

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

FIRST QUARTER 2022

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

INDEPENDENT QUALITY OF SERVICE SURVEY REPORT

INTRODUCTION

1.1. In order to measure the performance and service quality of Cellular Mobile Operators (CMOs), an independent Quality of Service (QoS) Survey has been carried out on eight (08) x Motorways, Highways and Inter-Cities Roads during 1st quarter i.e. January ~ March 2022. The name of Motorways, Highways and Inter-Cities Roads along with survey dates are mentioned in **Table 1.1: QoS Survey Roads & Dates:**

S. #.	Motorways/ Highways/ Inter Cities Roads			Survey Date
	Name	From	To	
1.	M-9 Motorway/N-5 Highway	Karachi	Kotri	11 February 2022
2.	M-5/Multan Sukkur Motorway	Multan	Sadiqabad	07 February 2022
3.	GT-Road /Mirpur-Bhimber Road	Rawalpindi	Bhimber	07 February 2022
4.	N-65 Highway	Sukkur	Jacobabad	15 February 2022
5.	M-14 / Hakla-Yarik Motorway	Rawalpindi	D.I. Khan	21 February 2022
6.	N-5 Highway	Sukkur	Dadu	22 February 2022
7.	E-75 /Murree Expressway	Rawalpindi	Muzaffarabad	28 February 2022
8.	GT-Road	Lahore	Kharian	14 March 2022

Table 1.1: QoS Survey Dates and Samples

DRIVE TEST DETAILS

2.1. The QoS survey was carried out using Automated QoS Monitoring & Benchmarking Tool i.e. "SMARTBENCHMARKER". Drive test teams covered Motorway / Highway/Inter Cities Roads from one city to other city. During the survey, mobile handsets for Voice Calls, SMS and Data Sessions, were kept in auto detect mode.

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**.

Road Name	4G Signal Strength Confidence Level				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Karachi to Kotri	94.79%	95.09%	83.81%	87.28%	Yes	Yes	No	No
Multan to Sadiqabad	95.86%	75.84%	7.43%	87.96%	Yes	No	No	No
Lahore to Kharian	98.22%	97.98%	93.79%	97.86%	Yes	Yes	Yes	Yes
Sukkur to Dadu	91.66%	63.19%	66.56%	83.57%	Yes	No	No	No
Sukkur to Jacobabad	95.86%	72.56%	51.11%	95.28%	Yes	No	No	Yes
M-14 Motorway	86.74%	87.19%	93.63%	83.85%	No	No	Yes	No
Rawalpindi to Bhimber	92.61%	92.47%	86.34%	94.37%	Yes	Yes	No	Yes
Rawalpindi to Muzaffarabad	86.71%	71.34%	74.36%	82.85%	No	No	No	No

Table 3.2: 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**.

Road Name	3G Signal Strength Confidence Level				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Karachi to Kotri	99.98%	98.04%	99.99%	99.93%	Yes	Yes	Yes	Yes
Multan to Sadiqabad	98.95%	99.01%	74.63%	100.00%	Yes	Yes	No	Yes
Lahore to Kharian	100.00%	100.00%	100.00%	100.00%	Yes	Yes	Yes	Yes
Sukkur to Dadu	99.07%	92.81%	97.27%	99.70%	Yes	Yes	Yes	Yes
Sukkur to Jacobabad	99.31%	100.00%	99.87%	100.00%	Yes	Yes	Yes	Yes
M-14 Motorway	95.38%	95.56%	94.80%	79.14%	Yes	Yes	No	Yes
Rawalpindi to Bhimber	96.18%	98.49%	98.30%	98.88%	Yes	Yes	Yes	Yes
Rawalpindi to Muzaffarabad	91.40%	99.30%	97.46%	99.24%	Yes	Yes	Yes	Yes

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

MOBILE BROADBAND SERVICE

4.1. A total of **3,790 successful http download test attempts** made. The company wise detail of Test Attempt Success Ratio, User Data Throughput, 4G/LTE, 3G & 2G Network Signal Strength is mentioned in **Table4.1: Data Tests Statistics**.

Description	Jazz	Telenor	Ufone	ZonG
<i>SUCCESSFUL DATA TEST ATTEMPTS</i>	997	1005	777	1011
<i>TEST ATTEMPTS SUCCESS RATIO (%)</i>	2.14	5.45	1.1	4.34
<i>USER DATA THROUGHPUT (Mbps)</i>	6.513	2.853	6.182	7.229
<i>AVERAGE 4G SIGNAL STRENGTH (RSRP) dBm</i>	-84.6	-88.7	-86.9	-86.8
<i>AVERAGE 4G SIGNAL STRENGTH (RSCP) dBm</i>	-73.55	-74.95	-77.4	-75.12
<i>AVERAGE 4G SIGNAL STRENGTH (RXLEV) dBm</i>	-73.38	-79.7	-78.64	-76.42

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 on **8 x surveyed roads** is shown in **Table4.2: 4G User Data Throughput \geq 2 Mbps**.

Road Name	User Data Throughput (Mbps)				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Karachi to Kotri	8.27	6.51	9.58	12.24	Third	Fourth	Second	First
Multan to Sadiqabad	10.21	3.93	6.54	8.67	First	Fourth	Third	Second
Lahore to Kharian	4.88	3.83	14.42	13.43	Third	Fourth	First	Second
Sukkur to Dadu	11.24	4.09	19.61	20.68	Third	Fourth	Second	First
Sukkur to Jacobabad	14.36	4.82	12.08	23.32	Second	Fourth	Third	First
M-14 Motorway	7.39	2.29	7.59	9.29	Third	Fourth	Second	First
Rawalpindi to Bhimber	9.27	2.51	13.17	9.74	Third	Fourth	First	Second
Rawalpindi to Muzaffarabad	16.28	3.90	19.36	13.00	Second	Fourth	First	Third

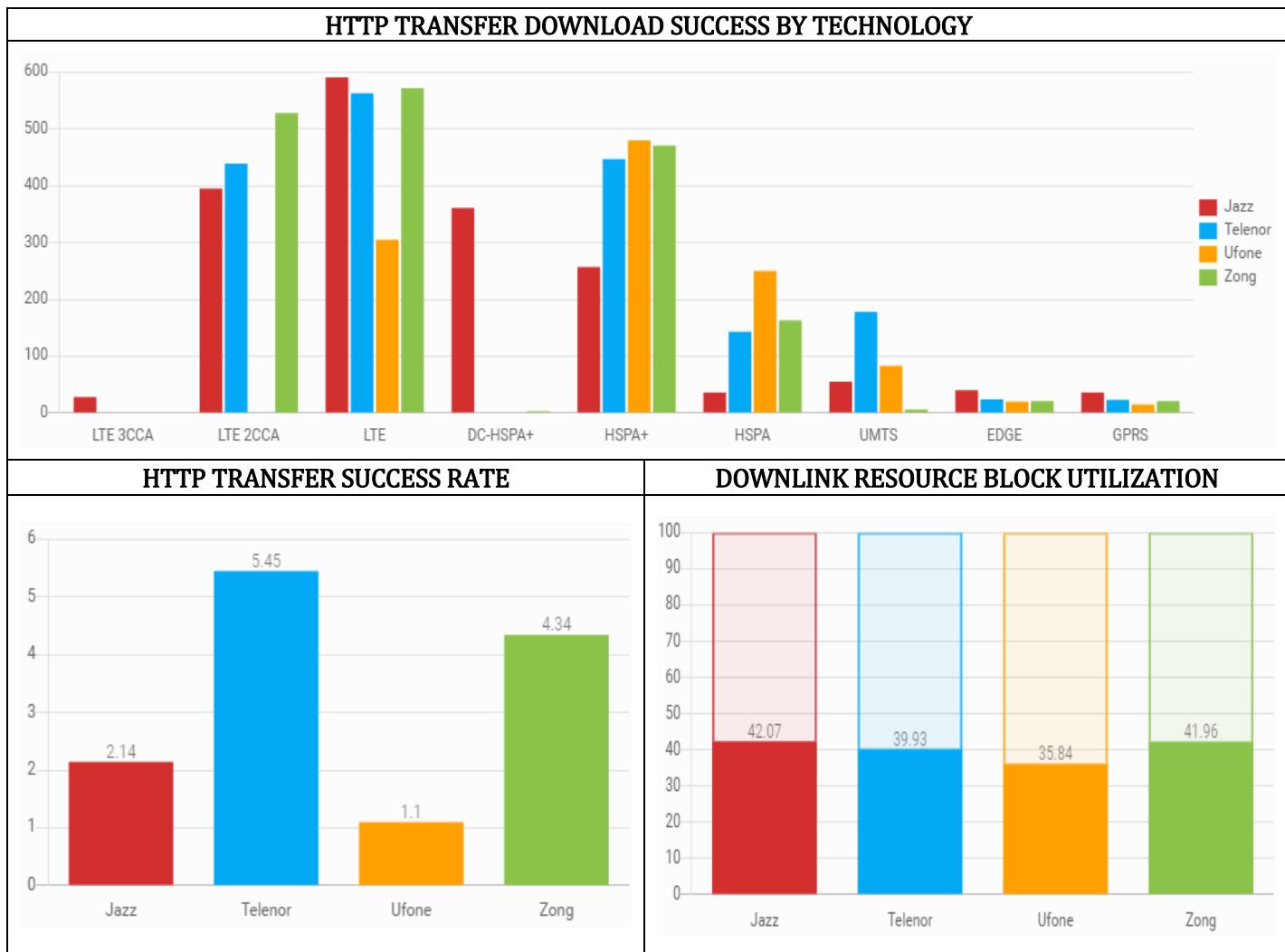
Table4.2: 4G User Data Throughput \geq 2 Mbps

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 on 8 x surveyed roads is shown in **Table4.2: 3G User Data Throughput \geq 256 Kbps**.

Road Name	User Data Throughput (Mbps)				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Karachi to Kotri	1981.13	2756.01	2184.63	705.58	Third	First	Second	Fourth
Multan to Sadiqabad	2444.61	3894.85	1767.03	945.42	Second	First	Third	Fourth
Lahore to Kharian	2635.73	1630.93	4702.69	2197.61	Second	Fourth	First	Third
Sukkur to Dadu	2749.16	3103.98	1444.37	1425.42	Second	First	Third	Fourth
Sukkur to Jacobabad	3143.59	3298.55	1487.58	1350.21	Second	First	Third	Fourth
M-14 Motorway	2033.62	1727.25	2227.00	1286.35	Second	Third	First	Fourth
Rawalpindi to Bhimber	2680.37	1254.91	1744.99	1042.25	First	Third	Second	Fourth
Rawalpindi to Muzaffarabad	2854.64	2200.68	2864.53	902.91	Second	Third	First	Fourth

Table4.2: 3G User Data Throughput \geq 256 Kbps

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



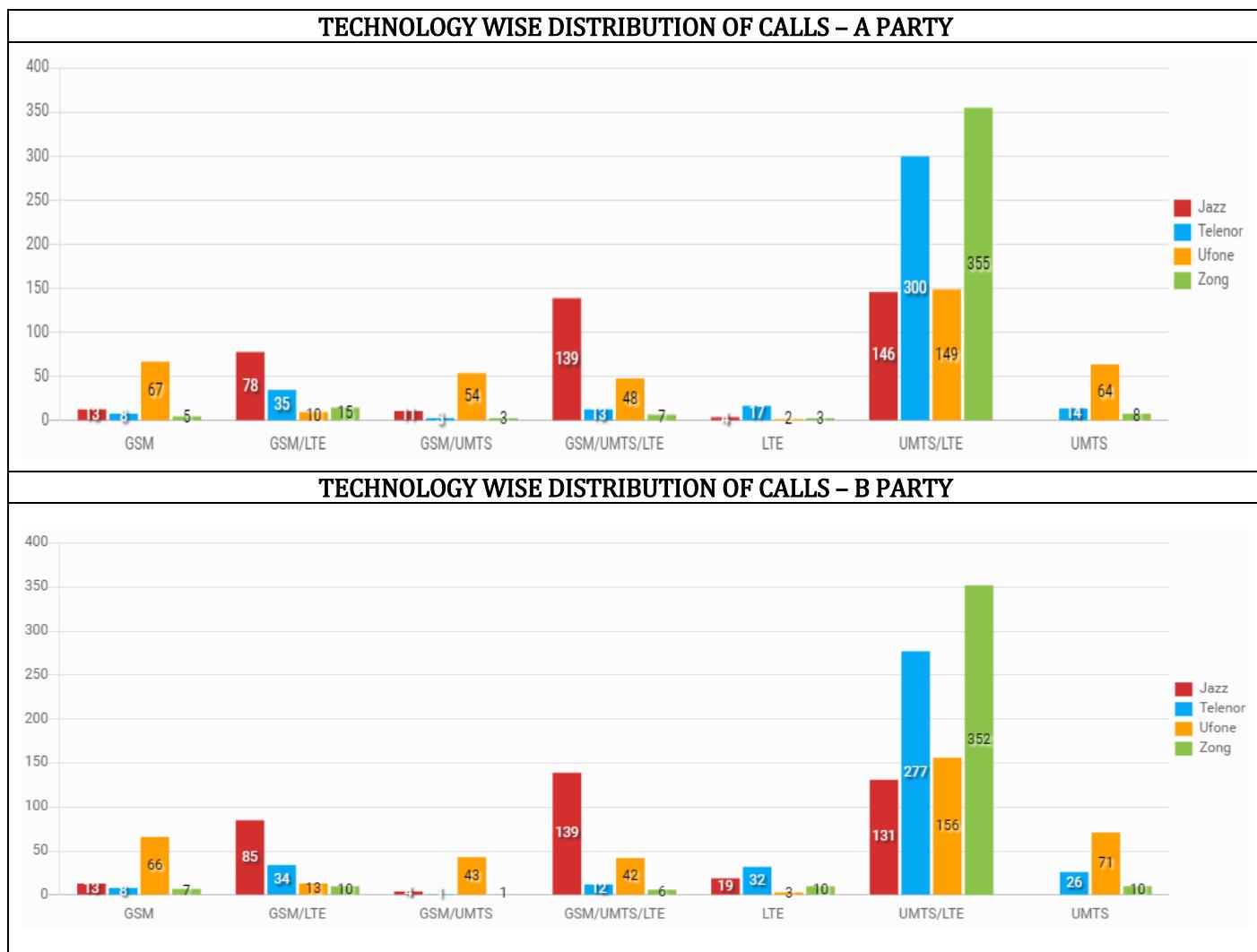
VOICE SERVICE

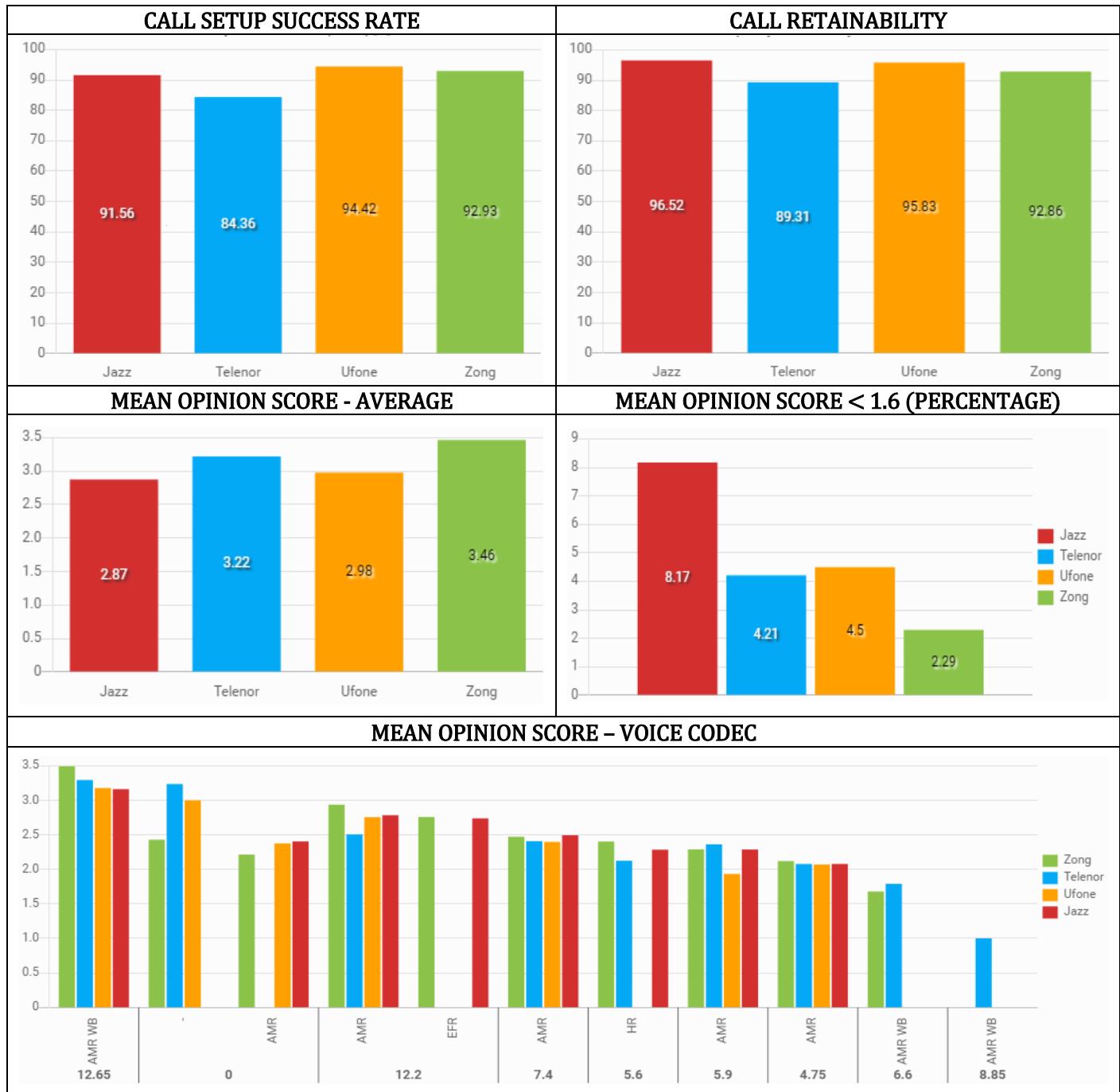
5.1. A total of **1,571 Calls attempts** made and out of which **144 attempts failed**. In **1,427 successfully established calls**, **54 calls dropped** prior to completion of two minutes duration, whereas **1,373 calls remained connected** for the complete duration of two minutes. The company wise call statistics is alongwith overall QoS KPIs is shown in **Table5.1: Call Statistics**.

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
TOTAL CALLS ATTEMPTS	391	390	394	396
FAILED CALLS ATTEMPTS	33	61	22	28
ESTABLISHED CALLS ATTEMPTS	358	329	372	368
DROPPED CALLS ATTEMPTS	14	17	12	11
COMPLETED CALLS ATTEMPTS	344	312	360	357
CALL SETUP SUCCESS RATE (%)	91.56	84.36	94.42	92.93
CALL SETUP TIME (Seconds)	8.44	9.94	7.43	7.6
CALL COMPLETION RATE (%)	96.52	89.31	95.83	92.86
ISHO SUCCESS RATE (%)	99.27	100	100	-
RAB SETUP SUCCESS RATE (%)	100	100	100	100
MEAN OPINION SCORE	2.87	3.22	2.98	3.46

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 in the graphs.





5.3. The 7 x QoS KPIs (*i.e.* Network Accessibility, Call Setup Success Rate, Call Setup Time, Call Completion Rate, Mean Opinion Score, Inter System Handover Success Rate & RAB Setup Success Rate) have been measured while testing voice services on 8 x surveyed roads of Pakistan. The compliance level of threshold values of voice QoS KPIs on each road is shown in Table 5.2: Voice QoS KPIs Compliance Level.

VOICE CALLS ROADS - COMPLIANCE (YES/NO)									
Operator	*Voice KPIs	Karachi to Kotri	Multan to Sadiqabad	Lahore to Kharian	Sukkur to Dadu	Sukkur to Jacobabad	M-14 Motorway	Rawalpindi to Bhimber	Rawalpindi to Muzaffarabad
Jazz	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SA	Yes	No	No	No	No	No	No	No
	CCT	Yes	No	Yes	Yes	No	Yes	Yes	No
	CCR	Yes	No	Yes	No	Yes	No	Yes	No
	MOS	Yes	No	Yes	No	No	No	No	No
	ISHO	Yes	Yes	No	Yes	Yes	Yes	Yes	No
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Telenor	NA	No	Yes	Yes	Yes	Yes	No	Yes	Yes
	SA	No	No	No	No	No	No	No	No
	CCT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	No	No	Yes	No	Yes	No	No	No
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
	ISHO	N/A	Yes	N/A	Yes	N/A	Yes	No	N/A
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ufone	NA	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
	SA	No	Yes	No	No	Yes	No	No	Yes
	CCT	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
	CCR	No	Yes	Yes	Yes	Yes	No	No	No
	MOS	Yes	No	Yes	No	Yes	No	Yes	No
	ISHO	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zong	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SA	Yes	Yes	No	Yes	Yes	No	No	No
	CCT	Yes	Yes	Yes	Yes	Yes	No	Yes	No
	CCR	Yes	Yes	Yes	Yes	Yes	No	No	No
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	RSSR	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 **1,578 SMS sending attempt** conducted, out of which **1,512 SMS successfully received** at B-Party. The company wise SMS Statistics are shown in **Table 6.1: SMS Statistics**

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
<i>SMS SEND REQUEST</i>	394	393	394	397
<i>SMS SUCCESSFULLY TRANSMITTED</i>	386	376	388	391
<i>SMS SUCCESSFULLY RECEIVED</i>	374	371	382	385
<i>SMS RECEIVE SUCCESS RATE (%)</i>	94.92	94.4	96.95	96.98
<i>END TO END DELIVERY TIME (Seconds)</i>	4.27	12.75	8.38	3.15

Table 6.1: SMS Statistics

6.2. The SMS Send Request by Technology, Success Rate and End to End Delivery Time and Send Duration 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 and plotted on maps. The Signal Strength maps along-with Voice & SMS QoS KPIs survey results in graphical form are shown at **Annex-A**.

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 and Voice Service based upon the compliance level against each QoS KPI in each category on **8 x surveyed roads**.

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

S. #.	Operator	Compliance Level – No. of Roads				Standing	
		Compliant		Non-Compliant			
		4G	3G	4G	3G		
1.	Jazz	6	8	2	-	1 st	
2.	ZonG	3	8	5	-	2 nd	
3.	Telenor	3	8	5	-	2 nd	
4.	Ufone	2	6	6	2	3 rd	

Table 8.1: CMOs Standing in Mobile Network Coverage

- b. **MOBILE BROADBAND SERVICE.** The categorization of each CMOs, as per the highest to lowest obtained User Data Throughput in 4G/LTE and 3G Networks is shown in **Table 8.2: CMOs Standing in Mobile Broadband Service**.

S. #.	Operator	Highest Throughput – No. of Roads				Standing
		1 st	2 nd	3 rd	4 th	
1.	ZonG	4	3	1	-	1 st
2.	Ufone	3	3	2	-	2 nd
3.	Jazz	1	2	5	-	3 rd
4.	Telenor	-	-	-	8	4 th

Table 8.2: CMOs Standing in Mobile Broadband Service

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

S. #.	Operator	Voice QoS KPIs – No. of Roads		Standing
		Compliant	Non-Compliant	
1.	ZonG	39	9	1 st
2.	Ufone	40	16	2 nd
3.	Telenor	34	18	3 rd
4.	Jazz	34	22	4 th

Table 8.3: CMOs Standing in Voice Service

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

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

Table 8.5: CMOs Overall Standing in QoS Survey

ANNEX - A

MOTORWAYS / HIGHWAYS /

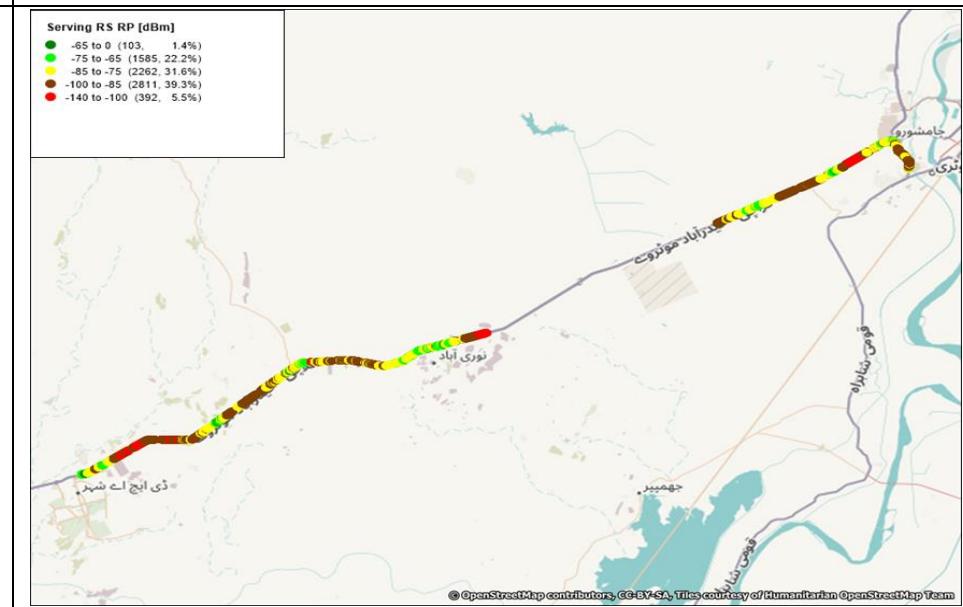
INTER CITIES ROADS

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

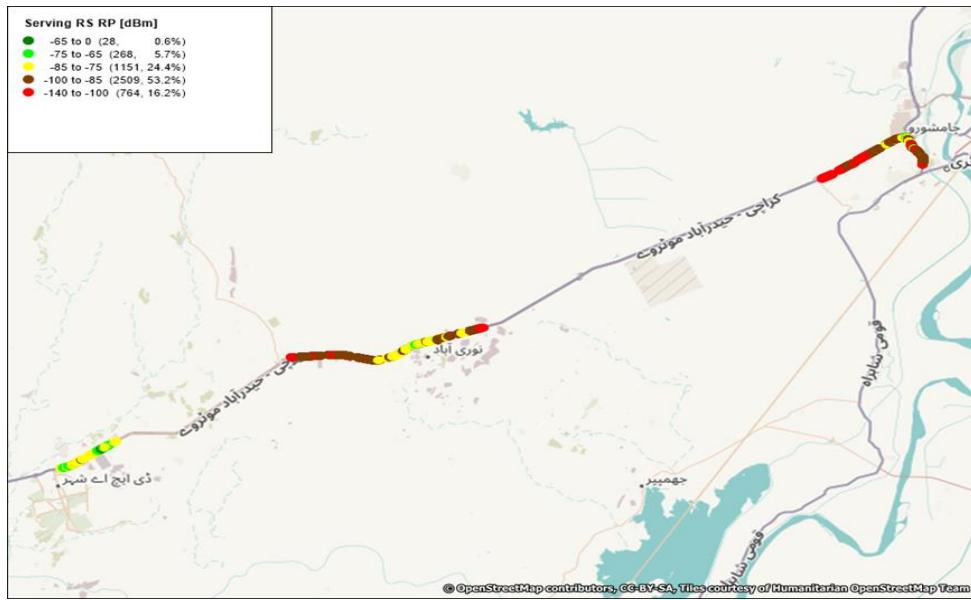
JAZZ 4G NETWORK COVERAGE – KARACHI TO KOTRI



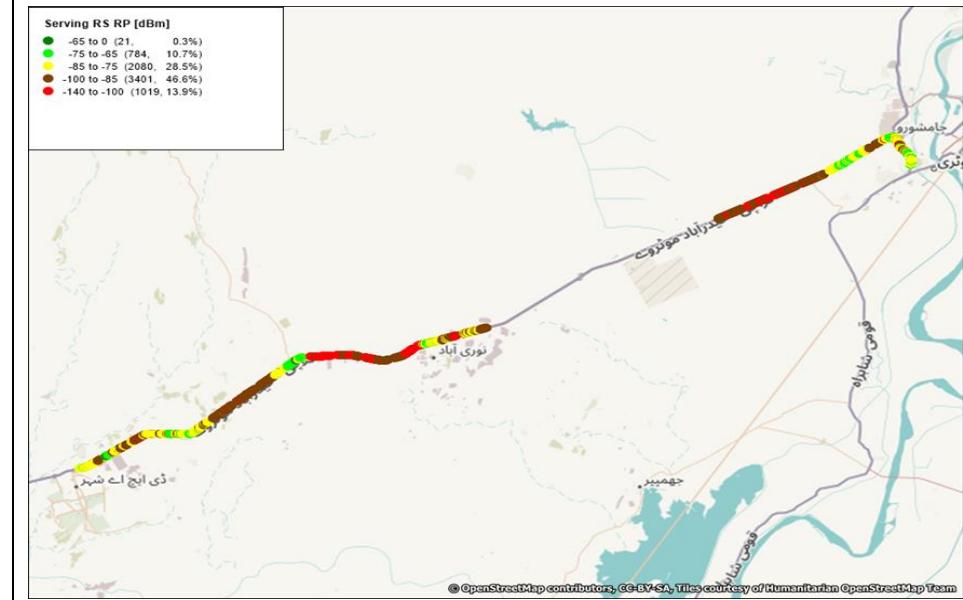
TELENOR 4G NETWORK COVERAGE – KARACHI TO KOTRI



UFONE 4G NETWORK COVERAGE – KARACHI TO KOTRI

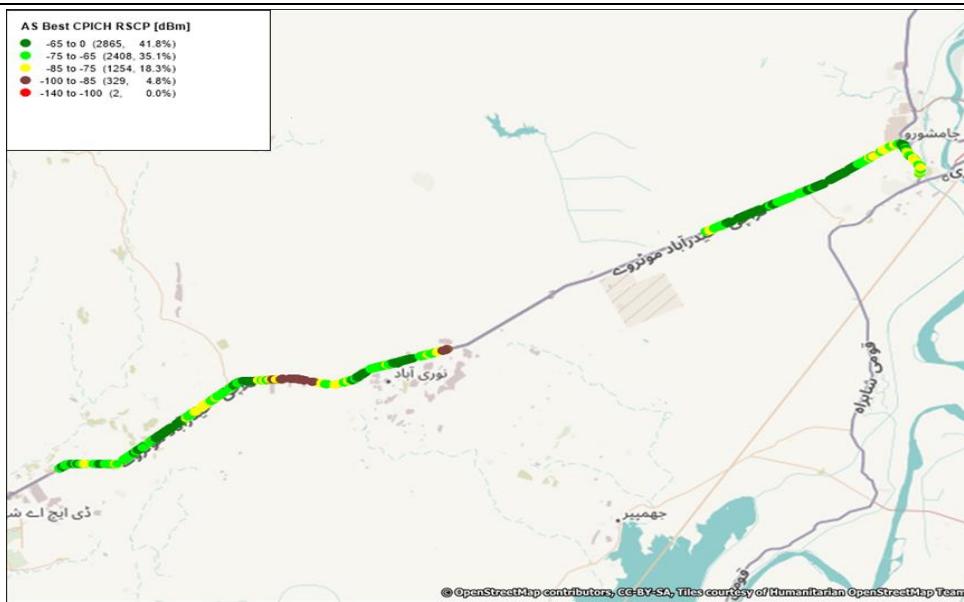


ZONG 4G NETWORK COVERAGE – KARACHI TO KOTRI

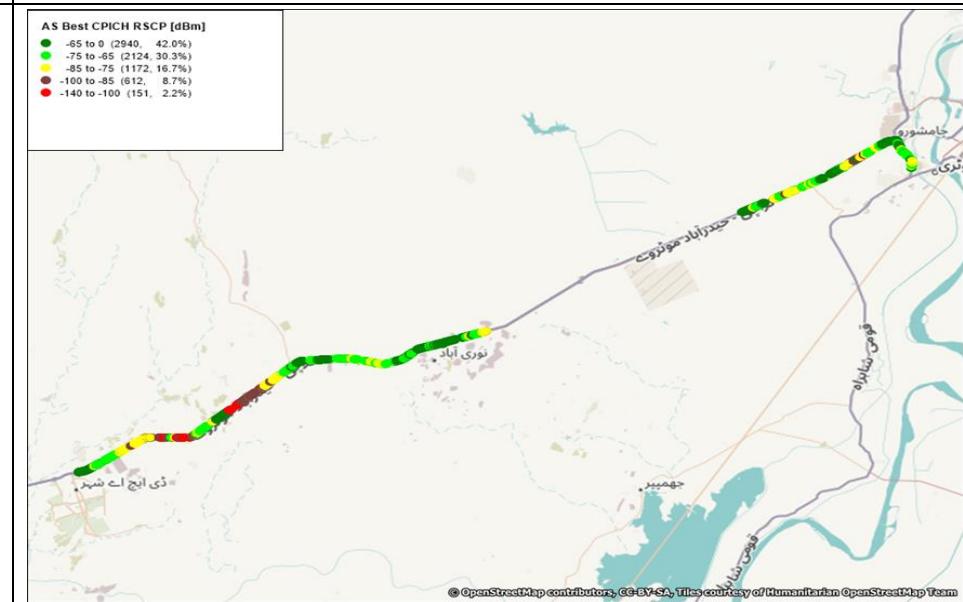


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

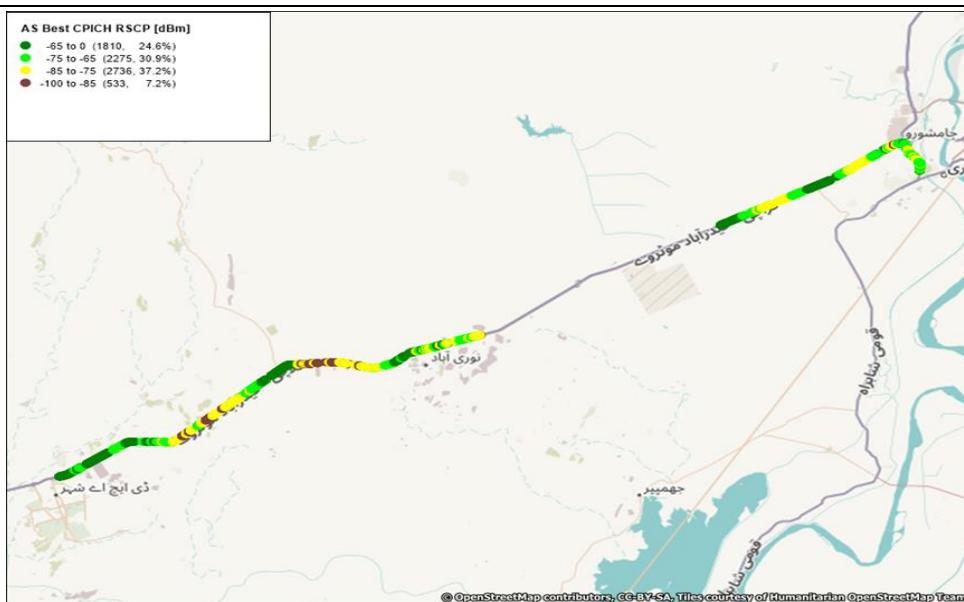
JAZZ 3G NETWORK COVERAGE – KARACHI TO KOTRI



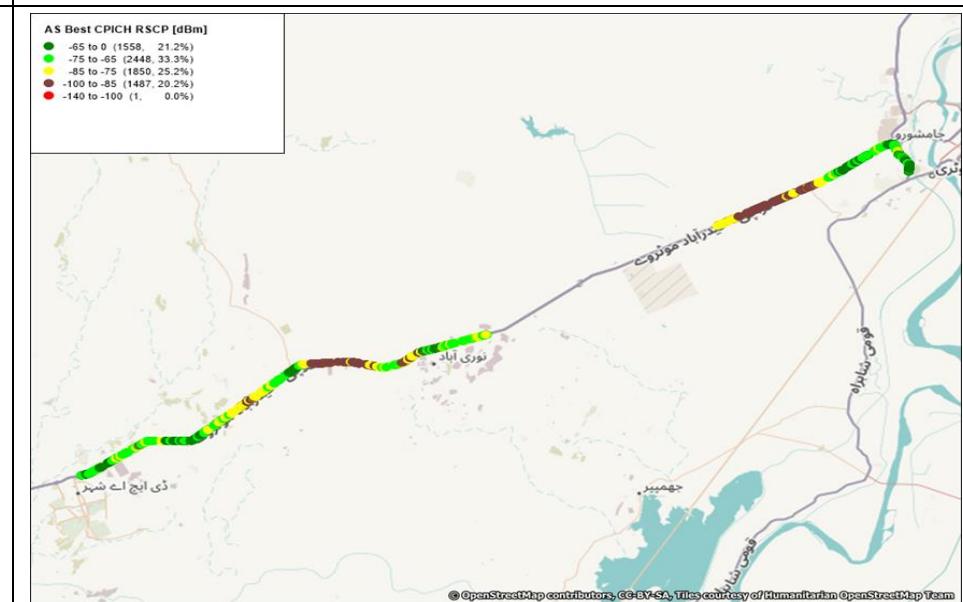
TELENOR 3G NETWORK COVERAGE – KARACHI TO KOTRI



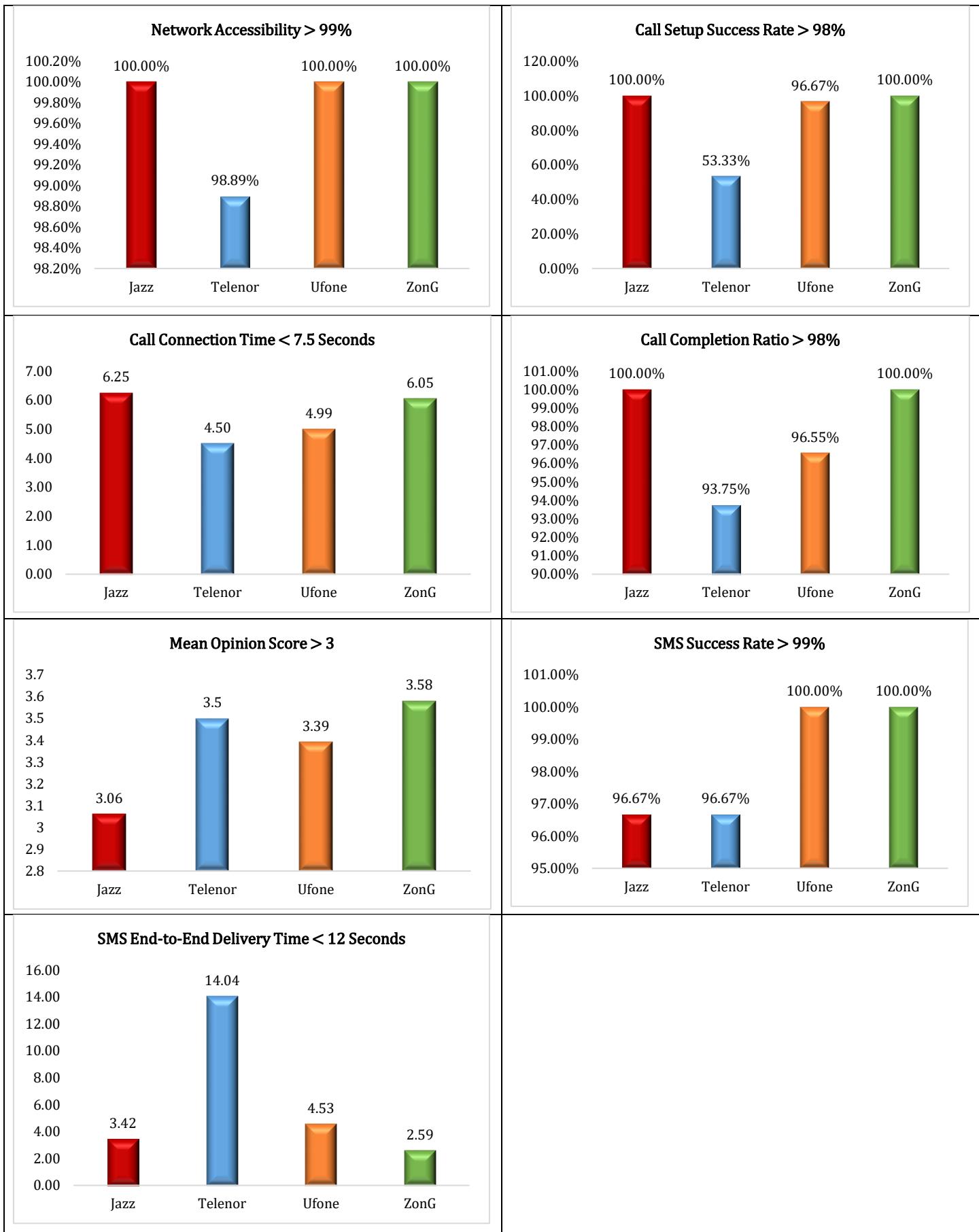
UFONE 3G NETWORK COVERAGE – KARACHI TO KOTRI



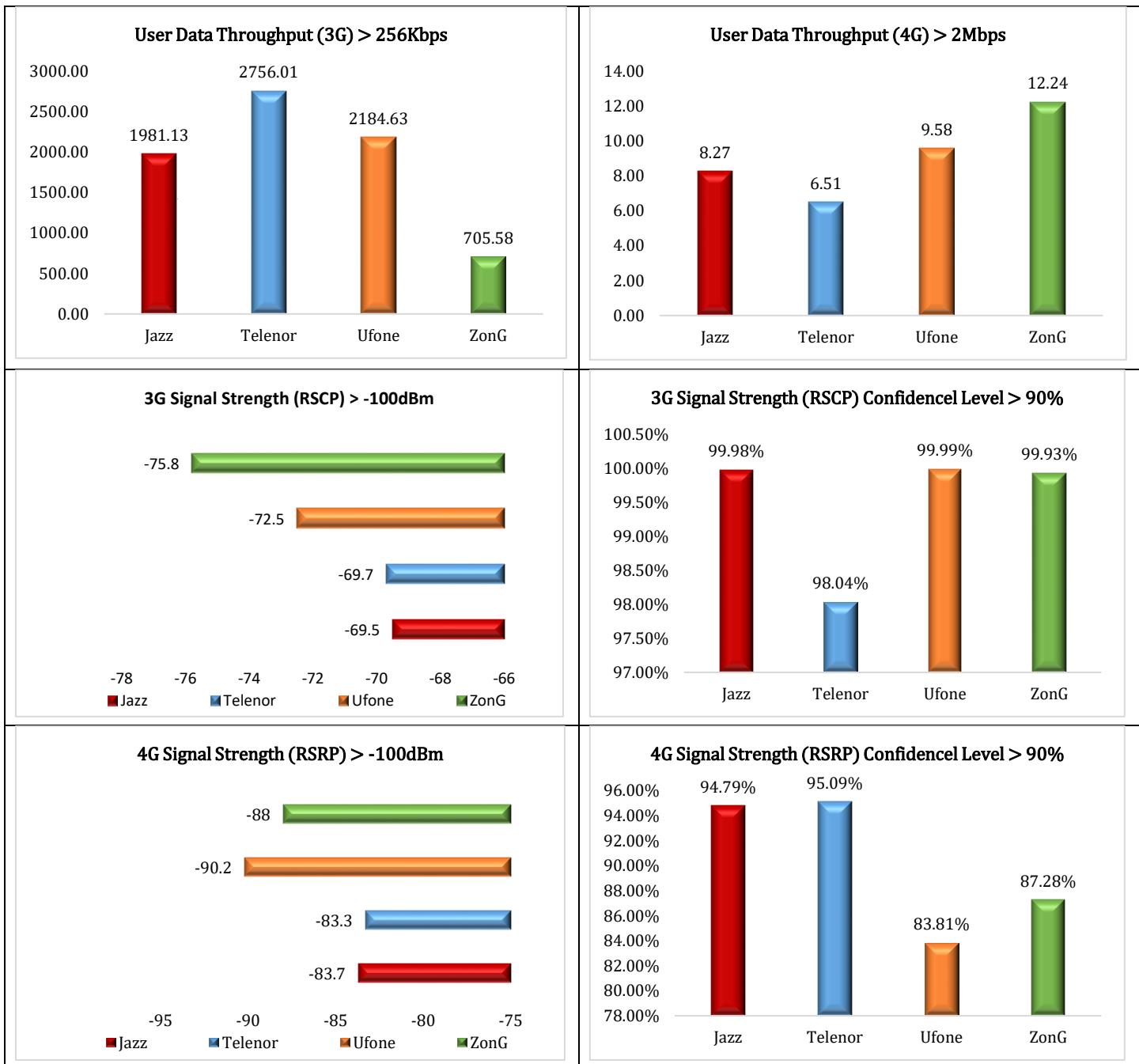
ZONG 3G NETWORK COVERAGE – KARACHI TO KOTRI



QUALITY OF SERVICE SURVEY RESULTS – KARACHI TO KOTRI

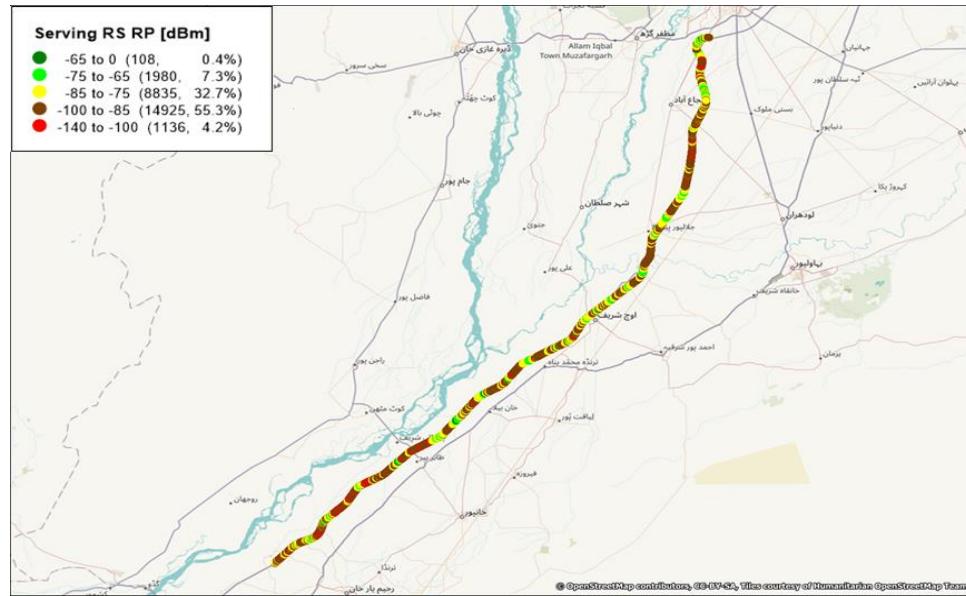


QUALITY OF SERVICE SURVEY RESULTS – KARACHI TO KOTRI

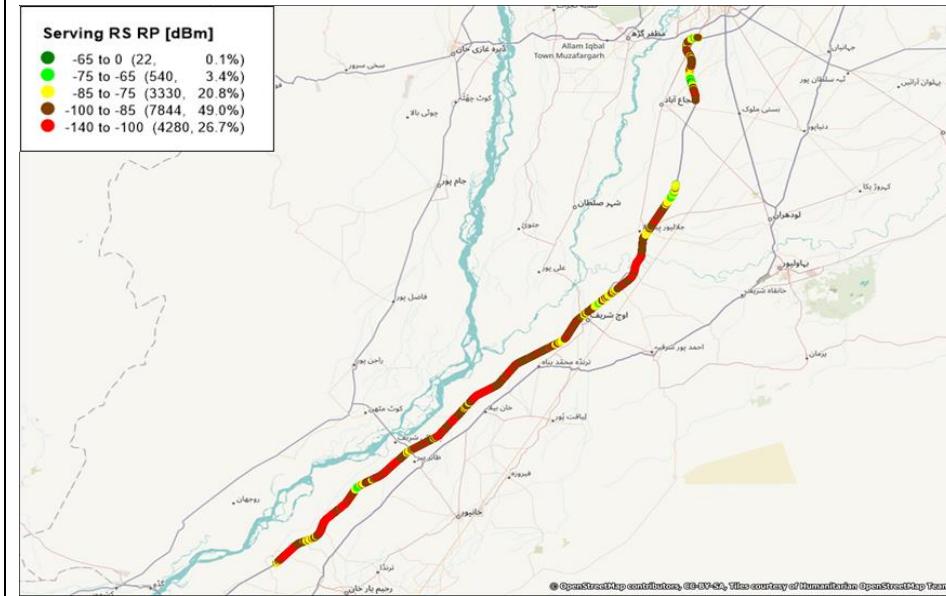


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

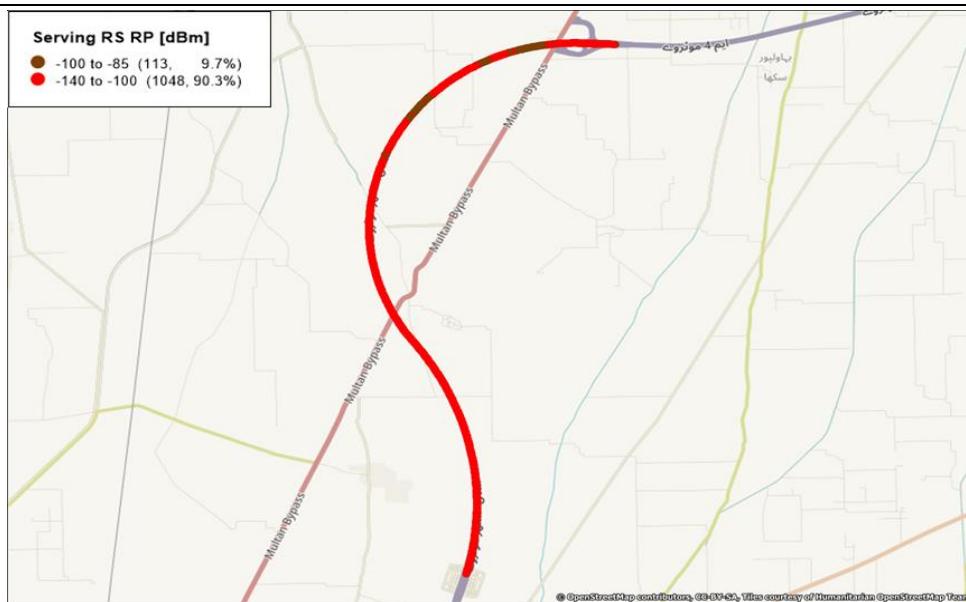
JAZZ 4G NETWORK COVERAGE – MULTAN TO SADIQABAD



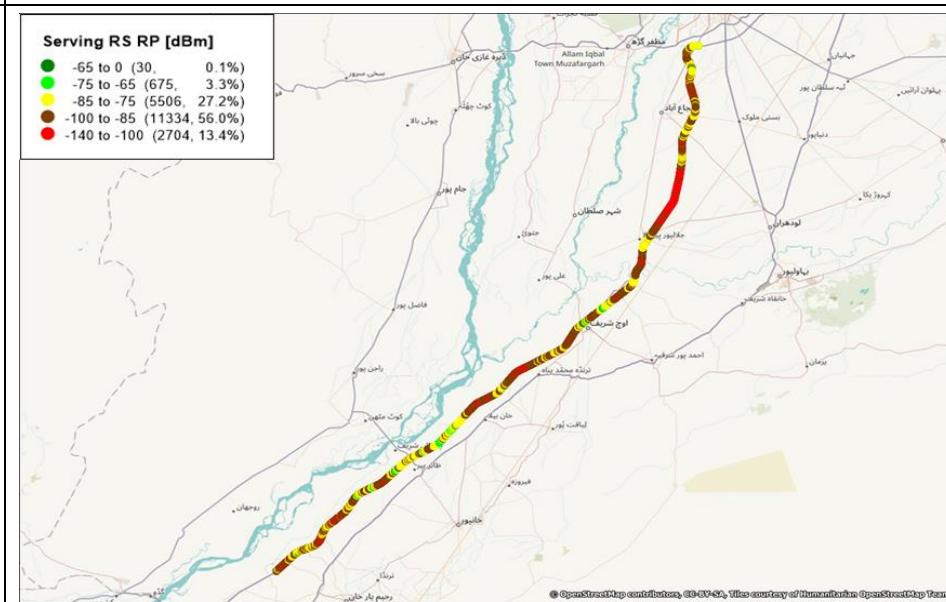
TELENOR 4G NETWORK COVERAGE – MULTAN TO SADIQABAD



UFONE 4G NETWORK COVERAGE – MULTAN TO SADIQABAD

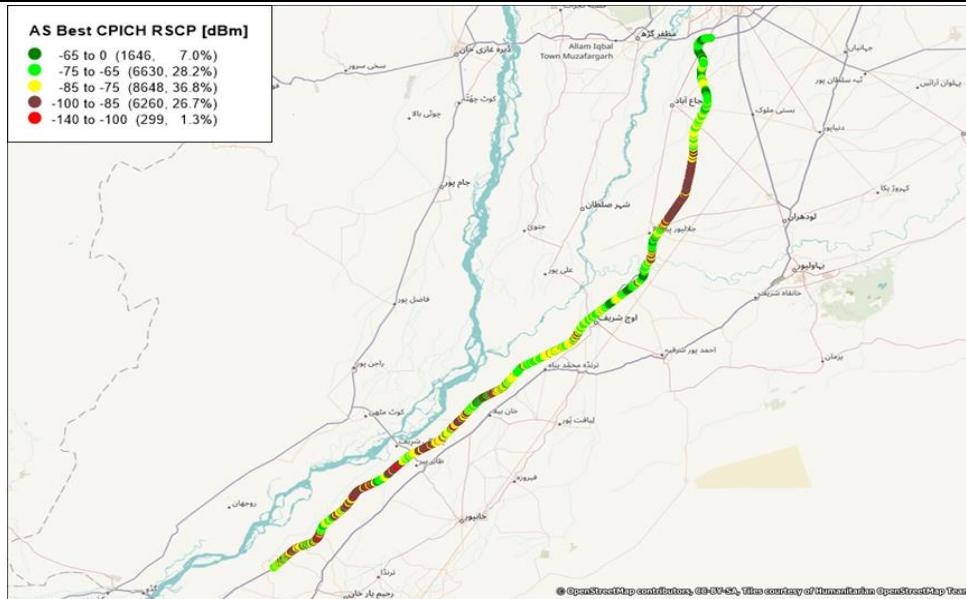


ZONG 4G NETWORK COVERAGE – MULTAN TO SADIQABAD

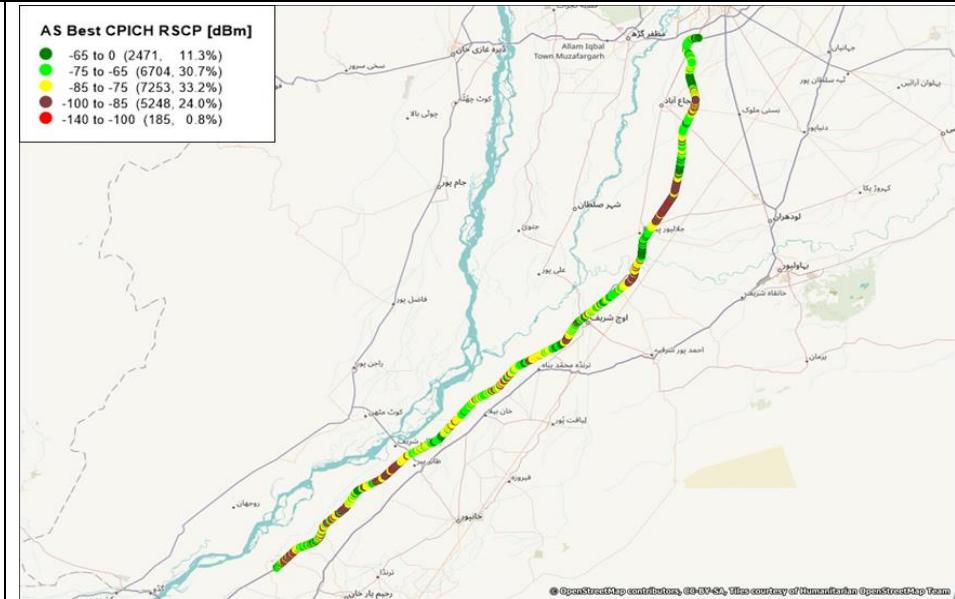


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

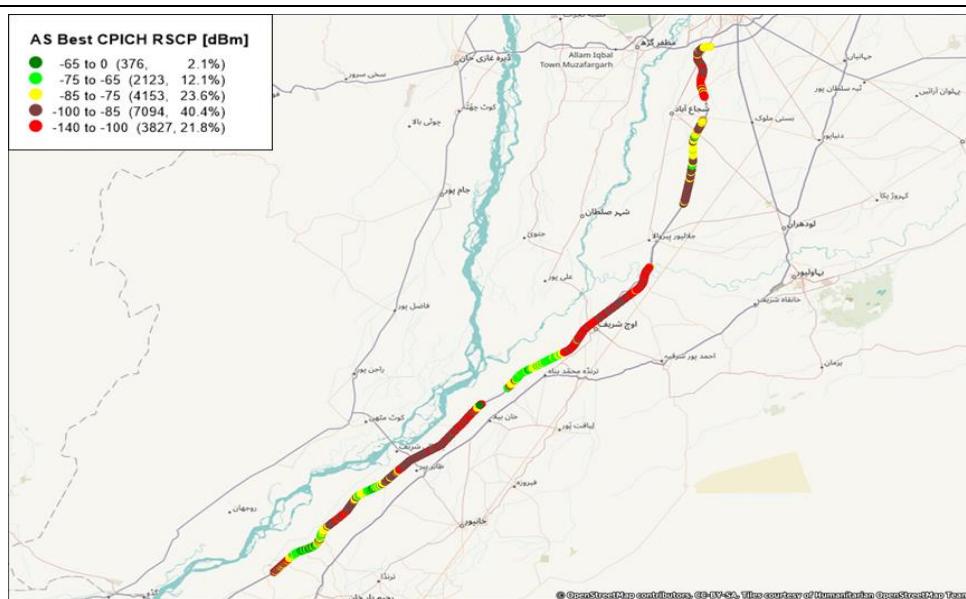
JAZZ 3G NETWORK COVERAGE – MULTAN TO SADIQABAD



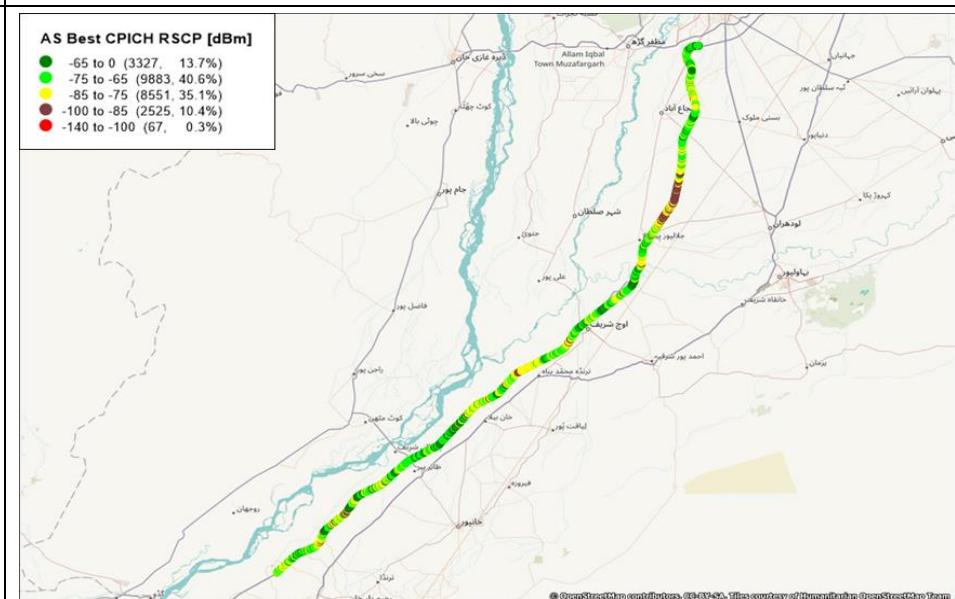
TELENOR 3G NETWORK COVERAGE – MULTAN TO SADIQABAD



UFONE 3G NETWORK COVERAGE – MULTAN TO SADIQABAD



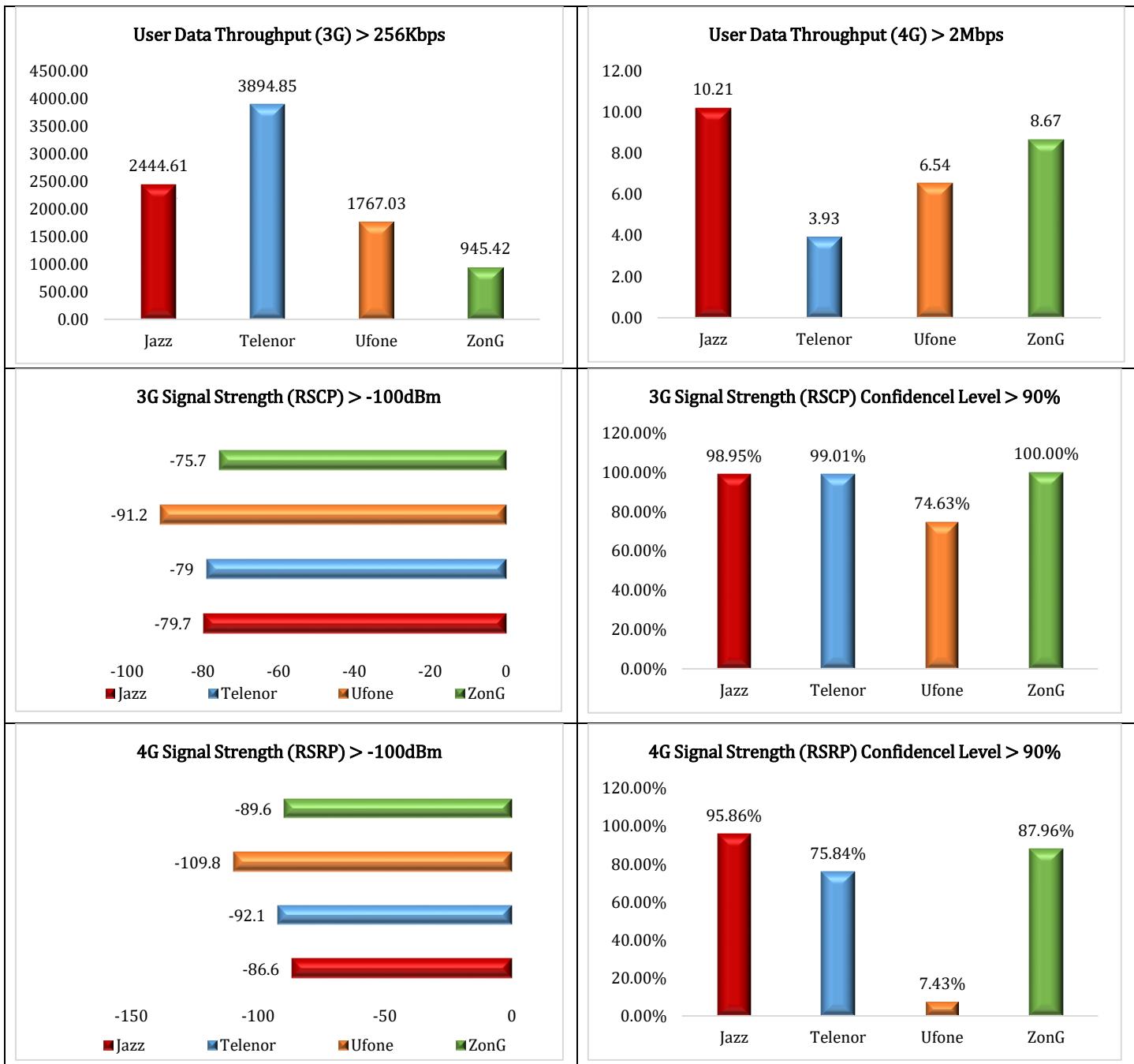
ZONG 3G NETWORK COVERAGE – MULTAN TO SADIQABAD



QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO SADIOQABAD

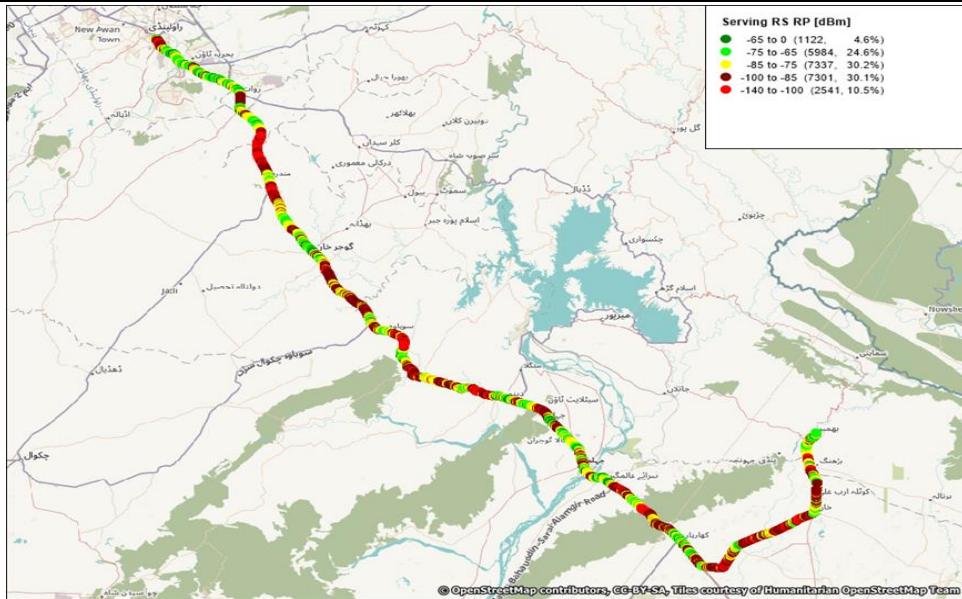


QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO SADIOQABAD

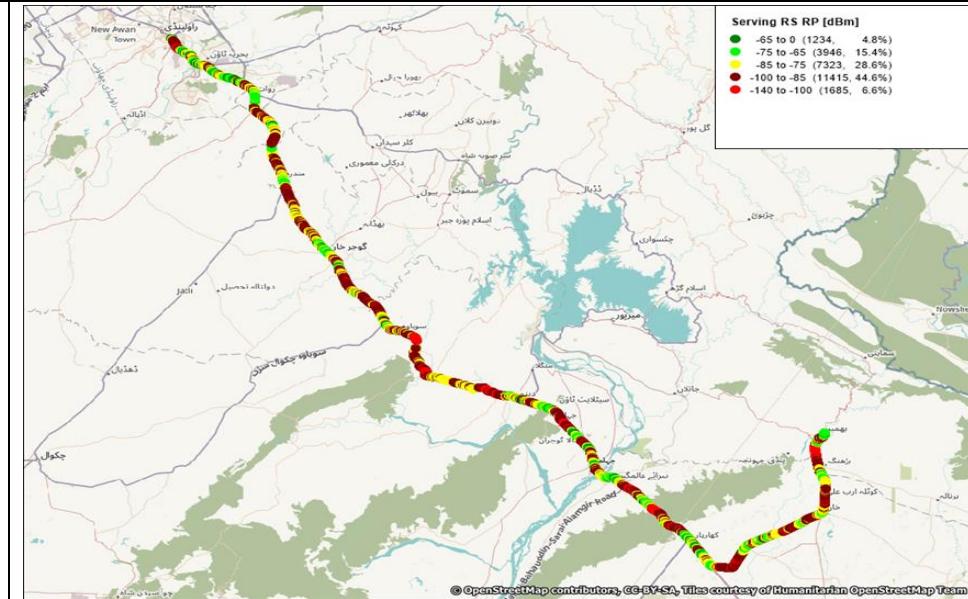


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

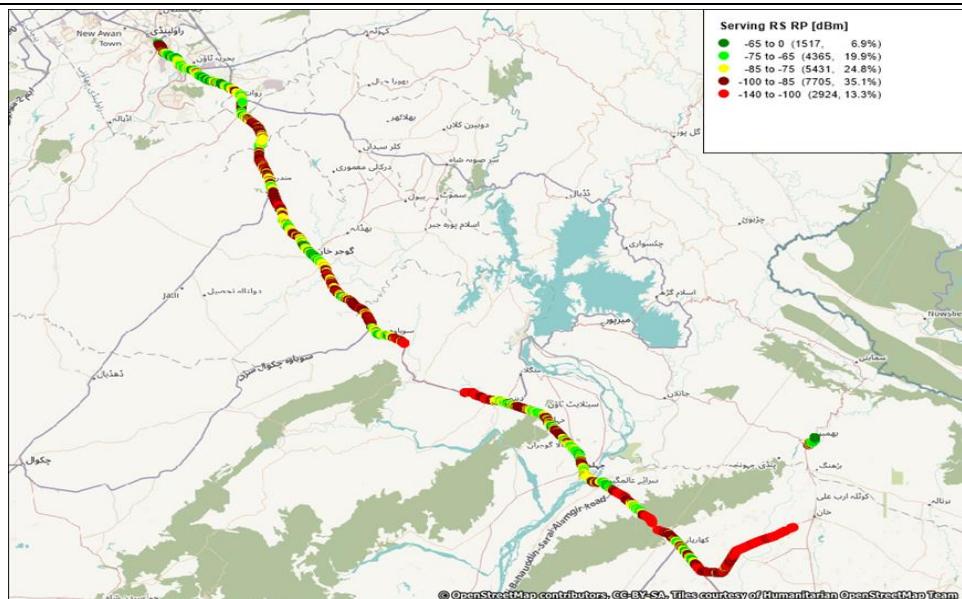
JAZZ 4G NETWORK COVERAGE – RAWALPINDI TO BHIMBER



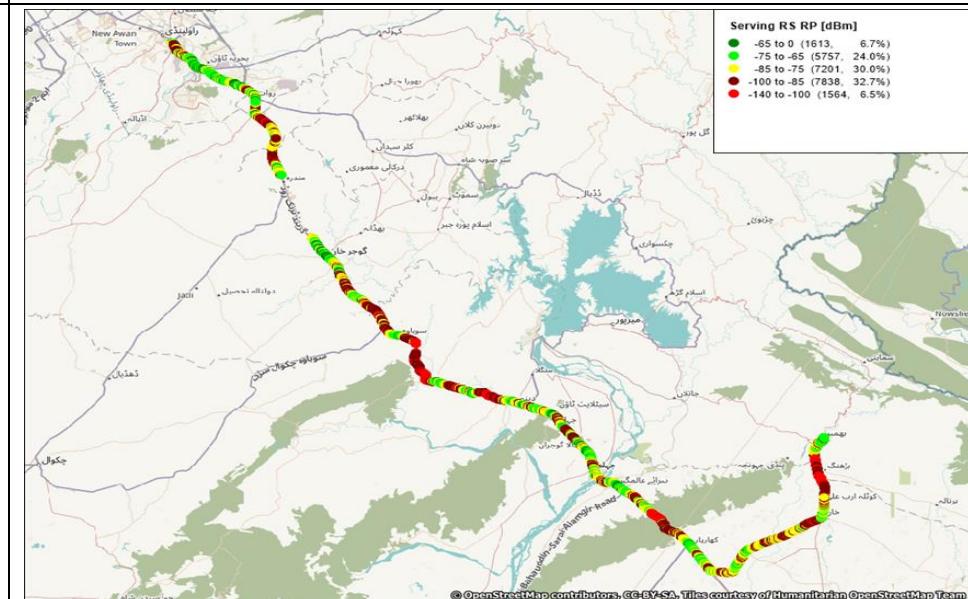
TELENOR 4G NETWORK COVERAGE – RAWALPINDI TO BHIMBER



UFONE 4G NETWORK COVERAGE – RAWALPINDI TO BHIMBER

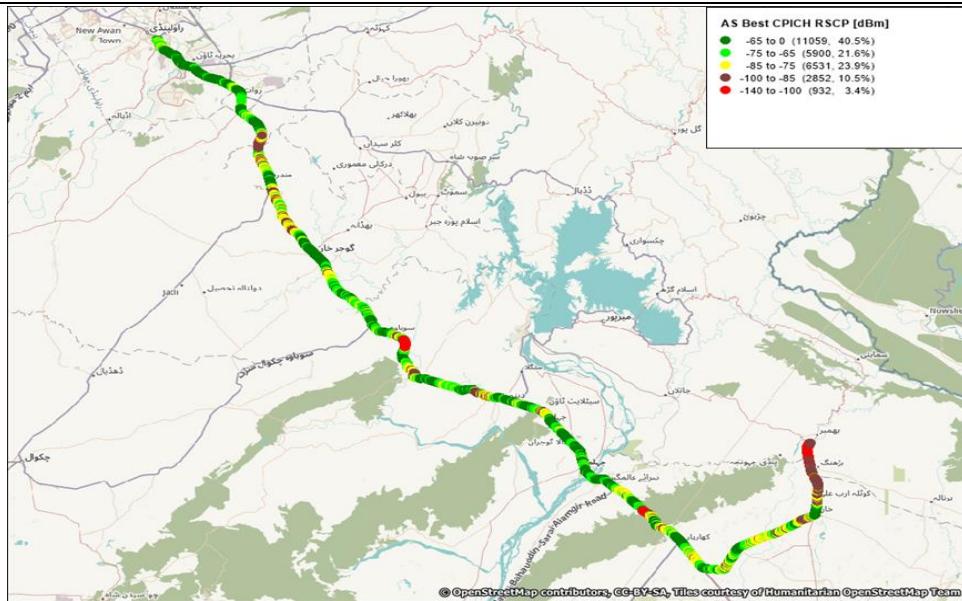


ZONG 4G NETWORK COVERAGE – RAWALPINDI TO BHIMBER

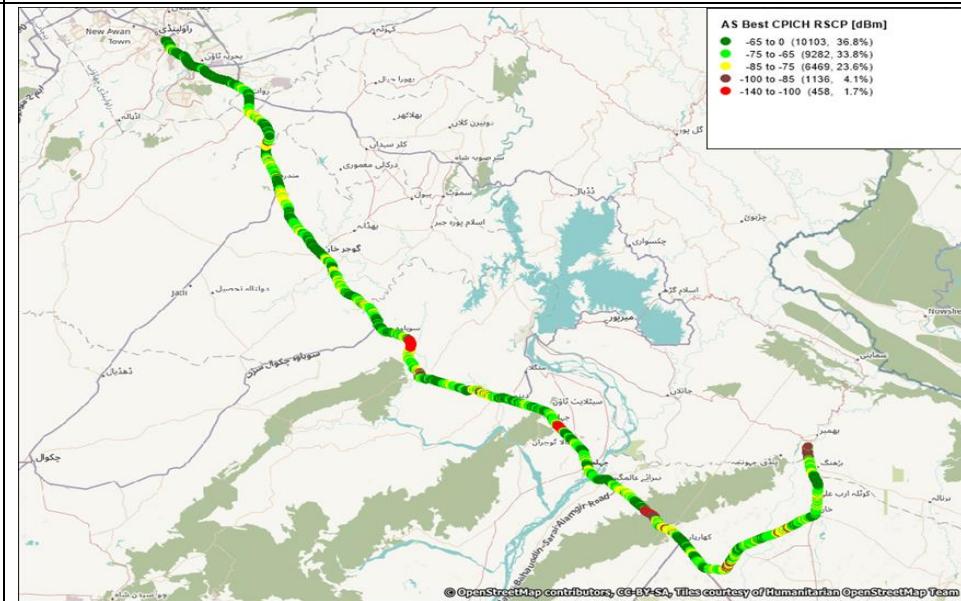


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

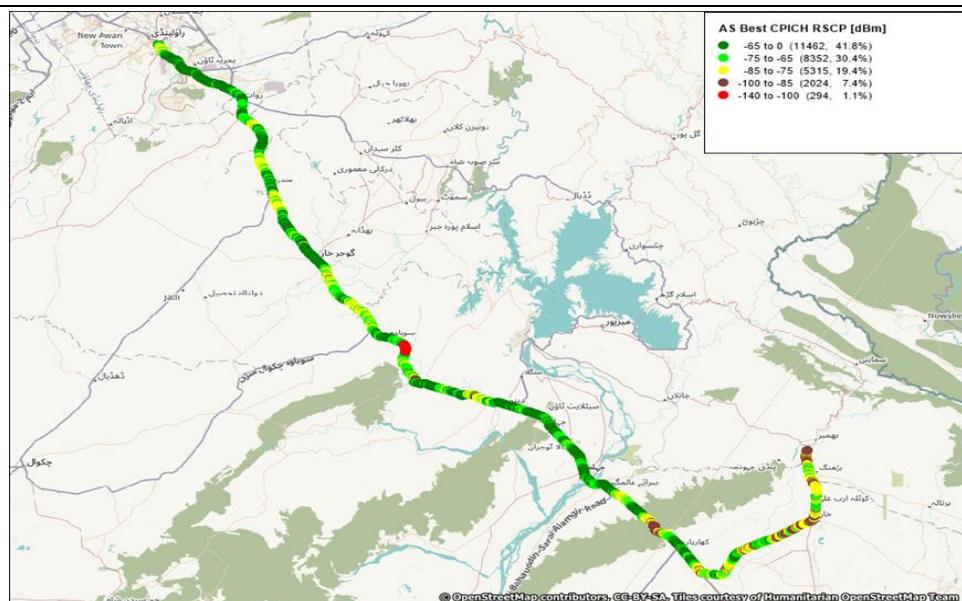
JAZZ 3G NETWORK COVERAGE – RAWALPINDI TO BHIMBER



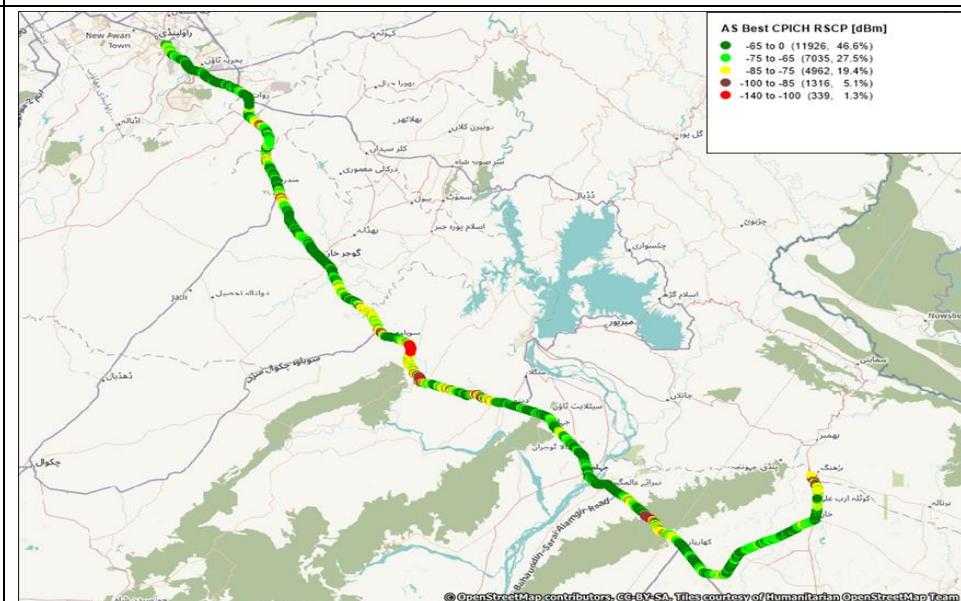
TELENOR 3G NETWORK COVERAGE – RAWALPINDI TO BHIMBER



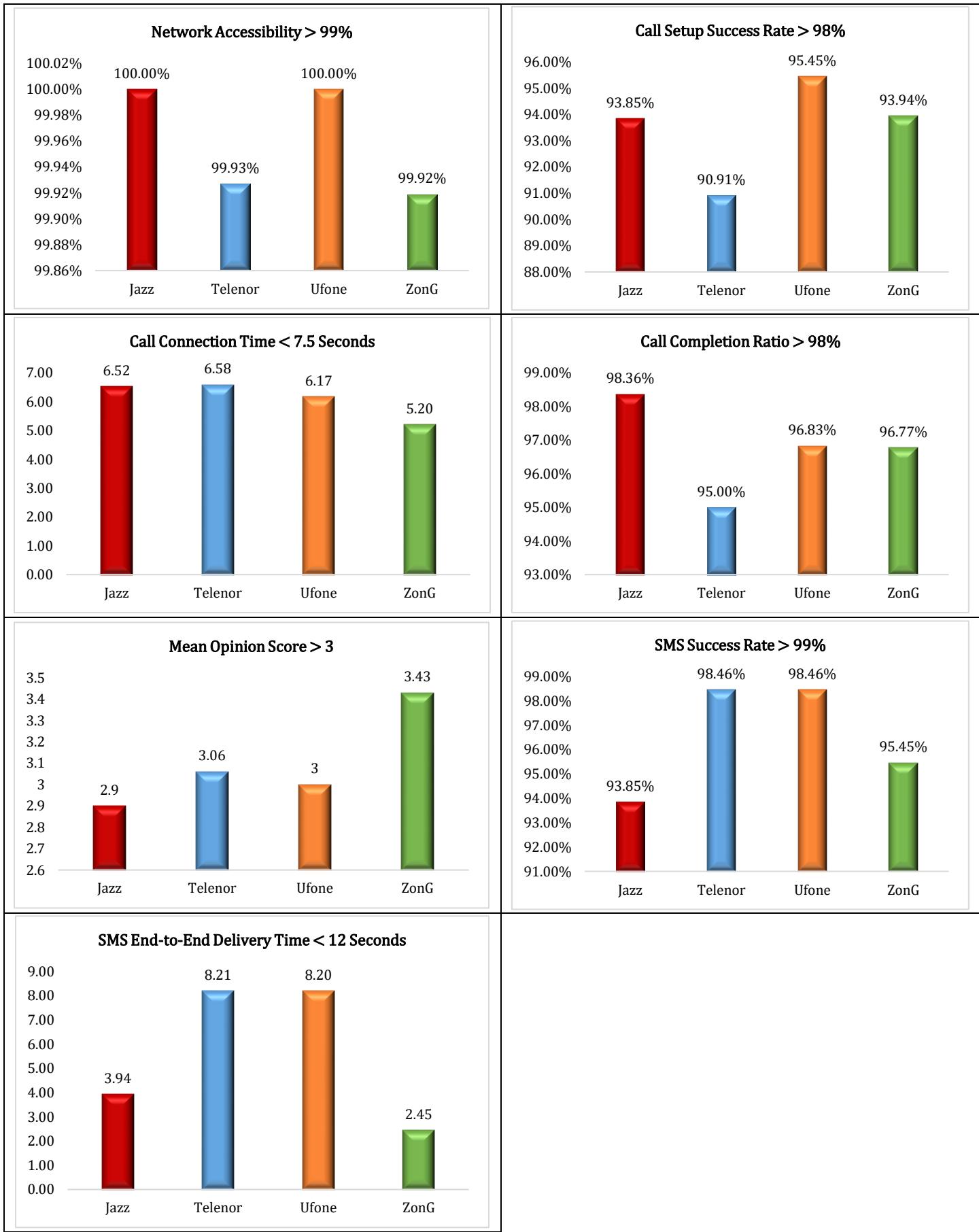
UFONE 3G NETWORK COVERAGE – RAWALPINDI TO BHIMBER



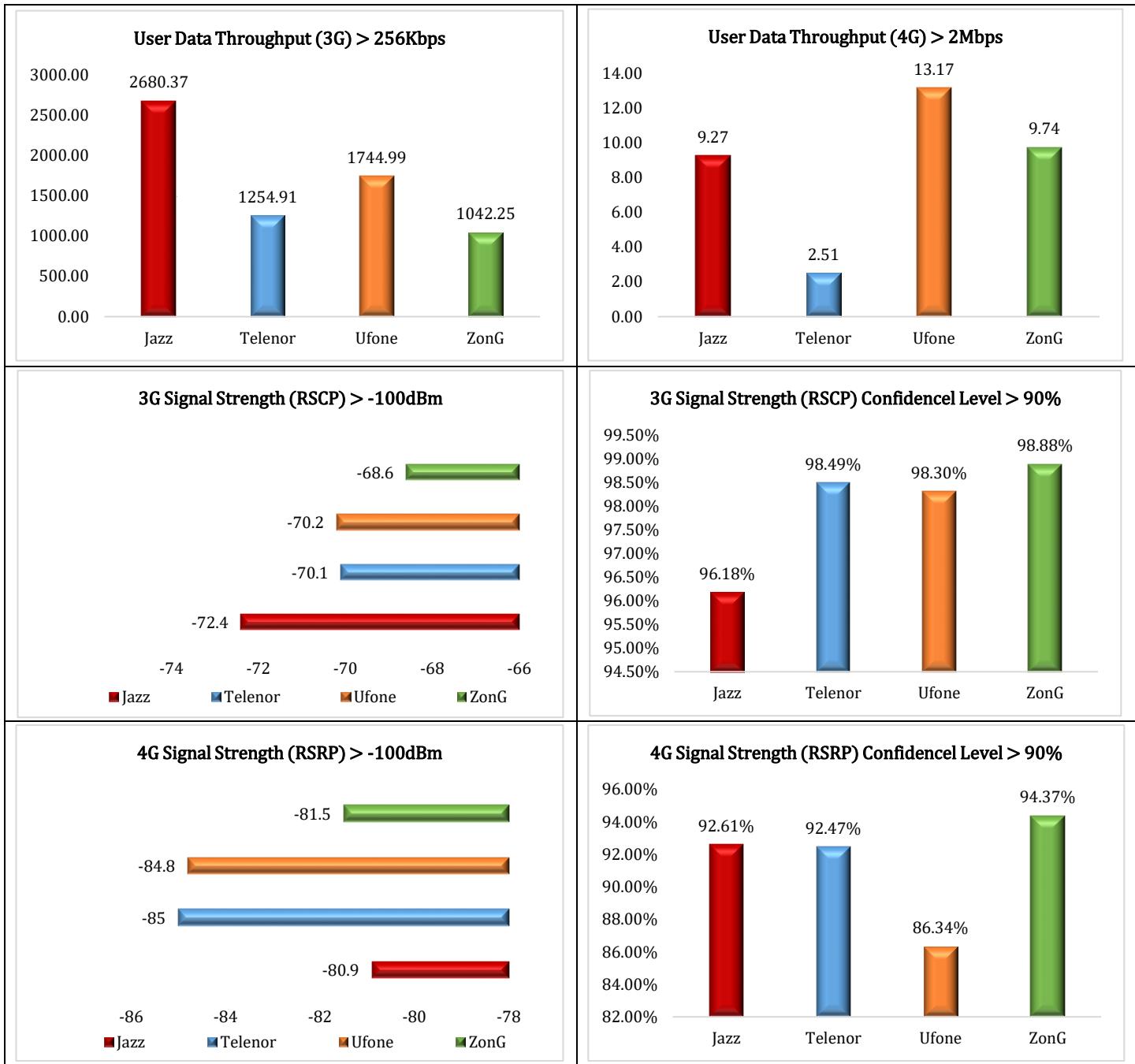
ZONG 3G NETWORK COVERAGE – RAWALPINDI TO BHIMBER



QUALITY OF SERVICE SURVEY RESULTS – RAWALPINDI TO BHIMBER

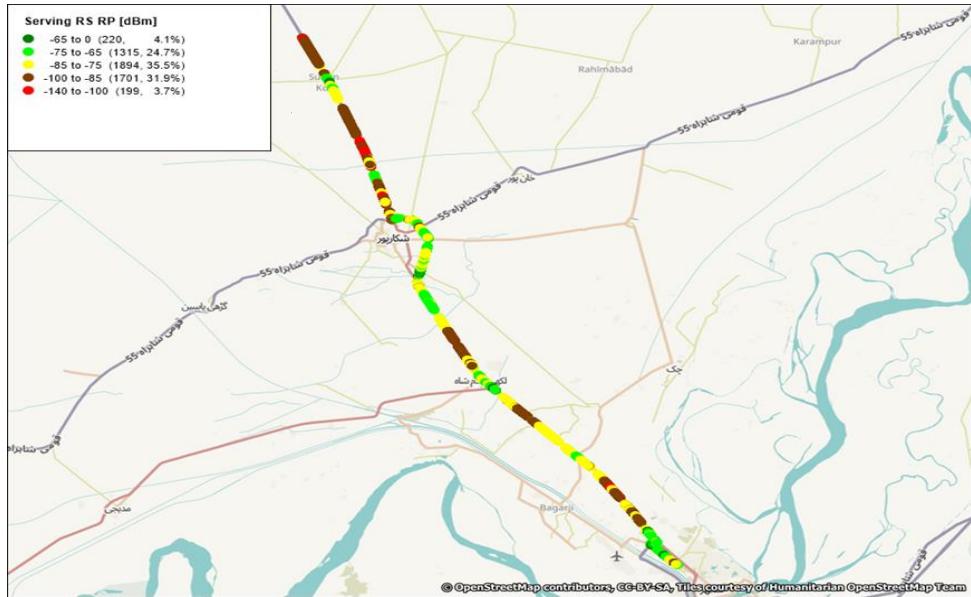


QUALITY OF SERVICE SURVEY RESULTS – RAWALPINDI TO BHIMBER

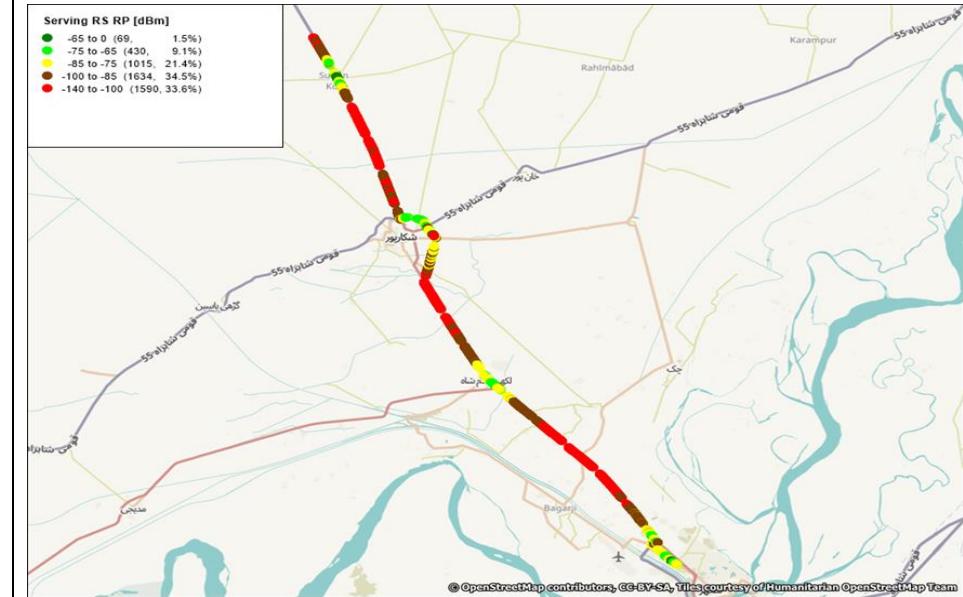


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

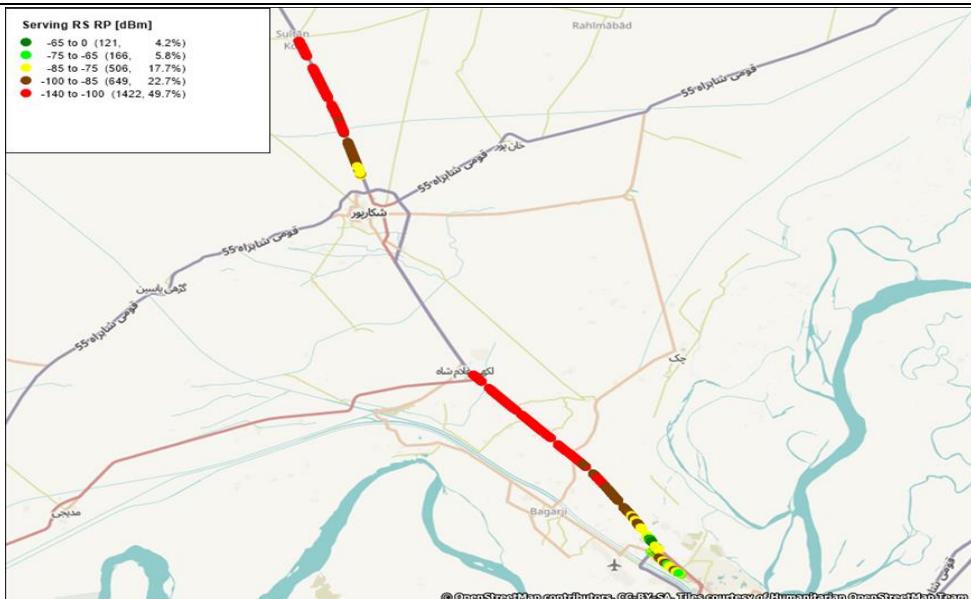
JAZZ 4G NETWORK COVERAGE – SUKKUR TO JACOBABAD



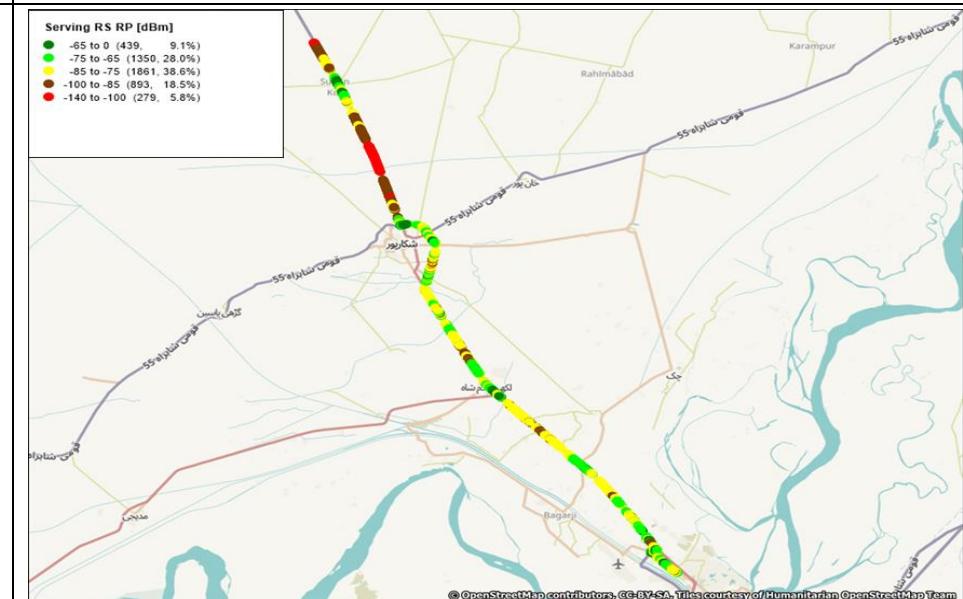
TELENOR 4G NETWORK COVERAGE – SUKKUR TO JACOBABAD



UFONE 4G NETWORK COVERAGE – SUKKUR TO JACOBABAD

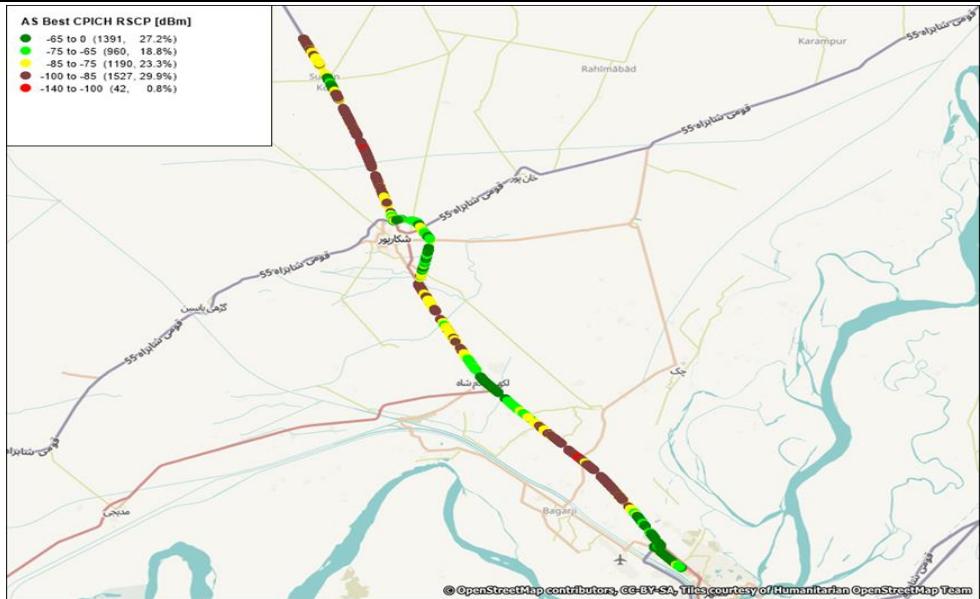


ZONG 4G NETWORK COVERAGE – SUKKUR TO JACOBABAD

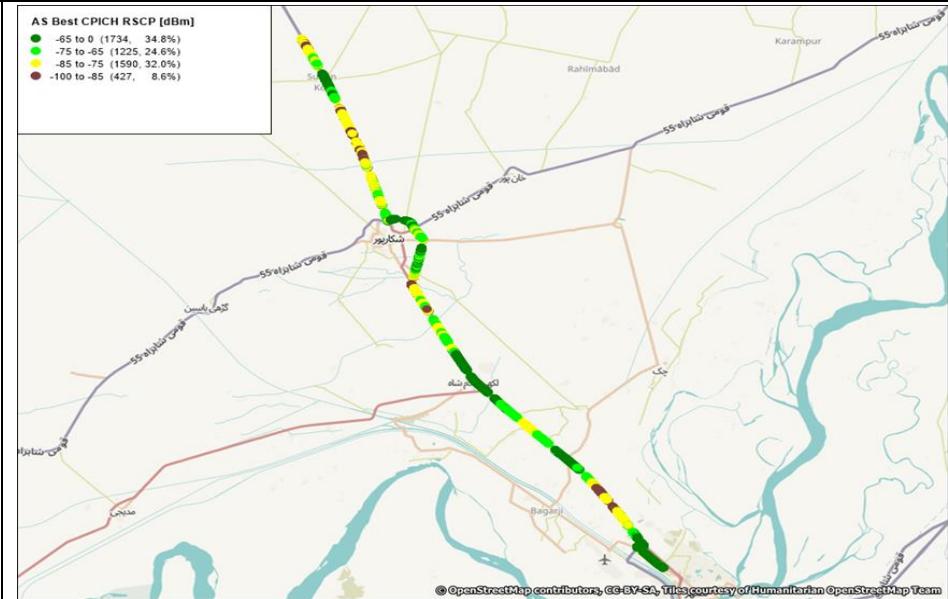


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

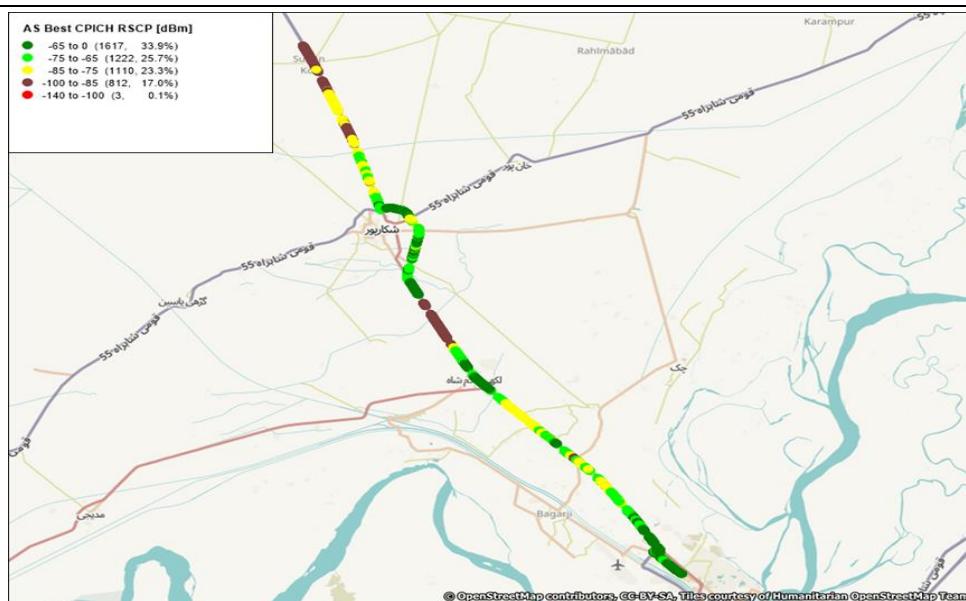
JAZZ 3G NETWORK COVERAGE – SUKKUR TO JACOBABAD



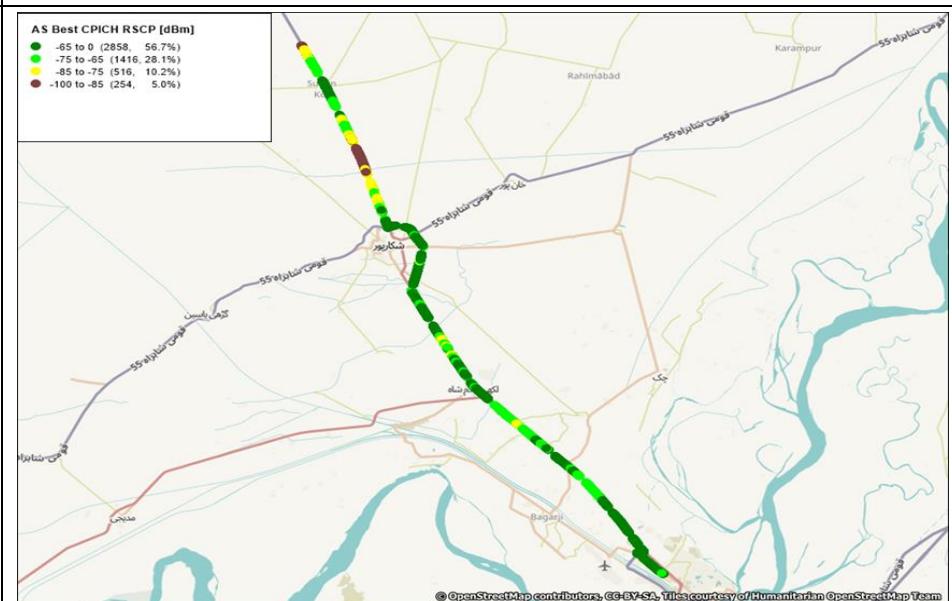
TELENOR 3G NETWORK COVERAGE – SUKKUR TO JACOBABAD



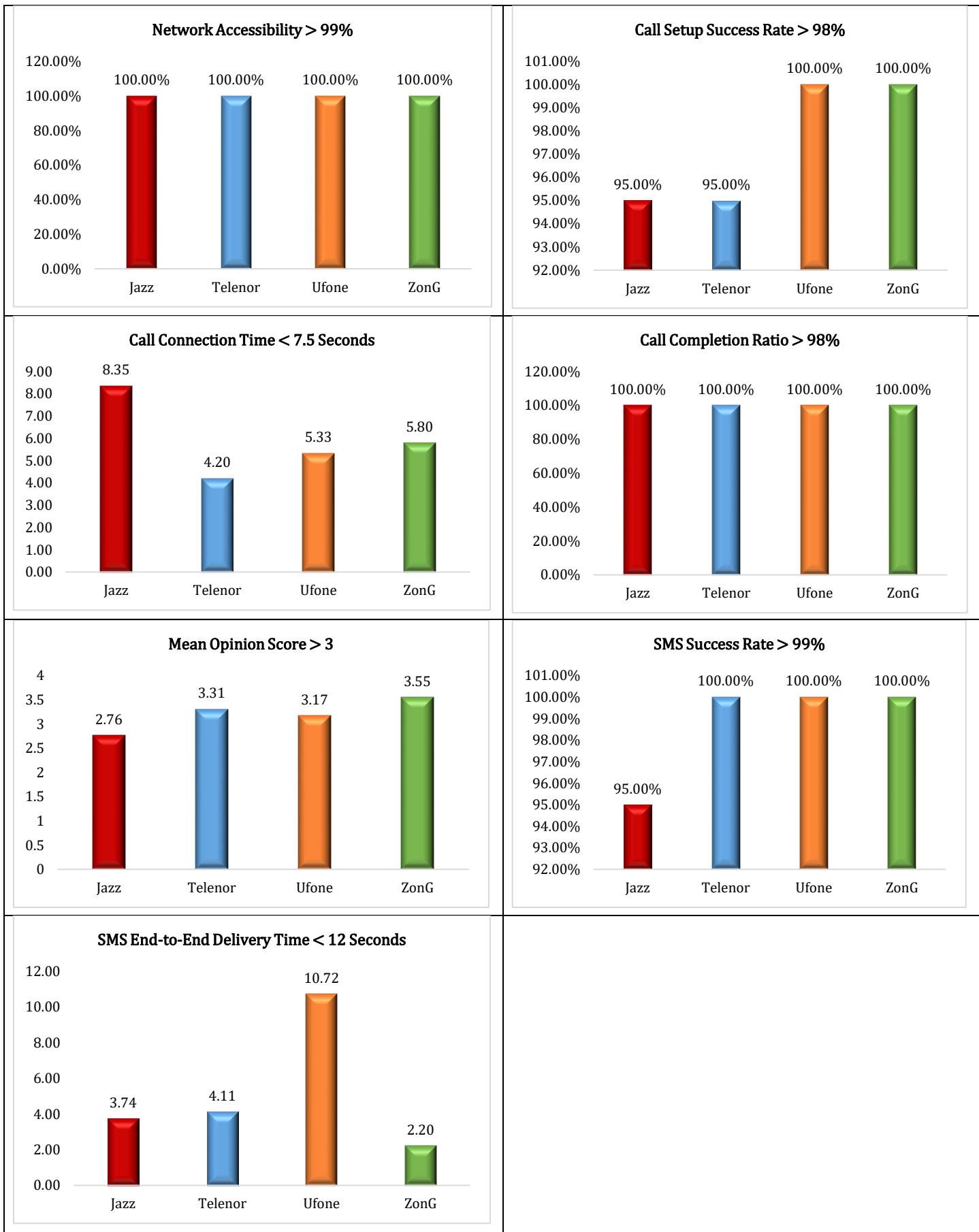
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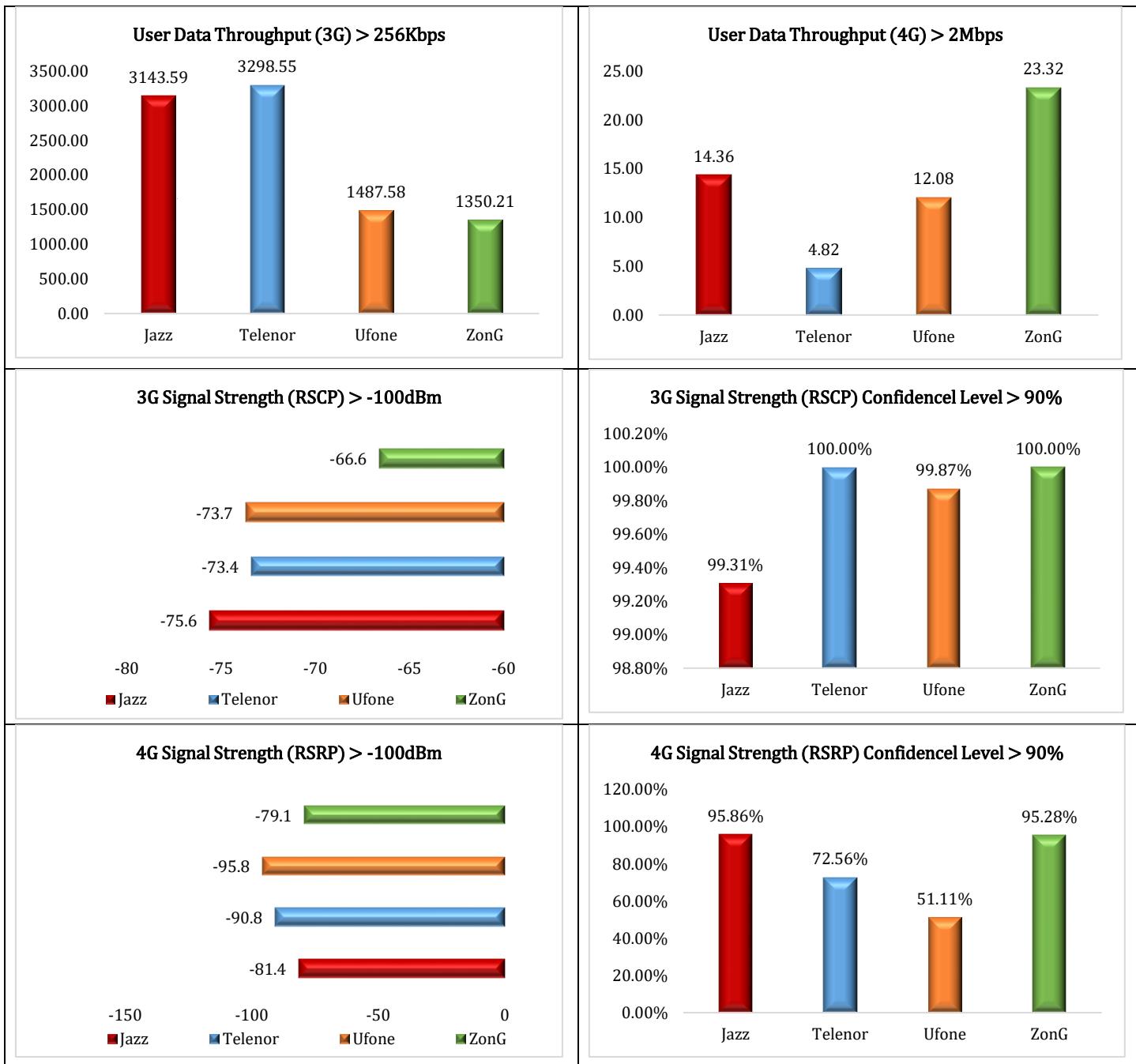
ZONG 3G NETWORK COVERAGE – SUKKUR TO JACOBABAD



QUALITY OF SERVICE SURVEY RESULTS – SUKKUR TO JACOBABAD

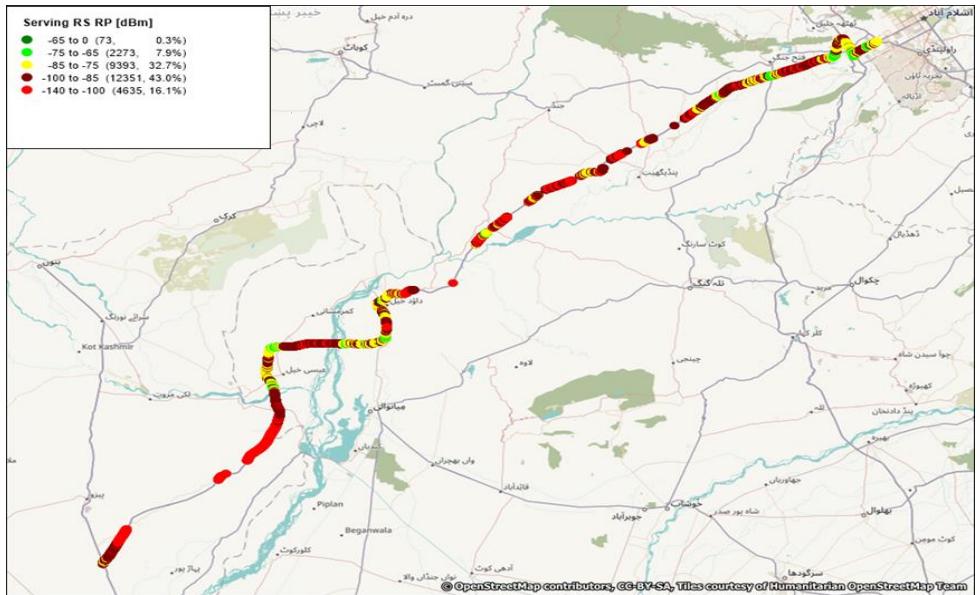


QUALITY OF SERVICE SURVEY RESULTS – SUKKUR TO JACOBABAD

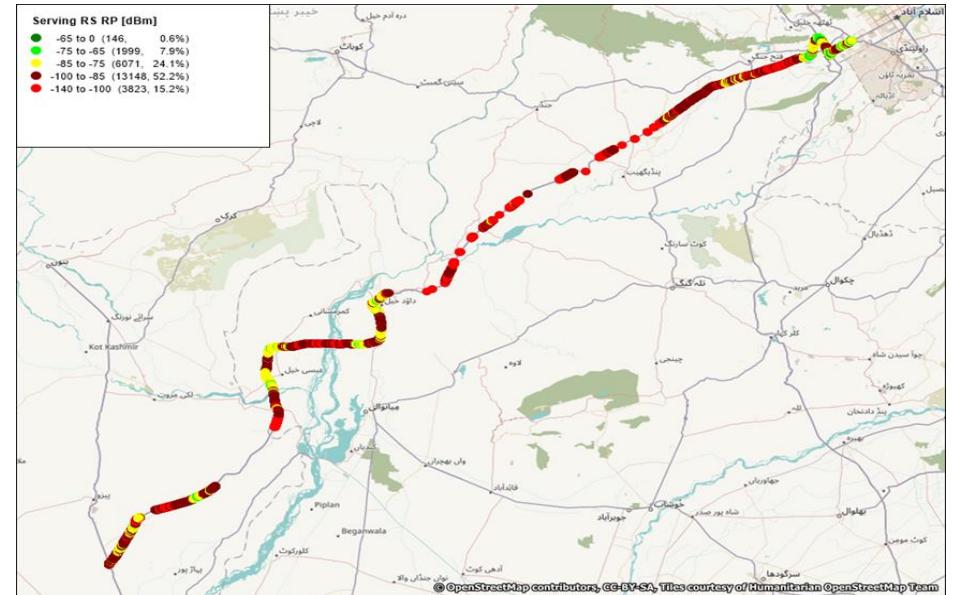


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

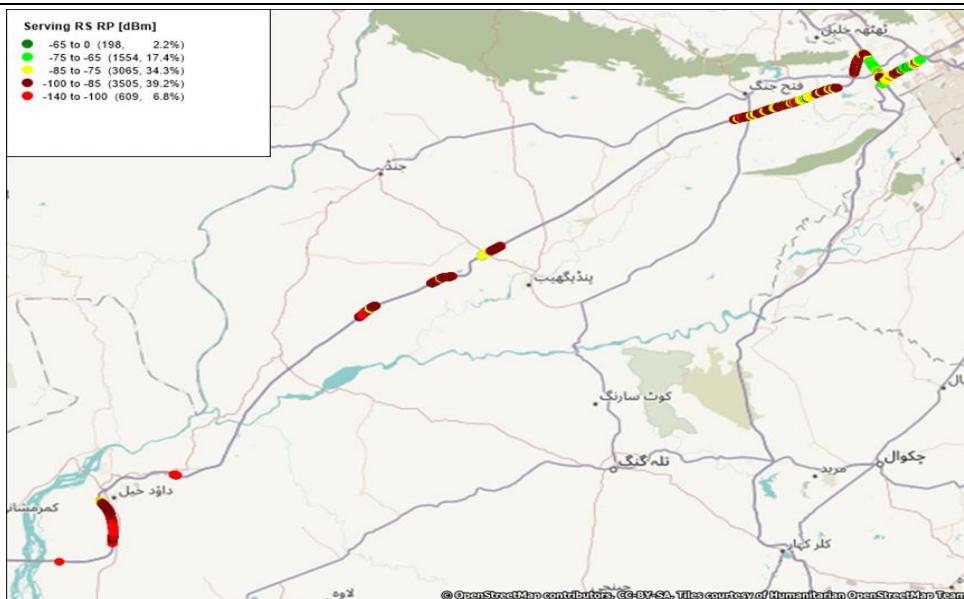
JAZZ 4G NETWORK COVERAGE – M-14



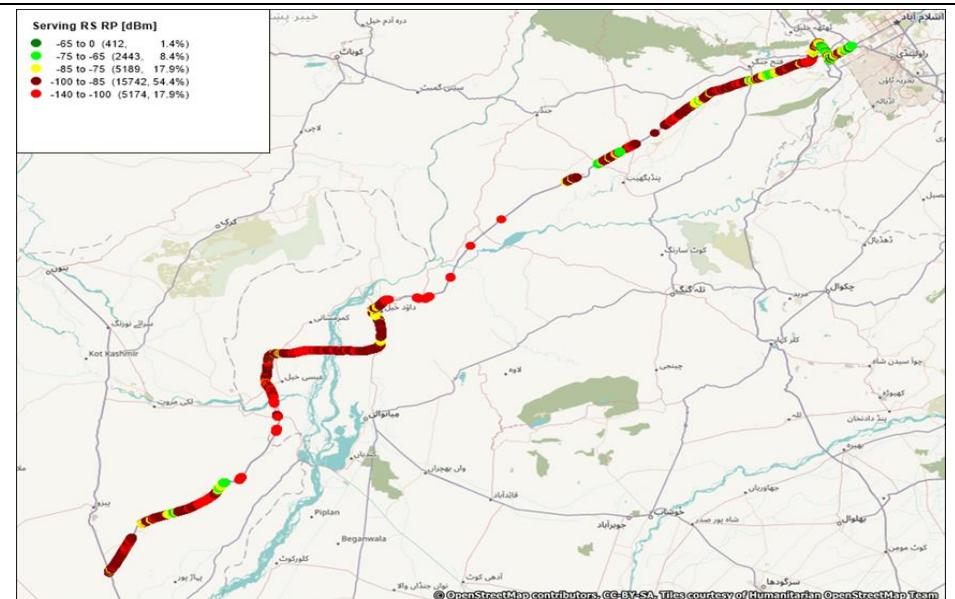
TELENOR 4G NETWORK COVERAGE – M-14



UFONE 4G NETWORK COVERAGE – M-14

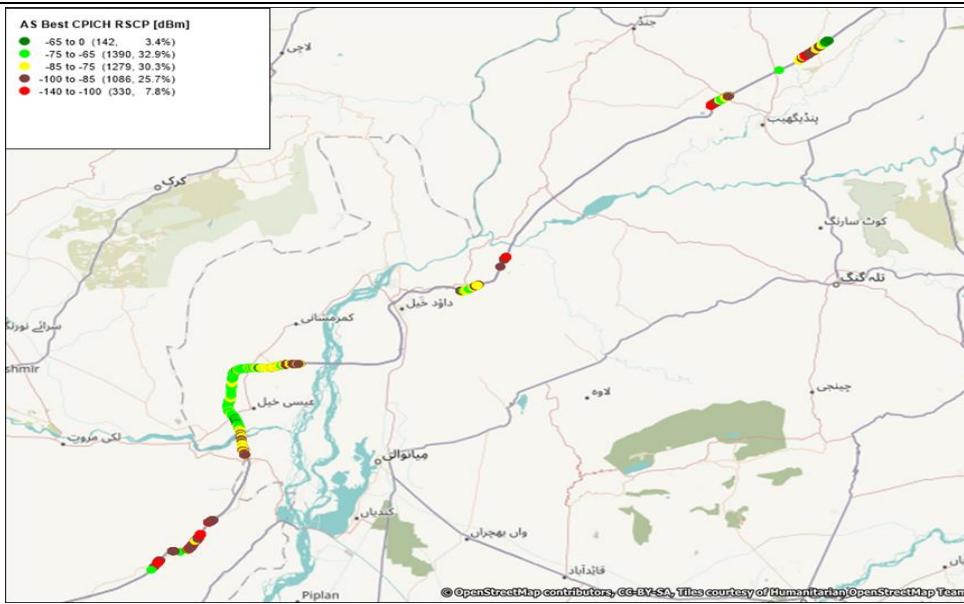


ZONG 4G NETWORK COVERAGE – M-14

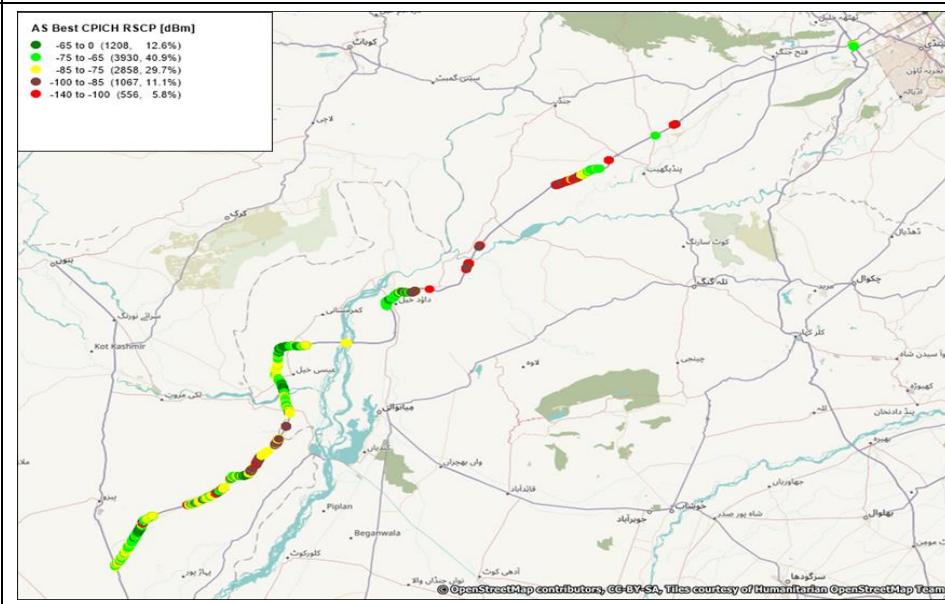


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

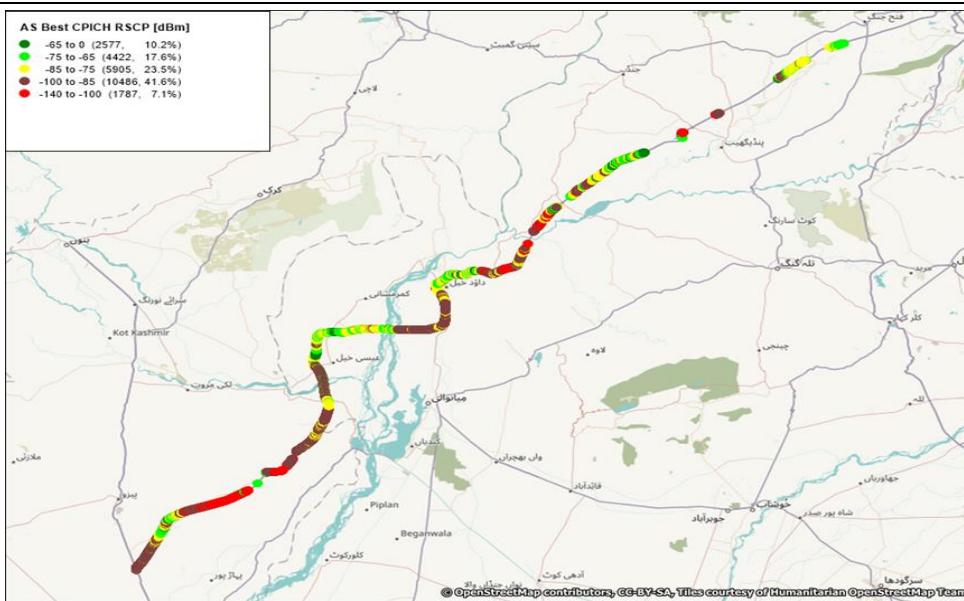
JAZZ 3G NETWORK COVERAGE – M-14



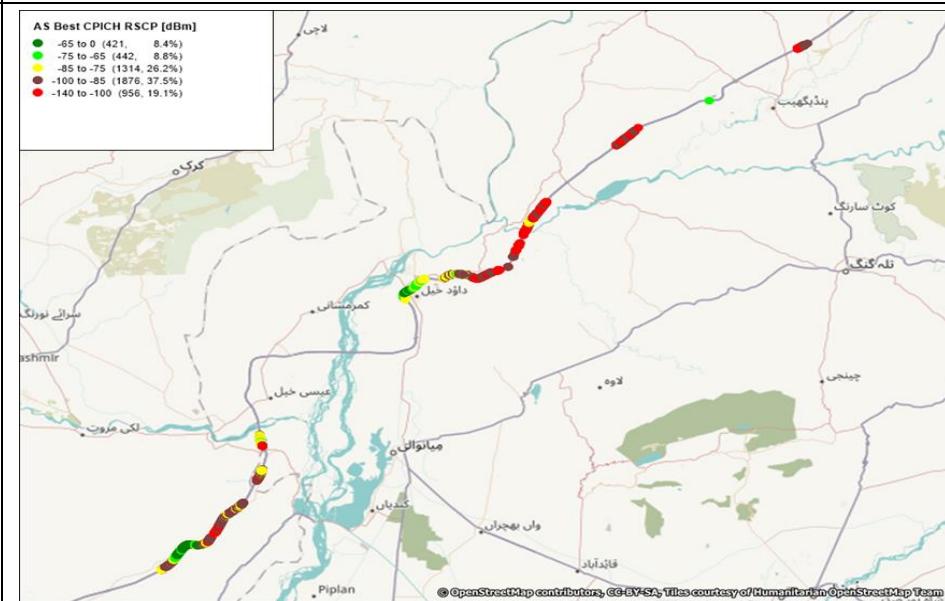
TELENOR 3G NETWORK COVERAGE – M-14



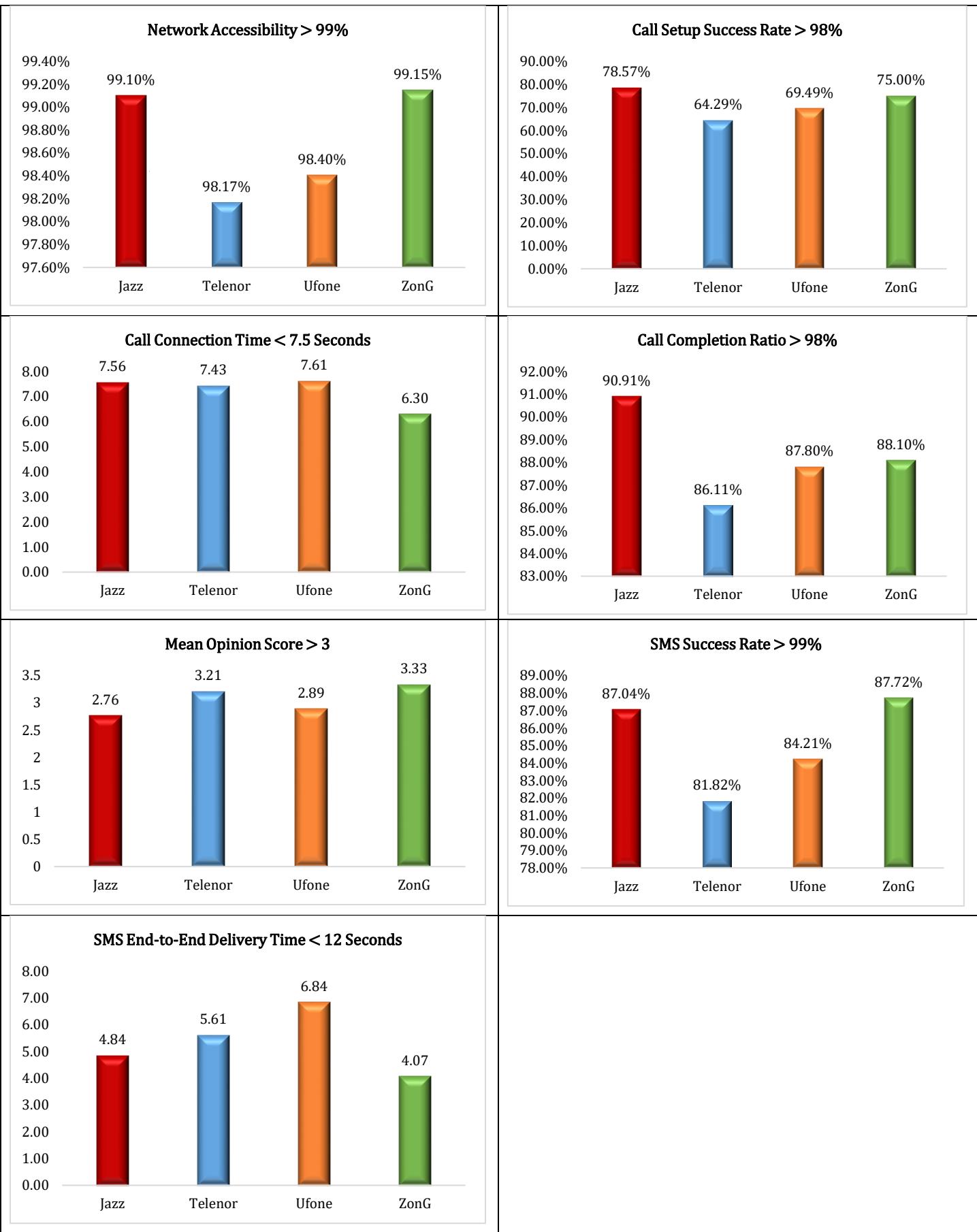
UFONE 3G NETWORK COVERAGE – M-14



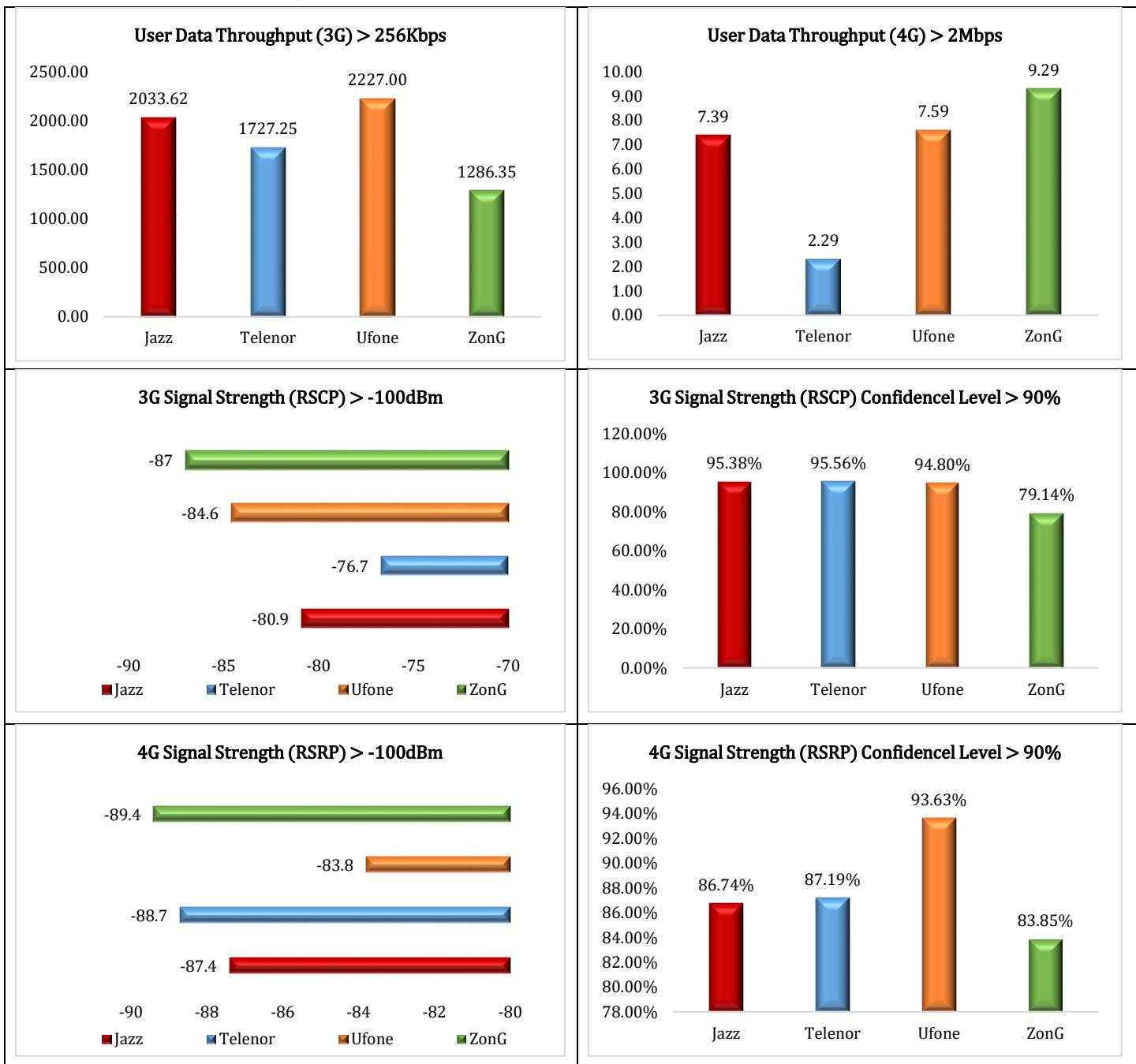
ZONG 3G NETWORK COVERAGE – M-14



QUALITY OF SERVICE SURVEY RESULTS – M-14

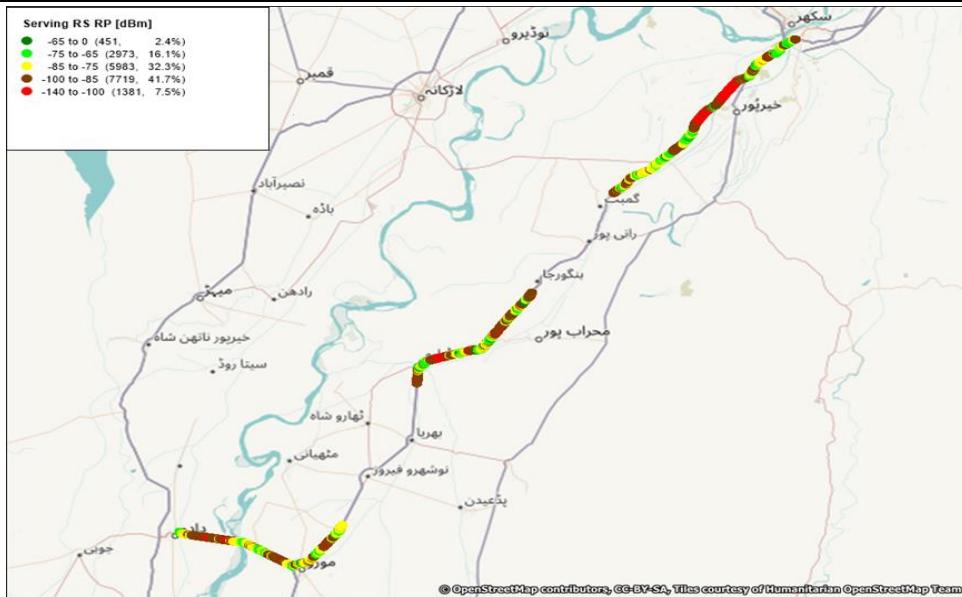


QUALITY OF SERVICE SURVEY RESULTS – M-14

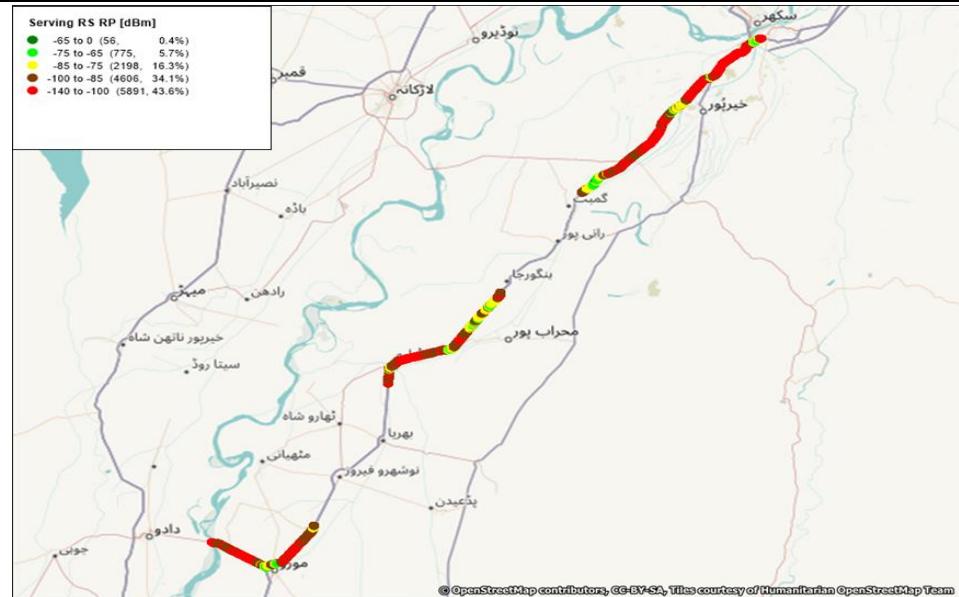


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – SUKKUR TO DADU



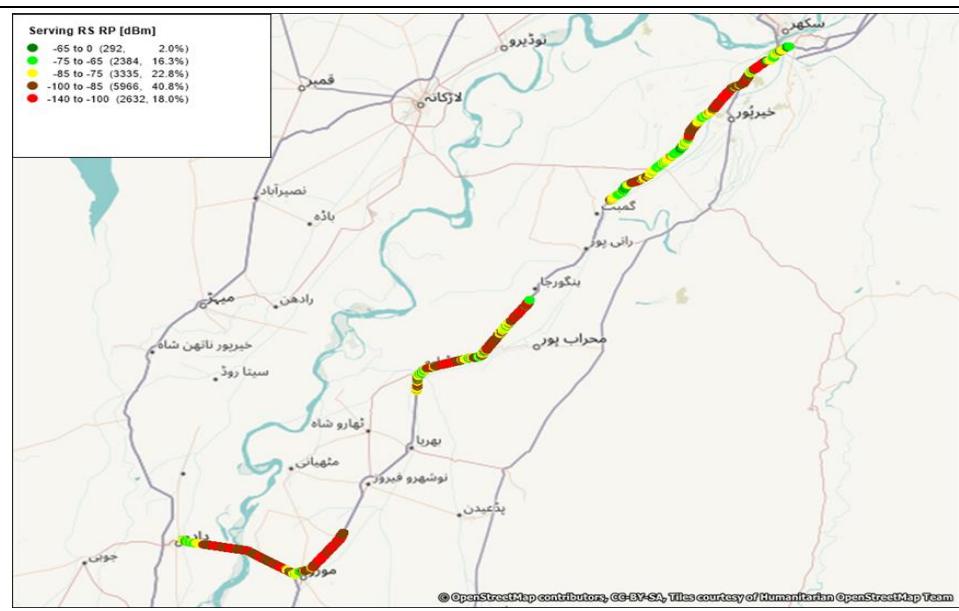
TELENOR 4G NETWORK COVERAGE – SUKKUR TO DADU



UFONE 4G NETWORK COVERAGE – SUKKUR TO DADU



ZONG 4G NETWORK COVERAGE – SUKKUR TO DADU



3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G NETWORK COVERAGE – SUKKUR TO DADU



TELENOR 3G NETWORK COVERAGE – SUKKUR TO DADU



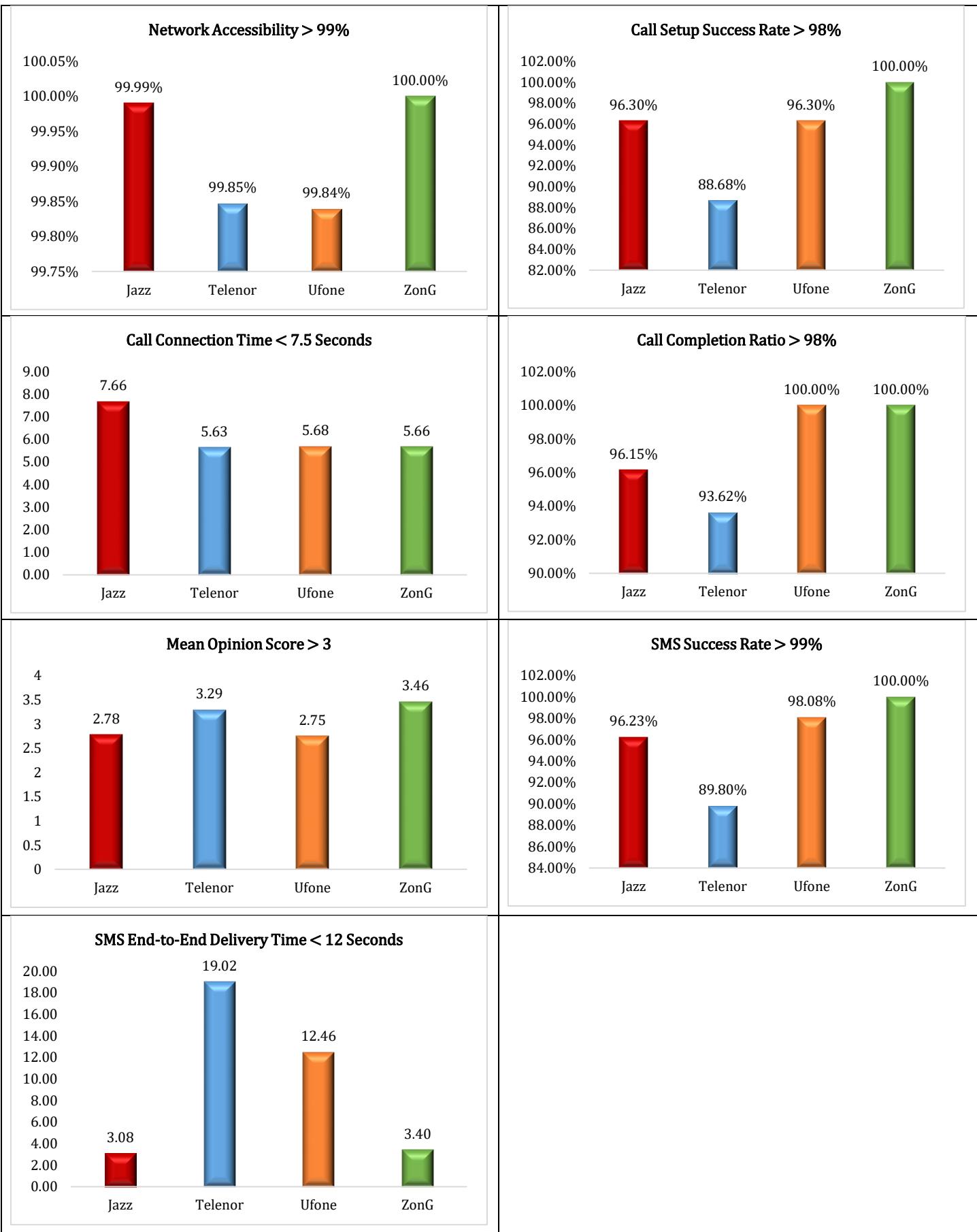
UFONE 3G NETWORK COVERAGE – SUKKUR TO DADU



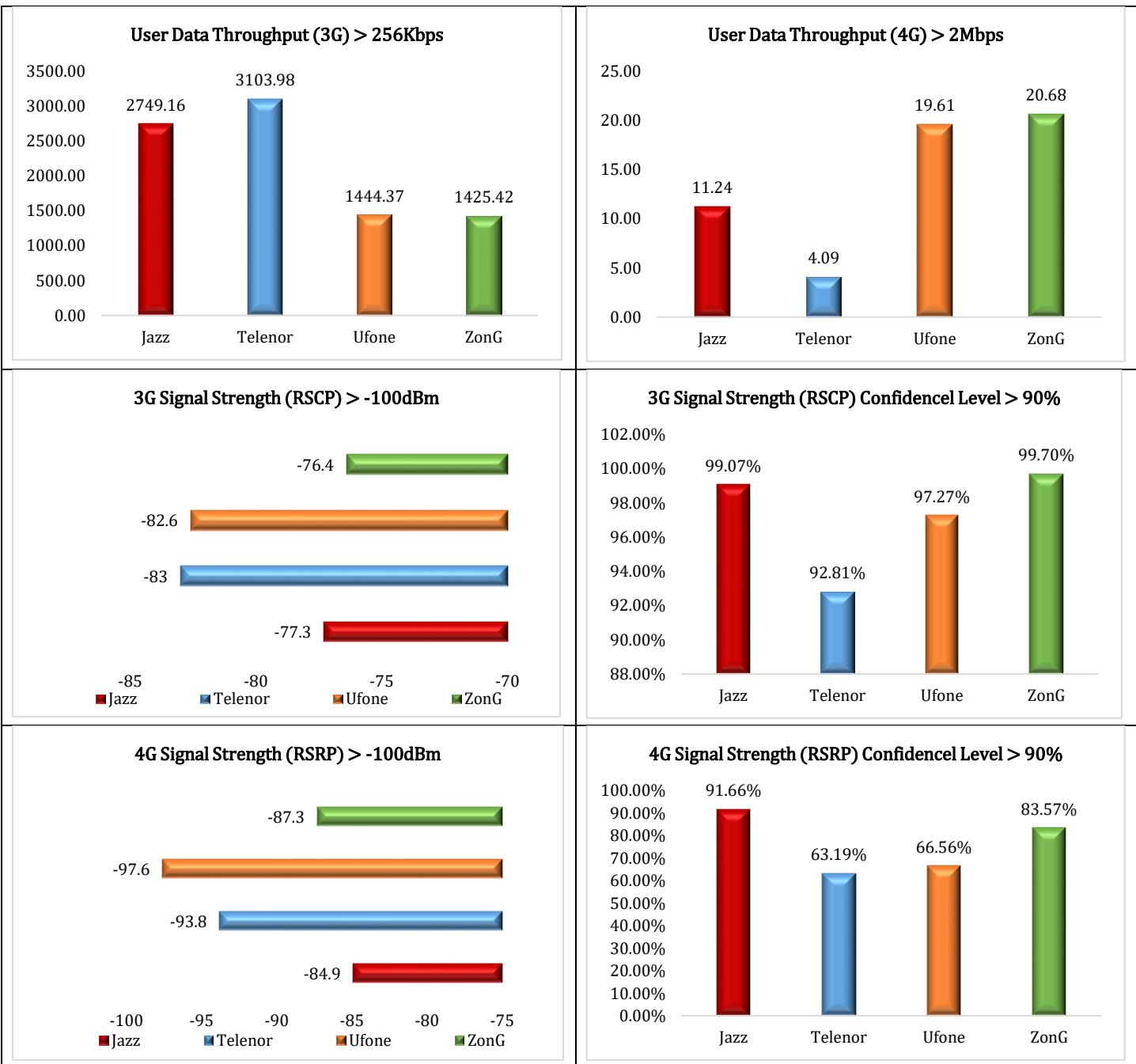
ZONG 3G NETWORK COVERAGE – SUKKUR TO DADU



QUALITY OF SERVICE SURVEY RESULTS – SUKKUR TO DADU

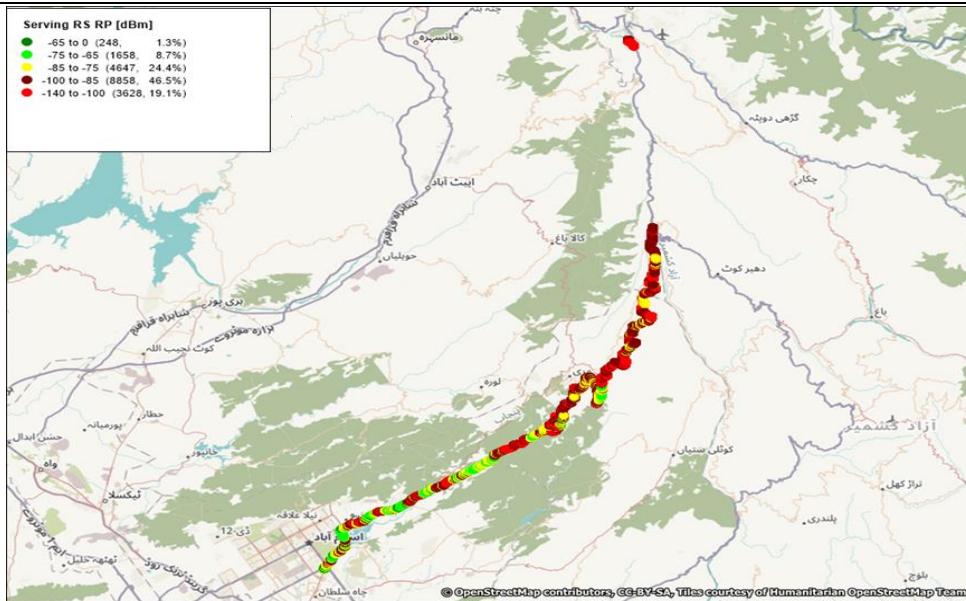


QUALITY OF SERVICE SURVEY RESULTS – SUKKUR TO DADU

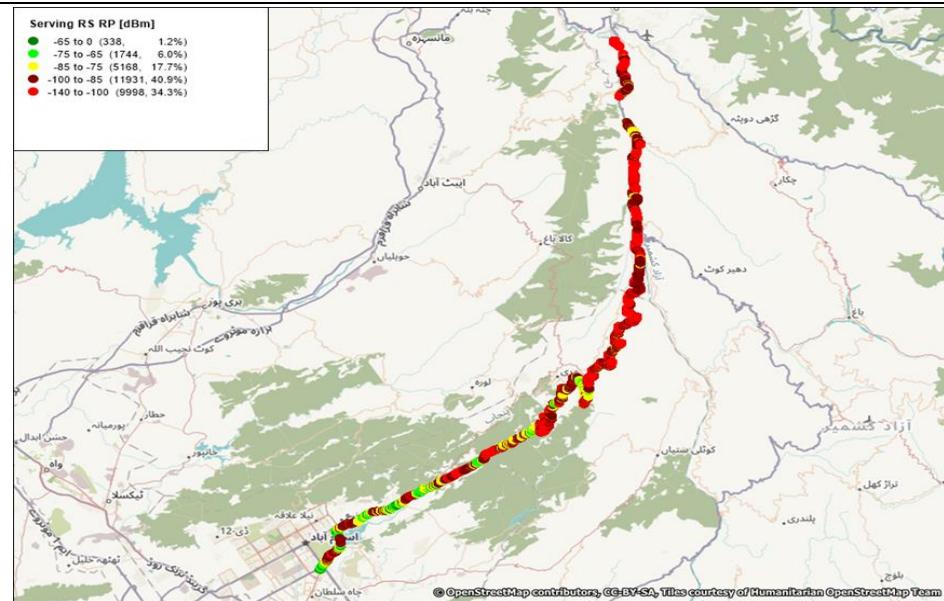


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

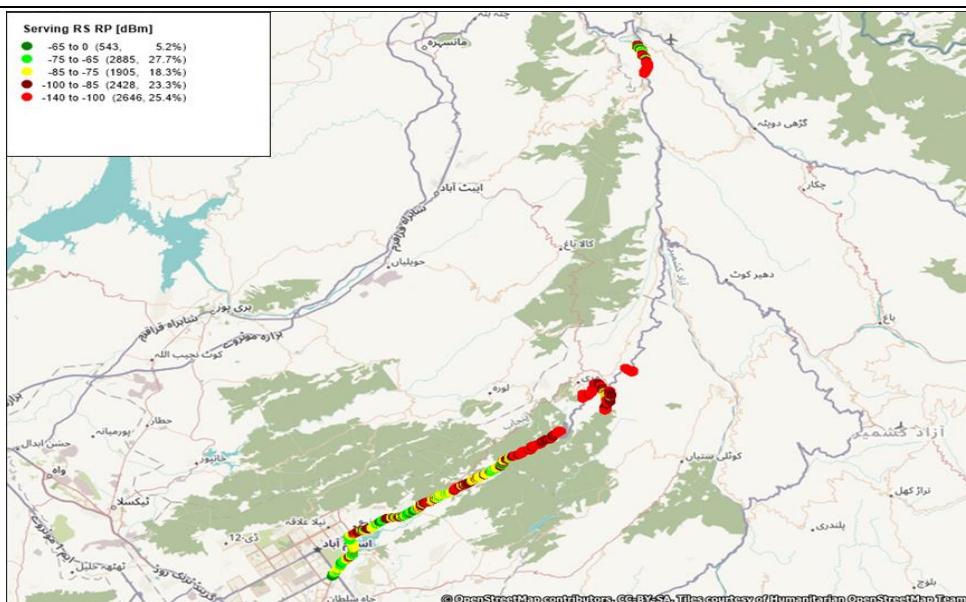
JAZZ 4G NETWORK COVERAGE – RAWALPINDI TO MUZAFFARABAD



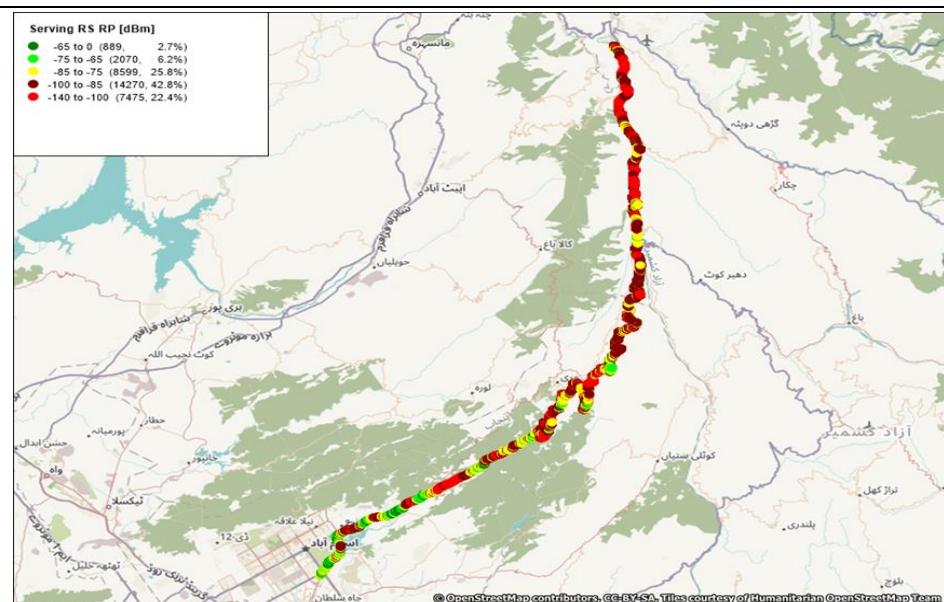
TELENOR 4G NETWORK COVERAGE – RAWALPINDI TO MUZAFFARABAD



UFONE 4G NETWORK COVERAGE – RAWALPINDI TO MUZAFFARABAD

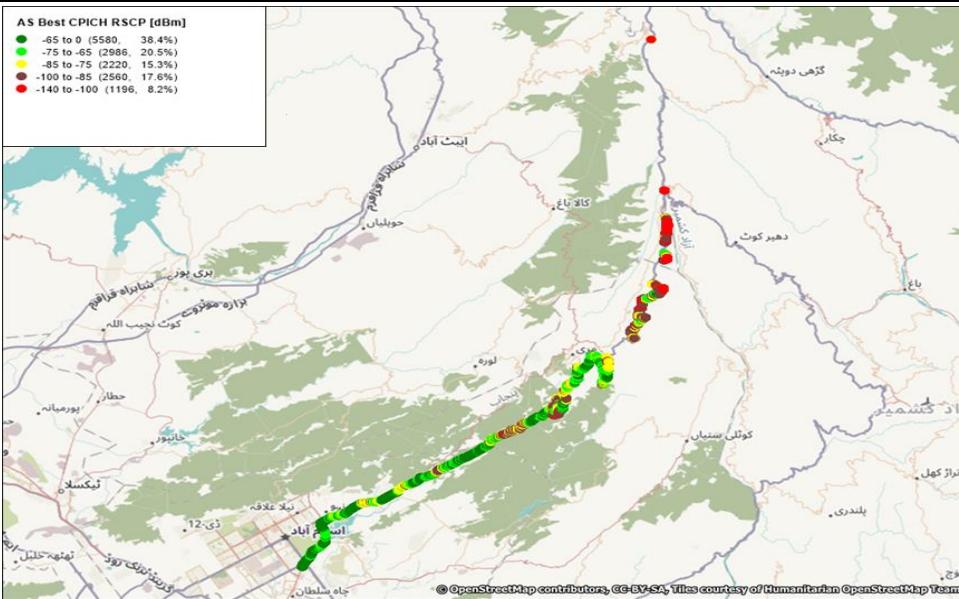


ZONG 4G NETWORK COVERAGE – RAWALPINDI TO MUZAFFARABAD

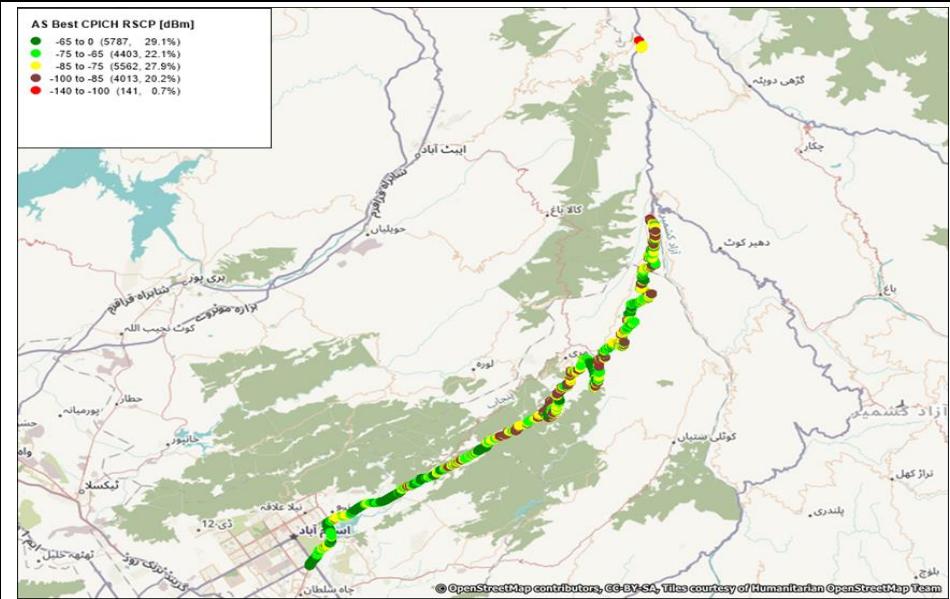


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

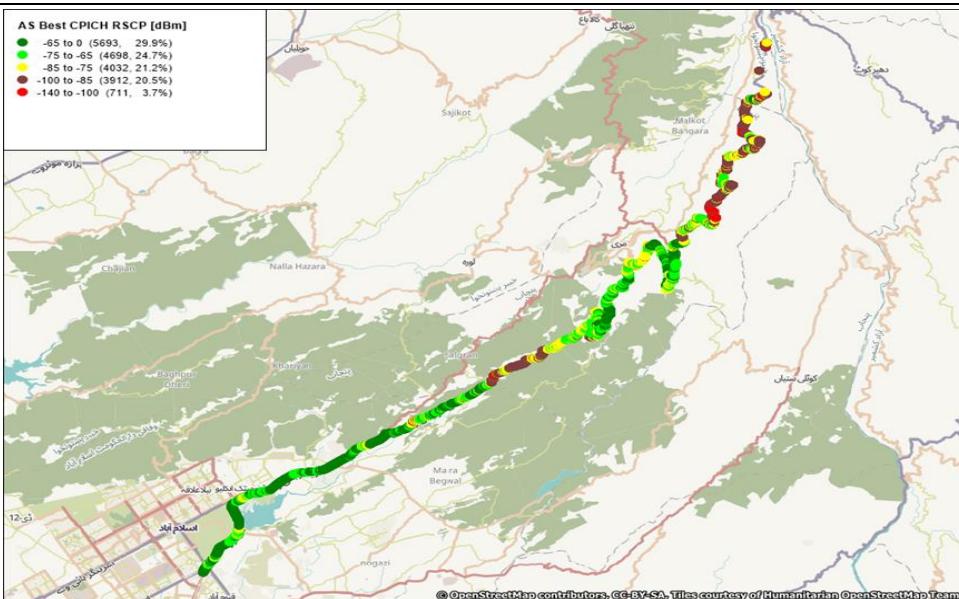
JAZZ 3G NETWORK COVERAGE – RAWALPINDI TO MUZAFFARABAD



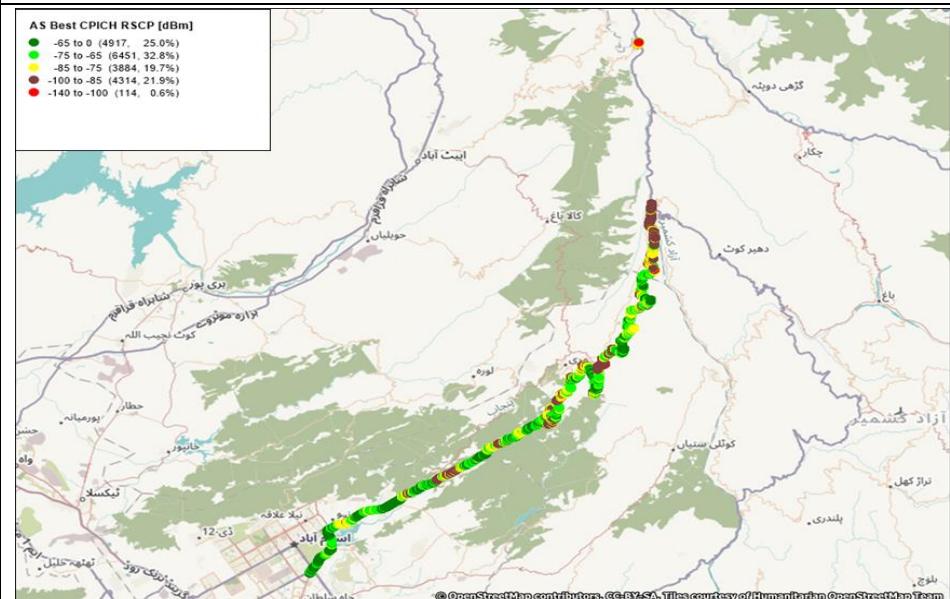
TELENOR 3G NETWORK COVERAGE – RAWALPINDI TO MUZAFFARABAD



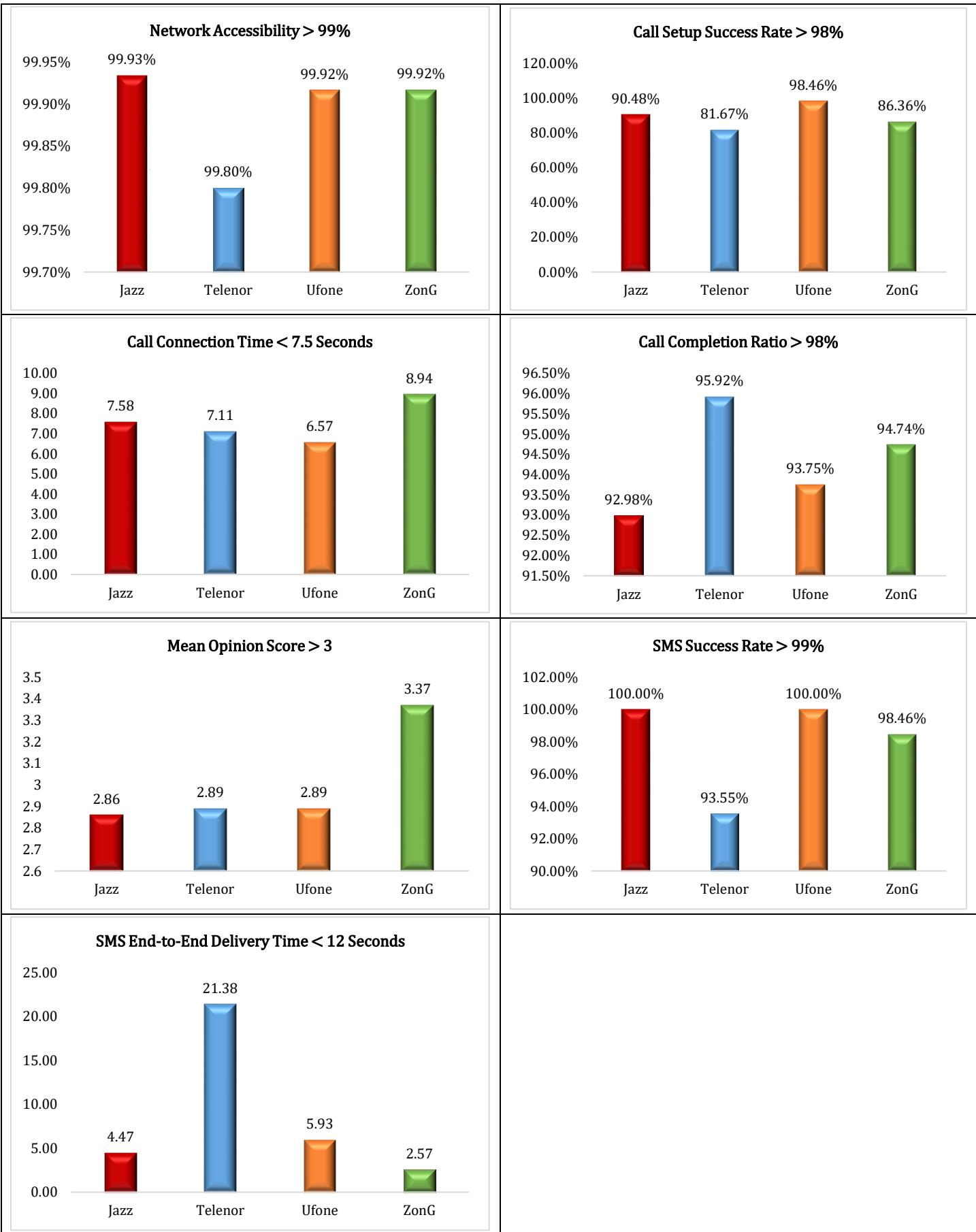
UFONE 3G NETWORK COVERAGE – RAWALPINDI TO MUZAFFARABAD



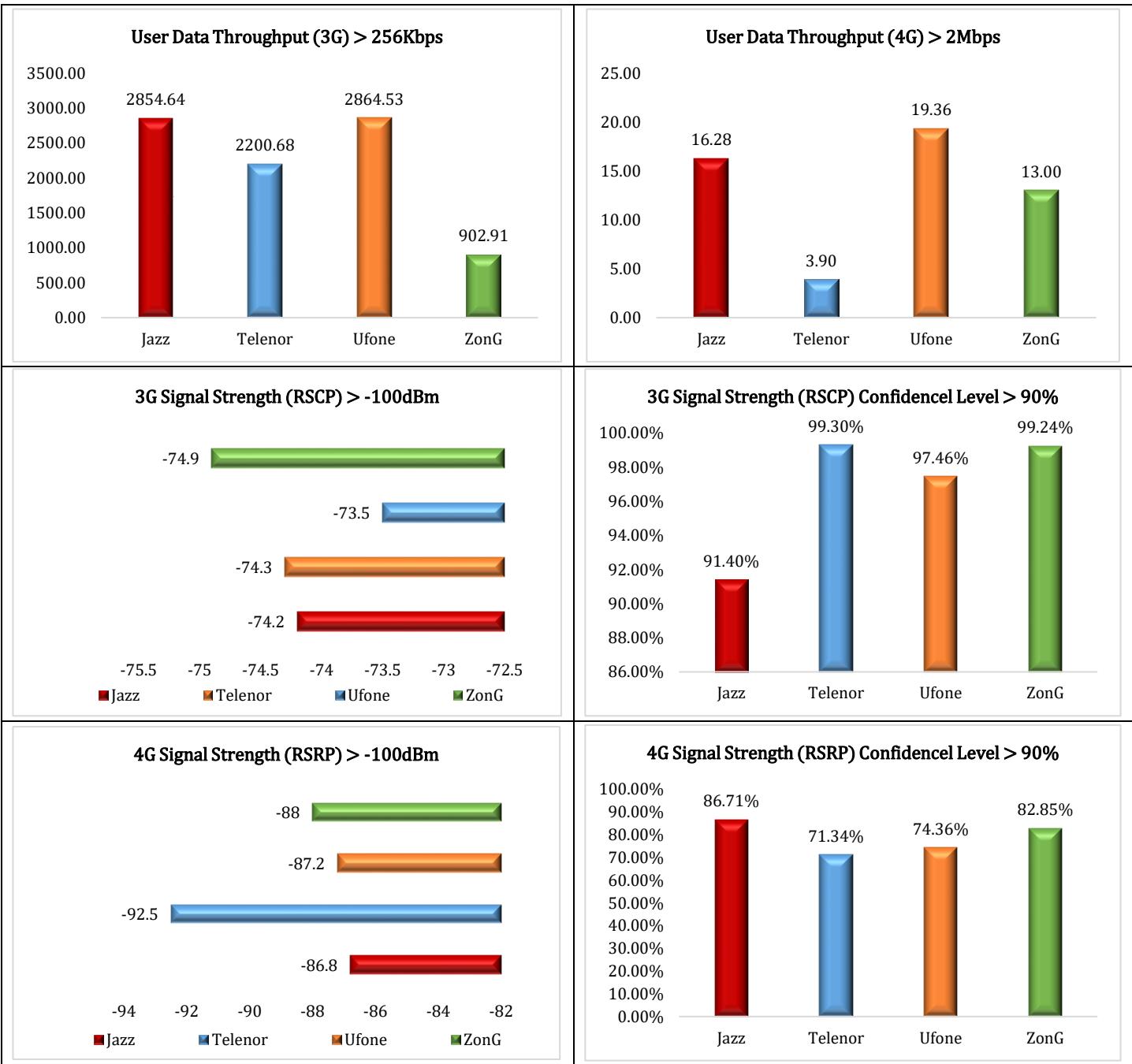
ZONG 3G NETWORK COVERAGE – RAWALPINDI TO MUZAFFARABAD



QUALITY OF SERVICE SURVEY RESULTS – RAWALPINDI TO MUZAFFARABAD

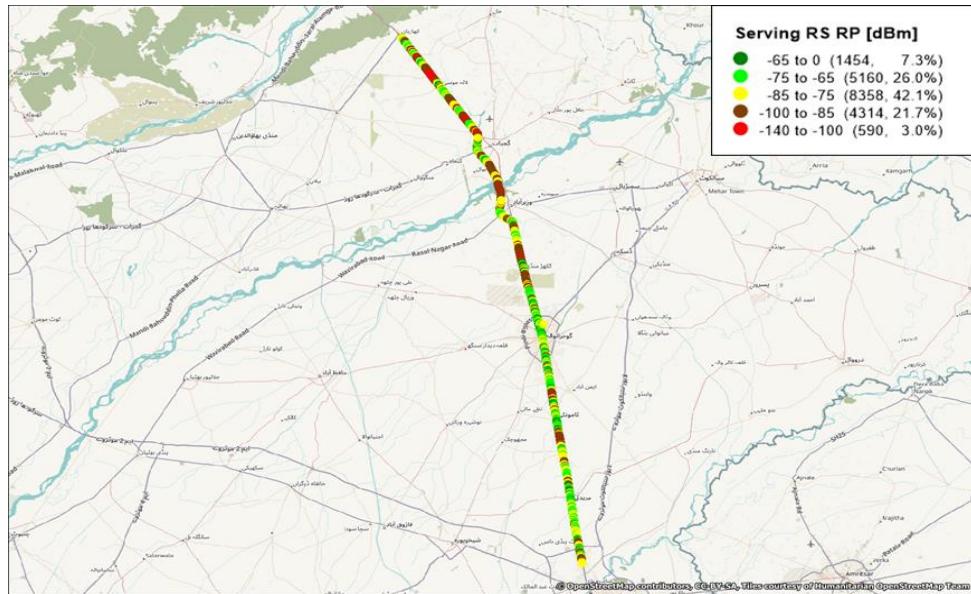


QUALITY OF SERVICE SURVEY RESULTS – RAWALPINDI TO MUZAFFARABAD

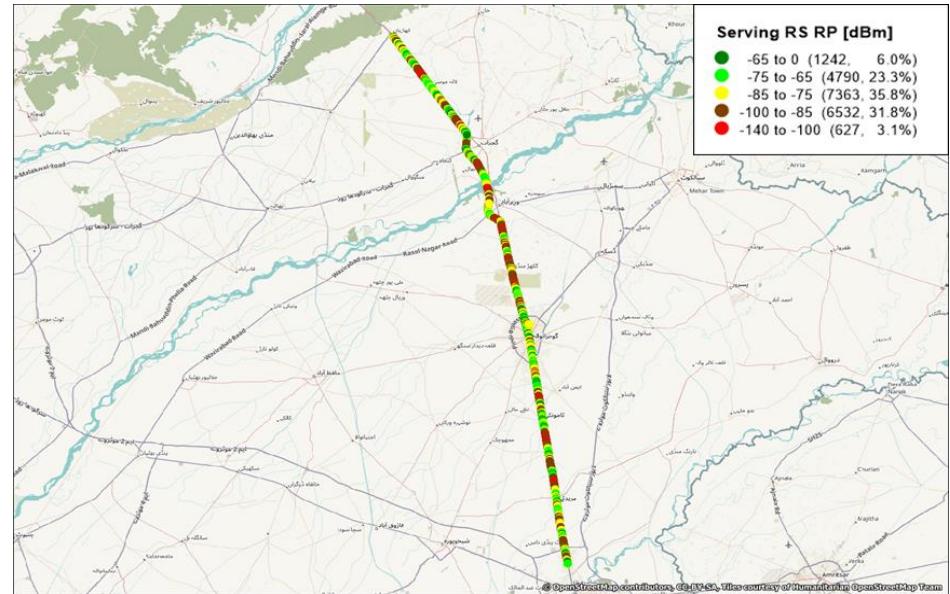


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

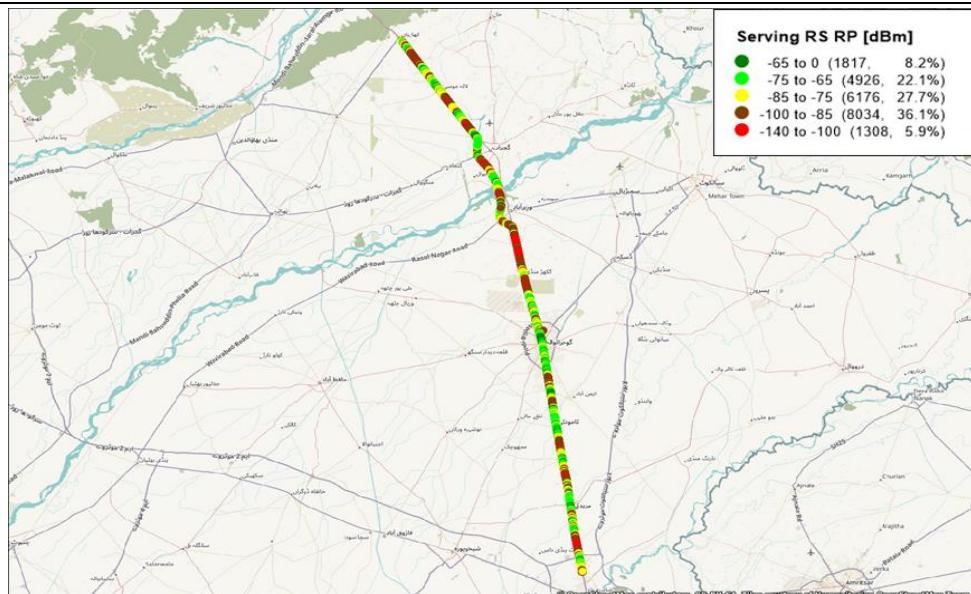
JAZZ 4G NETWORK COVERAGE – LAHORE TO KARIAN



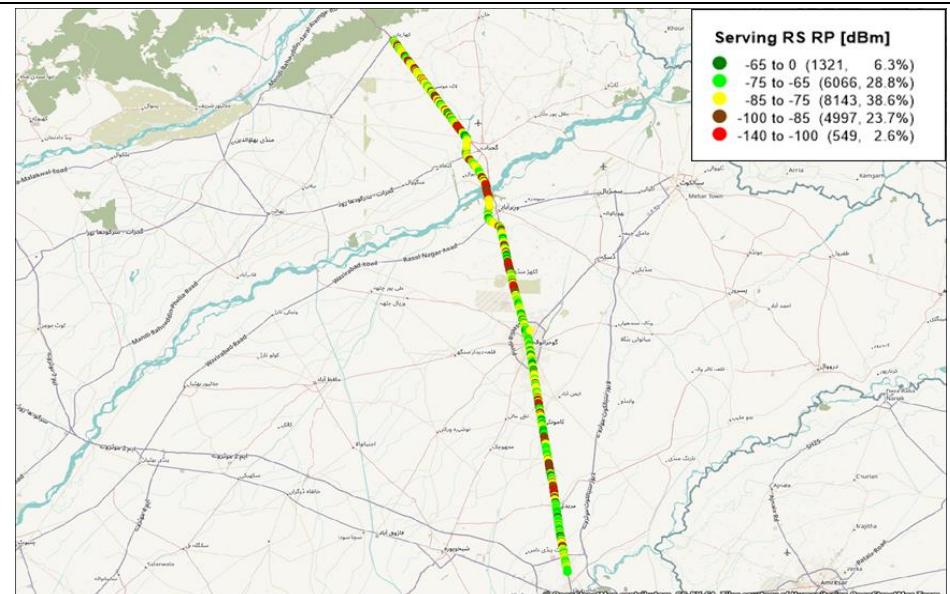
TELENOR 4G NETWORK COVERAGE – LAHORE TO KARIAN



UFONE 4G NETWORK COVERAGE – LAHORE TO KARIAN

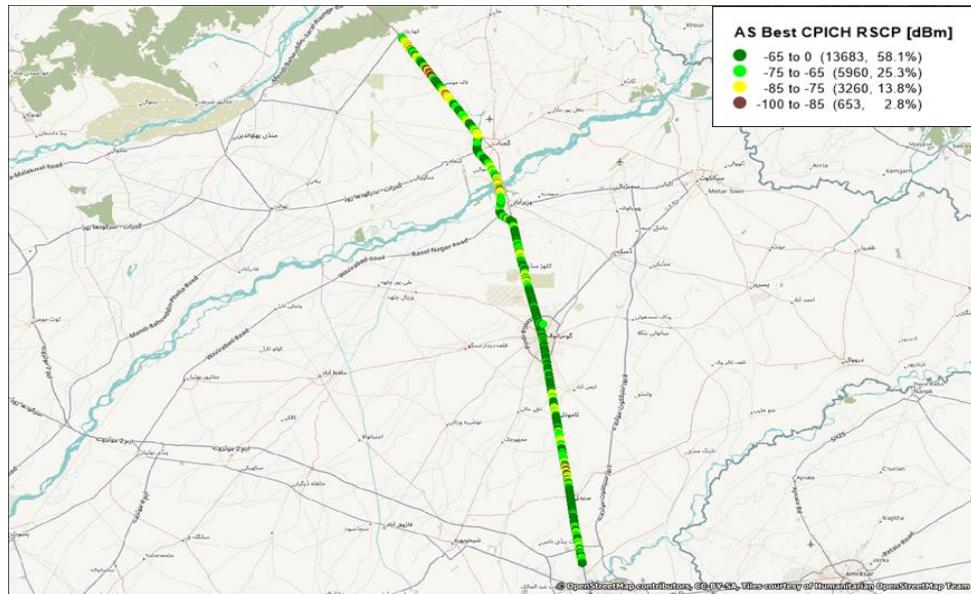


ZONG 4G NETWORK COVERAGE – LAHORE TO KARIAN

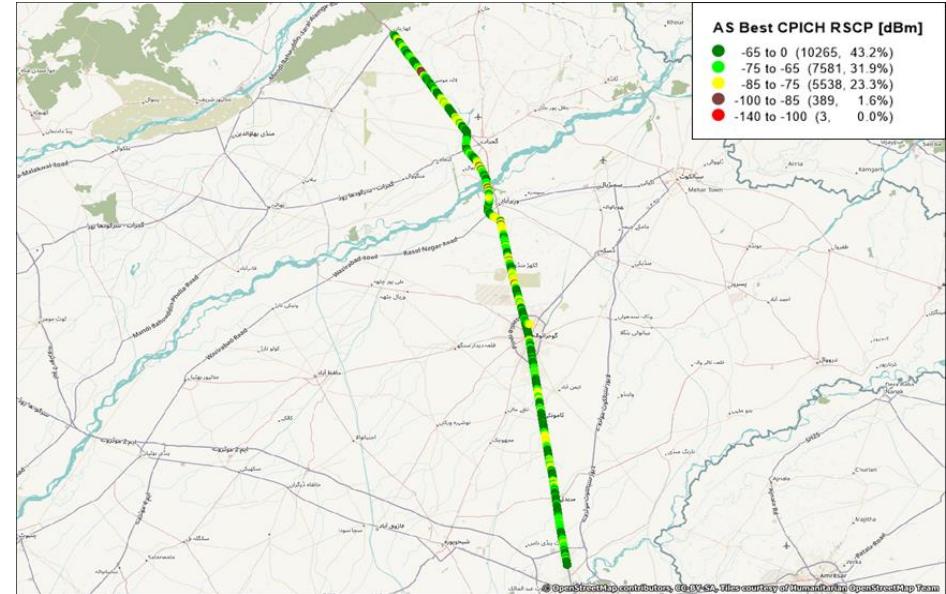


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

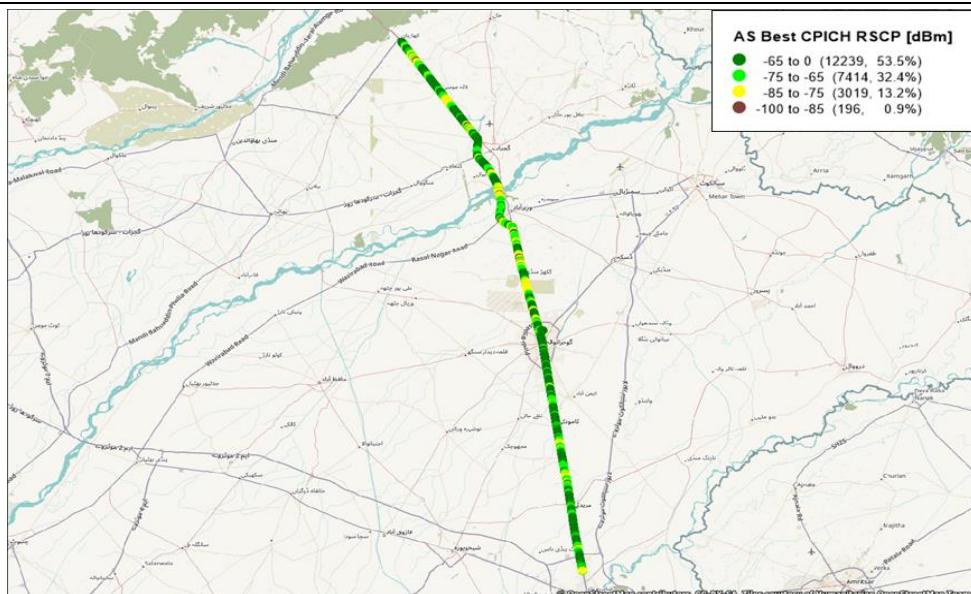
JAZZ 3G NETWORK COVERAGE – LAHORE TO KARIAN



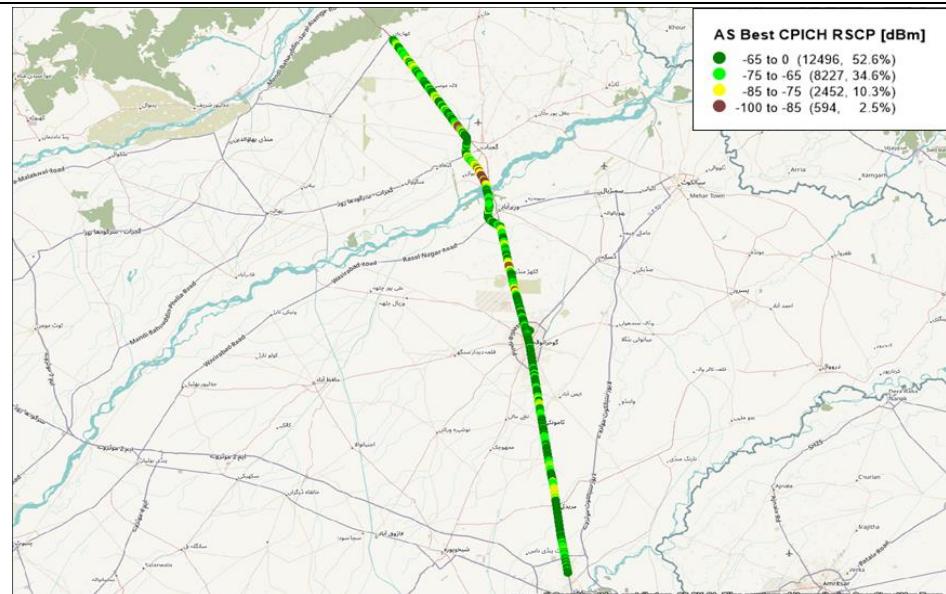
TELENOR 3G NETWORK COVERAGE – LAHORE TO KARIAN



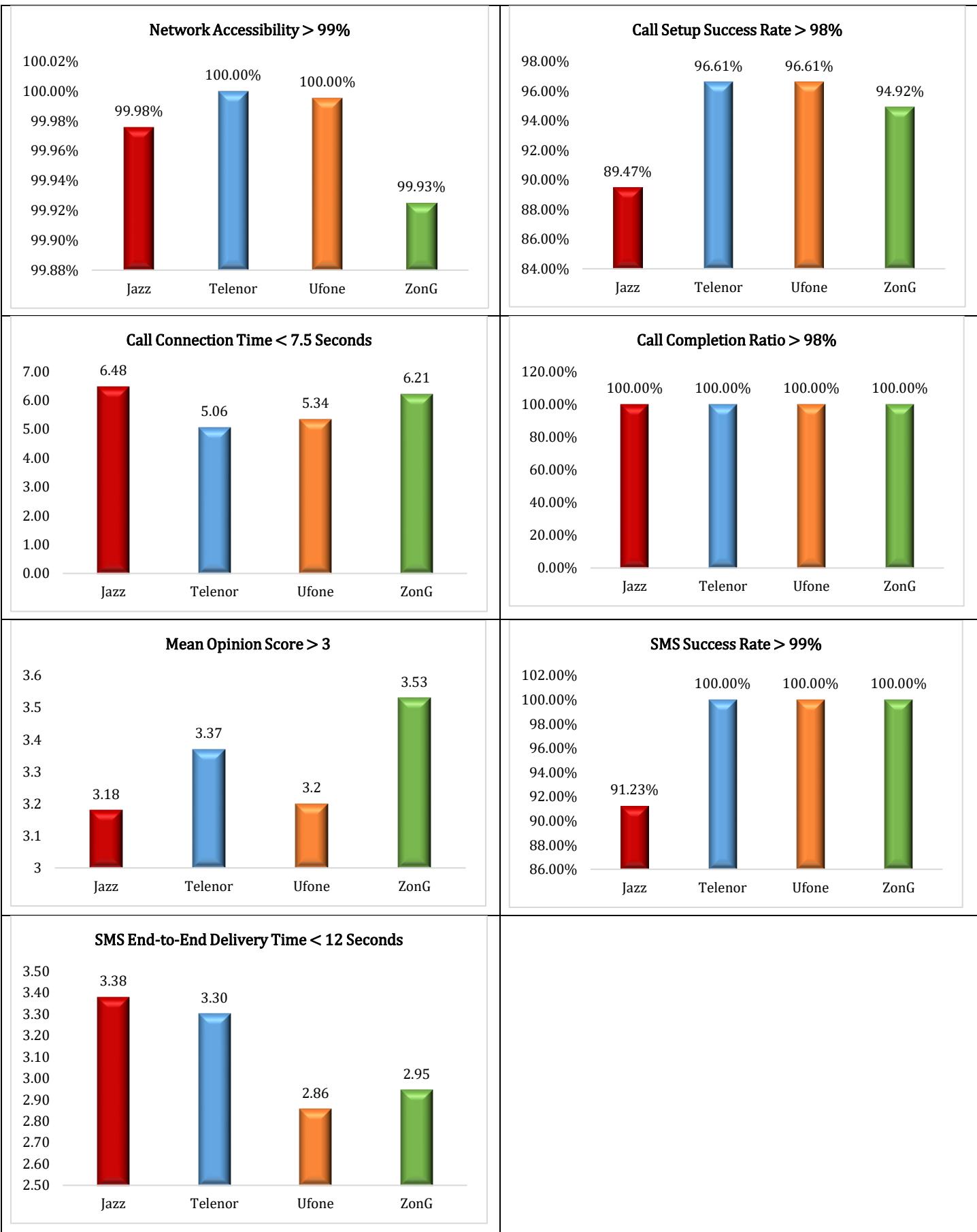
UFONE 3G NETWORK COVERAGE – LAHORE TO KARIAN



ZONG 3G NETWORK COVERAGE – LAHORE TO KARIAN



QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO KHARIAN



QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO KHARIAN

