



Fixed Broadband Quality of Service (QoS) Surveys

Network End Surveys

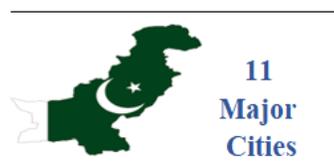
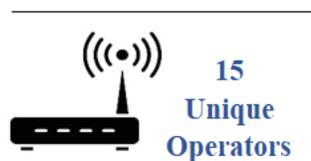
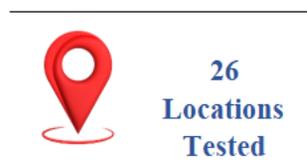
Quarter-04 2024

TABLE OF CONTENTS

1. Executive Summary	3
2. Background	5
3. Scope	5
4. Methodology	6
5. Parameters Monitored and Survey Results	6
6. KPIs Analysis	12
7. Conclusion	13

1. Executive Summary

Pakistan Telecommunication Authority (PTA) has carried out Quality of Service (QoS) Survey of 15 x unique operators in 11 x major cities of Pakistan during 4th Quarter 2024. During the survey, the performance of fixedline broadband operators have been assessed in accordance with the Fixedline Broadband Regulation, 2022. Citi wise summary of operators are mentioned below:



Operator Wise – Compliance Status

Sr No.	Operator Name	City	Overall Score	Percentage Compliance (%)	Compliance Status
1	PTCL	Karachi	10	100.0	↑
		Hyderabad	10	100.0	↑
		Manshera	10	100.0	↑
		Gawadar	5	50.0	→
		Faisalabad	10	100.0	↑
2	Cybernet	Hyderabad	10	100.0	↑
		Islamabad	8	83.3	→
		Haripur	10	100.0	↑
3	Multinet	Hyderabad	10	100.0	↑
		Islamabad	10	100.0	↑
		Peshawar	10	100.0	↑
4	NTC	Hyderabad	8	83.3	→
		Gawadar	3	33.3	→
5	TES	Hyderabad	10	100.0	↑
		Islamabad	10	100.0	↑
6	Lahore Express	Lahore	10	100.0	↑
7	Redtone	Lahore	8	83.3	→
8	Superior Connections	Lahore	10	100.0	↑
9	Telecard	Karachi	10	100.0	↑
10	SkyTel	Muzafabad	7	66.7	→
11	Wicloud	Muzafabad	8	83.3	→
12	Wideband	Peshawar	10	100.0	↑
13	Skynet	Sukkur	8	83.3	→
14	WifiZone	Sukkur	8	83.3	→
15	Wancom	Sukkur	10	100.0	↑

City Wise – QoS KPIs Compliance Status

City	Operator 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	Lahore Express	100.00	Y	100.00	Y	0.00	Y	29.45	Y	71.00	Y	0.23	Y
	Redtone	100.00	Y	100.00	Y	3.15	Y	318.70	N	54.78	Y	1.12	Y
	Superior Connections	100.00	Y	100.00	Y	0.90	Y	31.10	Y	50.25	Y	0.85	Y
Karachi	PTCL	100.00	Y	100.00	Y	2.35	Y	25.45	Y	17.04	Y	0.88	Y
	Telecard	100.00	Y	100.00	Y	1.00	Y	12.45	Y	76.51	Y	0.99	Y
Hyderabad	NTC	100.00	Y	100.00	Y	2.85	Y	15.50	Y	87.50	N	2.98	Y
	Multinet	100.00	Y	100.00	Y	9.25	Y	16.00	Y	31.50	Y	0.22	Y
	PTCL	100.00	Y	100.00	Y	2.40	Y	21.80	Y	65.85	N	1.45	Y
	TES	100.00	Y	100.00	Y	3.95	Y	16.55	Y	67.22	Y	0.99	Y
	Cybernet	100.00	Y	100.00	Y	1.00	Y	106.45	Y	71.25	Y	1.00	Y
Islamabad	TES	100.00	Y	100.00	Y	3.65	Y	35.45	Y	68.49	Y	2.51	Y
	Cybernet	100.00	Y	100.00	Y	11.10	Y	45.45	Y	83.02	N	4.27	Y
	Multinet	100.00	Y	99.17	Y	1.10	Y	37.65	Y	68.29	Y	6.33	Y
Haripur	Cybernet	100.00	Y	100.00	Y	3.65	Y	47.90	Y	79.02	Y	0.73	Y
Manshera	PTCL	100.00	Y	100.00	Y	3.35	Y	39.95	Y	61.33	Y	5.60	Y
Gwadar	PTCL	100.00	Y	100.00	Y	276.90	N	317.00	N	22.44	N	228.00	N
	NTC	100.00	Y	51.80	N	1361.25	N	1171.20	N	40.00	Y	335.00	N
Muzaffarabad	SkyTel	100.00	Y	100.00	Y	9.00	Y	43.45	Y	99.00	N	25.00	N
	Wicloud	100.00	Y	100.00	Y	1.45	Y	64.75	Y	100.00	N	1.97	Y
Peshawar	Multinet	100.00	Y	100.00	Y	2.35	Y	38.00	Y	79.00	Y	1.00	Y
	Wideband	100.00	Y	99.99	Y	0.65	Y	45.30	Y	76.00	Y	1.00	Y
Sukkur	Skynet	100.00	Y	100.00	Y	1.00	Y	27.85	Y	88.00	N	0.92	Y
	WifiZone	100.00	Y	100.00	Y	1.15	Y	21.85	Y	92.00	N	1.40	Y
	Wancom	100.00	Y	100.00	Y	6.00	Y	27.60	Y	64.00	Y	0.80	Y
Faisalabad	PTCL	100.00	Y	99.00	Y	2.00	Y	64.50	Y	52.00	Y	0.80	Y

Note: Red Highlighted KPIs are non-complied.

2. 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.

3. 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**.

4. Methodology

The **Quarter 04 surveys** started from October 1, 2024 till December 31, 2024. In the surveys, **15 major BSPs** were inspected, operating in **11 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. Hyderabad
- v. Peshawar
- vi. Faisalabad
- vii. Manshera
- viii. Haripur
- ix. Sukkur
- x. Muzaffarabad
- xi. Gwadar

The surveys are conducted by the **Enforcement Division team** of the 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.

5. 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.

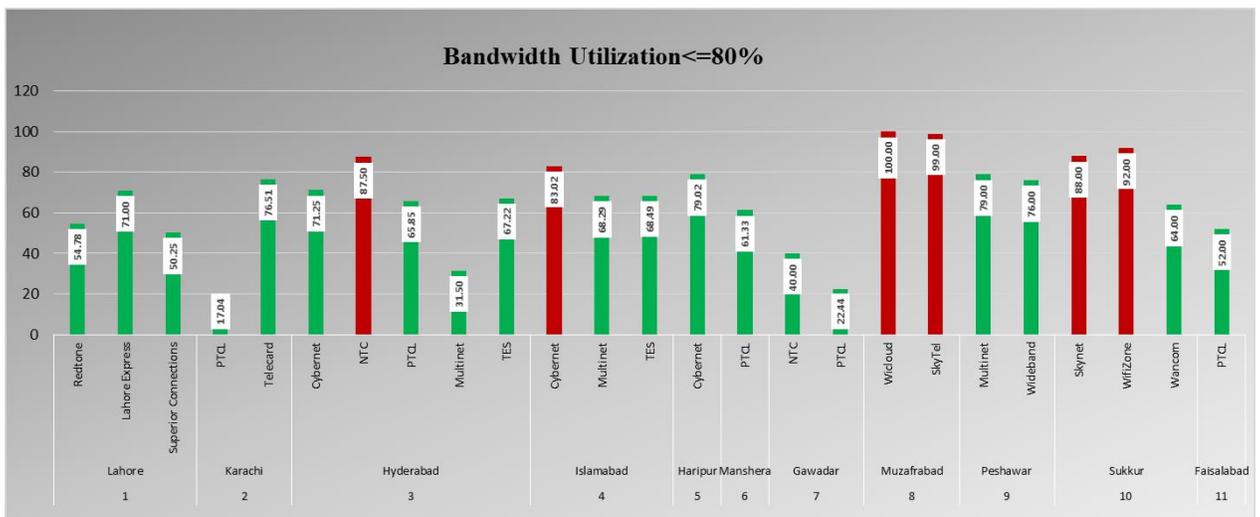
Benchmark:

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%



Results

Bandwidth utilization is not complied for majority of the operators and is exceeding above 80%. Operators include NTC (Hyderabad), CyberNet (Islamabad), WiCloud (Muzaffarabad), SkyNet, and WifiZone (Sukkur).

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:

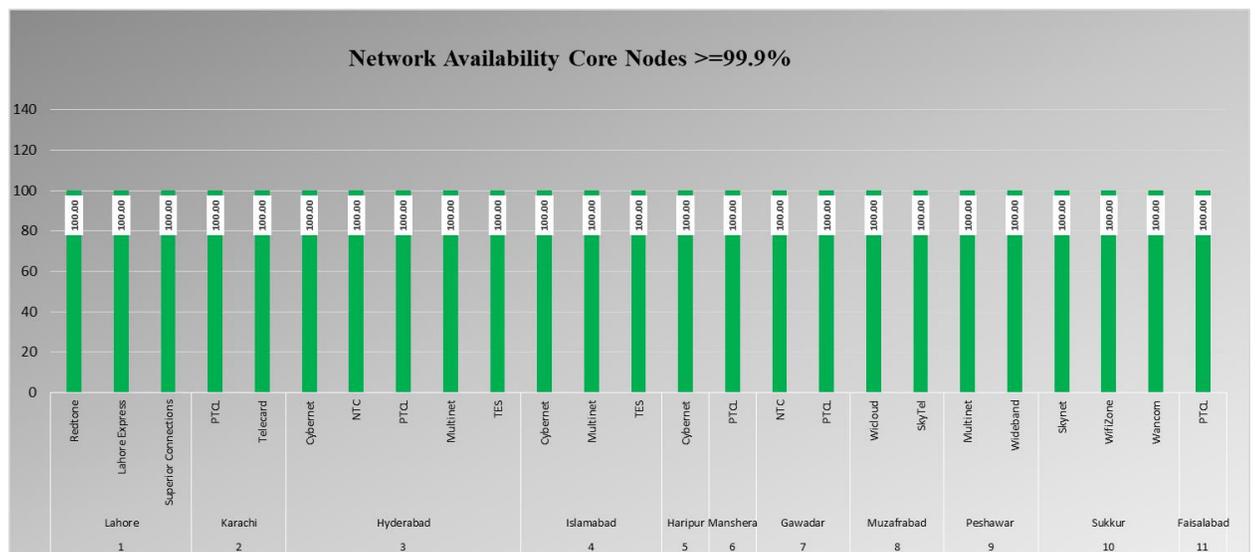
- a) Access Nodes should be > 99% and for;
- b) Core Nodes should be > 99.9%

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.

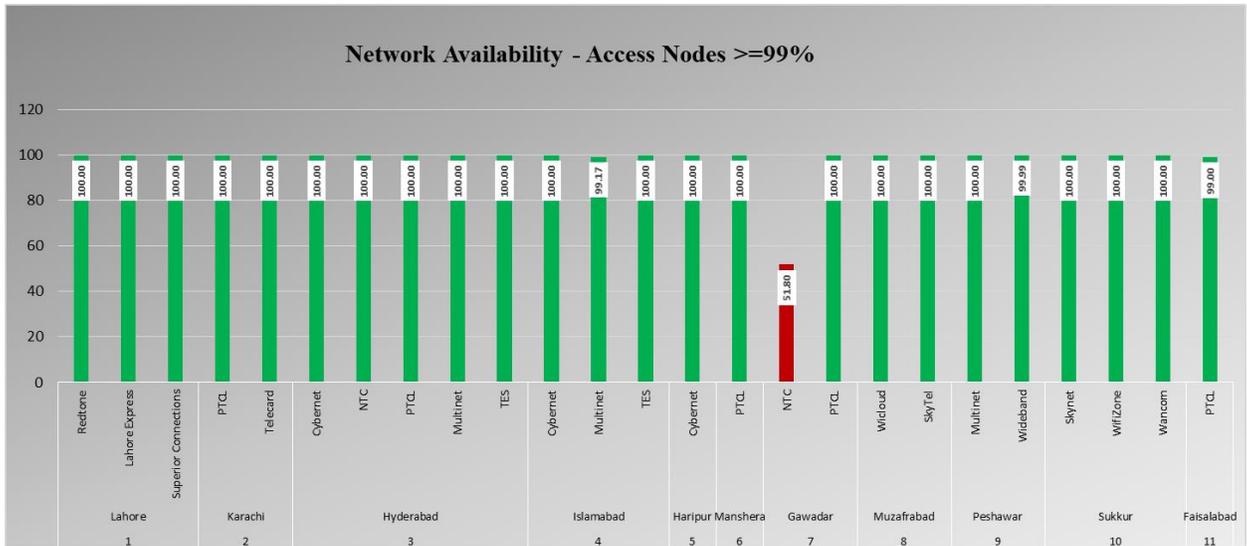


Results

Majority of operators comply with KPI i.e. Network Availability of Core Node.

b) Network Availability – Access Nodes

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



Results

Majority of operators comply with KPI i.e. Network Availability of Access Node. However, NTC for Gwadar city does not comply with the 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

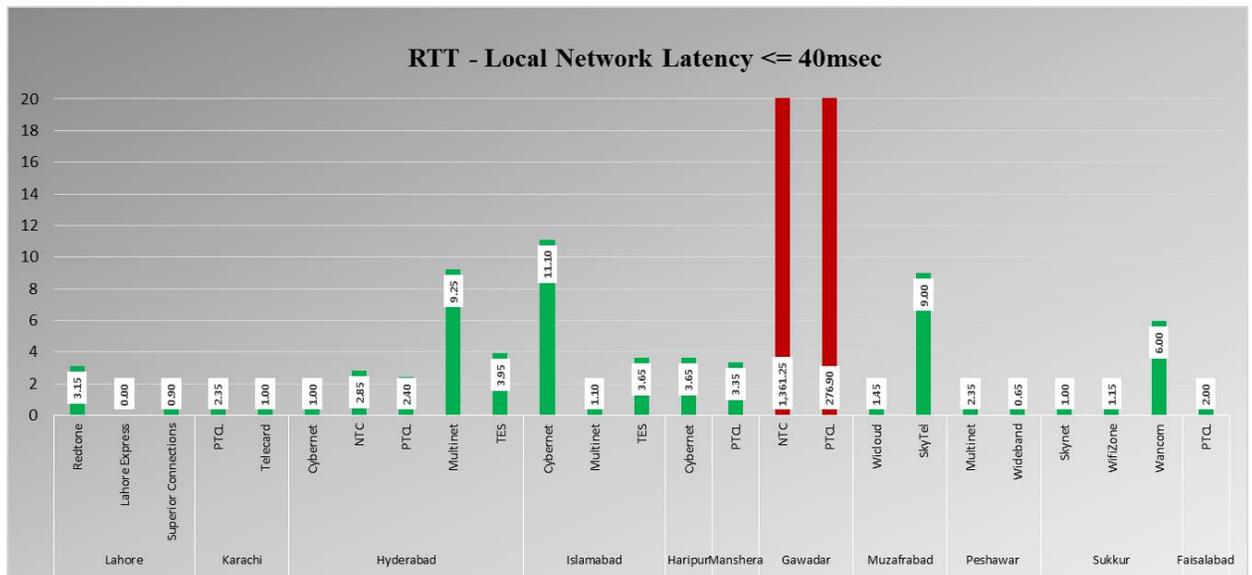
Network Latency in Segment	Threshold
Local Network Latency	= 40 msec
International segment – Terrestrial	= 110 msec

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).

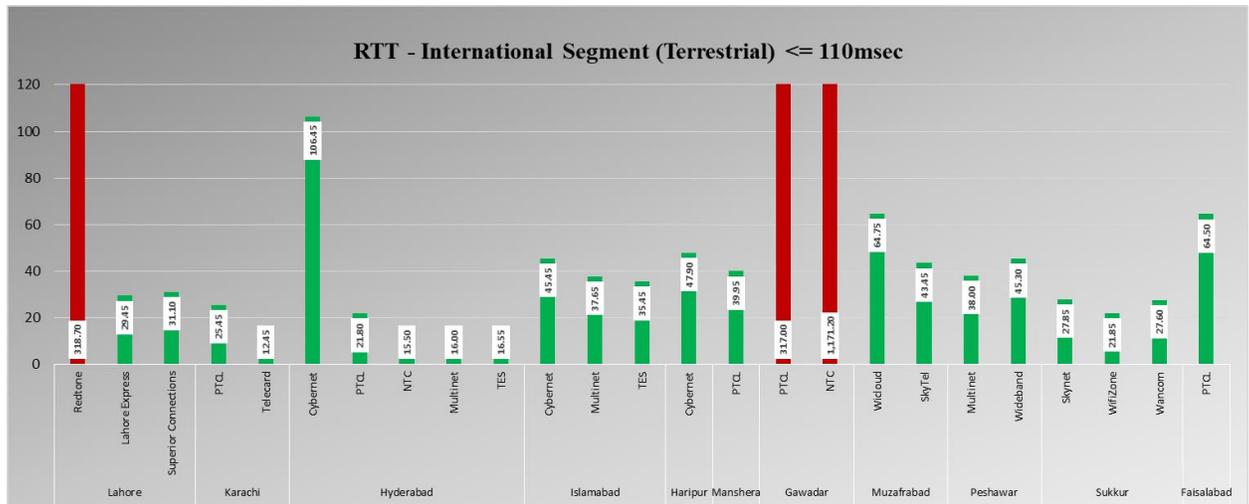


Results

Majority of operators comply with KPI i.e. Round Trip Time for Local Network. NTC and PTCL for Gwadar city, do not comply with 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.



Results

Majority of operators comply with KPI i.e. Round Trip Time for International Segment (Terrestrial Network). Only Redtone (Lahore), PTCL and NTC in Gwadar city are exceeding their KPI threshold value.

iv. Jitter (msec)

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.

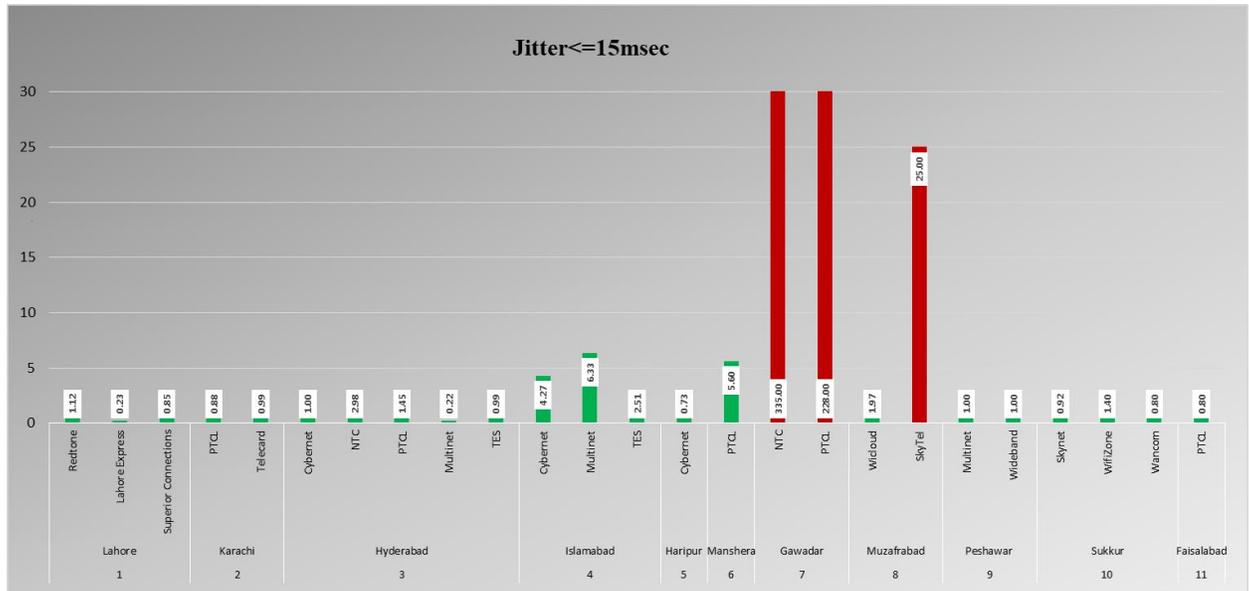
Benchmark

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) = $X (RTT_{avg} - RTT_k) / 100$ (magnitude shall be used without *+/-’ signs)



Results

Majority of operators comply with KPI i.e. Jitter. Only NTC and PTCL (Gwadar), SkyTelecom (Muzaffarabad) are exceeding their KPI threshold value.

6. KPIs Analysis

- **Bandwidth Utilization**, Network is choked with high bandwidth utilization for most of operators including NTC (Hyderabad), CyberNet (Islamabad), WiCloud (Muzaffarabad), SkyNet and WifiZone for Sukkur.
- **Latency** for local network is high for PTCL and NTC for Gwadar city. For international segment, latency is very high for NTC and PTCL for Gwadar, and Redtone for Lahore.
- **Jitter** is high for NTC and PTCL for Gwadar city, and Sky Telecom for Muzaffarabad.
- **Network Availability for Access Nodes** is below the threshold for NTC in Gwadar city.

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.