

INDEPENDENT QUALITY OF SERVICE **SURVEY OF CITIES IN PAKISTAN**

FIRST QUARTER 2021

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 Thirteen (13) different cities of Punjab, Sindh and Khyber Pakhtunkhwa (KPK). The name of cities along with survey dates are shown in **Table 1.1: QoS Survey Dates**:

S. #.	Province	City	Survey Dates
1.	Punjab	Attock	2 nd ~ 4 th Feb, 2021
2.		Multan	10 th ~ 15 th Feb, 2021
3.		Chakwal	16 th ~ 18 th Feb, 2021
4.		Bahawalpur	2 nd ~ 4 th Mar, 2021
5.		Mianwali	16 th ~ 17 th Mar, 2021
6.		Narowal	24 th ~ 25 th Mar, 2021
7.	Sindh	Nawabshah	2 nd ~ 4 th & 11 th Feb, 2021
8.		Sukkur	9 th ~ 11 th Feb, 2021
9.		Larkana	16 th ~ 18 th Feb, 2021
10.		Sanghar	2 nd ~ 3 rd Mar, 2021
11.		Badin	9 th ~ 10 th Mar, 2021
12.		Mirpur Khas	16 th ~ 17 th Mar, 2021
13.	Khyber Pakhtunkhwa	Nowshera	1 st ~ 2 nd Mar, 2021

Table 1.1: QOS Survey Dates

DRIVE TEST DETAILS

2.1. The QoS survey was carried out using the newly procured 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 Voice Calls and SMS Sessions, both A-Party and B-Party mobile handsets were kept in auto detect mode, whereas, in case of Data Sessions the mobile handset were locked in 4G/LTE and 3G mode. The Voice Calls and SMS Samples were distributed as 70% ON-NET and 30% OFF-NET.

MOBILE NETWORK COVERAGE

3.1. Mobile Network Signal Strength is measured in decibels (dBm). Signal Strength can range from approximately -30 dBm upto -120 dBm. The closer that number is to zero, the stronger the signal. In general, anything better than -100 decibel is considered a usable signal. The different ranges of signal strength and its effects on broadband speed and sustainability can be seen in **Table3.1: Signal Strength and Broadband Speed**.

S. #.	Signal Strength (dBm)	Signal Strength
1.	-65 to 0	Strong Signal with Maximum Data Speed
2.	-75 to -65	Strong Signal with Good Data Speed
3.	-85 to -75	Fair, Useful & Reliable Data Speed is Attainable
4.	-100 to -85	Marginal Data Speed with Possibility of Drop-Out
5.	-140 to -100	Performance will Drop Drastically

Table3.1: Signal Strength and Broadband Speed

3.2. **4G / LTE SIGNAL STRENGTH.** During the survey, 4G/LTE signal strength samples were recorded on survey routes. As per Next Generation Mobile Service (NGMS) licenses awarded, licensees are required to meet **the threshold of -100dBm or above of Reference Signal Receive Power (RSRP) with 90% confidence level.** The analysis of recorded signal strength revealed following:

- a. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 3.2: Compliance of 4G/LTE (RSRP) Signal Strength.**

S. #	Operator	Cities	
		Count	Names
1.	Jazz	12	Attock, Chakwal, Mianwali, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera
2.	Telenor	12	Attock, Chakwal, Mianwali, Narowal, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera
3.	Ufone	10	Attock, Chakwal, Mianwali, Narowal, Badin, Larkana, Nawabshah, Sanghar, Sukkur, Nowshera
4.	ZonG	13	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera

Table 3.2: Compliance of 4G/LTE (RSRP) Signal Strength

- b. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 3.3: Non-Compliance of 4G/LTE (RSRP) Signal Strength.**

S. #	Operator	Cities	
		Count	Names
1.	Jazz	1	Narowal
2.	Telenor	1	Multan
3.	Ufone	3	Multan, Bahawalpur, Mirpur Khas

Table 3.3: Non-Compliance of 4G/LTE (RSRP) Signal Strength

3.3. **3G SIGNAL STRENGTH.** During the survey 3G signal strength samples were recorded on survey routes. As per Next Generation Mobile Service (NGMS) licenses awarded, licensees are required to meet **the threshold of -100dBm or above of Received Signal Code Power (RSCP) with 90% confidence level.** The analysis of recorded signal strength revealed that all **CMOs remained compliant of the said threshold value at all 13 x surveyed cities.**

MOBILE BROADBAND SERVICE

4.1. **4G USER DATA THROUGHPUT.** As per Next Generation Mobile Service (NGMS) licenses awarded, licensees are required to meet **the threshold of minimum of 2Mbps of 4G User Data Throughput.** The analysis of Data Service QoS KPIs i.e. User Data Throughput Survey Results revealed following:

- a. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 4.1: Compliance of 4G User Data Throughput > 2 Mbps.**

S. #	Operator	Cities	
		Count	Names
1.	Jazz	12	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Sanghar, Sukkur, Nowshera
2.	Telenor	11	Attock, Chakwal, Mianwali, Narowal, Bahawalpur, Multan, Badin, Mirpur Khas, Nawabshah, Sukkur, Nowshera
3.	Ufone	12	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sukkur, Nowshera
4.	ZonG	13	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera

Table 4.1: Compliance of 4G User Data Throughput > 2Mbps

- b. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 4.2: Non-Compliance of 4G User Data Through > 2Mbps.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	1	Nawabshah
2.	Telenor	2	Larkana, Sanghar
3.	Ufone	1	Sanghar

Table 4.2: Non-Compliance of 4G User Data Throughput > 2Mbps

- 4.2. **3G USER DATA THROUGHPUT.** As per Next Generation Mobile Service (NGMS) licenses awarded, licensees are required to meet **the threshold of minimum of 256Kbps of 3G User Data Throughput.** The analysis of 3G User Data Throughput Survey Results revealed that all **CMOs remained compliant of minimum threshold value of 256 Kbps at all 13 x surveyed cities.**

VOICE SERVICE

- 5.1. 7 x QoS KPIs have been measured while testing voice services. The results of voice QoS KPIs are as under:

- a. **NETWORK ACCESSIBILITY.** All CMOs have achieved the QoS KPI **Network Accessibility > 99%** in all 13 x surveyed cities.
- b. **SERVICE ACCESSIBILITY.** The analysis of QoS KPI **Service Accessibility of > 98%** in surveyed cities revealed following.
- i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 5.1: Compliance of Service Accessibility > 98%**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	6	Narowal, Badin, Larkana, Mirpur Khas, Sanghar, Nawabshah,
2.	Ufone	6	Narowal, Badin, Larkana, Sanghar, Nawabshah, Sukkur
3.	ZonG	3	Bahawalpur, Badin, Larkana,

Table 5.1: Compliance of Service Accessibility > 98%

- ii. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 5.2: Non-Compliance of Service Accessibility > 98%.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	7	Attock, Chakwal, Mianwali, Multan, Bahawalpur, Nowshera, Sukkur
2.	Telenor	13	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Nowshera, Badin, Larkana, Mirpur Khas, Sanghar, Nawabshah, Sukkur
3.	Ufone	7	Attock, Chakwal, Mianwali, Multan, Bahawalpur, Nowshera, Mirpur Khas,
4.	ZonG	10	Attock, Chakwal, Mianwali, Narowal, Multan, Nowshera, Mirpur Khas, Sanghar, Nawabshah, Sukkur

Table 5.2: Non-Compliance of Service Accessibility > 98%

c. **CALL CONNECTION TIME.** The analysis of QoS KPI **Call Connection Time of < 6.5 Seconds** in all the surveyed cities revealed following.

i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 5.3: Compliance of Call Connection Time < 6.5 Seconds.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	9	Attock, Chakwal, Narowal, Bahawalpur, Badin, Larkana, Mirpur Khas, Sukkur, Nowshera
2.	Telenor	13	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera
3.	Ufone	12	Attock, Chakwal, Mianwali, Narowal, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera
4.	ZonG	12	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Nowshera

Table 5.3: Compliance of Call Connection Time < 6.5 Seconds

ii. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 5.4: Non-Compliance of Call Connection Time < 6.5 Seconds.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	4	Mianwali, Multan, Sanghar, Nawabshah
2.	Ufone	1	Multan
3.	ZonG	1	Sukkur

Table 5.4: Non-Compliance of Call Connection Time < 6.5 Seconds

d. **CALL COMPELETION RATIO.** The analysis of QoS KPI **Call Completion Ratio of > 98%** in surveyed cities revealed following:

i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 5.5: Compliance of Call Completion Ratio > 98%.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	10	Attock, Chakwal, Mianwali, Narowal, Bahawalpur, Badin, Mirpur Khas, Nawabshah, Sanghar, Nowshera
2.	Telenor	9	Attock, Mianwali, Narowal, Bahawalpur, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera
3.	Ufone	12	Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera
4.	ZonG	13	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera

Table 5.5: Compliance of Call Completion Ratio > 98%

ii. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 5.6: Non-Compliance of Call Completion Ratio > 98%.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	3	Multan, Larkana, Sukkur
2.	Telenor	4	Chakwal, Multan, Badin, Larkana
3.	Ufone	1	Attock

Table 5.6: Non-Compliance of Call Completion Ratio > 98%

e. **END-TO-END SPEECH QUALITY / MEAN OPINION SCORE.** The analysis of QoS KPI **End-to-End Speech Quality/ Mean Opinion Score of > 3** in all the surveyed cities revealed following:

i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 5.7: Compliance of Mean Opinion Score > 3.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	3	Chakwal, Badin, Mirpur Khas
2.	Telenor	1	Nawabshah
3.	Ufone	9	Attock, Narowal, Multan, Bahawalpur, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur
4.	ZonG	13	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera

Table 5.7: Compliance of Mean Opinion Score > 3

ii. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 5.8: Non-Compliance of Mean Opinion Score > 3.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	10	Attock, Mianwali, Narowal, Multan, Bahawalpur, Larkana, Nawabshah, Sanghar, Sukkur, Nowshera
2.	Telenor	12	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Sanghar, Sukkur, Nowshera
3.	Ufone	4	Chakwal, Mianwali, Nowshera, Badin

Table 5.8: Non-Compliance of Mean Opinion Score > 3

f. **INTER SYSTEM HANDOVER OF CIRCUIT SWITCHED VOICE.** Except **ZonG at Multan**, CMOs have achieved the QoS KPIs of **Inter System Handover of Circuit Switched Voice > 98%** in surveyed cities.

g. **RAB SETUP SUCCESS RATE.** **All CMOs have achieved** the QoS KPI **RAB Setup Success Rate > 98%** in all 13 x surveyed cities.

SMS SERVICE

6.1. 2 x QoS KPIs i.e. "SMS Success Rate" and "SMS End to End Delivery Time" have been measured and the results are as under:

a. **SMS SUCCESS RATE.** The analysis of QoS KPI **SMS Success Rate of 99%** in all the 13 x surveyed cities revealed following:

i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 6.1: Compliance of SMS Success Rate > 99%.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	3	Badin, Larkana, Sanghar
2.	Ufone	1	Nowshera
3.	ZonG	1	Badin

Table 6.1: Compliance of SMS Success Rate > 99%

- ii. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 6.2: Non-Compliance of SMS Success Rate > 99%.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	10	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Mirpur Khas, Nawabshah, Sukkur, Nowshera
2.	Telenor	13	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera
3.	Ufone	12	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur
4.	ZonG	12	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera

Table 6.2: Non-Compliance of SMS Success Rate > 99%

- b. **SMS END-TO-END DELIVERY TIME.** The analysis of QoS KPI **SMS End-to-End Delivery time of 12 Seconds** in 13 x surveyed cities revealed following:

- i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 6.3: Compliance of SMS End-To-End Delivery Time ≤ 12 Seconds.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	10	Attock, Chakwal, Narowal, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur
2.	Telenor	6	Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur
3.	Ufone	7	Attock, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur
4.	ZonG	13	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Badin, Larkana, Mirpur Khas, Nawabshah, Sanghar, Sukkur, Nowshera

Table 6.3: Compliance of SMS End-To-End Delivery Time ≤ 12 Seconds

- ii. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 6.4: Non-Compliance of SMS End-To-End Delivery Time ≤ 12 Seconds.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	3	Mianwali, Multan, Nowshera
2.	Telenor	7	Attock, Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Nowshera
3.	Ufone	6	Chakwal, Mianwali, Narowal, Multan, Bahawalpur, Nowshera

Table 6.4: Non-Compliance of SMS End-To-End Delivery Time ≤ 12 Seconds

SURVEY MAPS & GRAPHICAL RESULTS

7.1 The 4G/LTE Signal Strength (RSRP) samples recorded during drive test on survey routes plotted on maps along-with Voice & SMS QoS KPIs survey results in graphical form are placed at **Annex-A, B & C** for Cities of Punjab, Sindh & Khyber Pakhtunkhwa respectively.

STANDING IN SURVEY

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

- a. **MOBILE NETWORK COVERAGE.** The categorization of CMOs as per QoS KPI i.e. Signal Strength of 4G/LTE and 3G Networks in 13 x Surveyed Cities 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	26	-	1 st
2.	Jazz	25	1	2 nd
3.	Telenor	25	1	2 nd
4.	Ufone	23	3	3 rd

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 and 3G Networks is shown in **Table 8.2: CMOs Standing in Mobile Broadband Service.**

S. #.	Operator	Highest Throughput – Number of Cities								Standing	
		4G				3G				4G	3G
		1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th		
1.	ZonG	12	-	-	1	-	-	2	11	1 st	4 th
2.	Jazz	-	9	3	1	3	3	6	1	2 nd	3 rd
3.	Telenor	1	3	5	4	2	5	5	1	3 rd	2 nd
4.	Ufone	-	1	5	7	8	5	-	-	4 th	1 st

Table 8.2: CMOs Standing in Mobile Broadband Service

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

S. #.	Operator	Voice QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	ZonG	80	11	1 st
2.	Ufone	78	13	2 nd
3.	Jazz	67	24	3 rd
4.	Telenor	62	29	4 th

Table 8.3: CMOs Standing in Voice Service

- d. **SMS SERVICE.** The categorization of each CMOs, as per the maximum complaint SMS QoS KPIs which is shown in **Table 8.4: CMOs Standing in SMS Service**

S. #.	Operator	SMS QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	ZonG	14	12	1 st
2.	Jazz	13	13	2 nd
3.	Ufone	8	18	3 rd
4.	Telenor	6	20	4 th

Table 8.4: CMOs Standing in SMS Service

- e. **OVERALL STANDING.** The overall standing of each CMOs in each category of service is mentioned in **Table 8.5: CMOs Overall Standing in QoS Survey.**

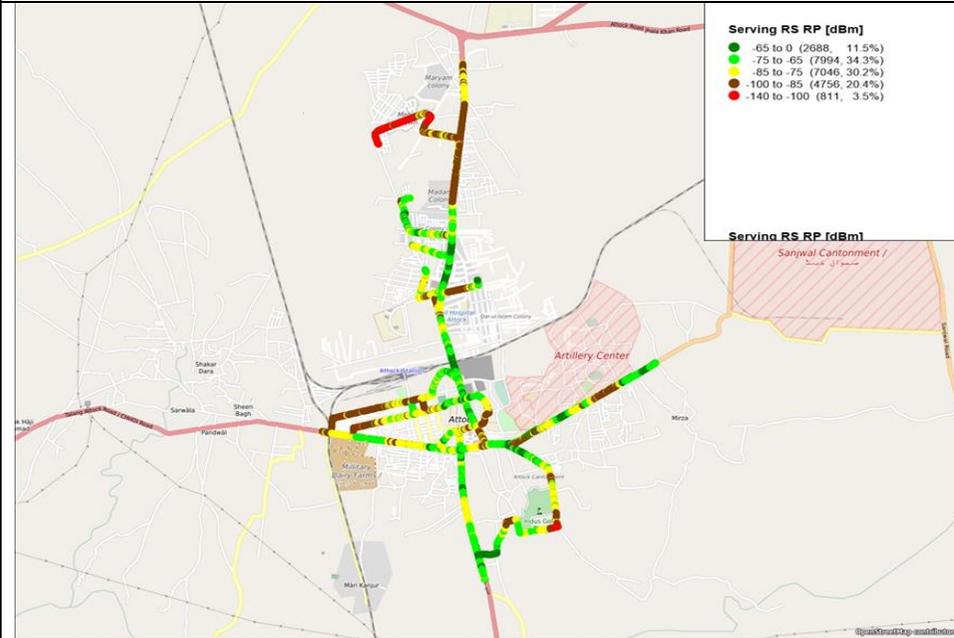
S. #.	Service		STANDING			
			1 st	2 nd	3 rd	4 th
1.	Mobile Network Coverage		ZonG	Jazz & Telenor	Ufone	-
2.	Mobile Broadband	3G	Ufone	Telenor	Jazz	ZonG
		4G	ZonG	Jazz	Telenor	Ufone
3.	Voice		ZonG	Ufone	Jazz	Telenor
4.	SMS		ZonG	Jazz	Ufone	Telenor

Table 8.5: CMOs Overall Standing in QoS Survey

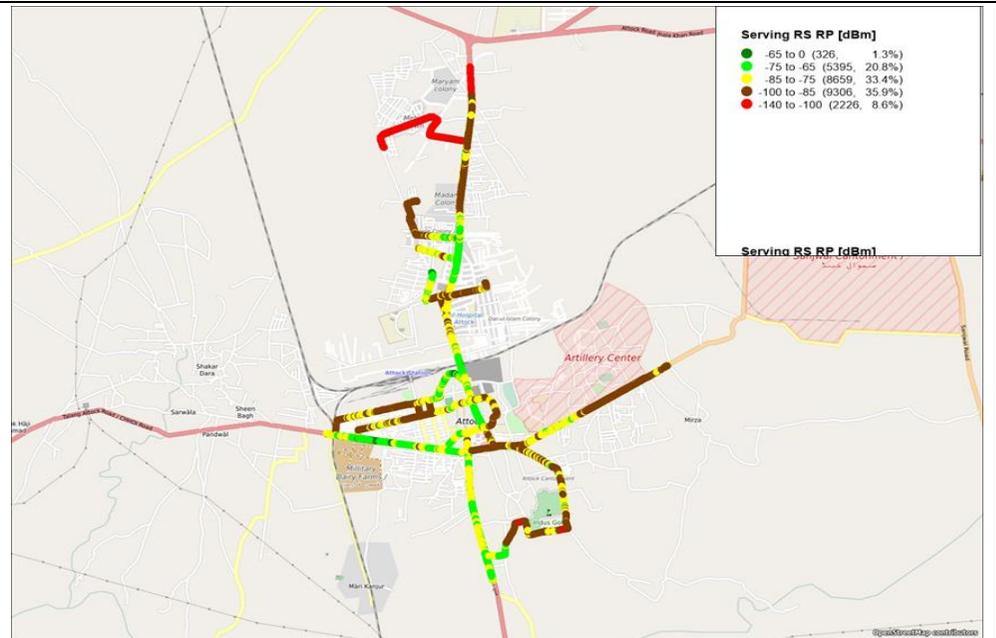
PUNJAB

4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

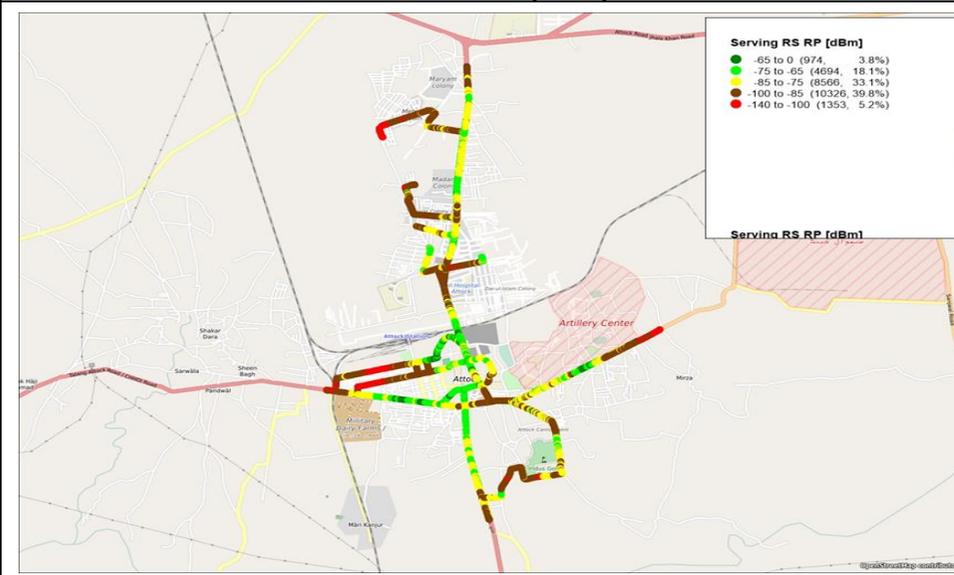
JAZZ 4G COVERAGE (RSRP) - ATTOCK



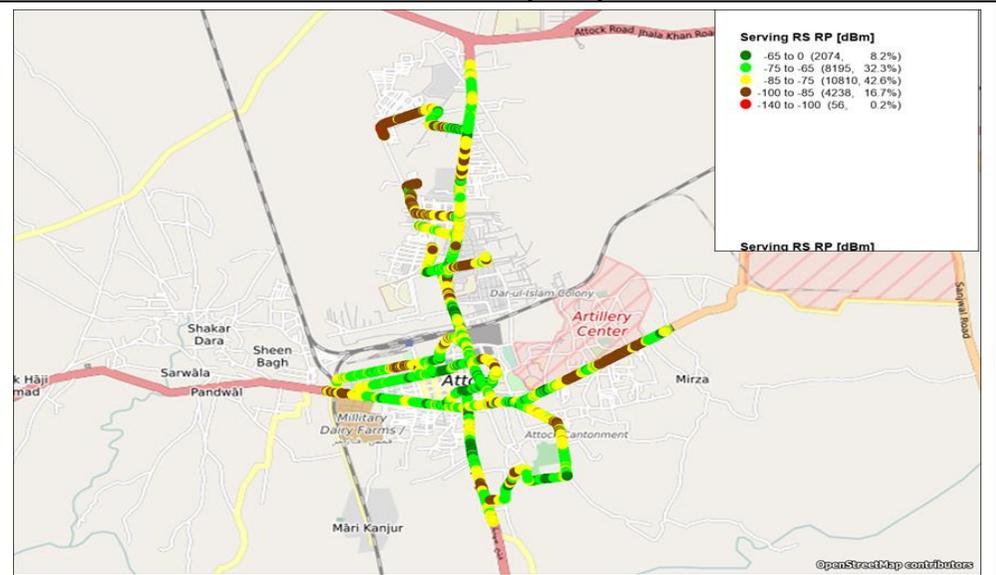
TELENOR 4G COVERAGE (RSRP) - ATTOCK



UFONE 4G COVERAGE (RSRP) - ATTOCK

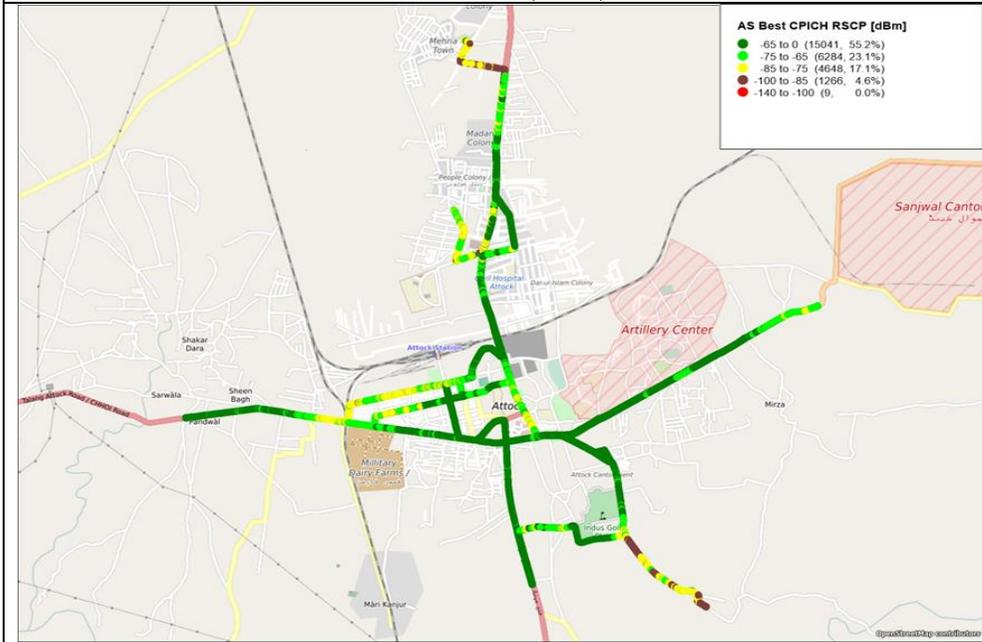


ZONG 4G COVERAGE (RSRP) - ATTOCK

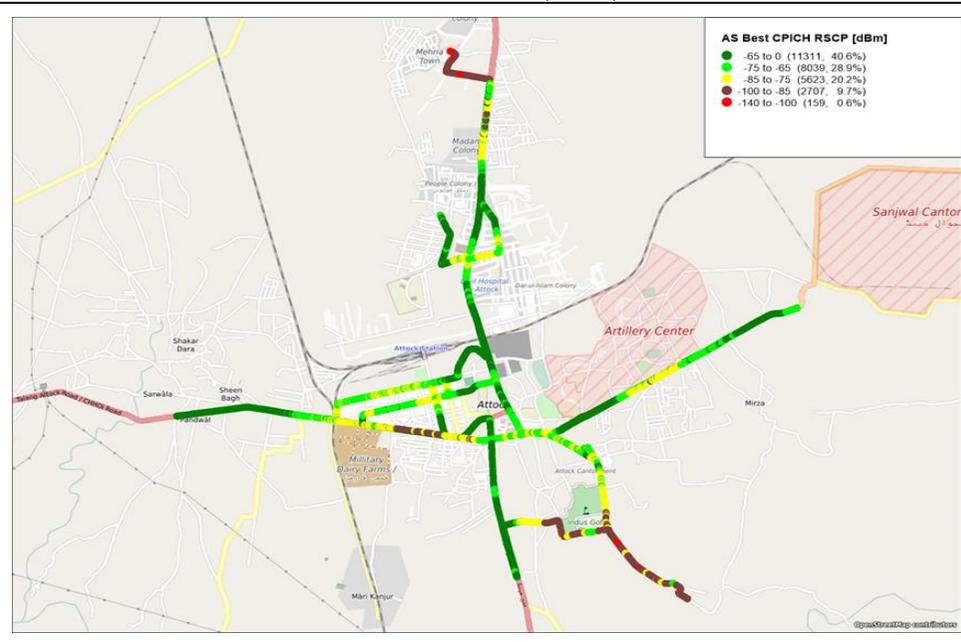


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

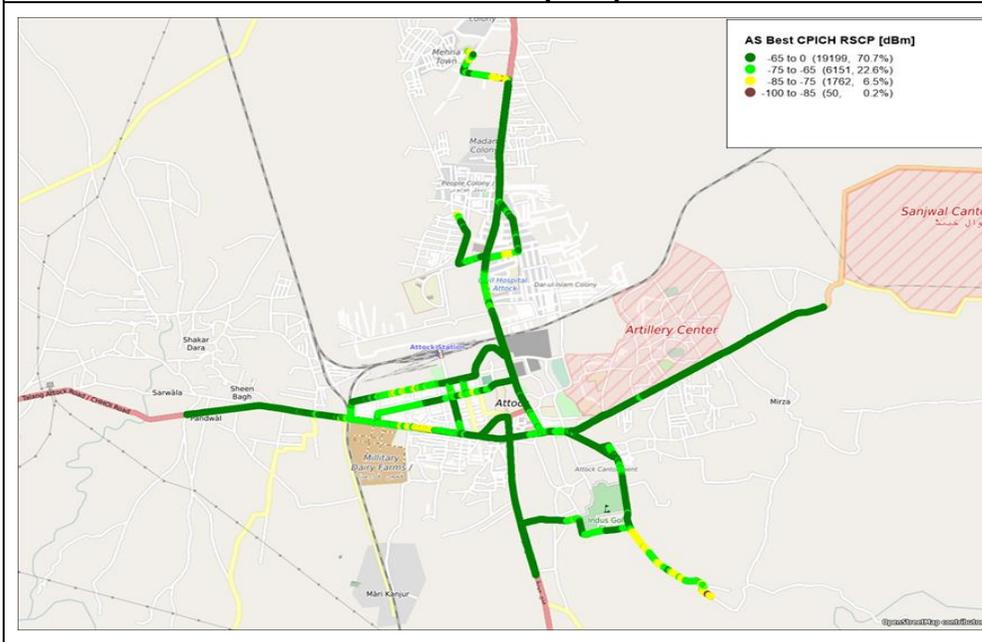
JAZZ 3G COVERAGE (RSCP) - ATTOCK



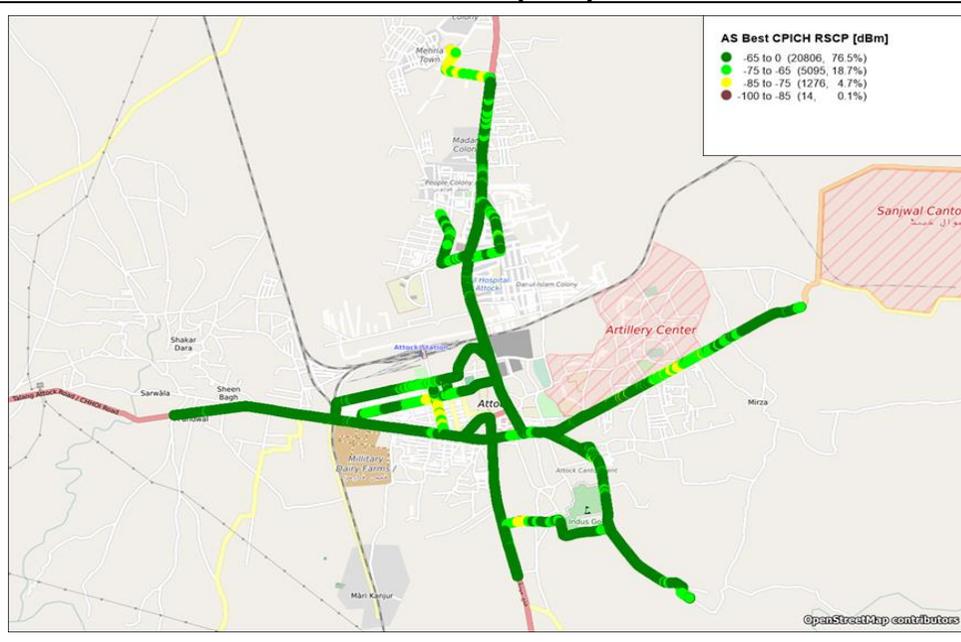
TELENOR 3G COVERAGE (RSCP) - ATTOCK



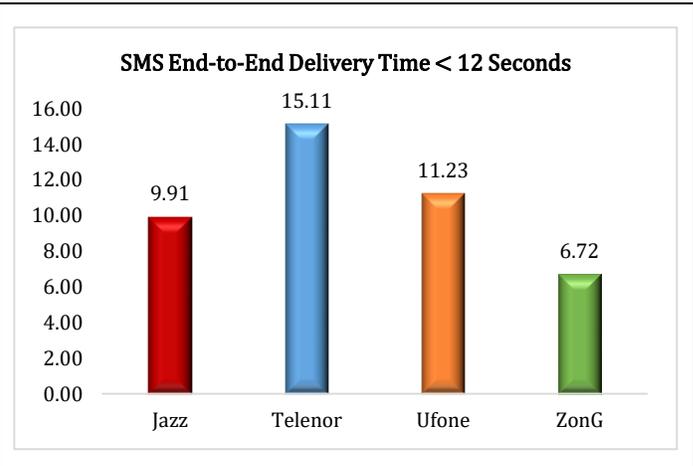
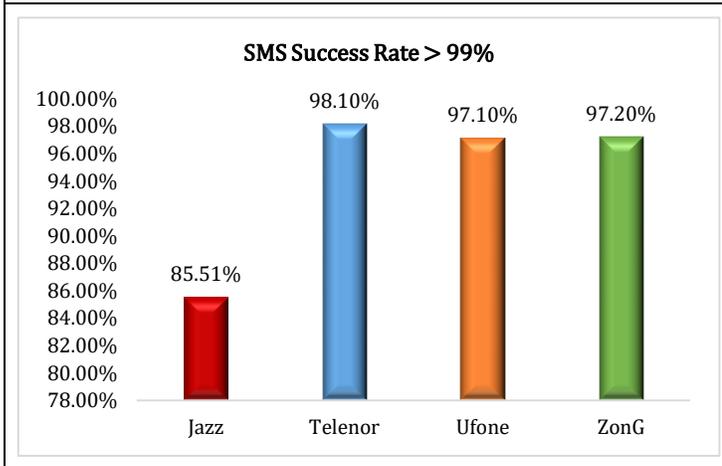
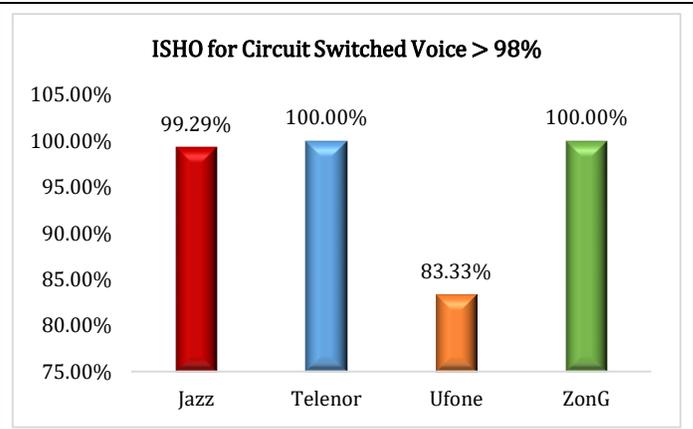
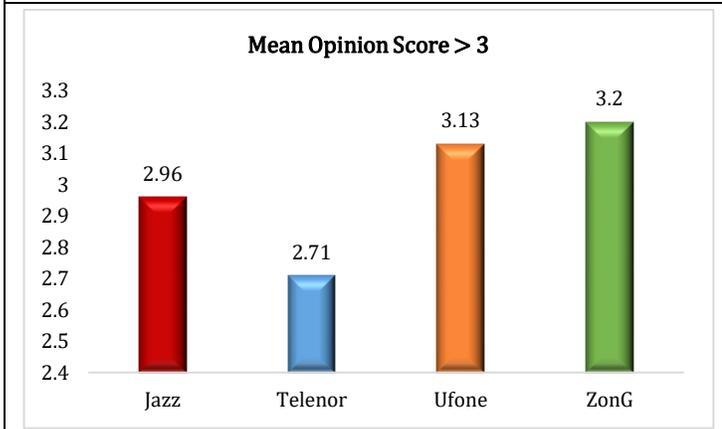
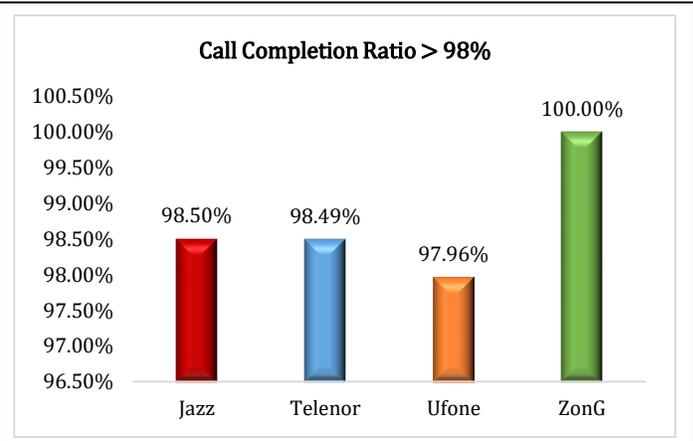
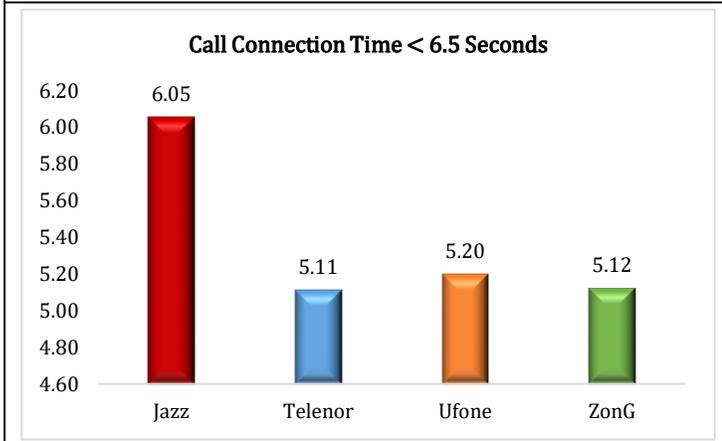
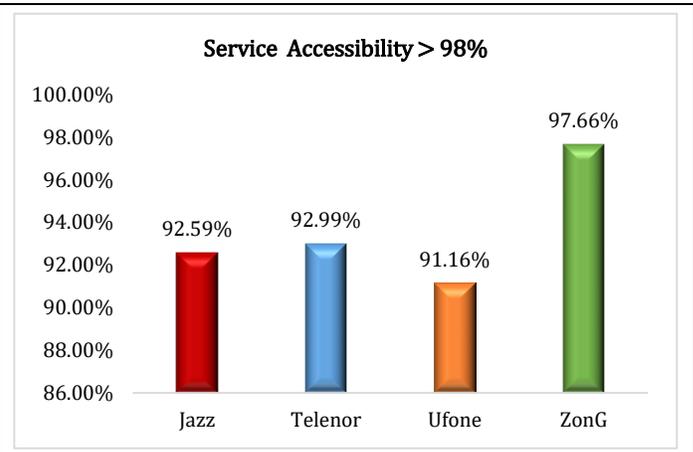
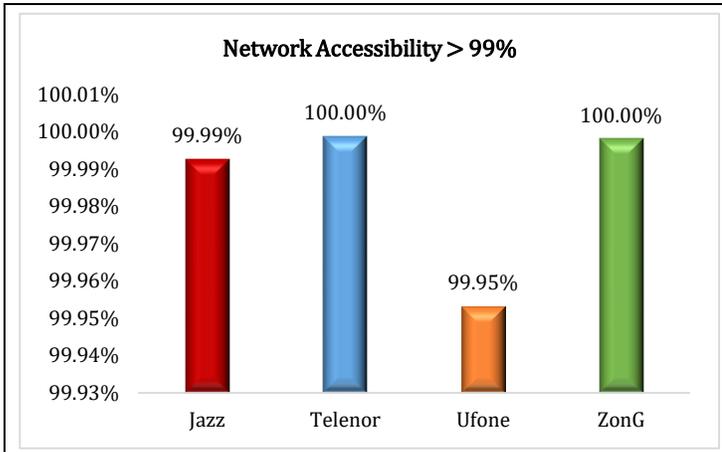
UFONE 3G COVERAGE (RSCP) - ATTOCK



ZONG 3G COVERAGE (RSCP) - ATTOCK

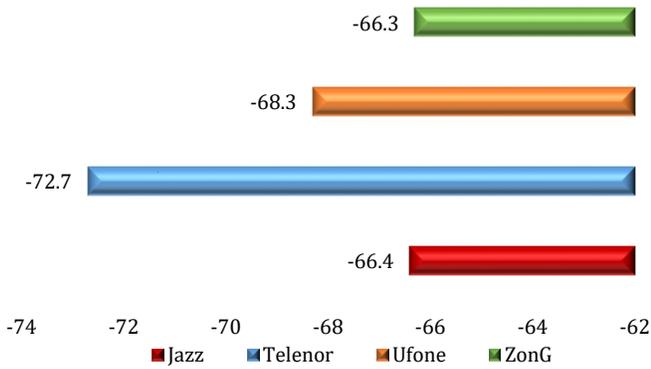


QUALITY OF SERVICE SURVEY RESULTS – ATTOCK

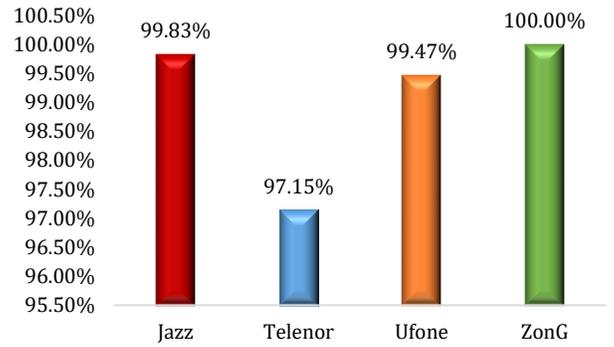


QUALITY OF SERVICE SURVEY RESULTS – ATTOCK

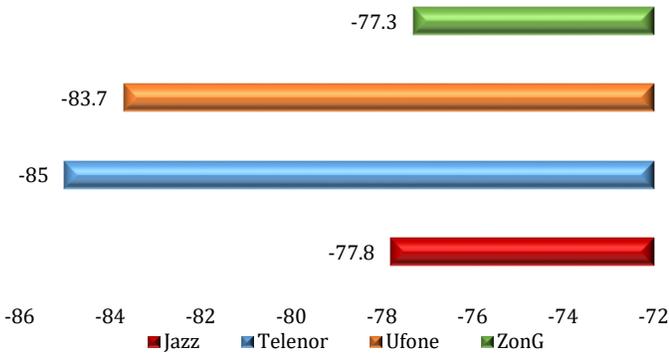
3G Signal Strength (RSCP) > -100dBm



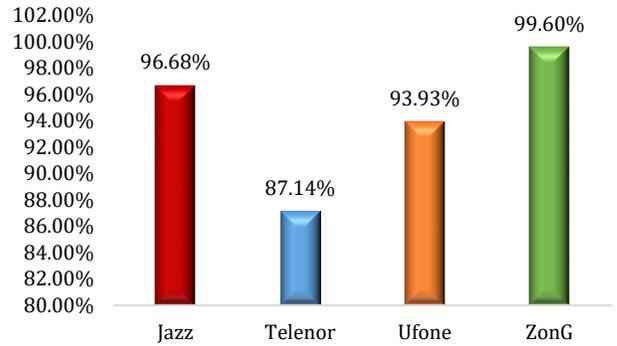
3G Signal Strength (RSCP) Confidencel Level > 90%



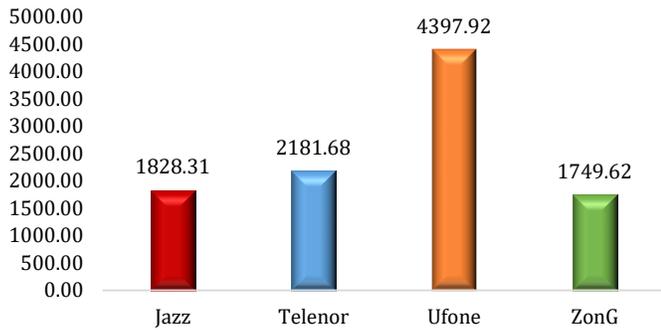
4G Signal Strength (RSRP) > -100dBm



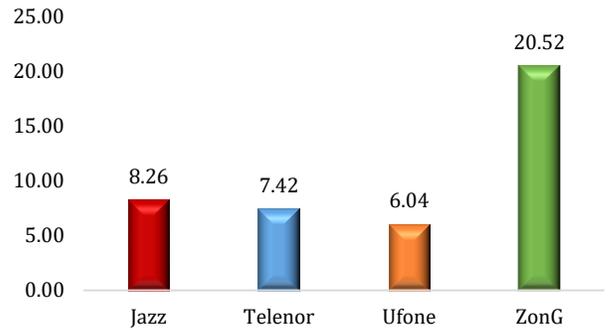
4G Signal Strength (RSRP) Confidencel Level > 90%



User Data Throughput (3G) > 256Kbps

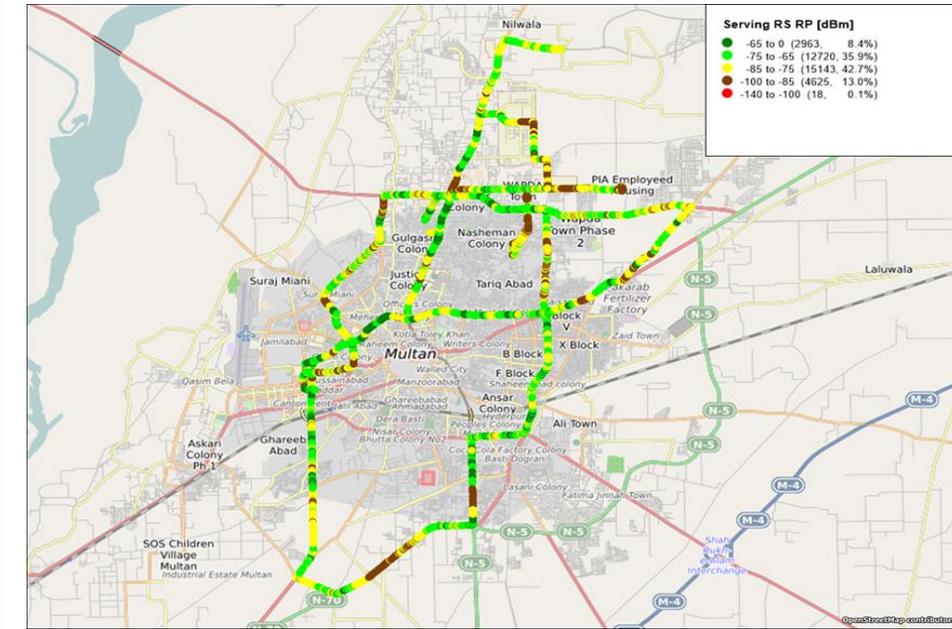


User Data Throughput (4G) > 2Mbps

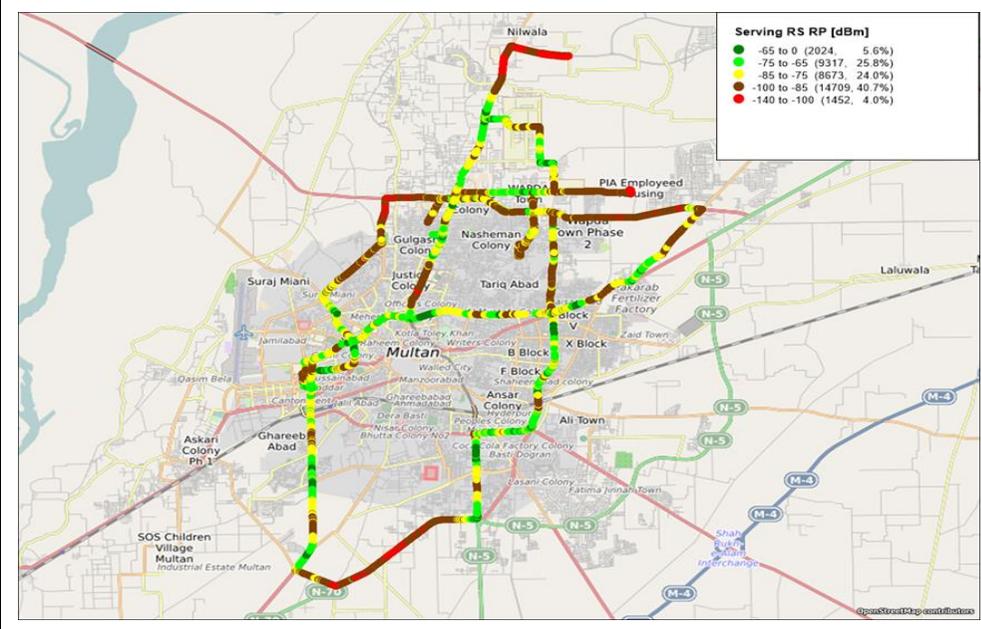


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

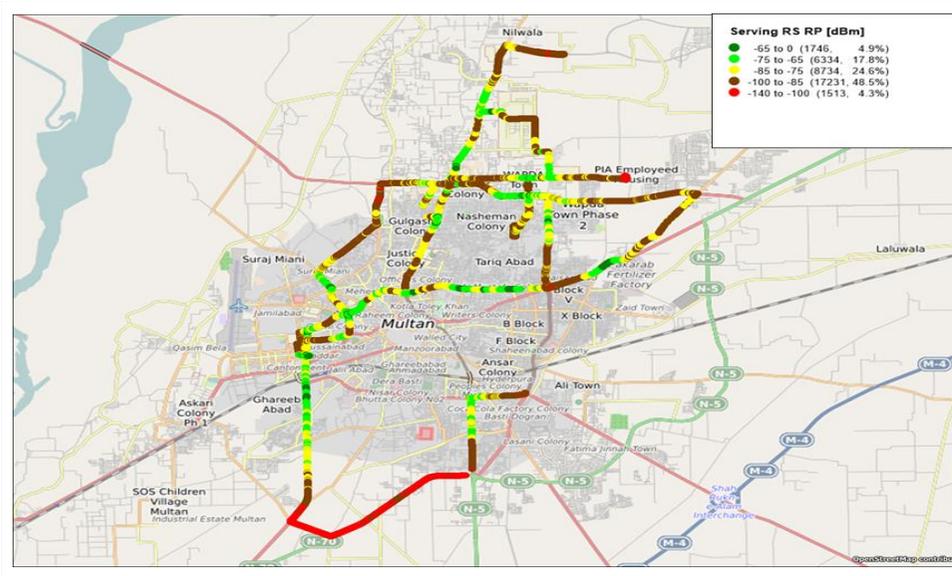
JAZZ 4G COVERAGE (RSRP) - MULTAN



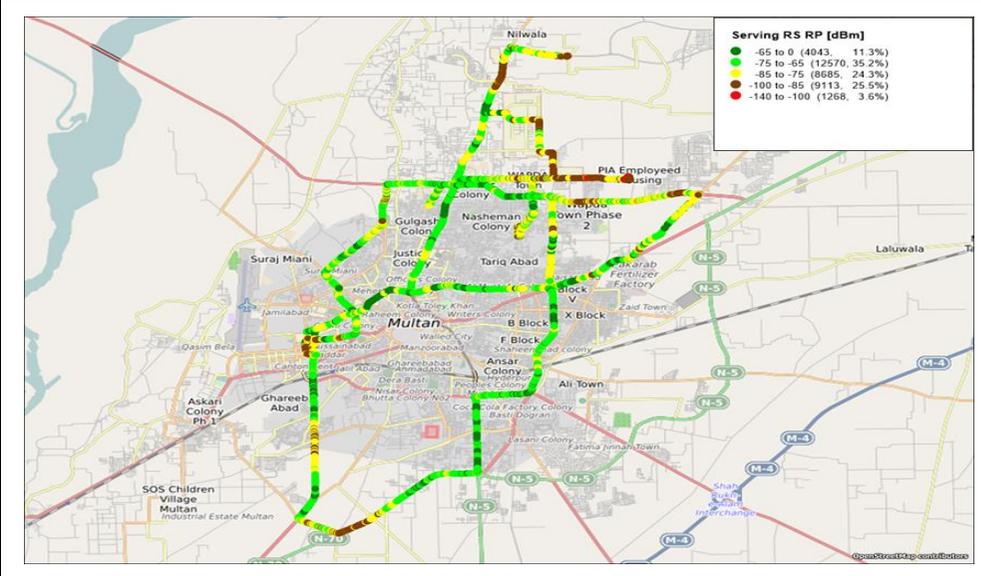
TELENOR 4G COVERAGE (RSRP) - MULTAN



UFONE 4G COVERAGE (RSRP) - MULTAN

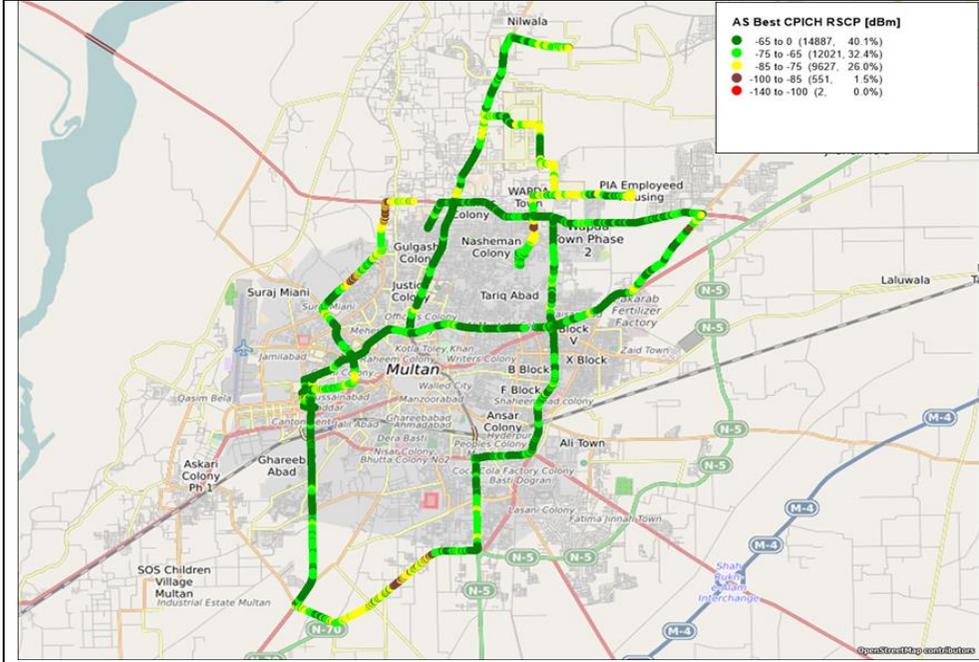


ZONG 4G COVERAGE (RSRP) - MULTAN

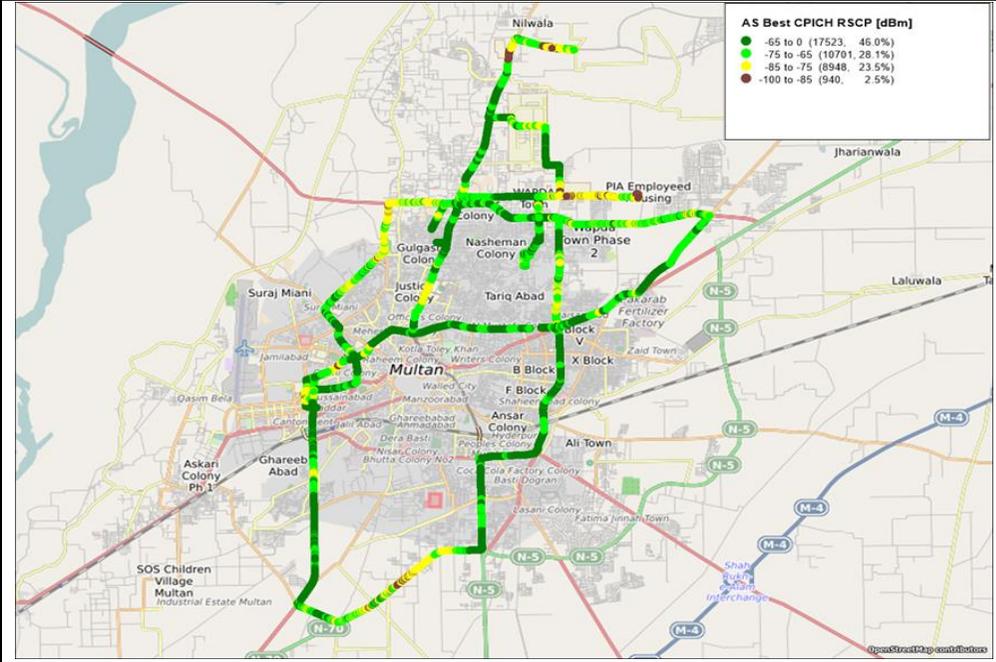


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

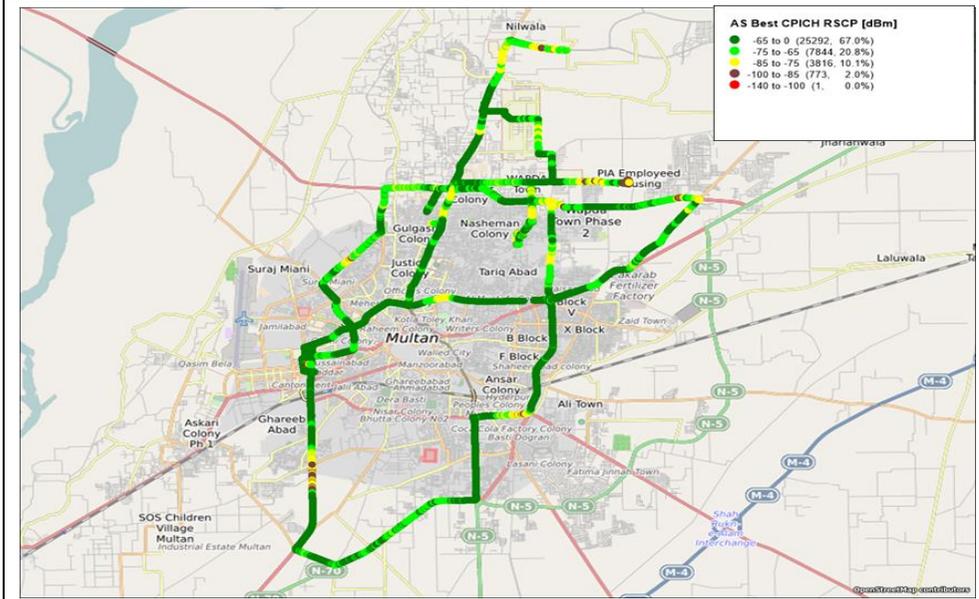
JAZZ 3G COVERAGE (RSCP) – MULTAN



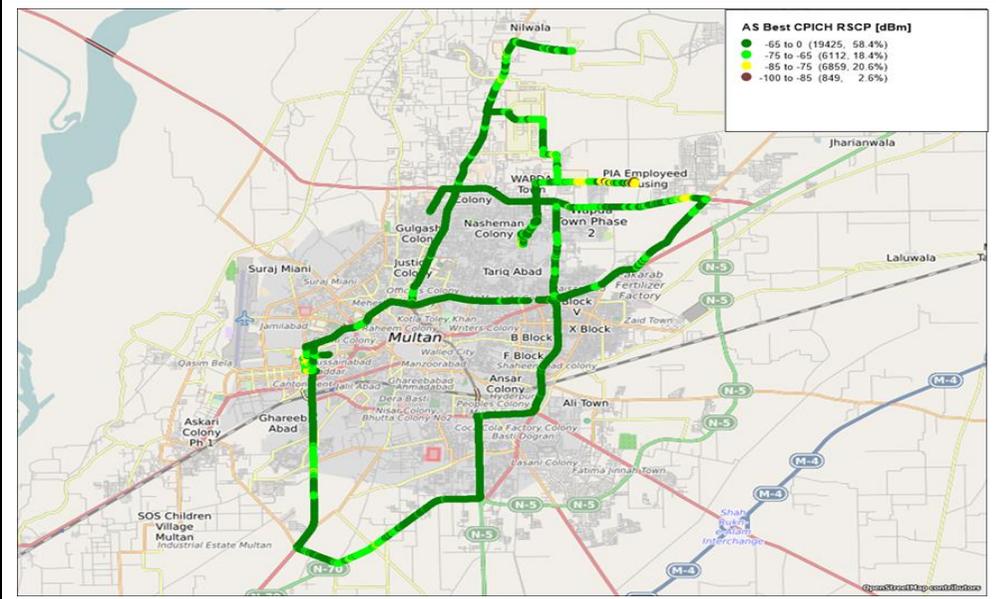
TELENOR 3G COVERAGE (RSCP) - MULTAN



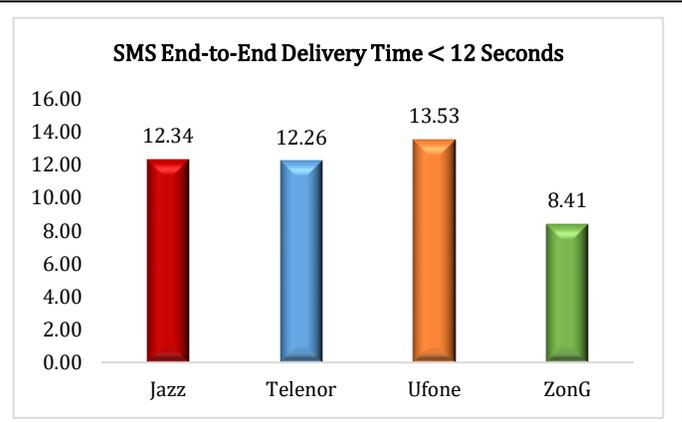
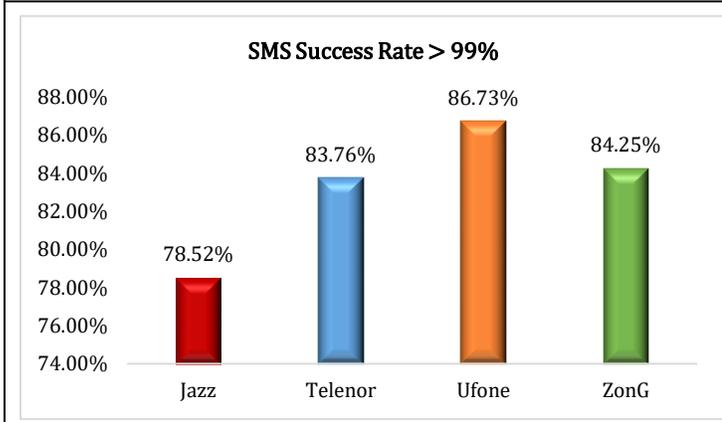
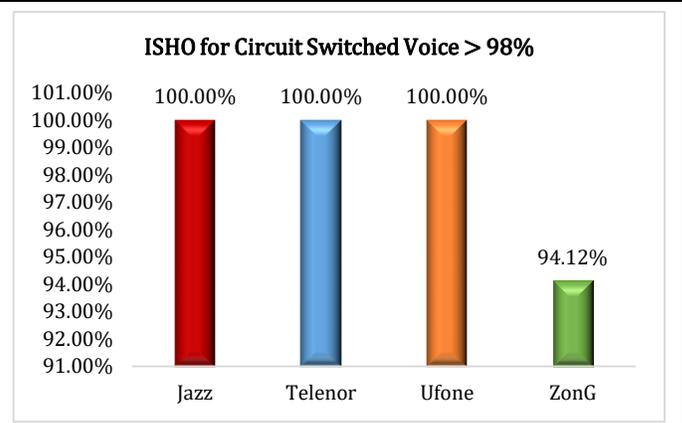
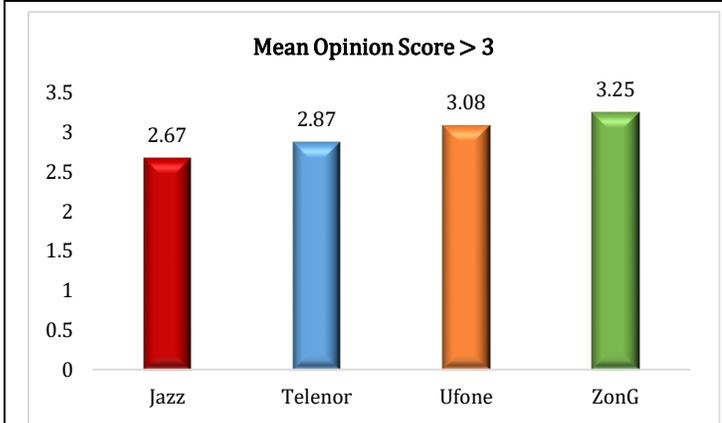
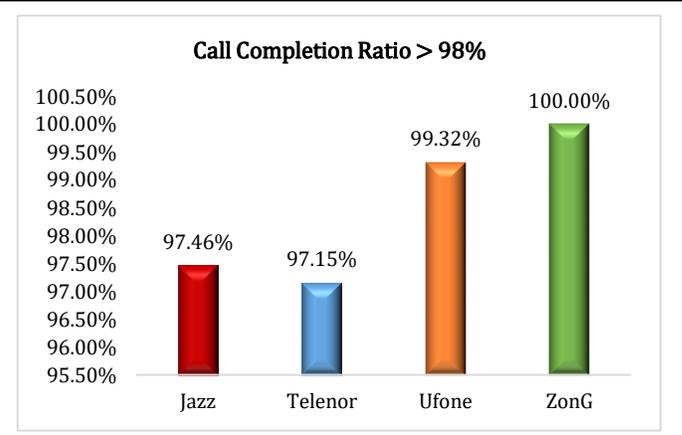
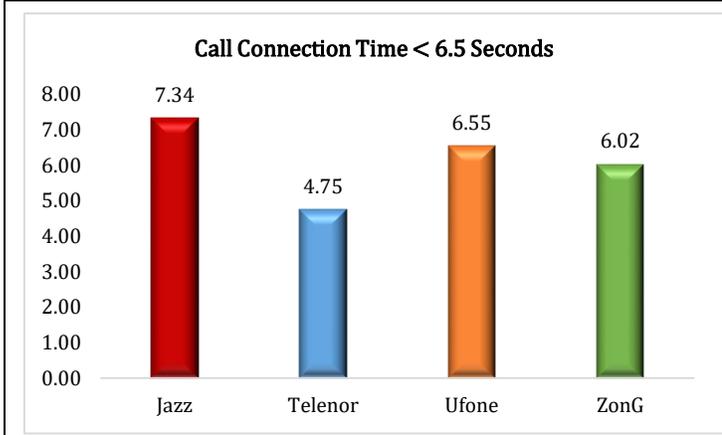
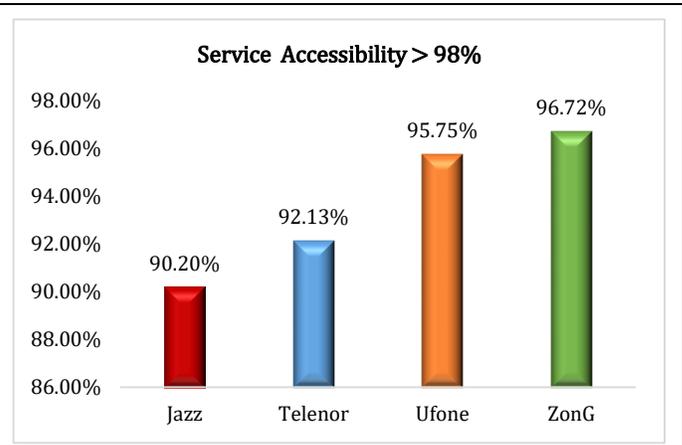
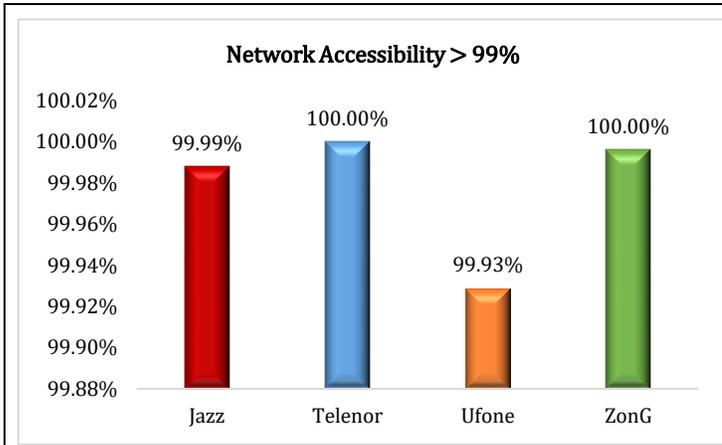
UFONE 3G COVERAGE (RSCP) - MULTAN



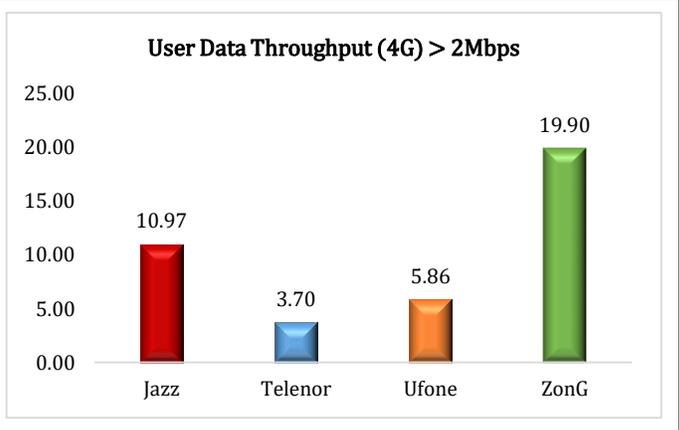
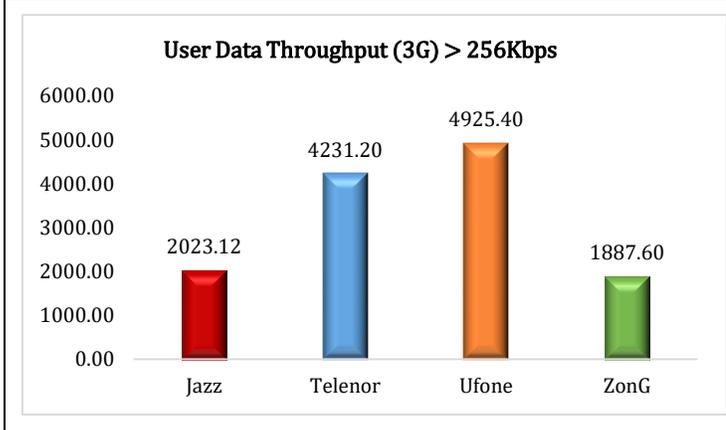
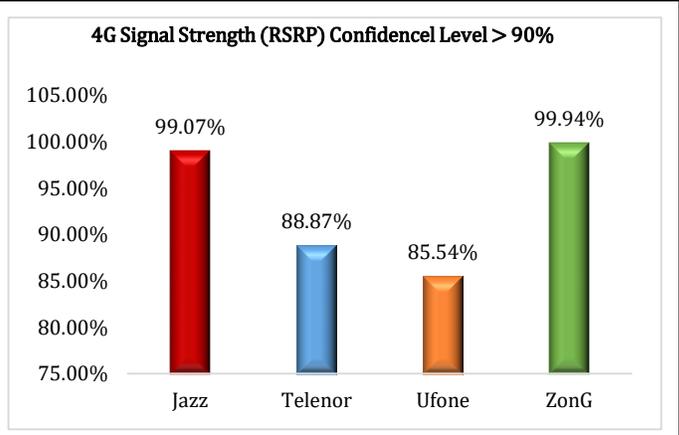
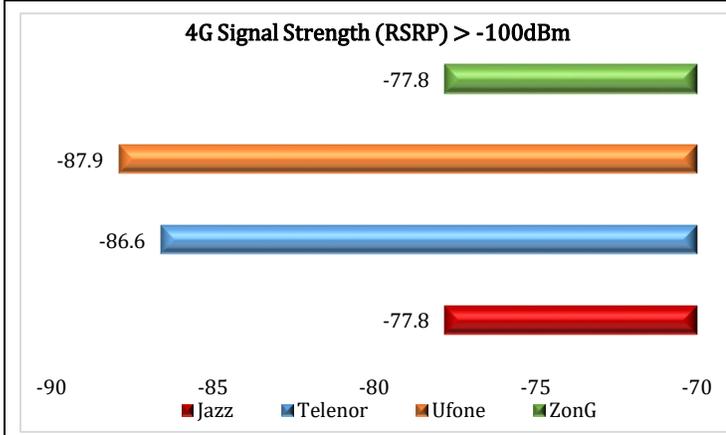
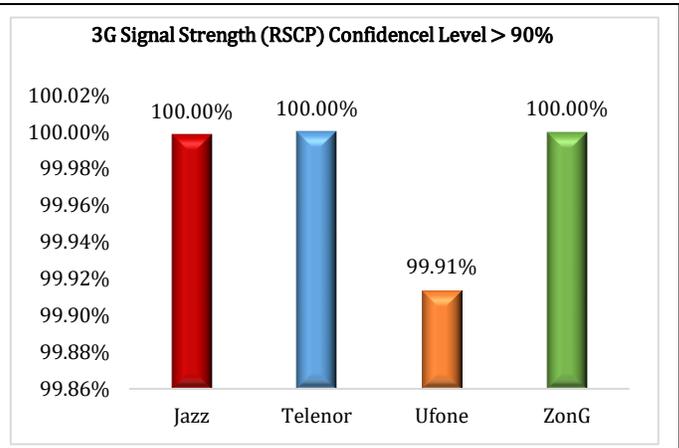
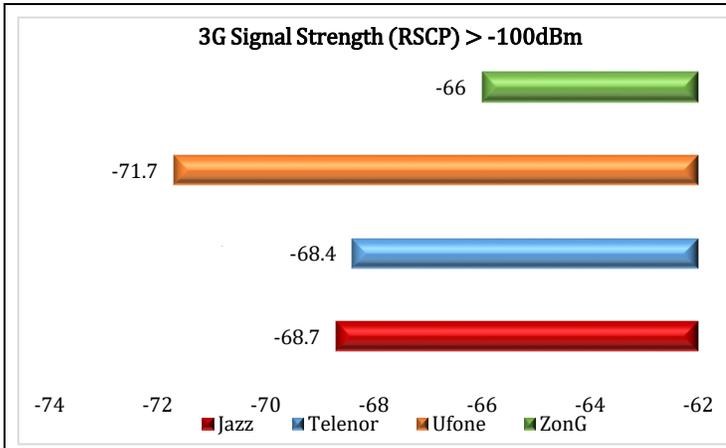
ZONG 3G COVERAGE (RSCP) - MULTAN



QUALITY OF SERVICE SURVEY RESULTS – MULTAN

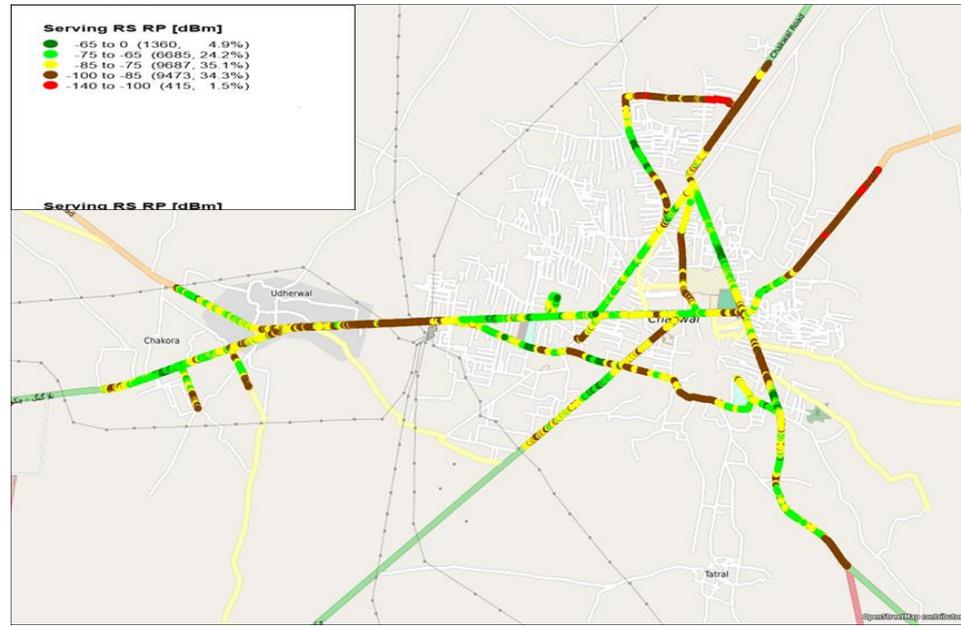


QUALITY OF SERVICE SURVEY RESULTS – MULTAN

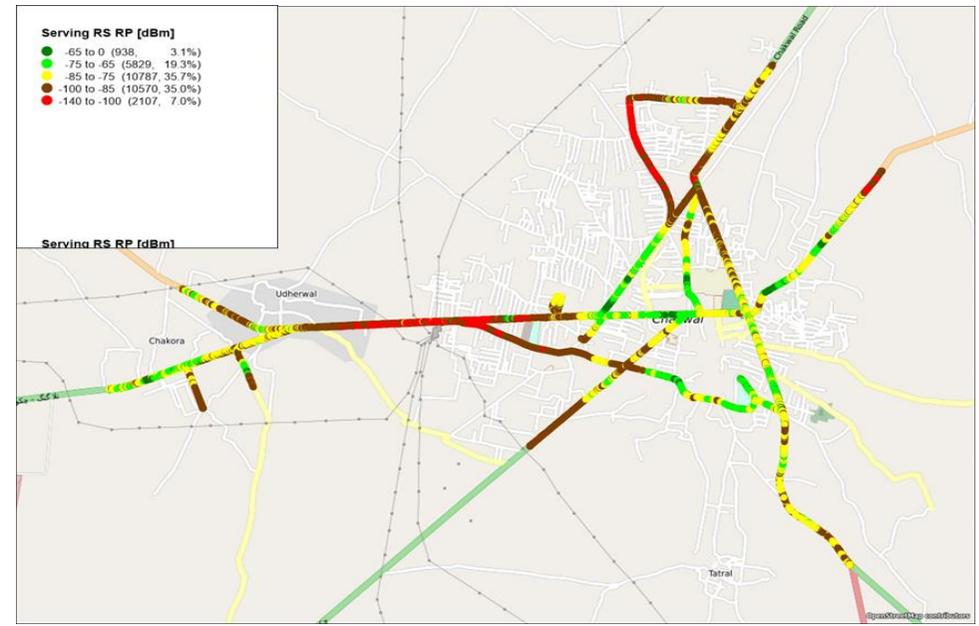


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

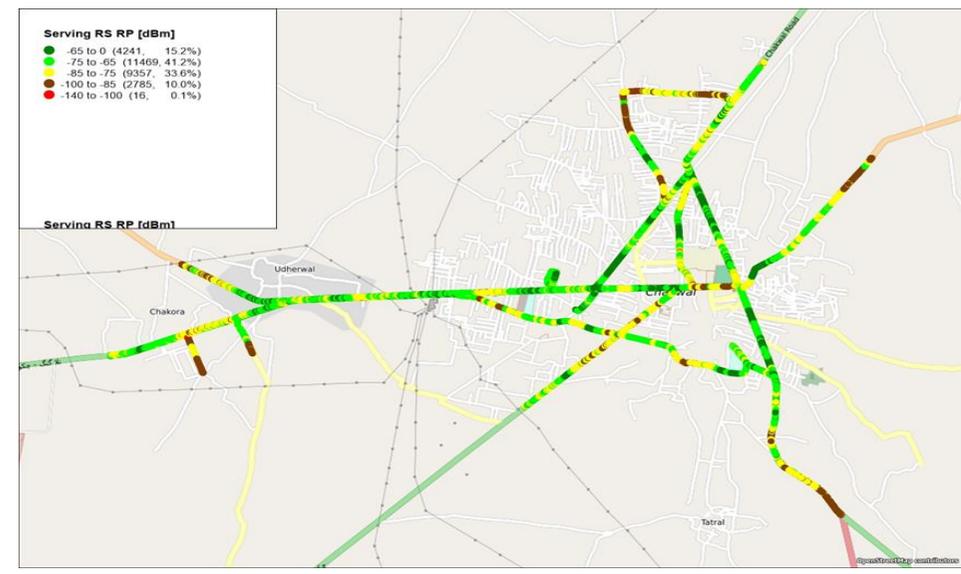
JAZZ 4G COVERAGE (RSRP) - CHAKWAL



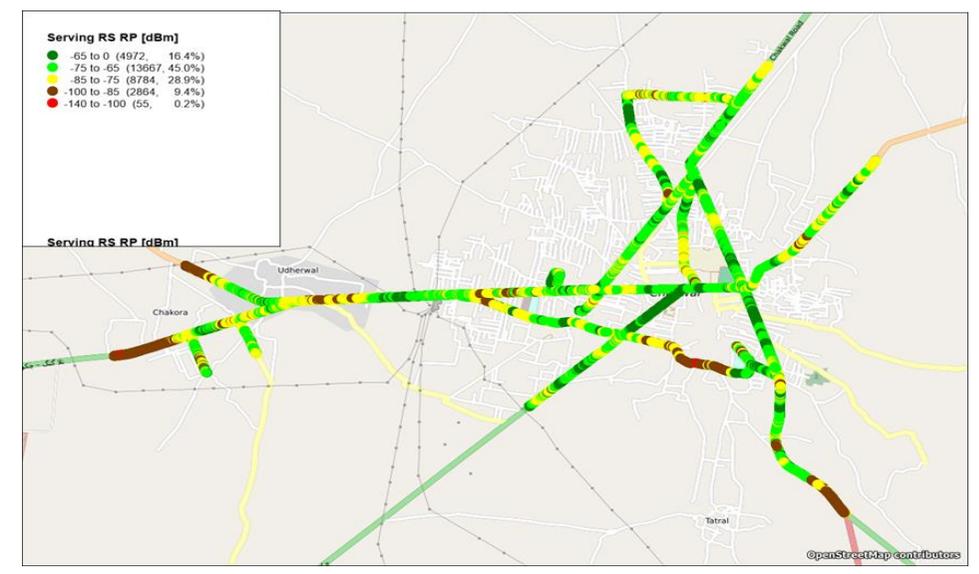
TELEOR 4G COVERAGE (RSRP) - CHAKWAL



UFONE 4G COVERAGE (RSRP) - CHAKWAL

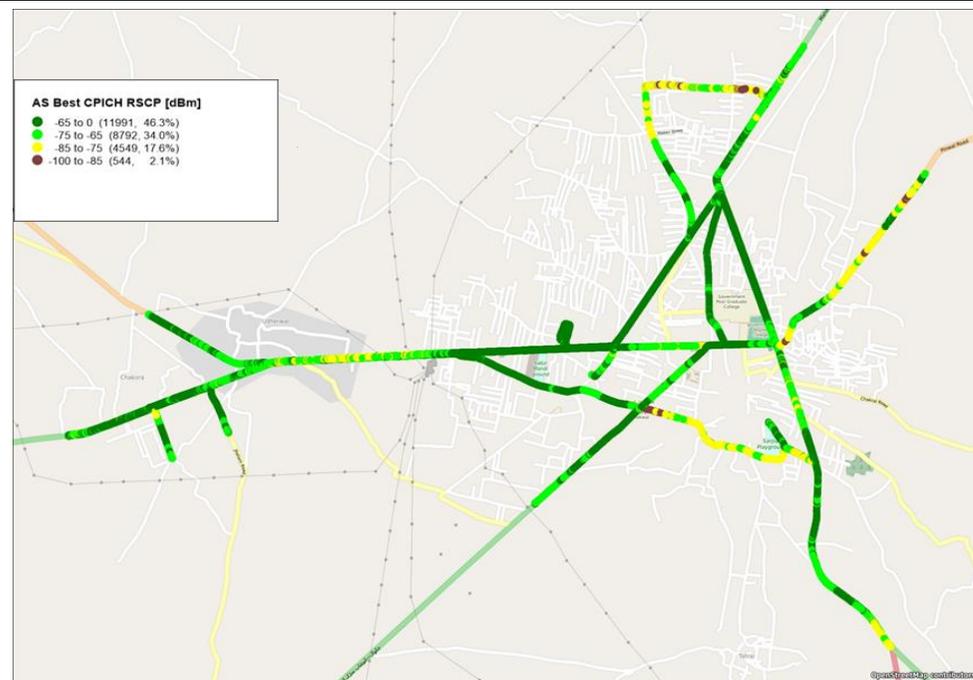


ZONG 4G COVERAGE (RSRP) - CHAKWAL

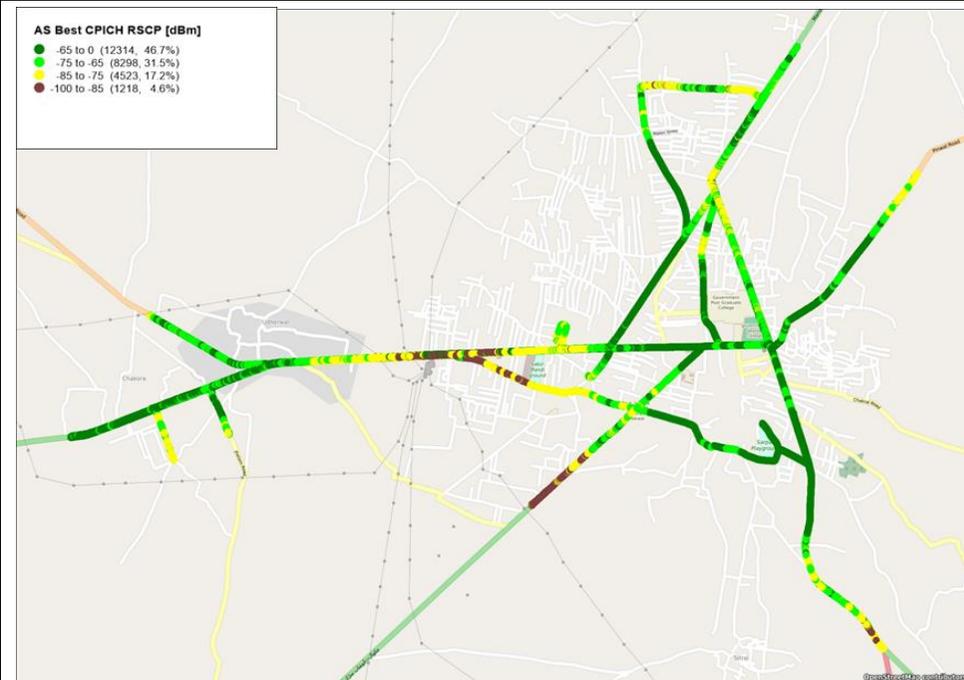


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

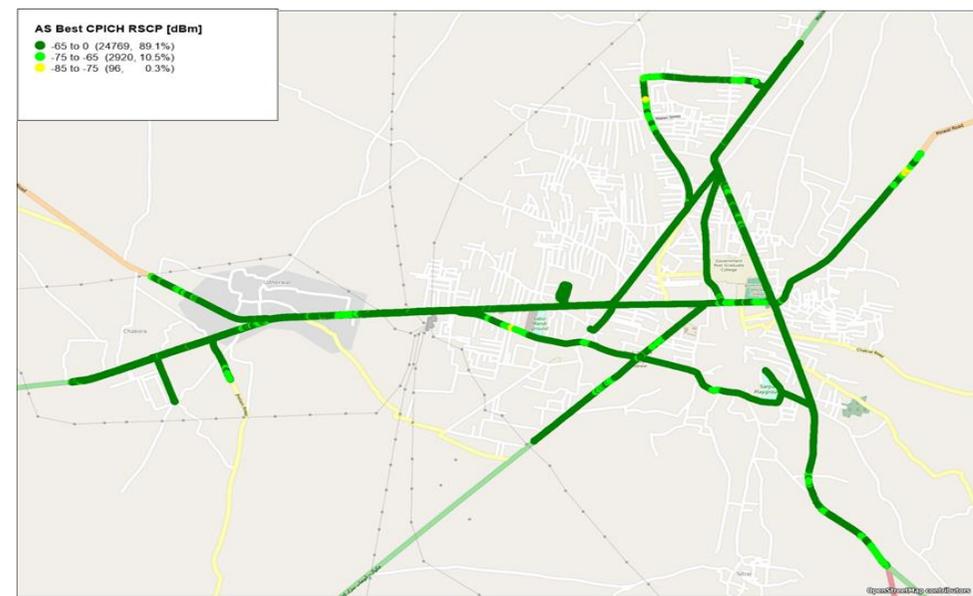
JAZZ 3G COVERAGE (RSCP) – CHAKWAL



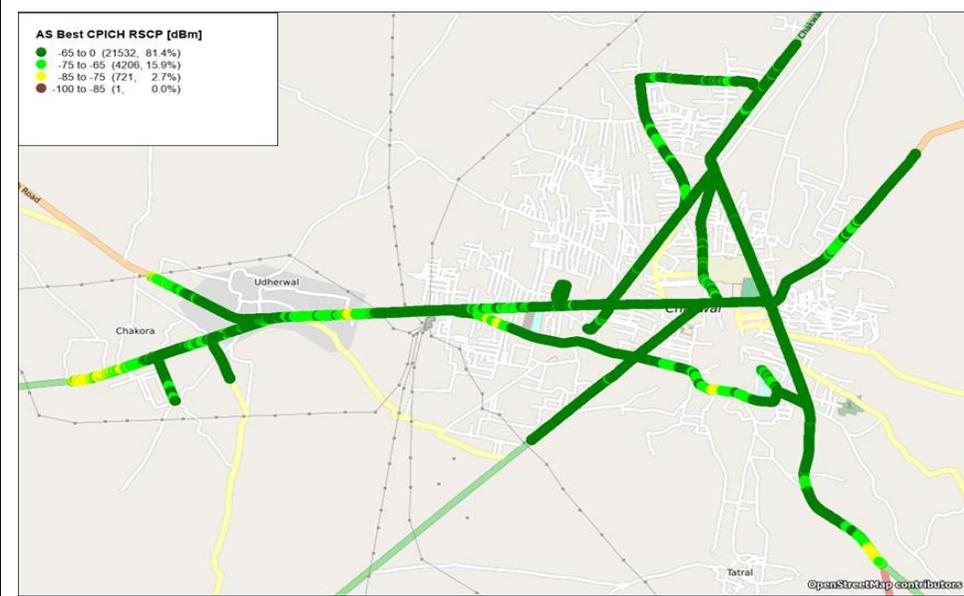
TELENOR 3G COVERAGE (RSCP) – CHAKWAL



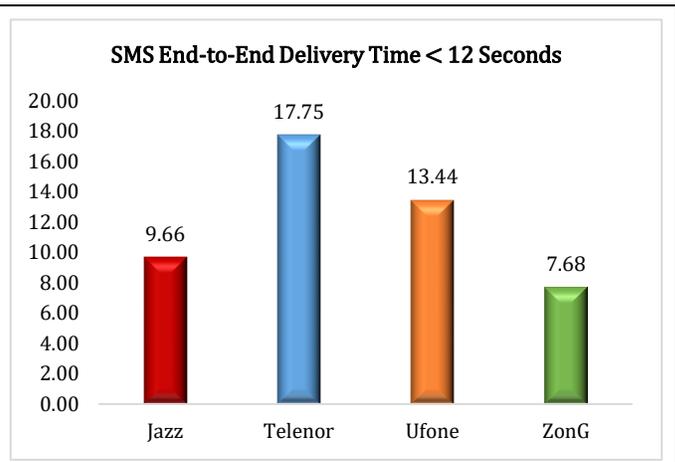
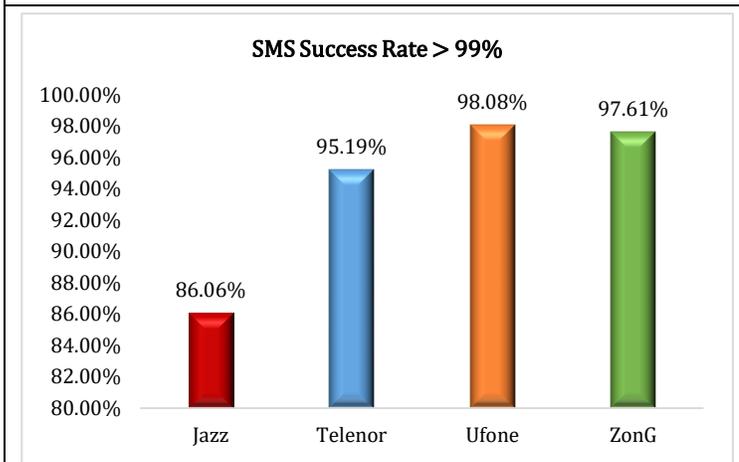
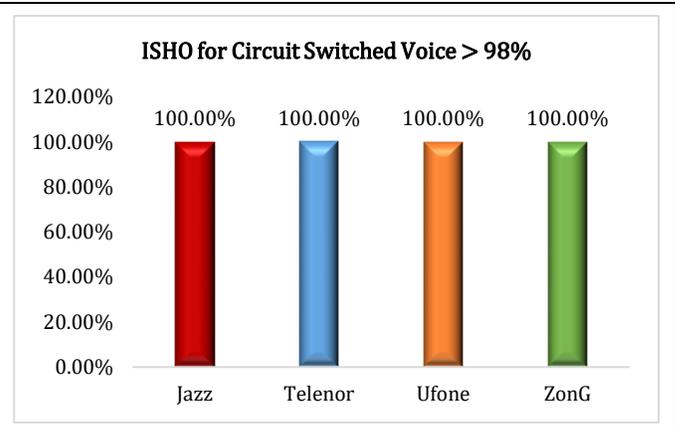
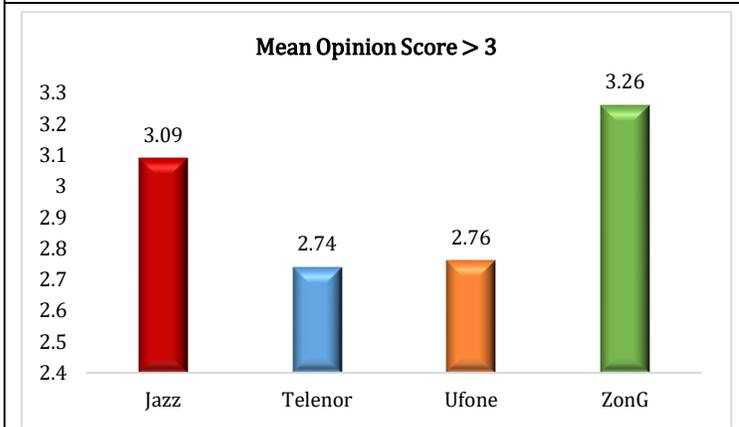
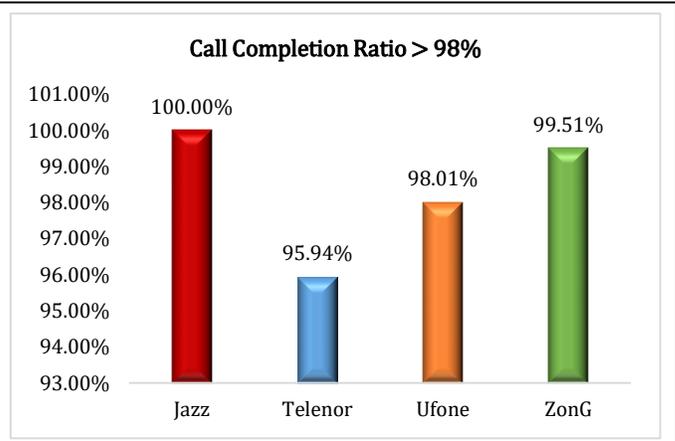
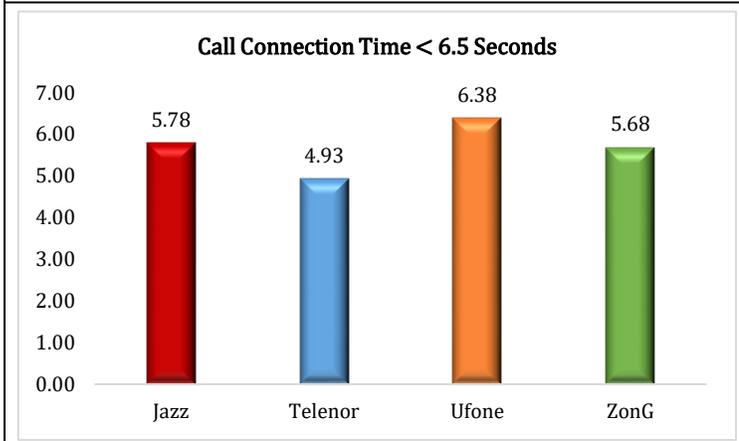
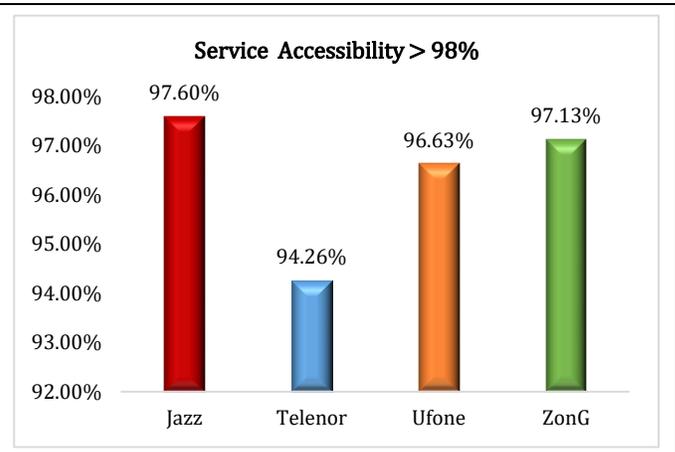
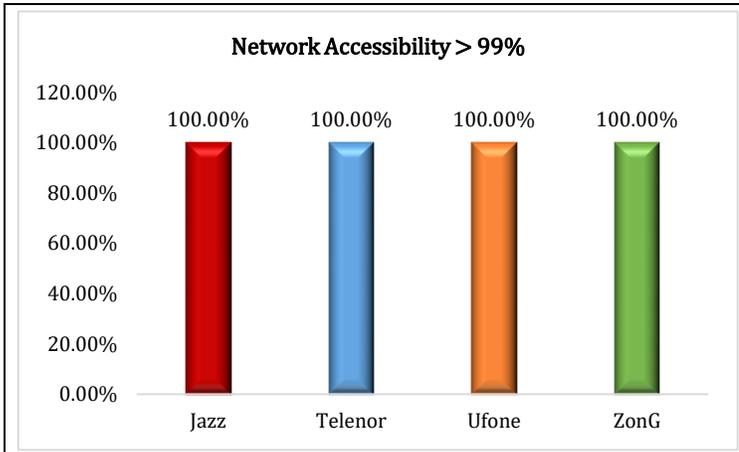
UFONE 3G COVERAGE (RSCP) – CHAKWAL



ZONG 3G COVERAGE (RSCP) – CHAKWAL

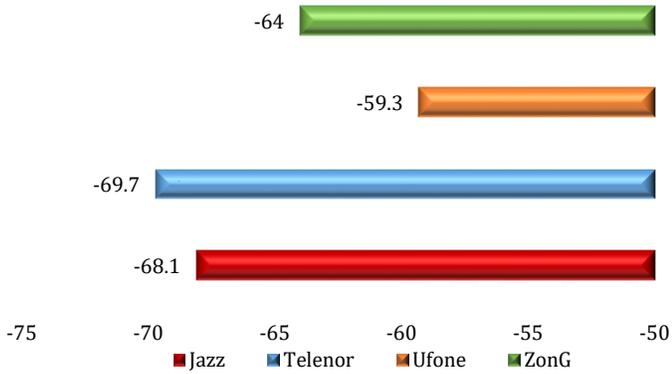


QUALITY OF SERVICE SURVEY RESULTS – CHAKWAL

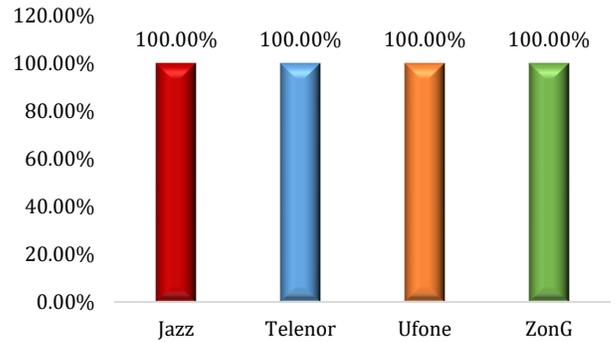


QUALITY OF SERVICE SURVEY RESULTS – CHAKWAL

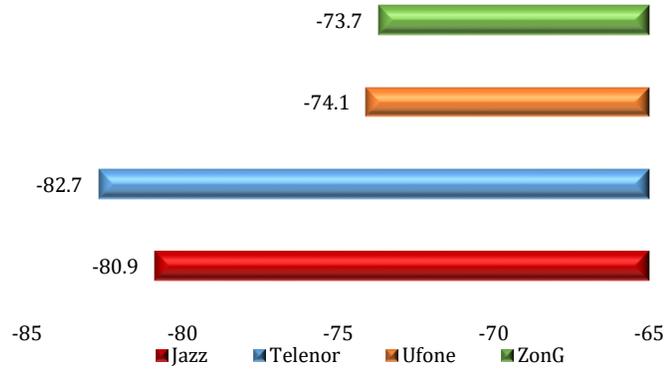
3G Signal Strength (RSCP) > -100dBm



3G Signal Strength (RSCP) Confidencel Level > 90%



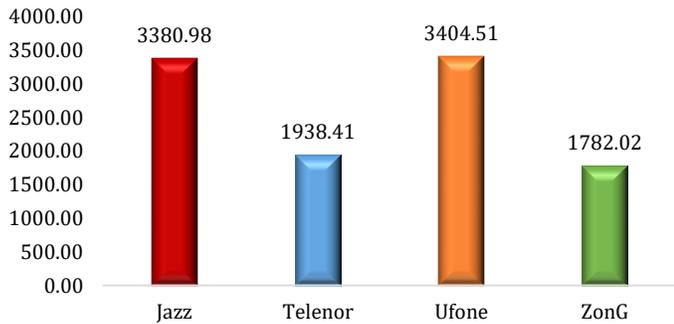
4G Signal Strength (RSRP) > -100dBm



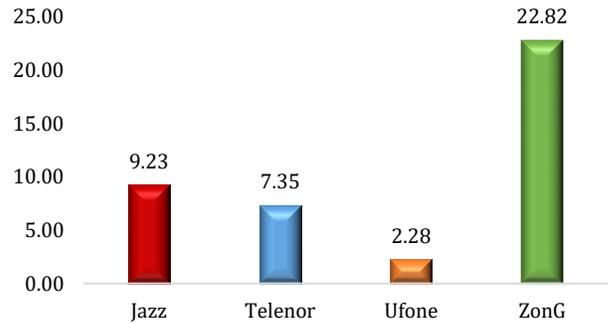
4G Signal Strength (RSRP) Confidencel Level > 90%



User Data Throughput (3G) > 256Kbps

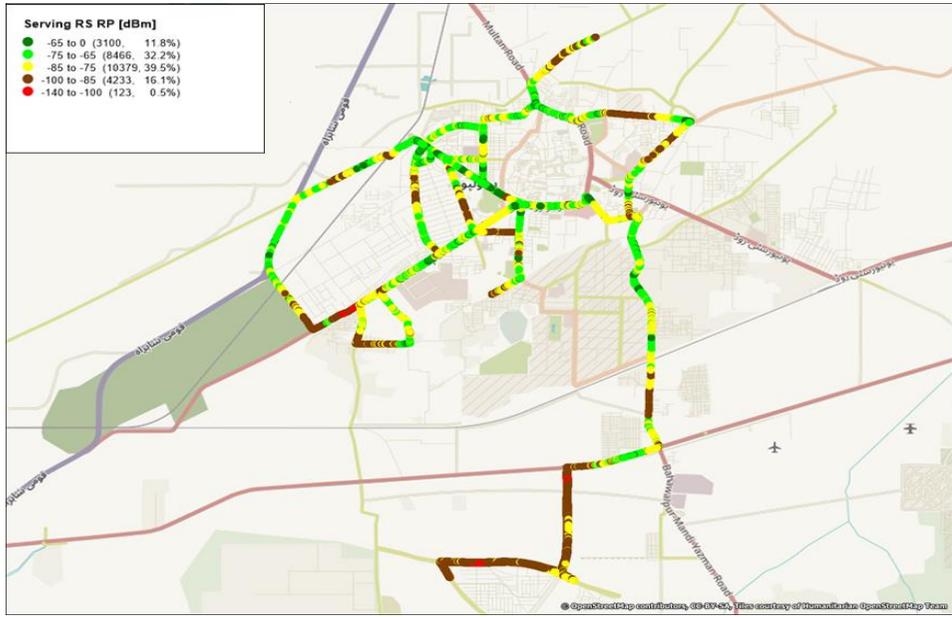


User Data Throughput (4G) > 2Mbps

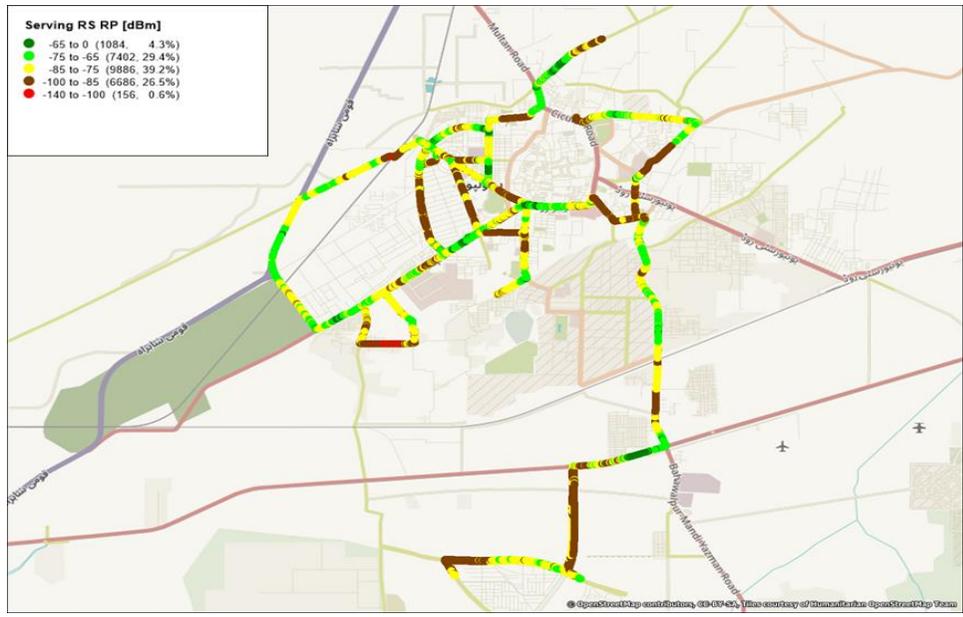


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

JAZZ 4G COVERAGE (RSRP) - BAHAWALPUR



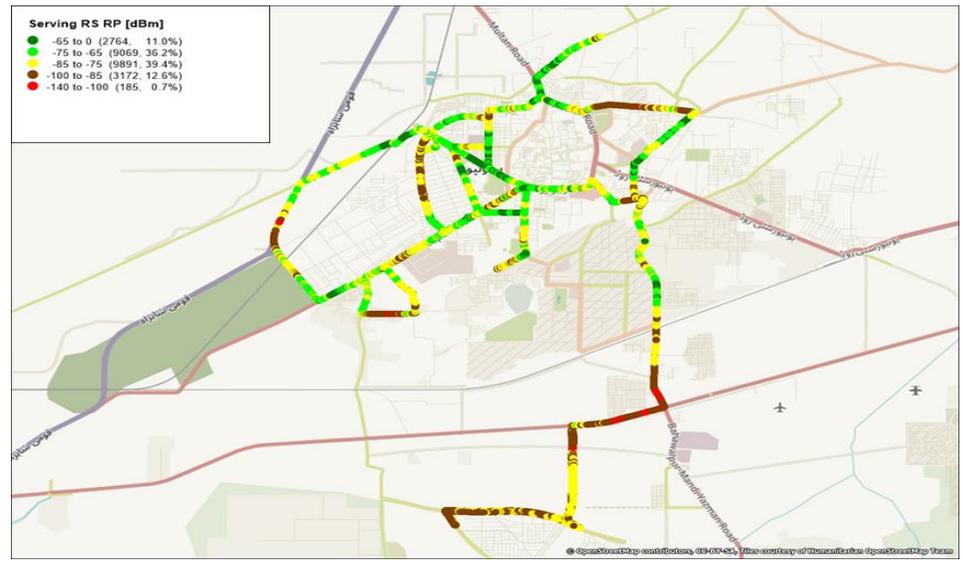
TELENOR 4G COVERAGE (RSRP) - BAHAWALPUR



UFONE 4G COVERAGE (RSRP) - BAHAWALPUR

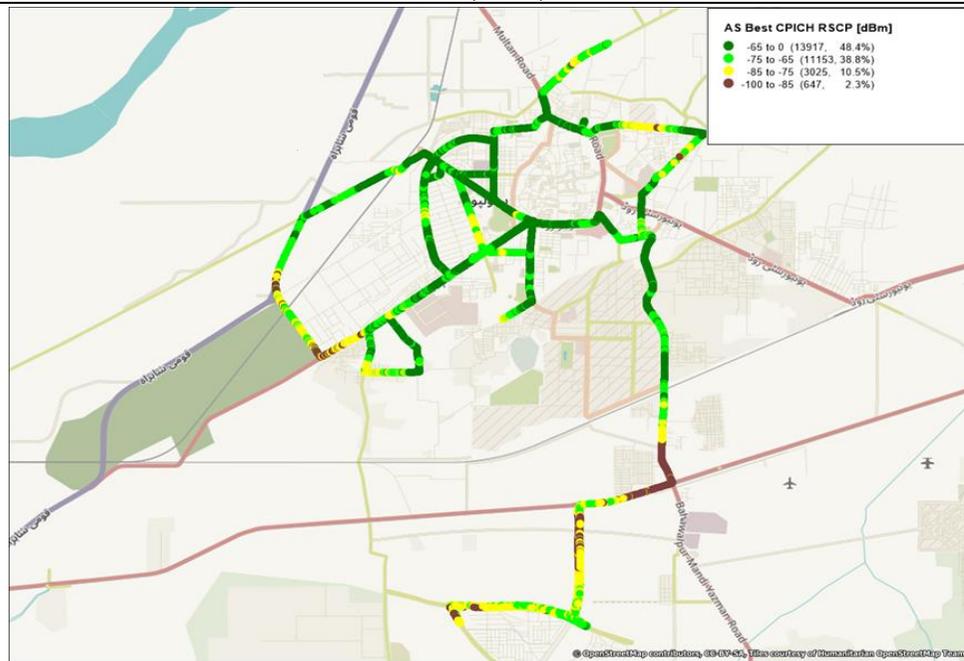


ZONG 4G COVERAGE (RSRP) - BAHAWALPUR

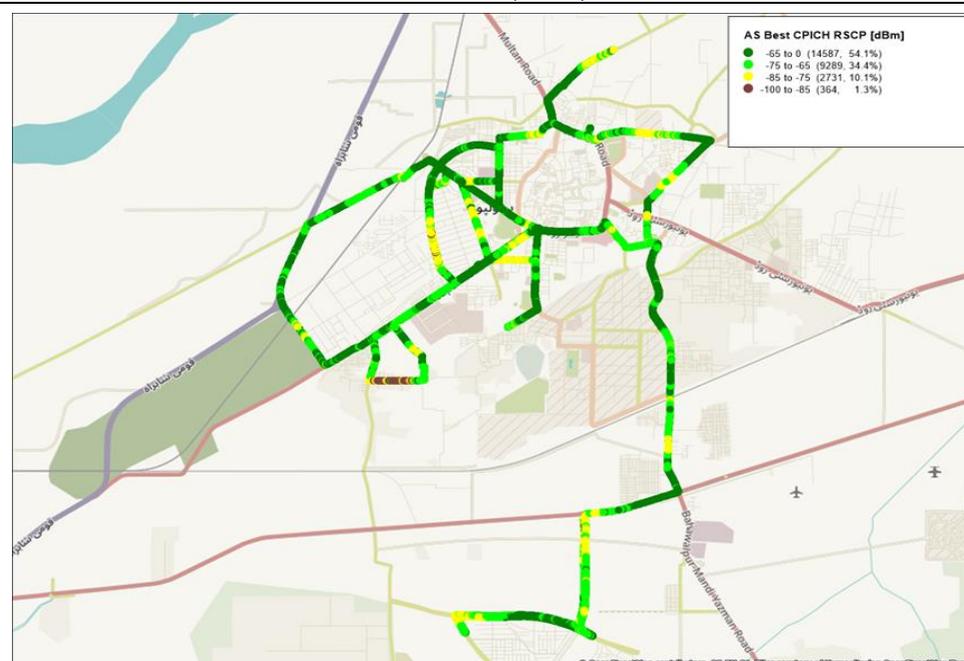


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

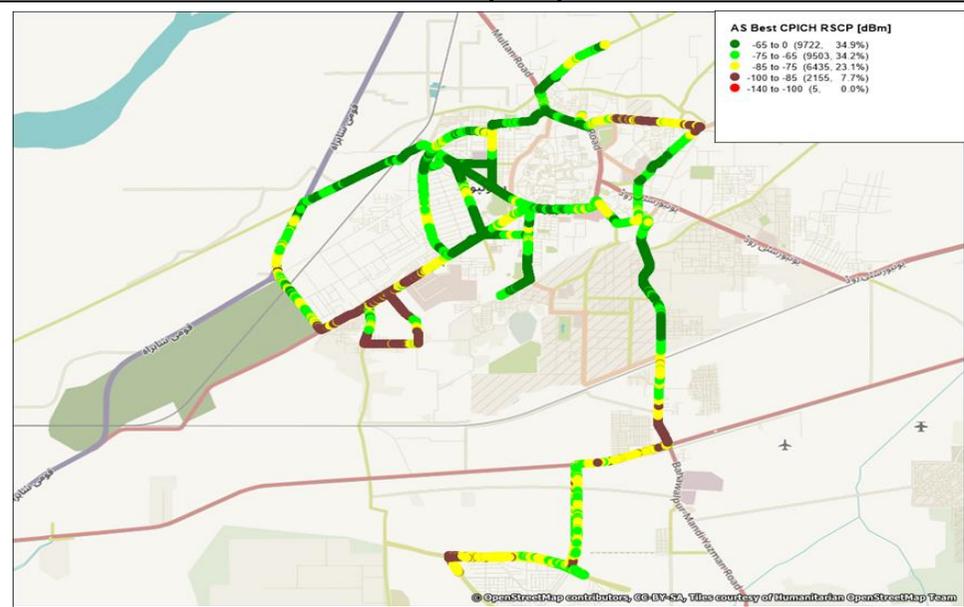
JAZZ 3G COVERAGE (RSCP) - BAHAWALPUR



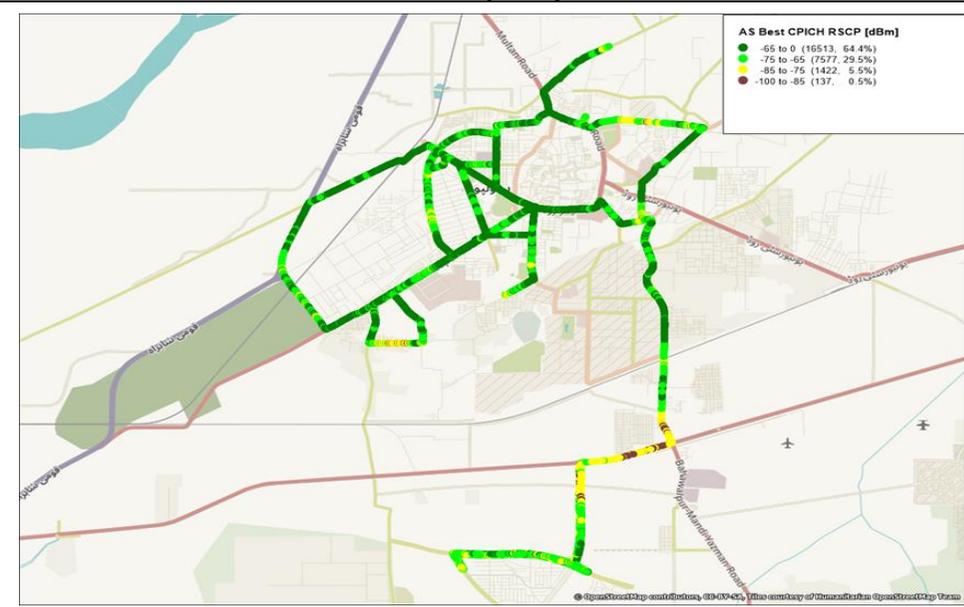
TELENOR 3G COVERAGE (RSCP) - BAHAWALPUR



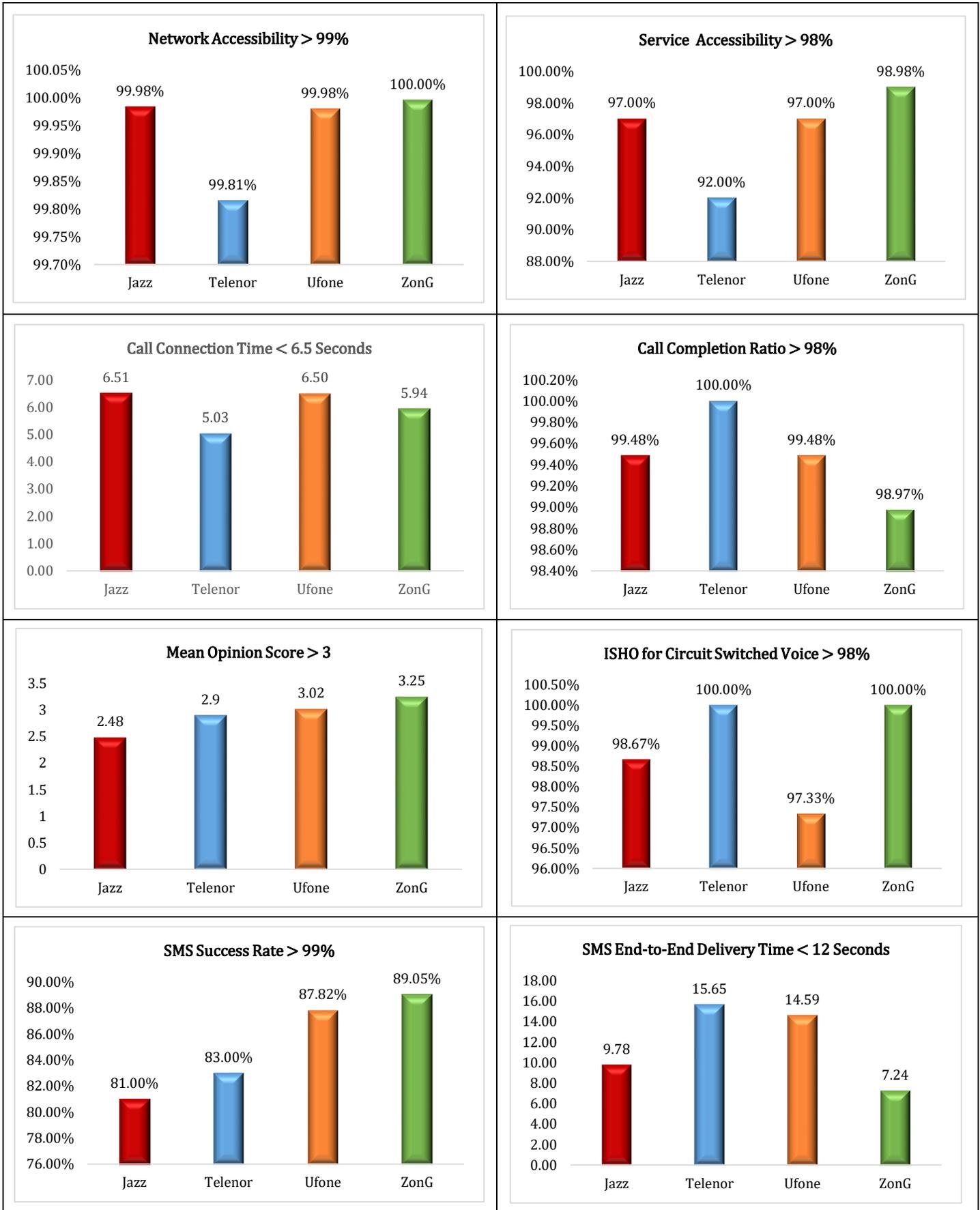
UFONE 3G COVERAGE (RSCP) - BAHAWALPUR



ZONG 3G COVERAGE (RSCP) - BAHAWALPUR

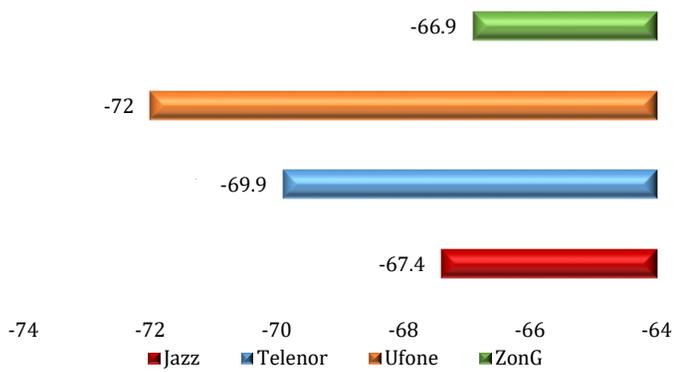


QUALITY OF SERVICE SURVEY RESULTS – BAHAWALPUR

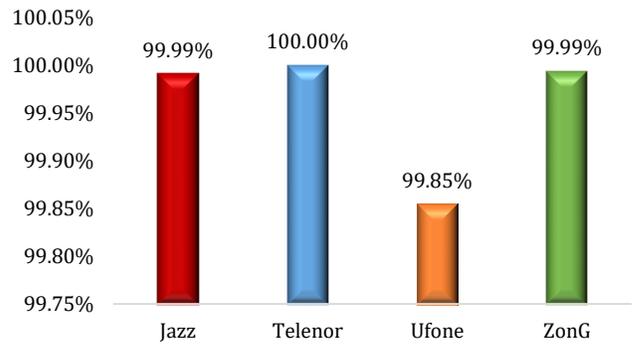


QUALITY OF SERVICE SURVEY RESULTS – BAHAWALPUR

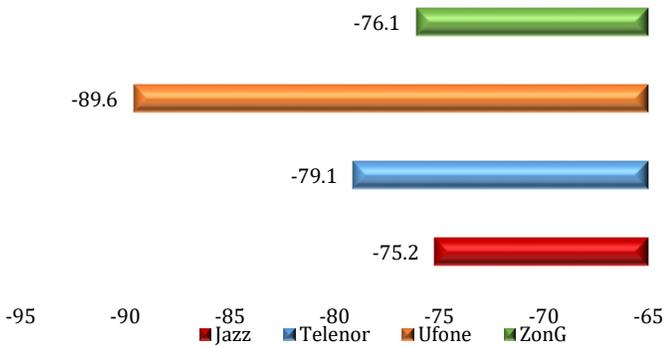
3G Signal Strength (RSCP) > -100dBm



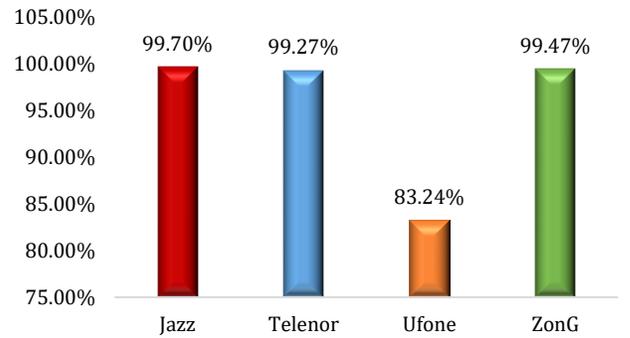
3G Signal Strength (RSCP) Confidencel Level > 90%



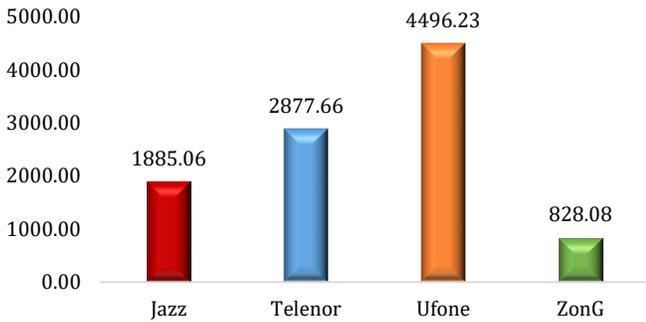
4G Signal Strength (RSRP) > -100dBm



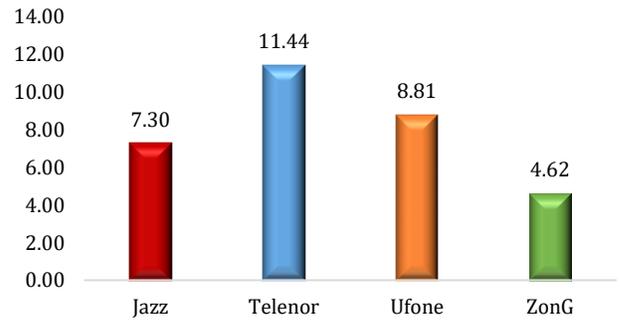
4G Signal Strength (RSRP) Confidencel Level > 90%



User Data Throughput (3G) > 256Kbps

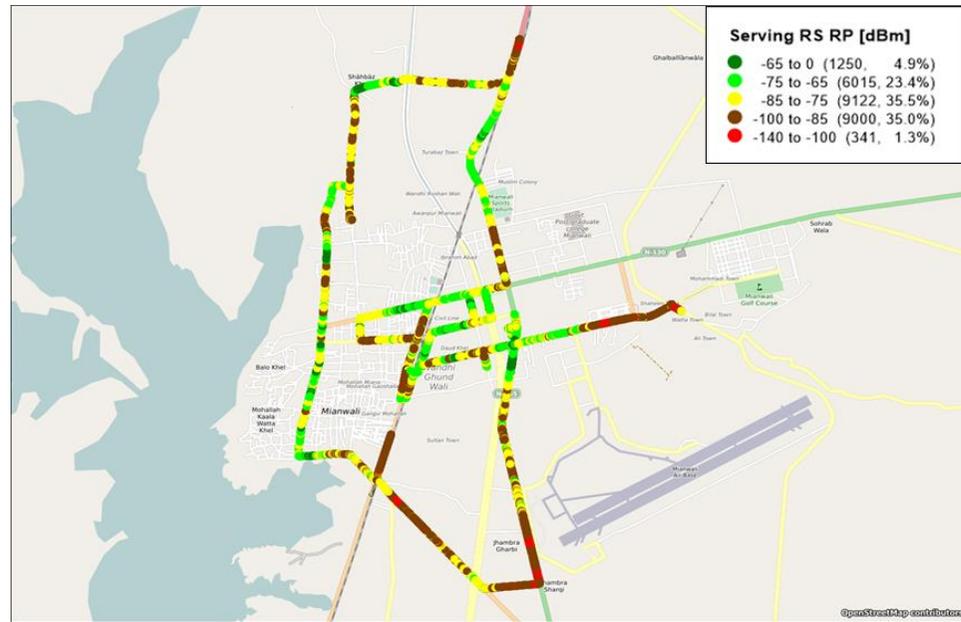


User Data Throughput (4G) > 2Mbps



4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

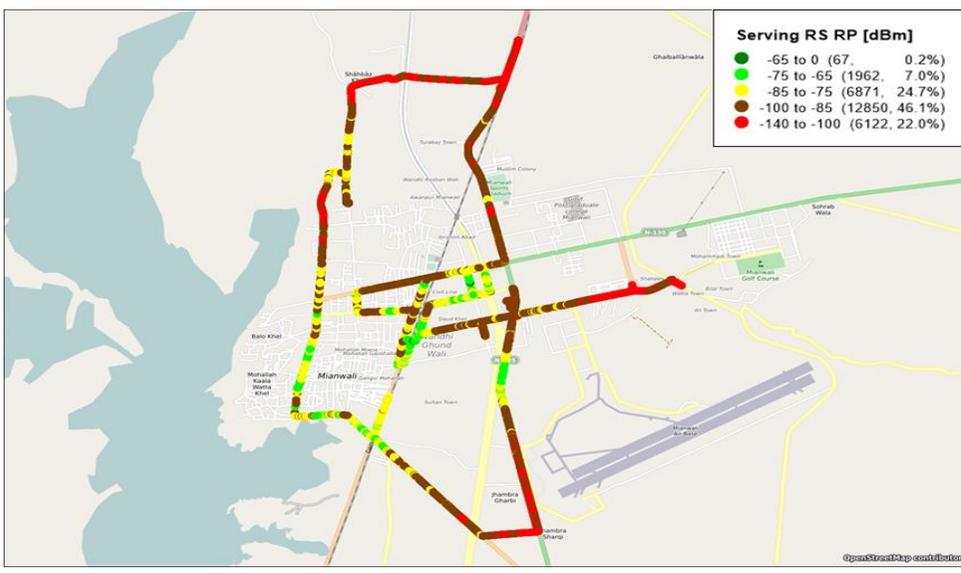
JAZZ 4G COVERAGE (RSRP) - MIANWALI



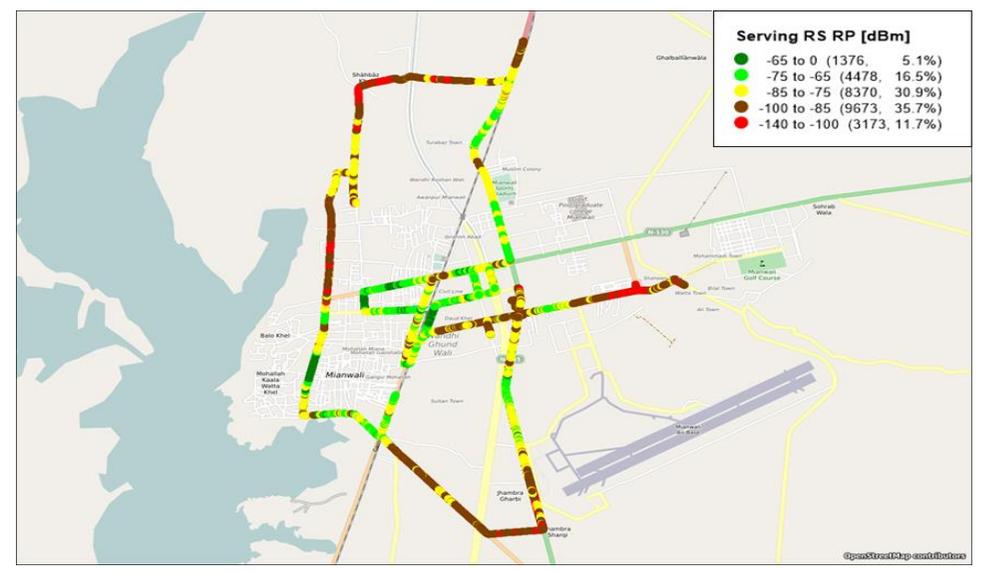
TELENOR 4G COVERAGE (RSRP) - MIANWALI



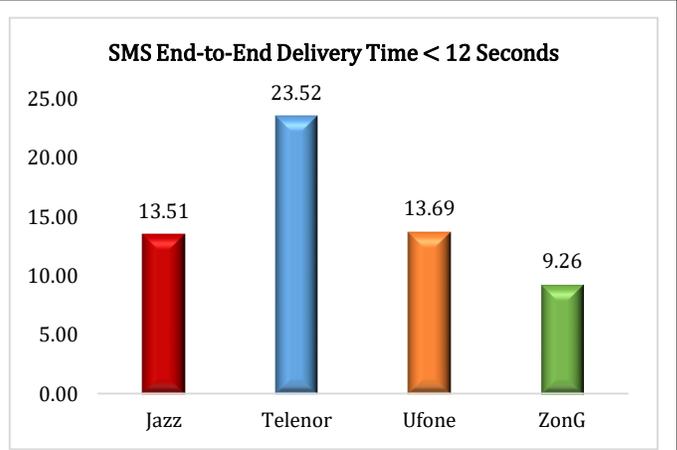
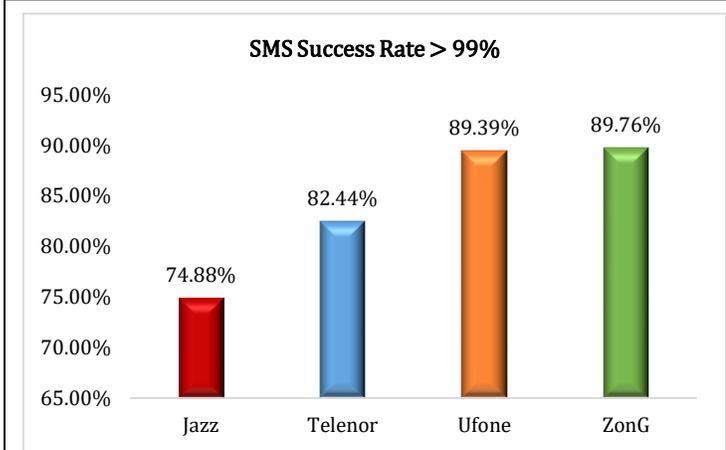
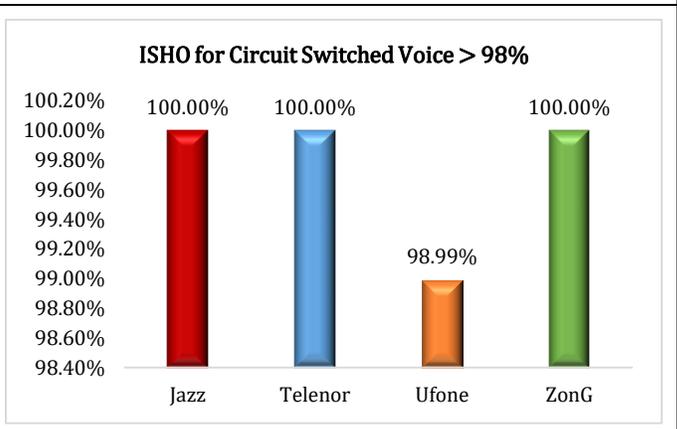
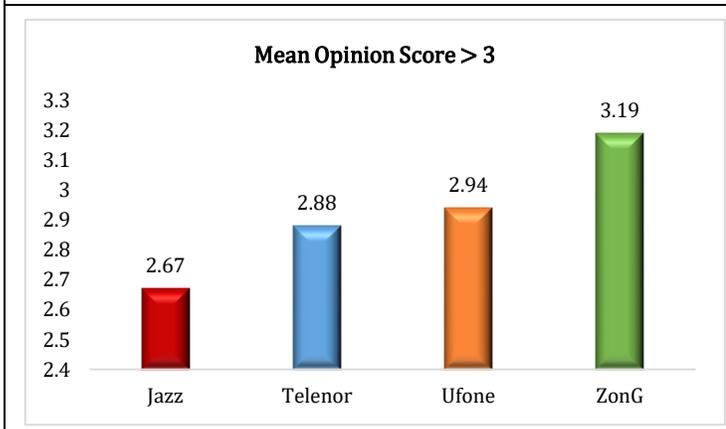
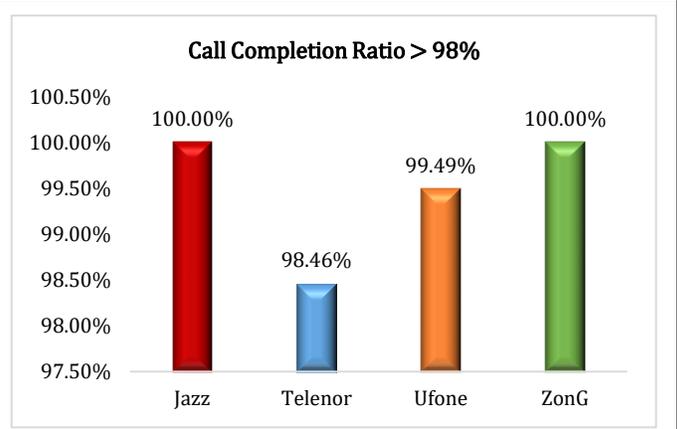
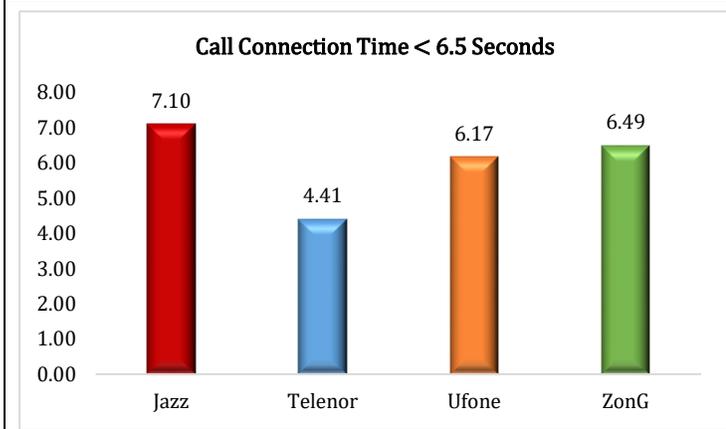
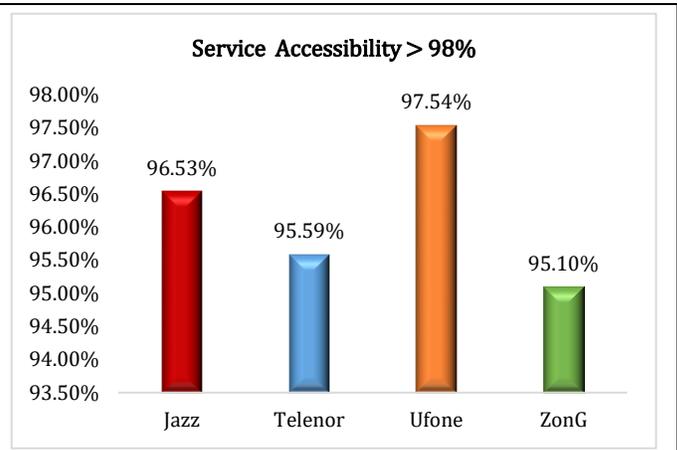
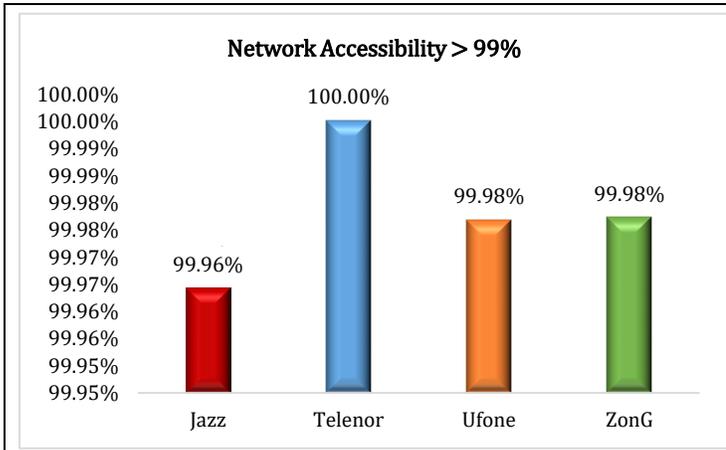
UFONE 4G COVERAGE (RSRP) - MIANWALI



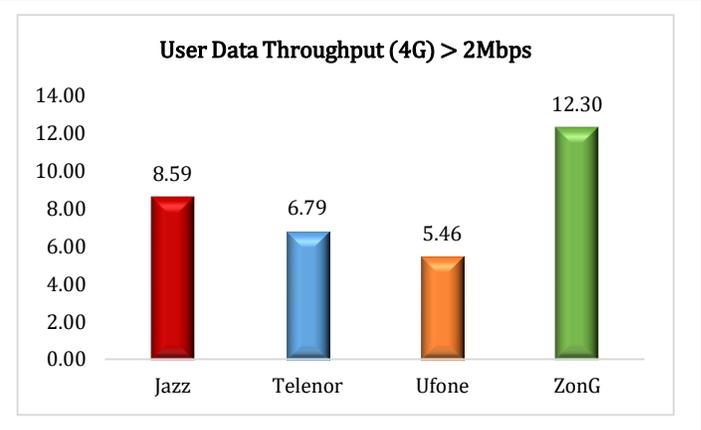
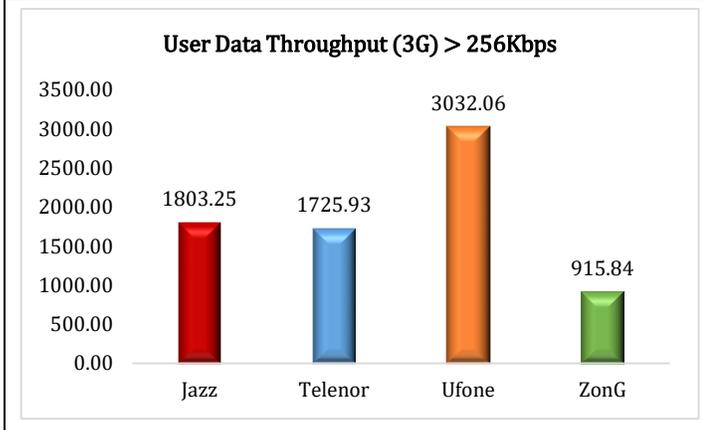
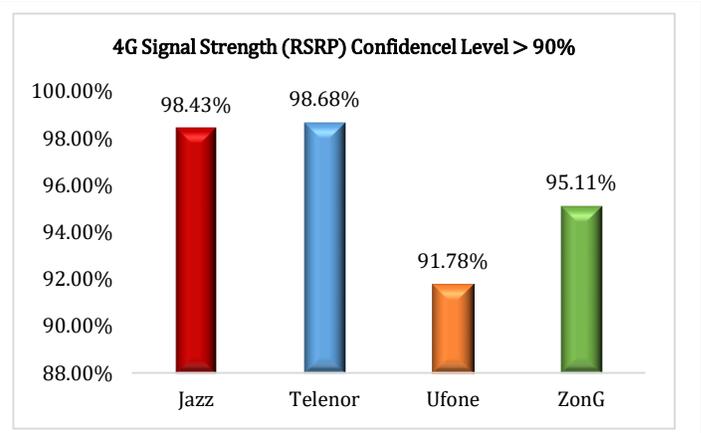
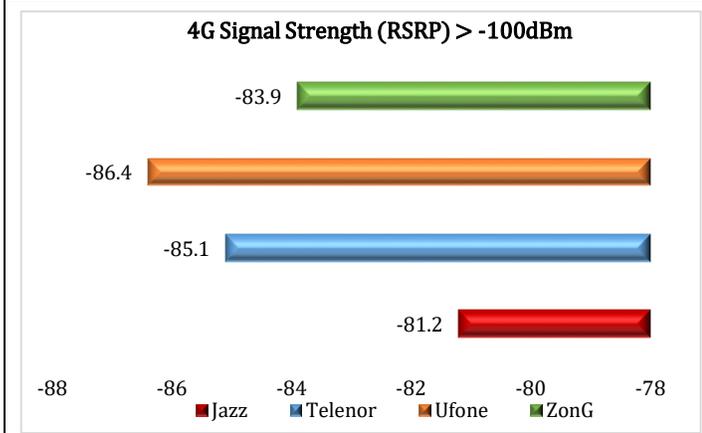
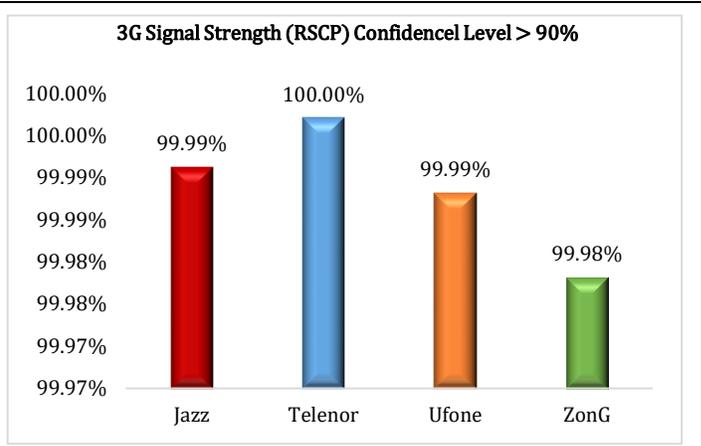
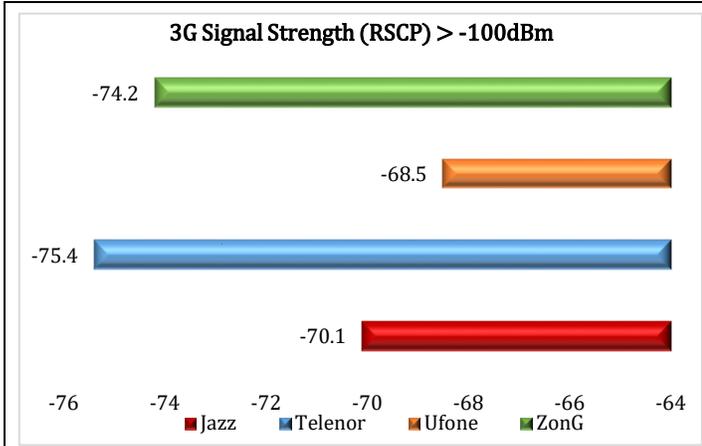
ZONG 4G COVERAGE (RSRP) - MIANWALI



QUALITY OF SERVICE SURVEY RESULTS – MIANWALI

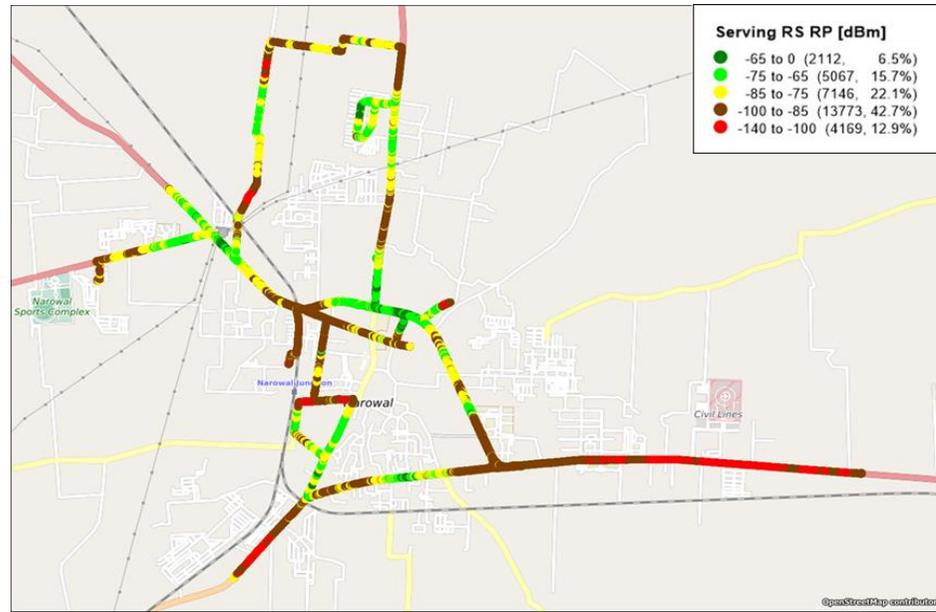


QUALITY OF SERVICE SURVEY RESULTS – MIANWALI

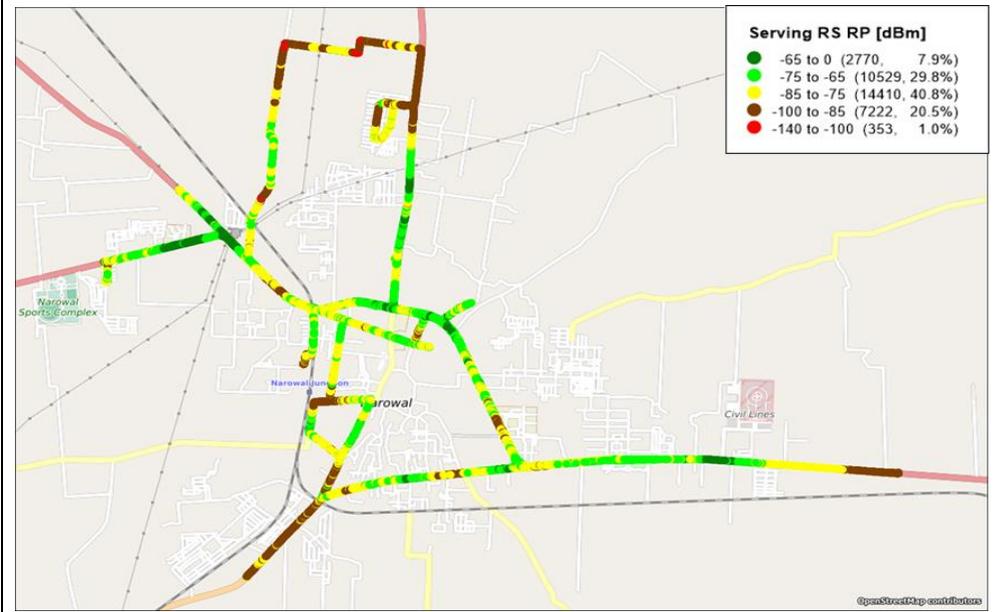


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

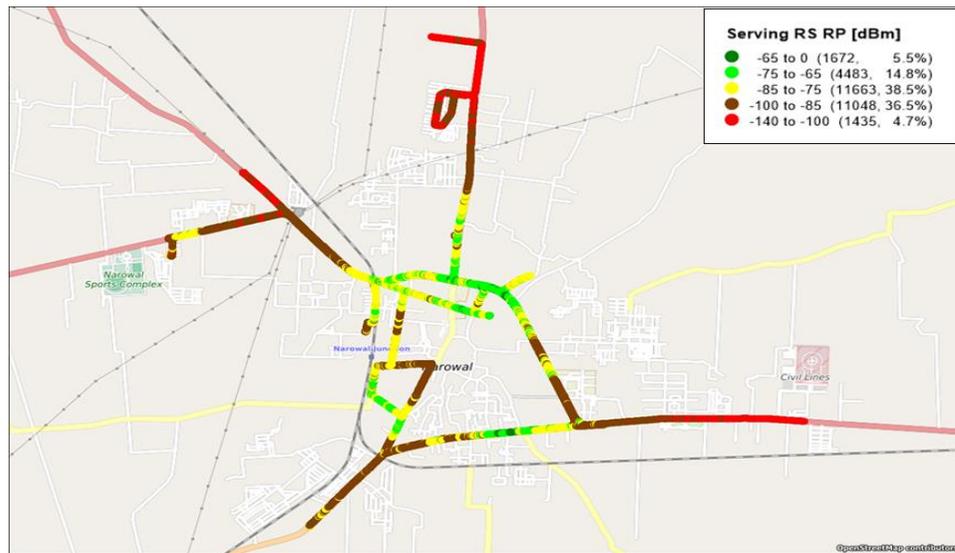
JAZZ 4G COVERAGE (RSRP) - NARROWAL



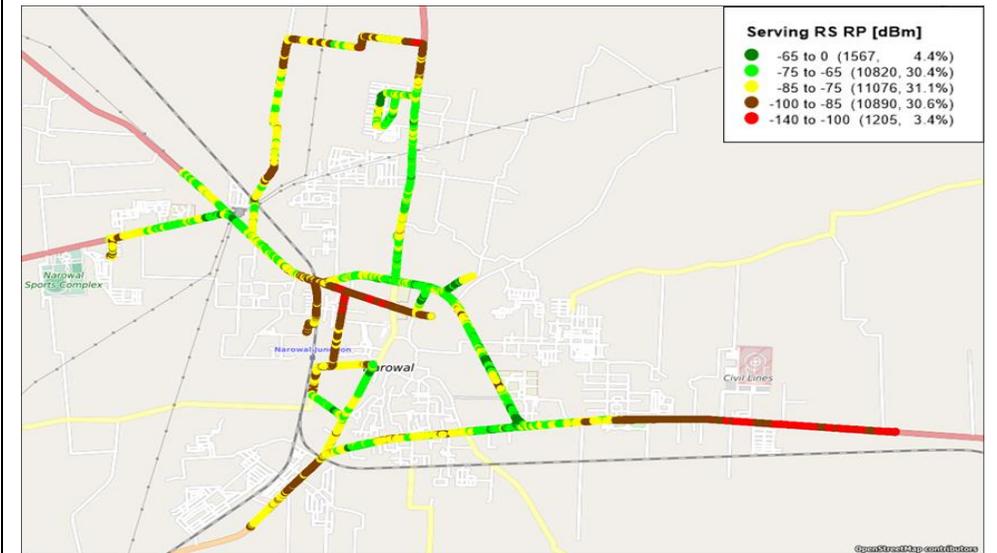
TELENOR 4G COVERAGE (RSRP) - NARROWAL



UFONE 4G COVERAGE (RSRP) - NARROWAL

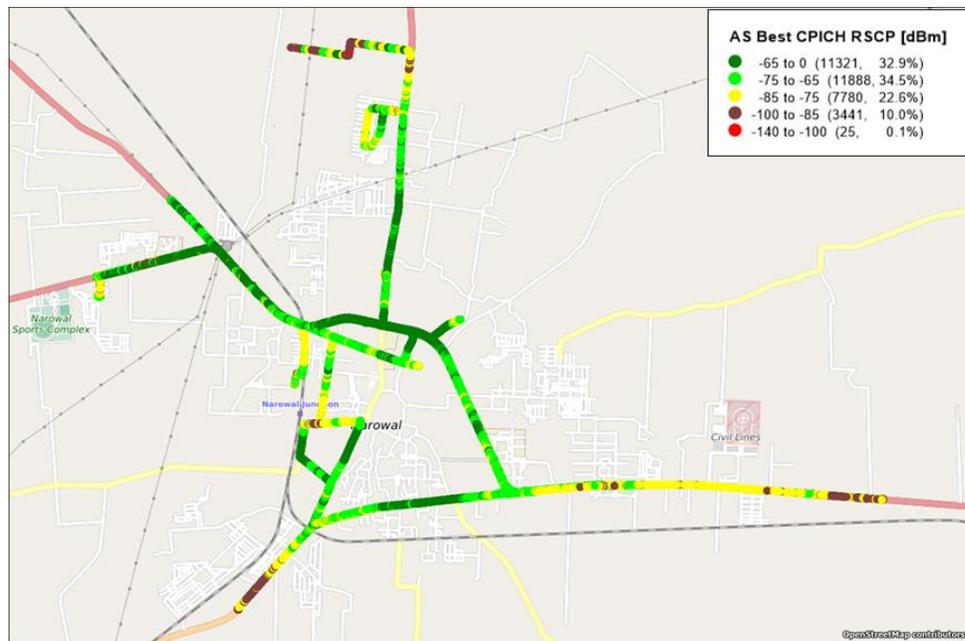


ZONG 4G COVERAGE (RSRP) - NARROWAL

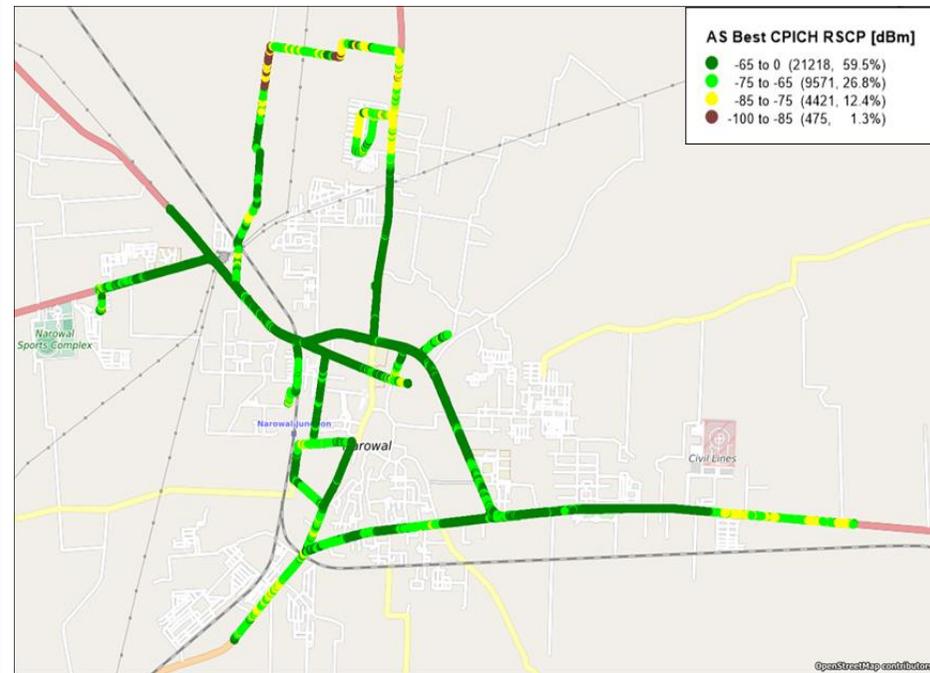


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

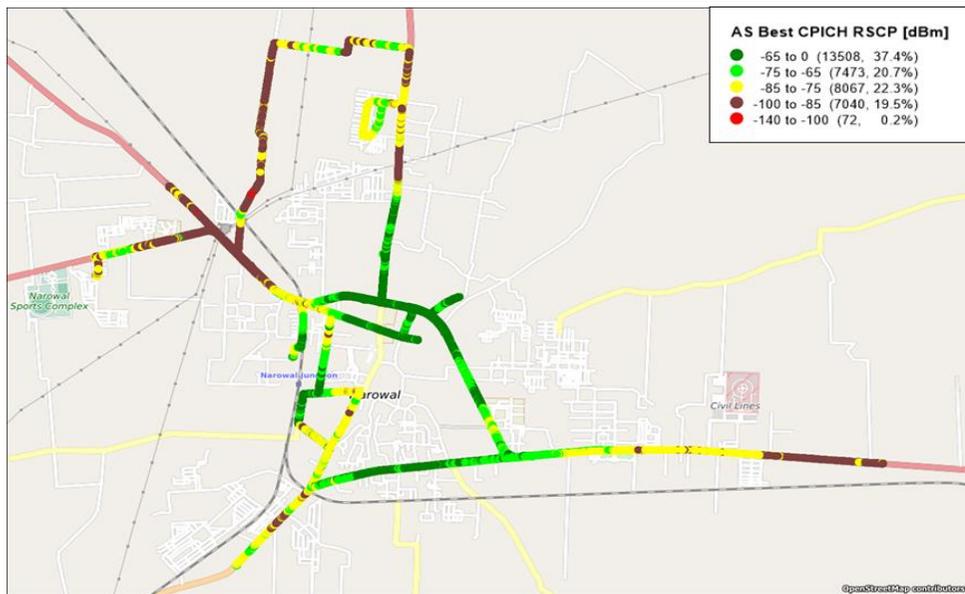
JAZZ 3G COVERAGE (RSCP) - NARROWAL



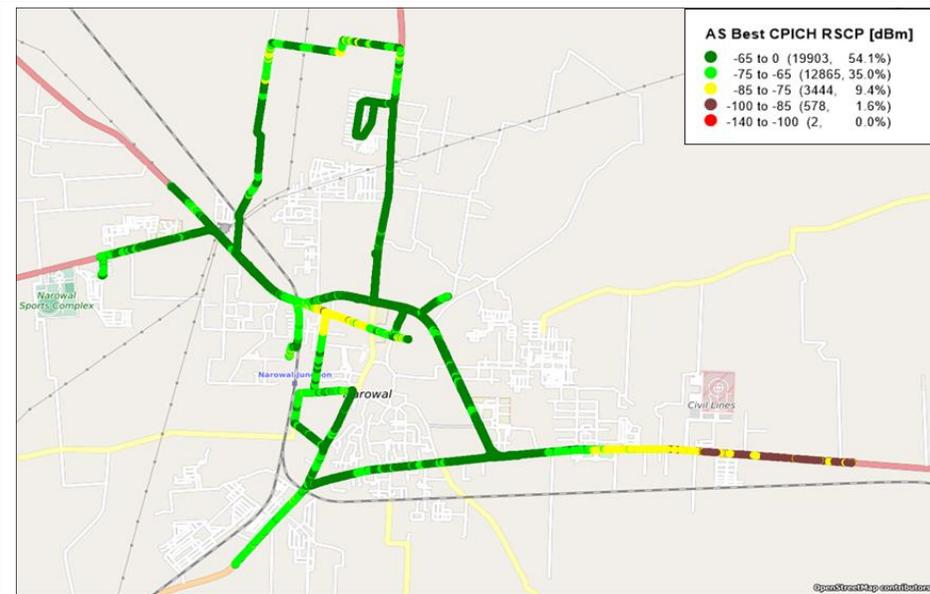
TELENOR 3G COVERAGE (RSCP) - NARROWAL



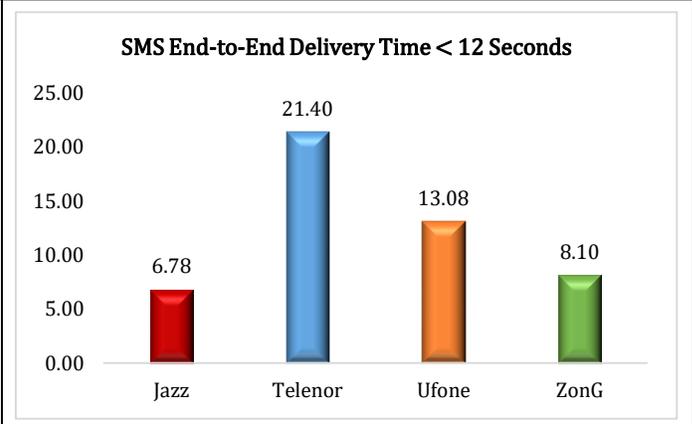
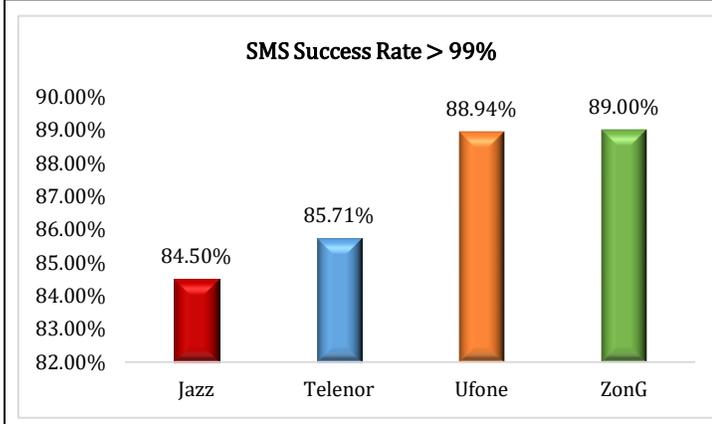
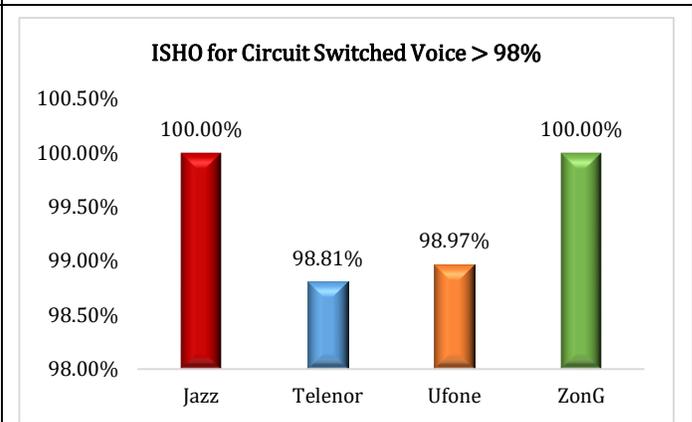
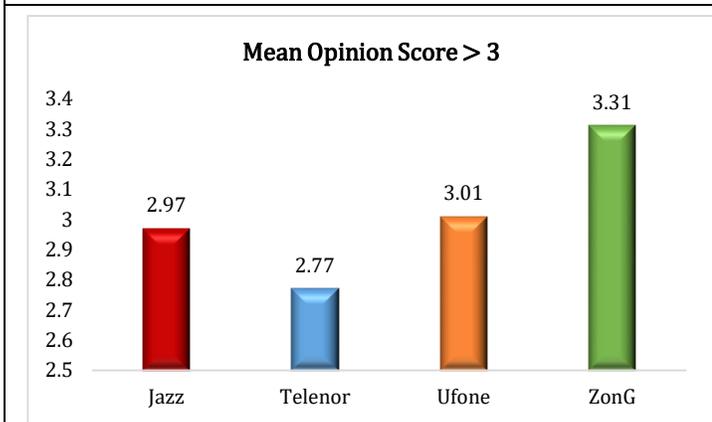
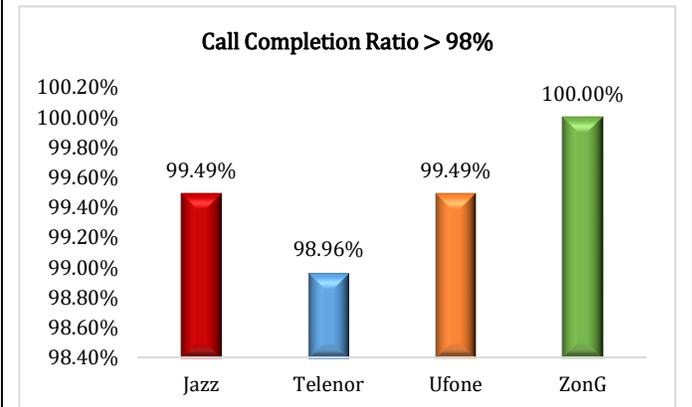
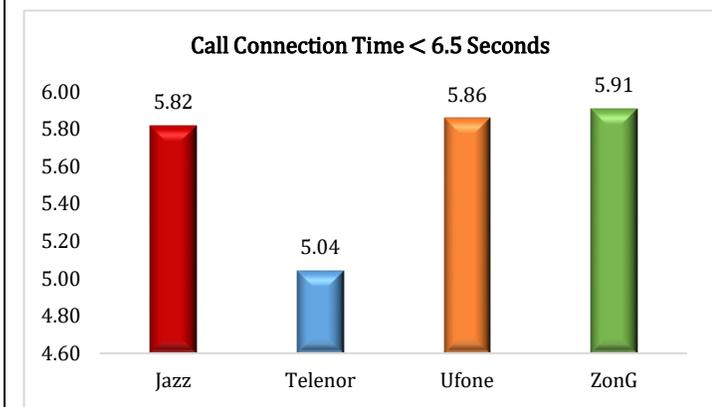
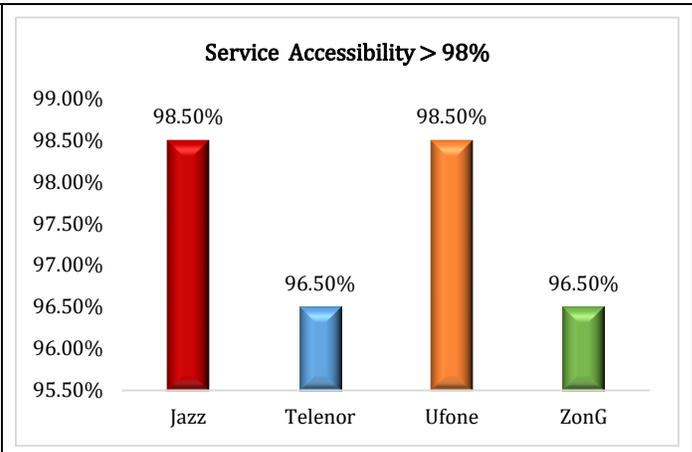
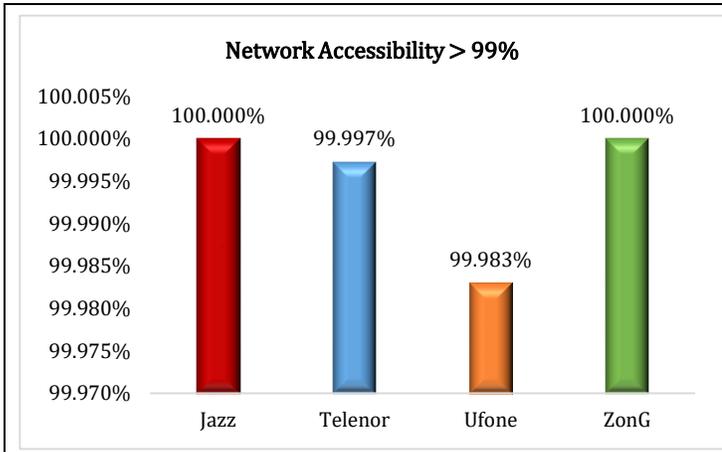
UFONE 3G COVERAGE (RSCP) - NARROWAL



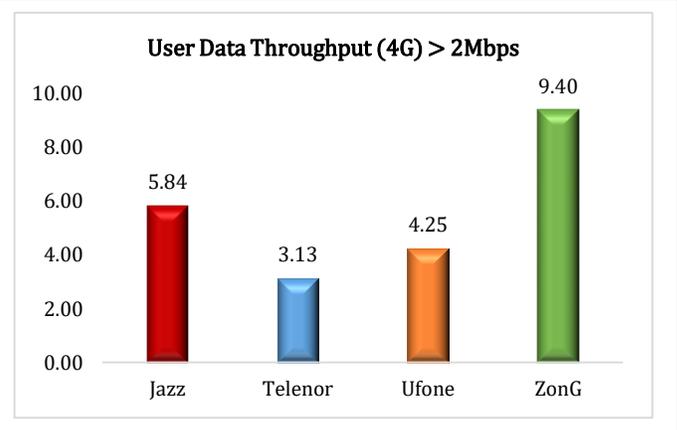
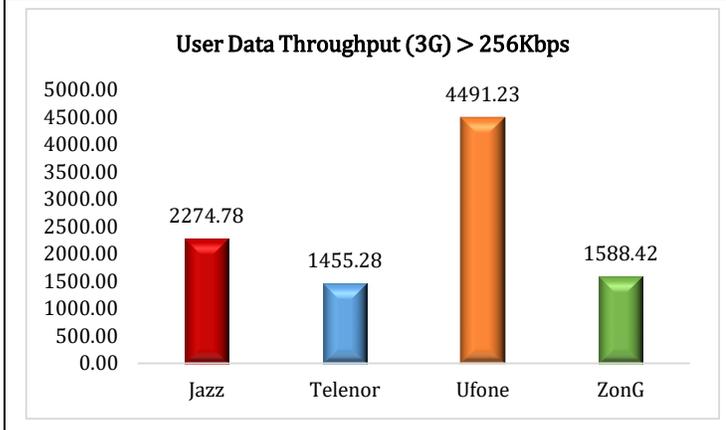
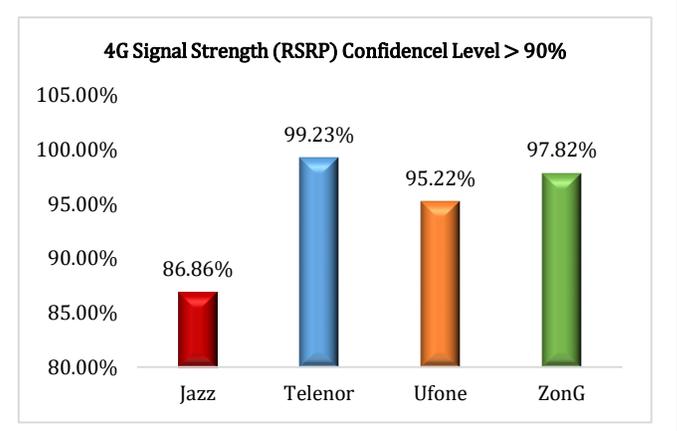
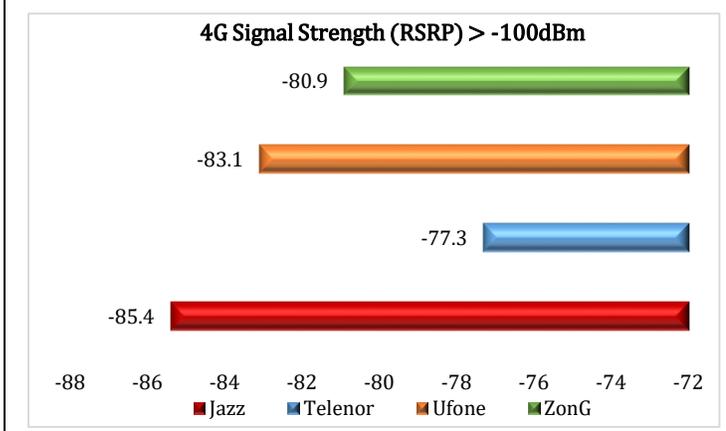
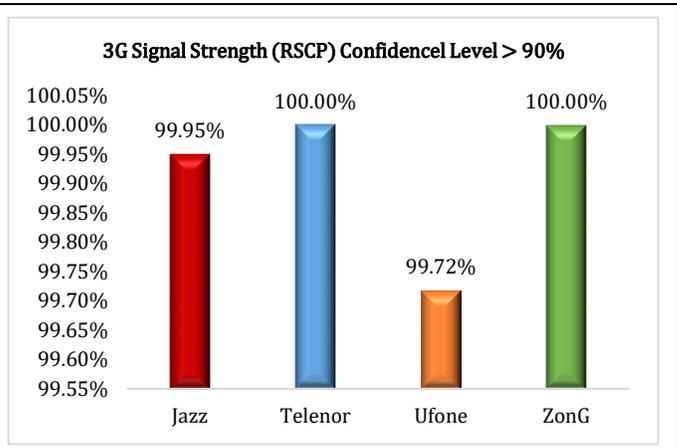
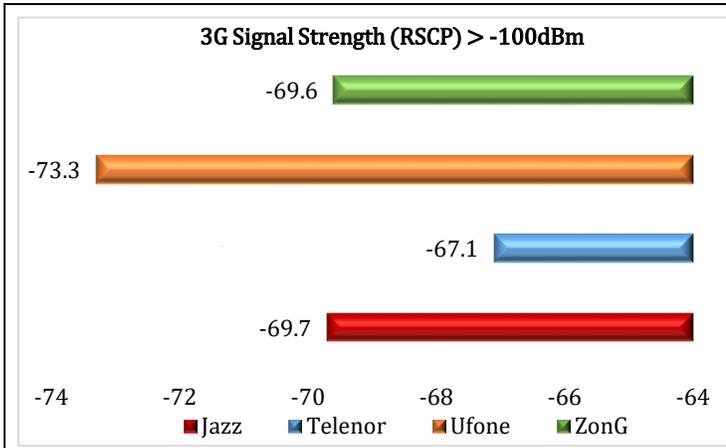
ZONG 3G COVERAGE (RSCP) - NARROWAL



QUALITY OF SERVICE SURVEY RESULTS – NARROWAL



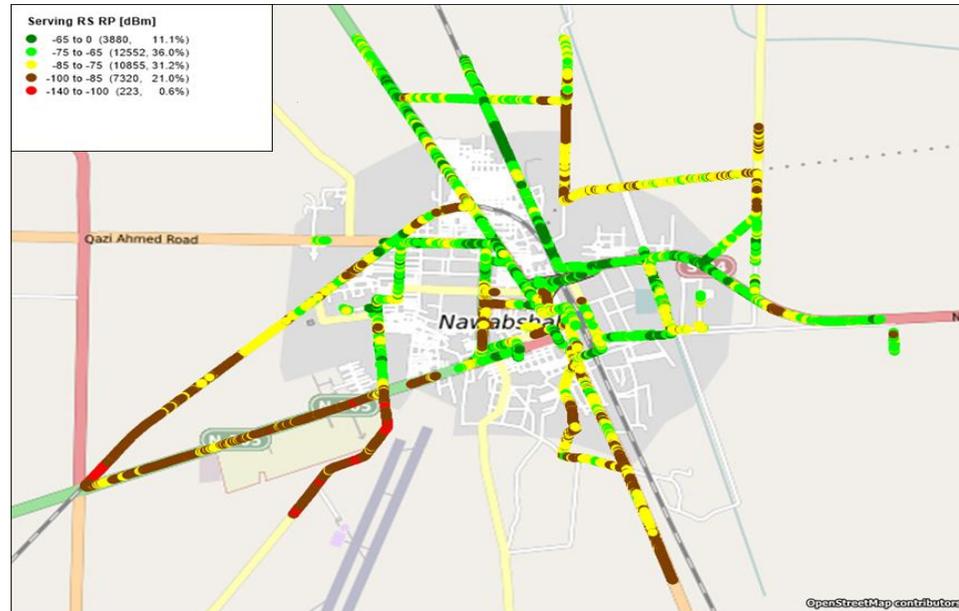
QUALITY OF SERVICE SURVEY RESULTS – NARROWAL



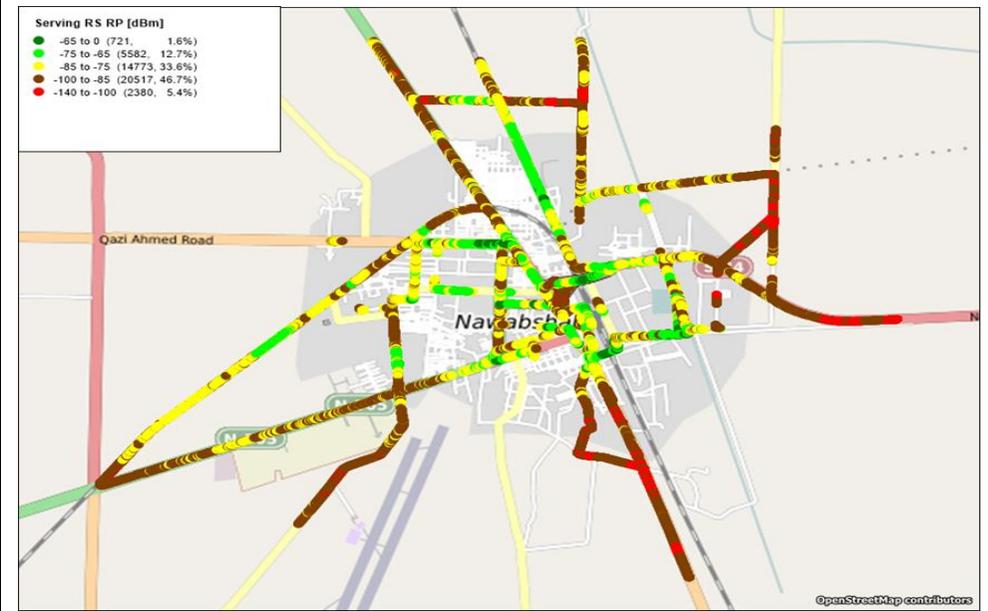
SINDH

4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

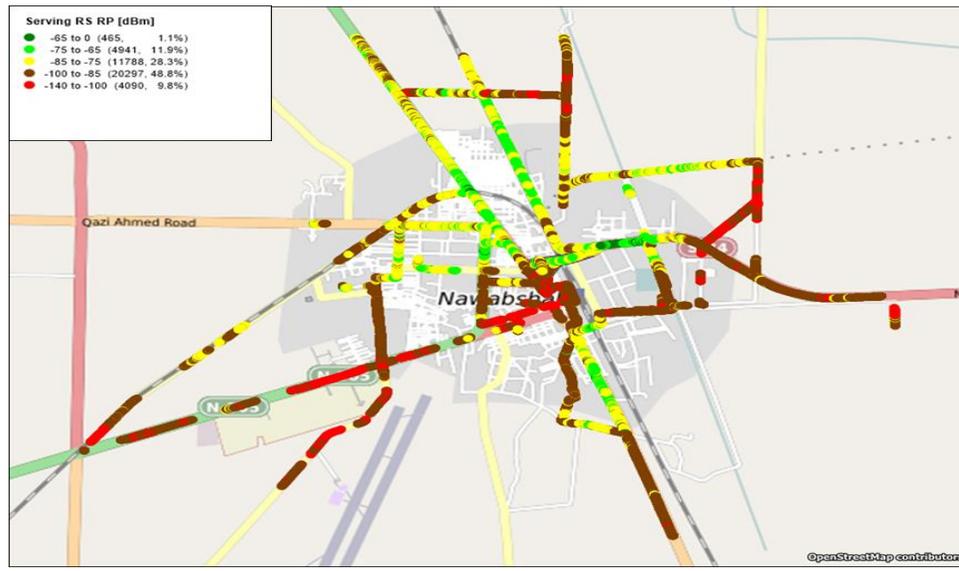
JAZZ 4G COVERAGE (RSRP) - NAWABSHAH



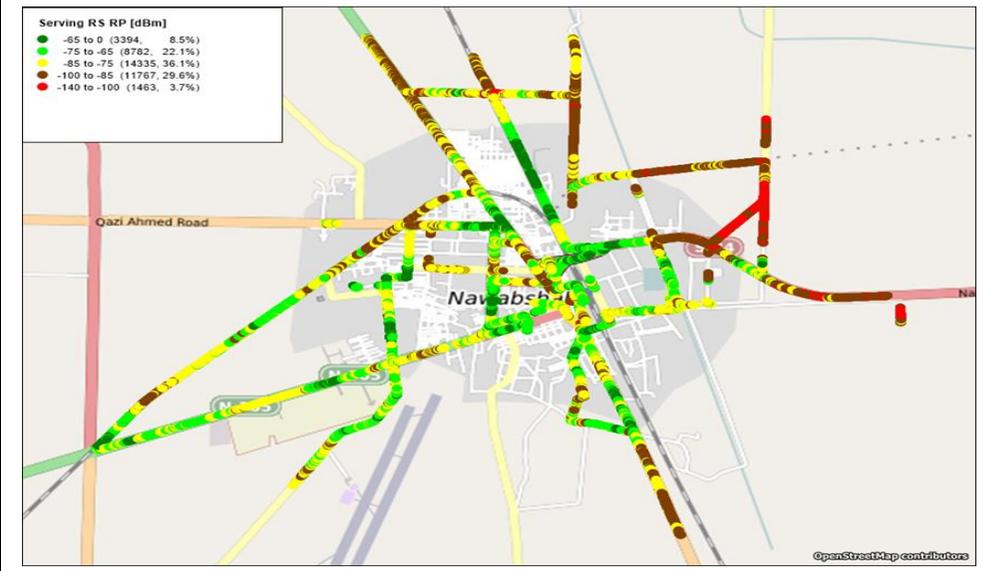
TELENOR 4G COVERAGE (RSRP) - NAWABSHAH



UFONE 4G COVERAGE (RSRP) - NAWABSHAH

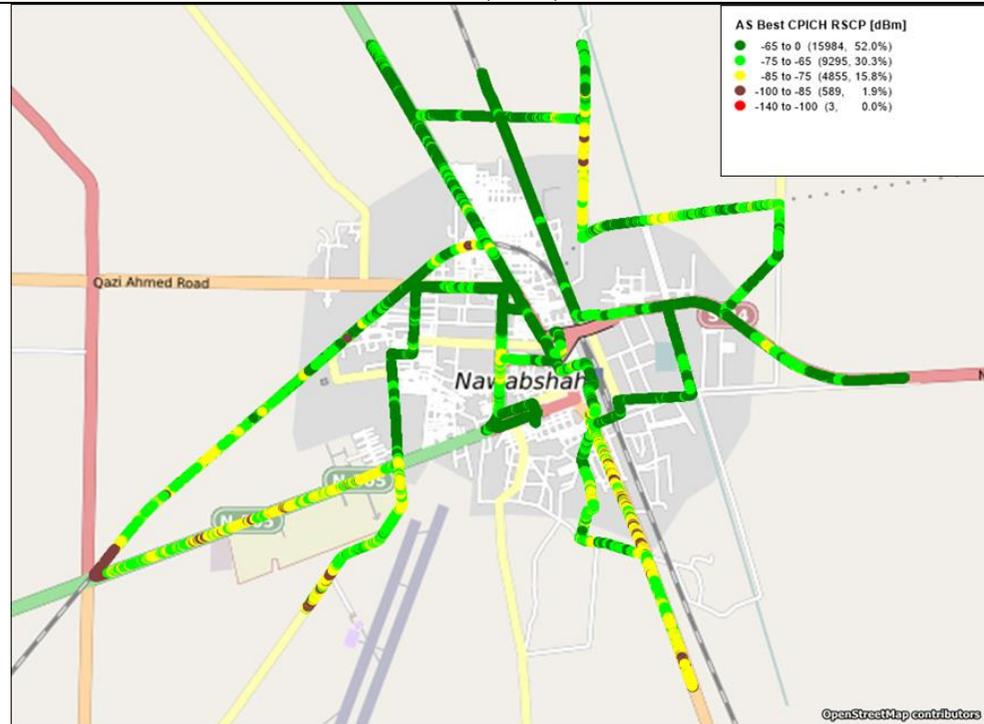


ZONG 4G COVERAGE (RSRP) - NAWABSHAH

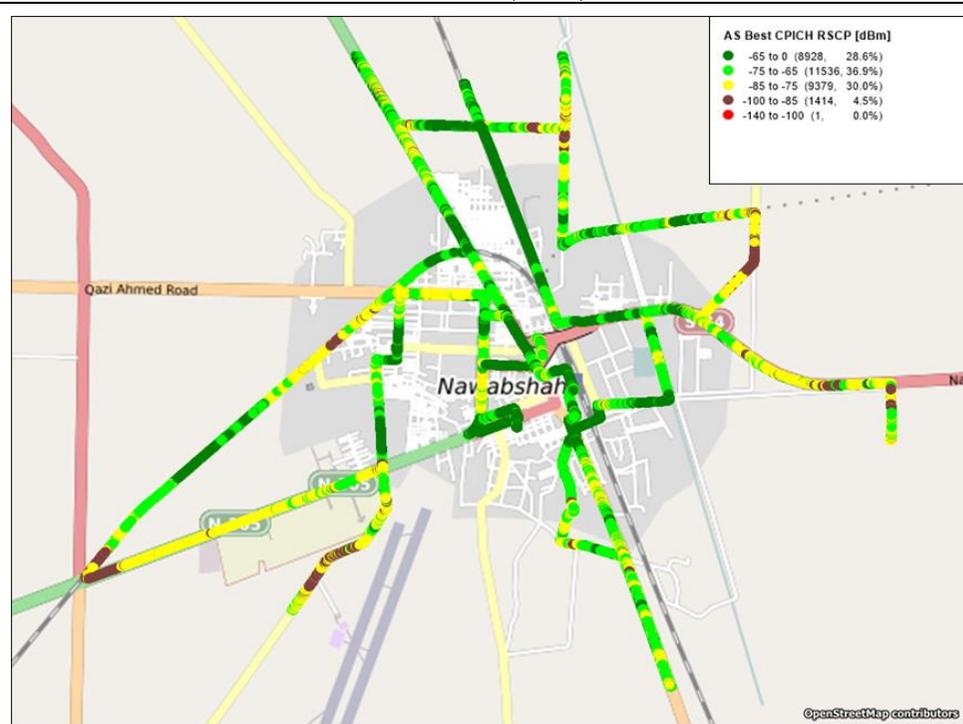


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

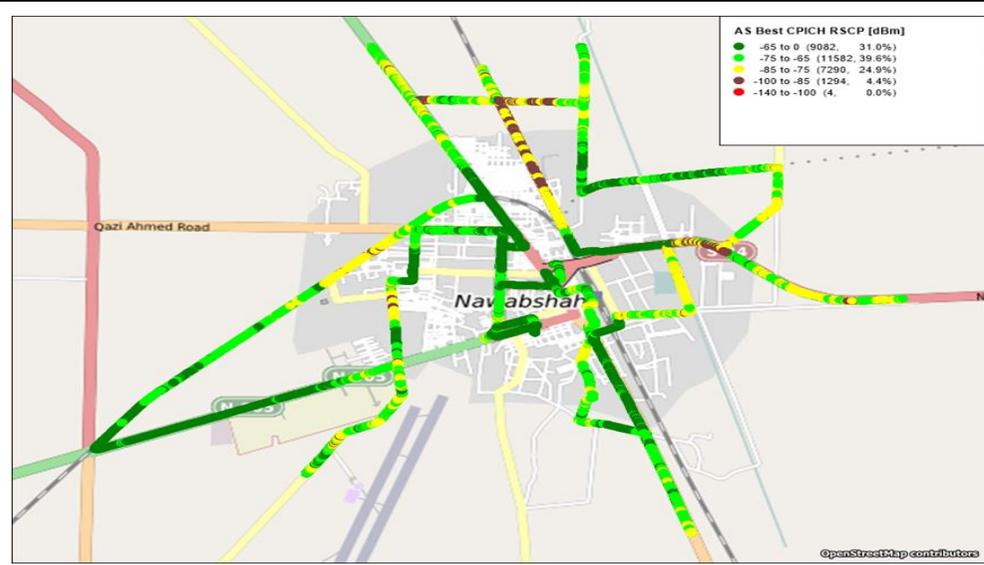
JAZZ 3G COVERAGE (RSCP) – NAWABSHAH



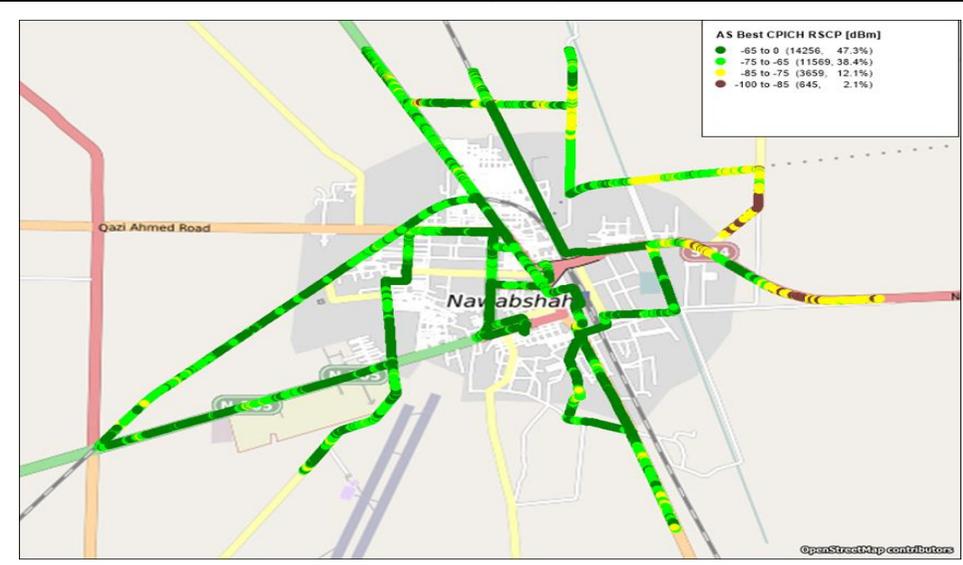
TELENOR3G COVERAGE (RSCP) - NAWABSHAH



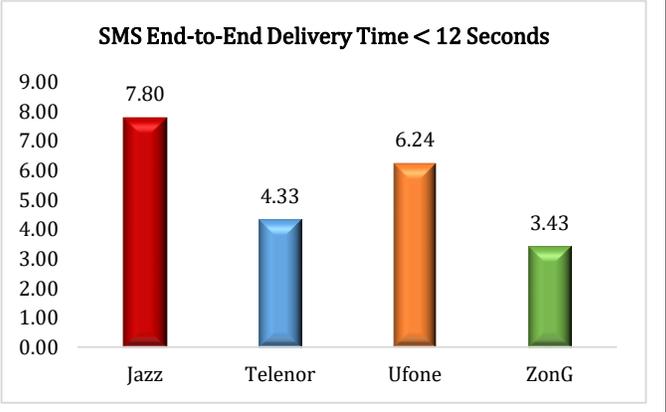
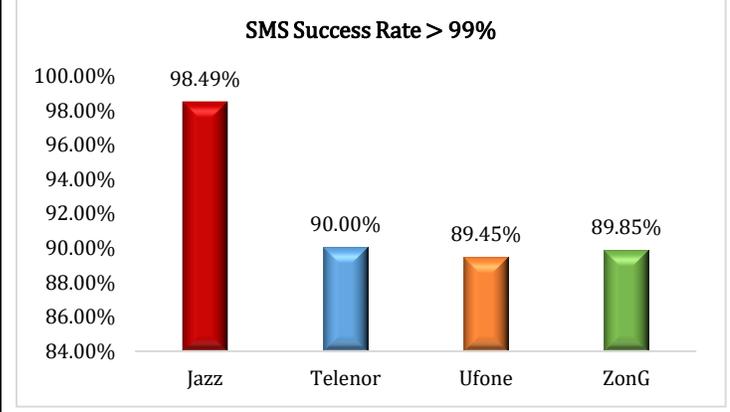
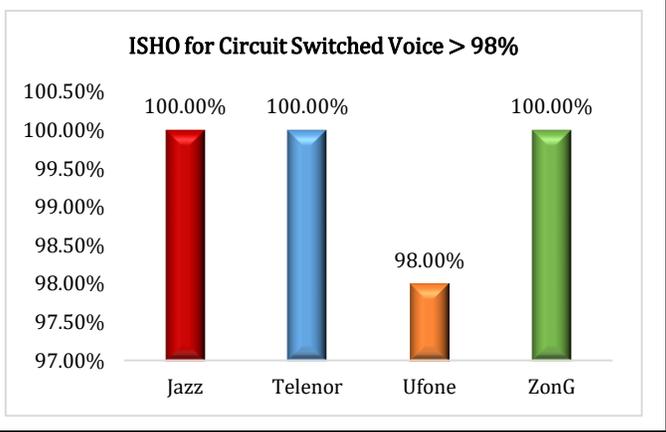
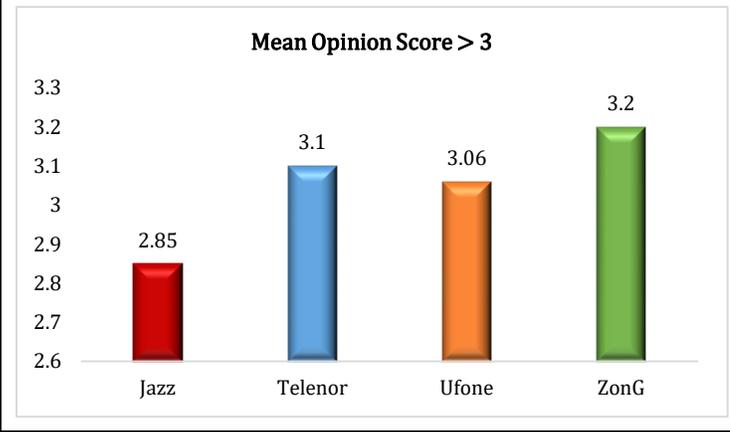
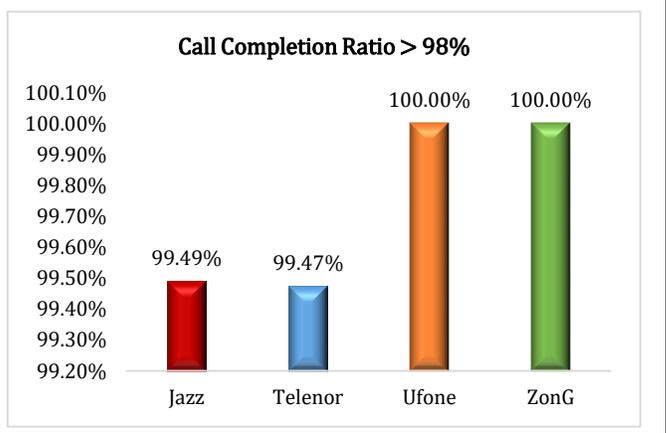
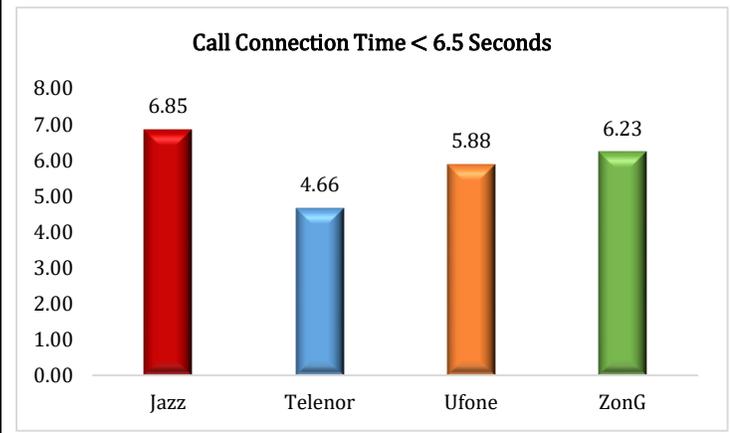
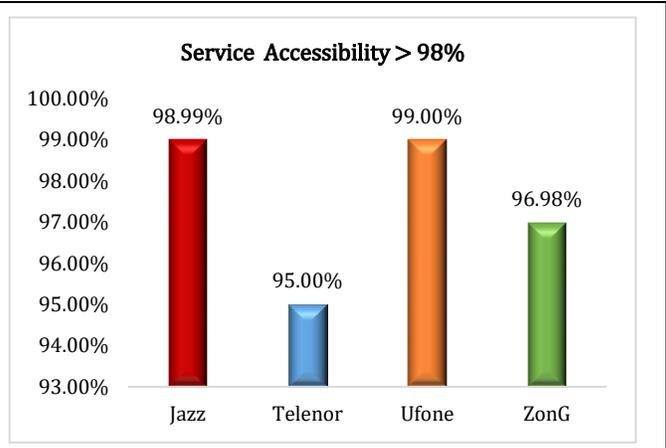
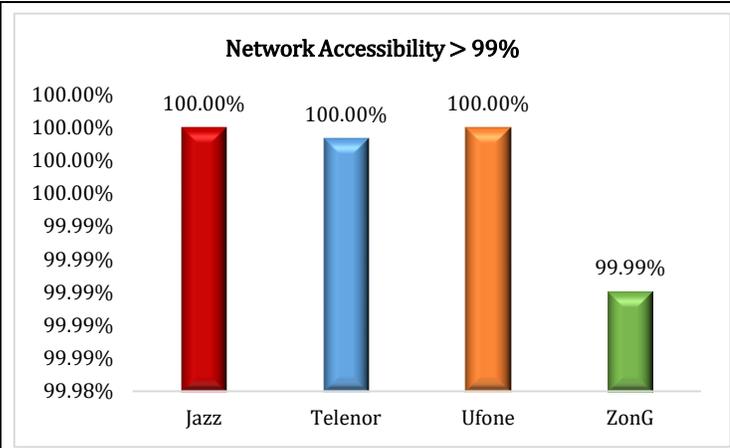
UFONE 3G COVERAGE (RSCP) - NAWABSHAH



ZONG 3G COVERAGE (RSCP) - NAWABSHAH

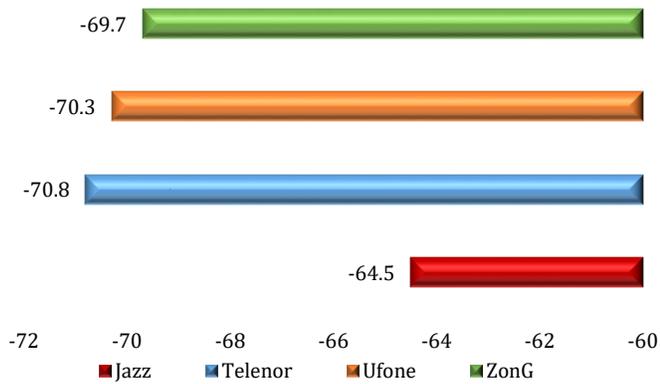


QUALITY OF SERVICE SURVEY RESULTS – NAWABSHAH

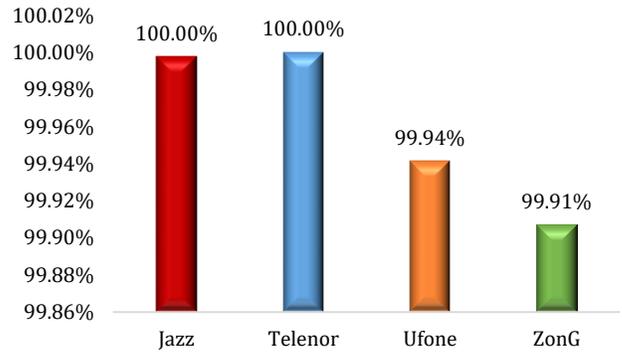


QUALITY OF SERVICE SURVEY RESULTS – NAWABSHAH

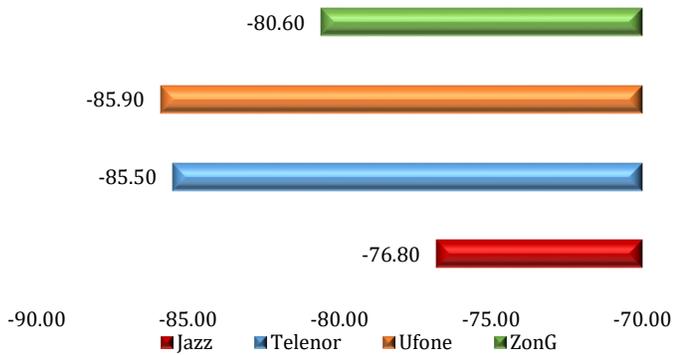
3G Signal Strength (RSCP) > -100dBm



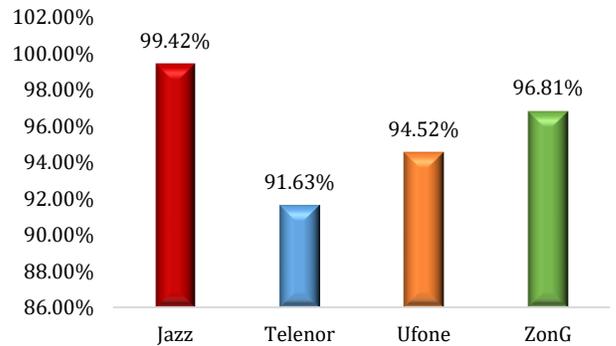
3G Signal Strength (RSCP) Confidencel Level > 90%



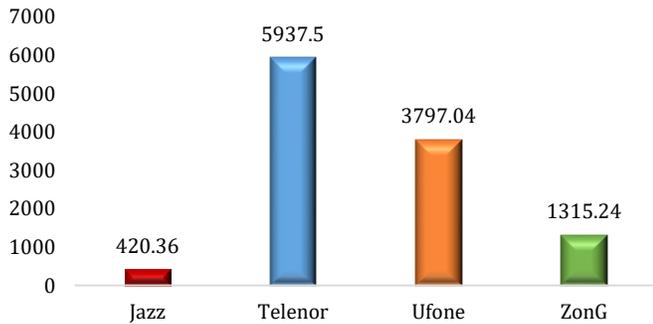
4G Signal Strength (RSRP) > -100dBm



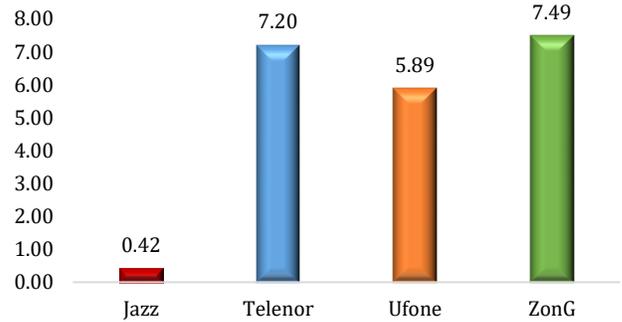
4G Signal Strength (RSRP) Confidencel Level > 90%



User Data Throughput (3G) > 256Kbps

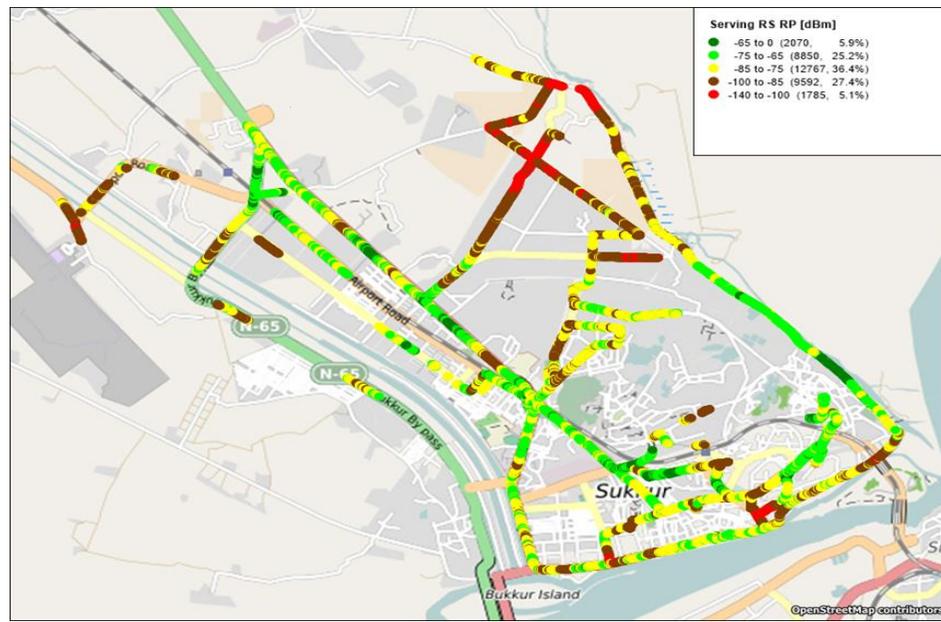


User Data Throughput (4G) > 2Mbps

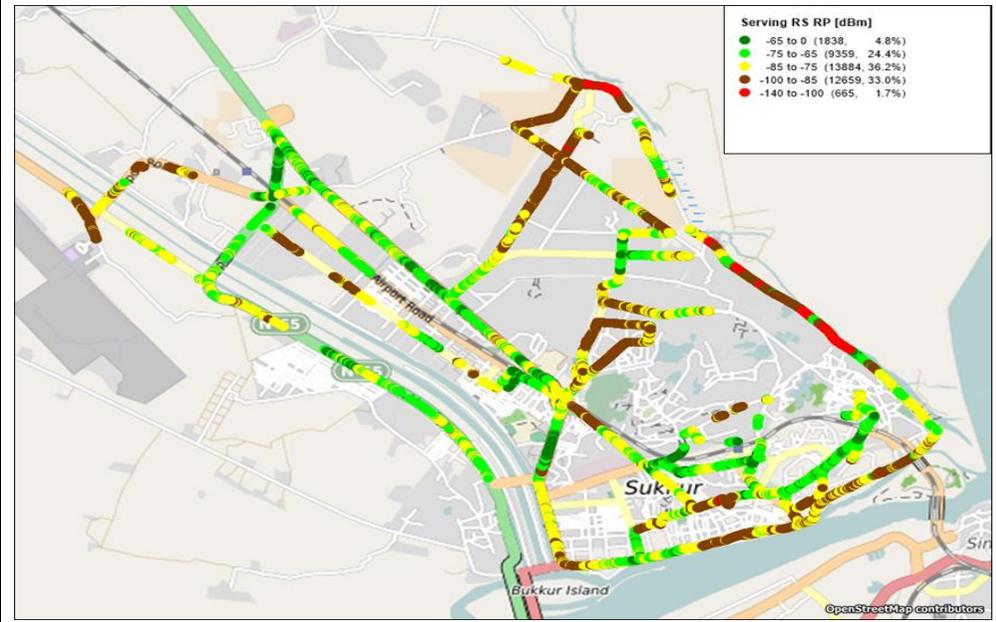


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

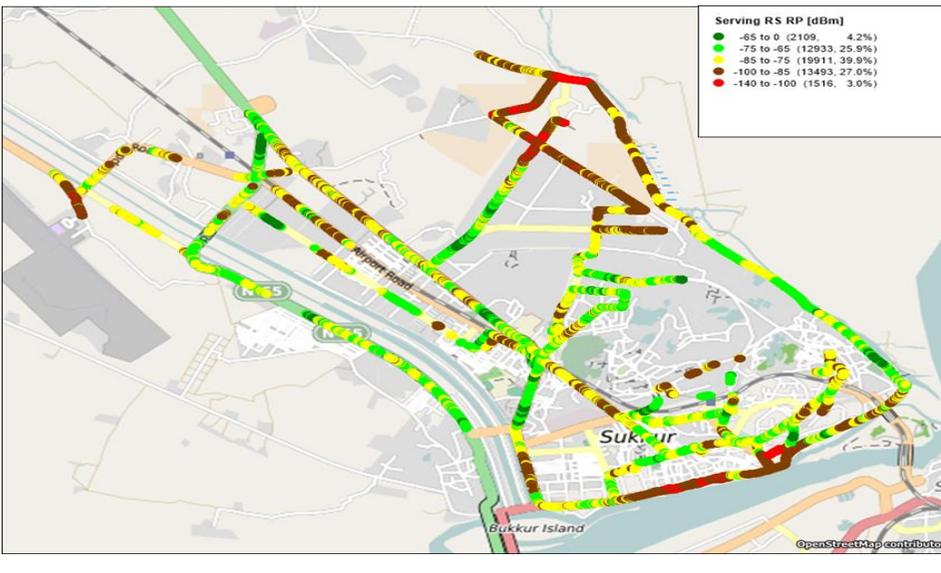
JAZZ 4G COVERAGE (RSRP) - SUKKUR



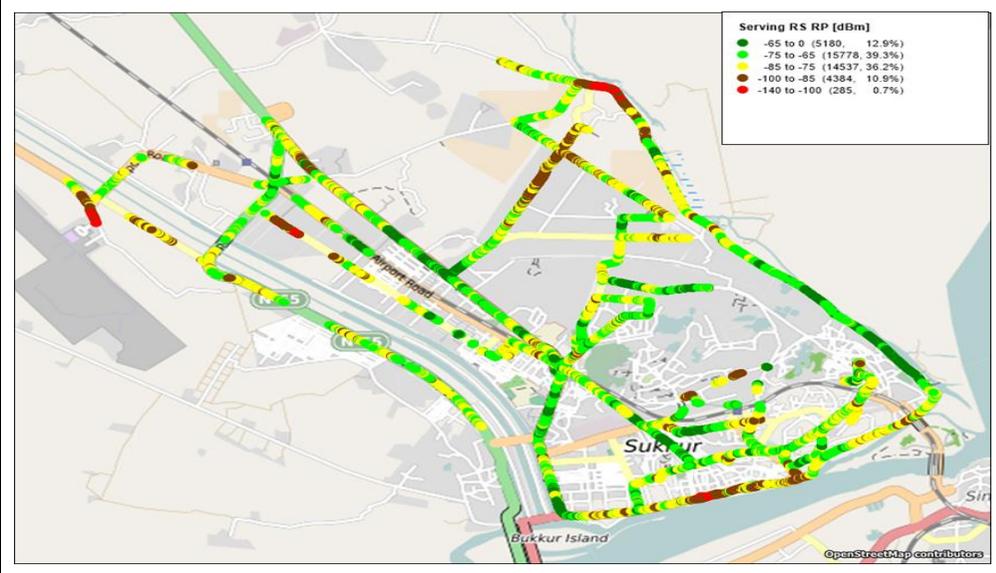
TELENOR 4G COVERAGE (RSRP) - SUKKUR



UFONE 4G COVERAGE (RSRP) - SUKKUR

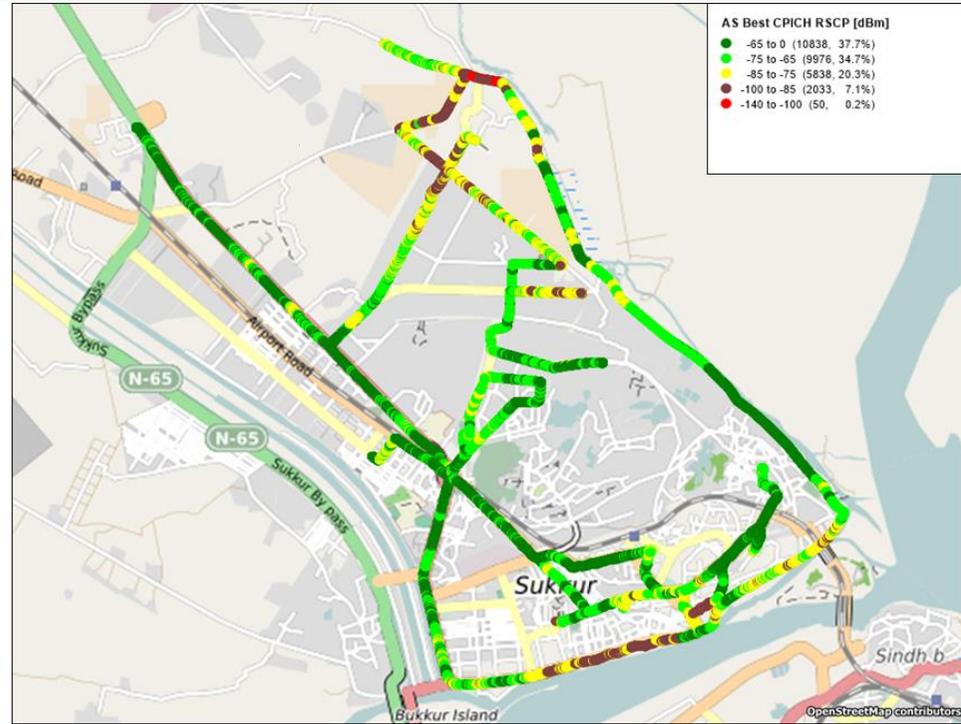


ZONG 4G COVERAGE (RSRP) - SUKKUR

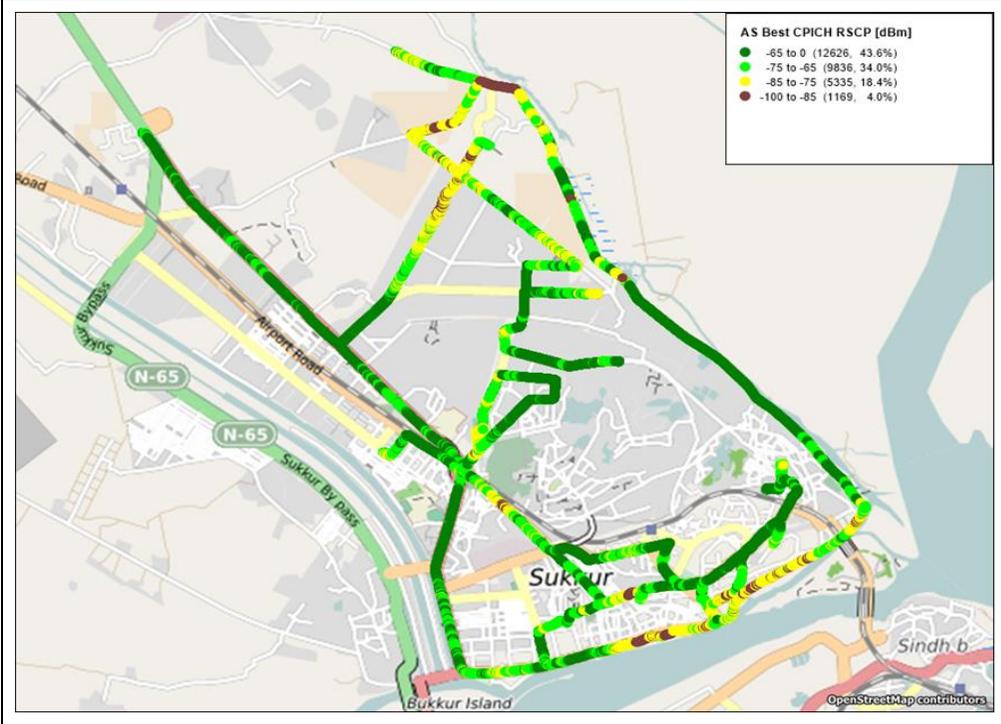


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

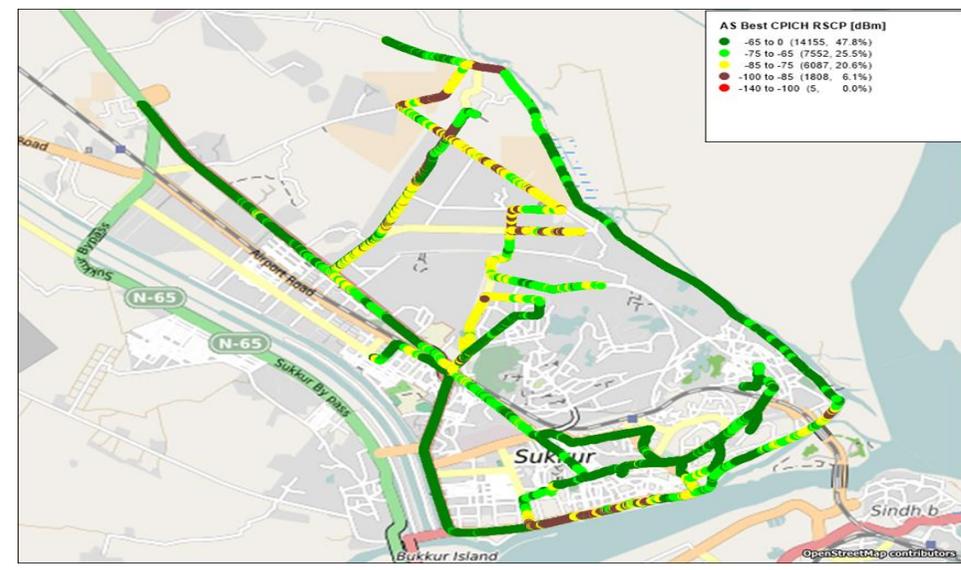
JAZZ 3G COVERAGE (RSCP) – SUKKUR



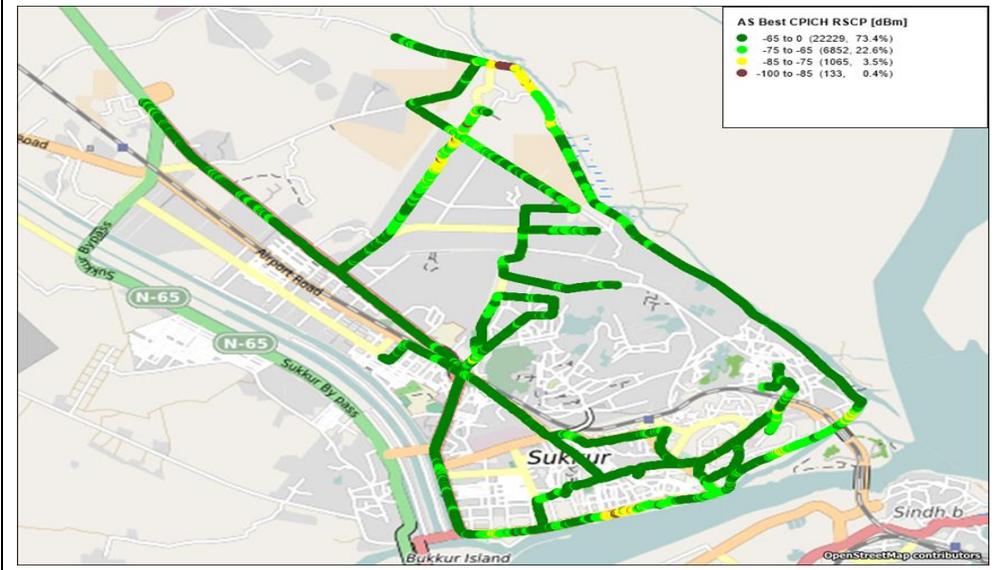
TELENOR 3G COVERAGE (RSCP) - SUKKUR



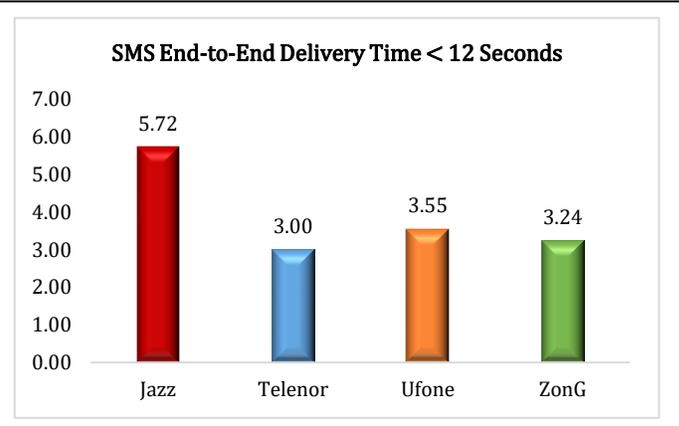
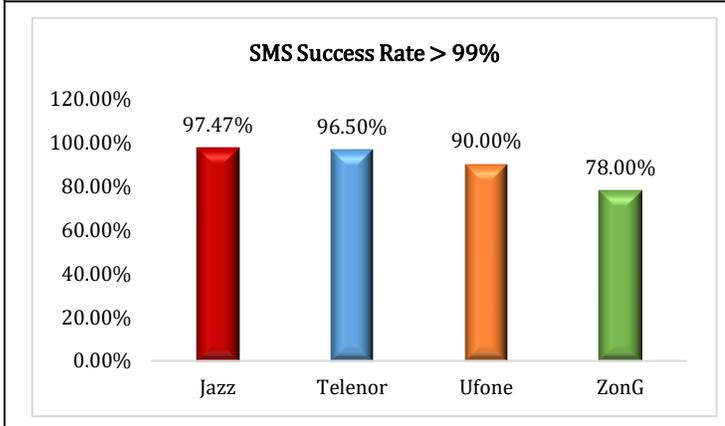
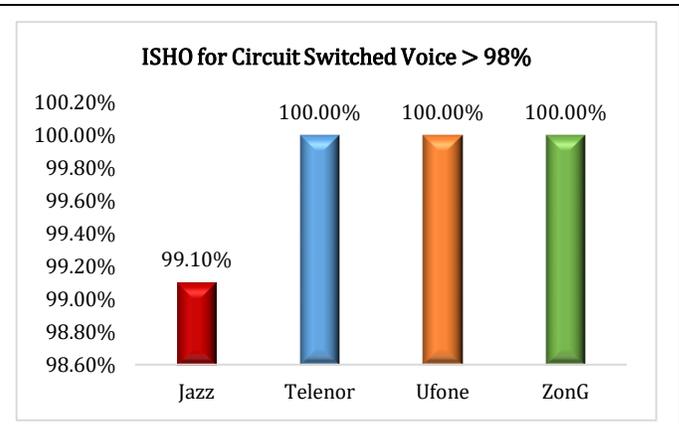
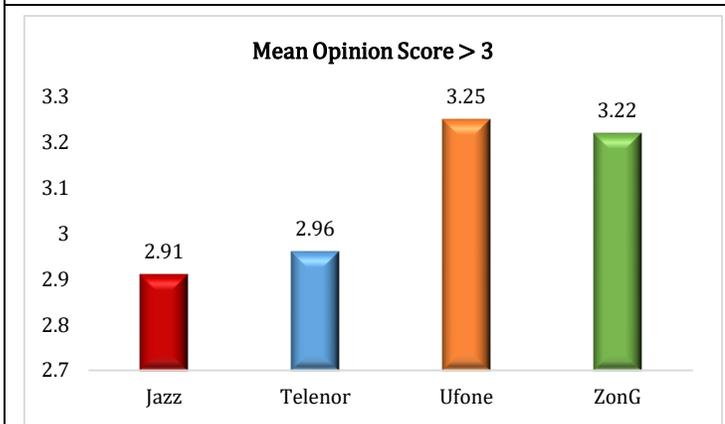
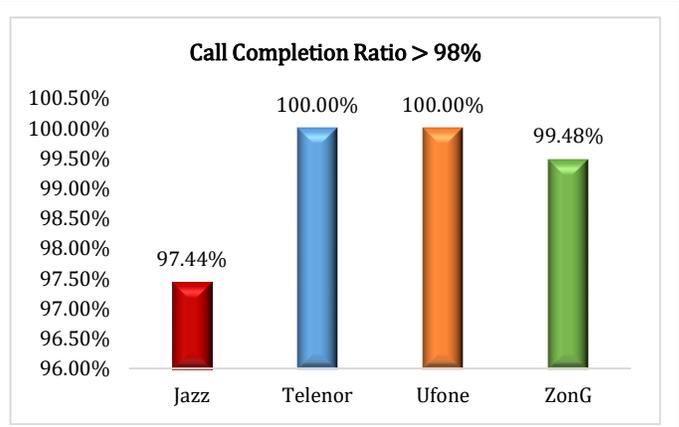
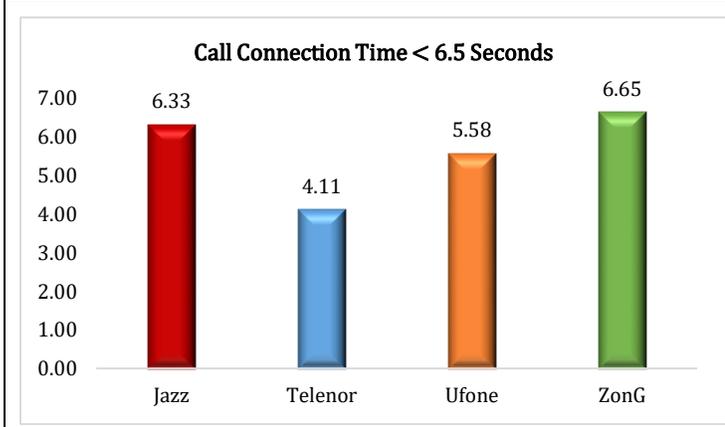
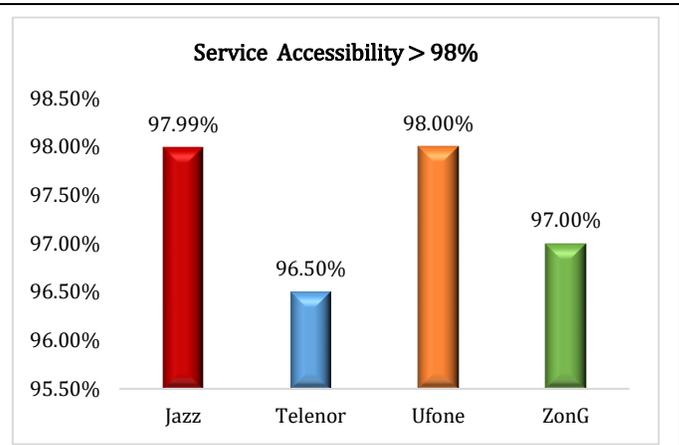
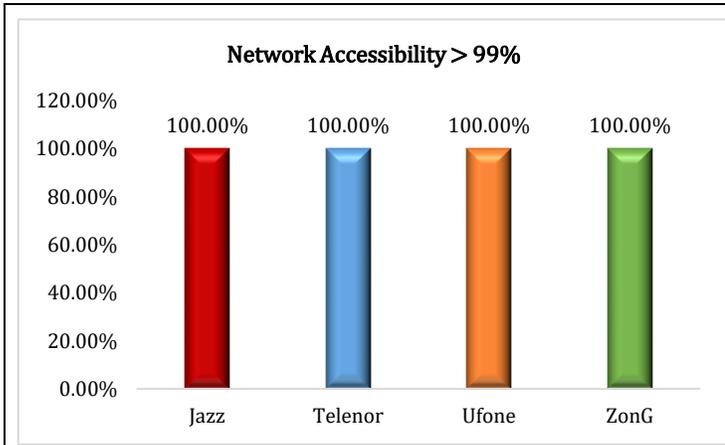
UFONE 3G COVERAGE (RSCP) - SUKKUR



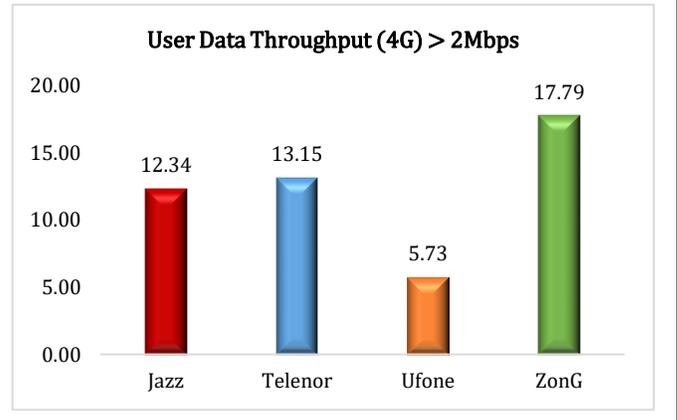
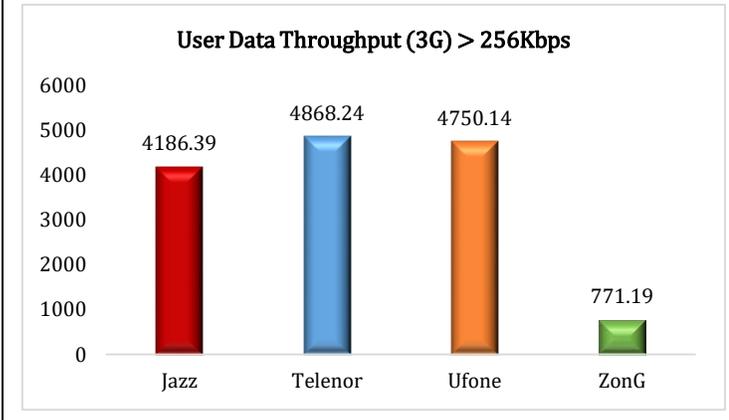
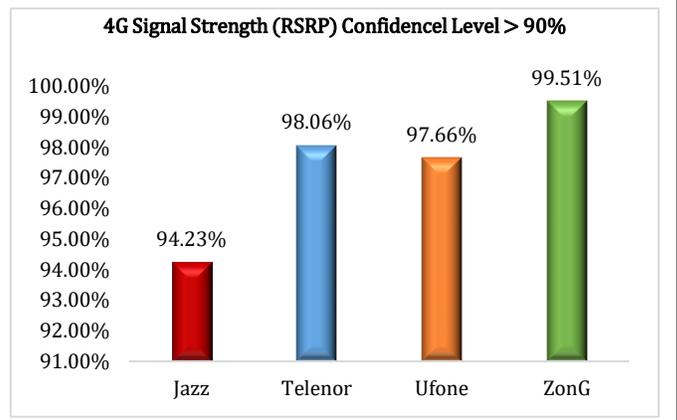
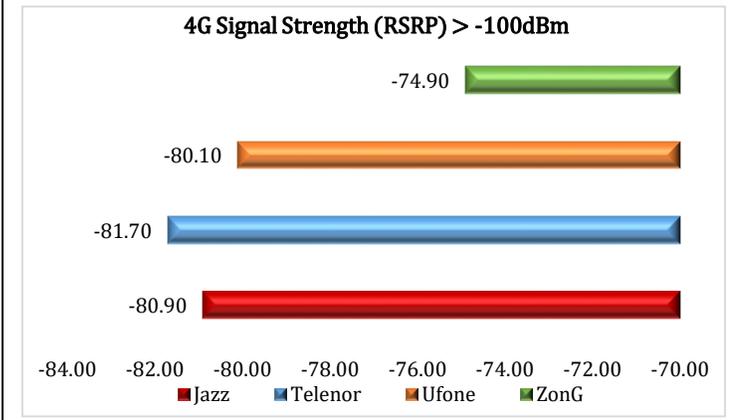
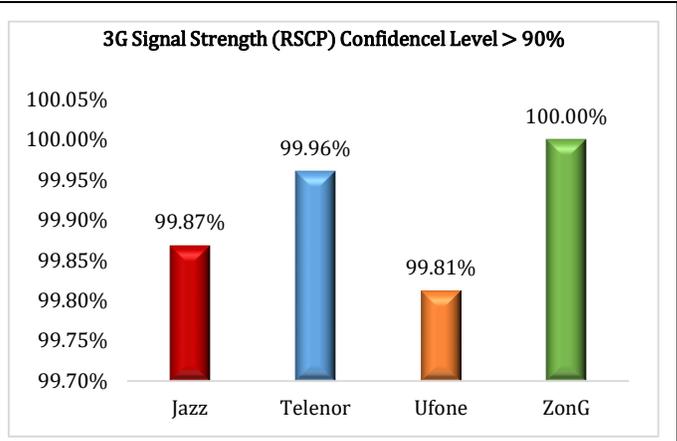
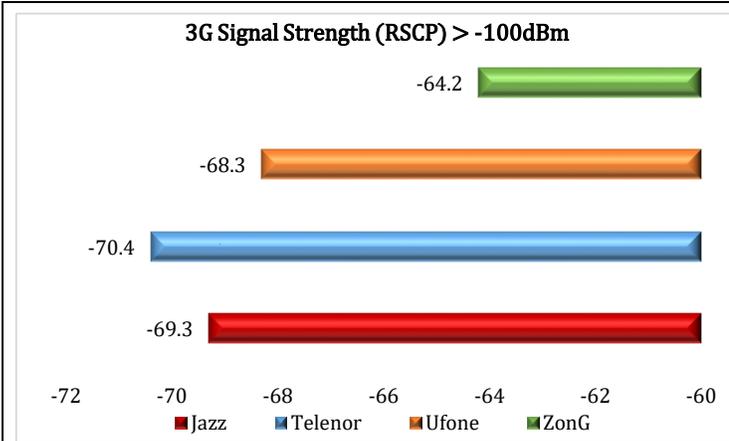
ZONG 3G COVERAGE (RSCP) - SUKKUR



QUALITY OF SERVICE SURVEY RESULTS – SUKKUR

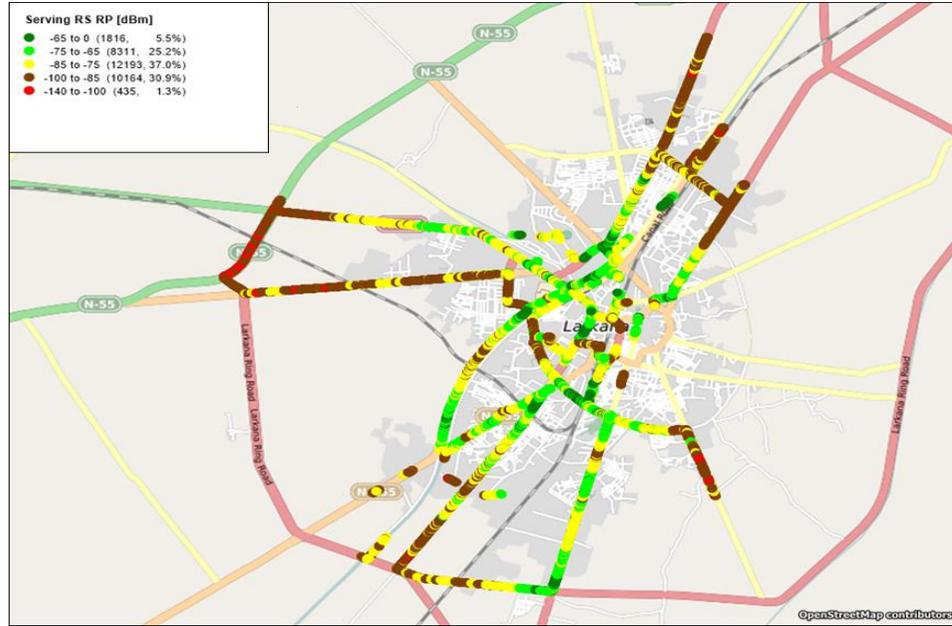


QUALITY OF SERVICE SURVEY RESULTS – SUKKUR

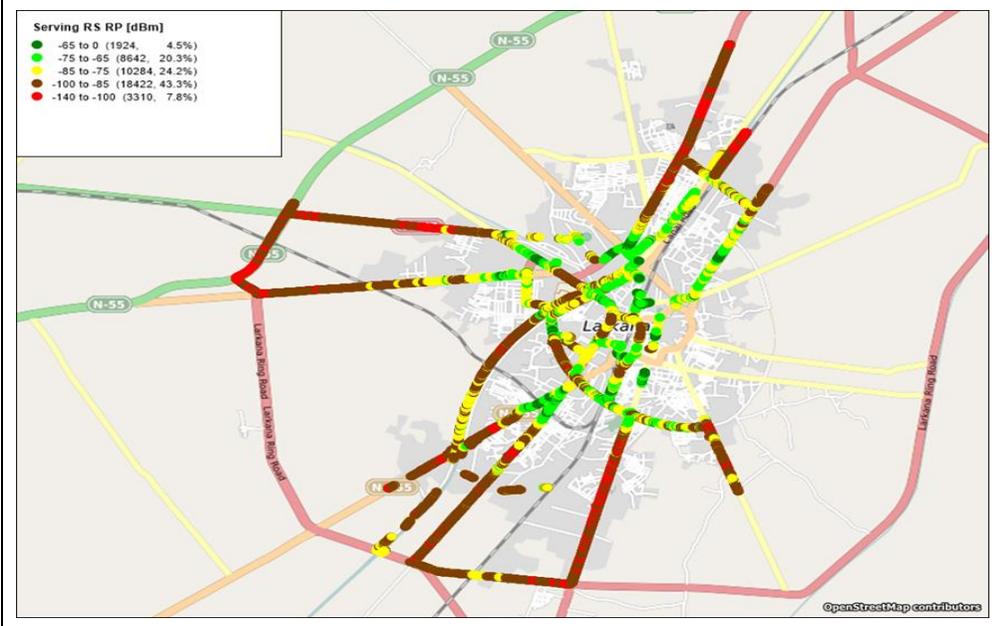


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

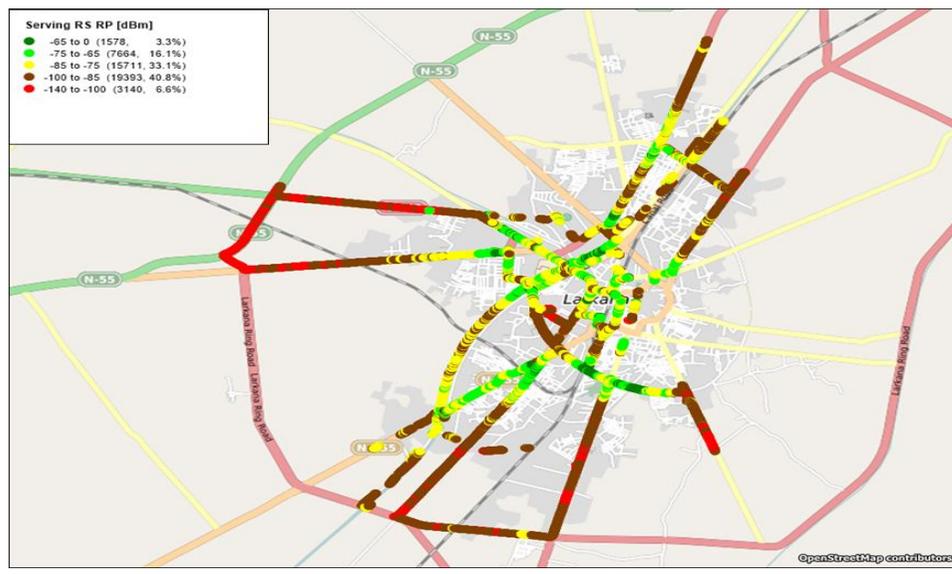
JAZZ 4G COVERAGE (RSRP) - LARKANA



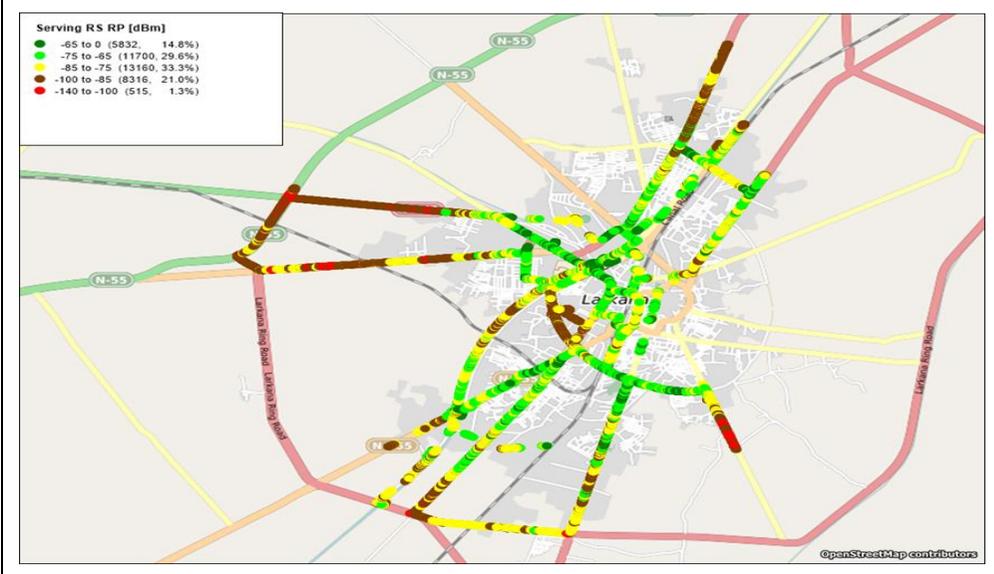
TELENOR 4G COVERAGE (RSRP) - LARKANA



UFONE 4G COVERAGE (RSRP) - LARKANA

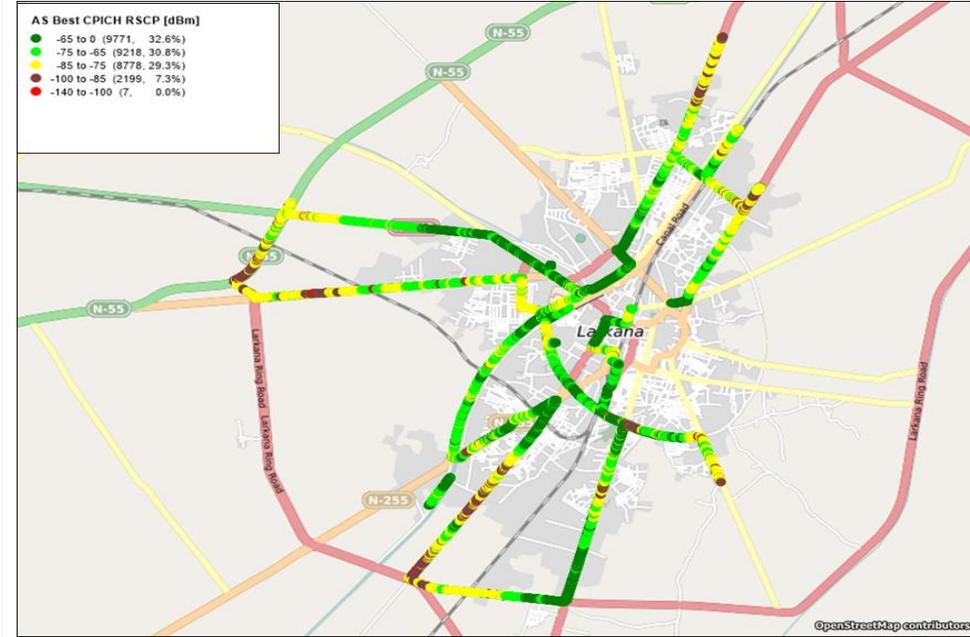


ZONG 4G COVERAGE (RSRP) - LARKANA

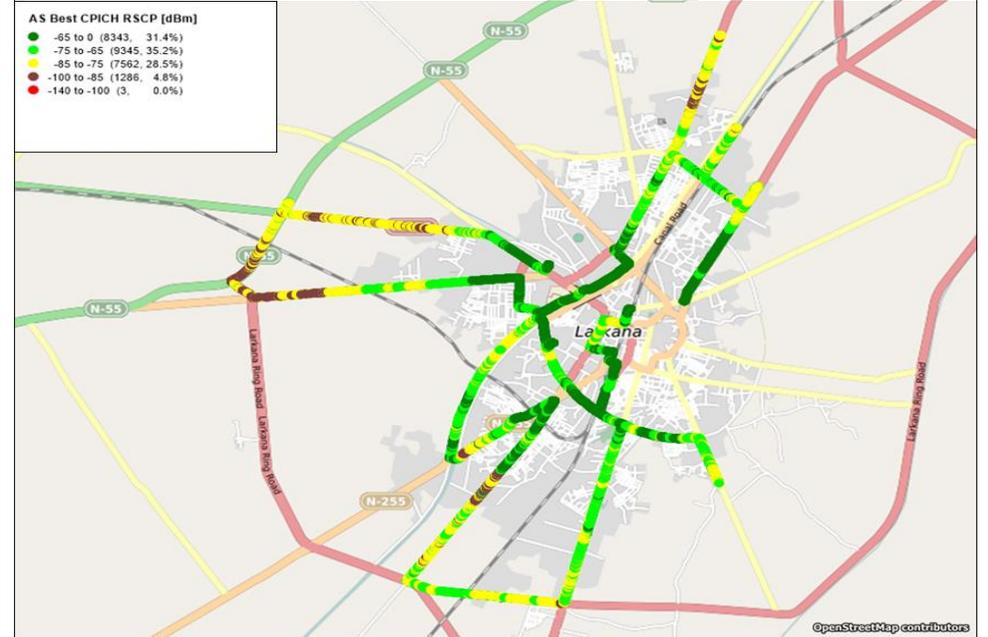


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

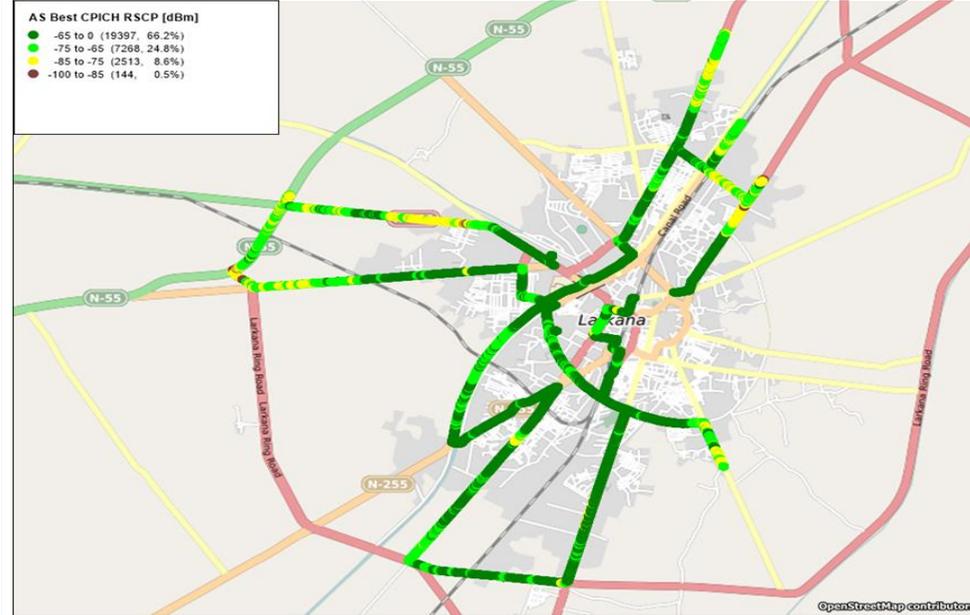
JAZZ 3G COVERAGE (RSCP) - LARKANA



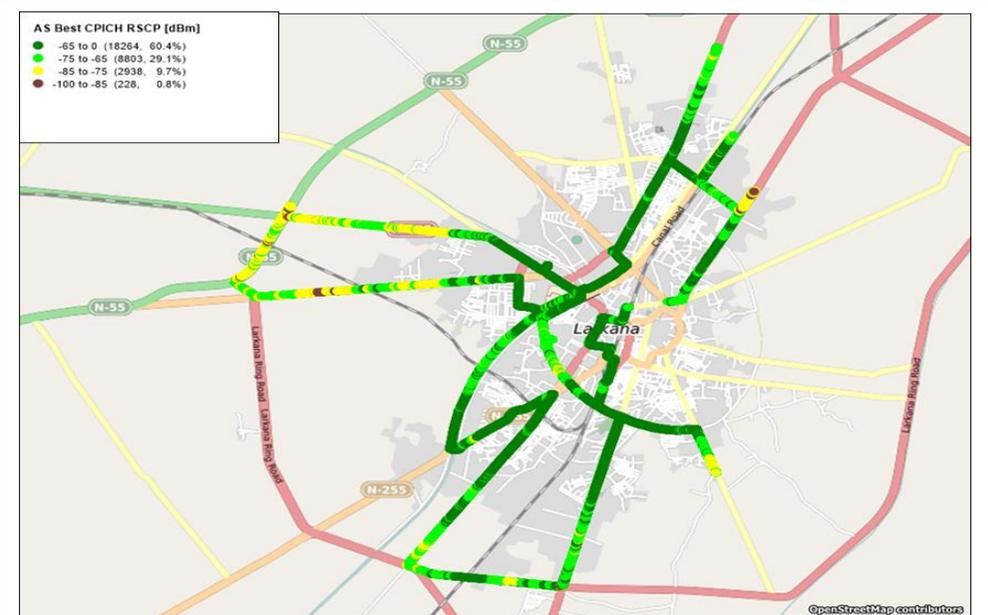
TELENOR 3G COVERAGE (RSCP) - LARKANA



UFONE 3G COVERAGE (RSCP) - LARKANA

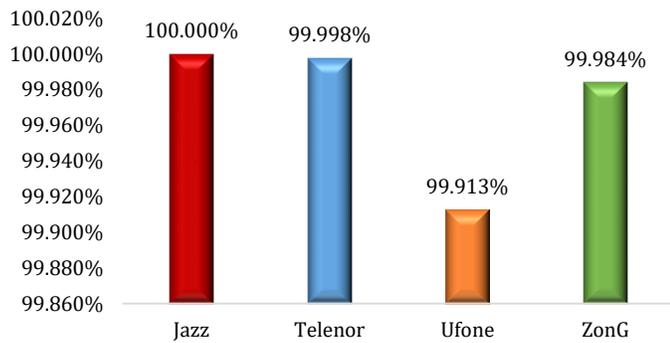


ZONG 3G COVERAGE (RSCP) - LARKANA

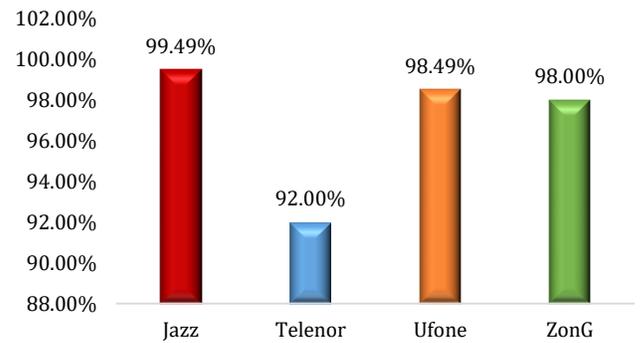


QUALITY OF SERVICE SURVEY RESULTS – LARKANA

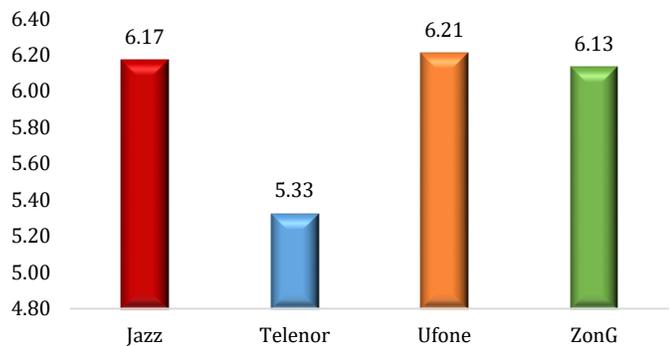
Network Accessibility > 99%



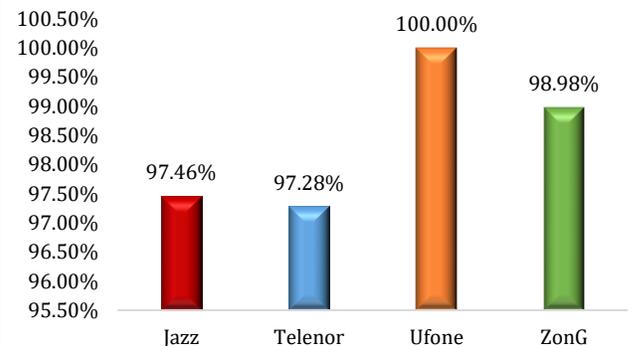
Service Accessibility > 98%



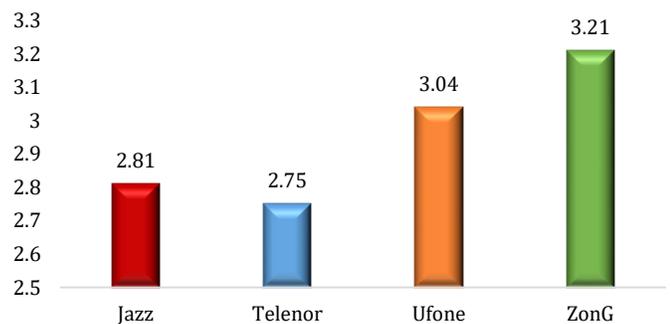
Call Connection Time < 6.5 Seconds



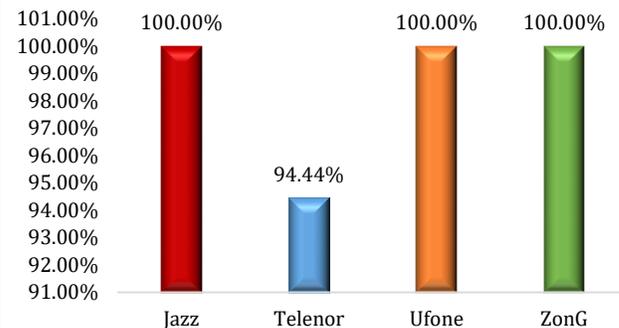
Call Completion Ratio > 98%



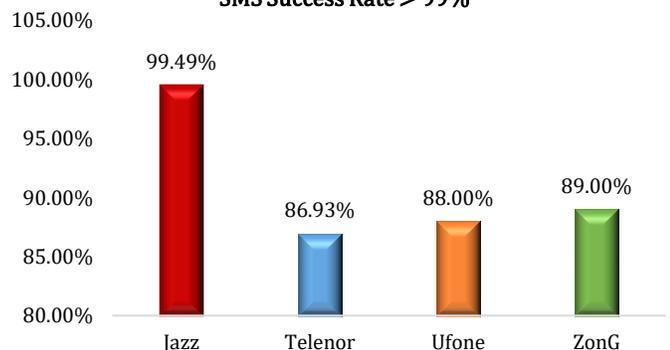
Mean Opinion Score > 3



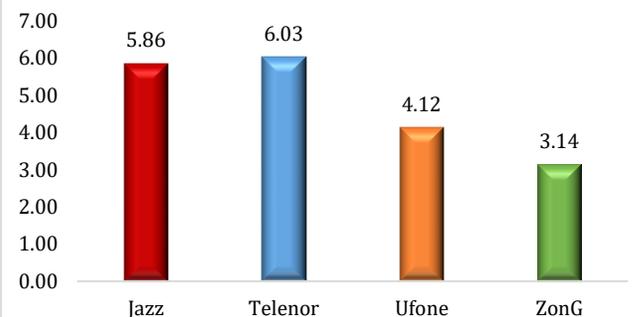
ISHO for Circuit Switched Voice > 98%



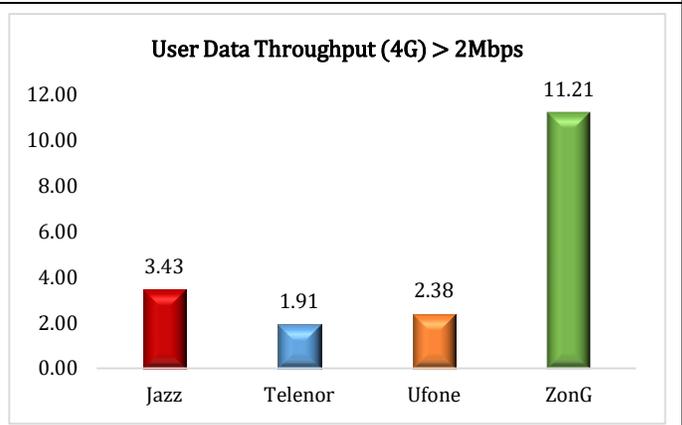
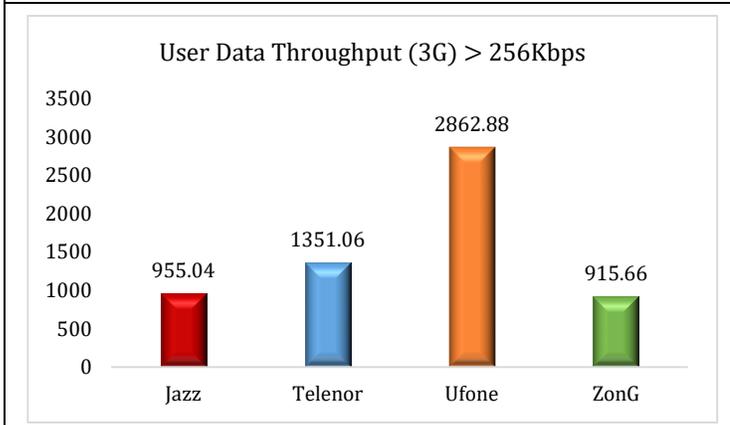
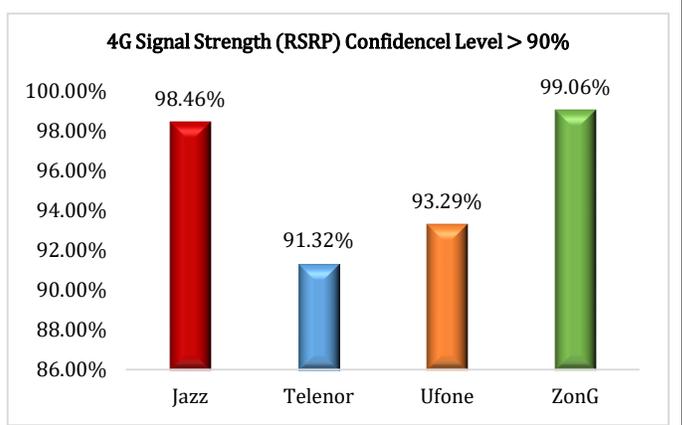
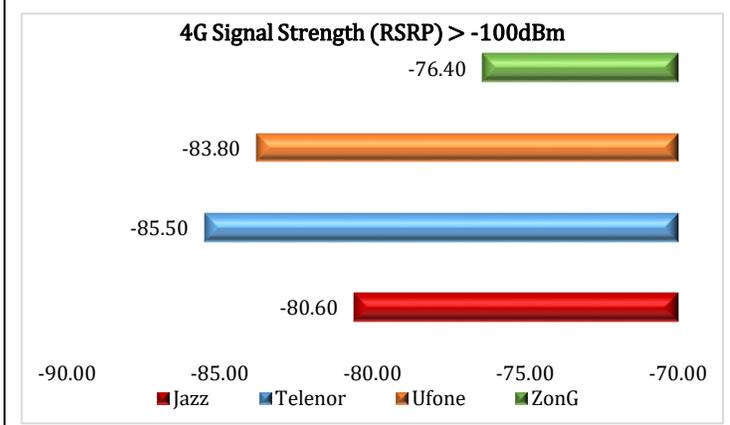
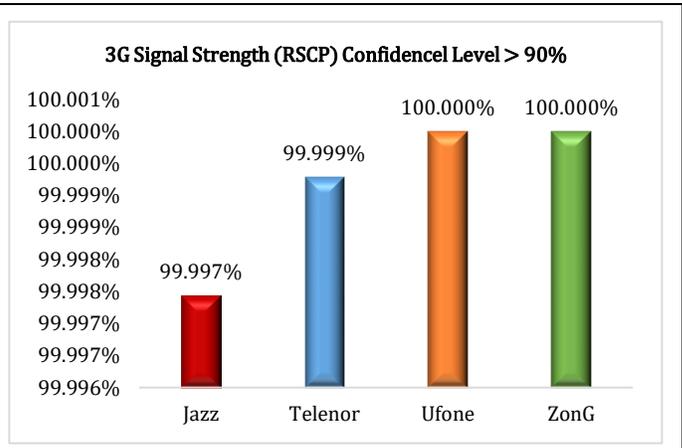
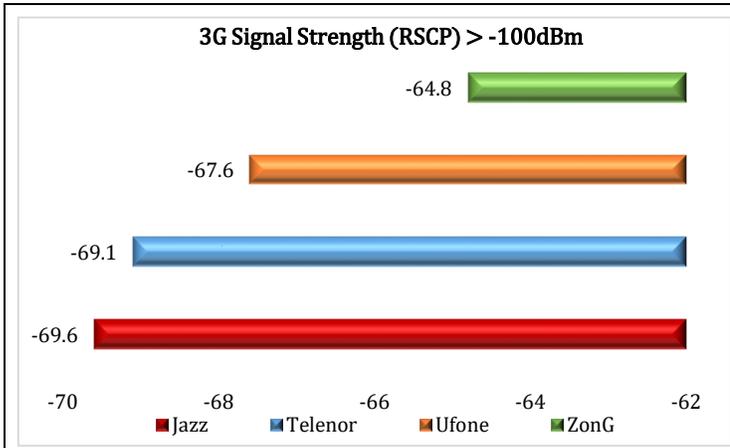
SMS Success Rate > 99%



SMS End-to-End Delivery Time < 12 Seconds

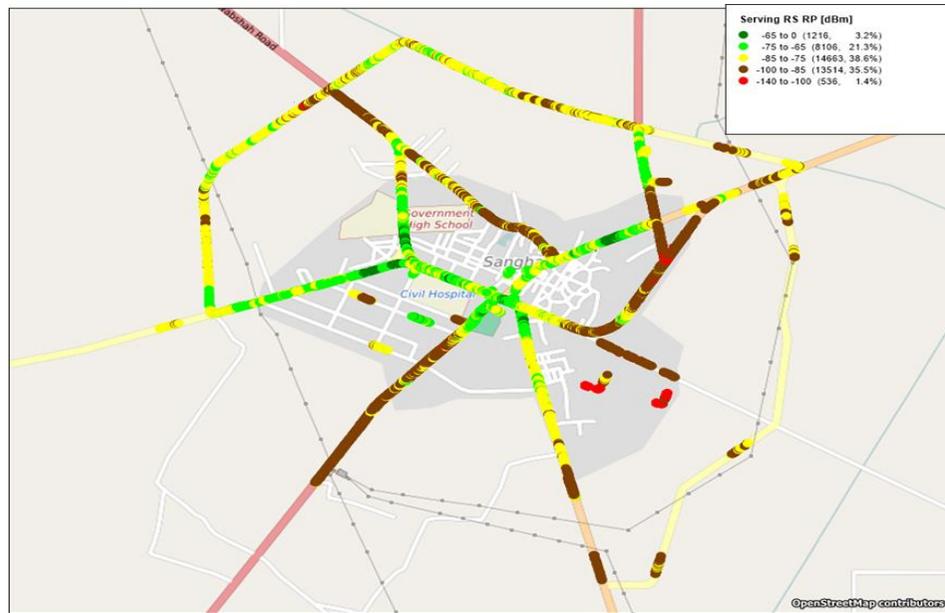


QUALITY OF SERVICE SURVEY RESULTS – LARKANA

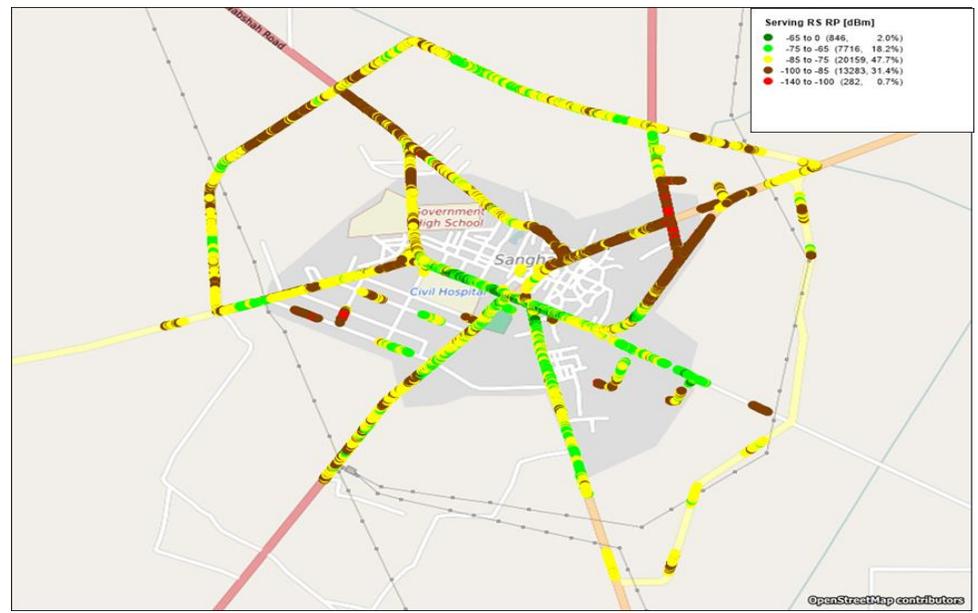


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

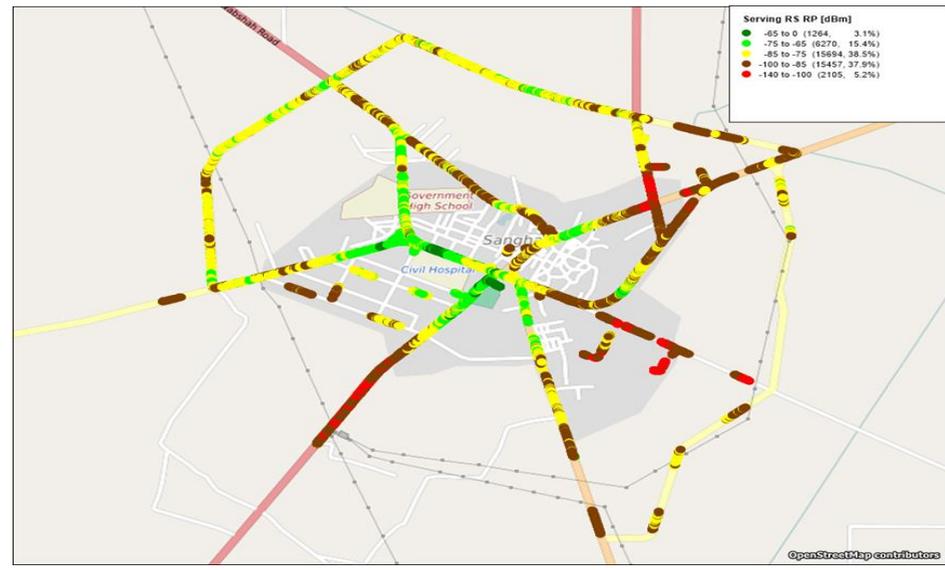
JAZZ 4G COVERAGE (RSRP) - SANGHAR



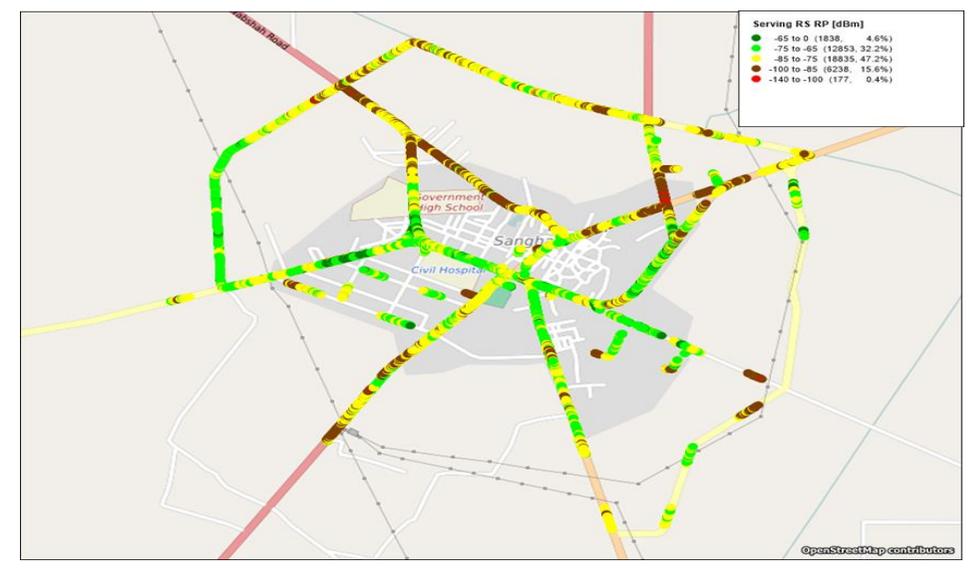
TELENOR 4G COVERAGE (RSRP) - SANGHAR



UFONE 4G COVERAGE (RSRP) - SANGHAR

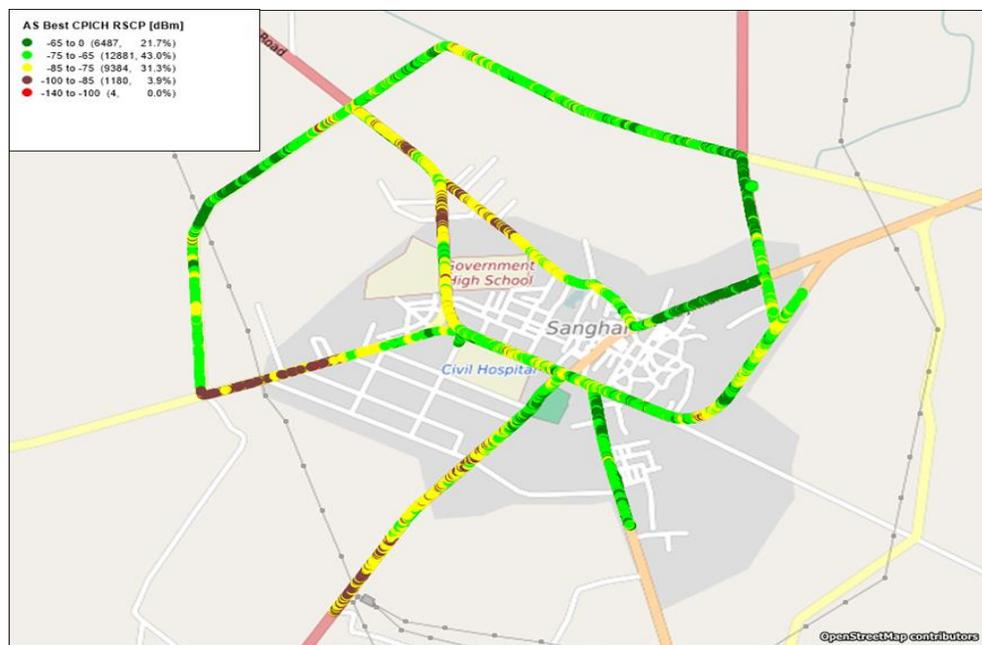


ZONG 4G COVERAGE (RSRP) - SANGHAR

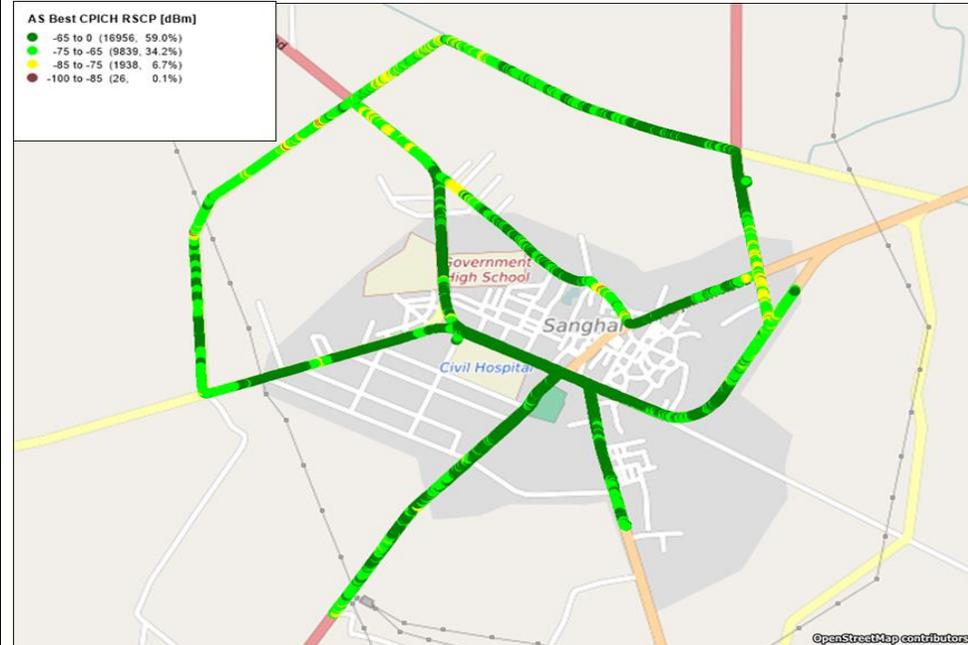


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

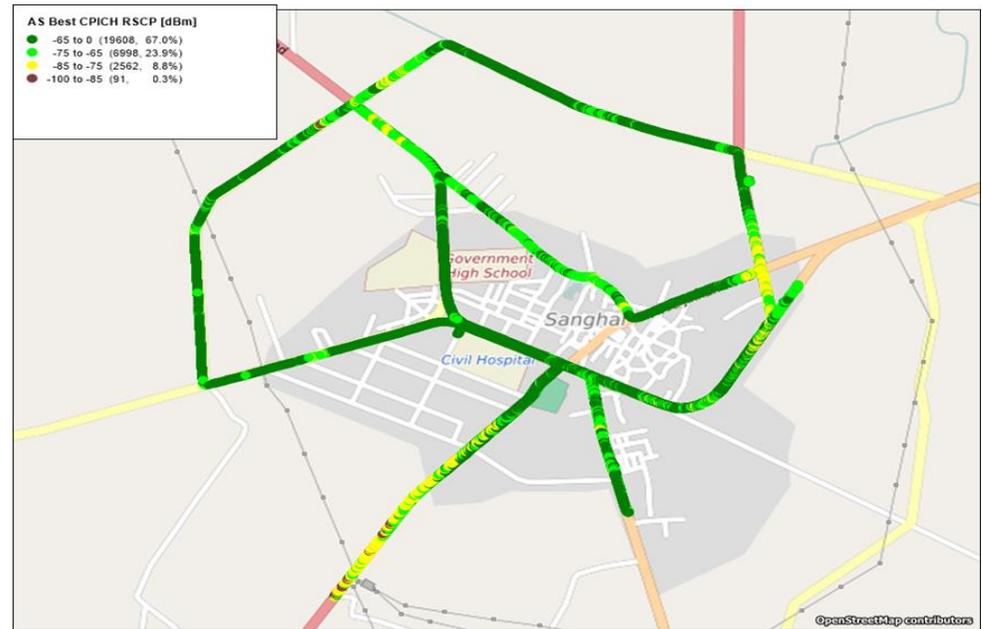
JAZZ 3G COVERAGE (RSCP) – SANGHAR



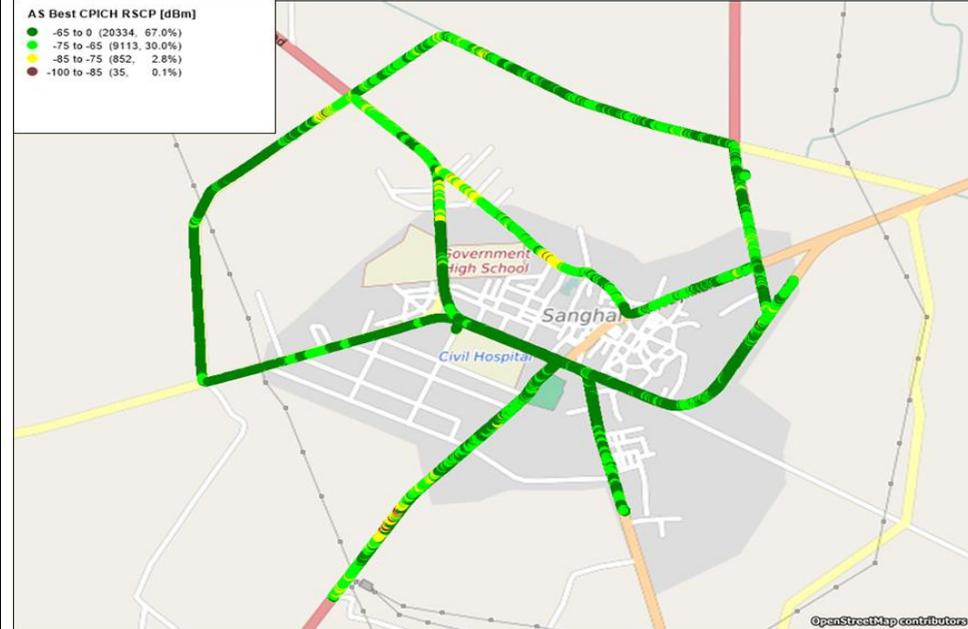
TELENOR 3G COVERAGE (RSCP) - SANGHAR



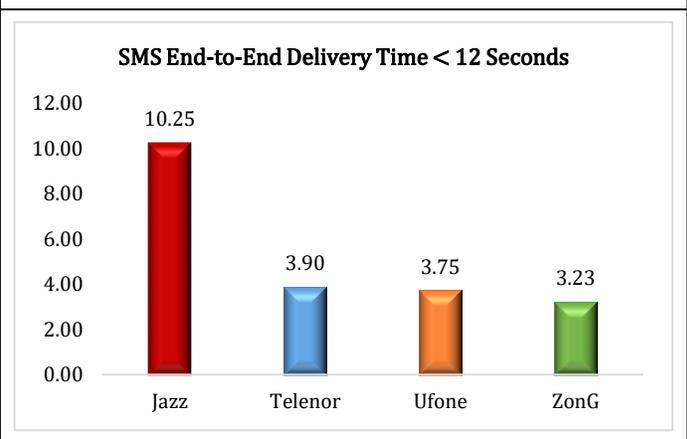
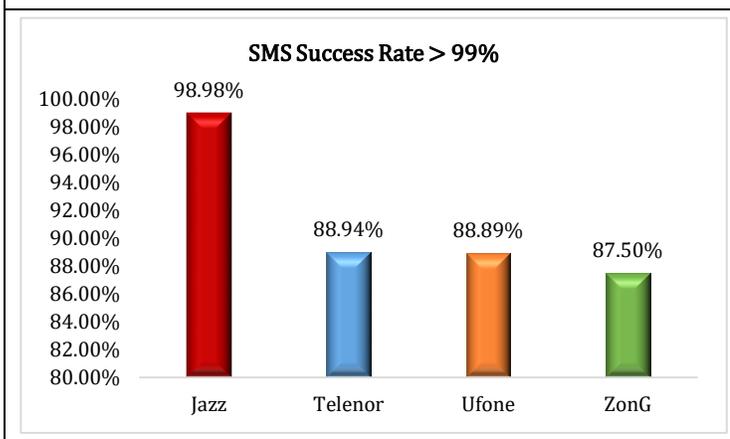
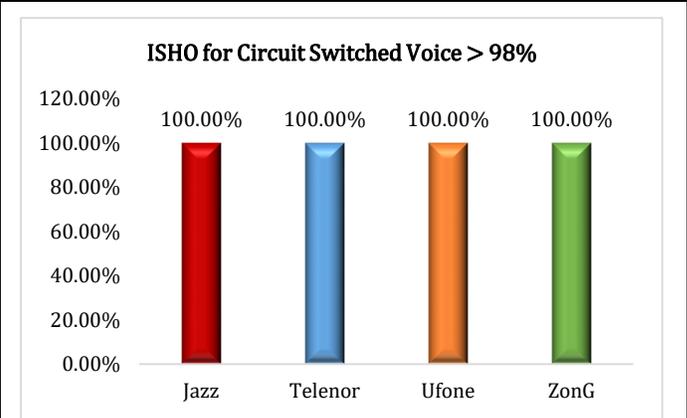
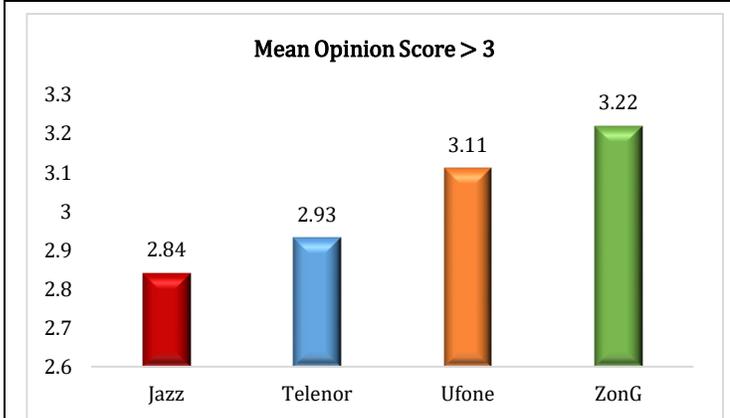
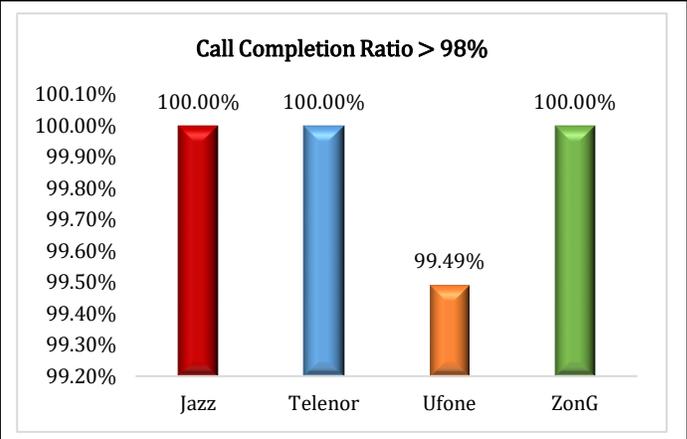
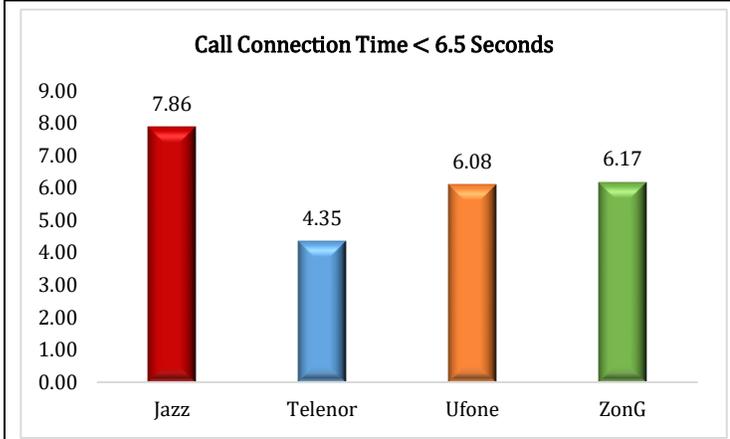
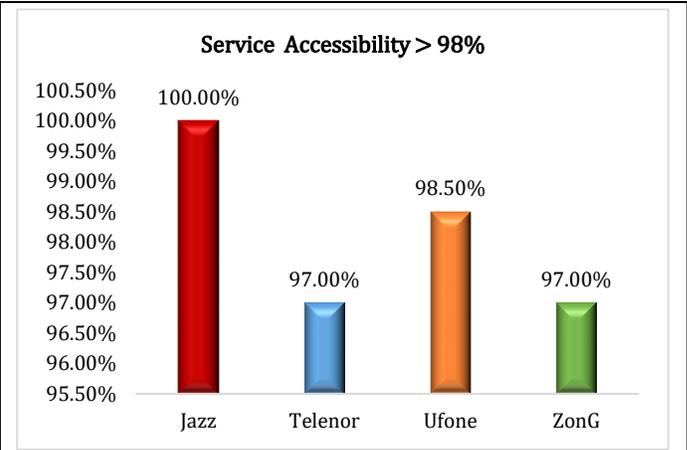
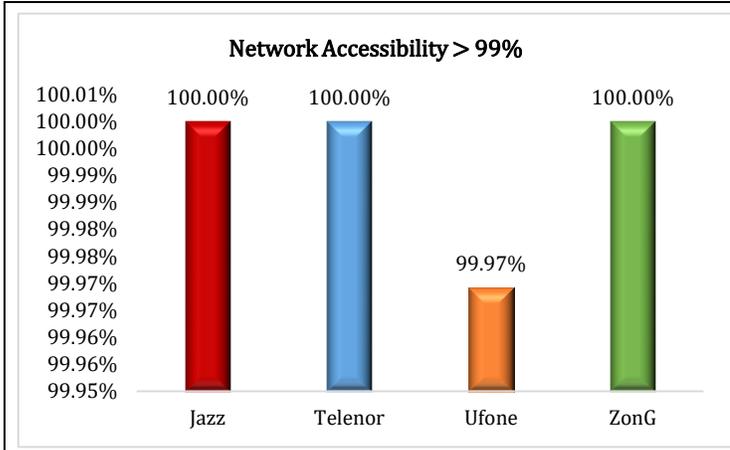
UFONE 3G COVERAGE (RSCP) - SANGHAR



ZONG 3G COVERAGE (RSCP) - SANGHAR

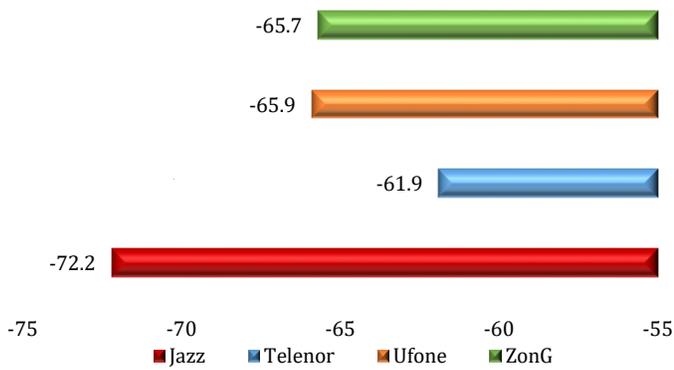


QUALITY OF SERVICE SURVEY RESULTS – SANGHAR

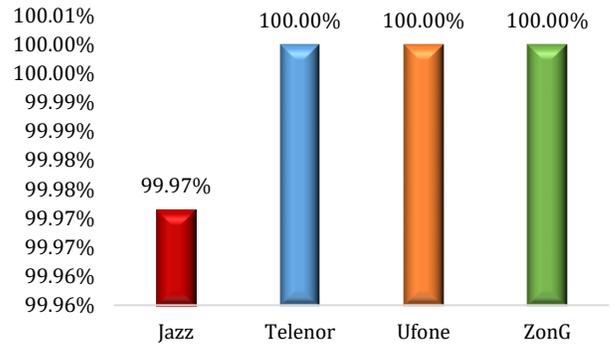


QUALITY OF SERVICE SURVEY RESULTS – SANGHAR

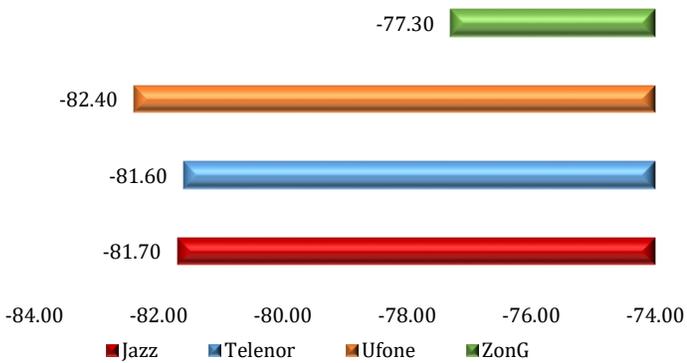
3G Signal Strength (RSCP) > -100dBm



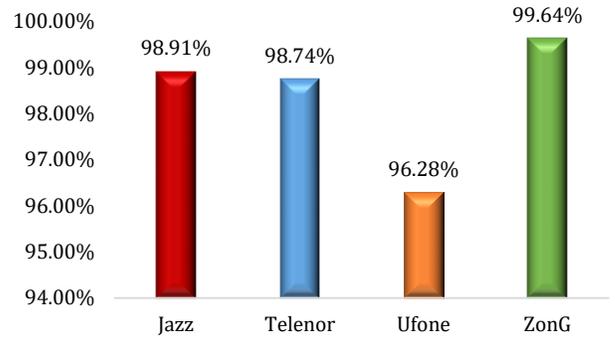
3G Signal Strength (RSCP) Confidencel Level > 90%



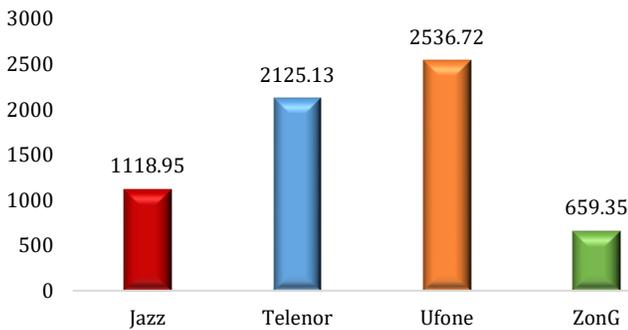
4G Signal Strength (RSRP) > -100dBm



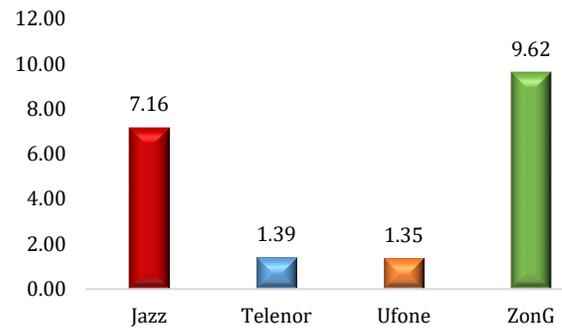
4G Signal Strength (RSRP) Confidencel Level > 90%



User Data Throughput (3G) > 256Kbps

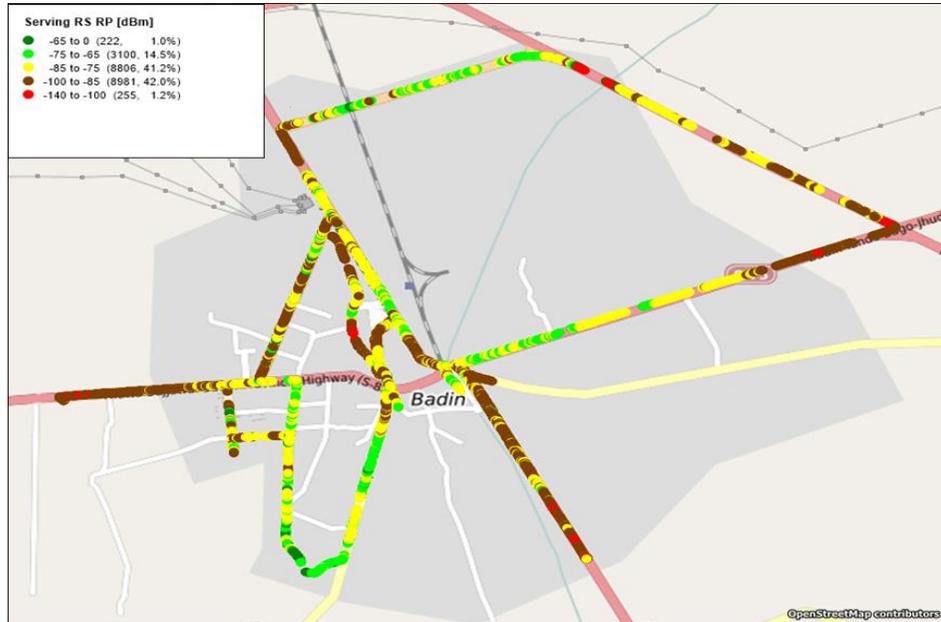


User Data Throughput (4G) > 2Mbps

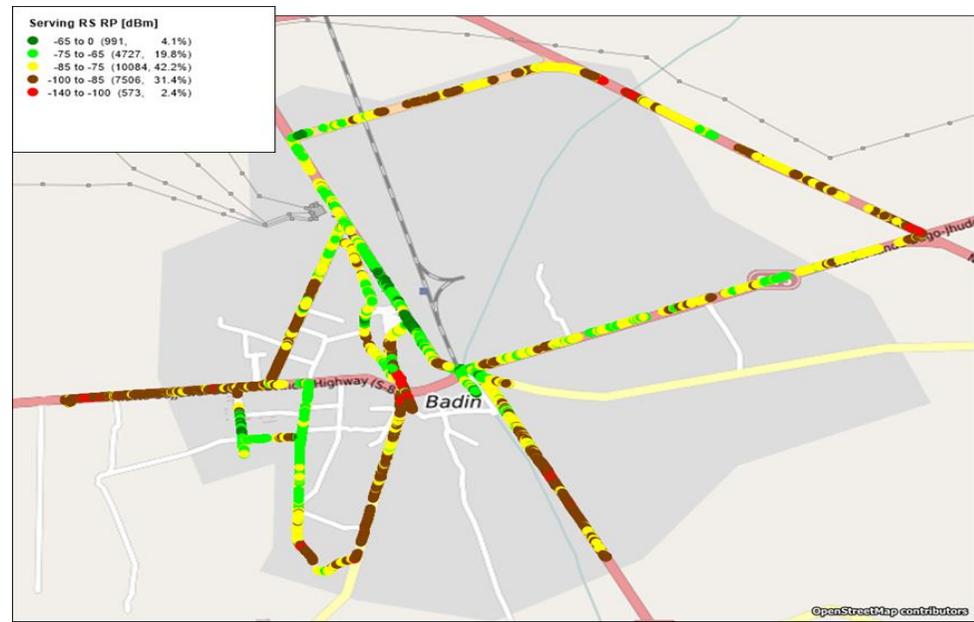


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

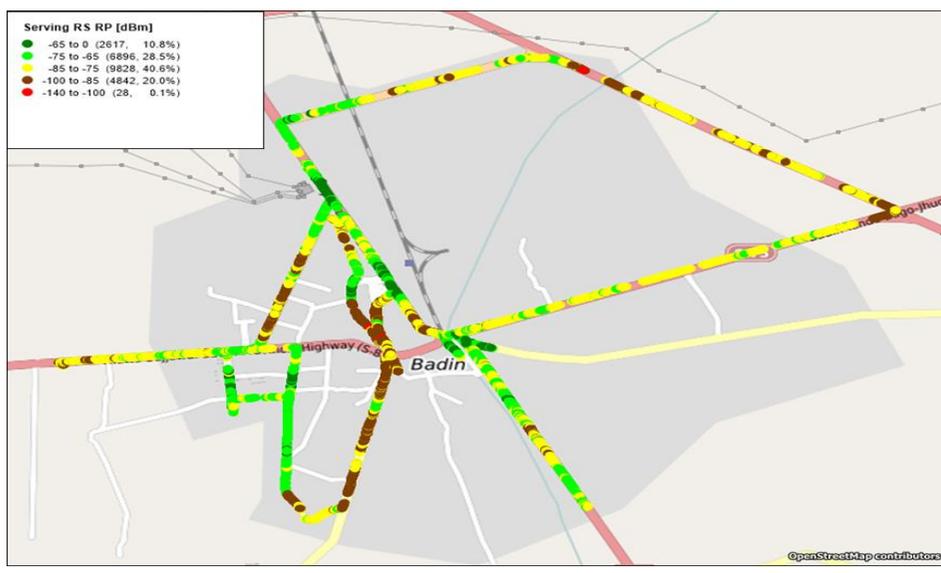
JAZZ 4G COVERAGE (RSRP) - BADIN



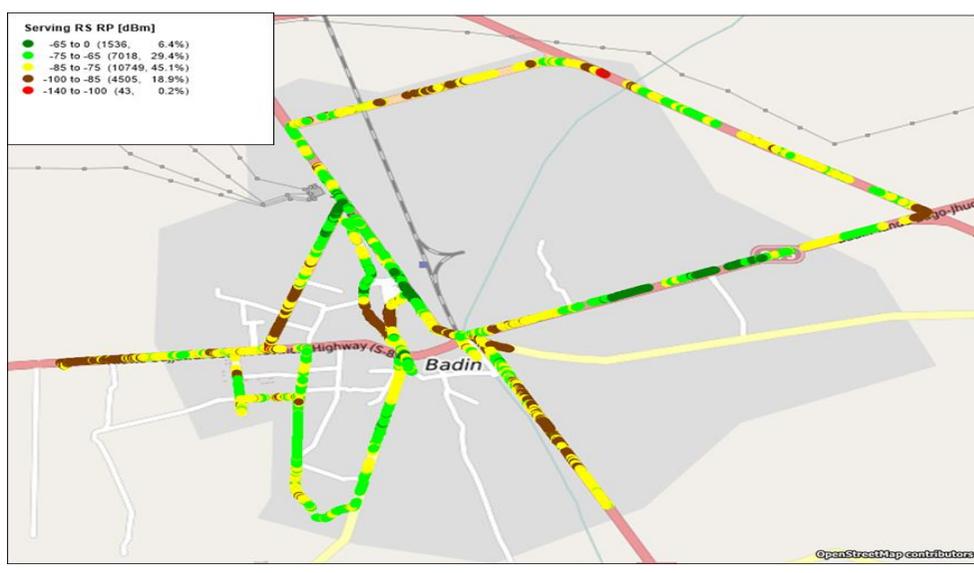
TELENOR 4G COVERAGE (RSRP) - BADIN



UFONE 4G COVERAGE (RSRP) - BADIN

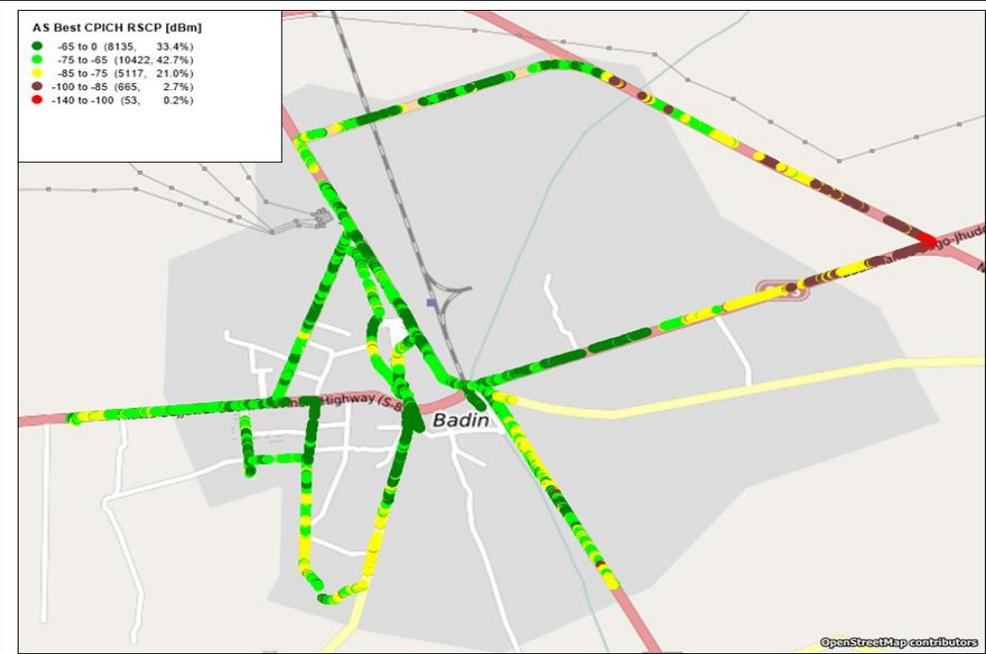


ZONG 4G COVERAGE (RSRP) - BADIN

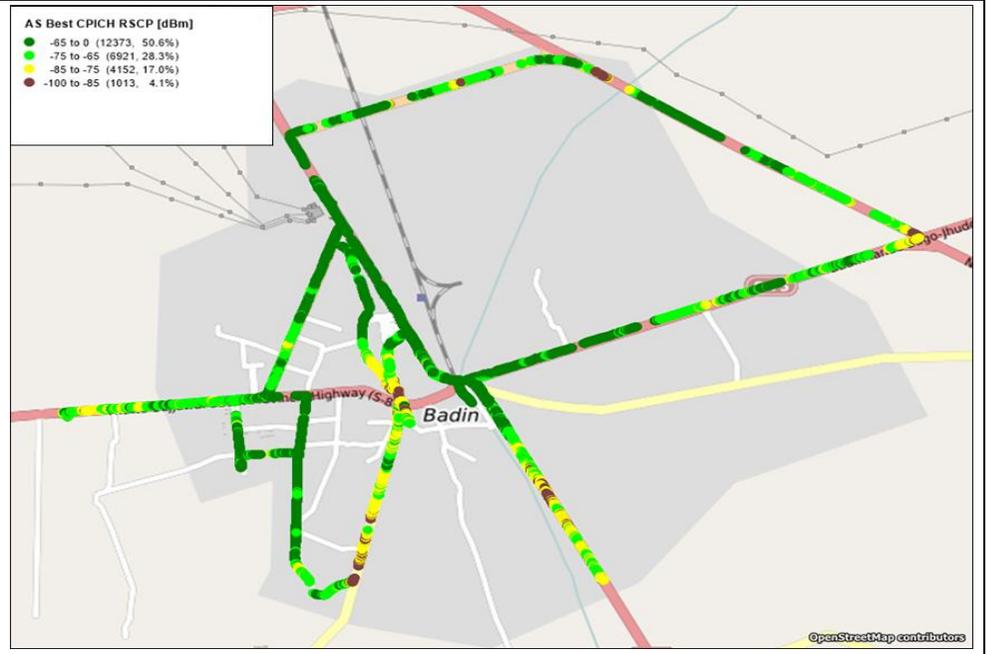


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

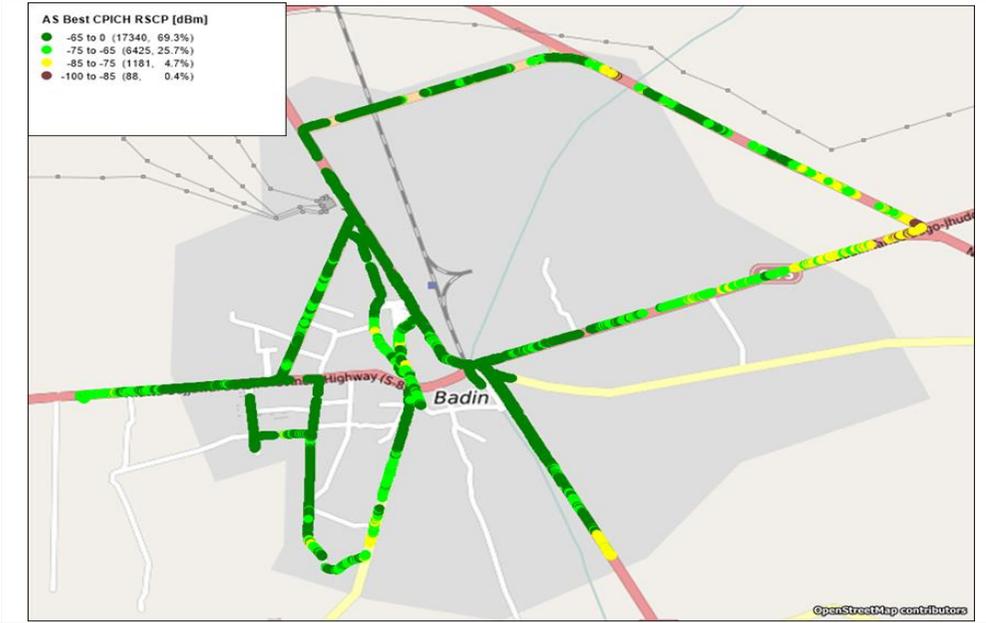
JAZZ 3G COVERAGE (RSCP) - BADIN



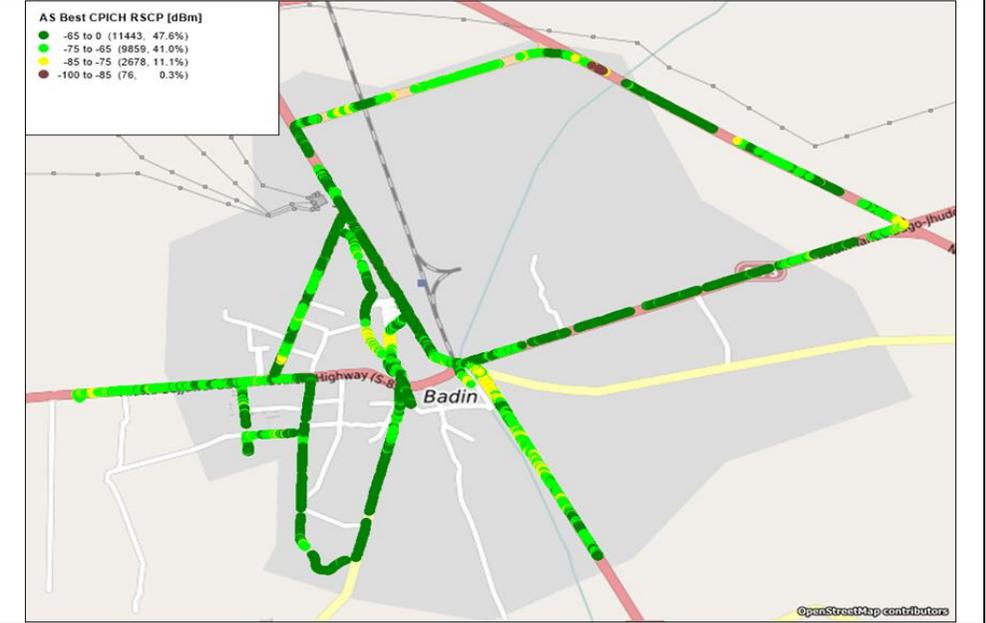
TELENOR 3G COVERAGE (RSCP) - BADIN



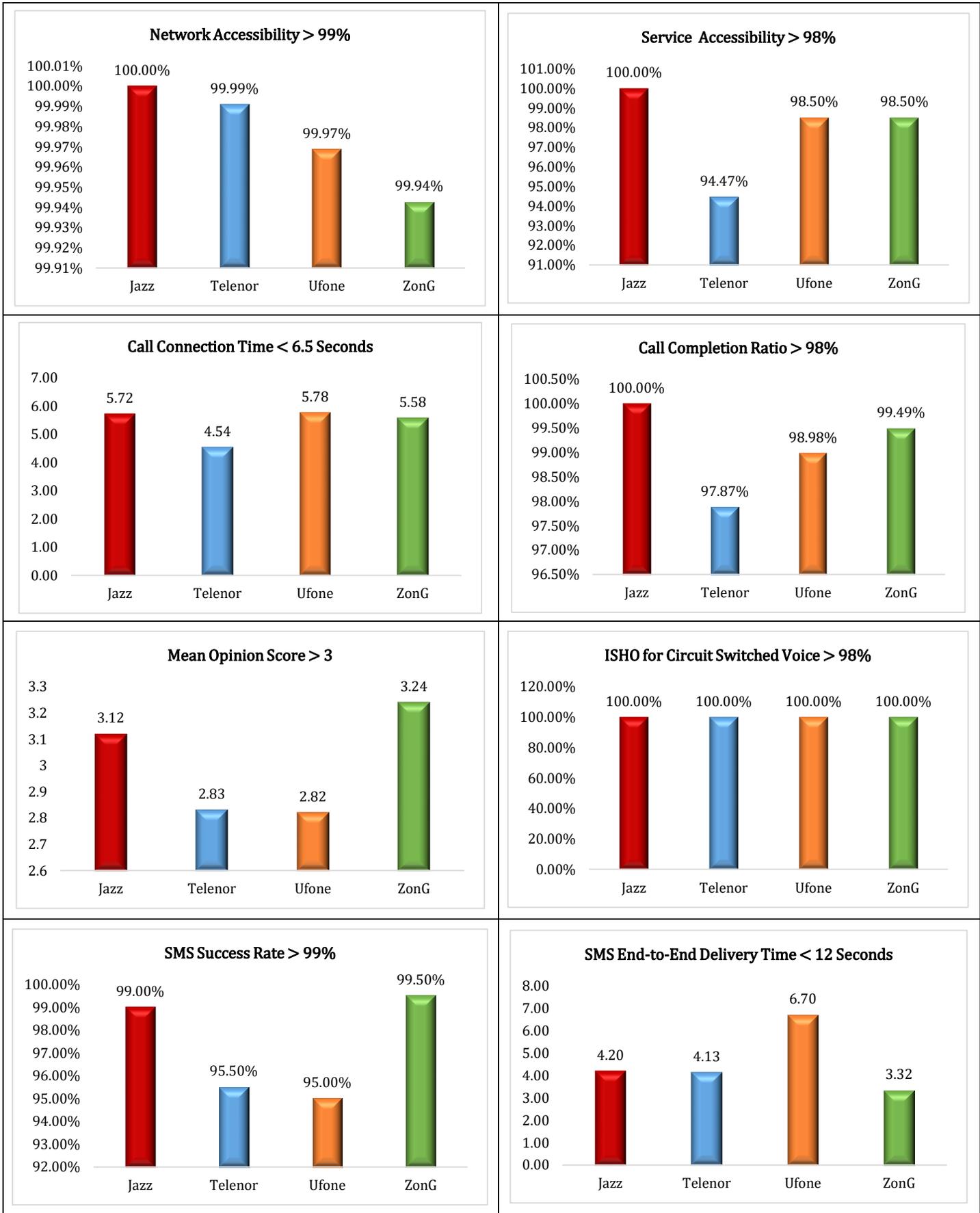
UFONE 3G COVERAGE (RSCP) - BADIN



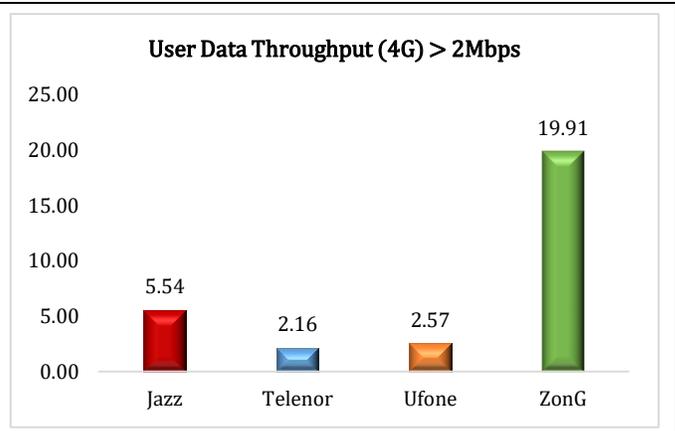
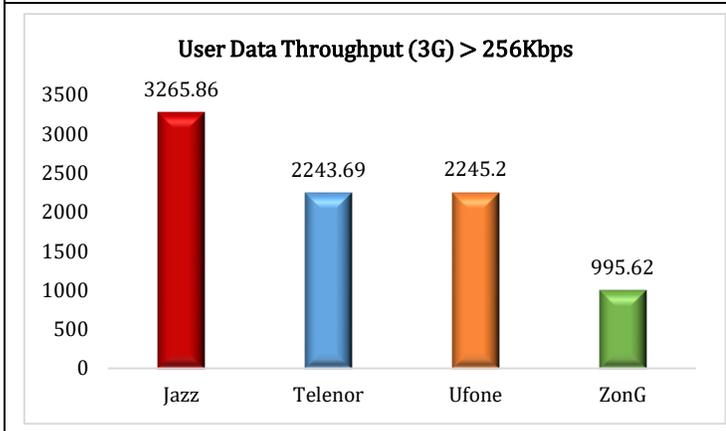
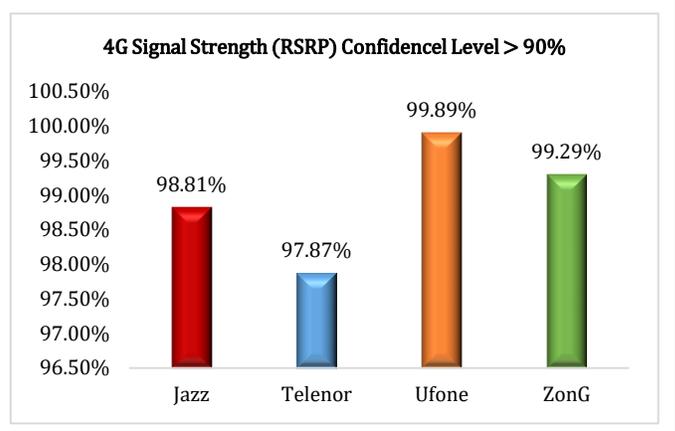
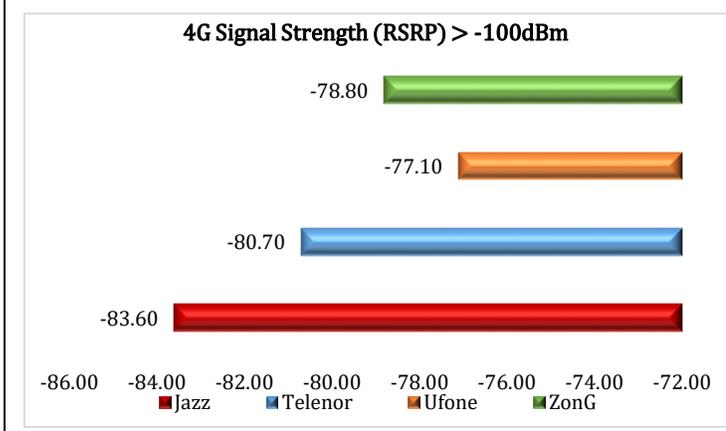
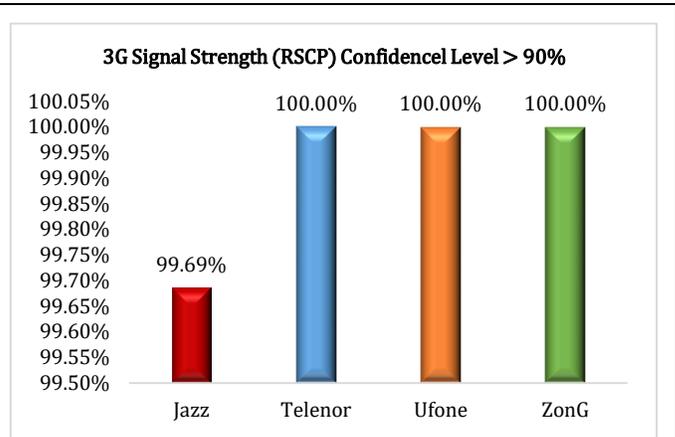
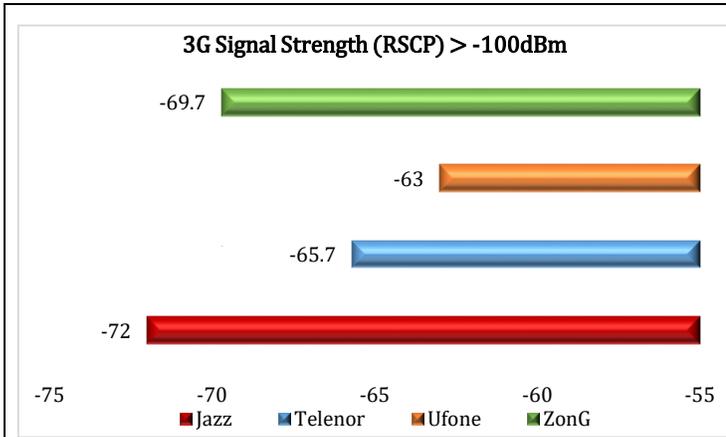
ZONG 3G COVERAGE (RSCP) - BADIN



QUALITY OF SERVICE SURVEY RESULTS – BADIN

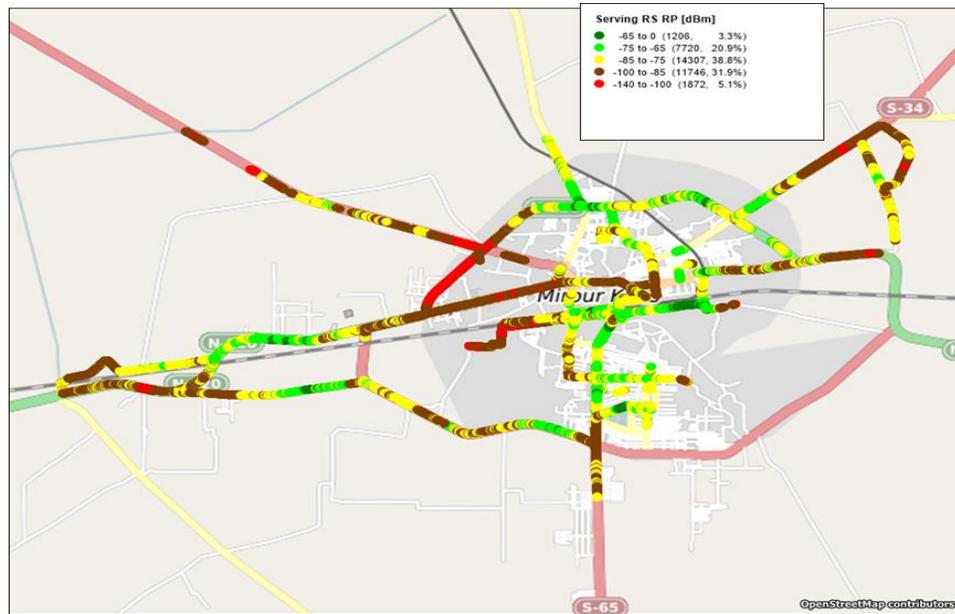


QUALITY OF SERVICE SURVEY RESULTS – BADIN

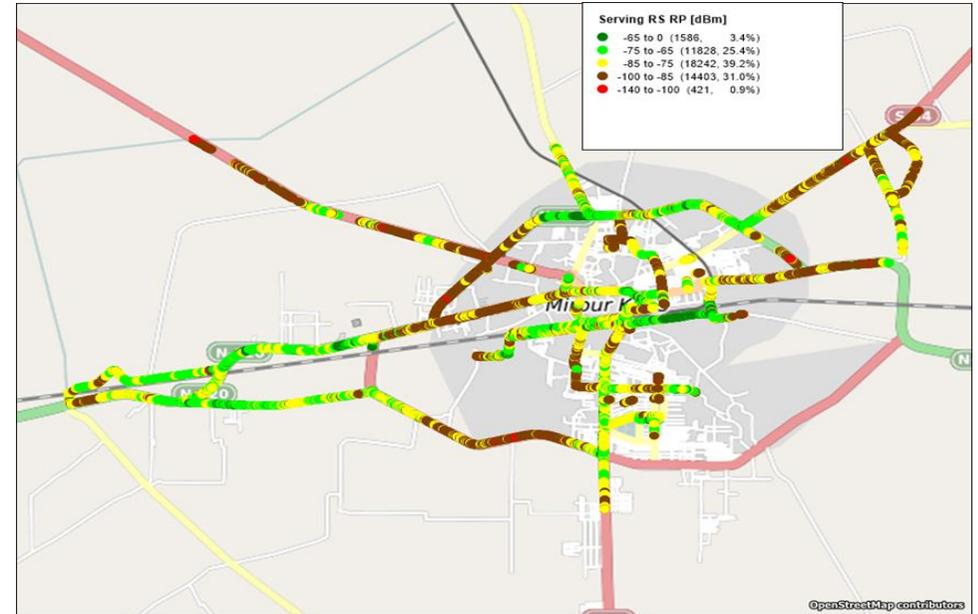


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

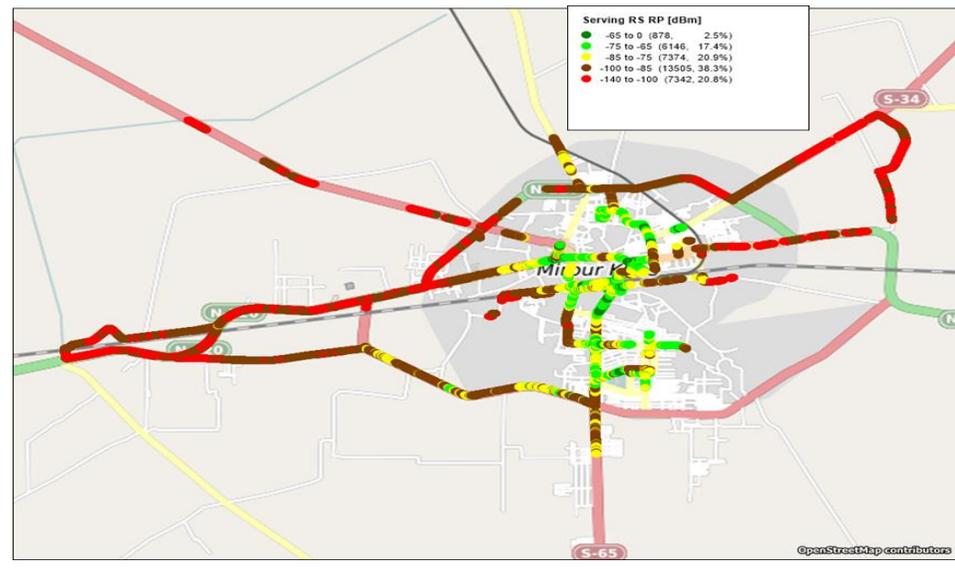
JAZZ 4G COVERAGE (RSRP) – MIRPURKHAS



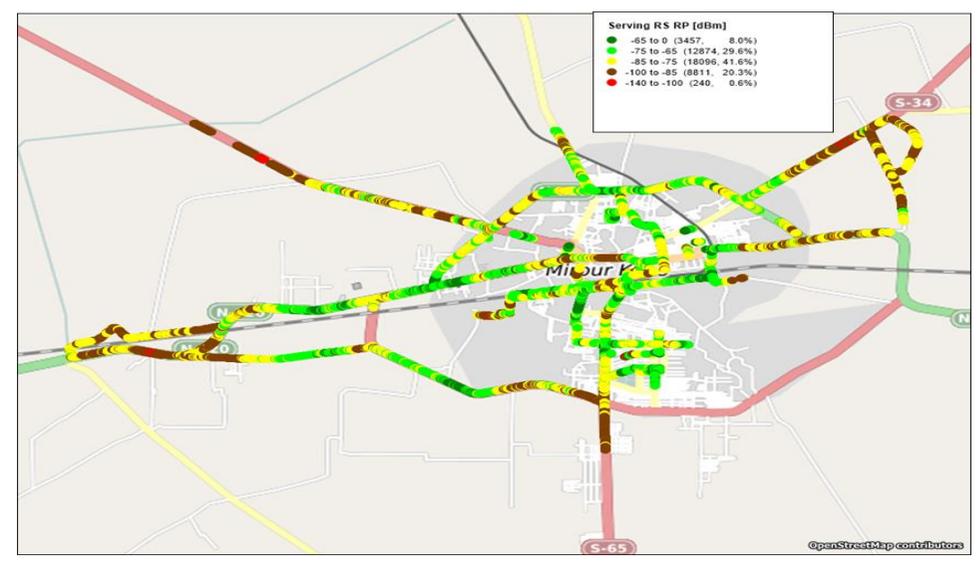
TELENOR 4G COVERAGE (RSRP) - MIRPURKHAS



UFONE 4G COVERAGE (RSRP) - MIRPURKHAS

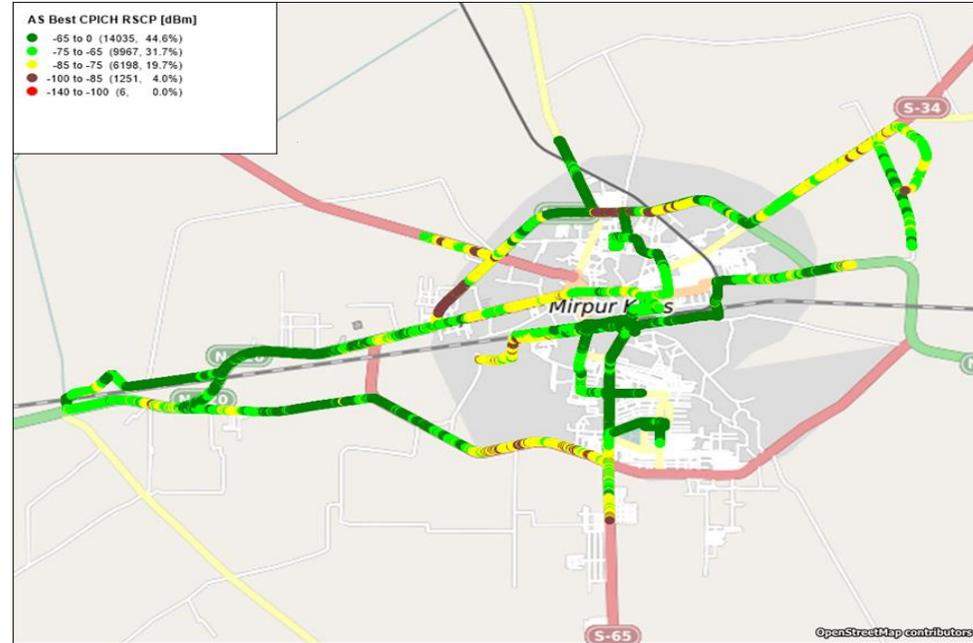


ZONG 4G COVERAGE (RSRP) - MIRPURKHAS

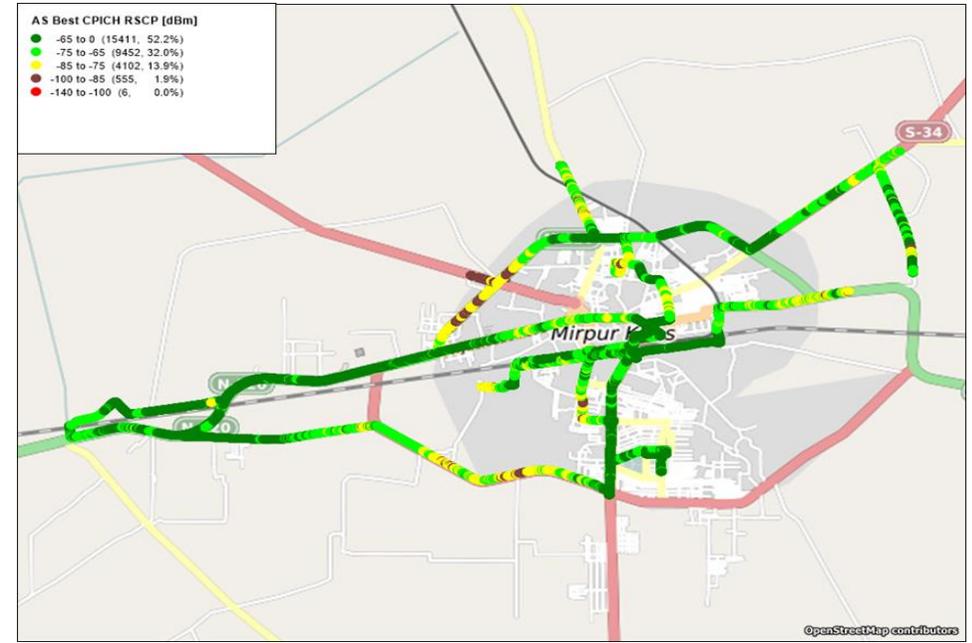


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

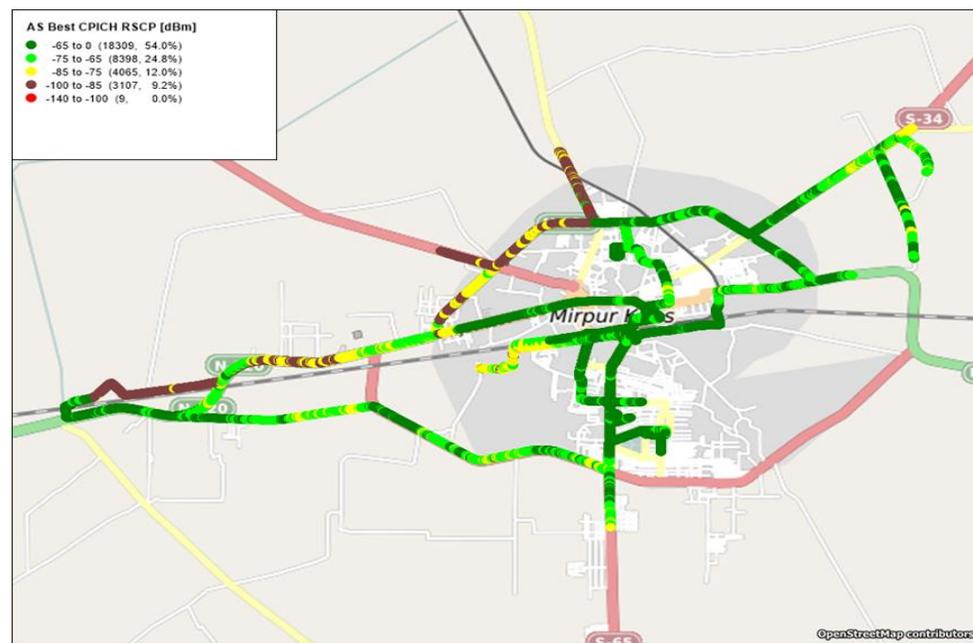
JAZZ 3G COVERAGE (RSCP) - MIRPURKHAS



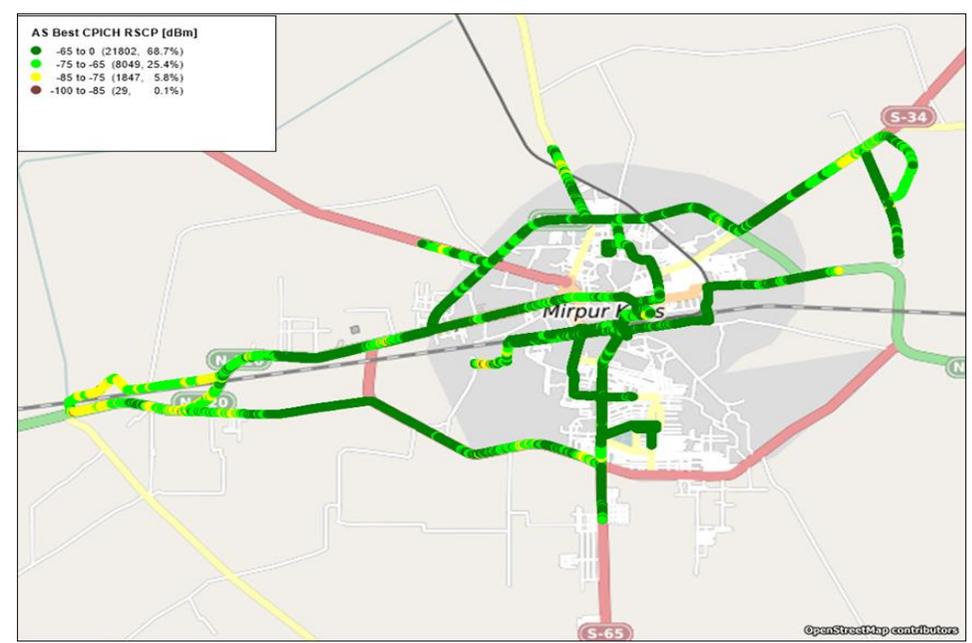
TELENOR 3G COVERAGE (RSCP) - MIRPURKHAS



UFONE 3G COVERAGE (RSCP) - MIRPURKHAS

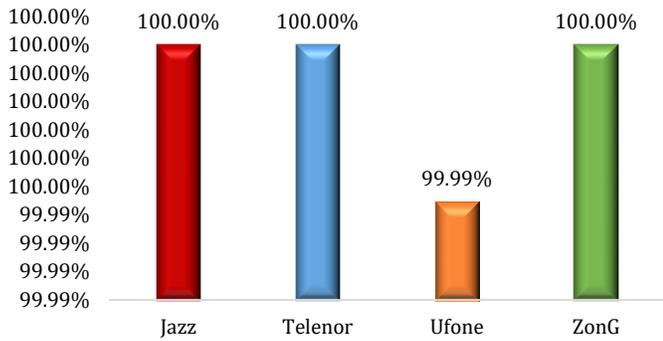


ZONG 3G COVERAGE (RSCP) - MIRPURKHAS

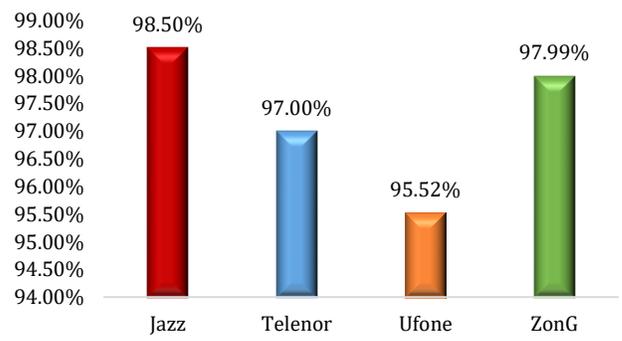


QUALITY OF SERVICE SURVEY RESULTS – MIRPUR KHAS

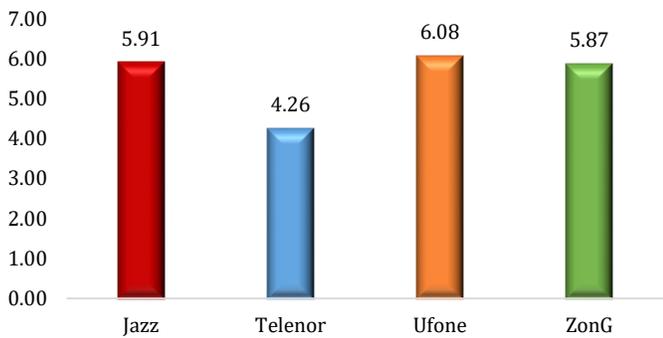
Network Accessibility > 99%



Service Accessibility > 98%



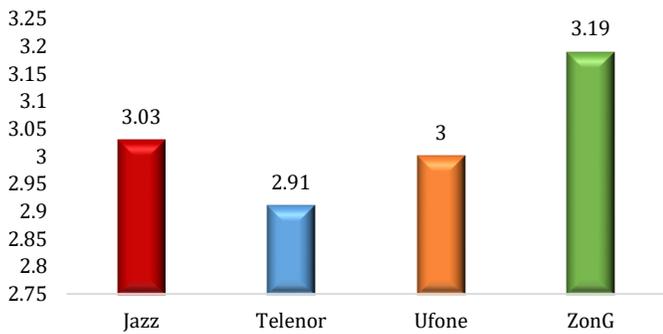
Call Connection Time < 6.5 Seconds



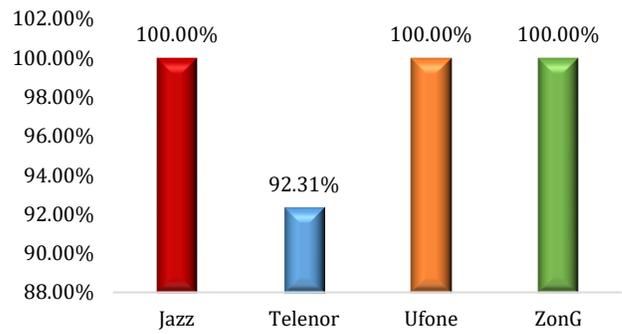
Call Completion Ratio > 98%



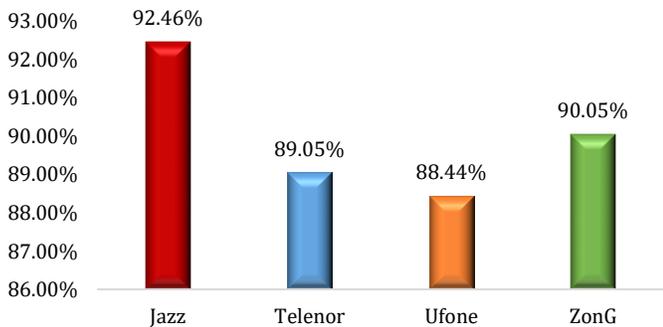
Mean Opinion Score > 3



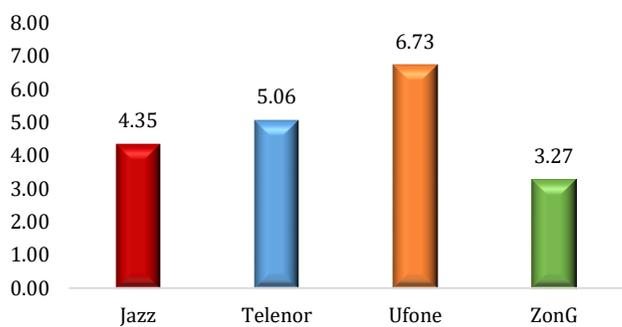
ISHO for Circuit Switched Voice > 98%



SMS Success Rate > 99%

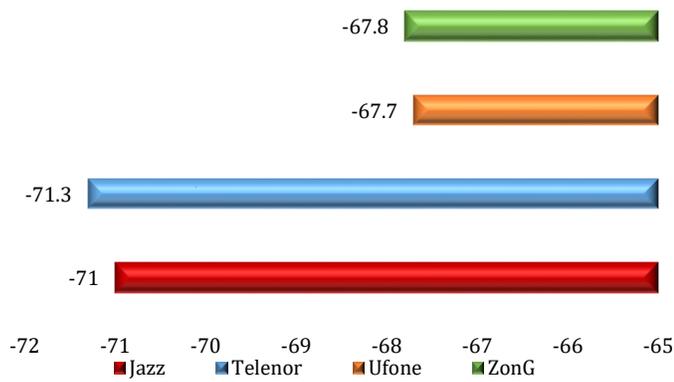


SMS End-to-End Delivery Time < 12 Seconds

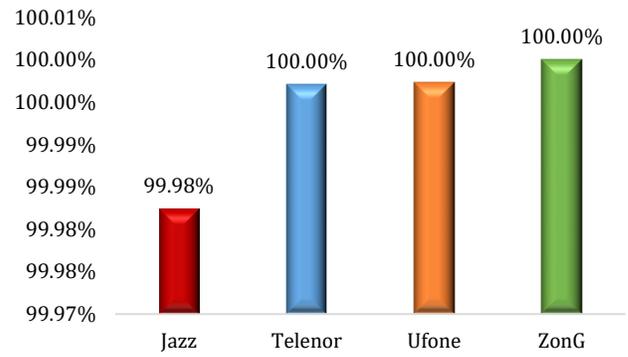


QUALITY OF SERVICE SURVEY RESULTS – MIRPUR KHAS

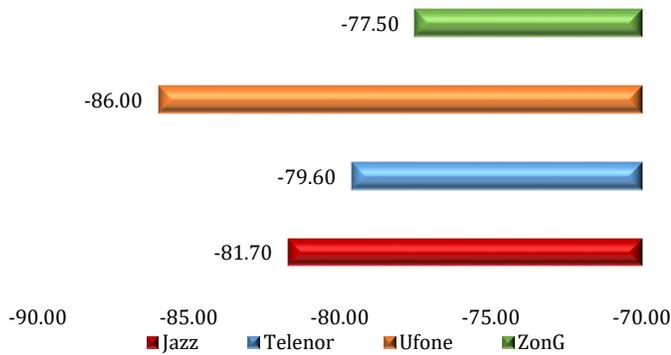
3G Signal Strength (RSCP) > -100dBm



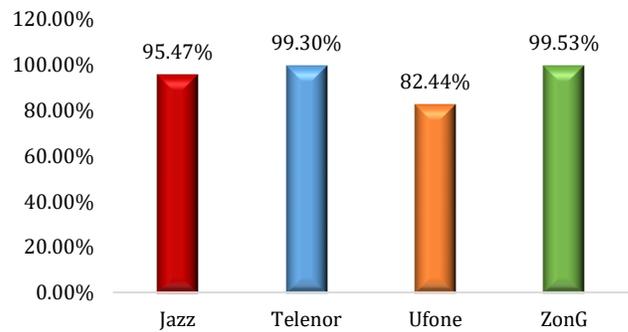
3G Signal Strength (RSCP) Confidencel Level > 90%



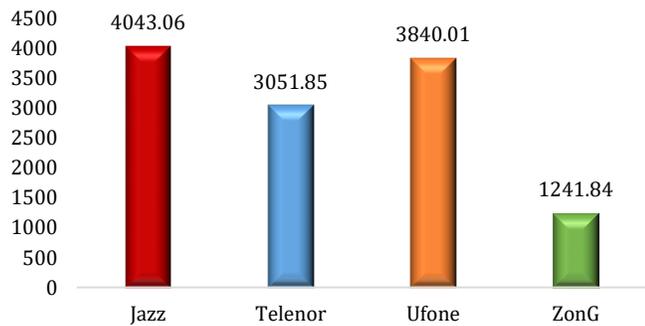
4G Signal Strength (RSRP) > -100dBm



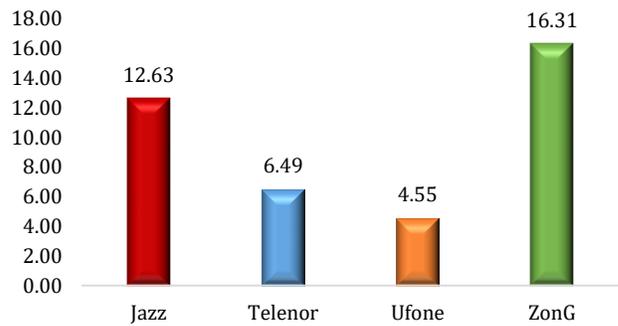
4G Signal Strength (RSRP) Confidencel Level > 90%



User Data Throughput (3G) > 256Kbps



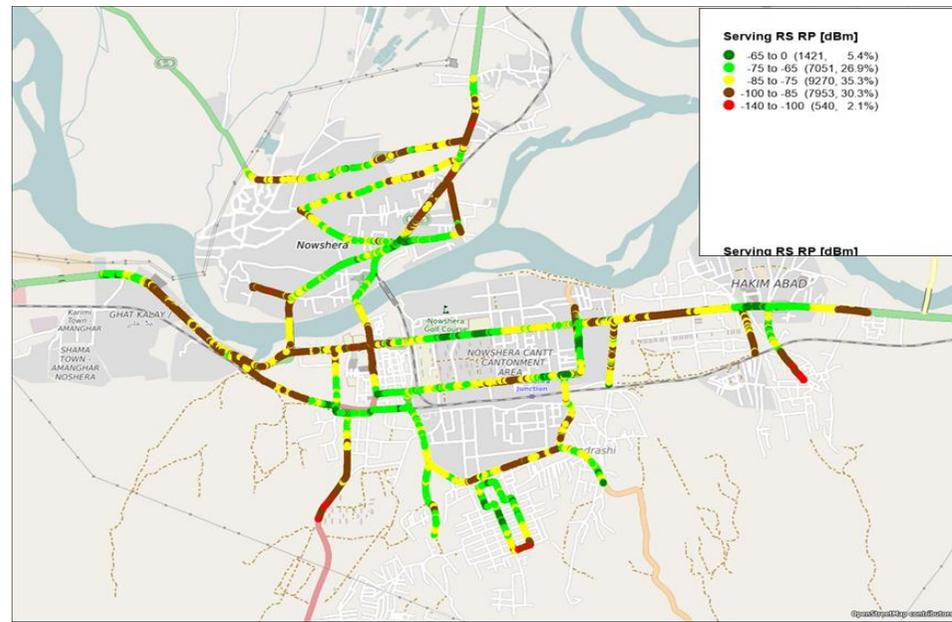
User Data Throughput (4G) > 2Mbps



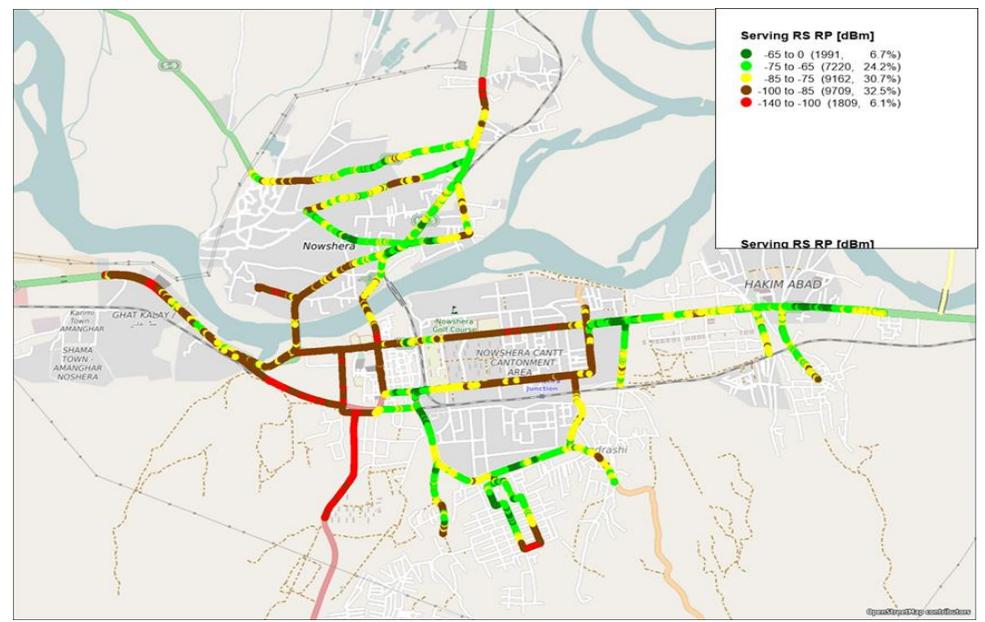
KHYBER PAKHTUNKHWA

4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

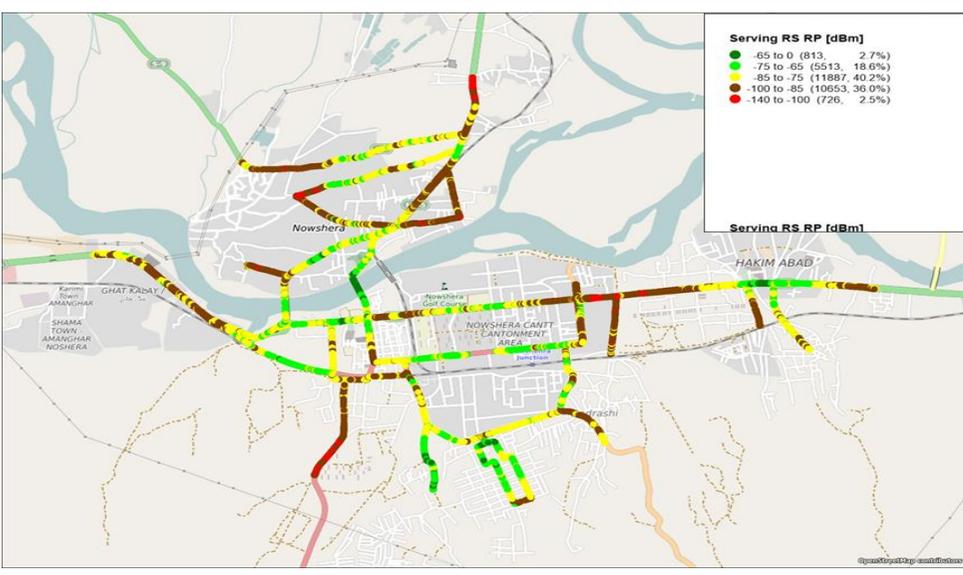
JAZZ 4G COVERAGE (RSRP) - NOWSHERA



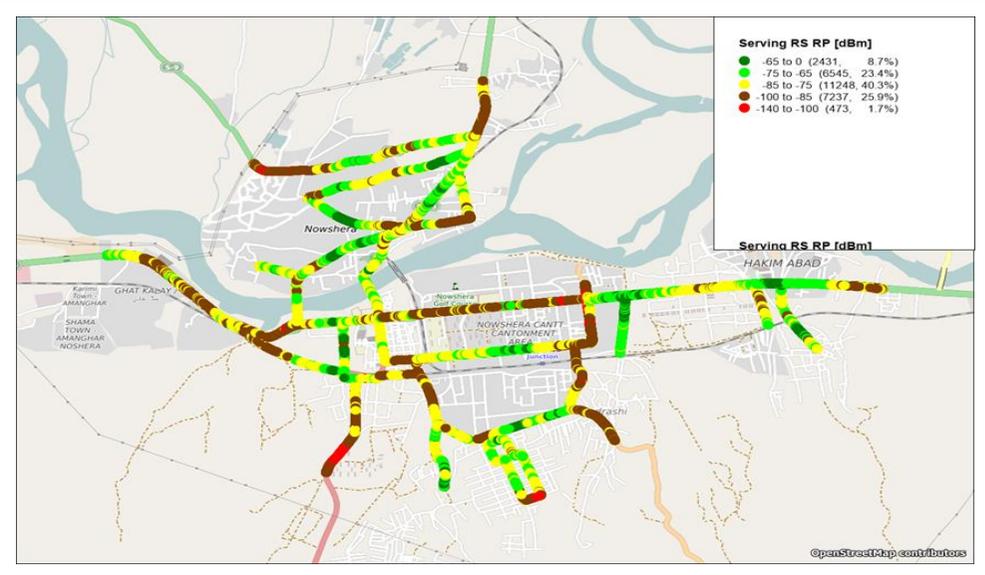
TELENOR 4G COVERAGE (RSRP) - NOWSHERA



UFONE 4G COVERAGE (RSRP) - NOWSHERA

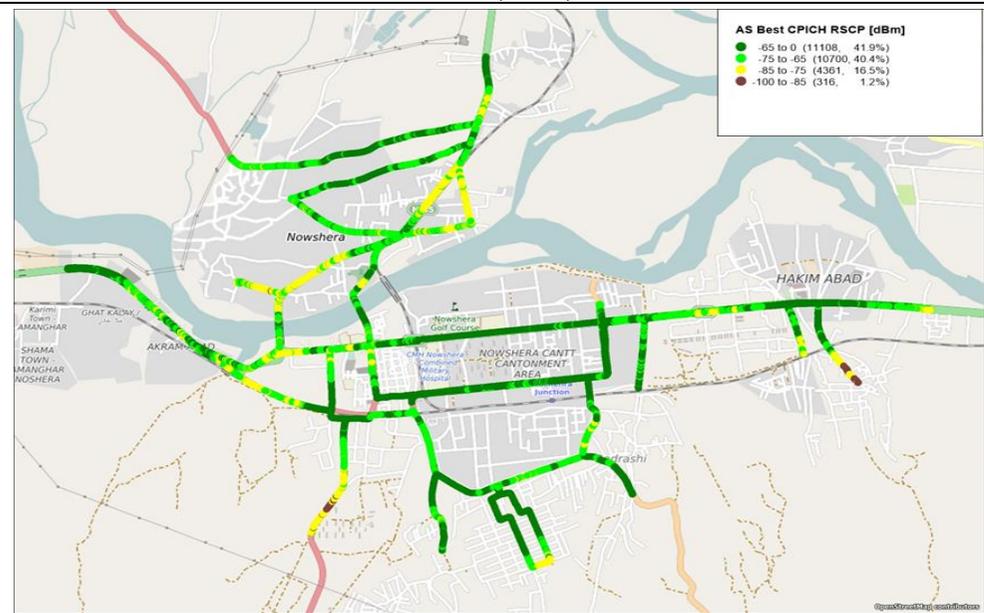


ZONG 4G COVERAGE (RSRP) - NOWSHERA

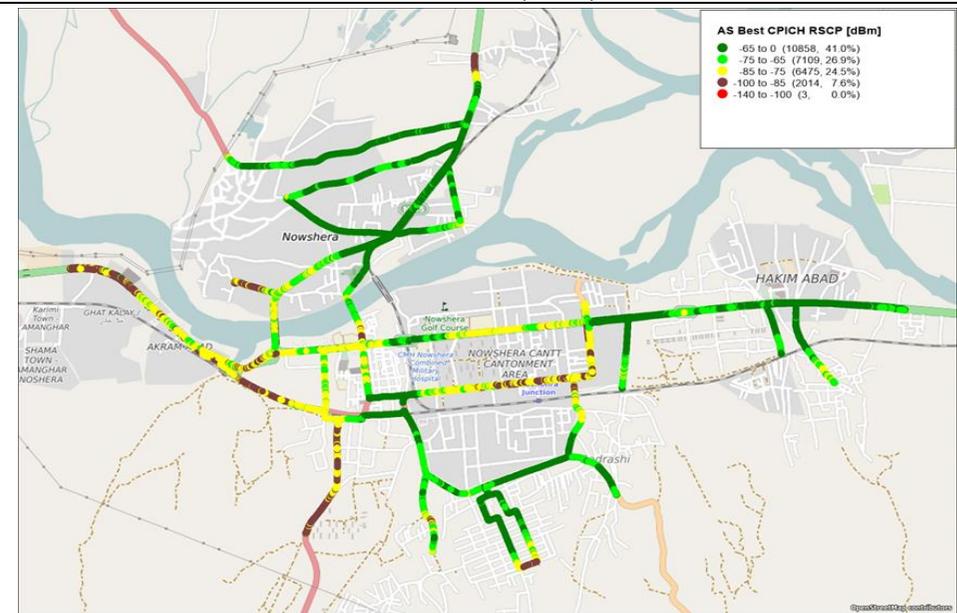


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

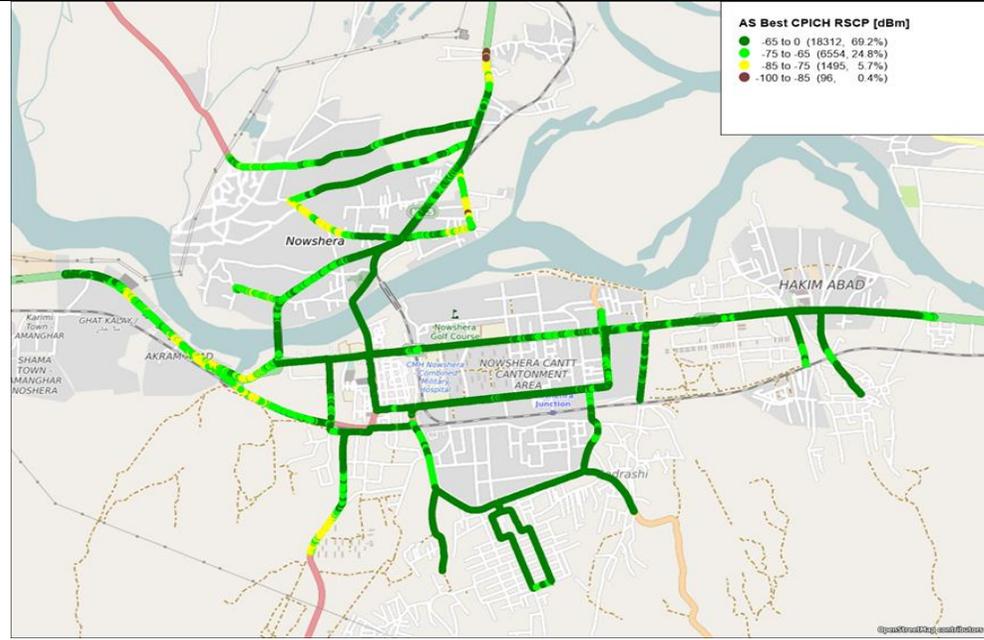
JAZZ 3G COVERAGE (RSCP) - NOWSHERA



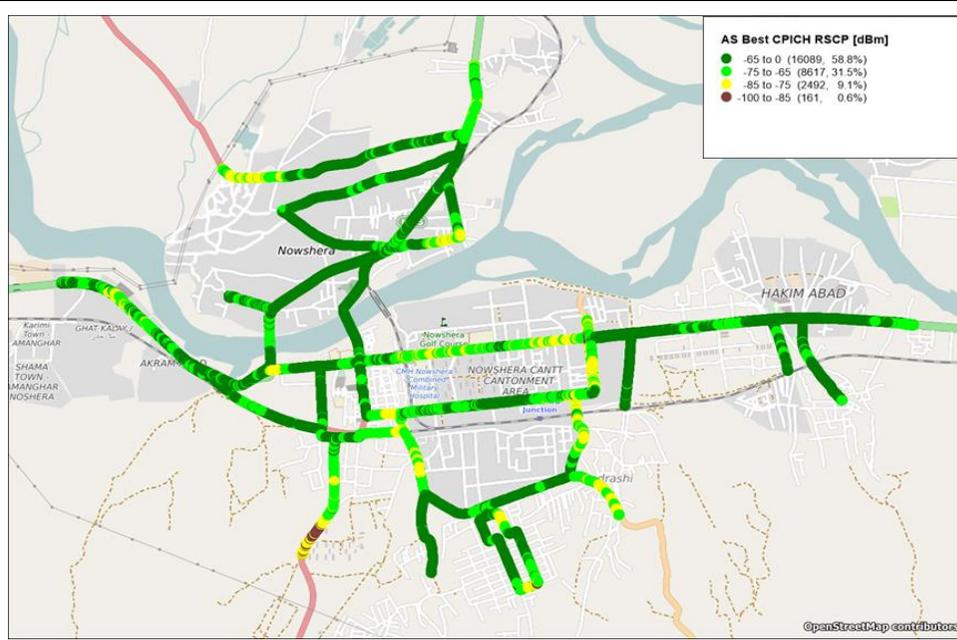
TELENOR 3G COVERAGE (RSCP) - NOWSHERA



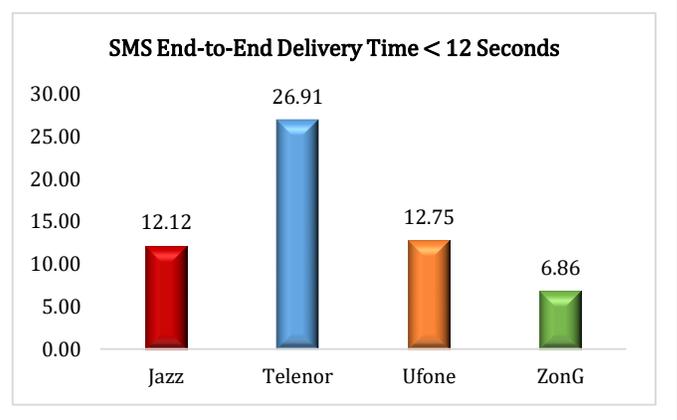
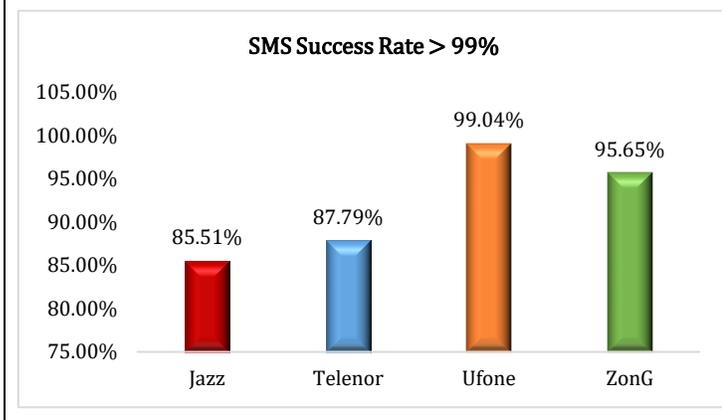
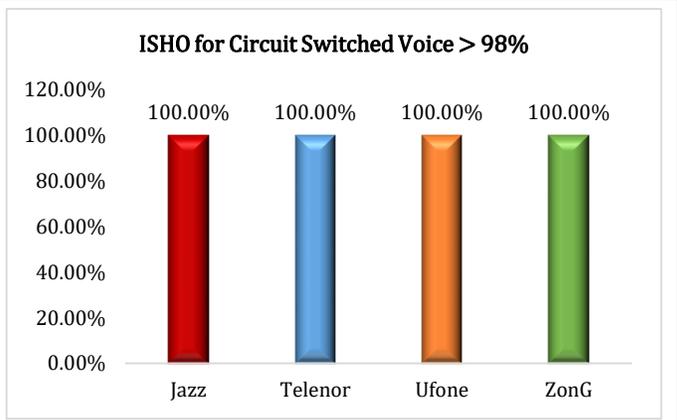
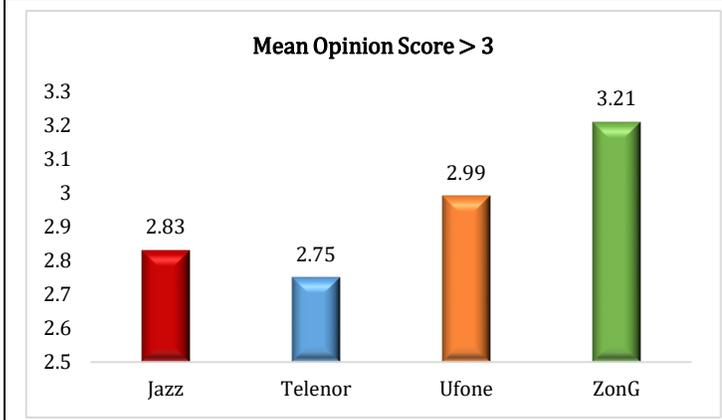
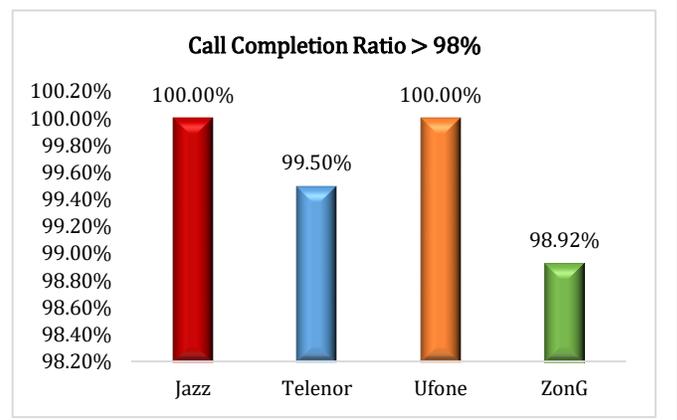
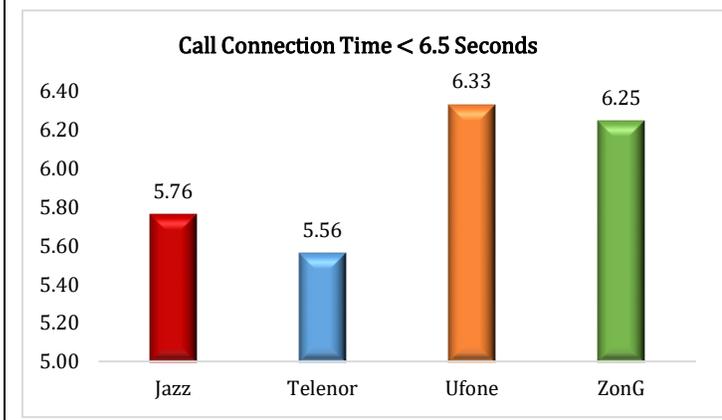
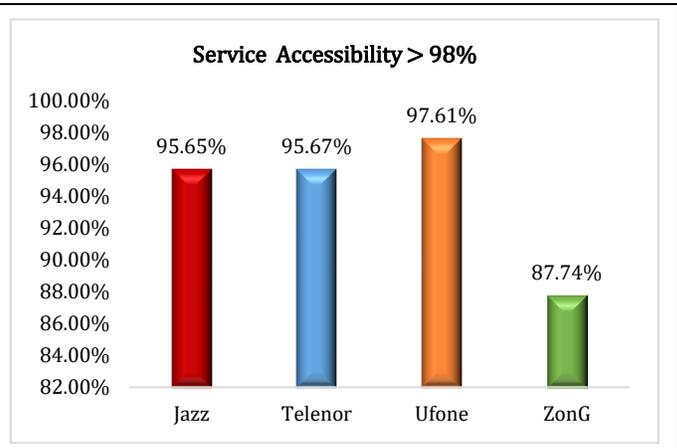
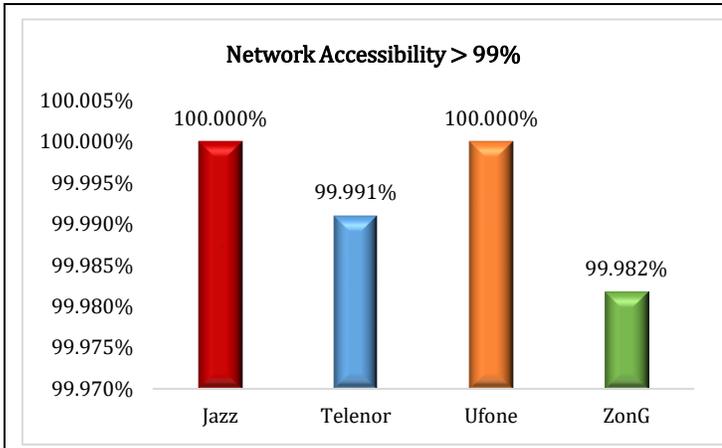
UFONE 3G COVERAGE (RSCP) - NOWSHERA



ZONG 3G COVERAGE (RSCP) - NOWSHERA



QUALITY OF SERVICE SURVEY RESULTS – NOWSHERA



QUALITY OF SERVICE SURVEY RESULTS – NOWSHERA

