

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

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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 <sup>nd</sup> ~ 4 <sup>th</sup> Feb, 2021
2.		Multan	10 <sup>th</sup> ~ 15 <sup>th</sup> Feb, 2021
3.		Chakwal	16 <sup>th</sup> ~ 18 <sup>th</sup> Feb, 2021
4.		Bahawalpur	2 <sup>nd</sup> ~ 4 <sup>th</sup> Mar, 2021
5.		Mianwali	16 <sup>th</sup> ~ 17 <sup>th</sup> Mar, 2021
6.		Narowal	24 <sup>th</sup> ~ 25 <sup>th</sup> Mar, 2021
7.	Sindh	Nawabshah	2 <sup>nd</sup> ~ 4 <sup>th</sup> & 11 <sup>th</sup> Feb, 2021
8.		Sukkur	9 <sup>th</sup> ~ 11 <sup>th</sup> Feb, 2021
9.		Larkana	16 <sup>th</sup> ~ 18 <sup>th</sup> Feb, 2021
10.		Sanghar	2 <sup>nd</sup> ~ 3 <sup>rd</sup> Mar, 2021
11.		Badin	9 <sup>th</sup> ~ 10 <sup>th</sup> Mar, 2021
12.		Mirpur Khas	16 <sup>th</sup> ~ 17 <sup>th</sup> Mar, 2021
13.	Khyber Pakhtunkhwa	Nowshera	1 <sup>st</sup> ~ 2 <sup>nd</sup> 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. "*SmartBenchmark*". 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, Mianwali, 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, Sukkur, 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 COMPLETION 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 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> & 4<sup>th</sup> 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 <sup>st</sup>
2.	Jazz	25	1	2 <sup>nd</sup>
3.	Telenor	25	1	2 <sup>nd</sup>
4.	Ufone	23	3	3 <sup>rd</sup>

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 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>		
1.	ZonG	12	-	-	1	-	-	2	11	1 <sup>st</sup>	4 <sup>th</sup>
2.	Jazz	-	9	3	1	3	3	6	1	2 <sup>nd</sup>	3 <sup>rd</sup>
3.	Telenor	1	3	5	4	2	5	5	1	3 <sup>rd</sup>	2 <sup>nd</sup>
4.	Ufone	-	1	5	7	8	5	-	-	4 <sup>th</sup>	1 <sup>st</sup>

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 <sup>st</sup>
2.	Ufone	78	13	2 <sup>nd</sup>
3.	Jazz	67	24	3 <sup>rd</sup>
4.	Telenor	62	29	4 <sup>th</sup>

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 <sup>st</sup>
2.	Jazz	13	13	2 <sup>nd</sup>
3.	Ufone	8	18	3 <sup>rd</sup>
4.	Telenor	6	20	4 <sup>th</sup>

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.**

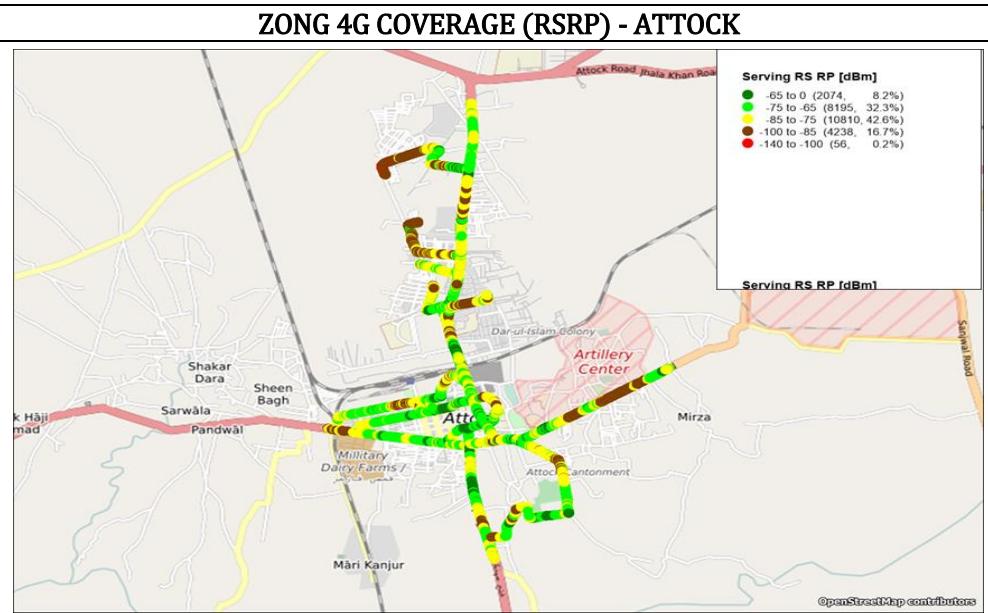
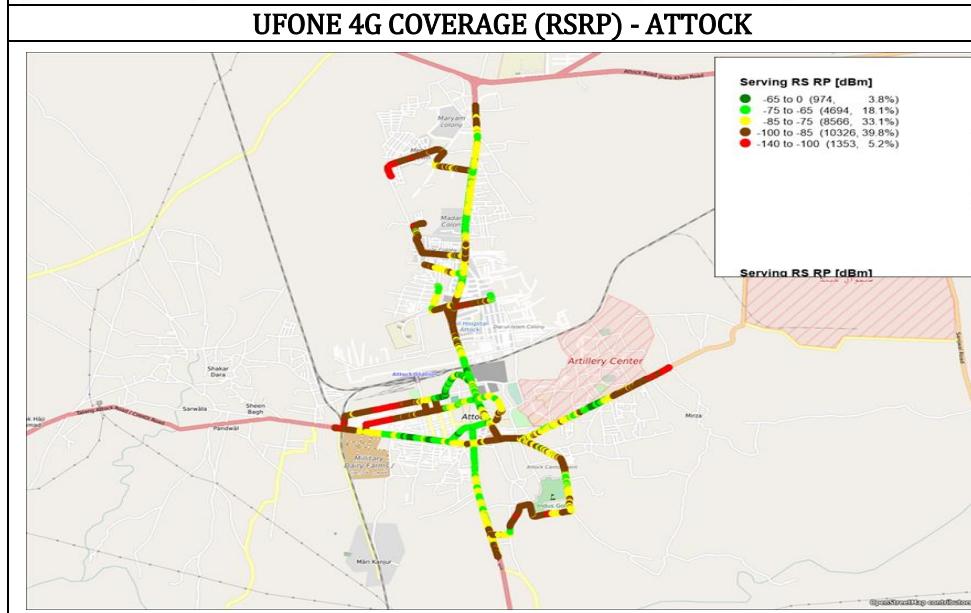
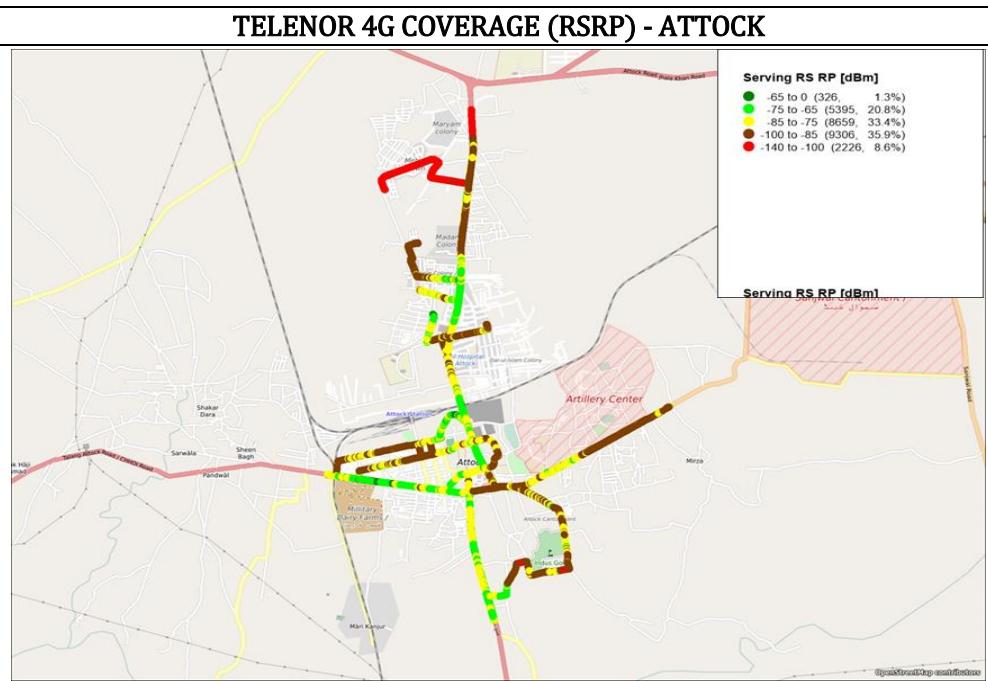
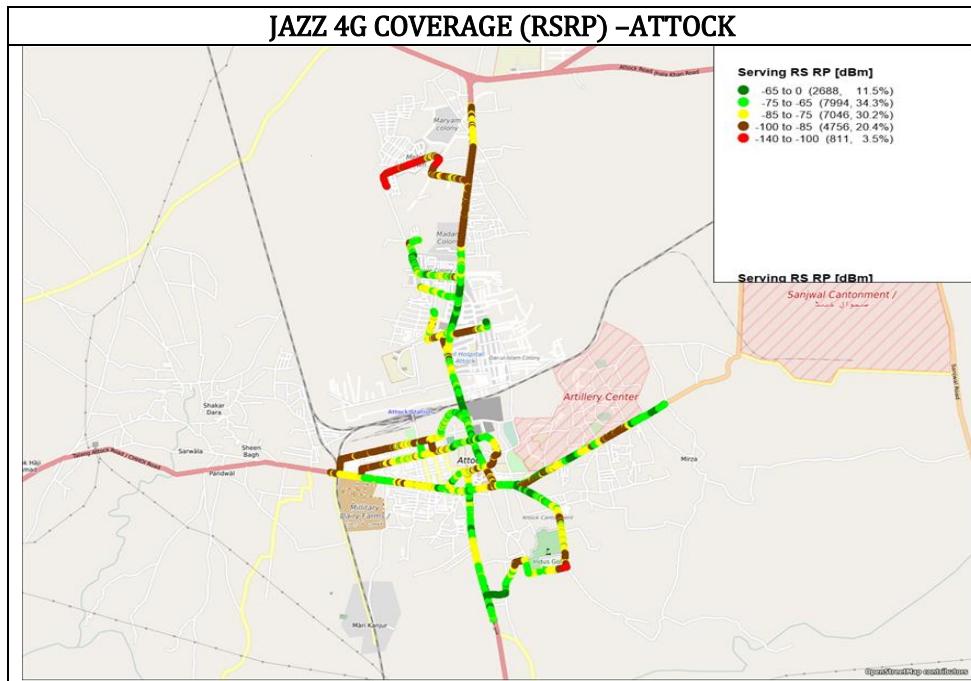
S. #.	Service	STANDING			
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
1.	Mobile Network Coverage	ZonG	Jazz & Telenor	Ufone	-
2.	Mobile Broadband	3G	Ufone	Telenor	Jazz
		4G	ZonG	Jazz	Telenor
3.	Voice	ZonG	Ufone	Jazz	Telenor
4.	SMS	ZonG	Jazz	Ufone	Telenor

Table 8.5: CMOs Overall Standing in QoS Survey

**ANNEX – A**

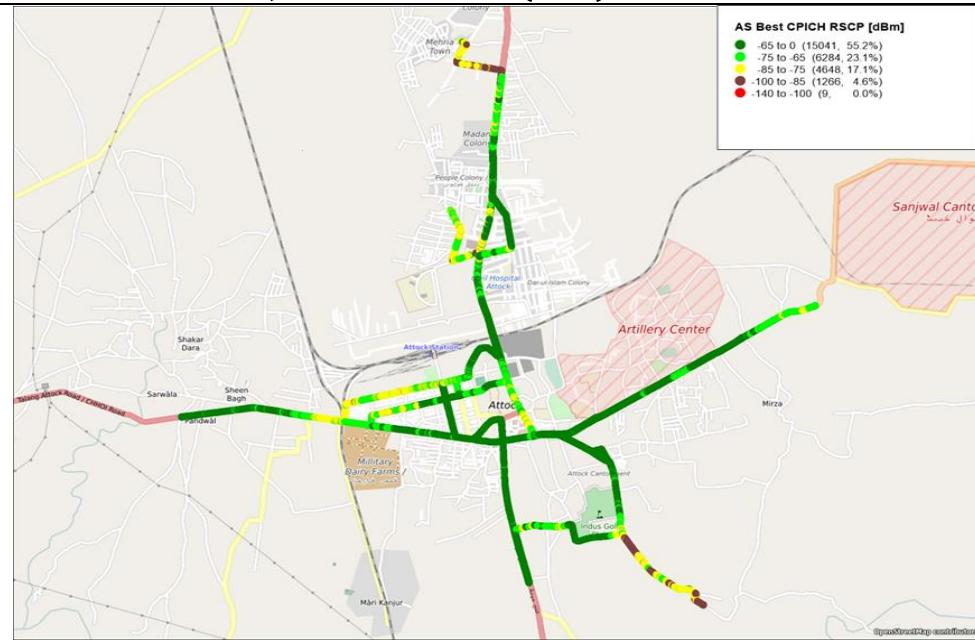
**PUNJAB**

## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

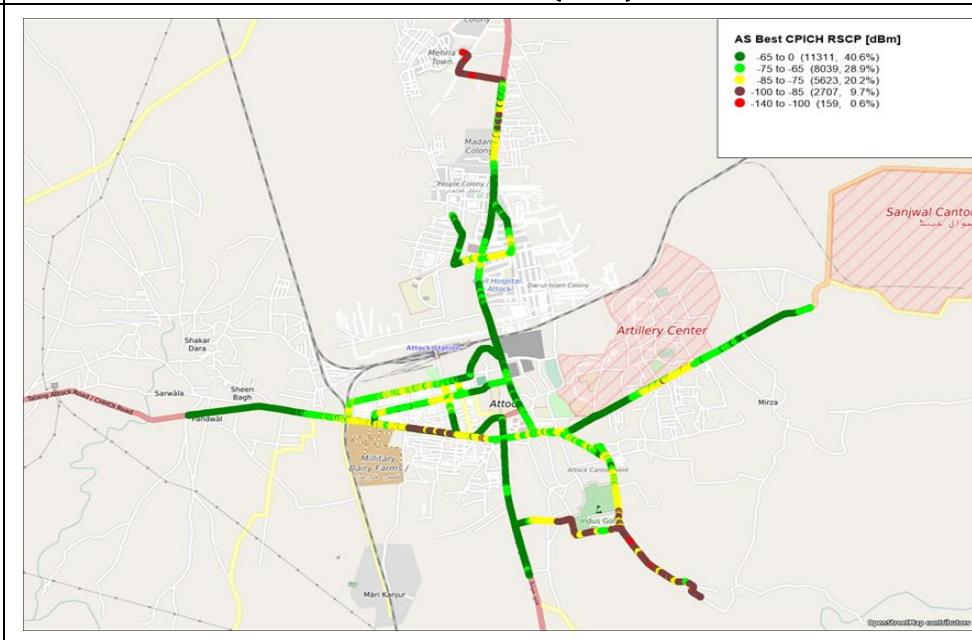


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

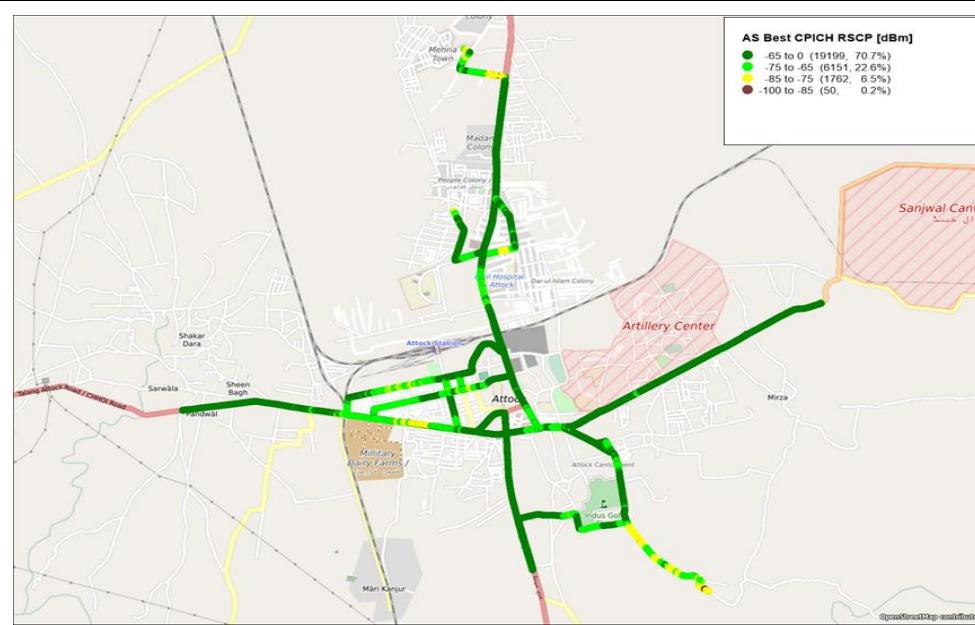
JAZZ 3G COVERAGE (RSCP) - ATTOCK



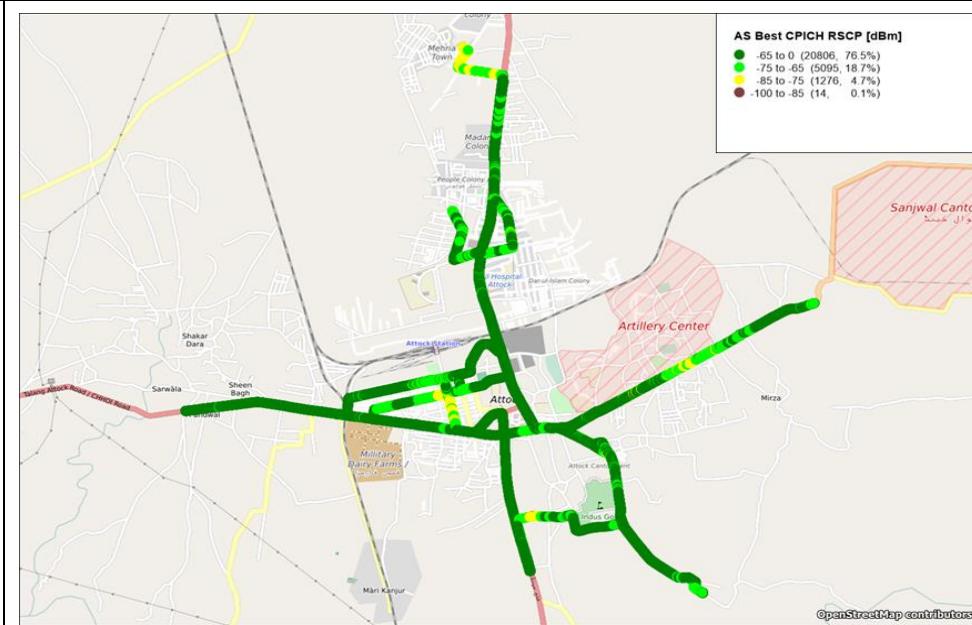
TELENOR 3G COVERAGE (RSCP) - ATTOCK



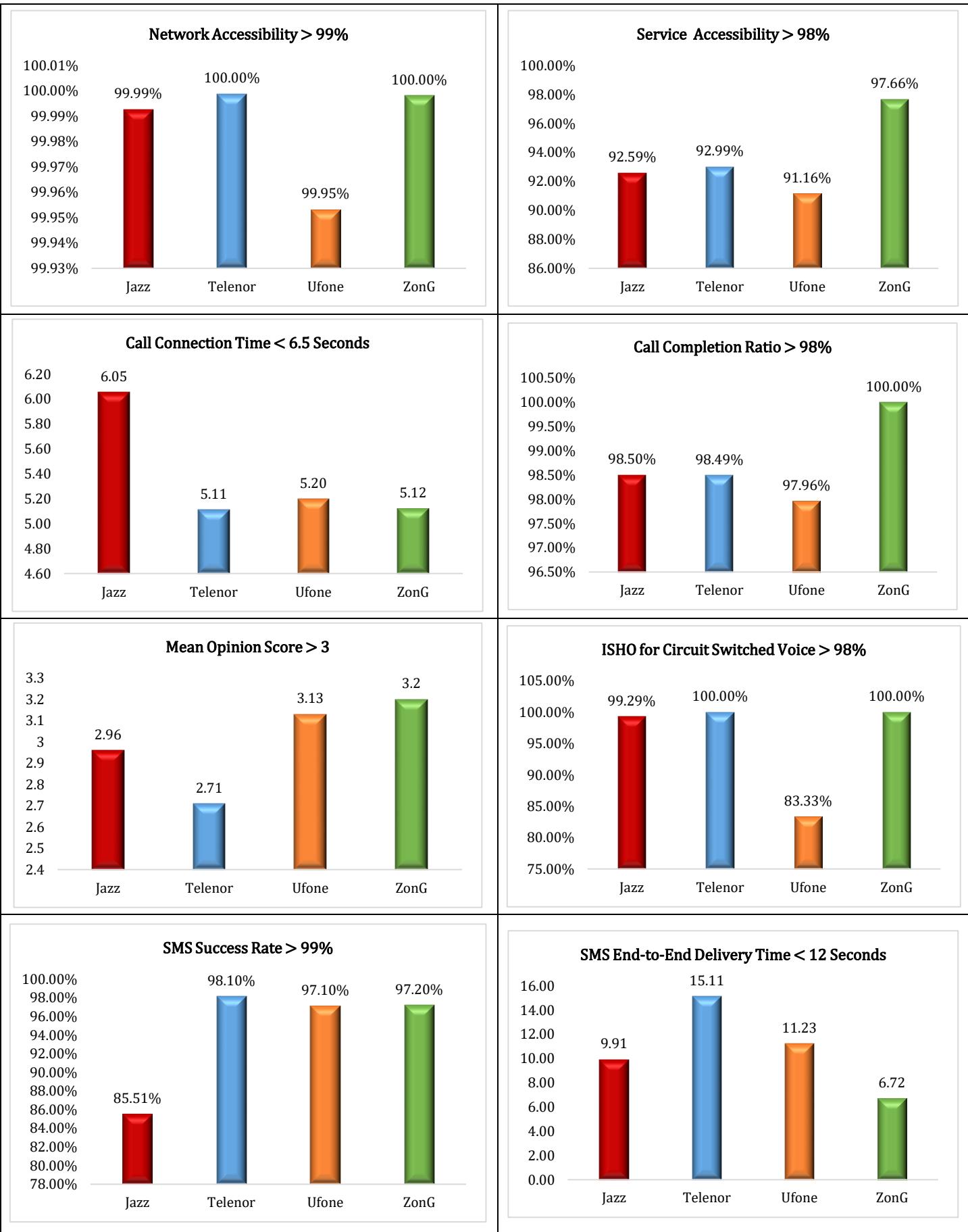
UFONE 3G COVERAGE (RSCP) - ATTOCK



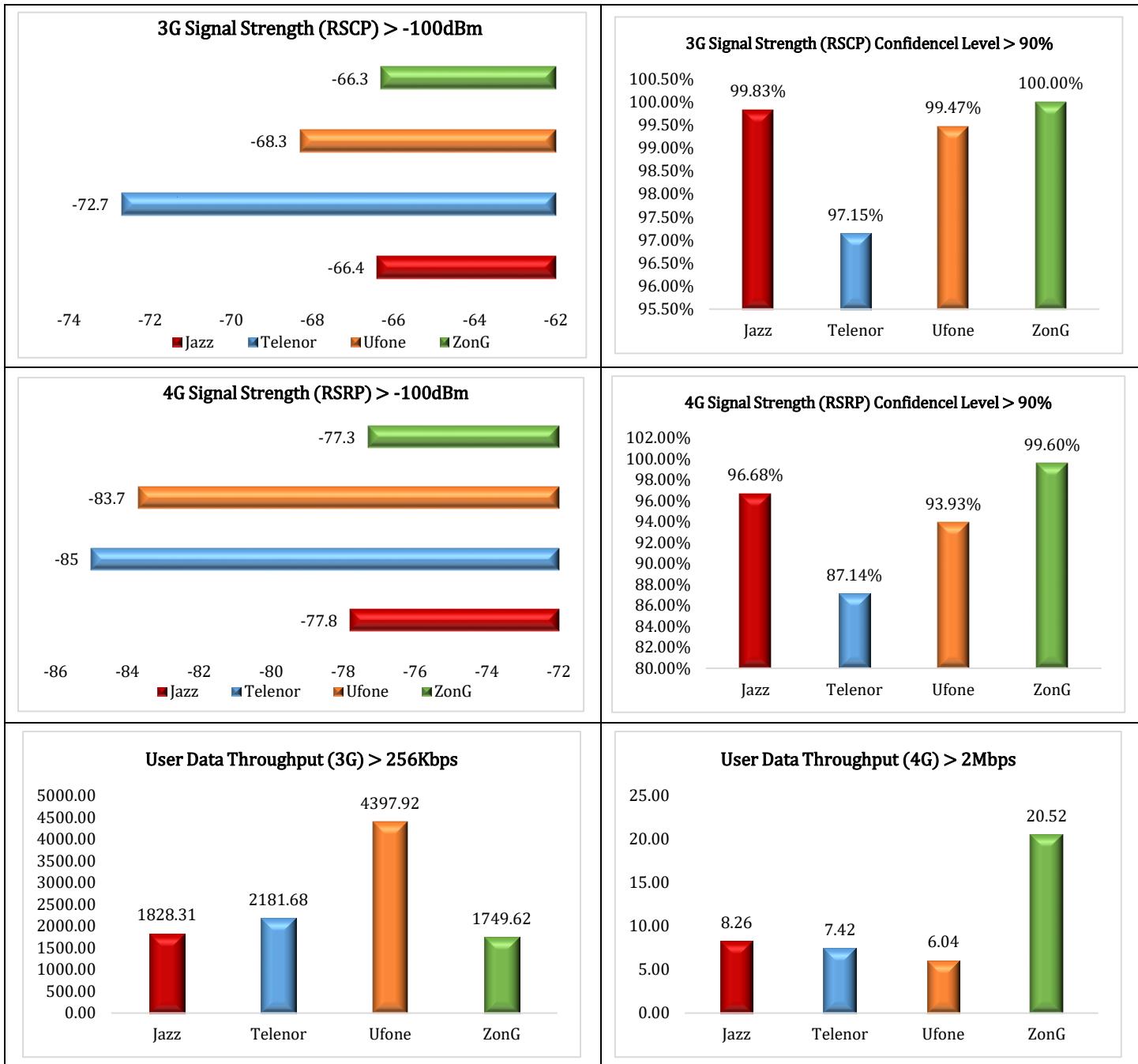
ZONG 3G COVERAGE (RSCP) - ATTOCK



## QUALITY OF SERVICE SURVEY RESULTS – ATTOCK

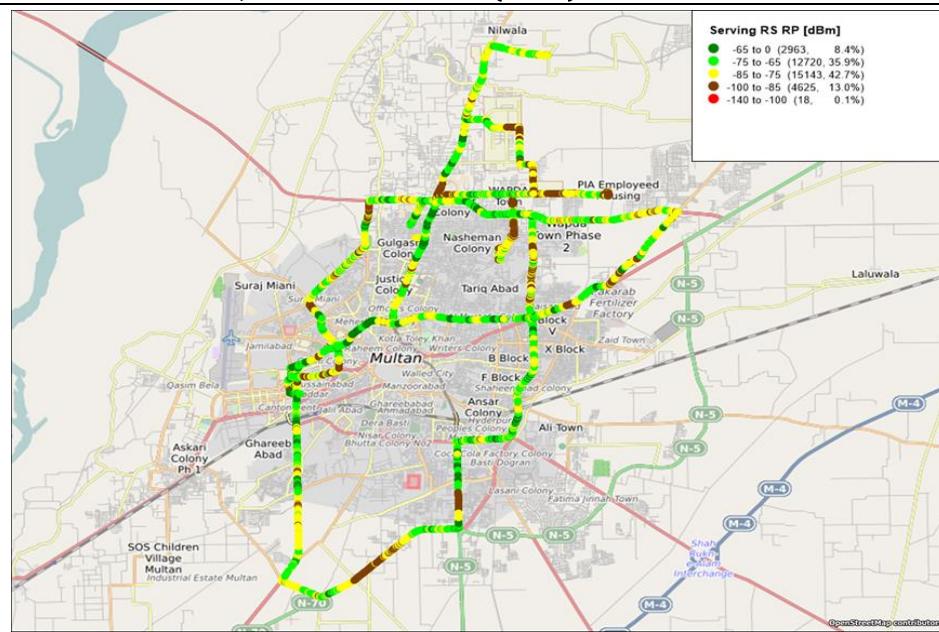


## QUALITY OF SERVICE SURVEY RESULTS – ATTOCK

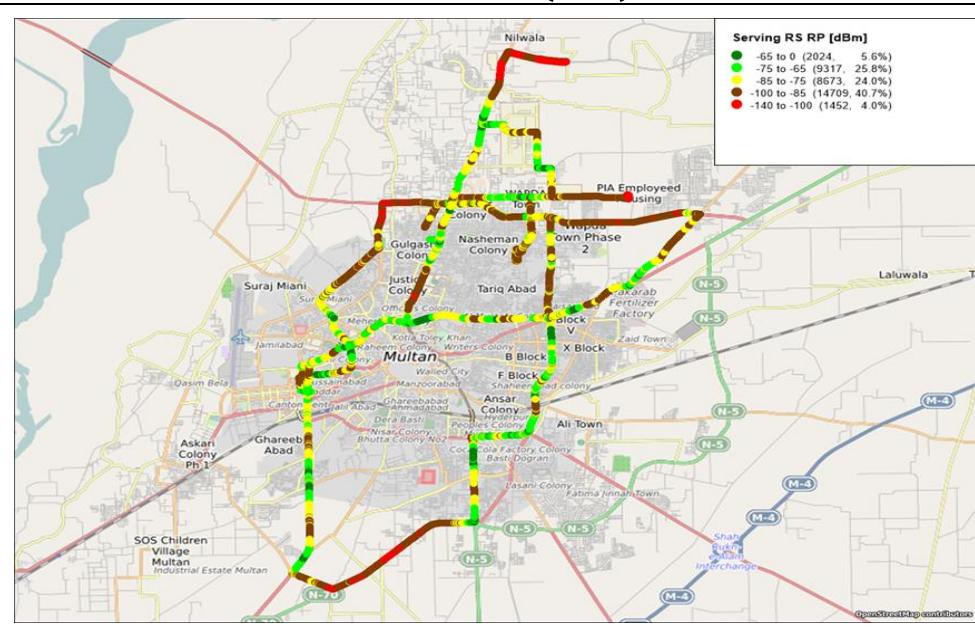


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

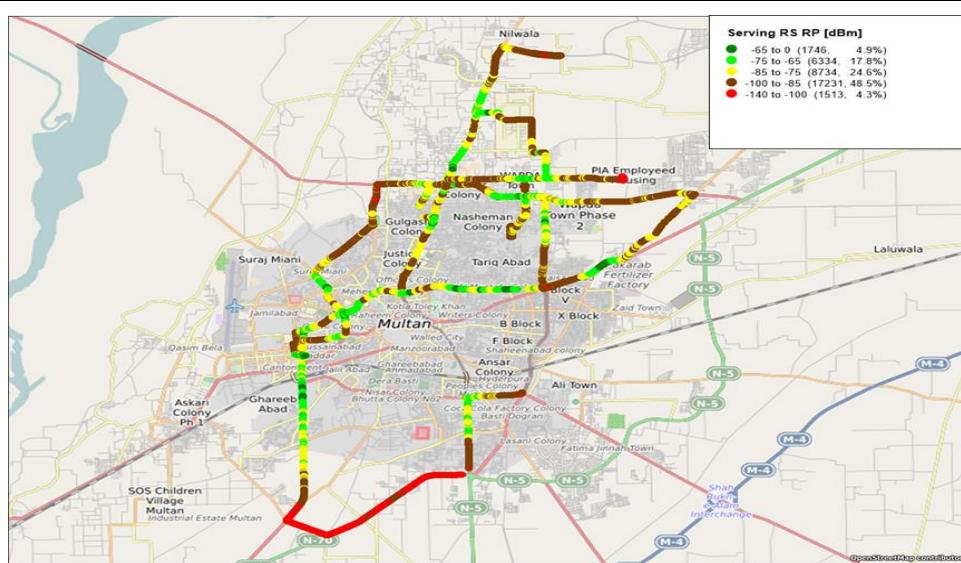
JAZZ 4G COVERAGE (RSRP) - MULTAN



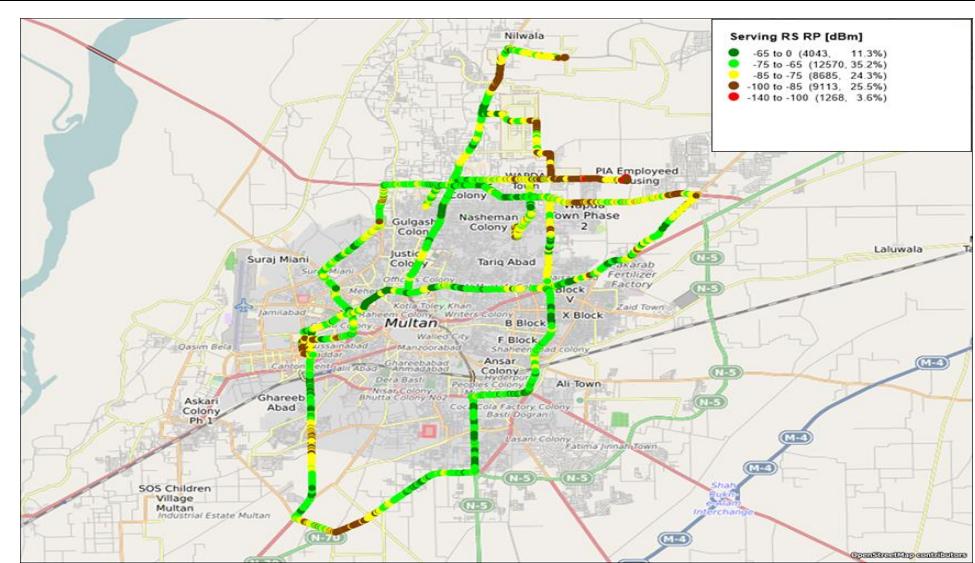
TELENOR 4G COVERAGE (RSRP) - MULTAN



UFONE 4G COVERAGE (RSRP) - MULTAN

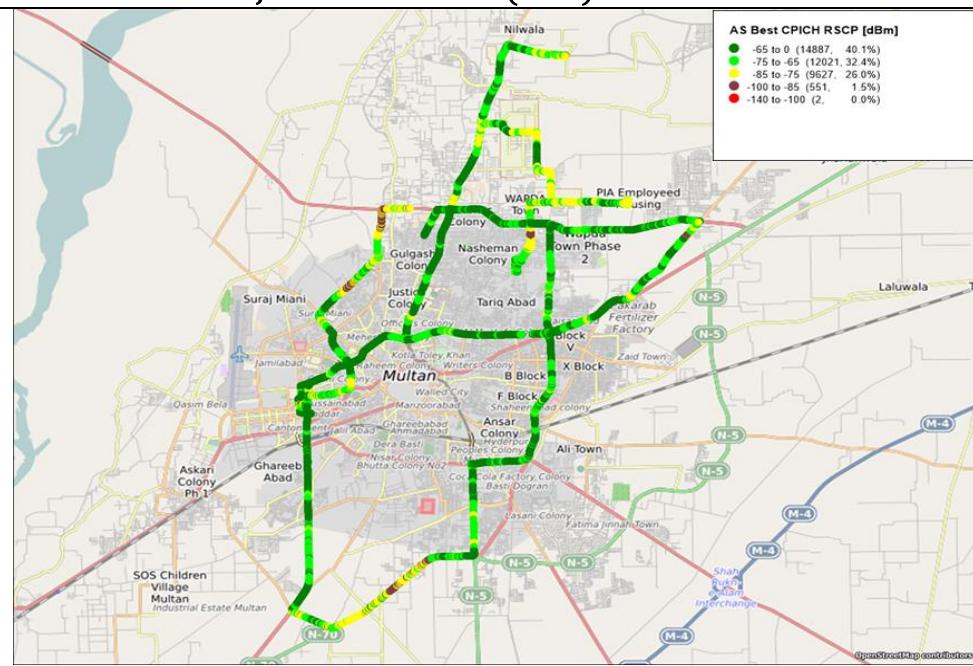


ZONG 4G COVERAGE (RSRP) - MULTAN

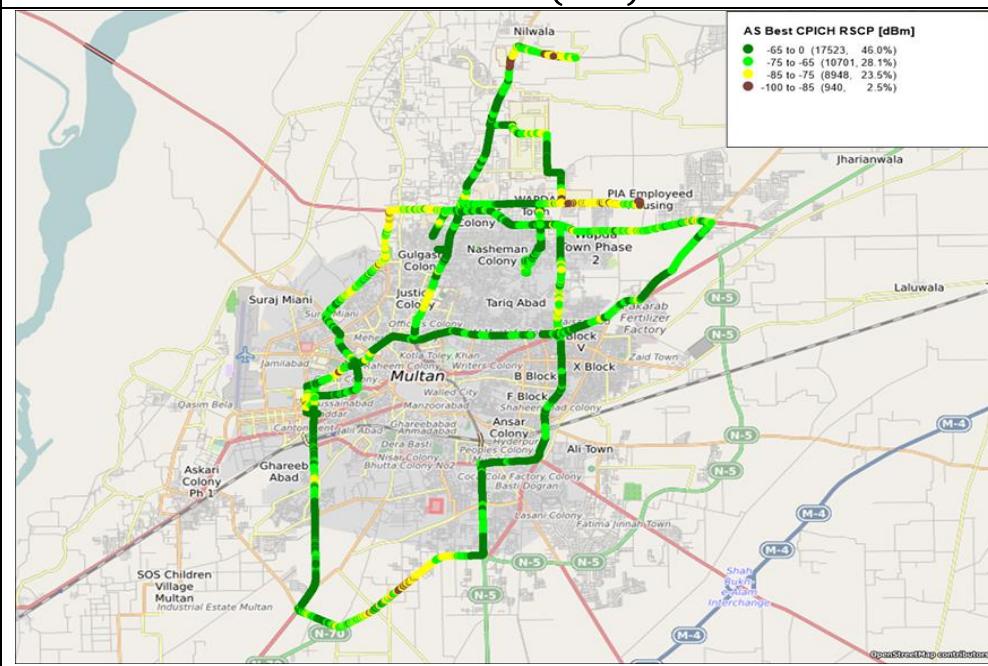


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

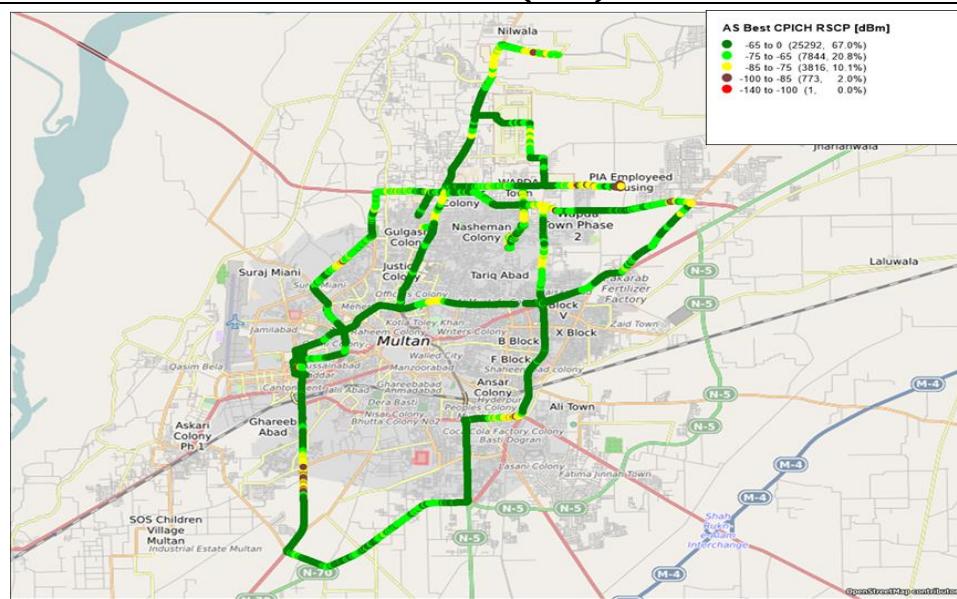
**JAZZ 3G COVERAGE (RSCP) - MULTAN**



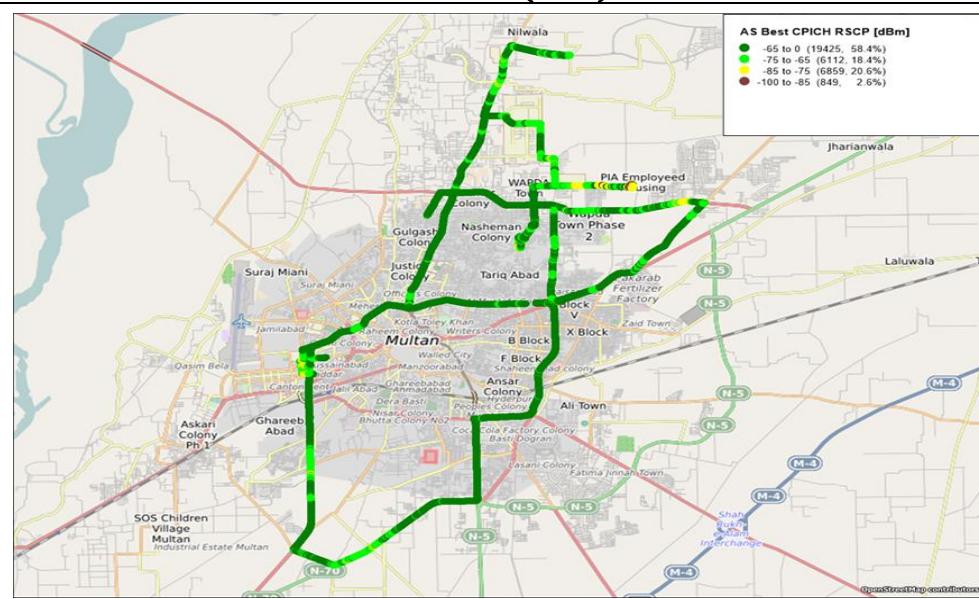
**TELENOR 3G COVERAGE (RSCP) - MULTAN**



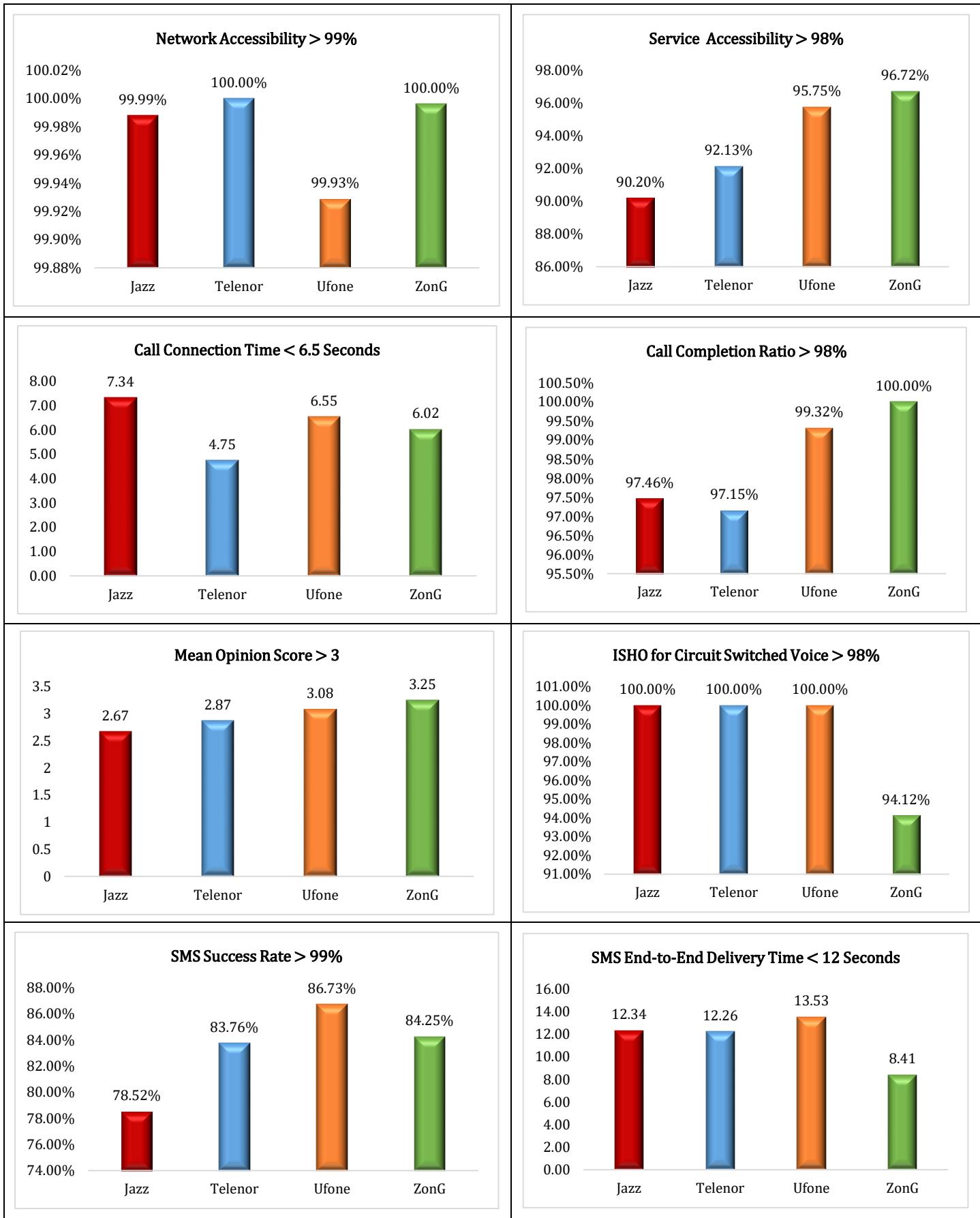
**UFONE 3G COVERAGE (RSCP) - MULTAN**



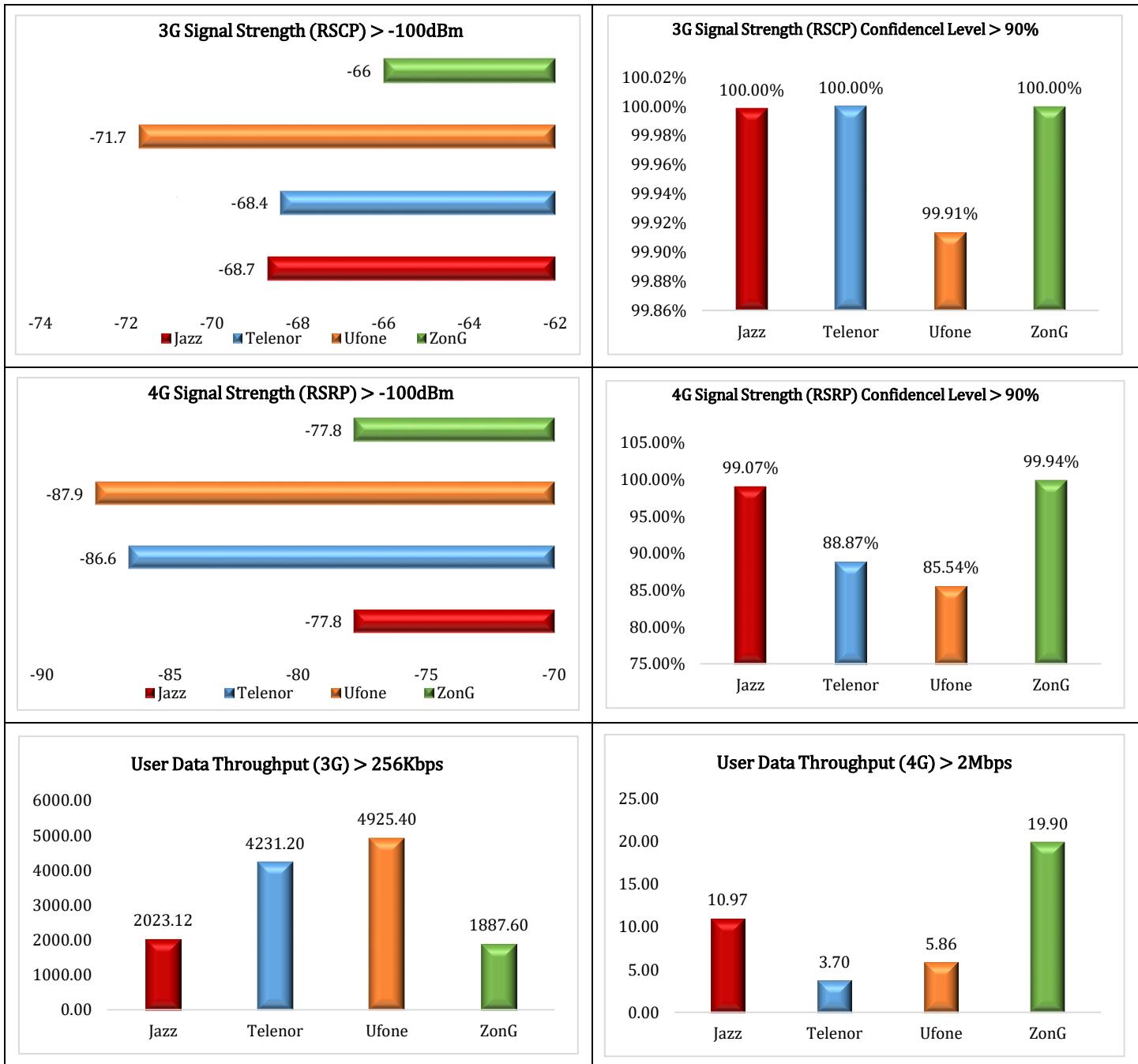
**ZONG 3G COVERAGE (RSCP) - MULTAN**



## QUALITY OF SERVICE SURVEY RESULTS – MULTAN

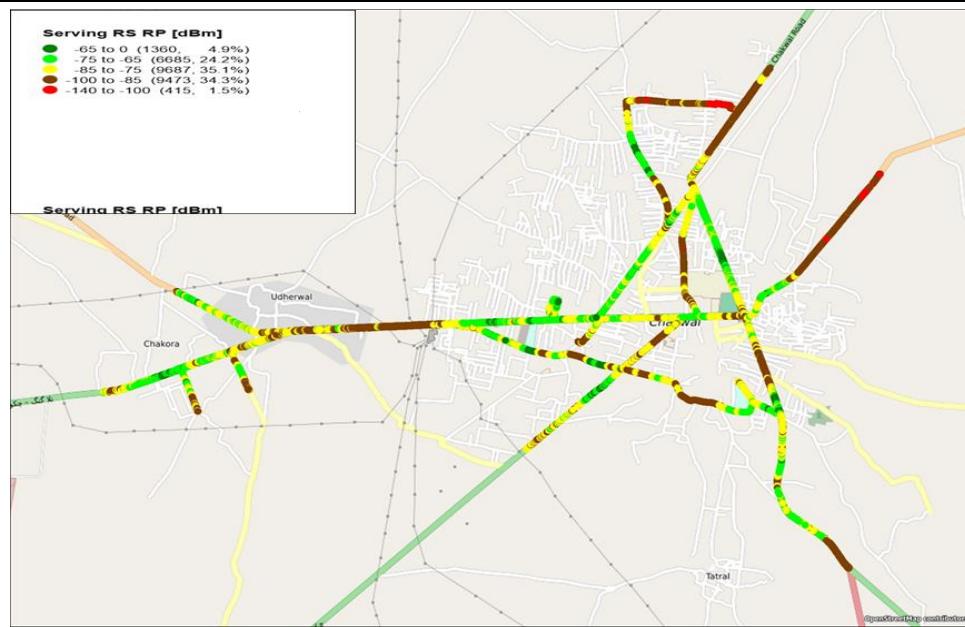


## QUALITY OF SERVICE SURVEY RESULTS – MULTAN

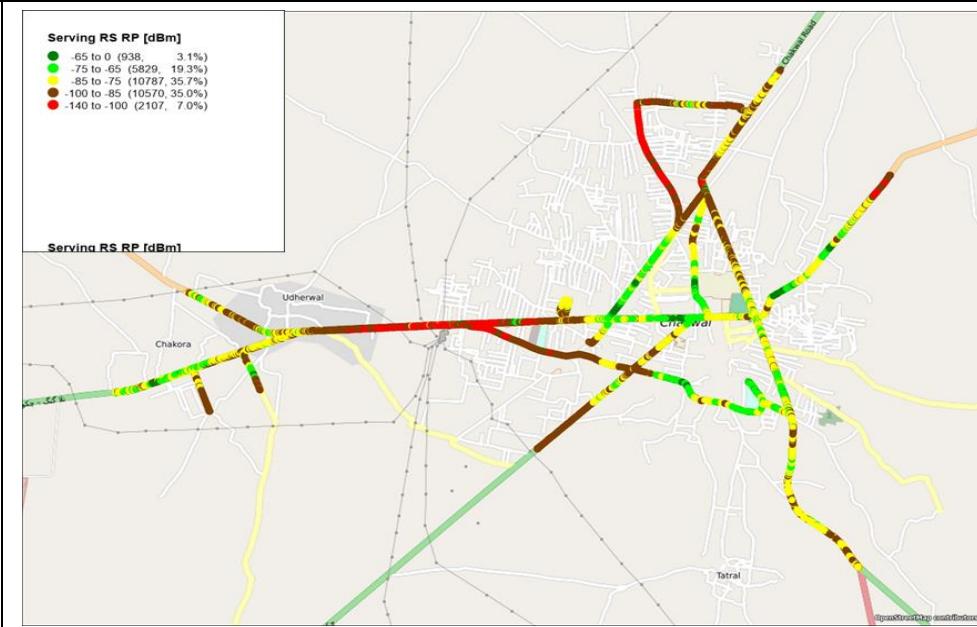


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

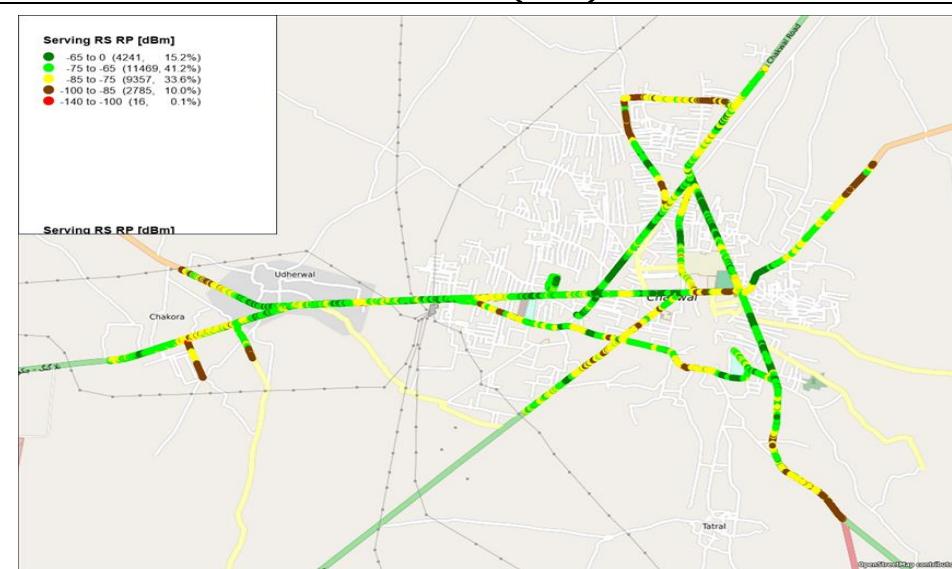
JAZZ 4G COVERAGE (RSRP) - CHAKWAL



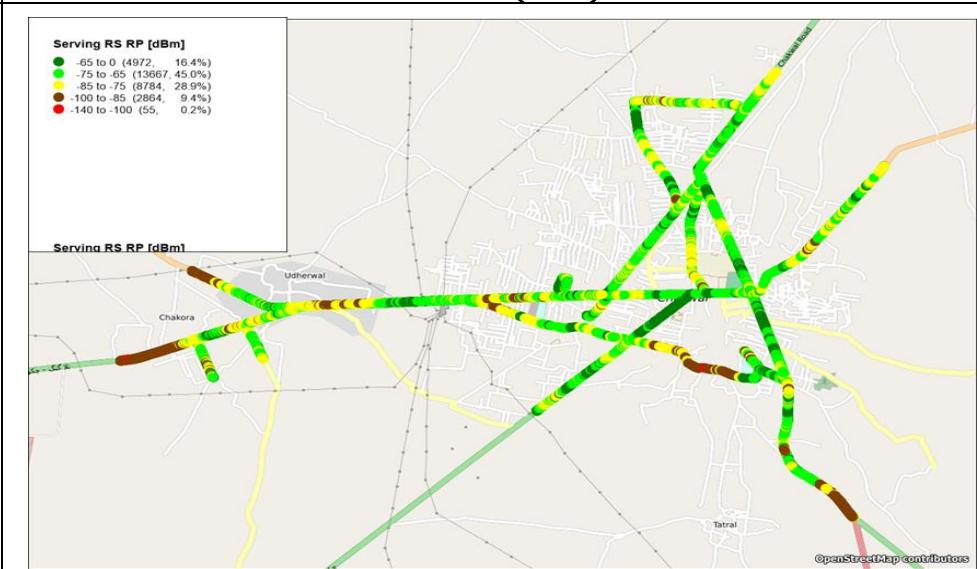
TELENOR 4G COVERAGE (RSRP) - CHAKWAL



UFONE 4G COVERAGE (RSRP) - CHAKWAL

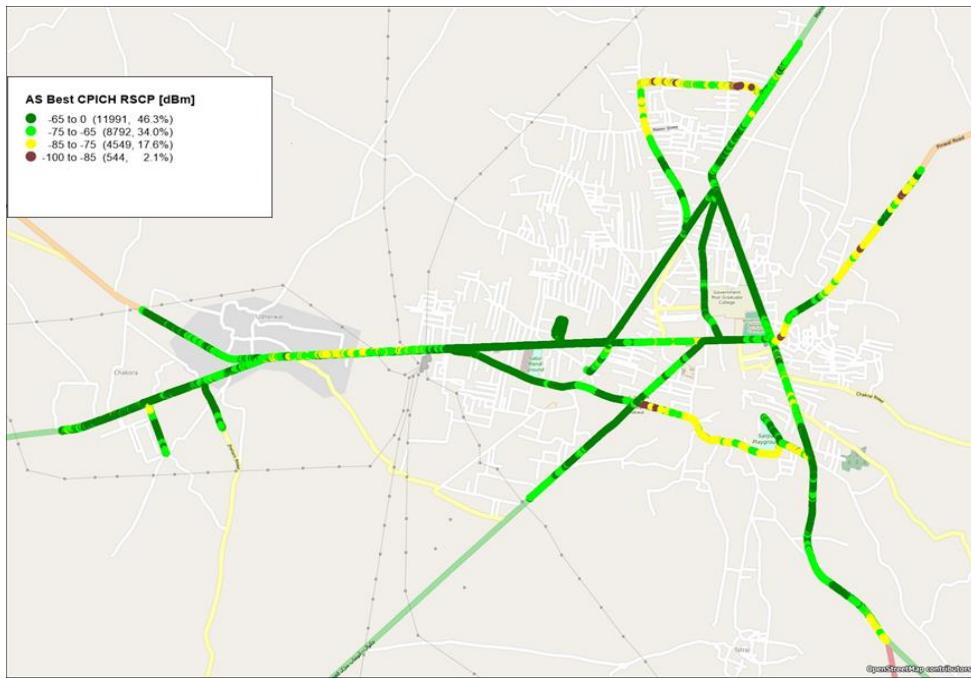


ZONG 4G COVERAGE (RSRP) - CHAKWAL

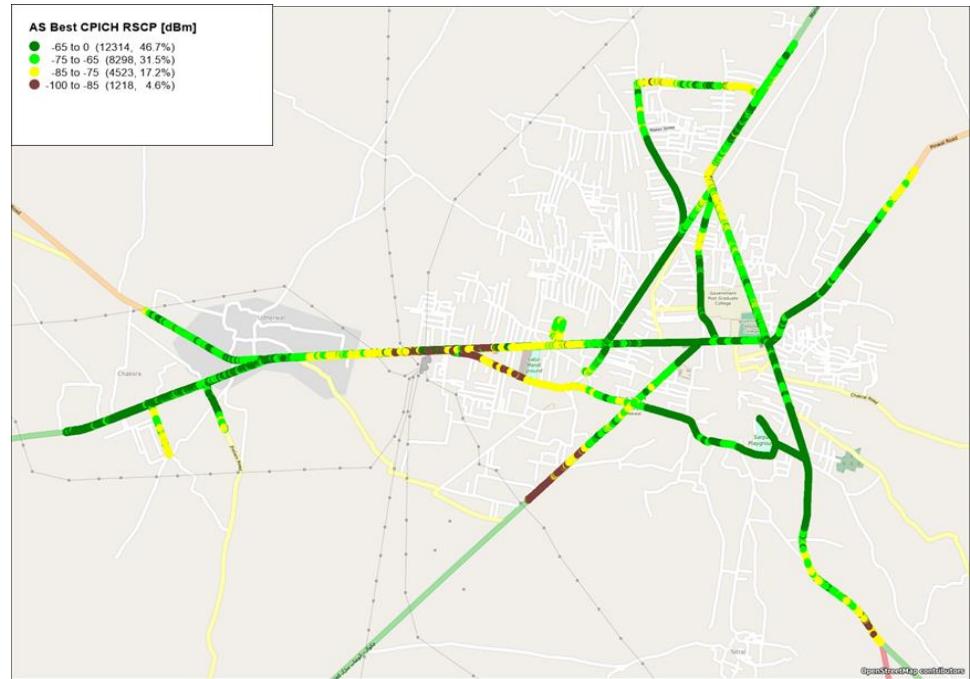


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

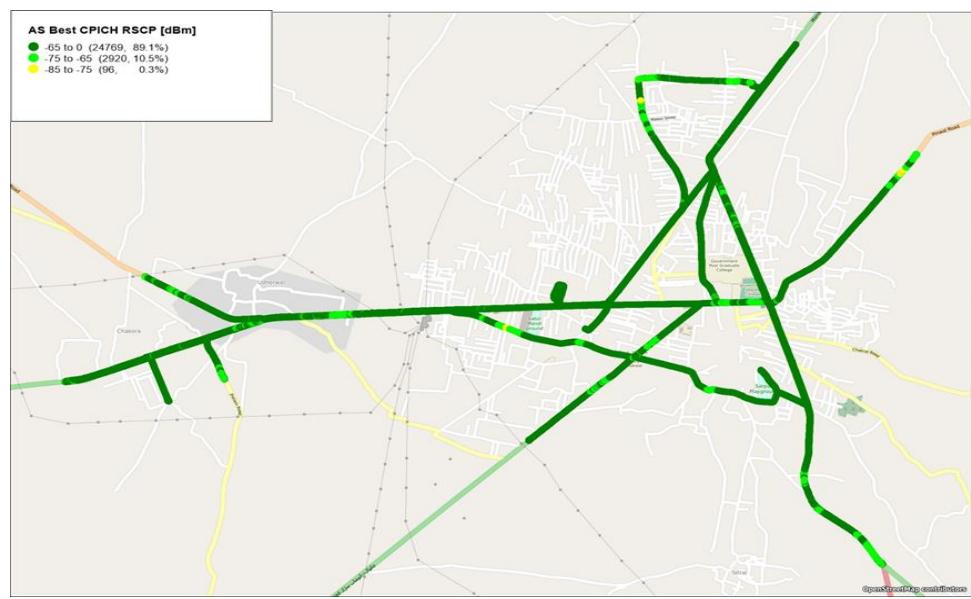
JAZZ 3G COVERAGE (RSCP) - CHAKWAL



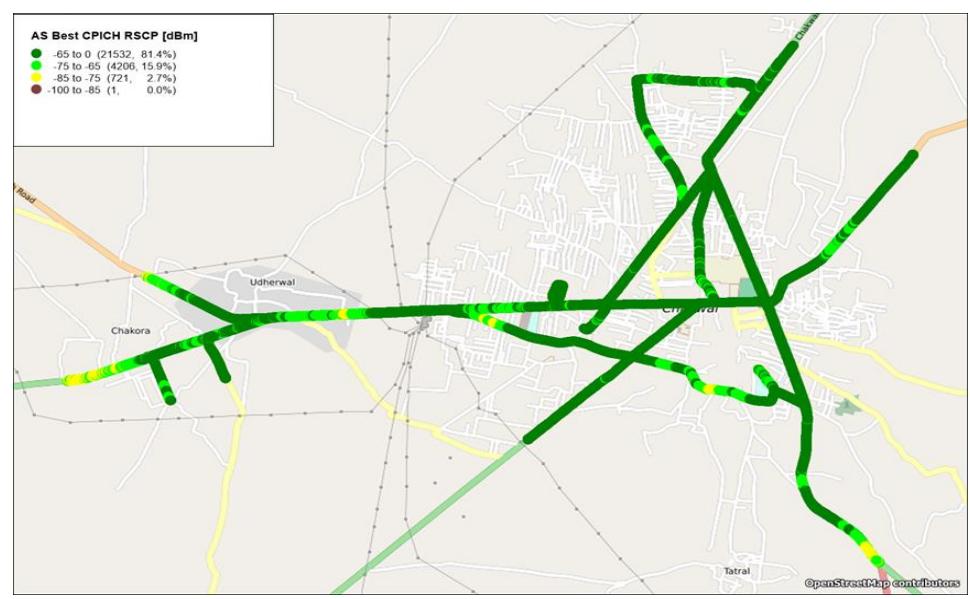
TELENOR 3G COVERAGE (RSCP) - CHAKWAL



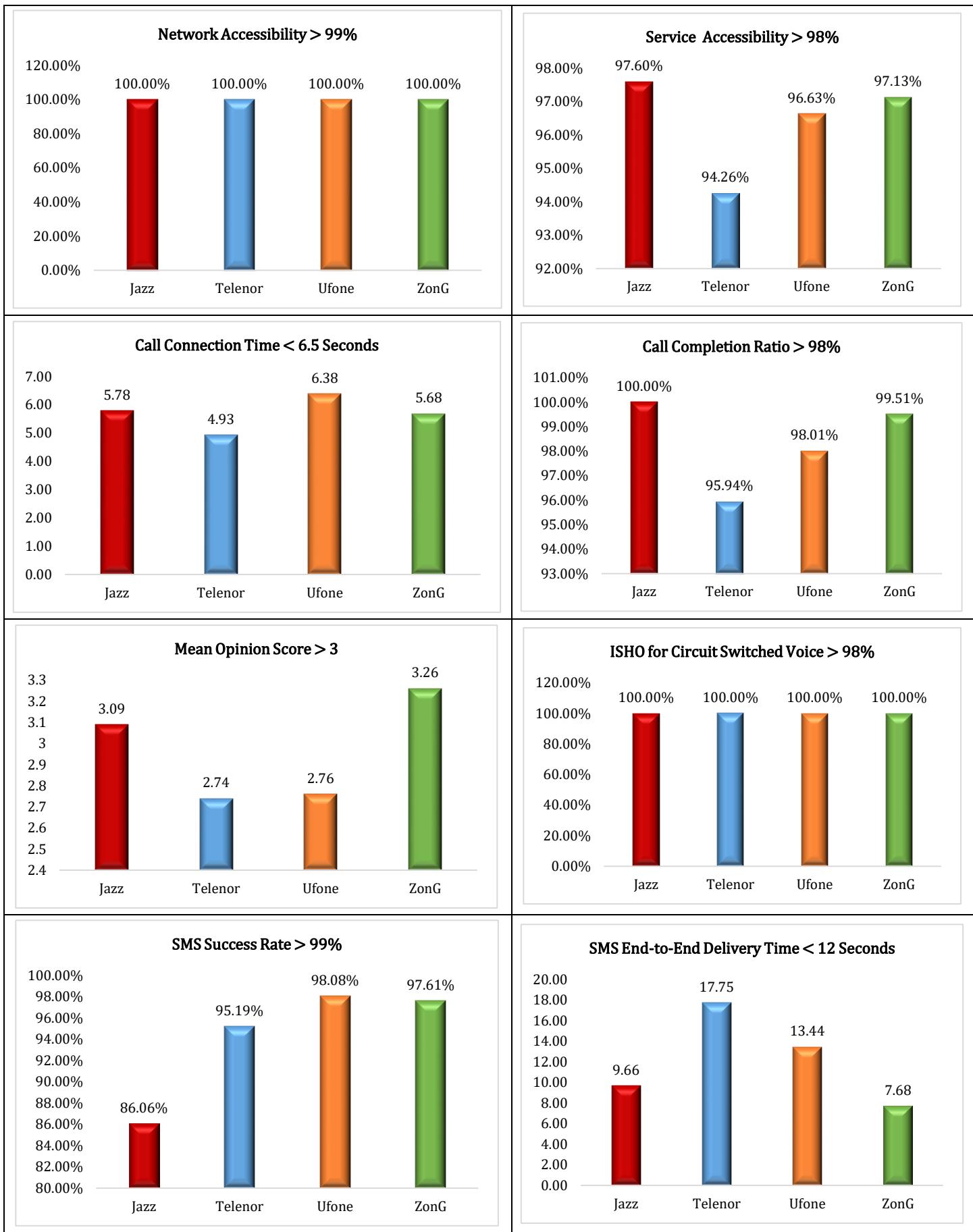
UFONE 3G COVERAGE (RSCP) - CHAKWAL



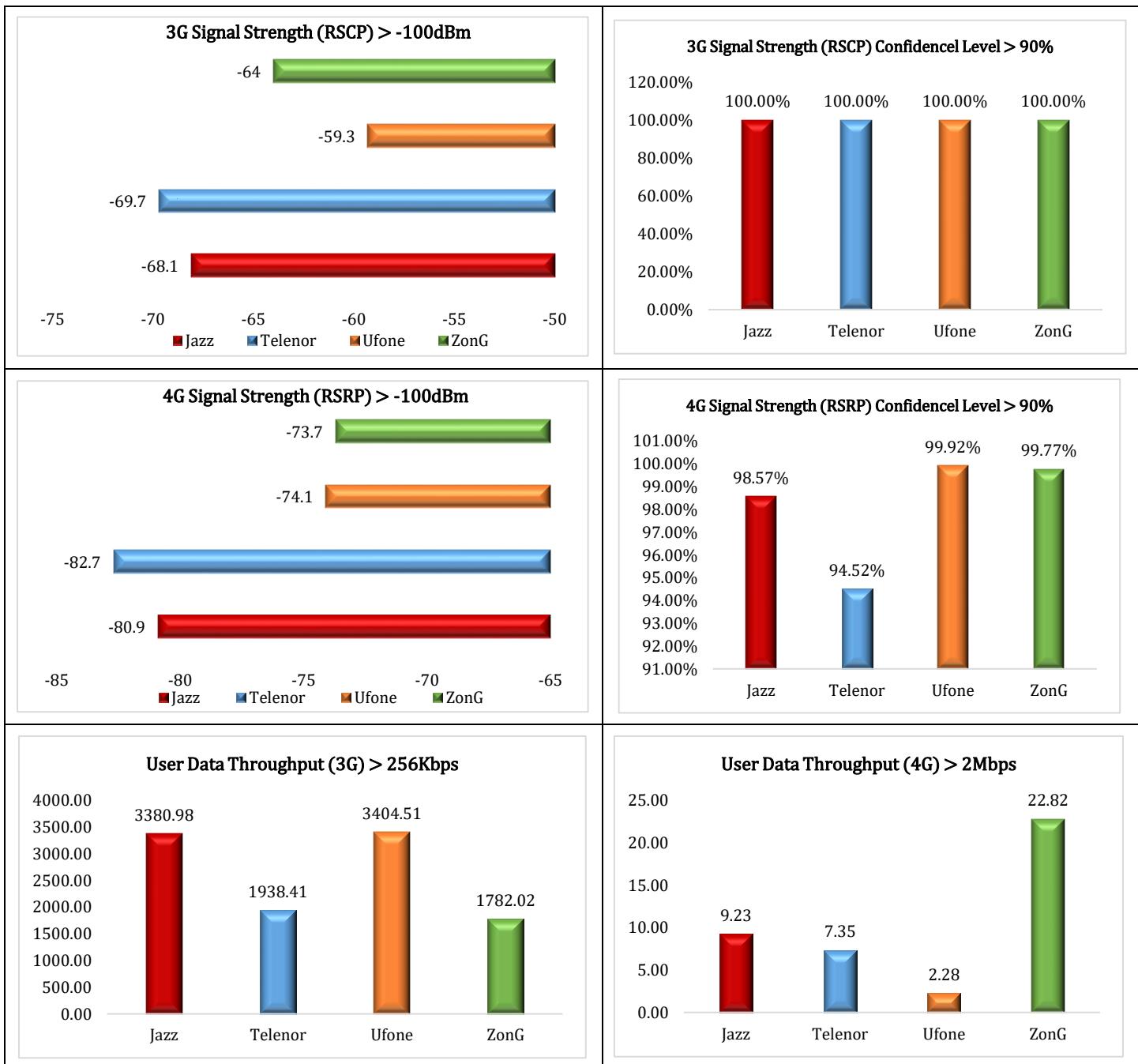
ZONG 3G COVERAGE (RSCP) - CHAKWAL



## QUALITY OF SERVICE SURVEY RESULTS – CHAKWAL

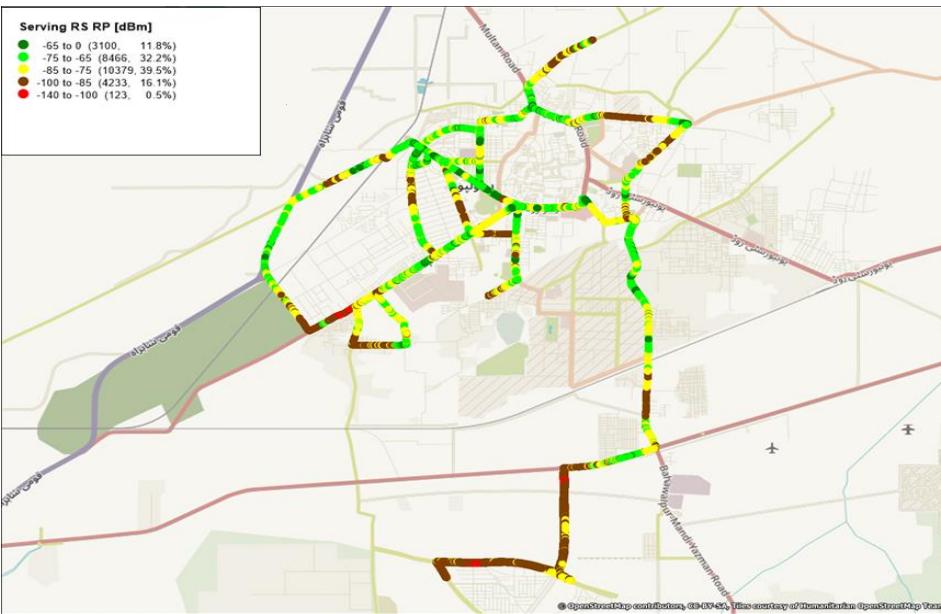


## QUALITY OF SERVICE SURVEY RESULTS – CHAKWAL

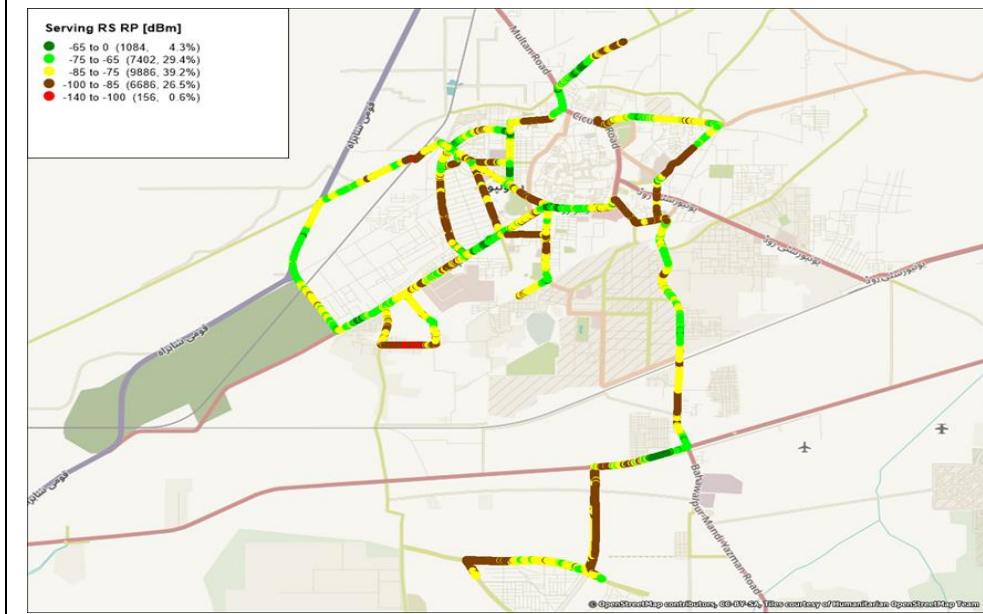


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

JAZZ 4G COVERAGE (RSRP) - BAHAWALPUR



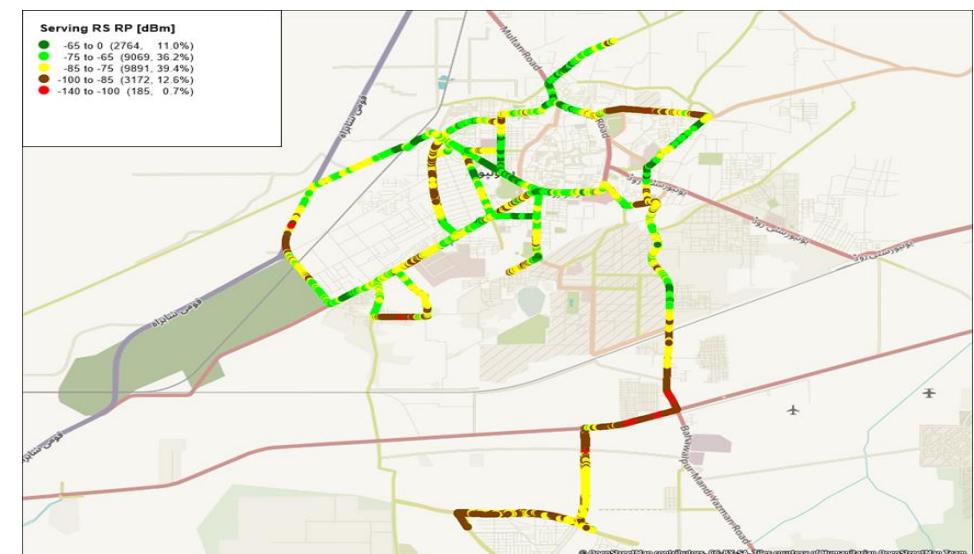
TELENOR 4G COVERAGE (RSRP) - BAHAWALPUR



UFONE 4G COVERAGE (RSRP) - BAHAWALPUR

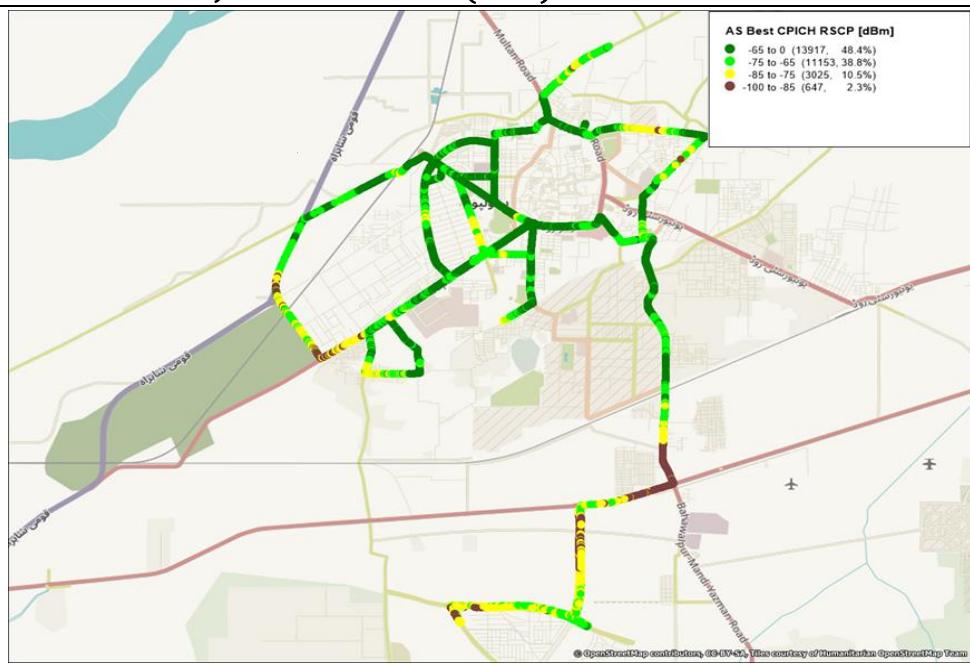


ZONG 4G COVERAGE (RSRP) - BAHAWALPUR

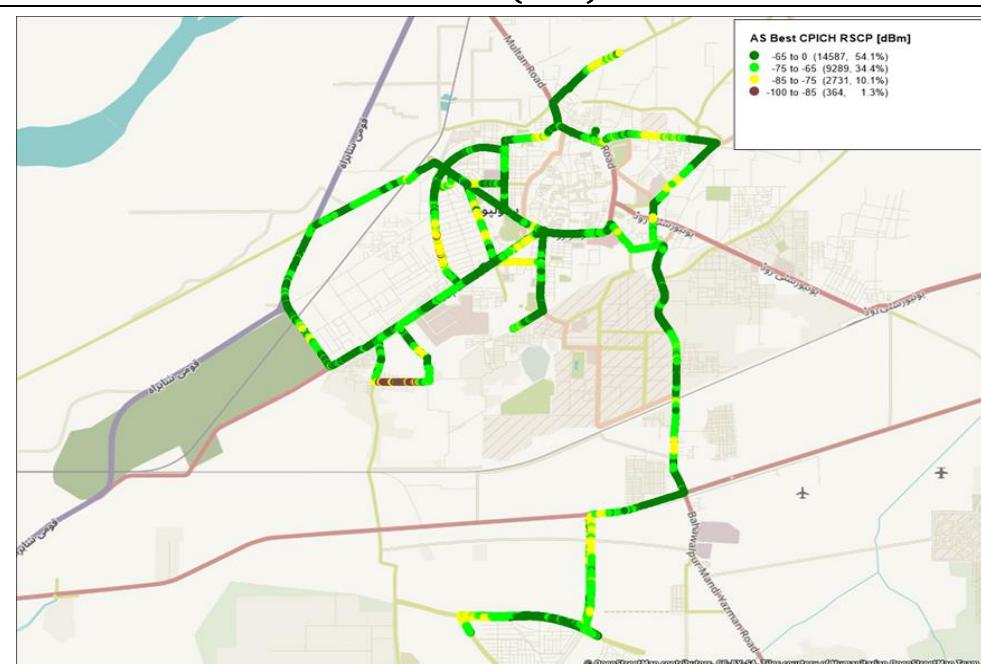


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

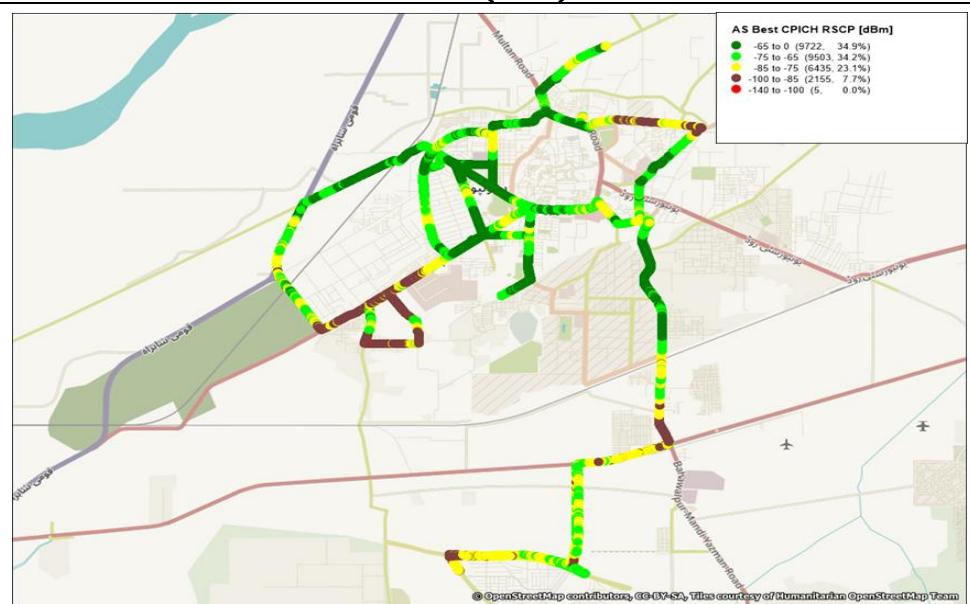
JAZZ 3G COVERAGE (RSCP) - BAHAWALPUR



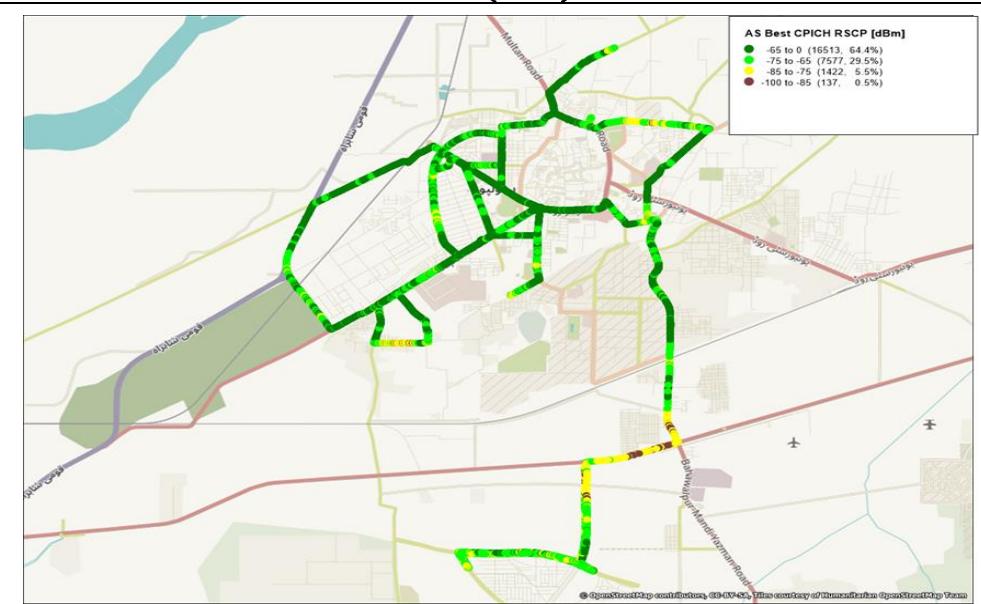
TELENOR 3G COVERAGE (RSCP) - BAHAWALPUR



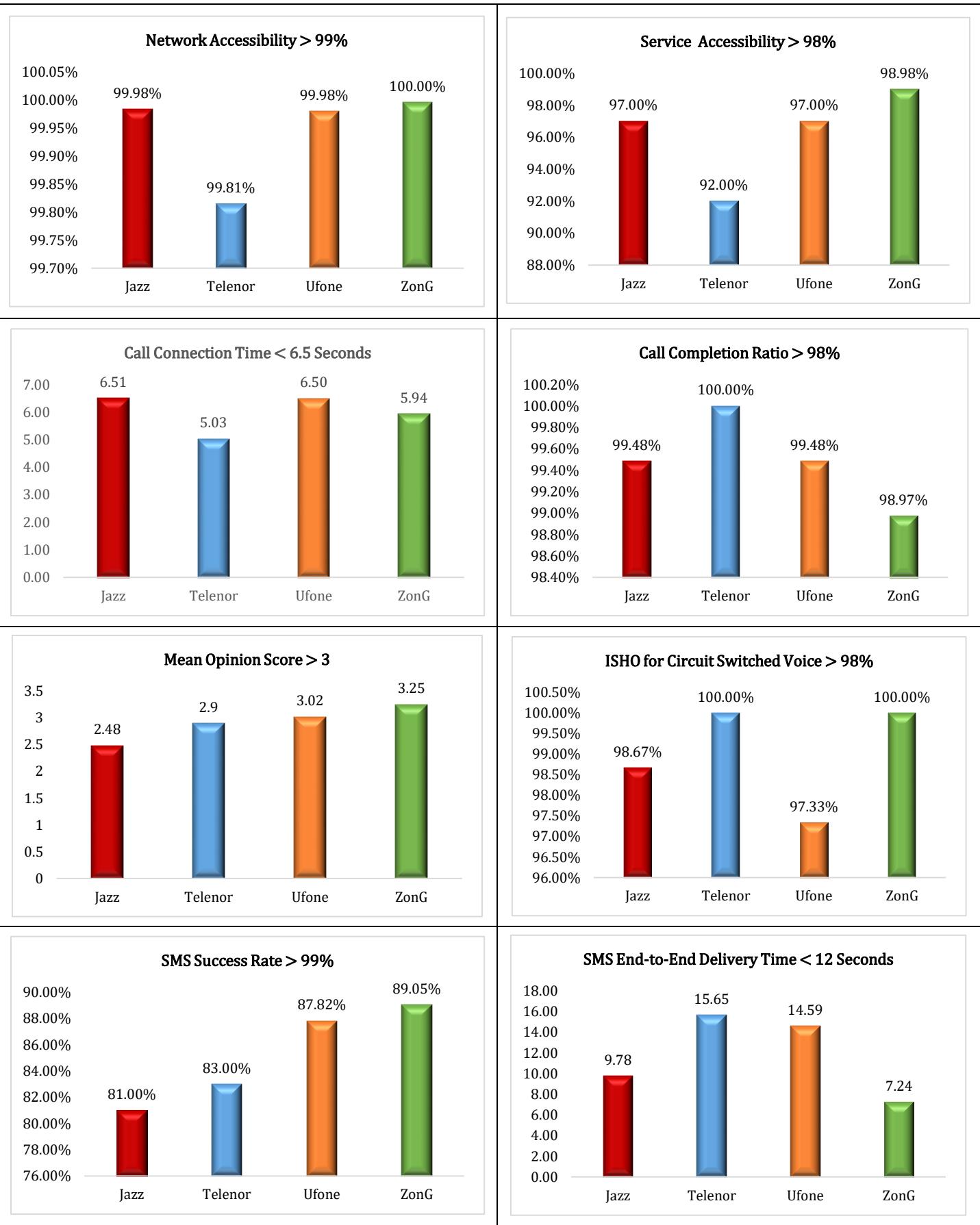
UFONE 3G COVERAGE (RSCP) - BAHAWALPUR



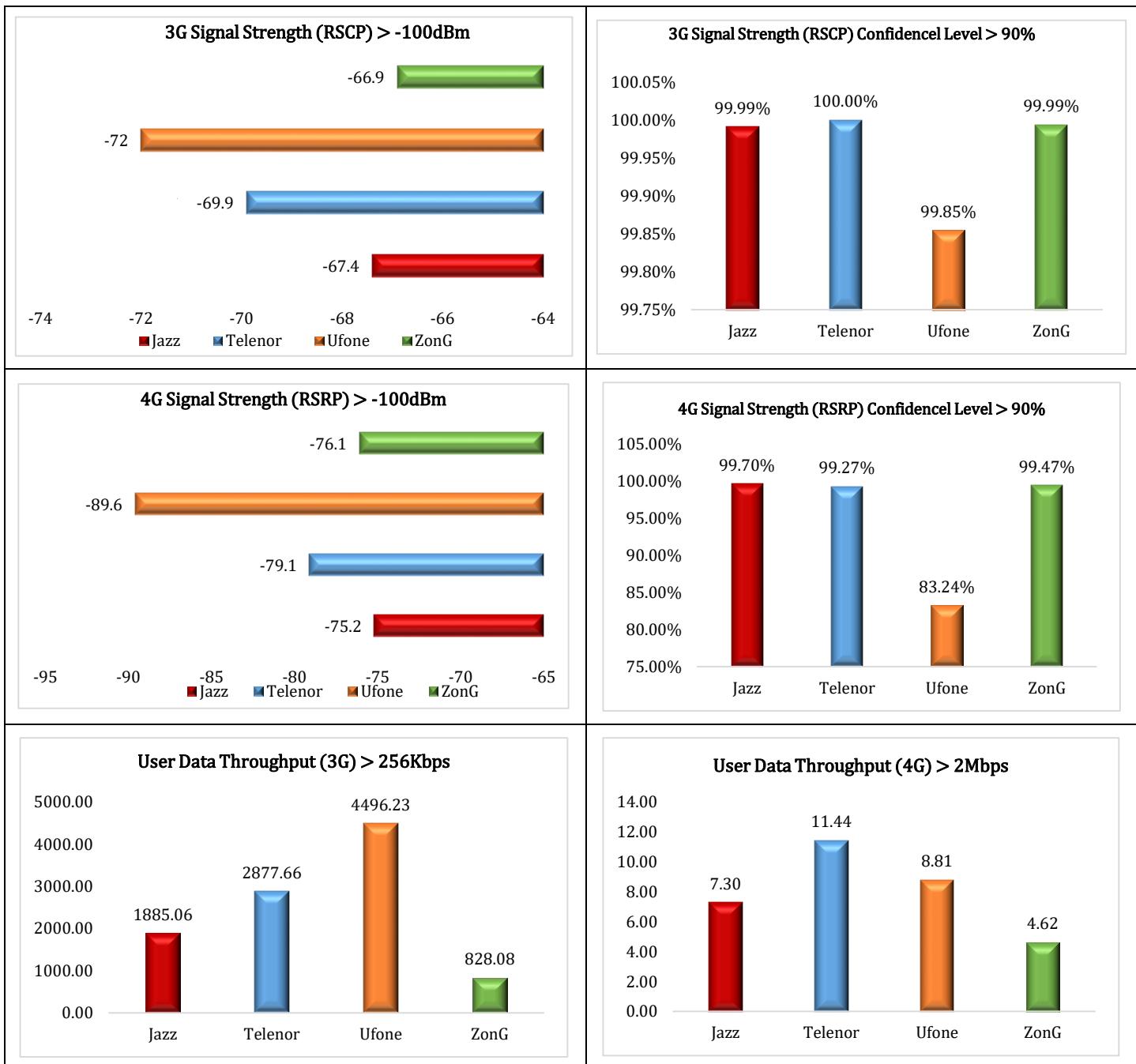
ZONG 3G COVERAGE (RSCP) - BAHAWALPUR



## QUALITY OF SERVICE SURVEY RESULTS – BAHAWALPUR

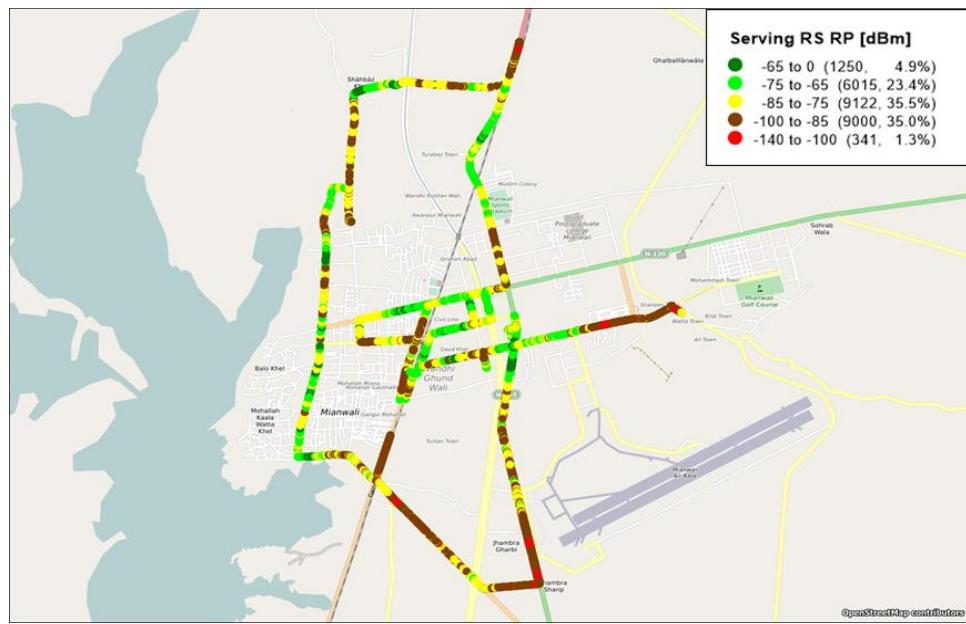


## QUALITY OF SERVICE SURVEY RESULTS – BAHAWALPUR

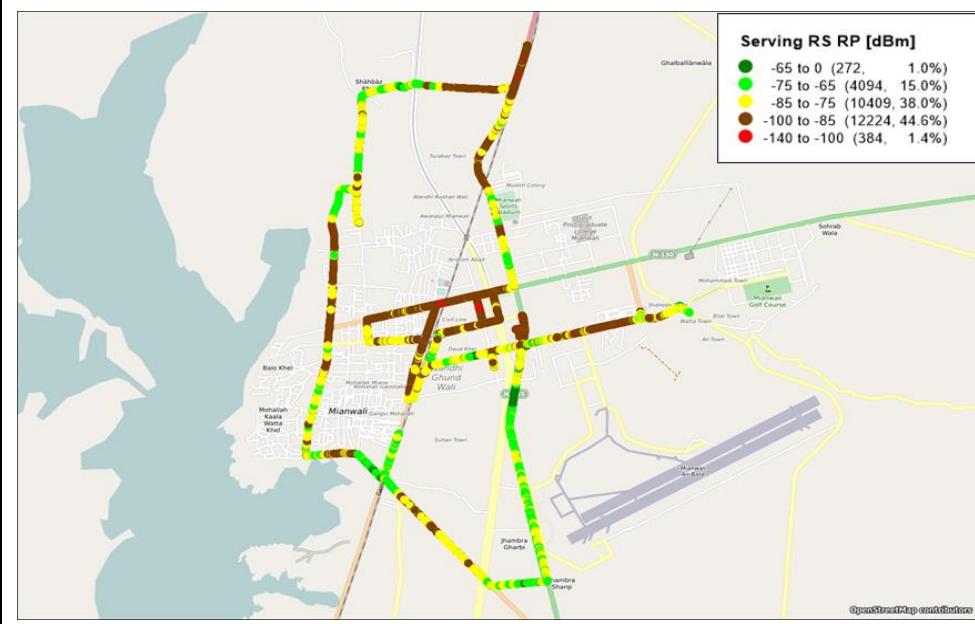


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

JAZZ 4G COVERAGE (RSRP) - MIANWALI



TELENOR 4G COVERAGE (RSRP) - MIANWALI



UFONE 4G COVERAGE (RSRP) - MIANWALI

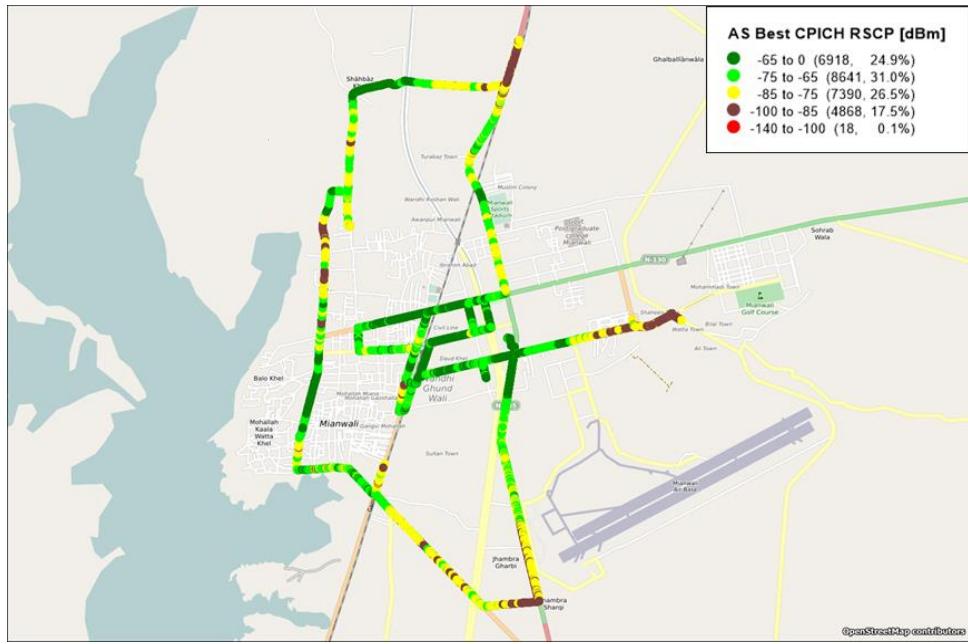


ZONG 4G COVERAGE (RSRP) - MIANWALI



## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

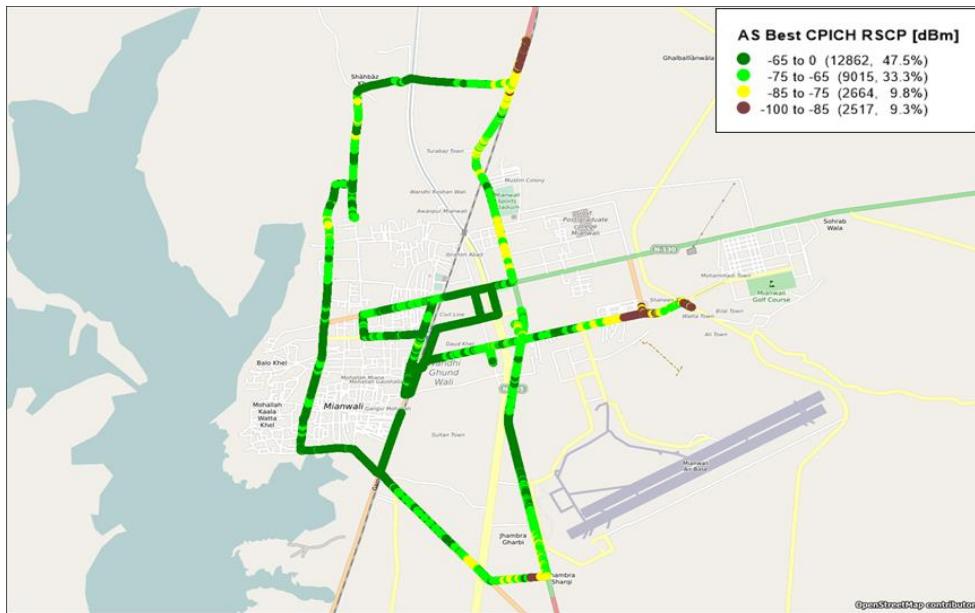
JAZZ 3G COVERAGE (RSCP) - MIANWALI



TELENOR 3G COVERAGE (RSCP) - MIANWALI



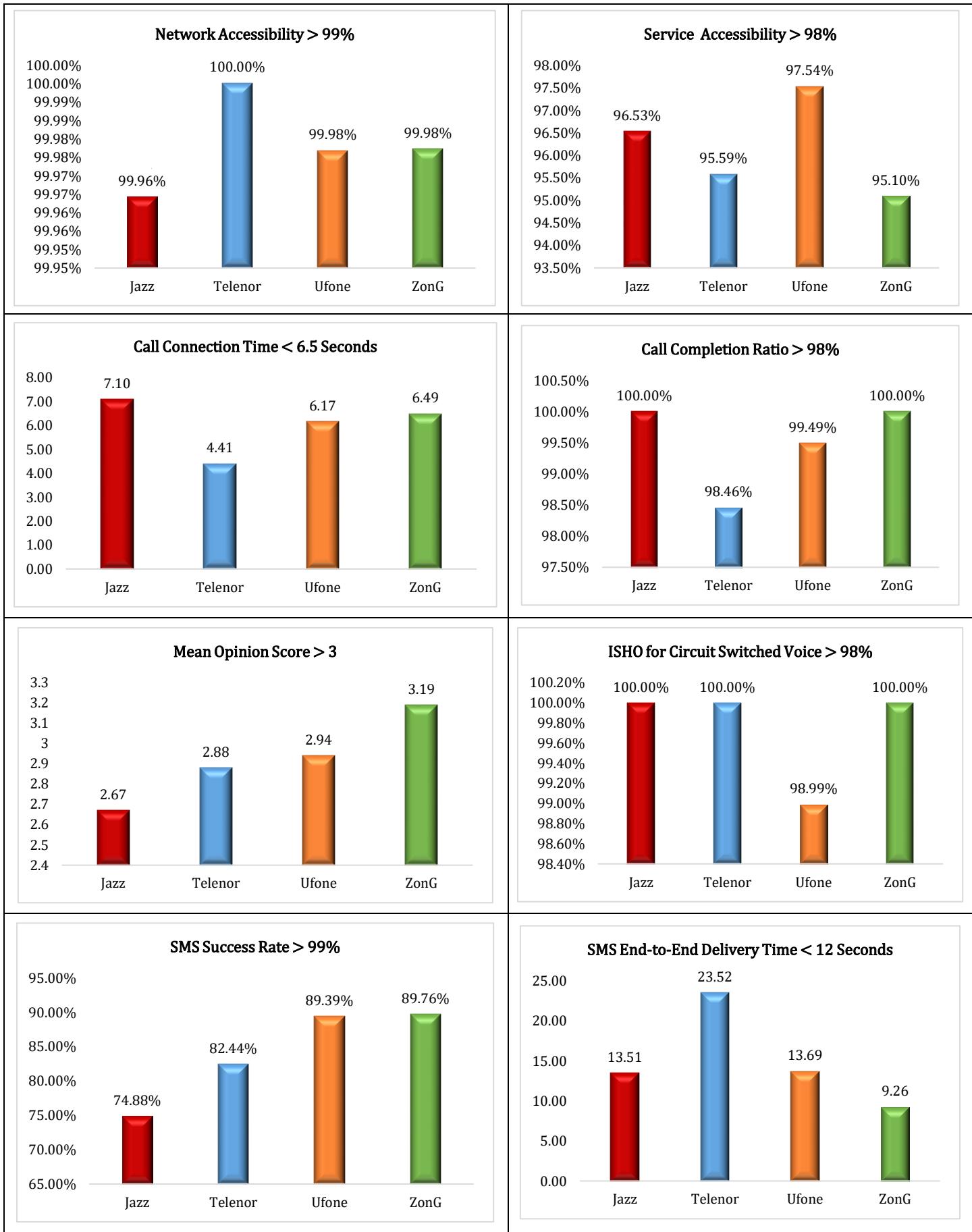
UFONE 3G COVERAGE (RSCP) - MIANWALI



ZONG 3G COVERAGE (RSCP) - MIANWALI



## QUALITY OF SERVICE SURVEY RESULTS – MIANWALI

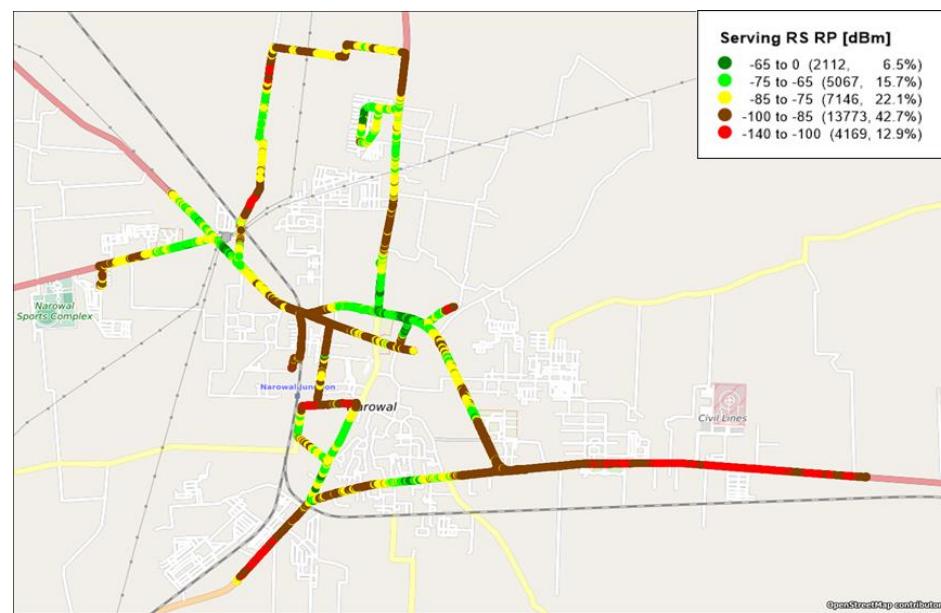


## QUALITY OF SERVICE SURVEY RESULTS – MIANWALI

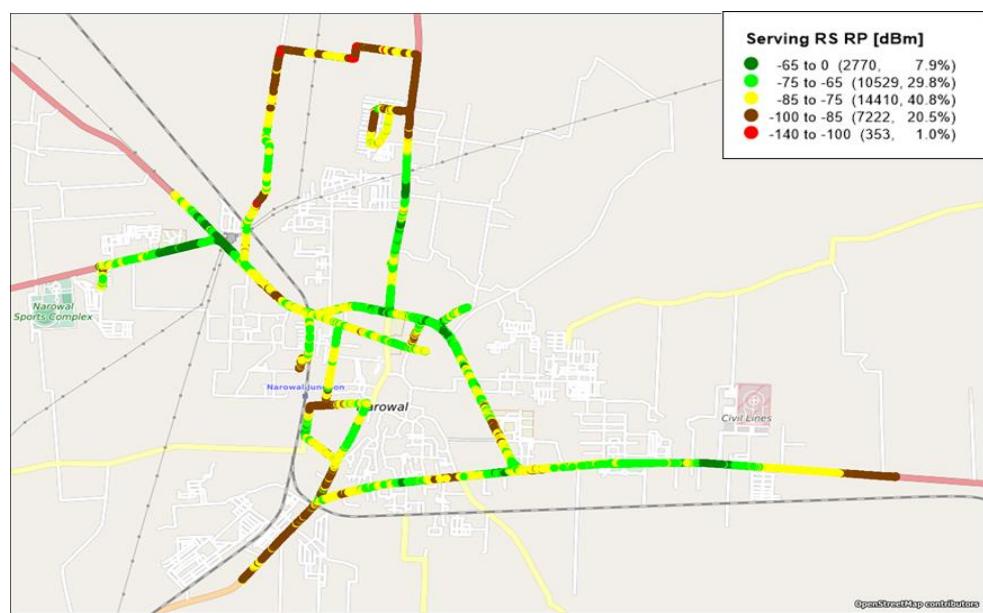


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

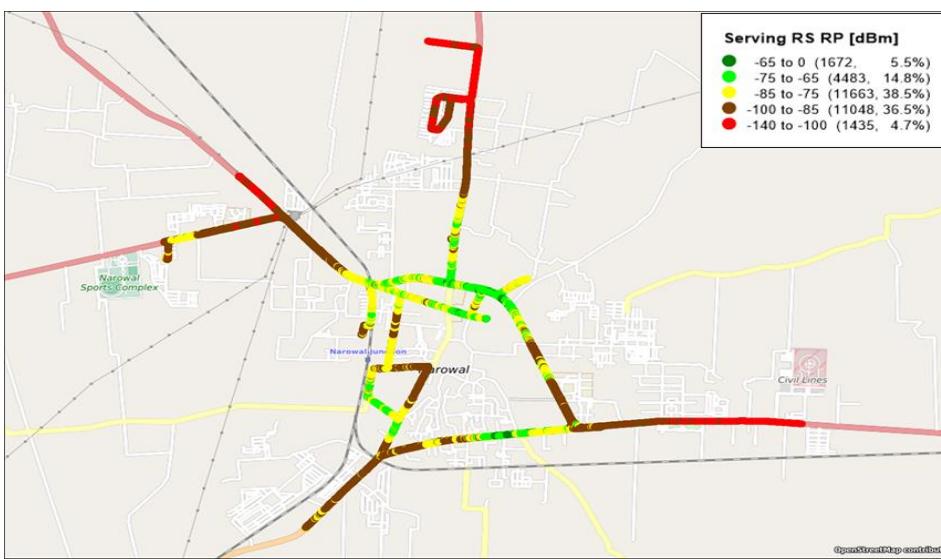
**JAZZ 4G COVERAGE (RSRP) - NARROWAL**



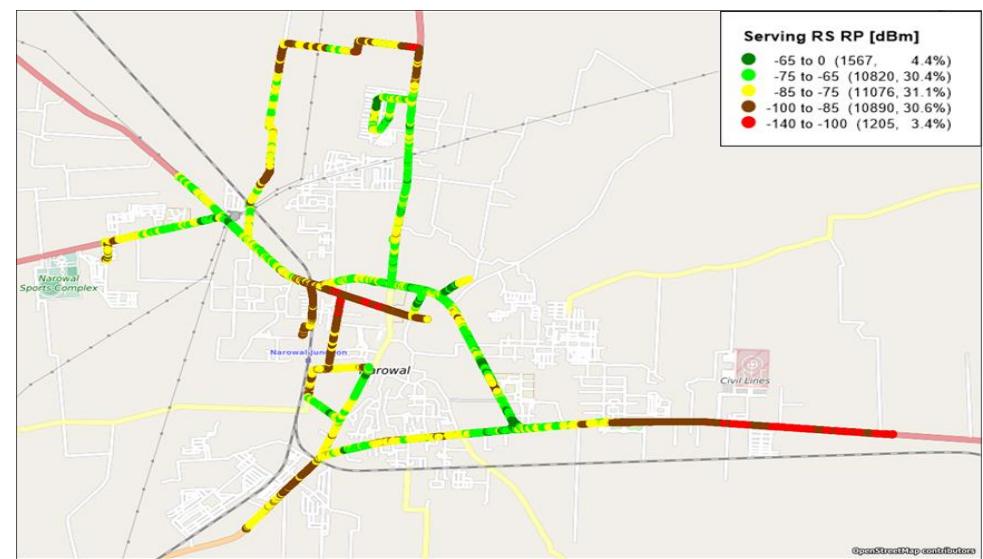
**TELENOR 4G COVERAGE (RSRP) - NARROWAL**



**UFONE 4G COVERAGE (RSRP) - NARROWAL**

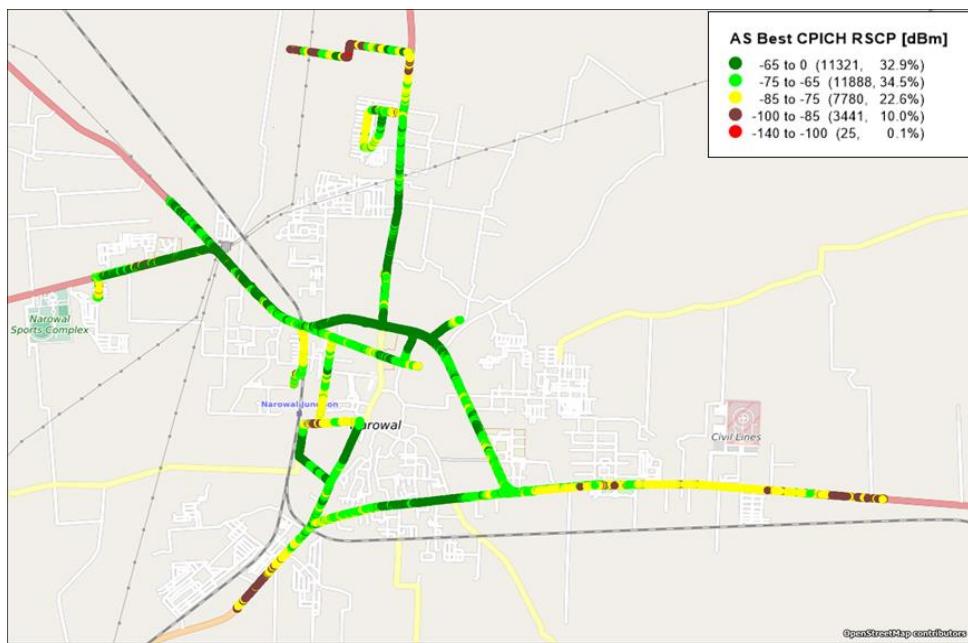


**ZONG 4G COVERAGE (RSRP) - NARROWAL**

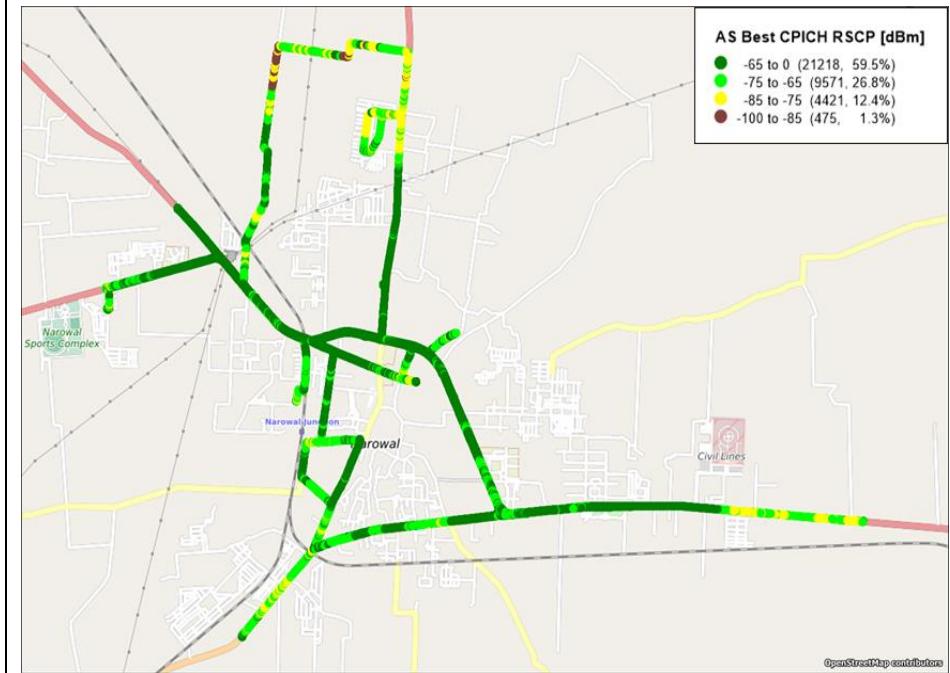


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

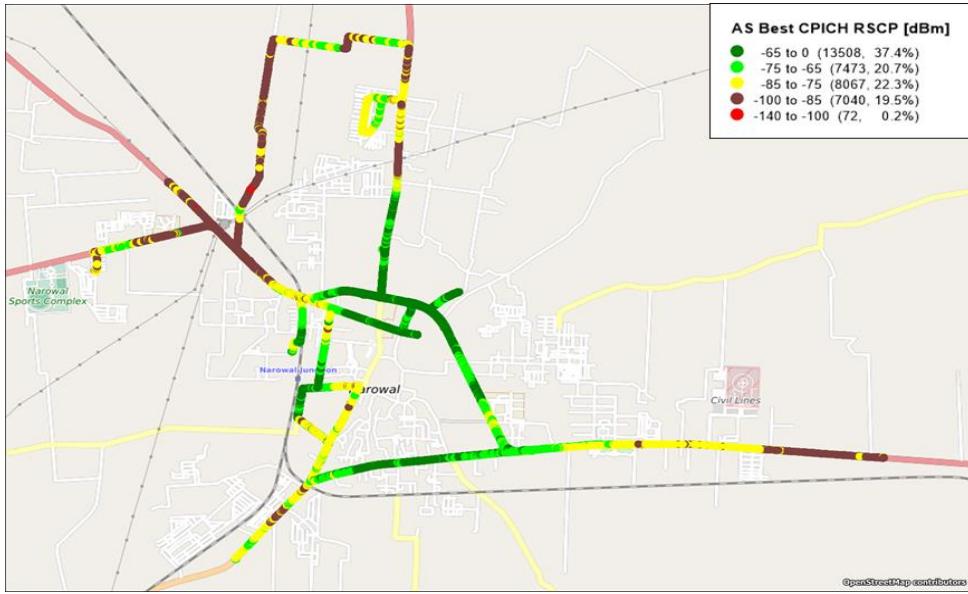
JAZZ 3G COVERAGE (RSCP) - NARROWAL



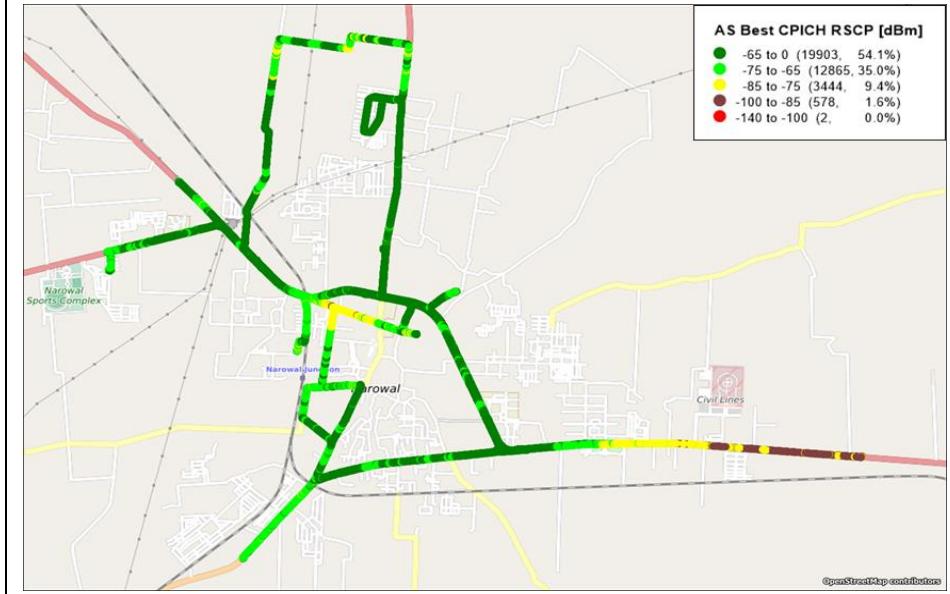
TELENOR 3G COVERAGE (RSCP) - NARROWAL



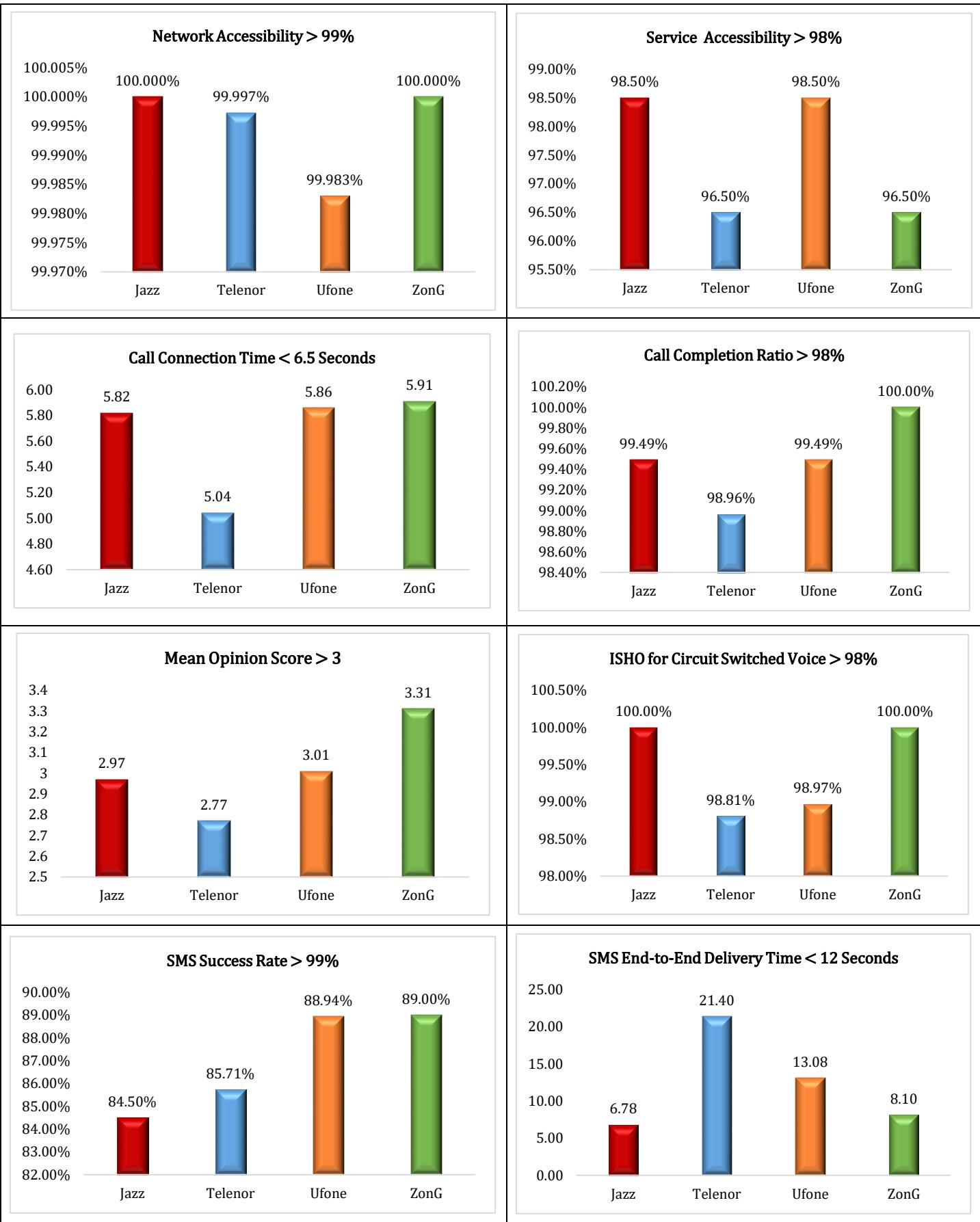
UFONE 3G COVERAGE (RSCP) - NARROWAL



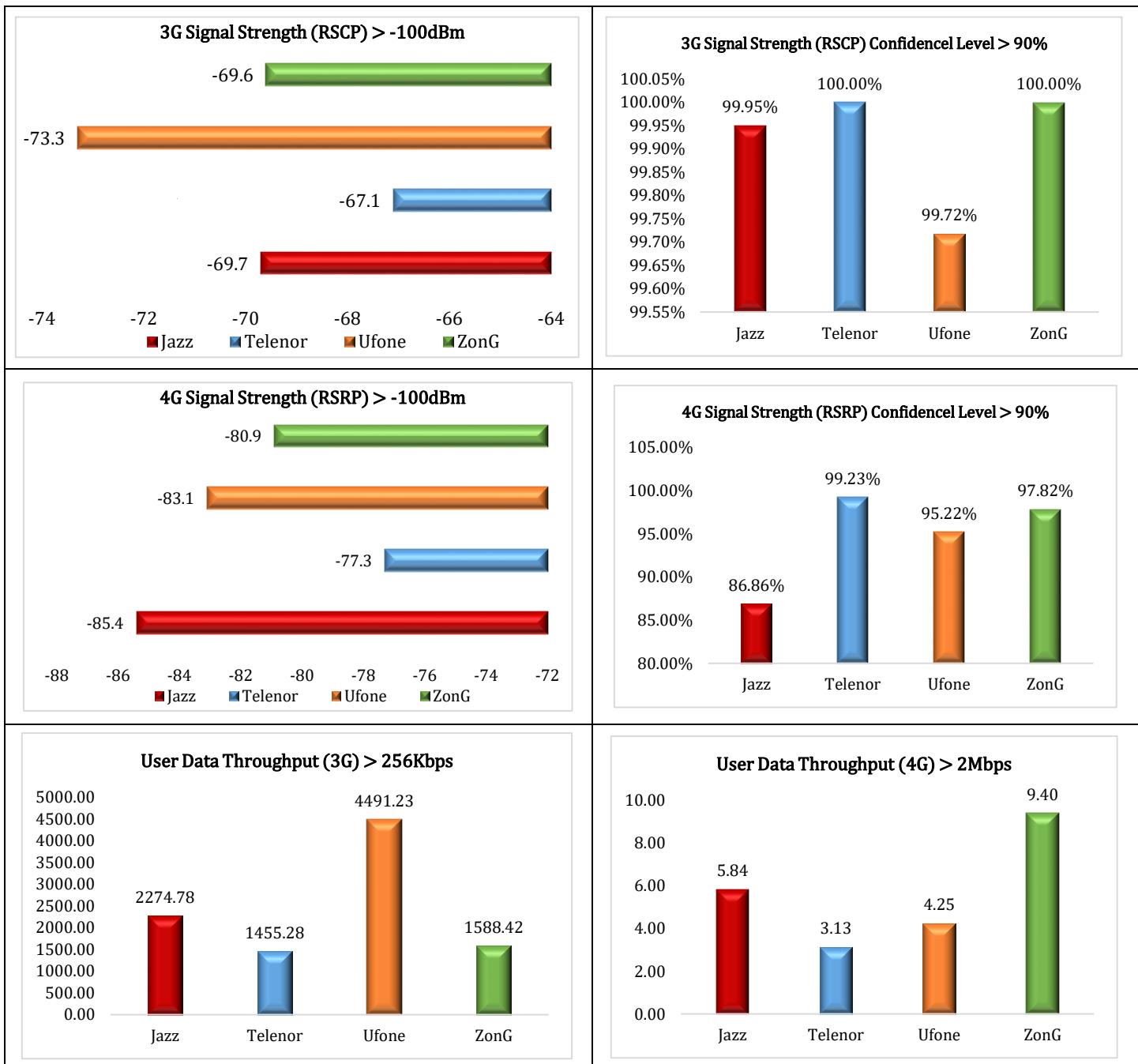
ZONG 3G COVERAGE (RSCP) - NARROWAL



## QUALITY OF SERVICE SURVEY RESULTS – NARROWAL



## QUALITY OF SERVICE SURVEY RESULTS – NARROWAL

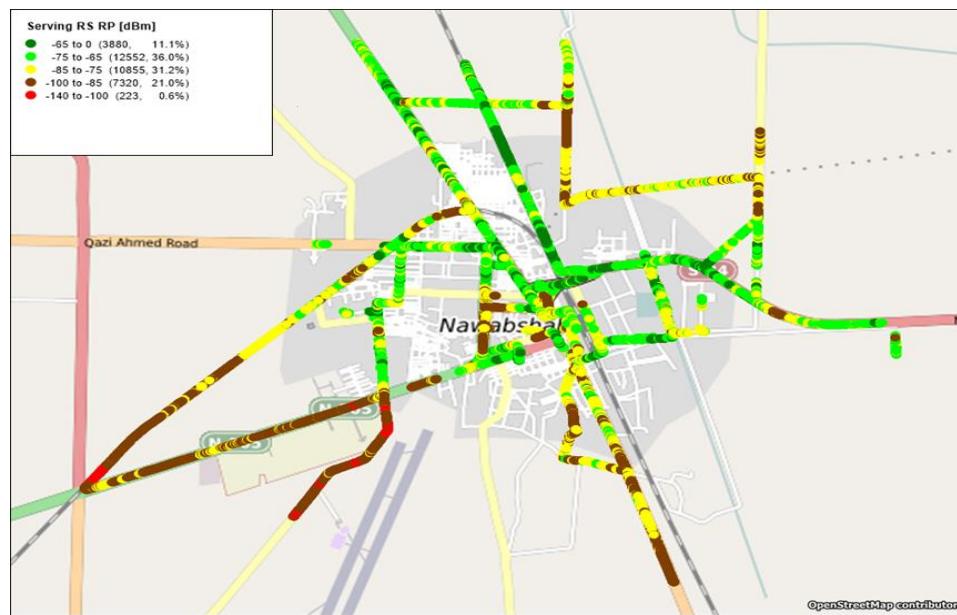


**ANNEX – B**

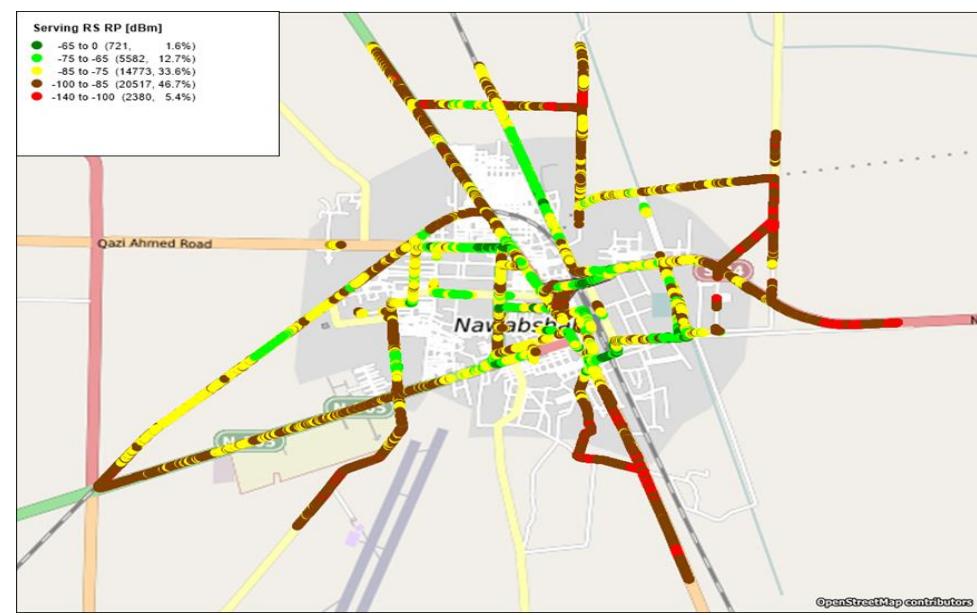
**SINDH**

## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

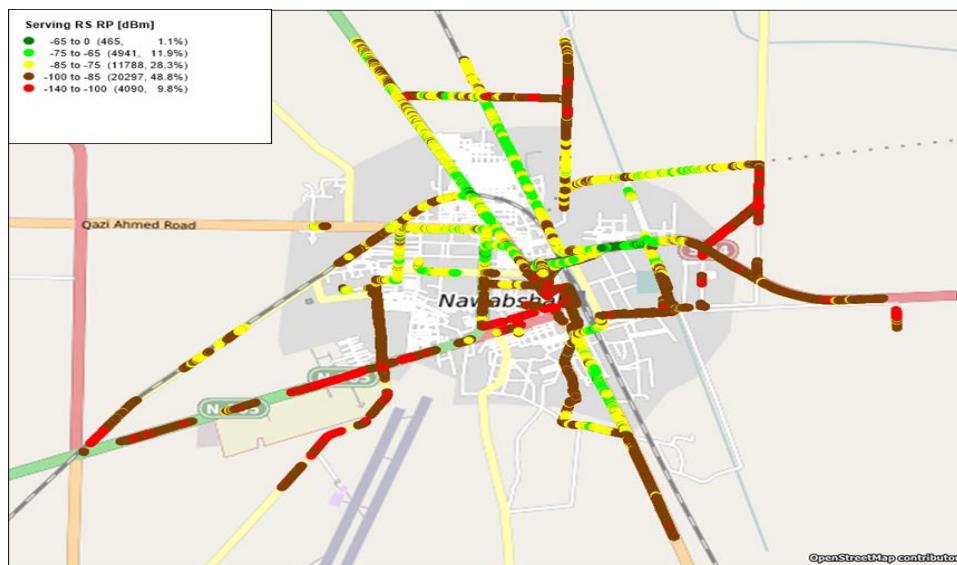
**JAZZ 4G COVERAGE (RSRP) - NAWABSHAH**



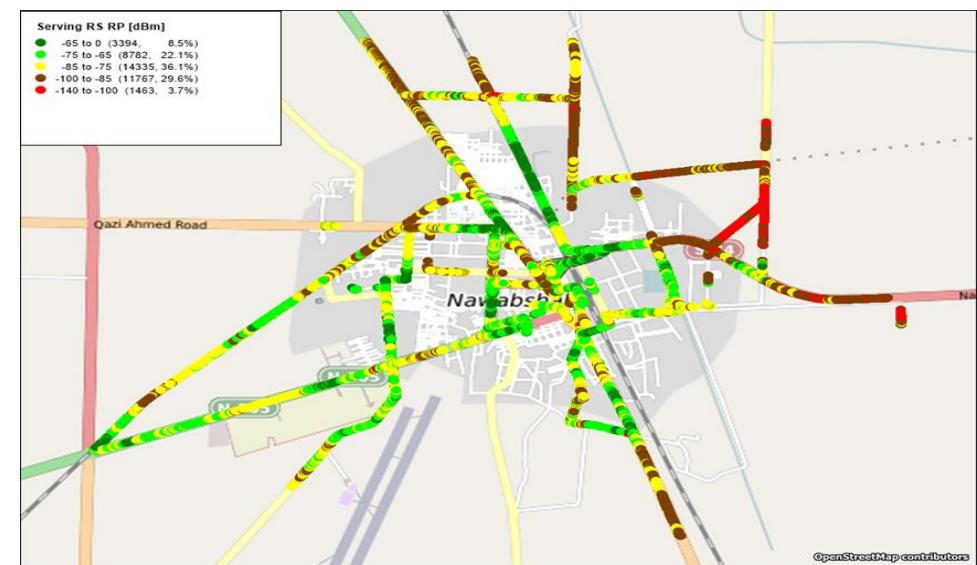
**TELENOR 4G COVERAGE (RSRP) - NAWABSHAH**



**UFONE 4G COVERAGE (RSRP) - NAWABSHAH**

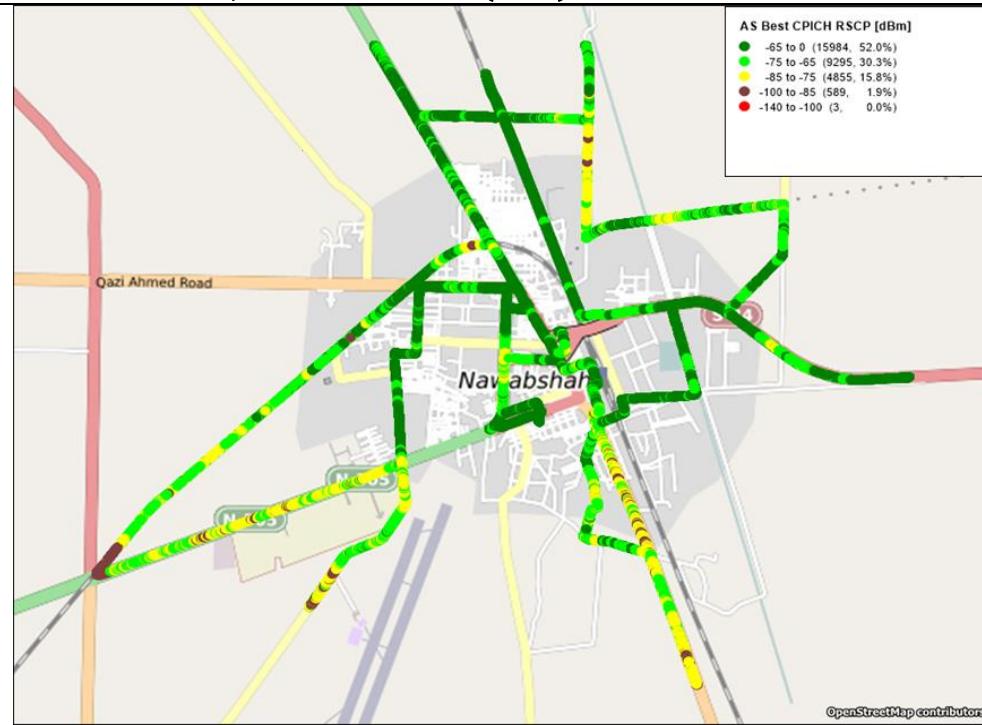


**ZONG 4G COVERAGE (RSRP) - NAWABSHAH**

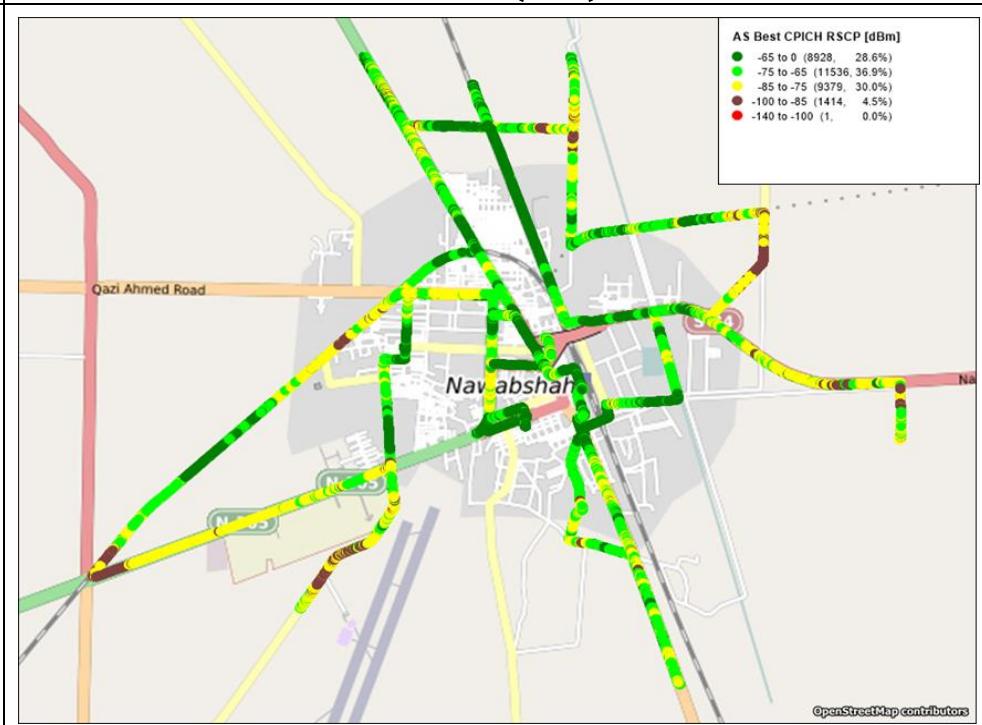


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

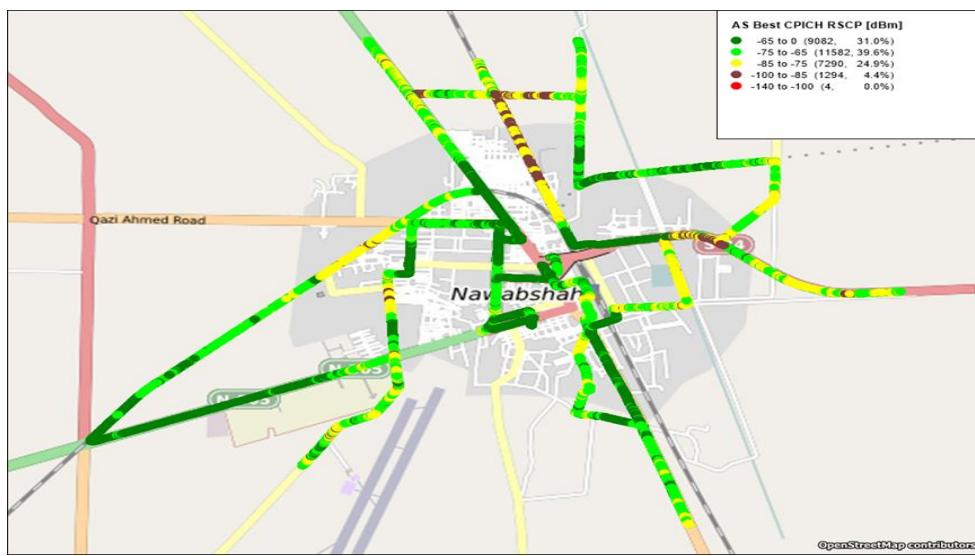
JAZZ 3G COVERAGE (RSCP) - NAWABSHAH



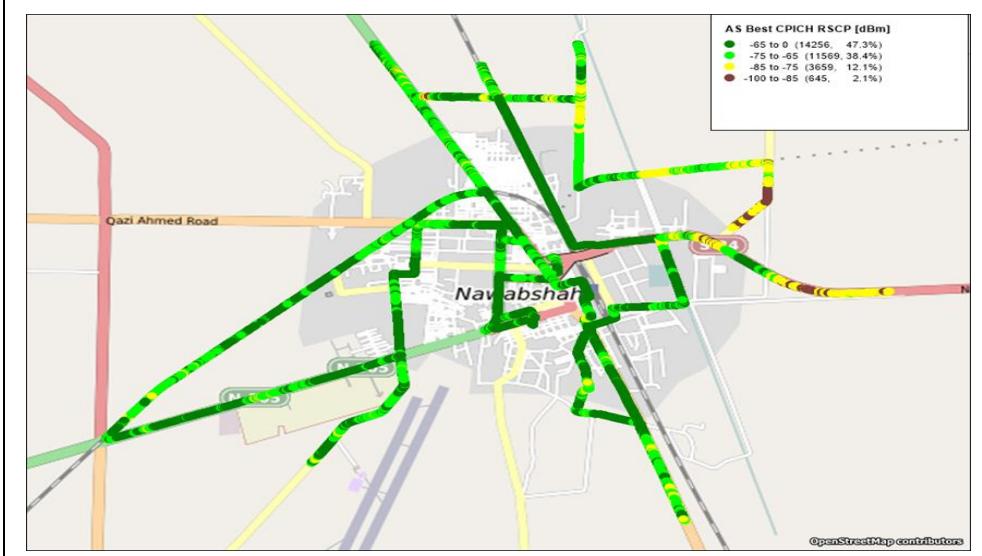
TELENOR 3G COVERAGE (RSCP) - NAWABSHAH



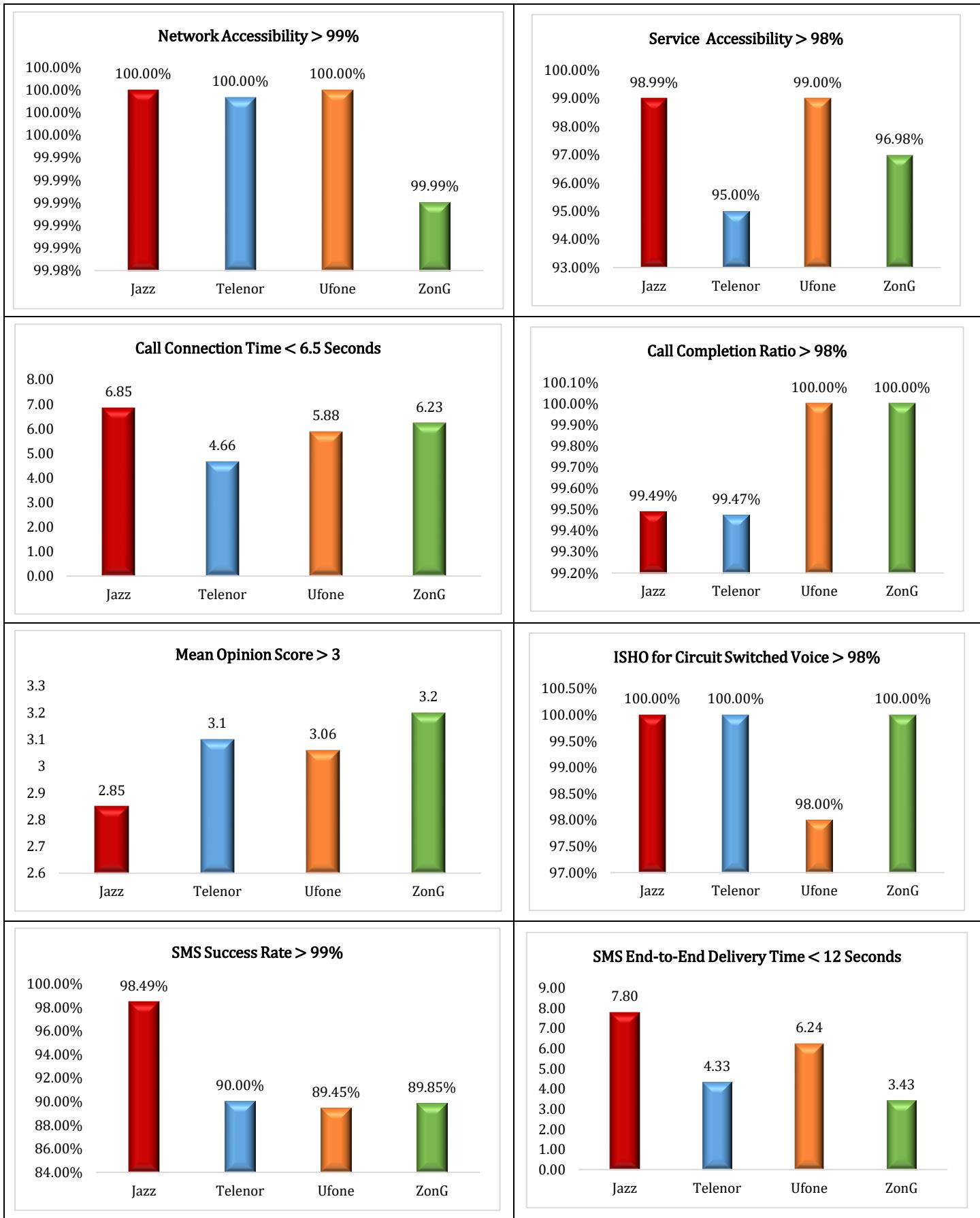
UFONE 3G COVERAGE (RSCP) - NAWABSHAH



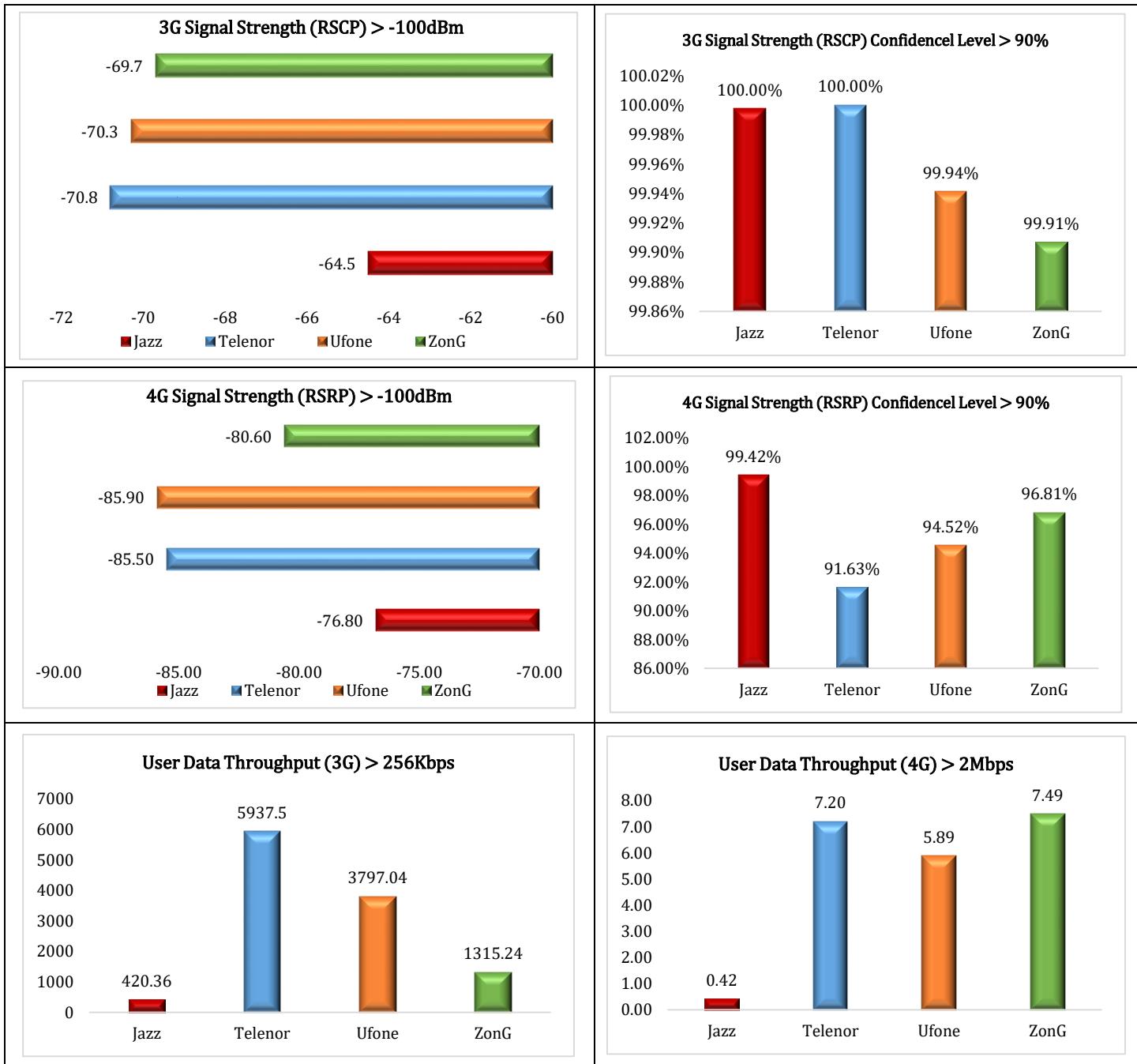
ZONG 3G COVERAGE (RSCP) - NAWABSHAH



## QUALITY OF SERVICE SURVEY RESULTS – NAWABSHAH

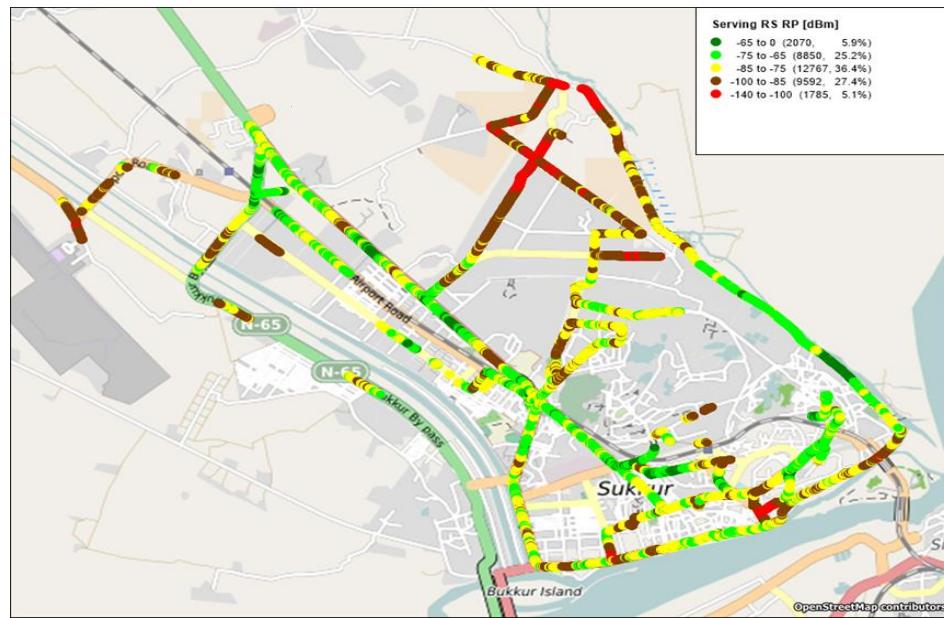


## QUALITY OF SERVICE SURVEY RESULTS – NAWABSHAH

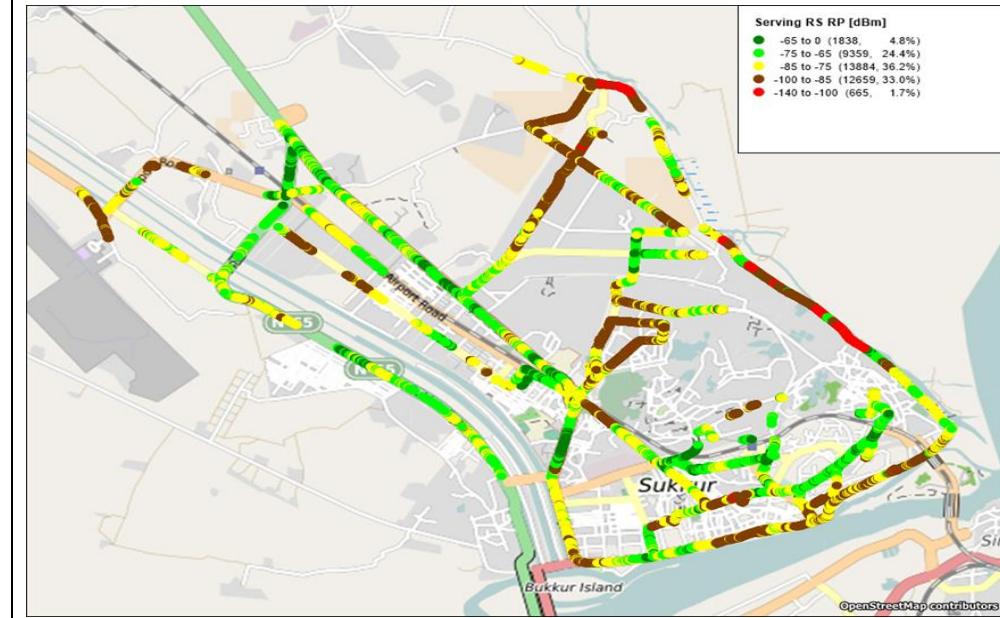


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

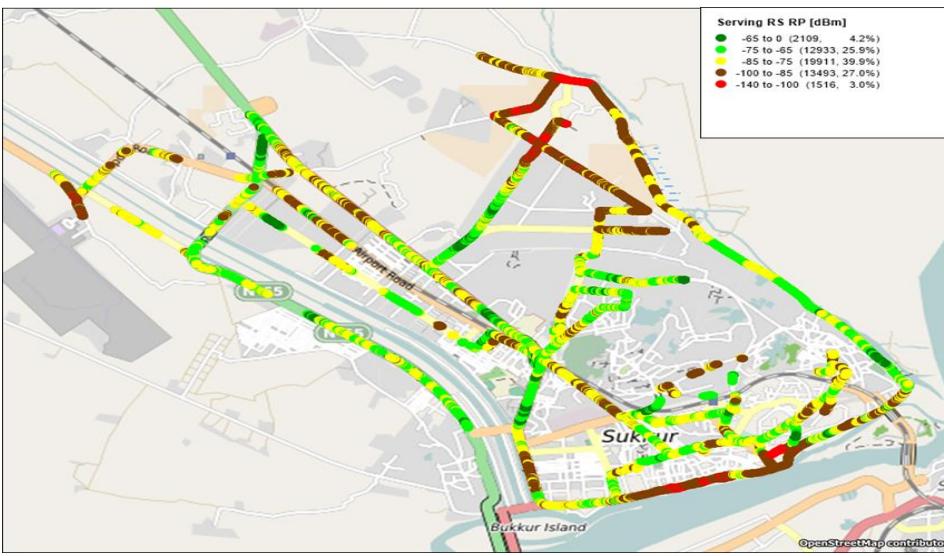
JAZZ 4G COVERAGE (RSRP) - SUKKUR



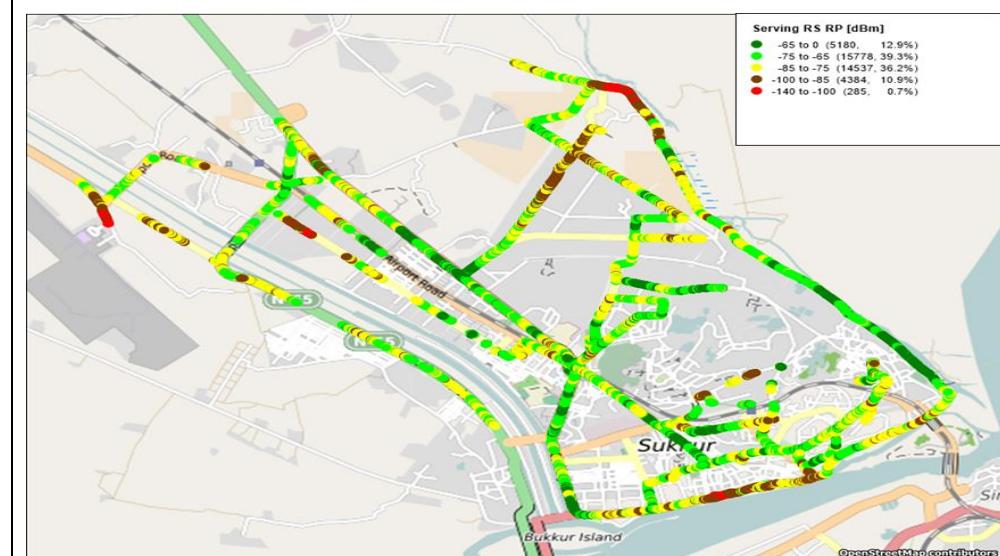
TELENOR 4G COVERAGE (RSRP) - SUKKUR



UFONE 4G COVERAGE (RSRP) - SUKKUR

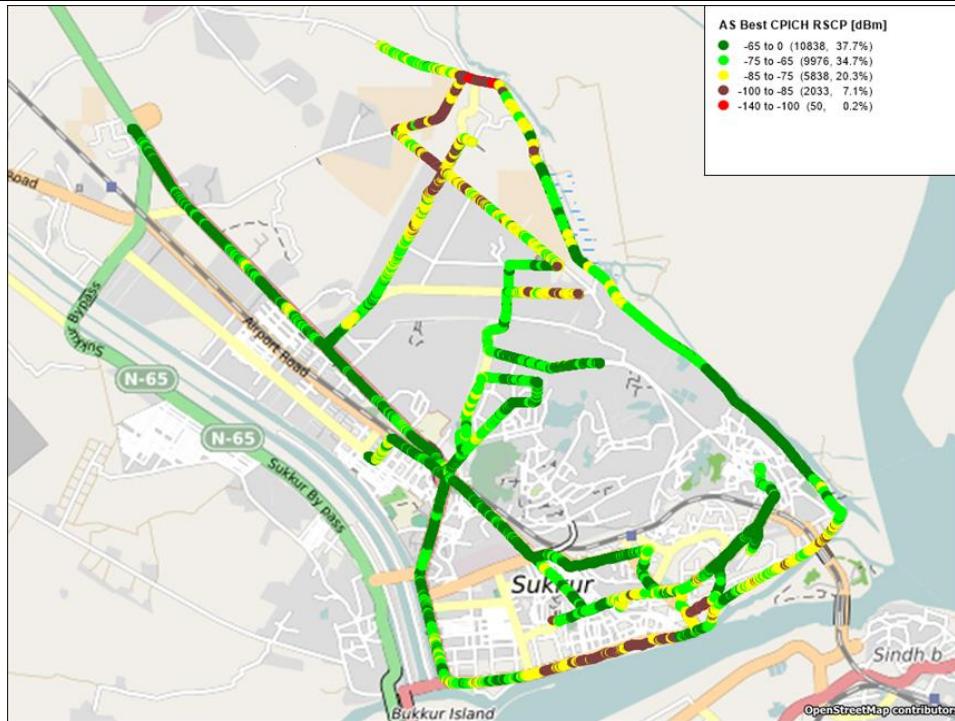


ZONG 4G COVERAGE (RSRP) - SUKKUR

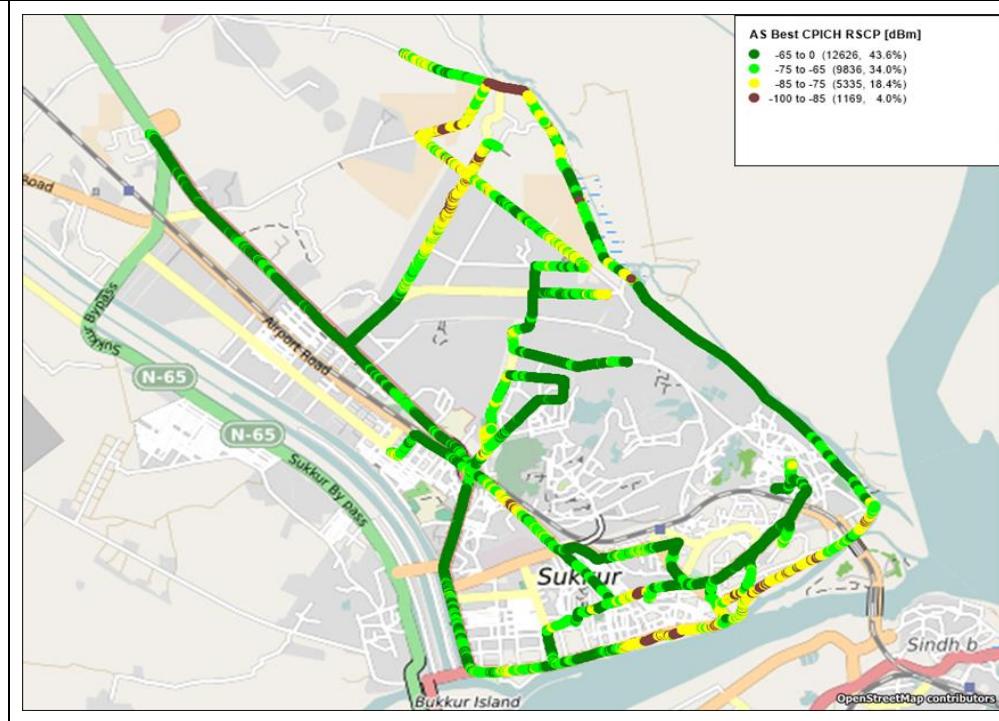


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

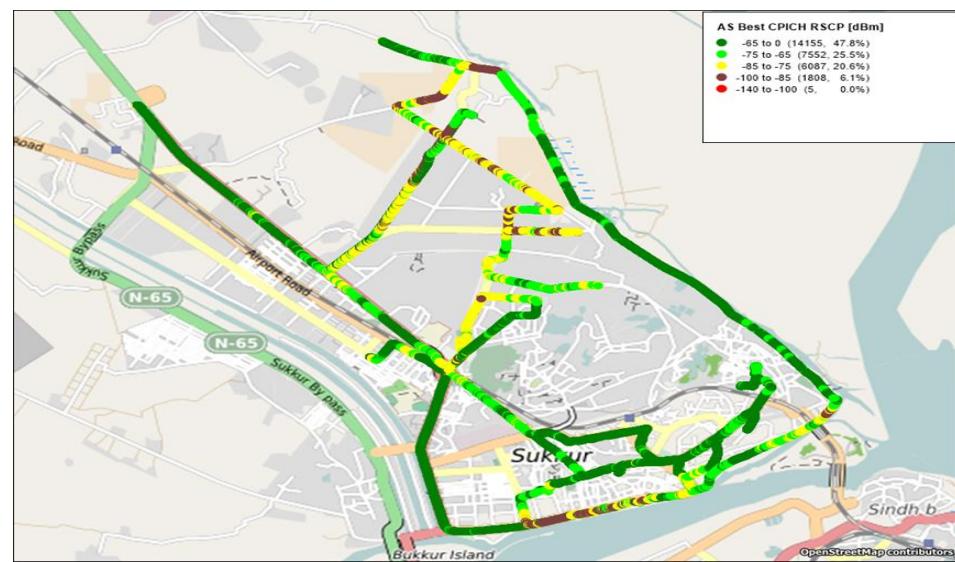
JAZZ 3G COVERAGE (RSCP) - SUKKUR



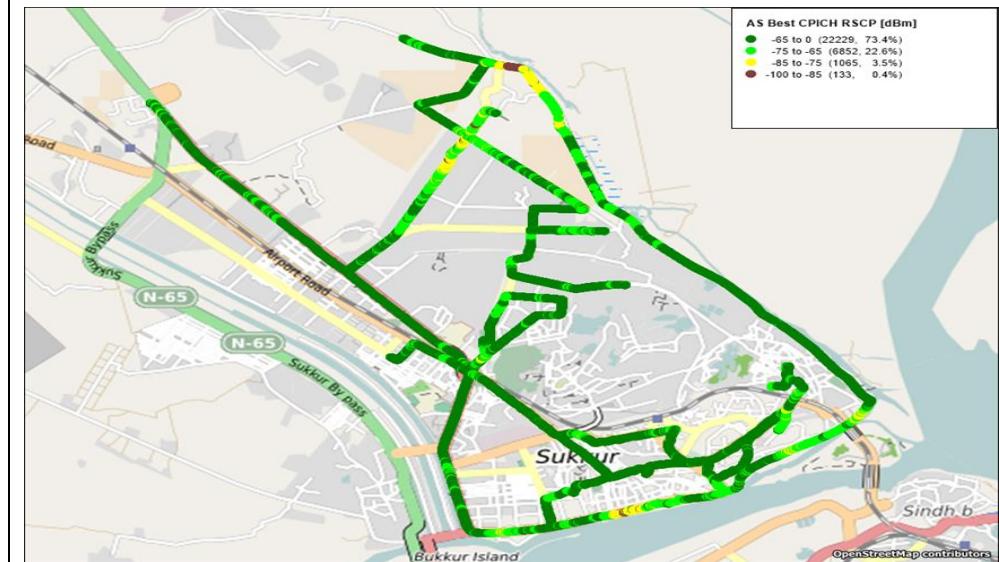
TELENOR 3G COVERAGE (RSCP) - SUKKUR



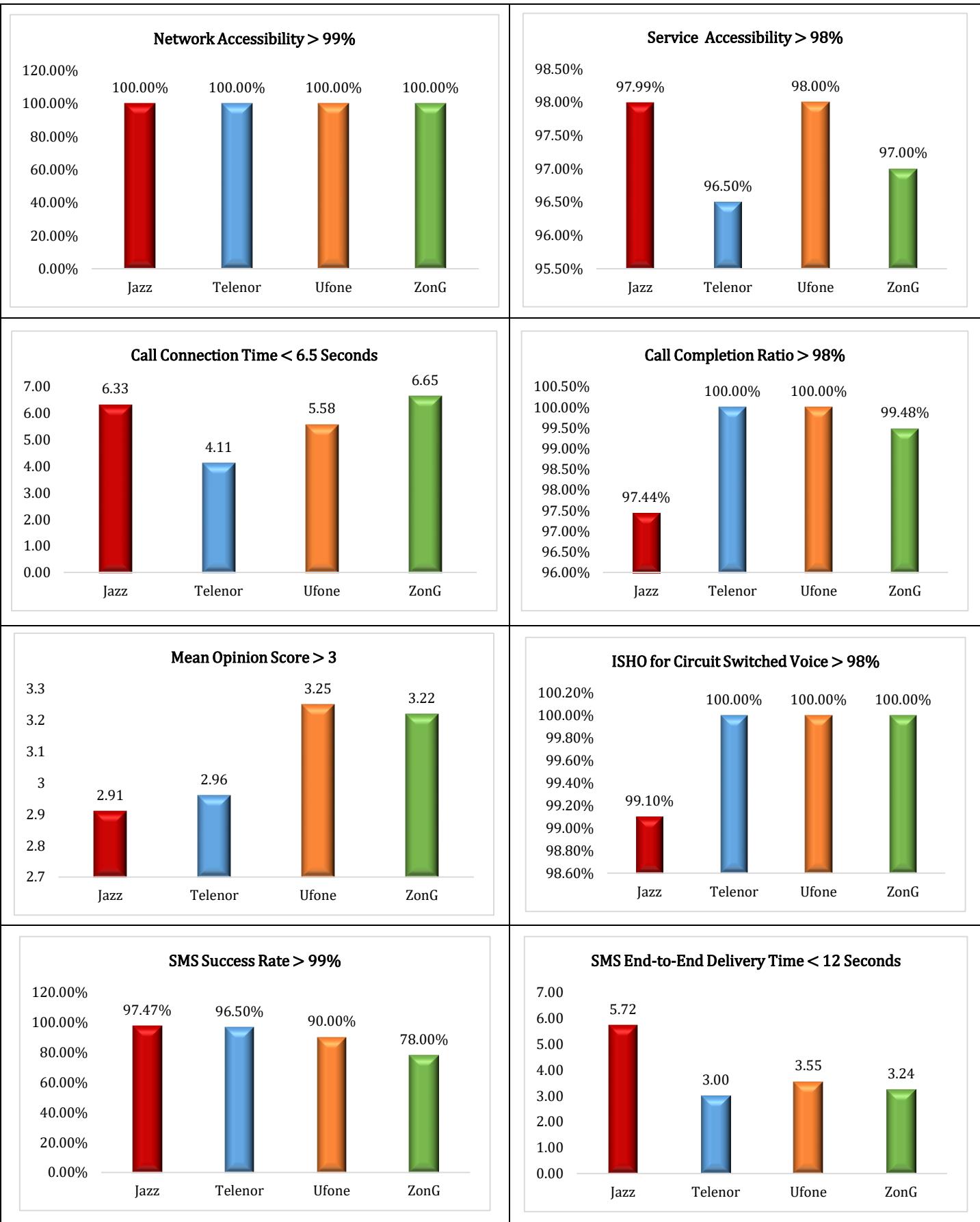
UFONE 3G COVERAGE (RSCP) - SUKKUR



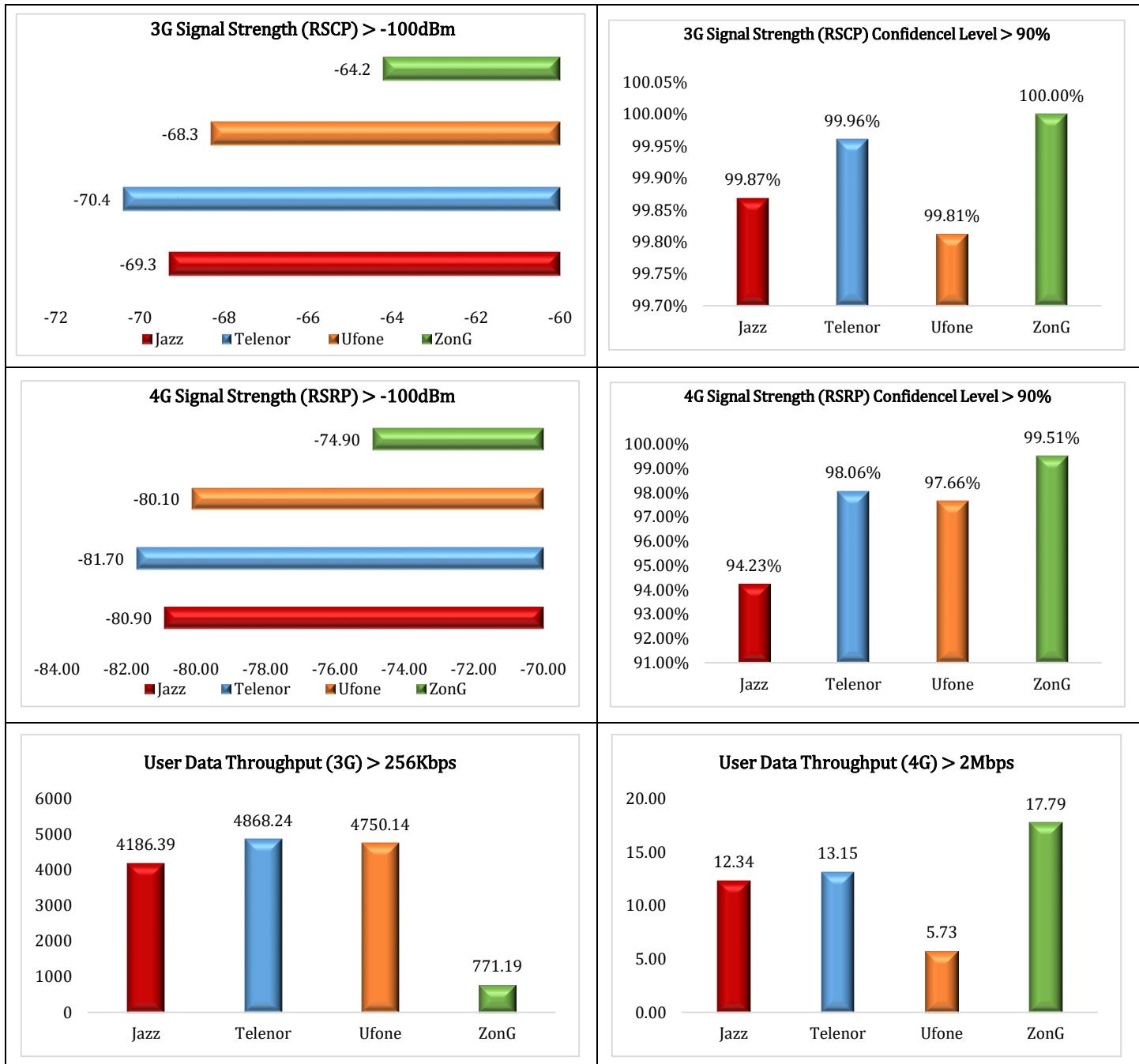
ZONG 3G COVERAGE (RSCP) - SUKKUR



## QUALITY OF SERVICE SURVEY RESULTS – SUKKUR

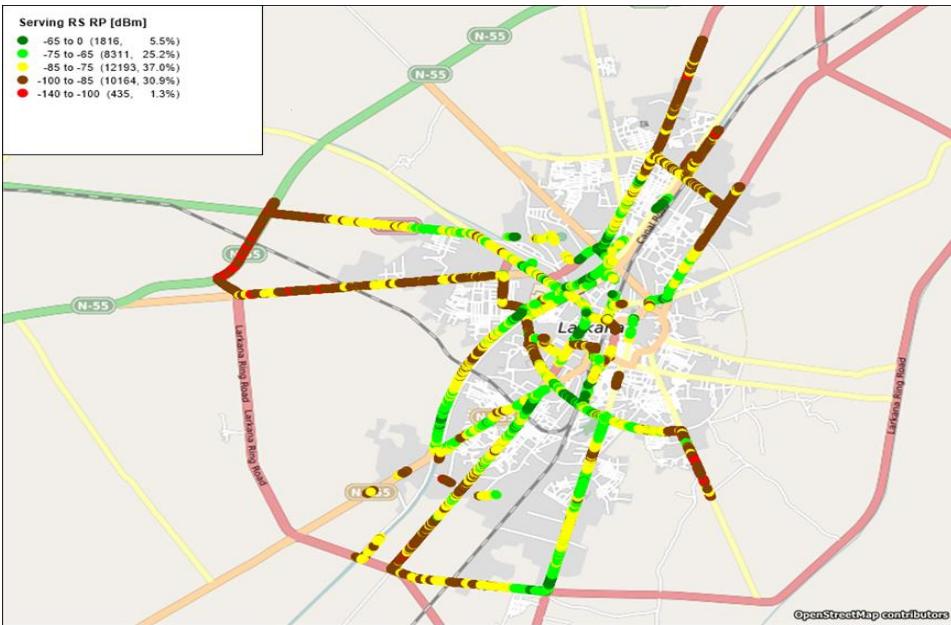


## QUALITY OF SERVICE SURVEY RESULTS – SUKKUR

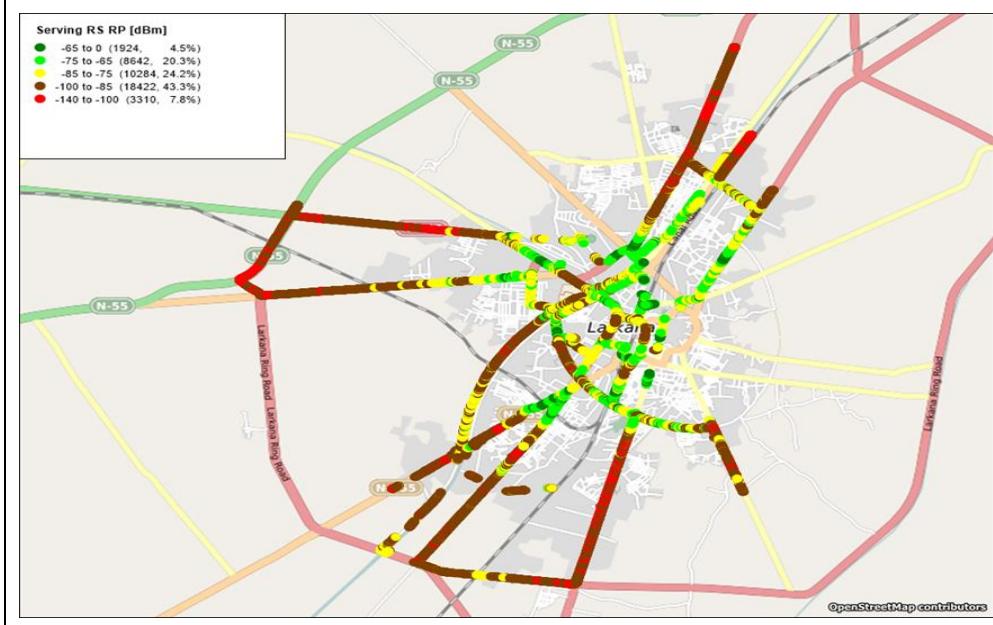


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

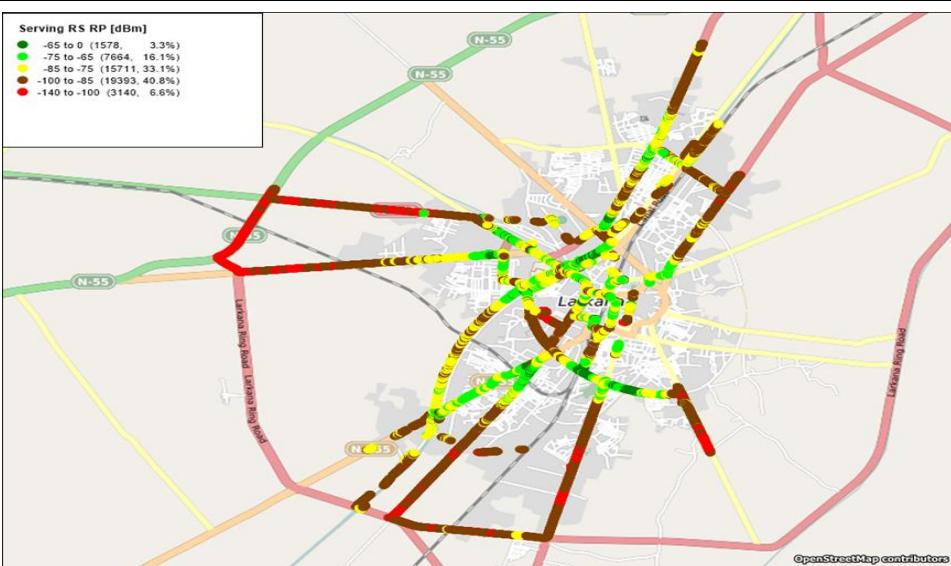
JAZZ 4G COVERAGE (RSRP) - LARKANA



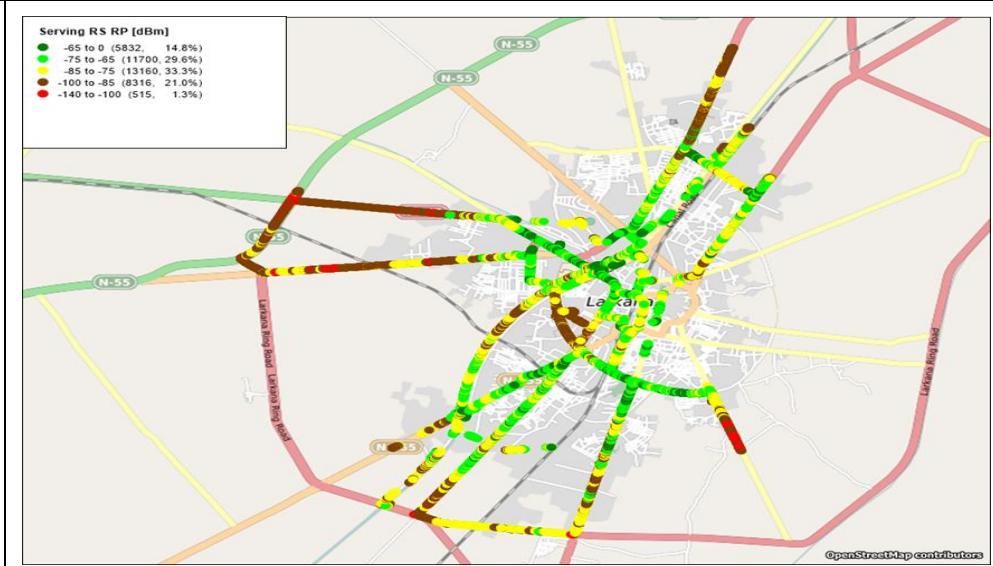
TELENOR 4G COVERAGE (RSRP) - LARKANA



UFONE 4G COVERAGE (RSRP) - LARKANA

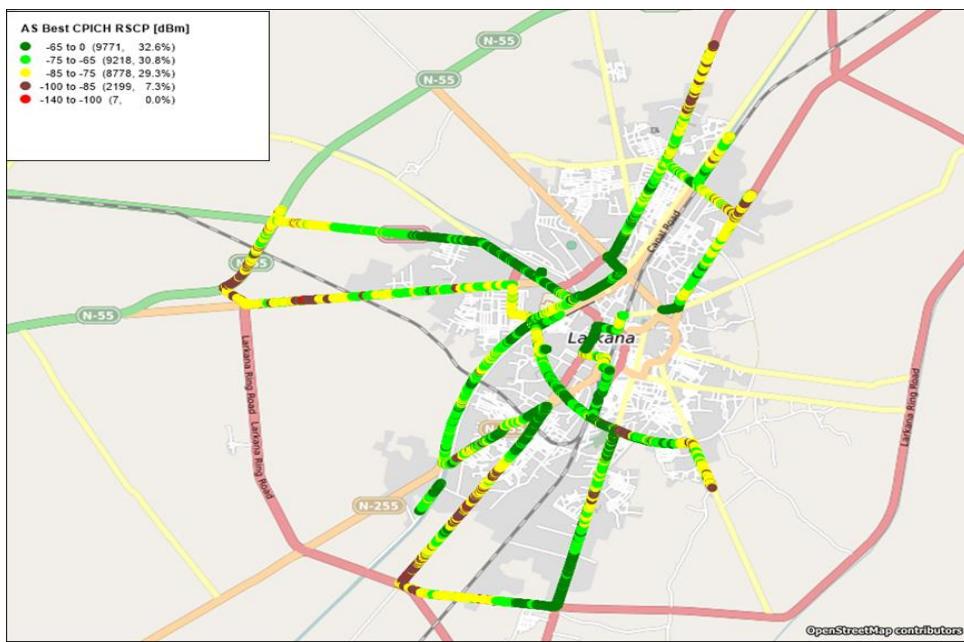


ZONG 4G COVERAGE (RSRP) - LARKANA

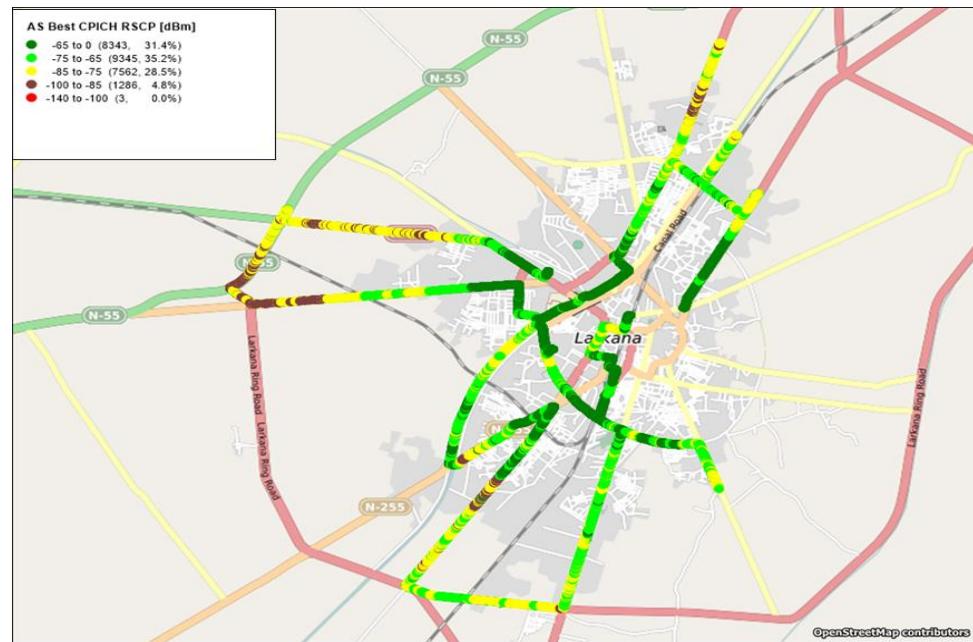


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

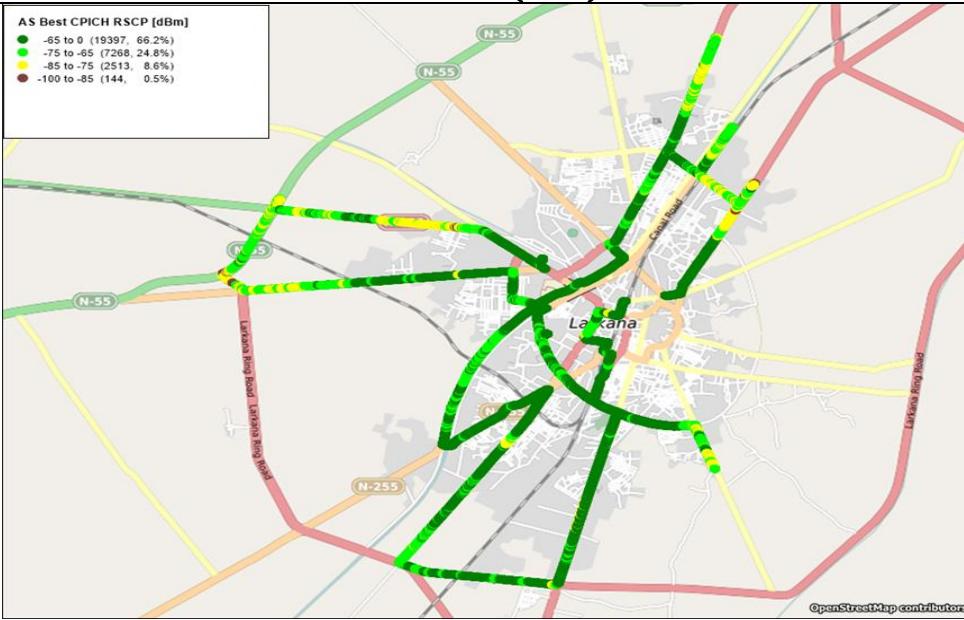
JAZZ 3G COVERAGE (RSCP) - LARKANA



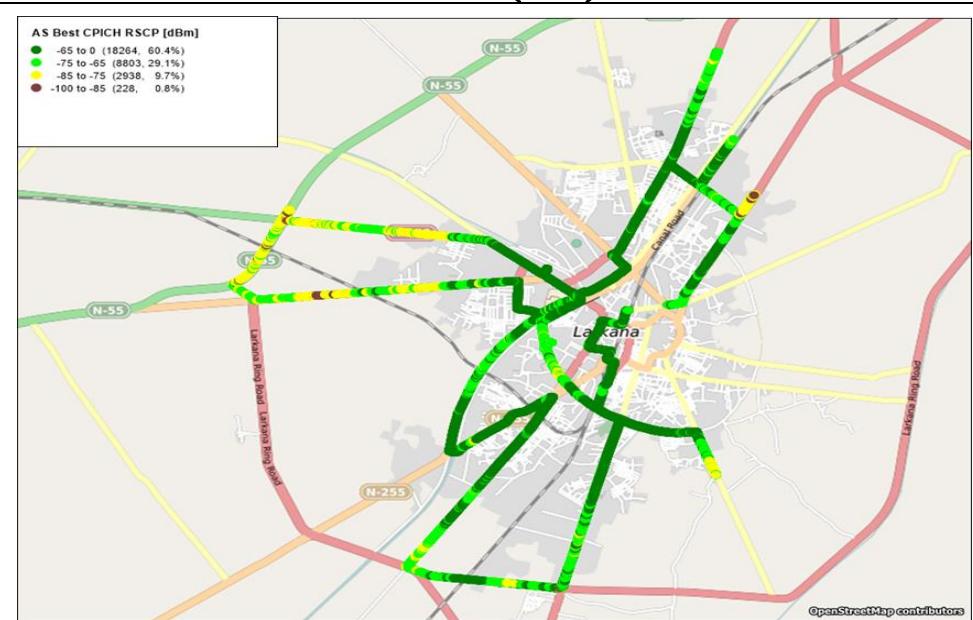
TELENOR 3G COVERAGE (RSCP) - LARKANA



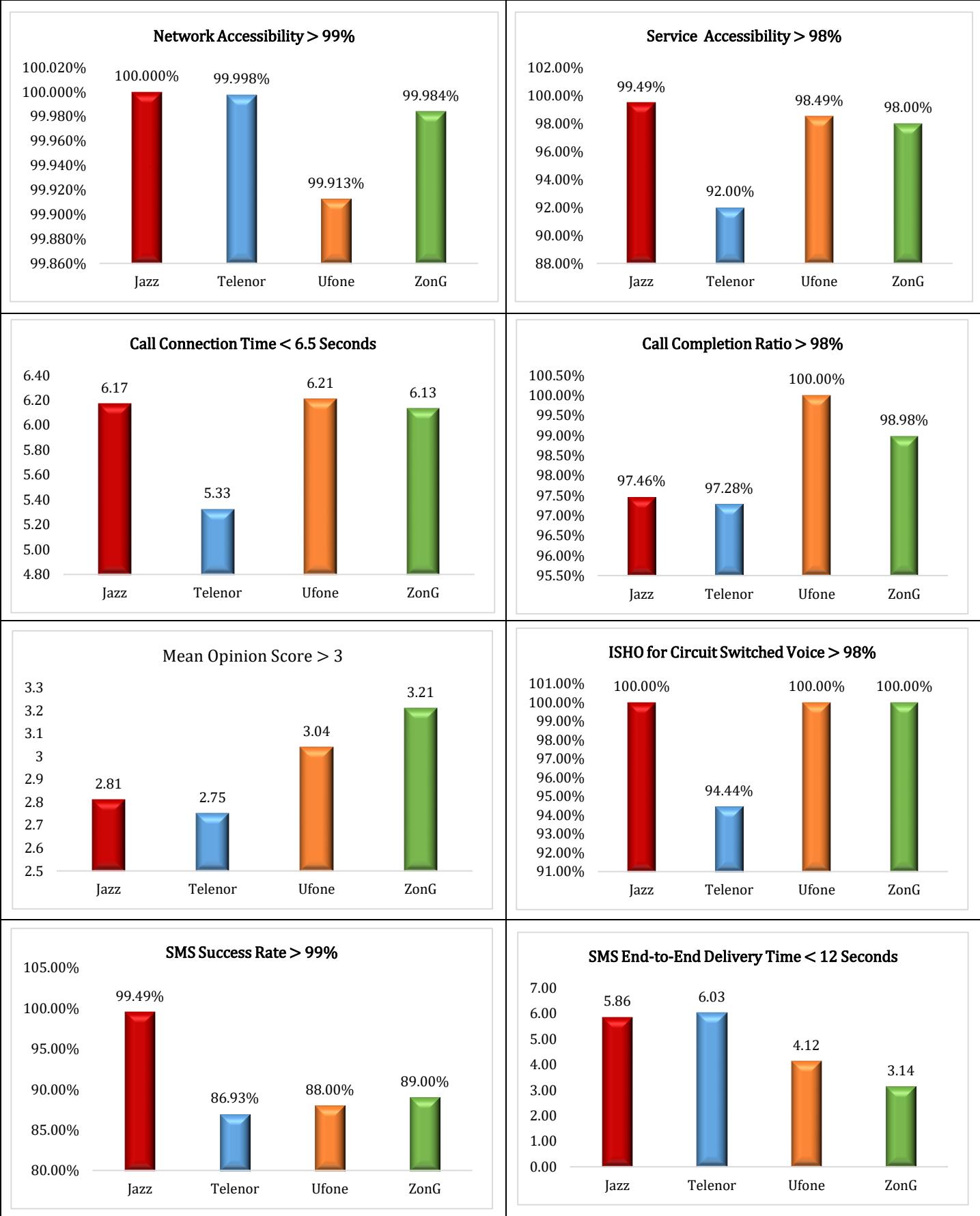
UFONE 3G COVERAGE (RSCP) - LARKANA



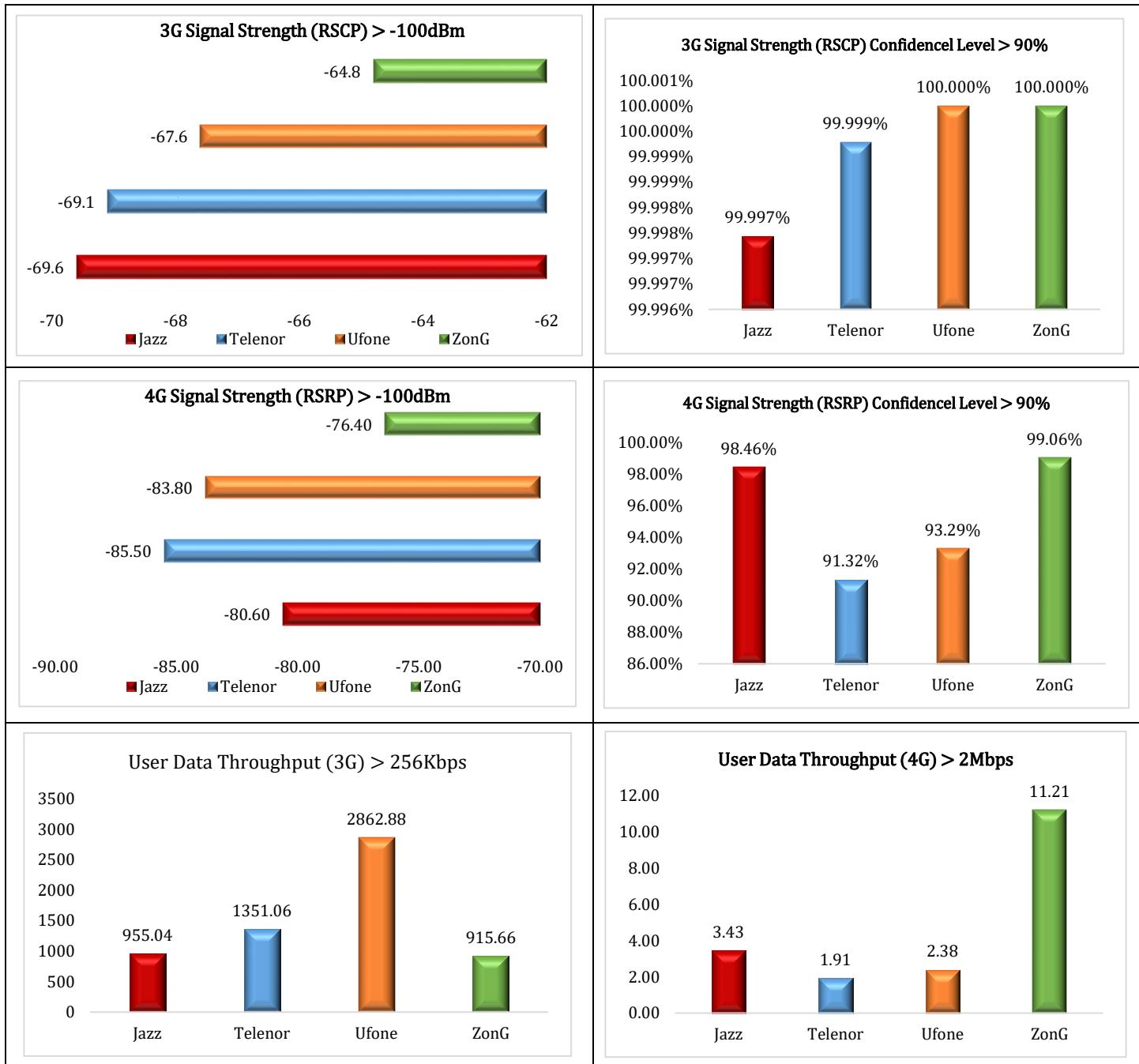
ZONG 3G COVERAGE (RSCP) - LARKANA



## QUALITY OF SERVICE SURVEY RESULTS – LARKANA

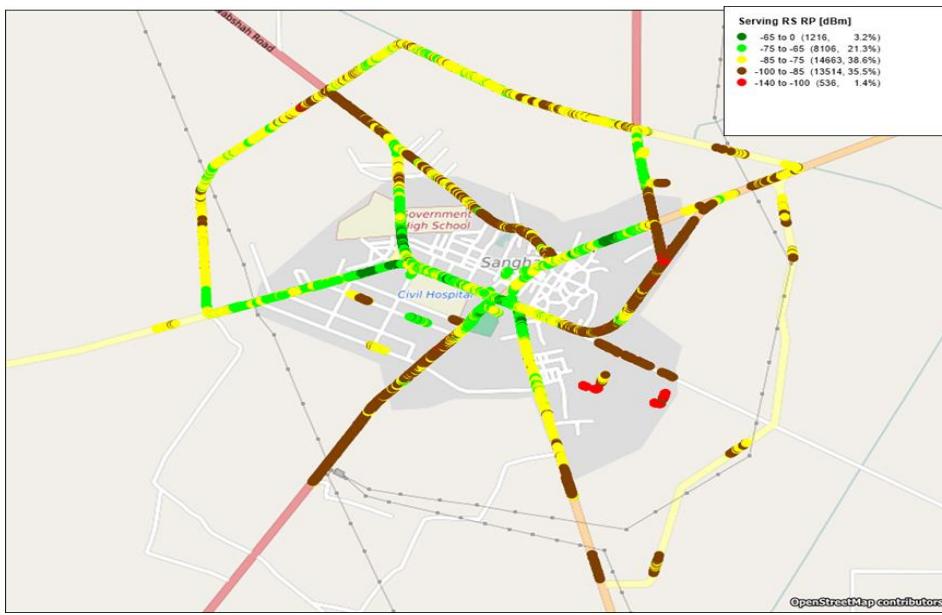


## QUALITY OF SERVICE SURVEY RESULTS – LARKANA

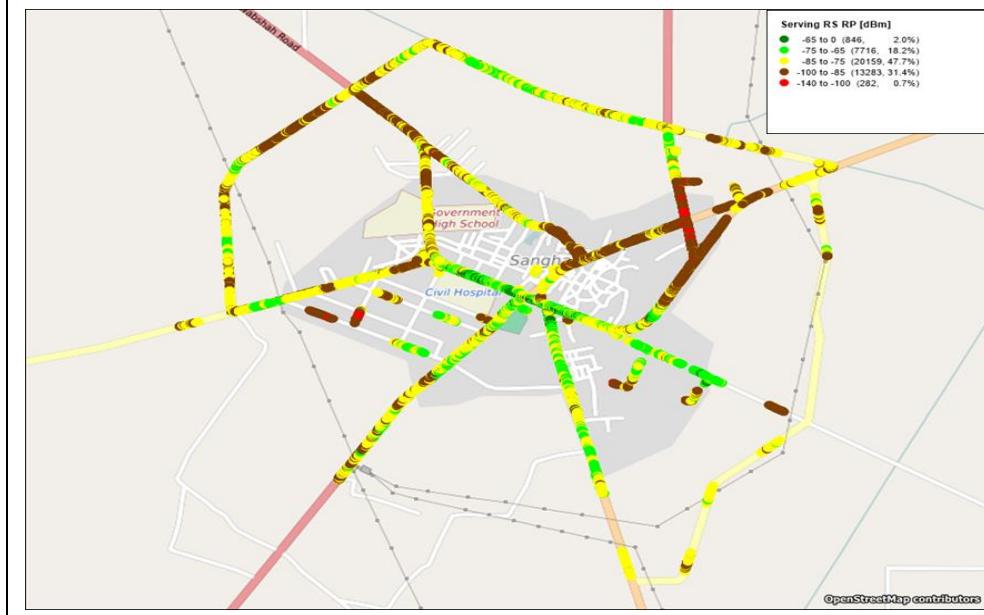


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

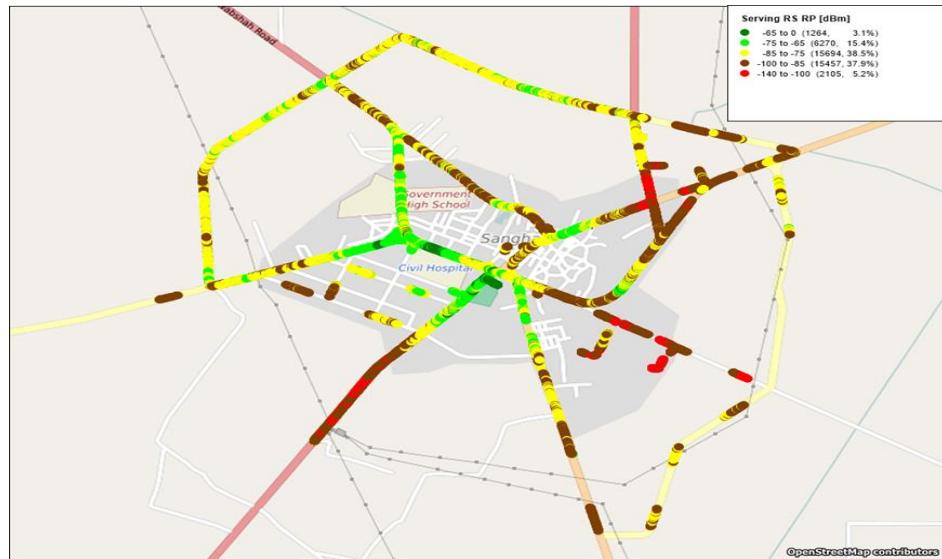
JAZZ 4G COVERAGE (RSRP) - SANGHAR



TELENOR 4G COVERAGE (RSRP) - SANGHAR



UFONE 4G COVERAGE (RSRP) - SANGHAR

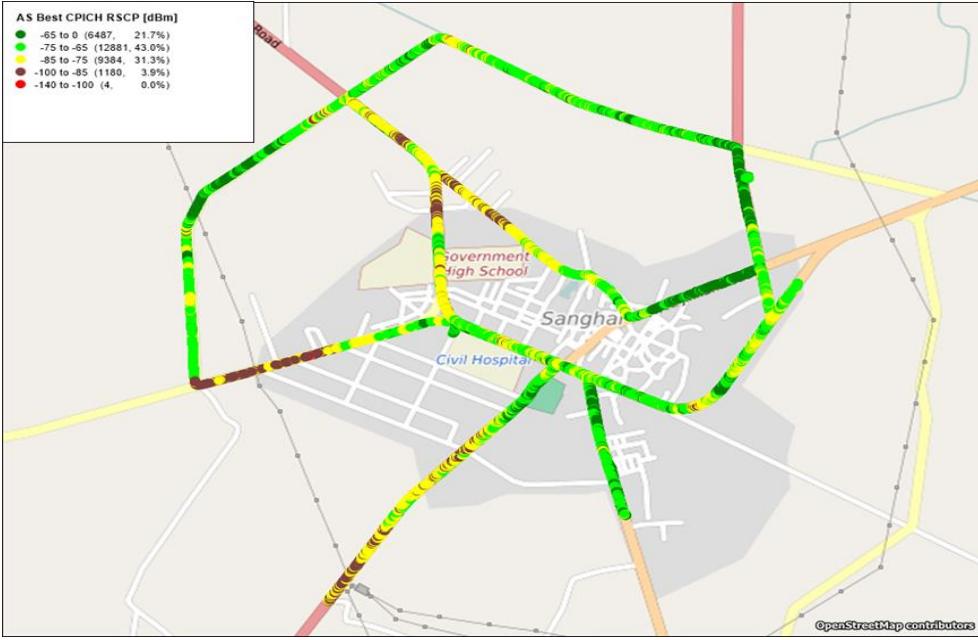


ZONG 4G COVERAGE (RSRP) - SANGHAR



## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

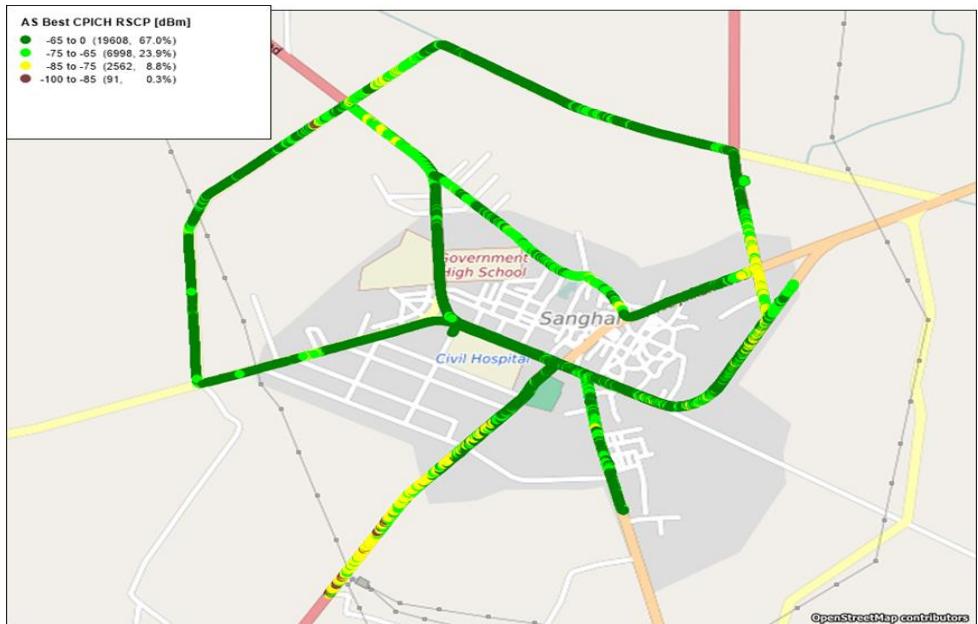
JAZZ 3G COVERAGE (RSCP) - SANGHAR



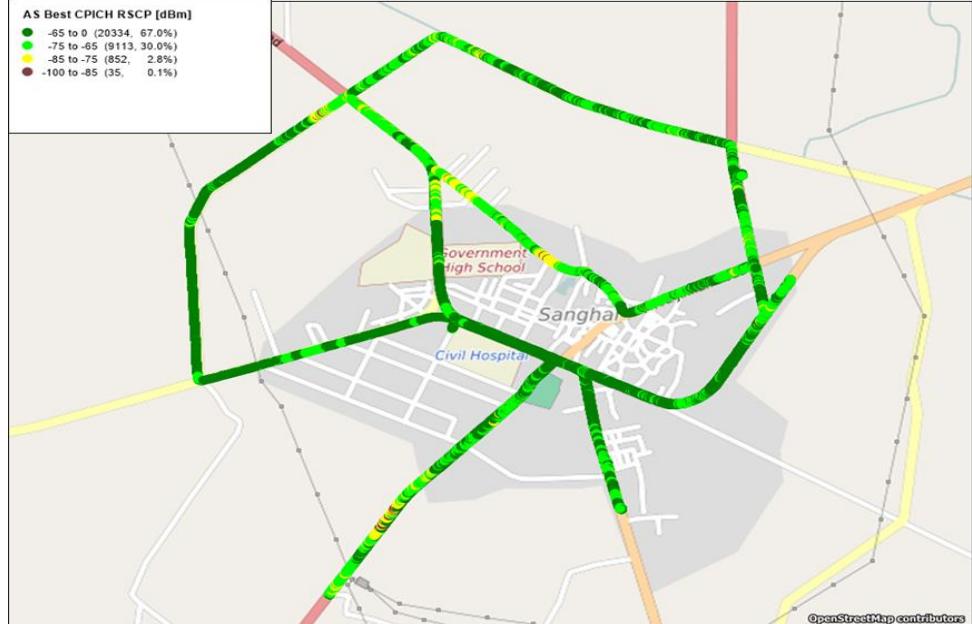
TELENOR 3G COVERAGE (RSCP) - SANGHAR



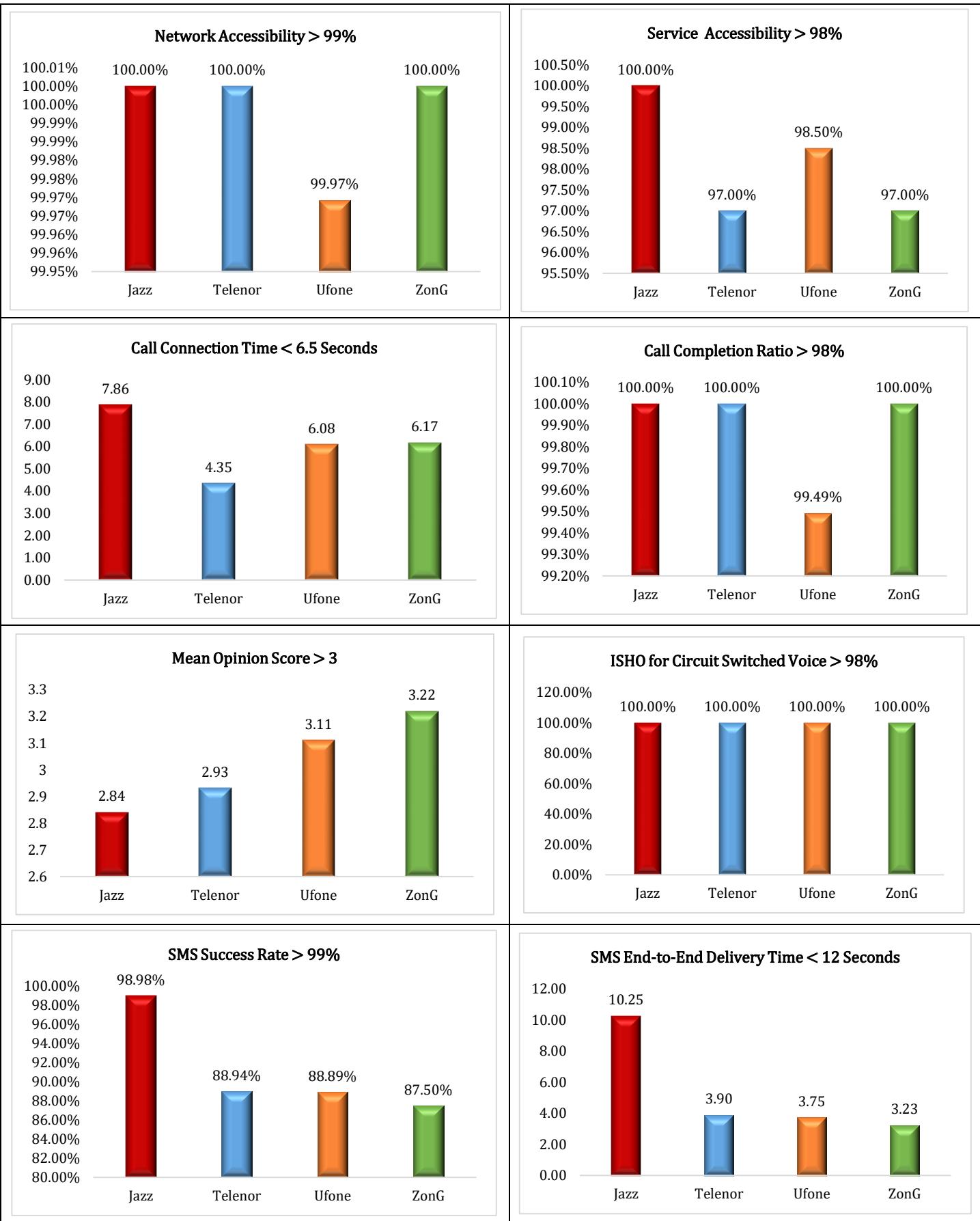
UFONE 3G COVERAGE (RSCP) - SANGHAR



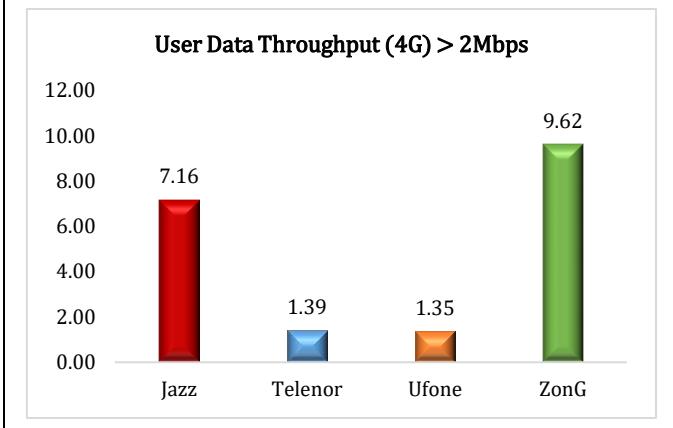
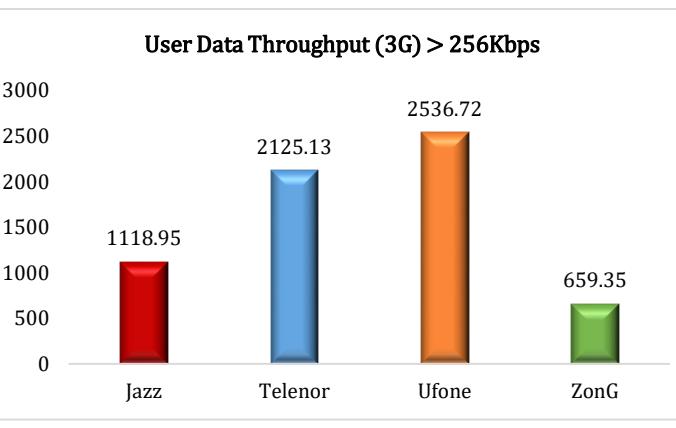
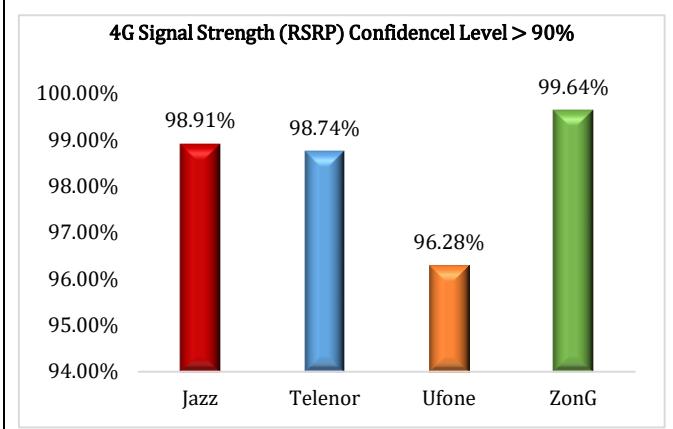
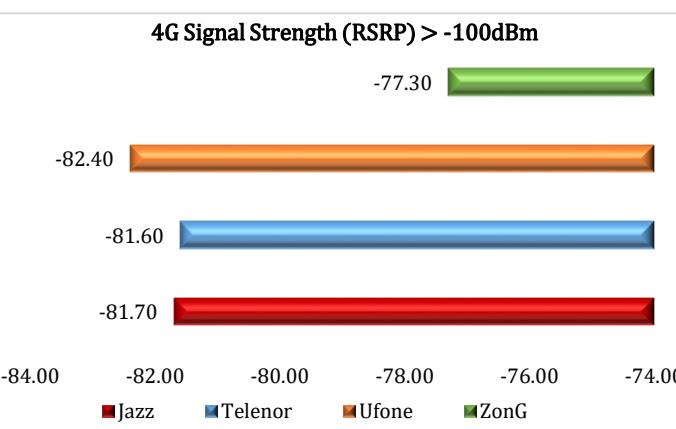
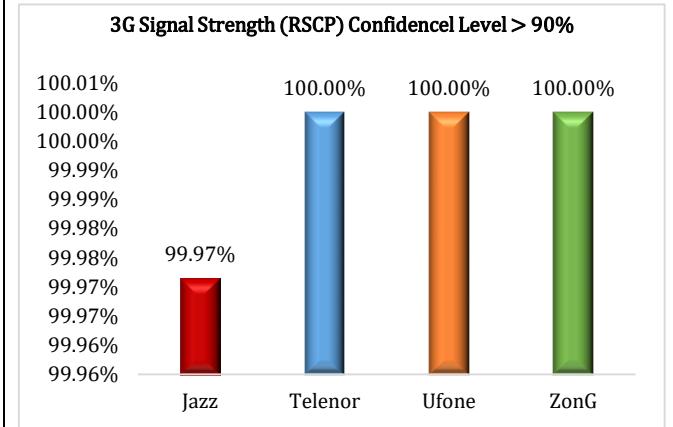
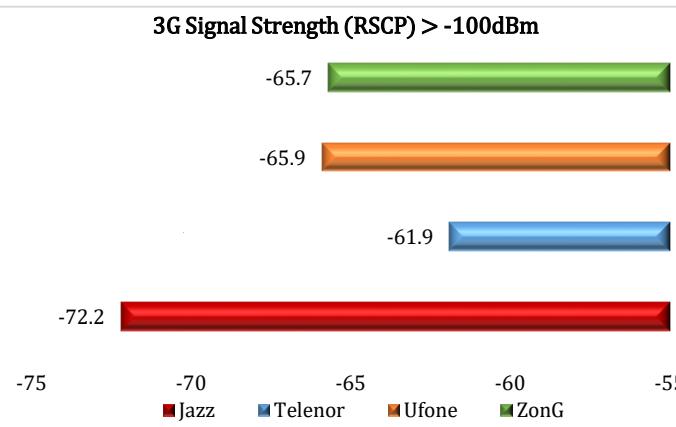
ZONG 3G COVERAGE (RSCP) - SANGHAR



## QUALITY OF SERVICE SURVEY RESULTS – SANGHAR

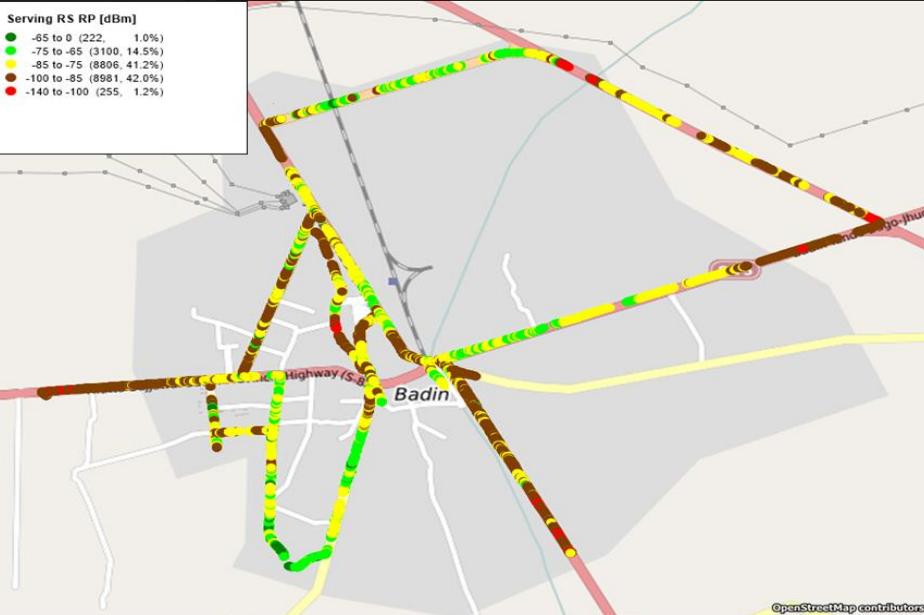


## QUALITY OF SERVICE SURVEY RESULTS – SANGHAR

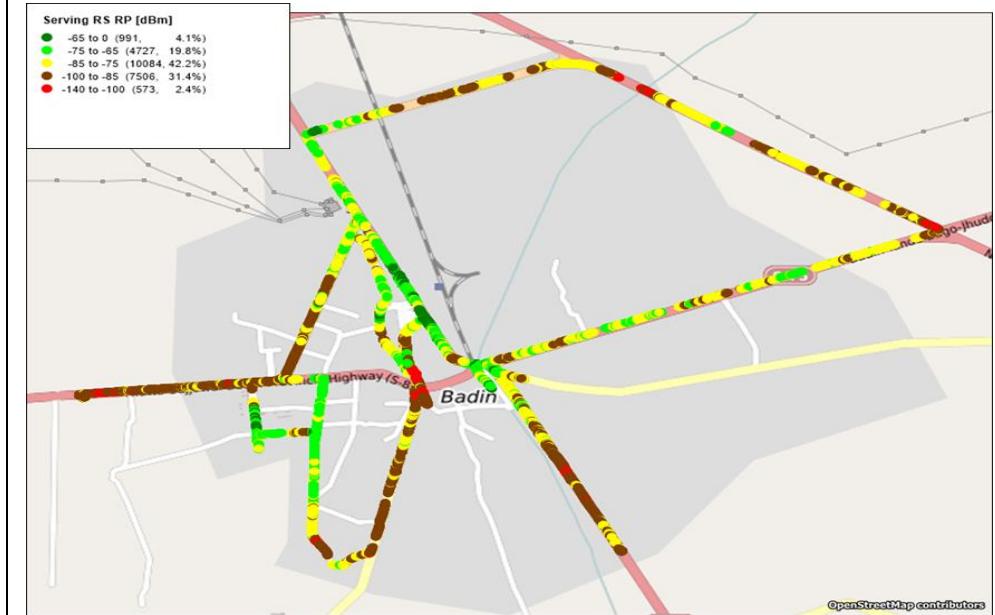


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

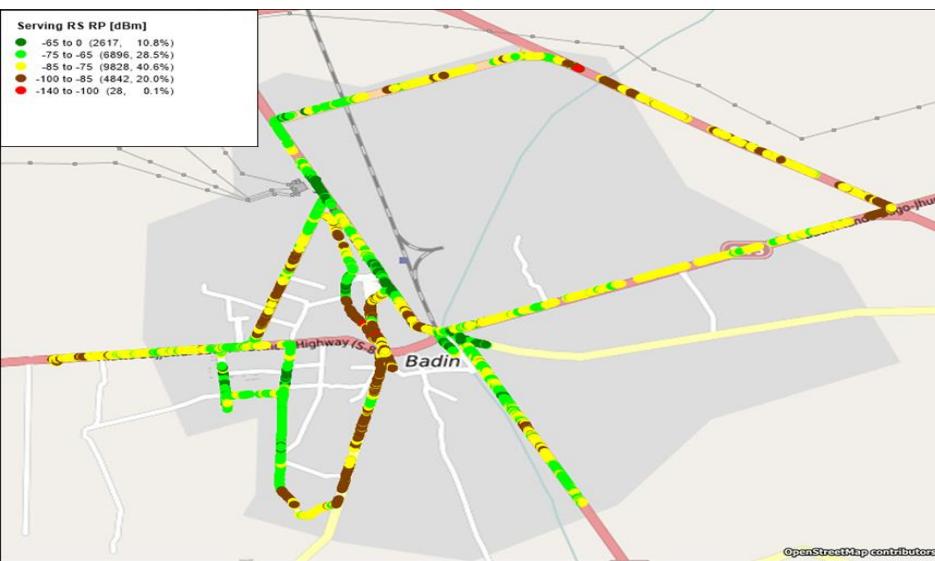
### JAZZ 4G COVERAGE (RSRP) - BADIN



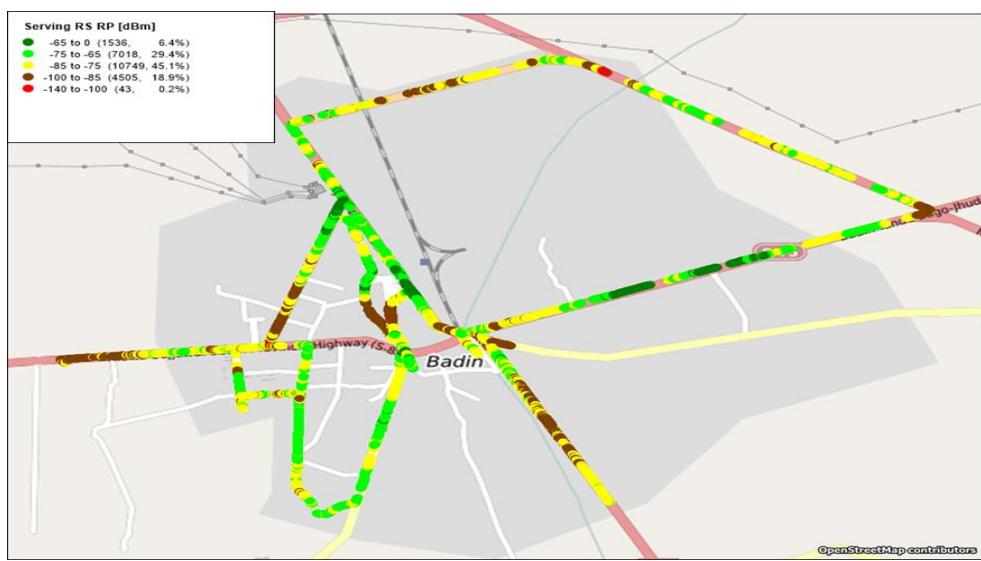
### TELENOR 4G COVERAGE (RSRP) - BADIN



### UFONE 4G COVERAGE (RSRP) - BADIN

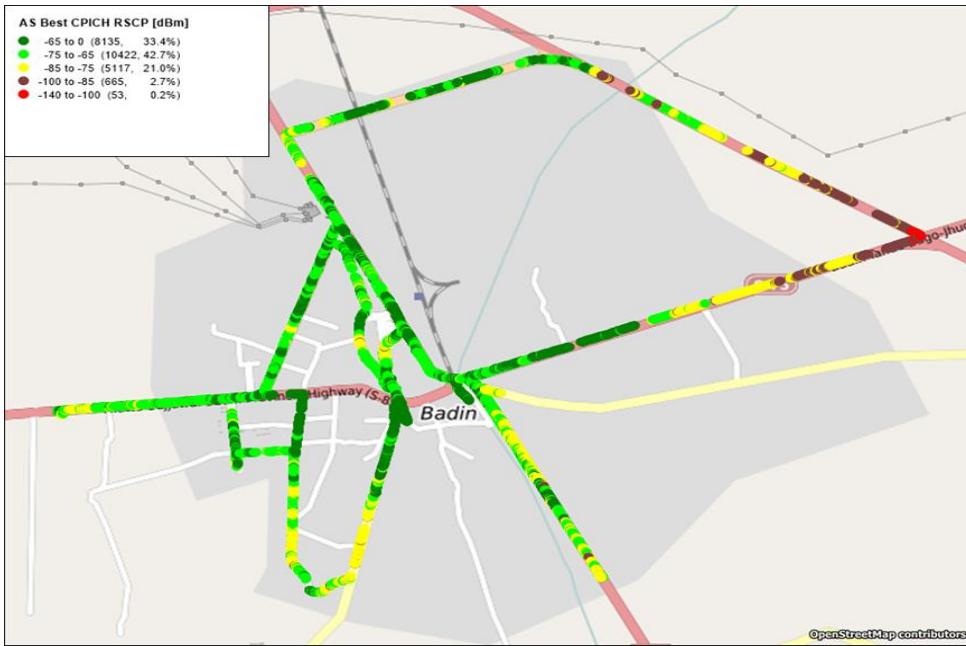


### ZONG 4G COVERAGE (RSRP) - BADIN

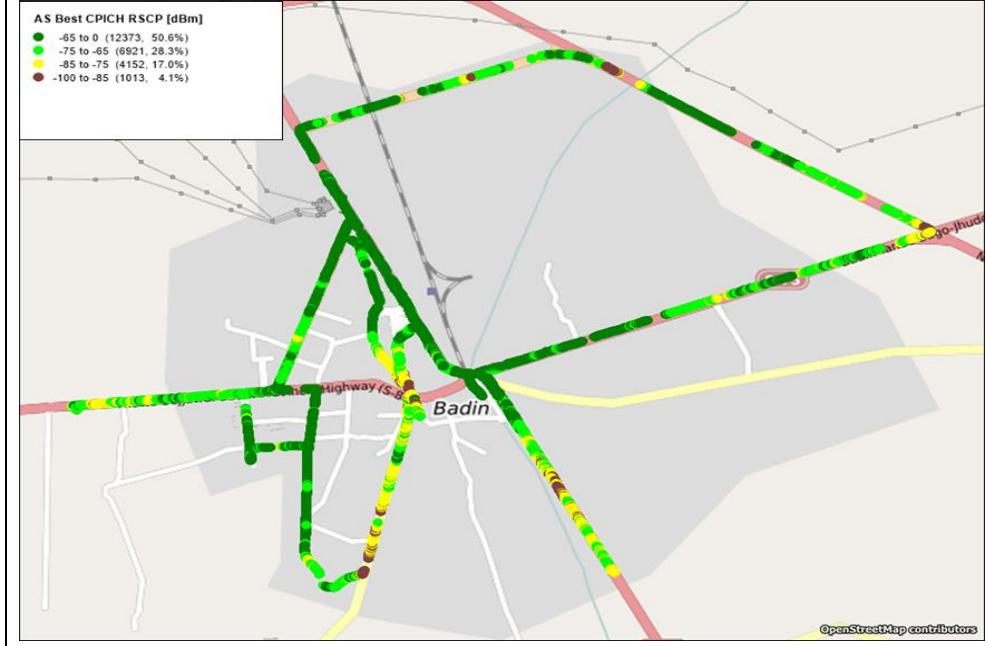


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

JAZZ 3G COVERAGE (RSCP) - BADIN



TELENOR 3G COVERAGE (RSCP) - BADIN



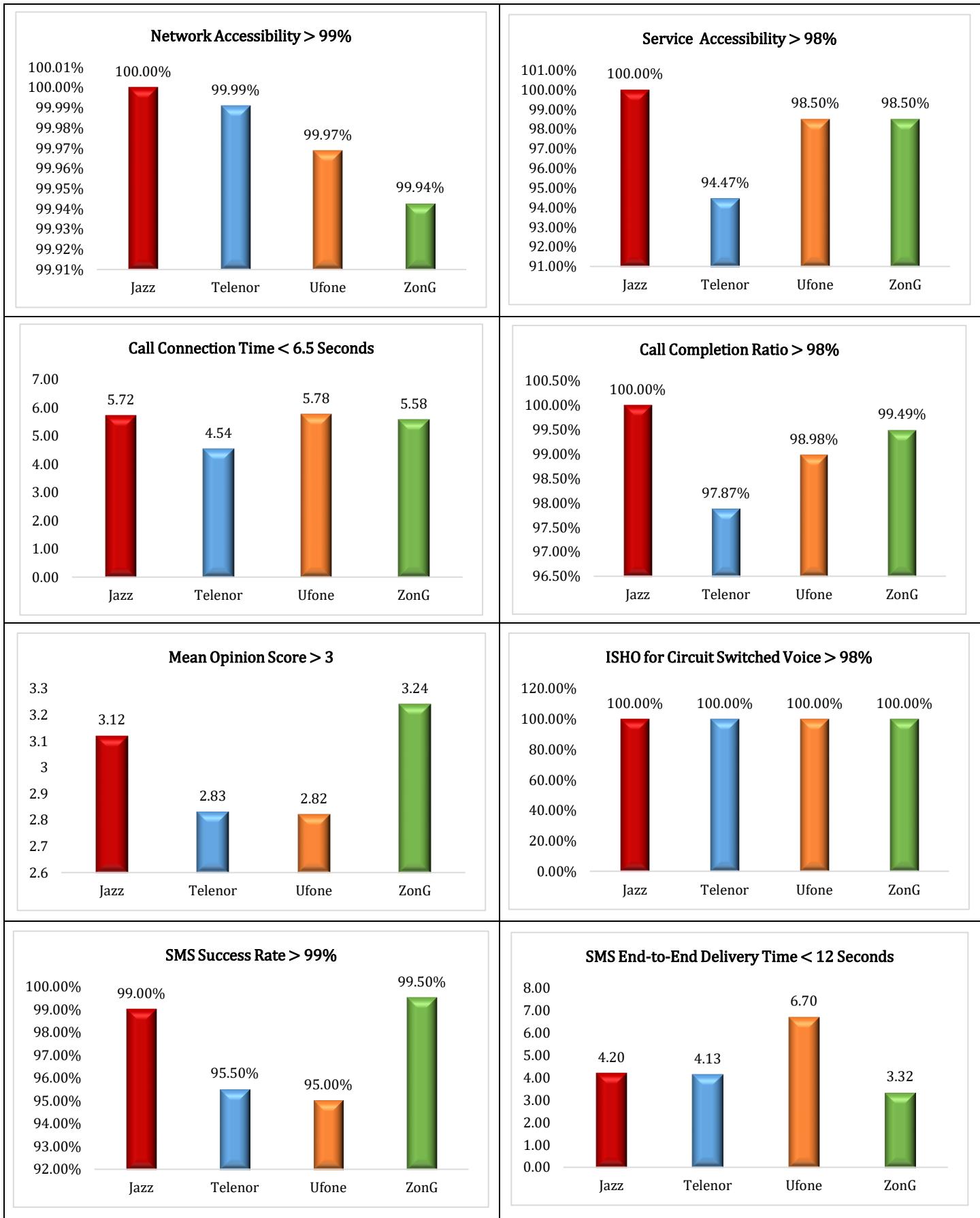
UFONE 3G COVERAGE (RSCP) - BADIN



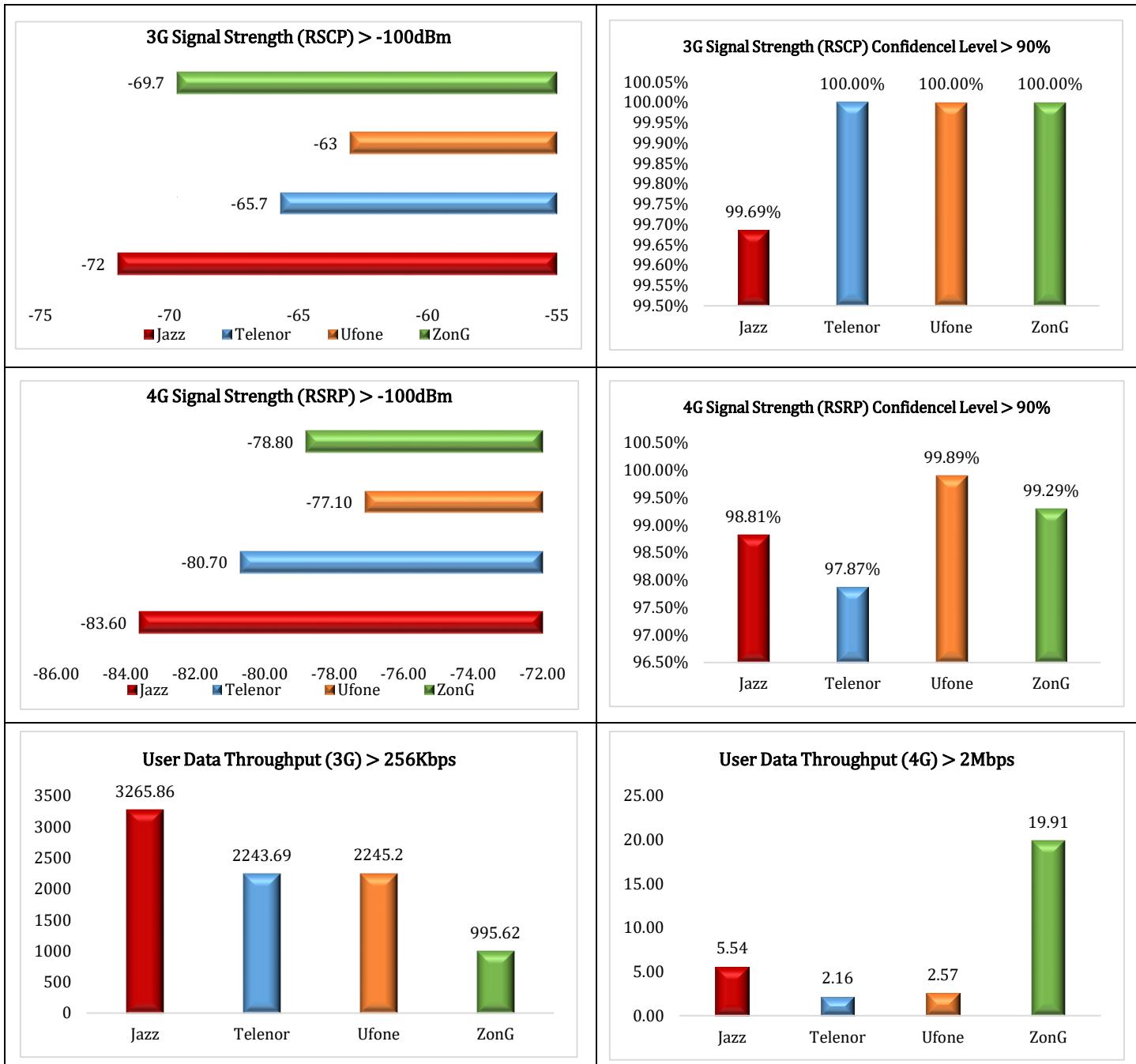
ZONG 3G COVERAGE (RSCP) - BADIN



## QUALITY OF SERVICE SURVEY RESULTS – BADIN

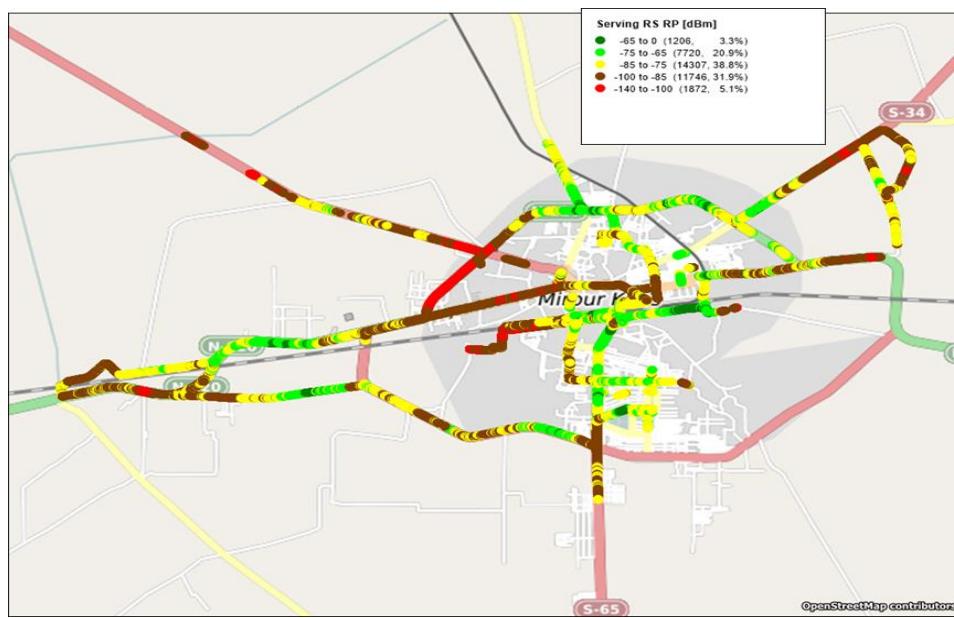


## QUALITY OF SERVICE SURVEY RESULTS – BADIN

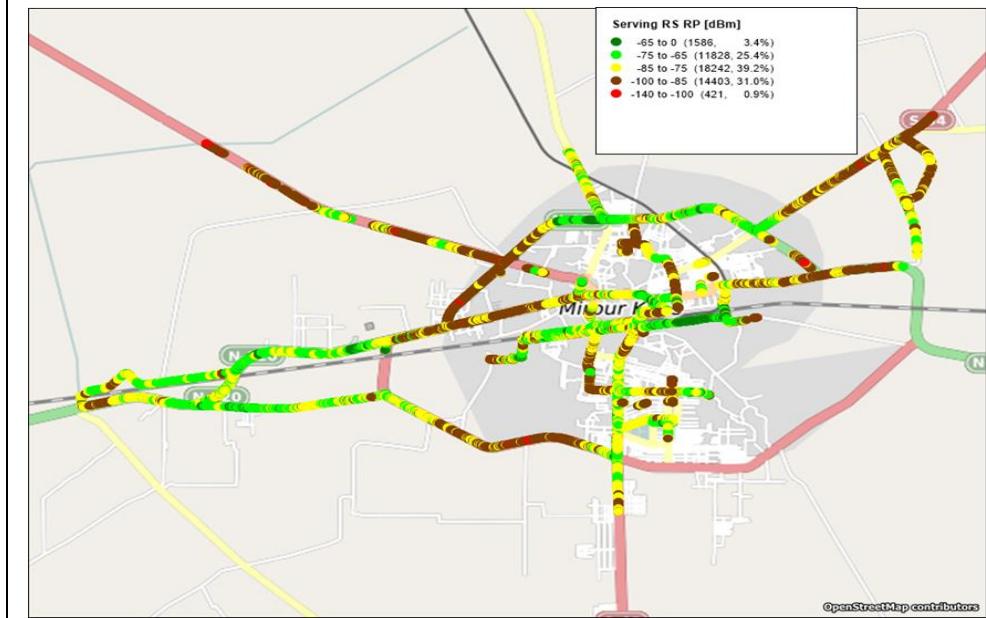


## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

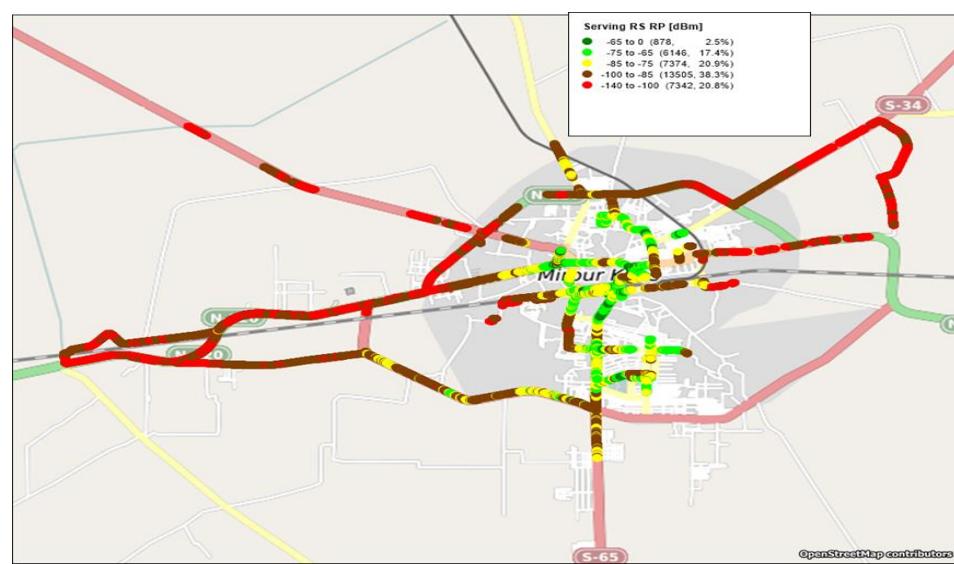
JAZZ 4G COVERAGE (RSRP) - MIRPURKHAS



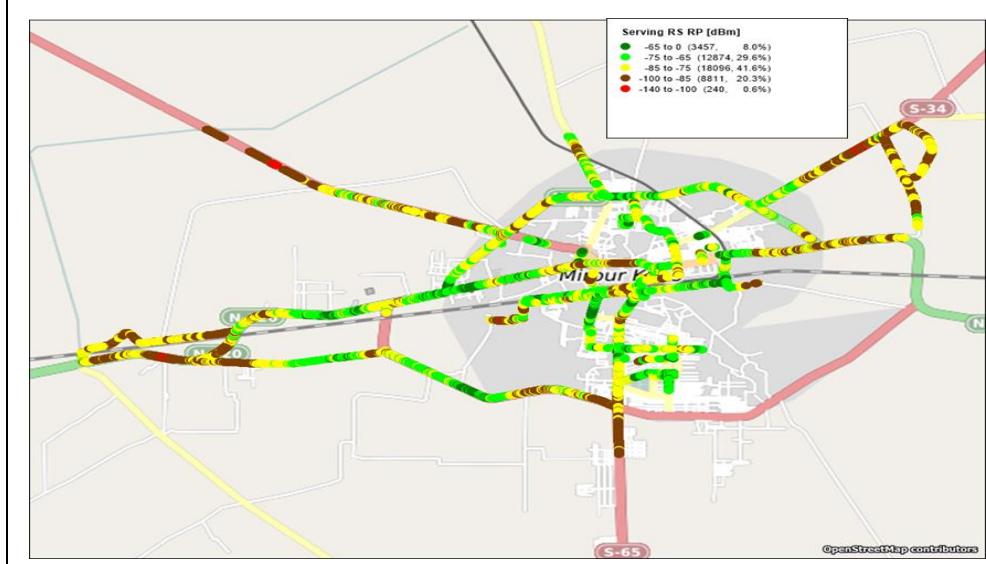
TELENOR 4G COVERAGE (RSRP) - MIRPURKHAS



UFONE 4G COVERAGE (RSRP) - MIRPURKHAS

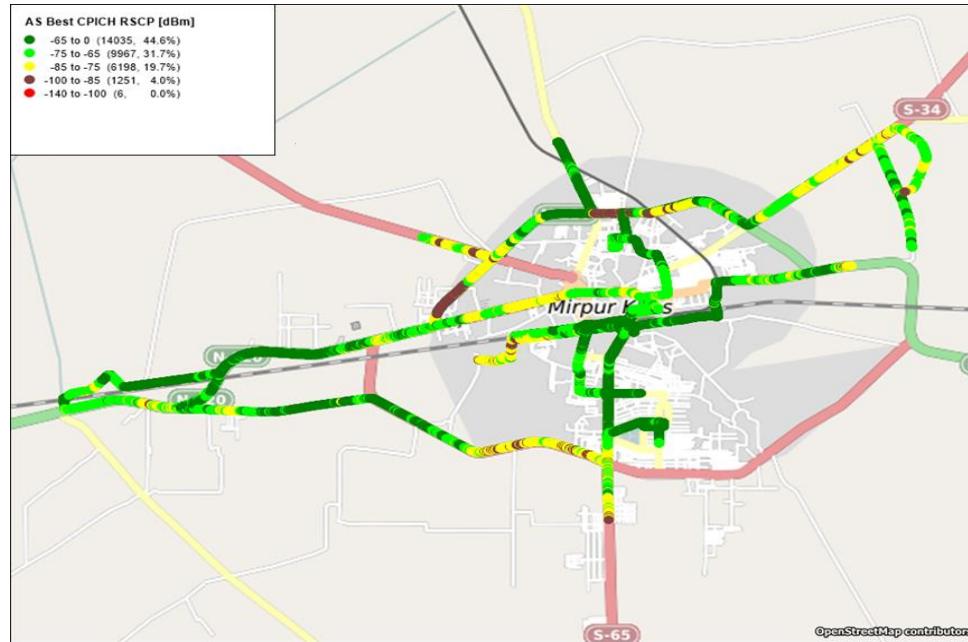


ZONG 4G COVERAGE (RSRP) - MIRPURKHAS

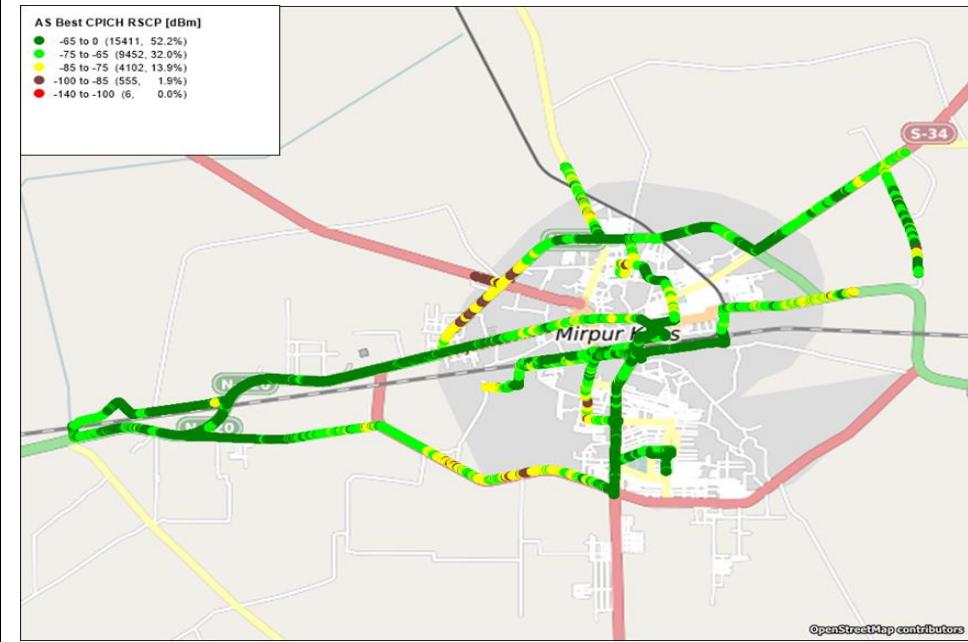


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

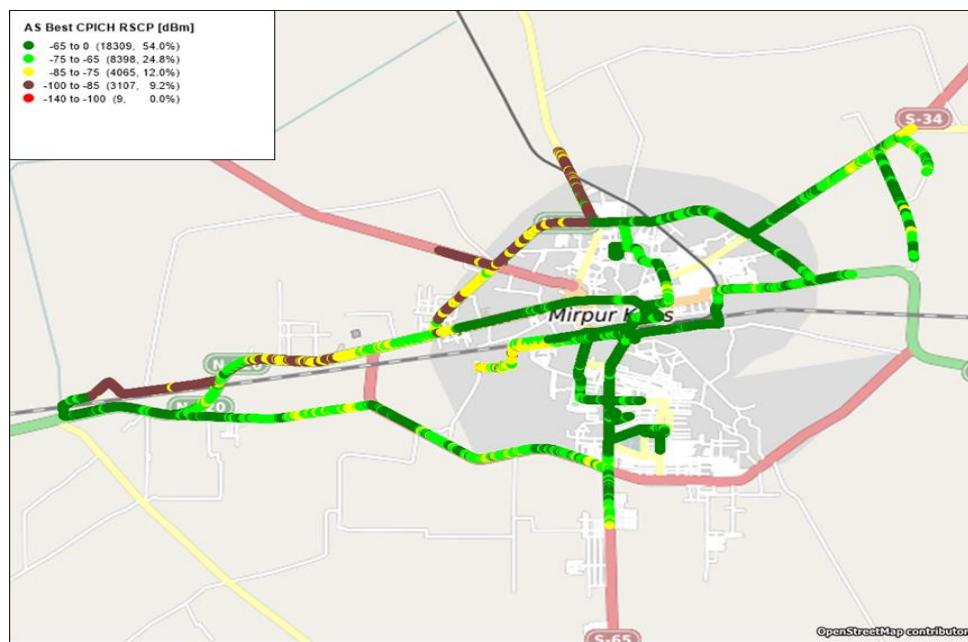
JAZZ 3G COVERAGE (RSCP) - MIRPURKHAS



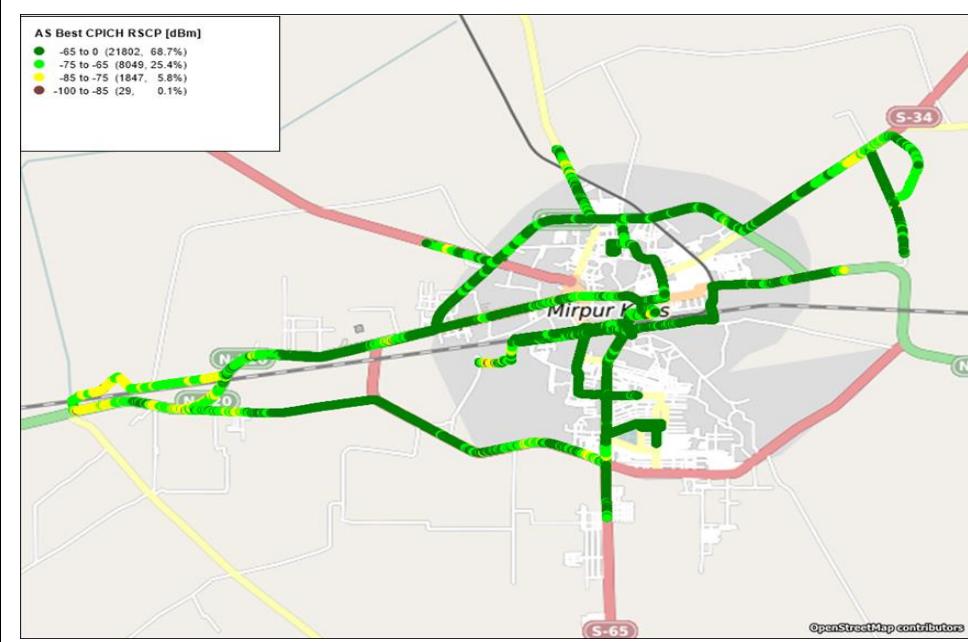
TELENOR 3G COVERAGE (RSCP) - MIRPURKHAS



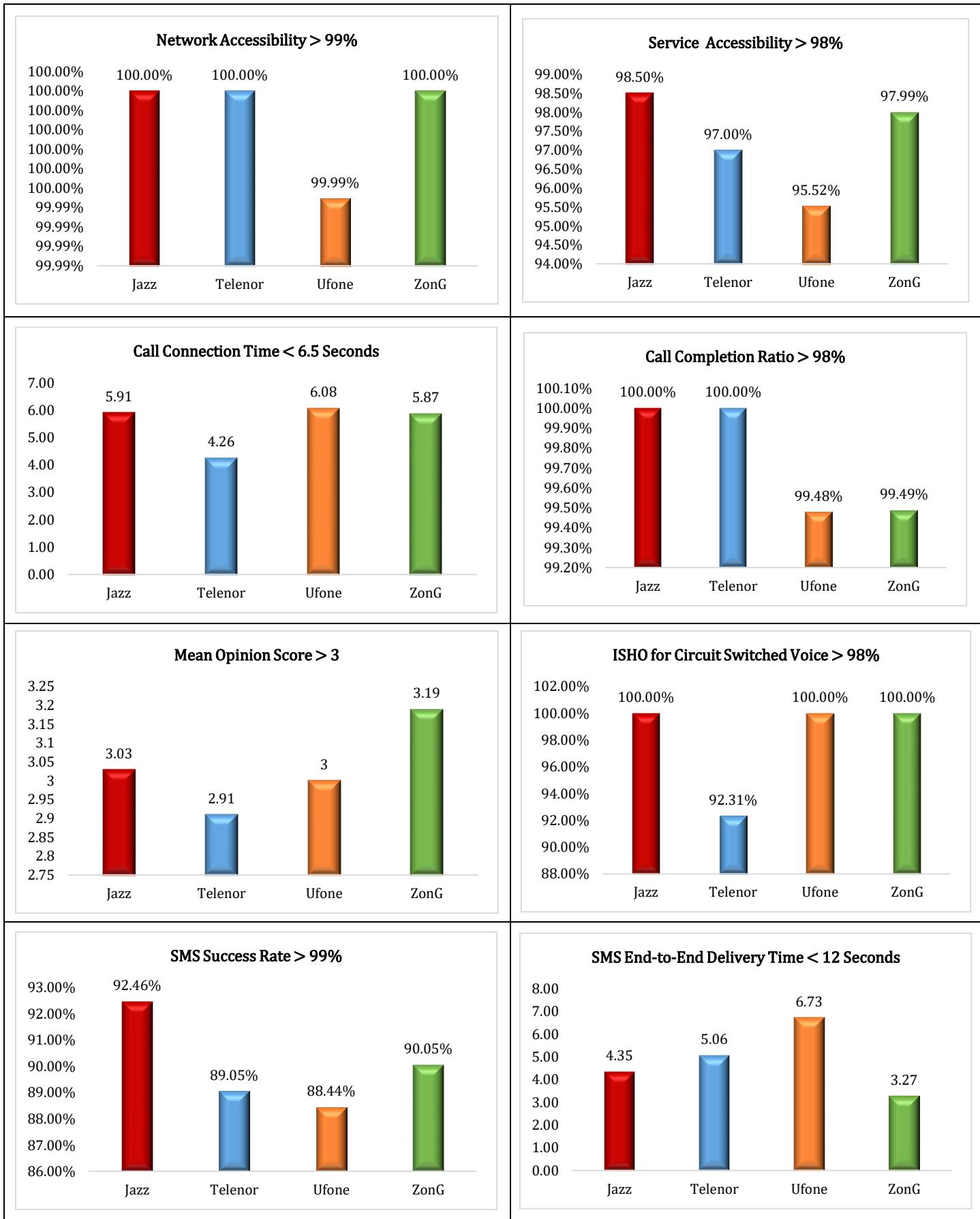
UFONE 3G COVERAGE (RSCP) - MIRPURKHAS



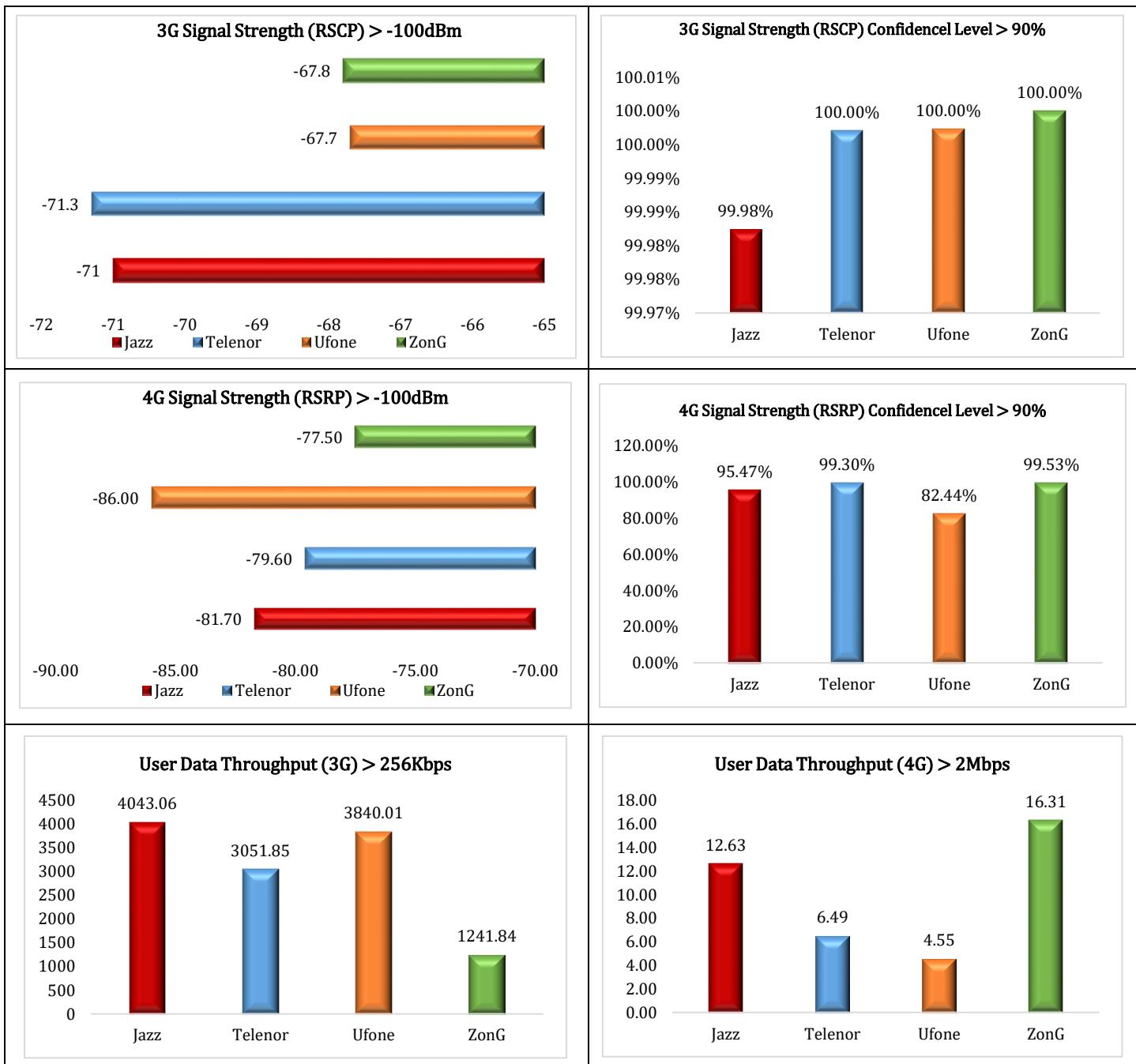
ZONG 3G COVERAGE (RSCP) - MIRPURKHAS



## QUALITY OF SERVICE SURVEY RESULTS – MIRPUR KHAS



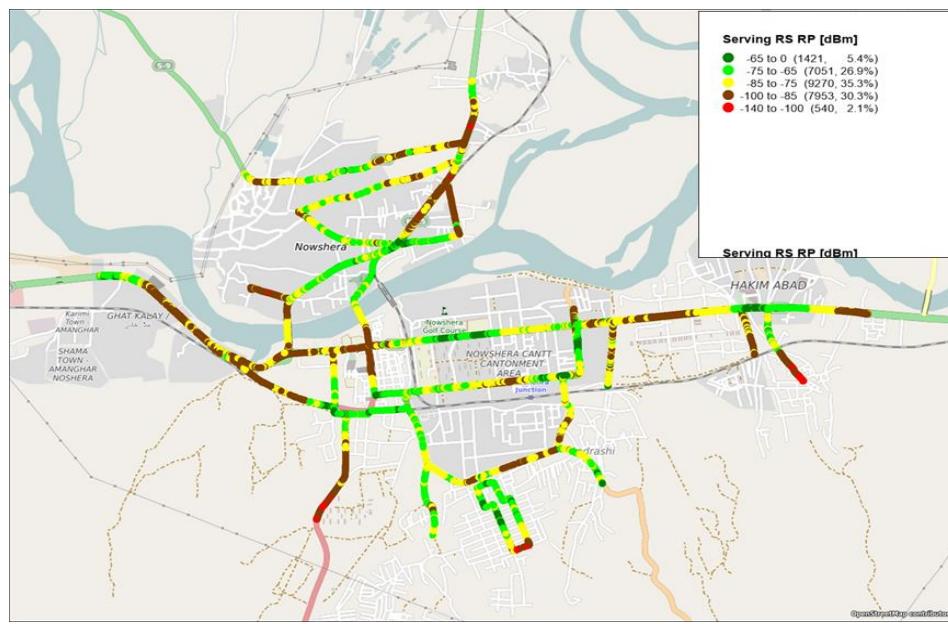
## QUALITY OF SERVICE SURVEY RESULTS – MIRPUR KHAS



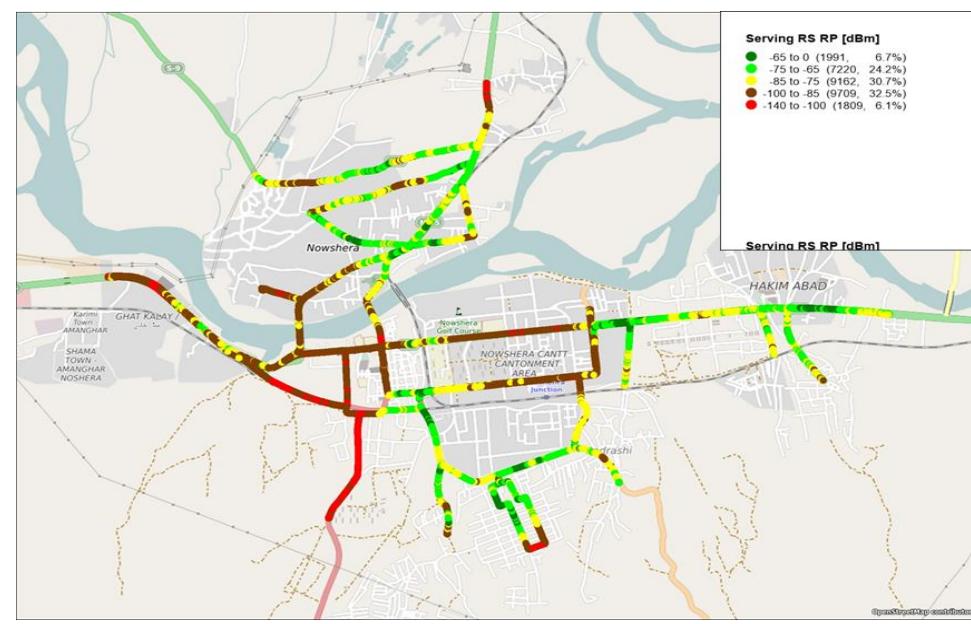
**KHYBER PAKHTUNKHWA**

## 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

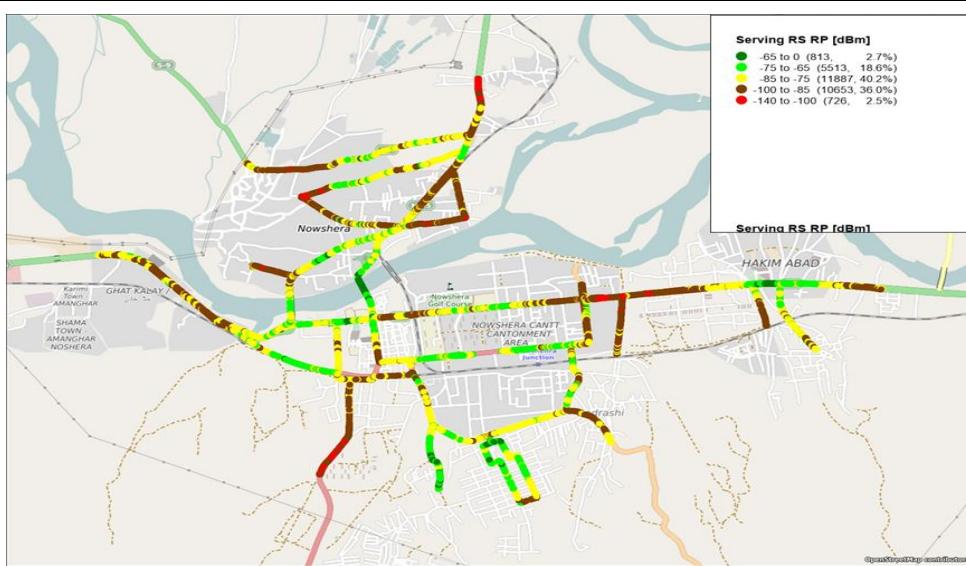
JAZZ 4G COVERAGE (RSRP) - NOWSHERA



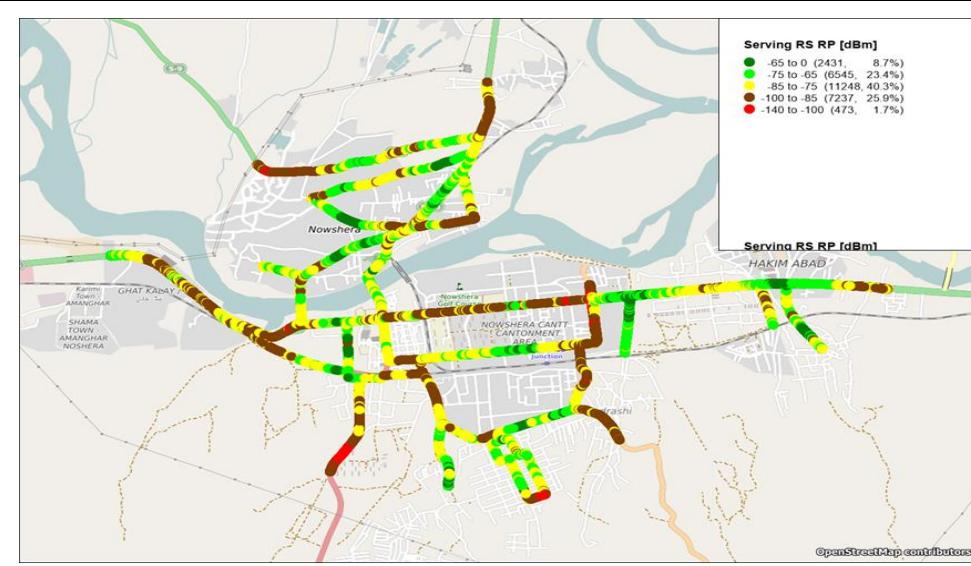
TELENOR 4G COVERAGE (RSRP) - NOWSHERA



UFONE 4G COVERAGE (RSRP) - NOWSHERA

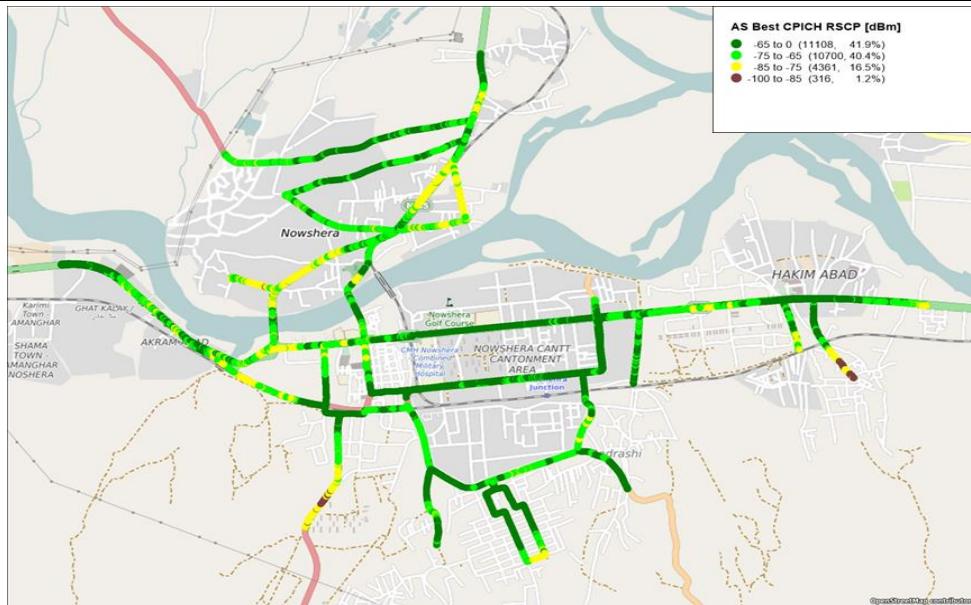


ZONG 4G COVERAGE (RSRP) - NOWSHERA

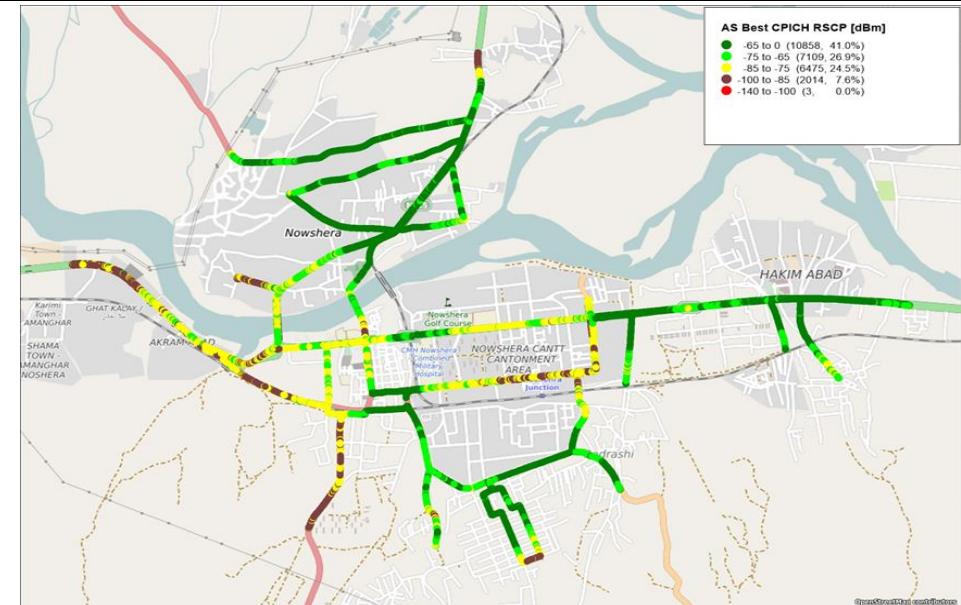


## 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

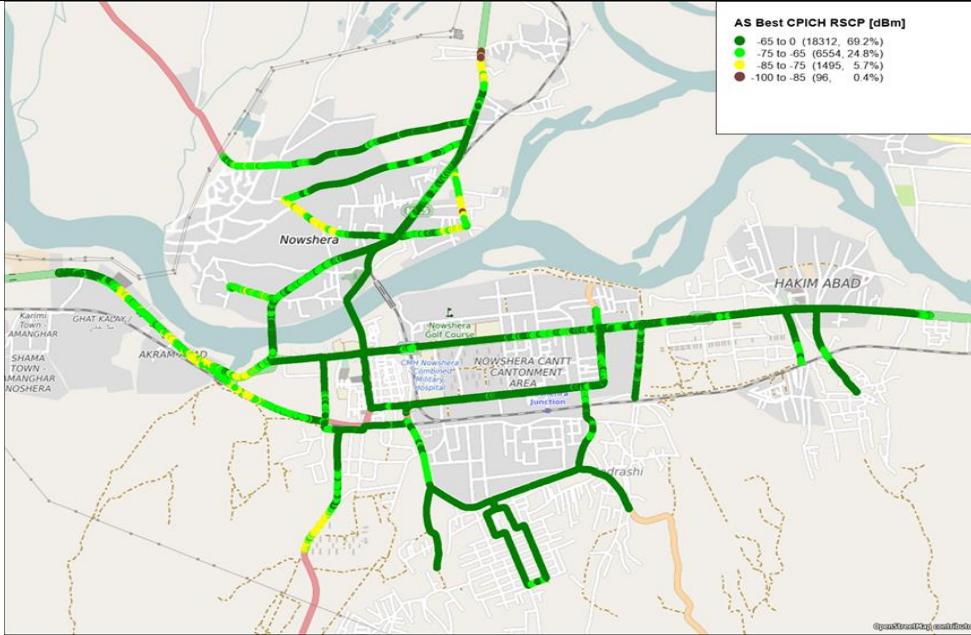
JAZZ 3G COVERAGE (RSCP) - NOWSHERA



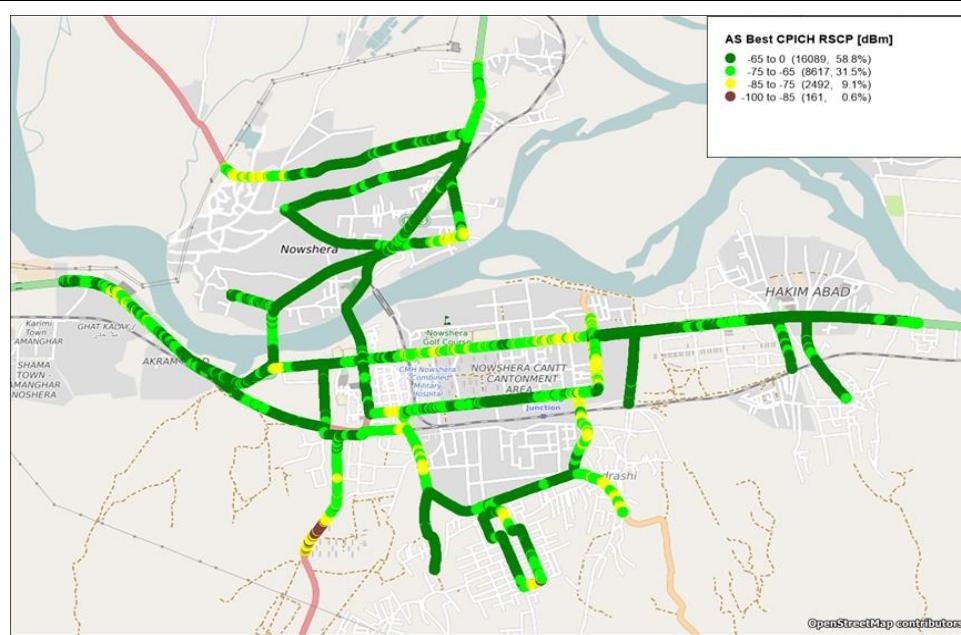
TELENOR 3G COVERAGE (RSCP) - NOWSHERA



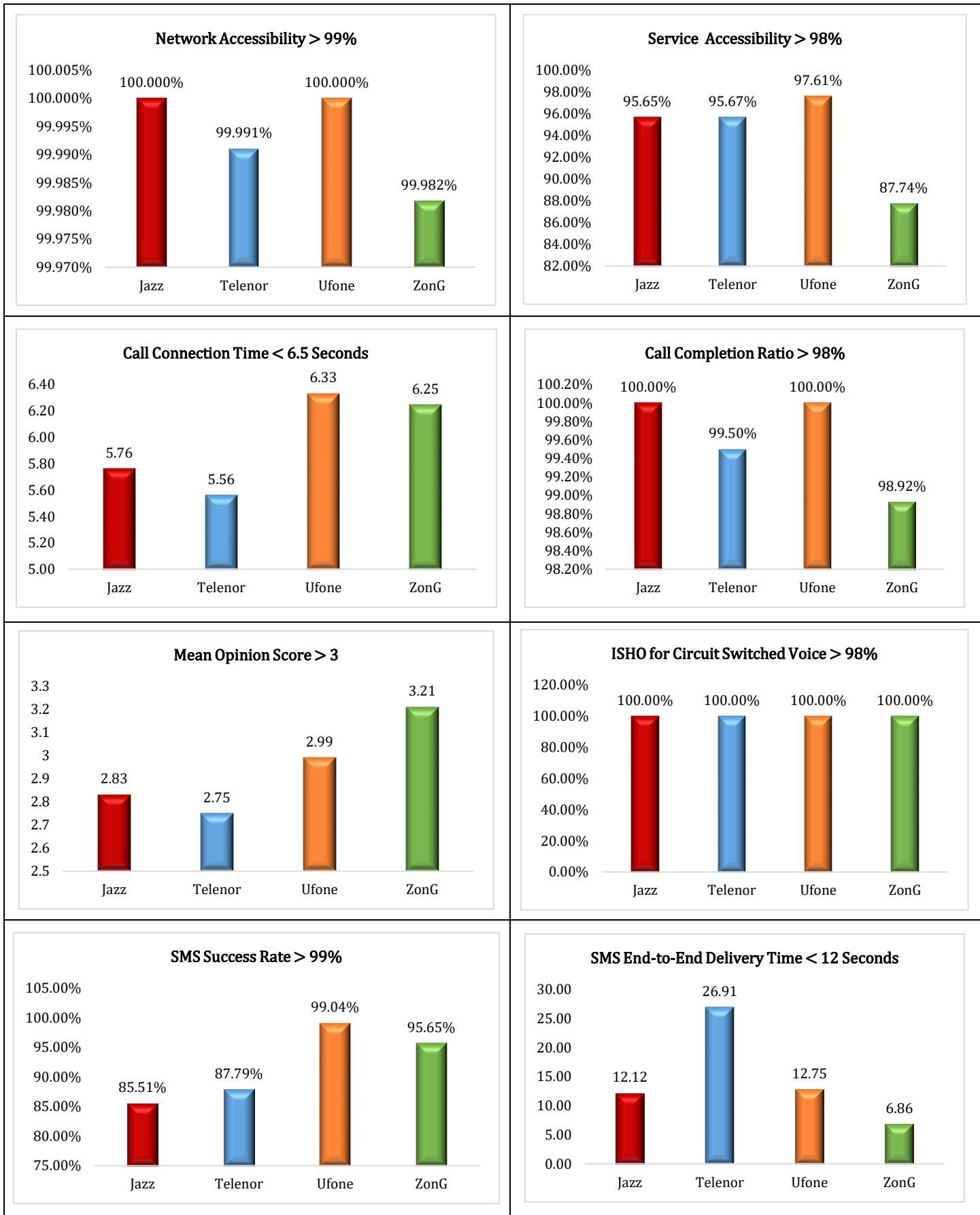
UFONE 3G COVERAGE (RSCP) - NOWSHERA



ZONG 3G COVERAGE (RSCP) - NOWSHERA



## QUALITY OF SERVICE SURVEY RESULTS – NOWSHERA



## QUALITY OF SERVICE SURVEY RESULTS – NOWSHERA

