INDEPENDENT QUALITY OF SERVICE SURVEY – CITIES IN AJK

FIRST QUARTER 2022

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

INDEPENDENT QUALITY OF SERVICE SURVEY REPORT

INTRODUCTION

1.1. In order to measure the performance and service quality of Cellular Mobile Operators (CMOs), an independent Quality of Service (QoS) Survey has been carried out in four (04) x cities of Azad Jammu & Kashmir (AJK), in first quarter 2022. 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.	Azad Jammu & Kashmir (AJK)	Bhimber	3	08 ~ 10 February 2022
2.		Mirpur	2	15 ~ 16 February 2022
3.		Muzaffarabad	3	1 ~ 3 March 2022
4.		Rawlakot	3	07 ~ 09 March 2022

Table 1.1: QoS Survey Dates and Samples

DRIVE TEST DETAILS

2.1. The QoS survey was carried out using Automated QoS Monitoring & Benchmarking Tool i.e. **"SMARTBENCHMARKER**". Drive test 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 auto detect mode.

MOBILE NETWORK COVERAGE

3.1. **4G / LTE SIGNAL STRENGTH**. During the survey, while conducting data test in auto mode, 4G/LTE 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 of Reference Signal Receive Power (RSRP) with 90% confidence level.** The Confidence Level and Compliance of signal strength is shown in **Table 3.1: 4G Signal Strength -100dBm with 90% Confidence Level in AJK**

4G Signal Strength -100dBm with 90% Confidence Level										
City	Confidence Level					Compliant (Yes/No)				
	Jazz	Telenor	Ufone	ZonG	SCOM	Jazz	Telenor	Ufone	ZonG	SCOM
Bhimber	**86.96%**	91.17%	90.57%	96.41%	94.98%	**No**	Yes	Yes	Yes	Yes
Mirpur	91.70%	97.83%	97.92%	94.86%	98.09%	Yes	Yes	Yes	Yes	Yes
Rawlakot	94.15%	97.26%	99.84%	97.93%	98.43%	Yes	Yes	Yes	Yes	Yes
Mirpur	**88.63%**	90.28%	99.07%	95.63%	97.83%	**No**	Yes	Yes	Yes	Yes

Table 3.1: 4G Signal Strength -100dBm with 90% Confidence Level in AJK

MOBILE BROADBAND SERVICE

4.1. A total of **6,802 http download test attempts** made successfully. The company wise detail of Test Attempt Success Ratio, User Data Throughput and 4G/LTE, 3G and 2G network signal strength is mentioned in **Table4.1: Data Tests Statistics.**

Description	Jazz	Telenor	Ufone	ZonG	SCOM
SUCCESSFUL DATA TEST ATTEMPTS	1183	1204	948	1164	2303
TEST ATTEMPTS SUCCESS RATIO (%)	2.54	18.82	0.47	75.1	22.13
USER DATA THROUGHPUT (Mbps)	**0.51**	4.854	16.82	8.485	3.931

Description	Jazz	Telenor	Ufone	ZonG	SCOM
AVERAGE 4G SIGNAL STRENGTH (RSRP) dBm	-83.7	-83.7	-80.4	-80.5	-81.4
AVERAGE 3G SIGNAL STRENGTH (RSCP) dBm	-	-88.15	-84.58	-80.95	-73.94
AVERAGE 2G SIGNAL STRENGTH (RXLEV) dBm	-68.65	-71.88	-68.31	-64.26	-73.29

Table4.1: Data Tests Statistics.

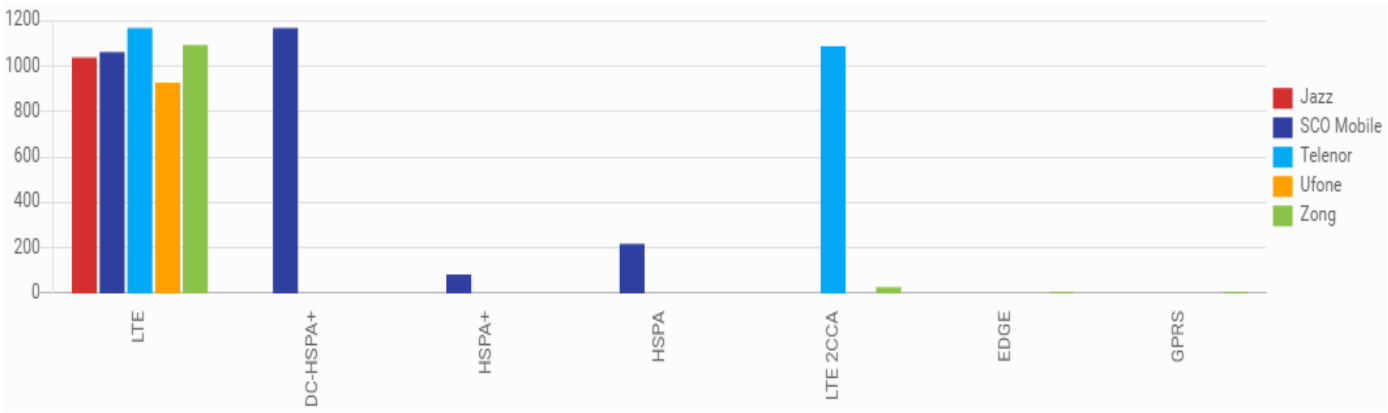
4.2. **4G USER DATA THROUGHPUT.** As per Next Generation Mobile Service (NGMS) licenses and Cellular Mobile Network Quality of Service (QoS) Regulations 2021, licensees are required to meet **the threshold of minimum of 2Mbps of 4G User Data Throughput.** The results of Data Service QoS KPI i.e. User Data Throughput is shown in **Table4.2: 4G User Data Throughput in AJK≥ 2 Mbps.**

City	4G User Data Throughput (Mbps)					Operator Position				
	Jazz	Telenor	Ufone	ZonG	SCOM	Jazz	Telenor	Ufone	ZonG	SCOM
Bhimber	**0.55**	10.20	29.54	20.04	4.30	**Fifth**	Third	First	Second	Fourth
Mirpur	**0.57**	4.53	**0.01**	7.58	3.27	**Fourth**	Second	**Fifth**	First	Third
Rawlakot	0.30	1.83	16.19	3.75	3.35	Fifth	Fourth	First	Second	Third
Mirpur	0.64	4.65	8.94	6.17	2.92	Fifth	Third	First	Second	Fourth

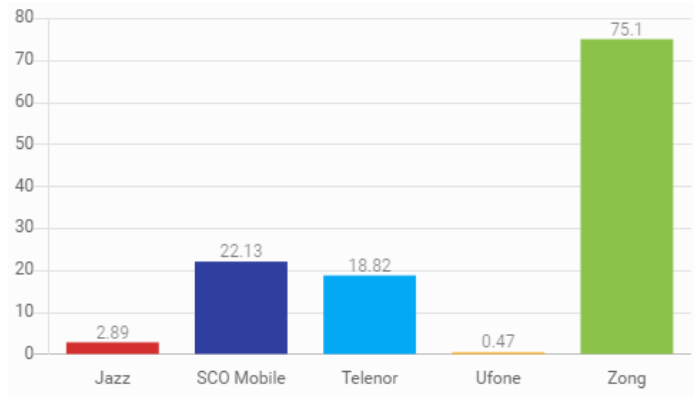
Table4.2.2: 4G User Data Throughput in AJK ≥ 2 Mbps

4.4. During the survey, the deployed technologies by Cellular Mobile Operators (CMOs), Success Rate of http Transfer Download Tests, Data Technologies during the Data Sessions alongwith Technology Bands and Resource Block Utilization have been recorded. The details can been seen in attached graphs.

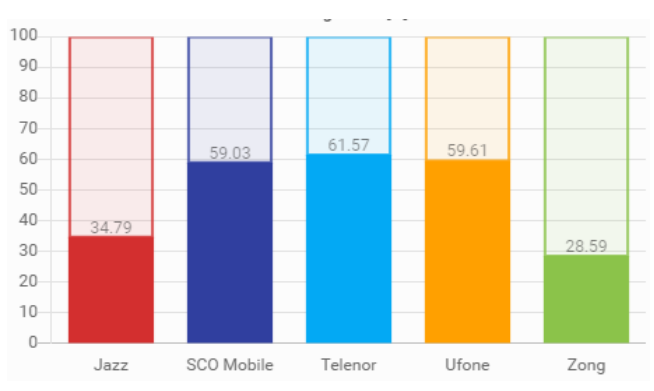
HTTP TRANSFER DOWNLOAD SUCCESS BY TECHNOLOGY



HTTP TRANSFER SUCCESS RATE



DOWNLINK RESOURCE BLOCK UTILIZATION



VOICE SERVICE

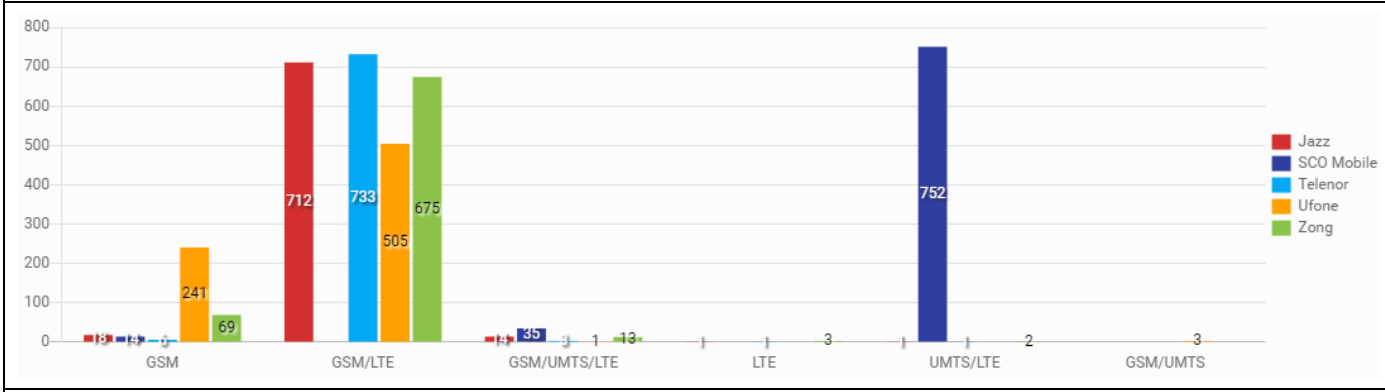
5.1. A total of **3,803 Call attempts** made and out of which **146 were failed attempts**. In **3,657 successful call attempts**, **52 calls dropped** prior to completion of two minutes duration, whereas, **3,605 calls remained connected** for the complete duration of two minutes. The company wise call statistics is shown in **Table5.1: Call Statistics.**

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG	SCOM
TOTAL CALLS ATTEMPTS	746	744	750	762	801
FAILED CALLS ATTEMPTS	36	68	11	19	12
ESTABLISHED CALLS ATTEMPTS	710	676	739	743	789
DROPPED CALLS ATTEMPTS	3	11	7	15	16
COMPLETED CALLS ATTEMPTS	707	665	732	728	773
CALL SETUP SUCCESS RATE	**95.17 %**	**90.86 %**	98.53 %	**97.51 %**	98.5 %
CALL SETUP TIME	**9.17 s**	**13.76 s**	**9.88 s**	**9.73 s**	**7.83 s**
CALL COMPLETION RATE	99.46 %	**94.89 %**	98.26 %	**97.73 %**	**91.06 %**
ISHO SUCCESS RATE	-	-	100 %	-	100 %
RAB SETUP SUCCESS RATE	100 %	100 %	100 %	100 %	100 %
MEAN OPINION SCORE	**2.75**	**2.52**	**2.65**	**2.64**	3.22
MOS EXCESS RATIO – MOS < 1.6	5.46 %	8.25 %	6.37 %	7.03	3.63 %
TOTAL SPEECH TEST	7137	6597	7377	7352	7791

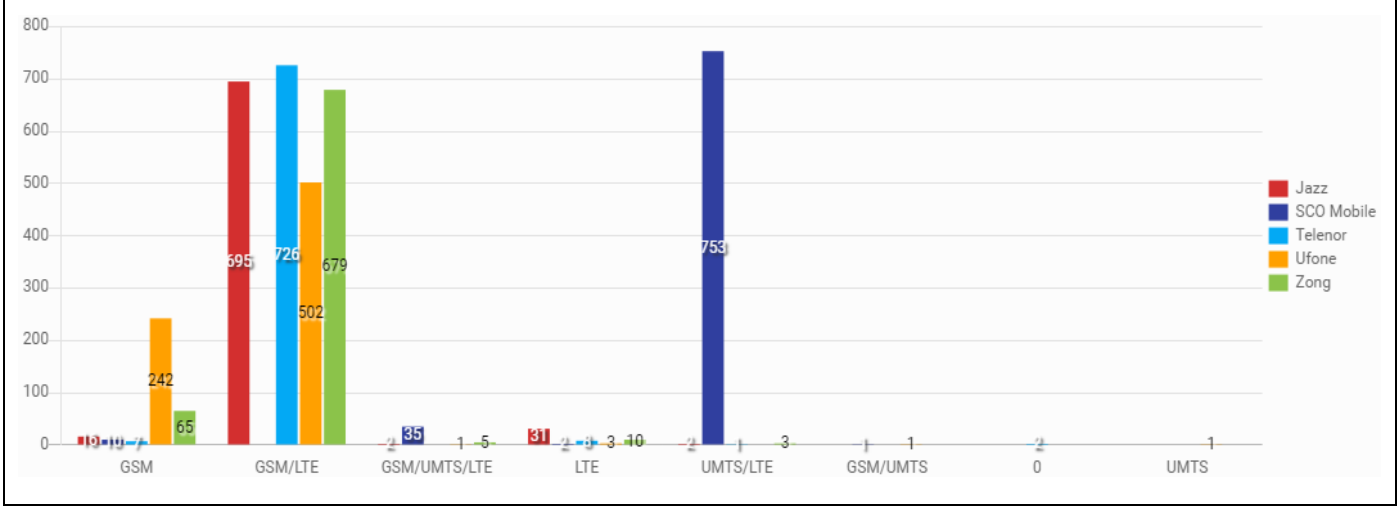
Table5.1: Call Statistics

5.2. The overall Call Setup Success Rate and Call Retainability alongwith Mean Opinion Score (MOS), the percentage of mute calls, MOS with respect to Voice CODEC and Technology per band is shown as under:

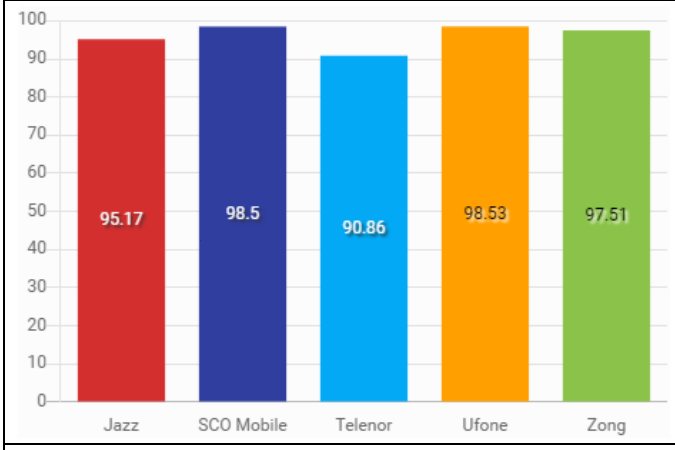
TECHNOLOGY WISE DISTRIBUTION OF CALLS – A PARTY



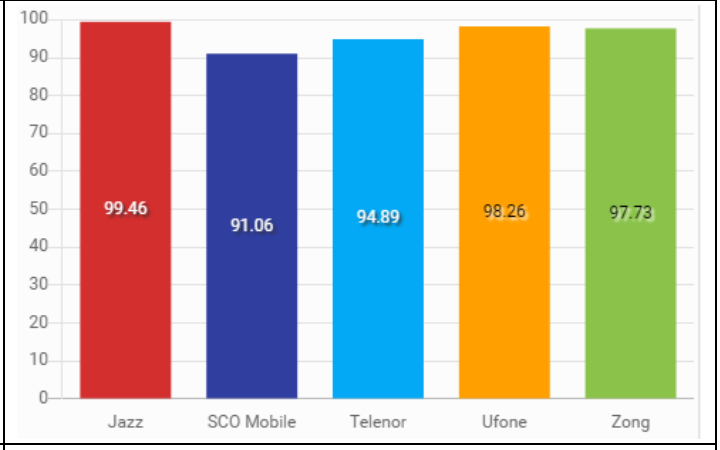
TECHNOLOGY WISE DISTRIBUTION OF CALLS – B PARTY



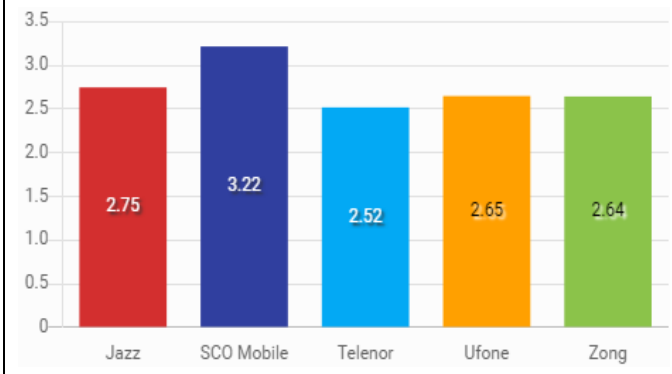
CALL SETUP SUCCESS RATE



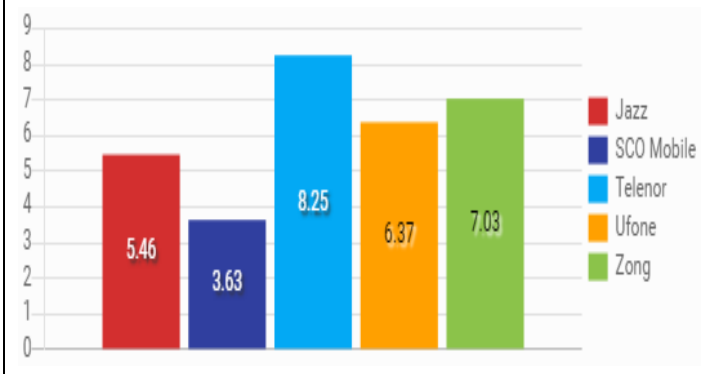
CALL RETAINABILITY



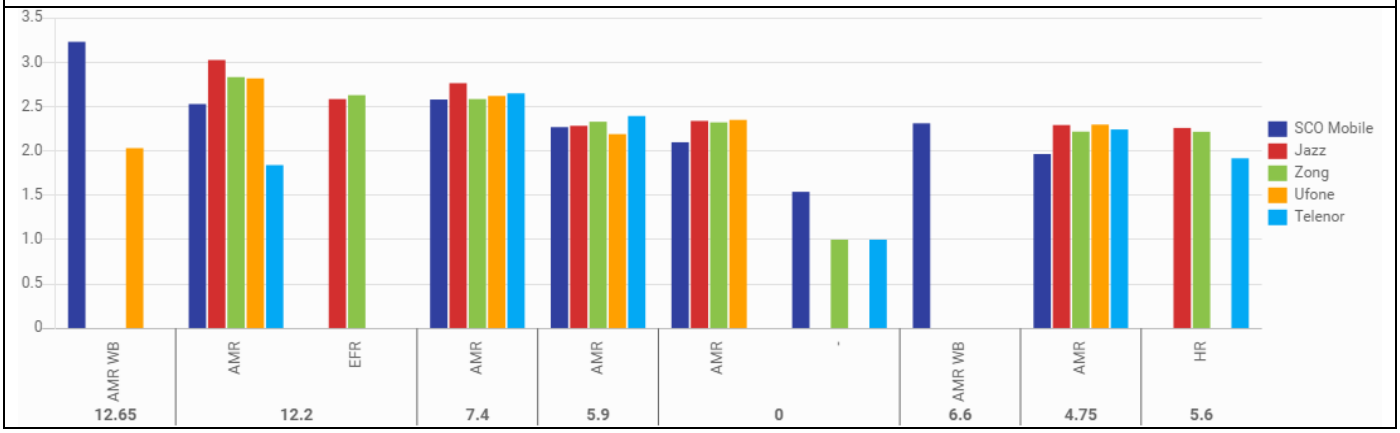
MEAN OPINION SCORE - AVERAGE



MEAN OPINION SCORE < 1.6 (PERCENTAGE)



MEAN OPINION SCORE – VOICE CODEC



5.3. The 7 x 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 **4 x surveyed cities** of AJK. The compliance level of threshold values of voice QoS KPIs in 9 x Cities is shown in each **Table 5.3: Voice QoS KPIs Compliance Level.**

Voice Service Cities - Compliance (Yes/No)					
Operator	Voice KPIs	**Bhimber**	**Mirpur**	**Rawlakot**	**Mirpur**
Jazz	Network Accessibility	Yes	Yes	Yes	Yes
	Service Accessibility	**No**	**No**	**No**	**No**
	Call Connection Time	Yes	Yes	**No**	**No**

Voice Service Cities - Compliance (Yes/No)					
Operator	Voice KPIs	**Bhimber**	**Mirpur**	**Rawlakot**	**Mirpur**
	Call Completion Ratio	Yes	Yes	Yes	Yes
	Mean Opinion Score	**No**	**No**	**No**	**No**
	Inter System Hand Over	**N/A**			
	RAB Setup Success Rate	**N/A**	Yes	**N/A**	**N/A**
Telenor	Network Accessibility	Yes	Yes	Yes	Yes
	Service Accessibility	**No**	**No**	Yes	**No**
	Call Connection Time	**No**	**No**	Yes	**No**
	Call Completion Ratio	Yes	**No**	Yes	**No**
	Mean Opinion Score	**No**	**No**	**No**	**No**
	Inter System Hand Over	**N/A**			
	RAB Setup Success Rate	Yes	**N/A**	**N/A**	**N/A**
Ufone	Network Accessibility	Yes	Yes	Yes	Yes
	Service Accessibility	**No**	Yes	Yes	Yes
	Call Connection Time	**No**	Yes	**No**	**No**
	Call Completion Ratio	Yes	**No**	Yes	Yes
	Mean Opinion Score	**No**	**No**	**No**	**No**
	Inter System Hand Over	Yes	**N/A**	**N/A**	**N/A**
	RAB Setup Success Rate	**No**	**N/A**	**N/A**	**N/A**
ZonG	Network Accessibility	Yes	Yes	Yes	Yes
	Service Accessibility	Yes	**No**	Yes	**No**
	Call Connection Time	**No**	**No**	**No**	**No**
	Call Completion Ratio	Yes	**No**	Yes	**No**
	Mean Opinion Score	**No**	**No**	**No**	**No**
	Inter System Hand Over	**N/A**			
	RAB Setup Success Rate	**N/A**	Yes	**N/A**	**N/A**
SCOM	Network Accessibility	Yes	Yes	Yes	Yes
	Service Accessibility	**No**	Yes	Yes	**No**
	Call Connection Time	Yes	Yes	Yes	Yes
	Call Completion Ratio	**No**	Yes	Yes	**No**
	Mean Opinion Score	Yes	Yes	Yes	Yes
	Inter System Hand Over	**No**	Yes	**No**	Yes
	RAB Setup Success Rate	Yes	Yes	Yes	Yes

Table 5.3: Voice QoS KPIs Compliance Level

SMS SERVICE

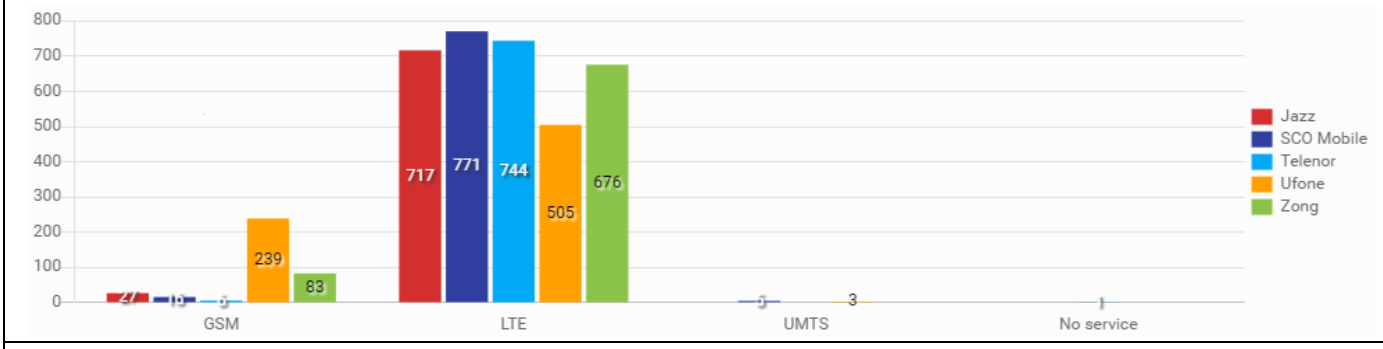
6.1. A total of **15,325 SMS sending attempts** conducted, out of which **15,128 SMS successfully received** at B-Party. The company wise SMS Statistics are shown in **Table6.1: SMS Statistics**

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG	SCOM
SMS SEND REQUEST	744	751	747	759	792
SMS SUCCESSFULLY RECEIVED	714	739	746	746	789
SMS RECEIVE SUCCESS RATE	**95.97 %**	**98.4 %**	99.87 %	**98.29 %**	99.62 %
END-TO-END DELIVERY TIME	4.21 s	6.75 s	5.26 s	3.18 s	2.23 s

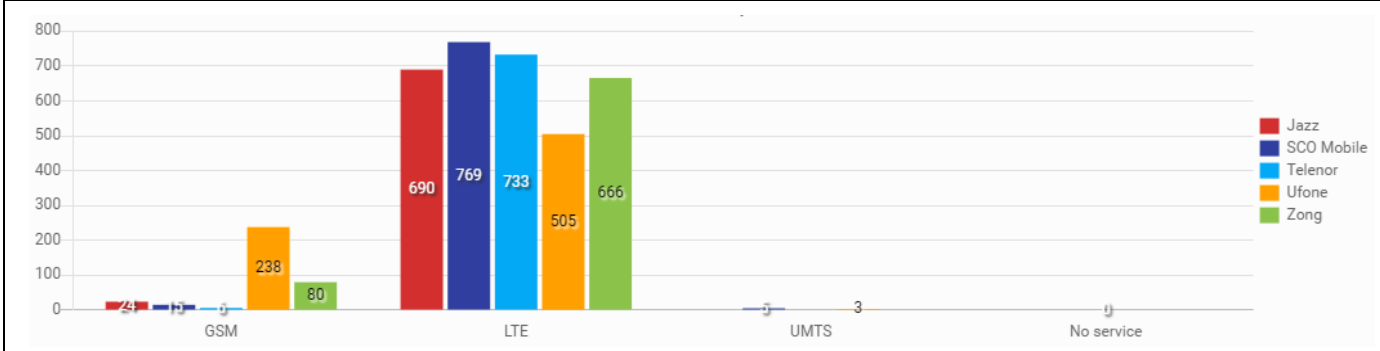
Table6.1: SMS Statistics

6.2. The SMS Send Request & Successful Reception by Technology, Average Success Rate & End to End Delivery Time and Delivery Duration by Technology are shown in the graphs.

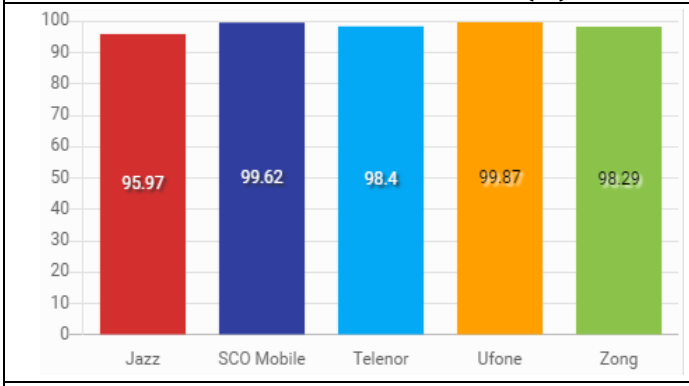
SMS SEND REQUEST BY TECHNOLOGY



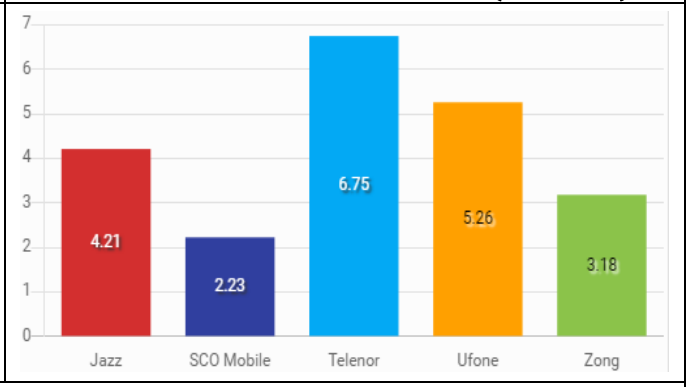
SMS SUCCESSFUL RECEPTION BY TECHNOLOGY



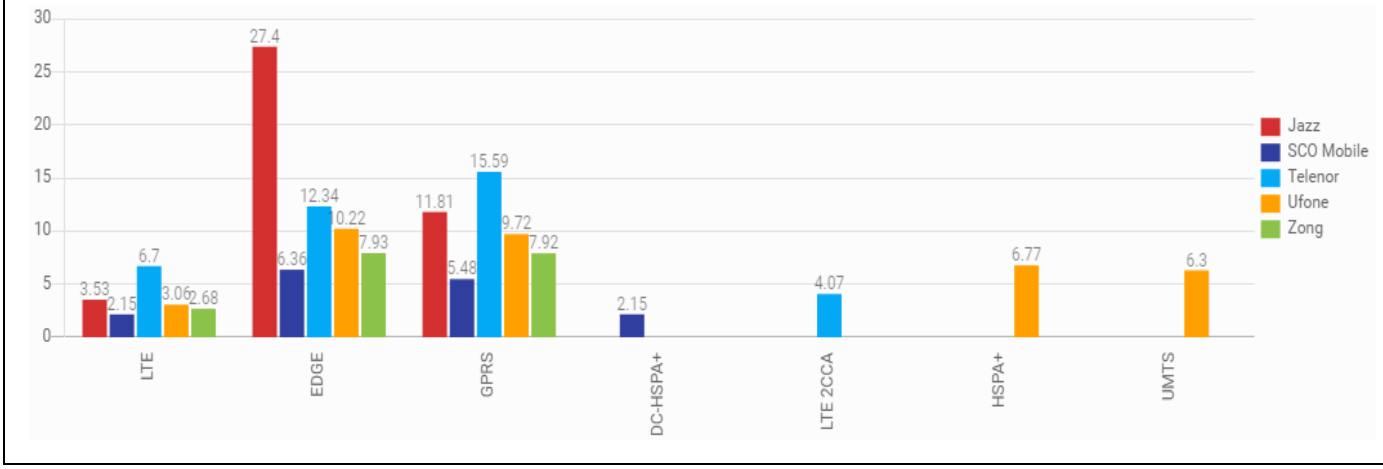
SMS RECEIVE SUCCESS RATE (%)



SMS END TO END DELIVERY TIME (SECONDS)



SMS DELIVERY DURATION BY TECHNOLOGY



SURVEY MAPS & GRAPHICAL RESULTS

7.1 The 4G/LTE (RSRP) and 3G (RSCP) Signal Strength samples recorded during drive test on survey routes and plotted on maps. The Signal Strength maps along-with Voice & SMS QoS KPIs survey results in graphical form are shown at **Annex-A,** for 4 x surveyed Cities of AJK.

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 **4 x surveyed cities**.

a. **MOBILE NETWORK COVERAGE.** The categorization of CMOs as per QoS KPI i.e. Signal Strength of 4G/LTE Networks is shown in **Table 8.1: CMOs Standing in Mobile Network Coverage.**

S. #.	Operator	Compliance Level – Number of Cities		Standing
		Compliant	Non-Compliant	
1.	ZonG	4	-	1st
2.	Telenor	4	-	1st
3.	SCOM	4	-	1st
4.	Ufone	4	-	1st
5.	Jazz	2	2	2nd

Table 8.1: CMOs Standing in Mobile Network Coverage

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	Highest Throughput – Number of Cities					Standing
		1st	2nd	3rd	4th	5th	
1.	Ufone	3	-	-	-	1	1st
2.	ZonG	1	3	-	-	-	2nd
3.	Telenor	-	1	2	1	-	3rd
4.	SCOM	-	-	2	2	-	4th
5.	Jazz	-	-	-	1	3	5th

Table 8.2: CMOs Standing in Mobile Broadband Service

c. **VOICE SERVICE.** The categorization of each CMOs, as per the maximum compliant 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	22	6	1st
2.	Ufone	12	10	2nd
3.	Telenor	9	12	3rd
4.	ZonG	9	12	3rd
5.	Jazz	11	10	4th

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				
		1st	2nd	3rd	4th	5th
1.	Network Coverage	ZonG, Telenor, SCOM & Ufone	Jazz	-	-	-
2.	Mobile Broadband	Ufone	ZonG	Telenor	SCOM	Jazz
3.	Voice	SCOM	Ufone	Telenor & ZonG	Jazz	-

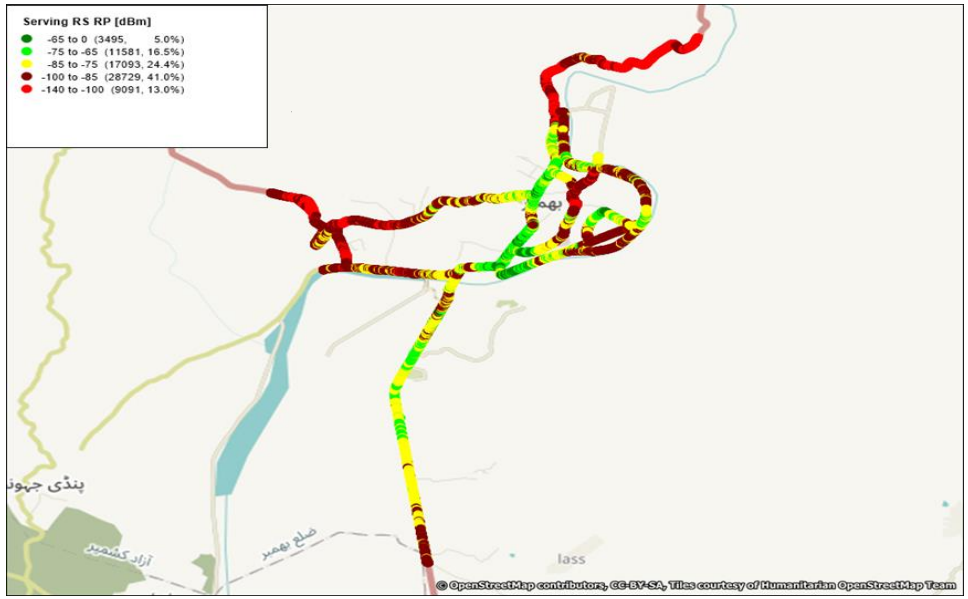
Table 8.4: CMOs Overall Standing in QoS Survey

ANNEX – A

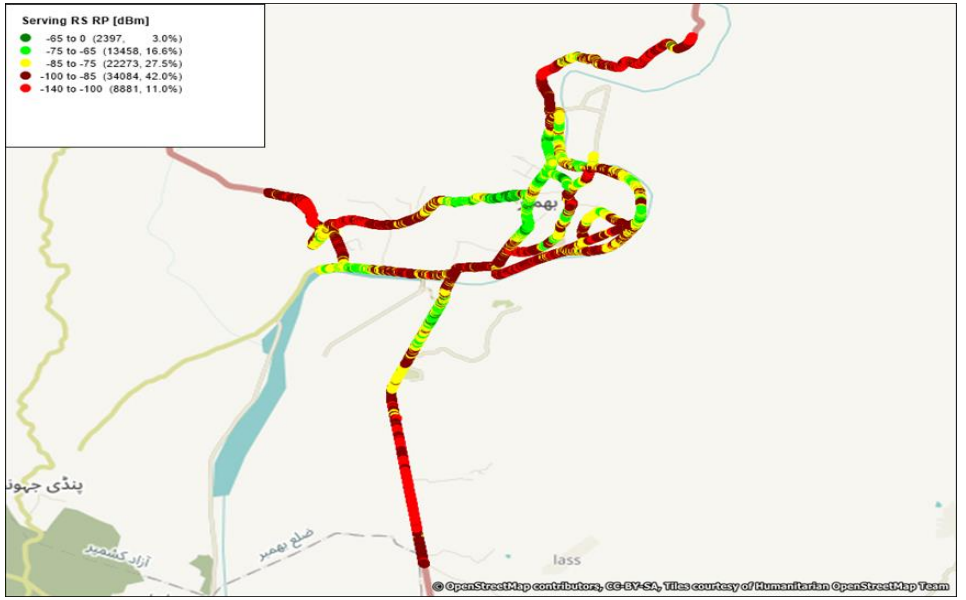
CITIES

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

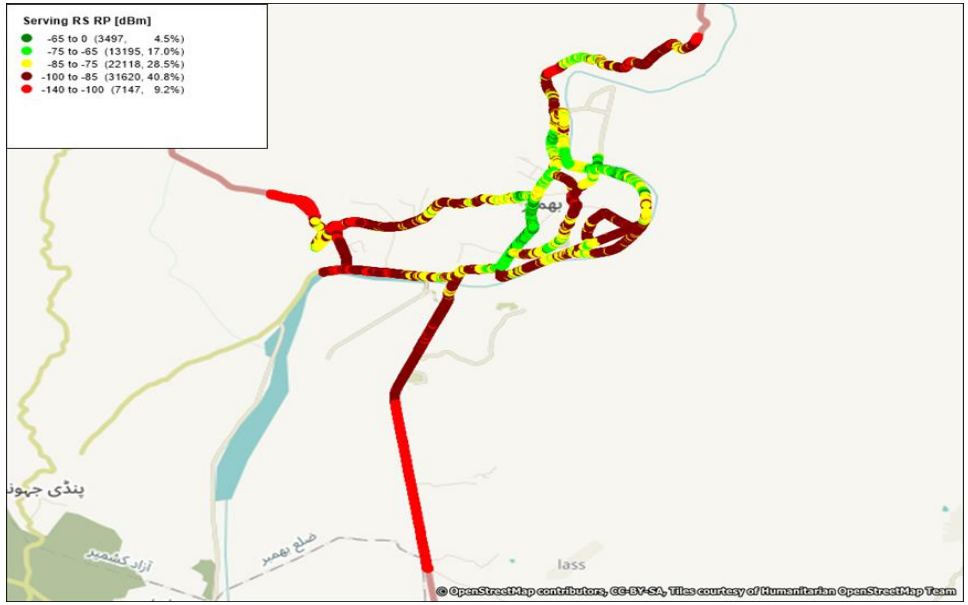
JAZZ 4G NETWORK COVERAGE – BHIMBER



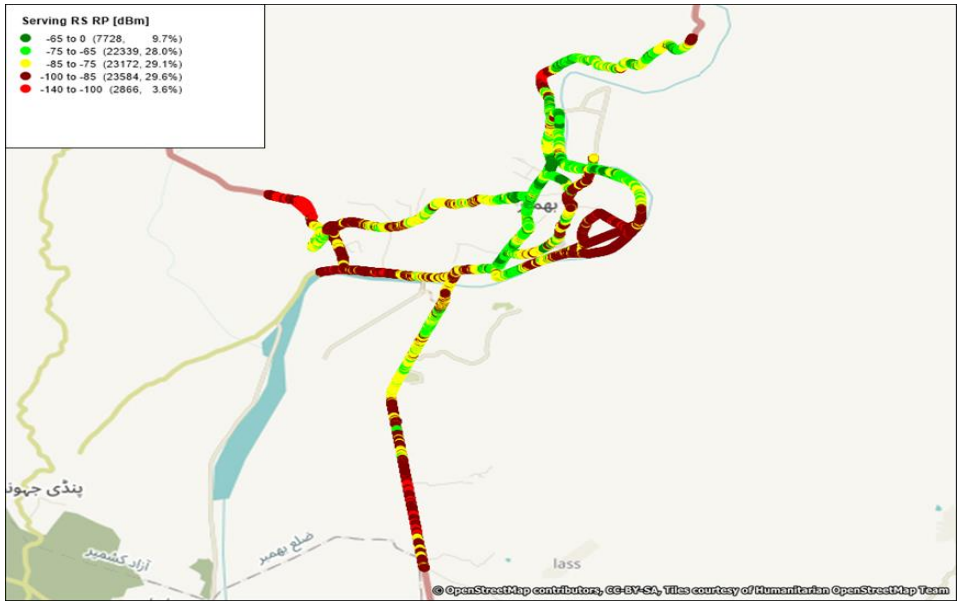
TELENOR 4G NETWORK COVERAGE – BHIMBER



UFONE 4G NETWORK COVERAGE – BHIMBER

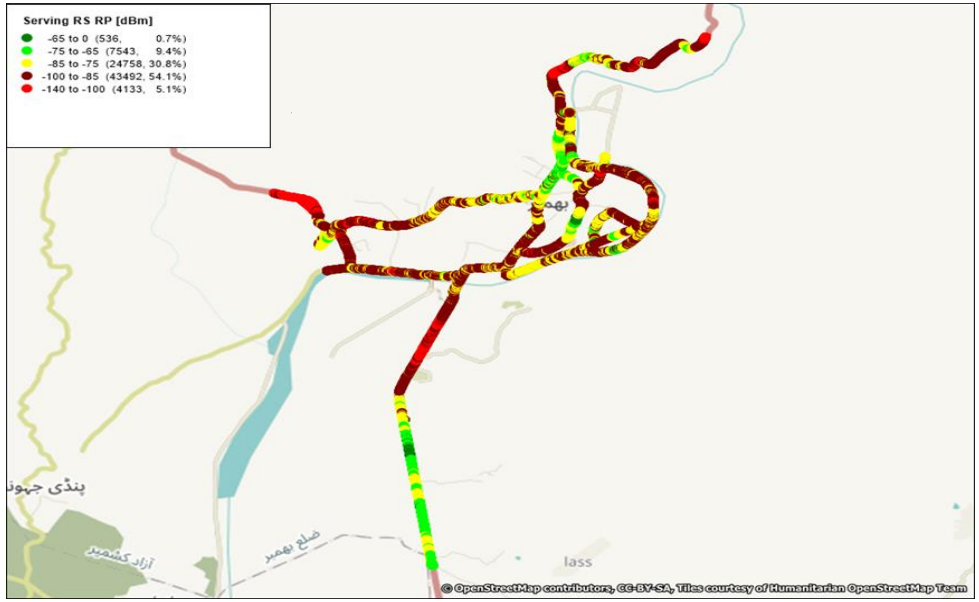


ZONG 4G NETWORK COVERAGE – BHIMBER

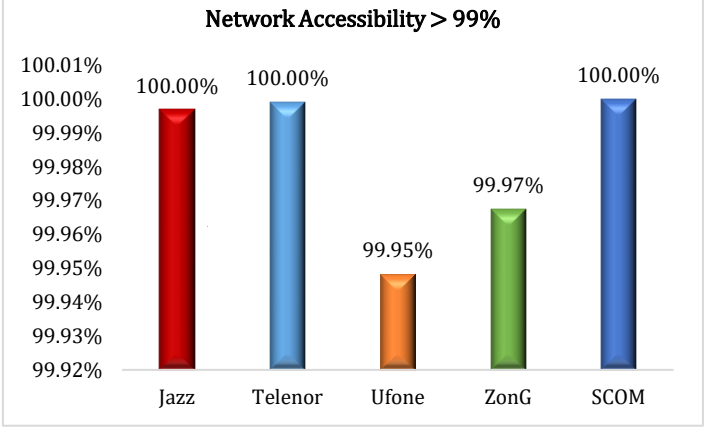


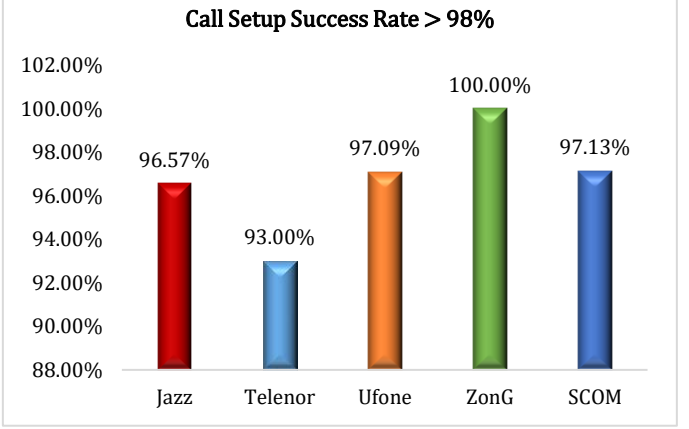
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

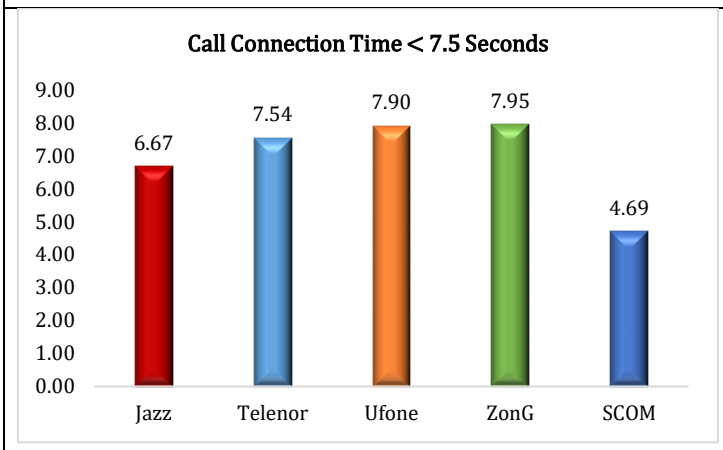
SCOM 4G NETWORK COVERAGE – BHIMBER

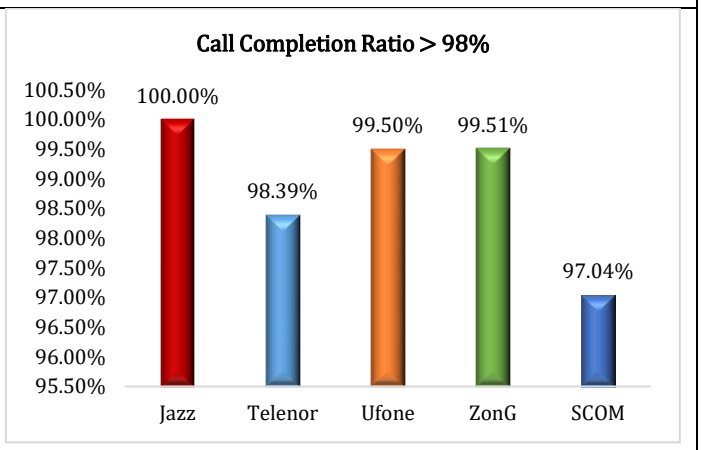


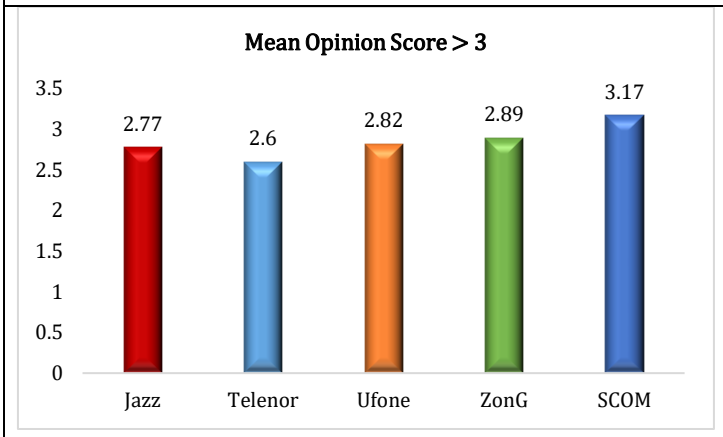
QUALITY OF SERVICE SURVEY RESULTS – BHIMBER

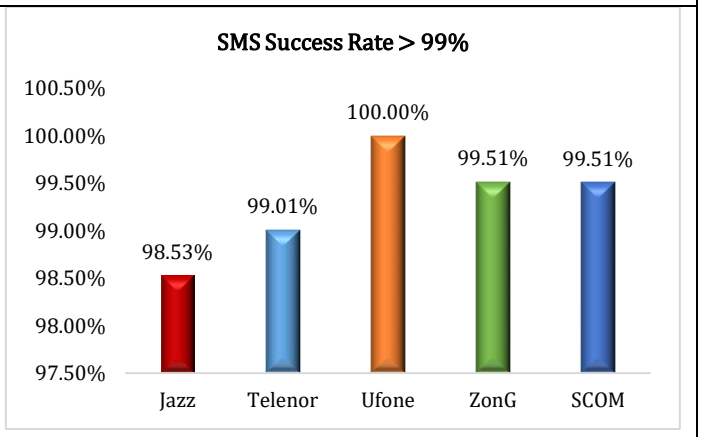


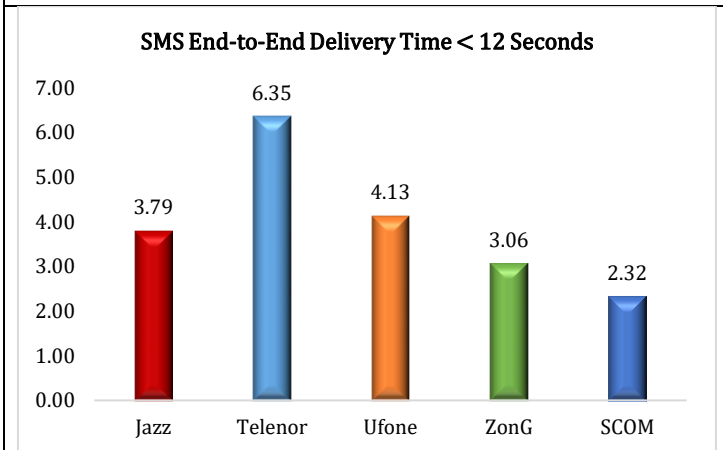




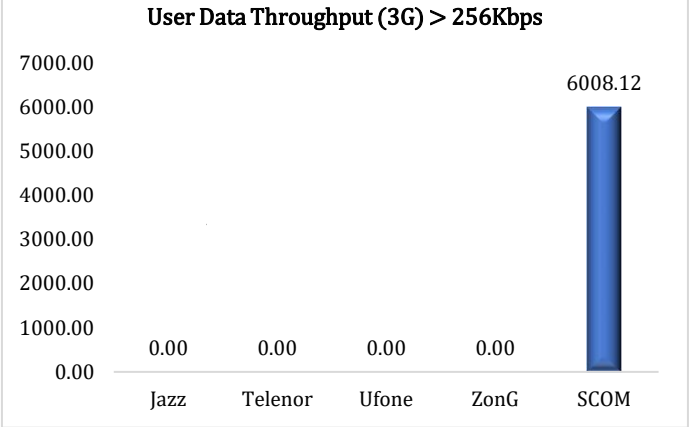


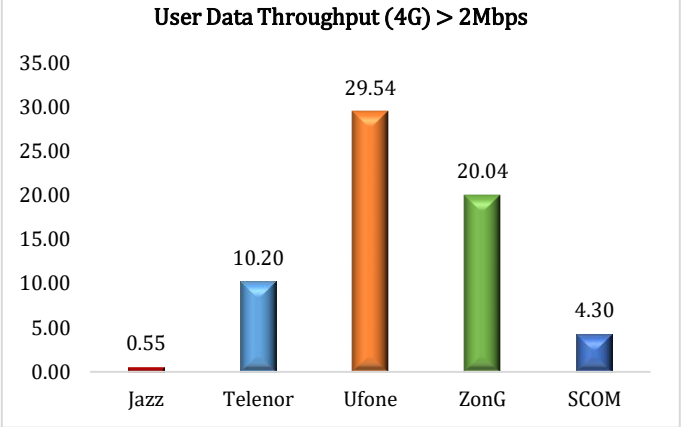


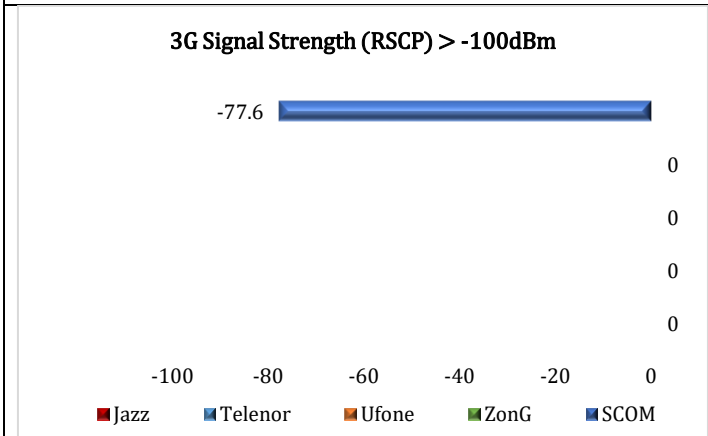


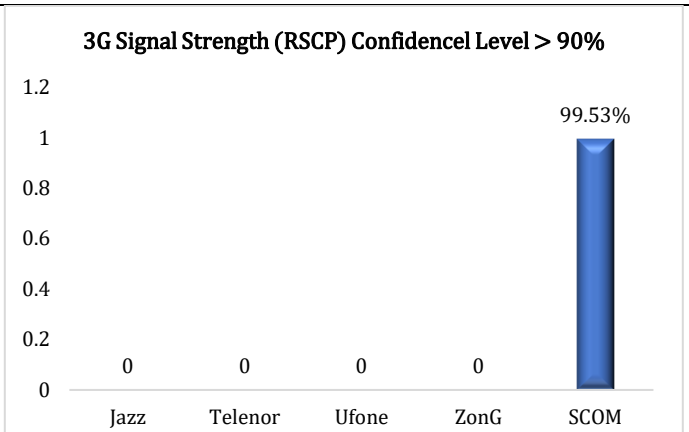


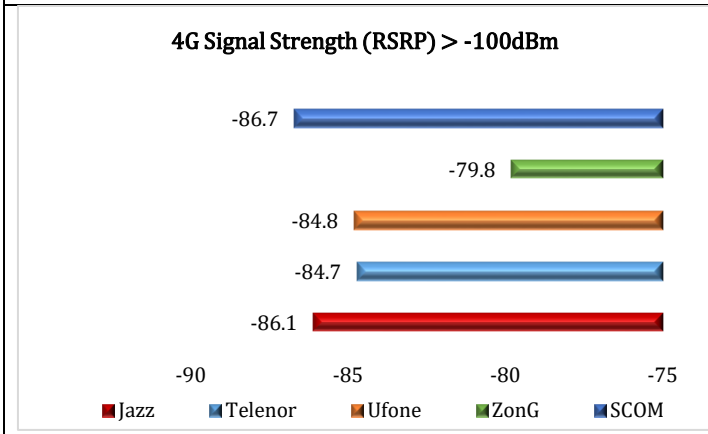
QUALITY OF SERVICE SURVEY RESULTS – BHIMBER

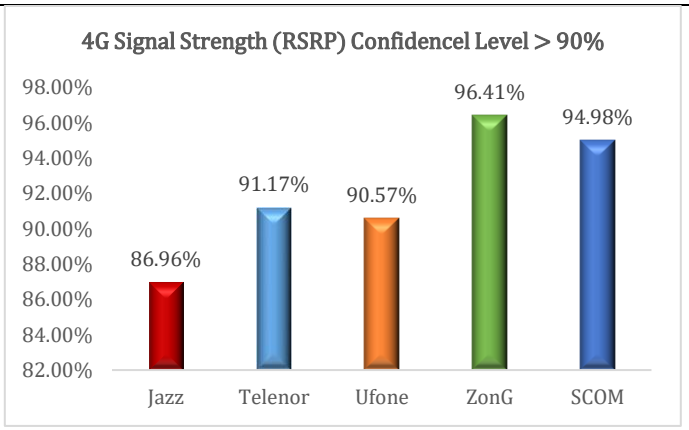






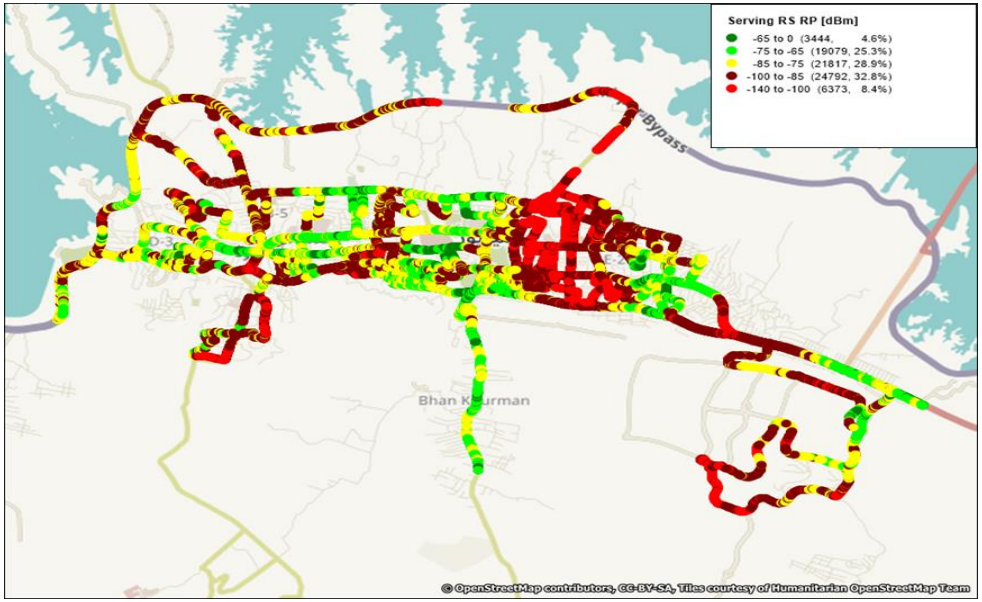




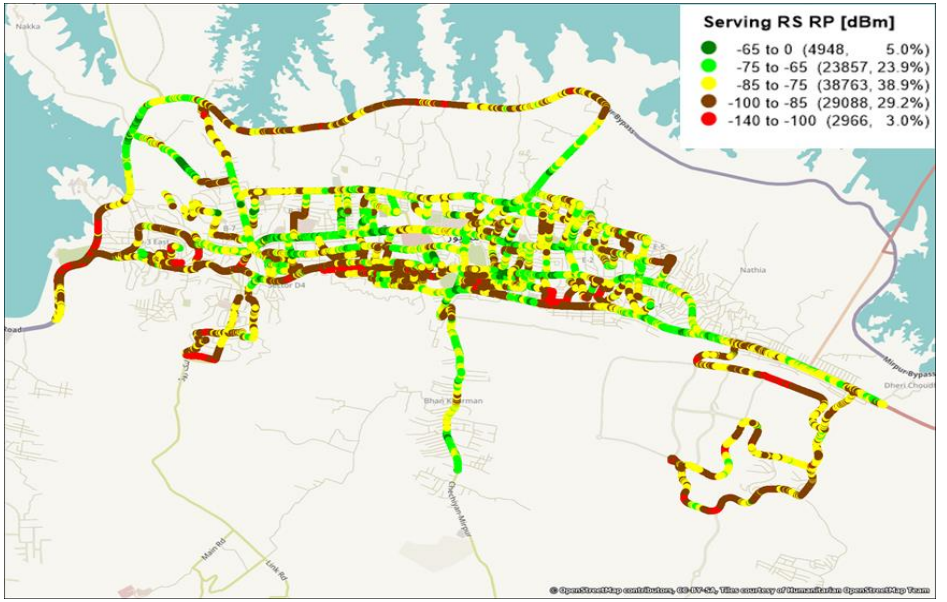


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

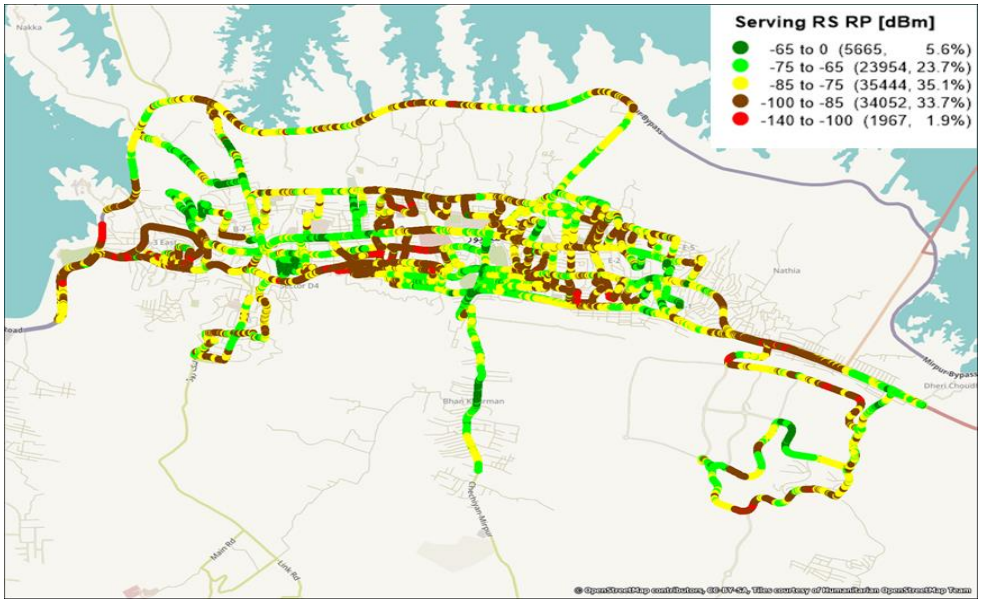
JAZZ 4G NETWORK COVERAGE – MIRPUR



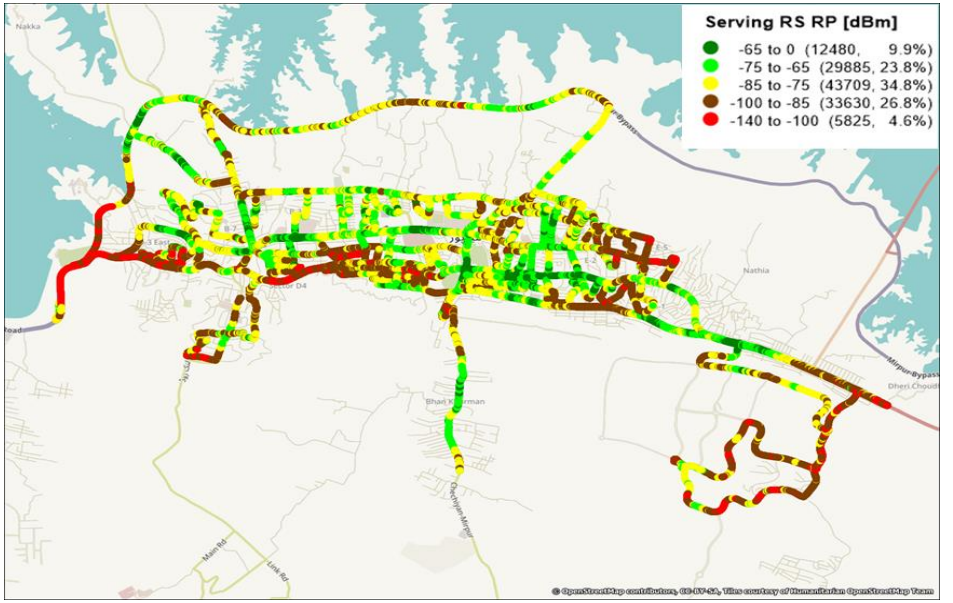
TELENOR 4G NETWORK COVERAGE – MIRPUR



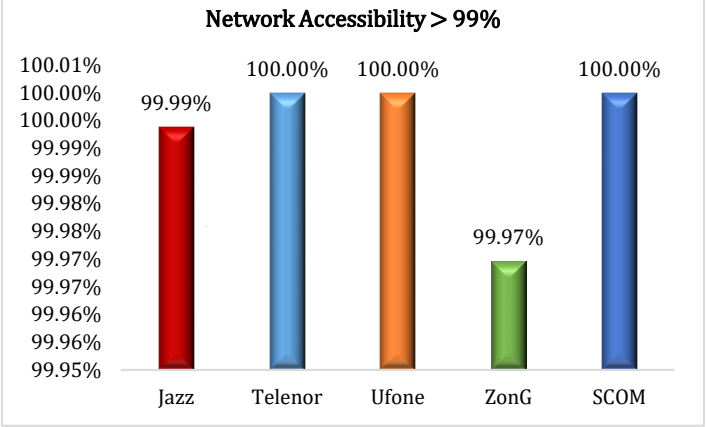
SCOM 4G NETWORK COVERAGE – MIRPUR

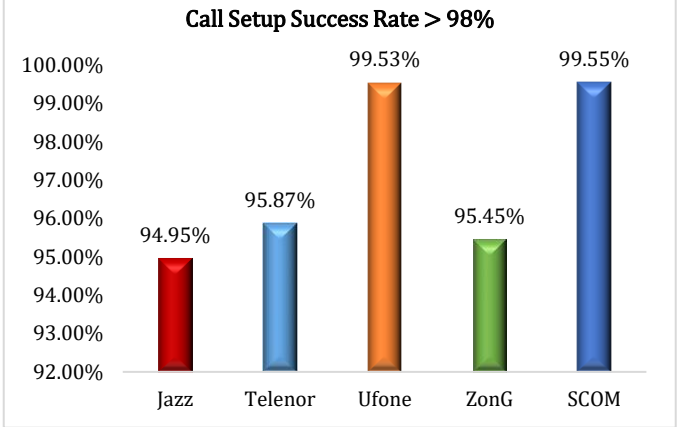


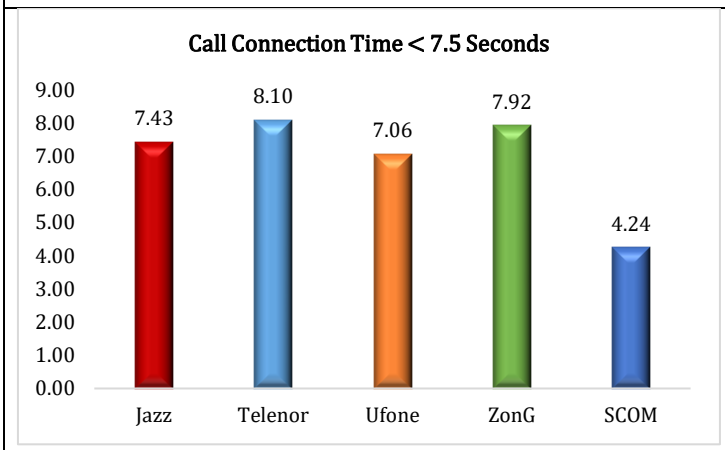
ZONG 4G NETWORK COVERAGE – MIRPUR

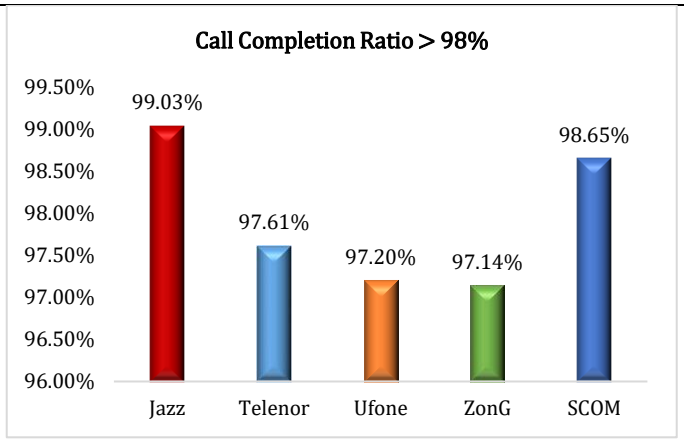


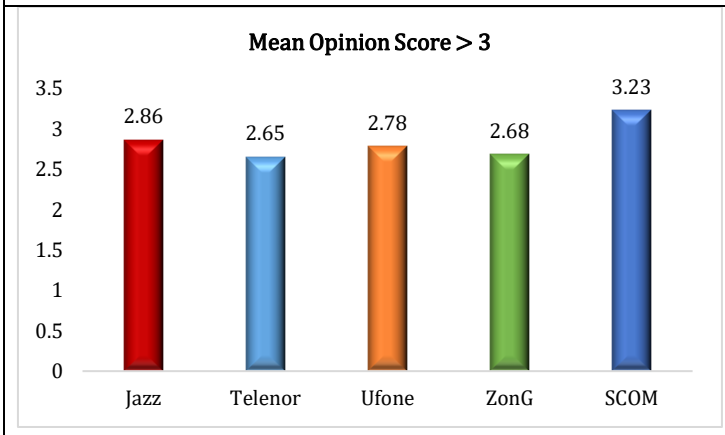
QUALITY OF SERVICE SURVEY RESULTS – MIRPUR

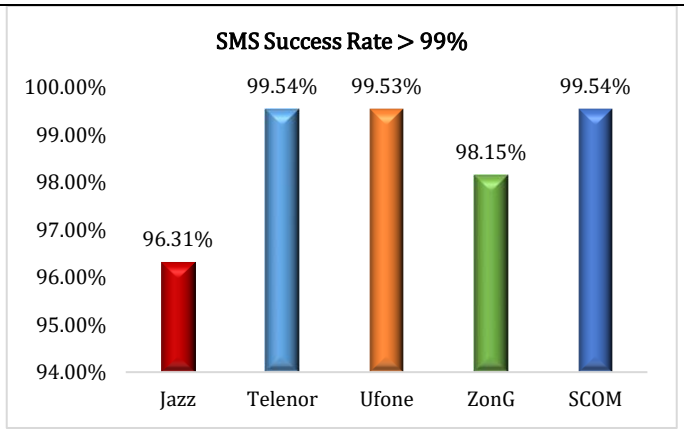


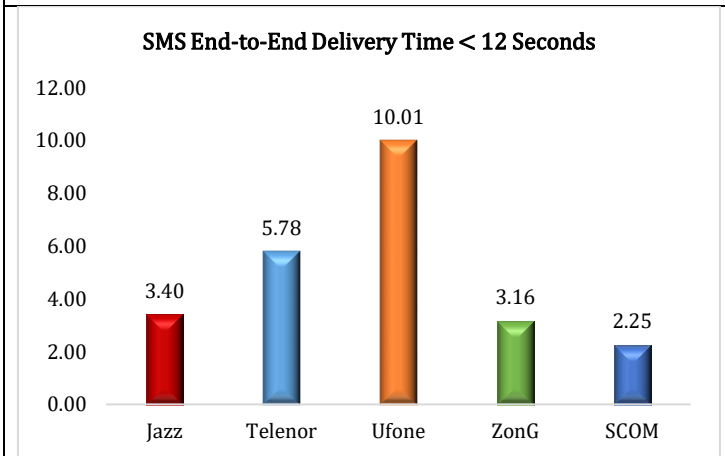




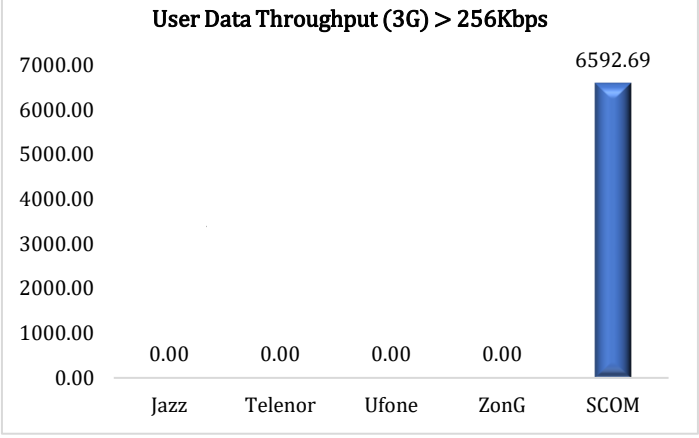


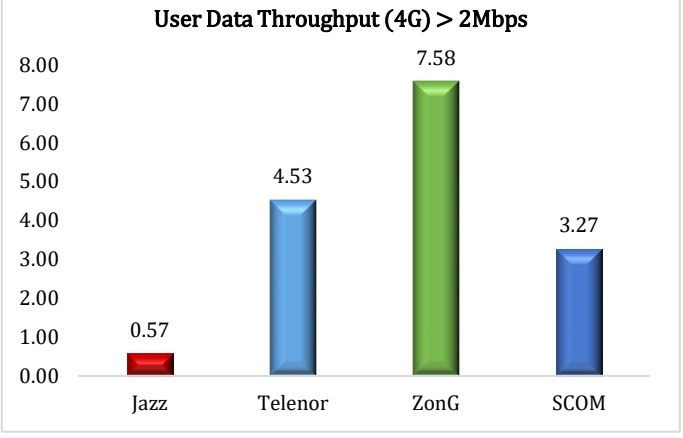


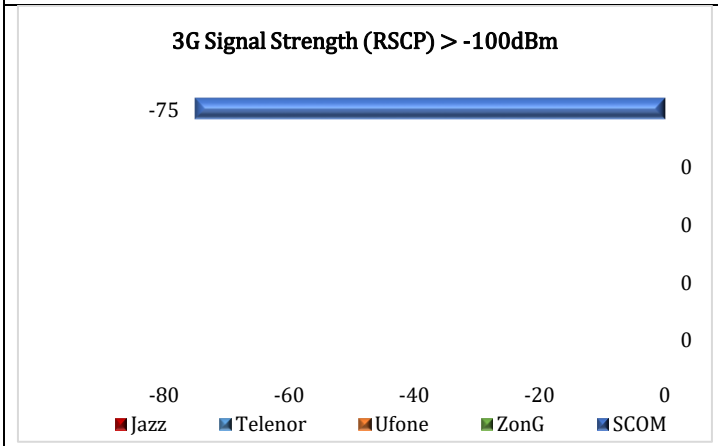


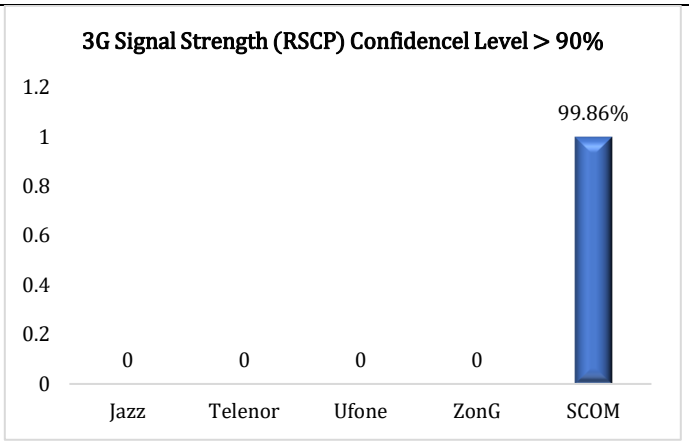


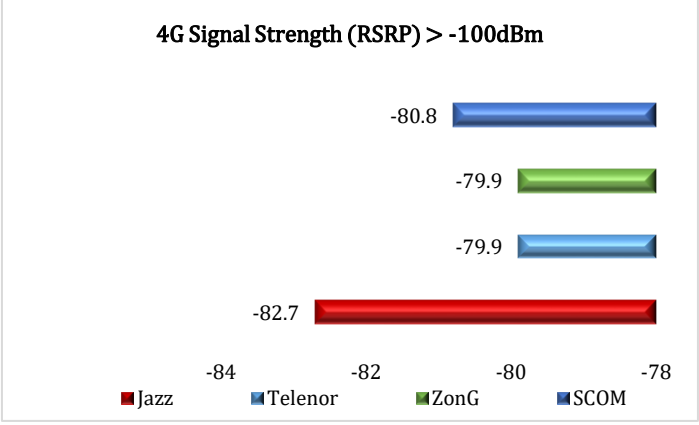
QUALITY OF SERVICE SURVEY RESULTS – MIRPUR

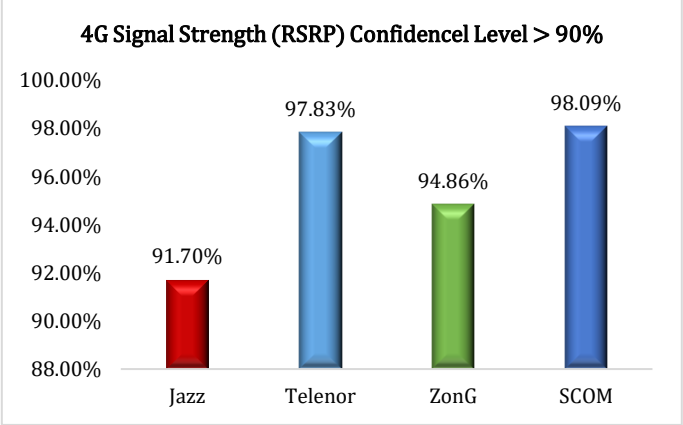






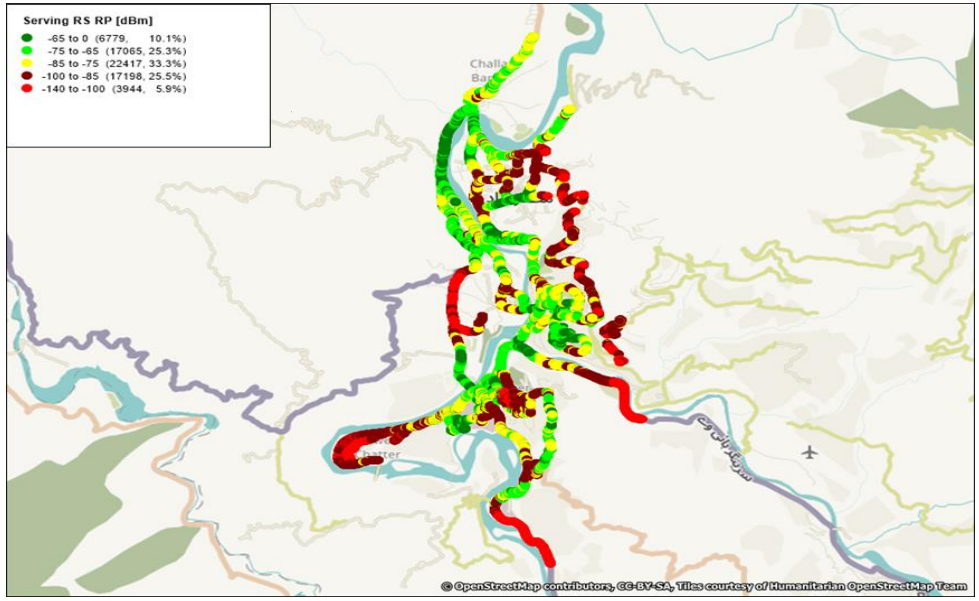




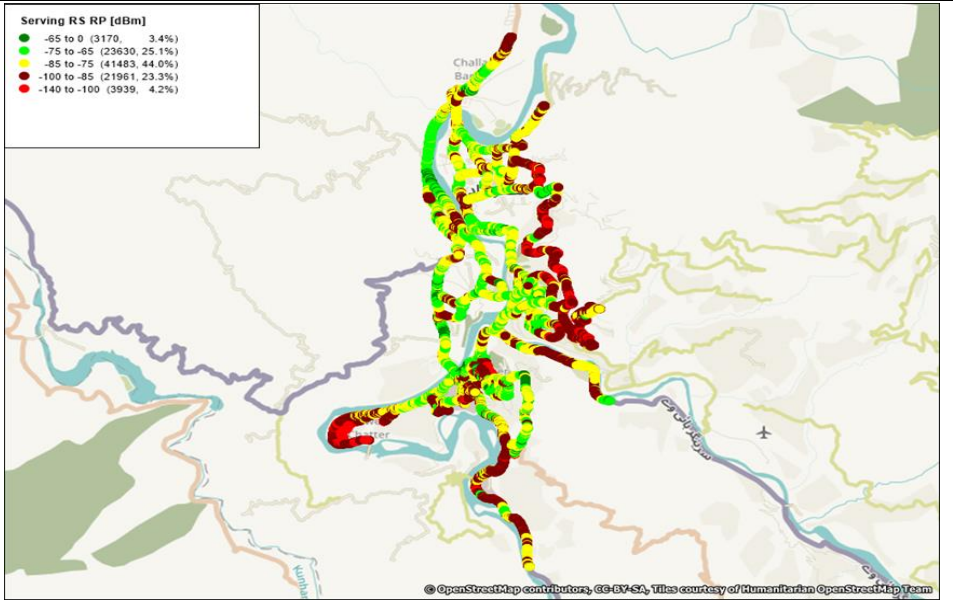


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

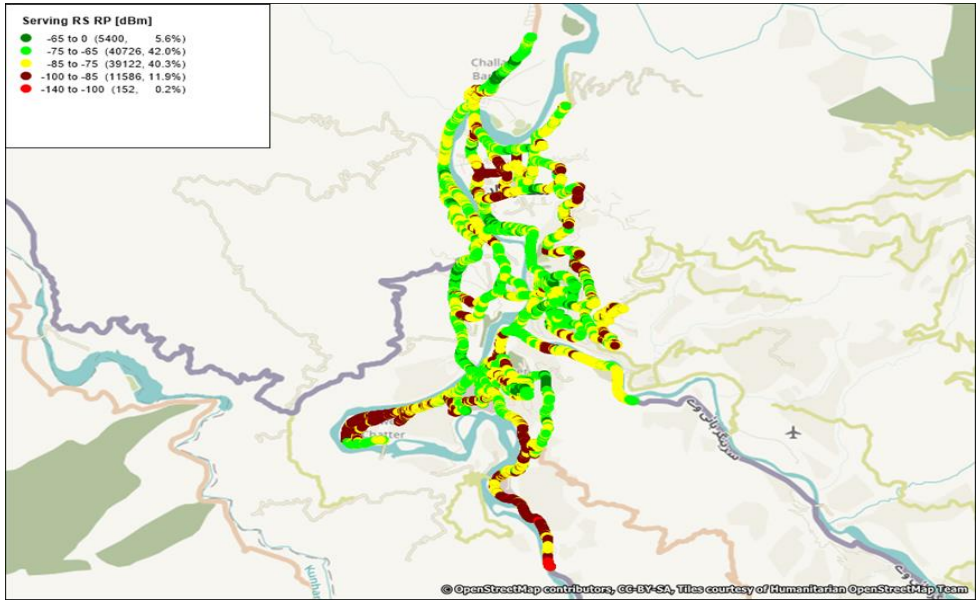
JAZZ 4G NETWORK COVERAGE – MUZAFFARABAD



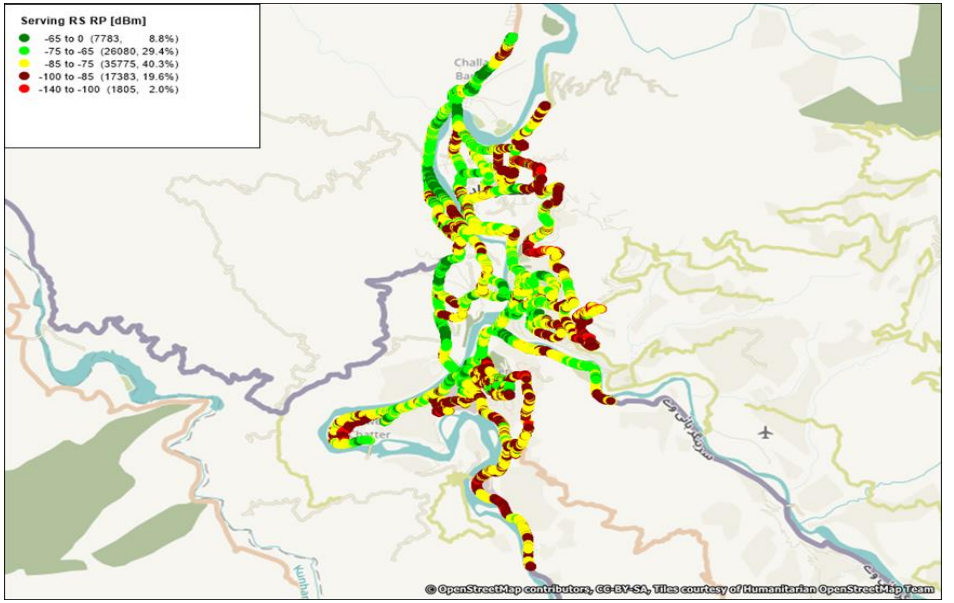
TELENOR 4G NETWORK COVERAGE – MUZAFFARABAD



UFONE 4G NETWORK COVERAGE – MUZAFFARABAD

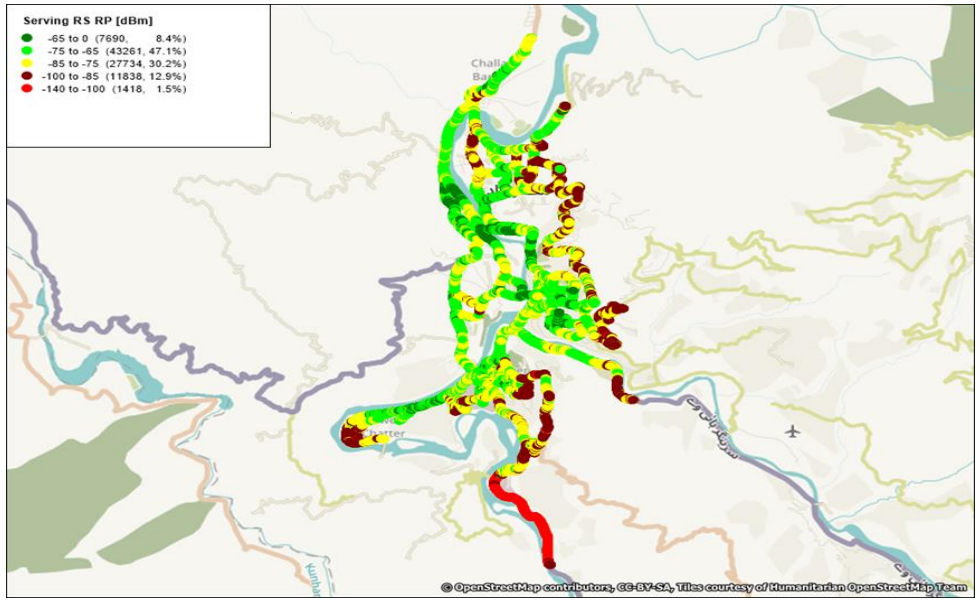


ZONG 4G NETWORK COVERAGE – MUZAFFARABAD

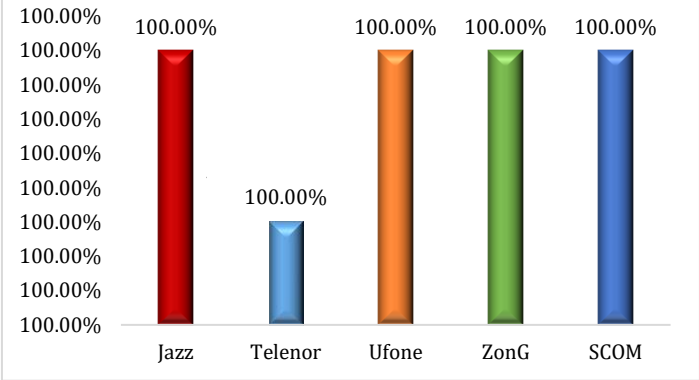


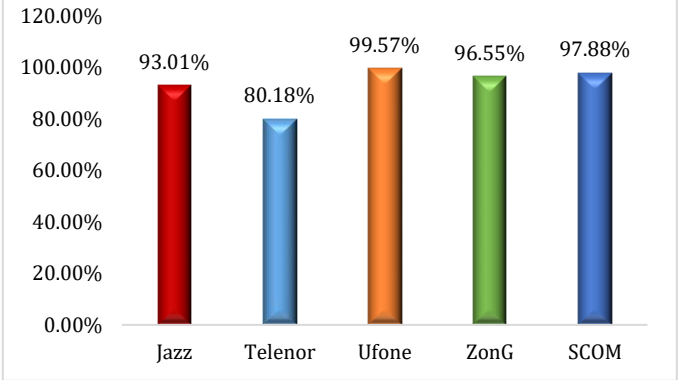
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

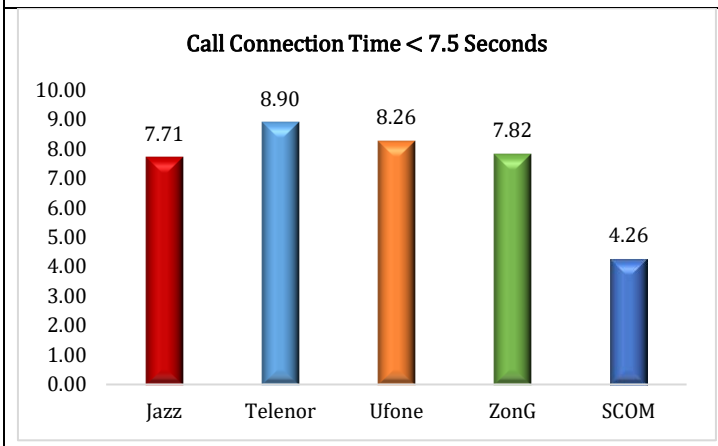
SCOM 4G NETWORK COVERAGE – MUZAFFARABAD

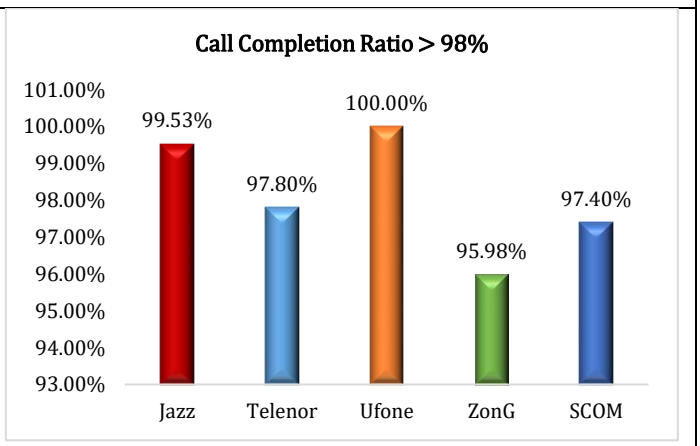


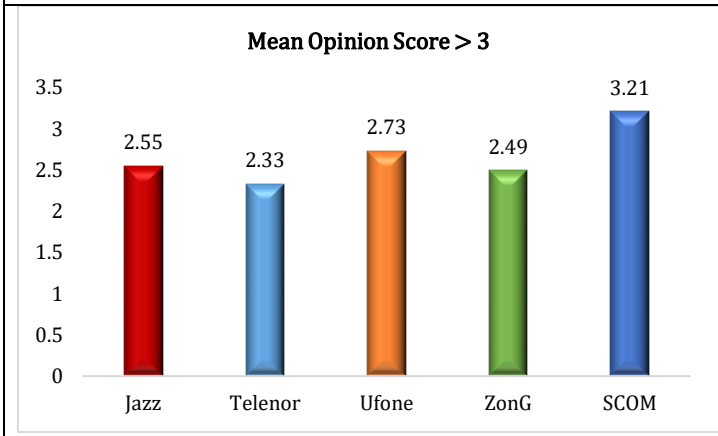
QUALITY OF SERVICE SURVEY RESULTS – MUZAFFARABAD

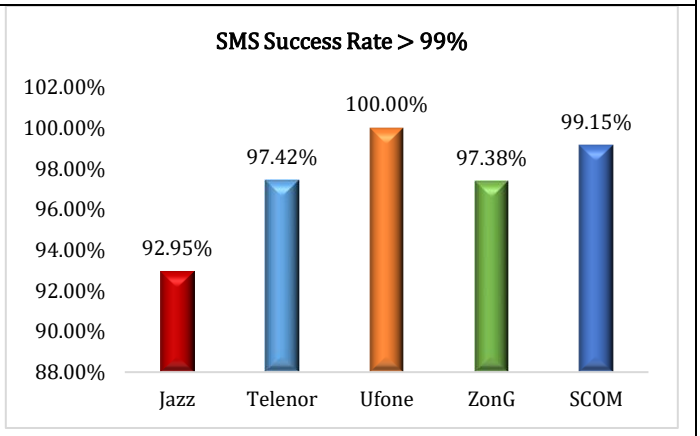


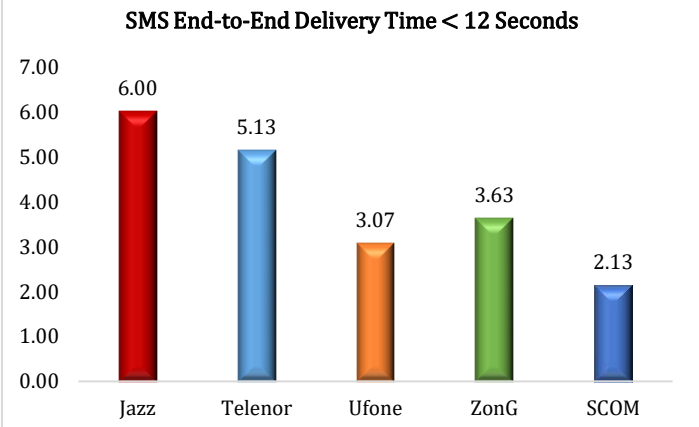




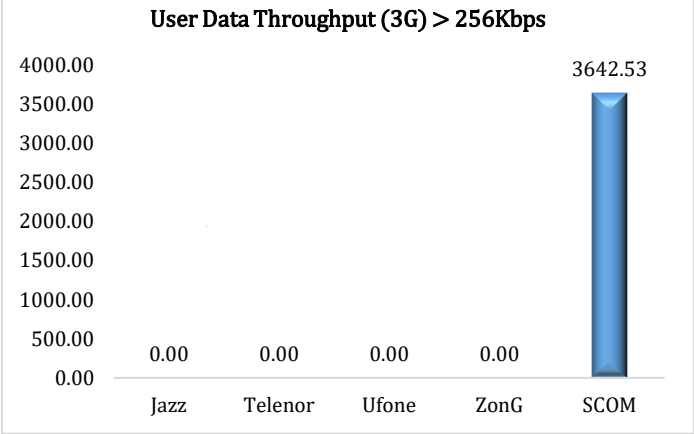


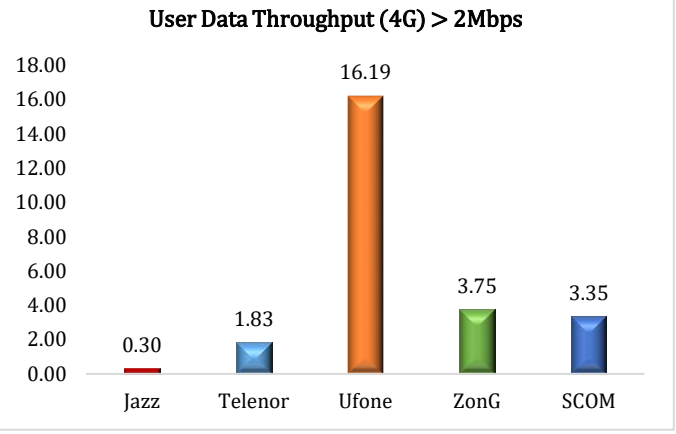


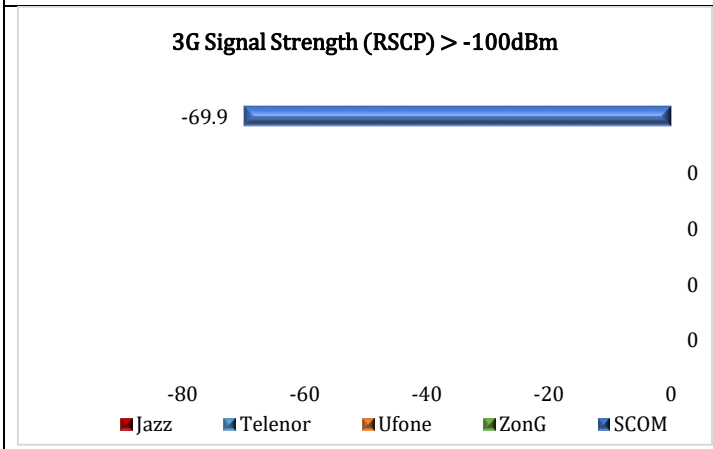


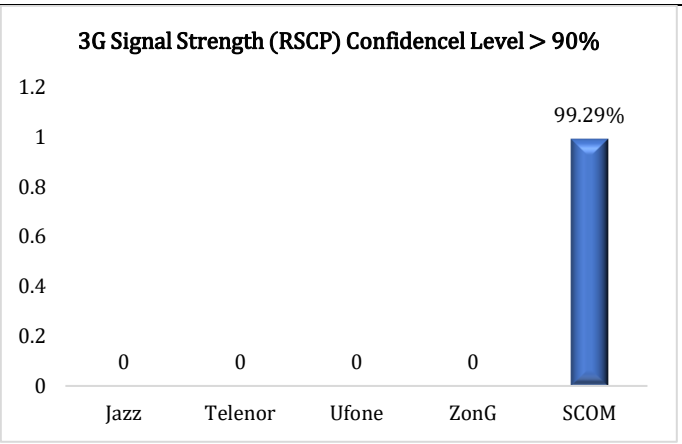


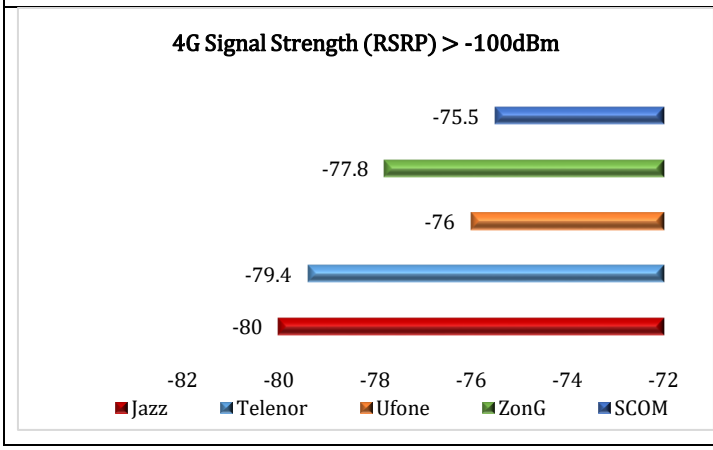
QUALITY OF SERVICE SURVEY RESULTS – MUZAFFARABAD

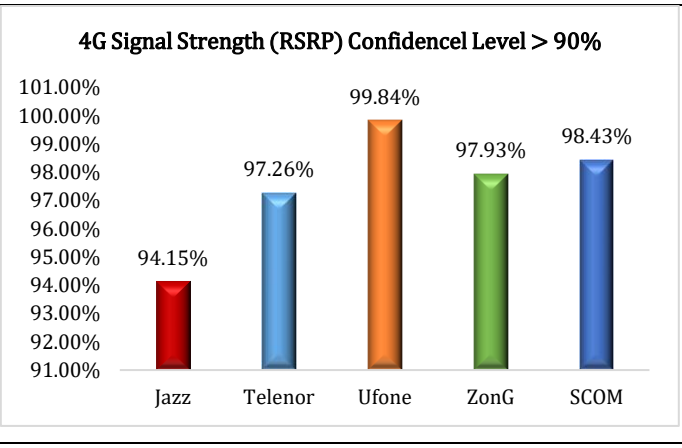






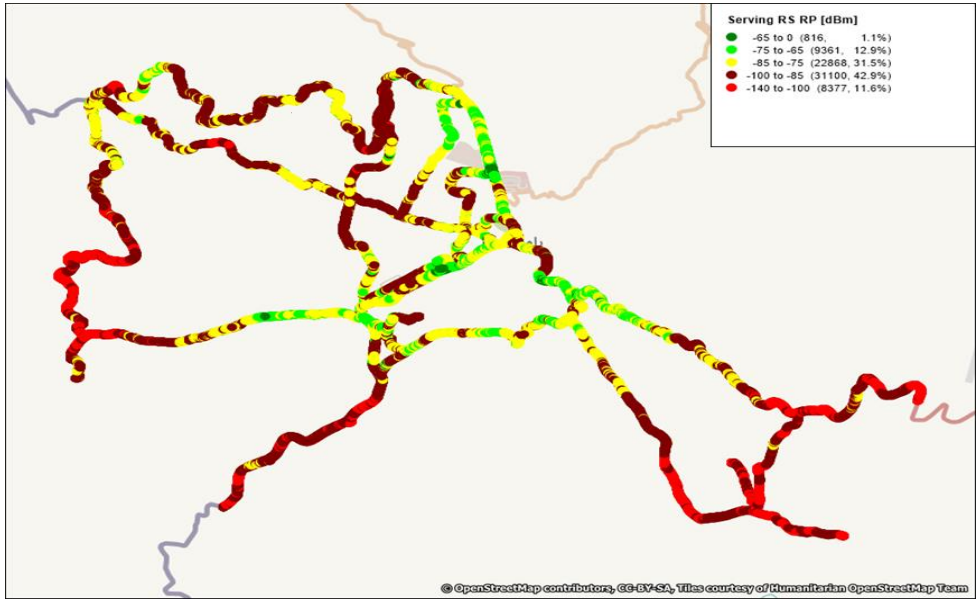




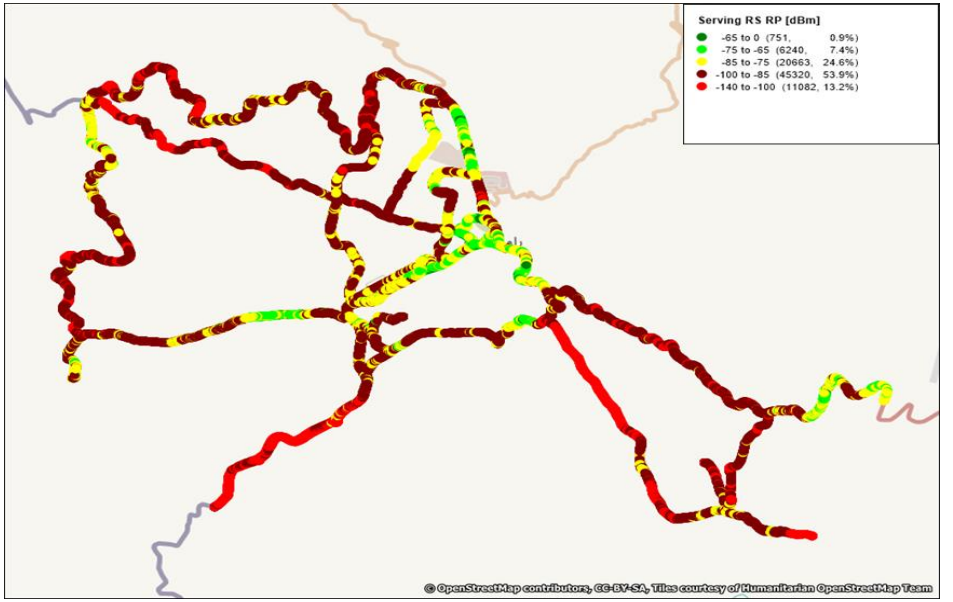


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

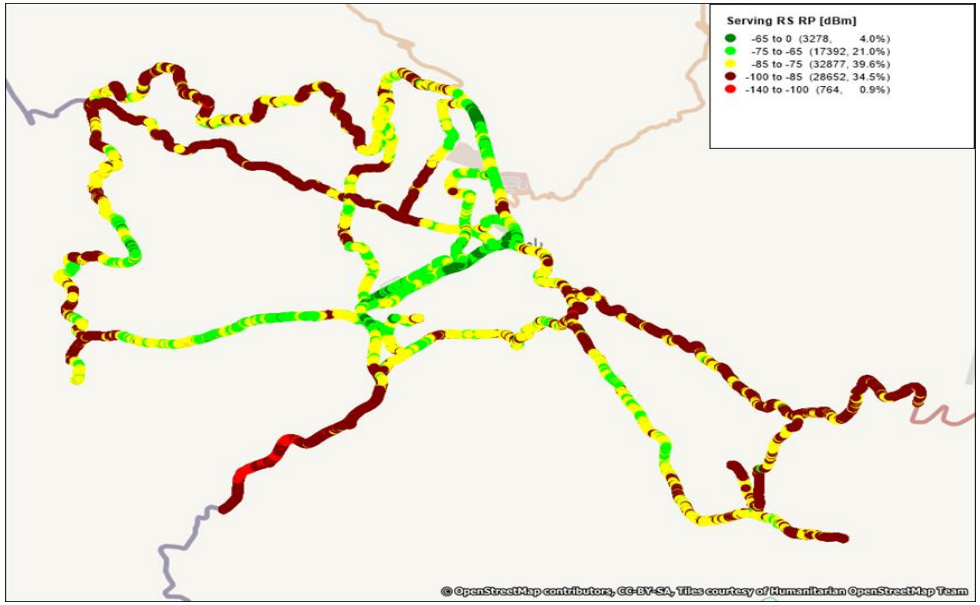
JAZZ 4G NETWORK COVERAGE – RAWLAKOT



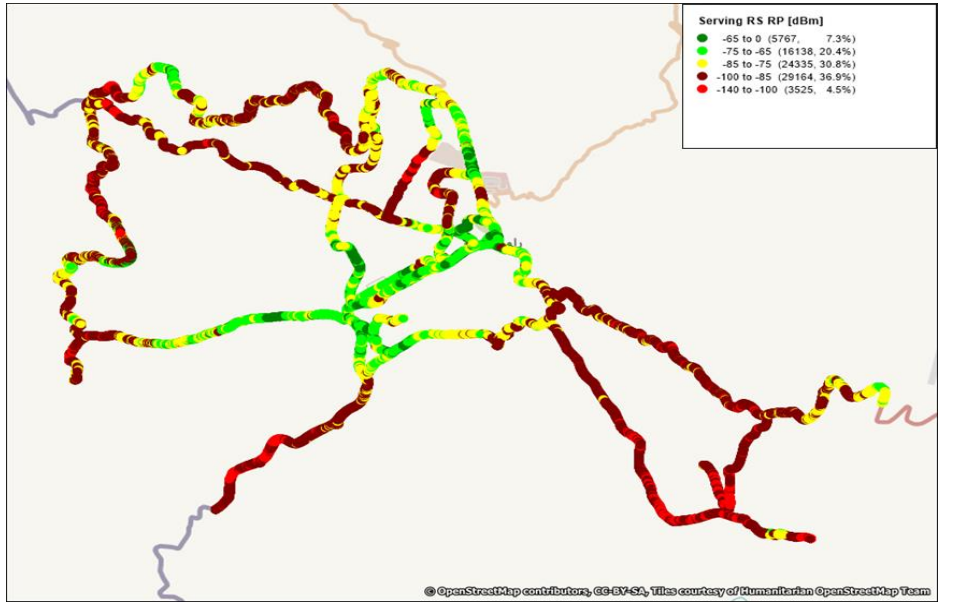
TELENOR 4G NETWORK COVERAGE – RAWLAKOT



UFONE 4G NETWORK COVERAGE – RAWLAKOT

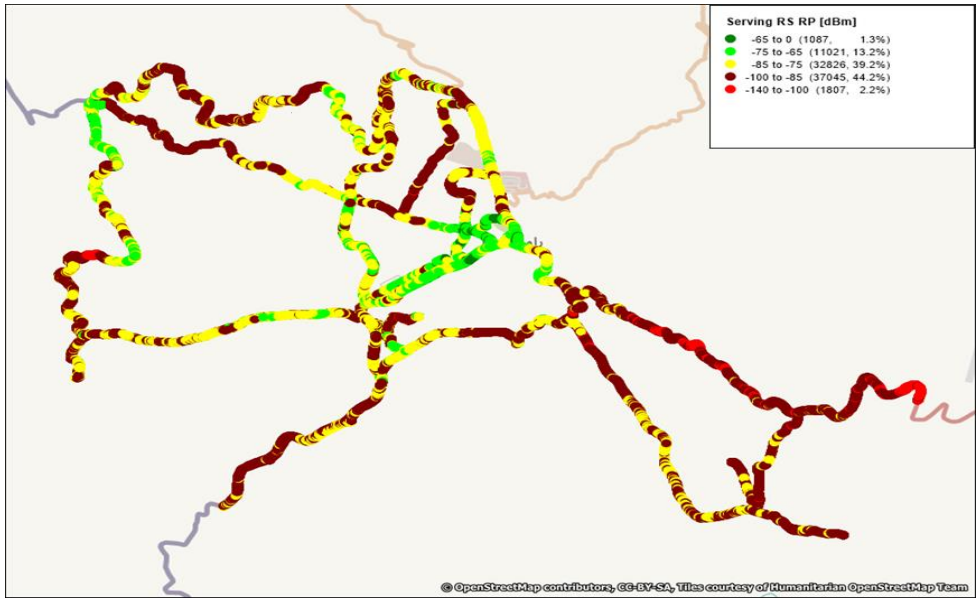


ZONG 4G NETWORK COVERAGE – RAWLAKOT

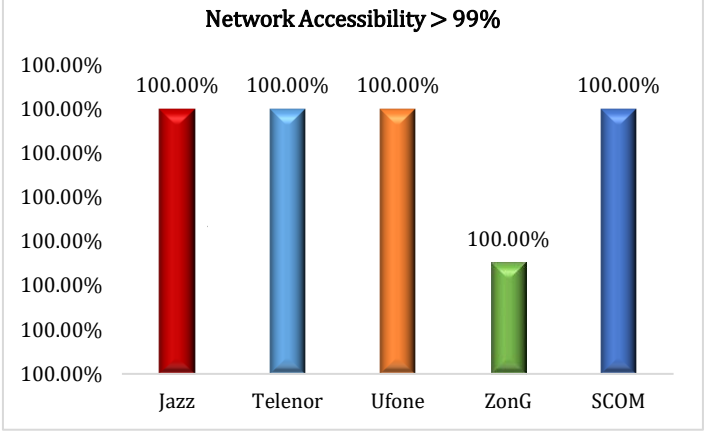


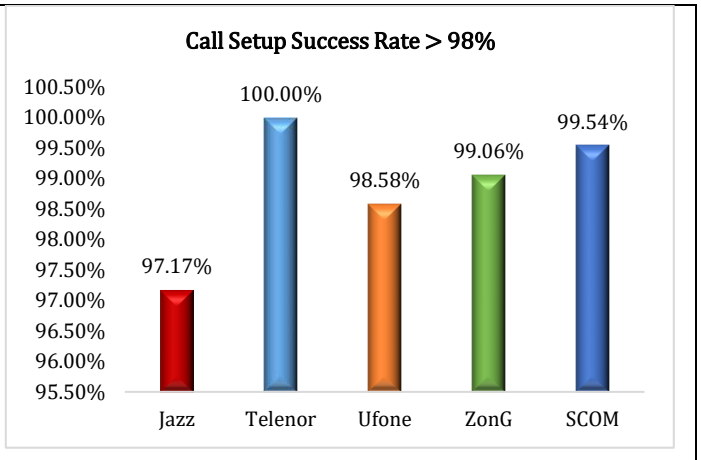
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

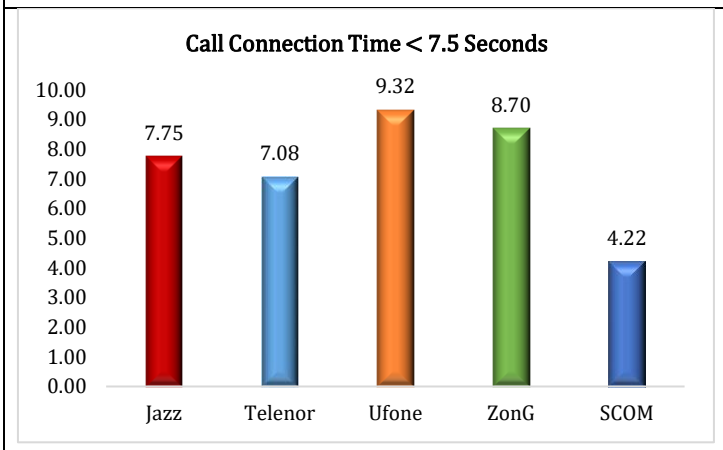
SCOM 4G NETWORK COVERAGE – RAWLAKOT

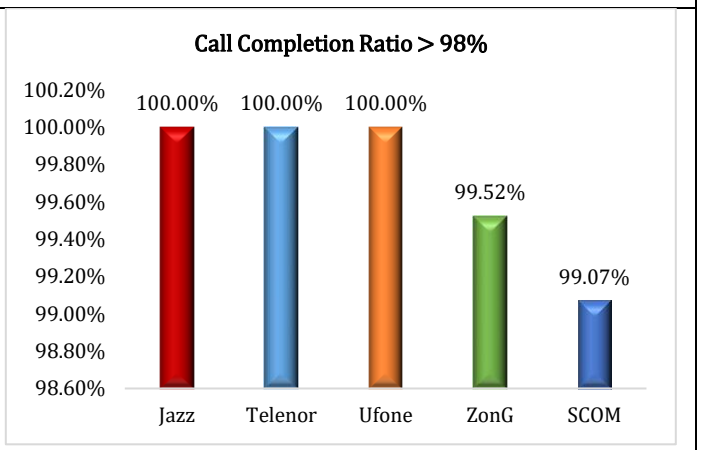


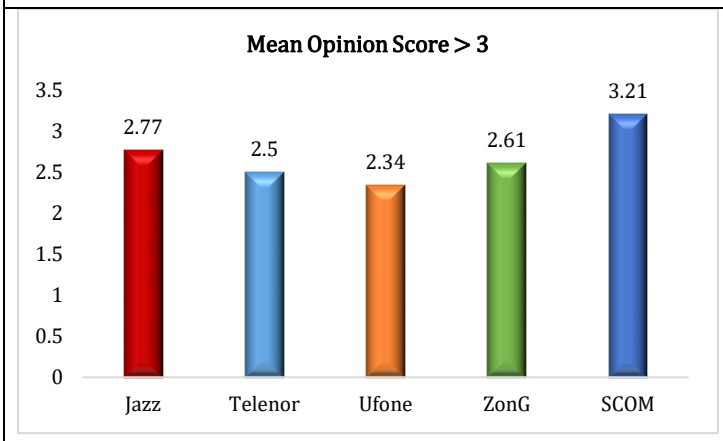
QUALITY OF SERVICE SURVEY RESULTS – RAWLAKOT

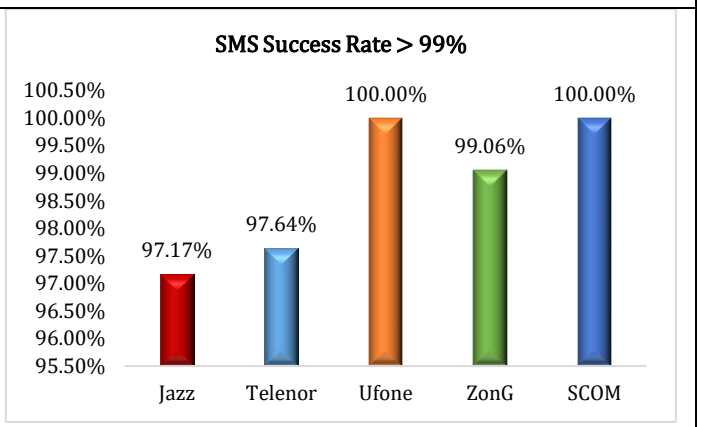


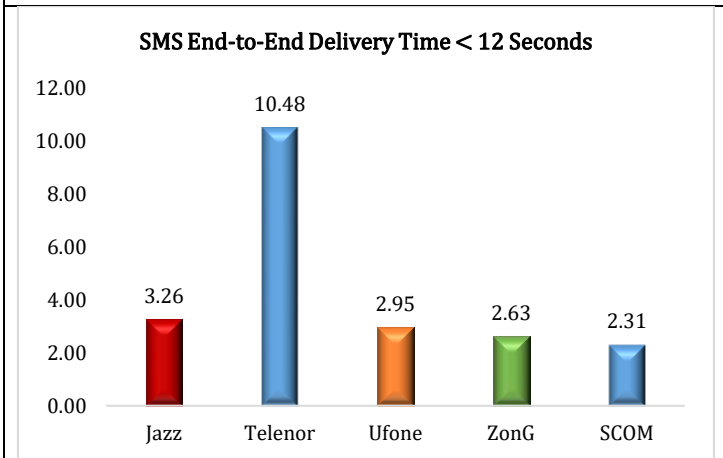
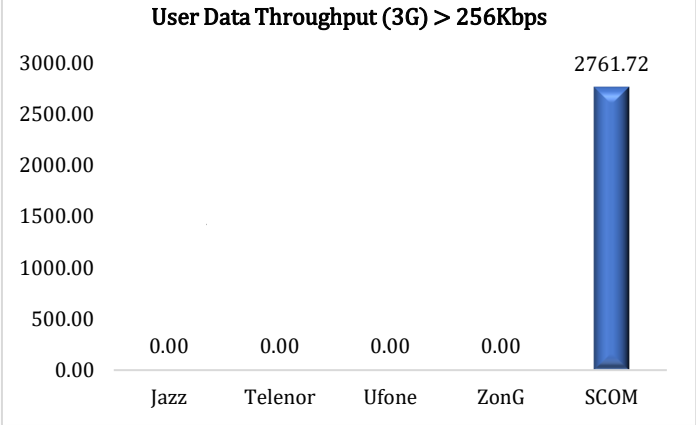
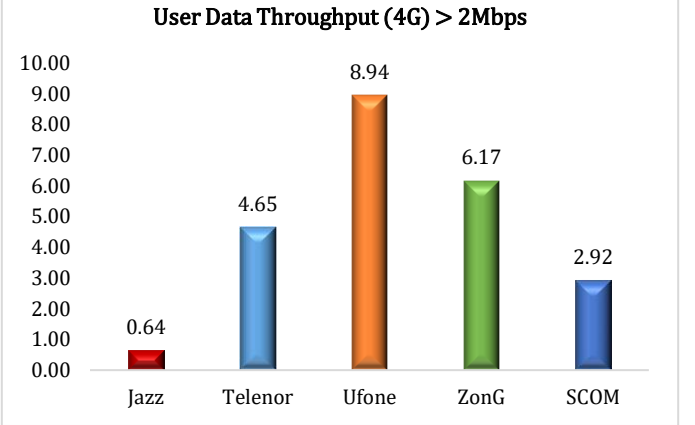
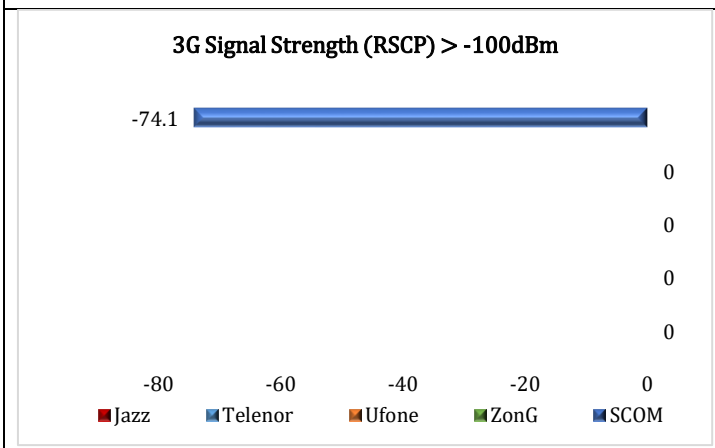
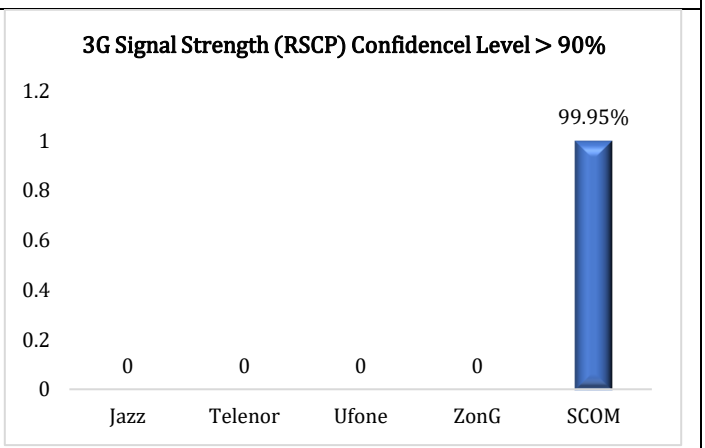
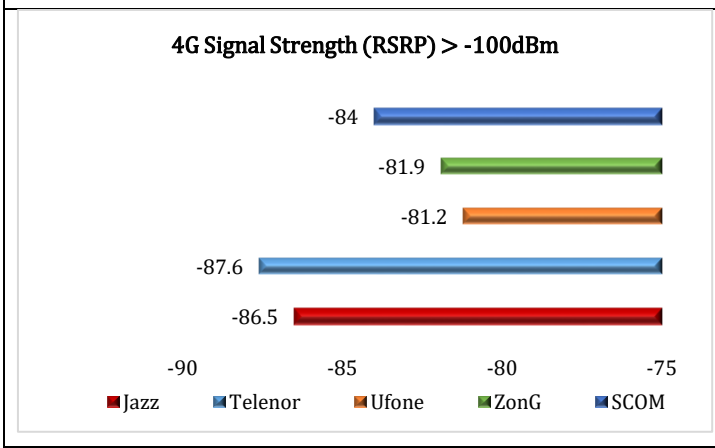
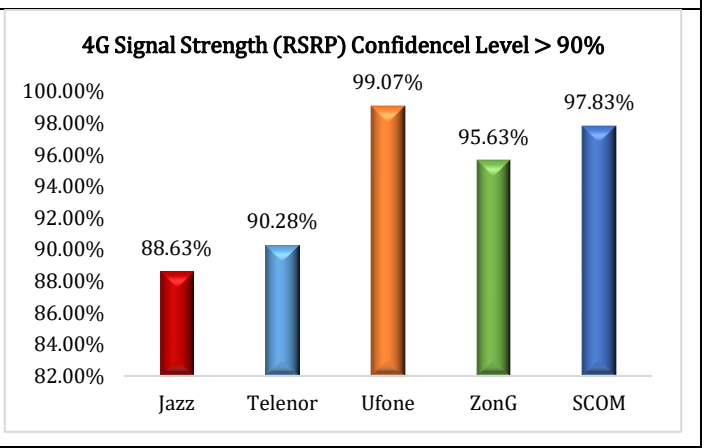












QUALITY OF SERVICE SURVEY RESULTS – RAWLAKOT