

QUALITY OF SERVICE SURVEY IN CITIES OF GILGIT BALTISTAN

THIRD QUARTER 2023

ENFORCEMENT WIRELESS – II DIRECTORATE
PTA | F-5/1, ISLAMABAD

JOINT QUALITY OF SERVICE SURVEY REPORT

INTRODUCTION

1.1 In order to measure the performance and service quality of Cellular Mobile Operators (CMOs), a Joint Quality of Service (QoS) Survey has been carried out in seven (07) x cities of Gilgit Baltistan, in Third Quarter 2023. The name of cities along with survey dates are mentioned in **Table 1.1: QoS Survey Cities & Dates**.

S. #	Province	City	Days	Survey Dates
1.	GILGIT BALTISTAN (GB)	GILGIT	2	8~9 August 2023
2.		HUNZA	2	15~16 August 2023
3.		GHAKUCH	2	11~12 August 2023
4.		ASTORE	1	28 August 2023
5.		SKARDU	2	21~22 August 2023
6.		SOST	1	17 August 2023
7.		KHAPLU	2	23~24 August 2023

Table 1.1: QoS Survey Dates and Samples

DRIVE TEST DETAILS

2.1 The QoS survey/drive tests were conducted using **NEMO QoS Tool** of CMOs. Drive test survey teams selected survey routes in such a manner to cover main roads, service roads and majority of sectors/colonies. During the survey, mobile handsets for Voice Calls, SMS and Data Sessions, were kept in 3G/4G locked mode.

VOICE SERVICE

3.1. A total of 4,400 Call attempts were made to analyze the performance of Cellular Voice services in 7 x cities of Gilgit Baltistan. 7x Voice Service QoS KPIs (i.e. Network Accessibility, Call Setup Success Rate, Call Setup Time, Call Completion Rate, Mean Opinion Score, Inter System Handover Success Rate & RAB Setup Success Rate) have been measured while testing voice services in 7 x surveyed cities of Gilgit Baltistan. CMO wise call statistics are shown in **Table 3.1: Call Statistics**. The overall compliance level of threshold values of voice QoS KIs in 7 x cities is shown in in **Table 3.2: City Wise Voice QoS KPIs Compliance Level**.

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG	SCOM
TOTAL CALLS ATTEMPTS	800	900	900	900	900
NETWORK ACESSEBILITY	100%	100%	100%	100%	100%
CALL SETUP SUCCESS RATE	100%	100%	99.71%	100%	100%
CALL SETUP TIME	7.8	6.5	6.4	8	4.3
CALL COMPLETION RATIO	100%	100%	96.86%	100%	100%
MEAN OPINION SCORE	3.8	3.6	3.8	3.6	3.8
ISHO SUCCESS RATE	N/A	N/A	N/A	N/A	100%
RAB SETUP SUCCESS RATE	N/A	N/A	N/A	N/A	100%

Table 3.1: Call Statistics.

OPERATOR	KPIS	GILGIT	HUNZA	SOST	GHAKUCH	ASTORE	SKARDU	KHAPLU
Jazz	NA	Yes	Yes	N/A	Yes	Yes	Yes	Yes
	SA	Yes	Yes	N/A	Yes	Yes	Yes	Yes
	CCT	No	No	N/A	No	Yes	No	Yes
	CCR	Yes	Yes	N/A	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	N/A	Yes	Yes	Yes	Yes
	ISHO	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	RSSR	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Telenor	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	No	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	RSSR	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ufone	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	No	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	RSSR	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ZonG	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	No	Yes	No	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	RSSR	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCOM	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3.2: City Wise Voice QoS KPIs Compliance Level.

SMS SERVICE

4.1 A total of 4,400 SMS sending attempts were conducted to gauge the performance of SMS service in Gilgit Baltistan. CMO wise SMS statistics are shown in **Table 4.1: CMO Wise SMS Statistics & Table 4.2: SMS QoS KPIs Compliance Level.**

DESCRIPTION	Jazz	Telenor	Ufone	Zong	SCOM
SMS SEND REQUEST	800	900	900	900	900
SMS RECEIVE SUCCESS RATE	100%	100%	99%	100%	100%
END-TO-END DELIVERY TIME	9	5.93	7.9	10.9	2.9

Table 4.1: CMO Wise SMS Statistics

Operator		Jazz		Telenor		Ufone		ZonG		SCOM	
SMS KPI		SR	DT	SR	DT	SR	DT	SR	DT	SR	DT
Surveyed Cities	GILGIT	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
	HUNZA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SOST	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	GHAKUCH	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ASTORE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SKARDU	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	KHAPLU	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

** Note SMS QoS KPIs: Success Rate (SR) > 99%, Delivery Time (DT) ≤ 12*

Table 4.2: SMS QoS KPIs Compliance Level

DATA SERVICES SIGNAL STRENGTH

5.1 During the survey, SCOM data services were tested in technology locked mode, wherein 4G and 3G signal strength samples were recorded on survey routes. As per Next Generation Mobile Service (NGMS) Licenses and Cellular Mobile Network Quality of Service (QoS) Regulations 2021, licensees are required to meet the threshold of -100dBm or above with 90% confidence level for RSRP and RSCP.

The Confidence Level and Compliance of signal strength is shown in **Table 5.1: Data Services Signal Strength -100dBm with 90% Confidence Level in Gilgit Baltistan.**

City	Average RSRP (4G)		Compliant (Yes/No)	Average RSCP (3G)		Compliant (Yes/No)
	Signal Strength	90% Confidence Level		Signal Strength	90% Confidence Level	
GILGIT	-76	98.98%	Yes	-68.39	99.9%	Yes
HUNZA	-85.8	93.46%	Yes	-76.35	99.46%	Yes
GHAKUCH	-86	98.36%	Yes	-73.09	99.96%	Yes
ASTORE	-80.13	97.3%	Yes	-73.7	99.9%	Yes
SKARDU	-82.89	96.2%	Yes	-73.92	100%	Yes
SOST	-74	99.98%	Yes	-74	99.98%	Yes
KHAPLU	-88.9	93.41%	Yes	-80.21	99.29%	Yes

Table 5.1: Data Services Signal Strength -100dBm with 90% Confidence Level in Gilgit Baltistan.

USER DATA THROUGHPUT

6.1 As per Next Generation Mobile Service (NGMS) Licenses and Cellular Mobile Network Quality of Service (QoS) Regulations 2021, licensees are required to meet the threshold of minimum of 2Mbps of 4G User Data Throughput and a of minimum of 256Kbps of 3G User Data Throughput. The results of Data Service QoS KPI i.e. User Data Throughput is shown in **Table 6.1: User Data Throughput in Gilgit Baltistan.**

City	SCOM	
	User Data Throughput (4G) > 2Mbps	User Data Throughput (3G) > 256kbps
GILGIT	7.2Mbps	4.5Mbps
HUNZA	5.2Mbps	3.5Mbps
GHAKUCH	4.6Mbps	2.8 Mbps
ASTORE	4.5Mbps	3Mbps
SKARDU	7.1Mbps	2.5Mbps
SOST	5.9Mbps	4Mbps
KHAPLU	4.5Mbps	3Mbps

Table 6.1: User Data Throughput in Gilgit Baltistan

SURVEY MAPS & GRAPHICAL RESULTS

7.1 The 4G/LTE (RSRP) 3G (RSCP) and 2G (RxLev) Signal Strength samples recorded during drive test on survey routes and plotted on maps. Coverage Maps of Voice Services Signal Strength are shown at **Annex-A**, Voice & SMS QoS KPIs survey results in graphical form are shown at **Annex-B**. Data Services Signal Strengths of SCOM are shown at **Annex-C** wherein **Annex-D** contains Data Services QoS KPIs survey results for 7x cities of Gilgit Baltistan.

STANDING IN SURVEY

8.1 CMOs have been prioritized/ placed at 1st, 2nd, 3rd, 4th & 5th position in each category i.e. Mobile Network Coverage, Mobile Broadband Service and Voice Service based upon the compliance level against each QoS KPI in each category in 7 x surveyed cities.

- a. **MOBILE NETWORK COVERAGE.** The compliance level of SCOM as per SignalStrength of 4G and 3G Networks is shown in **Table 8.1: Mobile Network Coverage Compliance.**

S. #	Technology	SCOM Compliance Level – Number of Cities		Standing
		Compliant	Non-Compliant	
1.	4G	7	0	1 st
2.	3G	7	0	

Table 8.1: Mobile Network Coverage Compliance

- b. **MOBILE BROADBAND SERVICE.** The categorization of each CMOs, as per the highest to lowest obtained User Data Throughput in 4G/LTE Networks is shown in **Table 8.2: CMOs Standing in Mobile Broadband Service.**

S. #	Operator	Technology	Highest Throughput – Number of Cities					Standing
			1 st	2 nd	3 rd	4 th	5 th	
1.	SCOM	4G	7	-	-	-	-	1 st
		3G	7	-	-	-	-	
2.	ZonG	Services Not Available					-	
3.	Telenor						-	
4.	Ufone						-	
5.	Jazz						-	

Table 8.2: CMOs Standing in Mobile Broadband Service

- c. **VOICE SERVICE.** The categorization of each CMOs, as per the maximum compliance of Voice QoS KPIs is shown in **Table 8.3: CMOs Standing in Voice Service.**

S. #.	Operator	Voice QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	SCOM	49	-	1 st
2.	Ufone	34	1	2 nd
3.	Telenor	34	1	2 nd
4.	ZonG	33	2	3 rd
5.	Jazz	26	4	4 th

Table 8.3: CMOs Standing in Voice Service

- d. **OVERALL STANDING.** The overall standing of each CMOs in different category of services is mentioned in **Table 8.4: CMOs Overall Standing in QoS Survey.**

S. #.	Service	STANDING				
		1 st	2 nd	3 rd	4 th	5 th
1.	Network Coverage	SCOM	Other CMOs are not providing Data Services			
2.	Mobile Broadband	SCOM				
3.	Voice	SCOM	Telenor & Ufone	Zong	Jazz	-

Table 8.4: CMOs Overall Standing in QoS Survey

Annex-A (Coverage Maps)

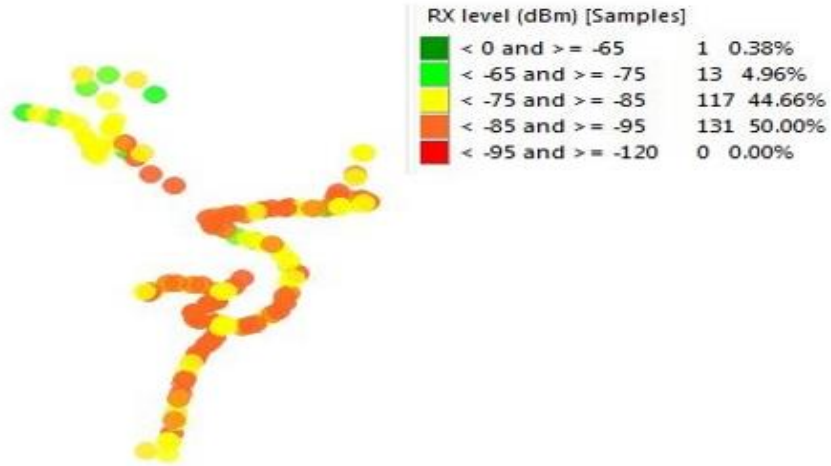
Annex-B (Data QoS Results)

Annex-C (Voice & SMS Results)

Annex-A (Voice Coverage Maps)

VOICE COVERAGE MAPS – ASTORE

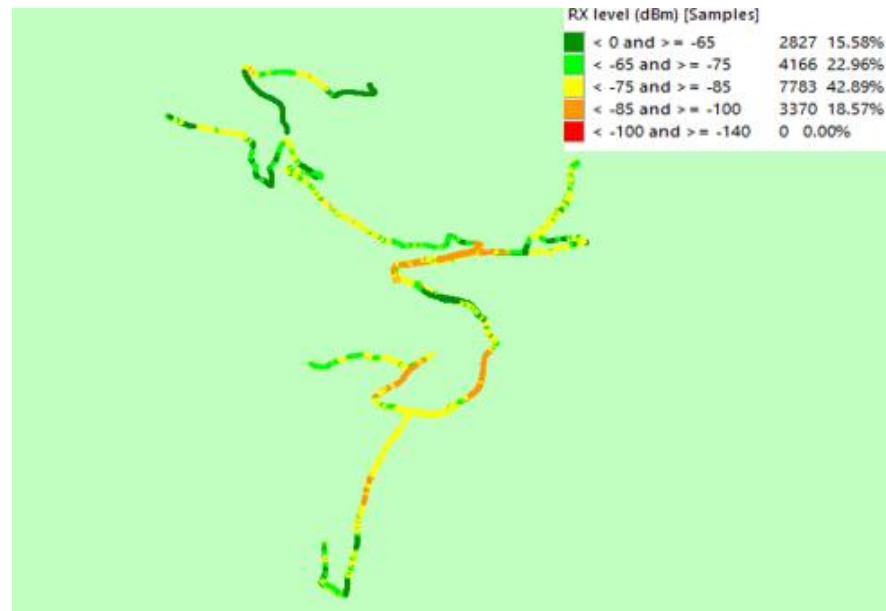
JAZZ VOICE NETWORK COVERAGE



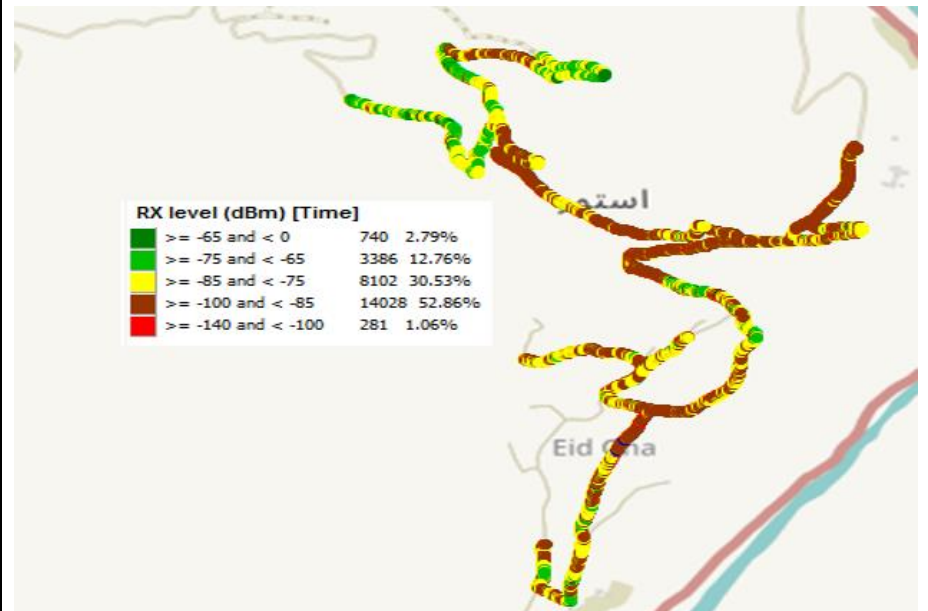
TELENOR VOICE NETWORK COVERAGE



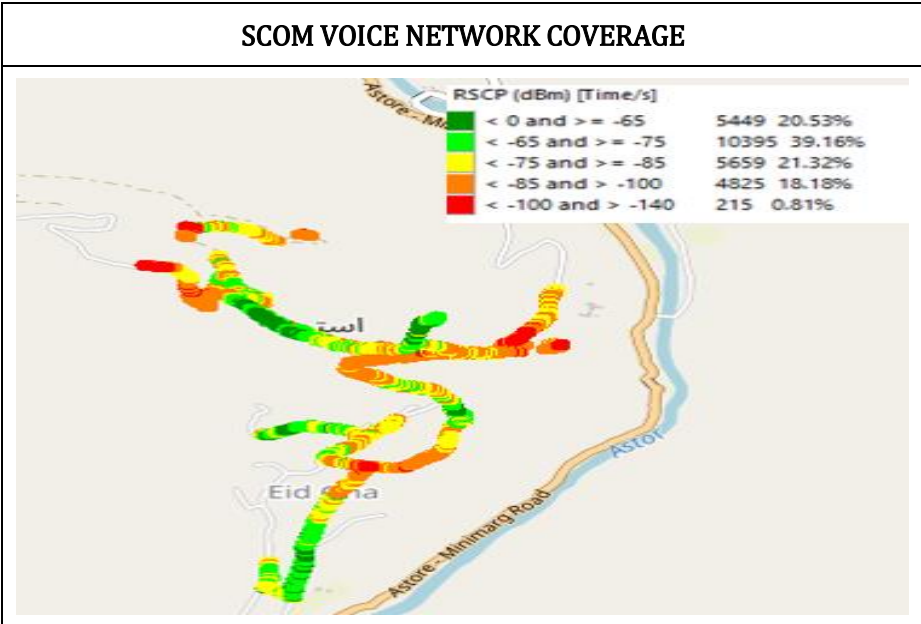
UFONE VOICE NETWORK COVERAGE



ZONG VOICE NETWORK COVERAGE

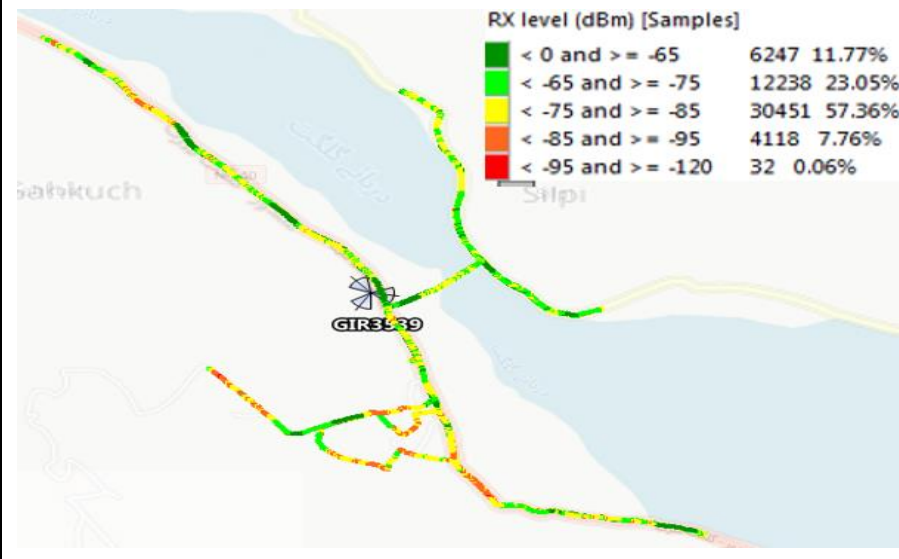


VOICE COVERAGE MAPS – ASTORE

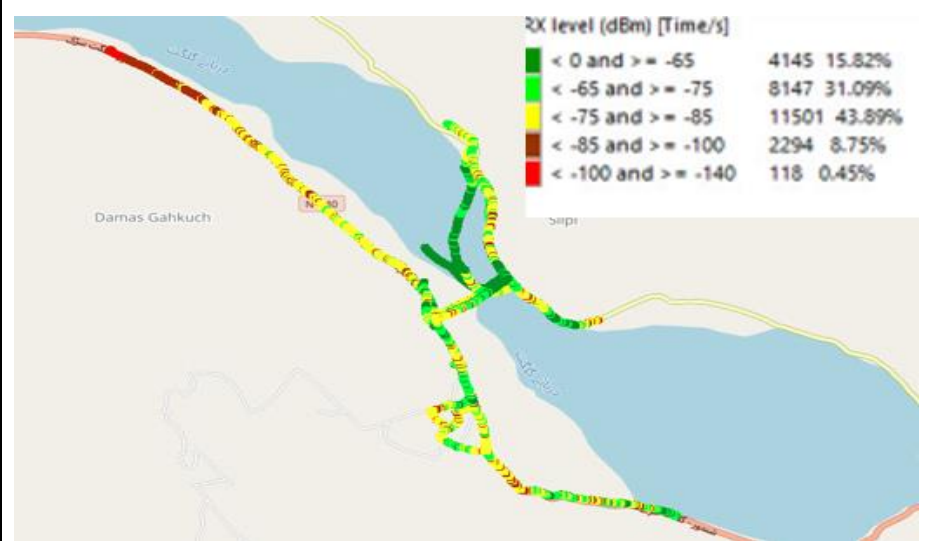


VOICE COVERAGE MAPS – GHAKUCH

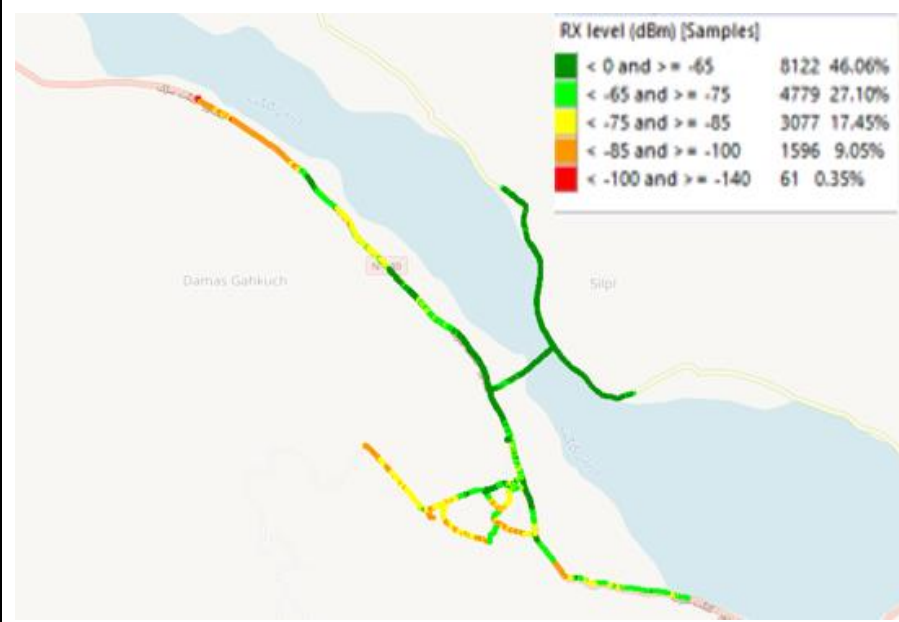
JAZZ VOICE NETWORK COVERAGE



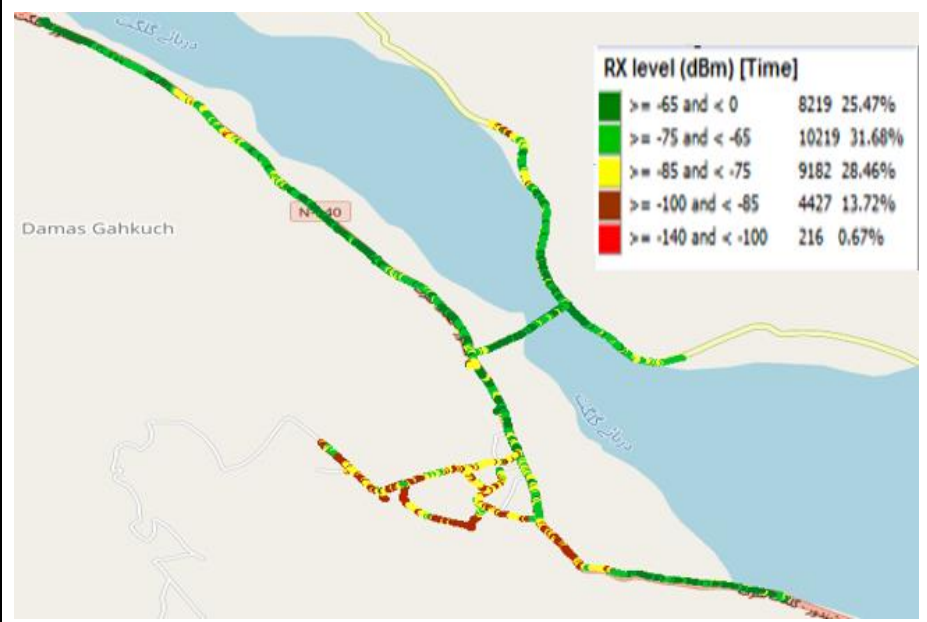
TELENOR VOICE NETWORK COVERAGE



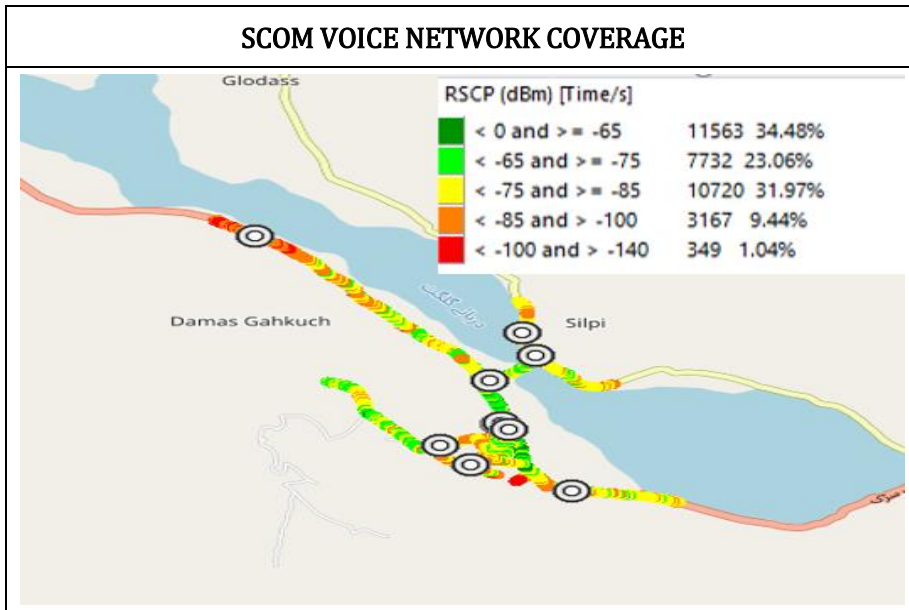
UFONE VOICE NETWORK COVERAGE



ZONG VOICE NETWORK COVERAGE



VOICE COVERAGE MAPS – GHAKUCH

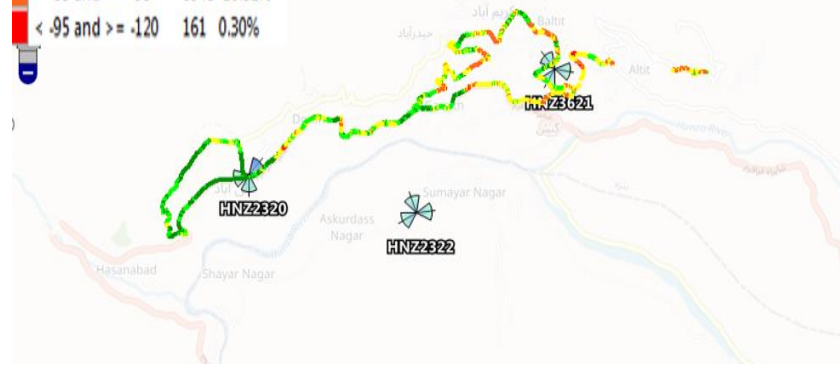


VOICE COVERAGE MAPS – HUNZA

JAZZ VOICE NETWORK COVERAGE

RX level (dBm) [Samples]

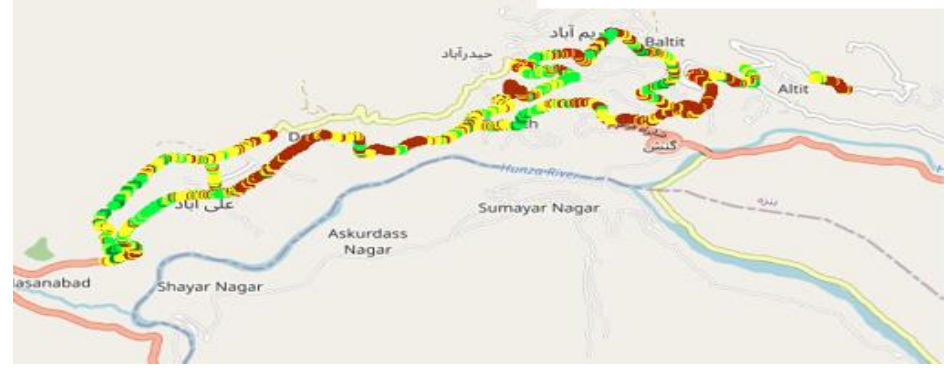
< 0 and >= -65	8452 15.61%
< -65 and >= -75	18442 34.05%
< -75 and >= -85	18154 33.52%
< -85 and >= -95	8948 16.52%
< -95 and >= -120	161 0.30%



TELENOR VOICE NETWORK COVERAGE

RX level (dBm) [Time/s]

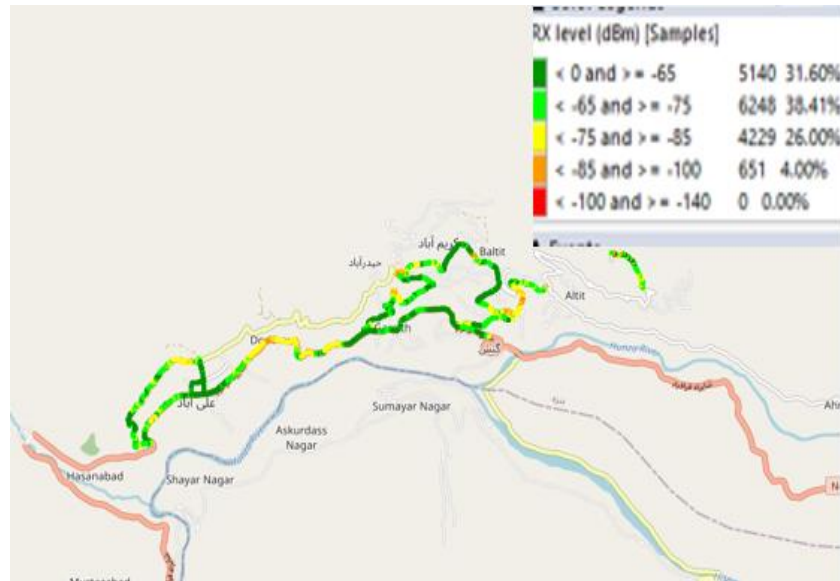
< 0 and >= -65	1126 3.90%
< -65 and >= -75	4244 14.71%
< -75 and >= -85	12075 41.85%
< -85 and >= -100	11083 38.41%
< -100 and >= -140	327 1.13%



UFONE VOICE NETWORK COVERAGE

RX level (dBm) [Samples]

< 0 and >= -65	5140 31.60%
< -65 and >= -75	6248 38.41%
< -75 and >= -85	4229 26.00%
< -85 and >= -100	651 4.00%
< -100 and >= -140	0 0.00%

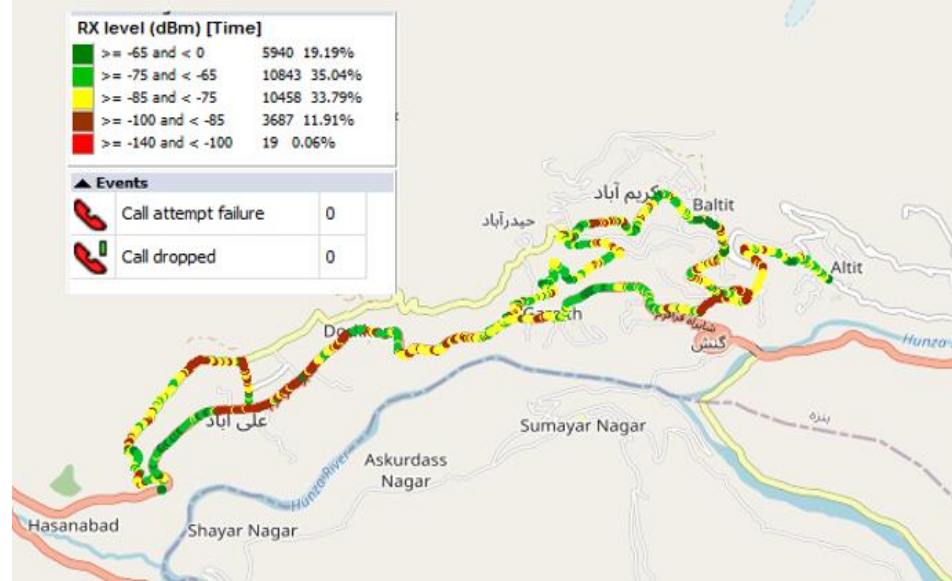


ZONG VOICE NETWORK COVERAGE

RX level (dBm) [Time]

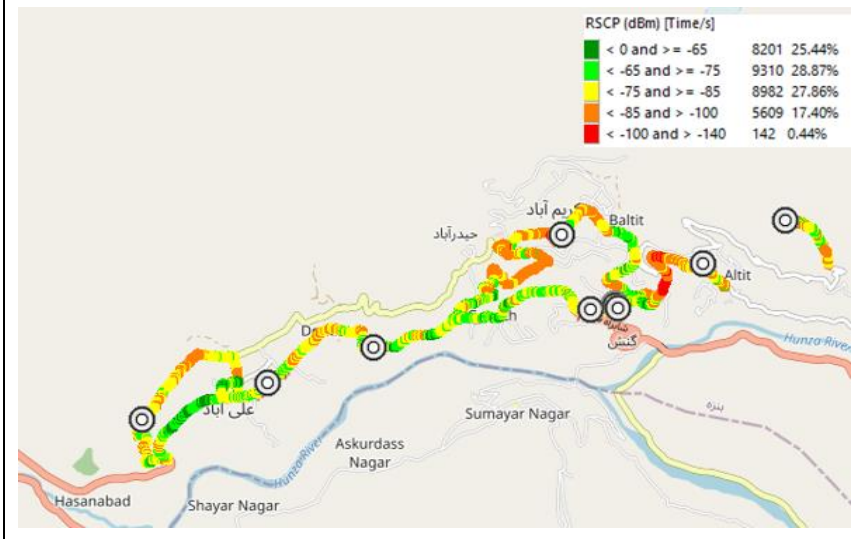
>= -65 and < 0	5940 19.19%
>= -75 and < -65	10843 35.04%
>= -85 and < -75	10458 33.79%
>= -100 and < -85	3687 11.91%
>= -140 and < -100	19 0.06%

▲ Events	
Call attempt failure	0
Call dropped	0

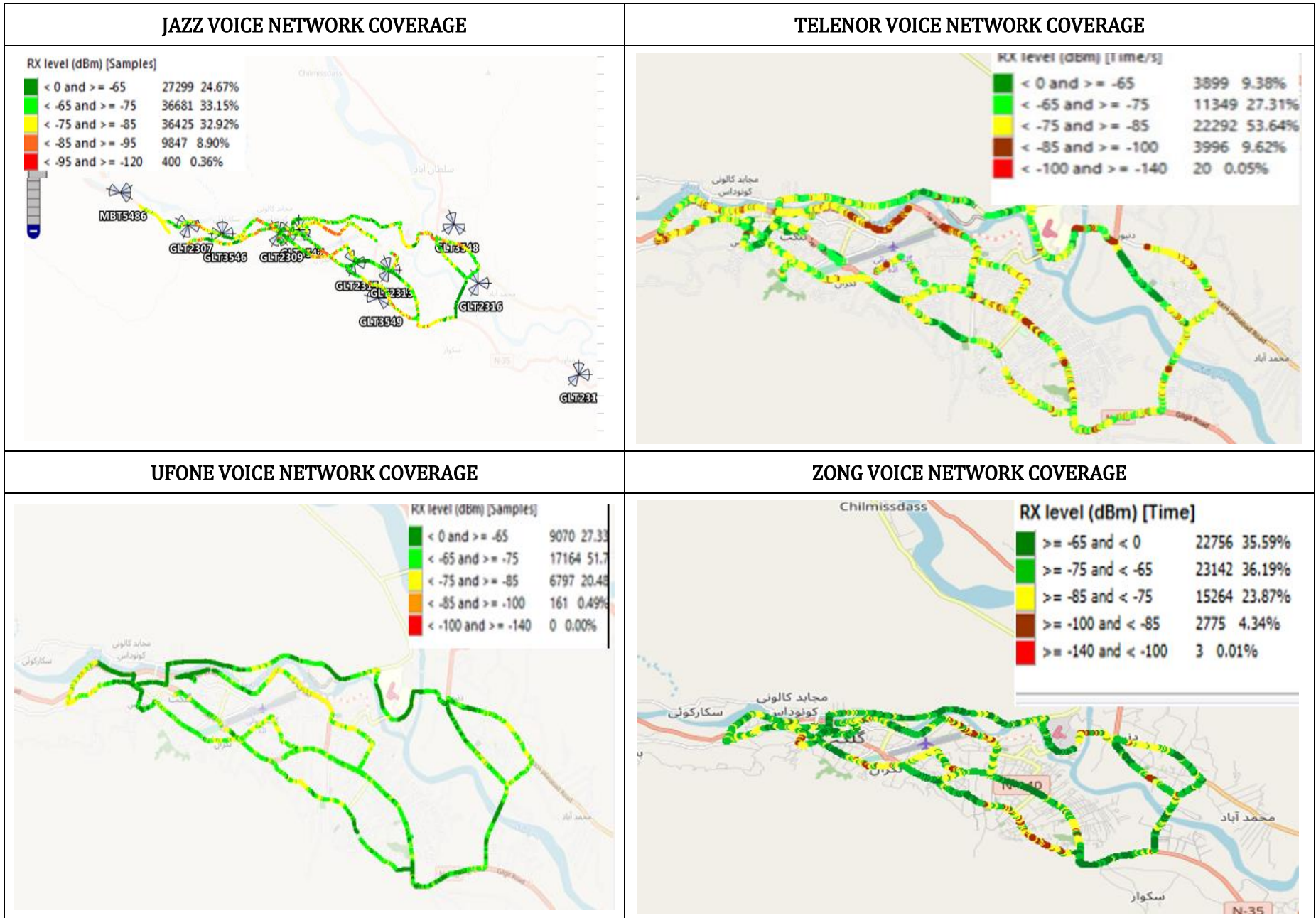


VOICE COVERAGE MAPS – HUNZA

SCOM VOICE NETWORK COVERAGE

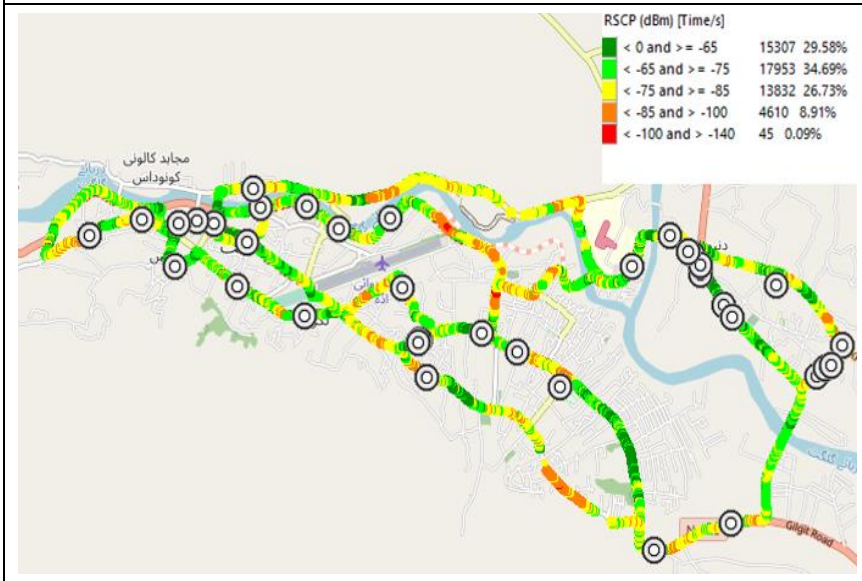


VOICE COVERAGE MAPS – GILGIT



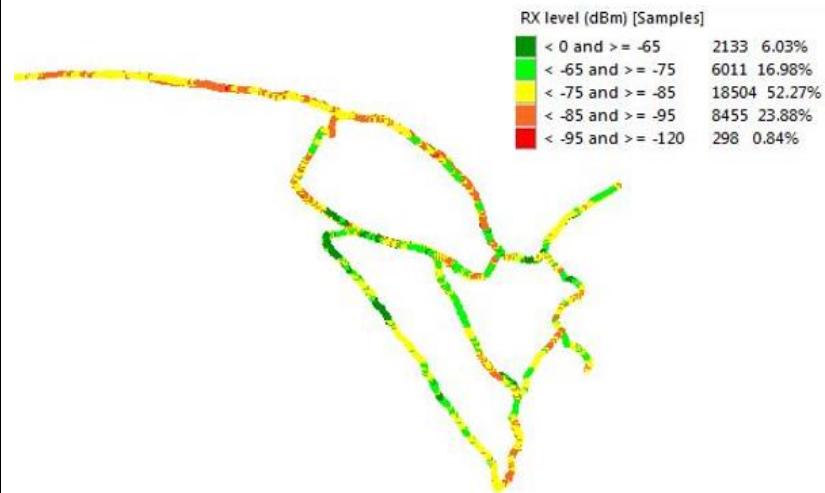
VOICE COVERAGE MAPS – GILGIT

SCOM VOICE NETWORK COVERAGE



VOICE COVERAGE MAPS – KHAPLU

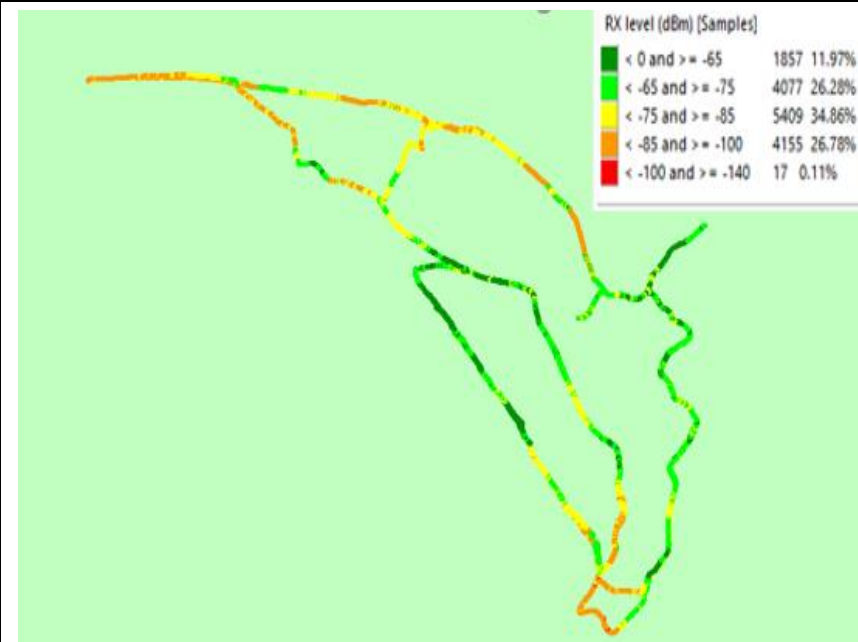
JAZZ VOICE NETWORK COVERAGE



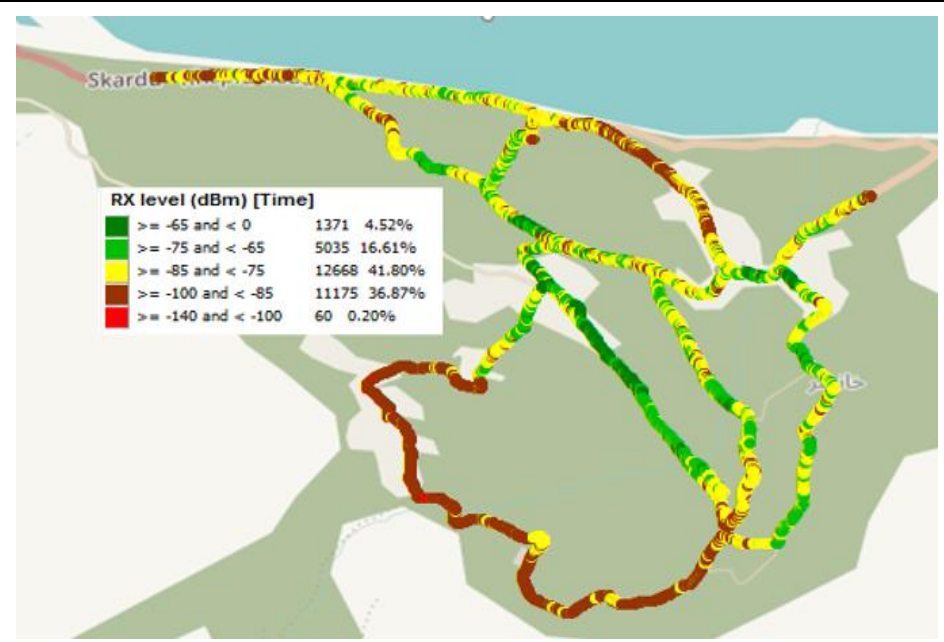
TELENOR VOICE NETWORK COVERAGE



UFONE VOICE NETWORK COVERAGE

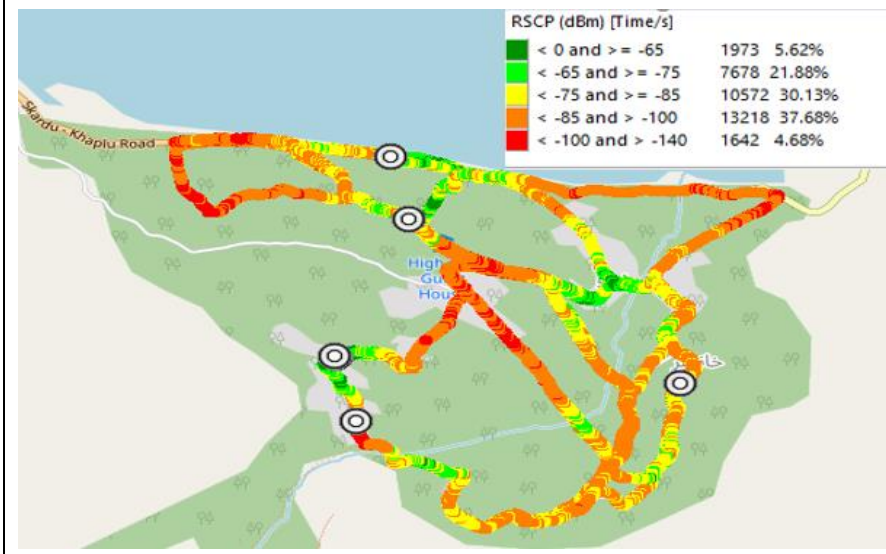


ZONG VOICE NETWORK COVERAGE



VOICE COVERAGE MAPS – KHAPLU

SCOM VOICE NETWORK COVERAGE

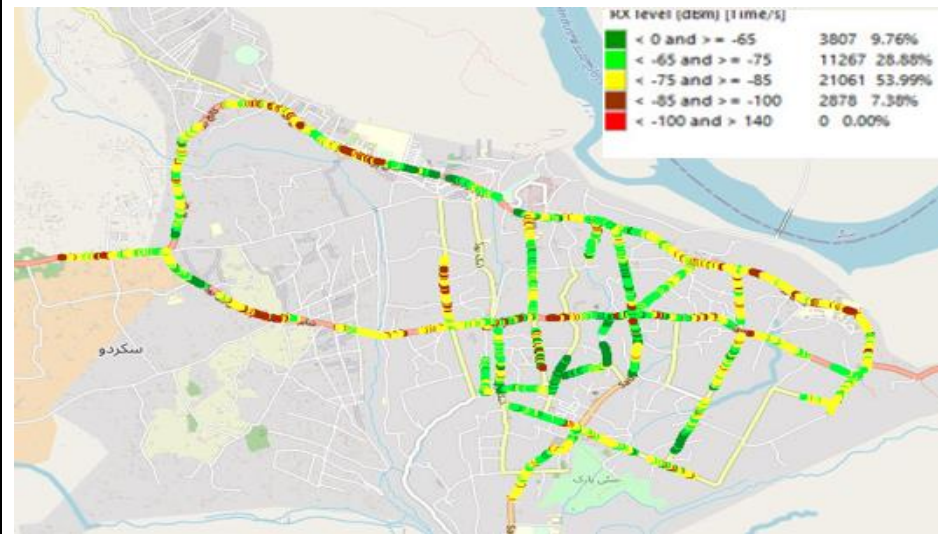


VOICE COVERAGE MAPS –SKARDU

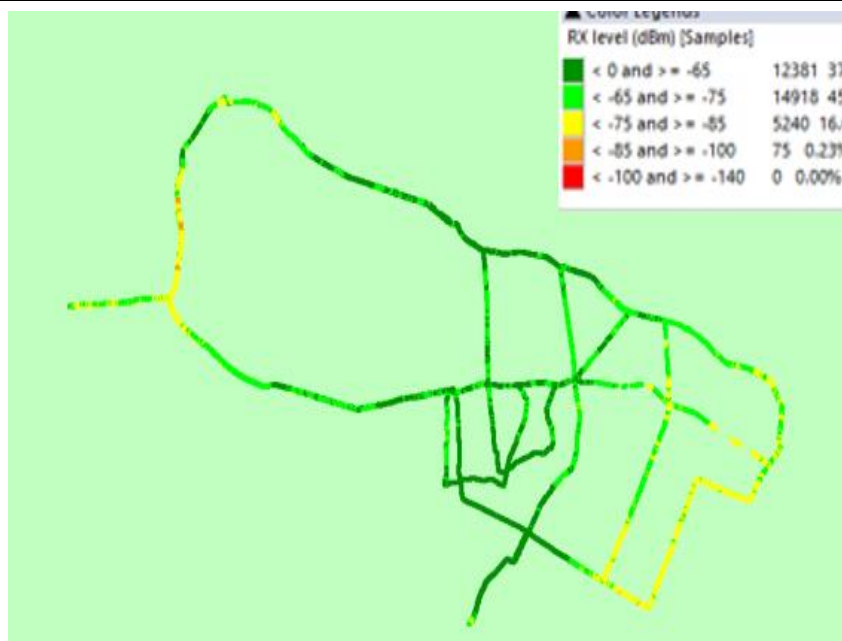
JAZZ VOICE NETWORK COVERAGE



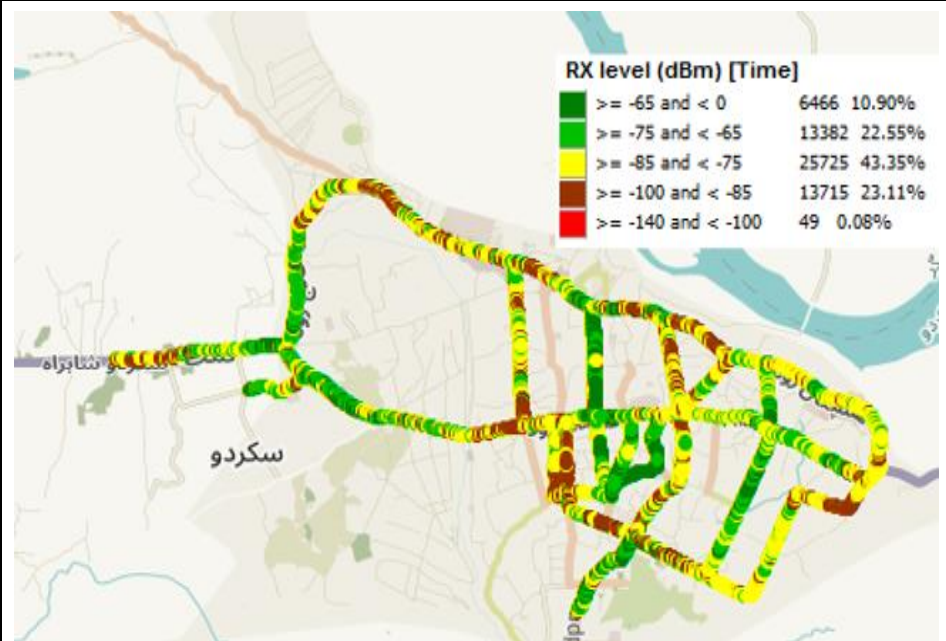
TELENOR VOICE NETWORK COVERAGE



UFONE VOICE NETWORK COVERAGE

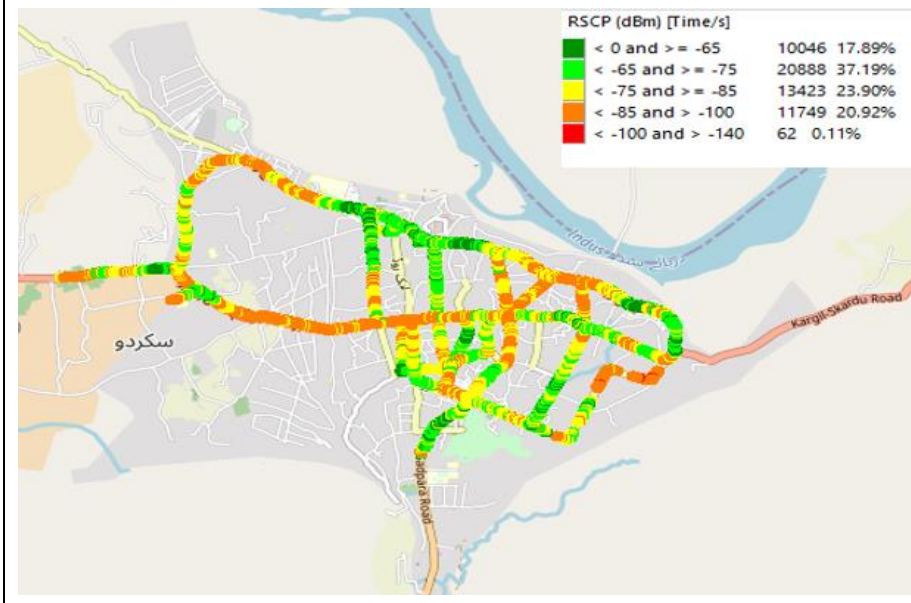


ZONG VOICE NETWORK COVERAGE

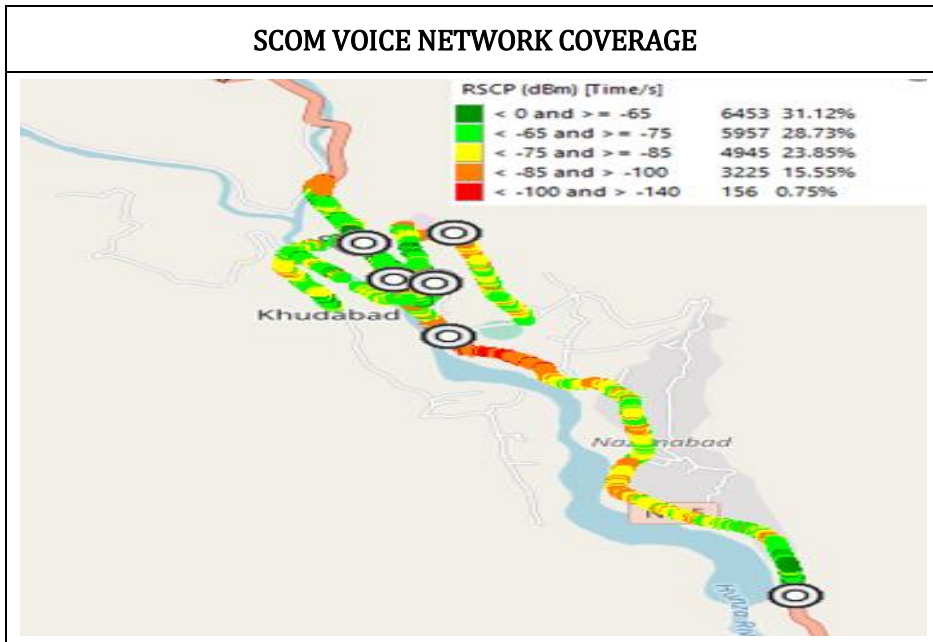


VOICE COVERAGE MAPS –SKARDU

SCOM VOICE NETWORK COVERAGE

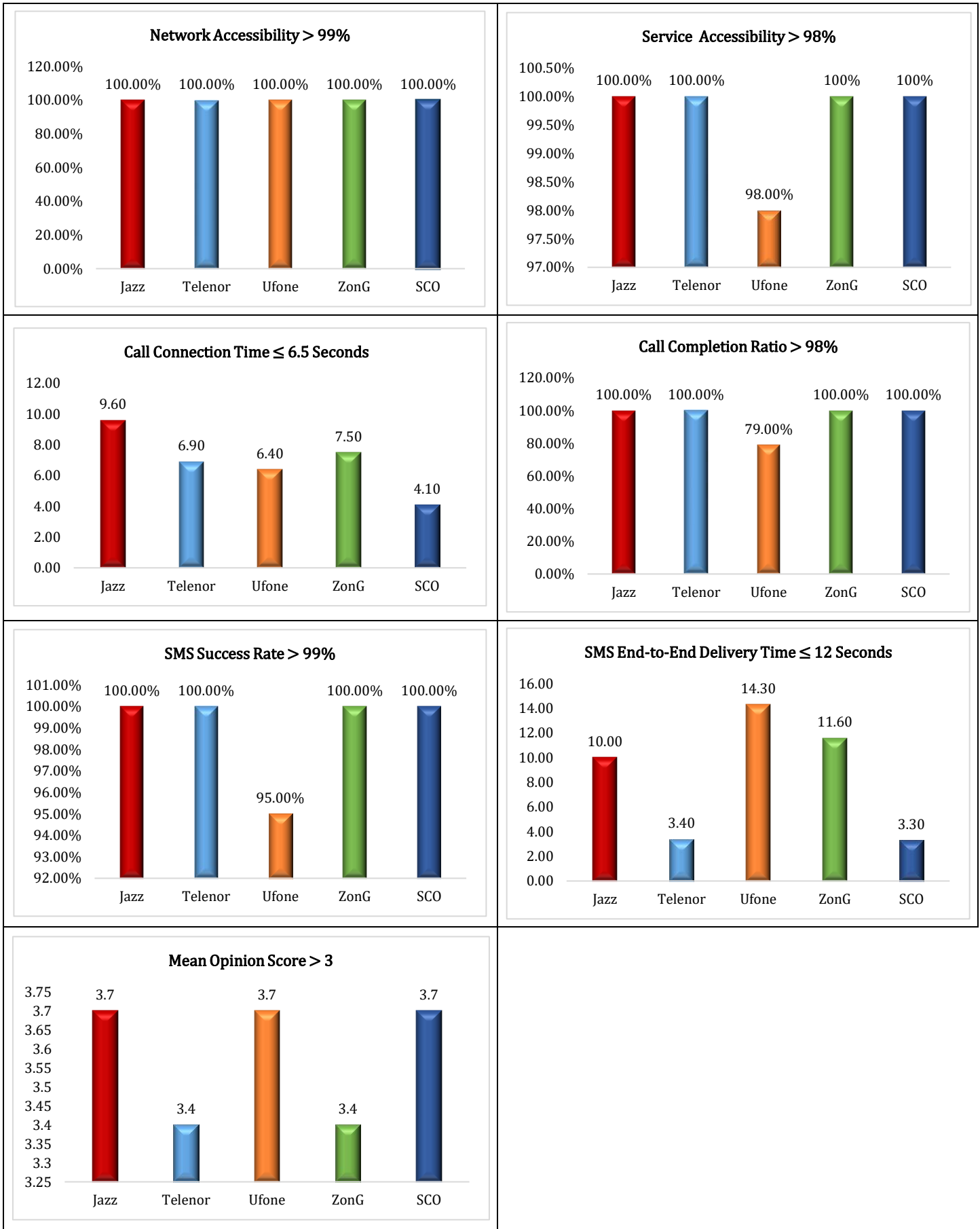


VOICE COVERAGE MAPS – SOST



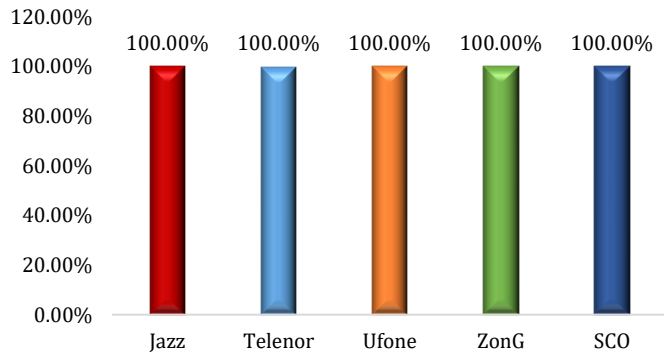
Annex-B (Voice QoS KPI Graphs)

QUALITY OF SERVICE SURVEY RESULTS – GILGIT

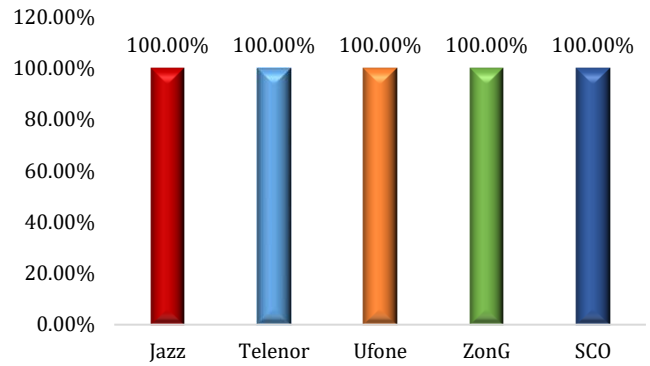


QUALITY OF SERVICE SURVEY RESULTS – HUNZA

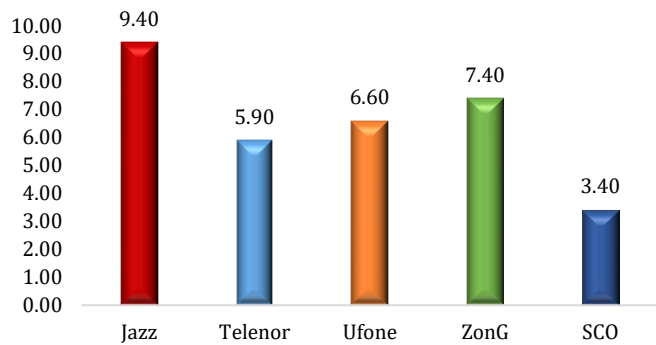
Network Accessibility > 99%



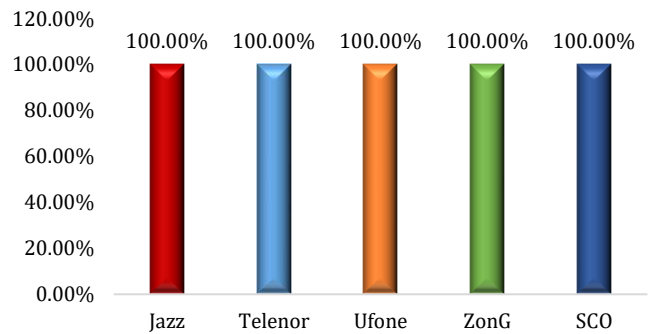
Service Accessibility > 98%



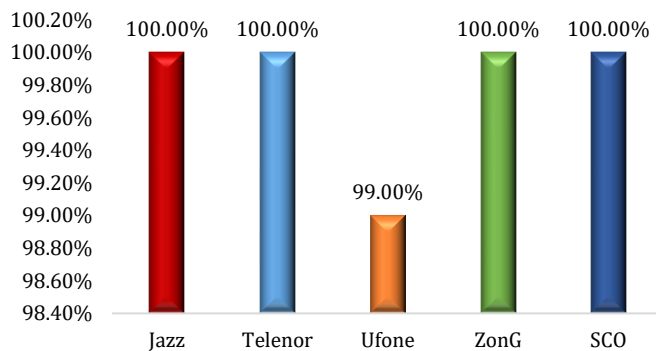
Call Connection Time ≤ 6.5 Seconds



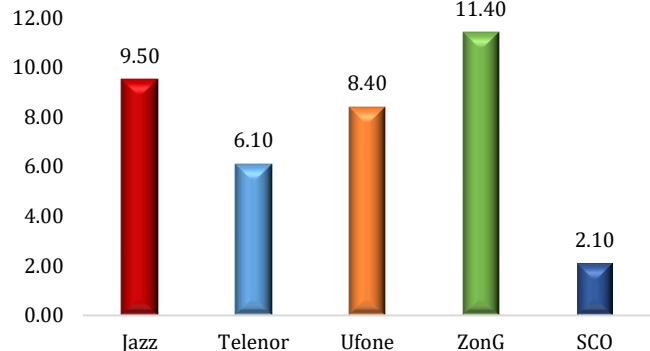
Call Completion Ratio > 98%



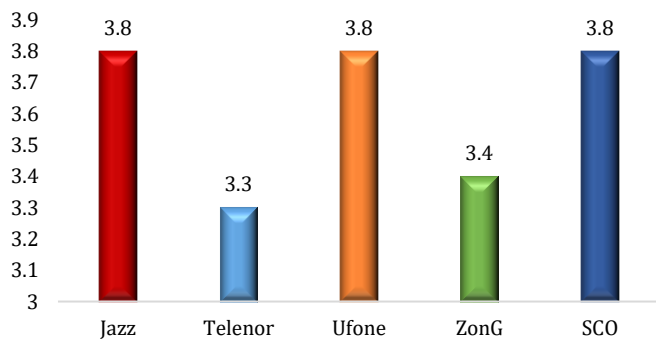
SMS Success Rate > 99%



SMS End-to-End Delivery Time ≤ 12 Seconds

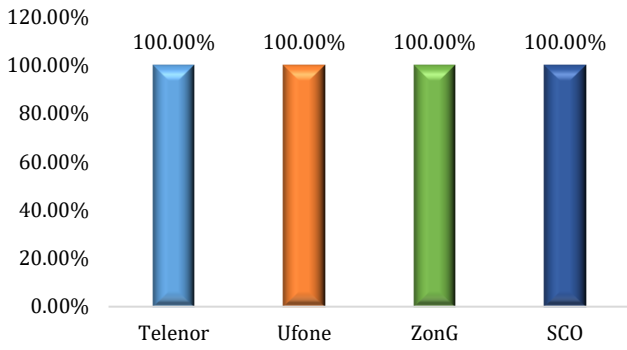


Mean Opinion Score > 3

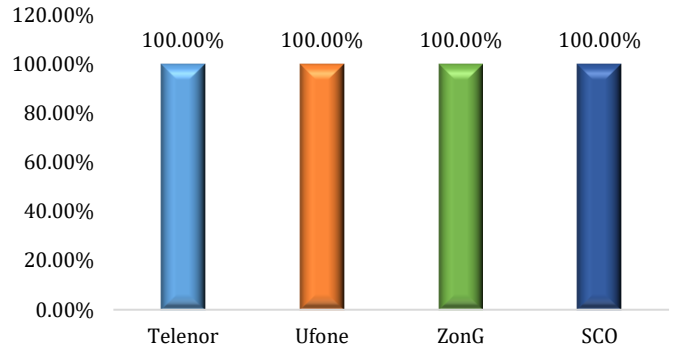


QUALITY OF SERVICE SURVEY RESULTS – SOST

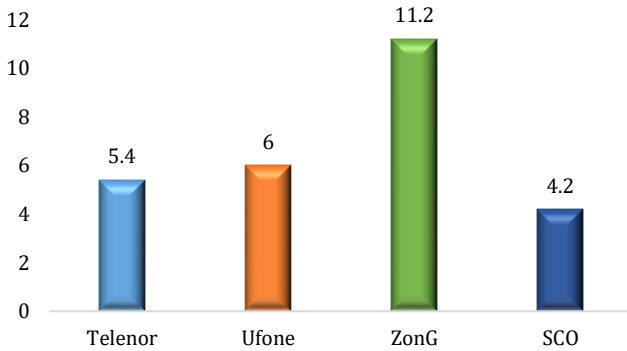
Network Accessibility > 99%



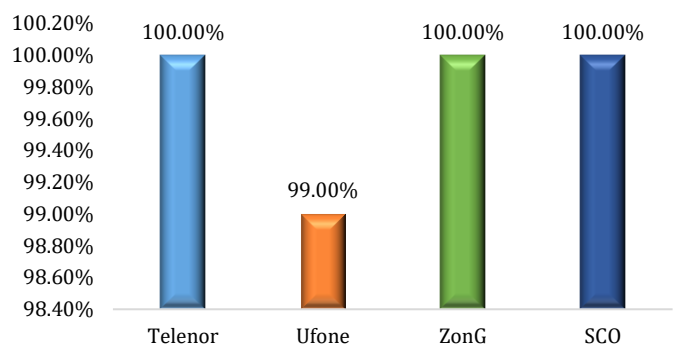
Service Accessibility > 98%



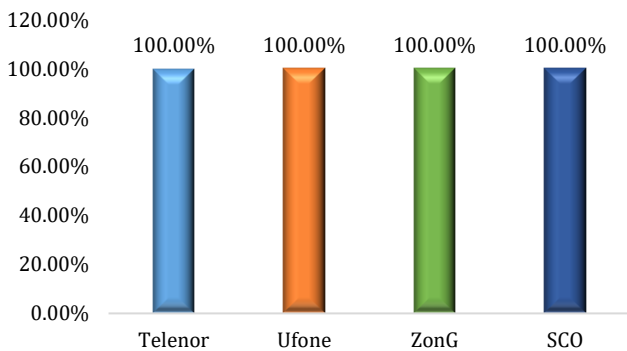
Call Connection Time ≤ 6.5 Seconds



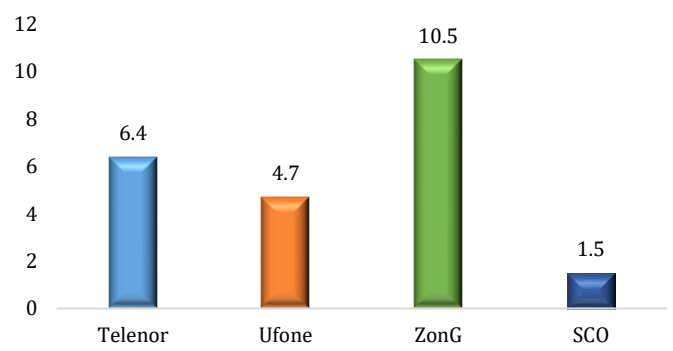
Call Completion Ratio > 98%



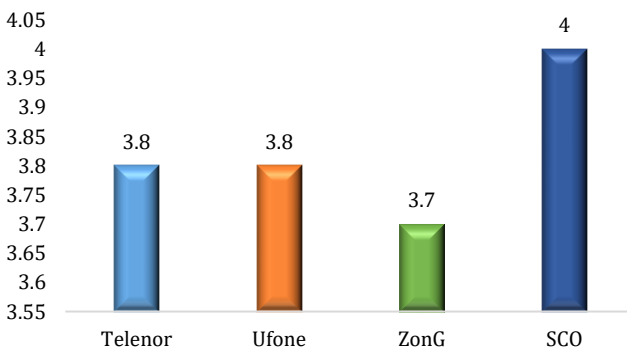
SMS Success Rate > 99%



SMS End-to-End Delivery Time ≤ 12 Seconds

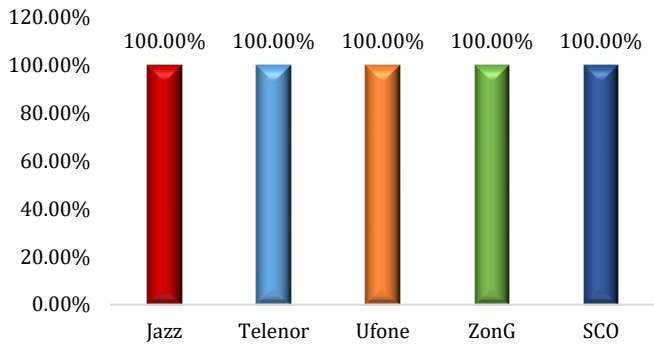


Mean Opinion Score > 3

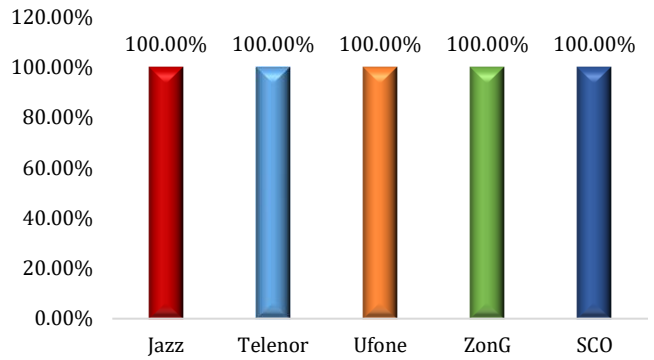


QUALITY OF SERVICE SURVEY RESULTS – GHAKUCH

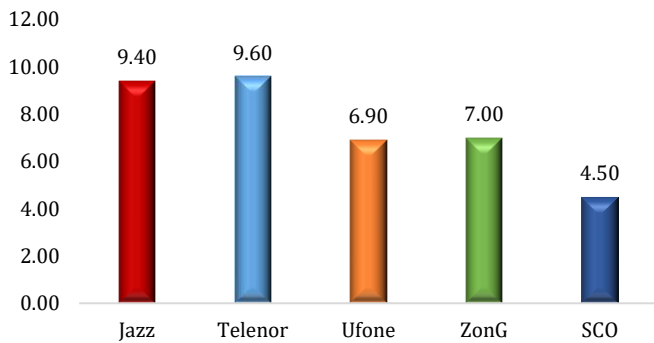
Network Accessibility > 99%



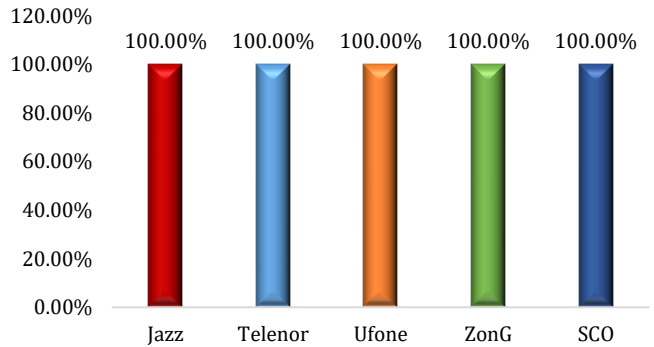
Service Accessibility > 98%



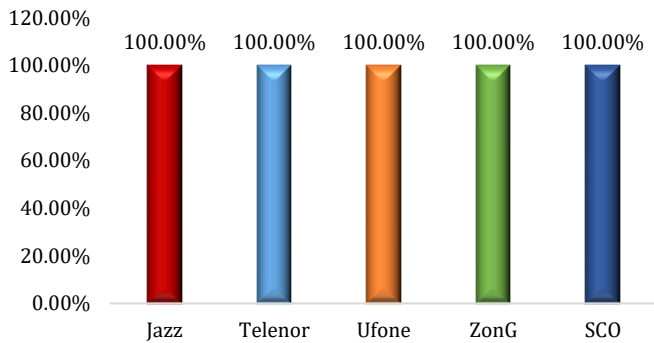
Call Connection Time ≤ 6.5 Seconds



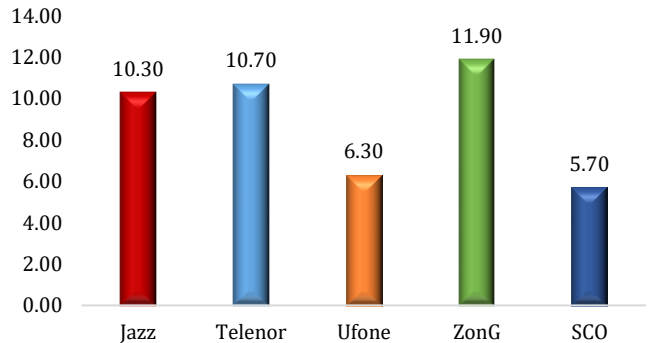
Call Completion Ratio > 98%



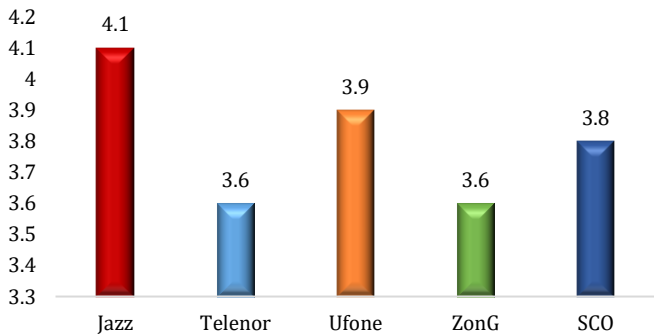
SMS Success Rate > 99%



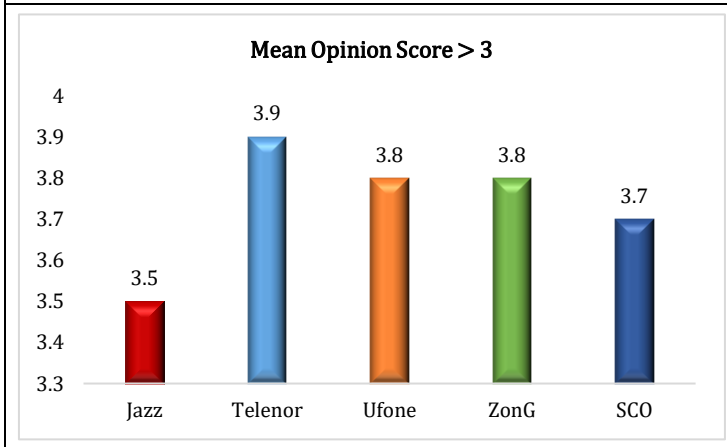
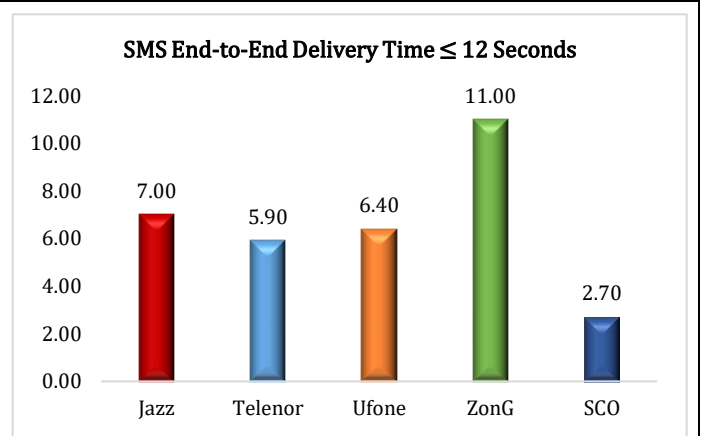
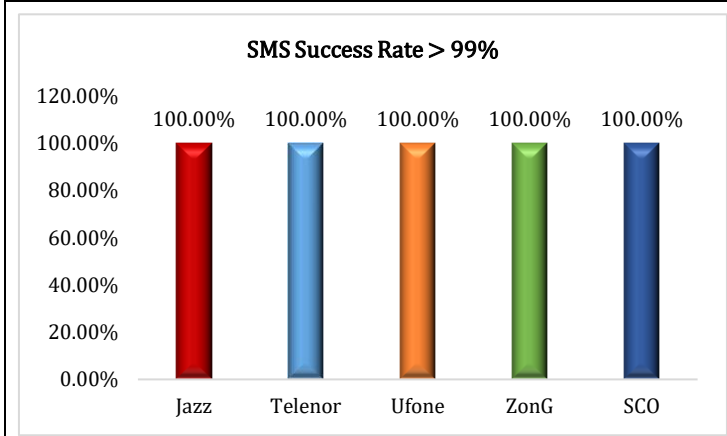
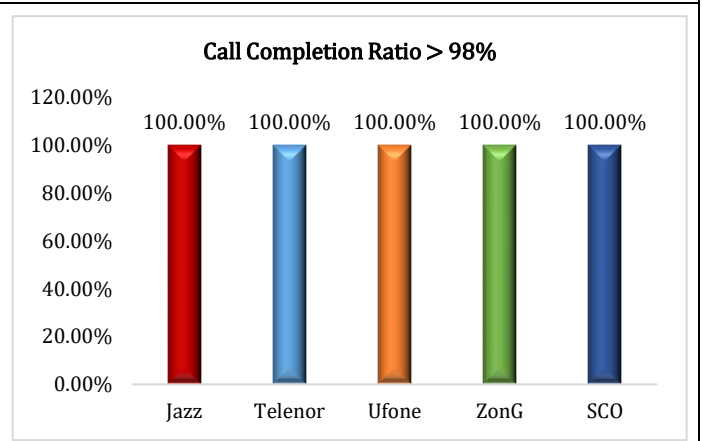
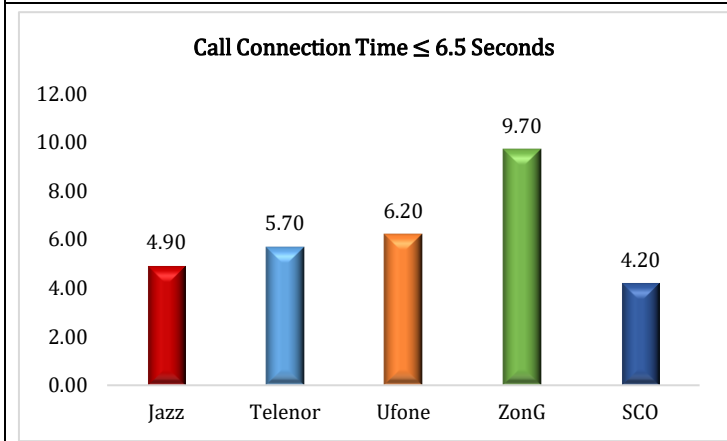
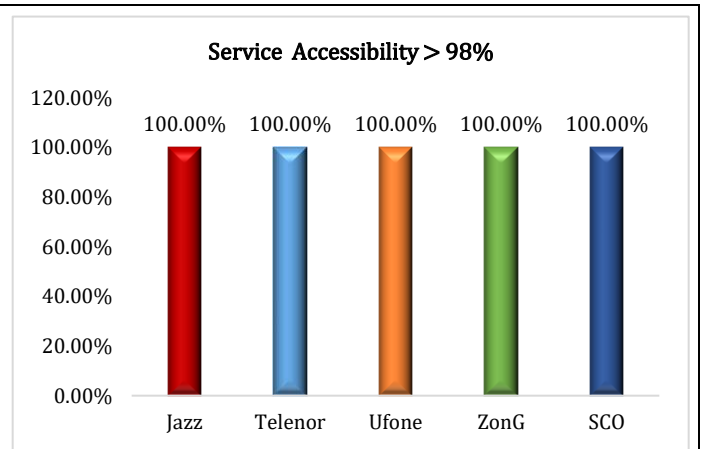
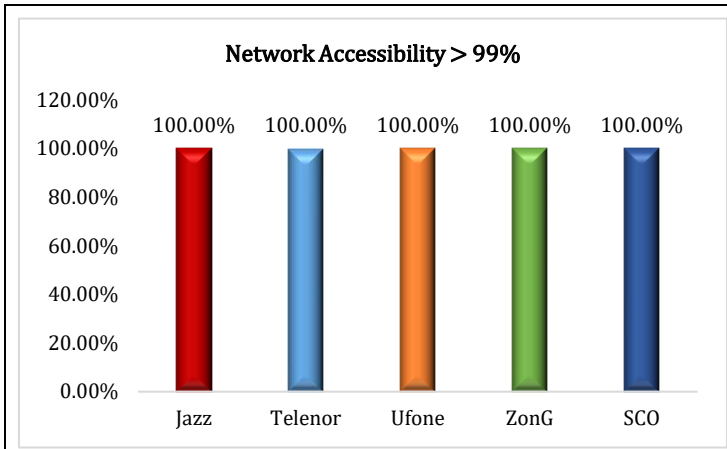
SMS End-to-End Delivery Time ≤ 12 Seconds



Mean Opinion Score > 3

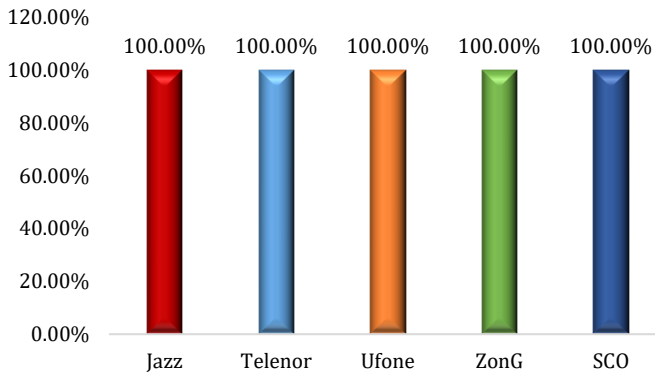


QUALITY OF SERVICE SURVEY RESULTS – ASTORE

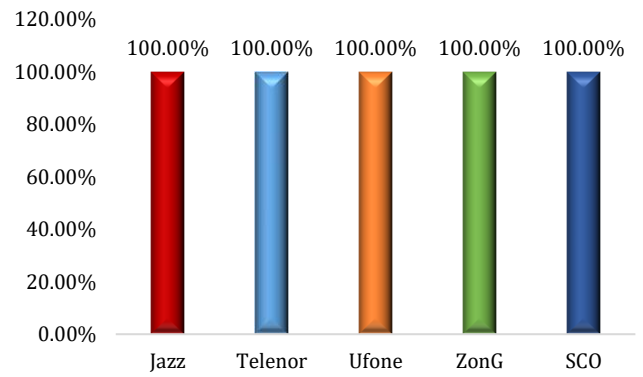


QUALITY OF SERVICE SURVEY RESULTS – SKARDU

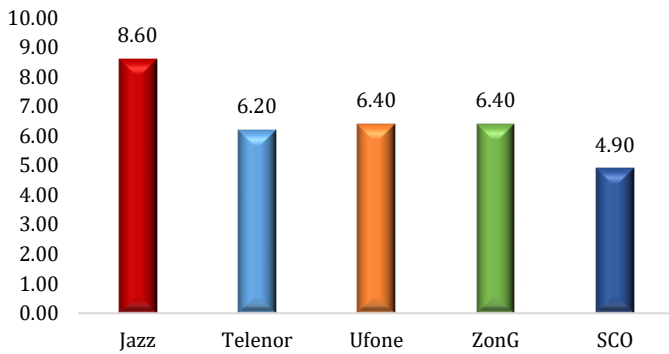
Network Accessibility > 99%



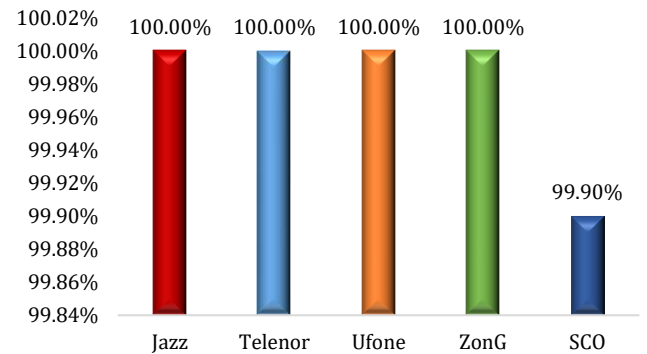
Service Accessibility > 98%



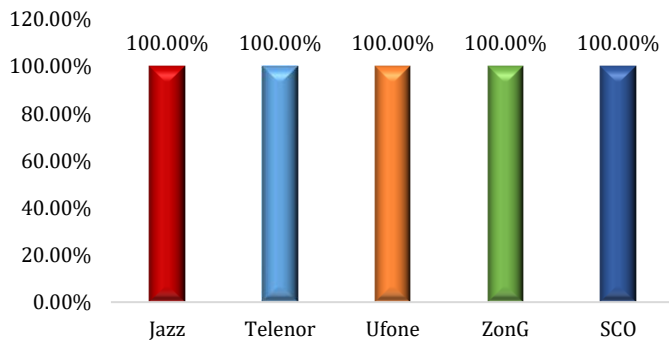
Call Connection Time ≤ 6.5 Seconds



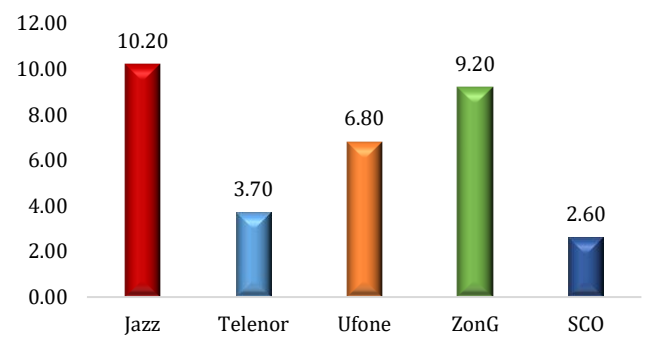
Call Completion Ratio > 98%



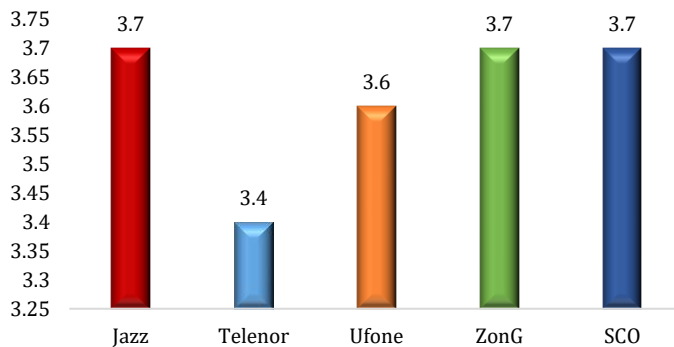
SMS Success Rate > 99%



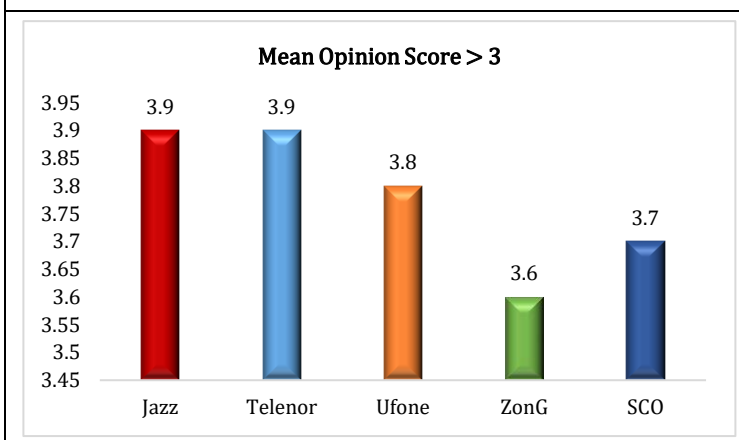
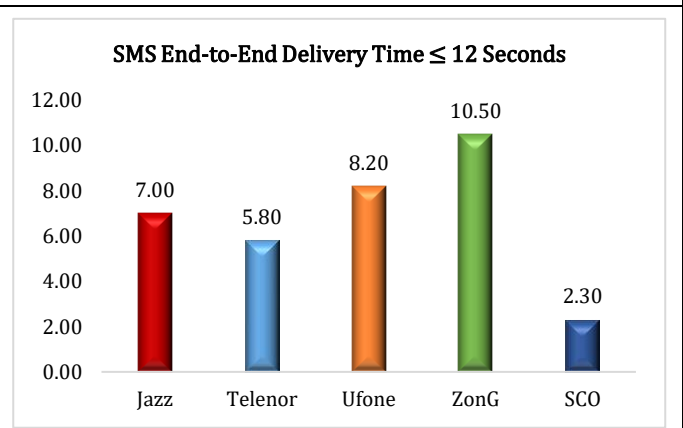
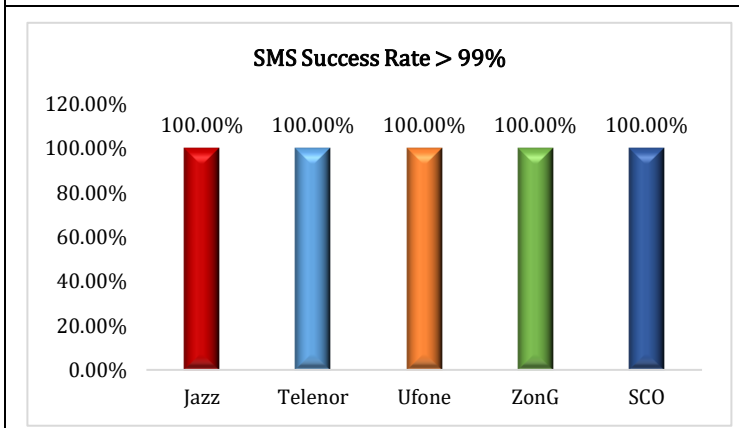
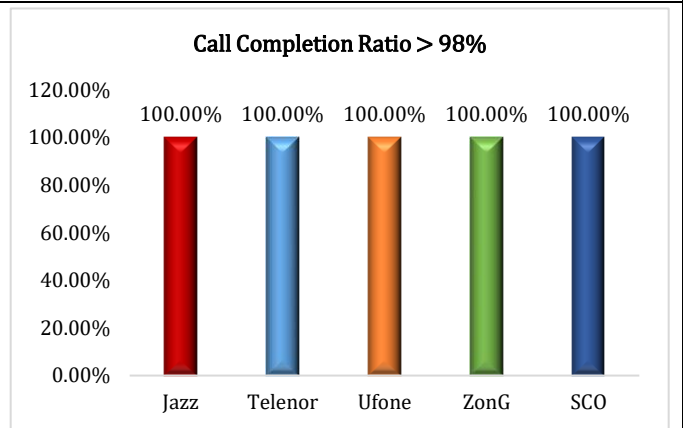
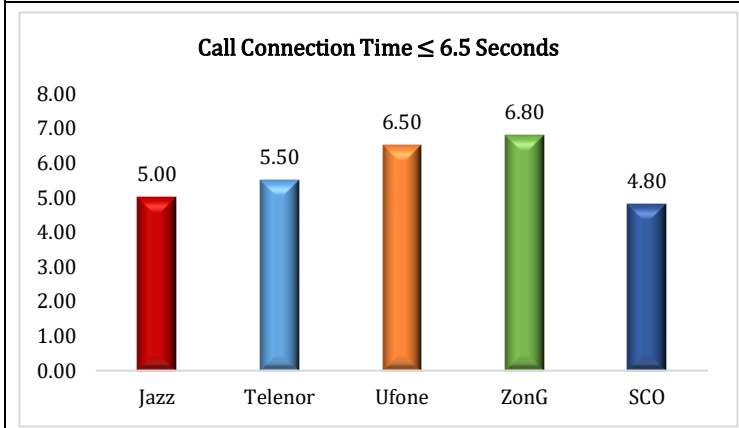
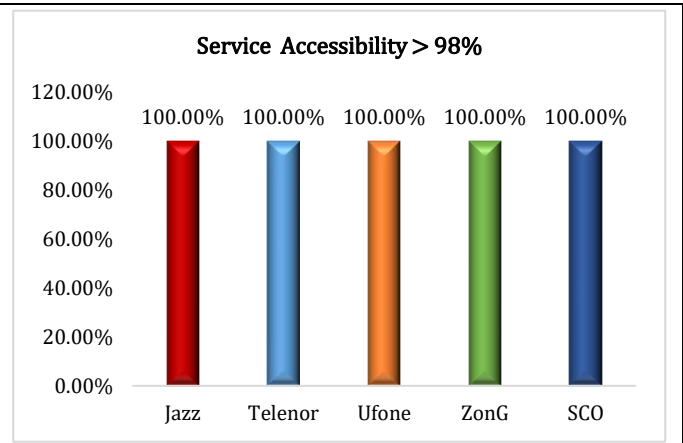
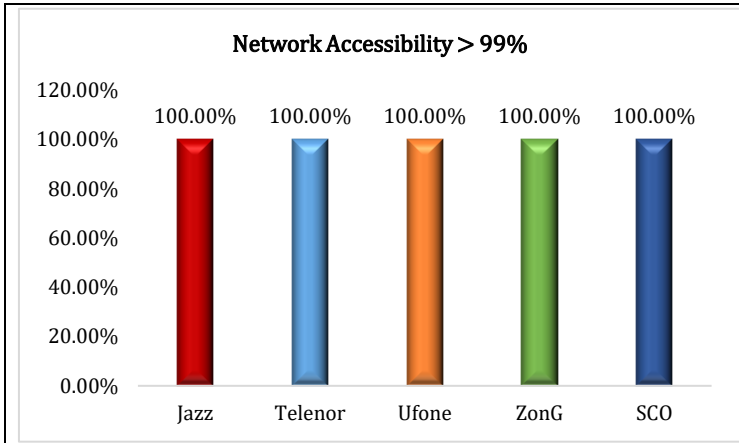
SMS End-to-End Delivery Time ≤ 12 Seconds



Mean Opinion Score > 3



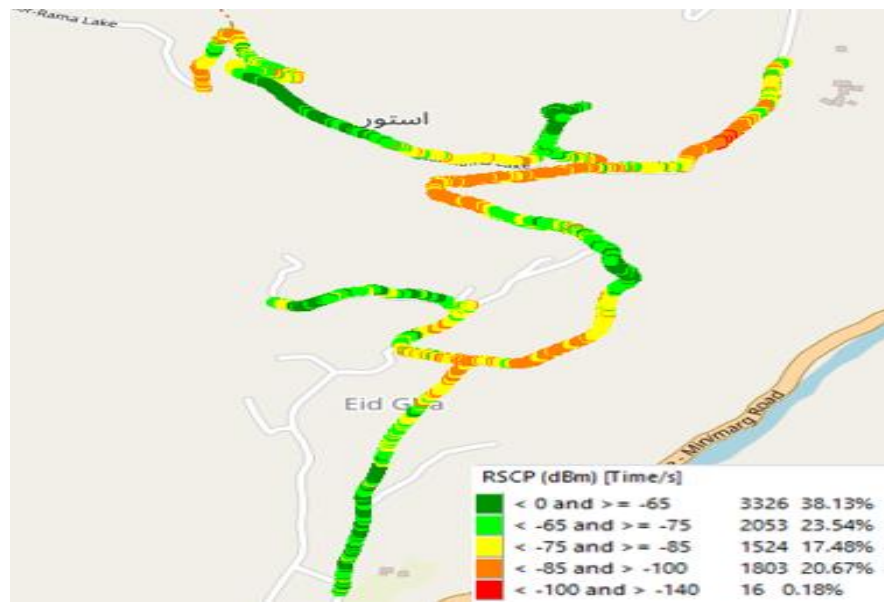
QUALITY OF SERVICE SURVEY RESULTS – KHAPLU



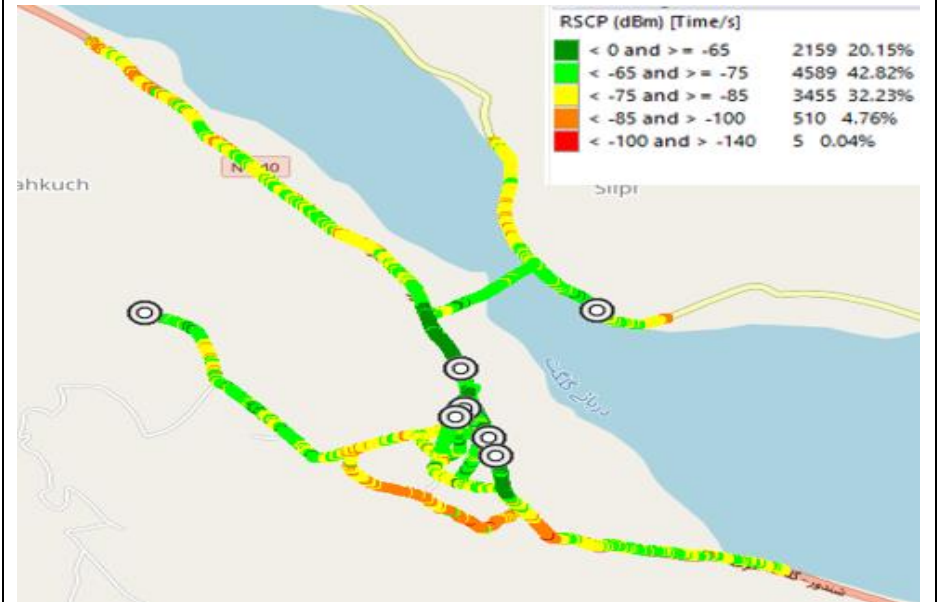
Annex-C (Data Coverage Maps)

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

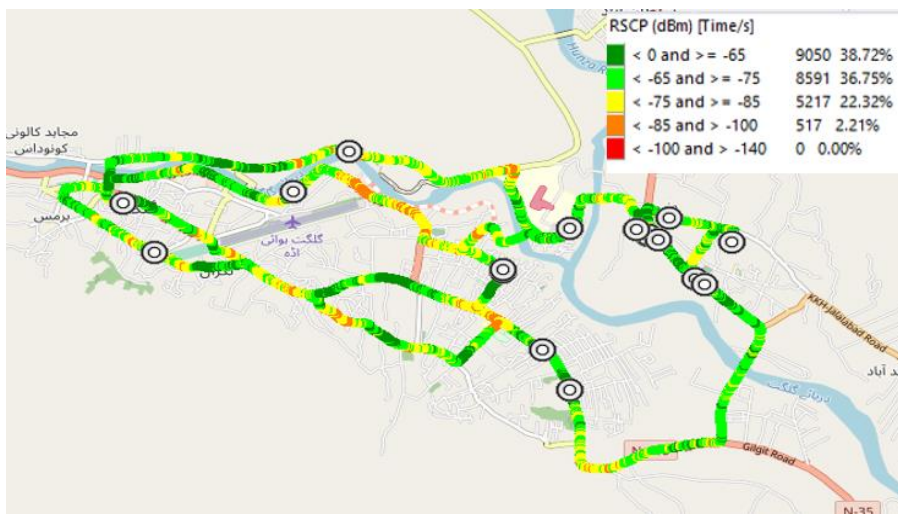
ASTORE



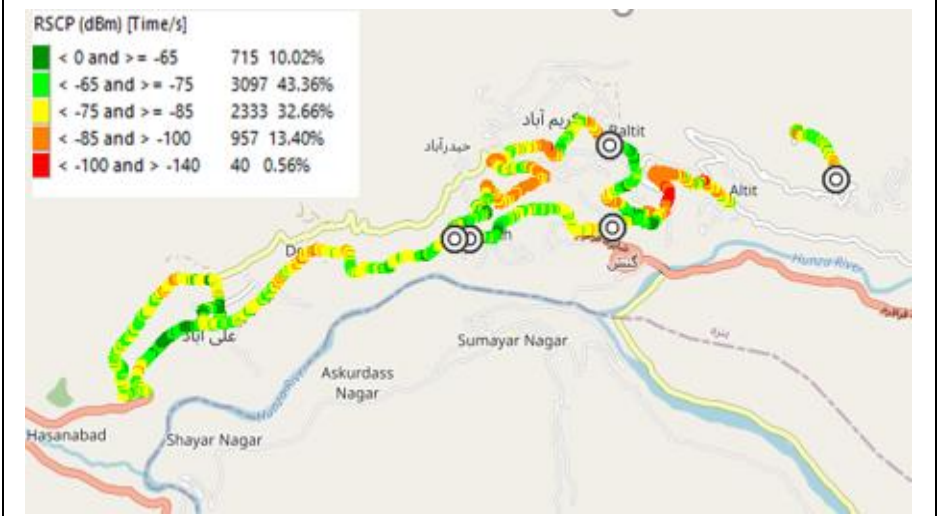
GHAKUCH



GILGIT



HUNZA

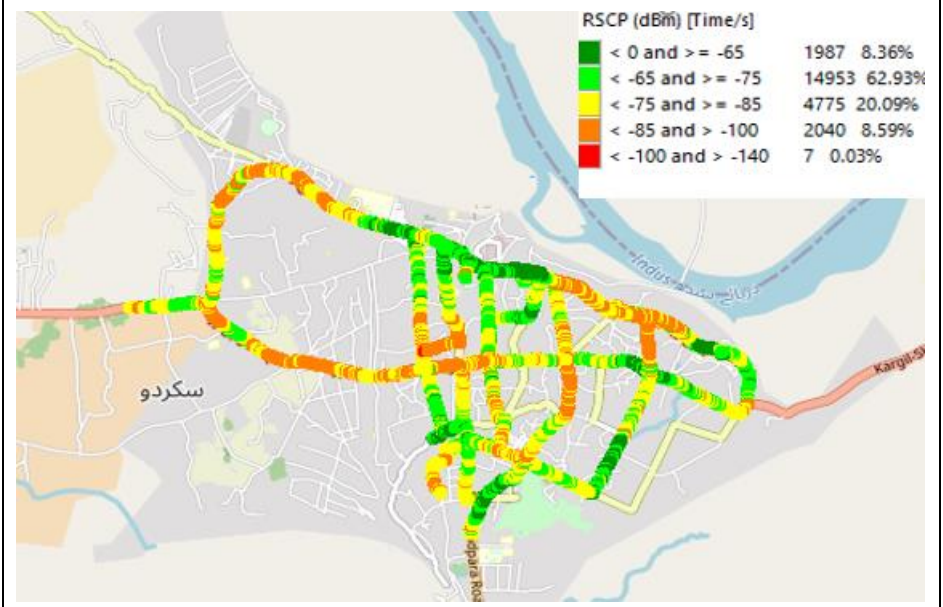


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

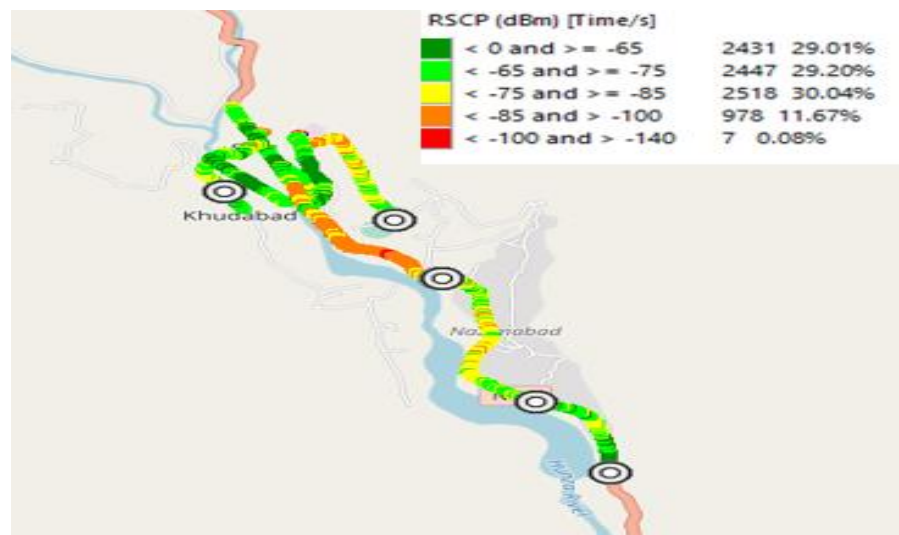
KHAPLU



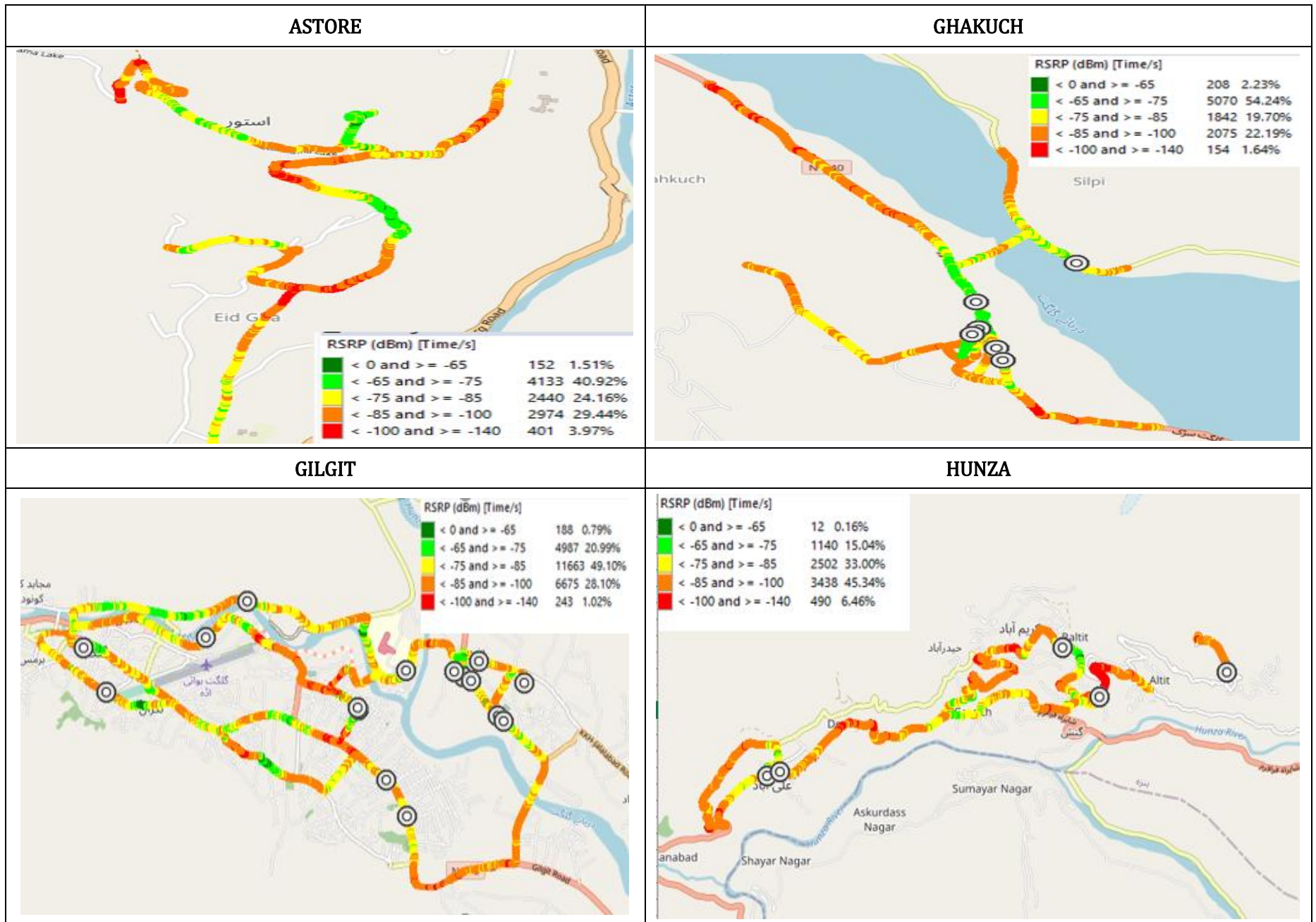
SKARDU



SOST



4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

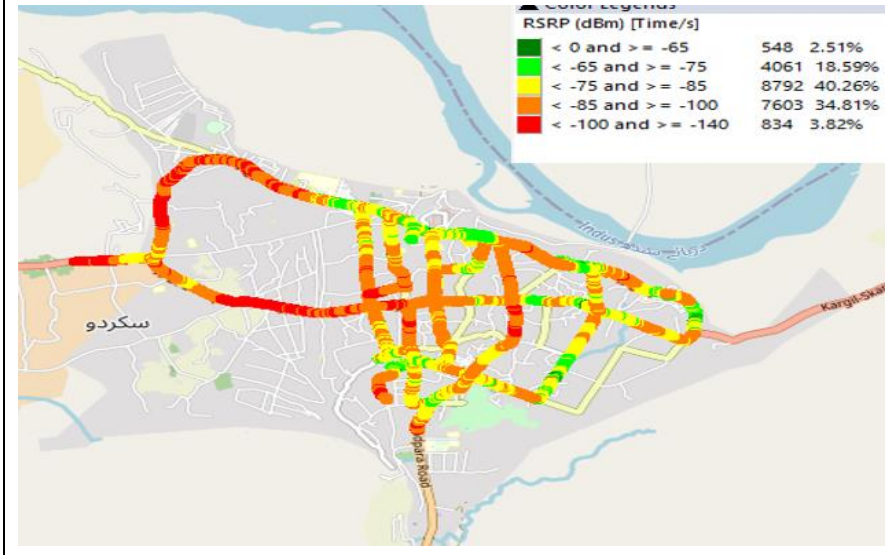


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

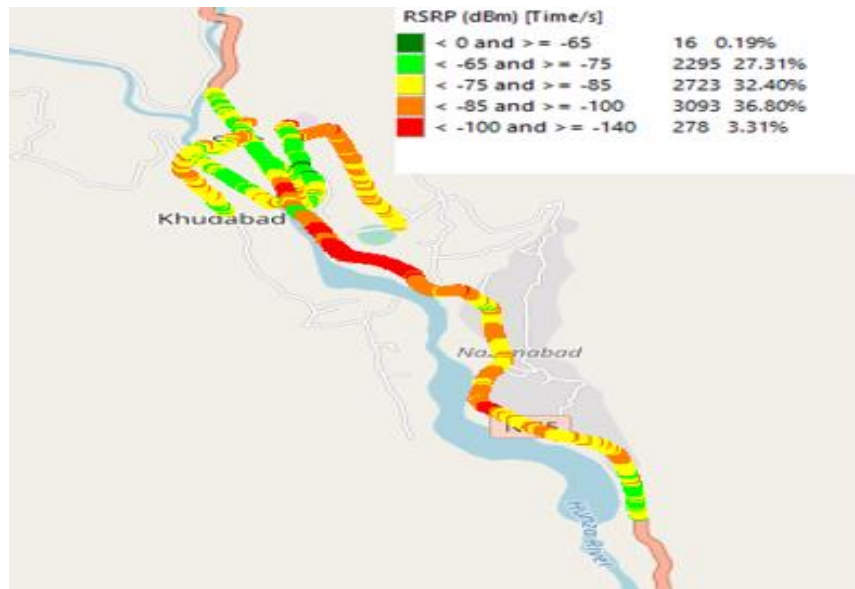
KHAPLU



SKARDU



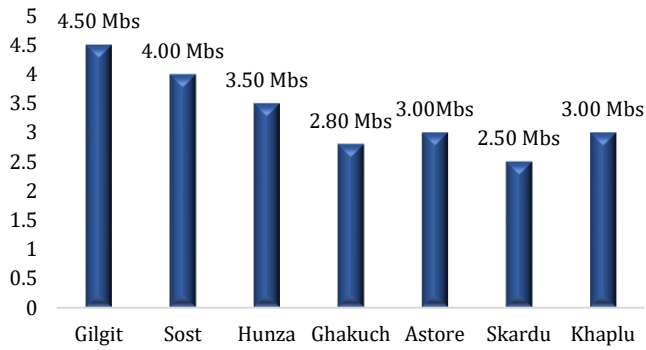
SOST



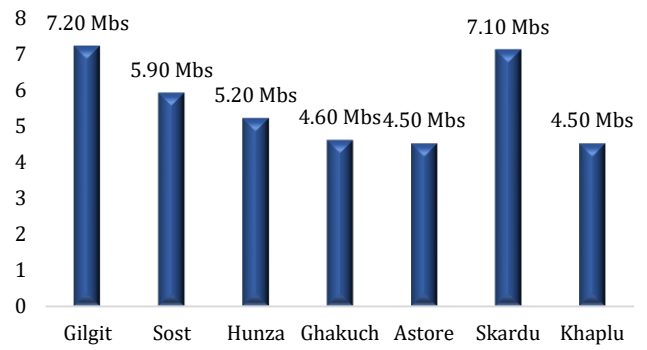
Annex-D (Data QoS KPI Graphs)

QUALITY OF SERVICE SURVEY RESULTS GILGIT BALTISTAN

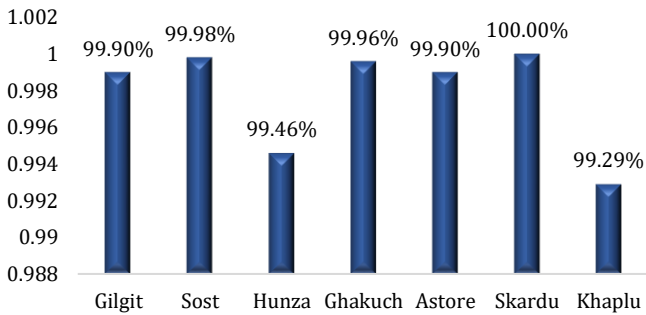
User Data Throughput (3G) > 256kbps



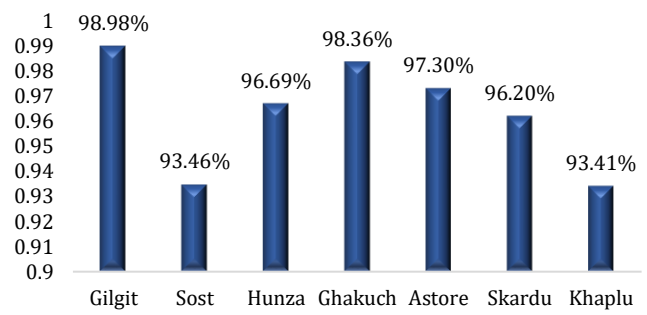
User Data Throughput (4G) > 2Mbps



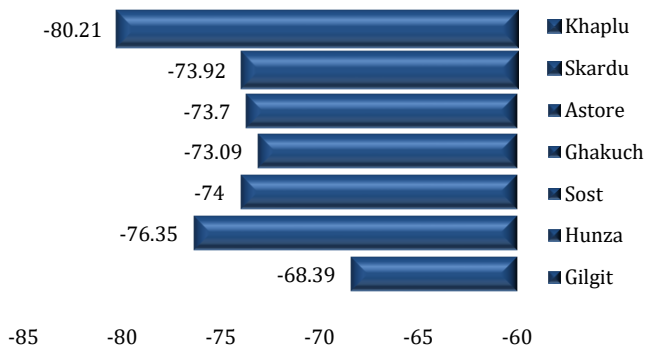
Signal Strength RSCP in dedicated mode (3G) 90% Confidence Level



Signal Strength RSRP in dedicated mode (4G) 90% Confidence Level



3G Signal Strength (RSCP) > -100dBm



4G Signal Strength (RSRP) > -100dBm

