Fixed Broadband Quality of Service (QoS) Surveys

Network End Surveys

Quarter-02 2024

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1. Background

The **Fixedline Quality of Service (QoS)** surveys for fixedline operators are conducted to assess the performance, reliability, and user satisfaction of fixed-line broadband services across Pakistan. This survey aims to understand how well service providers meet the regulatory benchmarks and consumer expectations for internet speed, connectivity stability, and customer support. As fixed-line broadband plays a crucial role in both personal and business communication, ensuring high-quality service is critical for the continued growth of digital infrastructure.

These Surveys across Pakistan are governed by the "Fixed Broadband Quality of Service Regulations, 2022." The regulations were enacted to set **Key Performance Indicators (KPIs)** that BSPs must meet to ensure reliable and high-quality fixed broadband services across Pakistan. These KPIs serve as measurable benchmarks to assess the service quality delivered to customers, including aspects such as network uptime, data throughput, latency, jitter, packet loss, and customer service responsiveness.

2. Scope

QoS surveys are crucial tools for measuring the performance of broadband networks in Pakistan, ensuring service providers adhere to high standards, and continually improving the availability and quality of internet services for consumers. These surveys cover all fixed broadband technologies in use, such as xDSL, DSL, copper and fiber optics technologies. The regulations apply to all BSPs operating in Pakistan, requiring them to maintain **minimum service standards** at various levels of their networks from access nodes to core nodes.

These surveys also provide critical data on network performance, helping identify gaps and inefficiencies in service delivery. This helps regulatory authorities enforce service standards and ensure BSPs meet the requirements for customer satisfaction.

By regularly testing and publishing the results of broadband services, the PTA promotes **transparency**. BSPs are held accountable for their network performance, fostering competition and driving improvements in broadband services.

By gauging factors such as **download/upload speeds**, network latency, and customer service efficiency, the surveys enable BSPs to improve their networks, which directly impacts the **user experience**.

3. Methodology

The Quarter 02 surveys started from April 1, 2024 till June 30, 2024. In the surveys, **26 major BSPs** were inspected, operating in **22 cities** across Pakistan. These cities were selected based on their high subscriber density, ensuring that the surveys focused on areas where the quality of service would have the most significant impact. The surveyed cities include:

i. Lahore
ii. Karachi
iii. Islamabad
iv. Hasanabdal
v. Fateh Jhang
vi. Peshawar
vii. Mingora
viii. Quetta
ix. Abbottabad
x. Haripur
xi. Faisalabad
xii. Sukkur
xiii. Multan
xiv. Muzaffarabad
xv. Mirpur
xvi. Gilgit
xvii. Hunza
xviii. Astore
xix. Ghakuch
xx. Skardu
xxi. Chilas
xxii. Shigar
xxiii. Gwadar
xxiv. Faisalabad

The surveys are conducted by the teams of **Enforcement Division, PTA** at the **Network Operation Centers (NOCs)** of each BSP. This method allowed for real-time assessments of

network performance across various parameters, offering a detailed insight into the performance of fixed broadband networks at a deeper, technical level.

4. Parameters Monitored and Survey Results

Following key network performance parameters are checked during the surveys:

  i. Bandwidth Utilization
  ii. Network Availability
      a) Core Nodes
      b) Access Nodes
  iii. Network Latency / Round Trip Time (RTT)
      a) Local Network Latency
      b) International Segment – Terrestrial
  iv. Jitter

Below mentioned are details of Network level parameters measurement details along with survey results:

i. Bandwidth Utilization

This measures how effectively the network's capacity is being used. It is the ratio of peak utilization of bandwidth to the total bandwidth available.

Benchmark:

The bandwidth utilization should be < **80%**

Measurement

BSPs are required to run "Daily" MRTG (Multi Router Traffic Grapher) Graphs at 5 minute average during peak hours. The highest bandwidth utilization is the peak utilization level for each month. BASPs are required to run "Monthly" MRTG Graphs to obtain average bandwidth utilization for each month for their network. BSPs should closely monitor their links and the loading level shall not exceed.

Bandwidth Utilization = (Peak Utilization level of the network / Total bandwidth available) x 100%

Bandwidth Utilization<=80%
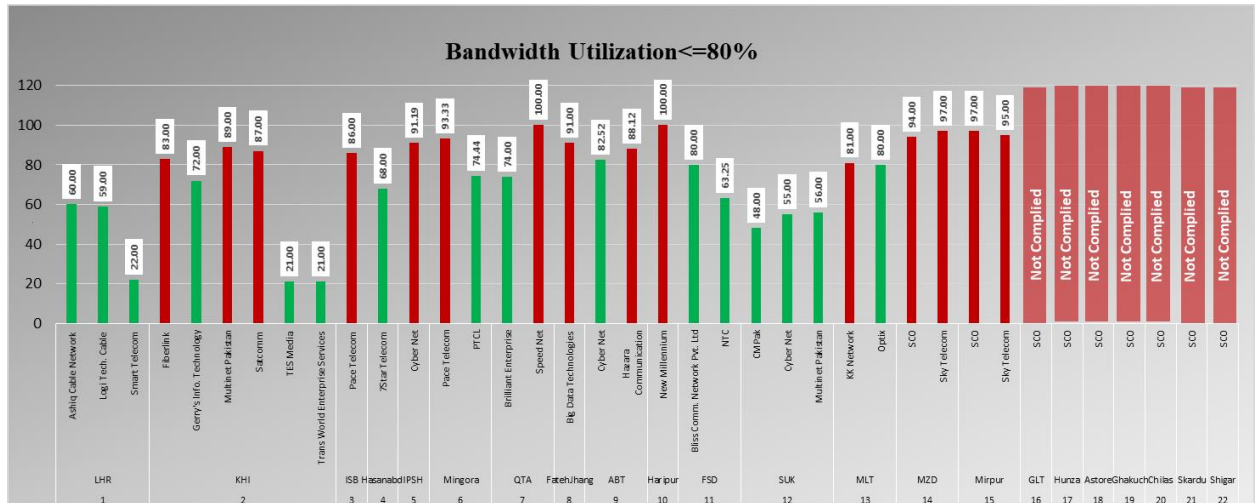
Results

Bandwidth utilization is not complied for majority of the operators and is exceeding above 80%. Operators include KK Network (Multan), Sky Telecom (Muzaffarabad & Mirpur), Multinet (Karachi), CyberNet (Abottabad, Peshawar), Fiberlink (Karachi), Satcomm (Karachi), Pace Telecom (Islamabad, Mingora), SpeedNet (, Big Data Technologies (Fateh Jhang), Hazara Communication (Abbottabad), New Millennium (Haripur) and SCO (Gilgit, Hunza, Skardu, Shigar, Chilas, Ghakuch and Astore).

ii. Network Availability

Network Availability is the measure of the degree to which the network (Access and Core) is operable and not in a state of failure or outage at any point of time.

It measures the total downtime of the network, including the ATM/IP switches, multiplexers, routers, e-mail facilities (if provided) and connection to Internet backbone over a month. All scheduled downtime for the purposes of maintenance and upgrading of the network system will be excluded from the calculation.

Benchmark

Network Availability for:

- a) Access Nodes should be > 99% and for;
- b) Core Nodes should be > 99.9%

Measurement

Network Availability = (Total operational minutes - Total minutes of service downtime) / (Total operational minutes) x 100%

a) Network Availability – Core Nodes

Core Nodes include BRAS, Metro Ethernet Switches, routers etc. along with their Operational Minutes and Down Time Minutes.

Results

Majority of operators comply with KPI i.e. Network Availability of Core Node. Only Speed Net (Quetta), Big Data Technologies (Fateh Jhang) and Hazara Communication (Abbottabad) and SCO did not (Gilgit, Hunza, Skardu, Shigar, Chilas, Ghakuch and Astore) are exceeding their KPI threshold.

b) Network Availability – Access Nodes

Access Nodes include MSAGs/MSANs, DSLAMs, ONUs, etc. along with their Operational Minutes and Down Time Minutes.

Network Availability - Access Nodes >=99%

Bar chart values (left to right): Ashiq Cable Network (LHR) 100.00, Logi Tech. Cable 100.00, Smart Telecom 100.00, Fiberlink 100.00, Gerry's Info. Technology 100.00, Multinet Pakistan 100.00, Satcomm 100.00, TES Media 100.00, Trans World Enterprise Services (KHI) 100.00, Pace Telecom 100.00, 7Star Telecom 100.00, Cyber Net (ISB) 100.00, Pace Telecom (Hasanabdl) 99.80, PTCL (PSH) 100.00, Brilliant Enterprise (Mingora) 100.00, Speed Net (QTA) 87.00, Big Data Technologies 100.00, Cyber Net (FatehJhang) 100.00, Hazara Communication (ABT) 98.99, New Millennium (Haripur) 99.99, Bliss Comm. Network Pvt. Ltd (FSD) 100.00, NTC 100.00, CMPak 99.99, Cyber Net (SUK) 100.00, Multinet Pakistan 99.99, KK Network (MLT) 99.98, Optix 99.99, SCO (MZD) 100.00, Sky Telecom 100.00, SCO (Mirpur) 100.00, Sky Telecom 100.00, SCO (GLT) Not Complied, SCO (Hunza) Not Complied, SCO (Astore) Not Complied, SCO (Ghakuch) Not Complied, SCO (Chilas) Not Complied, SCO (Skardu) Not Complied, SCO (Shigar) Not Complied

Results

Majority of operators comply with KPI i.e. Network Availability of Access Node. Majority of operators comply with KPI i.e. Network Availability of Core Node. Only Speed Net (Quetta) and Hazara Communication (Abbottabad) and SCO (Gilgit, Hunza, Skardu, Shigar, Chilas, Ghakuch and Astore) are exceeding their KPI threshold.

iii. Network Latency / Round Trip Time (RTT)

Latency or Round Trip Time (RTT) is the measure of duration of round trip for a data packet between specific source and destination. It is used to measure the delay on a network at a given time. The greater the latency within a network, the longer it takes packets to reach their destination.

Benchmark

Network Latency in Segment	Threshold
Local Network Latency	= 40 msec
International segment - Terrestrial	= 110 msec

Measurement

The RTT test shall be conducted using **"ping"** based on a minimum standard packet size of 32 bytes, and should be measured up to the edge node of the network, connected to the Internet cloud or any other server decided by the Authority. .

a) Round Trip Time (RTT) – Local Network

For calculating the Local Network Latency, obtain IP address of BSP's BRAS and run command "ping xxxx.xxxx.xxxx.xxxx –n 100" in DOS Prompt / mode. (xxxx here refers the IP address of the BRAS).
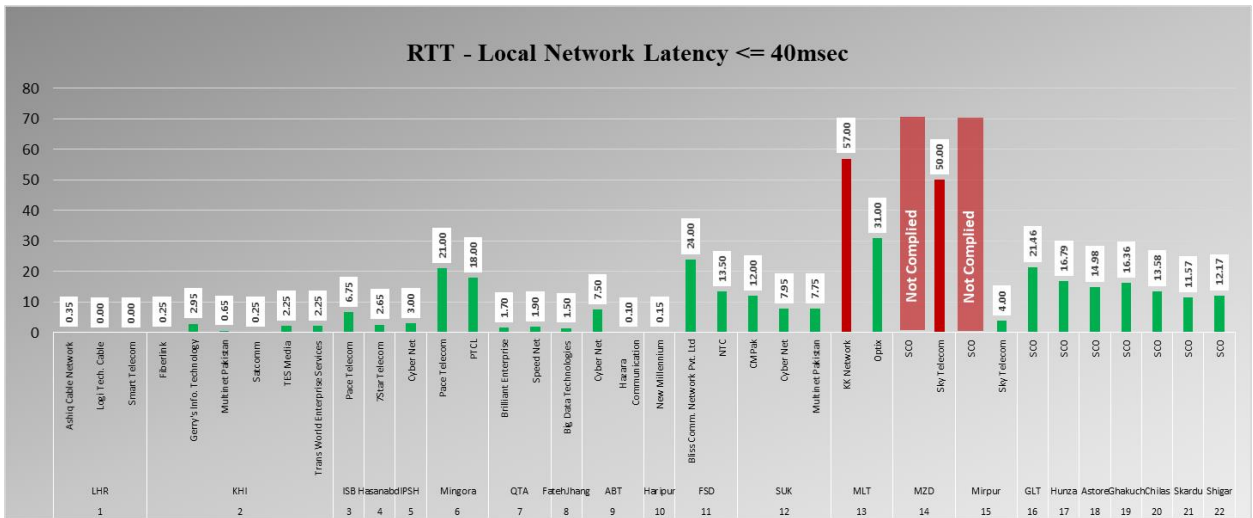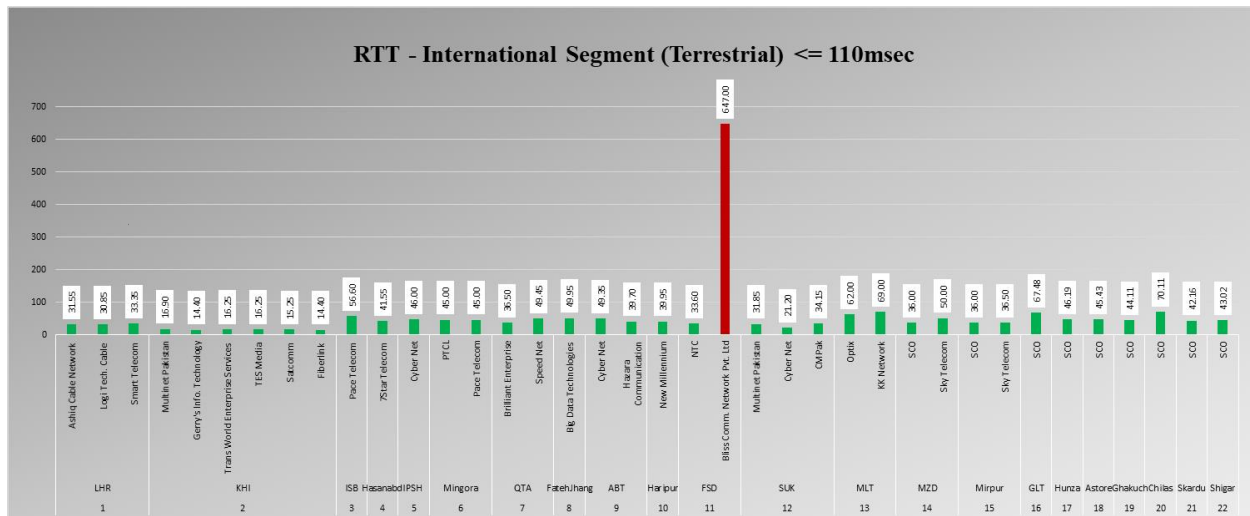

Results

Majority of operators comply with KPI i.e. Round Trip Time for Local Network. Only KK Network (Multan) and Sky Telecom (Muzaffarabad) and SCO (Muzaffarabad and Mirpur) are exceeding their KPI threshold value.

b) Round Trip Time (RTT) – International segment (Terrestrial)

For Calculating the International Segment – Terrestrial Segment: Run the following command " ping www.google.com –n 100" or any international known server as decided by the PTA team.

RTT - International Segment (Terrestrial) <= 110msec

Results

Majority of operators comply with KPI i.e. Round Trip Time for International Segment (Terrestrial Network). Only Bliss Communication Network (Faisalabad) are exceeding their KPI threshold value.

iv. Jitter (mses)

A jitter is a variation in latency. High amounts of jitter cause packets to be delivered out of sequence. In a specific time window, jitter refers to the variation between the maximum delay and minimum delay.

Benchmark

The Jitter should be **< 15 msec**

Measurement

The Jitter shall be calculated using **'ping'**. The minimum samples shall be 100. If RTT avg is the average RTT, derived out of 100 samples, and RTT 1, RTT 2....RTT 100 are the RTT for individual packets then jitter shall be calculated as follows:

Jitter (msec) = X (RTTavg-RTTk)/100 (magnitude shall be used without *+/-' signs)

Jitter<=15msec

Location	Operator	Value
LHR (1)	Ashiq Cable Network	0.71
	Logi Tech. Cable	0.70
	Smart Telecom	2.35
KHI (2)	Fiberlink	2.42
	Gerry's Info. Technology	1.22
	Multinet Pakistan	0.92
	Satcomm	0.71
	TES Media	1.03
	Trans World Enterprise Services	1.03
ISB (3)	Pace Telecom	4.80
Hasanabdl (4)	7Star Telecom	4.83
PSH (5)	Cyber Net	1.00
Mingora (6)	Pace Telecom	5.00
	PTCL	3.00
QTA (7)	Brilliant Enterprise	4.29
	Speed Net	8.46
FatehJhang (8)	Big Data Technologies	2.61
ABT (9)	Cyber Net	0.43
	Hazara Communication	1.11
Haripur (10)	New Millennium	0.85
FSD (11)	Bliss Comm. Network Pvt. Ltd	96.00
	NTC	28.00
SUK (12)	CM Pak	6.14
	Cyber Net	0.55
	Multinet Pakistan	1.04
MLT (13)	KK Network	1.00
	Optix	0.79
MZD (14)	SCO	0.01
	Sky Telecom	0.01
Mirpur (15)	SCO	0.01
	Sky Telecom	0.01
GLT (16)	SCO	0.86
Hunza (17)	SCO	0.73
Astore (18)	SCO	0.63
Ghakuch (19)	SCO	0.75
Chilas (20)	SCO	0.86
Skardu (21)	SCO	0.50
Shigar (22)	SCO	0.60

Results

Majority of operators comply with KPI i.e. Jitter. Only Bliss Communication and NTC for Faisalabad, are exceeding their KPI threshold value.

5. Quarterly Standing of BSPs for Quarter-01 2024

City	Company Name	Network Availability Core Nodes >=99.9%		Network Availability - Access Nodes >=99%		RTT - Local Network Latency <= 40msec		RTT - International Segment – Terrestrial <= 110msec		Bandwidth Utilization<= 80%		Jitter<= 15msec	
		Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)
Lahore	Ashiq Cable Network Pvt. Ltd.	100.00	Y	100.00	Y	0.35	Y	31.55	Y	60.00	Y	0.71	Y
Lahore	Logi Tech. Cable Pvt. Ltd.	100.00	Y	100.00	Y	0.00	Y	30.85	Y	59.00	Y	0.70	Y
Lahore	Smart Telecom Pvt. Ltd.	100.00	Y	100.00	Y	0.00	Y	33.35	Y	22.00	Y	2.35	Y
Karachi	Multinet Pakistan	100.00	Y	100.00	Y	0.65	Y	16.90	Y	89.00	N	0.92	Y
Karachi	Gerry's Information Technology (Pvt.) Ltd.	100.00	Y	100.00	Y	2.95	Y	14.40	Y	72.00	Y	1.22	Y
Karachi	Trans World Enterprise Services (Pvt.) Ltd	100.00	Y	100.00	Y	2.25	Y	16.25	Y	21.00	Y	1.03	Y
Karachi	TES Media (Pvt.) Ltd	100.00	Y	100.00	Y	2.25	Y	16.25	Y	21.00	Y	1.03	Y
Karachi	Satcomm (Pvt.) Ltd	100.00	Y	100.00	Y	0.25	Y	15.25	Y	87.00	N	0.71	Y
Karachi	Fiberlink (Pvt.) Ltd	100.00	Y	100.00	Y	0.25	Y	14.40	Y	83.00	N	2.42	Y
Islamabad	Pace Telecom (Pvt) Ltd	100.00	Y	100.00	Y	6.75	Y	56.60	Y	86.00	N	4.80	Y
Hasanabdal	7Star Telecom (Pvt) Ltd	100.00	Y	100.00	Y	2.65	Y	41.55	Y	68.00	Y	4.83	Y
Fateh Jhang	Big Data Technologies (Pvt.) Ltd	90.00	N	100.00	Y	1.50	Y	49.95	Y	91.00	N	2.61	Y
Peshawar	Cyber Net	100.00	Y	100.00	Y	3.00	Y	46.00	Y	91.19	N	1.00	Y
Mingora	Pace Telecom	100.00	Y	99.80	Y	21.00	Y	45.00	Y	93.33	N	5.00	Y
Mingora	PTCL	100.00	Y	100.00	Y	18.00	Y	45.00	Y	74.44	Y	3.00	Y
Quetta	Brilliant Enterprise	100.00	Y	100.00	Y	1.70	Y	36.50	Y	74.00	Y	4.29	Y
Quetta	Speed Net	87.00	N	87.00	N	1.90	Y	49.45	Y	100.00	N	8.46	Y
Abbottabad	Cyberet (storm Fiber)	100.00	Y	100.00	Y	7.50	Y	49.35	Y	82.52	N	0.43	Y
Abbottabad	Hazara Communication	99.81	N	98.99	N	0.10	Y	39.70	Y	88.12	N	1.11	Y
Haripur	New Millennium	99.99	Y	99.99	Y	0.15	Y	39.95	Y	100.00	N	0.85	Y
Faisalabad	National Telecommunication Corporation	99.98	Y	100.00	Y	13.50	Y	33.60	Y	63.25	Y	28.00	N
Faisalabad	Bliss Communication Network Pvt. Ltd	100.00	Y	100.00	Y	24.00	Y	647.00	N	80.00	Y	96.00	N
Sukkur	CMPak	100.00	Y	99.99	Y	12.00	Y	34.15	Y	48.00	Y	0.00	Y
Sukkur	Multinet Pakistan	100.00	Y	99.99	Y	7.75	Y	31.85	Y	56.00	Y	1.04	Y
Sukkur	Cybernet	100.00	Y	100.00	Y	7.95	Y	21.20	Y	55.00	Y	0.55	Y
Multan	Optix	100.00	Y	99.99	Y	31.00	Y	62.00	Y	80.00	Y	1.00	Y
Multan	KK Network	100.00	Y	99.98	Y	57.00	N	69.00	Y	81.00	N	1.00	Y

City	Company Name	Network Availability Core Nodes >=99.9%		Network Availability - Access Nodes >=99%		RTT - Local Network Latency <= 40msec		RTT - International Segment – Terrestrial <= 110msec		Bandwidth Utilization<= 80%		Jitter<= 15msec	
		Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)	Obtained %	Compliance (Y/N)
Muzaffarabad	SCO	100.00	Y	100.00	Y	-	N	36.00	Y	94.00	N	0.01	Y
Muzaffarabad	Sky Telecom	100.00	Y	100.00	Y	50.00	N	50.00	Y	97.00	N	0.01	Y
Mirpur	SCO	100.00	Y	100.00	Y	-	N	36.00	Y	97.00	N	0.01	Y
Mirpur	Sky Telecom	100.00	Y	100.00	Y	4.00	Y	36.50	Y	95.00	N	0.01	Y
Gilgit	SCO	-	N	-	N	21.46	Y	67.48	Y	-	N	0.86	Y
Hunza	SCO	-	N	-	N	16.79	Y	46.19	Y	-	N	0.73	Y
Astore	SCO	-	N	-	N	14.98	Y	45.43	Y	-	N	0.63	Y
Ghakuch	SCO	-	N	-	N	16.36	Y	44.11	Y	-	N	0.75	Y
Chilas	SCO	-	N	-	N	13.58	Y	70.11	Y	-	N	0.86	Y
Skardu	SCO	-	N	-	N	11.57	Y	42.16	Y	-	N	0.50	Y
Shigar	SCO	-	N	-	N	12.17	Y	43.02	Y	-	N	0.60	Y

6. KPIs Analysis

- **Bandwidth Utilization,** Network is choked with high bandwidth utilization for most of operators including KK Network, SCO, CyberNet, Storm Fiber, Sky Telecom, Fiberlink, Multinet, Satcomm, Pace Telecom, SpeedNet, Big Data Technologies, Hazara Communication and New Millennium.

- **Latency** for local network is high for KK Network, and Sky Telecom. For international segment, latency is very high for Bliss Communication Network (Pvt.) Ltd. for Faisalabad.

- **Jitter** is high for Bliss Communication Network (Pvt.) Ltd. and NTC for Faisalabad city.

- **Network Availability for Access Nodes** is below the threshold for SpeedNet (Quetta) and Hazara Communication (Abbottabad).

- **Network Availability for Core Nodes** is below the threshold for SpeedNet (Quetta), Big Data Technologies (Fateh Jhang) and Hazara Communication (Abbottabad).

- **SCO** has failed to demonstrate all KPIs mentioned in Fixed Broadband Regulations, 2022 i.e., (i) Bandwidth utilization, (ii) Network Availability for Access/Core Nodes, in Gilgit, Astore, Chilas, Hunza, Skardu, Ghakuch and Shigar and (iii) Latency for Access Network, in Muzaffarabad and Mirpur.

7. Conclusion

Survey revealed that most of Broadband Service Providers (BSPs) failed to meet a critical KPI i.e. **Bandwidth Utilization.** When bandwidth utilization is high, especially during peak traffic hours, it often results in reduced download and upload speeds, which can significantly degrade user experience and compromise the overall quality of service.

To address this issue, non-compliant BSPs were formally notified and provided with detailed performance metrics outlining their degraded KPIs. These metrics serve as a baseline for BSPs to understand where they fall short and to guide their efforts in optimizing network resources, ultimately aiming to enhance compliance, improve user experience, and ensure higher standards of service quality.