

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

FOURTH 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 on nine (09) Motorways / Highways / Inter Cities Roads of Punjab, Khyber Pakhtunkhwa (KPK) and Balochistan. The name of roads along with survey dates are shown in **Table 1.1: QoS Survey Roads & Dates:**

S. #.	Province	Road	Survey Dates
1.	Punjab	Multan to Muzaffargarh Road	11 th Oct 2021
2.		Multan to Khanewal Road	25 th Oct 2021
3.		Lahore to Sargodha Road	11 th Nov 2021
4.		Lahore to Gujrat Road	15 th Nov 2021
5.	Khyber Pakhtunkhwa	Peshawar to Mardan Road	1 st Nov 2021
6.		Abbottabad to Battagram Road	29 th Nov 2021
7.	Balochistan	Quetta to Mastung Road	18 th Oct 2021
8.		Quetta to Loralai Road	25 th Oct 2021
9.		Quetta to Dera Murad Jamali Road	1 st Nov 2021

Table 1.1: QoS Survey Roads & Dates

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 Toll Plaza to another Toll Plaza. 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
<i>Multan to Khanewal</i>	94.54%	84.33%	62.49%	97.37%	Yes	No	No	Yes
<i>Multan to Muzaffargarh</i>	90.15%	84.89%	62.36%	91.59%	Yes	No	No	Yes
<i>Quetta to Mastung</i>	93.09%	88.55%	92.38%	94.74%	Yes	No	Yes	Yes
<i>Quetta to Loralai</i>	78.89%	89.88%	88.35%	92.48%	No	No	No	Yes
<i>Quetta to Dera Murad Jamali</i>	92.66%	97.06%	96.85%	81.32%	Yes	Yes	Yes	No
<i>Peshawar to Mardan</i>	61.59%	79.98%	70.87%	85.53%	Yes	No	No	No

<i>Lahore to Sargodha</i>	96.83%	94.23%	34.47%	88.59%	Yes	Yes	No	No
<i>Lahore to Gujrat</i>	92.63%	92.24%	85.82%	96.69%	Yes	Yes	No	Yes
<i>Abbottabad to Battagram</i>	84.73%	92.05%	77.51%	90.70%	No	Yes	No	Yes

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
<i>Multan to Khanewal</i>	N/A	N/A	100.00%	N/A	N/A	N/A	Yes	N/A
<i>Multan to Muzaffargarh</i>	N/A	96.59%	88.19%	97.36%	N/A	Yes	No	Yes
<i>Quetta to Mastung</i>	96.81%	75.00%	95.30%	96.53%	Yes	No	Yes	Yes
<i>Quetta to Loralai</i>	68.64%	99.48%	90.18%	57.55%	No	Yes	Yes	No
<i>Quetta to Dera Murad Jamali</i>	66.30%	77.87%	75.56%	84.51%	No	No	No	No
<i>Peshawar to Mardan</i>	93.18%	N/A	99.63%	100.00%	Yes	N/A	Yes	Yes
<i>Lahore to Sargodha</i>	N/A	100.00%	99.26%	95.45%	N/A	Yes	Yes	Yes
<i>Lahore to Gujrat</i>	N/A	100%	100%	N/A	N/A	Yes	Yes	N/A
<i>Abbottabad to Battagram</i>	53.88%	45.73%	94.13%	85.42%	No	No	Yes	No

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

MOBILE BROADBAND SERVICE

4.1. A total of 4937 http download test attempts made, out of which 1925 were successful and rest of 3012 were failed. The company wise detail is mentioned in Table4.1: Data Tests Statistics.

Description	Jazz	Telenor	Ufone	ZonG
<i>TOTAL DATA TEST ATTEMPTS</i>	1336	1235	1139	1227
<i>SUCCESSFUL DATA TEST ATTEMPTS</i>	480	549	509	387
<i>FAILED DATA TEST ATTEMPTS</i>	856	686	630	840
<i>TEST ATTEMPTS SUCCESS RATIO</i>	35.93%	44.45%	44.69%	31.54%
<i>USER DATA THROUGHPUT</i>	7.351 Mbps	2.036 Mbps	2.71 Mbps	10.38 Mbps

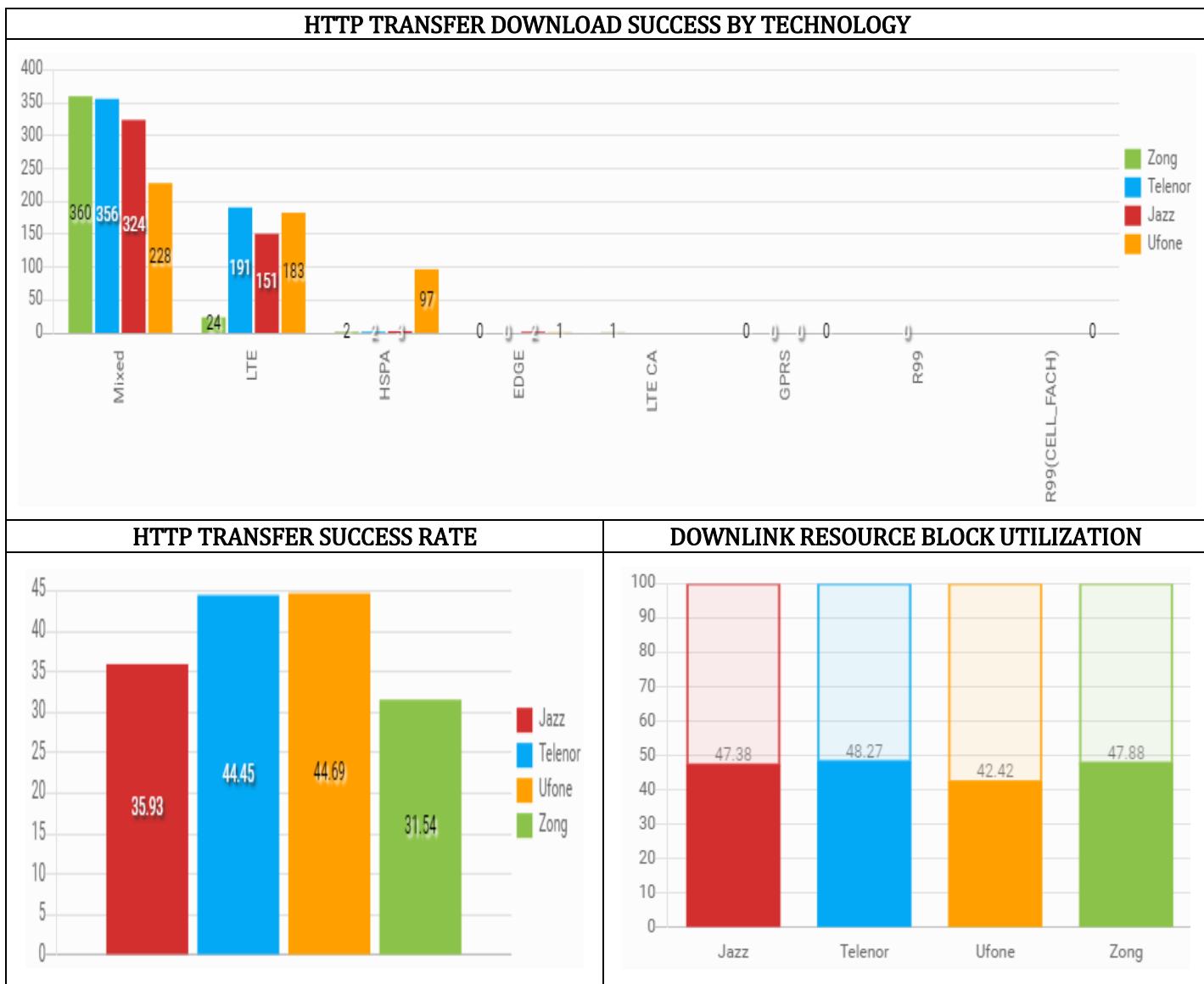
Table4.1: Data Tests Statistics

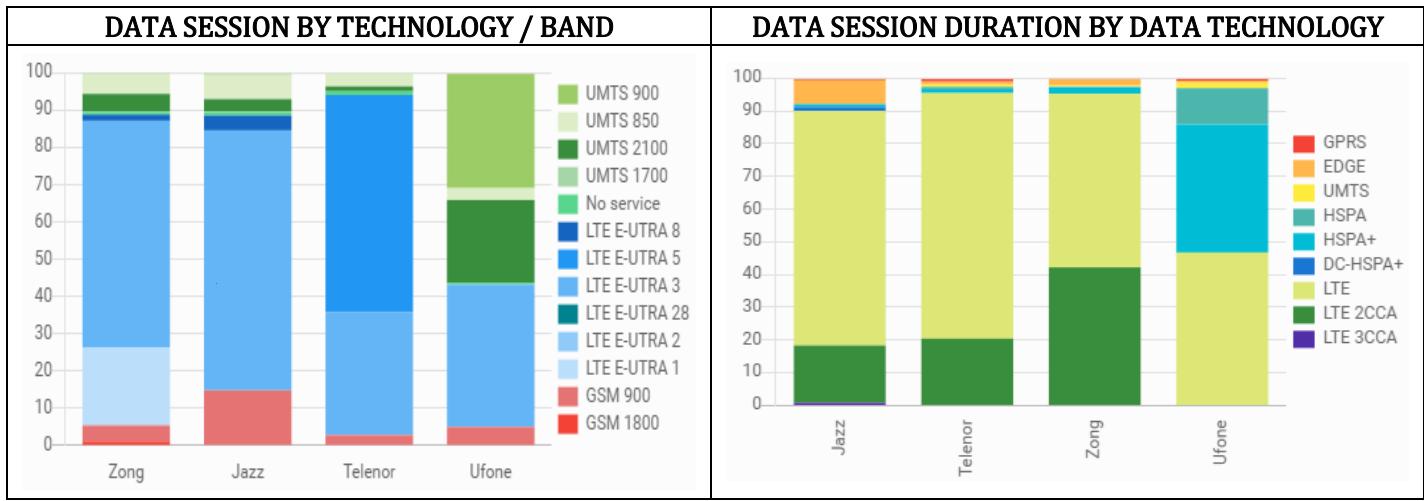
4.2. **4G USER DATA THROUGHPUT.** As per Next Generation Mobile Service (NGMS) licenses awarded, licensees are required to meet the threshold of minimum of 2Mbps of 4G User Data Throughput. The results of Data Service QoS KPI i.e. User Data Throughput on 9x surveyed roads is shown in Table4.2: 4G User Data Throughput \geq 2 Mbps.

Road Name	Throughput (Mbps)				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Multan to Khanewal	8.09	7.94	2.81	14.94	Second	Third	Fourth	First
Multan to Muzaffargarh	7.52	3.28	1.44	21.21	Second	Third	Fourth	First
Quetta to Mastung	6.95	2.16	3.44	9.55	Second	Fourth	Third	First
Quetta to Loralai	8.32	3.42	2.99	11.19	Second	Third	Fourth	First
Quetta to Dera Murad Jamali	16.53	3.23	3.85	13.55	First	Fourth	Third	Second
Peshawar to Mardan	8.48	3.14	3.35	14.54	Second	Fourth	Third	First
Lahore to Sargodha	9.09	1.55	2.20	8.75	First	Fourth	Third	Second
Lahore to Gujrat	7.05	2.87	12.15	11.57	Third	Fourth	First	Second
Abbottabad to Battagram	16.59	3.98	14.33	18.76	Second	Fourth	Second	First

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

4.3. 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

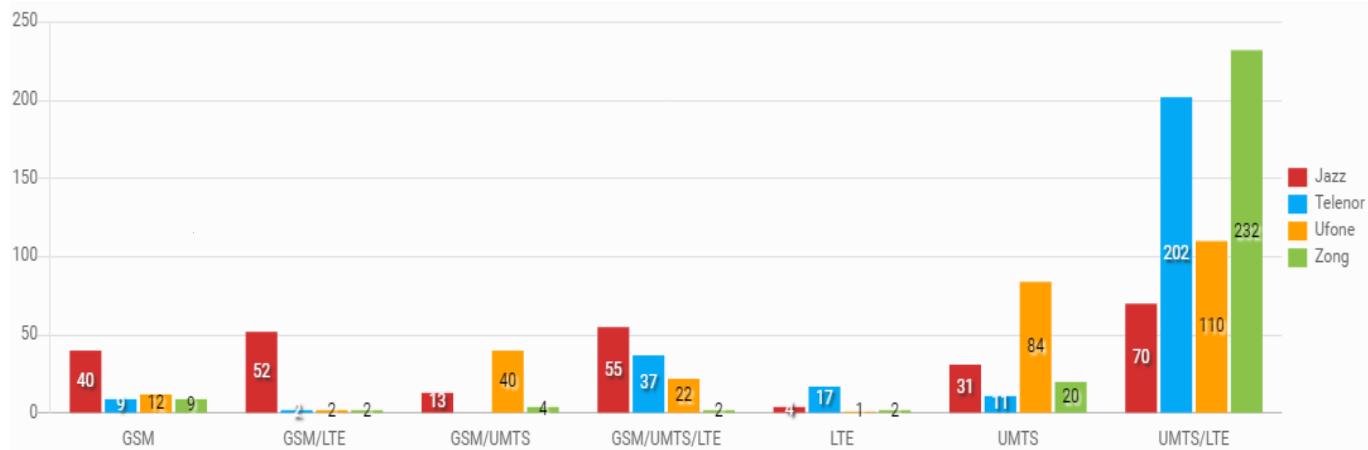
5.1. A total of **1085 Calls attempts** made and out of which **171 attempts failed**. In **914 successfully established calls**, **24 calls dropped** prior to completion of two minutes duration, whereas **890 calls remained connected** for the complete duration of two minutes. The company wise call statistics is alongwith overall QoS KPIs is shown in **Table5.1: Call Statistics**.

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
<i>TOTAL CALLS ATTEMPTS</i>	265	278	271	271
<i>FAILED CALLS ATTEMPTS</i>	62	46	25	38
<i>ESTABLISHED CALLS ATTEMPTS</i>	203	232	246	233
<i>DROPPED CALLS ATTEMPTS</i>	2	7	7	8
<i>COMPLETED CALLS ATTEMPTS</i>	201	225	239	225
<i>CALL SETUP SUCCESS RATE</i>	76.6%	83.45%	90.77%	85.98%
<i>CALL SETUP TIME</i>	8.75 s	8.91 s	6.77 s	7.94 s
<i>CALL COMPLETION RATE</i>	94.12%	93.03%	94.49%	92.62%
<i>ISHO SUCCESS RATE</i>	97.87%	100%	100%	-
<i>RAB SETUP SUCCESS RATE</i>	100%	100%	100%	100%
<i>MEAN OPINION SCORE</i>	2.91	3.28	3.19	3.39

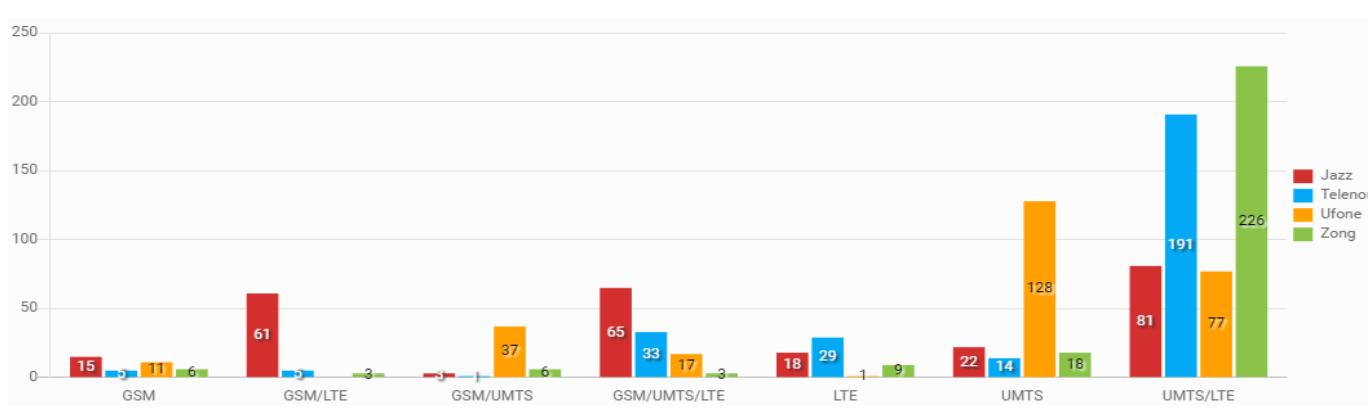
Table5.1: Call Statistics

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.

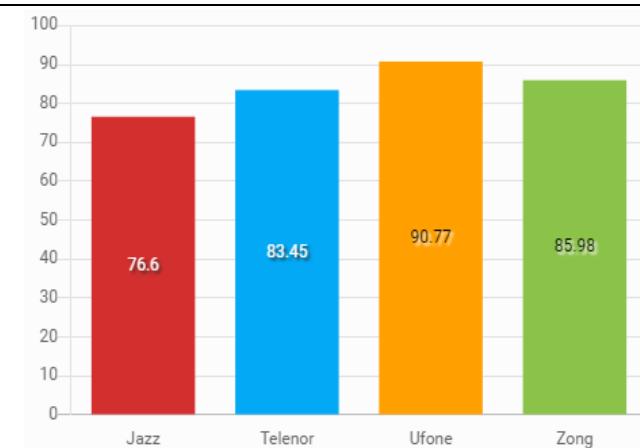
TECHNOLOGY WISE DISTRIBUTION OF CALLS – A PARTY



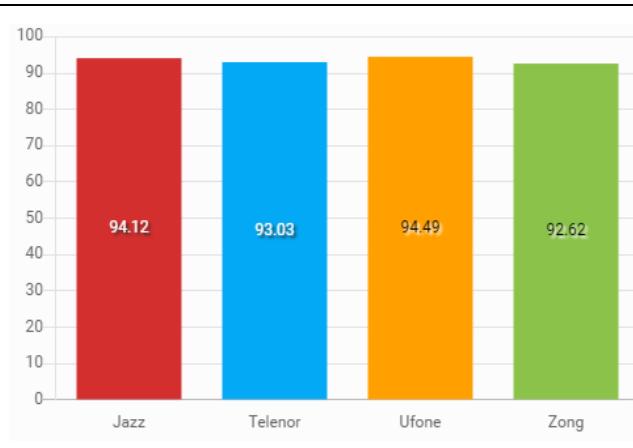
TECHNOLOGY WISE DISTRIBUTION OF CALLS – B PARTY



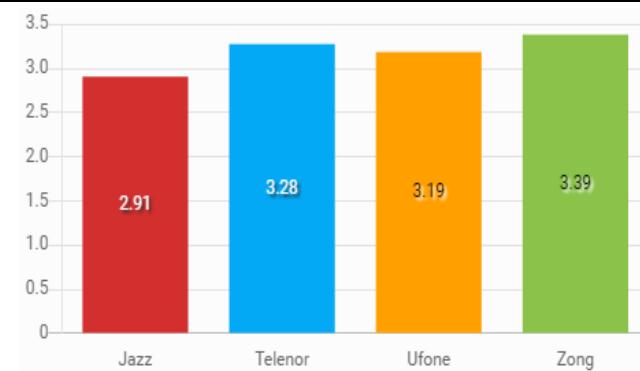
CALL SETUP SUCCESS RATE



CALL RETAINABILITY

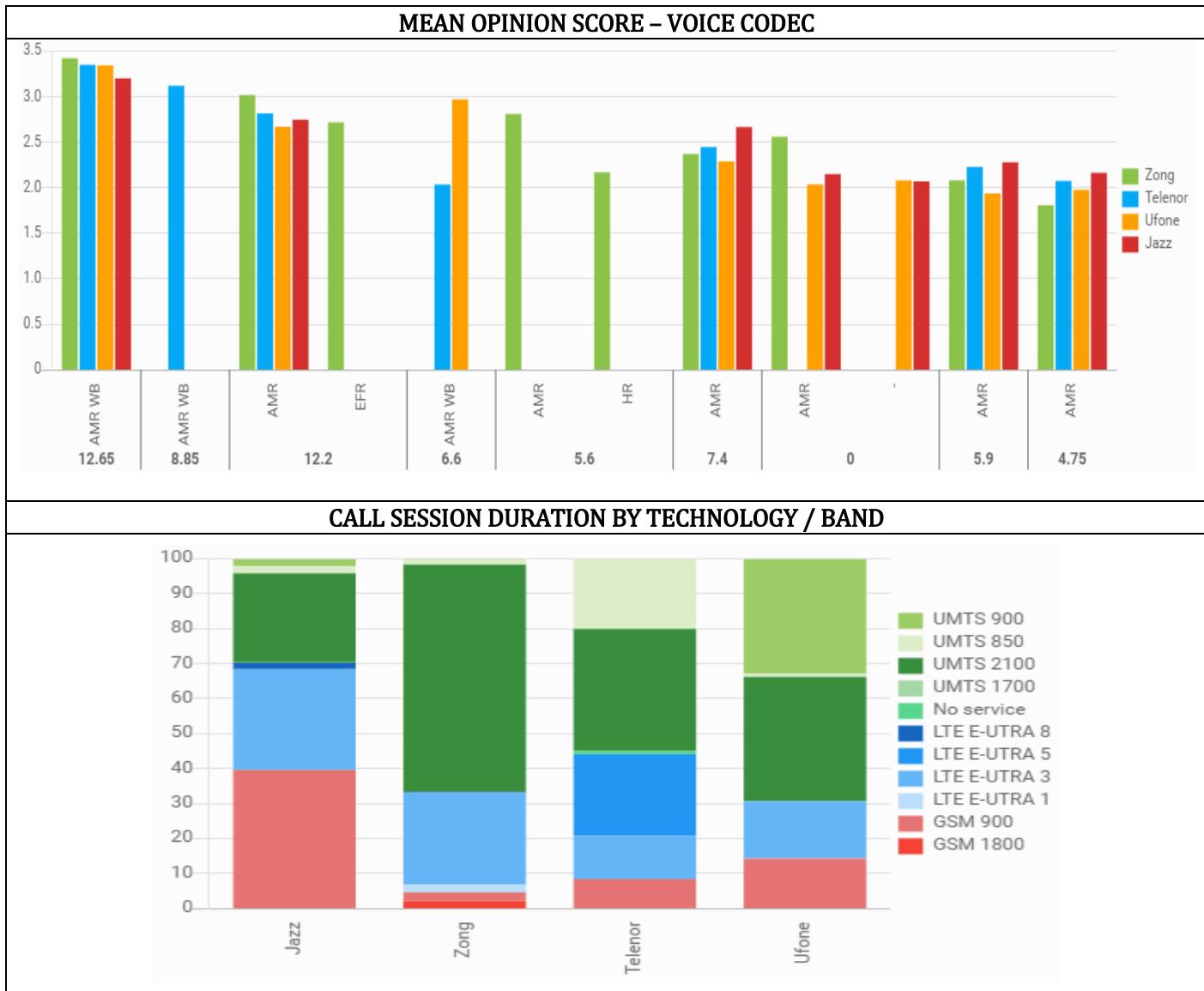


MEAN OPINION SCORE - AVERAGE



MEAN OPINION SCORE < 1.6 (PERCENTAGE)





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 **9 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	Multan to Khanewal	Multan to Muzaffargarh	Quetta to Mastung	Quetta to Loralai	Quetta to Dera Murad Jamali	Peshawar to Mardan	Lahore to Sargodha	Lahore to Gujrat	Abbottabad to Battagram
Jazz	NA	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
	SA	No	No	No	No	No	No	No	No	No
	CCT	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
	MOS	No	Yes	No	No	No	No	No	Yes	No
	ISHO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Telenor	NA	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes
	SA	Yes	No	No	No	No	No	No	No	No
	CCT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No
	MOS	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	ISHO	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ufone	NA	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
	SA	Yes	No	No	No	No	Yes	No	No	No
	CCT	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	No	No	Yes	Yes	No	No	Yes	Yes	No
	MOS	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zong	NA	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes
	SA	Yes	No	No	No	No	No	No	No	No
	CCT	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
	CCR	No	No	Yes	No	No	No	Yes	Yes	Yes
	MOS	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO					N/A				
	RSSR	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%

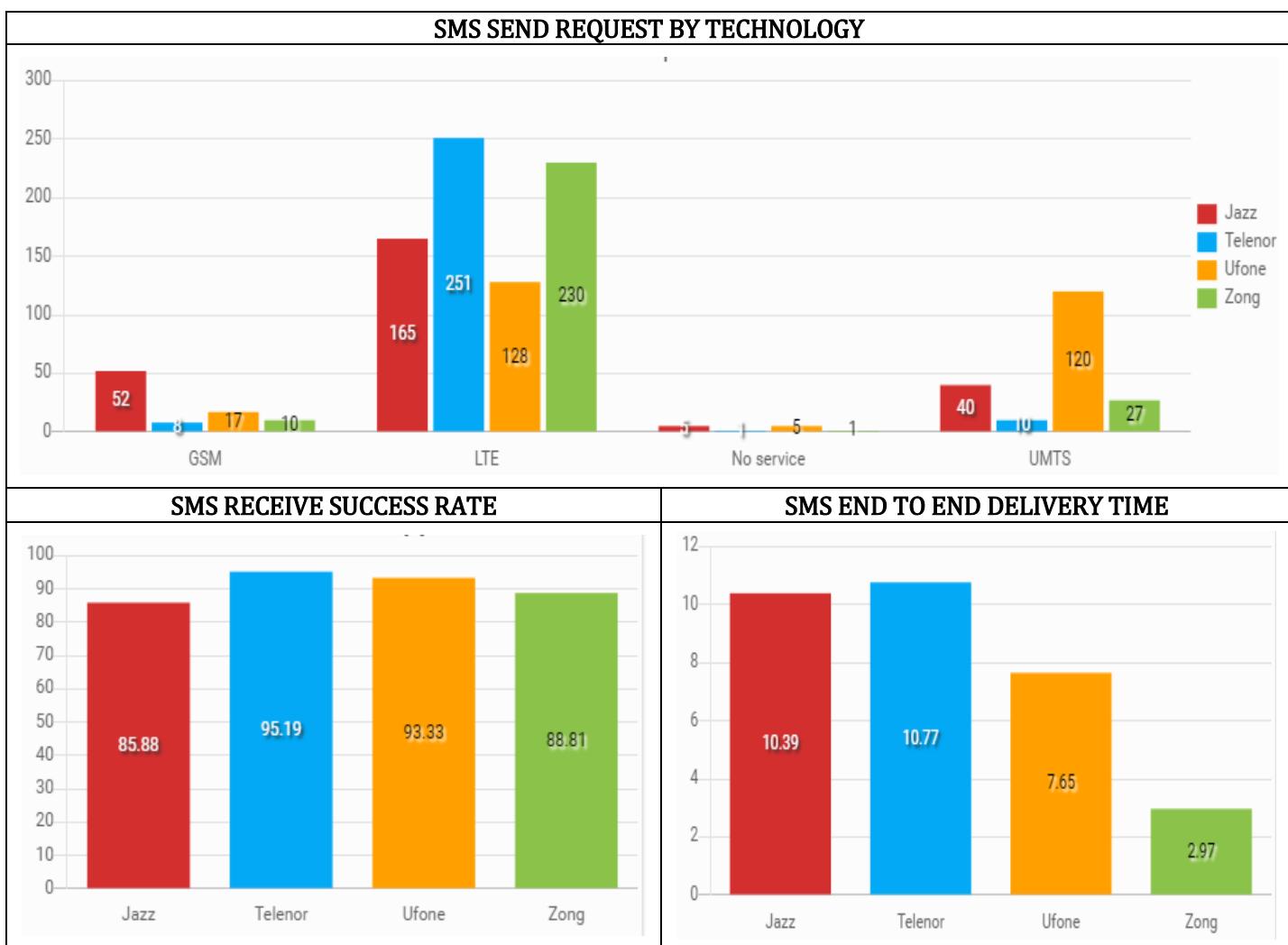
Table 5.2: Voice QoS KPIs Compliance Level

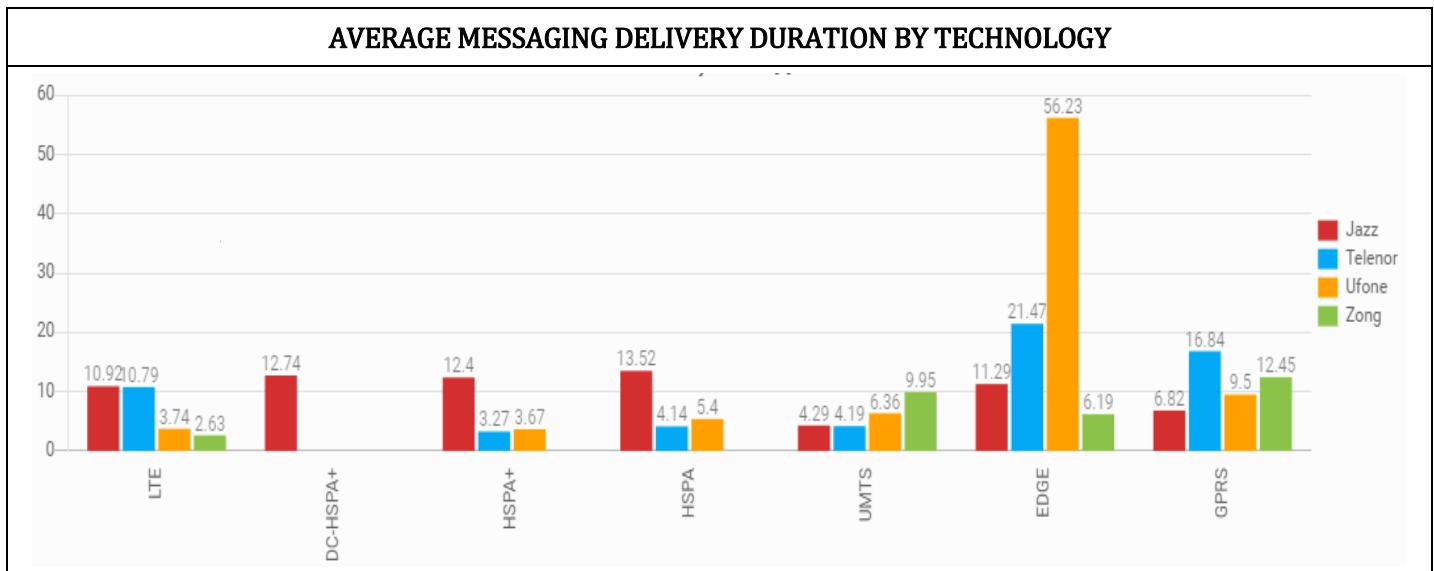
SMS SERVICE

6.1. A total of **1070 SMS sending attempt** conducted, out of which **972 SMS successfully received** at B-Party. The company wise SMS Statistics are shown in **Table6.1: SMS Statistics**

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
<i>SMS SEND REQUEST</i>	262	270	270	268
<i>SMS SUCCESSFULLY RECEIVED</i>	225	257	252	238
<i>SMS RECEIVE SUCCESS RATE</i>	85.88%	95.19%	93.33%	88.81%
<i>END TO END DELIVERY TIME</i>	10.39 s	10.77 s	7.65 s	2.97 s

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, Annex-B & Annex-C** for roads of Punjab, Khyber Pakhtunkhwa & Balochistan 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 and Voice Service based upon the compliance level against each QoS KPI in each category on **9 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.	ZonG	6	4	3	3	1 st	
2.	Jazz	7	1	2	3	2 nd	
3.	Telenor	4	4	5	3	3 rd	
4.	Ufone	2	7	7	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	6	3	-	-	1 st
2.	Jazz	2	6	1	-	2 nd
3.	Ufone	1	1	4	3	3 rd
4.	Telenor	-	-	3	6	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.	Ufone	54	9	1 st
2.	Telenor	46	16	2 nd
3.	ZonG	36	18	3 rd
4.	Jazz	39	24	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	ZonG	Jazz	Telenor & Ufone	-
2	Mobile Broadband	ZonG	Jazz	Ufone	Telenor
3.	Voice	Ufone	Telenor	ZonG	Jazz

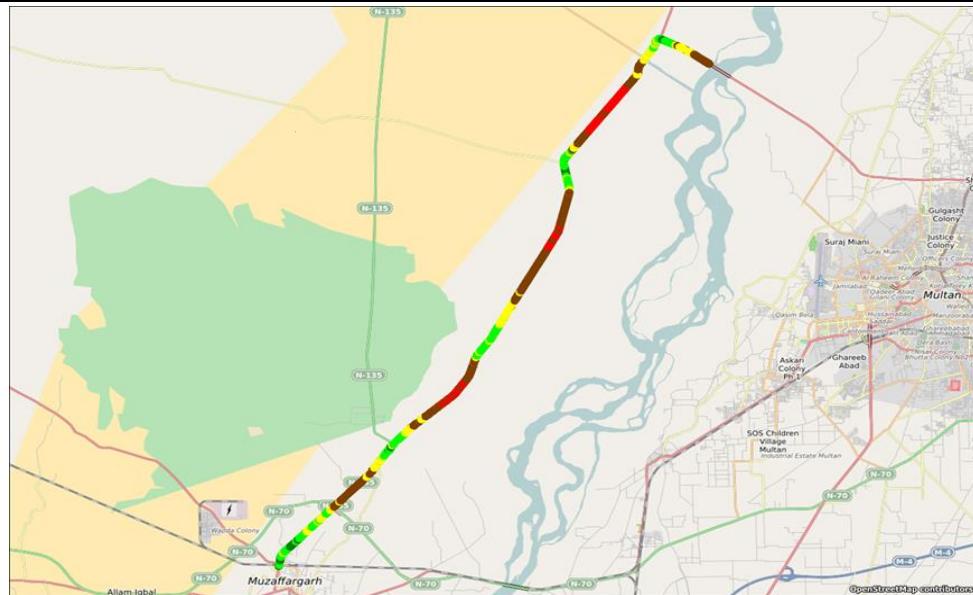
Table 8.5: CMOs Overall Standing in QoS Survey

ANNEX - A

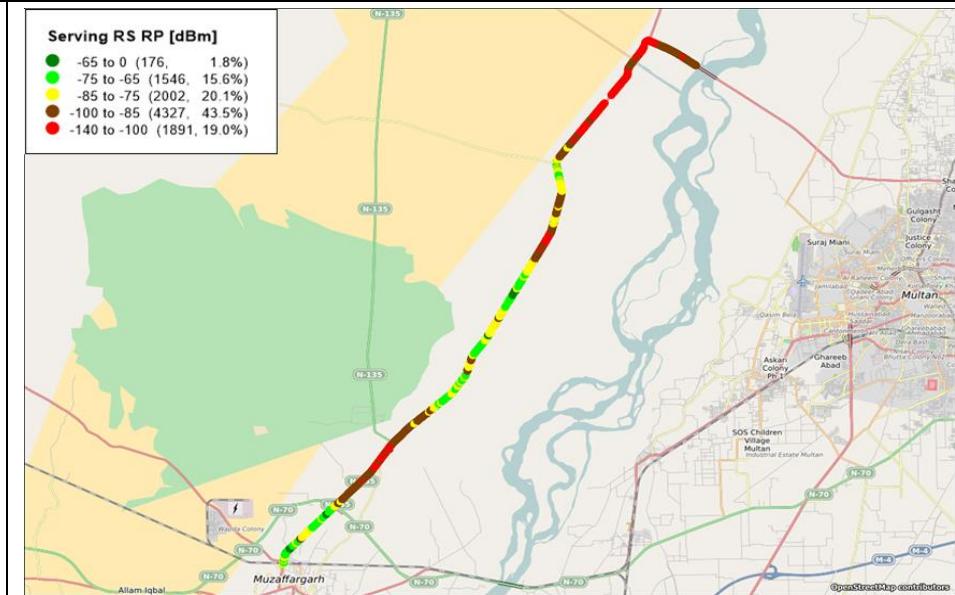
PUNJAB

4G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSRP)

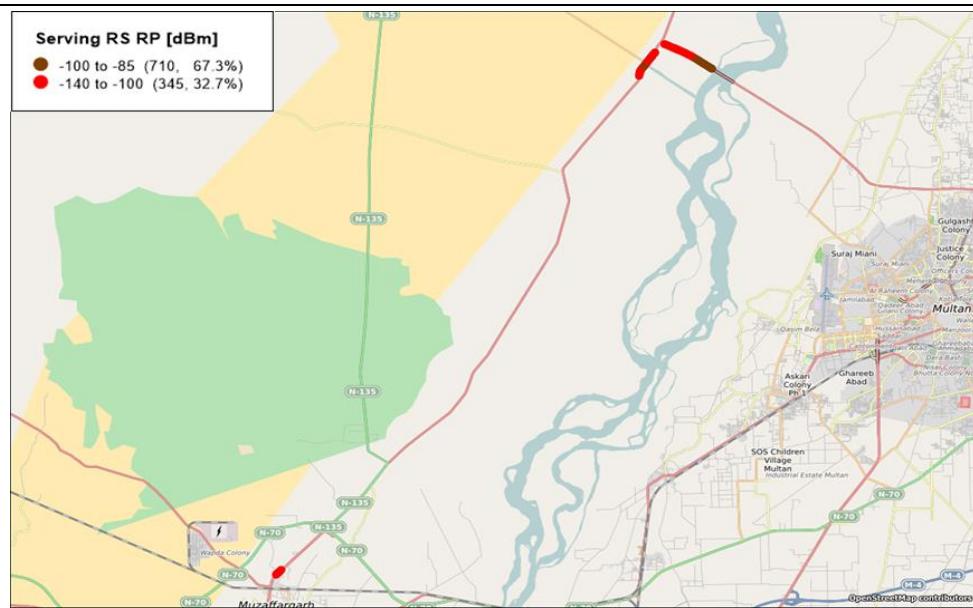
JAZZ 4G NETWORK COVERAGE – MULTAN TO MUZAFFARGARH



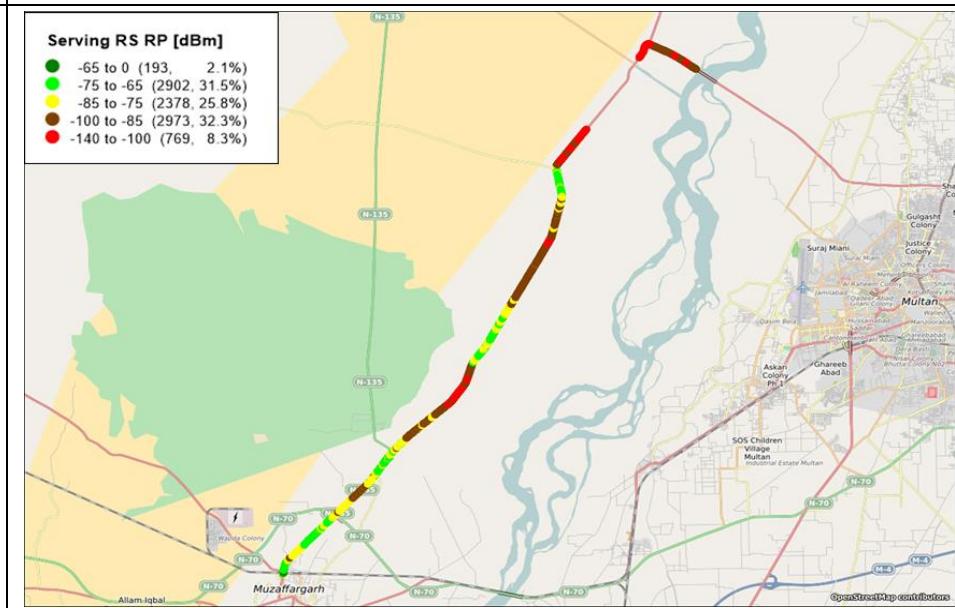
TELENOR 4G NETWORK COVERAGE – MULTAN TO MUZAFFARGARH



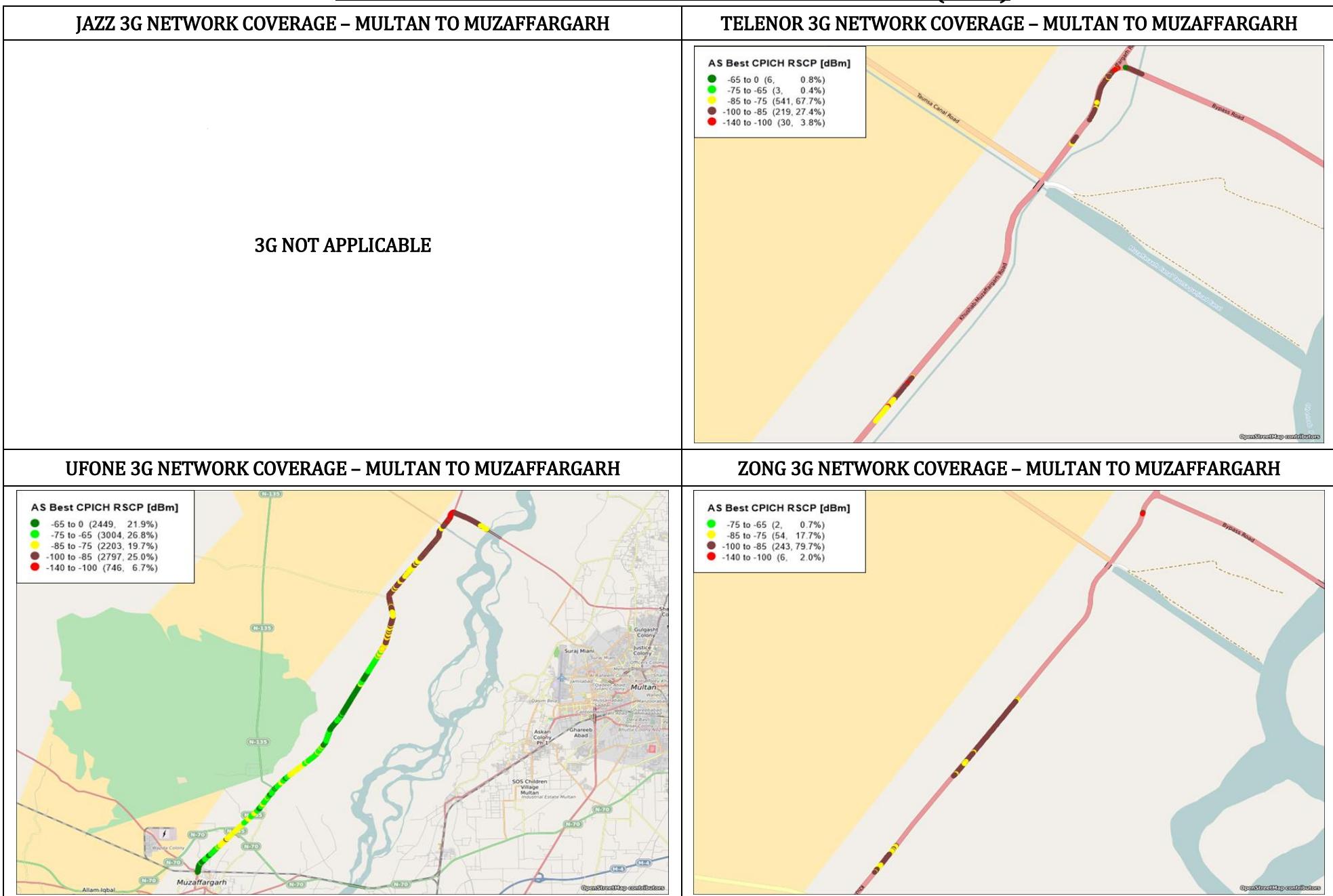
UFONE 4G NETWORK COVERAGE – MULTAN TO MUZAFFARGARH



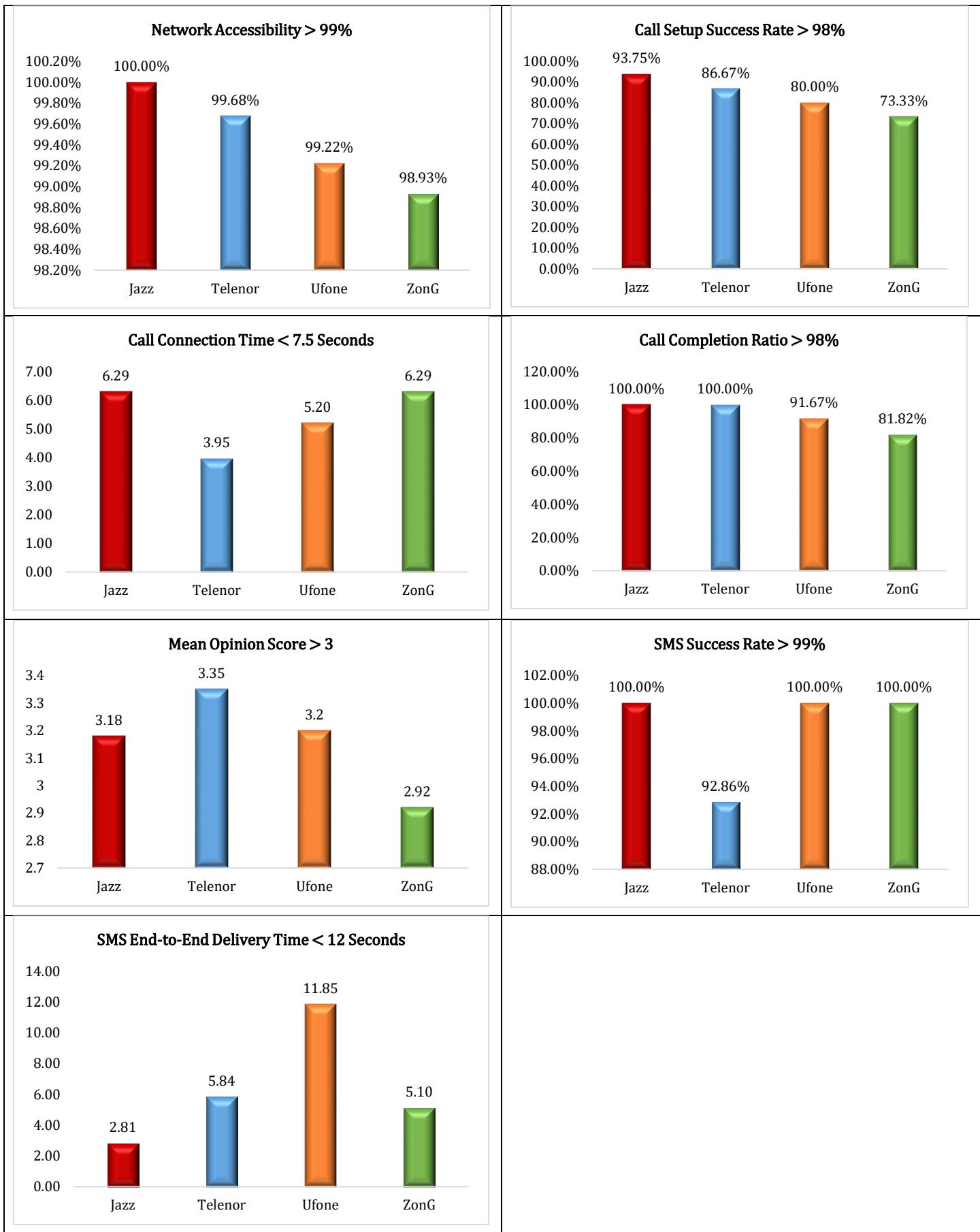
ZONG 4G NETWORK COVERAGE – MULTAN TO MUZAFFARGARH



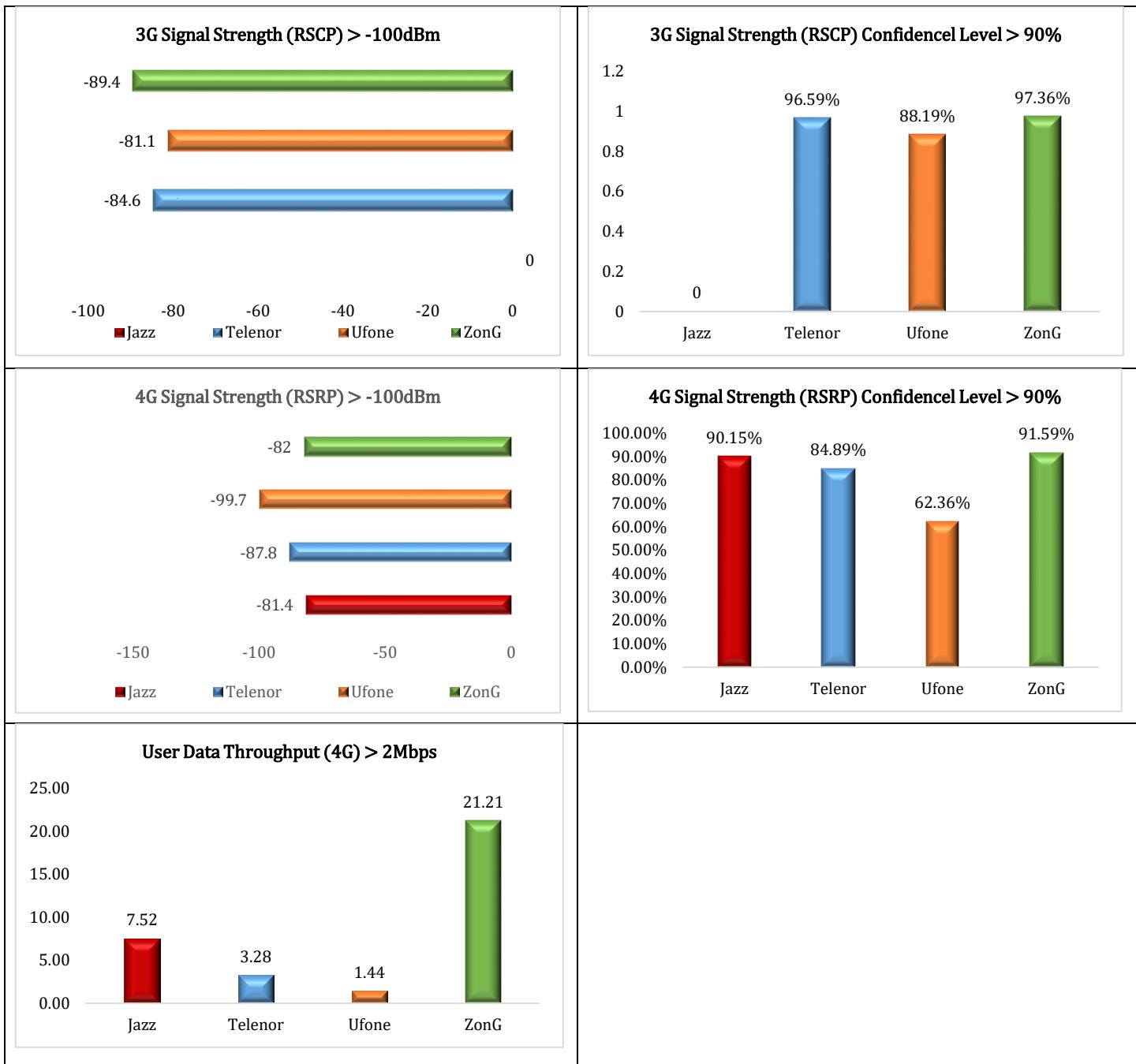
3G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSCP)



QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO MUZAFFARGARH

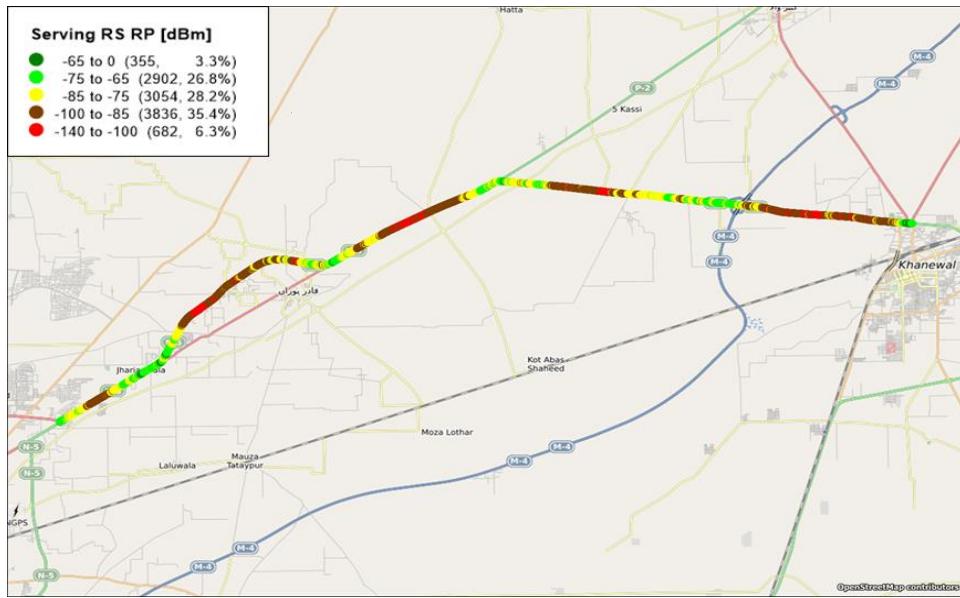


QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO MUZAFFARGARH

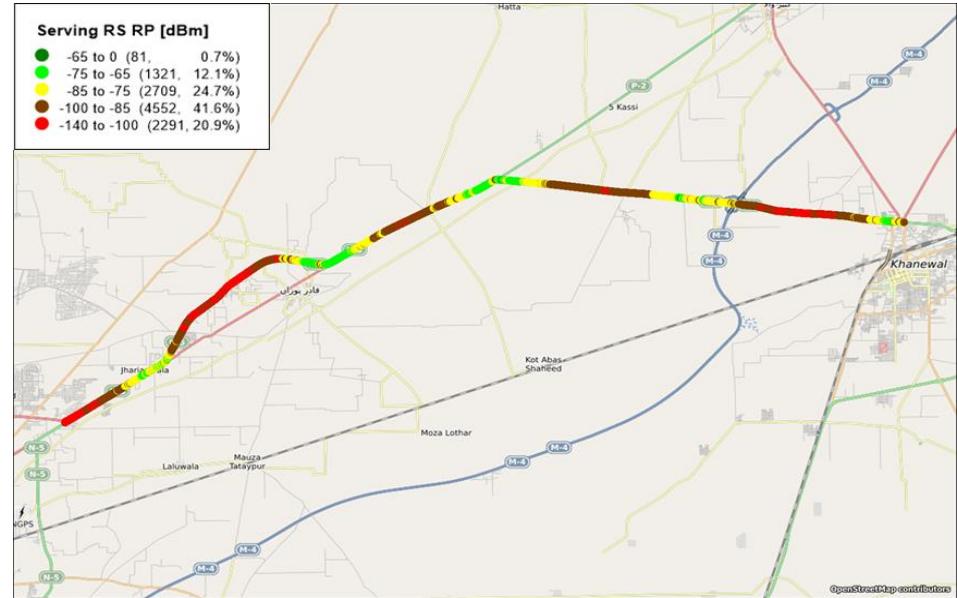


4G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSRP)

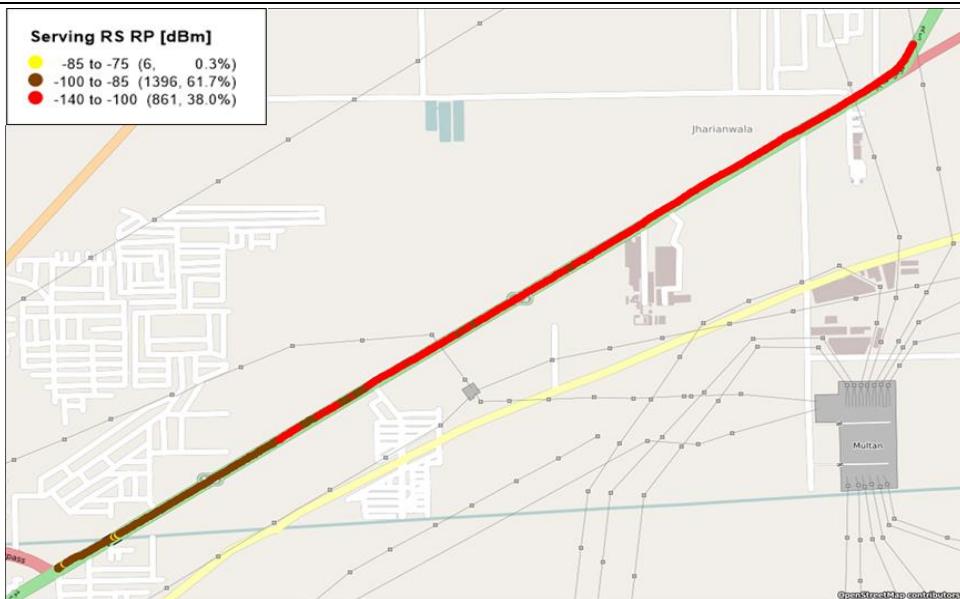
JAZZ 4G NETWORK COVERAGE – MULTAN TO KHANEWAL



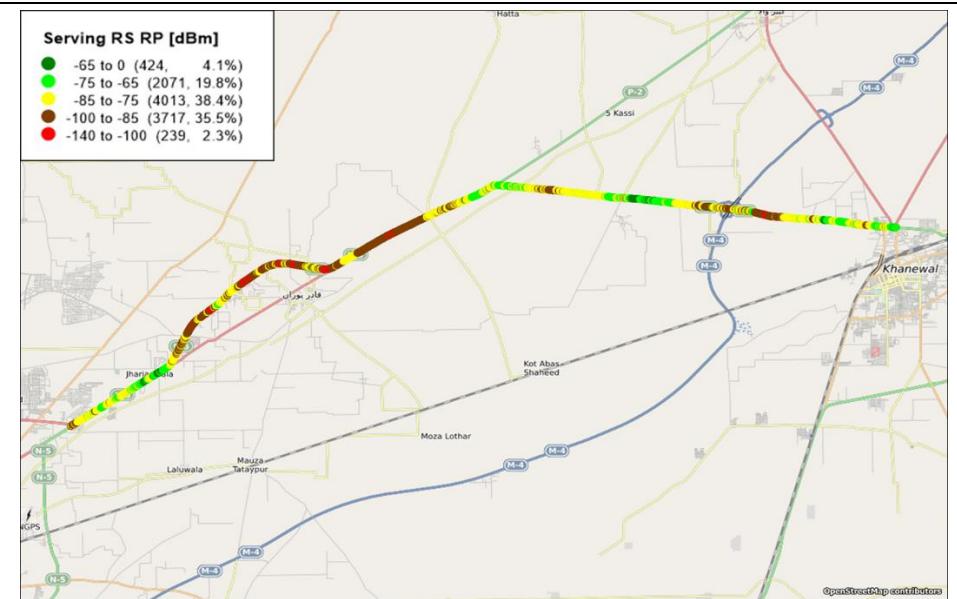
TELENOR 4G NETWORK COVERAGE – MULTAN TO KHANEWAL



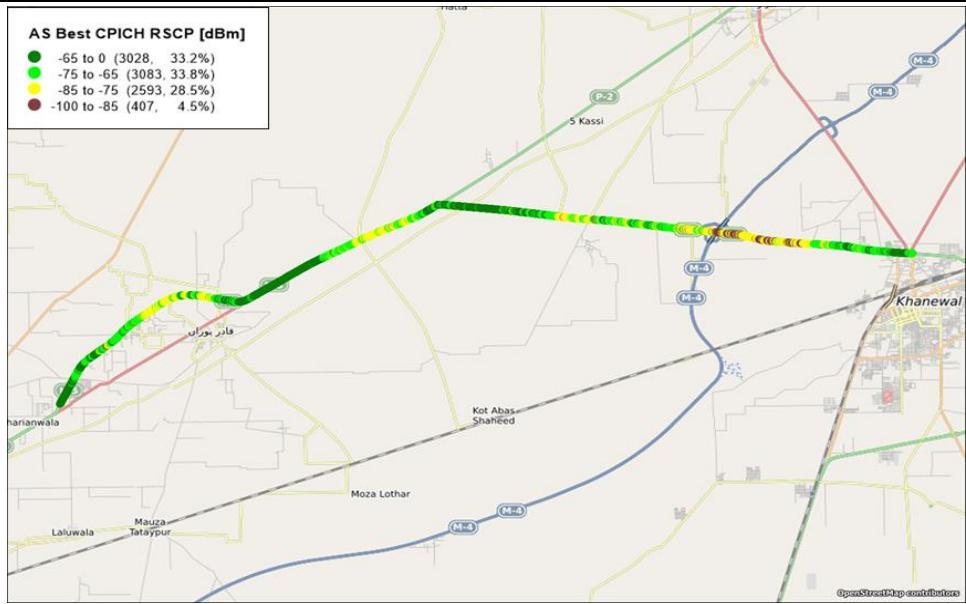
UFONE 4G NETWORK COVERAGE – MULTAN TO KHANEWAL



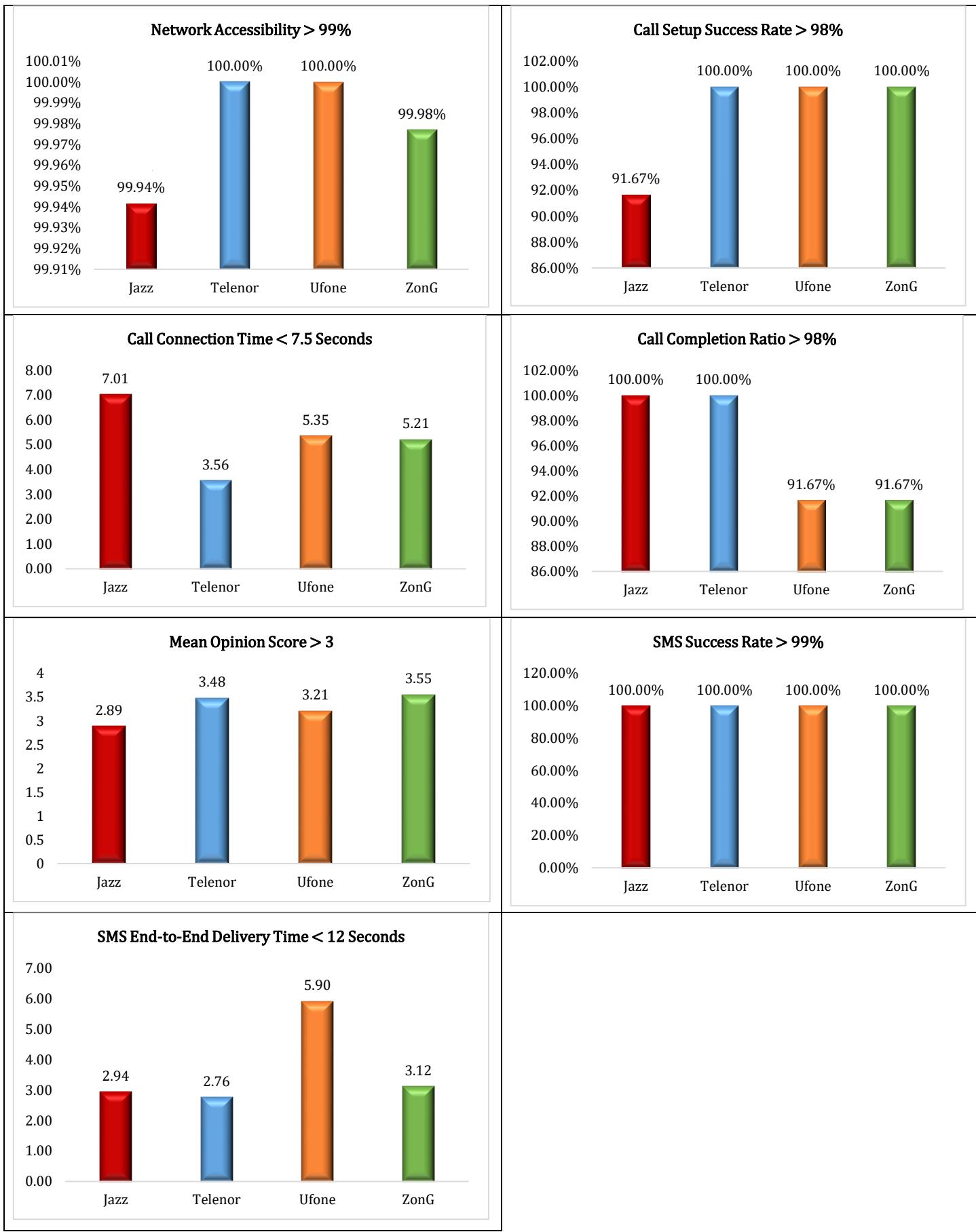
ZONG 4G NETWORK COVERAGE – MULTAN TO KHANEWAL



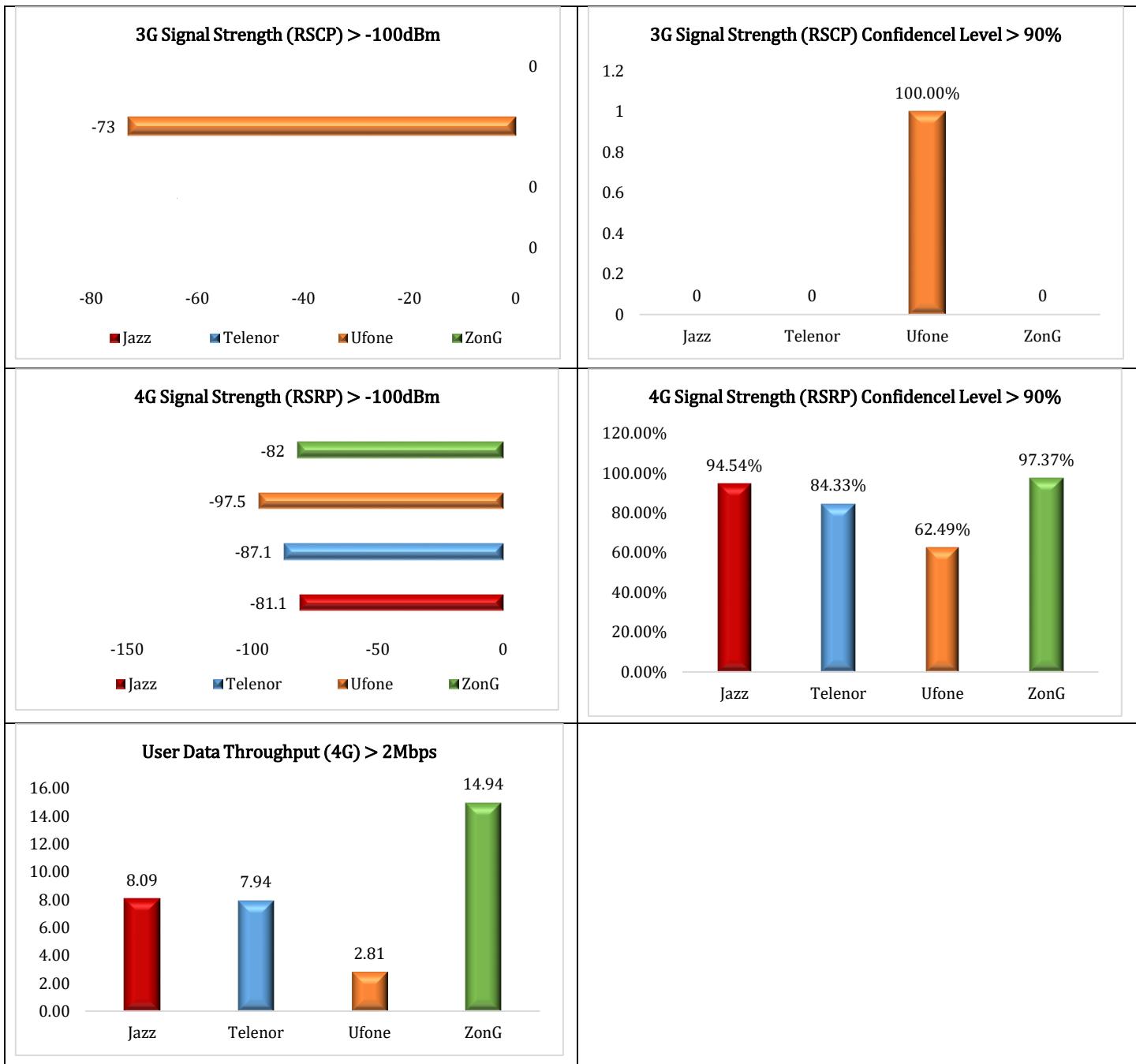
3G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSCP)

JAZZ 3G NETWORK COVERAGE – MULTAN TO KHANEWAL	TELENOR 3G NETWORK COVERAGE – MULTAN TO KHANEWAL
<p>3G NOT APPLICABLE</p>	<p>3G NOT APPLICABLE</p>
UFONE 3G NETWORK COVERAGE – MULTAN TO KHANEWAL	ZONG 3G NETWORK COVERAGE – MULTAN TO KHANEWAL
 <p>AS Best CPICH RSCP [dBm]</p> <ul style="list-style-type: none">-65 to 0 (3028, 33.2%)-75 to -65 (3083, 33.8%)-85 to -75 (2593, 28.5%)-100 to -85 (407, 4.5%) <p>OpenStreetMap contributors</p>	<p>3G NOT APPLICABLE</p>

QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO KHANEWAL

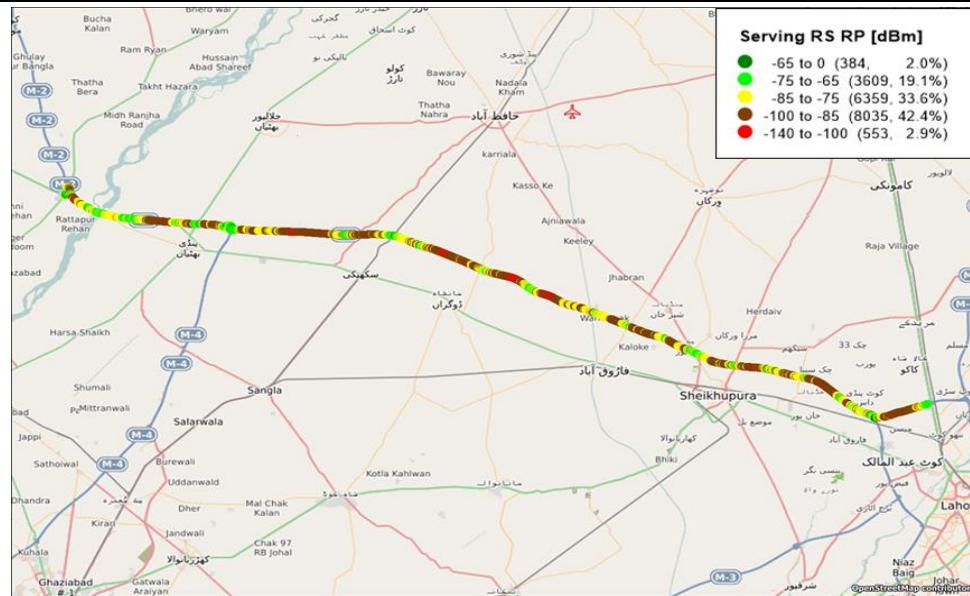


QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO KHANEWAL

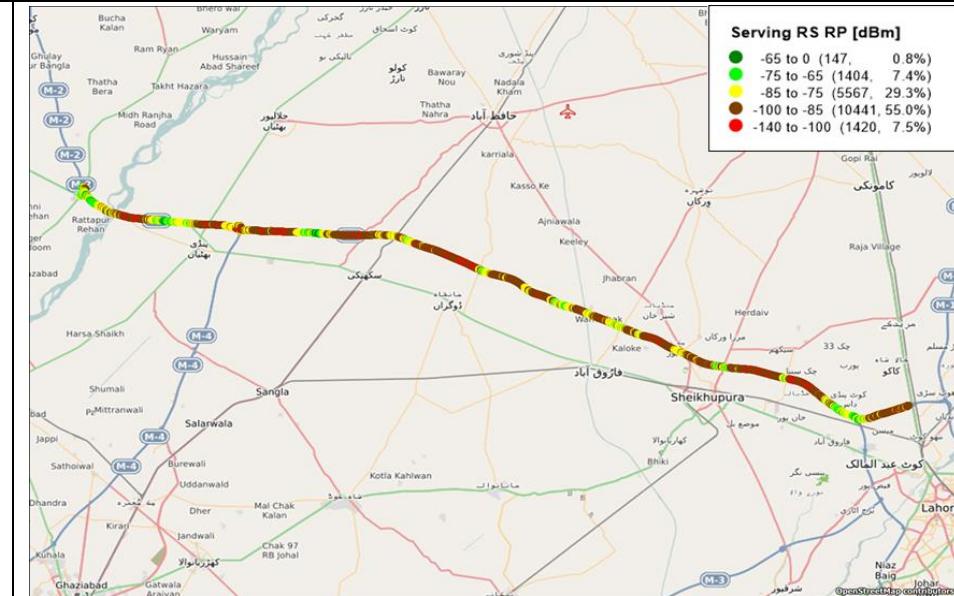


4G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSRP)

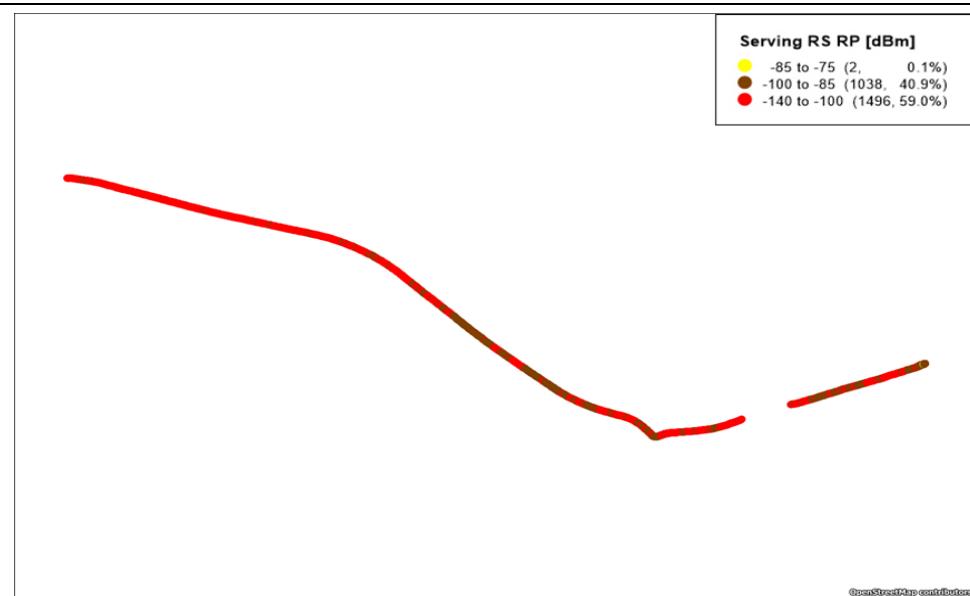
JAZZ 4G NETWORK COVERAGE – LAHORE TO SARGODHA



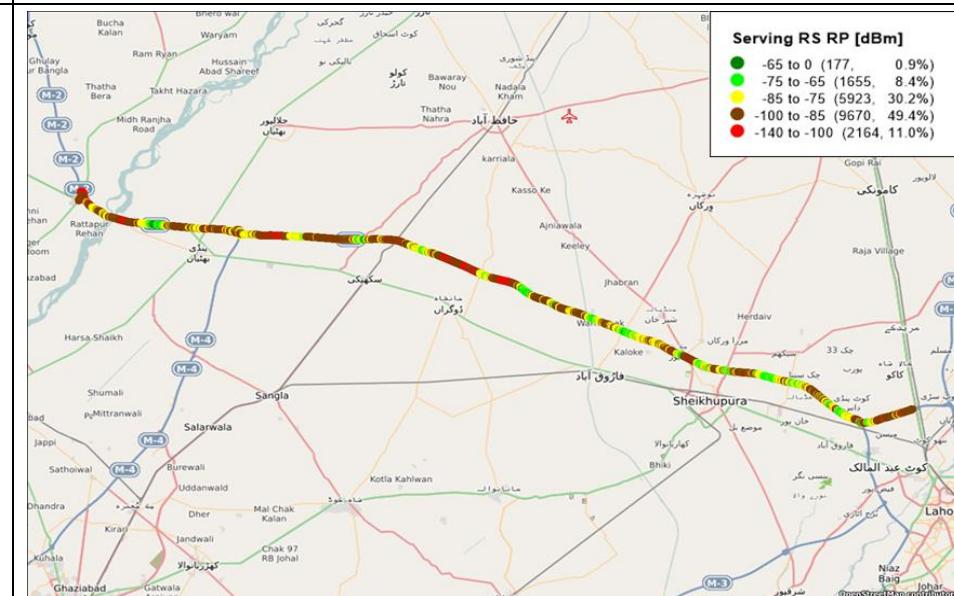
TELENOX 4G NETWORK COVERAGE – LAHORE TO SARGODHA



UFONE 4G NETWORK COVERAGE – LAHORE TO SARGODHA



ZONG 4G NETWORK COVERAGE – LAHORE TO SARGODHA



3G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSCP)

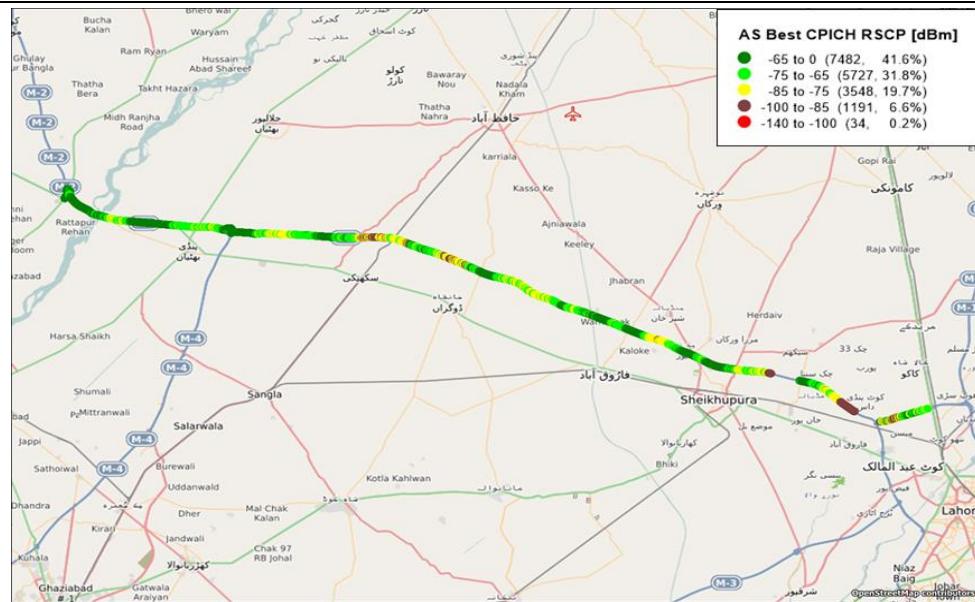
JAZZ 3G NETWORK COVERAGE – LAHORE TO SARGODHA

3G NOT APPLICABLE

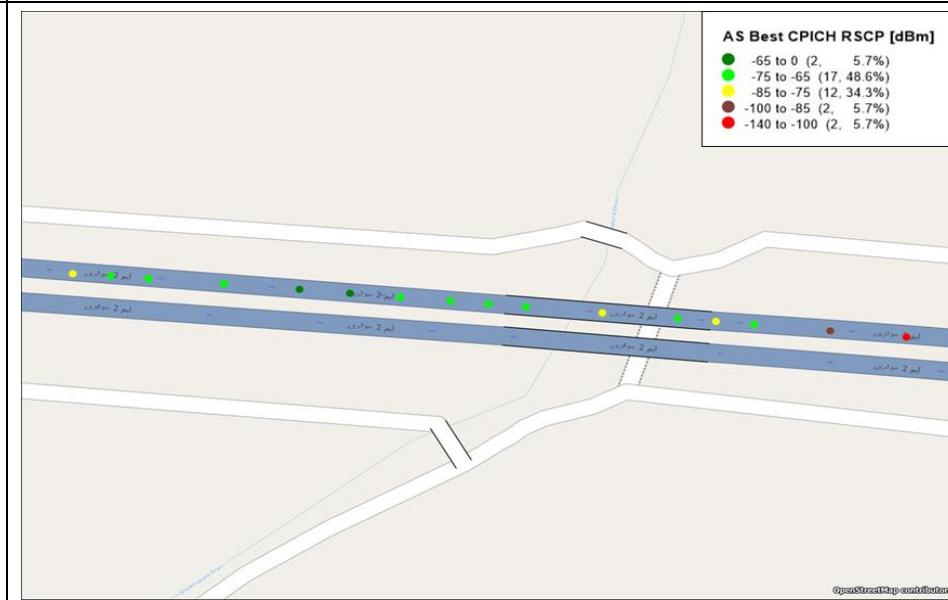
TELENOR 3G NETWORK COVERAGE – LAHORE TO SARGODHA



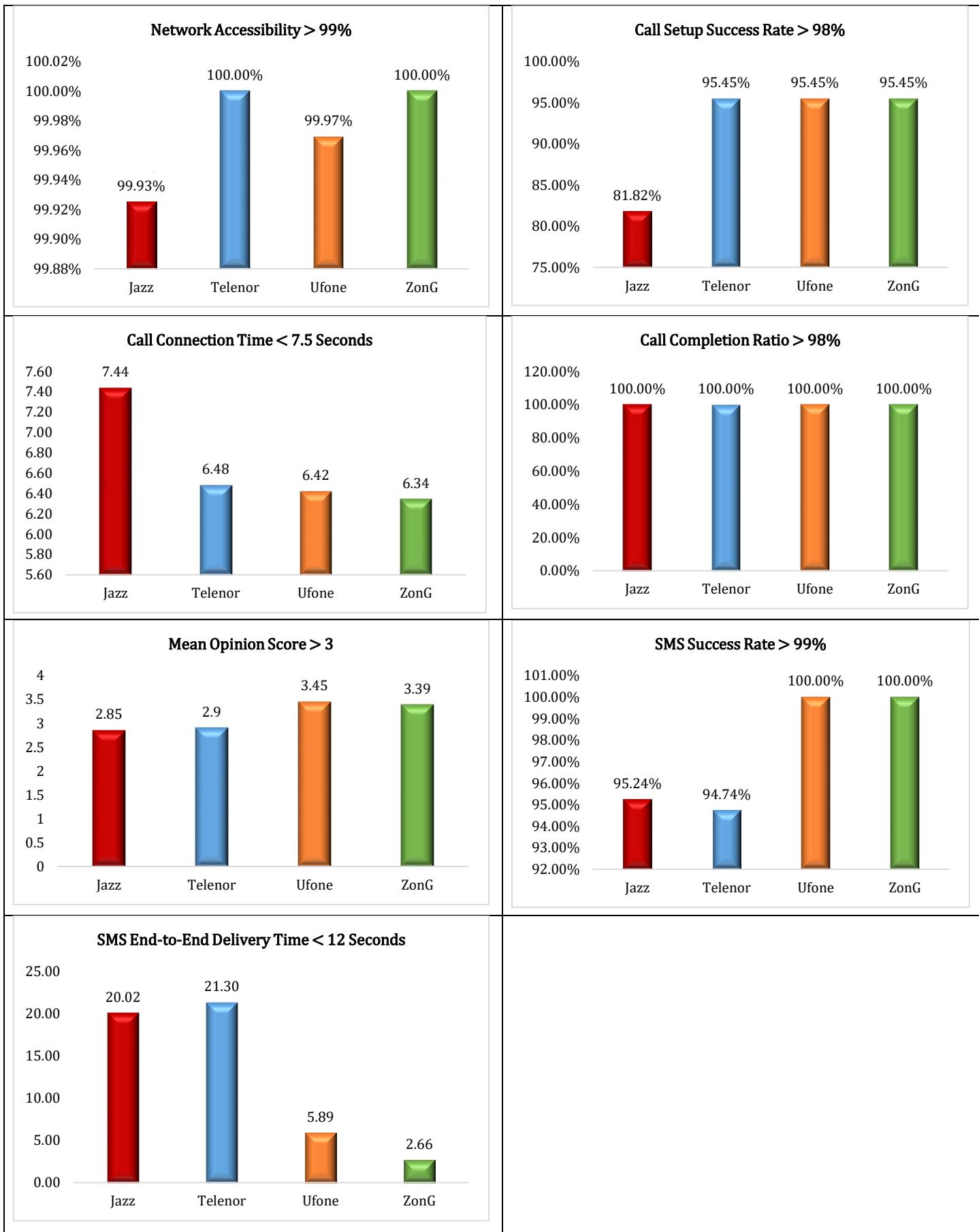
UFONE 3G NETWORK COVERAGE – LAHORE TO SARGODHA



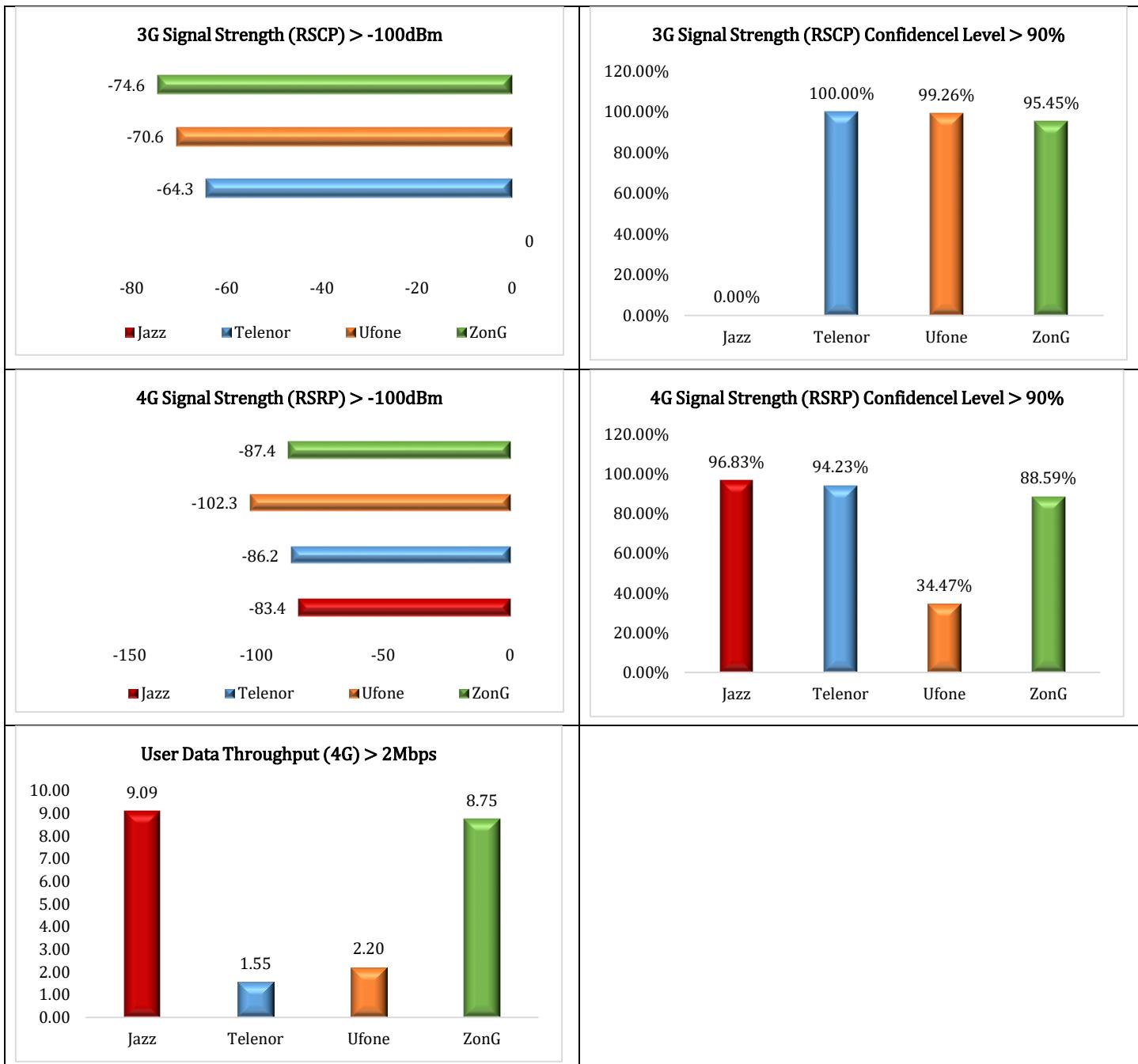
ZONG 3G NETWORK COVERAGE – LAHORE TO SARGODHA



QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO SARGODHA

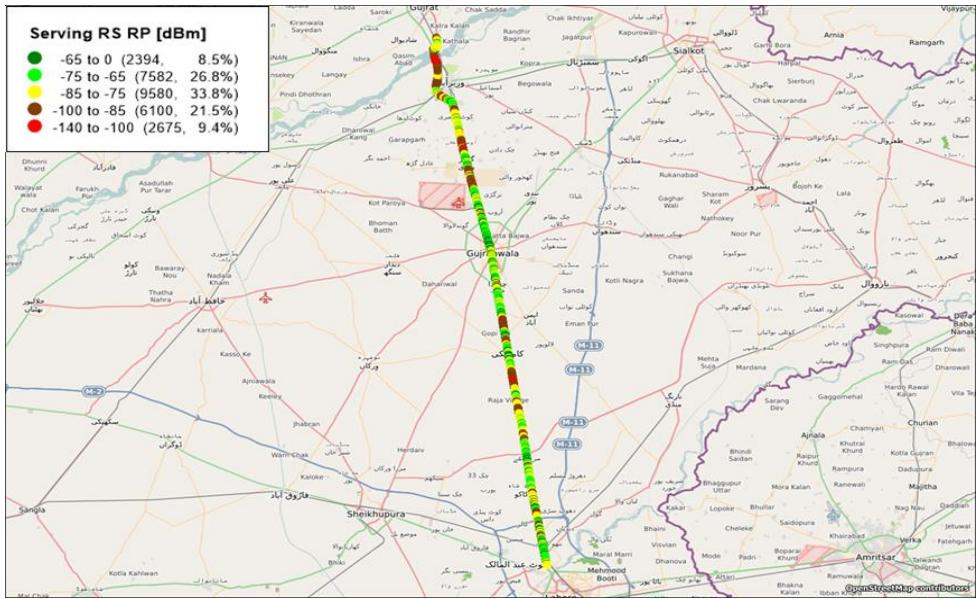


QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO SARGODHA

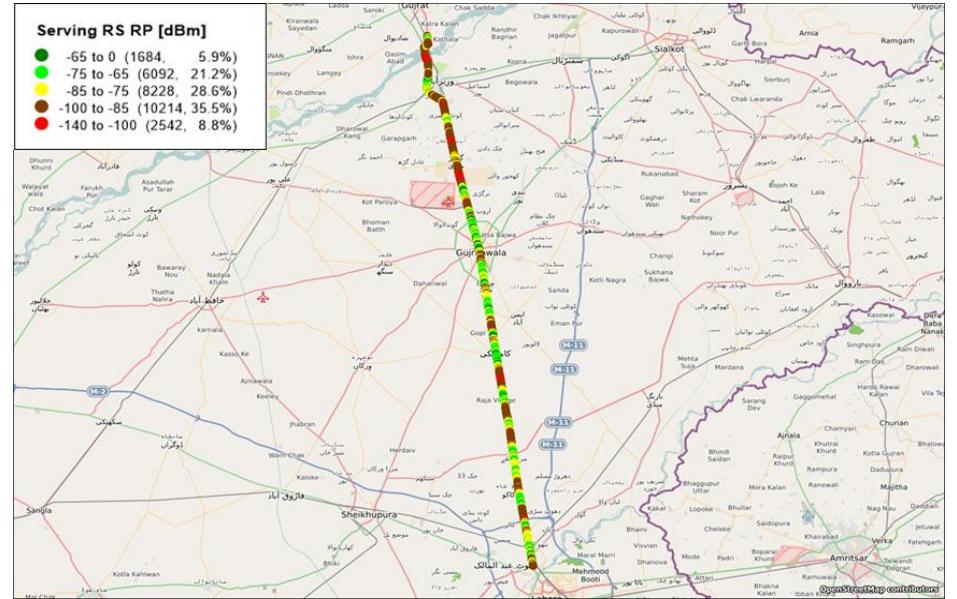


4G MOBILE COVERAGE ON ROADS - SIGNAL STRENGTH (RSRP)

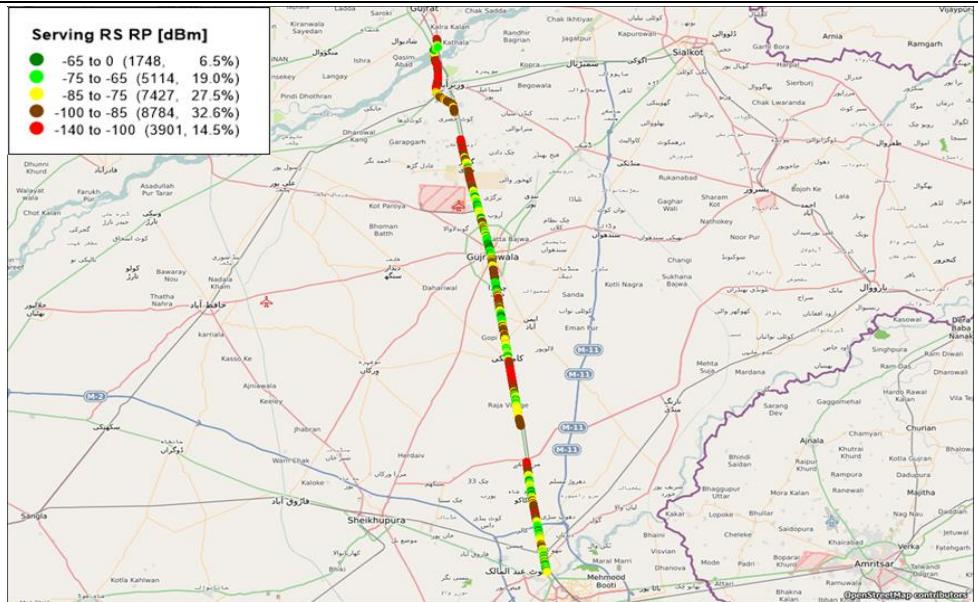
JAZZ 4G NETWORK COVERAGE – LAHORE TO GUJRAT



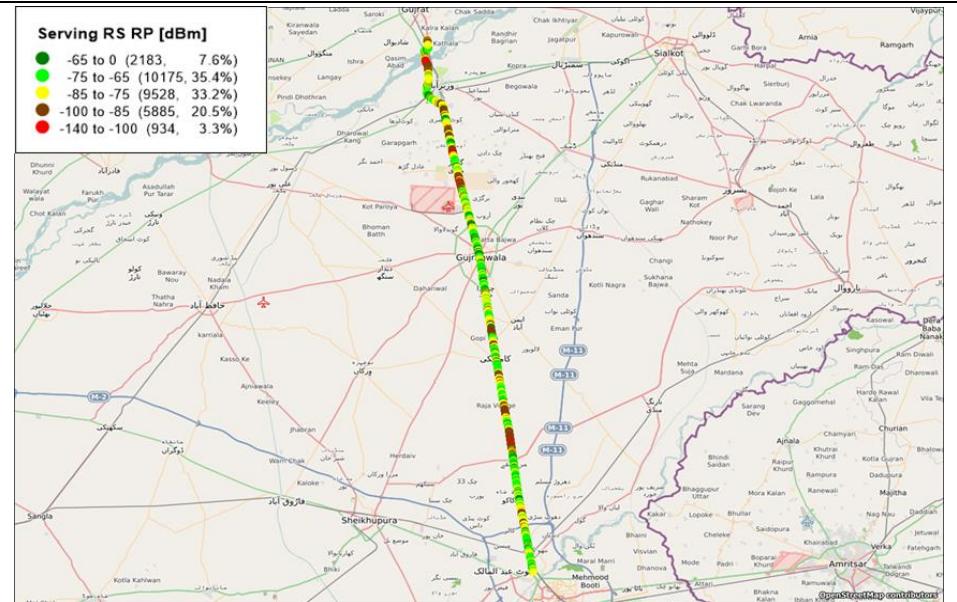
TELENOR 4G NETWORK COVERAGE – LAHORE TO GUJRAT



UFONE 4G NETWORK COVERAGE – LAHORE TO GUJRAT



ZONG 4G NETWORK COVERAGE – LAHORE TO GUJRAT

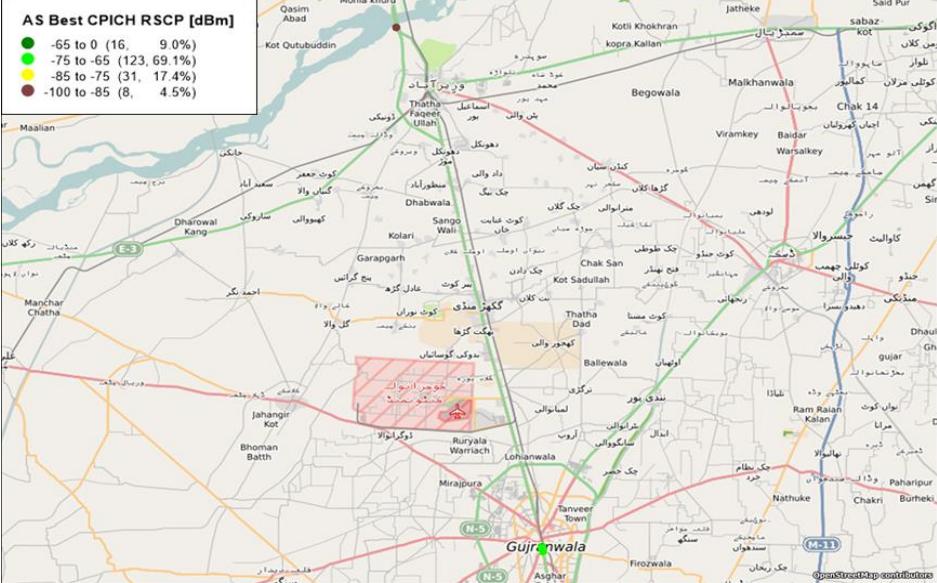


3G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSCP)

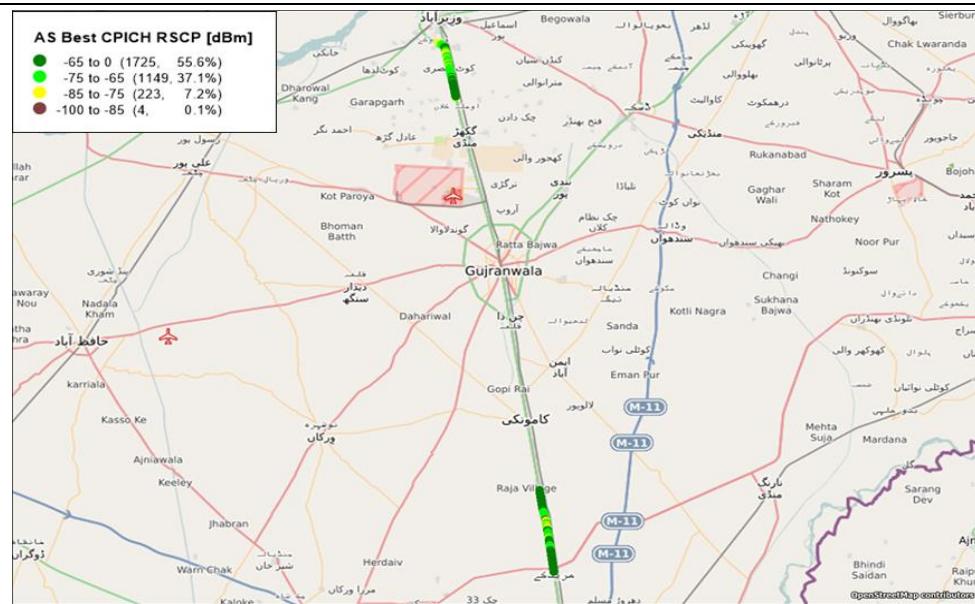
JAZZ 3G NETWORK COVERAGE – LAHORE TO GUJRAT

3G NOT APPLICABLE

TELENOR 3G NETWORK COVERAGE – LAHORE TO GUJRAT



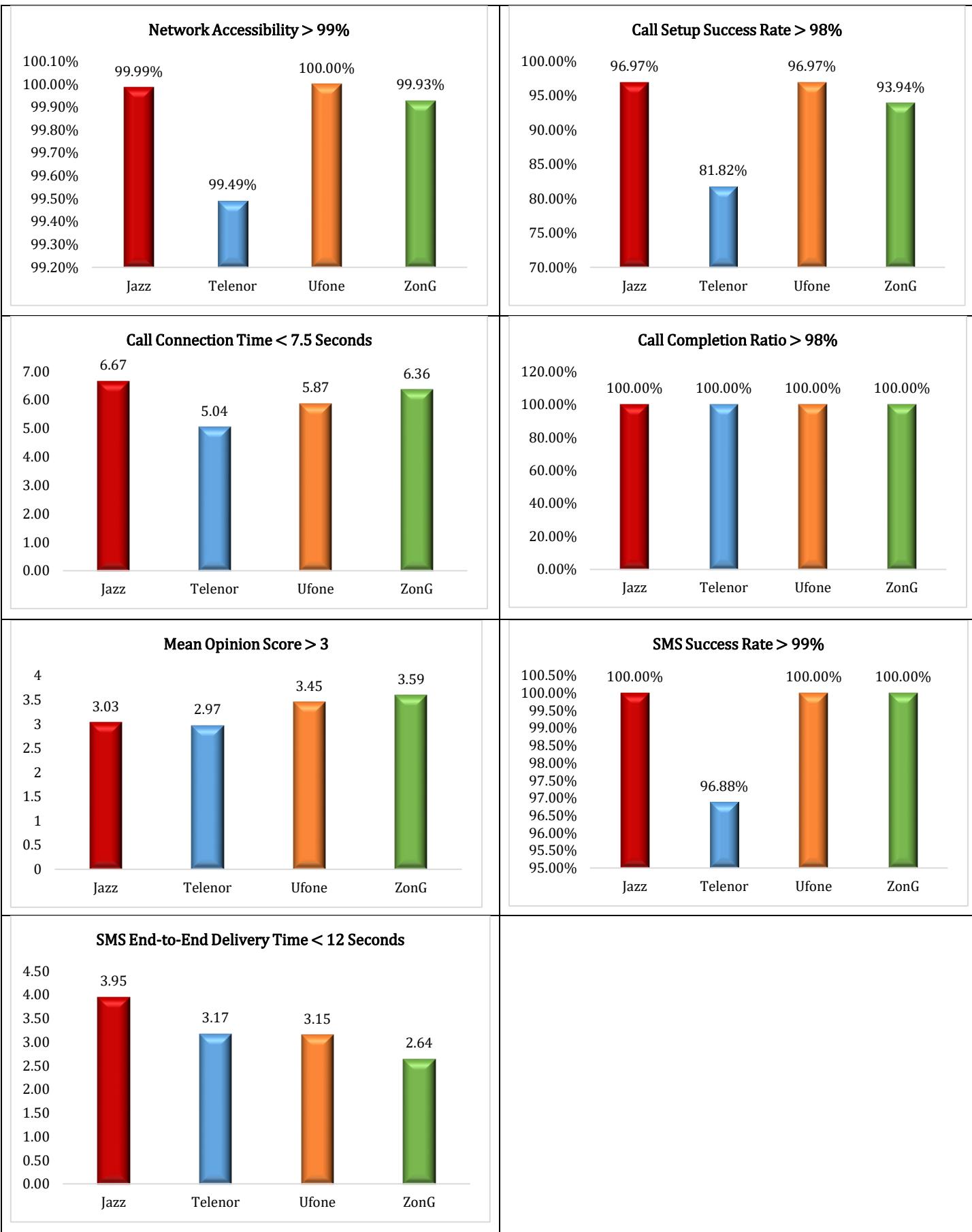
UFONE 3G NETWORK COVERAGE – LAHORE TO GUJRAT



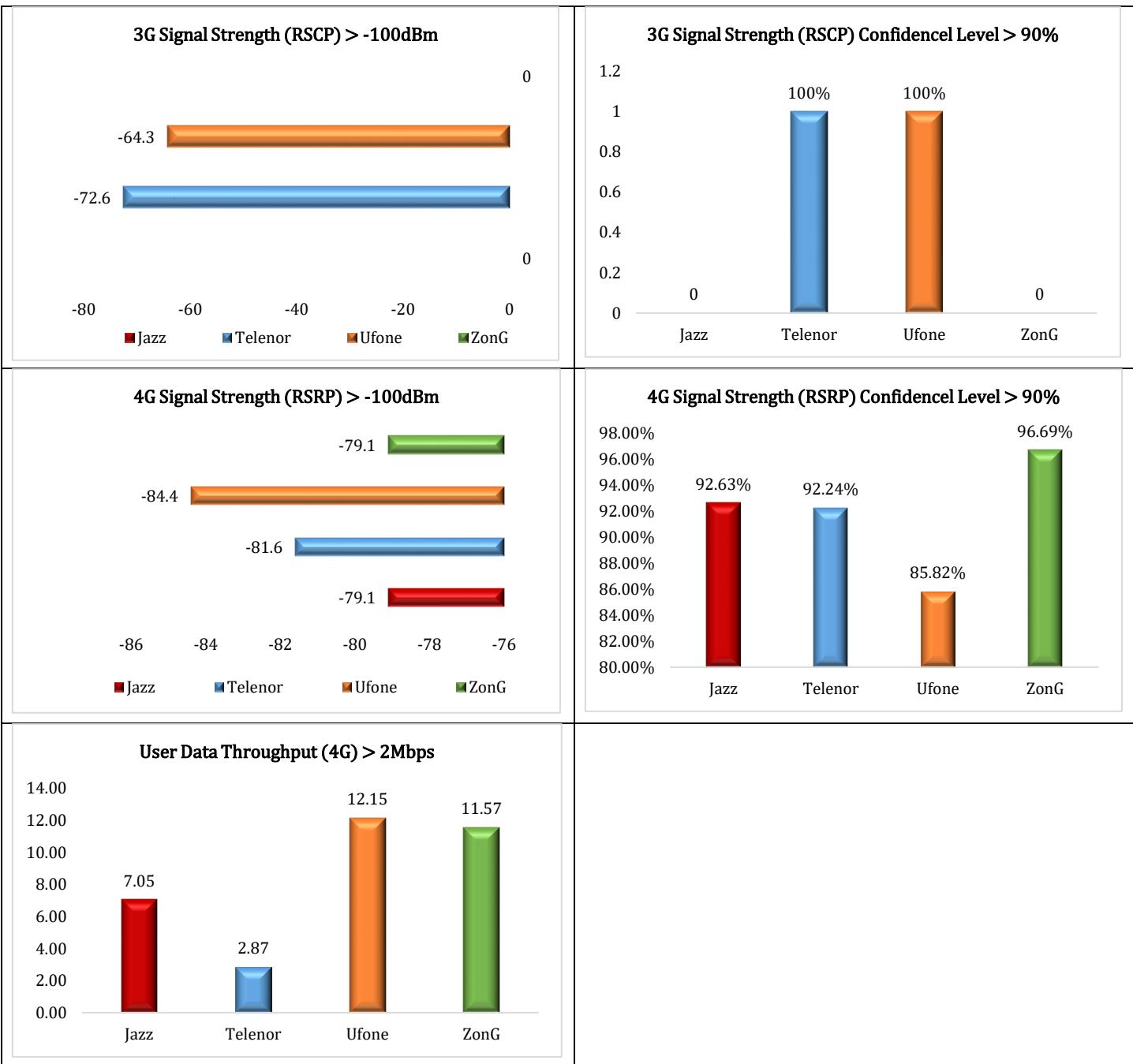
ZONG 3G NETWORK COVERAGE – LAHORE TO GUJRAT

3G NOT APPLICABLE

QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO GUJRAT



QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO GUJRAT

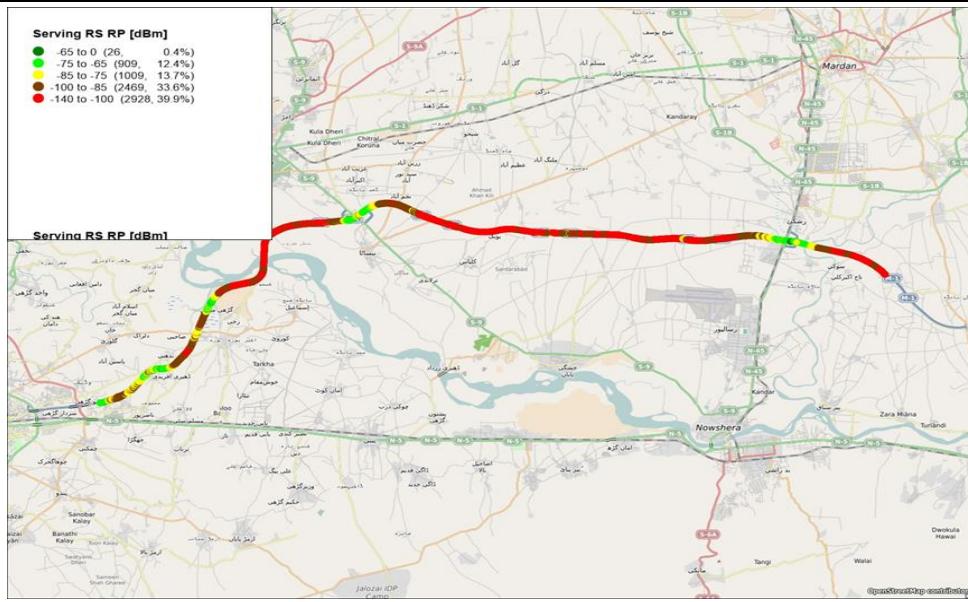


ANNEX – B

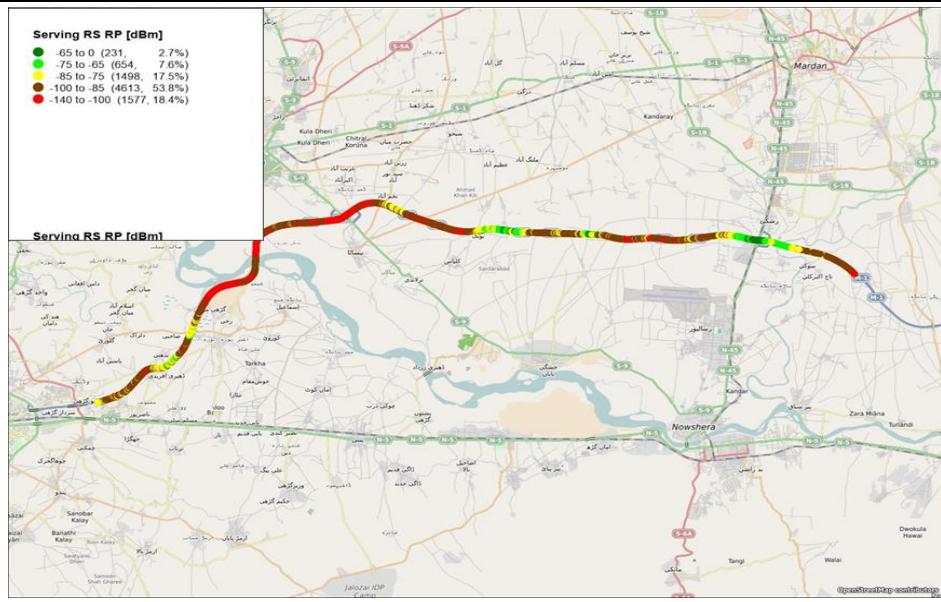
KHYBER PAKHTUNKHWA

4G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSRP)

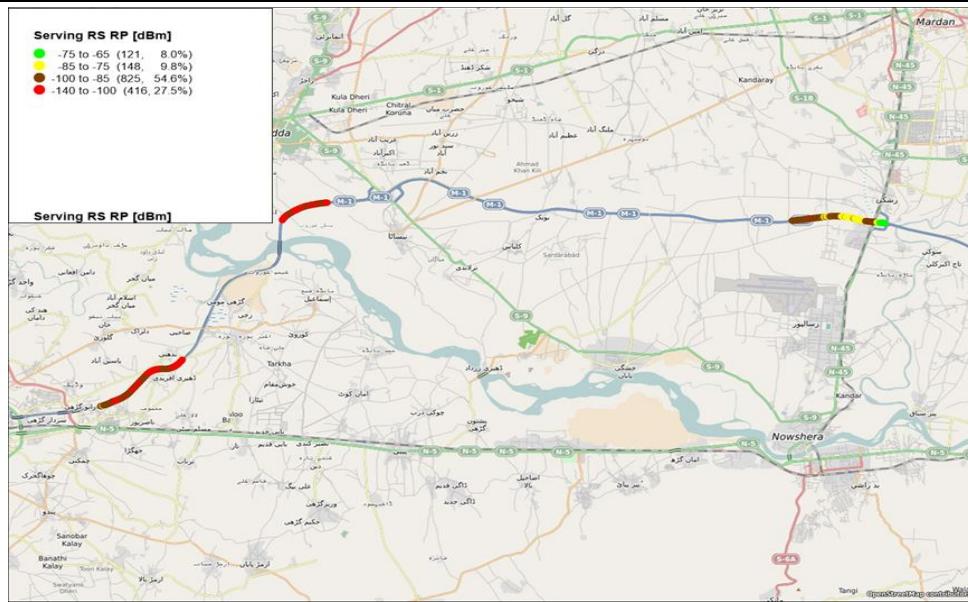
JAZZ 4G NETWORK COVERAGE – PESHAWAR TO MARDAN



TELENO 4G NETWORK COVERAGE – PESHAWAR TO MARDAN



UFONE 4G NETWORK COVERAGE – PESHAWAR TO MARDAN

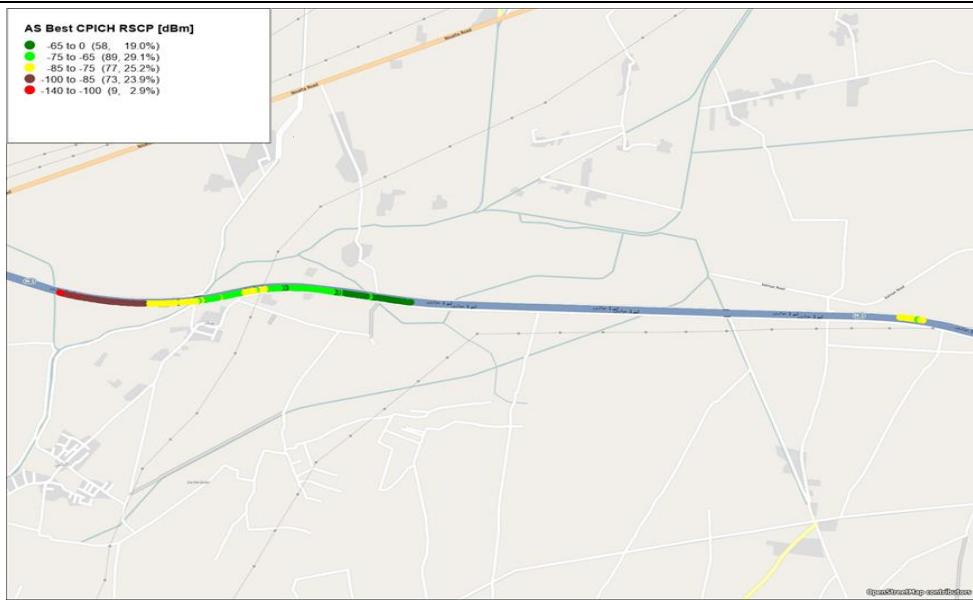


ZONG 4G NETWORK COVERAGE – PESHAWAR TO MARDAN



3G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSCP)

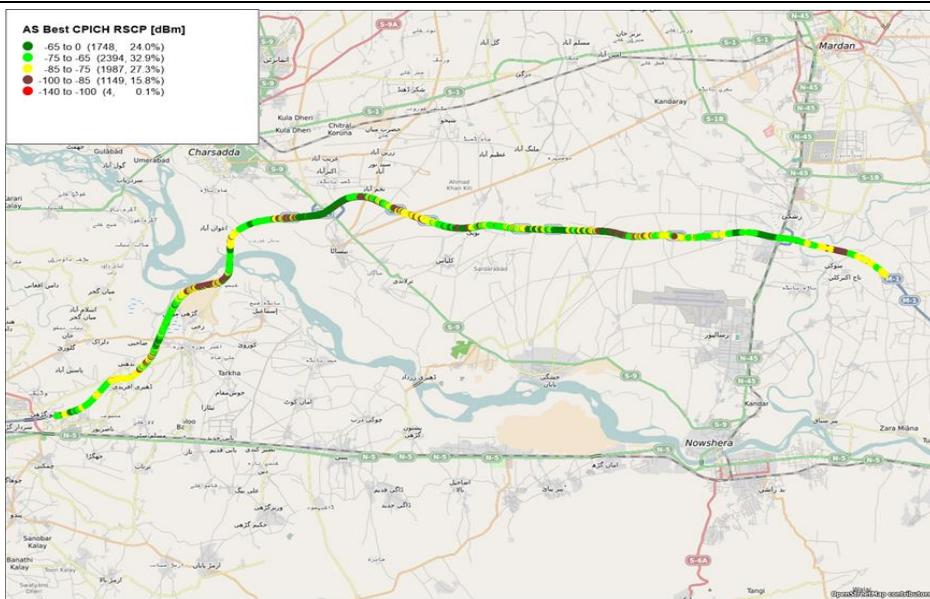
JAZZ 3G NETWORK COVERAGE – PESHAWAR TO MARDAN



TELENOR 3G NETWORK COVERAGE – PESHAWAR TO MARDAN

3G NOT APPLICABLE

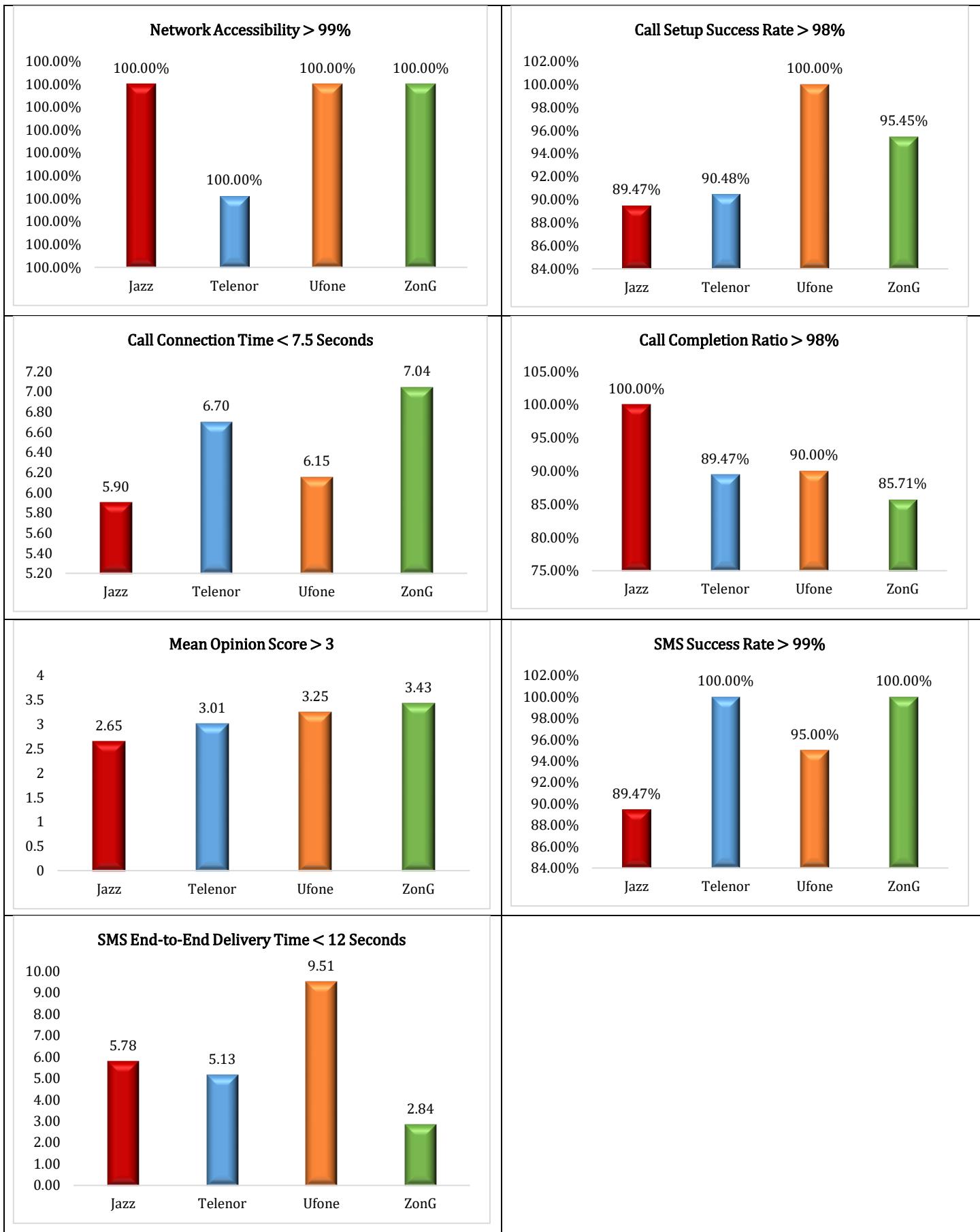
UFONE 3G NETWORK COVERAGE – PESHAWAR TO MARDAN



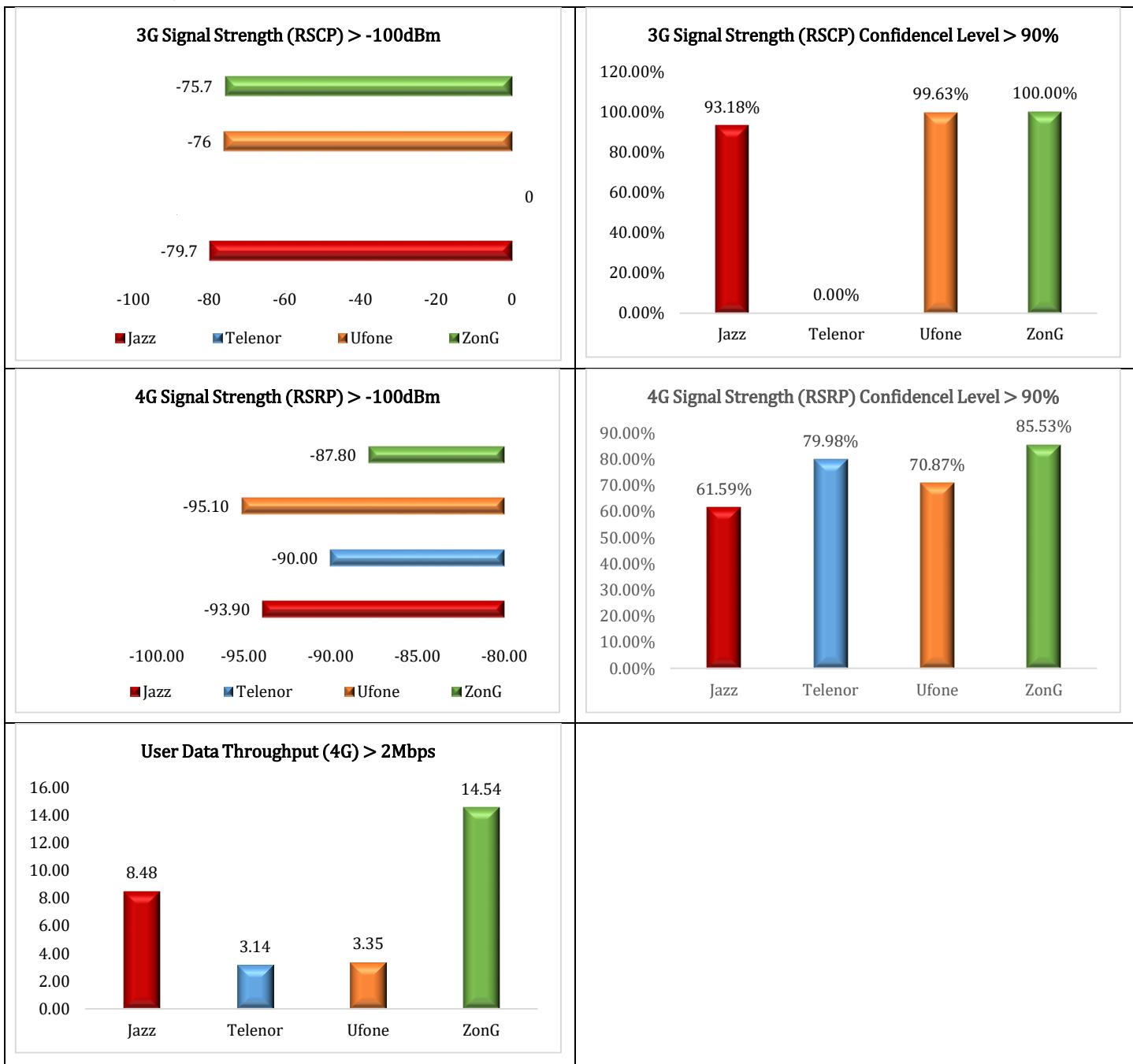
ZONG 3G NETWORK COVERAGE – PESHAWAR TO MARDAN



QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO MARDAN

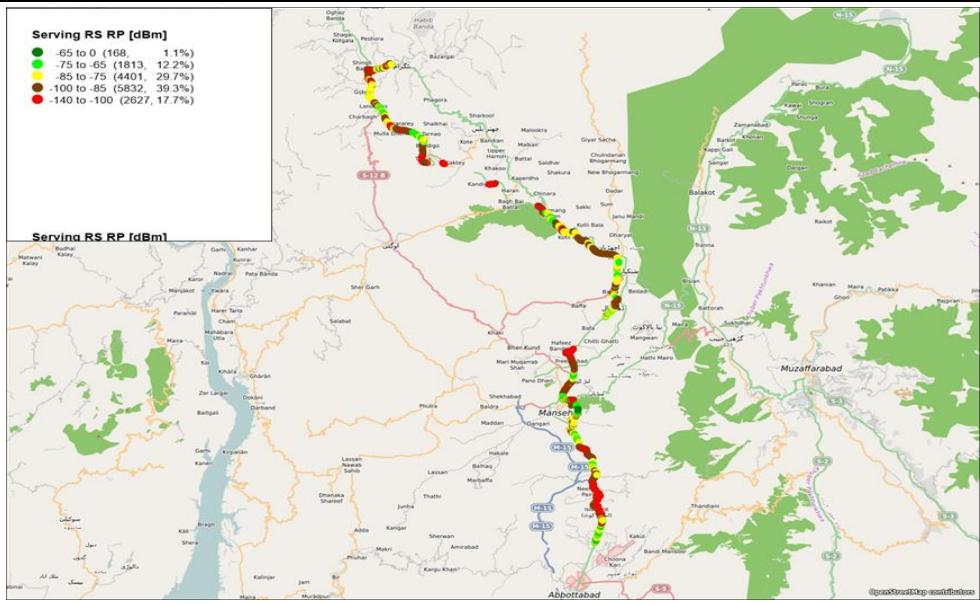


QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO MARDAN

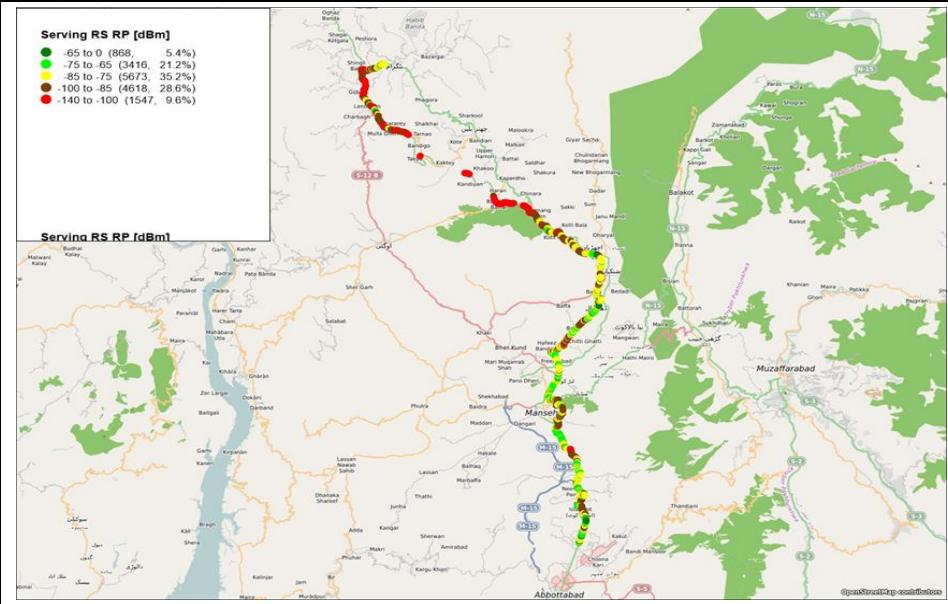


4G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSRP)

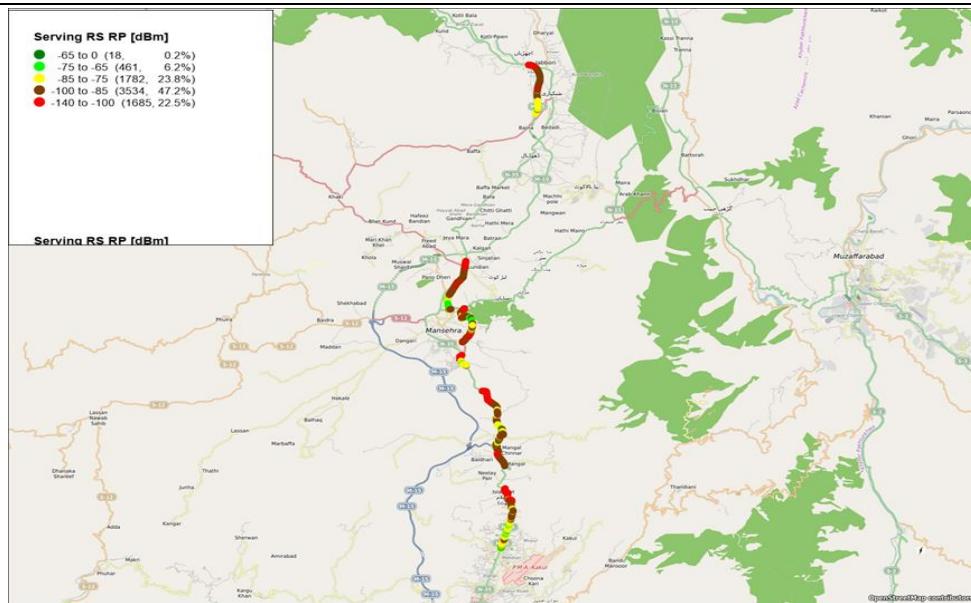
JAZZ 4G NETWORK COVERAGE – ABBOTTABAD TO BATTAGRAM



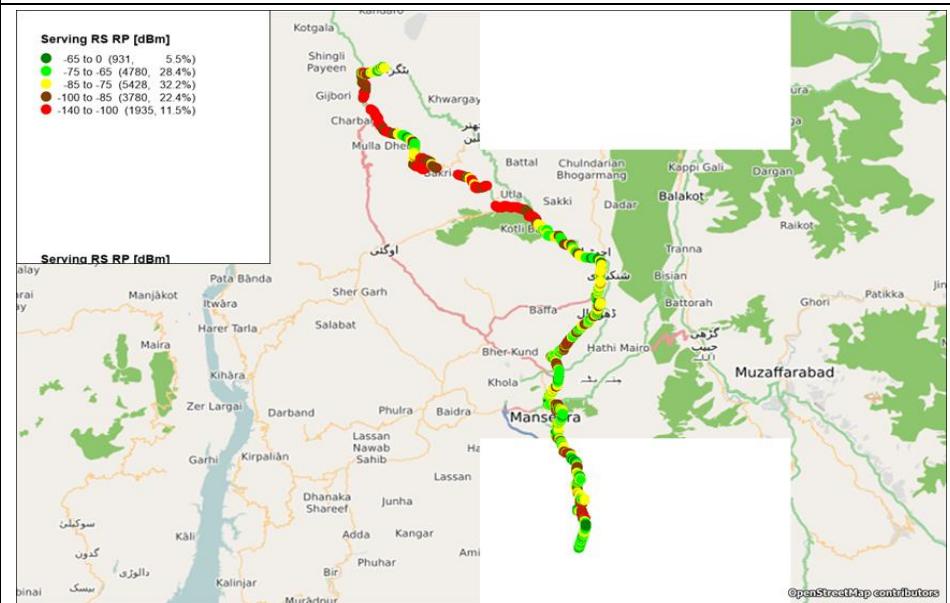
TELENOR 4G NETWORK COVERAGE – ABBOTTABAD TO BATTAGRAM



UFONE 4G NETWORK COVERAGE – ABBOTTABAD TO BATTAGRAM

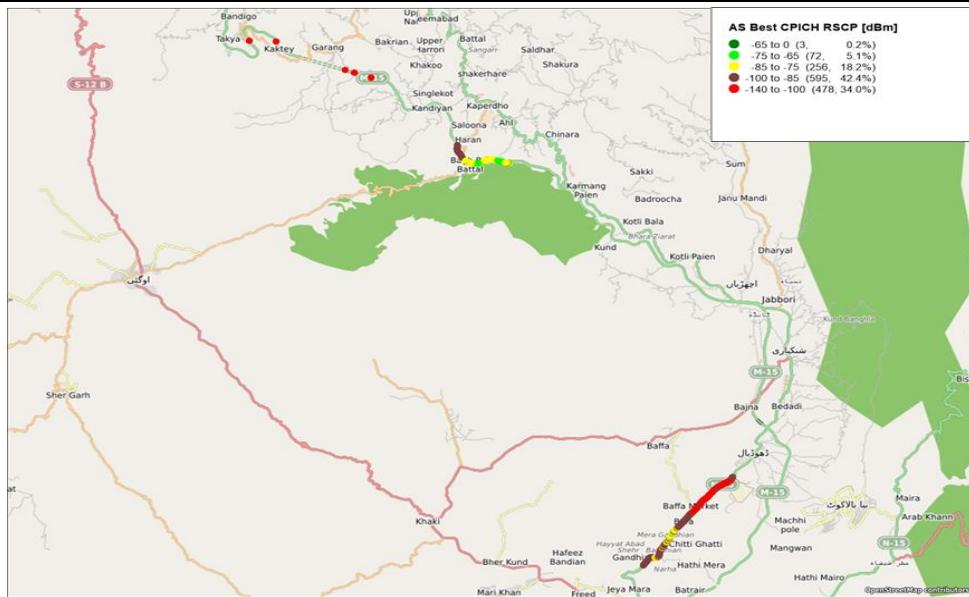


ZONG 4G NETWORK COVERAGE – ABBOTTABAD TO BATTAGRAM

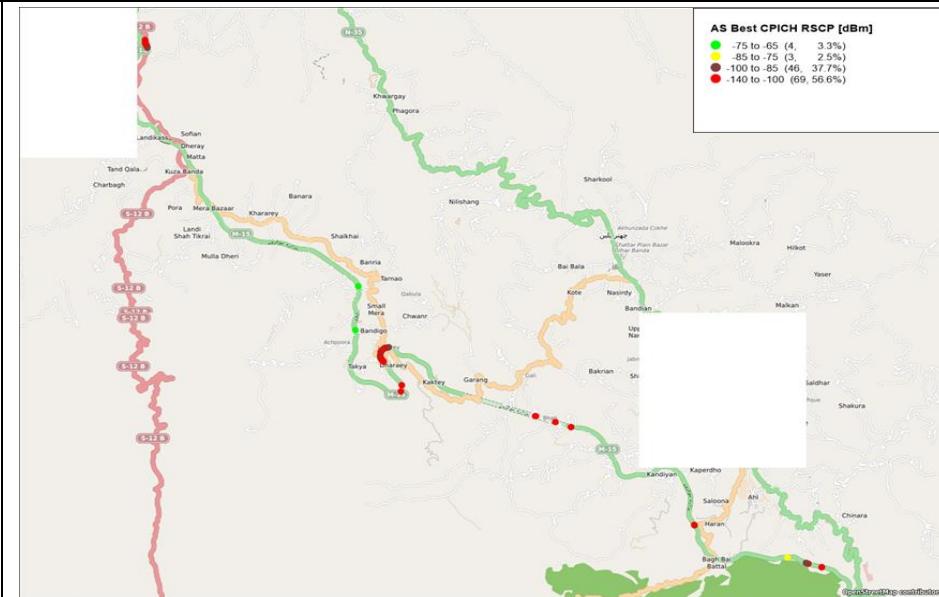


3G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSCP)

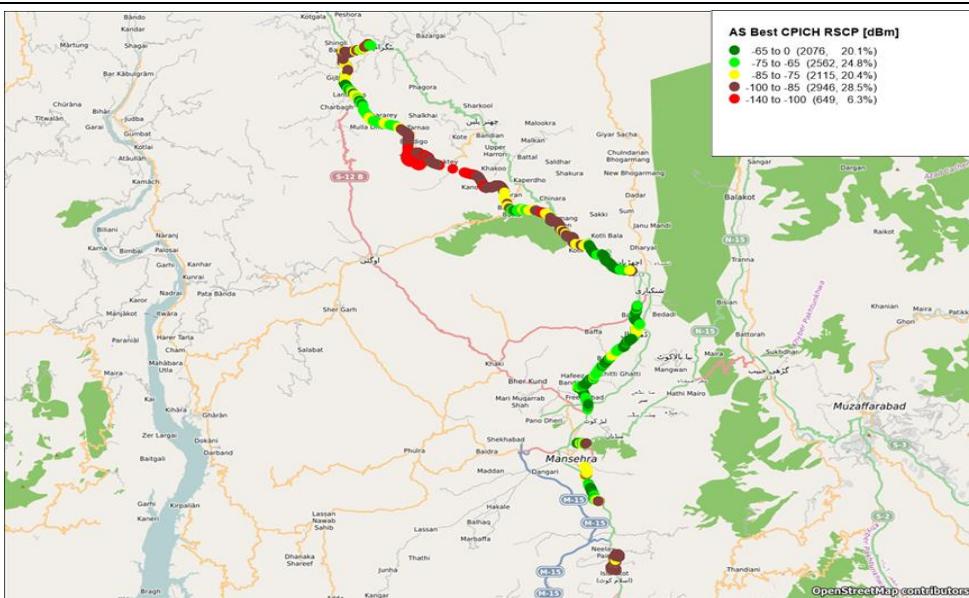
JAZZ 3G NETWORK COVERAGE – ABBOTTABAD TO BATTAGRAM



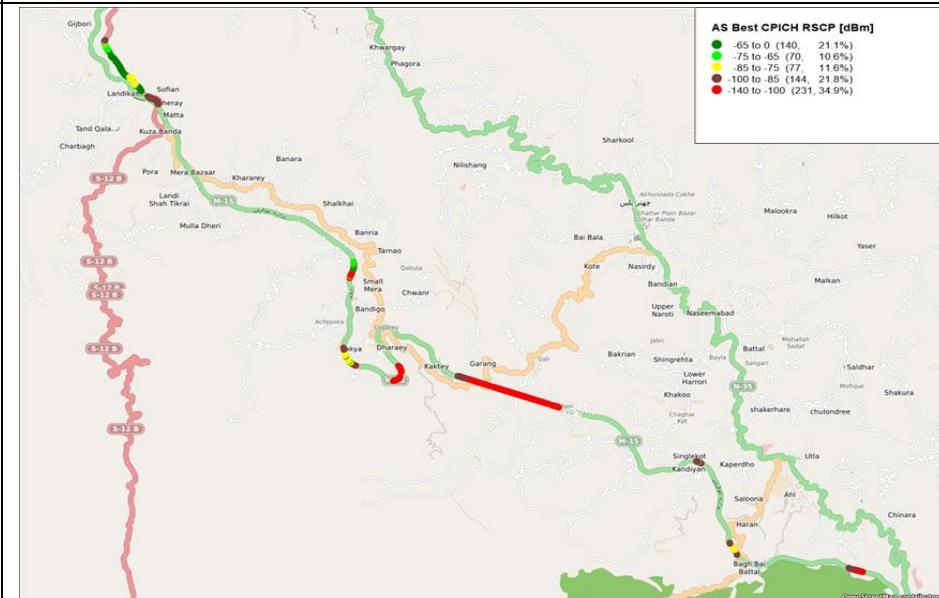
TELENOR 3G NETWORK COVERAGE – ABBOTTABAD TO BATTAGRAM



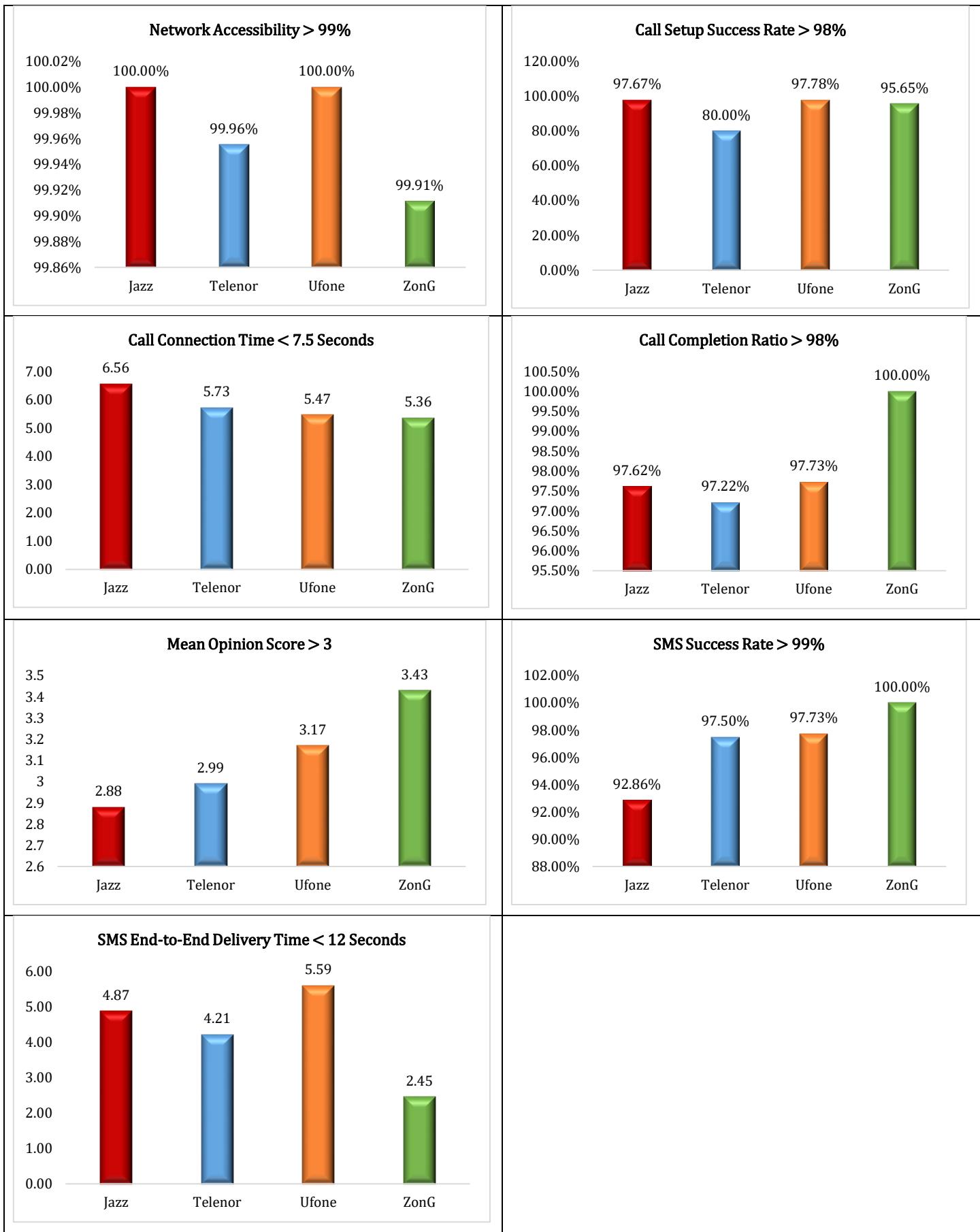
Ufone 3G Network Coverage – Abbottabad to Battagram



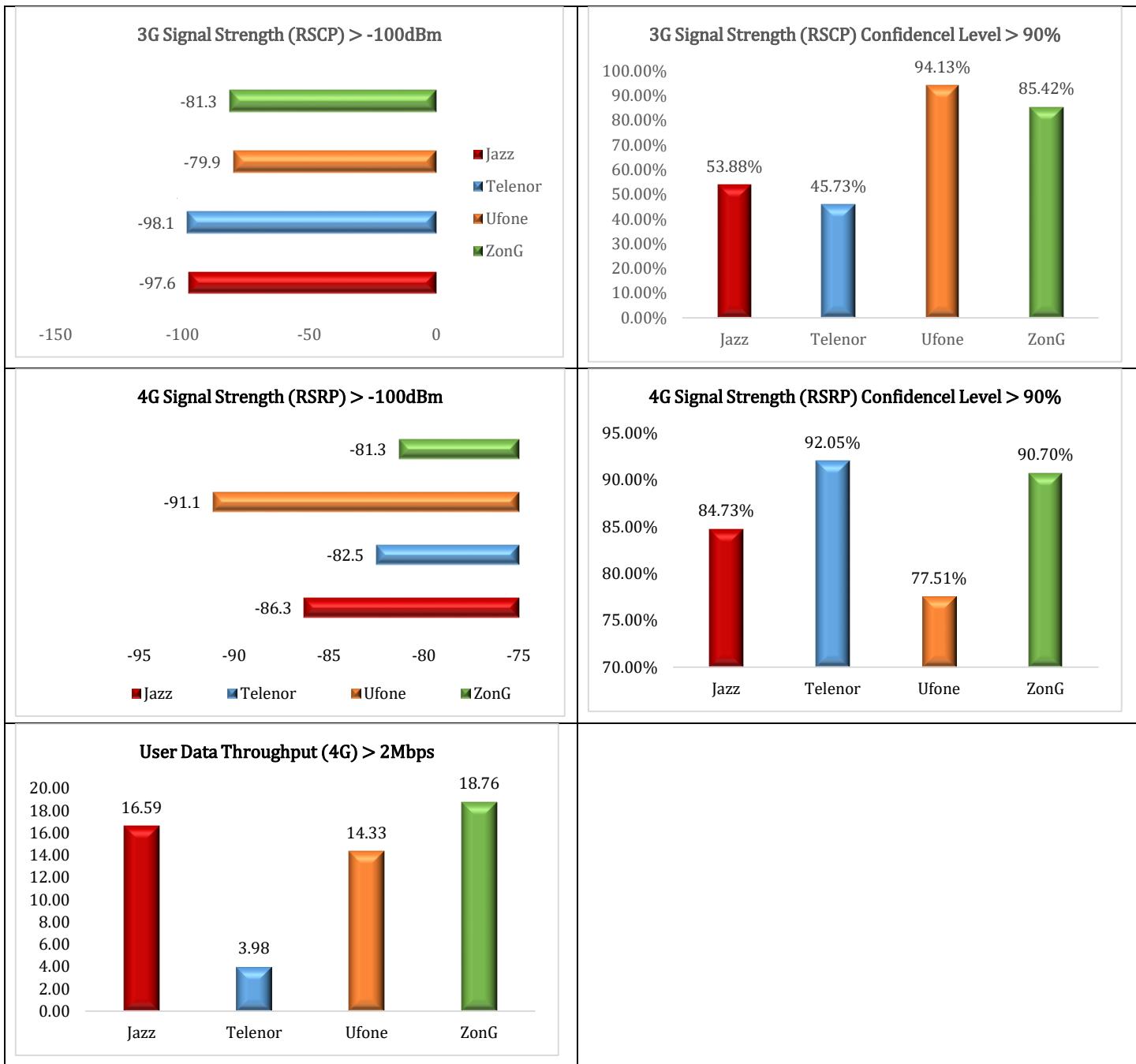
ZONG 3G NETWORK COVERAGE – ABBOTTABAD TO BATTAGRAM



QUALITY OF SERVICE SURVEY RESULTS – ABBOTTABAD TO BATTAGRAM



QUALITY OF SERVICE SURVEY RESULTS – ABBOTTABAD TO BATTAGRAM

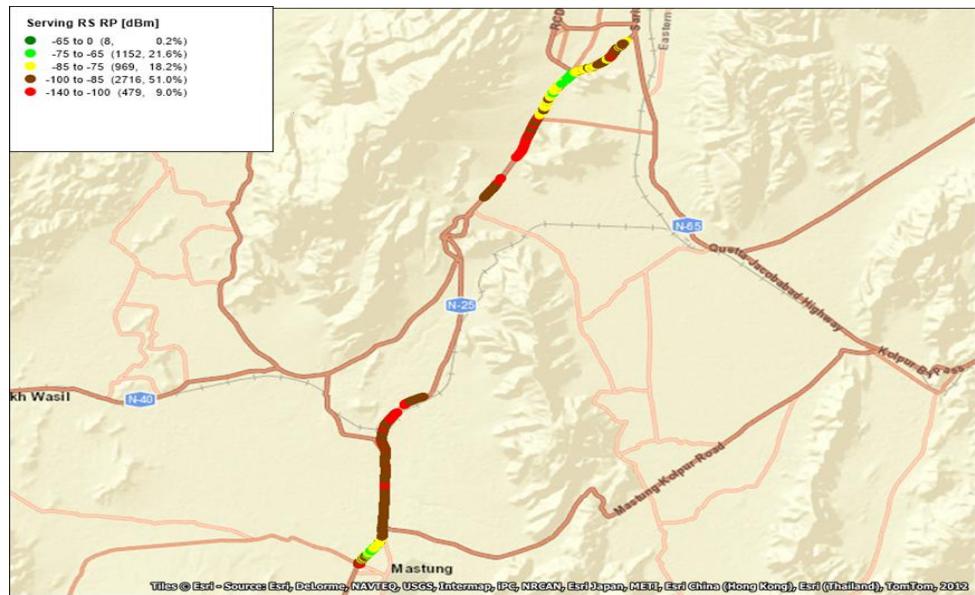


ANNEX – C

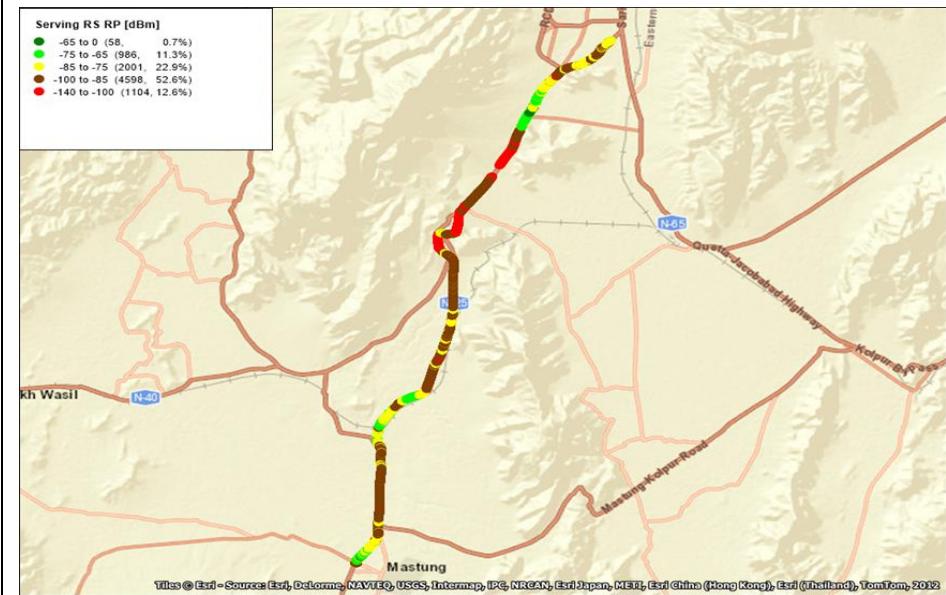
BALOCHISTAN

4G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSRP)

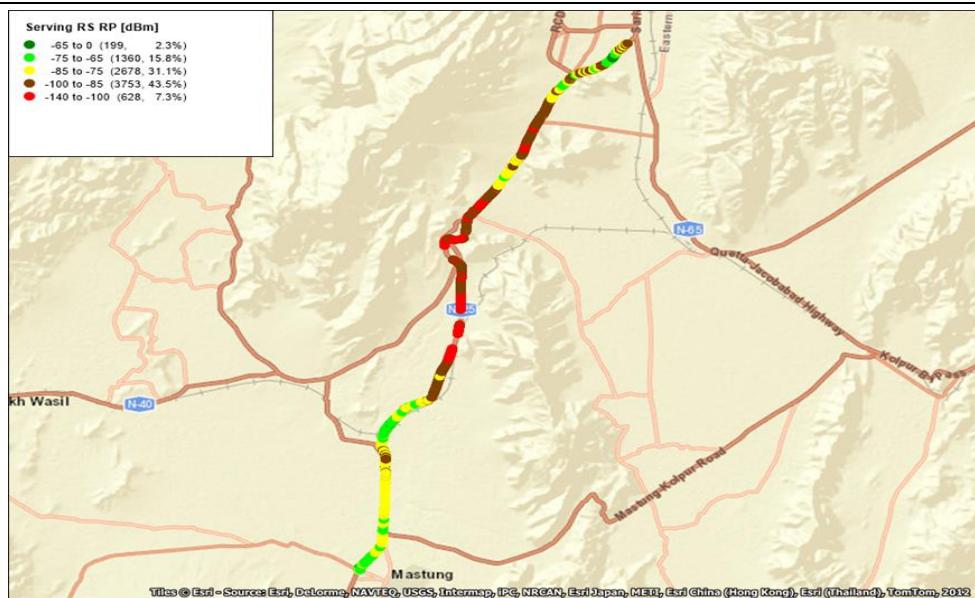
JAZZ 4G NETWORK COVERAGE – QUETTA TO MASTUNG



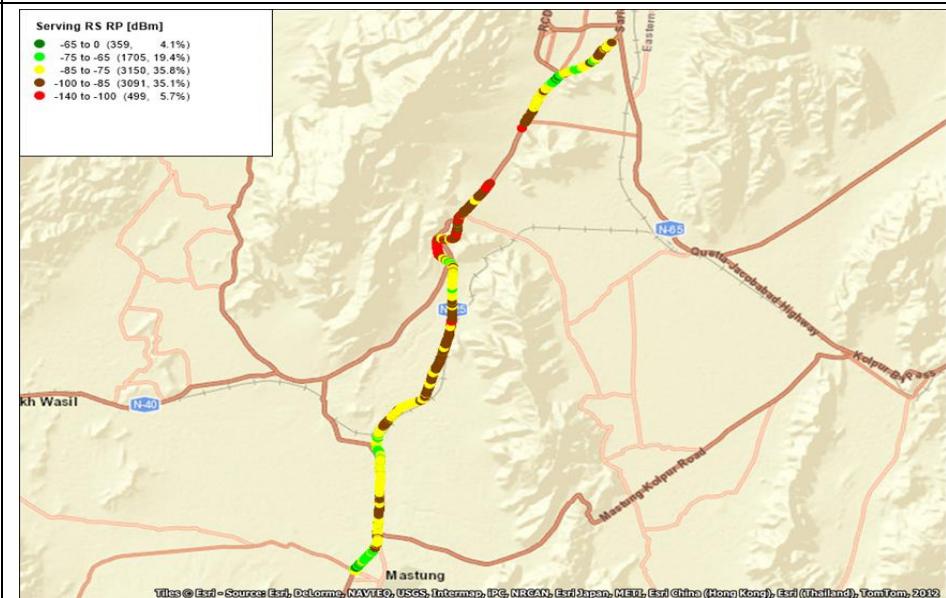
TELENOR 4G NETWORK COVERAGE – QUETTA TO MASTUNG



UFONE 4G NETWORK COVERAGE – QUETTA TO MASTUNG

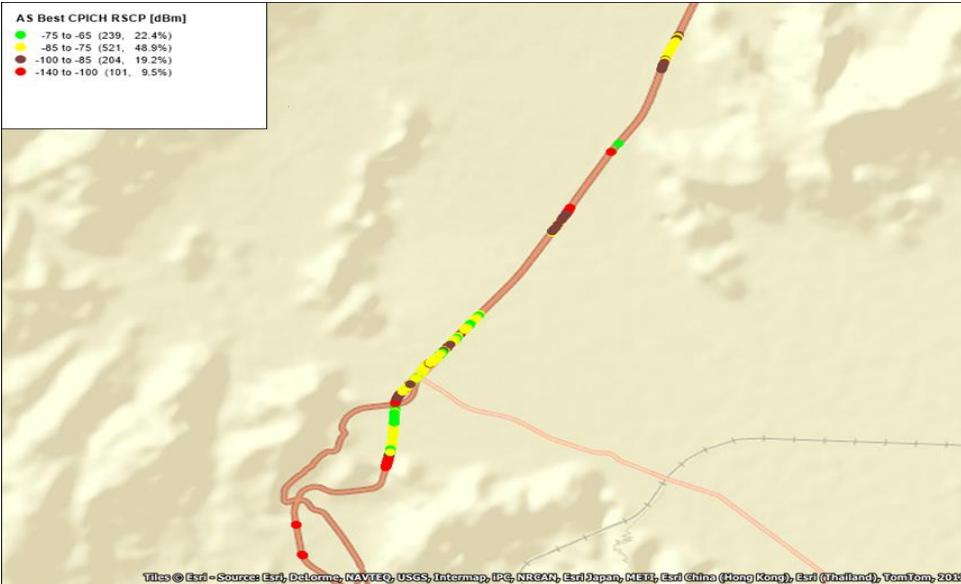


ZONG 4G NETWORK COVERAGE – QUETTA TO MASTUNG

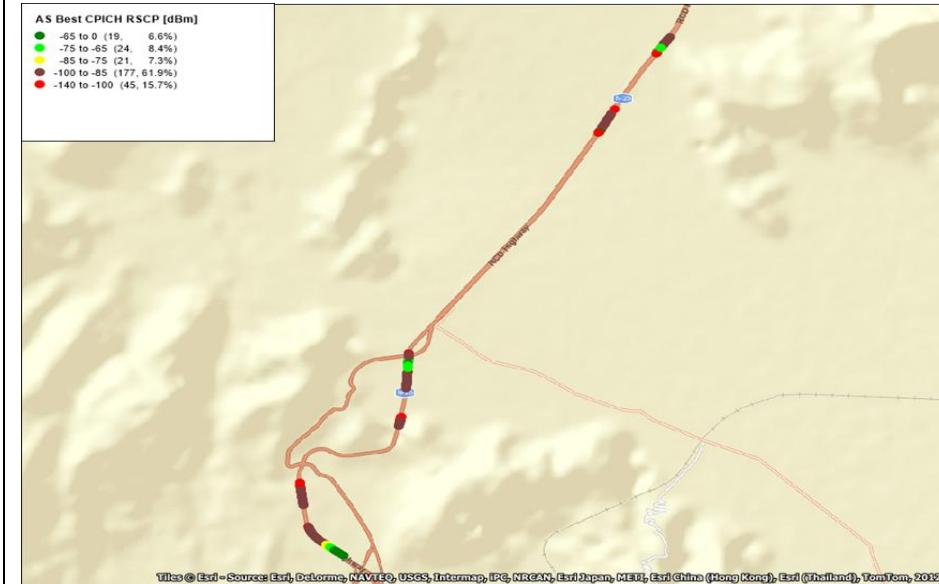


3G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSCP)

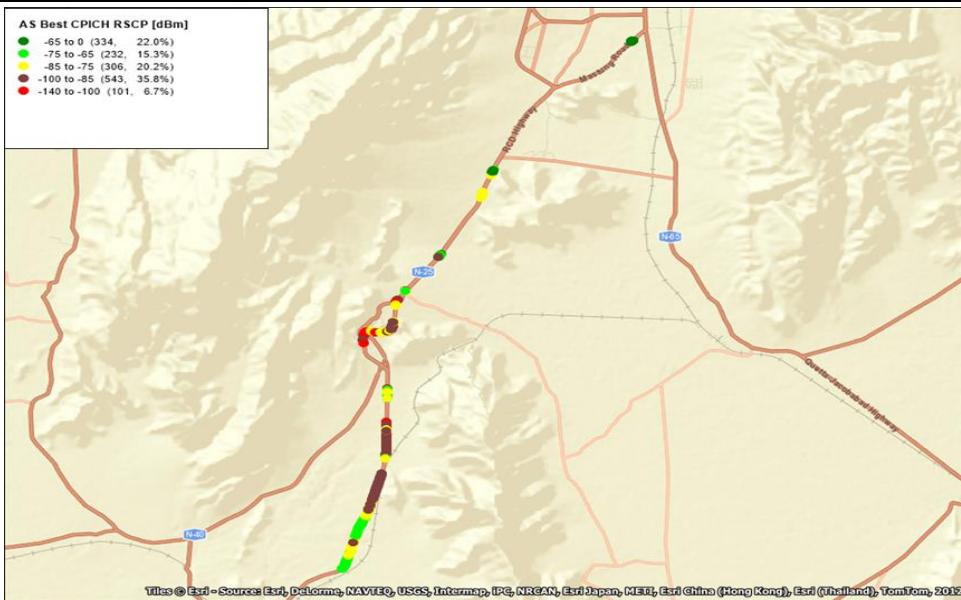
JAZZ 3G NETWORK COVERAGE – QUETTA TO MASTUNG



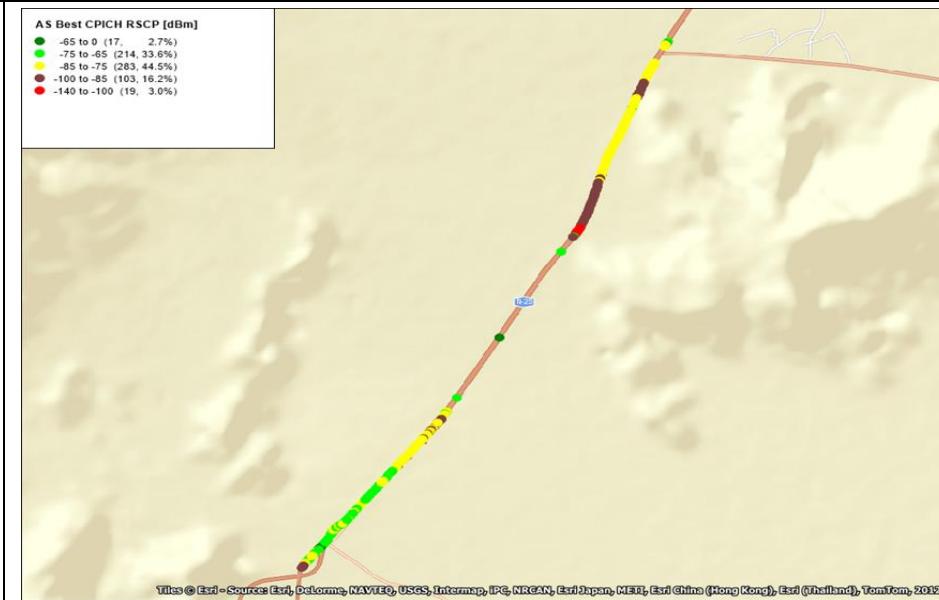
TELENOR 3G NETWORK COVERAGE – QUETTA TO MASTUNG



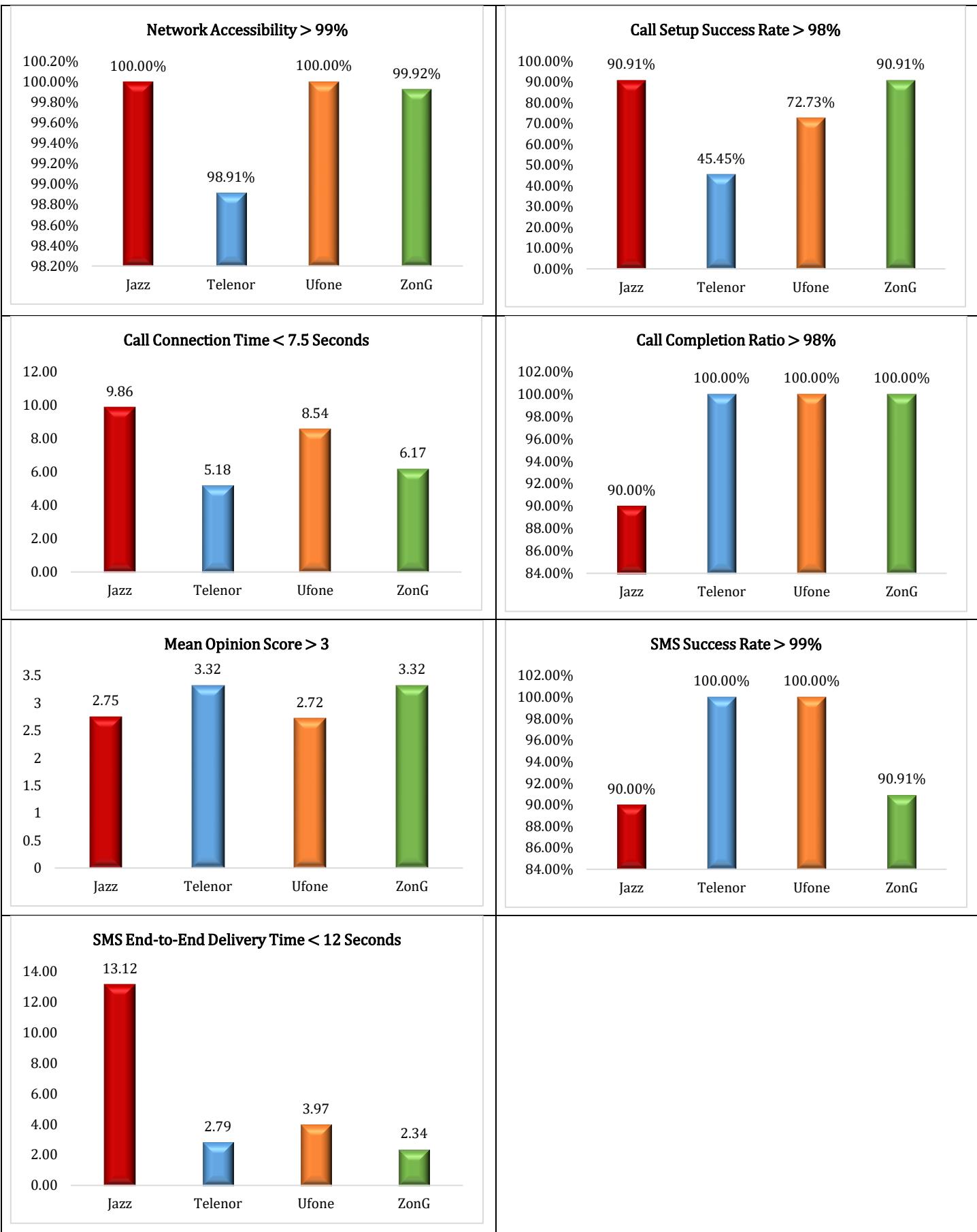
UFONE 3G NETWORK COVERAGE – QUETTA TO MASTUNG



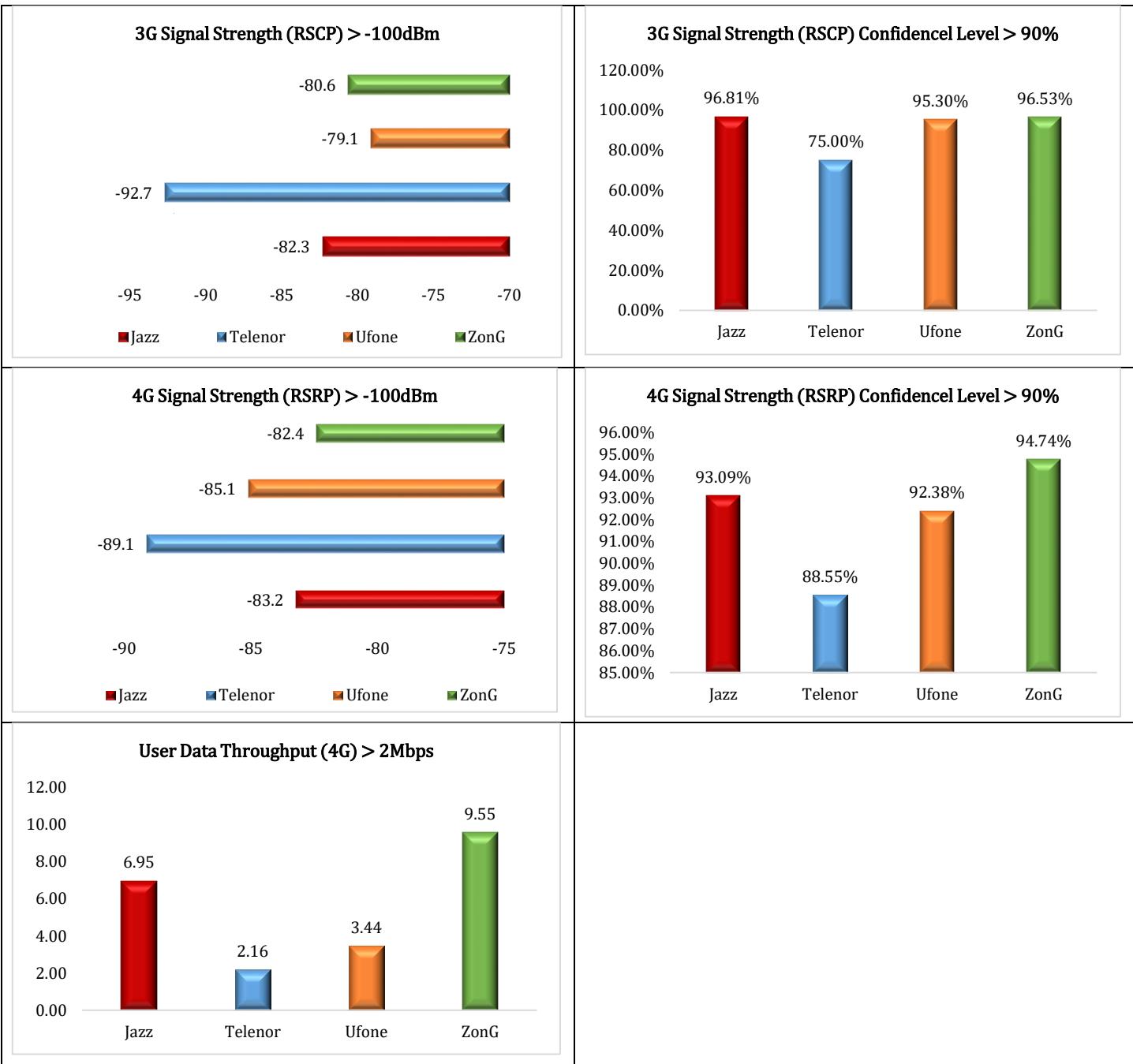
ZONG 3G NETWORK COVERAGE – QUETTA TO MASTUNG



QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO MASTUNG

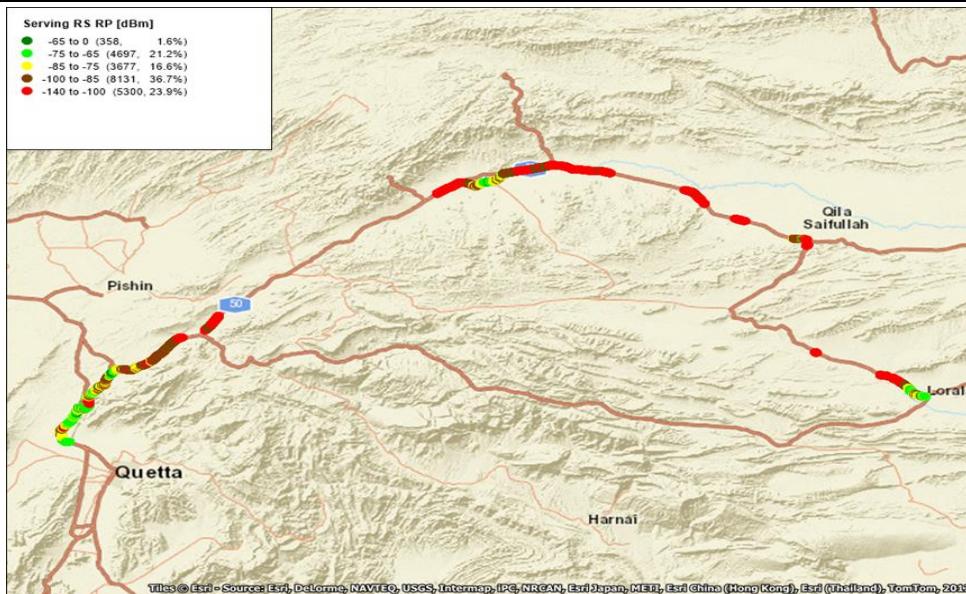


QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO MASTUNG

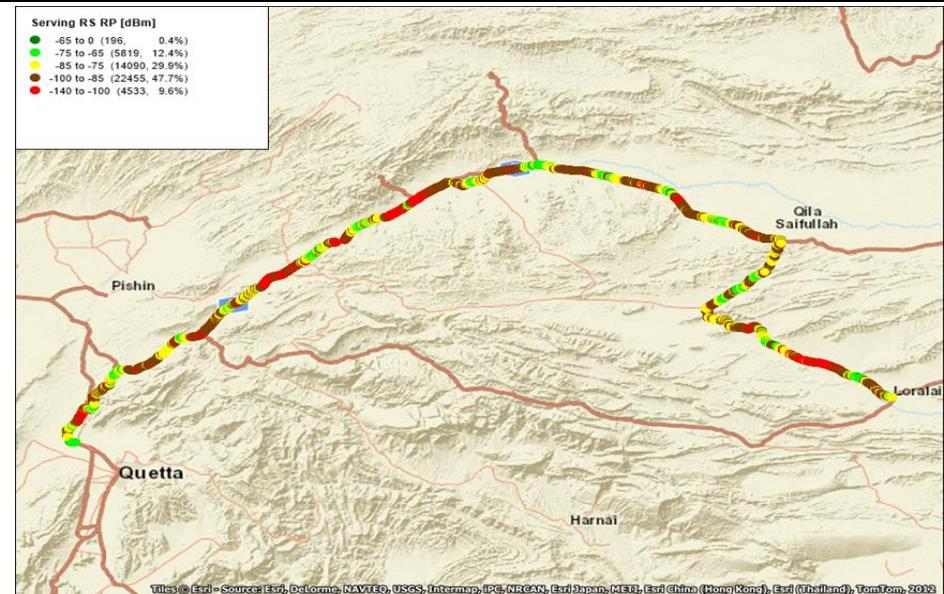


4G MOBILE COVERAGE ON ROADS– SIGNAL STRENGTH (RSRP)

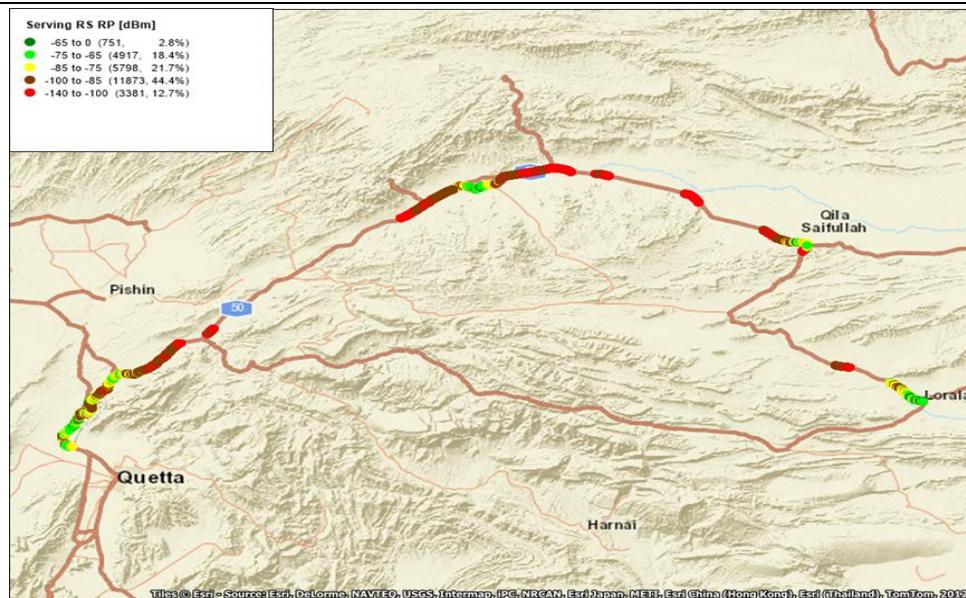
JAZZ 4G NETWORK COVERAGE – QUETTA TO LORALAI



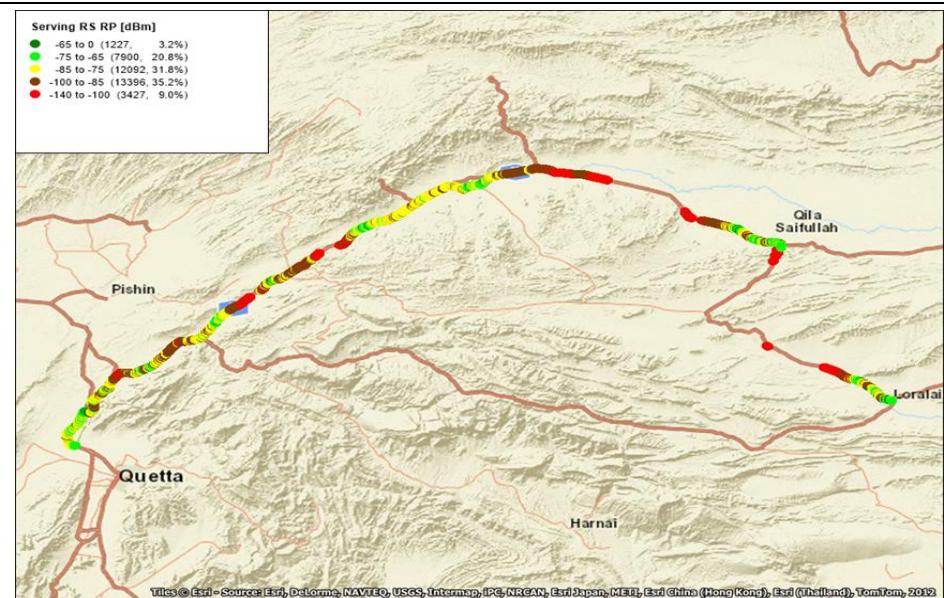
TELENOR 4G NETWORK COVERAGE – QUETTA TO LORALAI



UFONE 4G NETWORK COVERAGE – QUETTA TO LORALAI

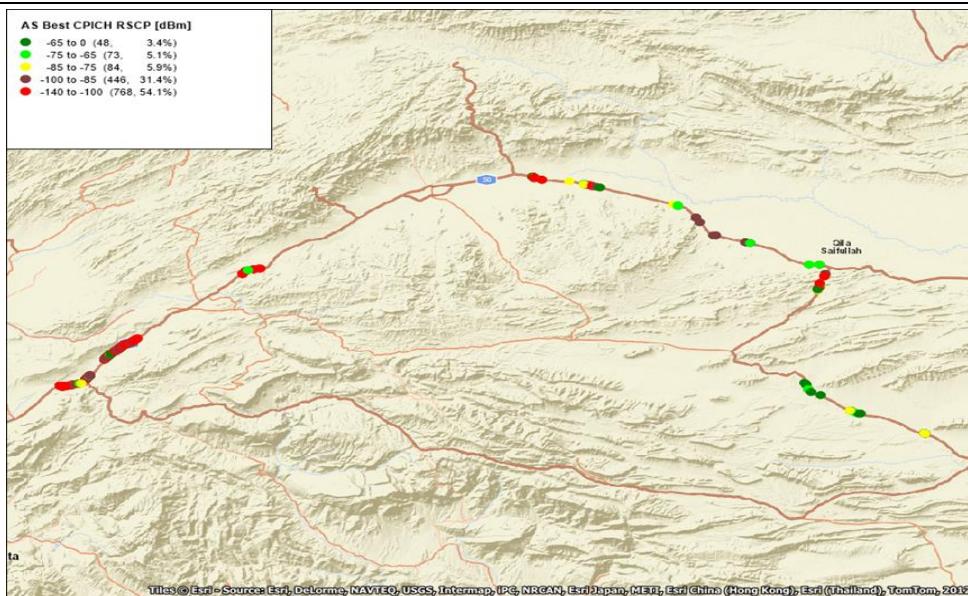


ZONG 4G NETWORK COVERAGE – QUETTA TO LORALAI

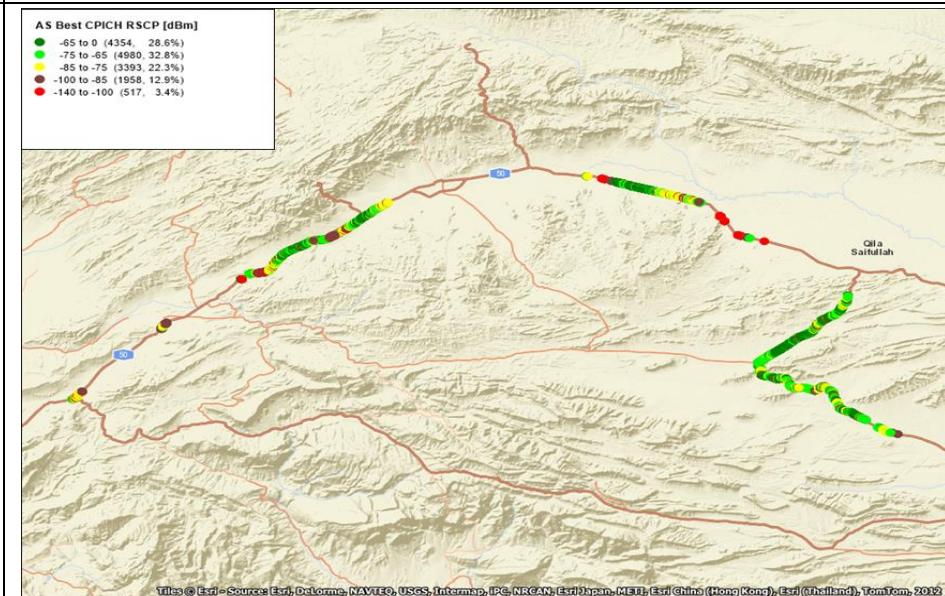


3G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSCP)

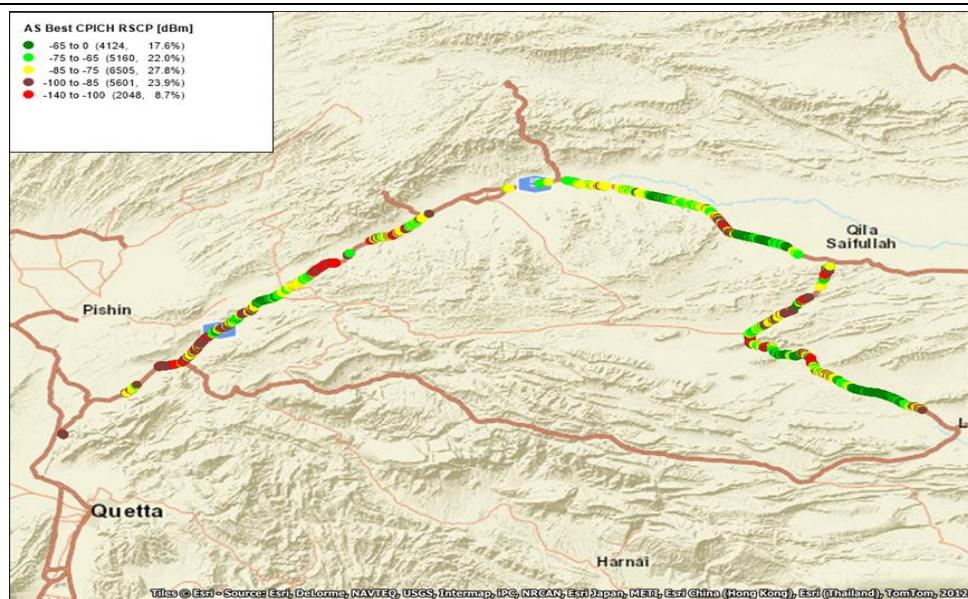
JAZZ 3G NETWORK COVERAGE – QUETTA TO LORALAI



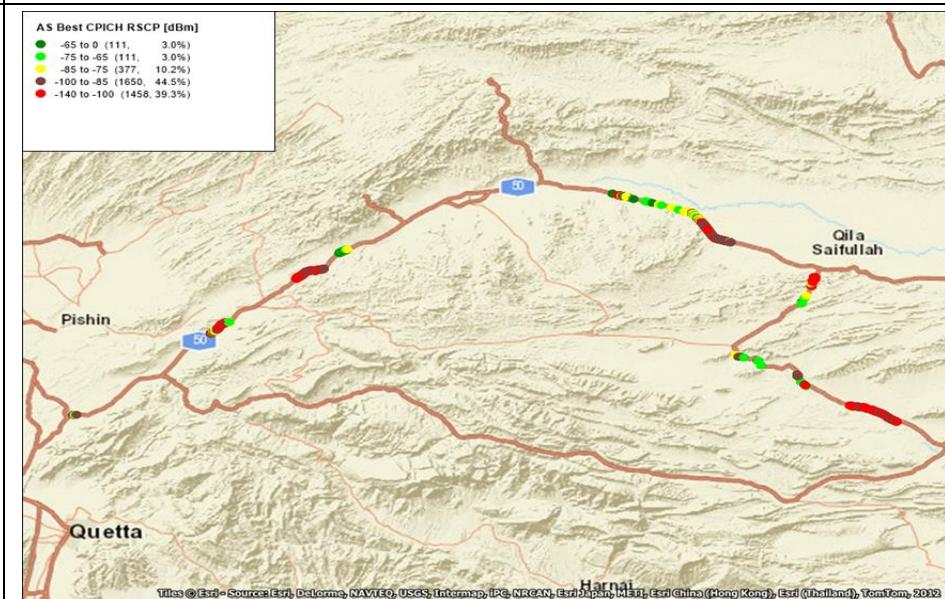
TELENOR 3G NETWORK COVERAGE – QUETTA TO LORALAI



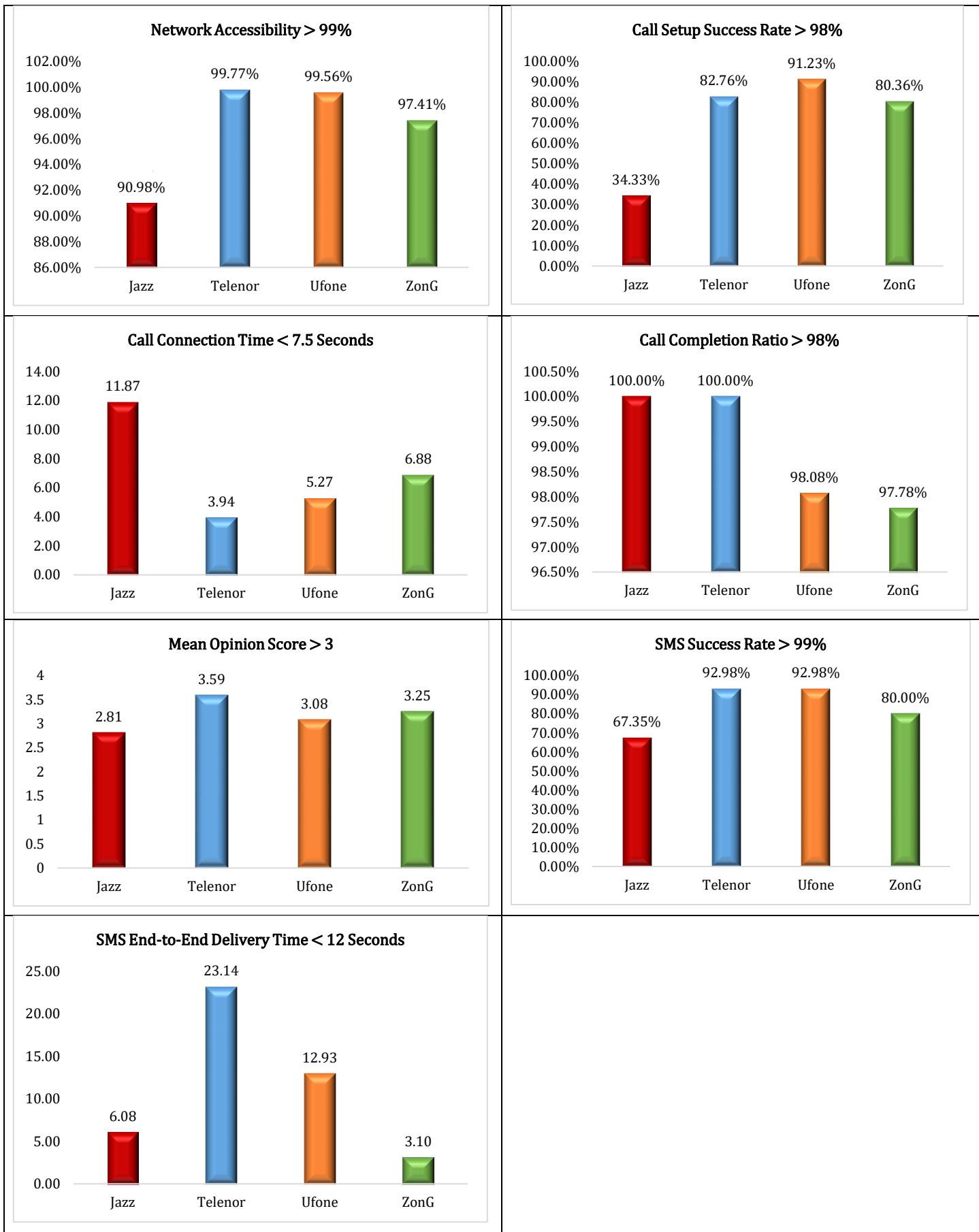
UFONE 3G NETWORK COVERAGE – QUETTA TO LORALAI



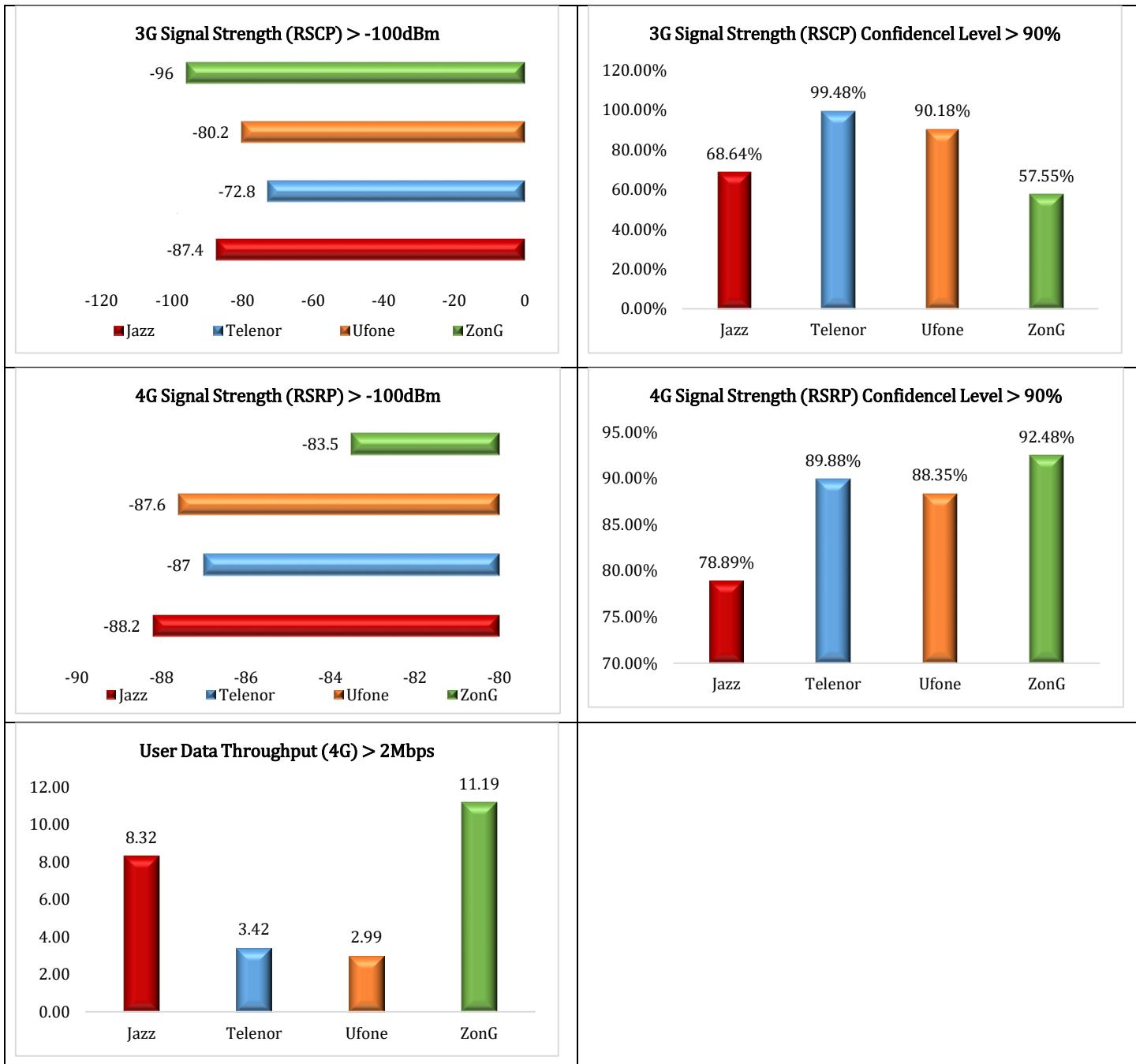
ZONG 3G NETWORK COVERAGE – QUETTA TO LORALAI



QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO LORALAI

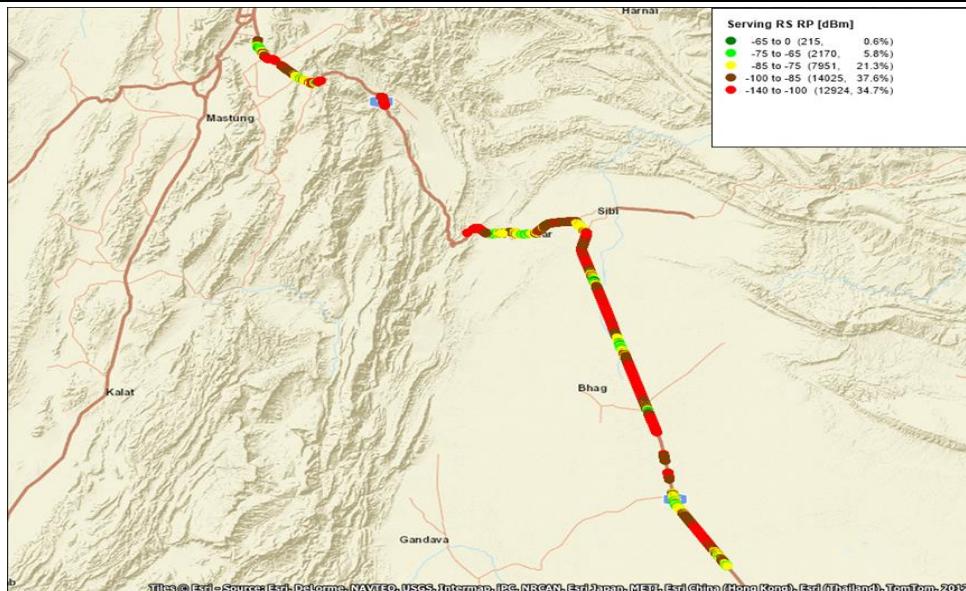


QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO LORALAI

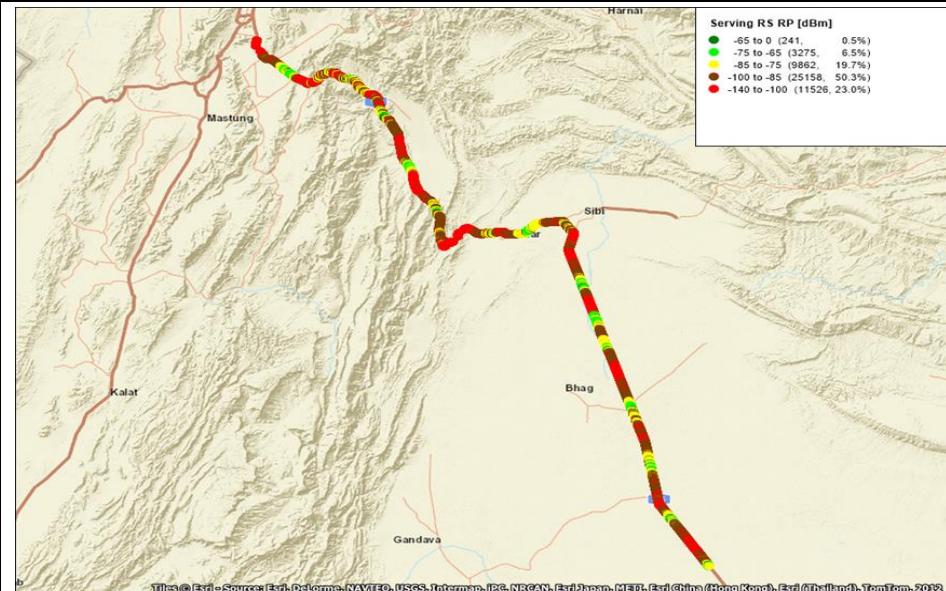


4G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSRP)

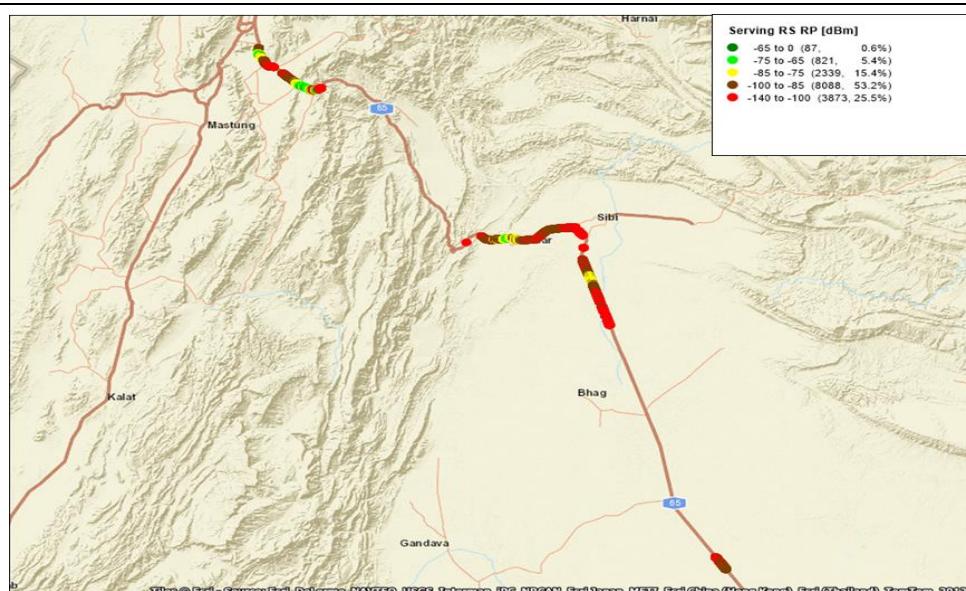
JAZZ 4G NETWORK COVERAGE – QUETTA TO DERA MURAD JAMALI



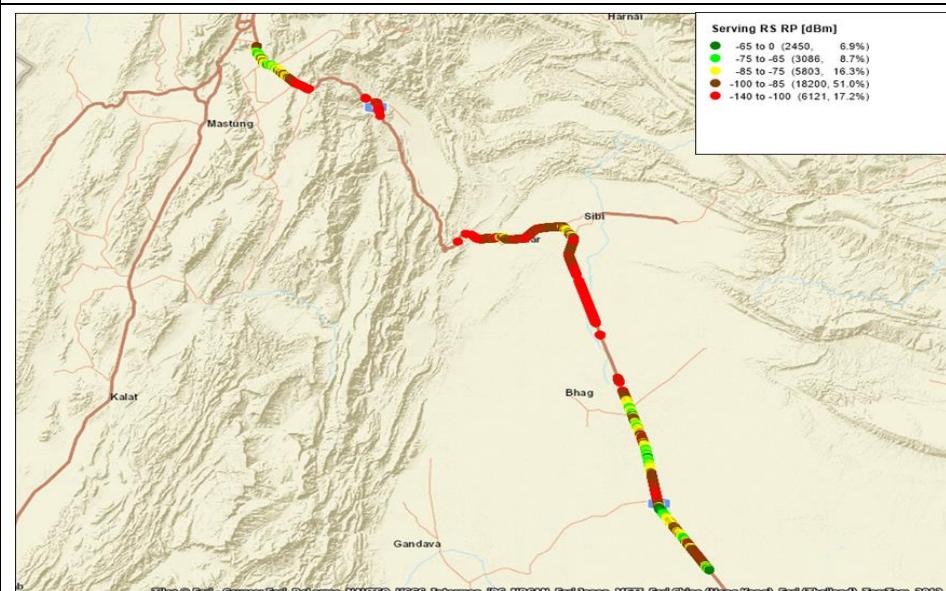
TELENOR 4G NETWORK COVERAGE – QUETTA TO DERA MURAD JAMALI



UFONE 4G NETWORK COVERAGE – QUETTA TO DERA MURAD JAMALI

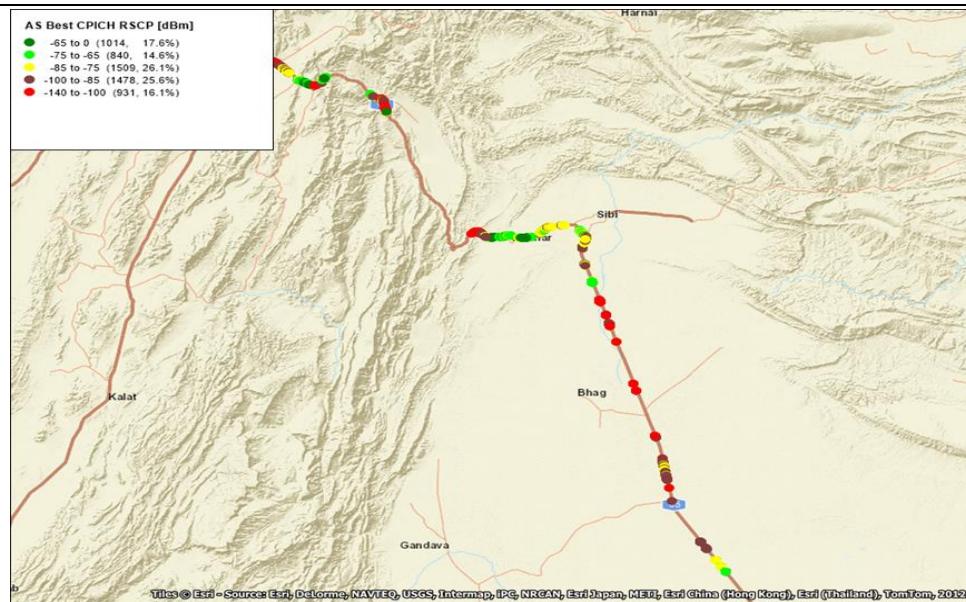


ZONG 4G NETWORK COVERAGE – QUETTA TO DERA MURAD JAMALI

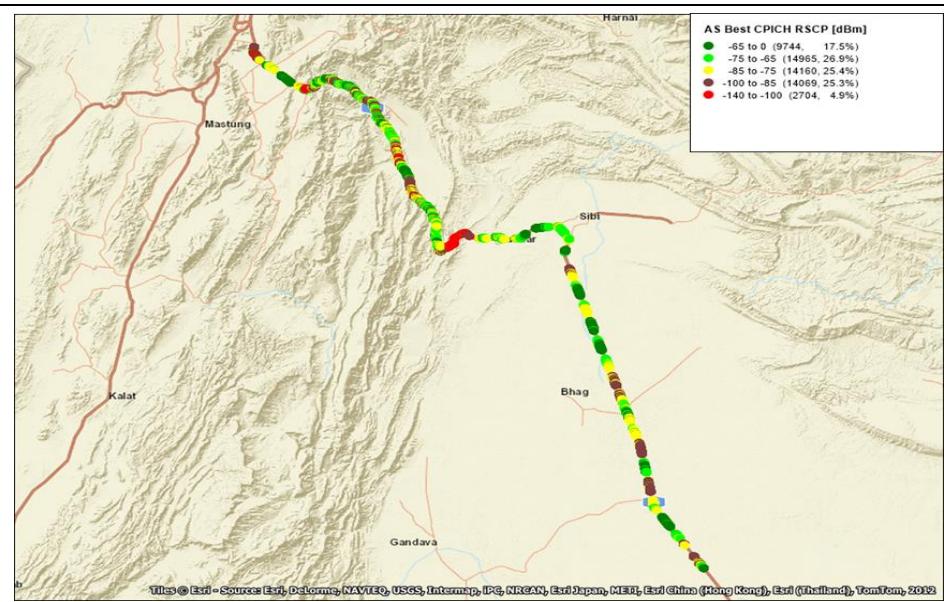


3G MOBILE COVERAGE ON ROADS- SIGNAL STRENGTH (RSCP)

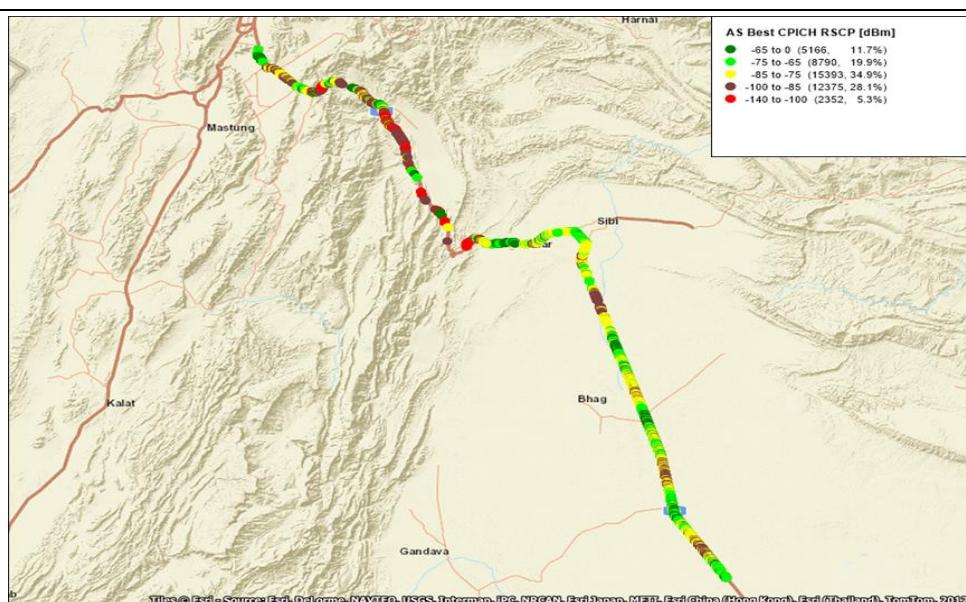
JAZZ 3G NETWORK COVERAGE – QUETTA TO DERA MURAD JAMALI



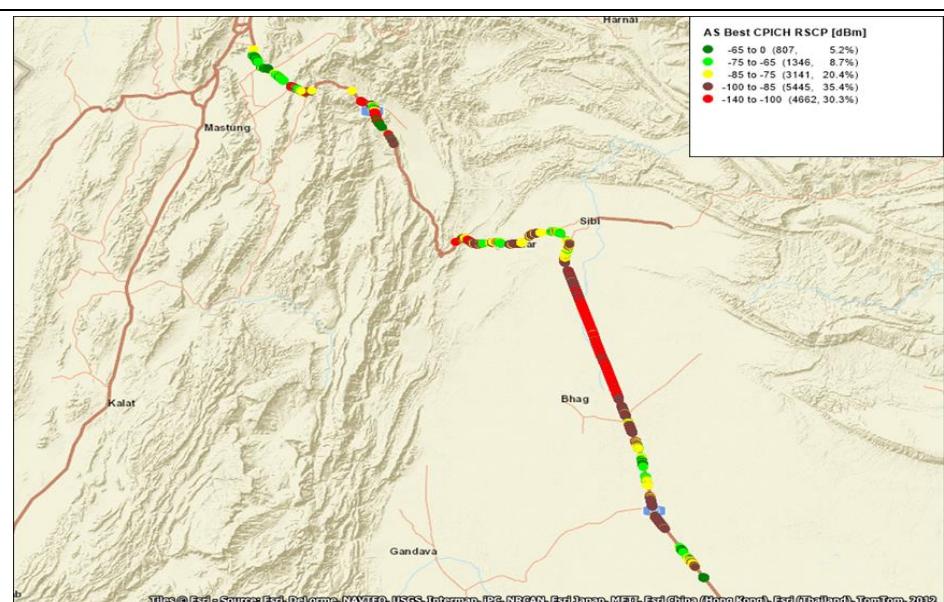
TELENOR 3G NETWORK COVERAGE – QUETTA TO DERA MURAD JAMALI



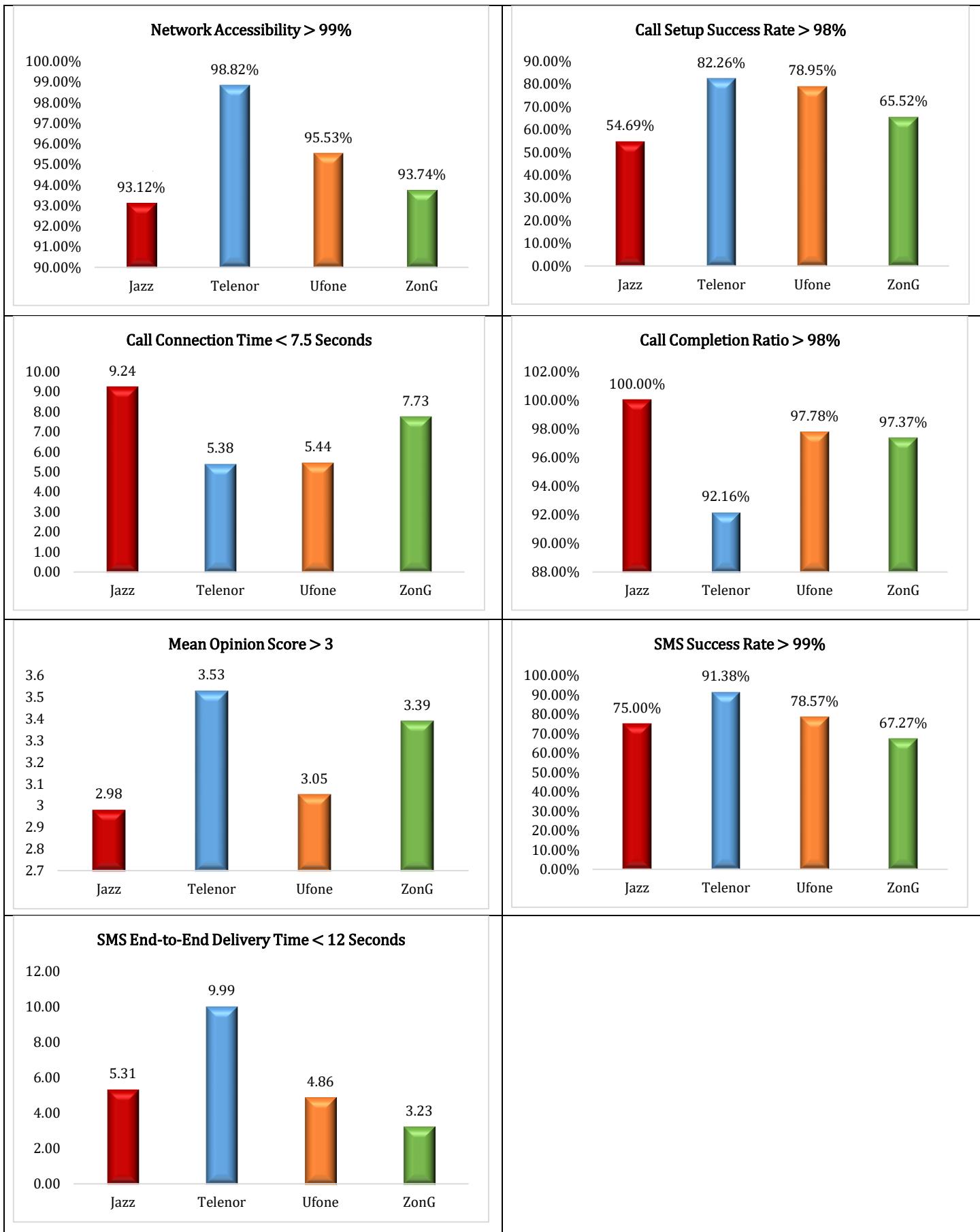
UFONE 3G NETWORK COVERAGE – QUETTA TO DERA MURAD JAMALI



ZONG 3G NETWORK COVERAGE – QUETTA TO DERA MURAD JAMALI



QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO DERA MURAD JAMALI



QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO DERA MURAD JAMALI

