

INDEPENDENT QUALITY OF SERVICE SURVEY IN CITIES OF PAKISTAN

THIRD 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 ten (10) cities of Punjab, Khyber Pakhtunkhwa (KPK) and Sindh. The name of cities along with survey dates are mentioned in **Table 1.1: QoS Survey Cities & Dates:**

S. #.	Province	City	Survey Dates
1.	Punjab	Jhang	27 th ~ 29 th July 2021
2.		Sialkot	2 nd ~ 5 th Aug, 2021
3.		Vehari	30 th Aug ~ 3 rd Sep, 2021
4.		Dera Ghazi Khan	6 th ~ 10 th Sep, 2021
5.	Khyber Pakhtunkhwa	Bannu	27 th ~ 29 th July 2021
6.		Dera Ismail Khan	2 nd ~ 5 th Aug, 2021
7.	Sindh	Thatta	27 th ~ 29 th July 2021
8.		Tando Allah Yar	2 nd ~ 5 th Aug, 2021
9.		Korangi	23 rd ~ 27 th Aug, 2021
10.		Malir	30 th Aug ~ 3 rd Sep, 2021

Table 1.1: QOS Survey Dates and Samples

DRIVE TEST DETAILS

2.1. The QoS survey was carried out using Automated QoS Monitoring & Benchmarking Tool i.e. "**SMARTBENCHMARKER**". Drive test teams selected survey routes in such a manner to cover main roads, service roads and majority of sectors/colonies. During 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.

MOBILE NETWORK COVERAGE

3.1. **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 Confidence Level and Compliance of signal strength is shown in **Table 3.1: 4G Signal Strength -100dBm with 90% Confidence Level.**

City	4G COVERAGE				COMPLIANT (YES/NO)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Jhang	99.09%	99.24%	100.00%	99.73%	Yes	Yes	Yes	Yes
Sialkot	98.78%	97.67%	99.03%	98.69%	Yes	Yes	Yes	Yes
Vehari	99.15%	96.93%	75.47%	99.40%	Yes	Yes	No	Yes
Dera Ghazi Khan	94.59%	95.05%	99.76%	99.91%	Yes	Yes	Yes	Yes
Bannu	53.66%	91.47%	99.95%	93.33%	No	Yes	Yes	Yes
Dera Ismail Khan	93.90%	98.08%	98.34%	98.35%	Yes	Yes	Yes	Yes
Thatta	93.31%	95.55%	N/A	98.99%	Yes	Yes	N/A	Yes
Tando Allah Yar	94.35%	88.76%	88.44%	99.12%	Yes	No	No	Yes
Korangi	99.20%	97.63%	92.43%	99.85%	Yes	Yes	Yes	Yes
Malir	98.10%	90.98%	95.11%	98.93%	Yes	Yes	Yes	Yes

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

3.2. **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 Confidence Level and Compliance of signal strength is shown in **Table 3.2: 3G Signal Strength -100dBm with 90% Confidence Level.**

City	3G COVERAGE							
	OPERATORS				COMPLIANT (YES/NO)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Jhang	99.97%	100.00%	99.98%	100.00%	Yes	Yes	Yes	Yes
Sialkot	100.00%	100.00%	100.00%	100.00%	Yes	Yes	Yes	Yes
Vehari	100.00%	99.99%	100.00%	100.00%	Yes	Yes	Yes	Yes
Dera Ghazi Khan	98.53%	99.99%	100.00%	100.00%	Yes	Yes	Yes	Yes
Bannu	99.49%	99.95%	100.00%	99.99%	Yes	Yes	Yes	Yes
Dera Ismail Khan	100.00%	99.99%	100.00%	100.00%	Yes	Yes	Yes	Yes
Thatta	94.50%	99.11%	96.20%	99.95%	Yes	Yes	Yes	Yes
Tando Allah Yar	100.00%	99.74%	99.91%	100.00%	Yes	Yes	Yes	Yes
Korangi	100.00%	100.00%	100.00%	100.00%	Yes	Yes	Yes	Yes
Malir	100.00%	99.93%	100.00%	100.00%	Yes	Yes	Yes	Yes

Table 3.2: 3G Signal Strength -100dBm with 90% Confidence Level

MOBILE BROADBAND SERVICE

4.1. A total of 24,772 http download test attempts made, out of which 19,296 were successful attempts and rest of the 5,476 were failed. The company wise detail is mentioned in **Table4.1: Data Tests Statistics.**

Description	Jazz	Telenor	Ufone	ZonG
TOTAL DATA TEST ATTEMPTS	5498	6665	7360	5249
SUCCESSFUL DATA TEST ATTEMPTS	5152	4731	4333	5080
FAILED DATA TEST ATTEMPTS	346	1934	3027	169
TEST ATTEMPTS SUCCESS RATIO	93.71%	70.98%	58.87%	96.78%

Table4.1: Data Tests Statistics.

4.2. **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 results of Data Service QoS KPI i.e. User Data Throughput is shown in **Table4.2: 4G User Data Throughput \geq 2 Mbps.**

City	4G DATA							
	Throughput (In Mbps)				Highest Throughput			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Jhang	20.91	4.33	N/A	18.03	First	Third	N/A	Second
Sialkot	12.11	6.74	3.73	19.48	Second	Third	Fourth	First
Vehari	7.50	13.77	9.12	18.20	Fourth	Second	Third	First
Dera Ghazi Khan	9.25	4.07	2.25	12.48	Second	Third	Fourth	First
Bannu	2.56	2.96	1.43	14.03	Third	Second	Fourth	First
Dera Ismail Khan	9.93	2.54	2.97	16.77	Second	Fourth	Third	First
Thatta	5.88	10.54	N/A	8.57	Third	First	N/A	First
Tando Allah Yar	5.58	2.80	10.50	9.61	Third	Fourth	First	Second
Korangi	17.86	9.99	4.22	15.95	First	Third	Fourth	Second
Malir	20.58	12.39	4.83	17.51	First	Third	Fourth	Second

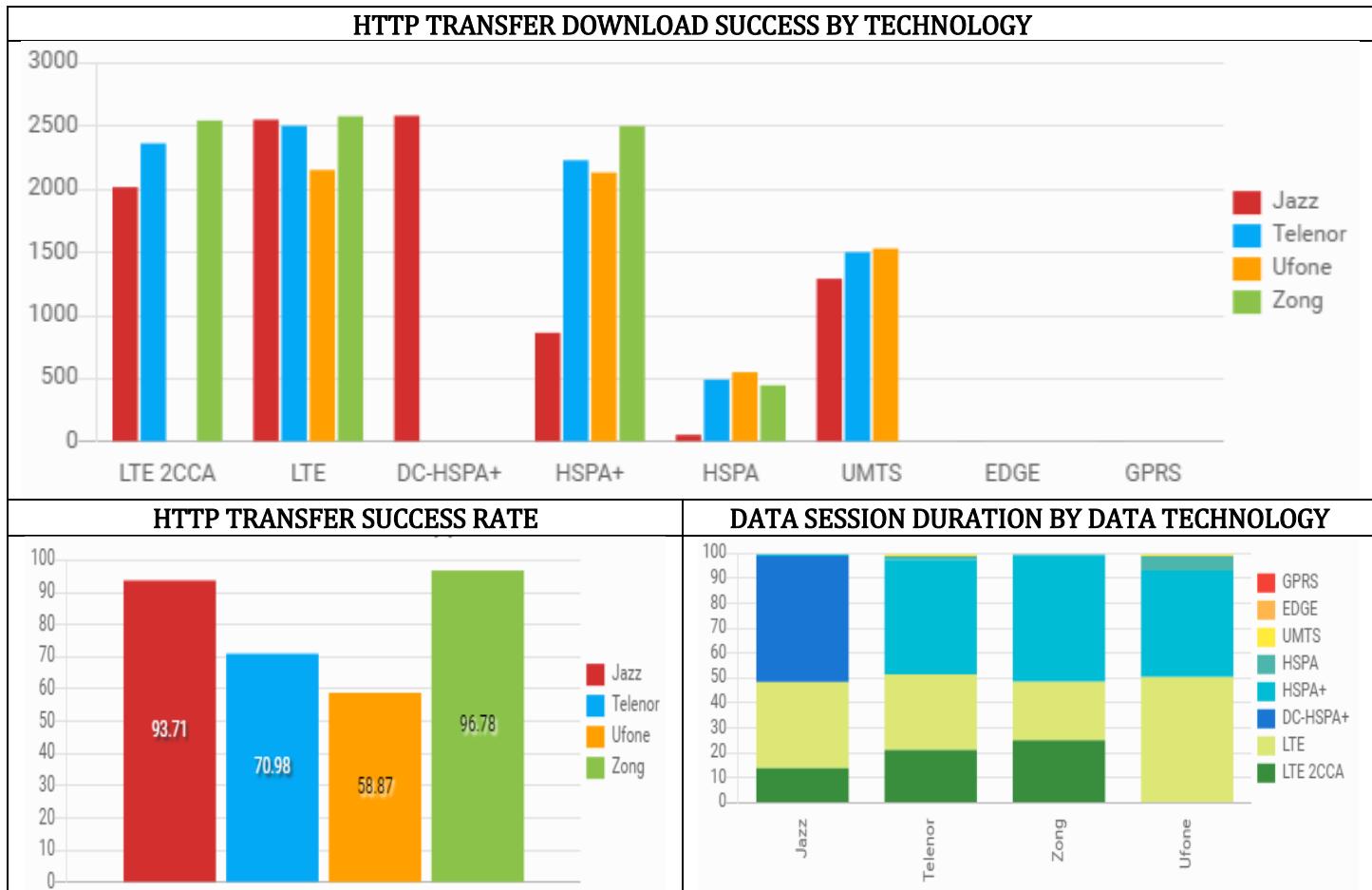
Table4.2: 4G User Data Throughput \geq 2 Mbps

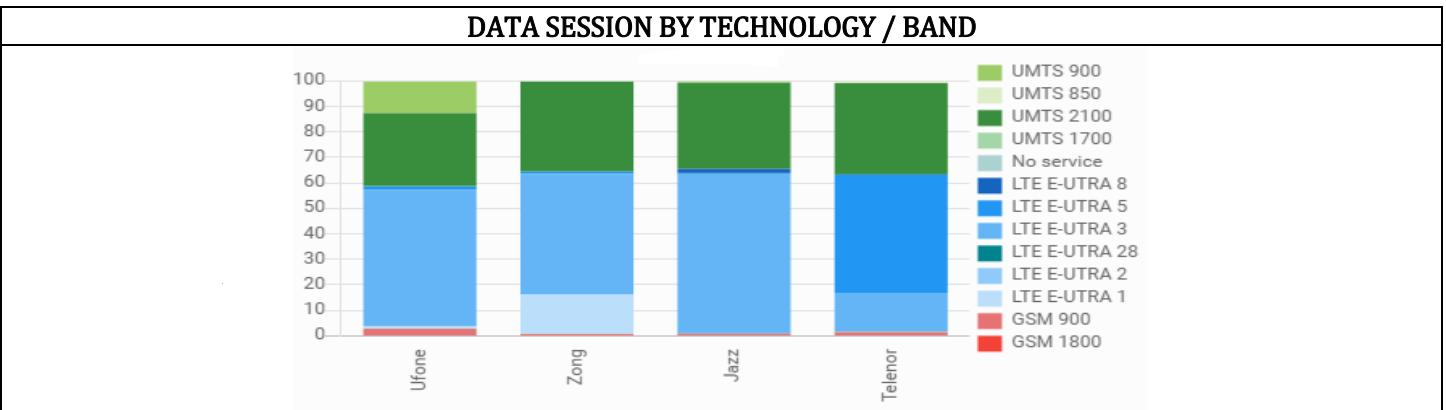
4.3. 3G USER DATA THROUGHPUT. As per Next Generation Mobile Service (NGMS) licenses awarded, licensees are required to meet the threshold of minimum of 256Kbps of 3G User Data Throughput. The results of Data Service QoS KPI i.e. User Data Throughput is shown in **Table4.3: 3G User Data Throughput \geq 256Kbps**.

City	3G DATA				Highest Throughput			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Jhang	4478.48	2022.75	4676.25	862.15	Second	Third	First	Fourth
Sialkot	3514.91	2802.62	3791.57	2224.03	Second	Third	First	Fourth
Vehari	1773.99	5347.01	4951.77	2376.52	Fourth	First	Second	Third
Dera Ghazi Khan	3437.35	1993.59	3530.71	1538.55	Second	Third	First	Fourth
Bannu	2934.74	1667.14	2831.62	1402.50	First	Third	Second	Fourth
Dera Ismail Khan	5028.43	1049.96	3548.42	1911.97	First	Fourth	Second	Third
Thatta	2334.18	4260.88	4271.92	884.26	Third	Second	First	Fourth
Tando Allah Yar	1486.40	2718.97	3383.15	1171.85	Third	Second	First	Fourth
Korangi	3729.09	3530.53	4865.94	1083.41	Second	Third	First	Fourth
Malir	3635.32	3695.63	4694.58	1304.10	Third	Second	First	Fourth

Table4.3: 3G User Data Throughput \geq 256Kbps

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





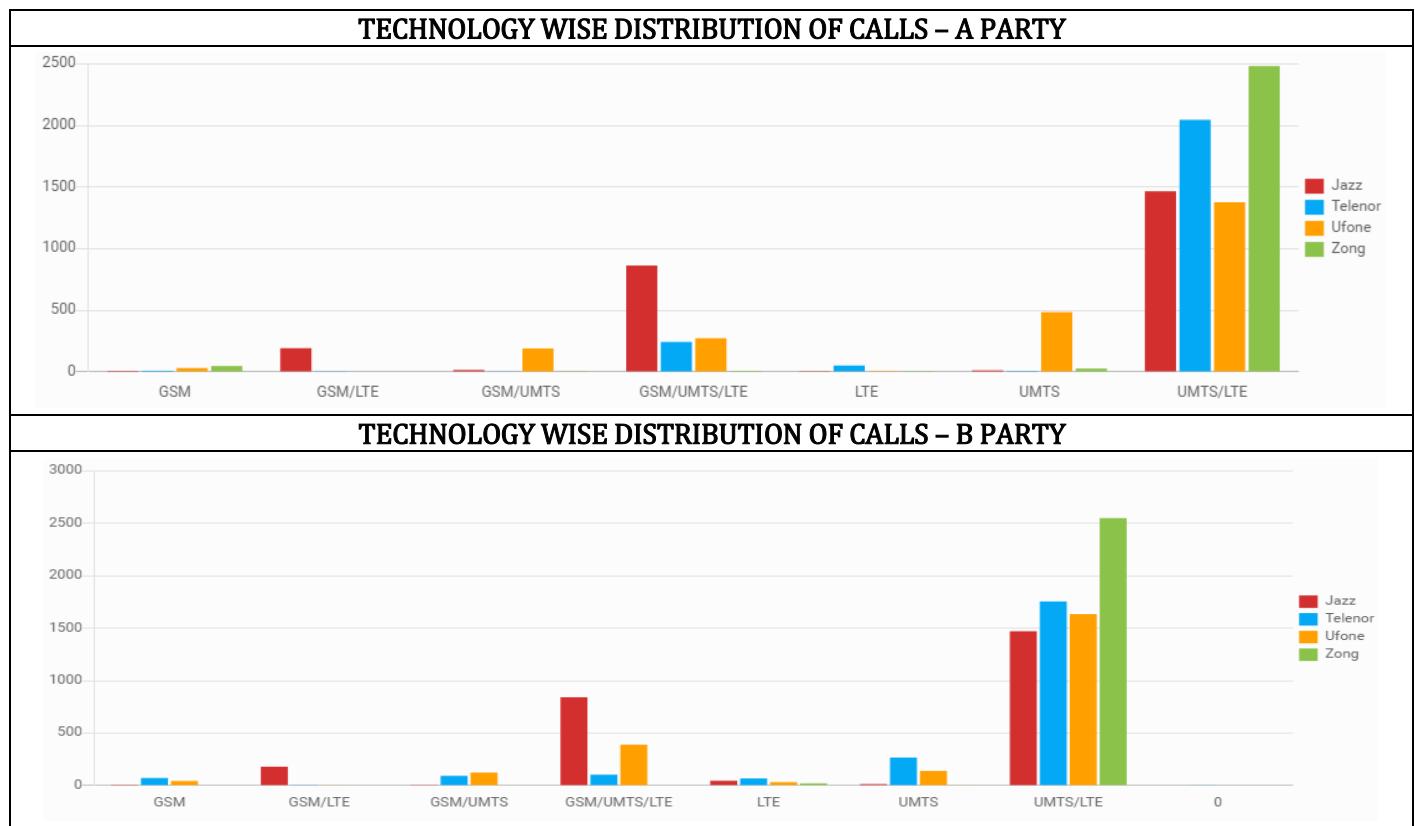
VOICE SERVICE

5.1. A total of 9,857 Calls attempts made and out of which 289 attempts failed. In 9568 successful call attempts, 69 calls dropped prior to completion of two minutes duration, whereas, 9499 calls remained connected for the complete duration of two minutes. The company wise call statistics is shown in **Table5.1: Call Statistics**.

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
<i>TOTAL CALLS</i>	2561	2360	2362	2574
<i>FAILED CALLS</i>	70	128	57	34
<i>ESTABLISHED CALLS</i>	2491	2232	2305	2540
<i>DROPPED CALLS</i>	11	32	28	8
<i>COMPLETED CALLS</i>	2480	2200	2277	2532

Table5.1: Call Statistics

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





5.3. 7 x QoS KPIs have been measured while testing voice services in 10 x cities of Pakistan. The compliance level of threshold values of voice QoS KPIs in each city is shown in **Table 5.2: Voice QoS KPIs Compliance Level**.

VOICE SERVICE CITIES – (COMPLIANT (YES/NO))											
Operator	*Voice QoS KPIs	Jhang	Sialkot	Vehari	DG Khan	Bannu	DI Khan	Thatta	Tando Allah Yar	Korangi	Malir
Jazz	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SA	No	No	Yes	No	Yes	No	No	No	No	Yes
	CCT	Yes	No	Yes	No	Yes	No	No	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Telenor	NA	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
	SA	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	No
	CCT	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
	CCR	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	Yes	Yes	No	Yes	Yes	Yes	Yes	N/A	Yes	No
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ufone	NA	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No
	SA	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ZonG	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SA	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Note Voice QoS KPIs: Network Accessibility (NA) > 99%, Service Accessibility (SA) > 98%, Call Connection Time (CCT) ≤ 7.5 Seconds, Call Completion Ratio (CCR) ≥ 98%, Mean Opinion Score (MOS) > 3, Inter System Hand Over (ISHO) > 98% & RAB Setup Success Rate (RSSR) > 98%

Table 5.2: Voice QoS KPIs Compliance Level

SMS SERVICE

6.1. A total of 9897 SMS sending attempt conducted, out of 9719 SMS successfully received at B-Party. The company wise SMS Statistics are shown in **Table6.1: SMS Statistics**

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
SMS SEND REQUEST	2567	2369	2385	2576
SMS SUCCESSFULLY RECEIVED	2515	2308	2327	2569
SMS RECEIVE SUCCESS RATE	97.97%	97.42%	97.56%	99.72%

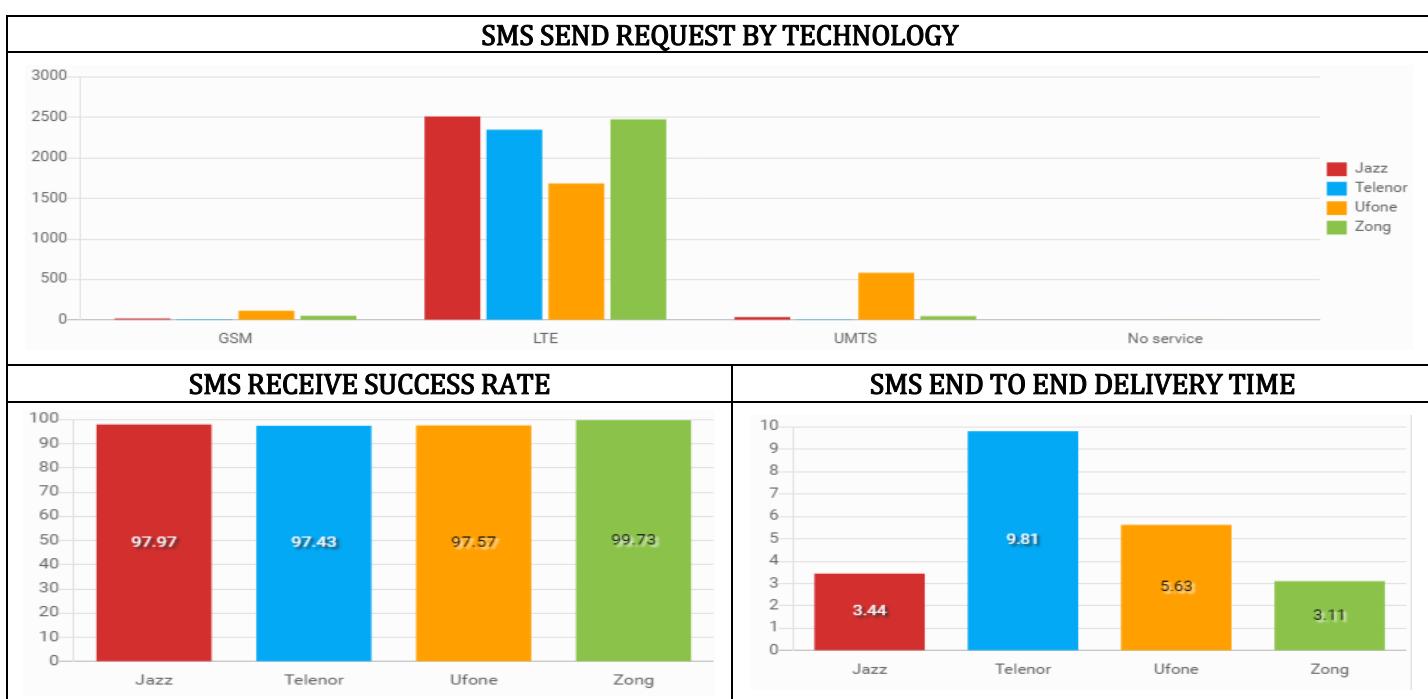
6.2. 2 x QoS KPIs i.e. "SMS Success Rate" and "SMS End to End Delivery Time" have been measured. The compliance level of threshold values of SMS QoS KPIs in each city is shown in **Table 6.2: SMS QoS KPIs Compliance Level**.

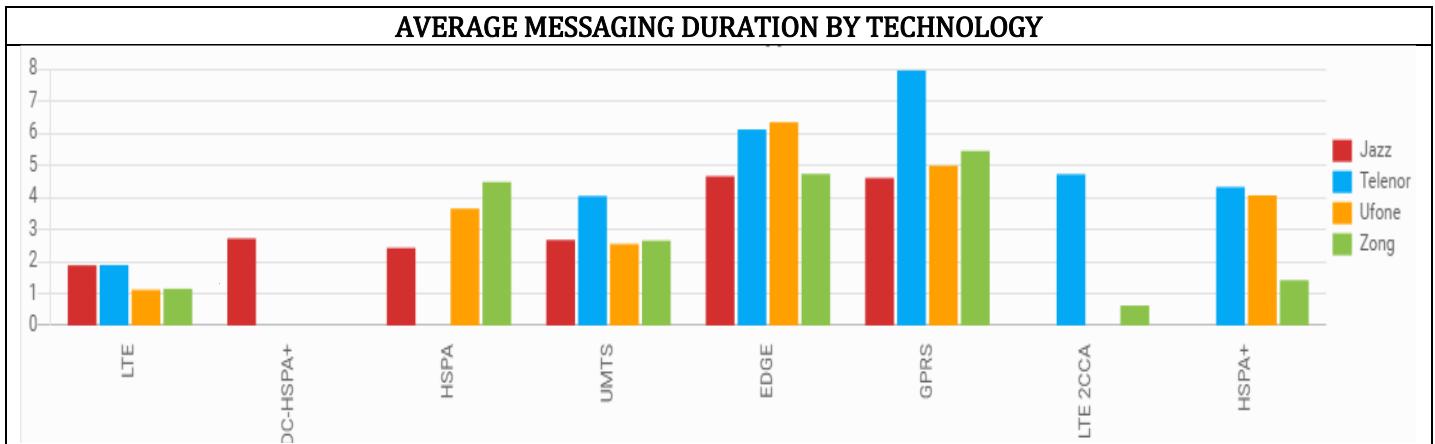
SMS SERVICE - COMPLIANT (YES/NO)									
Operator		Jazz		Telenor		Ufone		ZonG	
*SMS QoS KPI		SR	DT	SR	DT	SR	DT	SR	DT
Cities	Jhang	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	Sialkot	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	Vehari	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Dera Ghazi Khan	Yes	Yes	No	Yes	No	Yes	Yes	Yes
	Bannu	Yes	Yes	No	Yes	No	Yes	Yes	Yes
	Dera Ismail Khan	Yes	Yes	No	No	Yes	Yes	Yes	Yes
	Thatta	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	Tando Allah Yar	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	Korangi	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
	Malir	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes

* Note SMS QoS KPIs : SMS Success Rate (SR) \geq 99% & SMS End to End Delivery Time (DT) \leq 12 Seconds

Table 6.2: SMS QoS KPIs Compliance Level

6.3. The SMS Send Request by Technology, Success Rate and End to End Delivery Time is shown as under:





SURVEY MAPS & GRAPHICAL RESULTS

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

STANDING IN SURVEY

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

- a. **MOBILE NETWORK COVERAGE.** The categorization of CMOs as per QoS KPI i.e. Signal Strength of 4G/LTE and 3G Networks in 10 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	20	-	1 st
2.	Telenor	19	1	2 nd
3.	Jazz	19	1	3 rd
4.	Ufone	17	2	4 th

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	6	4	-	-	-	-	2	8	1 st	4 th
2.	Jazz	3	3	3	1	2	4	3	1	2 nd	2 nd
3.	Telenor	1	2	5	2	1	3	5	1	3 rd	3 rd
4.	Ufone	1	-	2	5	7	3	-	-	4 th	1 st

Table 8.2: CMOs Standing in Mobile Broadband Service

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

S. #.	Operator	Voice QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	ZonG	55	5	1 st
2.	Ufone	60	10	2 nd
3.	Telenor	60	10	2 nd
4.	Jazz	59	11	3 rd

Table 8.3: CMOs Standing in Voice Service

- d. **SMS SERVICE.** The categorization of each CMOs, as per the maximum compliant of 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	20	-	1 st
2.	ZonG	20	-	1 st
3.	Ufone	17	3	2 nd
4.	Telenor	11	9	3 rd

Table 8.4: CMOs Standing in SMS Service

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

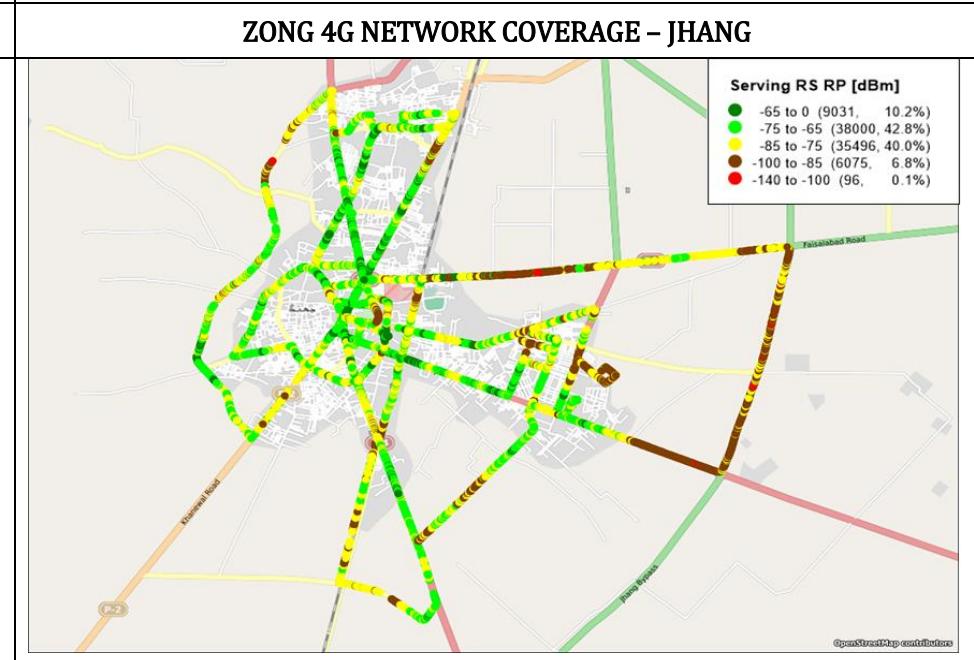
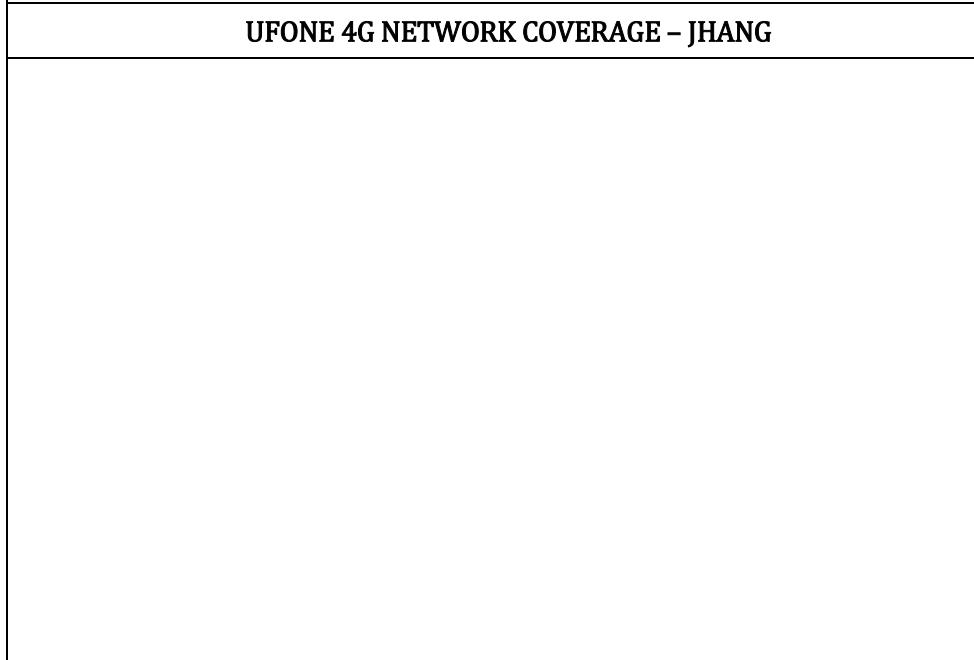
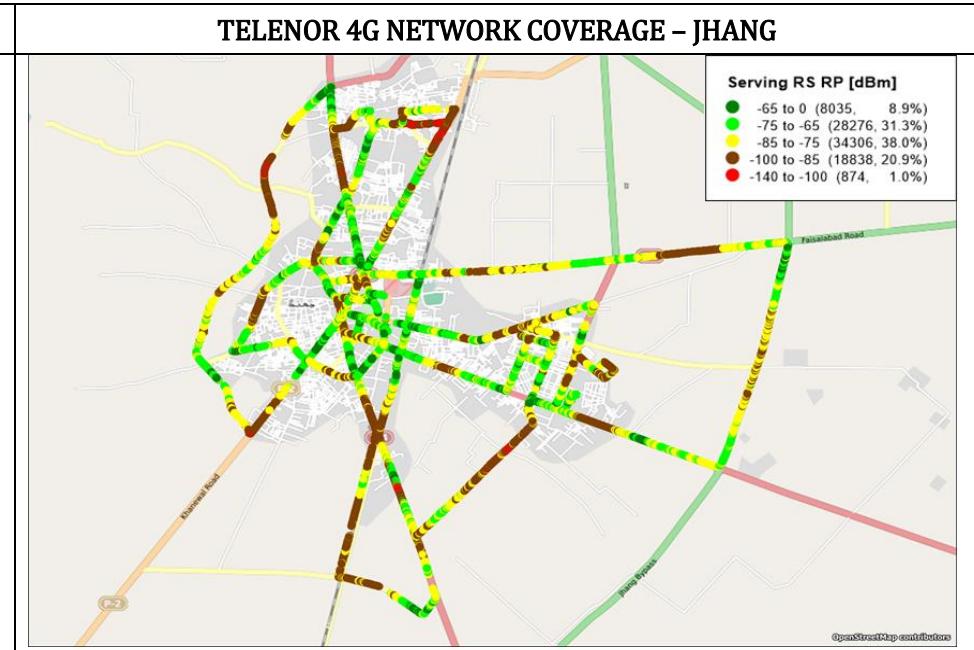
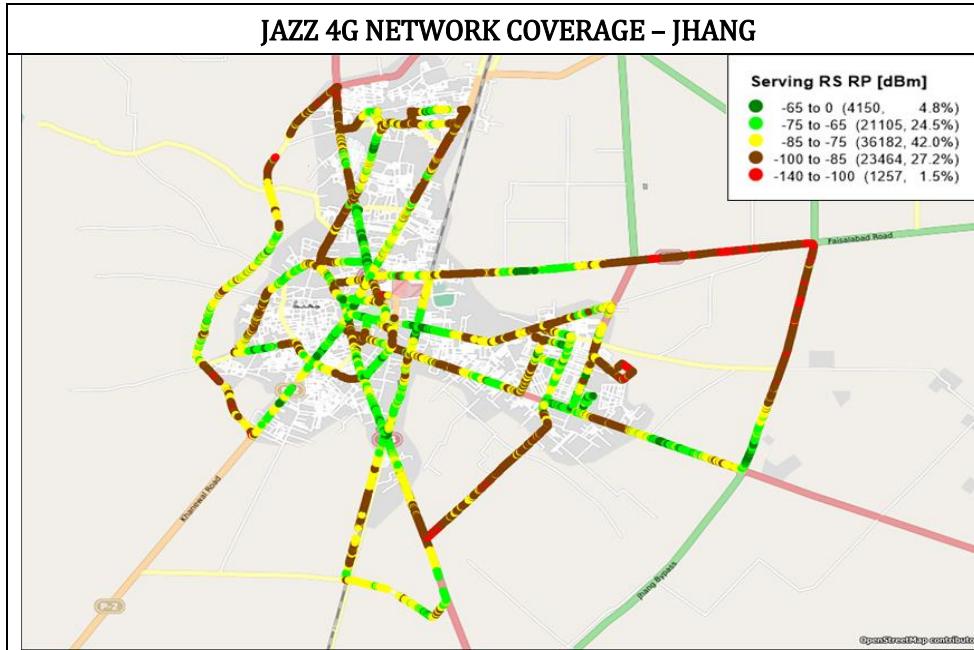
S. #.	Service	STANDING			
		1 st	2 nd	3 rd	4 th
1.	Mobile Network Coverage	ZonG	Telenor	Jazz	Ufone
2.	Mobile	Ufone	Jazz	Telenor	ZonG
	Broadband	ZonG	Jazz	Telenor	Ufone
3.	Voice	ZonG	Ufone & Telenor	Jazz	-
4.	SMS	Jazz & ZonG	Ufone	Telenor	

Table 8.5: CMOs Overall Standing in QoS Survey

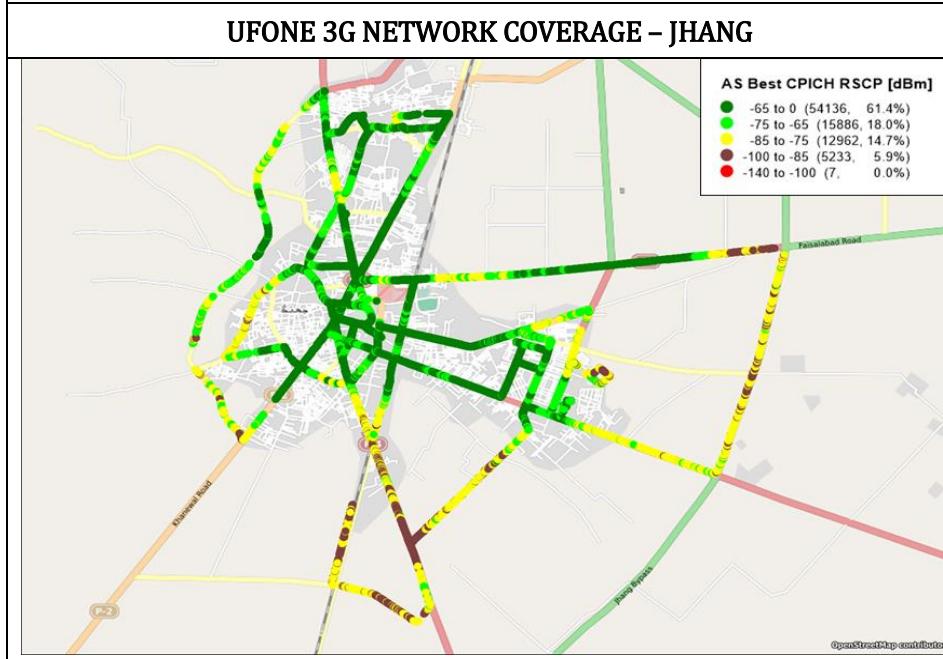
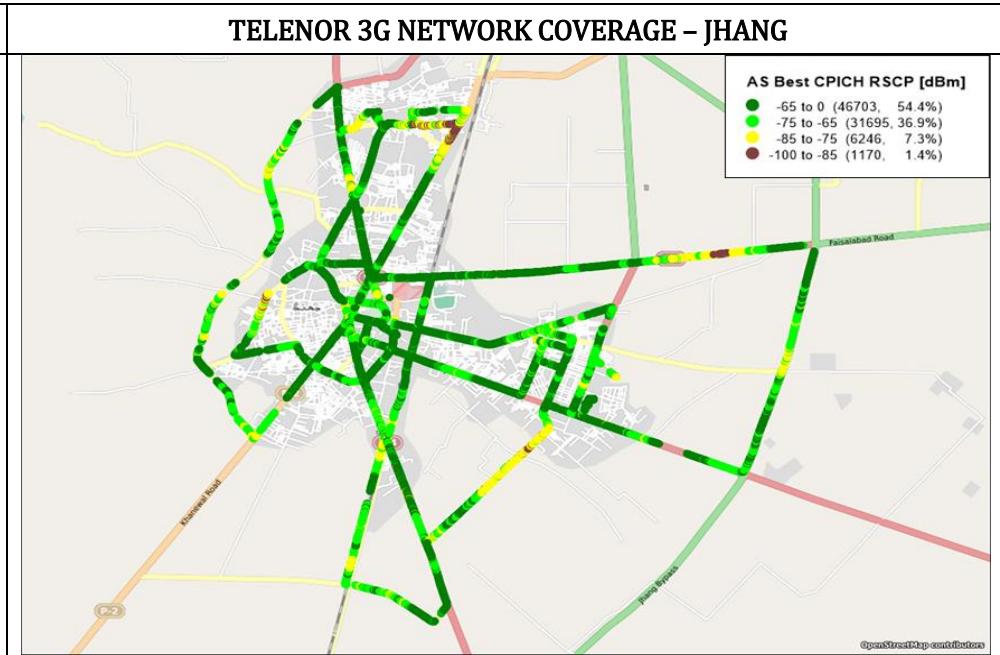
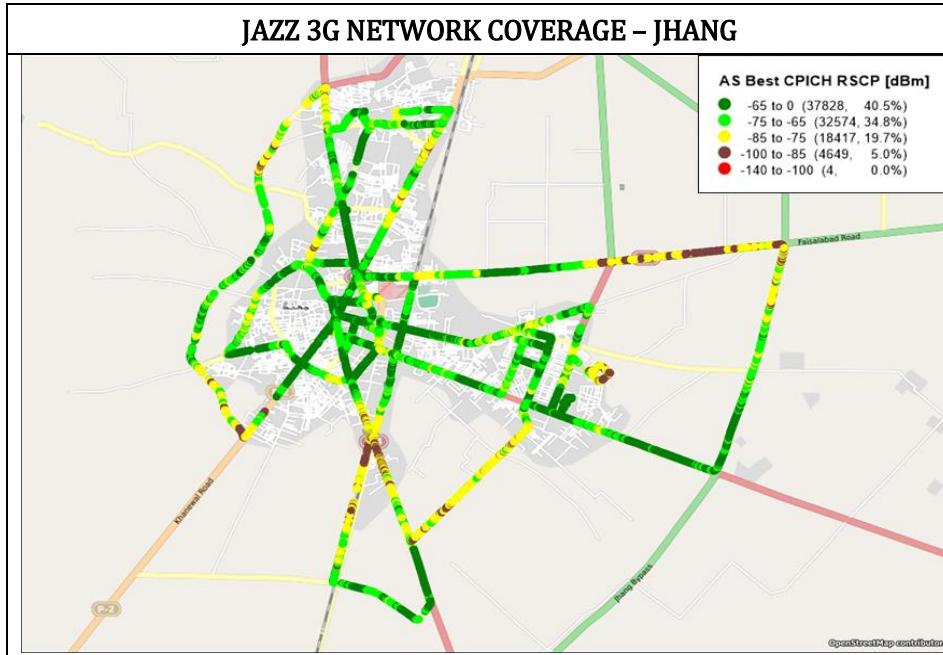
ANNEX - A

PUNJAB

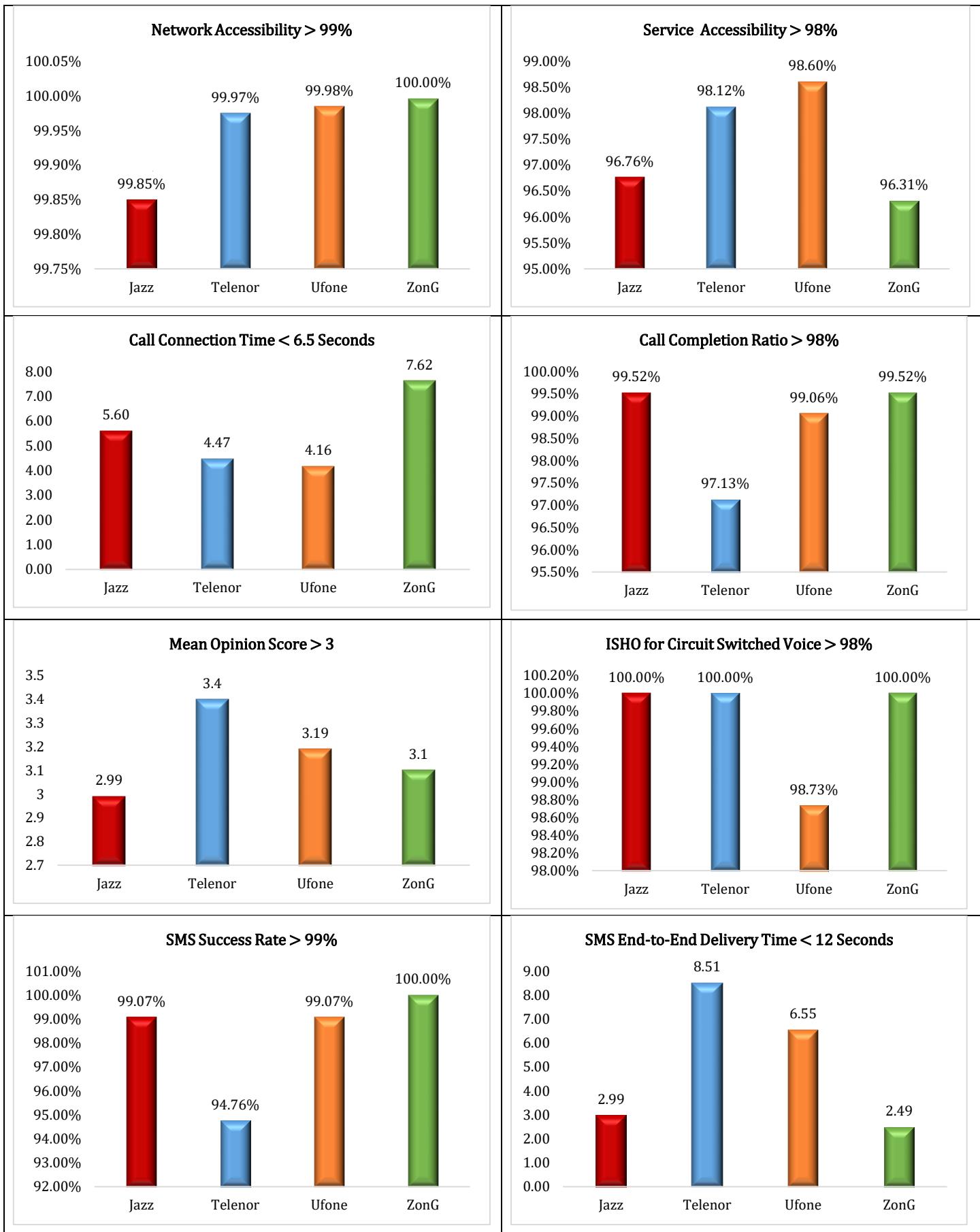
4G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSRP)



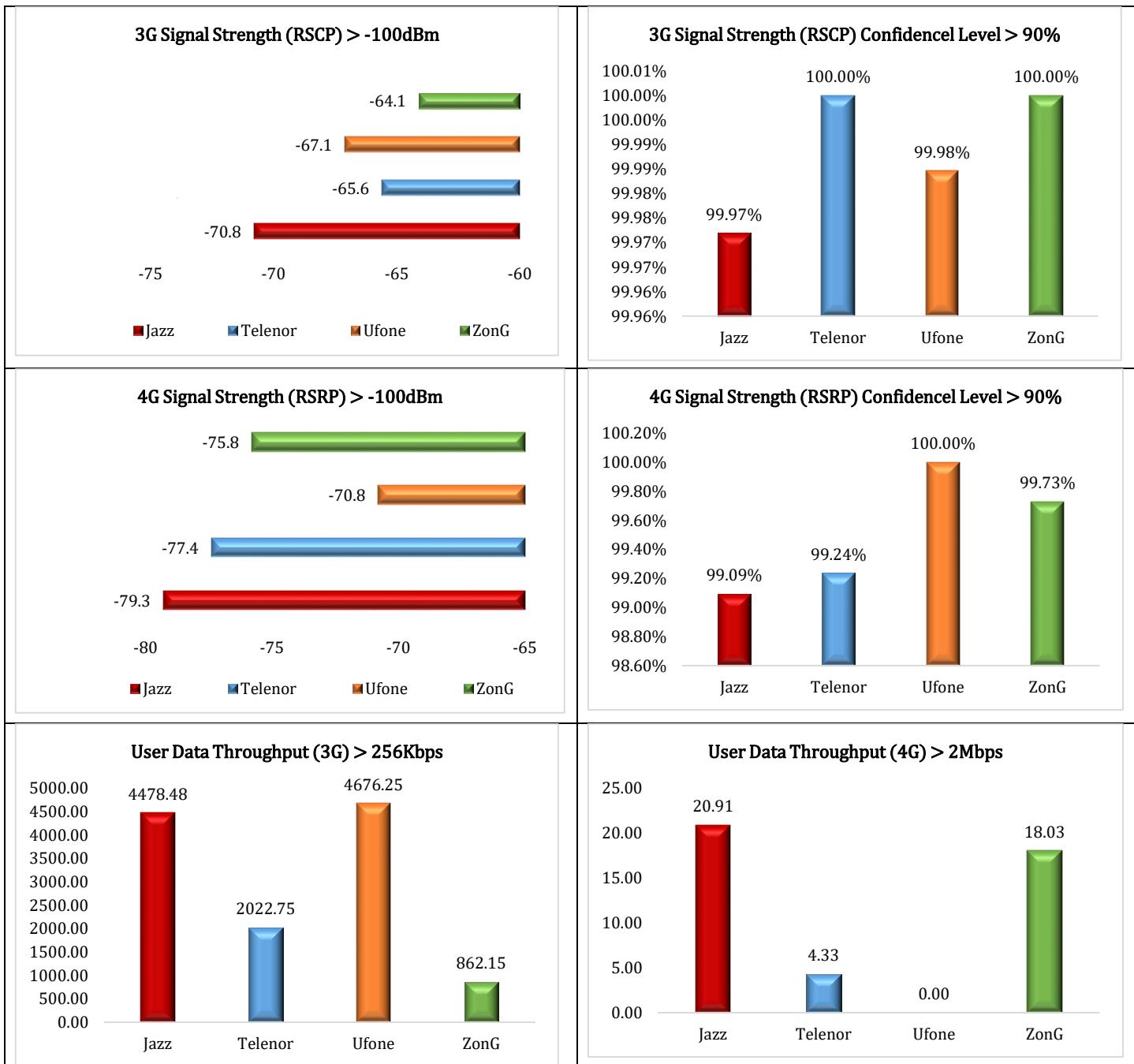
3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)



QUALITY OF SERVICE SURVEY RESULTS – JHANG



QUALITY OF SERVICE SURVEY RESULTS – JHANG

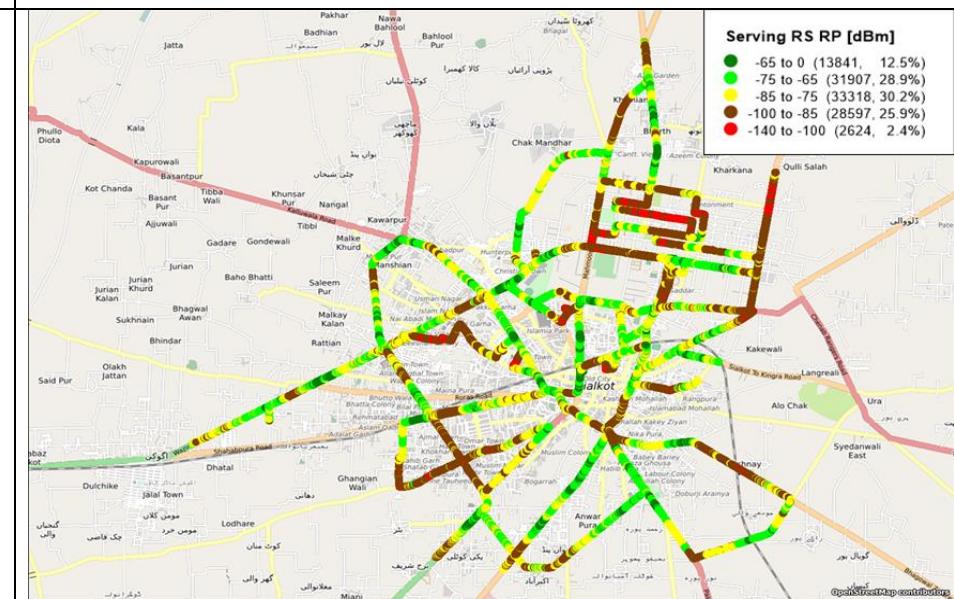


4G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSRP)

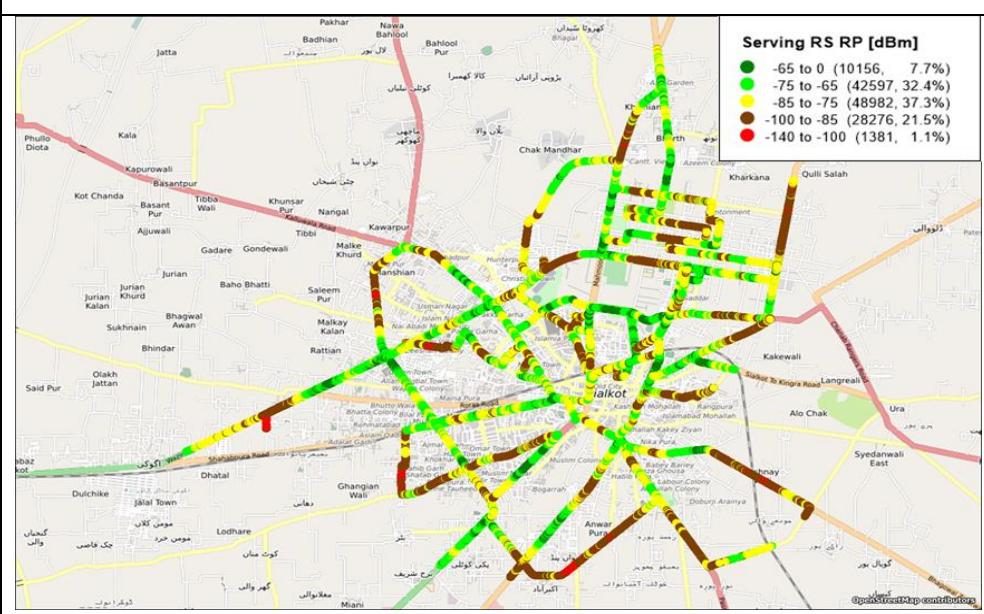
JAZZ 4G NETWORK COVERAGE – SIALKOT



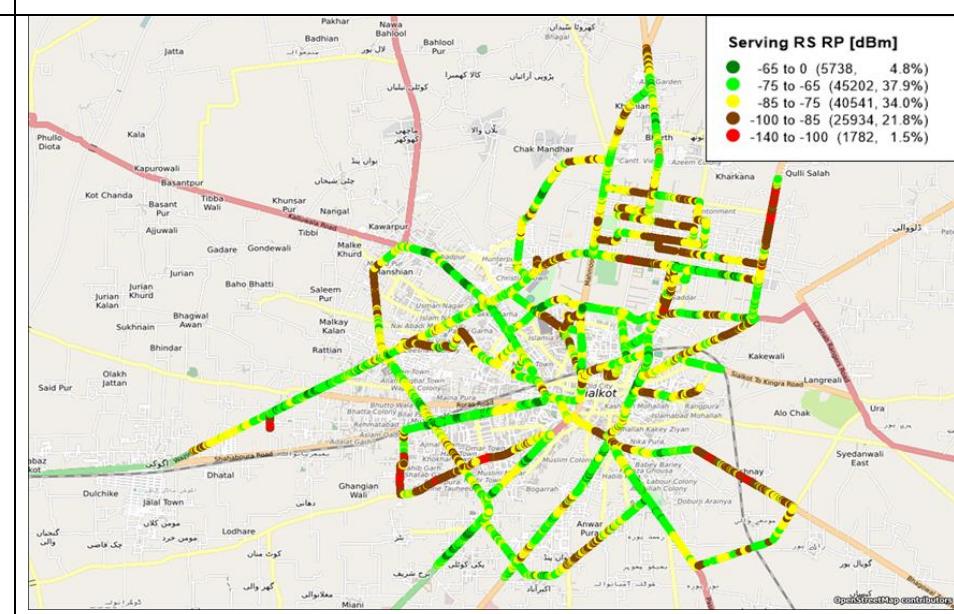
TELENOR 4G NETWORK COVERAGE – SIALKOT



UFONE 4G NETWORK COVERAGE – SIALKOT

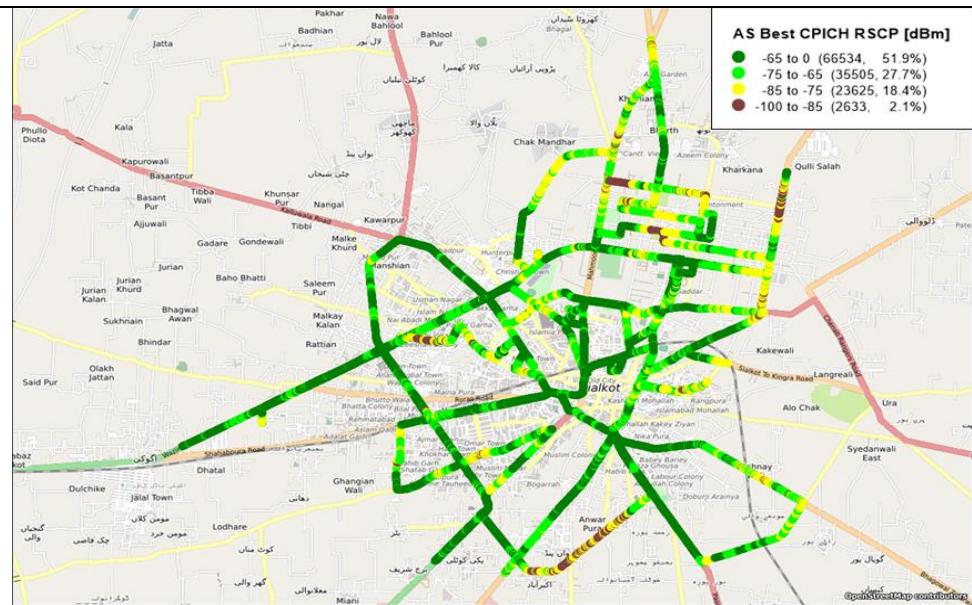


ZONG 4G NETWORK COVERAGE – SIALKOT

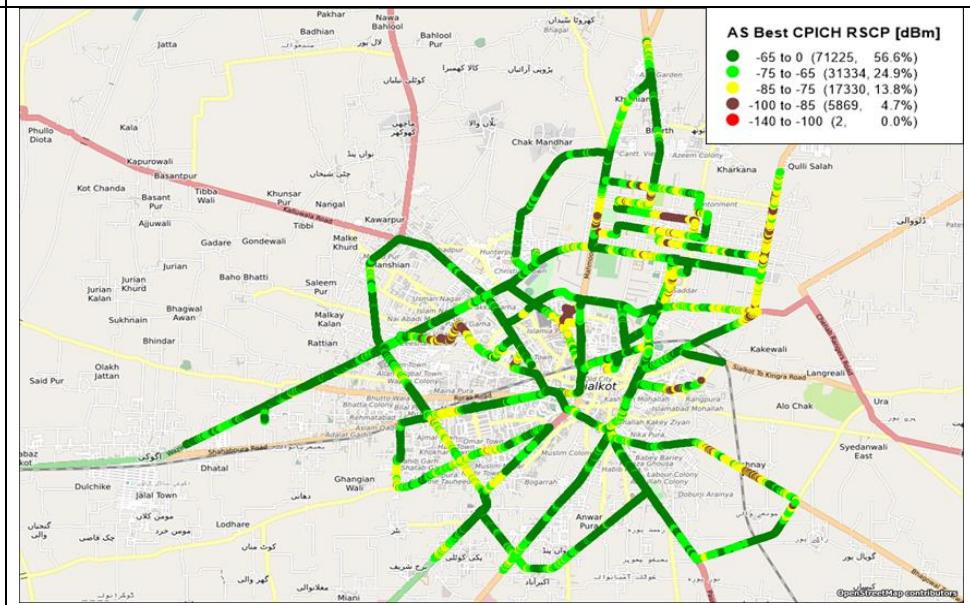


3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)

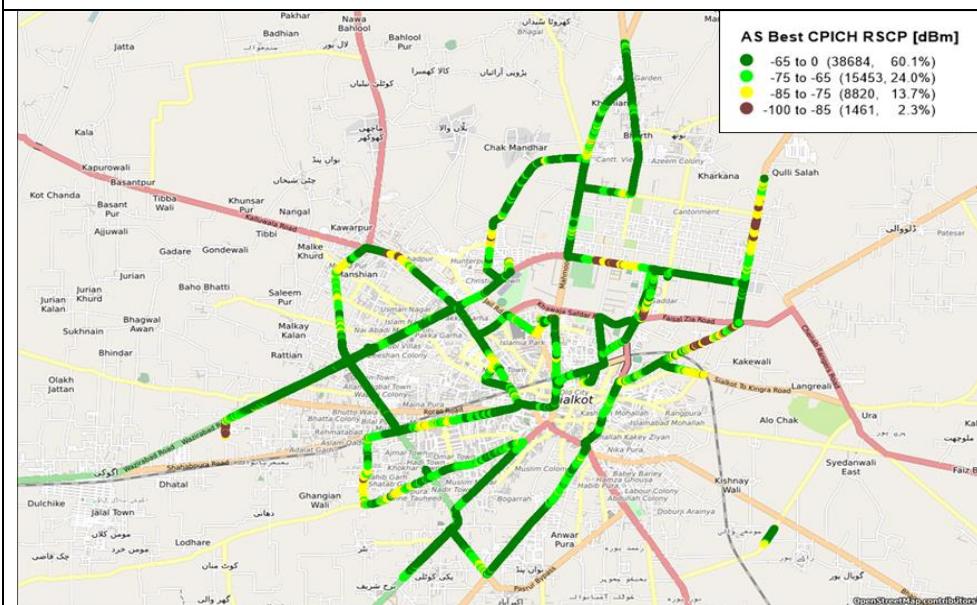
JAZZ 3G NETWORK COVERAGE – SIALKOT



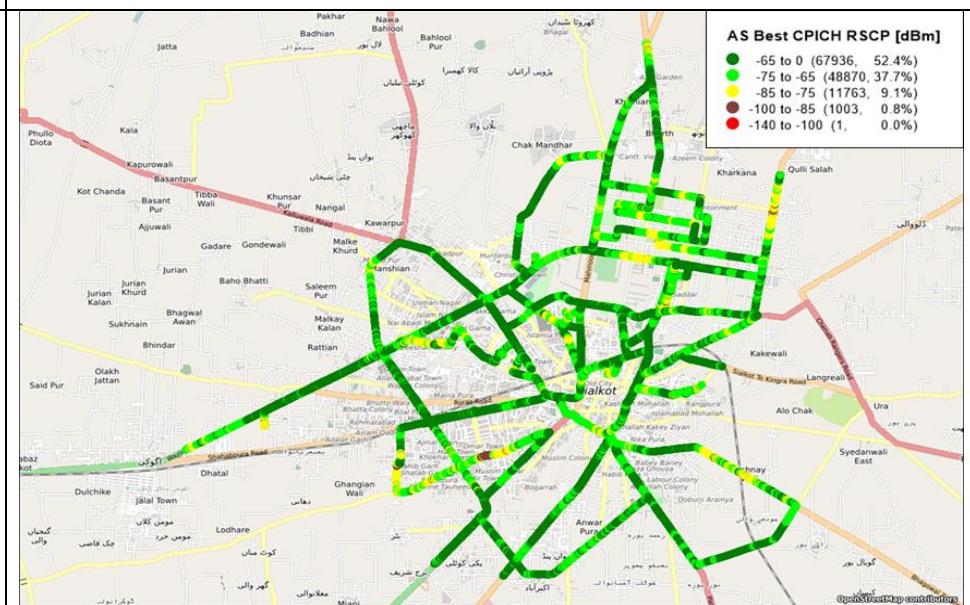
TELENOR 3G NETWORK COVERAGE – SIALKOT



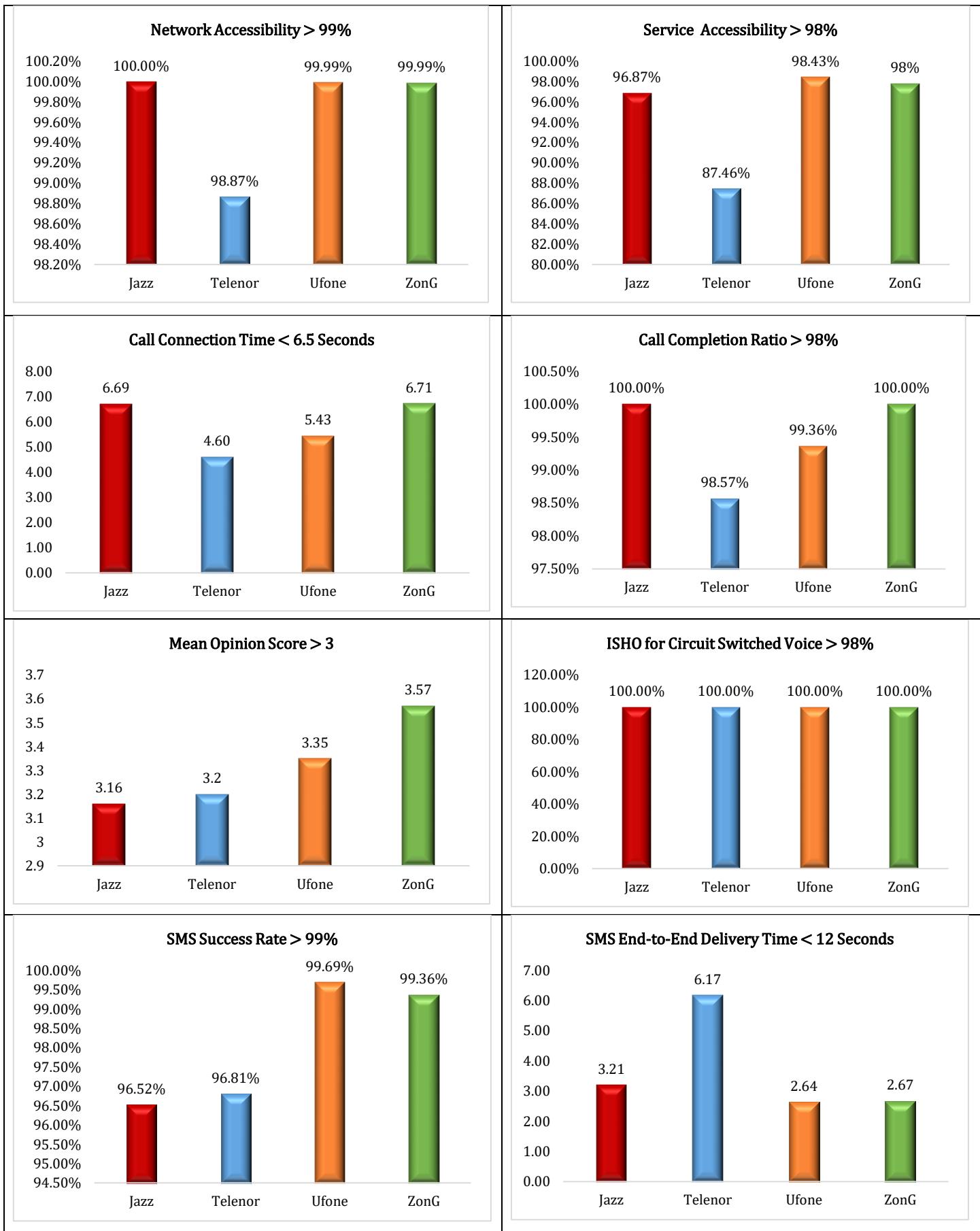
UFONE 3G NETWORK COVERAGE – SIALKOT



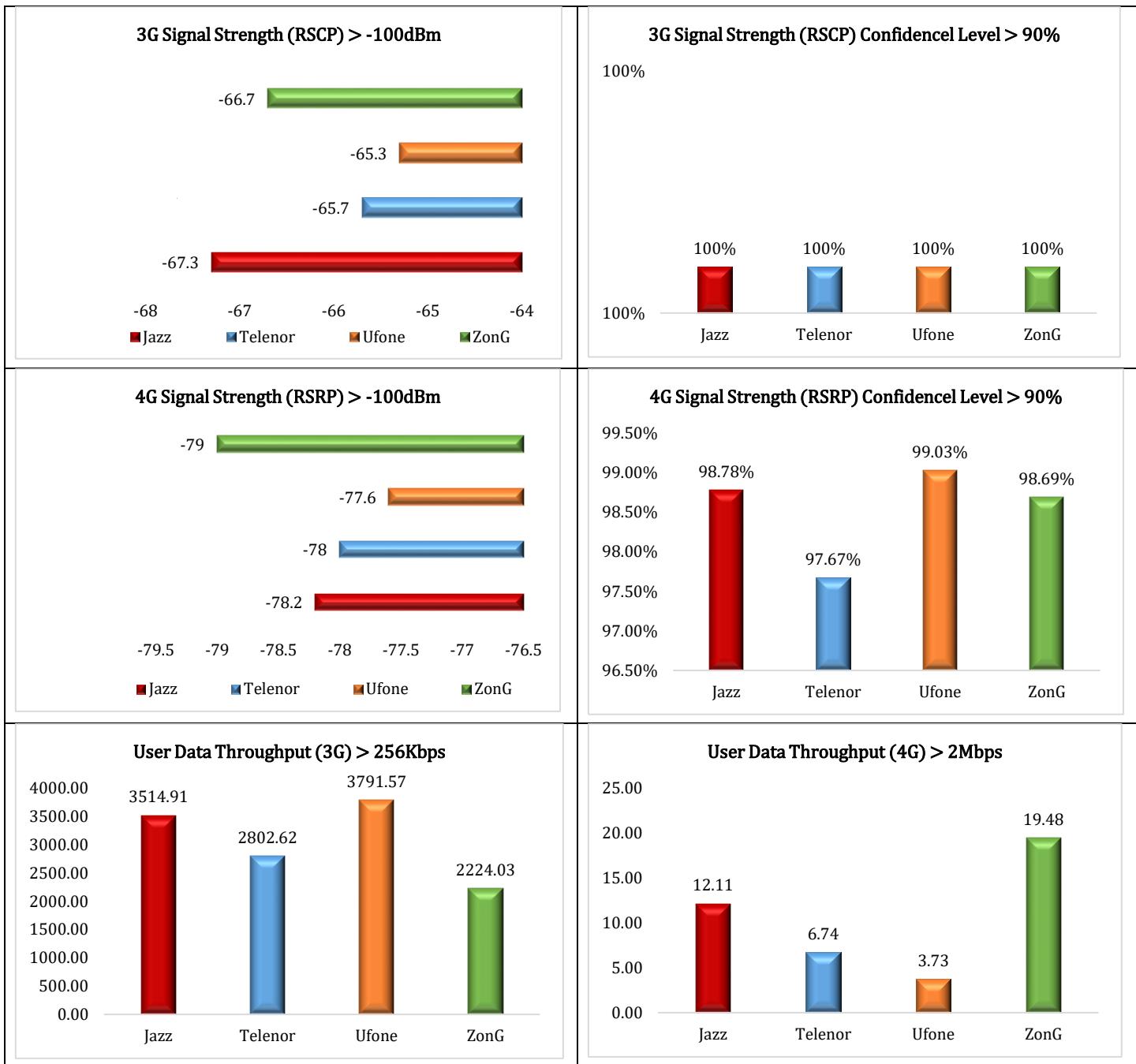
ZONG 3G NETWORK COVERAGE – SIALKOT



QUALITY OF SERVICE SURVEY RESULTS – SIALKOT

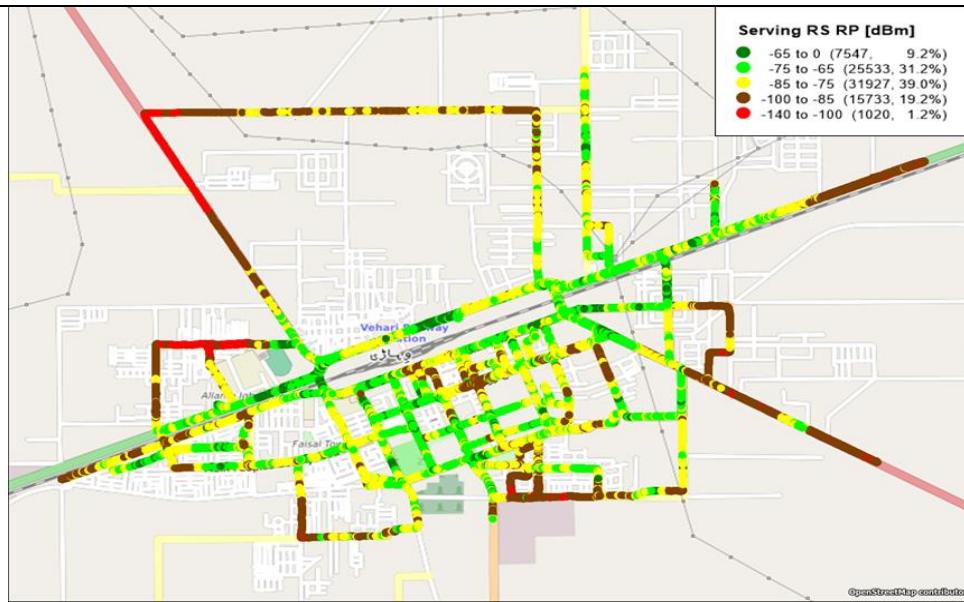


QUALITY OF SERVICE SURVEY RESULTS – SIALKOT

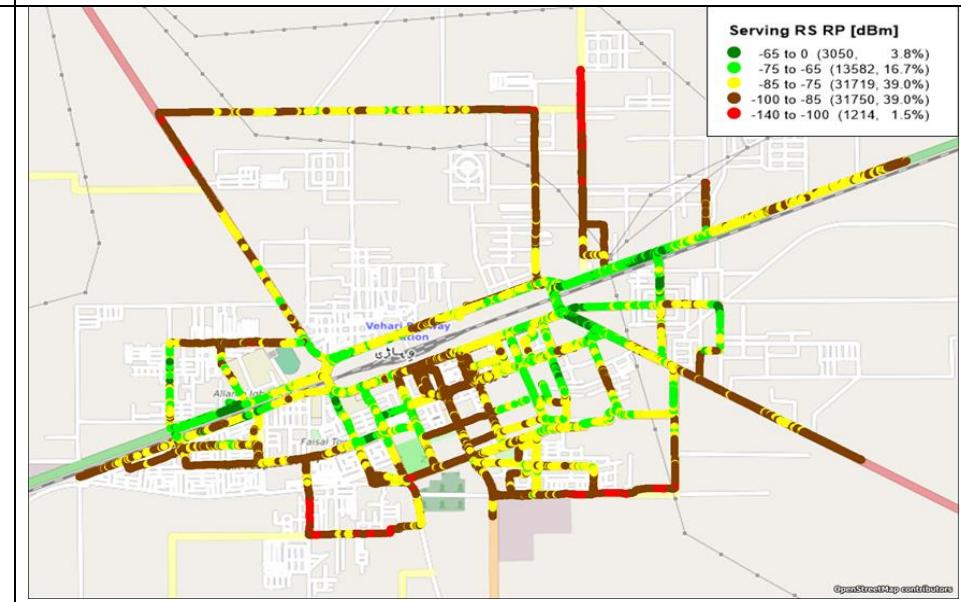


4G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSRP)

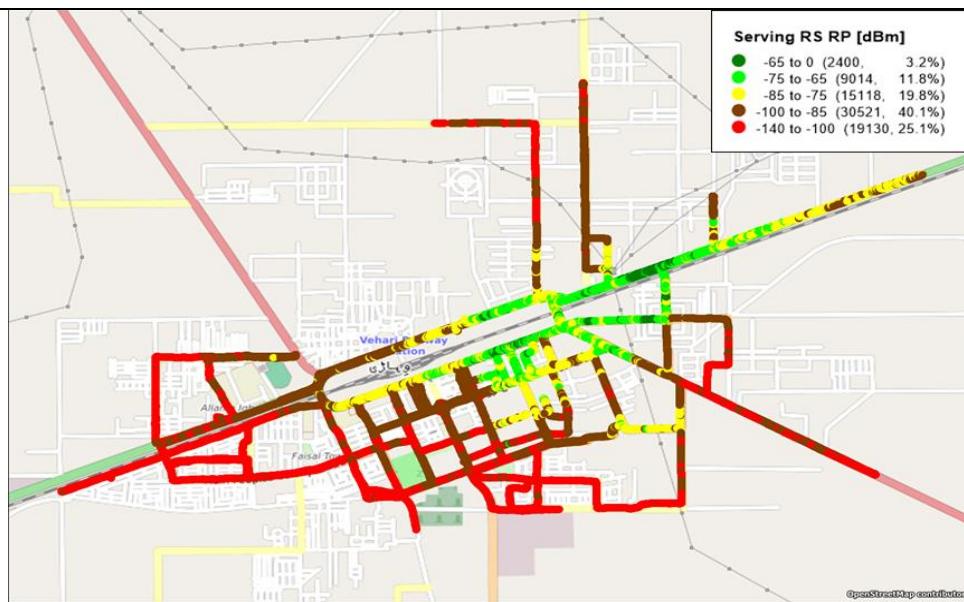
JAZZ 4G NETWORK COVERAGE – VEHARI



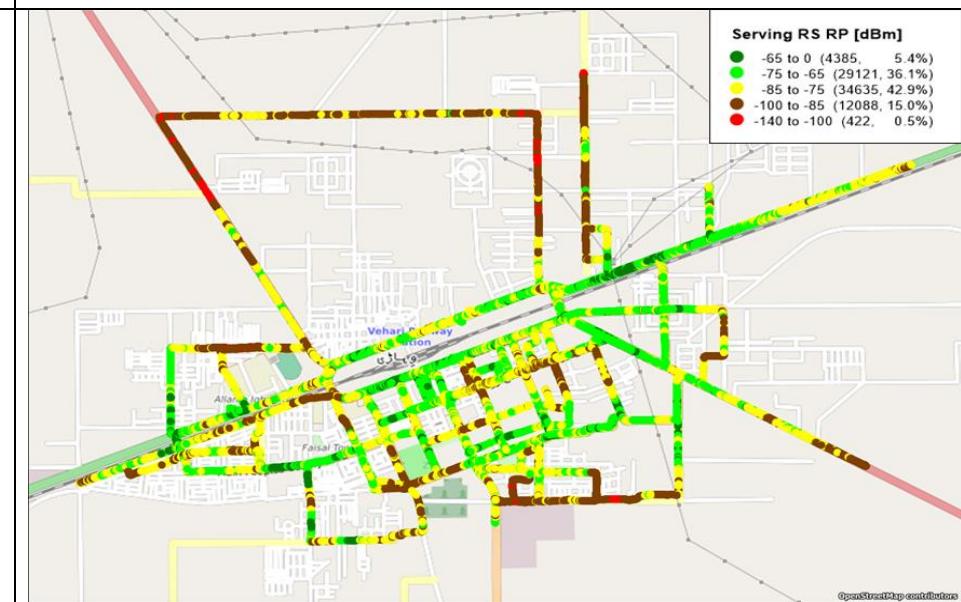
TELENOR 4G NETWORK COVERAGE – VEHARI



UFONE 4G NETWORK COVERAGE – VEHARI

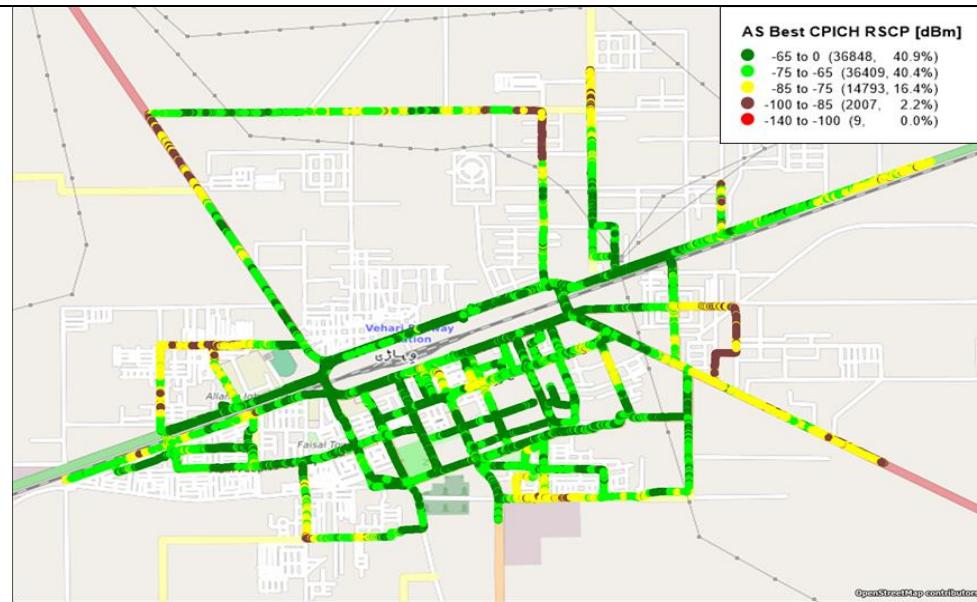


ZONG 4G NETWORK COVERAGE – VEHARI

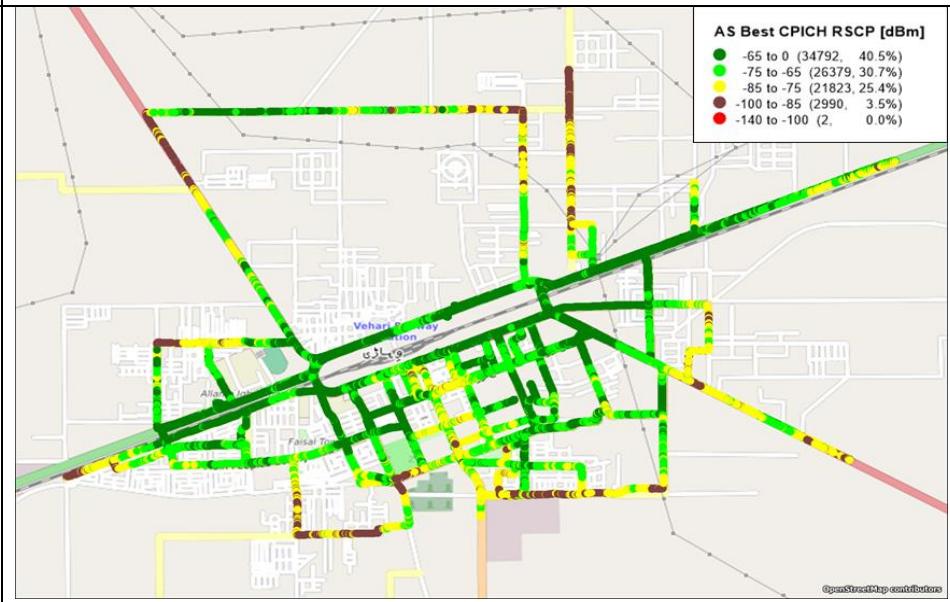


3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)

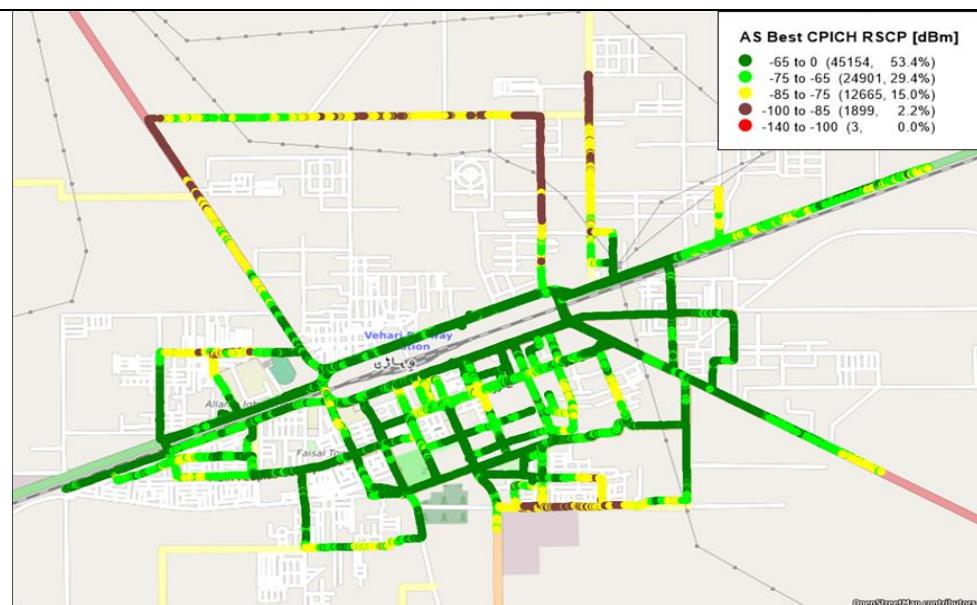
JAZZ 3G NETWORK COVERAGE – VEHARI



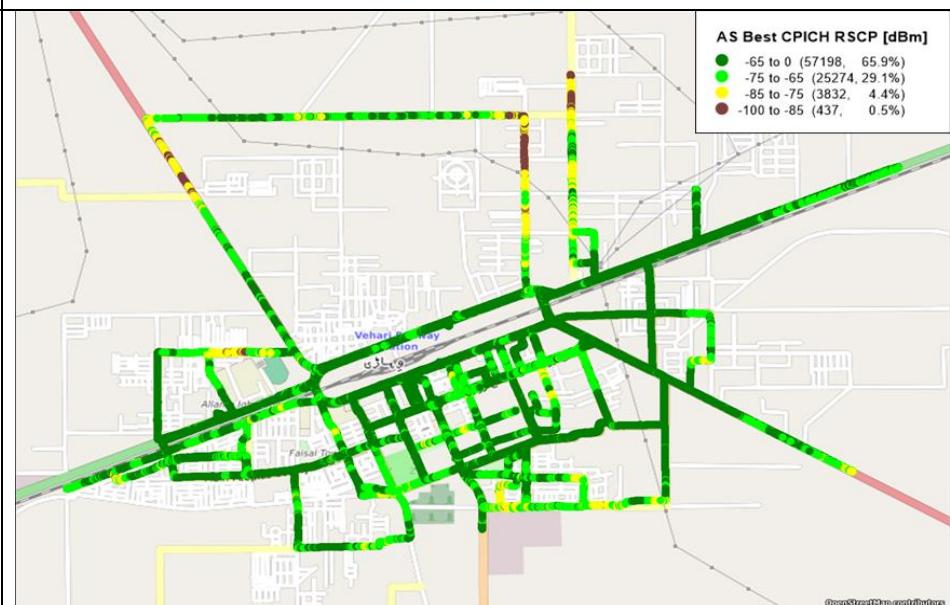
TELENOR 3G NETWORK COVERAGE – VEHARI



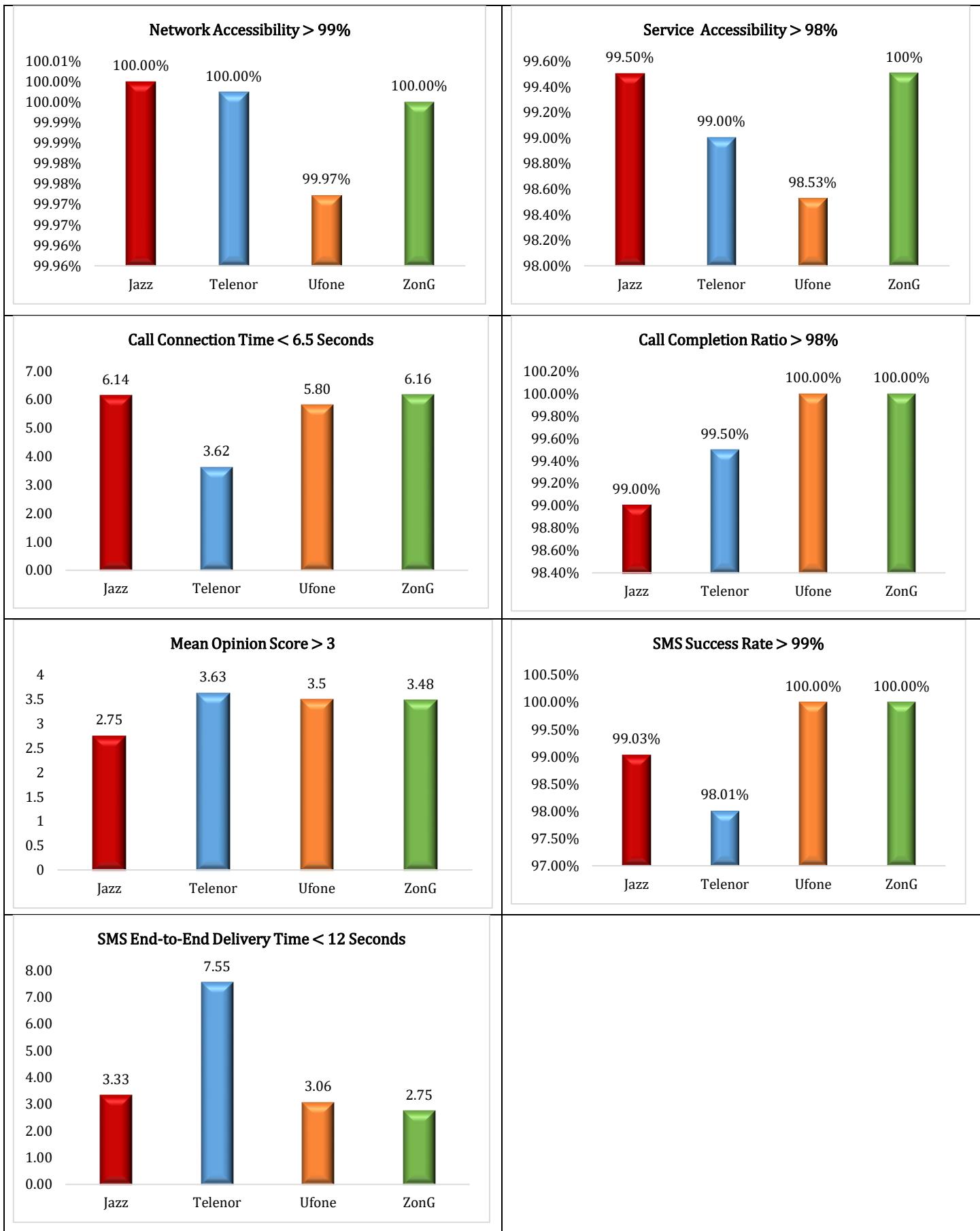
UFONE 3G NETWORK COVERAGE – VEHARI



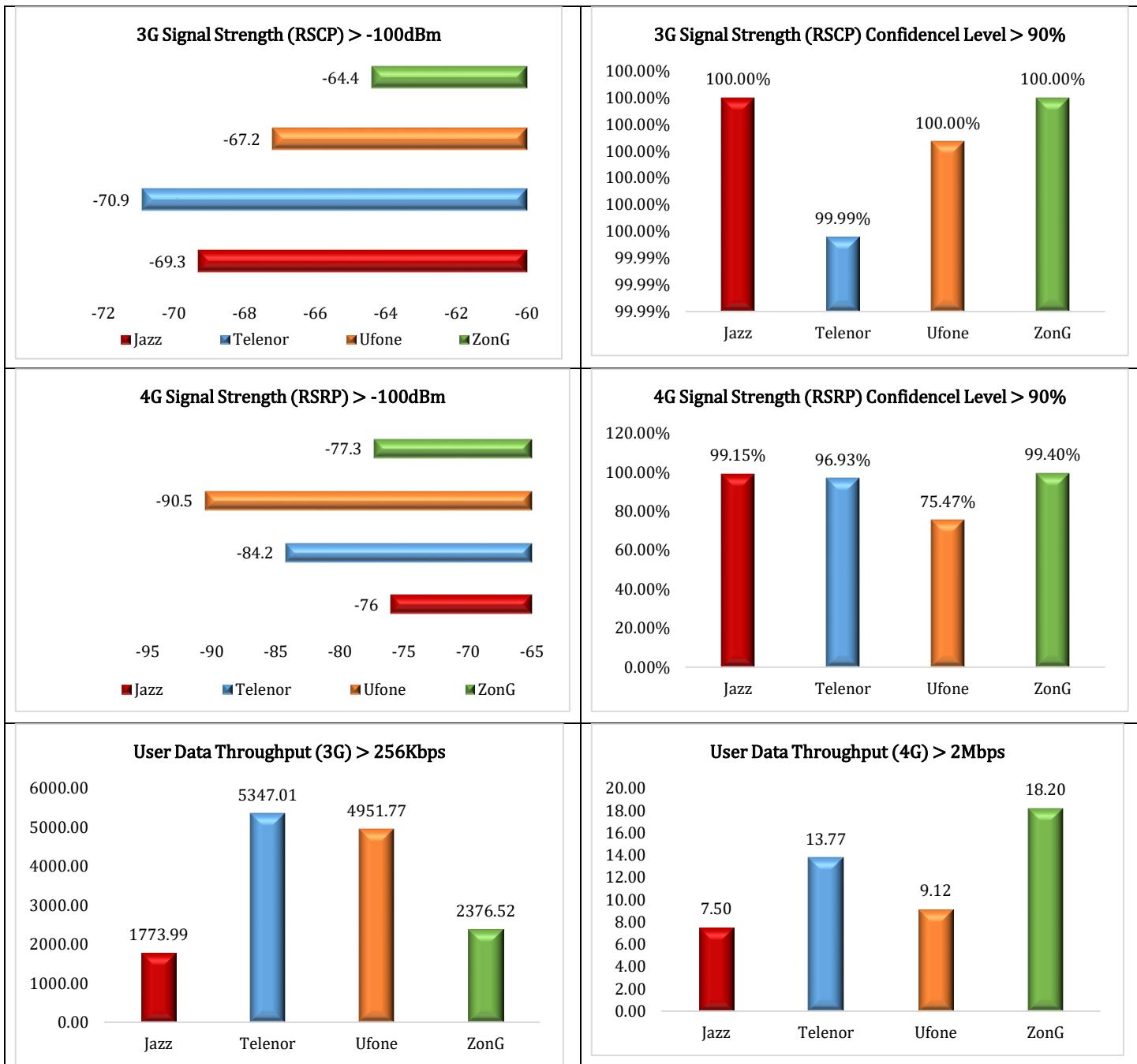
ZONG 3G NETWORK COVERAGE – VEHARI



QUALITY OF SERVICE SURVEY RESULTS – VEHARI

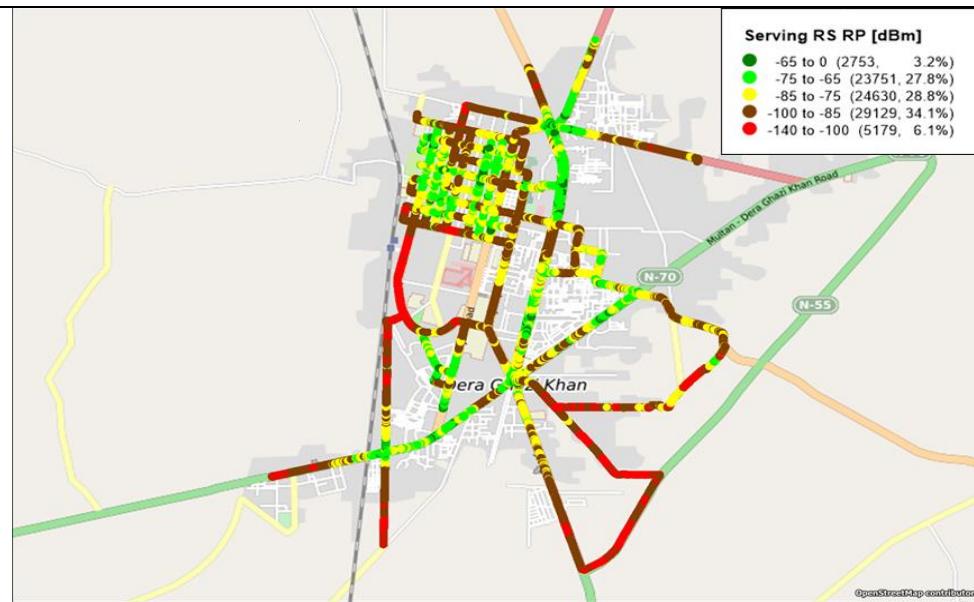


QUALITY OF SERVICE SURVEY RESULTS – VEHARI

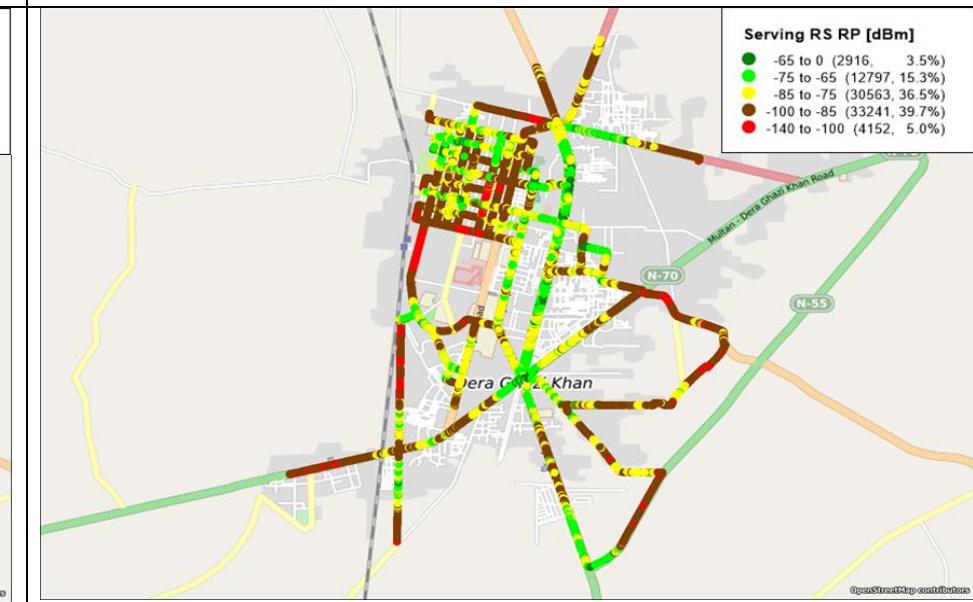


4G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSRP)

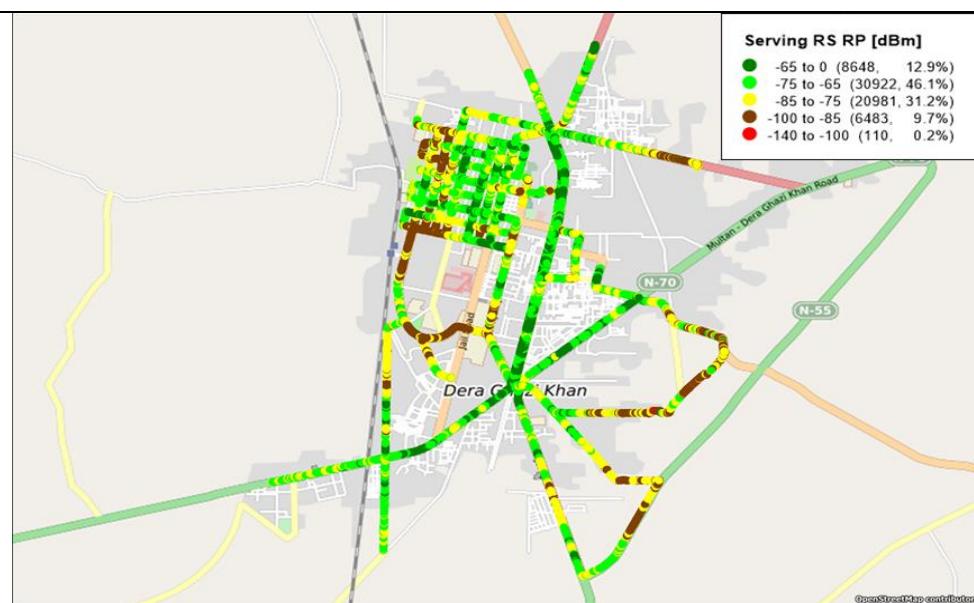
JAZZ 4G NETWORK COVERAGE – DG KHAN



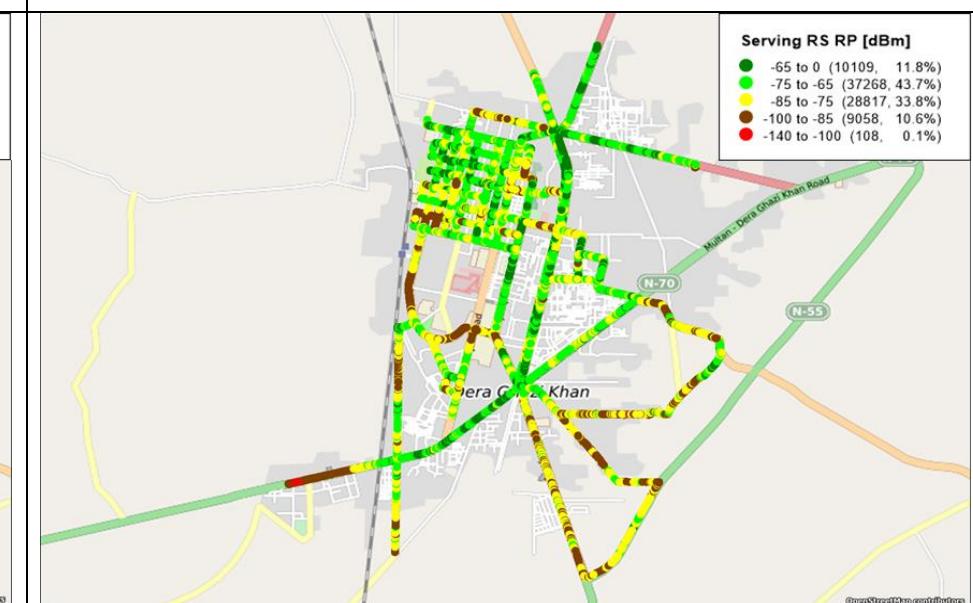
TELENOR 4G NETWORK COVERAGE – DG KHAN



UFONE 4G NETWORK COVERAGE – DG KHAN

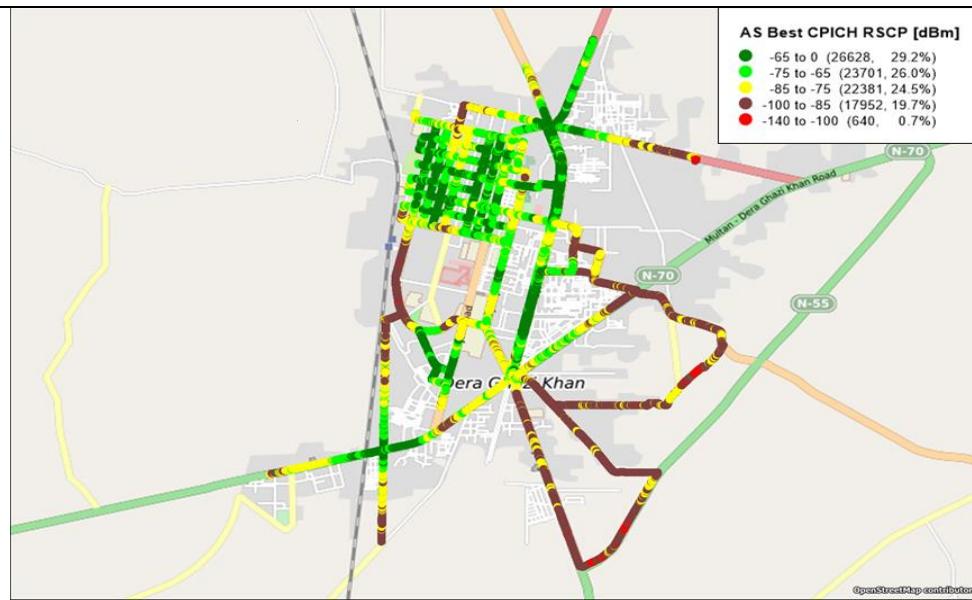


ZONG 4G NETWORK COVERAGE – DG KHAN

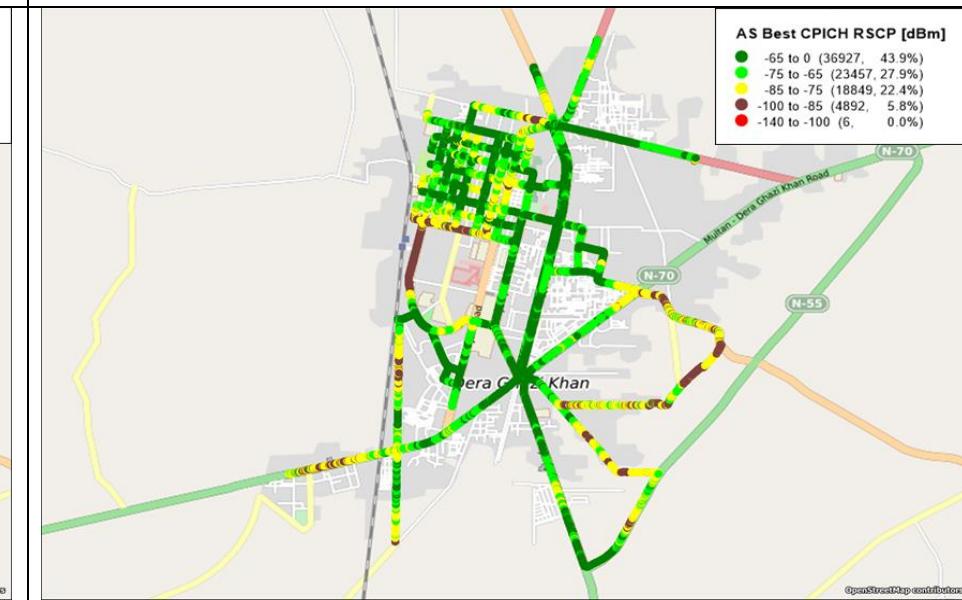


3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)

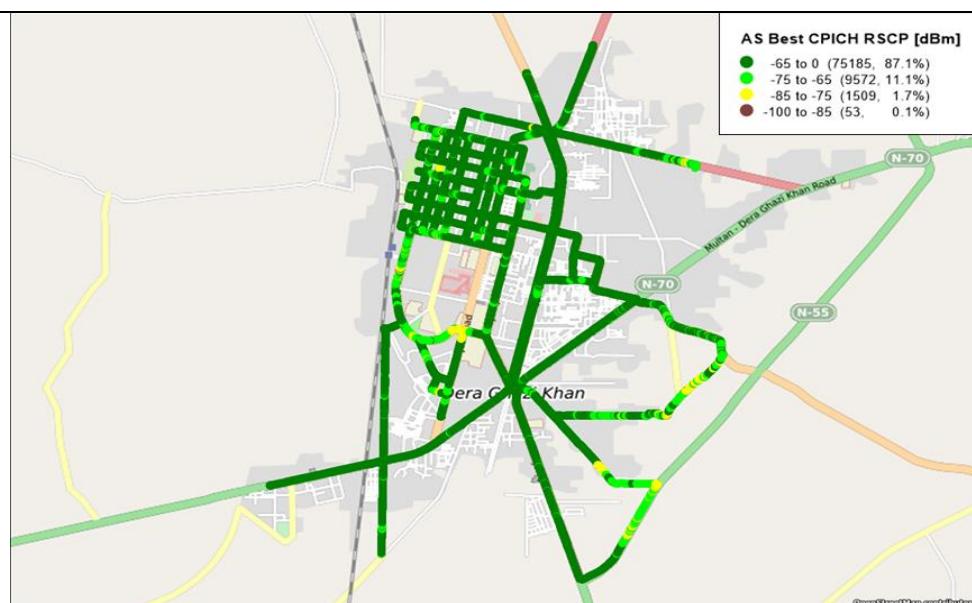
JAZZ 3G NETWORK COVERAGE – DG KHAN



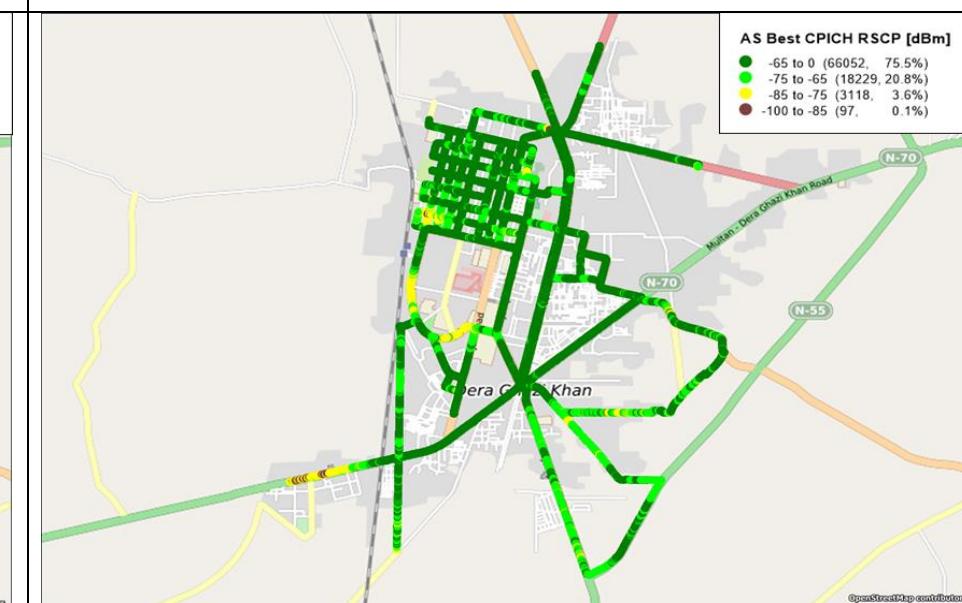
TELENOR 3G NETWORK COVERAGE – DG KHAN



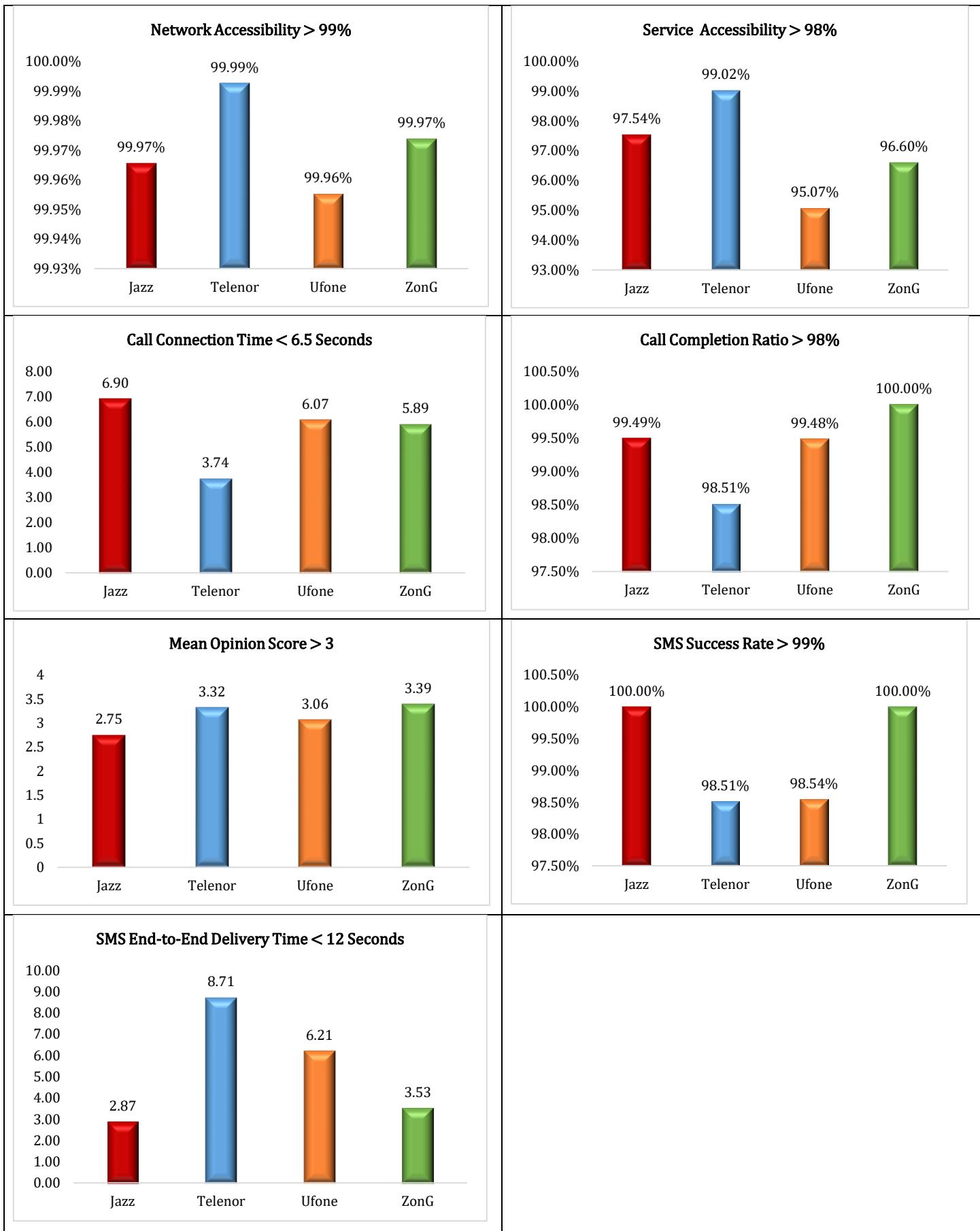
UFONE 3G NETWORK COVERAGE – DG KHAN



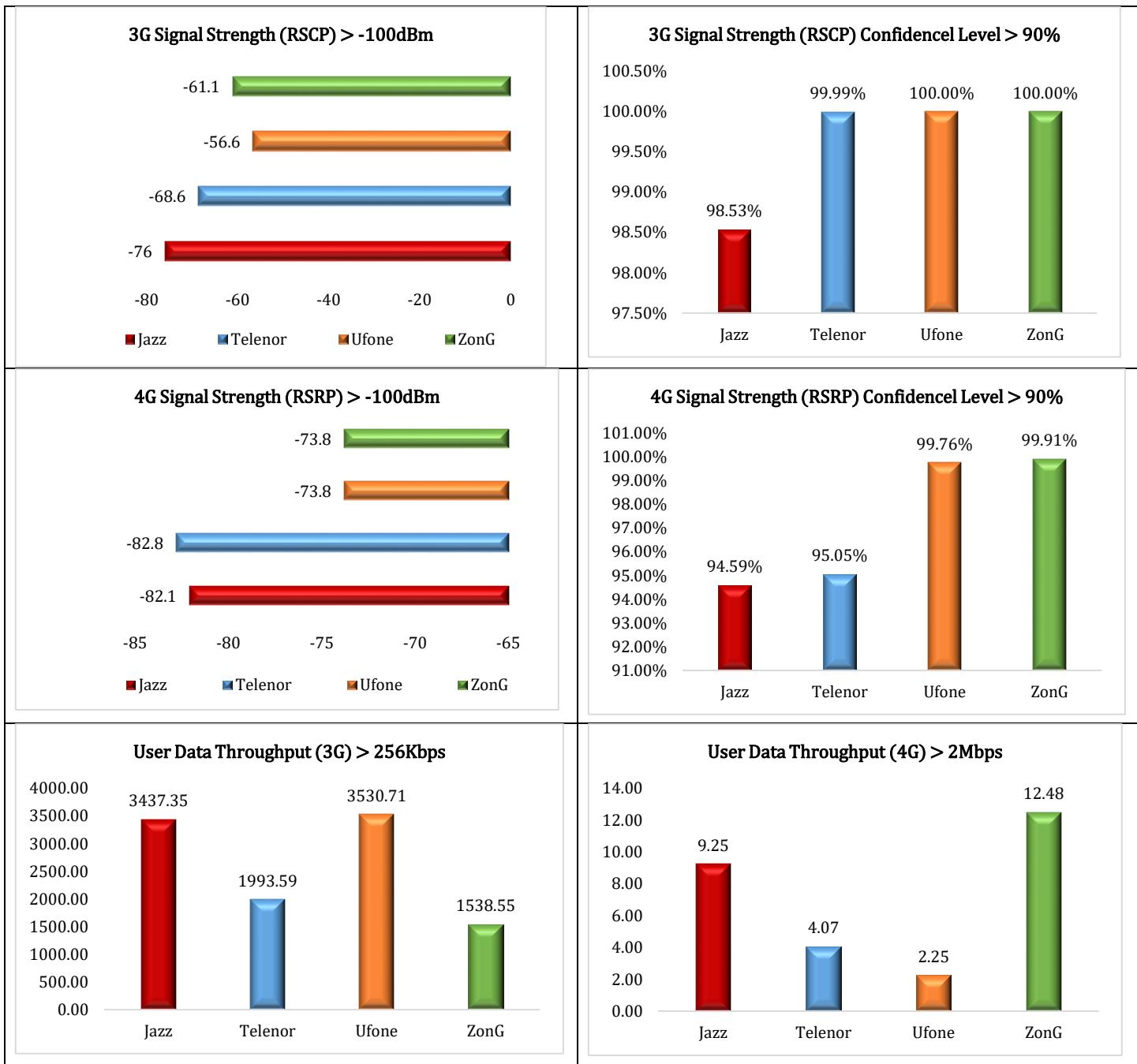
ZONG 3G NETWORK COVERAGE – DG KHAN



QUALITY OF SERVICE SURVEY RESULTS – DG KHAN



QUALITY OF SERVICE SURVEY RESULTS – DG KHAN

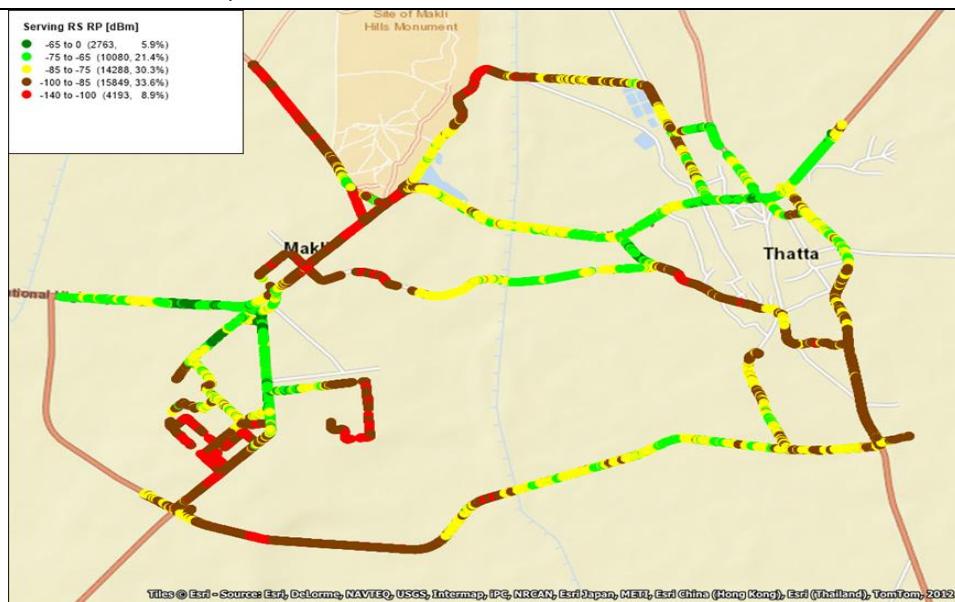


ANNEX – B

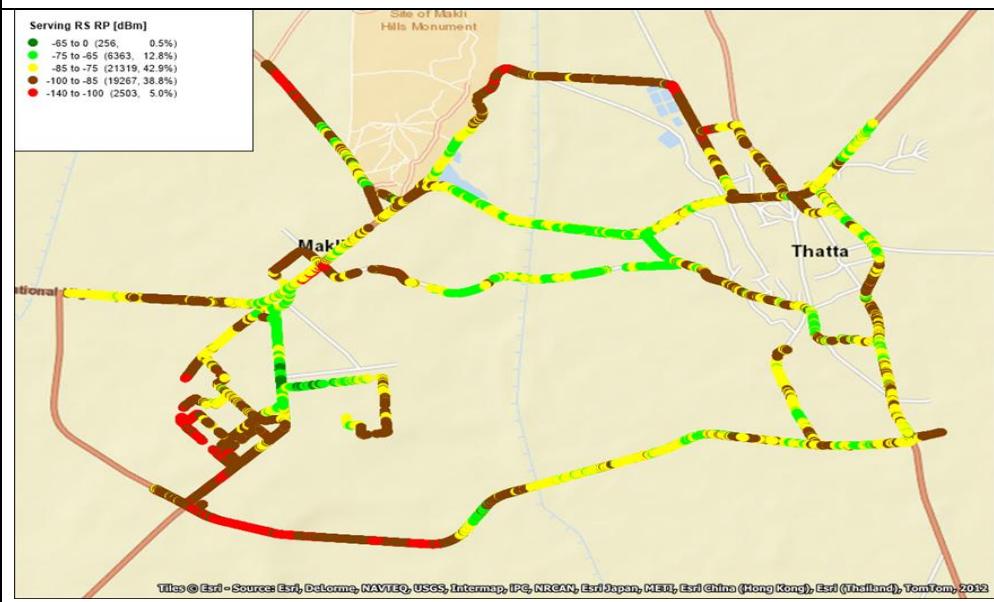
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4G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – THATTA



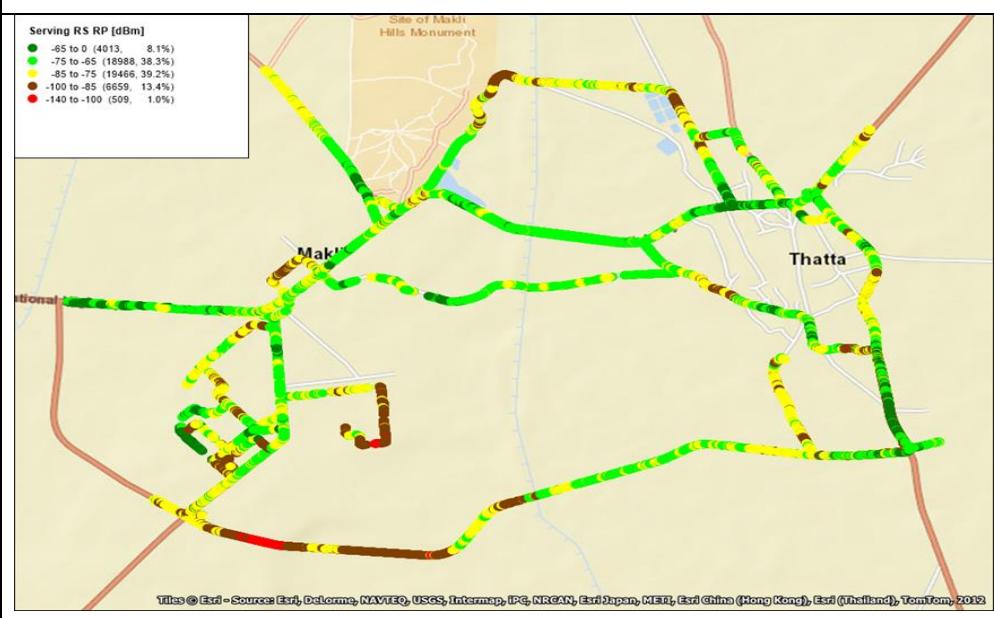
TELENOR 4G NETWORK COVERAGE – THATTA



UFONE 4G NETWORK COVERAGE – THATTA

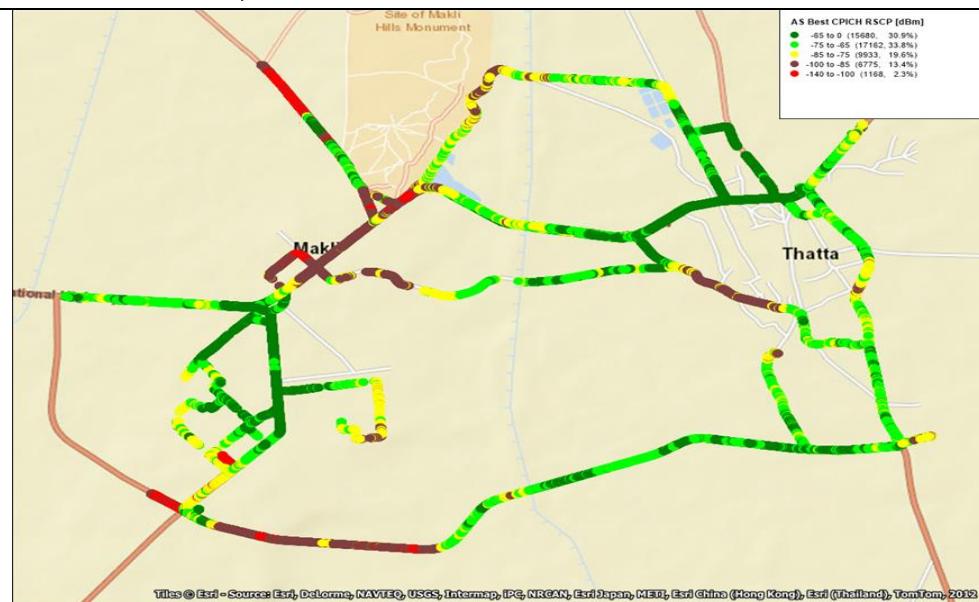


ZONG 4G NETWORK COVERAGE – THATTA

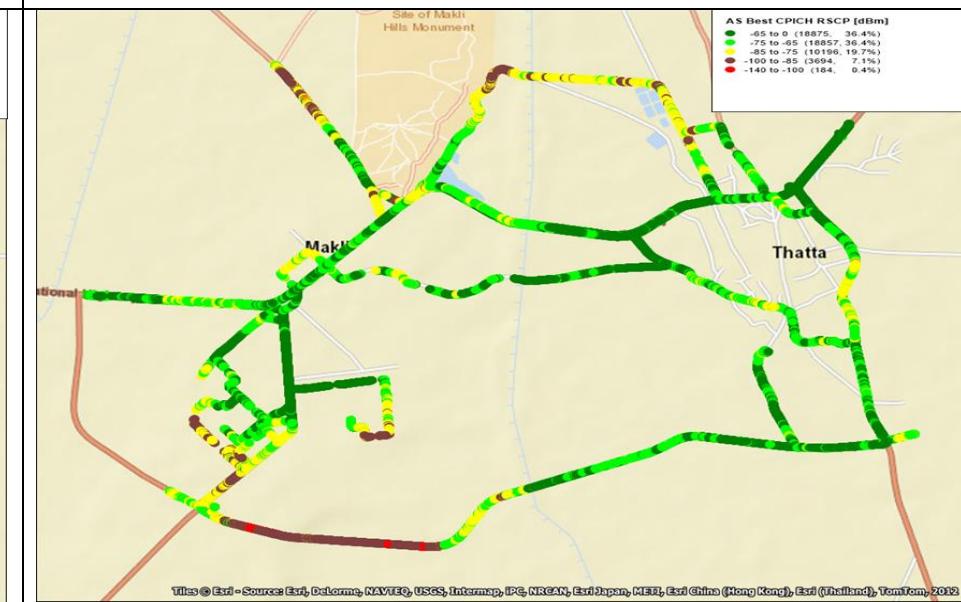


3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)

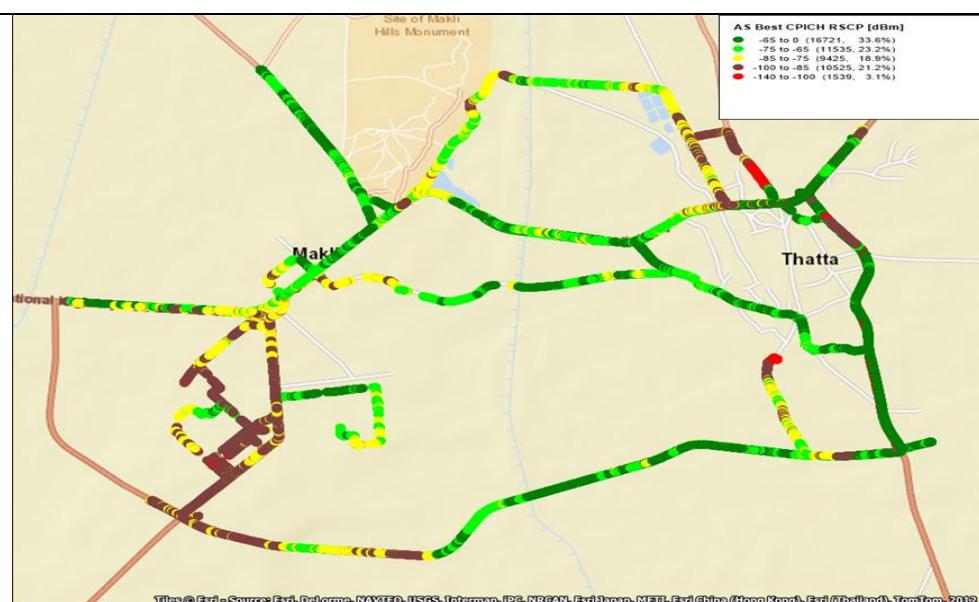
JAZZ 3G NETWORK COVERAGE - THATTA



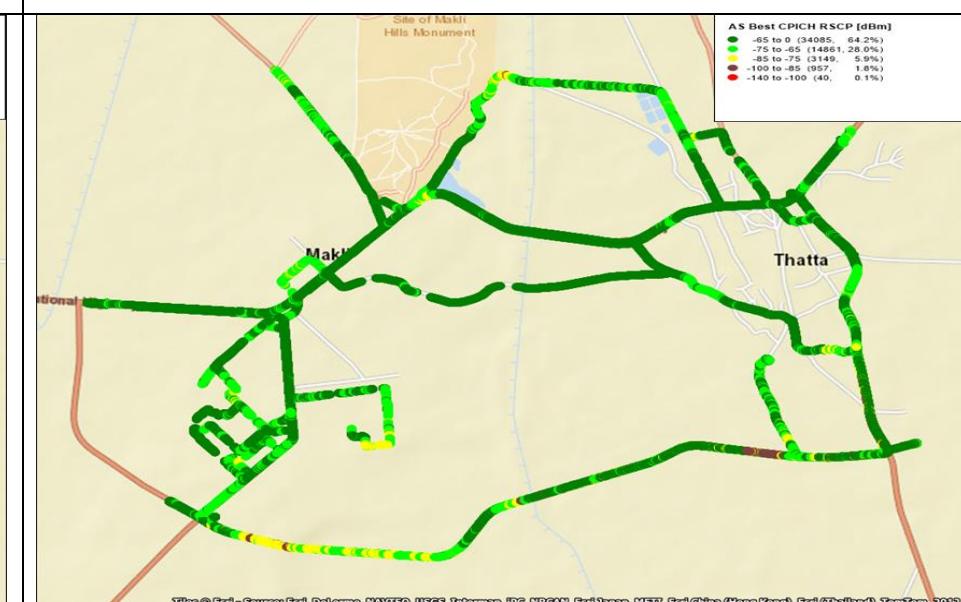
TELENOR 3G NETWORK COVERAGE - THATTA



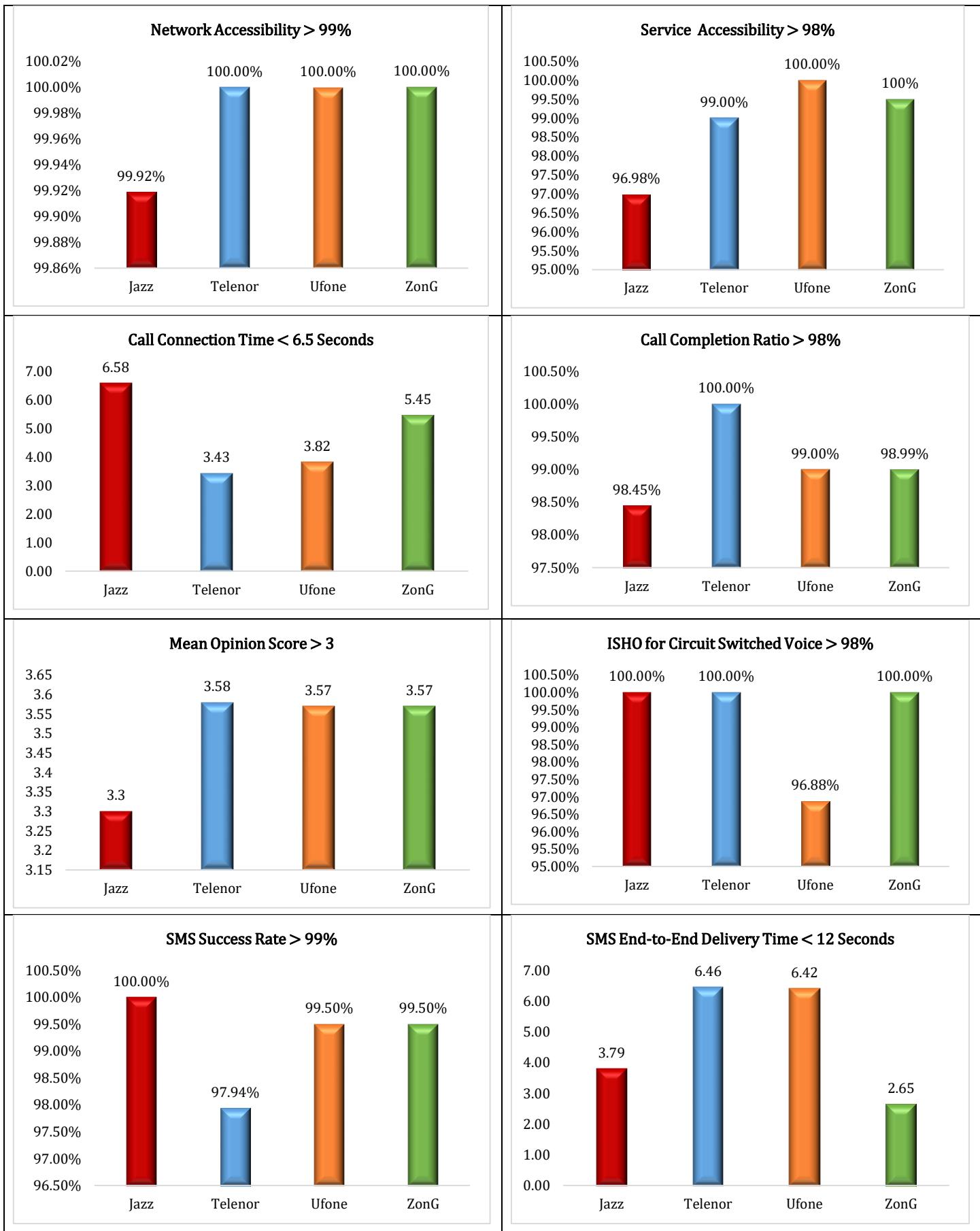
UFONE 3G NETWORK COVERAGE - THATTA



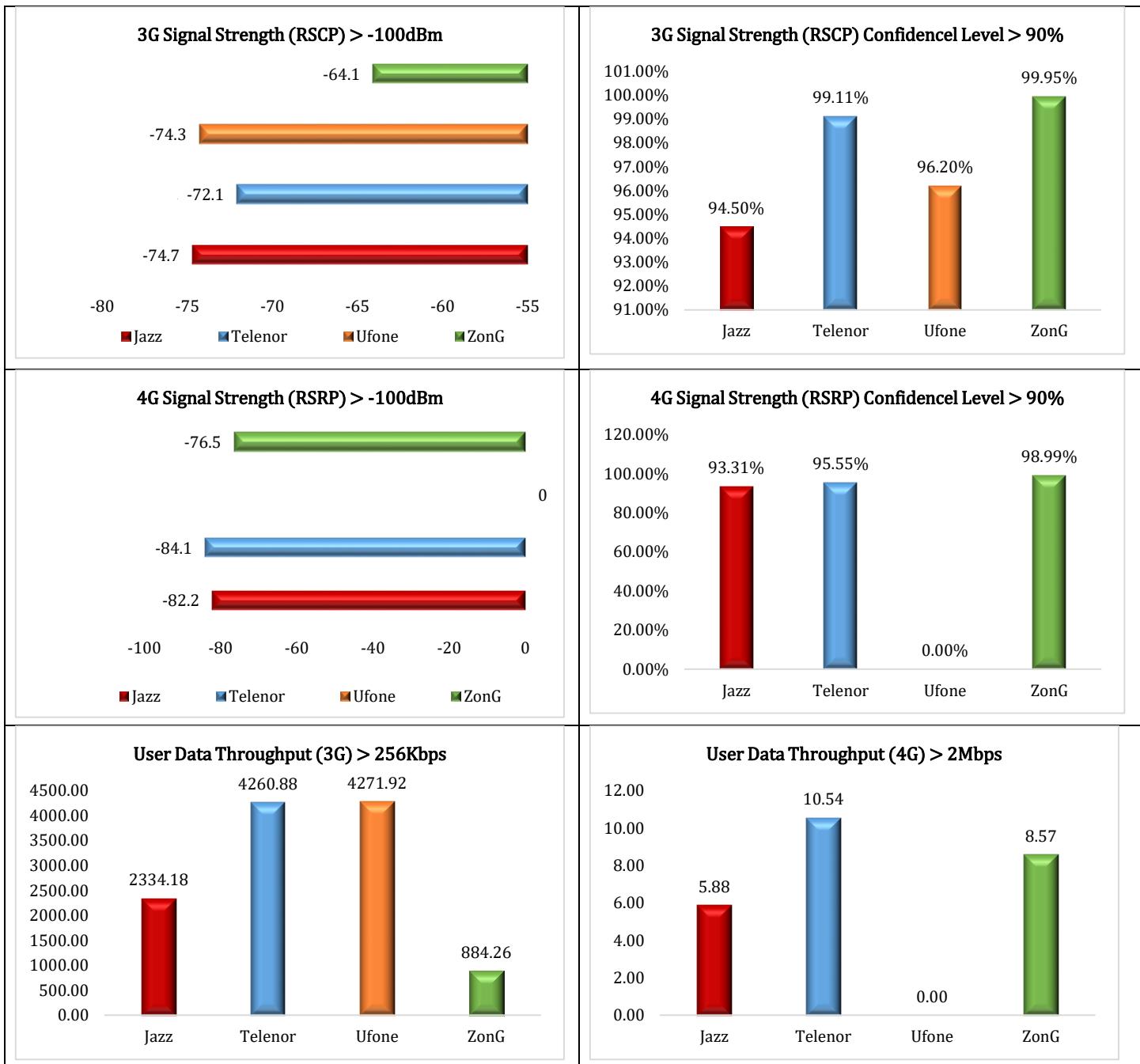
ZONG 3G NETWORK COVERAGE - THATTA



QUALITY OF SERVICE SURVEY RESULTS – THATTA

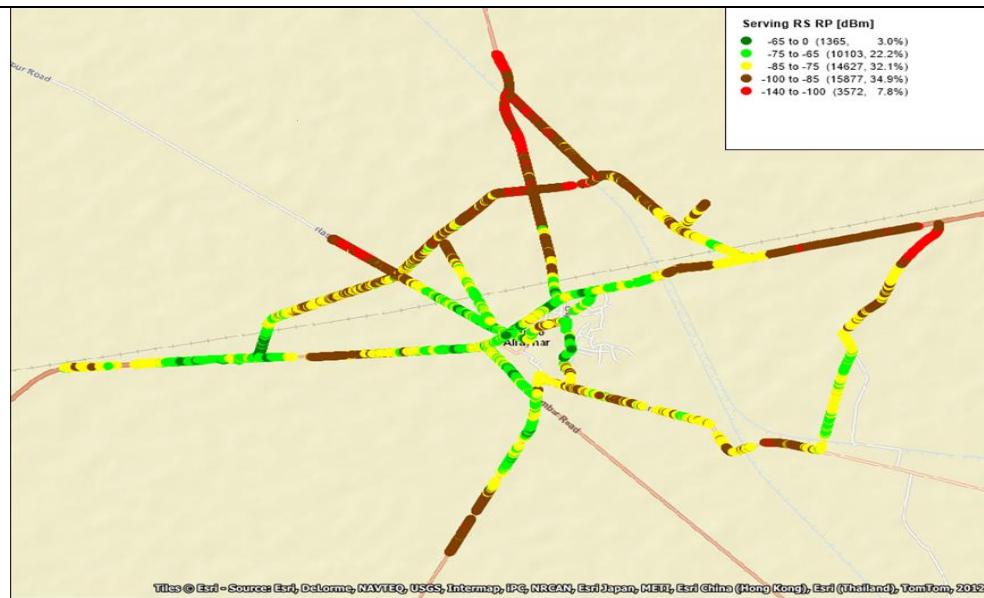


QUALITY OF SERVICE SURVEY RESULTS – THATTA

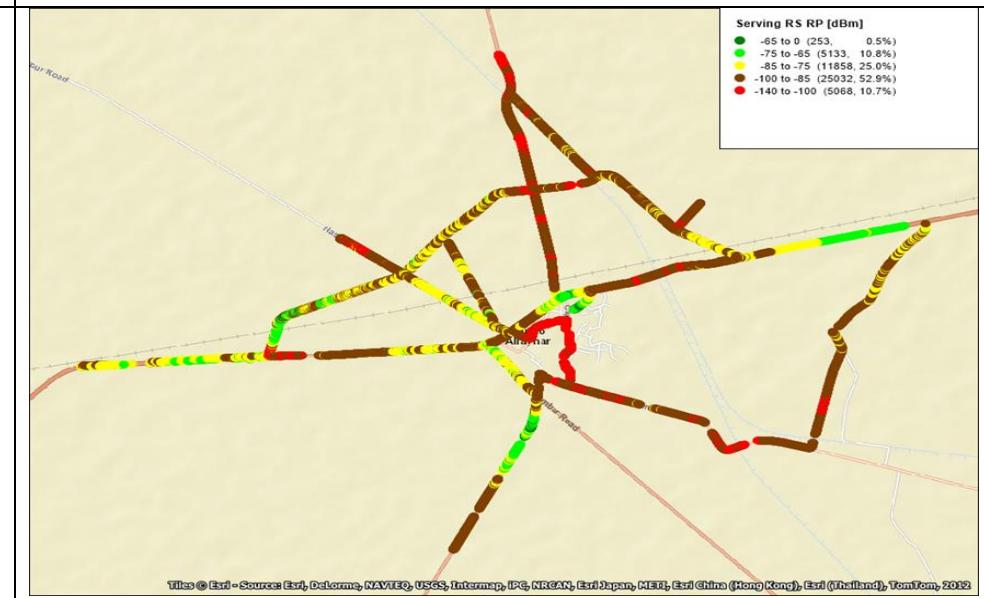


4G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSRP)

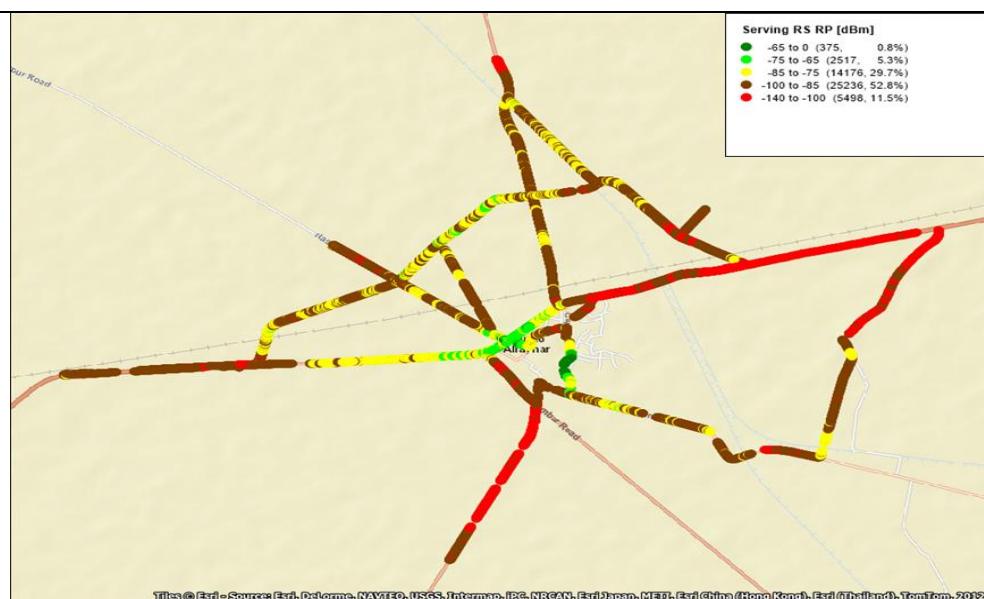
JAZZ 4G NETWORK COVERAGE – TANDO ALLAH YAR



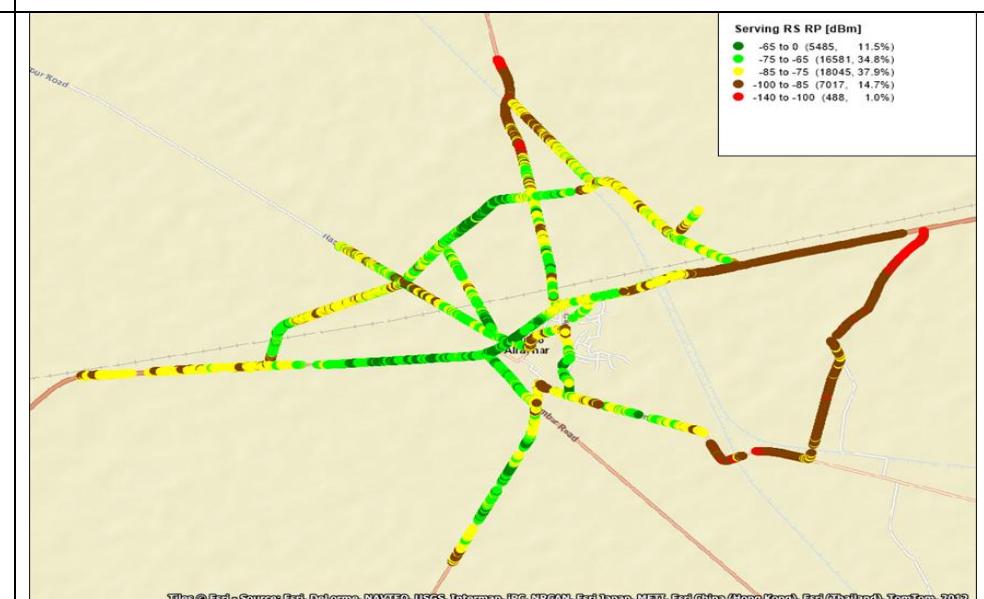
TELENOR 4G NETWORK COVERAGE – TANDO ALLAH YAR



UFONE 4G NETWORK COVERAGE – TANDO ALLAH YAR

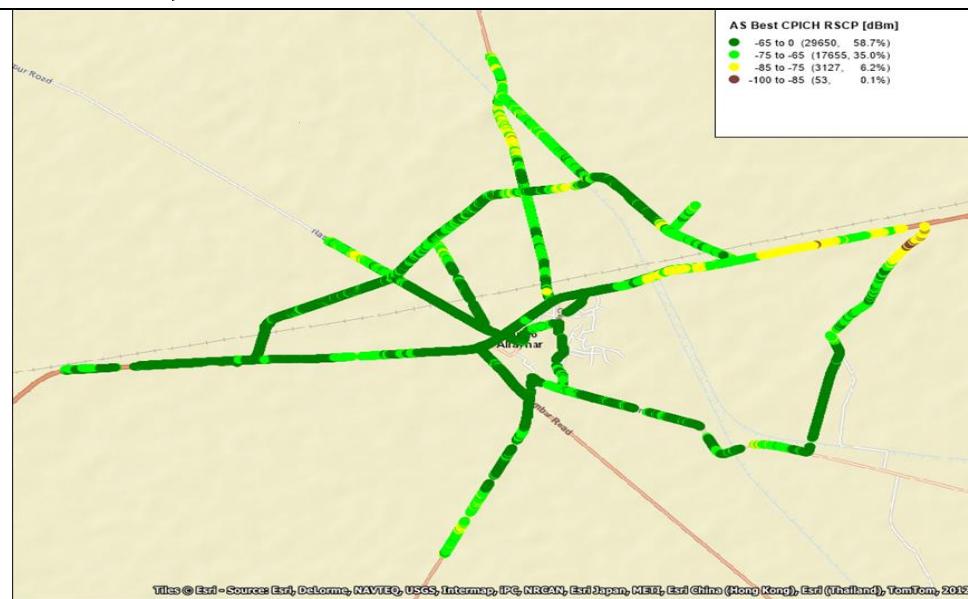


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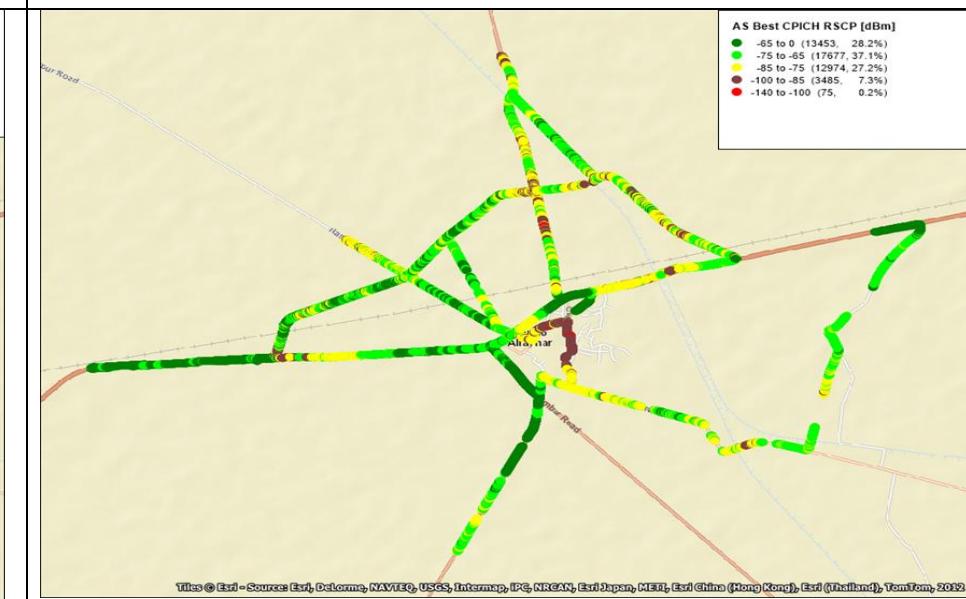


3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)

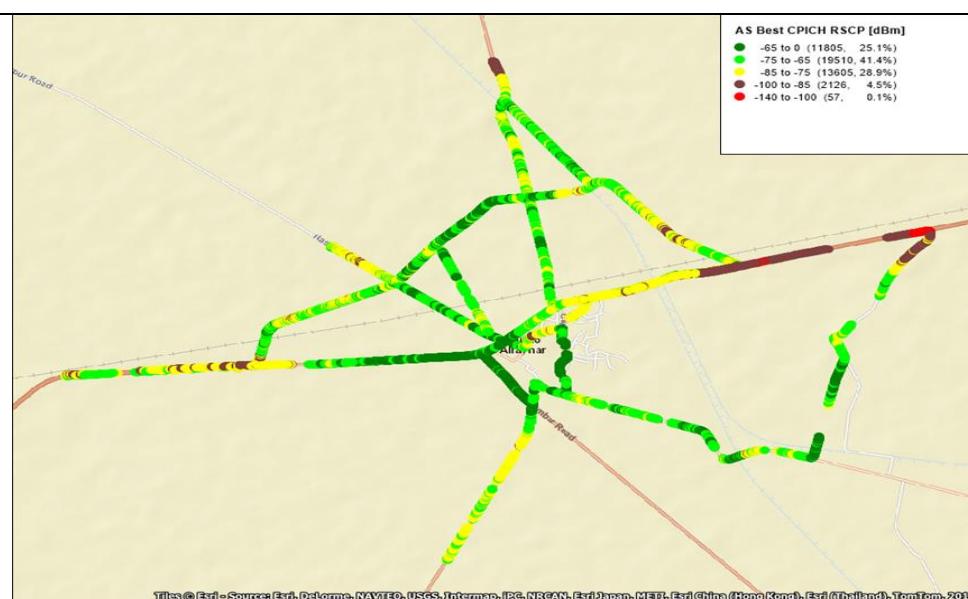
JAZZ 3G NETWORK COVERAGE – TANDO ALLAH YAR



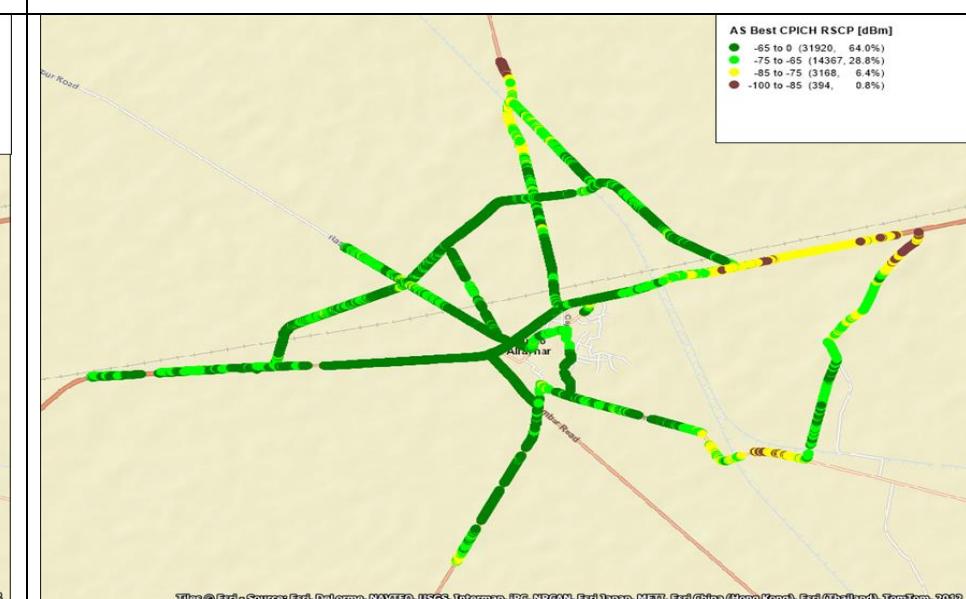
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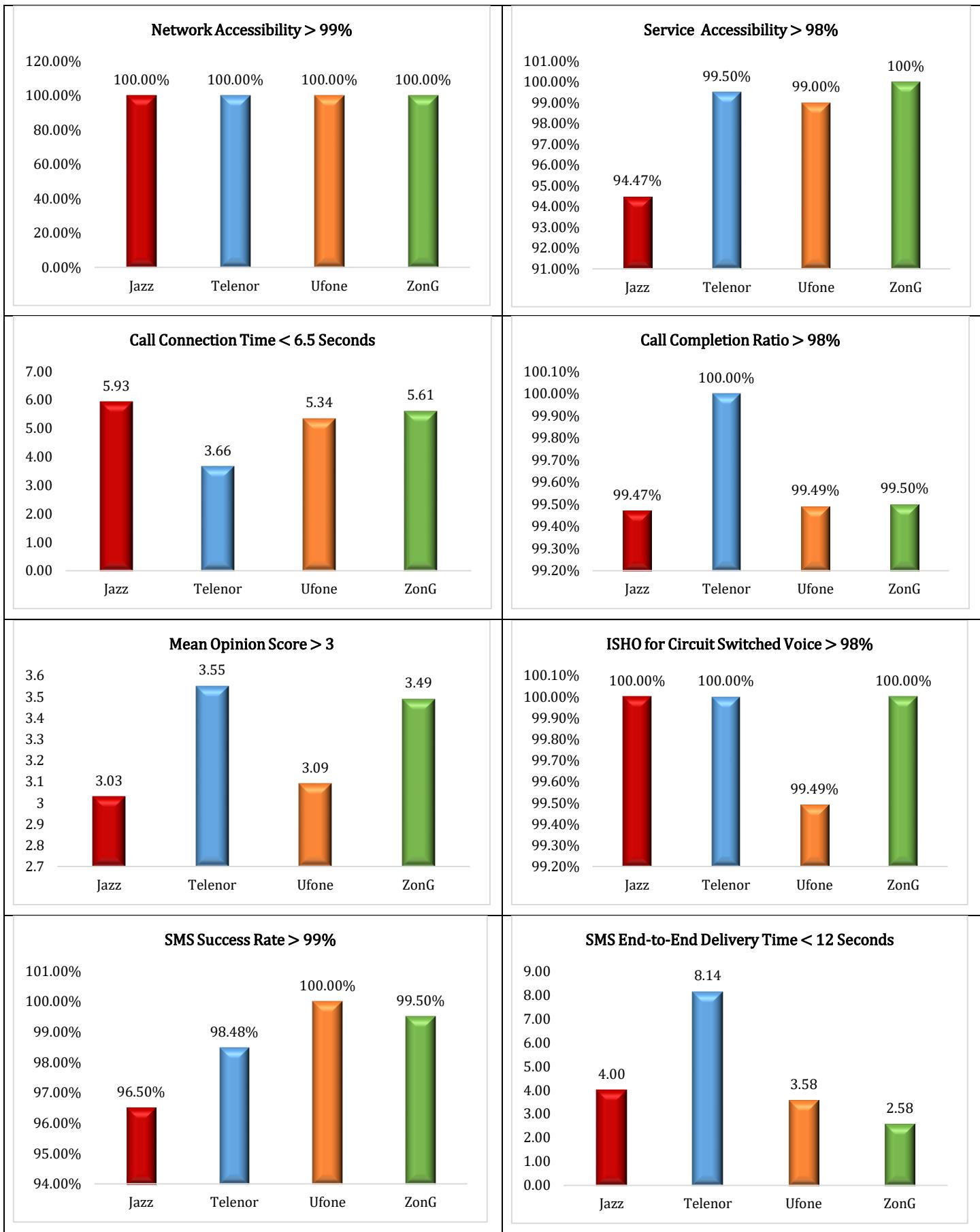
UFONE 3G NETWORK COVERAGE – TANDO ALLAH YAR



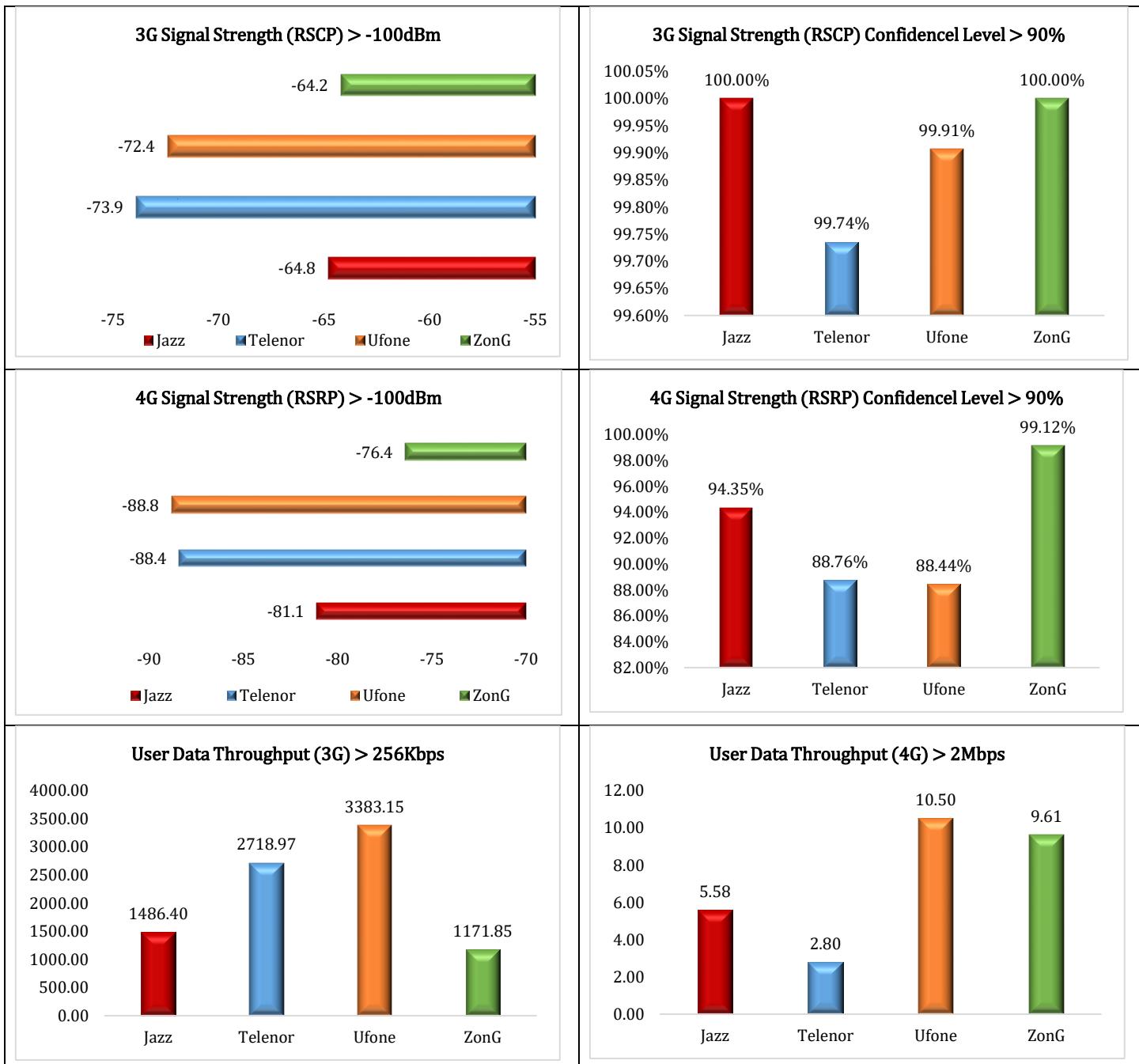
ZONG 3G NETWORK COVERAGE – TANDO ALLAH YAR



QUALITY OF SERVICE SURVEY RESULTS – TANDO ALLAH YAR

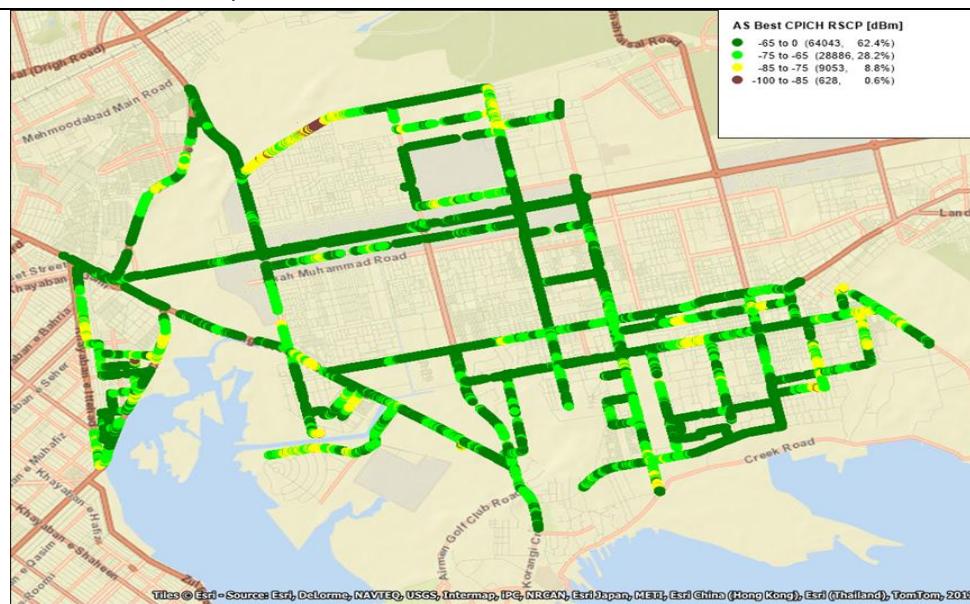


QUALITY OF SERVICE SURVEY RESULTS – TANDO ALLAH YAR

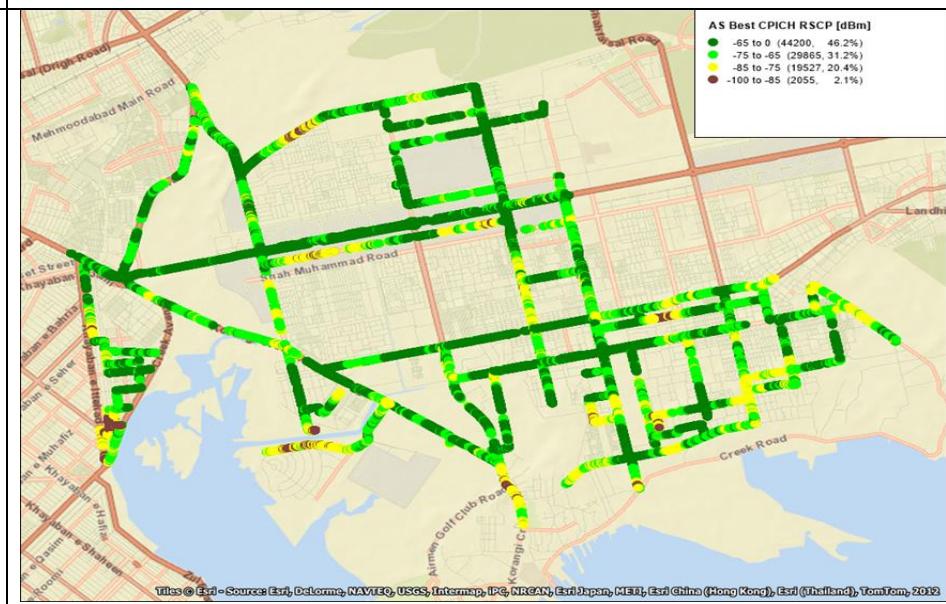


3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)

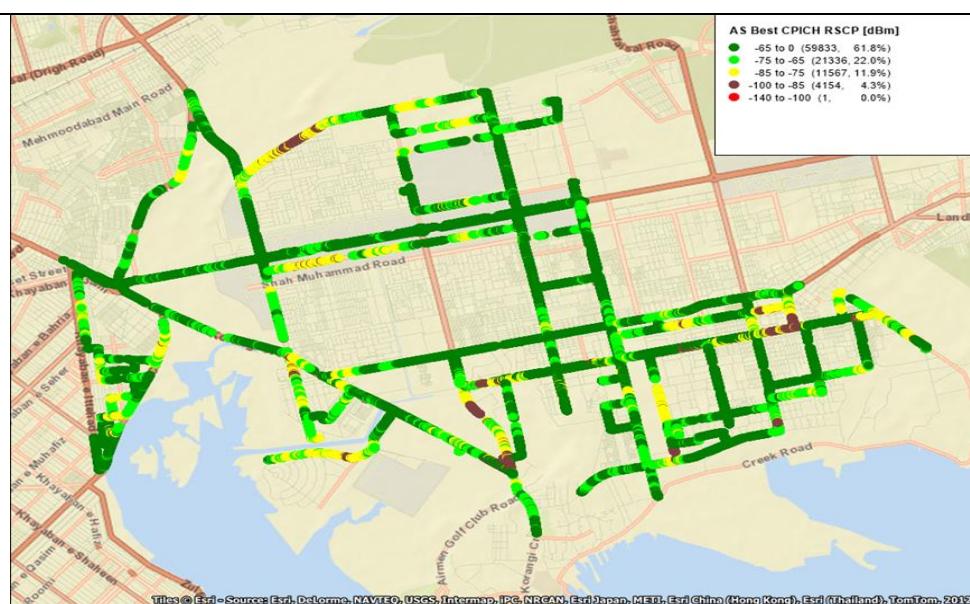
JAZZ 3G NETWORK COVERAGE – KORANGI



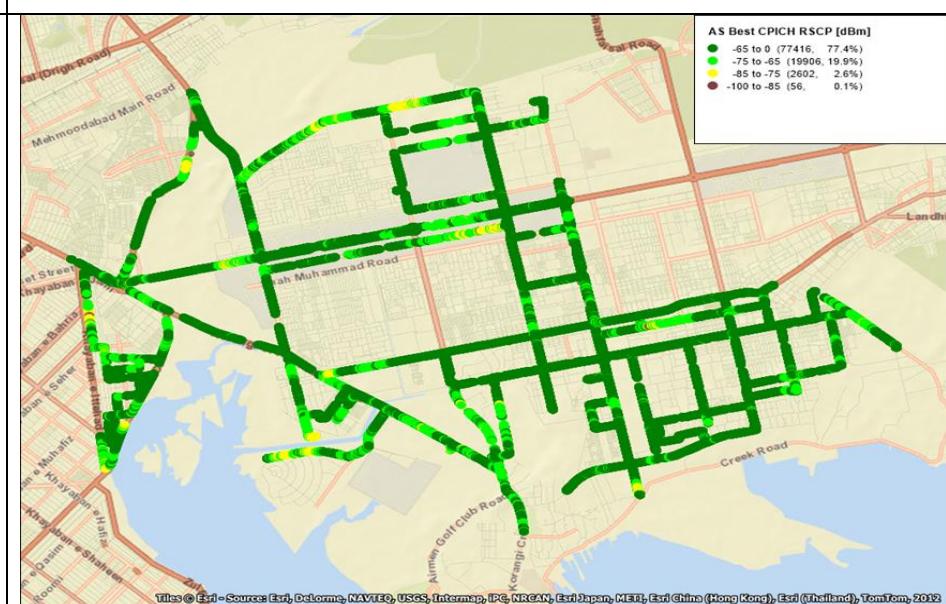
TELENOR 3G NETWORK COVERAGE – KORANGI



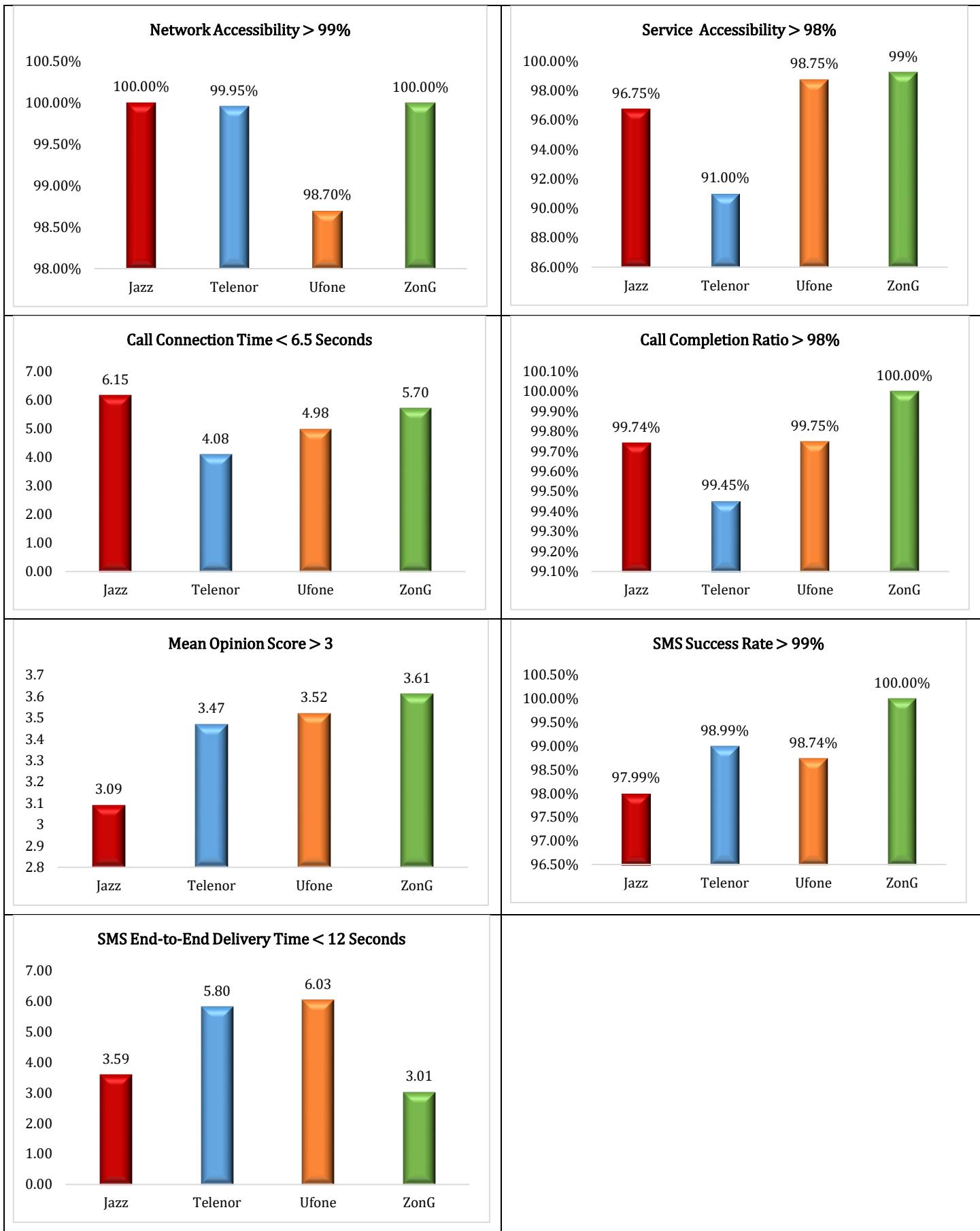
UFONE 3G NETWORK COVERAGE – KORANGI



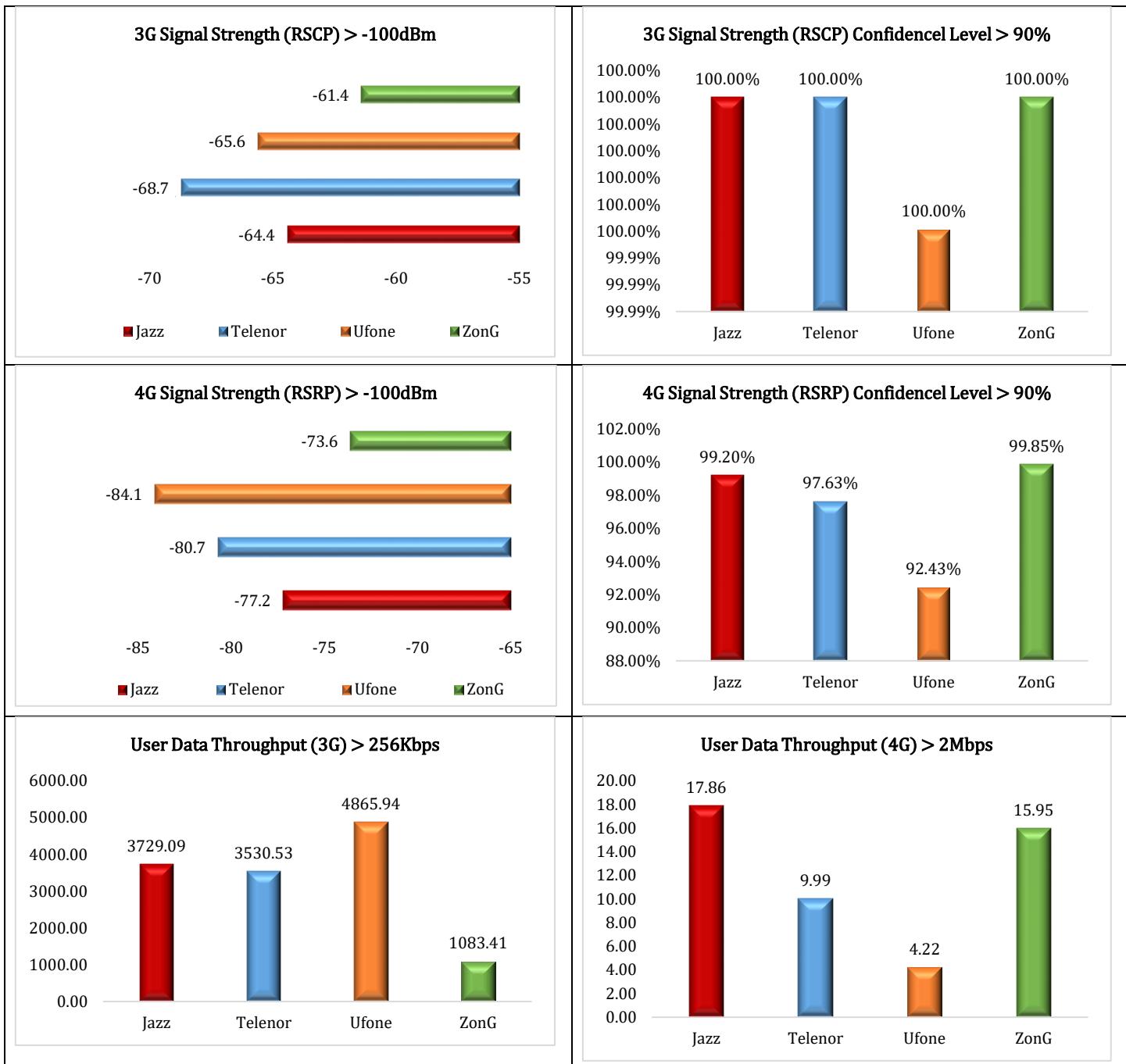
ZONG 3G NETWORK COVERAGE – KORANGI



QUALITY OF SERVICE SURVEY RESULTS – KORANGI

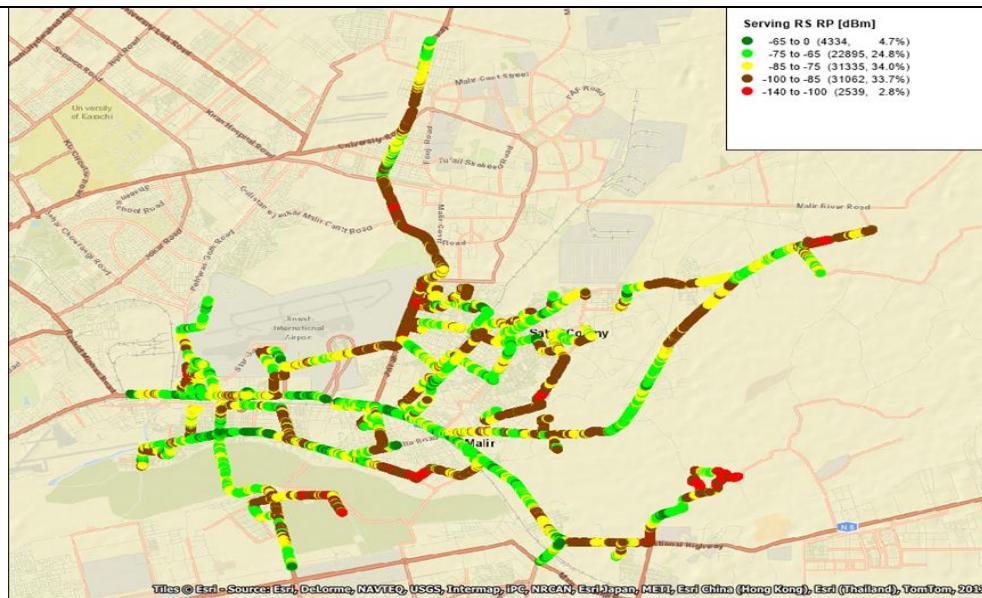


QUALITY OF SERVICE SURVEY RESULTS – KORANGI

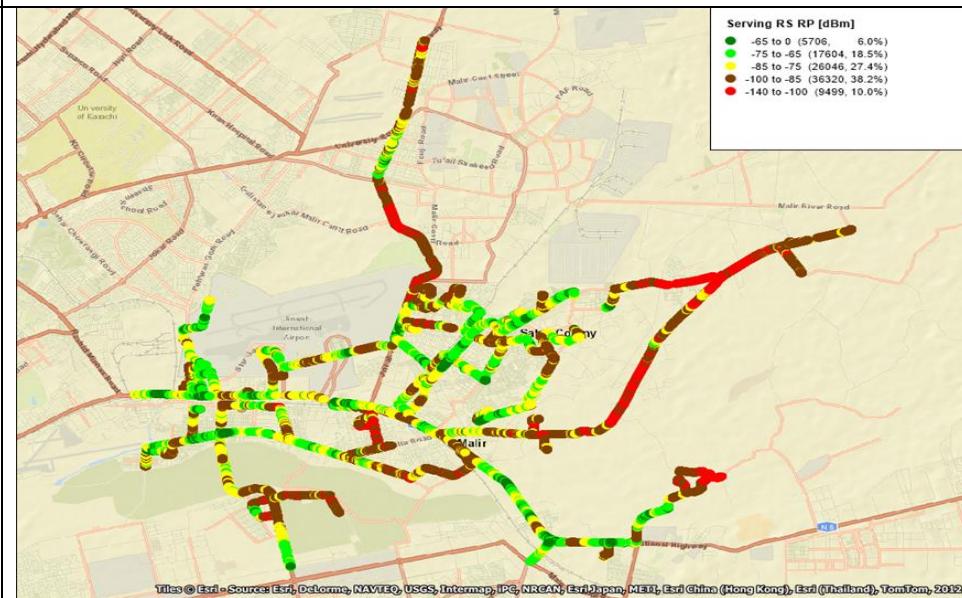


4G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSRP)

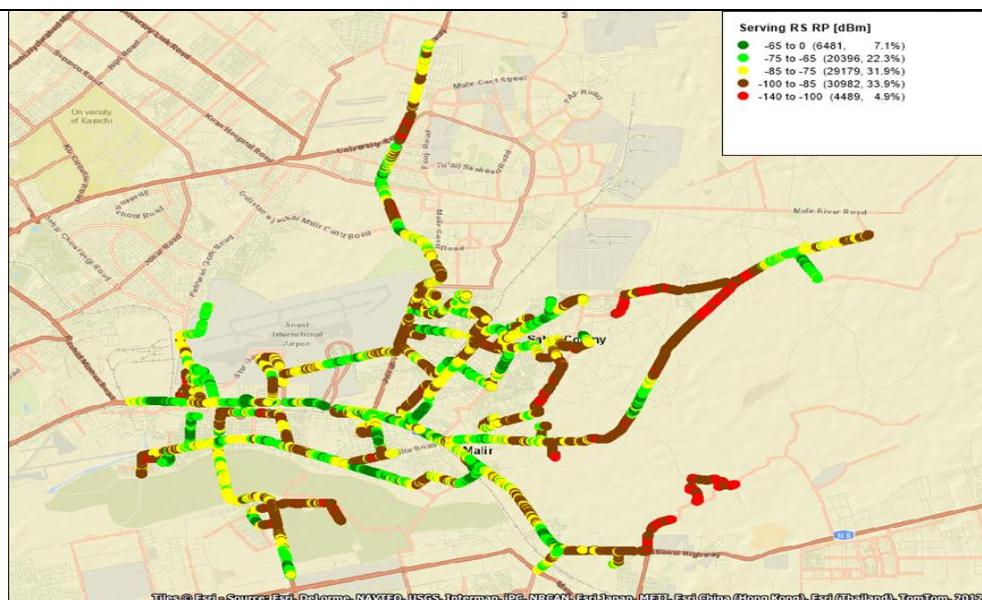
JAZZ 4G NETWORK COVERAGE – MALIR



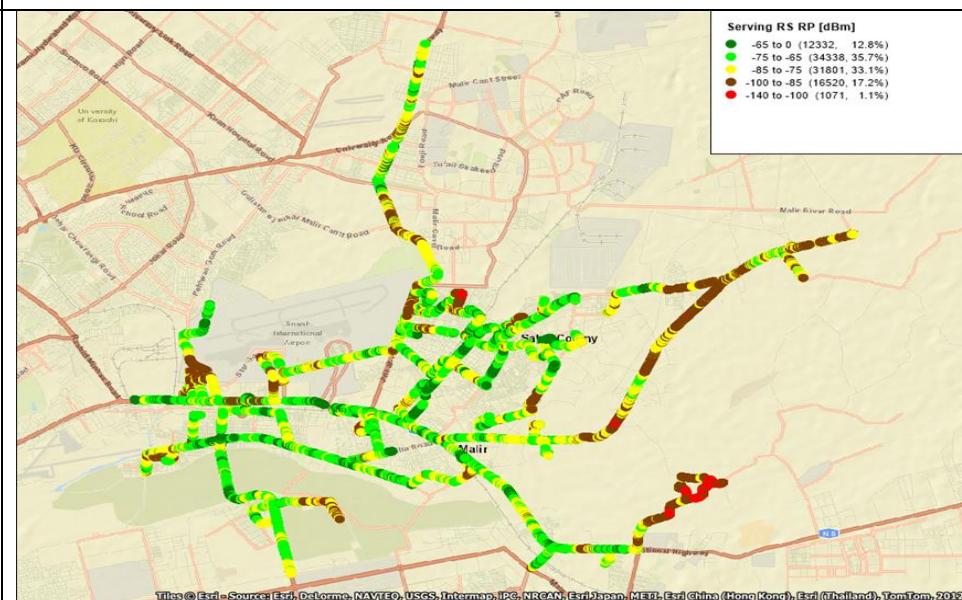
TELENOR 4G NETWORK COVERAGE – MALIR



UFONE 4G NETWORK COVERAGE – MALIR

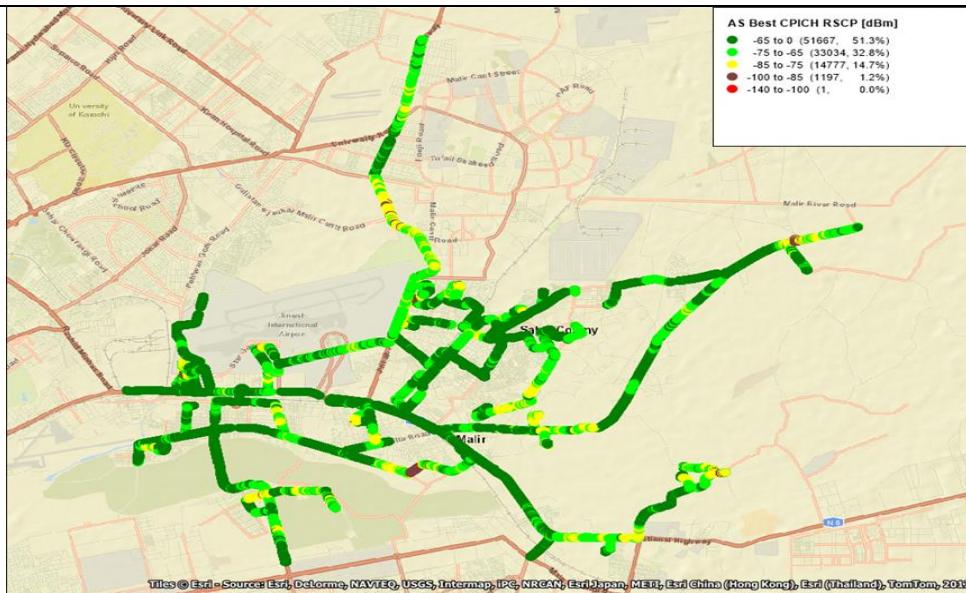


ZONG 4G NETWORK COVERAGE – MALIR

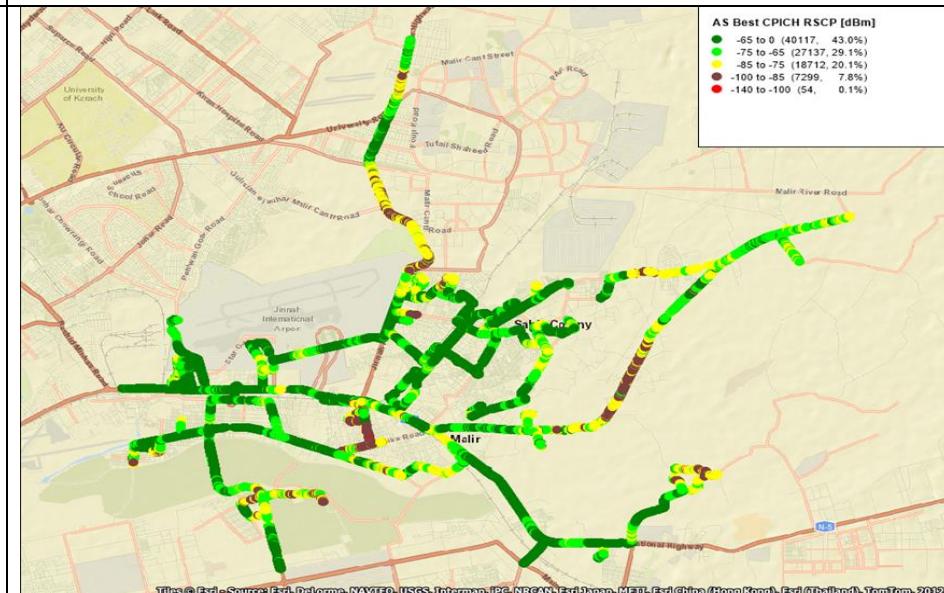


3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)

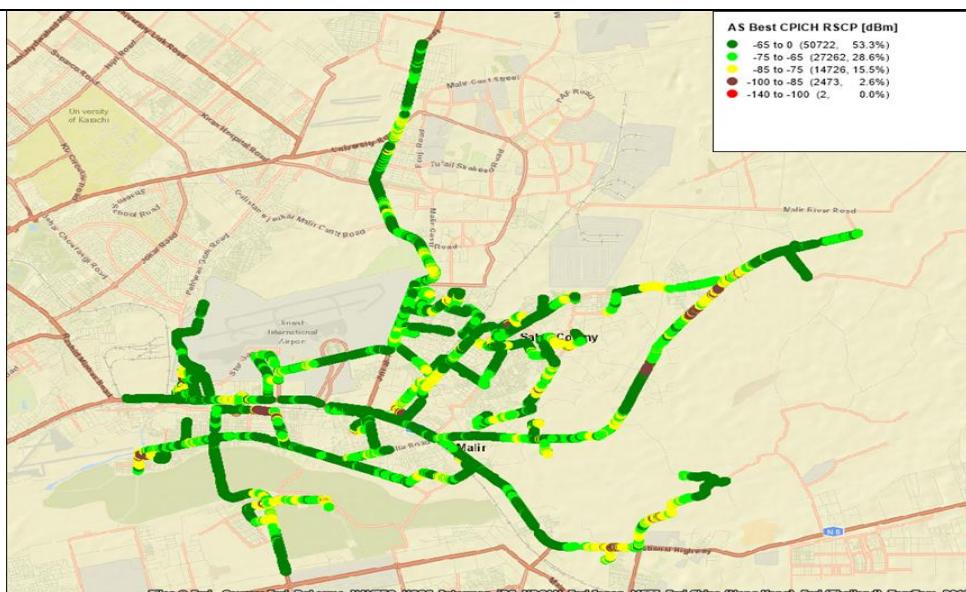
JAZZ 3G NETWORK COVERAGE – MALIR



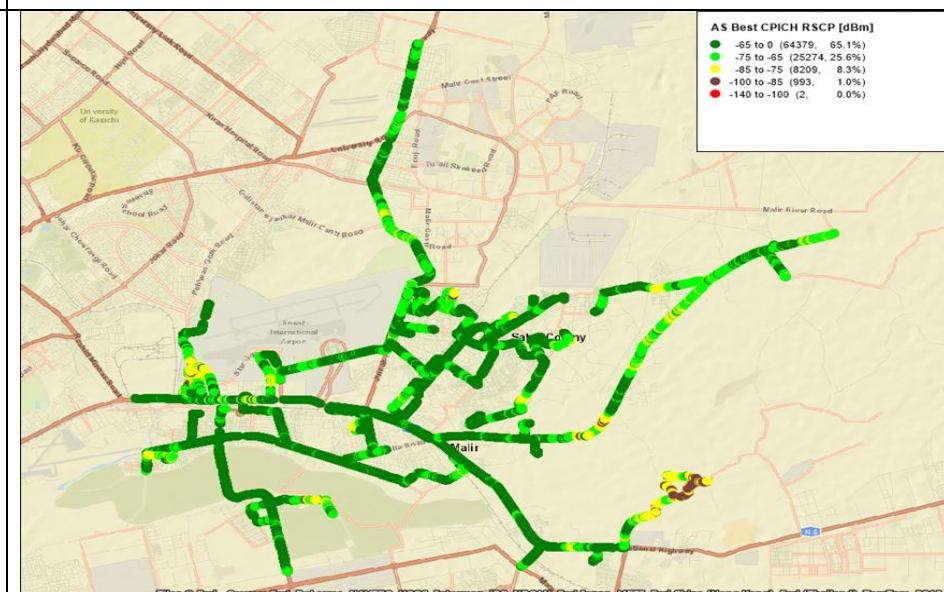
TELENOR 3G NETWORK COVERAGE – MALIR



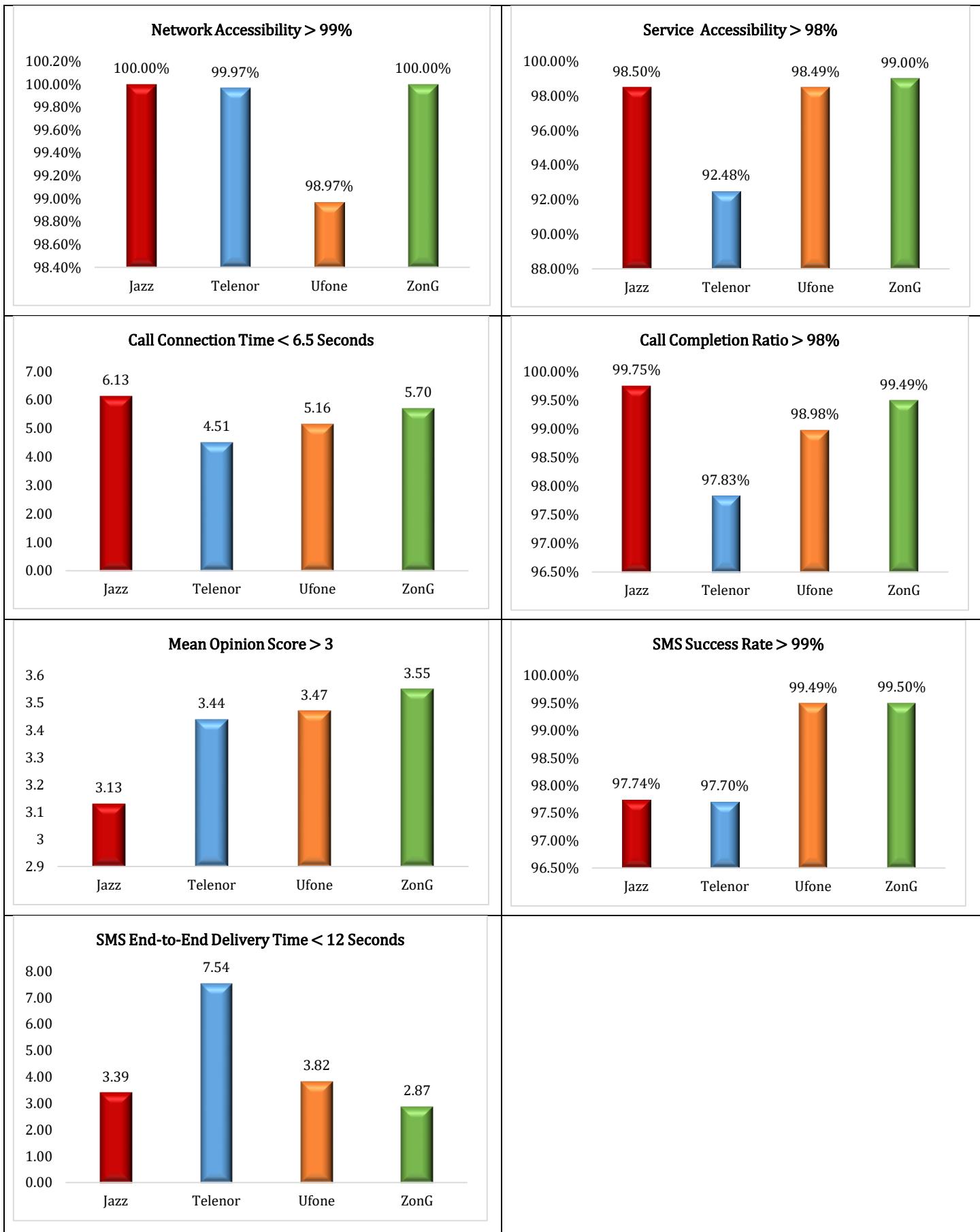
UFONE 3G NETWORK COVERAGE – MALIR



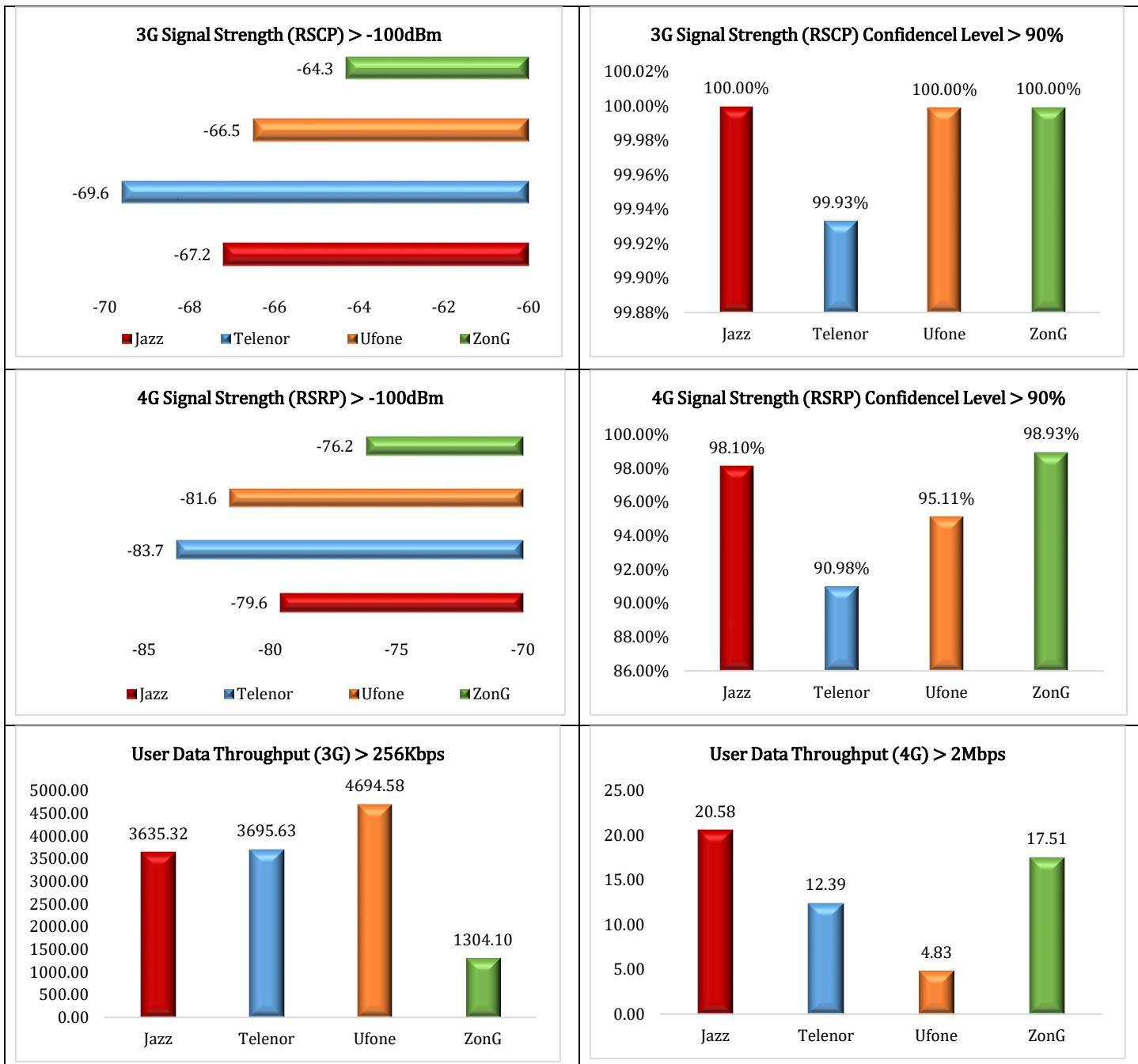
ZONG 3G NETWORK COVERAGE – MALIR



QUALITY OF SERVICE SURVEY RESULTS – MALIR



QUALITY OF SERVICE SURVEY RESULTS – MALIR

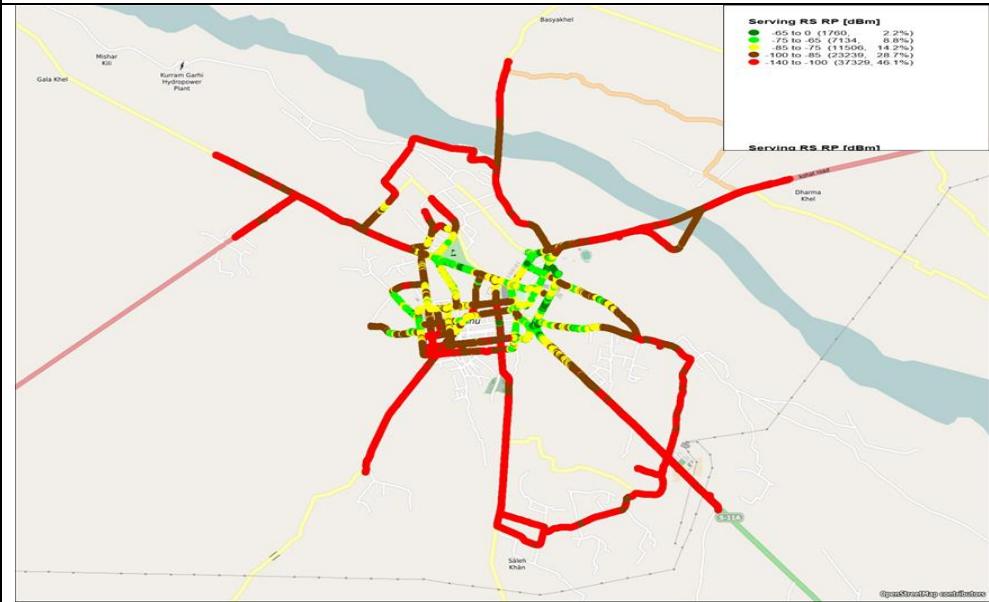


ANNEX – C

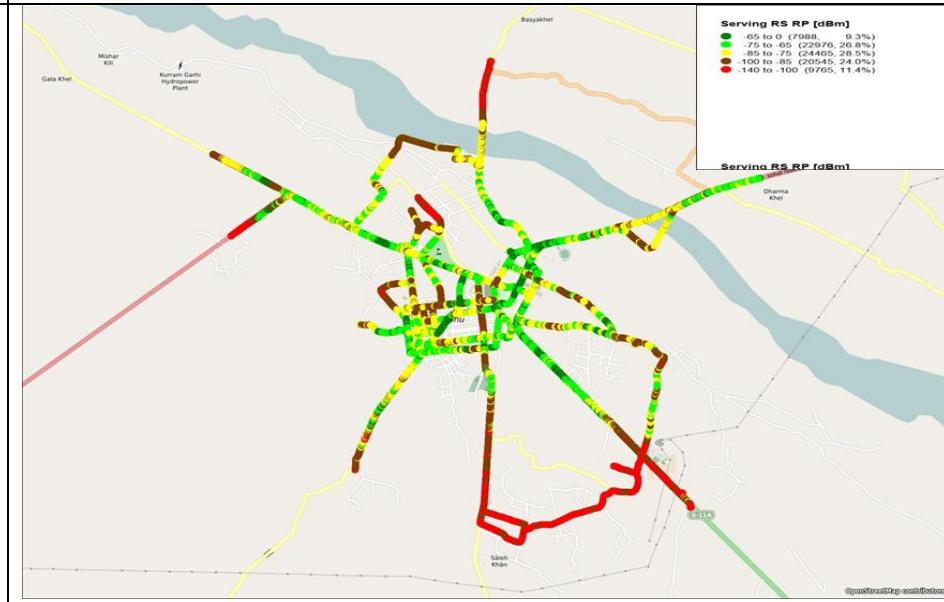
KHYBER PAKHTUNKHWA

4G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSRP)

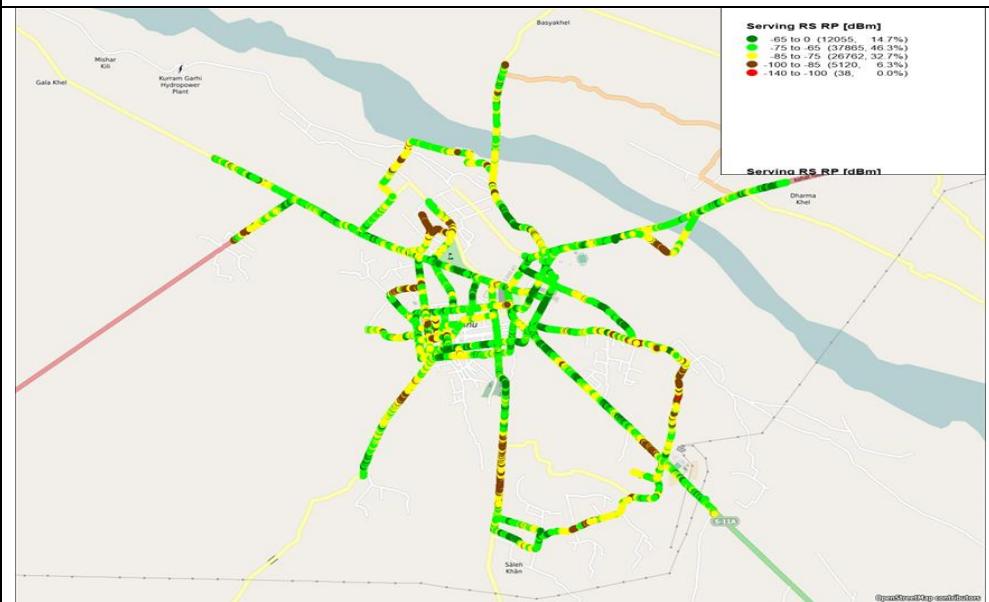
JAZZ 4G NETWORK COVERAGE – BANNU



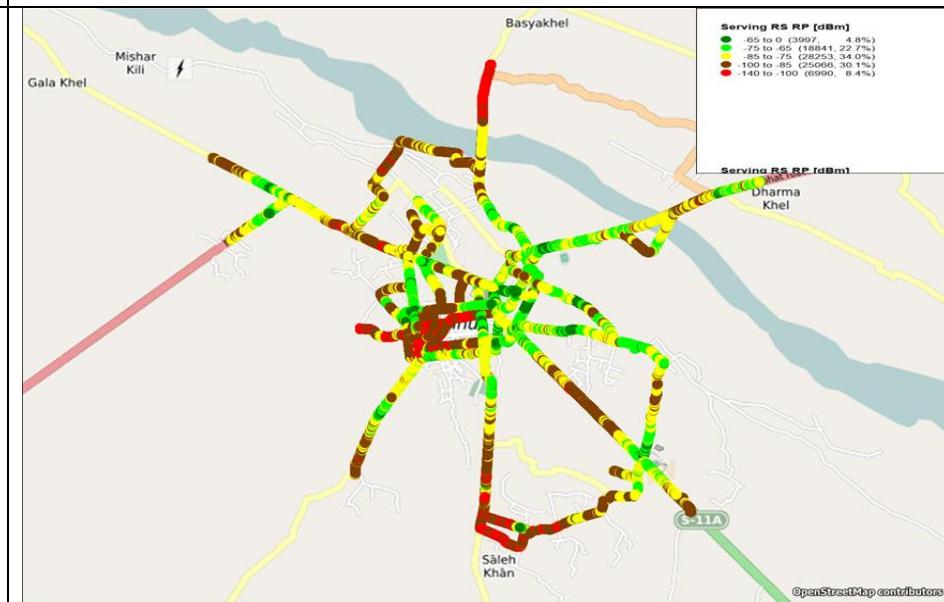
TELENOR 4G NETWORK COVERAGE – BANNU



UFONE 4G NETWORK COVERAGE – BANNU

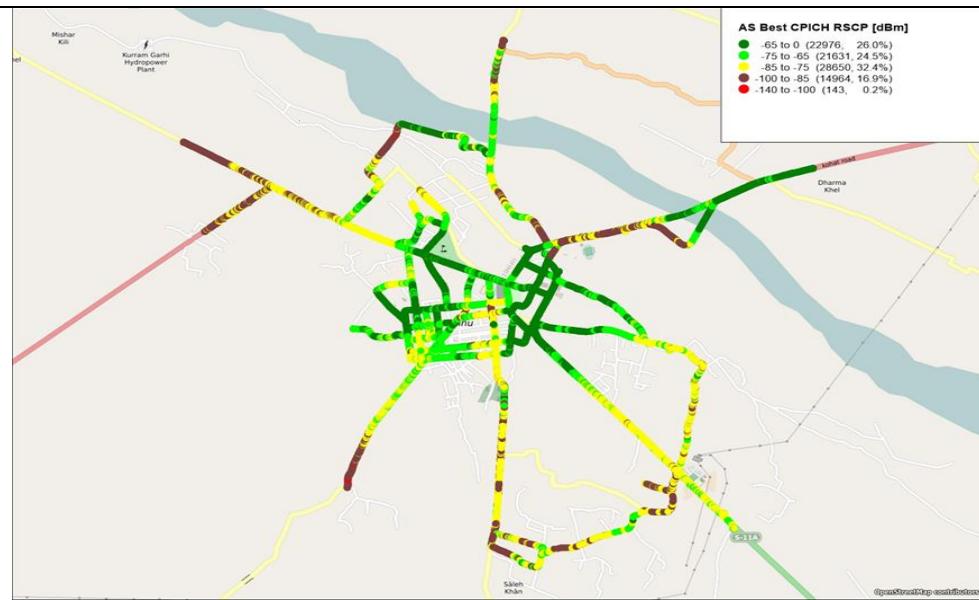


ZONG 4G NETWORK COVERAGE – BANNU

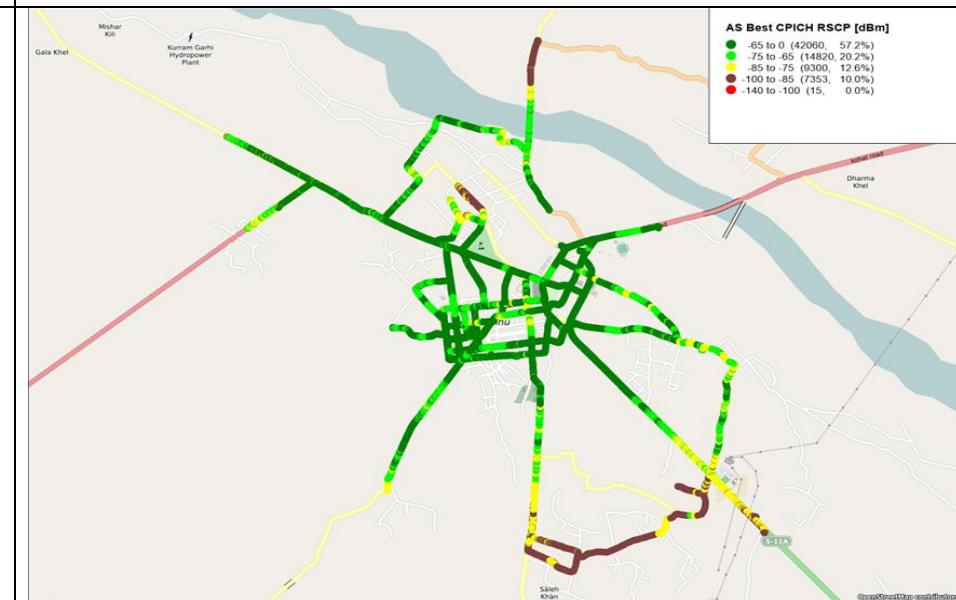


3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)

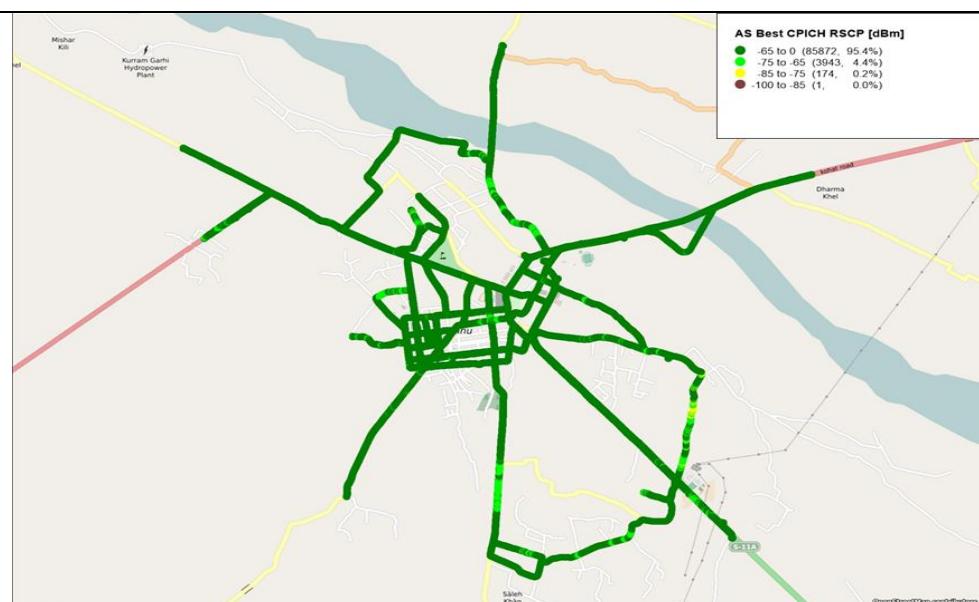
JAZZ 3G NETWORK COVERAGE – BANNU



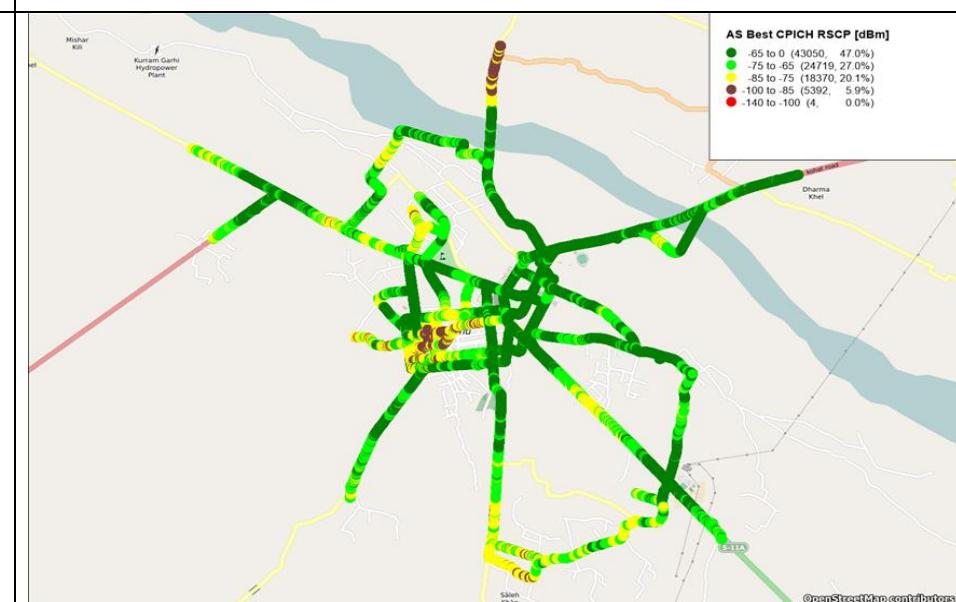
TELENOR 3G NETWORK COVERAGE – BANNU



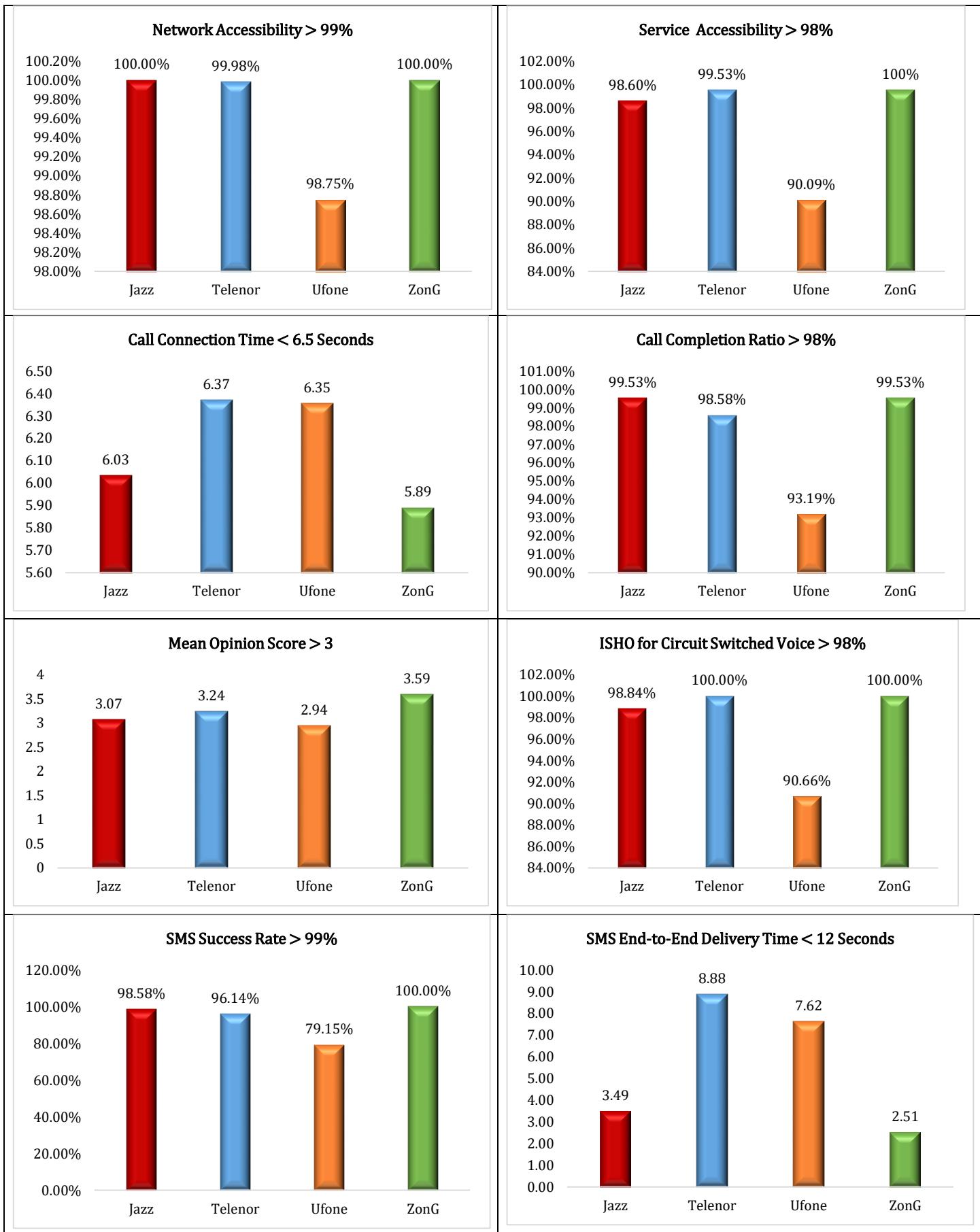
UFONE 3G NETWORK COVERAGE – BANNU



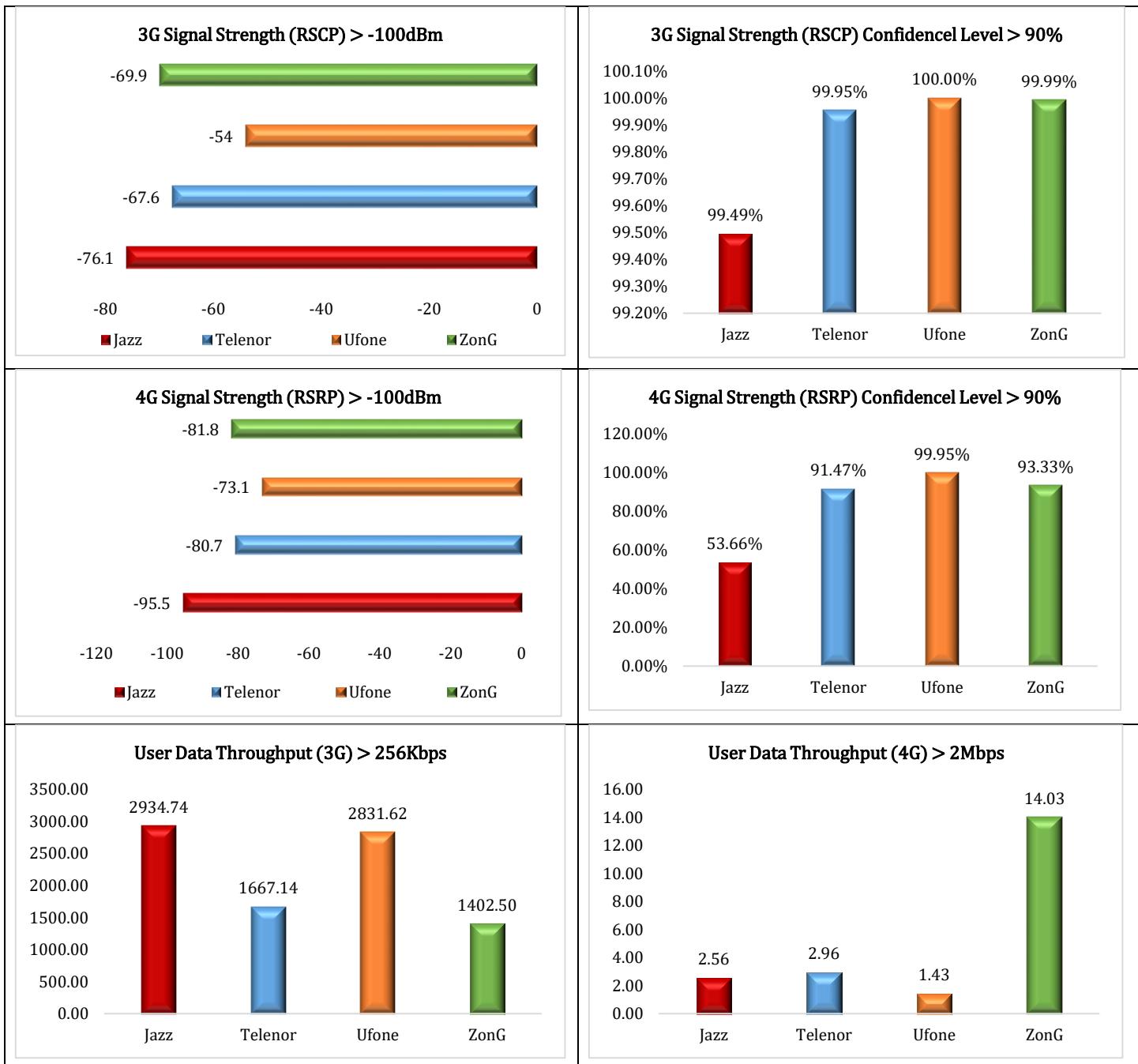
ZONG 3G NETWORK COVERAGE – BANNU



QUALITY OF SERVICE SURVEY RESULTS – BANNU

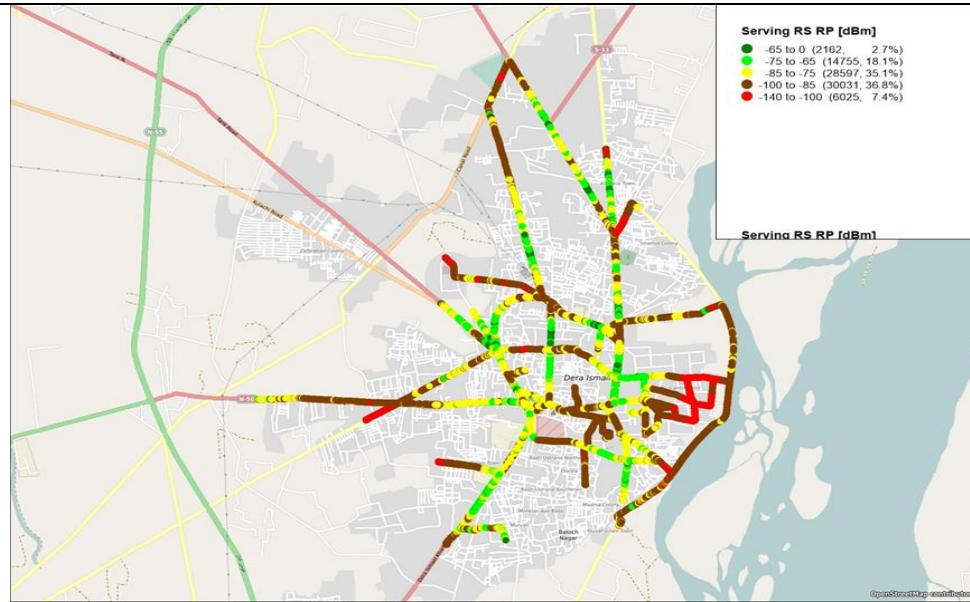


QUALITY OF SERVICE SURVEY RESULTS – BANNU

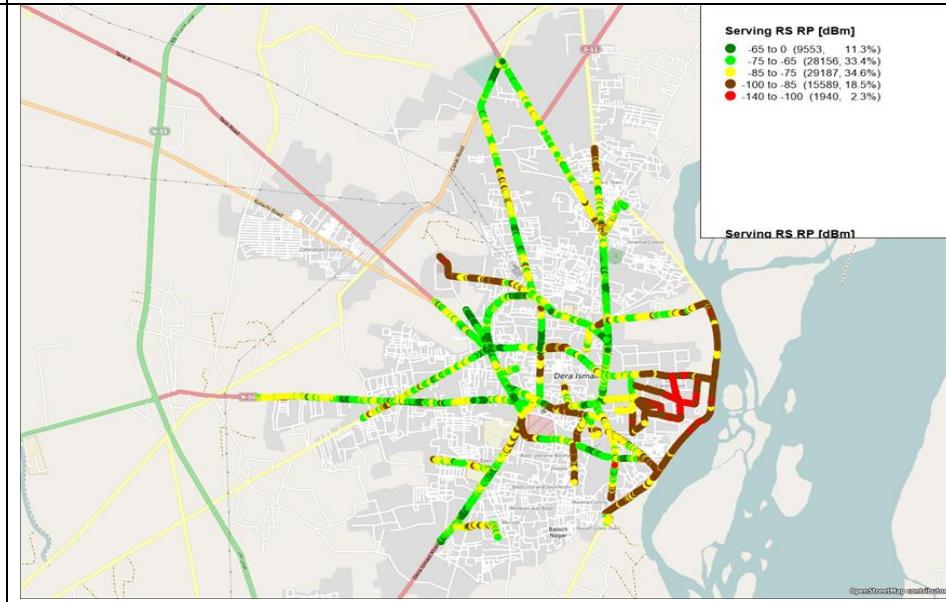


4G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSRP)

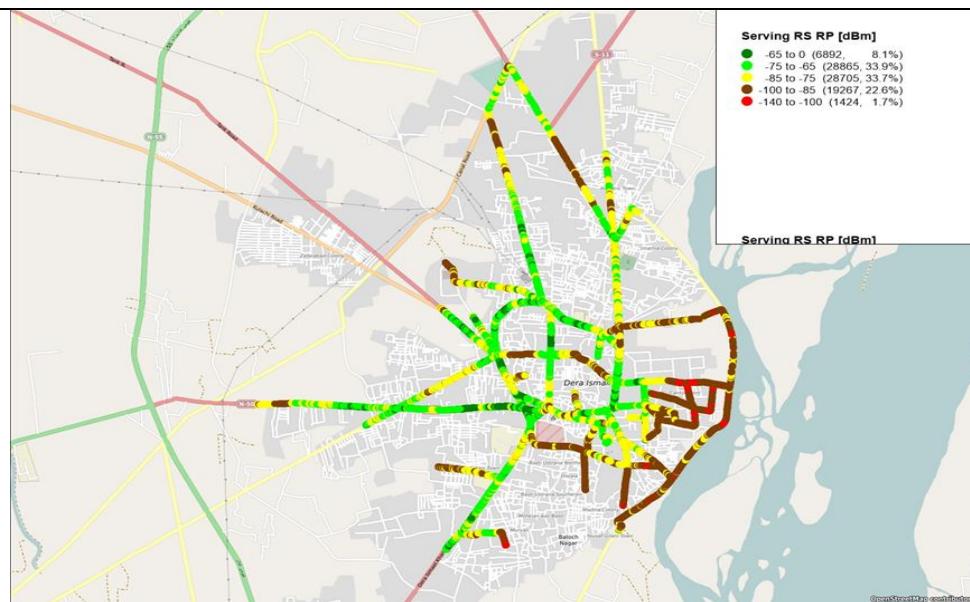
JAZZ 4G NETWORK COVERAGE - DI KHAN



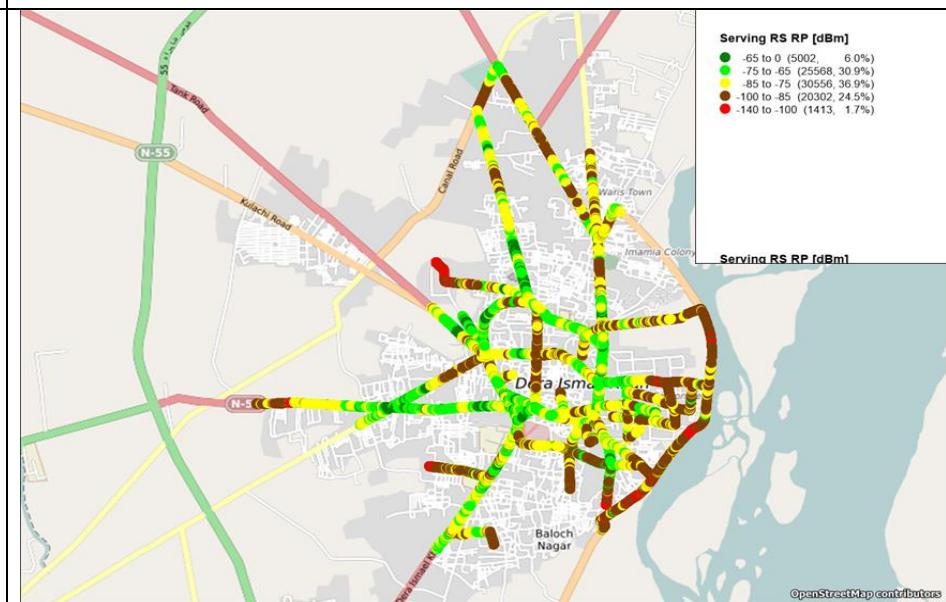
TELENOR 4G NETWORK COVERAGE - DI KHAN



Ufone 4G NETWORK COVERAGE - DI KHAN

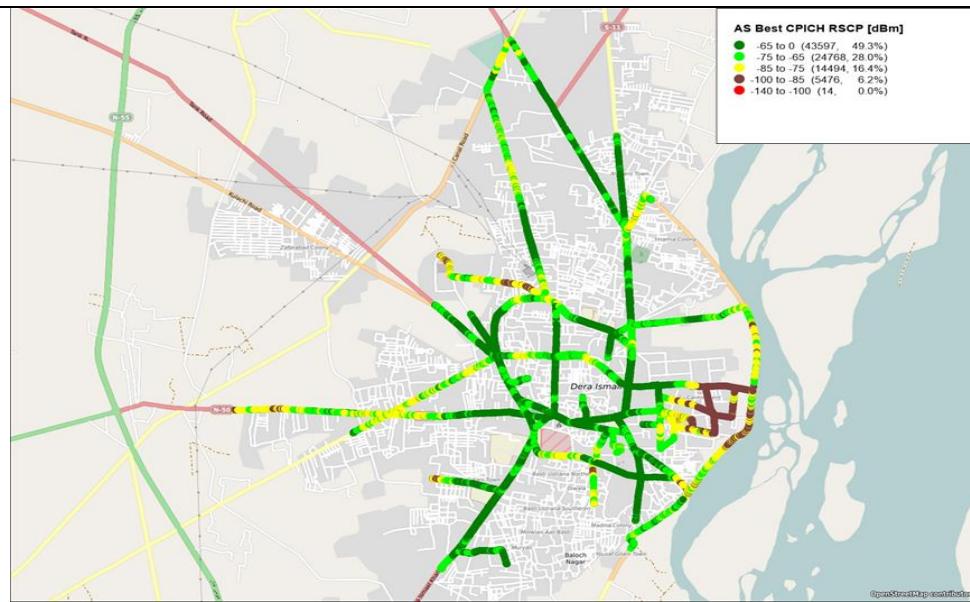


ZONG 4G NETWORK COVERAGE - DI KHAN

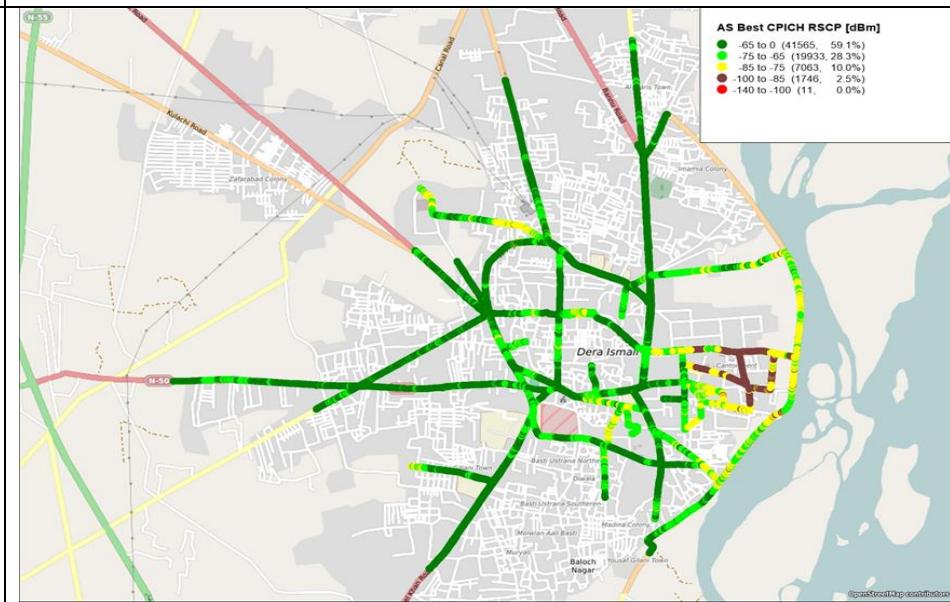


3G MOBILE COVERAGE IN CITIES- SIGNAL STRENGTH (RSCP)

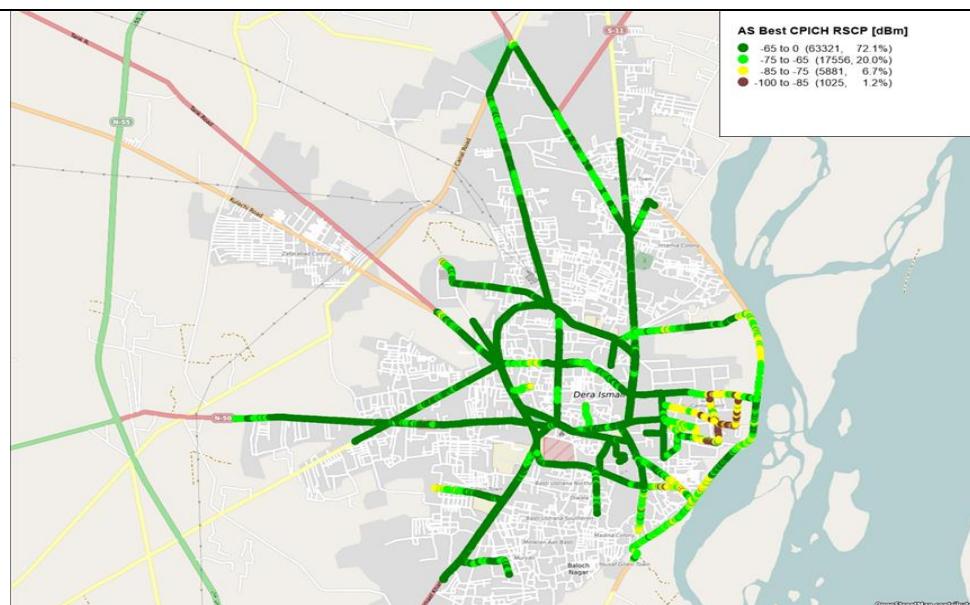
JAZZ 3G NETWORK COVERAGE - DI KHAN



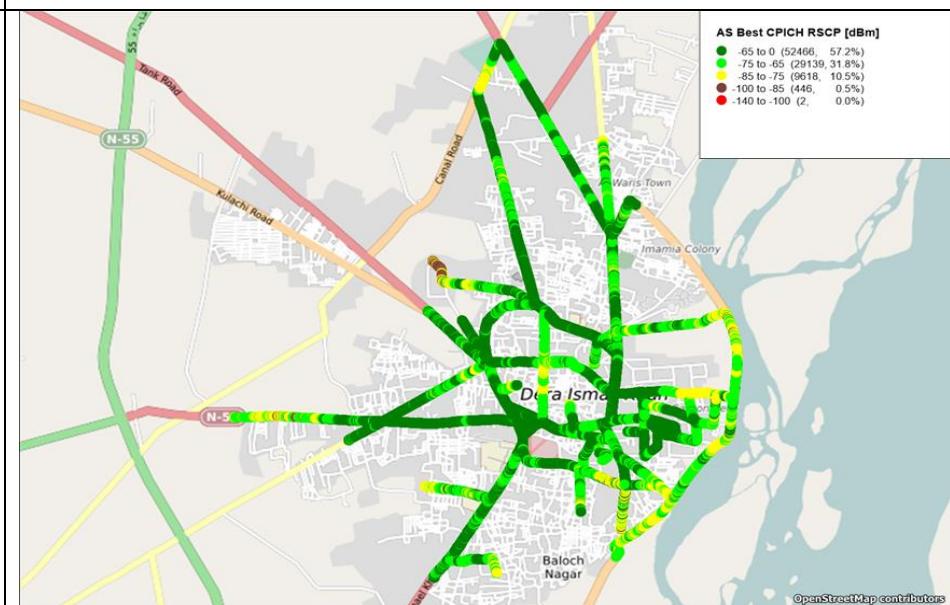
TELENOR 3G NETWORK COVERAGE - DI KHAN



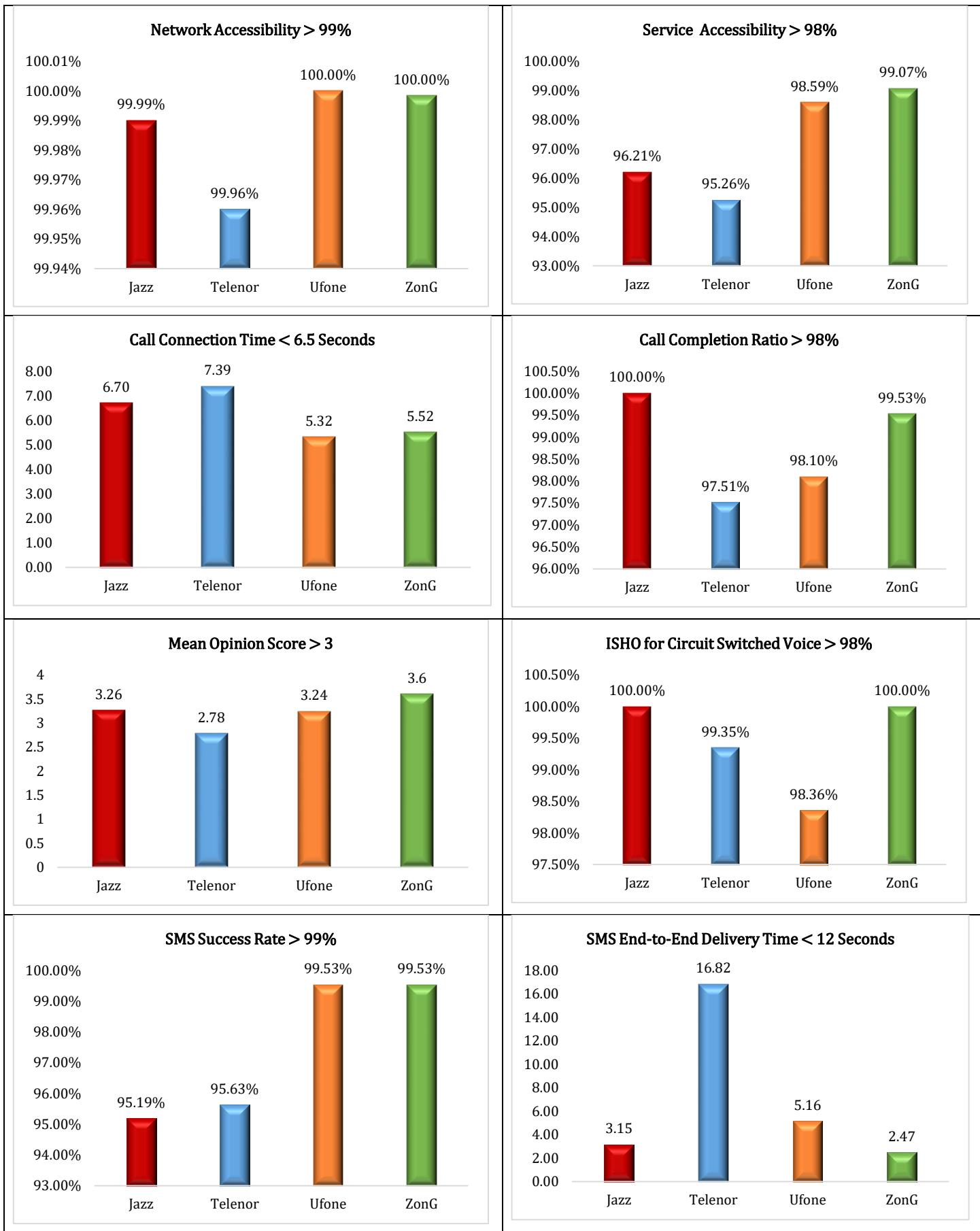
UFONE 3G NETWORK COVERAGE - DI KHAN



ZONG 3G NETWORK COVERAGE - DI KHAN



QUALITY OF SERVICE SURVEY RESULTS – DI KHAN



QUALITY OF SERVICE SURVEY RESULTS – DI KHAN

