

INDEPENDENT QUALITY OF SERVICE **SURVEY OF TOWNS 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 Eight (08) different towns of Punjab, Sindh and Khyber Pakhtunkhwa (KPK). The name of towns along with survey dates are shown in **Table 1.1: QoS Survey Dates**:

S. #.	Province	City	Survey Dates
1.	Punjab	Kot Addu	2 nd ~ 3 rd Feb, 2021
2.		Gujar Khan	8 th & 9 th Feb, 2021
3.		Taxila	10 th & 15 th Feb, 2021
4.		Abdul Hakeem	18 th ~ 19 th Feb, 2021
5.		Pattoki	9 th Mar, 2021
6.	Sindh	Tando Muhammad Khan	25 th Feb, 2021
7.		Nooriabad	24 th ~ 25 th Mar, 2021
8.	Khyber Pakhtunkhwa	Jahangira	26 th Feb, 2021

Table 1.1: QoS Survey Dates

DRIVE TEST DETAILS

2.1. QoS survey was carried out using 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 modes. 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 towns where CMOs remained compliant is mentioned in **Table 3.2: Compliance of 4G/LTE (RSRP) Signal Strength.**

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	7	Tando Muhammad Khan, Nooriabad, Kot Addu, Abdul Hakeem, Pattoki, Gujar Khan
2.	Telenor	7	Tando Muhammad Khan, Nooriabad, Kot Addu, Abdul Hakeem, Pattoki, Gujar Khan
3.	Ufone	6	Tando Muhammad Khan, Nooriabad, Kot Addu, Abdul Hakeem, Gujar Khan
4.	ZonG	7	Tando Muhammad Khan, Nooriabad, Kot Addu, Abdul Hakeem, Pattoki, Gujar Khan

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

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

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	1	Jahangira
2.	Telenor	1	Jahangira
3.	Ufone	1	Jahangira
4.	ZonG	1	Jahangira

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 08 x surveyed towns.

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 towns where CMOs remained compliant is mentioned in **Table 4.1: Compliance of 4G User Data Throughput > 2 Mbps.**

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
2.	Telenor	5	Taxila, Abdul Hakeem, Nooriabad, Tando Muhammad Khan, Jahangira
3.	Ufone	6	Taxila, Gujar Khan, Abdul Hakeem, Kot Addu, Nooriabad, Jahangira
4.	ZonG	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira

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

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

S. #.	Operator	Towns	
		Count	Names
1.	Telenor	3	Gujar Khan, Pattoki, Kot Addu
2.	Ufone	1	Tando Muhammad Khan

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 08 x surveyed towns.

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 08 x surveyed towns.
- b. **SERVICE ACCESSIBILITY.** The analysis of QoS KPI Service Accessibility of > 98% in all 08 x surveyed towns revealed following.
 - i. **COMPLIANCE.** The towns where CMOs remained compliant is mentioned in **Table 5.1: Compliance of Service Accessibility > 98%**

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	5	Taxila, Gujar Khan, Abdul Hakeem, Nooriabad, Tando Muhammad Khan
2.	Telenor	1	Nooriabad
3.	Ufone	3	Abdul Hakeem, Nooriabad, Tando Muhammad Khan
4.	ZonG	4	Pattoki, Abdul Hakeem, Kot Addu, Tando Muhammad Khan

Table 5.1: Compliance of Service Accessibility > 98%

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

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	3	Pattoki, Kot Addu, Jahangira
2.	Telenor	7	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Tando Muhammad Khan, Jahangira
3.	Ufone	5	Taxila, Gujar Khan, Pattoki, Kot Addu, Jahangira
4.	ZonG	4	Taxila, Gujar Khan, Nooriabad, Jahangira

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 08 x surveyed towns revealed following.
 - i. **COMPLIANCE.** The towns where CMOs remained compliant is mentioned in **Table 5.3: Compliance of Call Connection Time < 6.5 Seconds.**

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	7	Taxila, Gujar Khan, Pattoki, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
2.	Telenor	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
3.	Ufone	7	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Nooriabad, Tando Muhammad Khan, Jahangira
4.	ZonG	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira

Table 5.3: Compliance of Call Connection Time < 6.5 Seconds

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

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	1	Abdul Hakeem
2.	Ufone	1	Kot Addu

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 all 08 x surveyed towns revealed following:
- i. **COMPLIANCE.** The towns where CMOs remained compliant is mentioned in **Table 5.5: Compliance of Call Completion Ratio > 98%.**

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
2.	Telenor	6	Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
3.	Ufone	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
4.	ZonG	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira

Table 5.5: Compliance of Call Completion Ratio > 98%

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

S. #.	Operator	Towns	
		Count	Names
1.	Telenor	2	Taxila, Gujar Khan

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 08 x surveyed towns revealed following:
- i. **COMPLIANCE.** The towns where CMOs remained compliant is mentioned in **Table 5.7: Compliance of Mean Opinion Score > 3.**

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	5	Taxila, Pattoki, Nooriabad, Tando Muhammad Khan, Jahangira
2.	Telenor	1	Kot Addu
3.	Ufone	4	Gujar Khan, Pattoki, Kot Addu, Nooriabad
4.	ZonG	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira

Table 5.7: Compliance of Mean Opinion Score > 3

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

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	3	Gujar Khan, Abdul Hakeem, Kot Addu
2.	Telenor	7	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Nooriabad, Tando Muhammad Khan, Jahangira
3.	Ufone	4	Taxila, Abdul Hakeem, Tando Muhammad Khan, Jahangira

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

f. **INTER SYSTEM HANDOVER OF CIRCUIT SWITCHED VOICE.** The analysis of QoS KPI Inter System Handover of Circuit Switched Voice > 98% in all 08 x surveyed towns revealed following:

i. **COMPLIANCE.** The towns where CMOs remained compliant is mentioned in Table 5.9: ISHO for Circuit Switched Voice $\geq 98\%$.

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
2.	Telenor	7	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Jahangira
3.	Ufone	7	Taxila, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
4.	ZonG	7	Taxila, Gujar Khan, Pattoki, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira

Table 5.9: ISHO for Circuit Switched Voice $\geq 98\%$.

ii. **NON-COMPLIANCE.** The towns where CMOs remained non-compliant is mentioned in Table 5.1.1: ISHO for Circuit Switched Voice $\geq 98\%$.

S. #.	Operator	Towns	
		Count	Names
1.	Telenor	1	Tando Muhammad Khan
2.	Ufone	1	Gujar Khan
3.	ZonG	1	Abdul Hakeem

Table 5.1.1: ISHO for Circuit Switched Voice $\geq 98\%$.

g. **RAB SETUP SUCCESS RATE.** All CMOs have achieved the QoS KPI RAB Setup Success Rate > 98% in all 08 x surveyed towns.

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 08 x surveyed towns revealed following:
 - i. **COMPLIANCE.** The towns where CMOs remained compliant is mentioned in **Table 6.1: Compliance of SMS Success Rate > 99%.**

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	2	Nooriabad, Tando Muhammad Khan
2.	Ufone	1	Taxila

Table 6.1: Compliance of SMS Success Rate > 99%

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

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	6	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Jahangira
2.	Telenor	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
3.	Ufone	7	Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira
4.	ZonG	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira

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 all 08 x surveyed towns revealed following:

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

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	7	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan
2.	Telenor	3	Kot Addu, Nooriabad, Tando Muhammad Khan
3.	Ufone	6	Taxila, Gujar Khan, Pattoki, Kot Addu, Nooriabad, Tando Muhammad Khan
4.	ZonG	8	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Kot Addu, Nooriabad, Tando Muhammad Khan, Jahangira

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

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

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	1	Jahangira
2.	Telenor	5	Taxila, Gujar Khan, Pattoki, Abdul Hakeem, Jahangira

S. #.	Operator	Towns	
		Count	Names
3.	Ufone	2	Abdul Hakeem, Jahangira

Table 6.4: Non-Compliance of SMS End-To-End Delivery Time \leq 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, Annex-B & Annex-C for towns of Punjab, Sindh & Khyber Pakhtunkhwa respectively.

STANDING OF CMOS 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 towns. The details are:

- a. **MOBILE NETWORK COVERAGE.** The categorization of CMOs as per QoS KPI i.e. Signal Strength of 4G/LTE and 3G Networks in 08 x Surveyed towns is shown in **Table 8.1: CMOs Standing in Mobile Network Coverage.**

S. #.	Operator	Compliance Level – Number of Towns		Standing
		Compliant	Non-Compliant	
1.	ZonG	15	1	1 st
2.	Jazz	15	1	1 st
3.	Telenor	15	1	1 st
4.	Ufone	14	2	2 nd

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	8	-	-	-	-	-	-	8	1 st	4 th
2.	Jazz	-	5	3	-	3	2	3	-	2 nd	2 nd
3.	Ufone	-	3	4	-	4	2	2	-	3 rd	1 st
4.	Telenor	-	-	1	7	1	4	3	-	4 th	3 rd

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	51	5	1 st
2.	Jazz	49	7	2 nd
3.	Ufone	45	11	3 rd
4.	Telenor	39	17	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.	Jazz	9	7	1 st
2.	ZonG	8	8	2 nd
3.	Ufone	7	9	3 rd
4.	Telenor	3	13	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.**

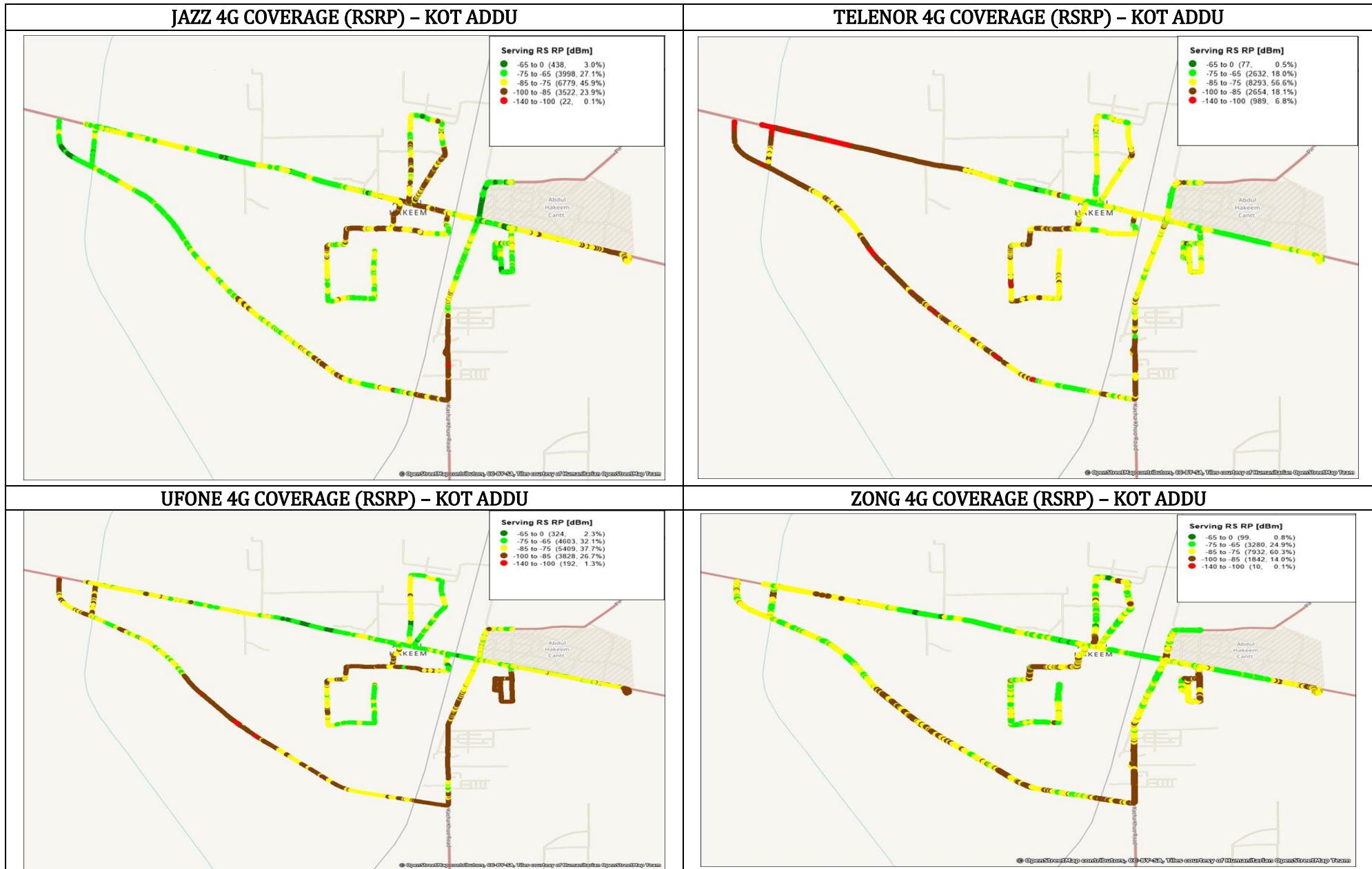
S. #.	Service	STANDING			
		1 st	2 nd	3 rd	4 th
1.	Mobile Network Coverage	Jazz, Telenor & ZonG	Ufone	-	-
2.	Mobile Broadband	3G	Ufone	Jazz	Telenor
		4G	ZonG	Jazz	Ufone
3.	Voice	ZonG	Jazz	Ufone	Telenor
4.	SMS	Jazz	ZonG	Ufone	Telenor

Table 8.5: CMOs Overall Standing in QoS Survey

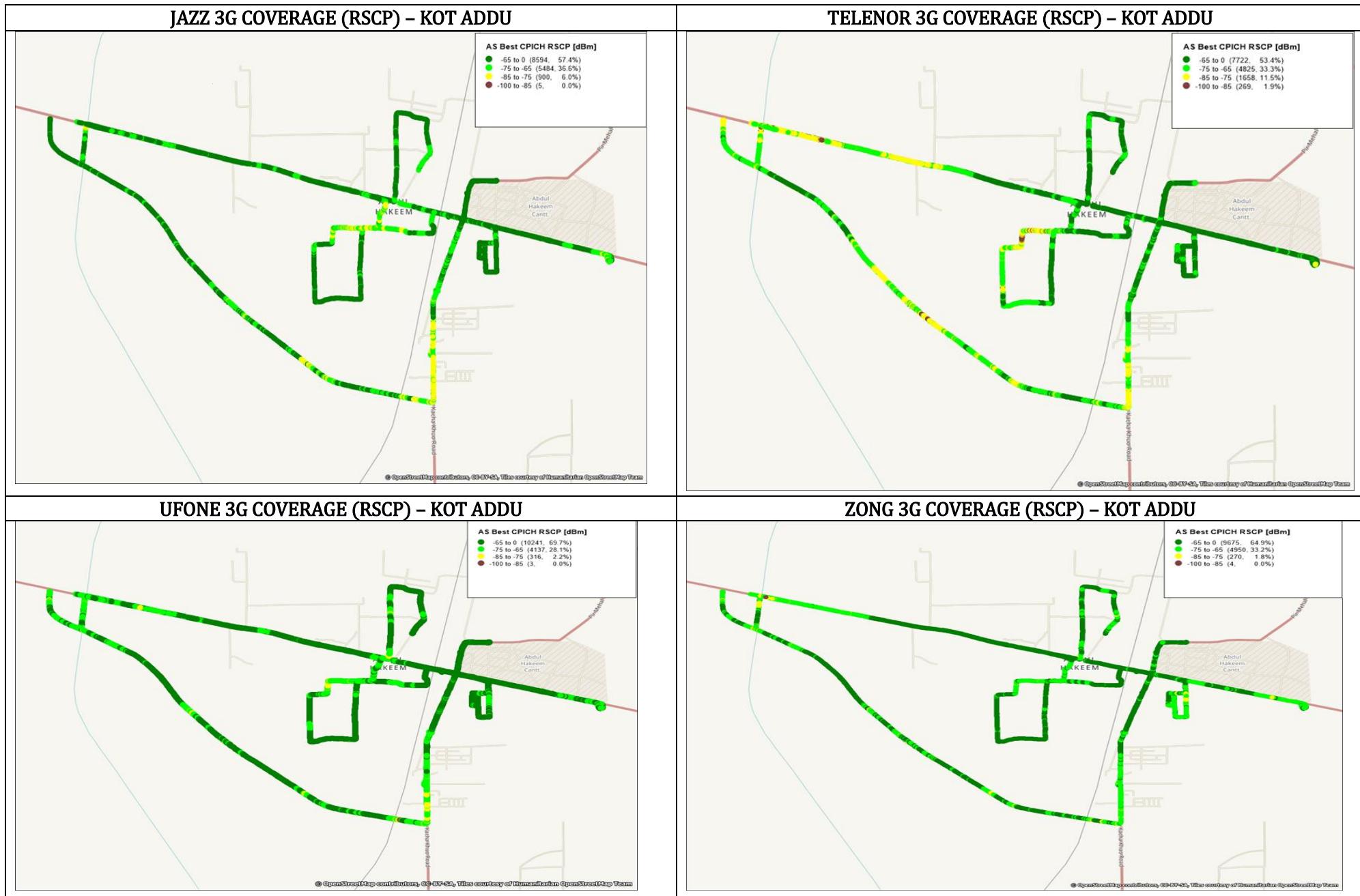
ANNEX – A

PUNJAB

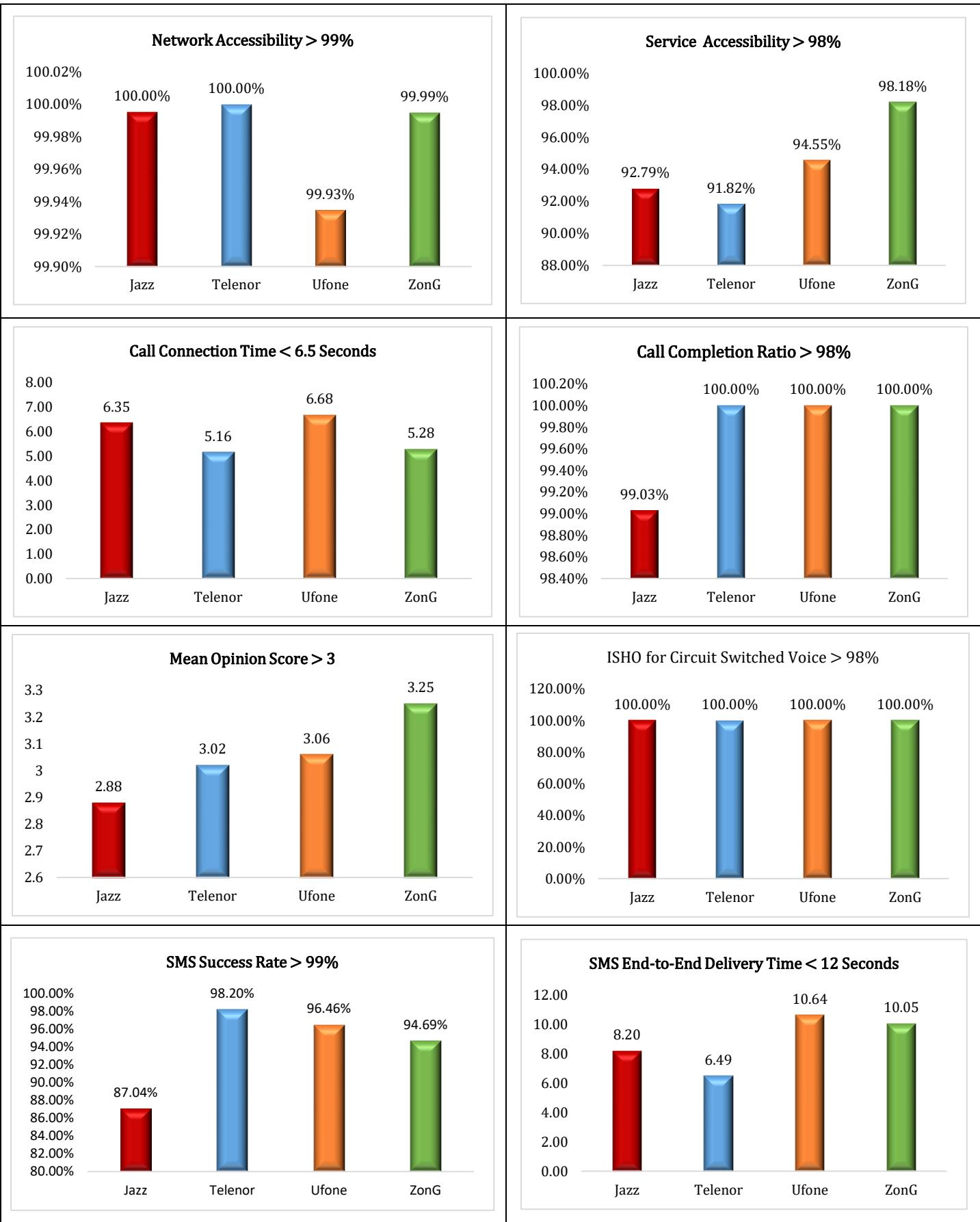
4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)



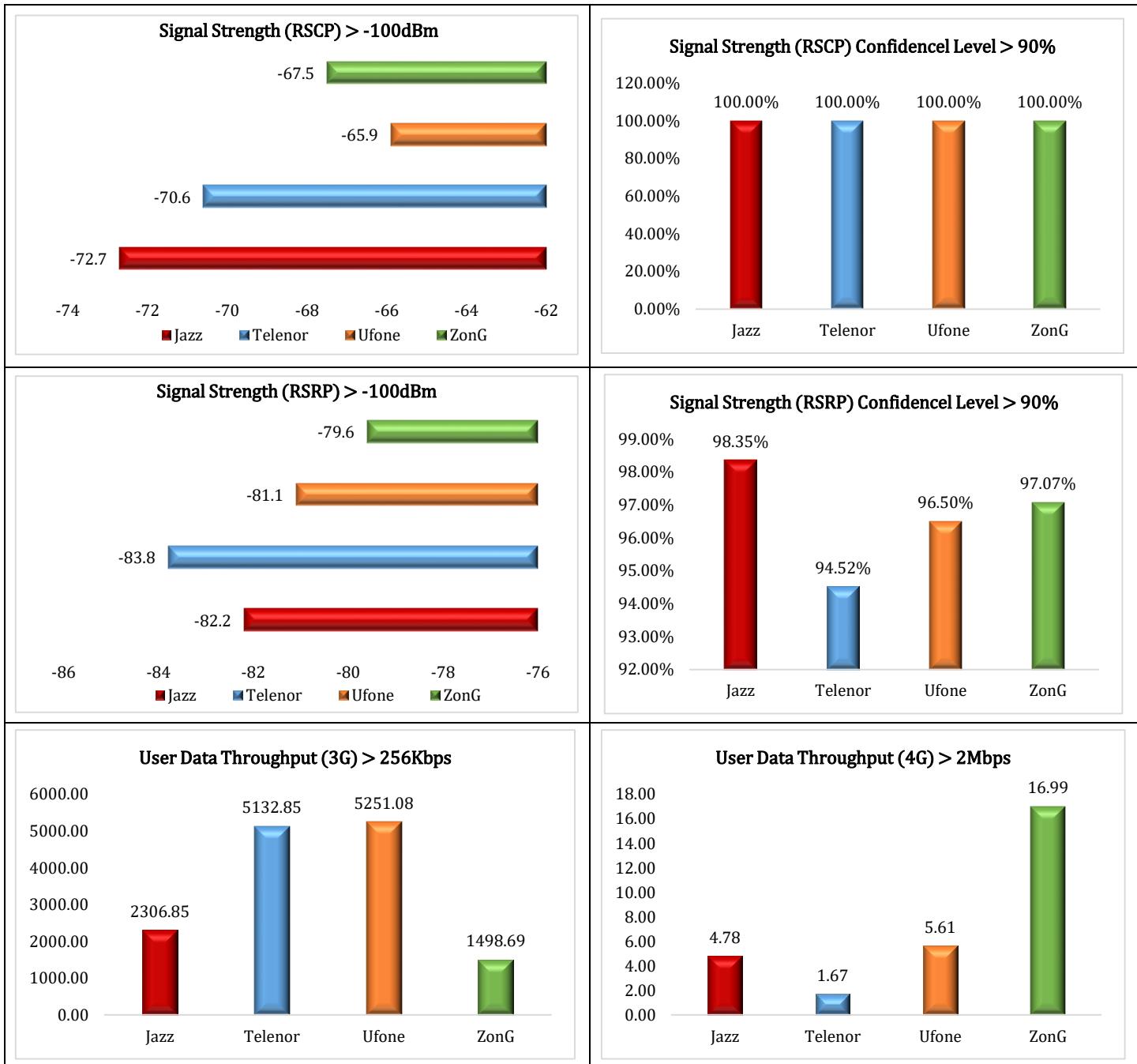
3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)



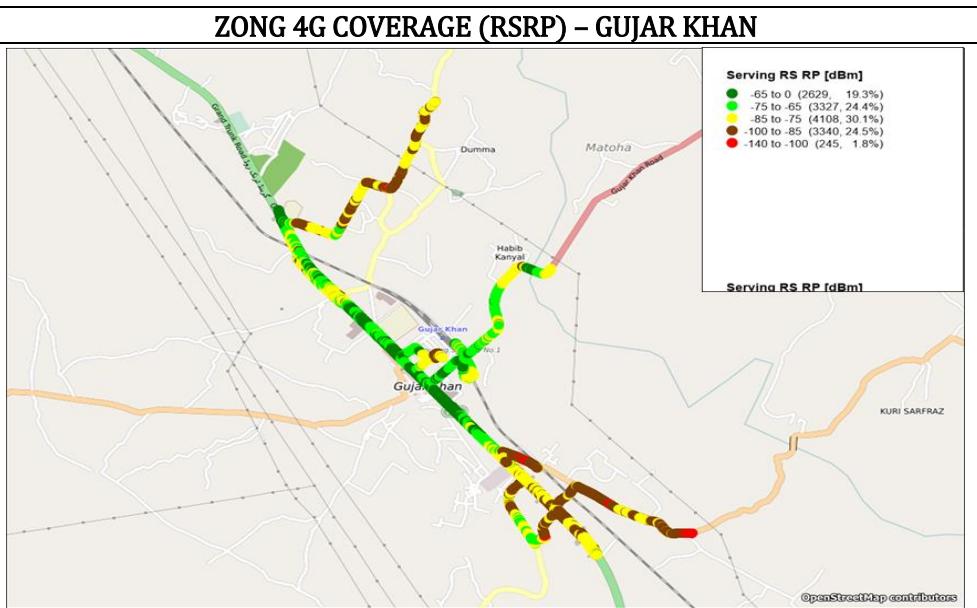
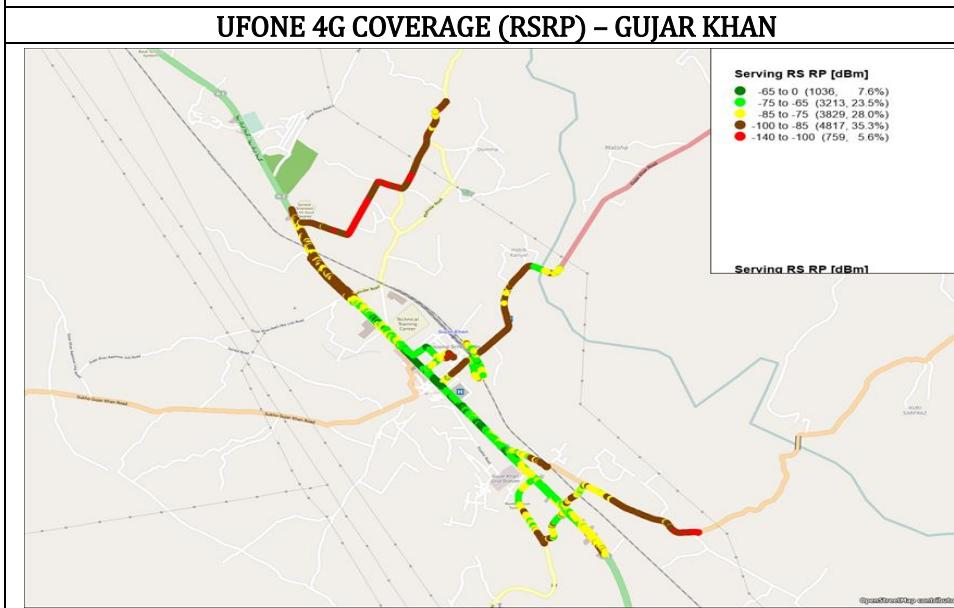
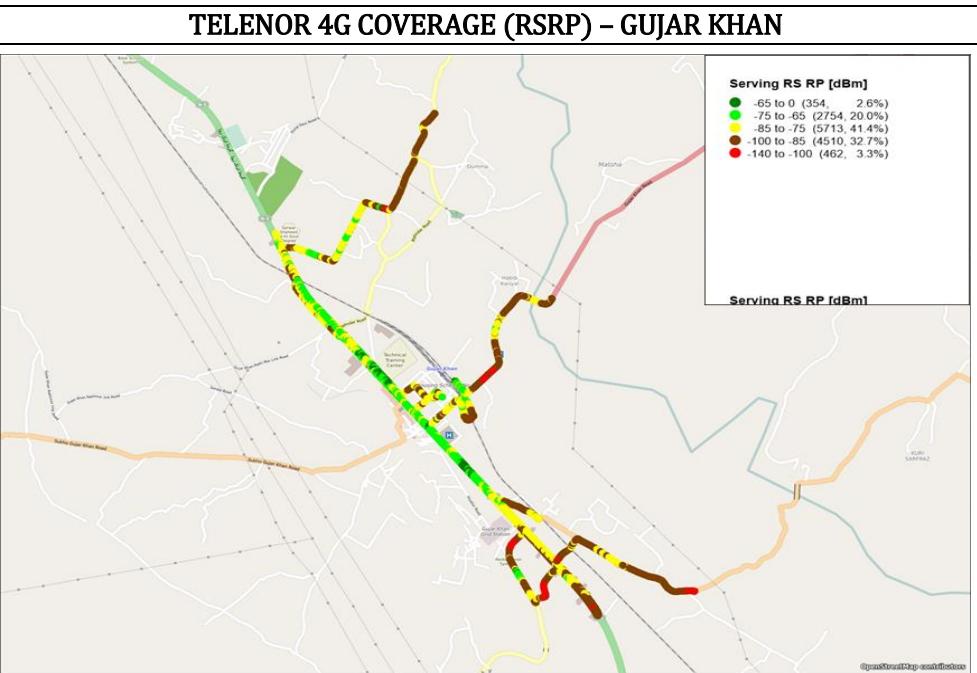
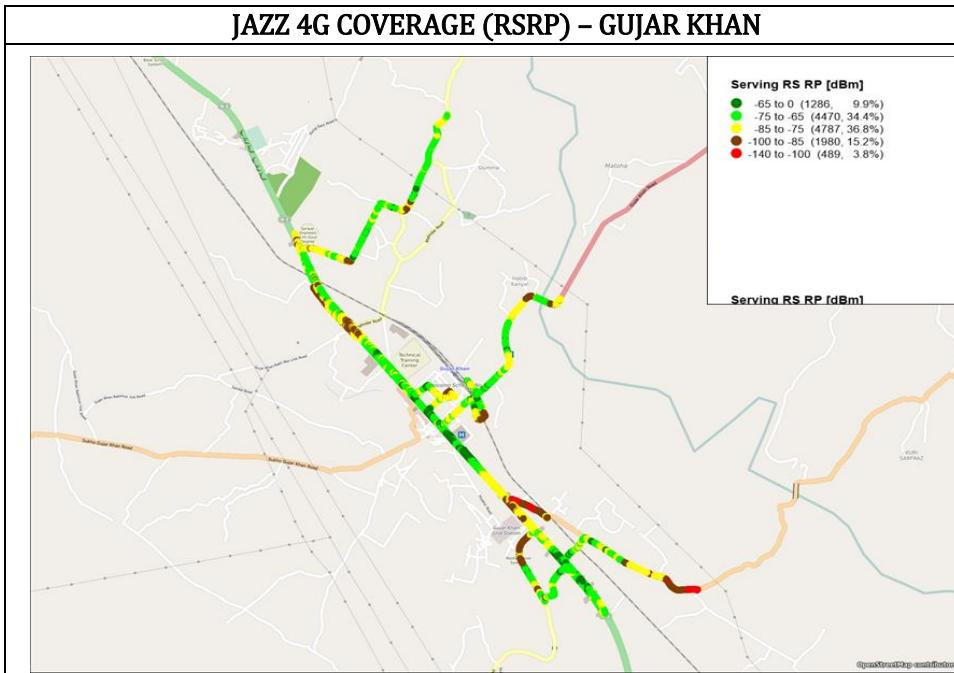
QUALITY OF SERVICE SURVEY RESULTS – KOT ADDU



QUALITY OF SERVICE SURVEY RESULTS – KOT ADDU

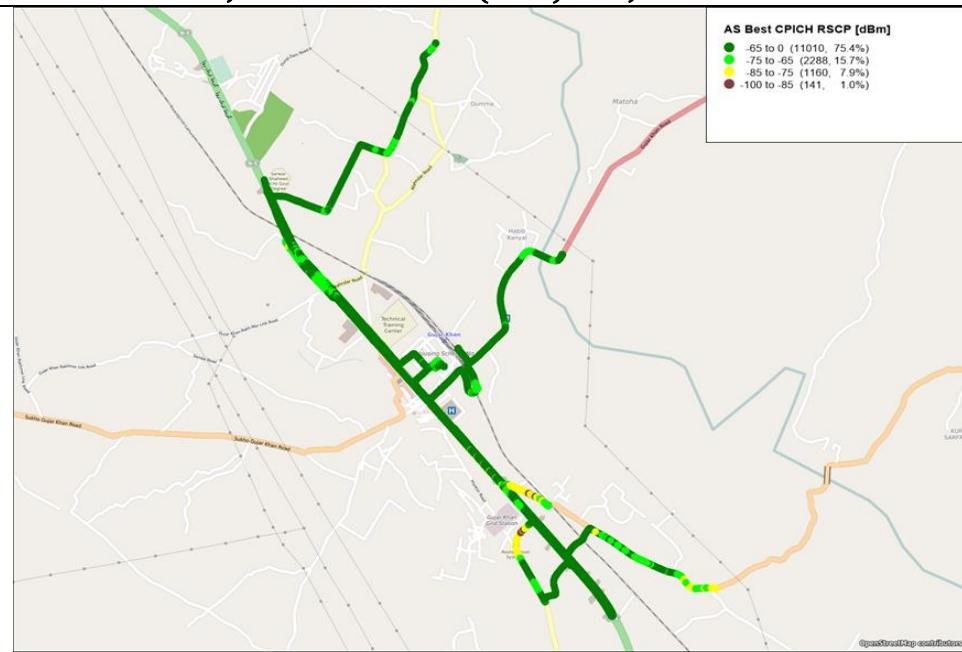


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

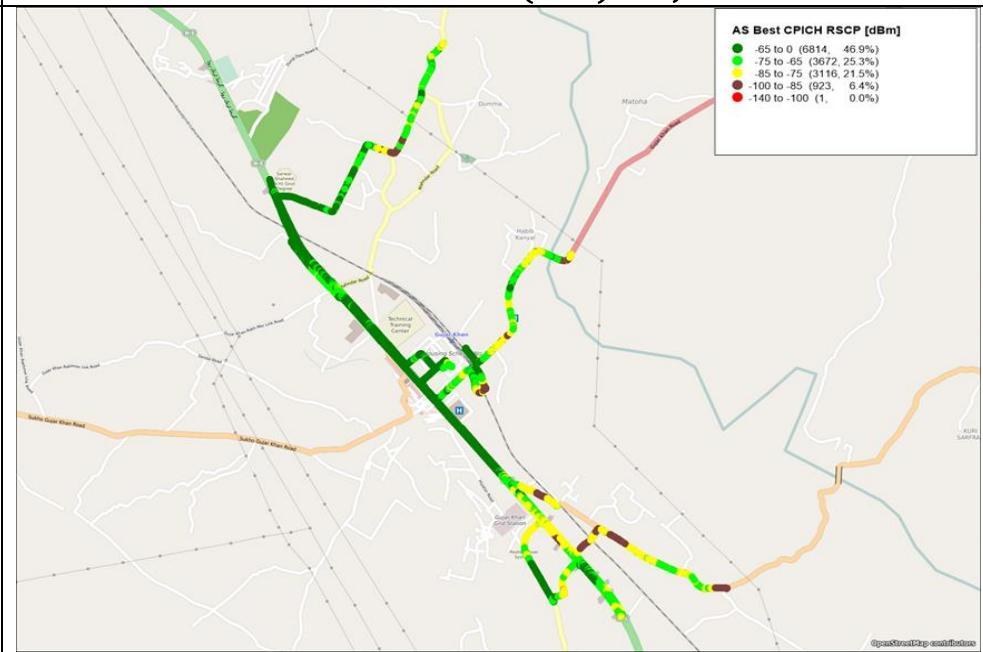


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

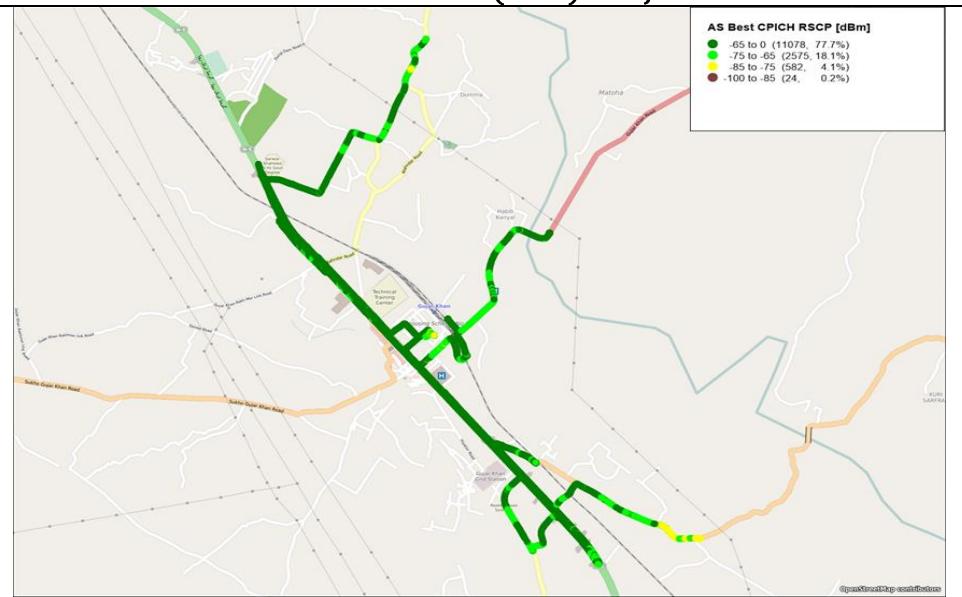
JAZZ 3G COVERAGE (RSCP) – GUJAR KHAN



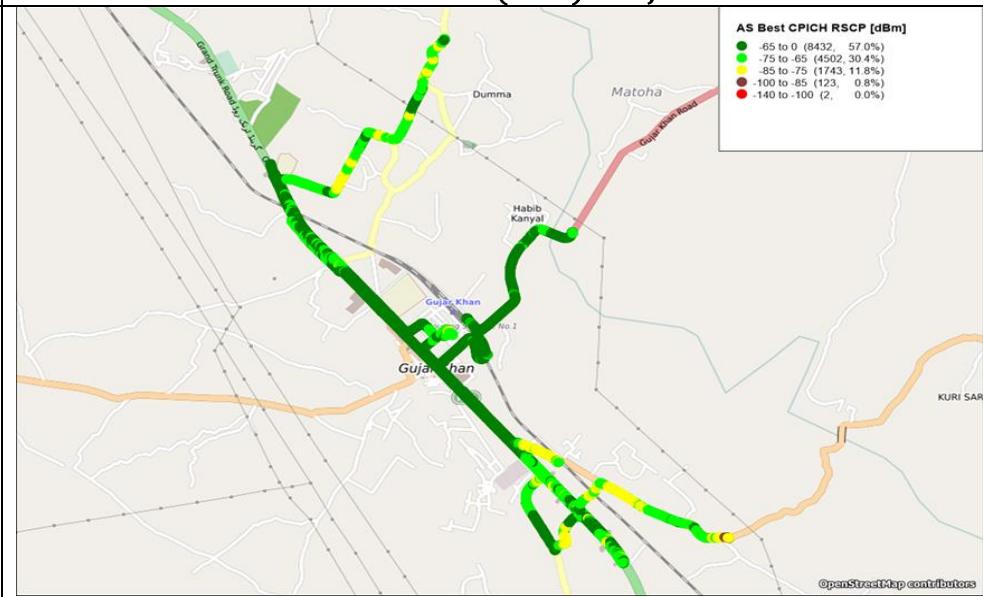
TELENOR 3G COVERAGE (RSCP) – GUJAR KHAN



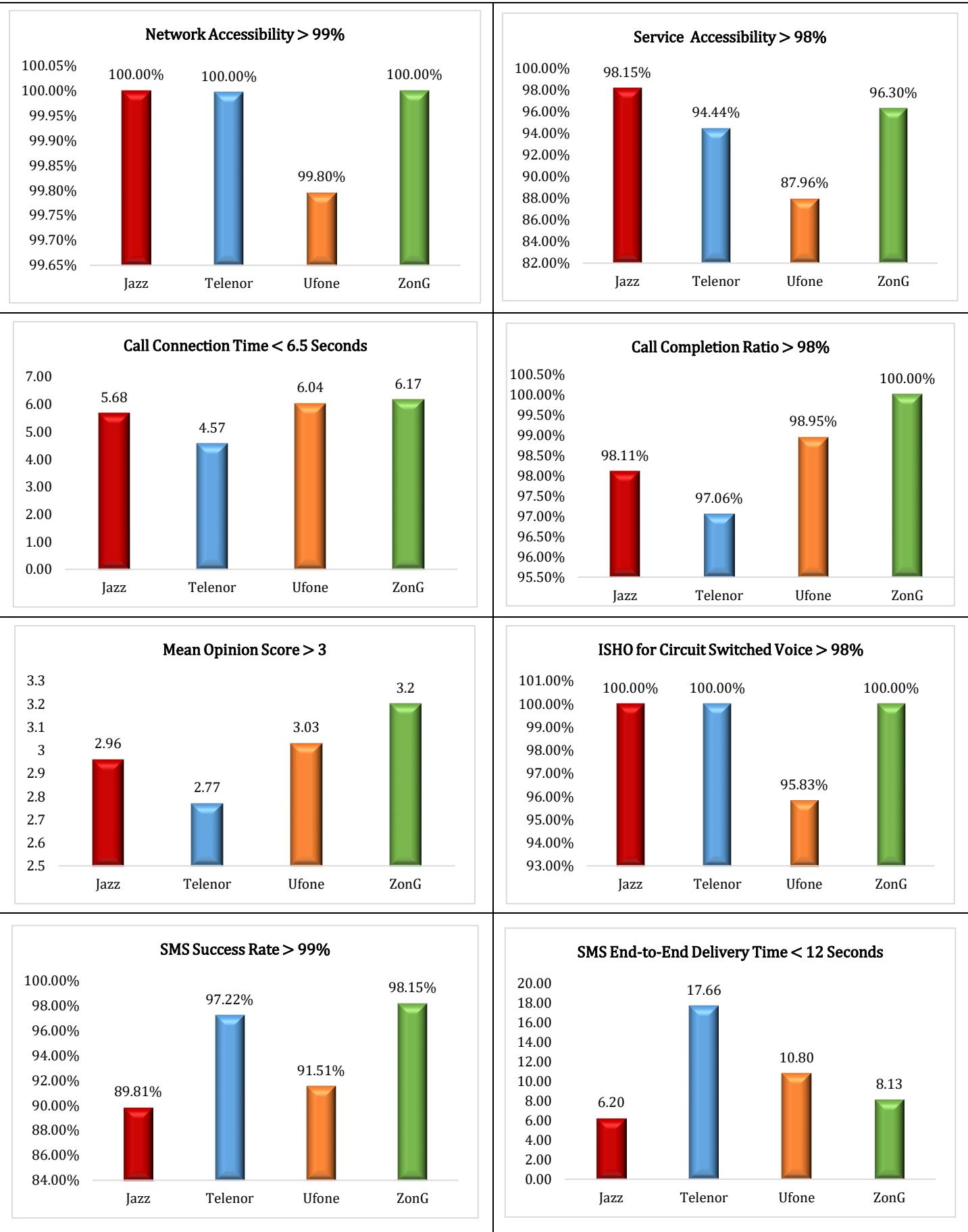
UFONE 3G COVERAGE (RSCP) – GUJAR KHAN



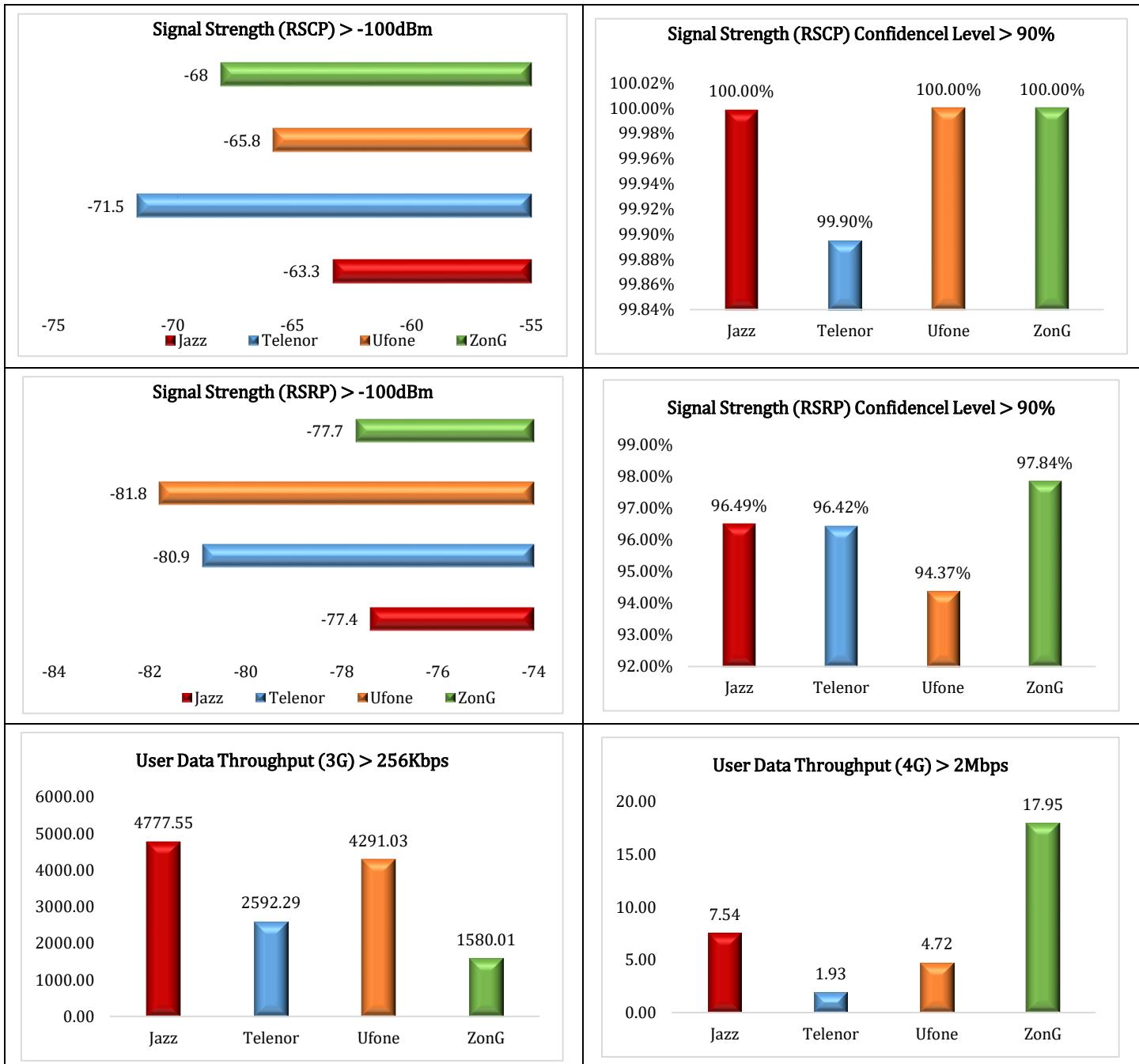
ZONG 3G COVERAGE (RSCP) – GUJAR KHAN



QUALITY OF SERVICE SURVEY RESULTS – GUJAR KHAN

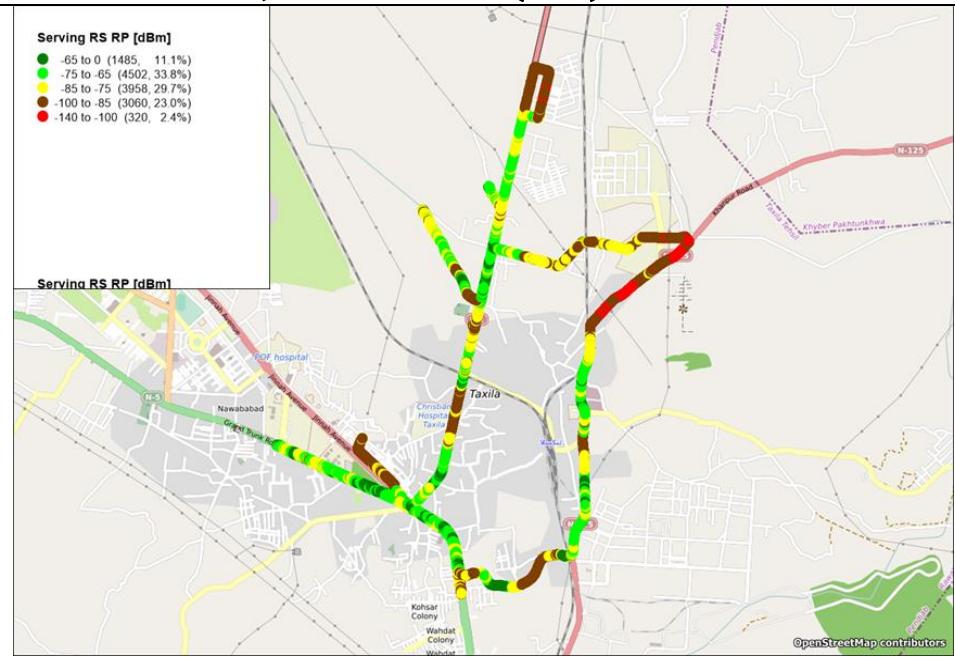


QUALITY OF SERVICE SURVEY RESULTS – GUJAR KHAN

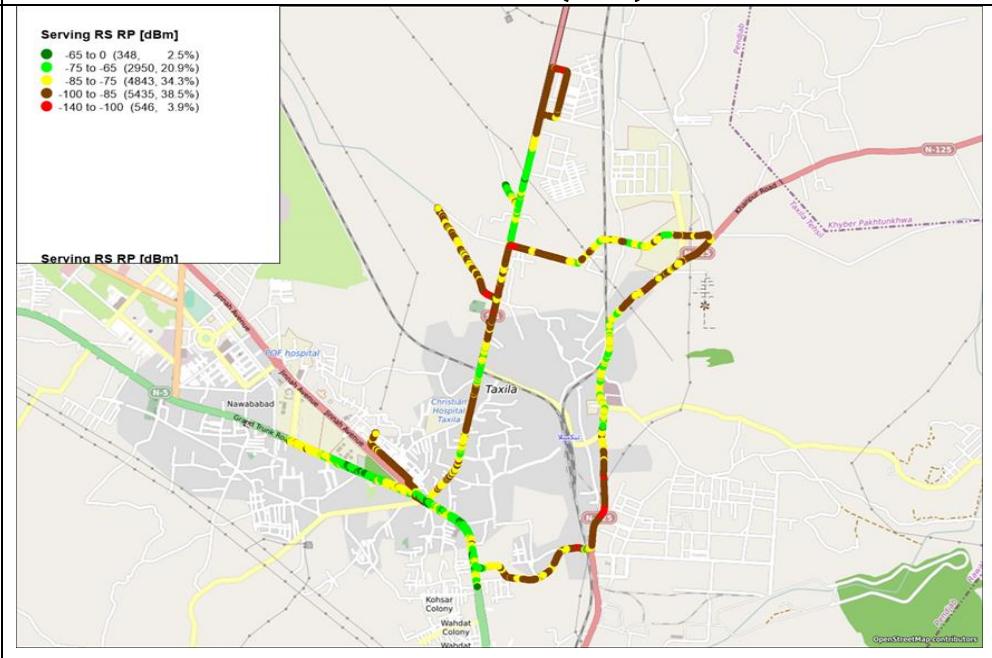


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

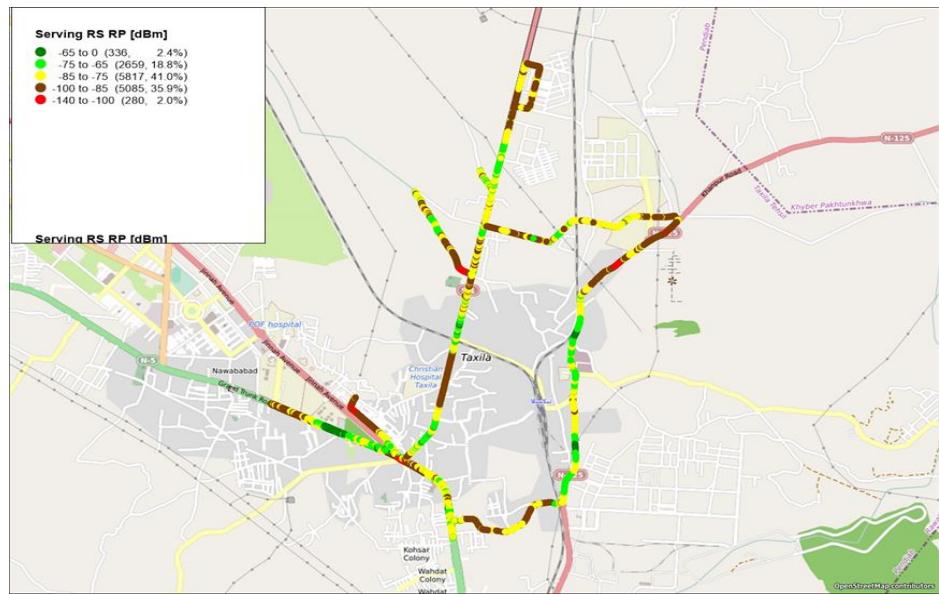
JAZZ 4G COVERAGE (RSRP) - TAXILA



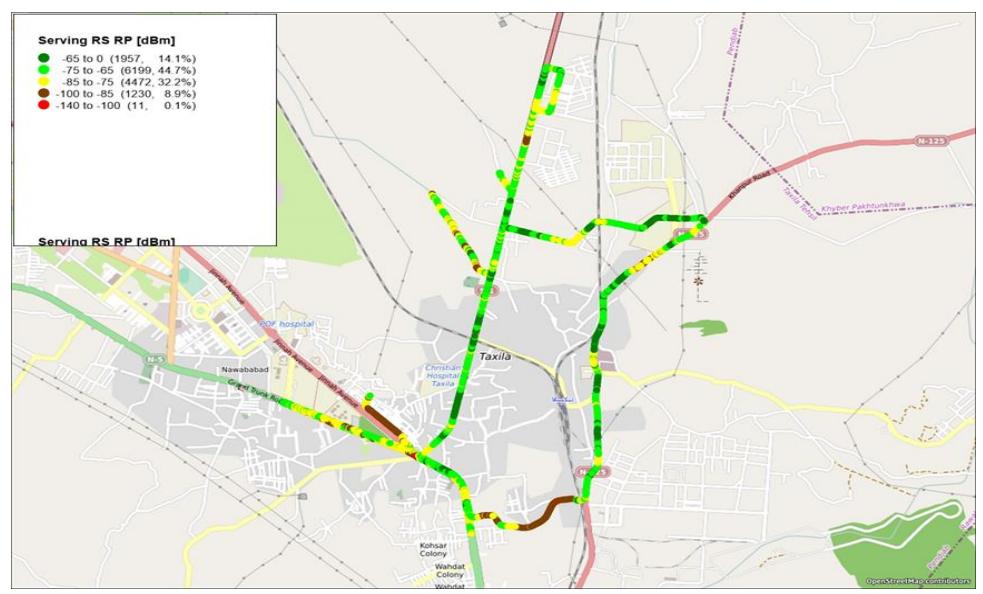
TELENOR 4G COVERAGE (RSRP) - TAXILA



UFONE 4G COVERAGE (RSRP) - TAXILA

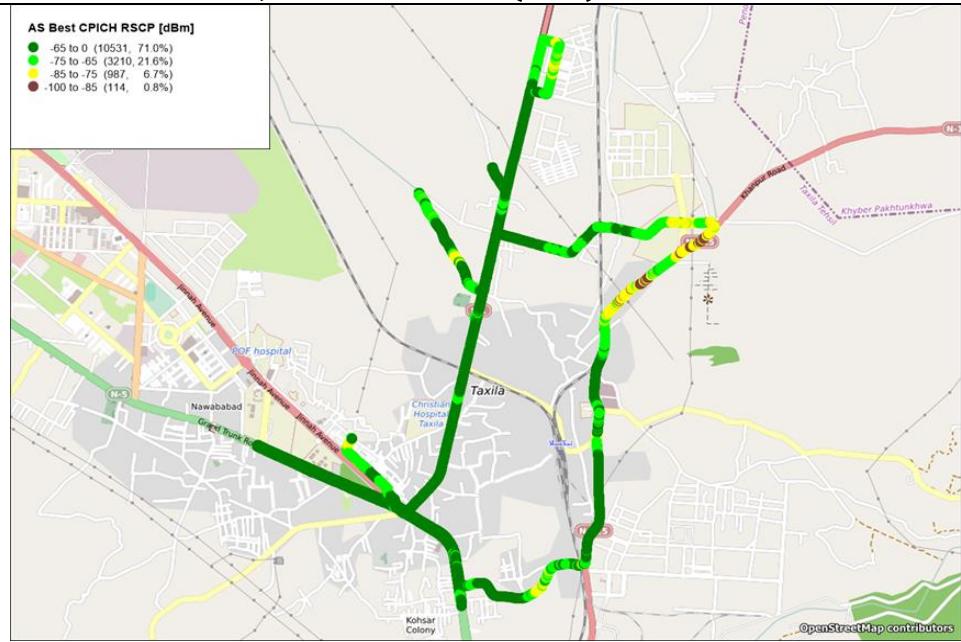


ZONG 4G COVERAGE (RSRP) - TAXILA

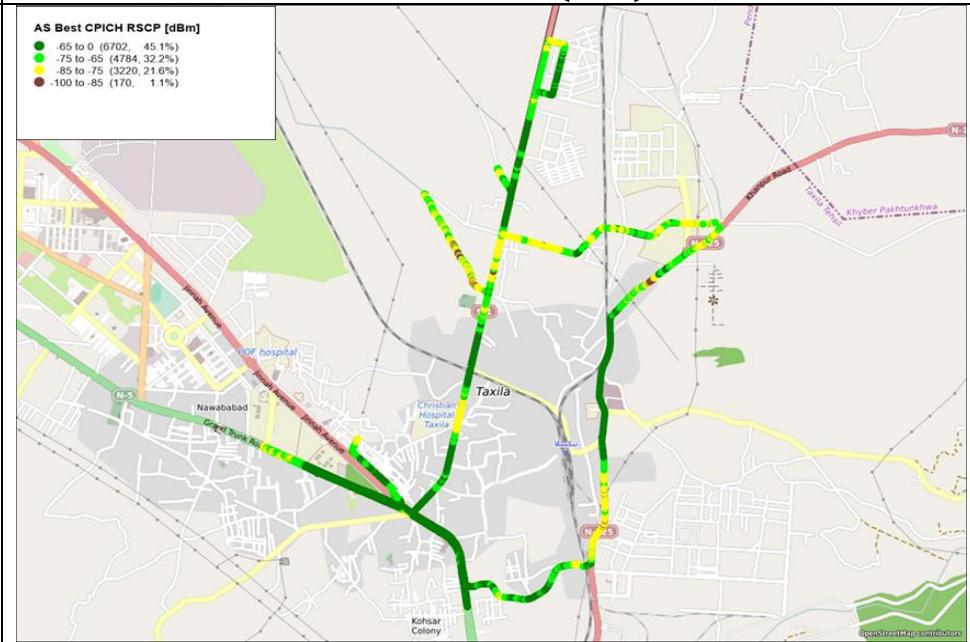


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

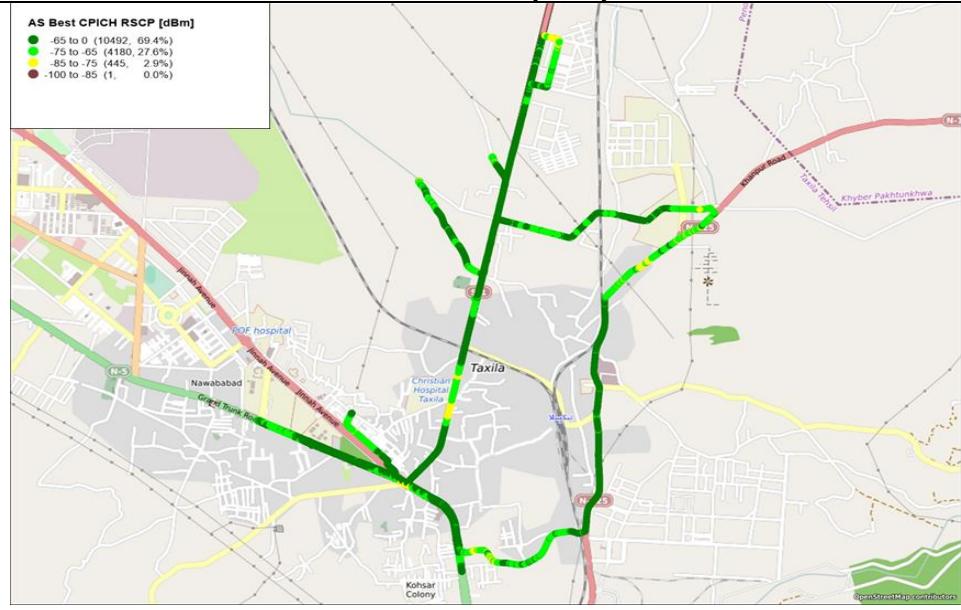
JAZZ 3G COVERAGE (RSCP) - TAXILA



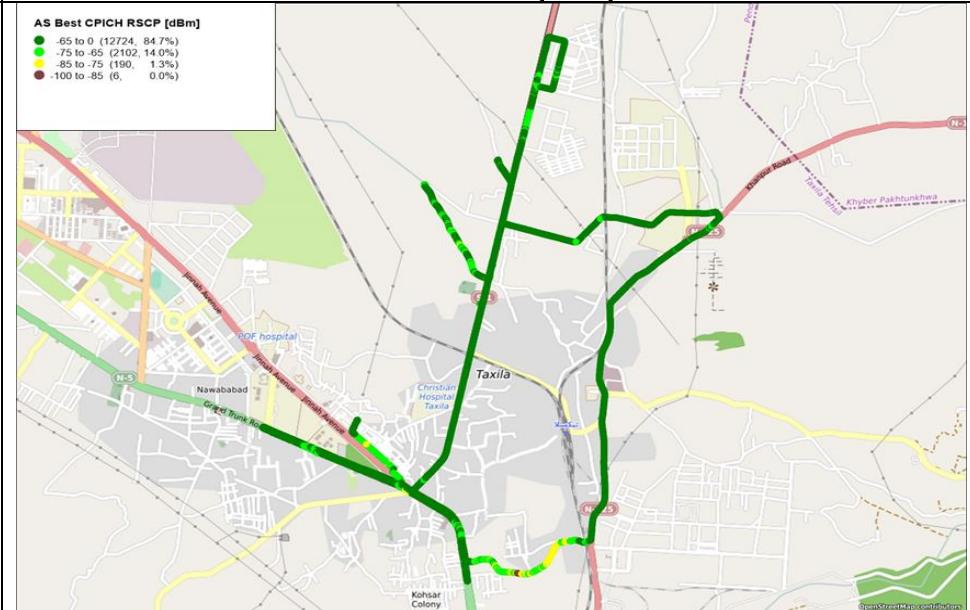
TELENOR 3G COVERAGE (RSCP) - TAXILA



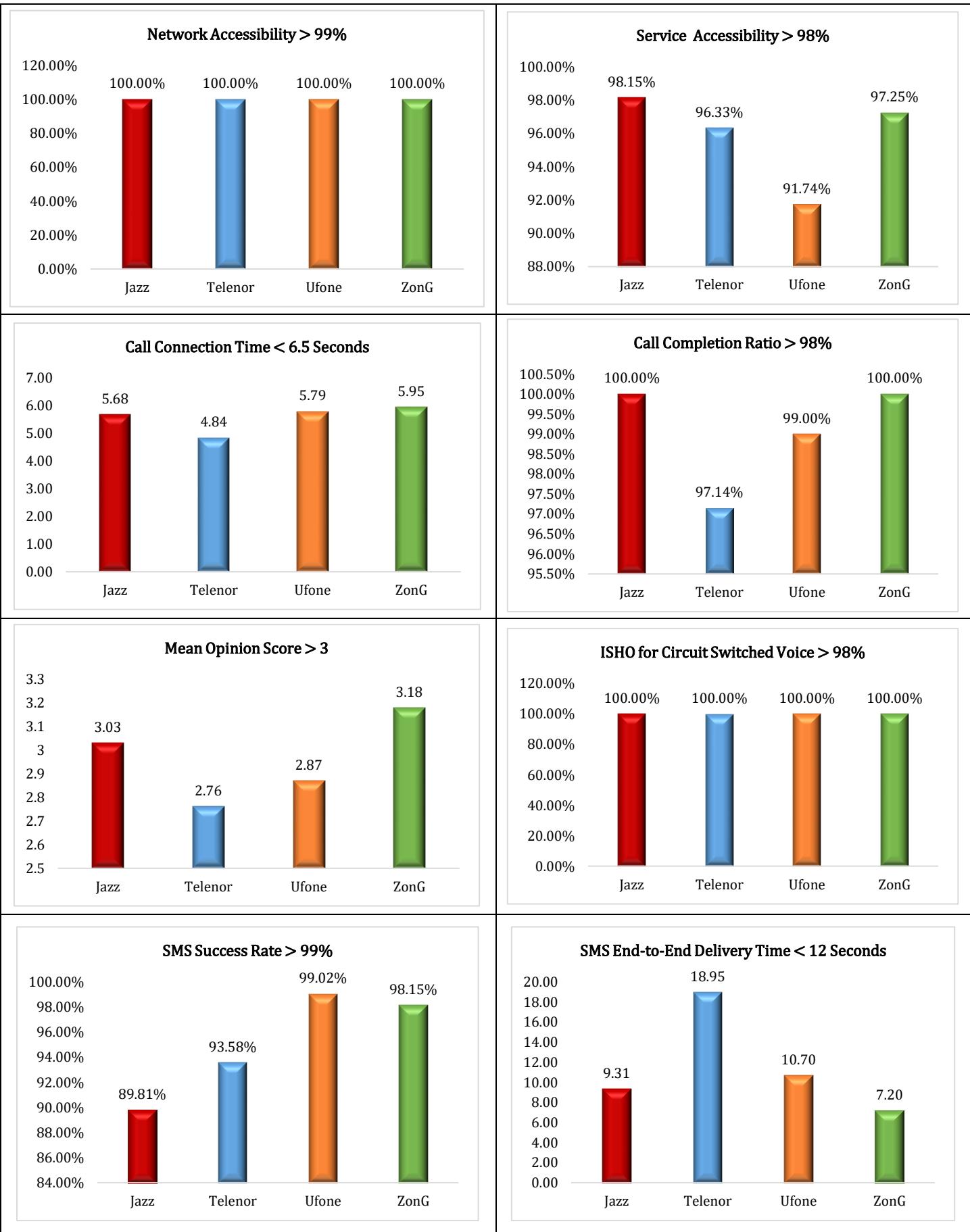
UFONE 3G COVERAGE (RSCP) - TAXILA



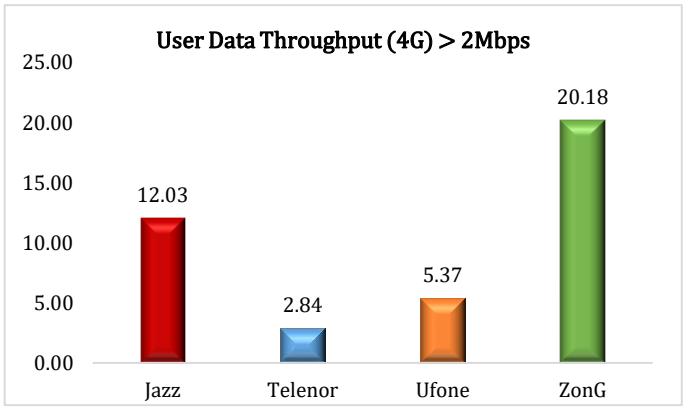
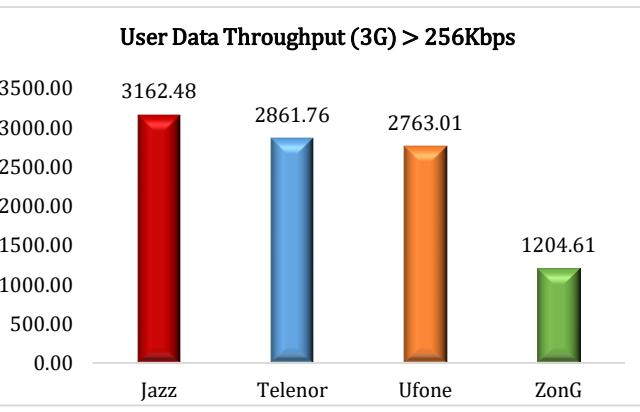
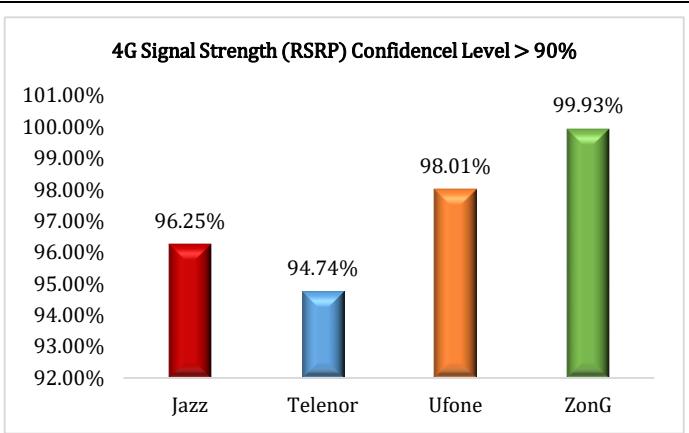
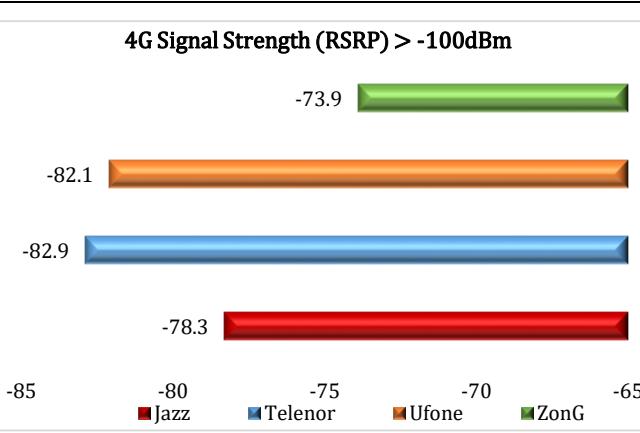
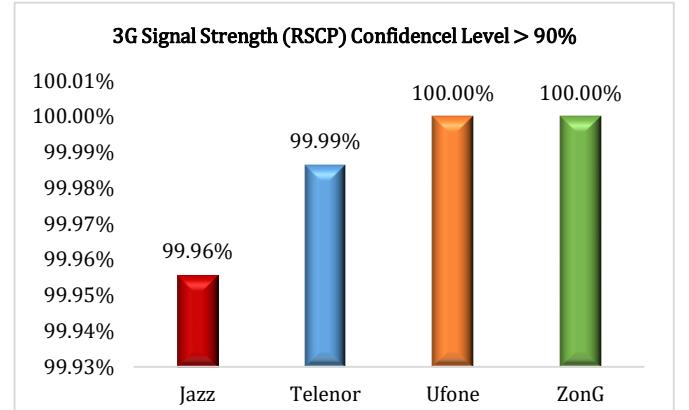
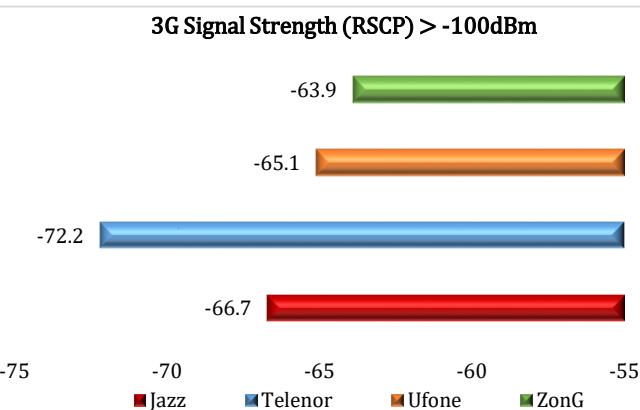
ZONG 3G COVERAGE (RSCP) - TAXILA



QUALITY OF SERVICE SURVEY RESULTS – TAXILA

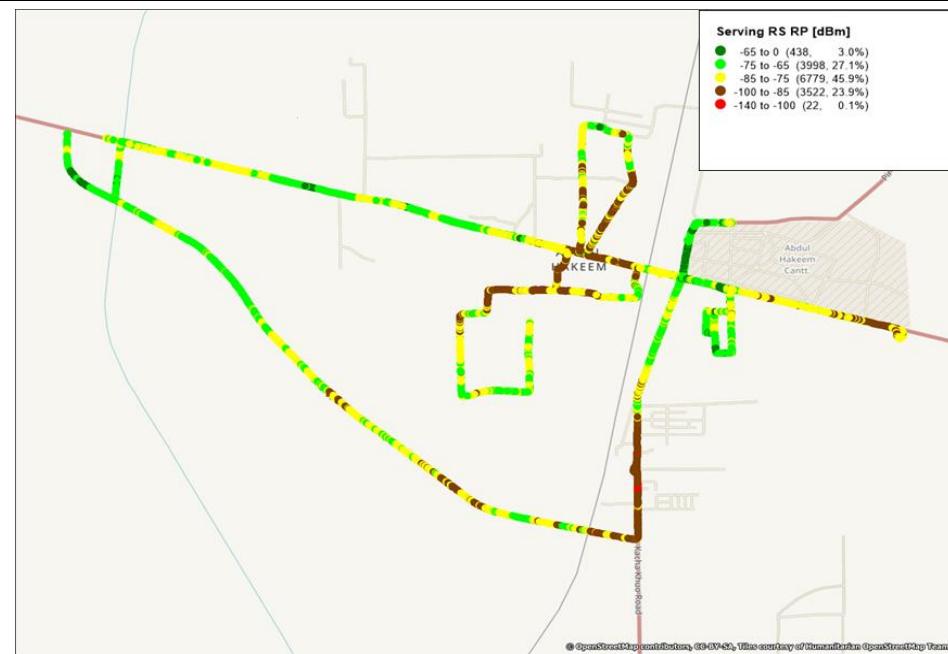


QUALITY OF SERVICE SURVEY RESULTS – TAXILA

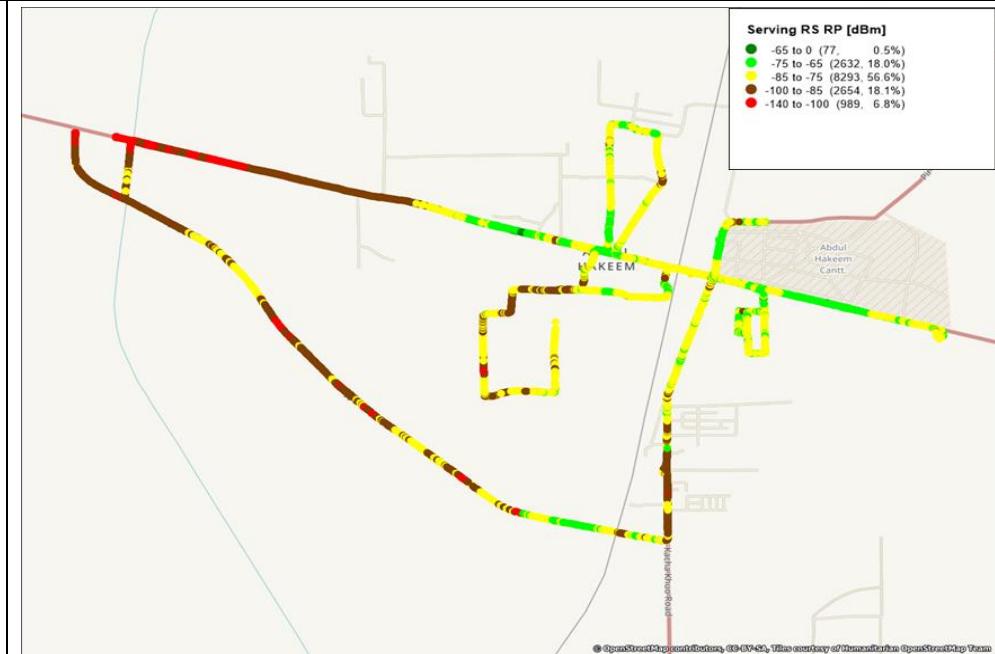


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

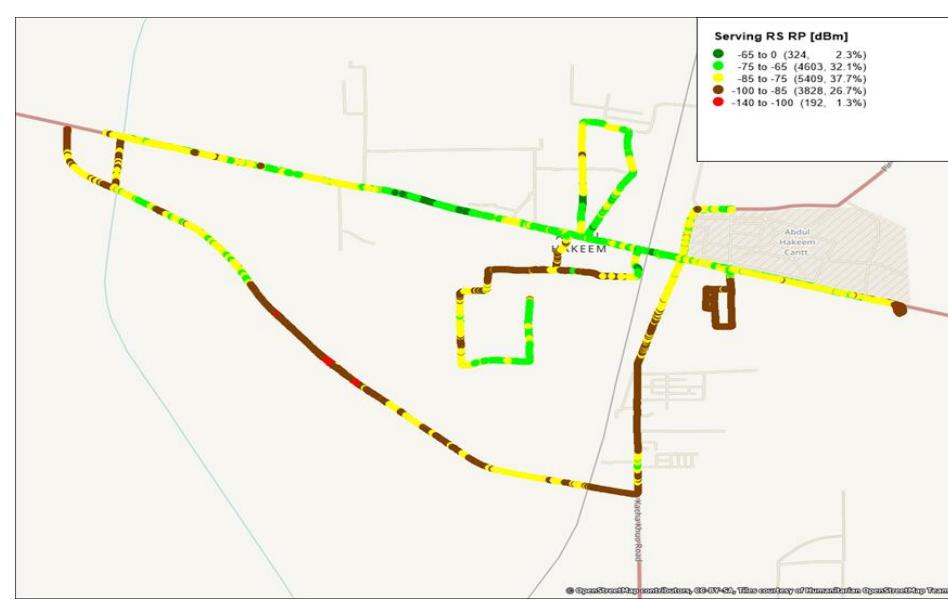
JAZZ 4G COVERAGE (RSRP) - ABDUL HAKEEM



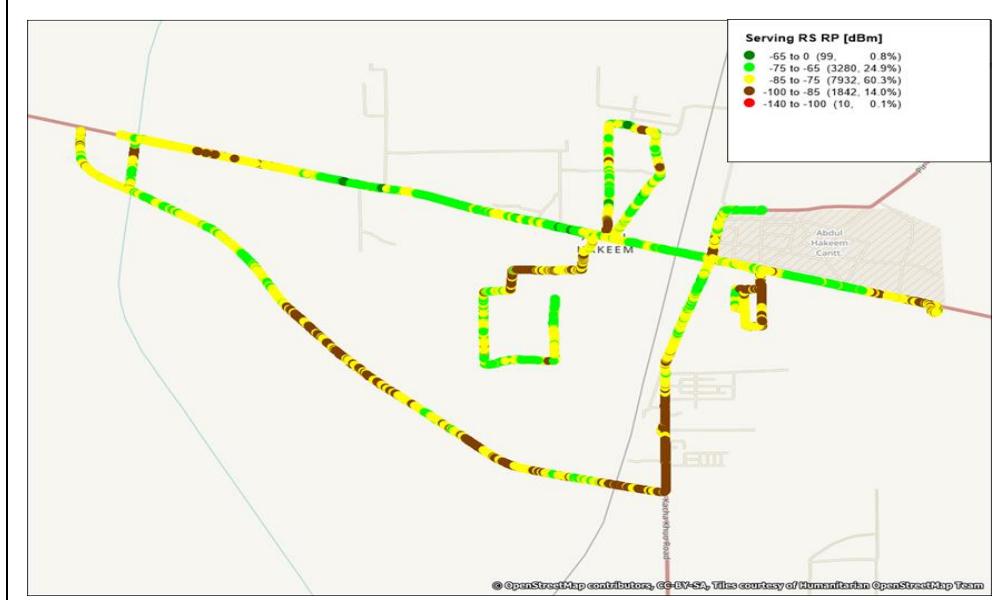
TELENOR 4G COVERAGE (RSRP) - ABDUL HAKEEM



UFONE 4G COVERAGE (RSRP) - ABDUL HAKEEM

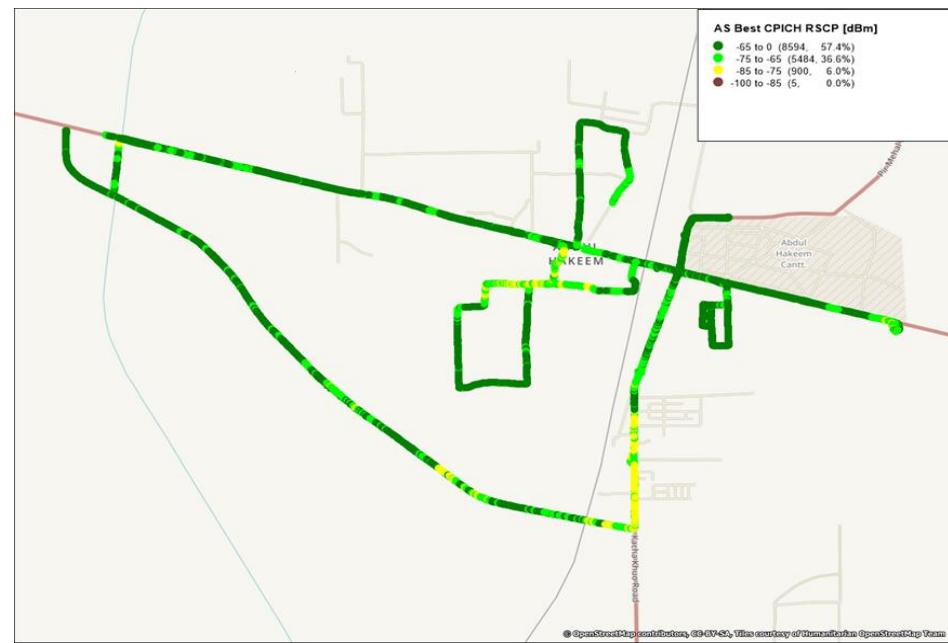


ZONG 4G COVERAGE (RSRP) - ABDUL HAKEEM

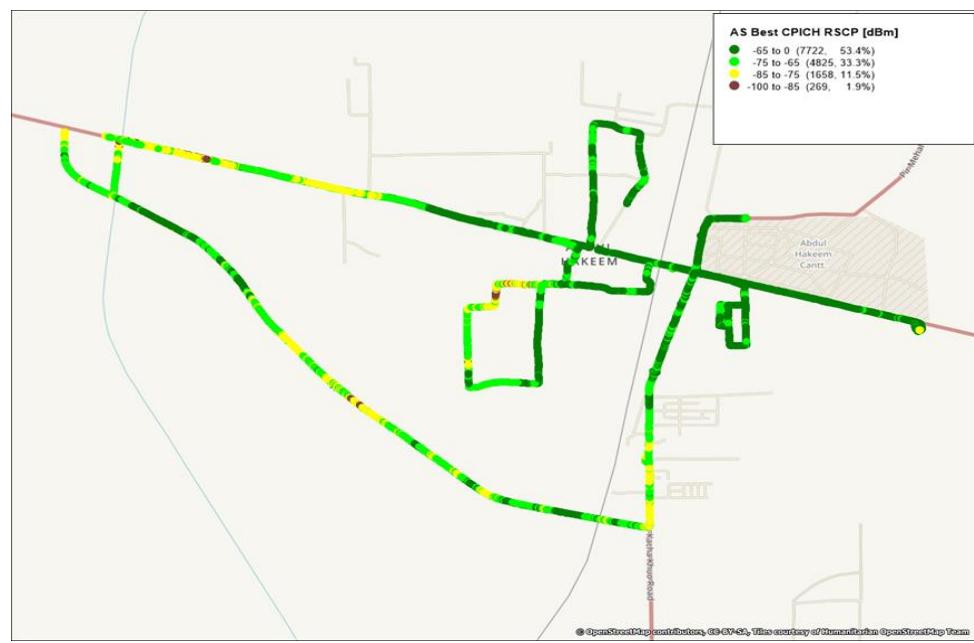


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

JAZZ 3G COVERAGE (RSCP) - ABDUL HAKEEM



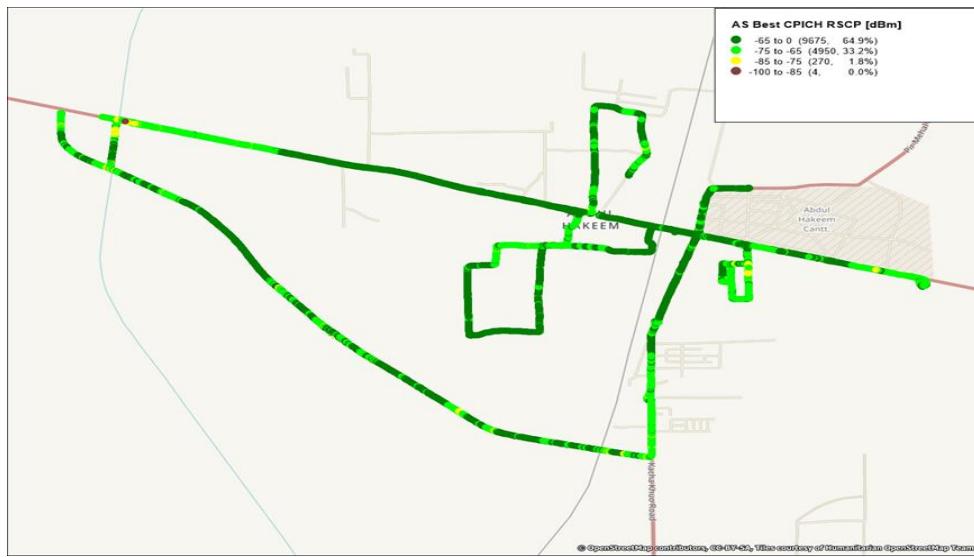
TELENOR 3G COVERAGE (RSCP) - ABDUL HAKEEM



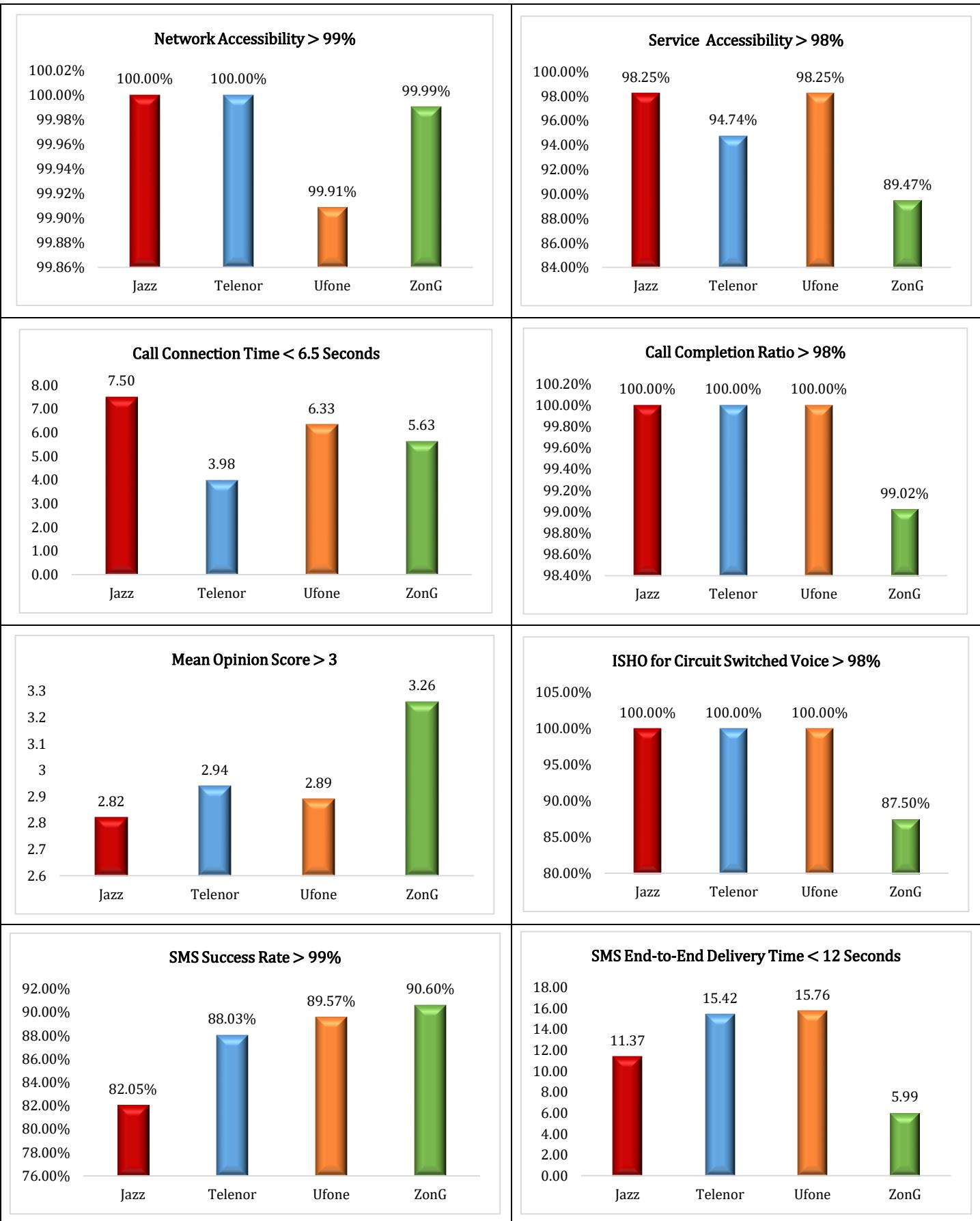
UFONE 3G COVERAGE (RSCP) - ABDUL HAKEEM



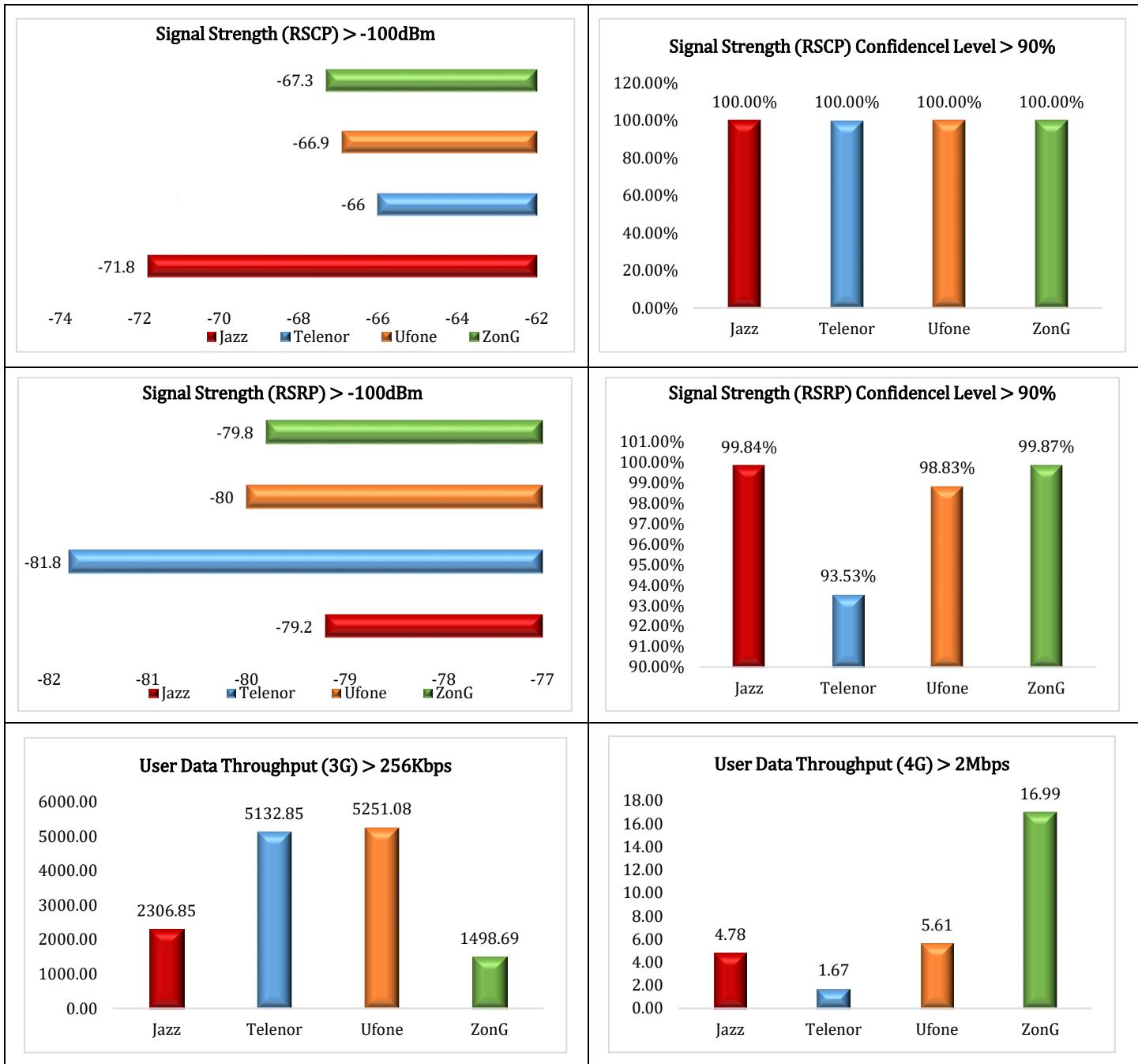
ZONG 3G COVERAGE (RSCP) - ABDUL HAKEEM



QUALITY OF SERVICE SURVEY RESULTS – ABDUL HAKEEM

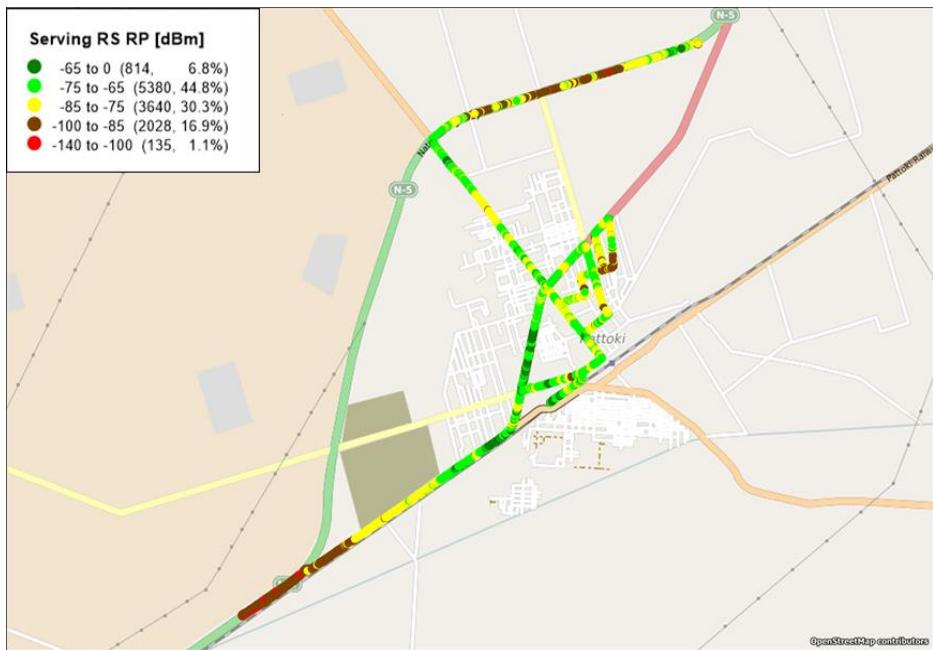


QUALITY OF SERVICE SURVEY RESULTS – ABDUL HAKEEM

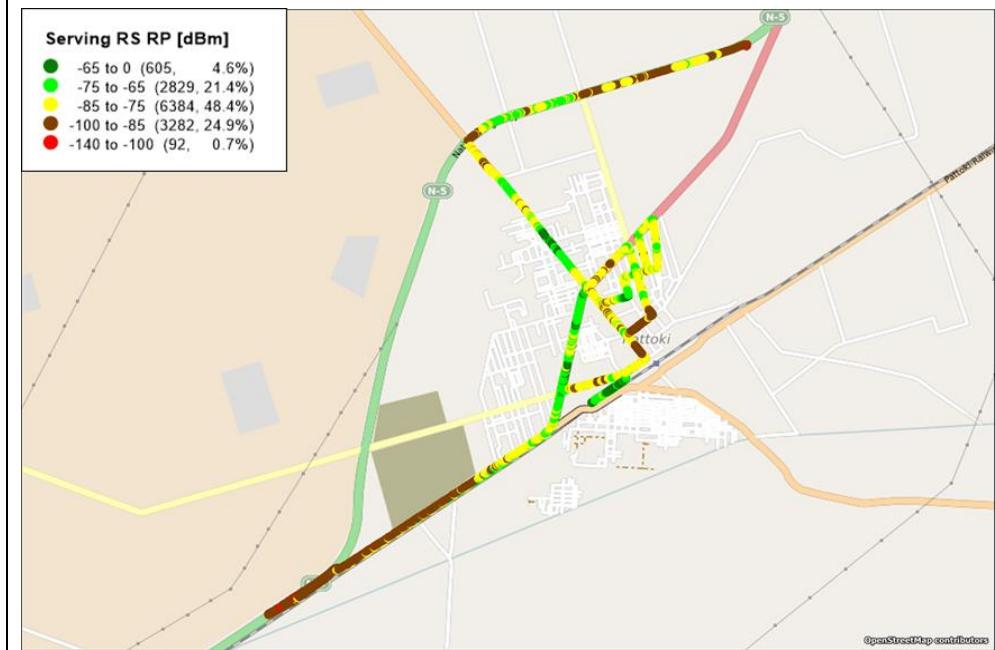


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

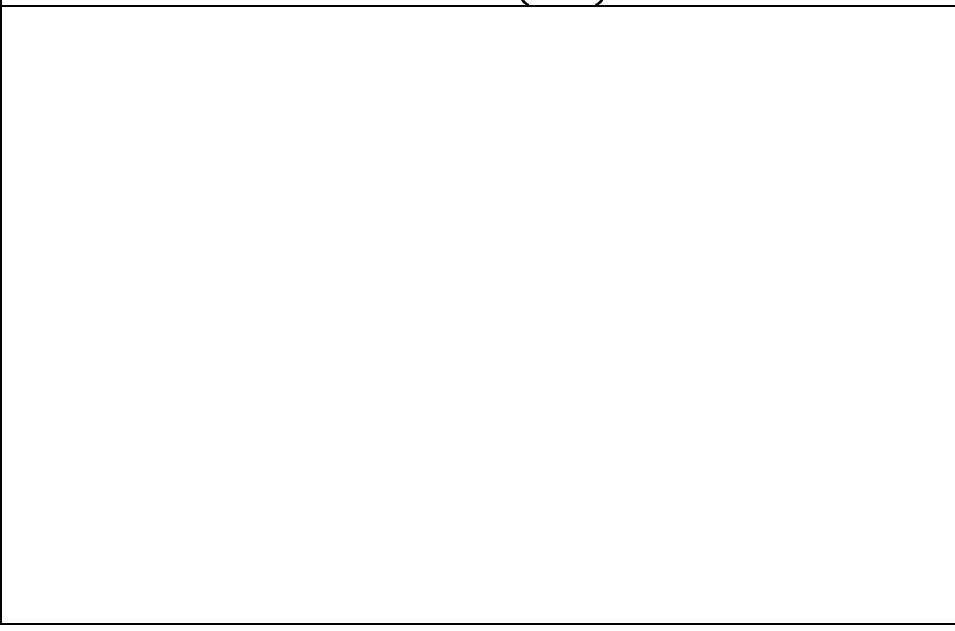
JAZZ 4G COVERAGE (RSRP) – PATTOKI



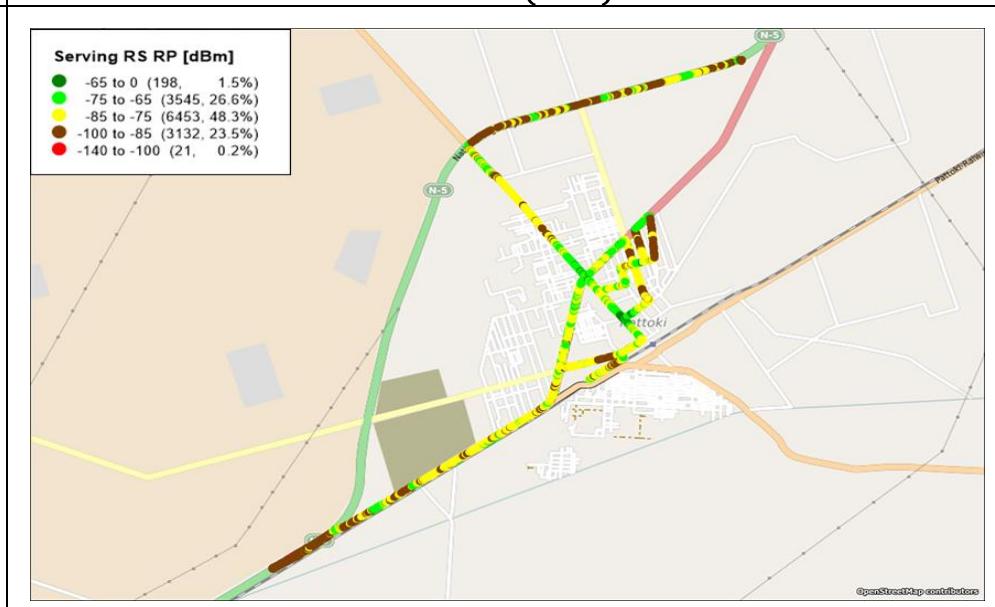
TELENOR 4G COVERAGE (RSRP) – PATTOKI



UFONE 4G COVERAGE (RSRP) – PATTOKI

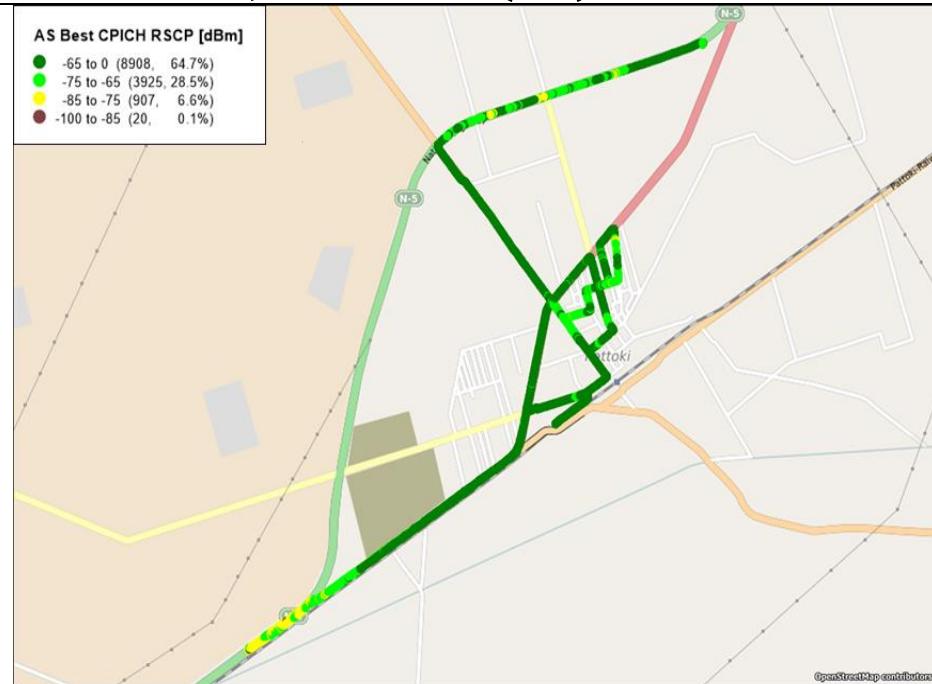


ZONG 4G COVERAGE (RSRP) – PATTOKI

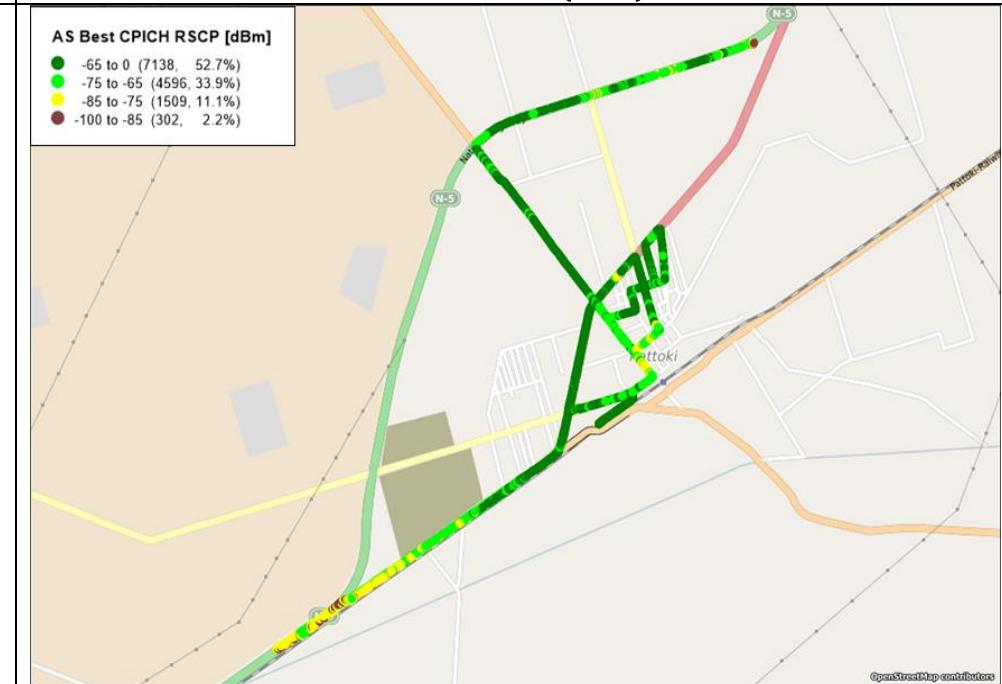


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

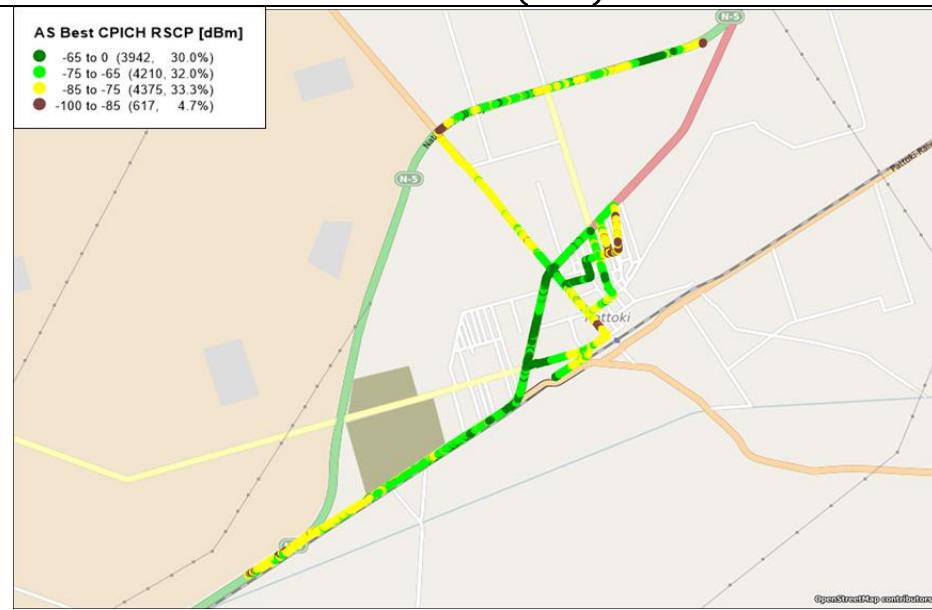
JAZZ 3G COVERAGE (RSCP) – PATTOKI



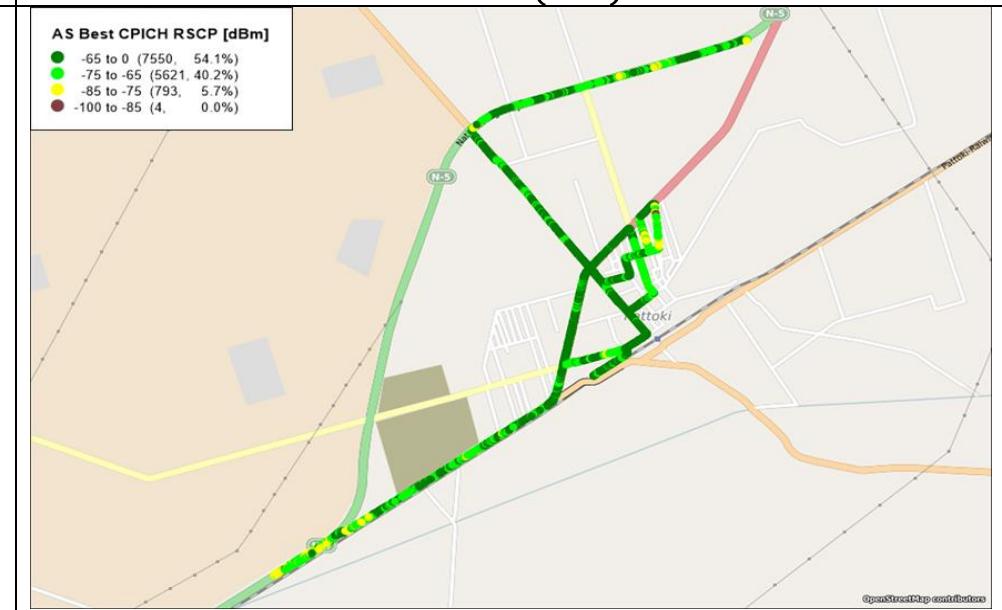
TELENOR 3G COVERAGE (RSCP) – PATTOKI



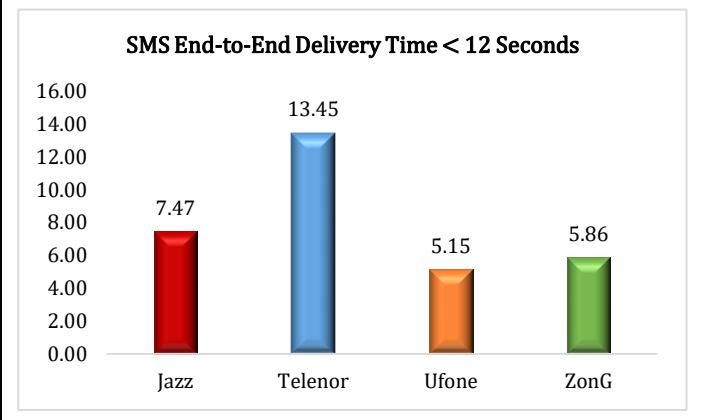
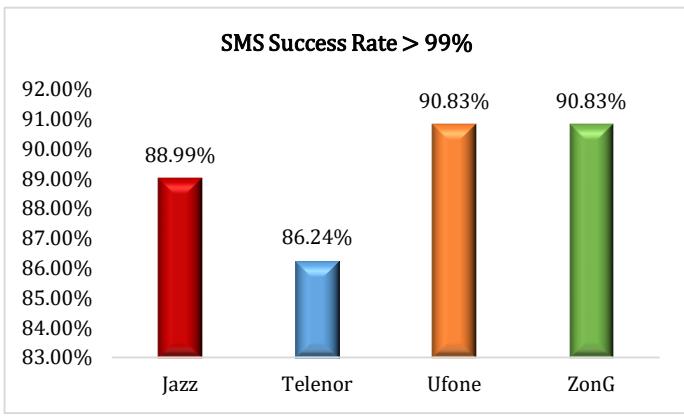
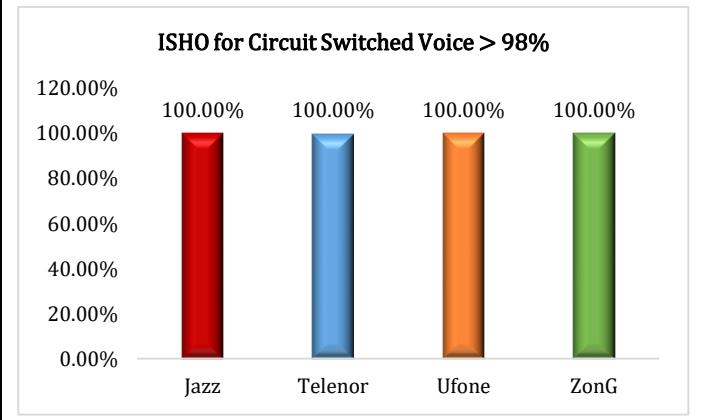
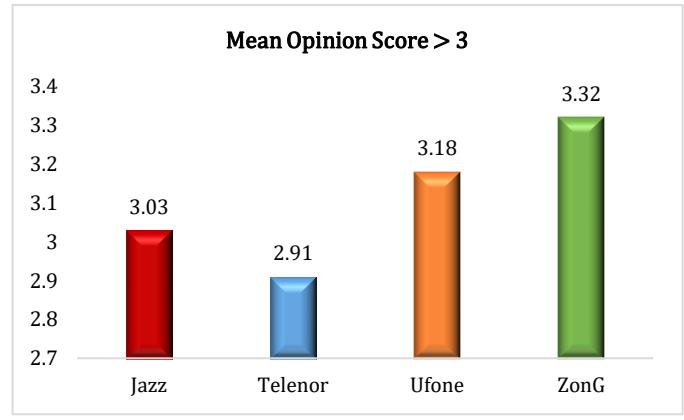
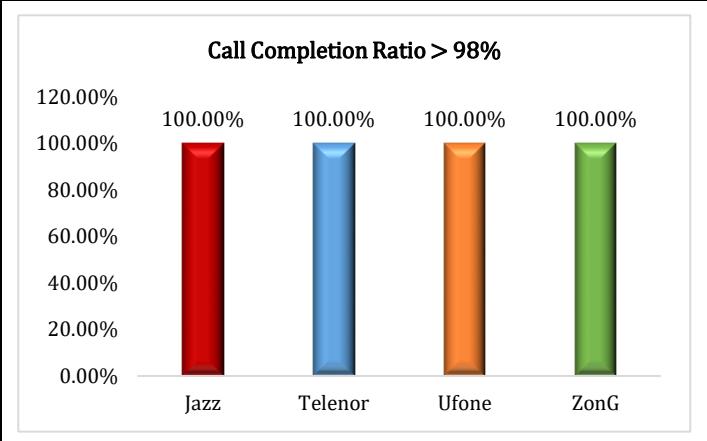
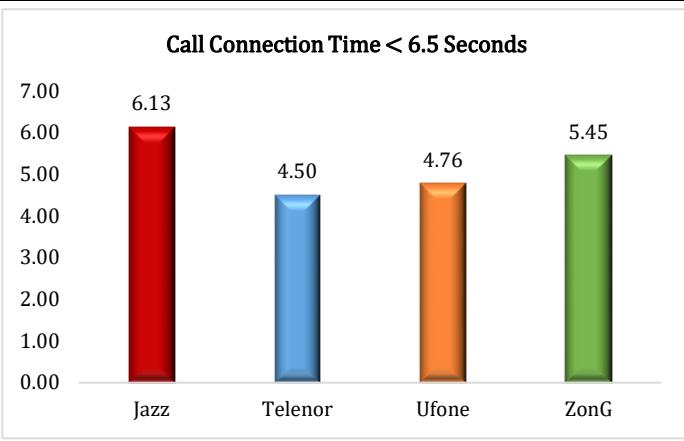
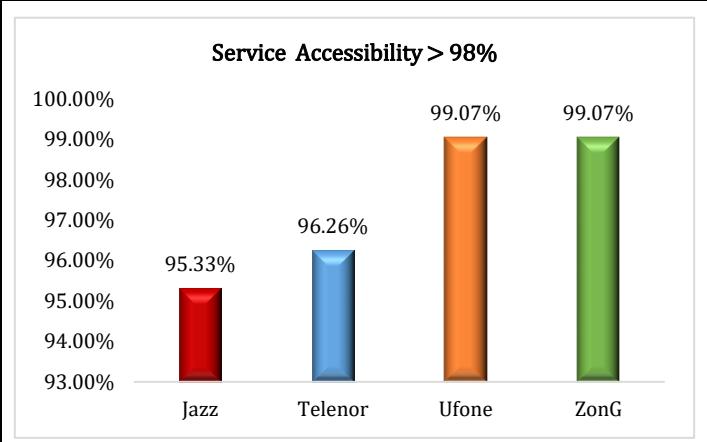
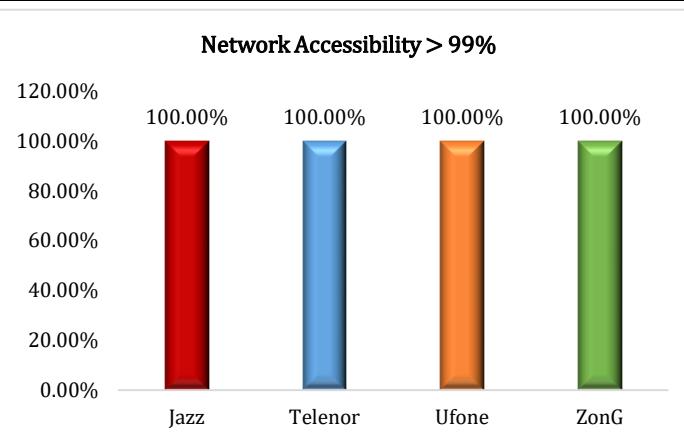
UFONE 3G COVERAGE (RSCP) – PATTOKI



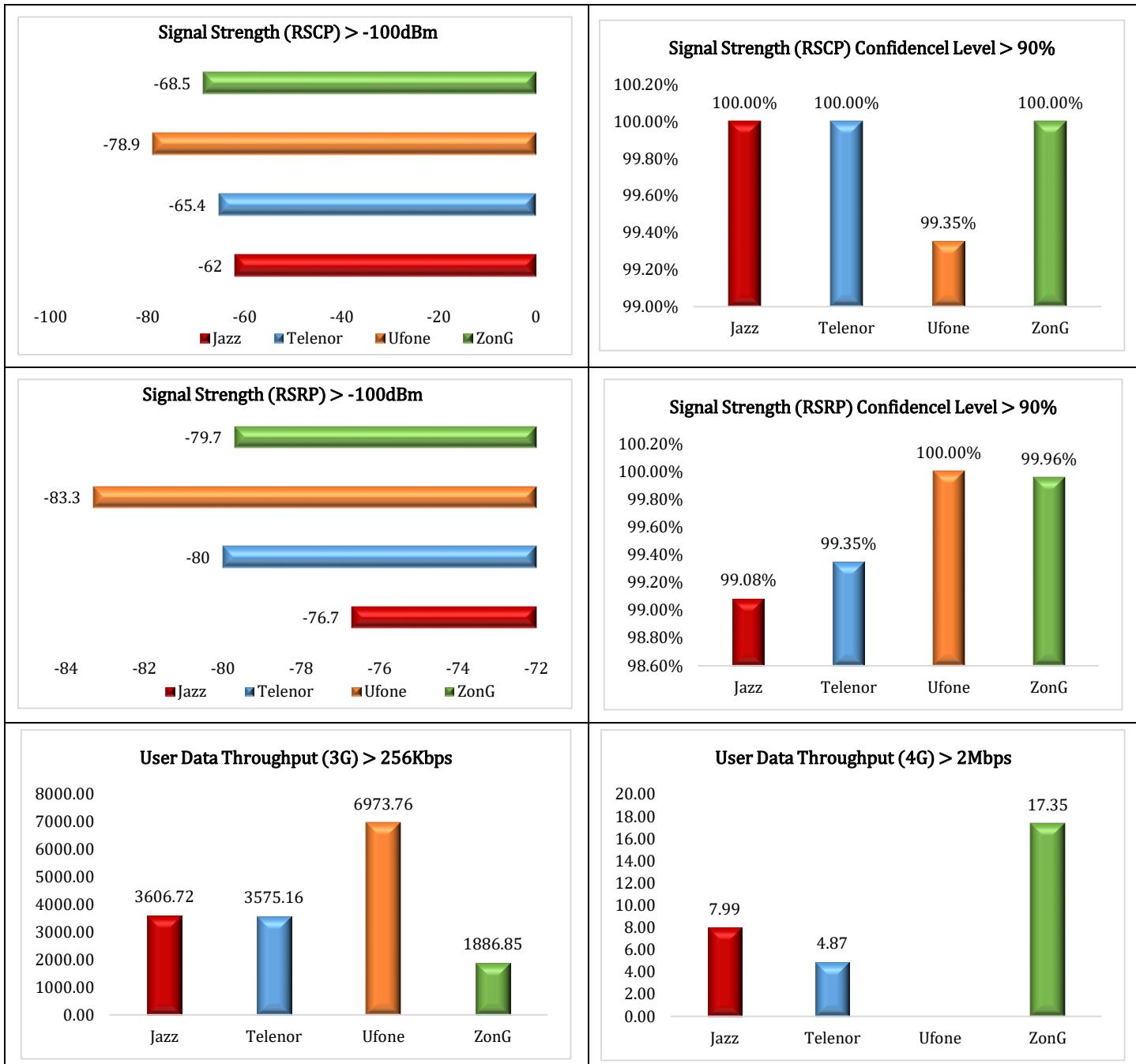
ZONG 3G COVERAGE (RSCP) – PATTOKI



QUALITY OF SERVICE SURVEY RESULTS – PAT TOKI



QUALITY OF SERVICE SURVEY RESULTS – PAT TOKI

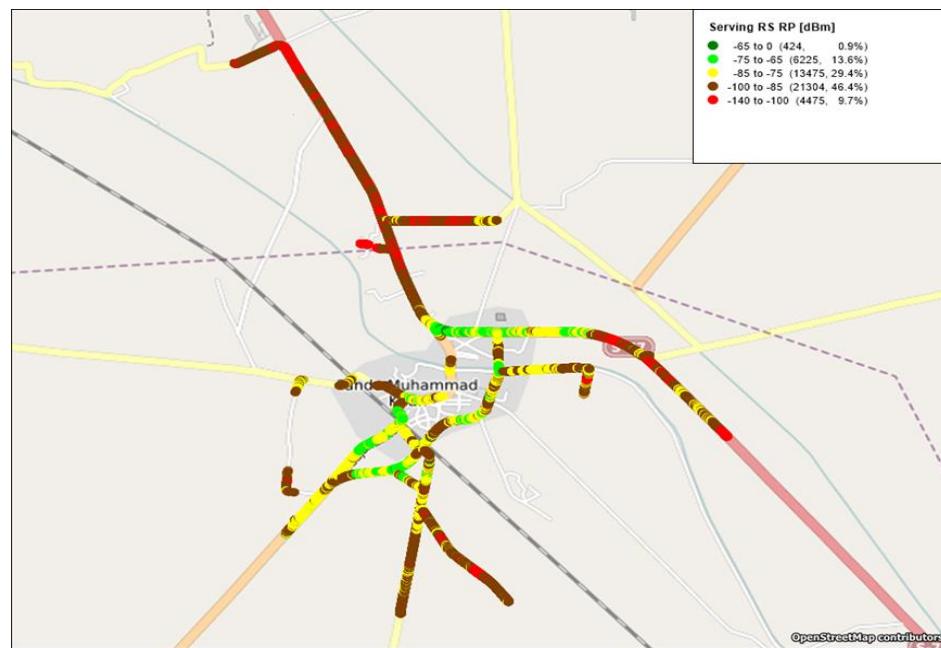


ANNEX – B

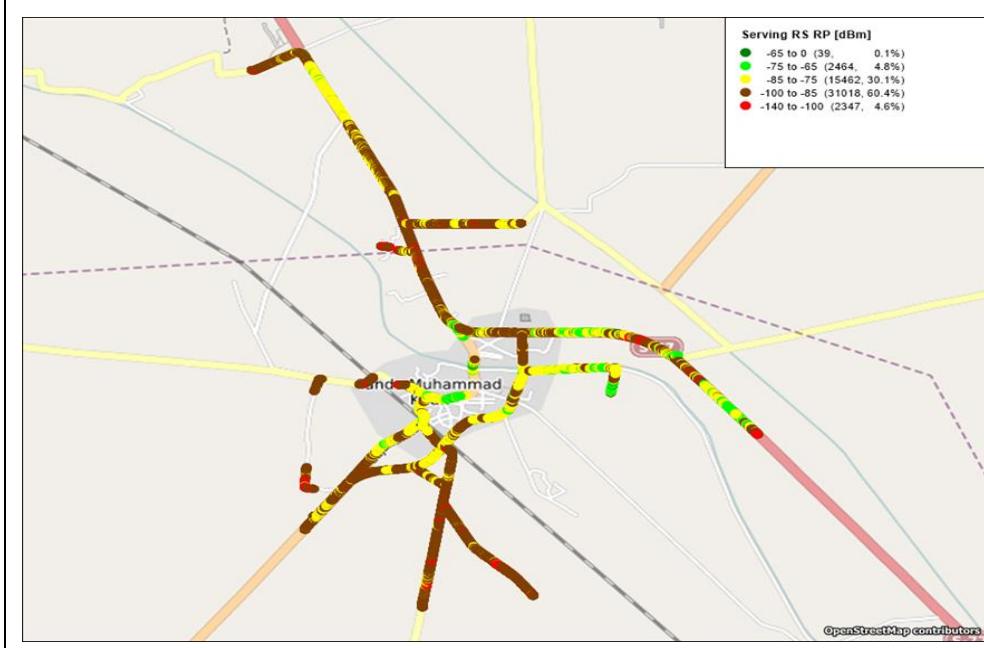
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4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

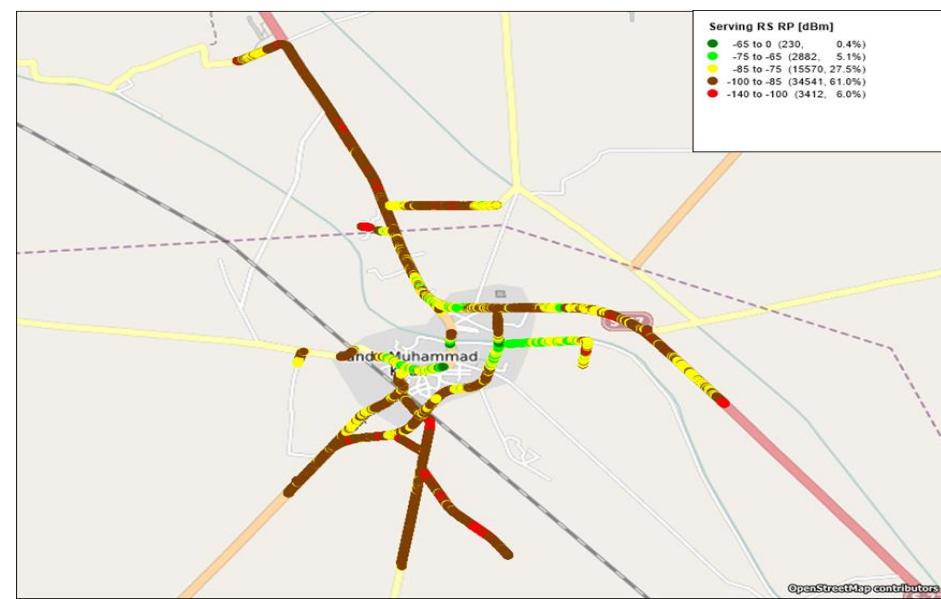
JAZZ 4G COVERAGE (RSRP) - TANDO MUHAMMAD KHAN



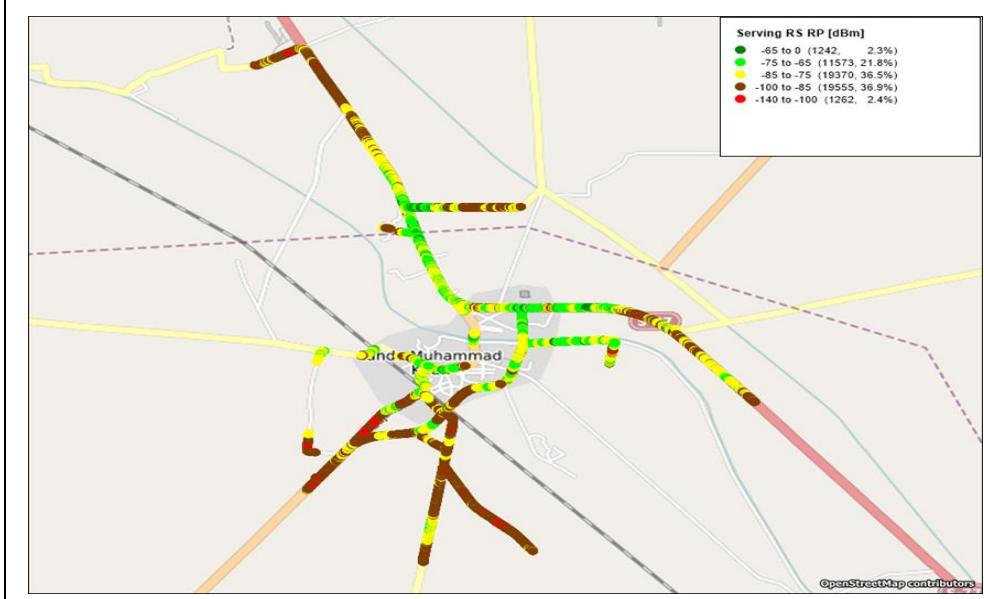
TELENOR 4G COVERAGE (RSRP) - TANDO MUHAMMAD KHAN



UFONE 4G COVERAGE (RSRP) - TANDO MUHAMMAD KHAN

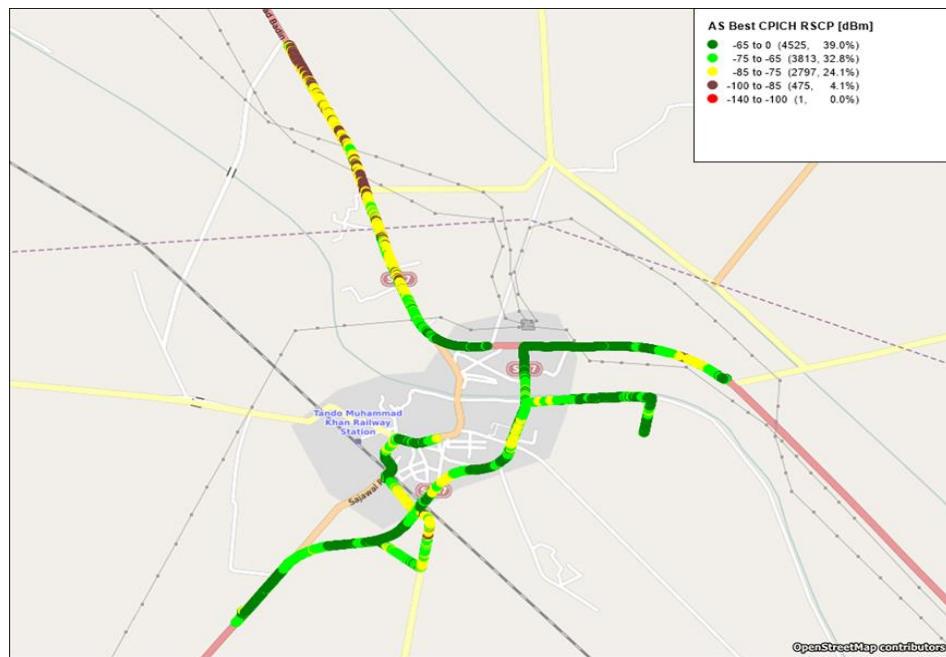


ZONG 4G COVERAGE (RSRP) - TANDO MUHAMMAD KHAN

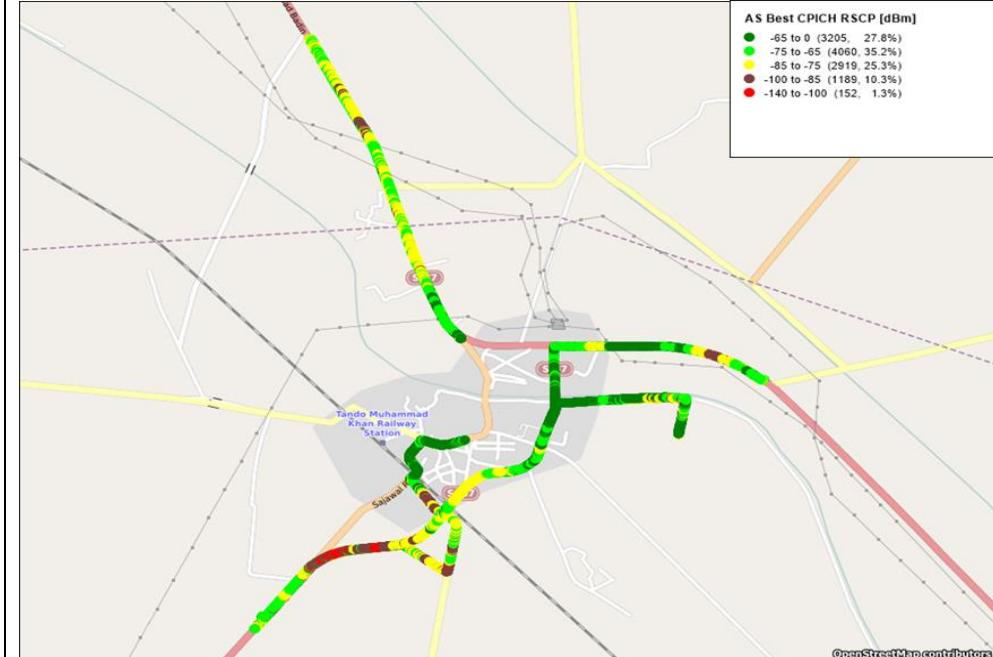


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

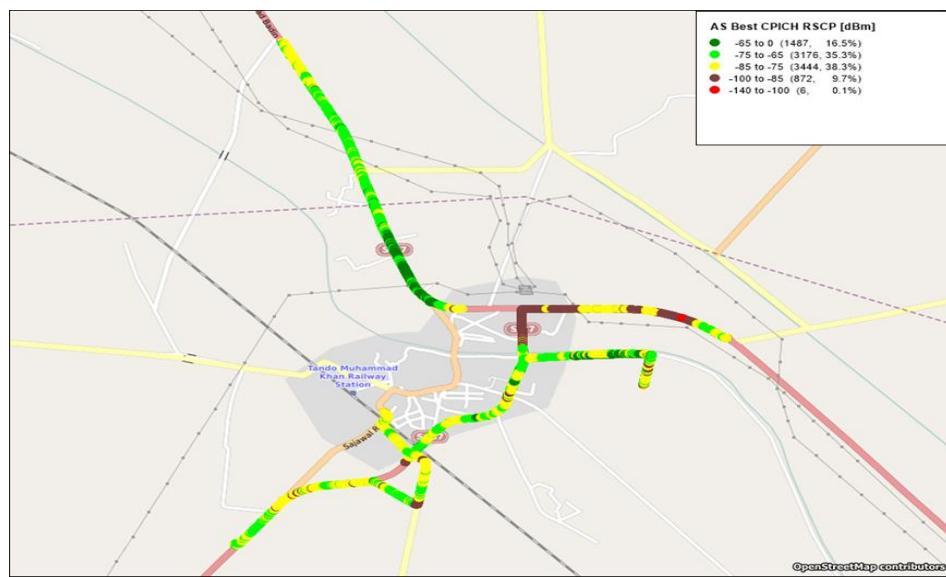
JAZZ 3G COVERAGE (RSCP) - TANDO MUHAMMAD KHAN



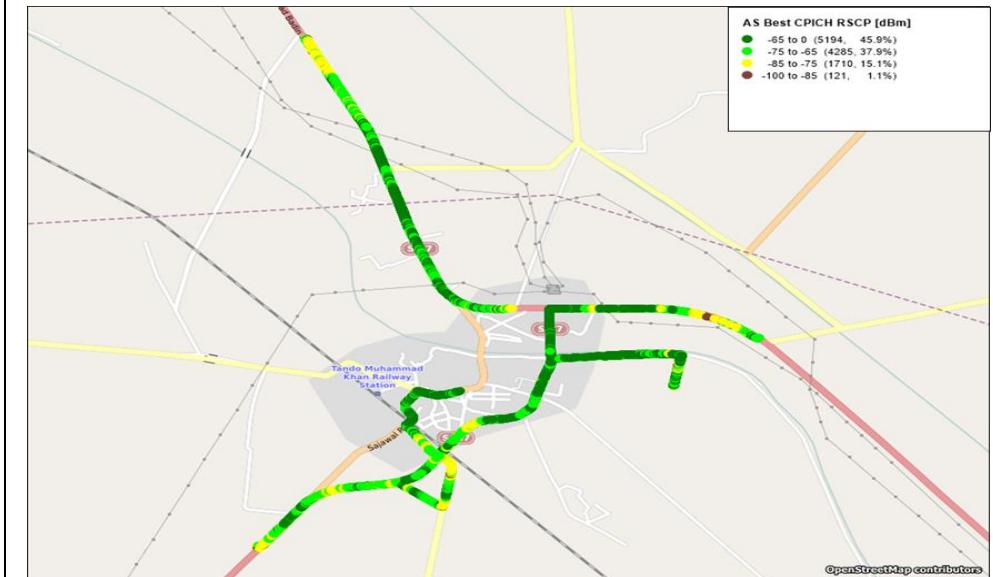
TELENOR 3G COVERAGE (RSCP) - TANDO MUHAMMAD KHAN



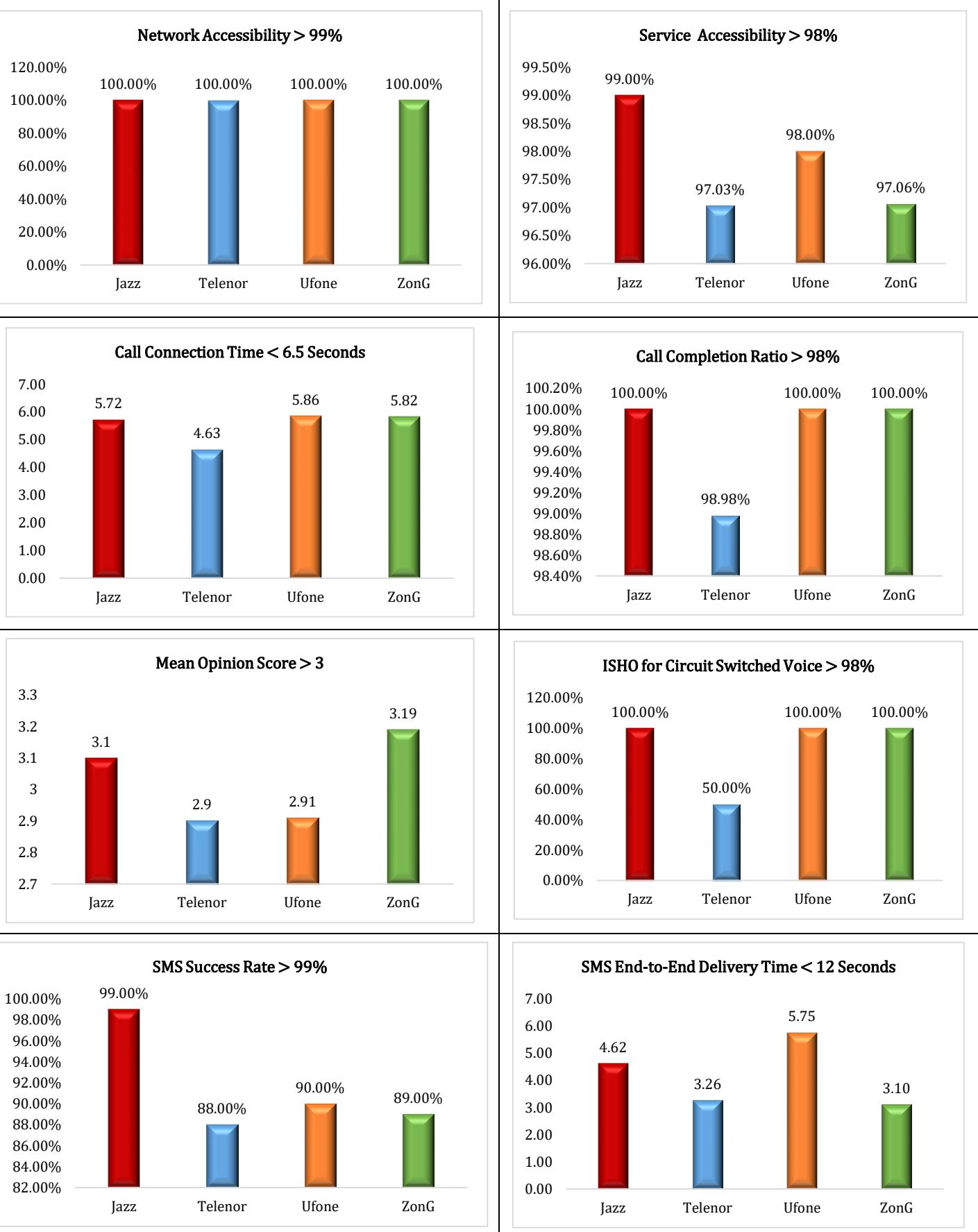
UFONE 3G COVERAGE (RSCP) - TANDO MUHAMMAD KHAN



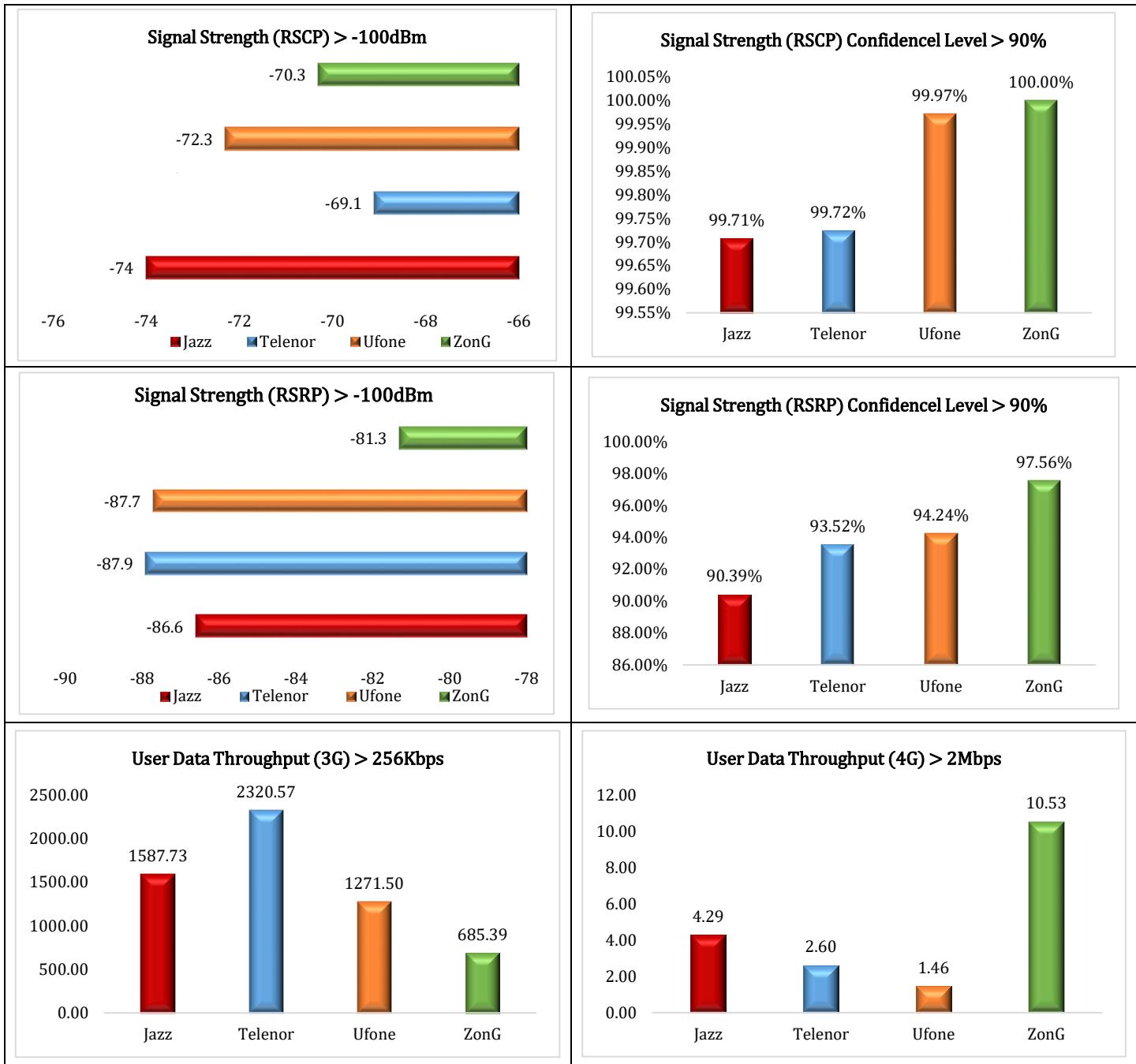
ZONG 3G COVERAGE (RSCP) - TANDO MUHAMMAD KHAN



QUALITY OF SERVICE SURVEY RESULTS – TANDO MUHAMMAD KHAN

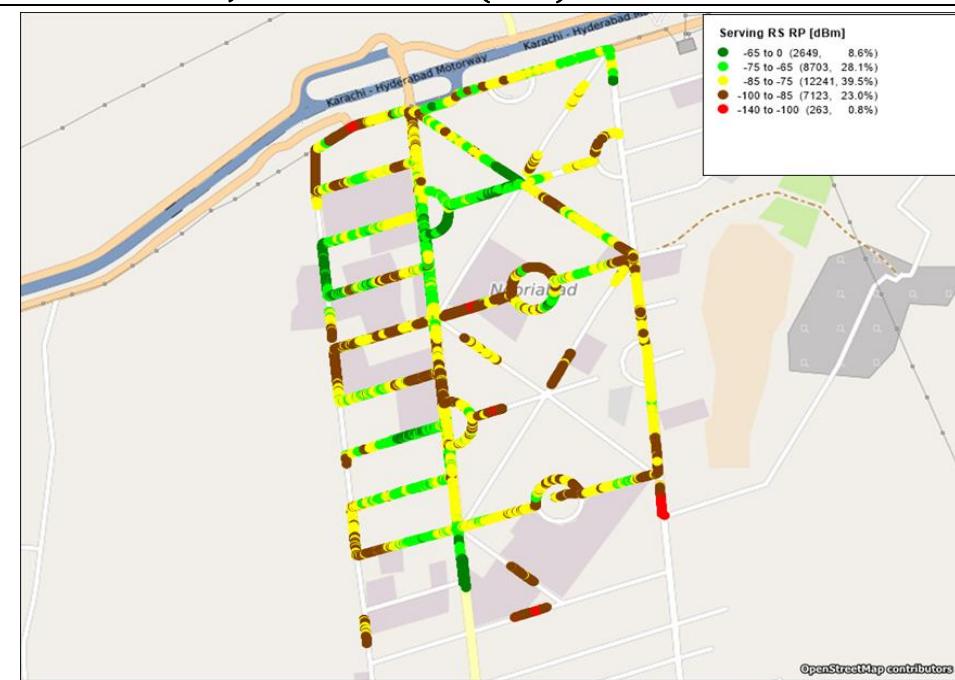


QUALITY OF SERVICE SURVEY RESULTS – TANDO MUHAMMAD KHAN

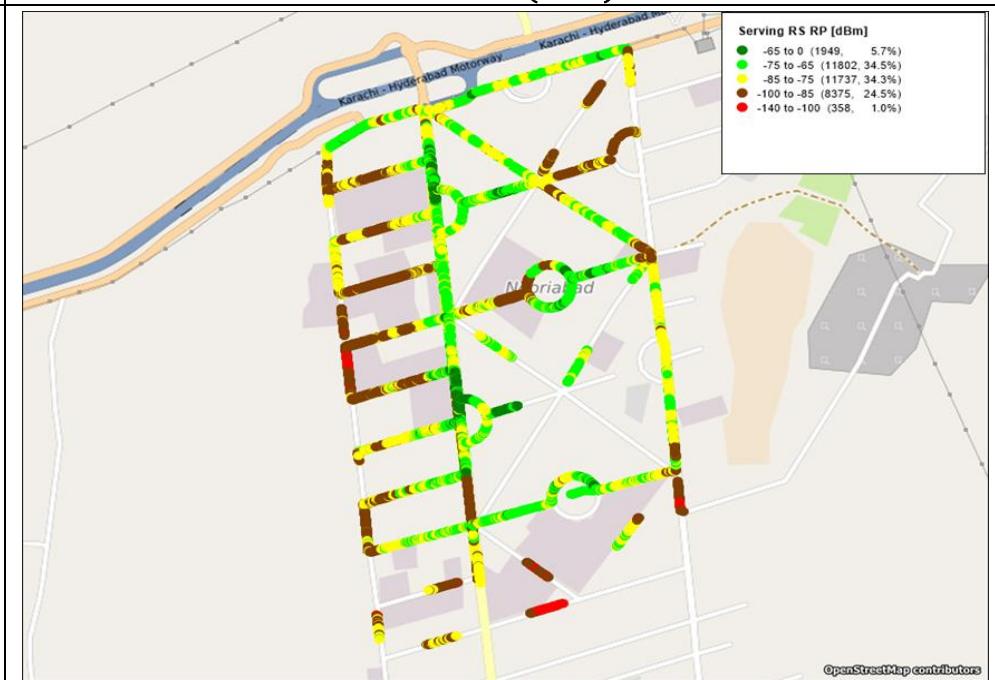


4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

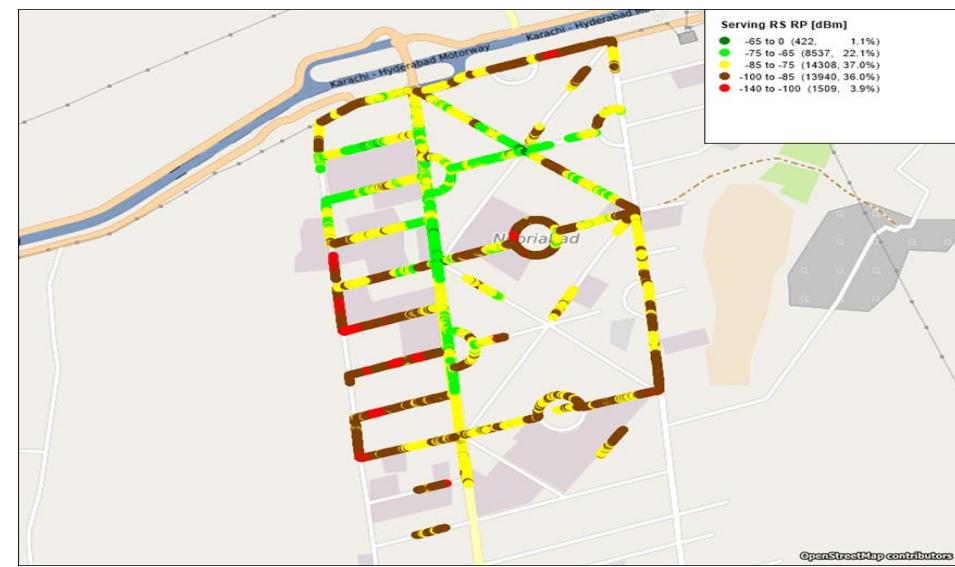
JAZZ 4G COVERAGE (RSRP) - NOORIABAD



TELENOR 4G COVERAGE (RSRP) - NOORIABAD



UFONE 4G COVERAGE (RSRP) - NOORIABAD

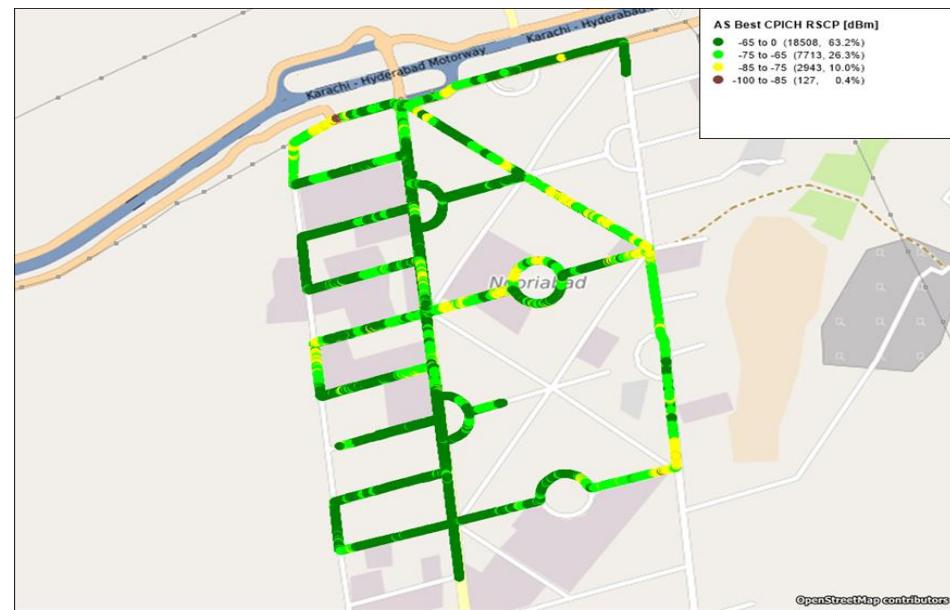


ZONG 4G COVERAGE (RSRP) - NOORIABAD

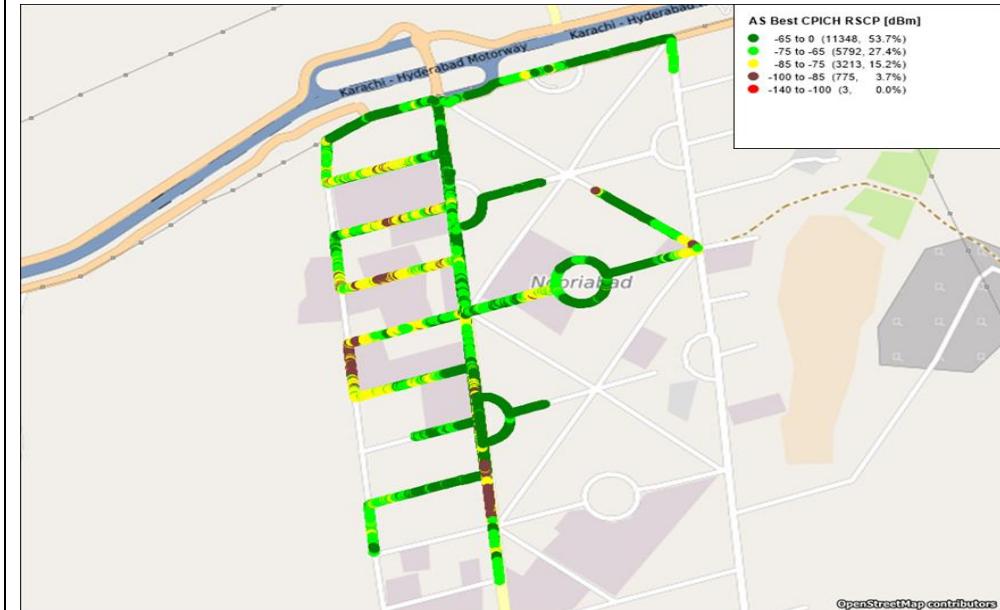


3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

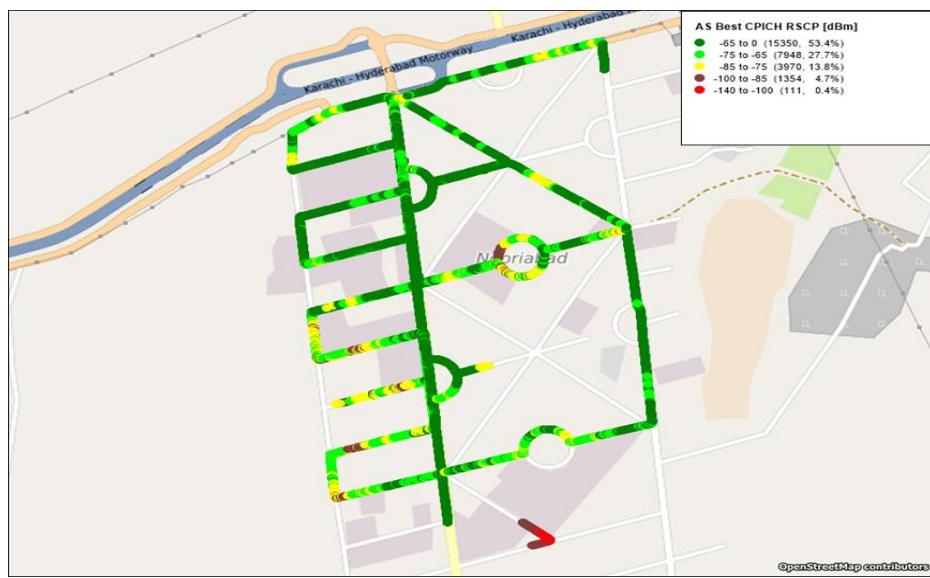
JAZZ 3G COVERAGE (RSCP) - NOORIABAD



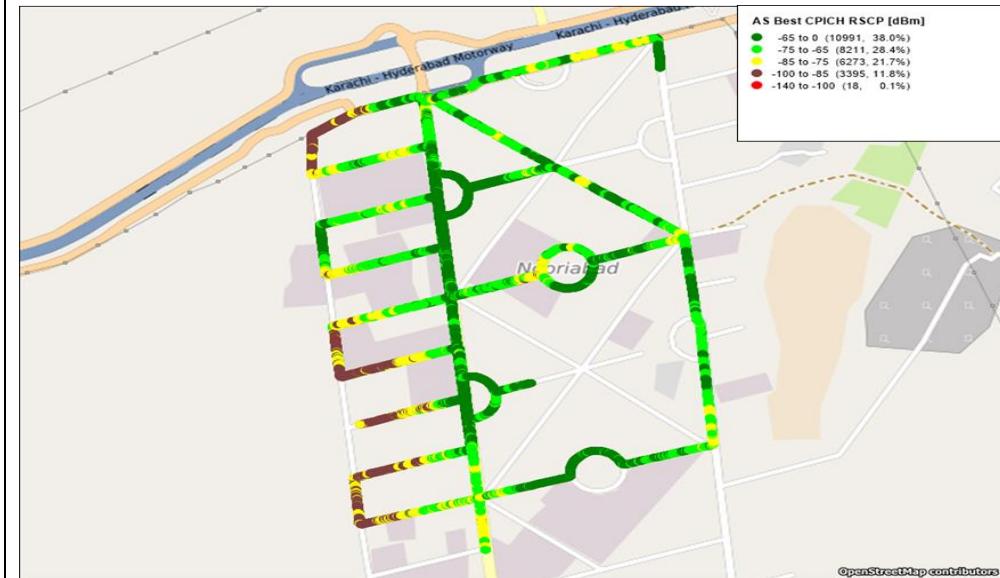
TELENOR 3G COVERAGE (RSCP) - NOORIABAD



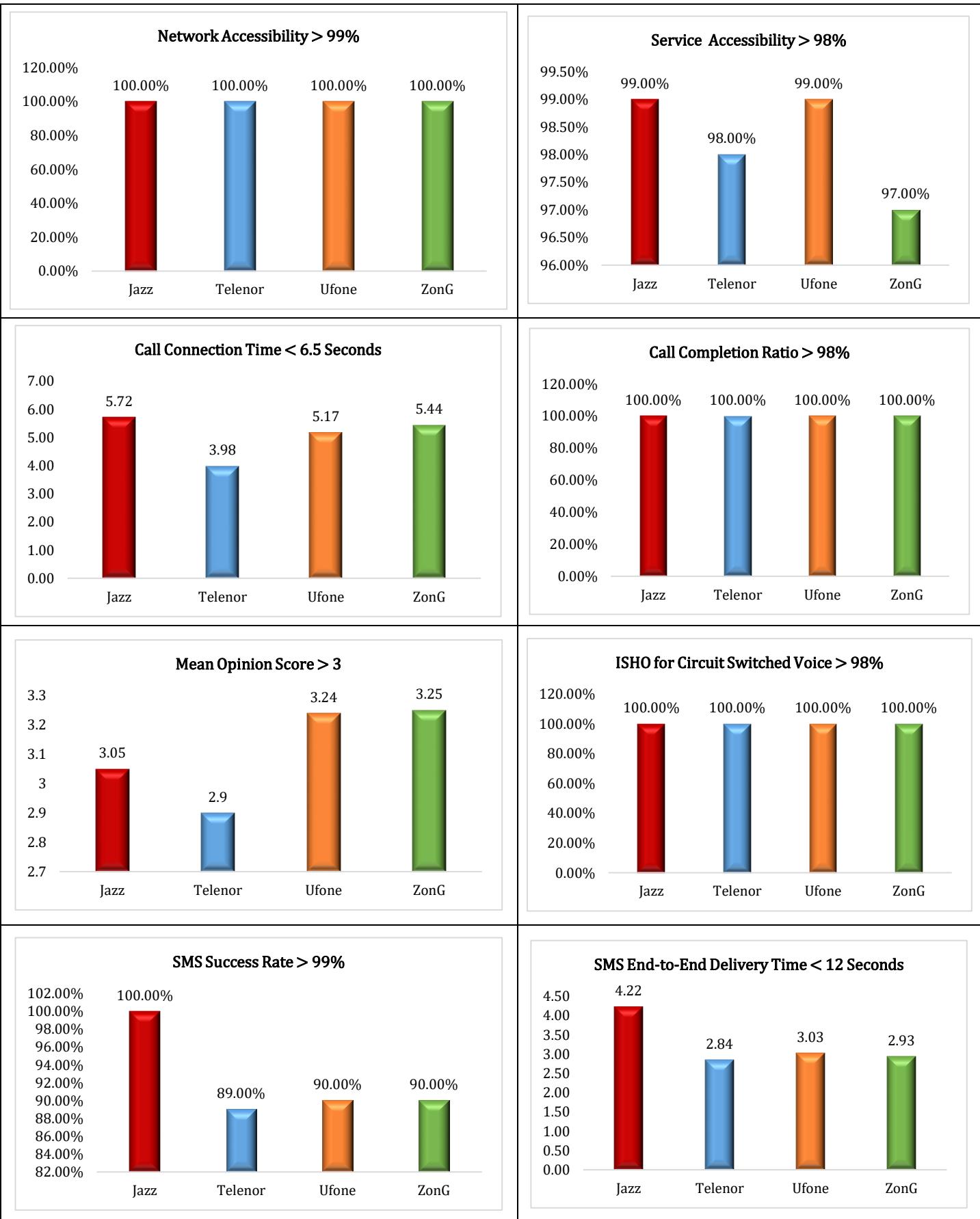
UFONE 3G COVERAGE (RSCP) - NOORIABAD



ZONG 3G COVERAGE (RSCP) - NOORIABAD



QUALITY OF SERVICE SURVEY RESULTS – NOORIABAD



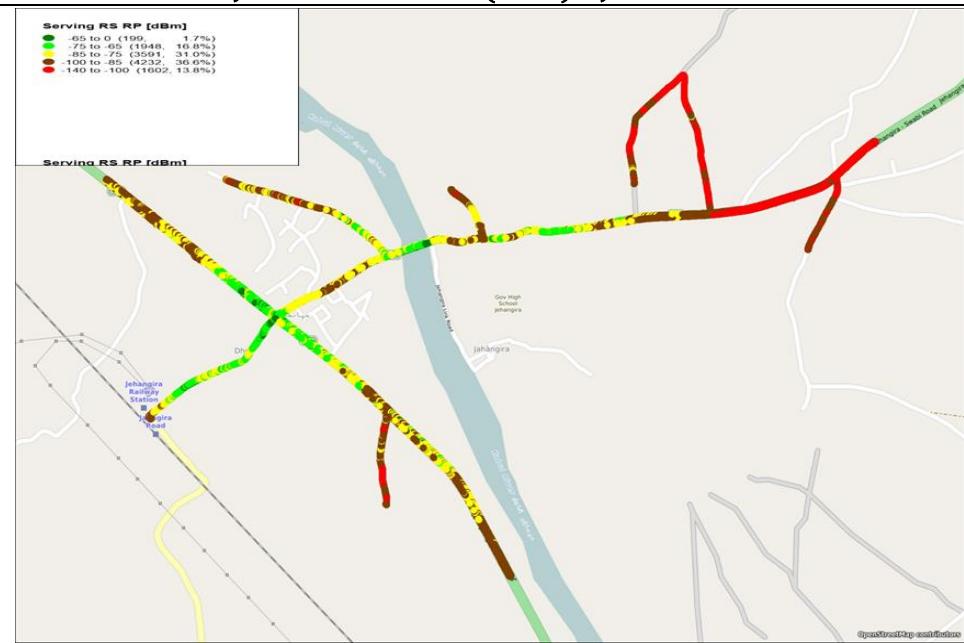
QUALITY OF SERVICE SURVEY RESULTS – NOORIABAD



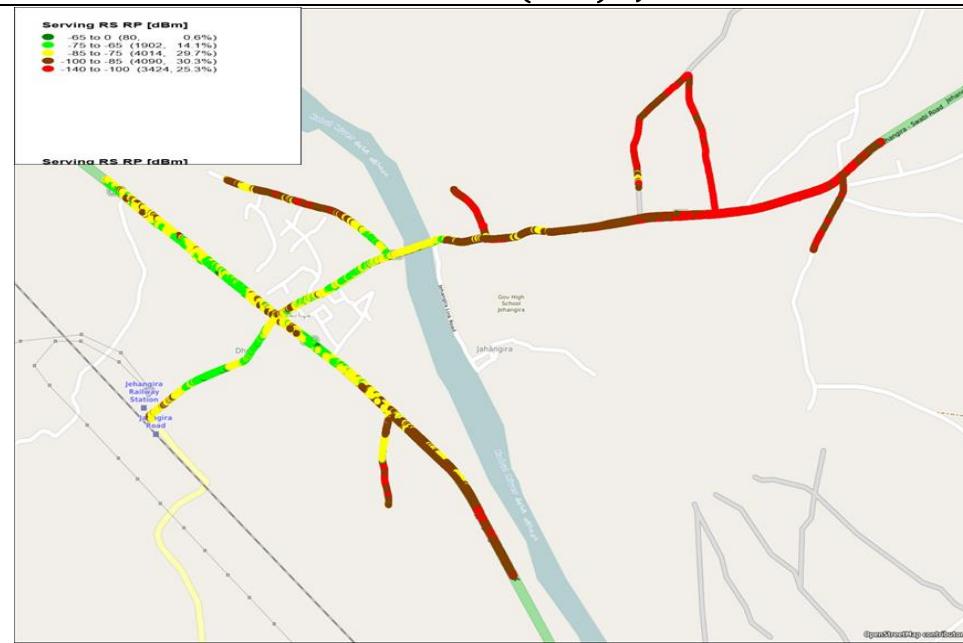
KHYBER PAKHTUNKHWA

4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

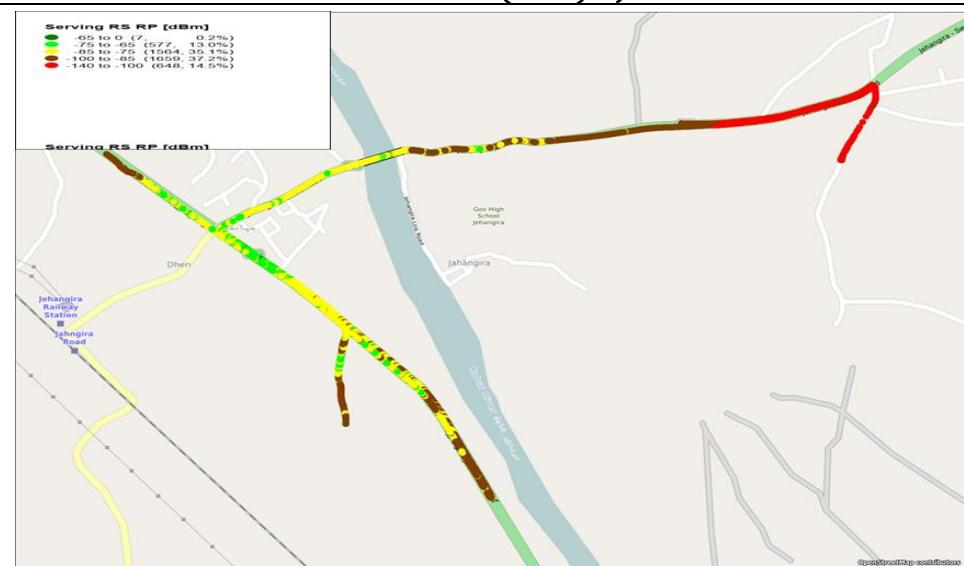
JAZZ 4G COVERAGE (RSRP) - JAHANGIRA



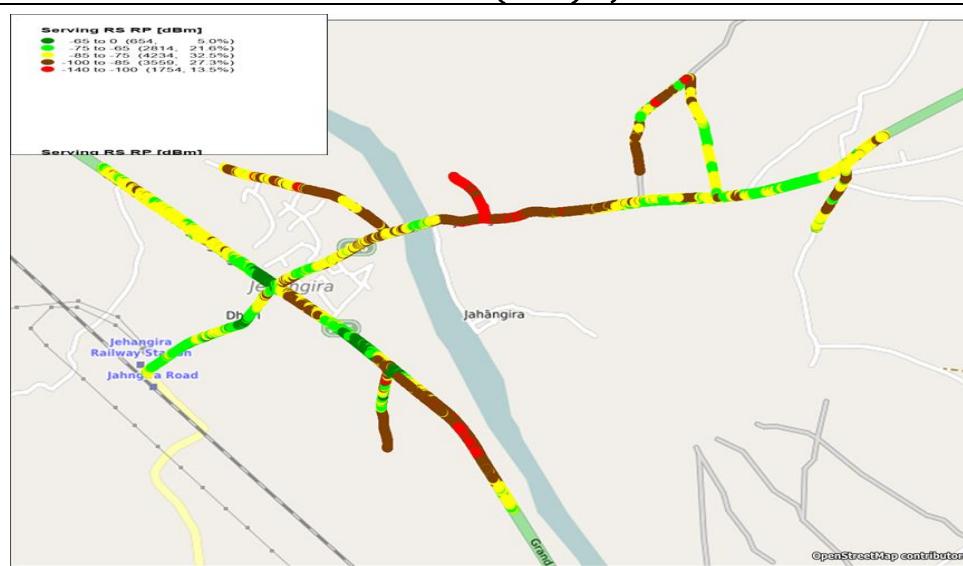
TELENOR 4G COVERAGE (RSRP) - JAHANGIRA



UFONE 4G COVERAGE (RSRP) - JAHANGIRA



ZONG 4G COVERAGE (RSRP) - JAHANGIRA



3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

JAZZ 3G COVERAGE (RSCP) - JAHANGIRA



TELENOR 3G COVERAGE (RSCP) - JAHANGIRA



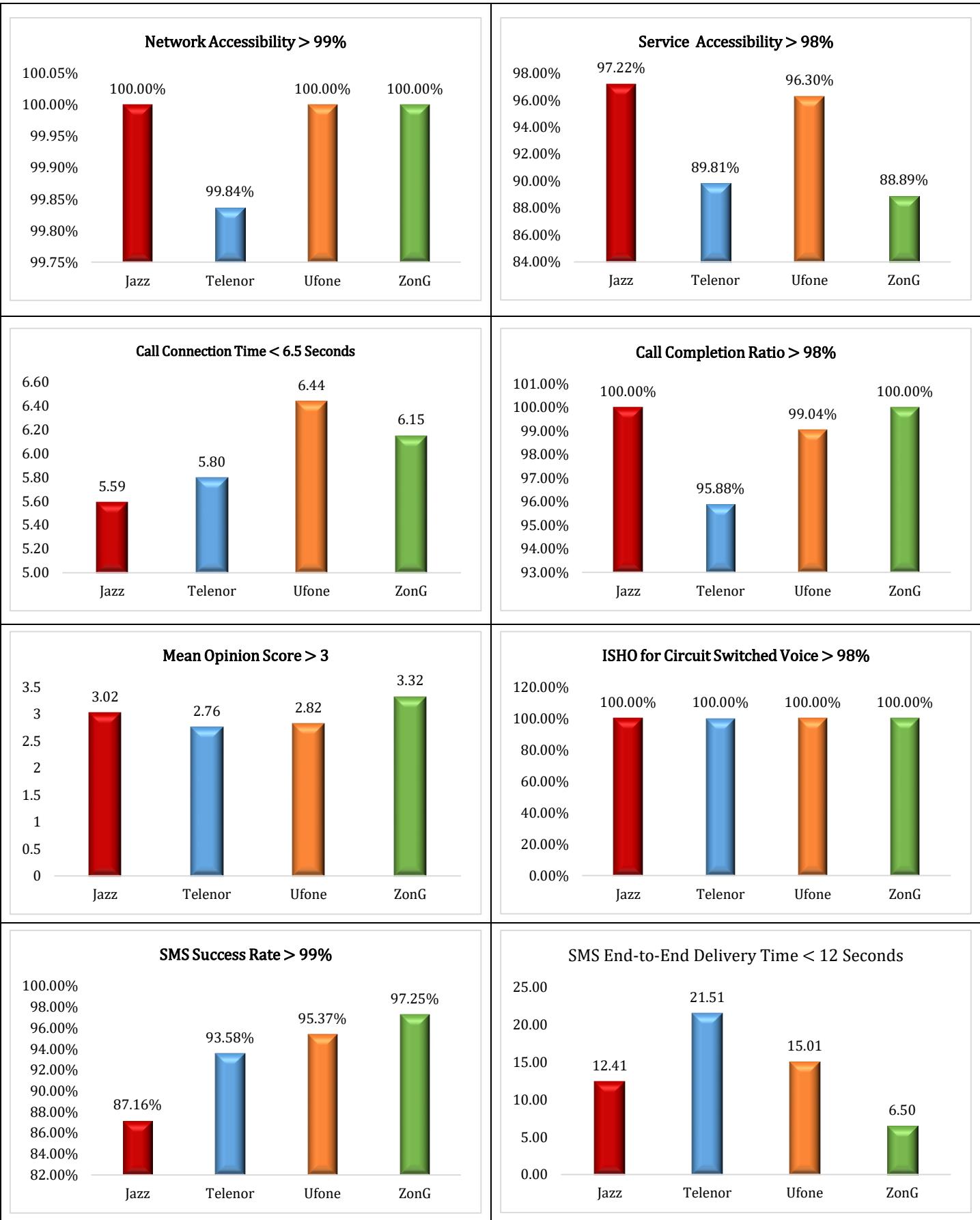
UFONE 3G COVERAGE (RSCP) - JAHANGIRA



ZONG 3G COVERAGE (RSCP) - JAHANGIRA



QUALITY OF SERVICE SURVEY RESULTS – JAHANGIRA



QUALITY OF SERVICE SURVEY RESULTS – JAHANGIRA

