Very Satisfied Satisfied Dissatisfied Very
Dissatisfied

Technical Support Very Satisfied Satisfied Dissatisfied Very Dissatisfied

Choice of Operators in your area Very Satisfied Satisfied Dissatisfied
Very Dissatisfied

Did Broadband made any noteworthy impact on your access to Internet?

Very Much To Some Extent Not at All

How important is Broadband for your family members?

Very Much To Some Extent Not at All