

INDEPENDENT QUALITY OF SERVICE
SURVEY – MOTORWAYS / HIGHWAYS OF
PAKISTAN

FOURTH 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 at Thirteen (13) x Motorways & Highways during 4th Quarter i.e. October ~ December 2022. The name of Motorways and Highways along with survey dates are mentioned in **Table 1.1: QoS Survey of Motorways/Highways & Dates:**

S. #	Name	From	To	Survey Date
1.	N-50	QUETTA	ZHOB	21 Nov 2022
2.	N-50	ZHOB	QUETTA	25 Nov, 2022
3.	N-60	LAHORE	SARGODHA	13~ 14 Oct, 2022
4.	N-5	LAHORE	RAWALPINDI	21 ~ 22 Dec, 2022
5.	N-5	LAHORE	MULTAN	1 ~ 2 Dec , 2022
6.	N-80	ISLAMABAD	KOHAT	17 Nov ~ 18 Nov 2022
7.	N-130	MIANWALI	BAKHAR	5 Dec 2022
8.	M-14	ISAMABAD	D.I KHAN	30 Nov~1 Dec 2022
9.	N-115	TRANDA MUHAMMAD PANAH	JALALPUR PIRWALA	15 Dec 2022
10.	N-5	KOT SABZAL	MULTAN	20 Dec~ 21 Dec 2022
11.	N-95	CHAKDARA	BAHRAIN	23 Nov 2022
12.	N-90	KHAWAZKHEL	BEHSAM	24 Nov 2022
13.	N-55	PESHAWER	D.G KHAN	29 Nov ~ 2 Dec 2022

Table 1.1: QoS Survey of Motorways / Highways & 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 Motorways and Highways from one Toll Plaza to another Toll Plaza. During the survey, mobile handsets for Voice Calls, SMS were kept in technology auto detect mode whereas in case of Mobile Broadband, the handsets were kept both in auto detect as well as locked mode.

MOBILE NETWORK COVERAGE

3.1. **4G / LTE SIGNAL STRENGTH.** During the survey, while conducting data test in technology auto detect mode as well as locked mode, 4G/LTE signal strength samples were recorded on survey routes. As per Next Generation Mobile Service (NGMS) licenses, licensees are required to meet the threshold of -100 dBm or above of Reference Signal Receive Power (RSRP) with 90% confidence level. Road wise compliance of 90% confidence level of signal strength is shown in (i). **Table 3.1: 4G Signal Strength Technology Auto Detect Mode -100 dBm with 90% Confidence Level & (ii). Table 3.2: 4G Signal Strength Technology Locked Mode -100 dBm with 90% Confidence Level.**

4G Signal Strength -100dBm with 90% Confidence Level – Technology Auto Detect Mode								
Road Name	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	62.45	82.28	92.9	88.0	No	No	Yes	No
Zhob to Quetta	68.47	81.72	92.06	90.55	No	No	Yes	Yes
Lahore to Sargodha	95.03	84.25	83.09	85.71	Yes	No	No	No
Lahore to Rawalpindi	94.23	86.36	94.99	96.98	Yes	No	Yes	Yes
Lahore to Multan	94.74	79.00	81.36	93.98	Yes	No	No	Yes

<i>Islamabad to Kohat</i>	78.17	77.61	90.12	75.61	No	No	Yes	No
<i>Mianwali to Bakhar</i>	65.04	67.08	68.17	60.61	No	No	No	No
<i>Islamabad to D.I Khan</i>	77.71	72.74	79.77	65.65	No	No	No	No
<i>T.M Panah to Jalalpur Pirwala</i>	83.21	67.41	64.11	79.10	No	No	No	No
<i>Kot Sabzal to Multan</i>	95.00	82.80	77.94	92.23	Yes	No	No	Yes
<i>Chakdara to Kalam</i>	80.57	98.57	87.64	81.16	No	Yes	No	No
<i>Khuazakhela to Behsam</i>	71.32	76.37	85.96	57.26	No	No	No	No
<i>Peshawer to DG Khan</i>	75.28	87.58	88.12	76.21	No	No	No	No

Table 3.1: 4G Signal Strength Technology Auto Detect Mode -100 dBm with 90% Confidence Level

4G Signal Strength -100dBm with 90% Confidence Level – Technology Locked Mode								
Road Name	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
<i>Zhob to Quetta</i>	75.44	85.19	85.68	84.17	No	No	No	No
<i>Lahore to Sargodha</i>	95.84	89.11	84.95	83.62	Yes	No	No	No
<i>Lahore to Rawalpindi</i>	95.39	88.07	95.34	97.68	Yes	No	Yes	Yes
<i>Lahore to Multan</i>	94.85	84.89	82.01	94.28	Yes	No	No	Yes
<i>Islamabad to Kohat</i>	77.78	80.88	80.58	81.81	No	No	No	No
<i>Mianwali to Bakhar</i>	67.48	66.69	51.28	58.92	No	No	No	No
<i>Islamabad to D.I Khan</i>	75.76	65.39	60.60	61.77	No	No	No	No
<i>T.M Panah to Jalalpur Pirwala</i>	87.27	64.25	63.16	83.07	No	No	No	No
<i>Kot Sabzal to Multan</i>	95.20	87.02	69.78	91.2	Yes	No	No	Yes
<i>Chakdara to Kalam</i>	82.03	98.20	85.72	87.65	No	Yes	No	No
<i>Khuazakhela to Behsam</i>	53.58	74.10	62.38	62.72	No	No	No	No
<i>Peshawer to DG Khan</i>	78.0	83.88	77.13	78.91	No	No	No	No

Table 3.2: 4G Signal Strength Technology Locked Mode -100 dBm with 90% Confidence Level

3.2. 3G SIGNAL STRENGTH IN TECHNOLOGY AUTO DETECT MODE. During the survey, while conducting data tests, the signal strength samples were recorded on survey routes, wherever network switched to 3G while keeping the mobile handset in technology auto detect mode and also in technology locked mode. As per Next Generation Mobile Service (NGMS) licenses, licensees are required to meet the threshold of -100 dBm or above of Received Signal Code Power (RSCP) with 90% confidence level. Road wise compliance of 90% confidence level of signal strength is shown in (i). **Table 3.3: 3G Signal Strength Technology Auto Detect Mode -100 dBm with 90% Confidence Level** (ii). **Table 3.4: 3G Signal Strength Technology Locked Mode -100 dBm with 90% Confidence Level**.

3G Signal Strength -100dBm with 90% Confidence Level – Technology Auto Detect Mode								
Road Name	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
<i>Quetta to Zhob</i>	94.90	98.84	98.72	65.06	Yes	Yes	Yes	No
<i>Zhob to Quetta</i>	89.02	94.77	96.84	82.14	No	Yes	Yes	No
<i>Lahore to Sargodha</i>	N/A	N/A	100.0	95.49	N/A	N/A	Yes	Yes
<i>Lahore to Rawalpindi</i>	N/A	59.7	95.07	64.63	N/A	No	Yes	No
<i>Lahore to Multan</i>	N/A	100.0	97.63	N/A	N/A	Yes	Yes	N/A
<i>Islamabad to Kohat</i>	92.52	100.0	80.06	58.85	Yes	Yes	No	No
<i>Mianwali to Bakhar</i>	20.41	57.89	72.70	64.04	No	No	No	No
<i>Islamabad to D.I Khan</i>	77.64	81.65	77.25	67.20	No	No	No	No
<i>T.M Panah to Jalalpur Pirwala</i>	N/A	90.81	N/A	85.29	N/A	Yes	N/A	No
<i>Kot Sabzal to Multan</i>	N/A	96.61	91.61	100.0	N/A	Yes	Yes	Yes
<i>Chakdara to Kalam</i>	86.25	100.0	99.17	70.77	No	Yes	Yes	No
<i>Khuazakhela to Behsam</i>	85.92%	100.0	74.14	63.86	No	Yes	No	No

Peshawer to DG Khan	79.91	92.47	92.82	52.41	No	Yes	Yes	No
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Table 3.3: 3G Signal Strength Technology Auto Detect Mode -100 dBm with 90% Confidence Level

3G Signal Strength -100dBm with 90% Confidence Level – Technology Locked Mode								
Road Name	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	98.63	99.6	99.1	93.50	Yes	Yes	Yes	Yes
Lahore to Sargodha	99.02	99.46	97.87	99.75	Yes	Yes	Yes	Yes
Lahore to Rawalpindi	99.08	99.63	99.86	99.37	Yes	Yes	Yes	Yes
Lahore to Multan	99.36	90.83	89.99	100.00	Yes	Yes	No	Yes
Islamabad to Kohat	91.21	98.16	97.17	93.87	Yes	Yes	Yes	Yes
Mianwali to Bakhar	75.06	88.53	84.71	91.23	No	No	No	Yes
Isamabad to D.I Khan	86.37	92.19	91.03	87.68	No	Yes	Yes	No
T.M Panah to Jalalpur Pirwala	99.12	96.08	59.59	99.96	Yes	Yes	No	Yes
Kot Sabzal to Multan	93.65	98.31	94.2	99.78	Yes	Yes	Yes	Yes
Chakdara to Kalam	97.20	99.95	95.48	98.77	Yes	Yes	Yes	Yes
Khuzakhela to Behsam	81.41	97.2	83.69	79.12	No	Yes	No	No
Peshawer to DG Khan	81.84	97.99	98.09	97.01	No	Yes	Yes	Yes

Table 3.4: 3G Signal Strength Technology Locked Mode -100 dBm with 90% Confidence Level

MOBILE BROADBAND SERVICE

4.1. **DATA SESSIONS IN TECHNOLOGY AUTO DETECT MODE & LOCKED MODE.** A series of Mobile Broadband/Data tests including Capacity Tests, Data Transfer Tests, Web Browsing and Ping were carried out wherein Key Performance Indicators (KPIs) of Upload and Download User Data Throughput (i.e. Speed), Webpage Loading Time and Latency have been measured. In Fixed Duration Testing, a File of 10GB was downloaded and Uploaded for 3 minutes duration whereas in Fixed Size Testing, a File of 5MB and 2MB was completely downloaded and uploaded respectively. In order to measure Webpage Loading Time, different national webpages were checked and in case of Latency international and national host were pinged to measure Round Trip Time (RTT)/Latency. The 4G/LTE and 3G signal strength, Number of Tests, Upload and Download User Data Throughput, Webpage Loading Time and Latency detail is mentioned in **Table 4.1: Data Tests Statistics.**

DESCRIPTION			JAZZ	TELENOR	UFONE	ZONG	
AUTO DETECT MODE	CAPACITY TEST	DOWNLOAD	<i>ATTEMPTS</i>	2314	2175	2317	2247
			<i>SPEED (Mbps)</i>	24.454	6.037	13.107	23.142
	DATA TRANSFER TEST	UPLOAD	<i>ATTEMPTS</i>	2320	2178	2321	2250
			<i>SPEED (Mbps)</i>	18.531	6.311	15.122	16.37
	BROWSING TEST	DOWNLOAD	<i>ATTEMPTS</i>	2270	2089	2048	2228
			<i>SPEED (Mbps)</i>	10.06	5.236	8.028	10.25
		UPLOAD	<i>ATTEMPTS</i>	2337	2194	2337	2260
			<i>SPEED (Mbps)</i>	7.746	6.075	8.222	9.063
	PING TEST		<i>ATTEMPTS</i>	11643	10923	11634	11277
			<i>LOADING TIME (Seconds)</i>	6.69	7.85	6.91	6.65
			<i>ATTEMPTS</i>	4690	4411	4693	4542
			<i>LATENCY (msec)</i>	259.91	251.97	280	241.8
			<i>AVERAGE 4G SIGNAL STRENGTH (RSRP) dBm</i>	-84	-86.3	-85.1	-85
			<i>AVERAGE 3G SIGNAL STRENGTH (RSCP) dBm</i>	-82.58	-80.97	-82.61	-93.04

DESCRIPTION				JAZZ	TELENOR	UFONE	ZONG	
LOCKED MODE	4G	DATA TRANSFER TEST	DOWNLOAD	ATTEMPTS	958	956	958	957
				SPEED (Mbps)	17.125	3.957	10.491	16.64
		PING TEST	UPLOAD	ATTEMPTS	950	950	950	950
				SPEED (Mbps)	15.551	5.12	12.042	9.786
		AVERAGE 4G SIGNAL STRENGTH (RSRP) dBm		ATTEMPTS	966	966	966	965
				LATENCY (msec)	94.06	98.66	100.63	114.71
	3G	DATA TRANSFER TEST	DOWNLOAD	ATTEMPTS	-84.8	-87.5	-88.2	-86.1
				SPEED (Mbps)	469	840	773	837
		PING TEST	UPLOAD	ATTEMPTS	2.063	2.532	2.65	2.175
				SPEED (Mbps)	405	825	755	826
		AVERAGE 3G SIGNAL STRENGTH (RSCP) dBm		ATTEMPTS	0.86	1.5	2.006	0.964
				LATENCY (msec)	918	918	917	918
				AVERAGE 3G SIGNAL STRENGTH (RSCP) dBm	477.66	661.44	502.52	253.64

Table 4.1: Data Tests Statistics

4.2. **DOWNLOAD USER DATA THROUGHPUT.** As per Next Generation Mobile Service (NGMS) licenses, licensees are required to meet the threshold of minimum of 3 Mbps of 4G/LTE & 512 Kbps of 3G Download User Data Throughput. The results of Data Service QoS KPI i.e. Download User Data Throughput is shown in (i). **Table 4.2: Download User Data Throughput Technology Auto Detect Mode [Fixed Duration] ≥ 3 Mbps,** (ii). **Table 4.3: Download User Data Throughput Technology Auto Detect Mode [Fixed Size] ≥ 3 Mbps,** (iii). **Table 4.4: Download User Data Throughput 4G/LTE Technology Locked Mode [Fixed Duration] ≥ 3 Mbps &** (iv). **Table 4.5: Download User Data Throughput 3G Technology Locked Mode [Fixed Duration] ≥ 512 Kbps.**

DOWNLOAD USER DATA THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE (FIXED DURATION)								
Road	Download Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	20.00	6.55	13.97	27.33	Second	Fourth	Third	First
Zhob to Quetta	18.77	6.75	6.83	11.77	First	Fourth	Third	Second
Lahore to Sargodha	25.84	4.85	18.39	21.23	First	Fourth	Third	Second
Lahore to Rawalpindi	22.23	5.09	9.70	22.20	First	Fourth	Third	Second
Lahore to Multan	18.52	7.77	15.98	16.04	First	Fourth	Third	Second
Islamabad to Kohat	30.69	5.46	12.42	15.65	First	Fourth	Third	Second
Mianwali to Bakhar	26.47	7.04	13.30	27.44	Second	Fourth	Third	First
Isamabad to D.I Khan	24.80	6.12	10.50	14.89	First	Fourth	Third	Second
T.M Panah to Jalalpur Pirwala	13.91	3.99	13.45	25.50	Second	Fourth	Third	First
Kot Sabzal to Multan	26.66	6.10	8.05	24.34	First	Fourth	Third	Second
Chakdara to Kalam	22.67	9.53	15.12	30.24	Second	Fourth	Third	First
Khuazakhela to Behsam	27.97	2.67	15.64	23.38	First	Fourth	Third	Second
Peshawer to DG Khan	15.19	4.75	15.64	37.54	Third	Fourth	Second	First

Table4.2: Download User Data Throughput Technology Auto Detect Mode [Fixed Duration] ≥ 3 Mbps

DOWNLOAD USER DATA THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE (FIXED SIZE)								
Road	Download Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	8.45	6.77	9.25	11.67	Third	Fourth	Second	First
Zhob to Quetta	8.29	6.67	5.70	10.30	Second	Third	Fourth	First
Lahore to Sargodha	11.26	5.22	11.52	11.03	Second	Fourth	First	Third
Lahore to Rawalpindi	11.29	5.52	8.11	11.33	Second	Fourth	Third	First

DOWNLOAD USER DATA THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE (FIXED SIZE)								
Road	Download Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Lahore to Multan	10.43	6.39	8.96	9.60	First	Fourth	Third	Second
Islamabad to Kohat	13.41	5.05	8.36	9.65	First	Fourth	Third	Second
Mianwali to Bakhar	12.36	6.68	7.86	13.22	Second	Fourth	Third	First
Isamabad to D.I Khan	11.92	5.14	8.23	10.17	First	Fourth	Third	Second
T.M Panah to Jalalpur Pirwala	8.24	4.00	8.14	11.78	Second	Fourth	Third	First
Kot Sabzal to Multan	12.54	5.88	6.48	12.10	First	Fourth	Third	Second
Chakdara to Kalam	11.72	7.02	9.22	13.92	Second	Fourth	Third	First
Khuazakhela to Behsam	12.84	3.64	10.45	12.89	Second	Fourth	Third	First
Peshawer to DG Khan	10.31	5.05	11.92	14.85	Third	Fourth	Second	First

Table4.3: Download User Data Throughput Technology Auto Detect Mode [Fixed Size] \geq 3 Mbps

DOWNLOAD USER DATA THROUGHPUT IN 4G/LTE TECHNOLOGY LOCKED MODE (FIXED DURATION)								
Road	Download Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Zhab to Quetta	10.99	6.68	8.38	7.16	First	Fourth	Second	Third
Lahore to Sargodha	15.10	3.09	15.32	17.38	Third	Fourth	Second	First
Lahore to Rawalpindi	15.50	3.25	9.44	18.97	Second	Fourth	Third	First
Lahore to Multan	13.38	6.01	13.35	14.59	Second	Fourth	Third	First
Islamabad to Kohat	20.93	3.33	5.85	12.40	First	Fourth	Third	Second
Mianwali to Bakhar	4.09	2.15	2.41	5.53	Second	Fourth	Fourth	First
Isamabad to D.I Khan	7.80	1.73	3.57	5.48	First	Fourth	Fourth	Second
T.M Panah to Jalalpur Pirwala	15.06	3.56	12.93	17.99	Second	Fourth	Third	First
Kot Sabzal to Multan	23.11	5.79	16.11	18.16	First	Fourth	Third	Second
Chakdara to Kalam	21.41	1.82	17.64	25.99	Second	Fourth	Third	First
Khuazakhela to Behsam	0.65	1.76	17.12	13.84	Fourth	Fourth	First	Second
Peshawer to DG Khan	22.32	3.59	6.30	22.58	Second	Fourth	Third	First

Table 4.4: Download User Data Throughput 4G/LTE Technology Locked Mode [Fixed Duration] \geq 3 Mbps

DOWNLOAD USER DATA THROUGHPUT IN 3G TECHNOLOGY LOCKED MODE (FIXED DURATION)								
Road	Download Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	3310.09	4286.82	4032.73	2410.64	Third	First	Second	Fourth
Lahore to Sargodha	3109.03	2239.95	3814.86	1973.73	Second	Third	First	Fourth
Lahore to Rawalpindi	2208.67	1811.03	3327.1	2389.37	Third	Fourth	First	Second
Lahore to Multan	2510.27	2388.08	2496.11	1689.42	First	Third	Second	Fourth
Islamabad to Kohat	3416.89	1884.31	2135.95	1955.74	First	Fourth	Second	Third
Mianwali to Bakhar	2093.44	2138.59	1721.02	1854.36	Second	First	Fourth	Third
Isamabad to D.I Khan	2166.22	1313.63	2360.81	1475.1	Second	Fourth	First	Third
T.M Panah to Jalalpur Pirwala	3290.86	2219.17	1482.73	1876.5	First	Second	Fourth	Third
Kot Sabzal to Multan	2945.38	4460.73	2350.35	2852.61	Second	First	Fourth	Third
Chakdara to Kalam	2945.38	4460.73	2350.35	2852.61	Second	First	Fourth	Third
Khuazakhela to Behsam	4138.82	1307.93	2418.62	2297.68	First	Fourth	Second	Third
Peshawer to DG Khan	1823.3	1517.58	1911.81	2037.49	Third	Fourth	Second	First

Table 4.5: Download User Data Throughput IN 3G Technology Locked Mode [Fixed Duration] \geq 512 Kbps

4.3. **UPLOAD USER DATA THROUGHPUT.** As per Cellular Mobile Network Quality of Service (QoS) Regulations 2021, licensees are required to meet the threshold of minimum of 768 Kbps of 4G/LTE & 128 Kbps of 3G of Upload User Data Throughput. The results of Data Service QoS KPI i.e. Upload User Data Throughput is shown in (i). **Table 4.6: Upload User Data Throughput Technology Auto Detect Mode [Fixed Duration] \geq 768 Kbps,** (ii). **Table 4.7: Upload User Data Throughput Technology Auto Detect Mode [Fixed Size] \geq 768 Kbps,** (iii). **Table 4.8: Upload User Data Throughput in 4G/LTE Technology Locked**

Mode [Fixed Duration] \geq 768 Kbps & (iv). Table 4.9: Upload User Data Throughput in 3G Technology Locked Mode [Fixed Duration] \geq 128 Kbps.

UPLOAD USER DATA THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE (FIXED DURATION)								
Road	Upload Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	16071.85	4620.93	17662.64	16913.76	Third	Fourth	First	Second
Zhob to Quetta	14445.73	5203.71	13526.88	16978.23	Second	Fourth	Third	First
Lahore to Sargodha	21187.7	6575.18	18402.93	14811.03	First	Fourth	Second	Third
Lahore to Rawalpindi	18033.43	6342.89	19589.29	21727.77	Third	Fourth	Second	First
Lahore to Multan	17483.04	6013.29	14095.94	15426.7	First	Fourth	Third	Second
Islamabad to Kohat	17803.1	7840.56	17885.7	15142.61	Second	Fourth	First	Third
Mianwali to Bakhar	15141.84	5827.45	12654.66	10180.92	First	Fourth	Second	Third
Isamabad to D.I Khan	17002.48	5702.02	12255.25	8878.16	First	Fourth	Second	Third
T.M Panah to Jalalpur Pirwala	17775.52	3989.82	11920.74	14897.28	First	Fourth	Third	Second
Kot Sabzal to Multan	21654.26	7437.34	12740.01	18210.53	First	Fourth	Third	Second
Chakdara to Kalam	18683.35	4234.95	17807.99	16642	First	Fourth	Second	Third
Khuazakhela to Behsam	6975.27	6775.59	15370.44	17500.71	Third	Fourth	Second	First
Peshawer to DG Khan	18349.59	7774.97	11452.81	16387.45	First	Fourth	Third	Second

Table 4.6: Upload User Data Throughput Technology Auto Detect Mode [Fixed Duration] \geq 768 Kbps

UPLOAD USER DATA THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE (FIXED SIZE)								
Road	Upload Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	6192.3	4866.38	8297.9	7990.55	Third	Fourth	First	Second
Zhob to Quetta	5735.17	4672.48	4846.81	6611.92	Second	Fourth	Third	First
Lahore to Sargodha	7284.31	5435.75	8569.24	7638.65	Third	Fourth	First	Second
Lahore to Rawalpindi	5842.5	5562.8	7480.29	7910.14	Third	Fourth	Second	First
Lahore to Multan	6025.81	5177.9	5219.32	7250.36	Second	Fourth	Third	First
Islamabad to Kohat	6487.43	5883.52	7538.79	6746.31	Third	Fourth	First	Second
Mianwali to Bakhar	6502.4	5725.2	6815.23	6831.79	Third	Fourth	Second	First
Isamabad to D.I Khan	6772.27	5468.01	7257.92	7667.31	Third	Fourth	Second	First
T.M Panah to J. Pirwala	10779.64	9131.75	11876.7	11559.4	Third	Fourth	First	Second
Kot Sabzal to Multan	12354.28	10908.75	11046.4	14280.9	Second	Fourth	Third	First
Chakdara to Kalam	12192.52	9539.01	16882.8	13549.4	Third	Fourth	First	Second
Khuazakhela to Behsam	10621.75	10256.71	16878.4	13814.4	Third	Fourth	First	Second
Peshawer to DG Khan	12252.51	10169.19	12301.7	13733.1	Third	Fourth	Second	First

Table 4.7: Upload User Data Throughput Technology Auto Detect Mode [Fixed Size] \geq 768 Kbps

UPLOAD USER DATA THROUGHPUT IN 4G TECHNOLOGY LOCKED MODE (FIXED DURATION)								
Road	Upload Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Zhob to Quetta	7942.43	4365.81	11787.94	14687.9	Third	Fourth	Second	First
Lahore to Sargodha	20419.17	5123.96	17036.05	9342.6	First	Fourth	Second	Third
Lahore to Rawalpindi	19569.5	5166.58	17938.07	14213.99	First	Fourth	Second	Third
Lahore to Multan	16635.89	5101.13	10309.4	8981.37	First	Fourth	Second	Third
Islamabad to Kohat	13382.39	7183.49	18471.69	13544.29	Third	Fourth	First	Second
Mianwali to Bakhar	8658.84	3307.68	10163.53	5274.95	Second	Fourth	First	Third
Isamabad to D.I Khan	14837.24	5260.72	11068.11	8835.63	First	Fourth	Second	Third
T.M Panah to J. Pirwala	13494.83	2348.09	10761.36	7004.57	First	Fourth	Second	Third
Kot Sabzal to Multan	19497.48	5972.93	9416.83	7929.4	First	Fourth	Second	Third
Chakdara to Kalam	14040.69	3438	16406.1	13690.82	Second	Fourth	First	Third
Khuazakhela to Behsam	8836.05	3128.51	11945.95	23244.33	Third	Fourth	Second	First
Peshawer to DG Khan	17372.47	5900.3	9532.04	7745.57	First	Fourth	Second	Third

Table 4.8: Upload User Data Throughput in 4G Technology Locked Mode [Fixed Duration] \geq 768 Kbps

Road	Upload Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	997.71	1890.55	2742.63	1196.13	Fourth	Second	First	Third
Lahore to Sargodha	654.73	1218.52	1783.34	634.46	Third	Second	First	Fourth
Lahore to Rawalpindi	724.45	1174.63	2345.99	608.85	Third	Second	First	Fourth
Lahore to Multan	1225.36	1224.81	1846.35	760.84	Second	Third	First	Fourth
Islamabad to Kohat	1322.19	1127.62	1515.2	847.25	Second	Third	First	Fourth
Mianwali to Bakhar	870.66	1105.53	1158.63	847.64	Third	Second	First	Fourth
Isamabad to D.I Khan	913.48	1040.11	1698.64	338.79	Third	Second	First	Fourth
T.M Panah to J. Pirwala	1776.22	2236.29	1173.86	665.92	Second	First	Third	Fourth
Kot Sabzal to Multan	1482.14	2305.9	1889.79	892.19	Third	First	Second	Fourth
Chakdara to Kalam	1151.39	917.79	1277.26	1651.27	Third	Fourth	Second	First
Khuazakhela to Behsam	322.8	975.77	2184.98	1761.51	Fourth	Third	First	Second
Peshawer to DG Khan	1007.85	1417.77	2184.26	1447.54	Fourth	Third	First	Second

Table 4.9: Upload User Data Throughput in 3G Technology Locked Mode [Fixed Duration] \geq 128 Kbps

4.4. **WEBPAGE LOADING TIME.** As per Cellular Mobile Network Quality of Service (QoS) Regulations 2021, licensees are required to meet Webpage Loading Time threshold of 5 Seconds. The results of Webpage Loading Time is shown in **Table 4.10: Webpage Loading Time < 5 Seconds.**

Road	Webpage Loading Time (Sec)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	6.3	6.5	6.3	6.4	No	No	No	No
Zhob to Quetta	6.2	6.7	7.3	6.5	No	No	No	No
Lahore to Sargodha	5.8	7.0	5.3	5.6	No	No	No	No
Lahore to Rawalpindi	5	7	6	5	Yes	No	No	Yes
Lahore to Multan	6	7	6	6	No	No	No	No
Islamabad to Kohat	5.5	7.1	6.5	6.2	No	No	No	No
Mianwali to Bakhar	5.9	6.7	6.6	5.3	No	No	No	No
Isamabad to D.I Khan	6.1	7.2	6.6	6.1	No	No	No	No
T.M Panah to J. Pirwala	7.1	7.7	7.3	7.1	No	No	No	No
Kot Sabzal to Multan	6.5	7.1	6.8	6.1	No	No	No	No
Chakdara to Kalam	6.6	8.2	6.9	6.3	No	No	No	No
Khuazakhela to Behsam	6.2	7.7	6.5	5.9	No	No	No	No
Peshawer to DG Khan	6.6	7.7	7.5	6.6	No	No	No	No

Table 4.10: Webpage Loading Time < 5 Seconds

4.5. **LATENCY.** As per Cellular Mobile Network Quality of Service (QoS) Regulations 2021, licensees are required to meet threshold of 75 milliseconds of 4G/LTE Technology & 150 milliseconds of 3G Technology of Latency. The results of QoS KPI Latency is shown in (i). **Table 4.11: Latency in Technology Auto Detect Mode < 75 milliseconds,** (ii). **Table 4.12: Latency in 4G/LTE Technology Locked Mode < 75 milliseconds &** (iii) **Table 4.13: Latency in 3G Technology Locked Mode < 150 milliseconds.**

Road	Latency (milliseconds)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	326	280	252	290	No	No	No	No
Zhob to Quetta	292	299	394	228	No	No	No	No
Lahore to Sargodha	261	234	217	225	No	No	No	No

LATENCY IN TECHNOLOGY AUTO DETECT MODE								
Road	Latency (milliseconds)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Lahore to Rawalpindi	255	242	221	223	No	No	No	No
Lahore to Multan	242	237	304	239	No	No	No	No
Islamabad to Kohat	243	246	257	295	No	No	No	No
Mianwali to Bakhar	337	262	307	268	No	No	No	No
Isamabad to D.I Khan	255	342	285	314	No	No	No	No
T.M Panah to J. Pirwala	242	243	319	218	No	No	No	No
Kot Sabzal to Multan	232	220	319	211	No	No	No	No
Chakdara to Kalam	280	238	262	223	No	No	No	No
Khuazakhela to Behsam	588	266	471	270	No	No	No	No
Peshawer to DG Khan	269	260	308	246	No	No	No	No

Table 4.11: Latency in Technology Auto Detect Mode < 75 milliseconds

LATENCY IN 4G/LTE TECHNOLOGY LOCKED MODE								
Road	Latency (milliseconds)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Zhab to Quetta	165	103	104	151	No	No	No	No
Lahore to Sargodha	66	85	88	69	Yes	No	No	Yes
Lahore to Rawalpindi	87	90	88	216	No	No	No	No
Lahore to Multan	95	98	80	98	No	No	No	No
Islamabad to Kohat	82	87	87	154	No	No	No	No
Mianwali to Bakhar	160	133	119	114	No	No	No	No
Isamabad to D.I Khan	108	116	117	141	No	No	No	No
T.M Panah to J. Pirwala	69	93	131	79	Yes	No	No	No
Kot Sabzal to Multan	70	89	106	69	Yes	No	No	Yes
Chakdara to Kalam	97	97	115	106	No	No	No	No
Khuazakhela to Behsam	198	130	123	217	No	No	No	No
Peshawer to DG Khan	112	116	111	103	No	No	No	No

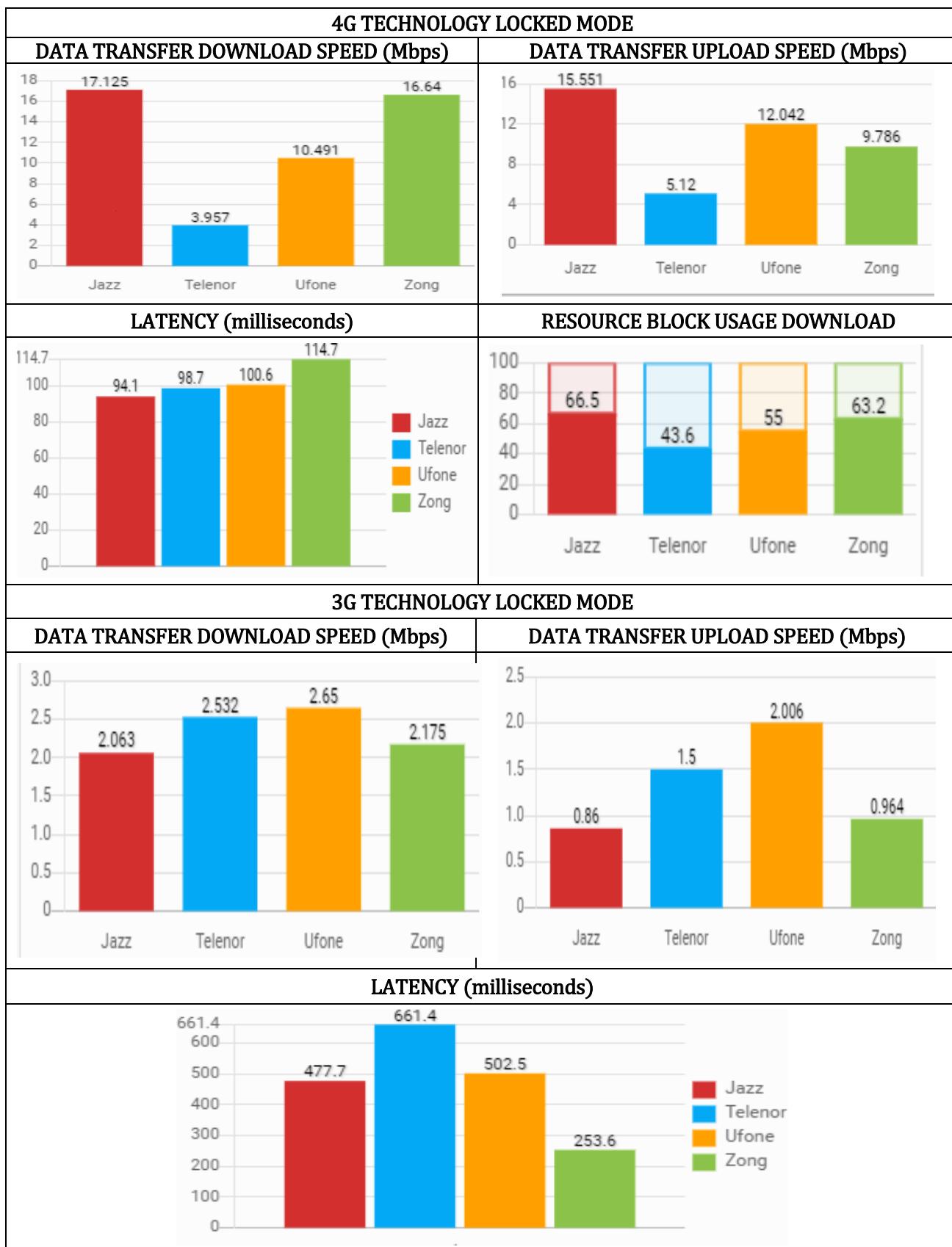
Table 4.12: Latency in 4G/LTE Technology Locked Mode < 75 milliseconds

LATENCY IN 3G TECHNOLOGY LOCKED MODE								
Road	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
Quetta to Zhob	513	996	458	391	No	No	No	No
Lahore to Sargodha	607	493	521	137	No	No	No	Yes
Lahore to Rawalpindi	489	389	506	136	No	No	No	Yes
Lahore to Multan	351	496	446	117	No	No	No	Yes
Islamabad to Kohat	577	453	445	285	No	No	No	No
Mianwali to Bakhar	381	930	492	375	No	No	No	No
Isamabad to D.I Khan	574	600	467	371	No	No	No	No
T.M Panah to J. Pirwala	169	1185	292	107	No	No	No	Yes
Kot Sabzal to Multan	243	1025	509	111	No	No	No	Yes
Chakdara to Kalam	521	693	518	387	No	No	No	No
Khuazakhela to Behsam	642	561	521	683	No	No	No	No
Peshawer to DG Khan	643	719	585	399	No	No	No	No

Table 4.13: Latency in 3G Technology Locked Mode < 150 milliseconds

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





VOICE SERVICE

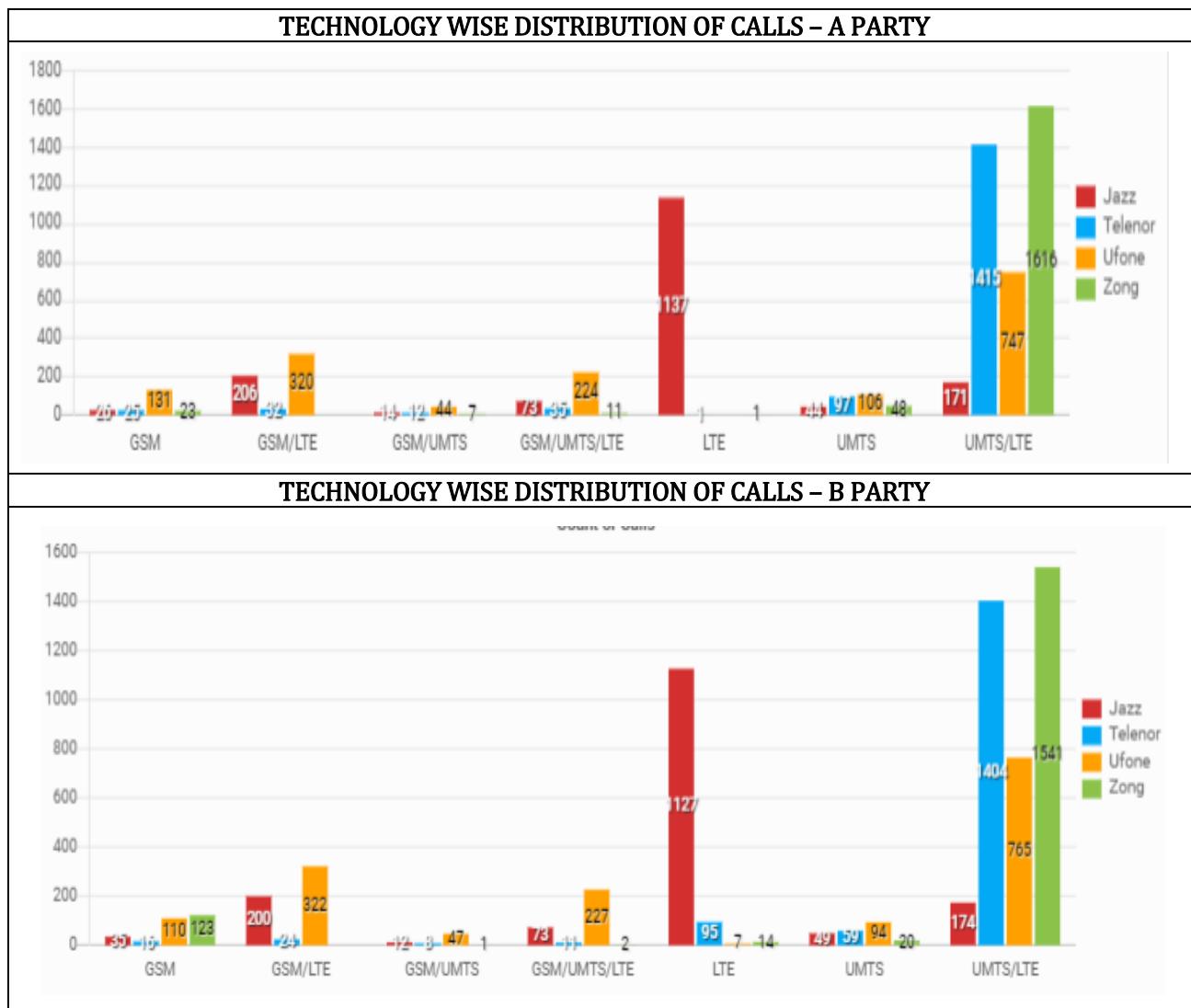
5.1. A total of **6697** Call attempts were made and out of which **828** were failed attempts. In **5869** successful call attempts, **284** calls dropped prior to completion of two minutes duration, whereas, **5585**

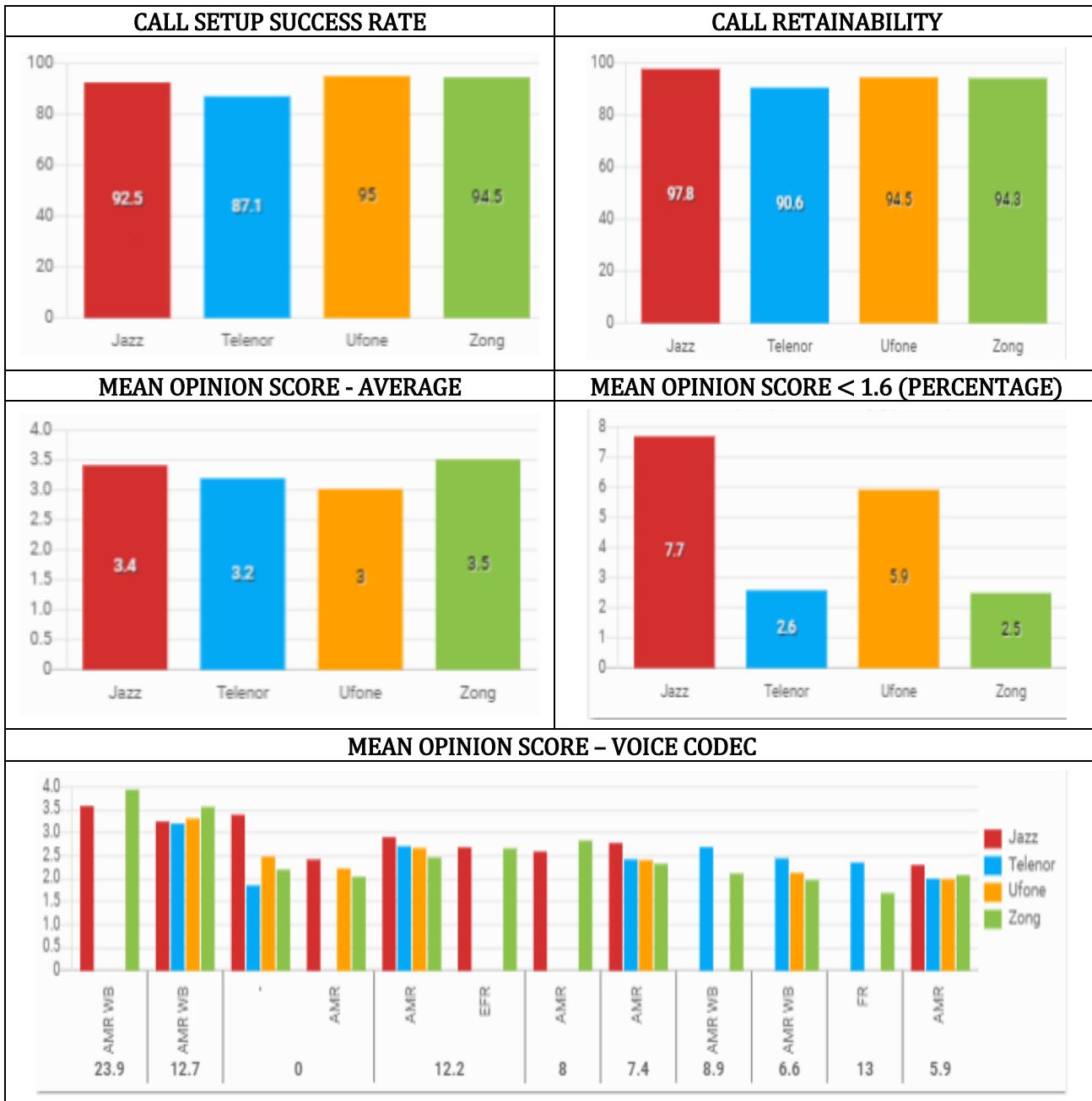
calls remained connected for the complete duration of two minutes. The company wise call statistics is shown in Table 5.1: Call Statistics.

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
TOTAL CALLS ATTEMPTS	1671	1617	1572	1706
FAILED CALLS ATTEMPTS	125	209	78	93
ESTABLISHED CALLS ATTEMPTS	1546	1408	1494	1613
DROPPED CALLS ATTEMPTS	45	70	60	44
COMPLETED CALLS ATTEMPTS	1501	1338	1434	1569
CALL SETUP SUCCESS RATE (%)	92.52	87.07	95.04	94.55
CALL SETUP TIME (SECONDS)	8.39	9.66	8.27	7.05
CALL COMPLETION RATE (%)	97.78	90.58	94.55	94.27
ISHO SUCCESS RATE (%)	100	100	96.97	-
RAB SETUP SUCCESS RATE (%)	100	100	96.97	-
MEAN OPINION SCORE	3.42	3.2	3.02	3.51
MEAN OPINION SCORE EXCESS RATIO - MOS < 1.6 (%)	7.7	2.58	5.92	2.5
TOTAL SPEECH TEST	15136	13737	14516	15989

Table 5.1: Call Statistics

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





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 in **13 x surveyed roads** of Pakistan. The compliance level of threshold values of Voice QoS KPIs is shown in each **Table 5.1 & Table 5.2: Voice QoS KPIs Compliance Level**.

VOICE CALLS – COMPLIANCE (YES/NO)								
Operator	*Voice KPIs	Quetta to Zhob	Zhob to Quetta	Lahore to Sargodha	Lahore to Rawalpindi	Lahore to Multan	Islamabad to Kohat	Mianwali to Bakhar
Jazz	NA	No	No	Yes	Yes	Yes	Yes	No
	SA	No	No	No	No	Yes	No	No
	CCT	No	No	Yes	Yes	Yes	Yes	No
	CCR	No	No	Yes	Yes	Yes	No	No
	MOS	No	No	Yes	Yes	Yes	Yes	Yes
	ISHO	N/a	N/a	Yes	Yes	Yes	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Telenor	NA	No	Yes	No	Yes	Yes	Yes	Yes
	SA	No	No	No	No	No	No	No
	CCT	Yes	Yes	Yes	No	Yes	Yes	Yes
	CCR	No	No	No	No	No	No	No
	MOS	Yes	Yes	Yes	No	Yes	Yes	No
	ISHO	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	Yes	N/a	Yes	Yes	N/a	N/a	N/a
Ufone	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SA	Yes	No	Yes	Yes	Yes	No	No
	CCT	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	No	No	No	Yes	Yes	No	No
	MOS	Yes	Yes	Yes	Yes	Yes	No	No
	ISHO	No	Yes	Yes	Yes	No	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zong	NA	No	No	Yes	Yes	Yes	Yes	Yes
	SA	No	No	No	Yes	No	No	No
	CCT	No	No	Yes	Yes	Yes	Yes	Yes
	CCR	No	No	Yes	No	Yes	No	Yes
	MOS	No	No	Yes	Yes	Yes	Yes	Yes
	RSSR	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 5.1: Voice QoS KPIs Compliance Level

VOICE CALLS – COMPLIANCE (YES/NO)							
Operator	*Voice KPIs	Islamabad to D.I Khan	T.M Panah to J. Pirwala	Kot Sabzal to Multan	Chakdara to Kalam	Khuazakhela to Behsam	Peshawer to DG Khan.
Jazz	NA	Yes	Yes	Yes	Yes	No	Yes
	SA	No	Yes	Yes	Yes	No	No
	CCT	Yes	Yes	Yes	Yes	No	Yes
	CCR	No	Yes	No	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	No	No
	ISHO	Yes	Yes	No	No	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes
Telenor	NA	No	Yes	Yes	Yes	Yes	Yes
	SA	No	No	No	No	No	No
	CCT	No	Yes	Yes	Yes	Yes	Yes
	CCR	No	No	No	Yes	No	No
	MOS	No	Yes	Yes	Yes	Yes	Yes
	ISHO	Yes	No	No	No	Yes	No
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes
Ufone	NA	No	Yes	Yes	Yes	No	Yes
	SA	No	No	Yes	Yes	No	No
	CCT	Yes	No	No	Yes	Yes	Yes
	CCR	No	Yes	Yes	Yes	Yes	No
	MOS	No	No	No	Yes	No	No
	ISHO	No	No	No	Yes	No	No
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes
Zong	NA	No	Yes	Yes	Yes	No	Yes
	SA	No	Yes	Yes	Yes	No	No
	CCT	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	No	Yes	Yes	Yes	Yes	No
	MOS	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	N/A	N/A	N/A	N/A	N/A	N/A

* 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

SURVEY MAPS & GRAPHICAL RESULTS

7.1 The 4G/LTE (RSRP) and 3G (RSCP) Signal Strength samples recorded during drive test on survey routes, were plotted on maps. The Signal Strength maps along-with Voice, SMS and Data QoS KPIs survey results in graphical form are shown at **Annex-A (Coverage Maps)**, **Annex-B (Data QoS Results)** and **Annex-C (Voice & SMS Results)**.

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 in 13 x surveyed roads of Pakistan.

- a. **MOBILE NETWORK COVERAGE.** The categorization of CMOs as per QoS KPI i.e. Signal Strength of 4G/LTE and 3G Networks measured in Technology Auto Detect and Locked Mode is shown in **Table 8.1: CMOs Standing in Mobile Network Coverage – Technology Auto Detect Mode** & **Table 8.2: CMOs Standing in Mobile Network Coverage – Technology Locked Mode**

S. #.	Operator	Compliance Level – Number of Roads Technology Auto Detect Mode						Standing	
		Compliant			Non-Compliant				
		4G	3G	Total	4G	3G	Total		
1.	Ufone	4	8	12	9	4	12	First	
2.	Telenor	1	9	10	12	3	15	Second	
3.	Jazz	4	2	6	9	6	15	Third	
4.	ZonG	4	2	6	9	19	19	Fourth	

Table 8.1: CMOs Standing in Mobile Network Coverage – Technology Auto Detect Mode

S. #	Operator	Compliance Level – Number of Roads Technology Locked Mode						Standing	
		Compliant			Non-Compliant				
		4G	3G	Total	4G	3G	Total		
1.	ZonG	3	10	13	9	2	11	First	
2.	Telenor	1	11	12	11	1	12	Second	
3.	Jazz	4	8	12	8	4	12	Second	
4.	Ufone	1	8	9	11	4	15	Third	

Table 8.2: CMOs Standing in Mobile Network Coverage – Technology Locked Mode

- b. **MOBILE BROADBAND SERVICE.** The categorization of each CMOs in Mobile Broadband Service is as under:

- (i) **User Download Data Throughput.** The User Download Data Throughput in Fixed Duration and Fixed Size Testing, as per the highest to lowest obtained results, is shown in **Table 8.3: CMOs Standing in User Download Data Throughput – Technology Auto Detect Mode** & **Table 8.4: CMOs Standing in User Download Data Throughput – Technology Locked Mode**.

S. #	Operator	Highest Download Throughput – Number of Roads								Standing			
		Technology Auto Detect Mode								Fixed Duration	Fixed Size		
		Fixed Duration				Fixed Size							
		1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th				
1.	ZonG	5	8	-	-	8	4	1	-	2 nd	1 st		
2.	Jazz	8	4	1	-	4	7	2	-	1 st	2 nd		
3.	Ufone	-	1	12	-	1	2	9	1	3 rd	3 rd		
4.	Telenor	-	-	-	13	-	-	1	12	4 th	4 th		

Table 8.3: CMOs Standing in User Download Data Throughput - Technology Auto Detect Mode

S. #	Operator	Highest Download Throughput – Number of Roads								Standing	
		4G Locked Mode				3G Locked Mode				Fixed Duration	
		Fixed Duration				Fixed Duration				4G	3G
		1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th		
1.	Jazz	4	6	1	1	4	5	3	-	2 nd	1 st
2.	Telenor	-	-	-	12	4	1	2	5	4 th	2 nd
3.	Ufone	1	2	7	2	3	5	-	4	3 rd	3 rd
4.	ZonG	7	4	1	-	1	1	7	3	1 st	4 th

Table 8.4: CMOs Standing in User Download Data Throughput- Technology Locked Mode

- (ii) User Upload Data Throughput. The User Upload Data Throughput in Fixed Duration and Fixed Size Testing, as per the highest to lowest obtained results, is shown in **Table 8.5: CMOs Standing in User Upload Data Throughput – Technology Auto Detect Mode & Table 8.6: CMOs Standing in User Upload Data Throughput – Technology Locked Mode**.

S. #	Operator	Highest Upload Throughput – Number of Roads								Standing			
		Technology Auto Detect Mode								Fixed Duration	Fixed Size		
		Fixed Size				Fixed Duration							
		1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th				
1.	ZonG	7	6	-	-	3	5	5	-	2 nd	1 st		
2.	Ufone	6	4	3	-	2	6	5	-	3 rd	2 nd		
3.	Jazz	-	3	10	-	8	2	3	-	1 st	3 rd		
4.	Telenor	-	-	-	13	-	-	-	13	4 th	4 th		

Table 8.5: CMOs Standing in Upload Data Throughput Technology Auto Detect Mode

S. #	Operator	Highest Upload Throughput – Number of Roads								Standing	
		4G-Fixed Duration				3G-Fixed Duration				4G	3G
		1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th		
1.	Ufone	3	9	-	-	9	2	1	-	2 nd	1 st
2.	Telenor	-	-	-	12	2	5	4	1	4 th	2 nd
3.	ZonG	2	1	9	-	1	2	1	8	3 rd	3 rd
4.	Jazz	7	2	3	-	-	3	6	3	1 st	4 th

Table 8.6: CMOs Standing in User Upload Data Throughput – Technology Locked Mode

- (iii) Webpage Loading Time. The categorization of each CMOs, as per the maximum compliant of Webpage Loading Time QoS KPIs is shown, is shown in **Table 8.7: CMOs Standing in Webpage Loading Time**.

S. #	Operator	Webpage Loading Time - Number of Roads				Standing	
		Compliant		Non-Compliant			
1.	ZonG	1		12		1 st	
2.	Jazz	1		12		1 st	
3.	Telenor	-		13		-	
4.	Ufone	0		13		-	

Table 8.7: CMOs Standing in Webpage Loading Time

- (iv) Latency. The categorization of each CMOs, as per the maximum compliant of Webpage Loading Time QoS KPIs is shown in **Table 8.8: CMOs Standing in Latency**.

S. #	Operator	Latency - Number of Roads								Standing	
		Compliant				Non-Compliant					
		Auto	4G	3G	Total	Auto	4G	3G	Total		
1.	ZonG	-	2	5	7	13	10	7	30	1 st	
2.	Jazz	-	3	0	3	13	9	12	34	2 nd	
3.	Telenor	-	-	-	-	13	12	12	37	-	
4.	Ufone	-	-	-	-	13	12	12	37	-	

Table 8.8: CMOs Standing in Latency

- c. **VOICE SERVICE**. The categorization of each CMOs, as per the maximum compliance of Voice QoS KPIs is shown in **Table 8.8: CMOs Standing in Voice Service**.

S. #	Operator	Voice QoS KPIs				Standing
		Compliant		Non-Compliant		
1.	ZonG	55		23		1 st
2.	Jazz	60		29		2 nd
3.	Ufone	59		32		3 rd
4.	Telenor	50		37		4 th

Table 8.8: CMOs Standing in Voice Service

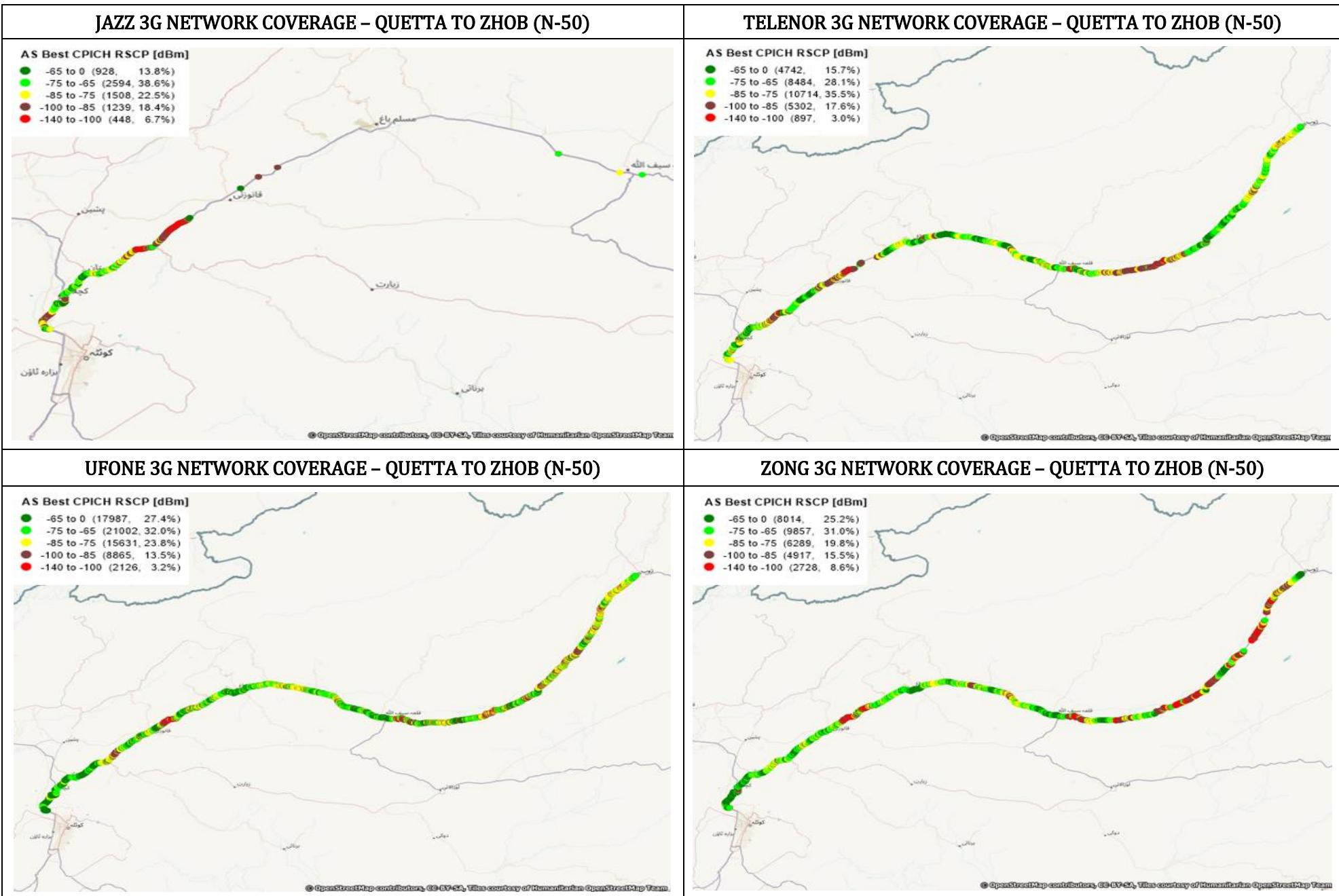
- d. **OVERALL STANDING.** The overall standing of each CMOs in different category of services is mentioned in **Table 8.9: CMOs Overall Standing in QoS Survey**.

S. #.	Service		STANDING				
			1 st	2 nd	3 rd	4 th	
1.	Mobile Network Coverage		Auto Mode	Ufone	Telenor	ZonG	
			Locked Mode	ZonG	Jazz Telenor	Ufone -	
2.	Mobile Broadband	Fixed Duration	Download	Auto Mode	Jazz	ZonG	
				4G	ZonG	Jazz	
			3G	Jazz	Telenor	Ufone	
		Upload	Auto Mode	Jazz	ZonG	Ufone	
			4G	Jazz	Ufone	ZonG	
			3G	Ufone	Telenor	ZonG	
		Fixed Size	Download	Auto Mode	ZonG	Jazz	
			Upload	Auto Mode	ZonG	Ufone	
3.	Webpage Loading Time			ZonG	Jazz	Ufone	
	Latency			ZonG	Jazz	Ufone	
	Voice			ZonG	Jazz	Telenor	

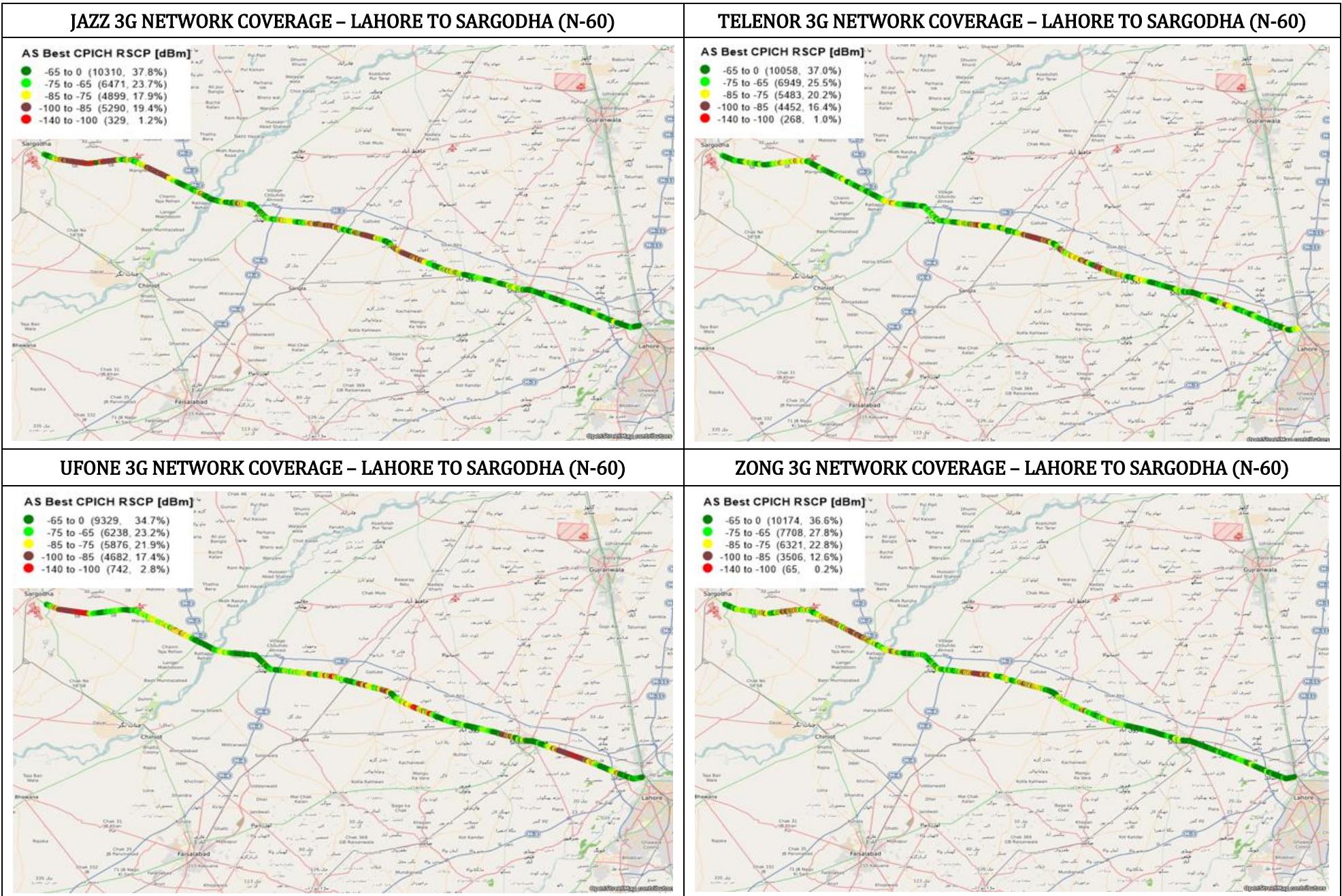
Table 8.9: CMOs Overall Standing in QoS Survey

MOBILE BROADBAND 3G COVERAGE MAPS

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

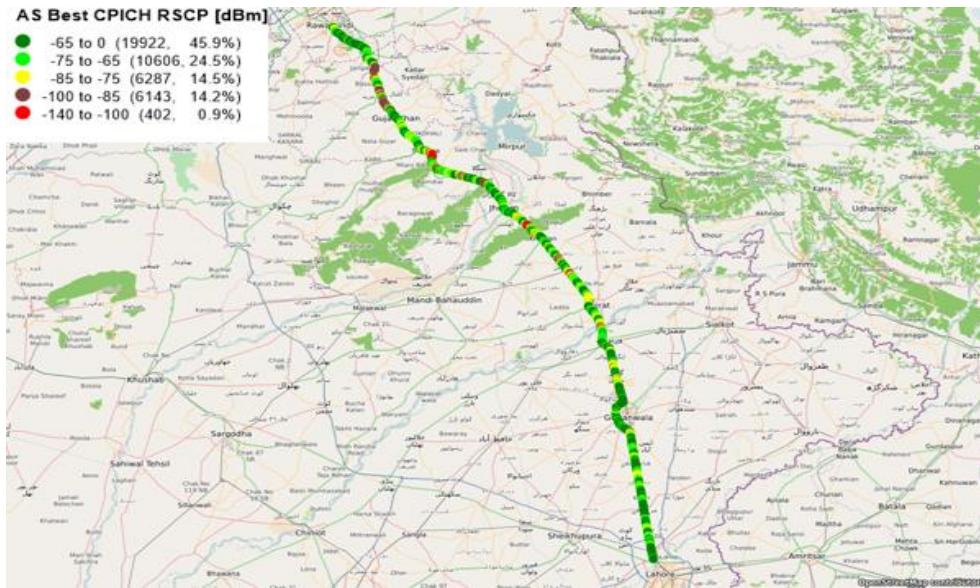


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

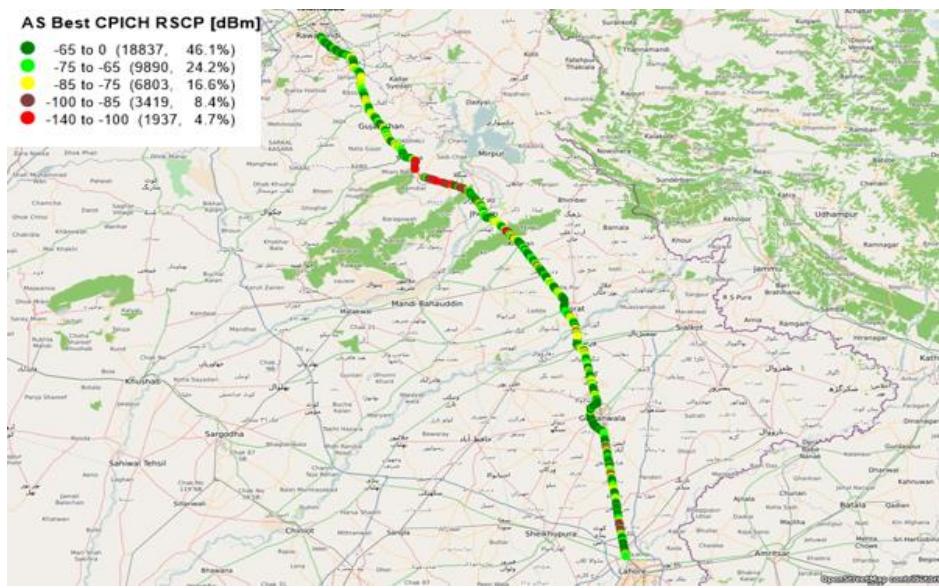


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

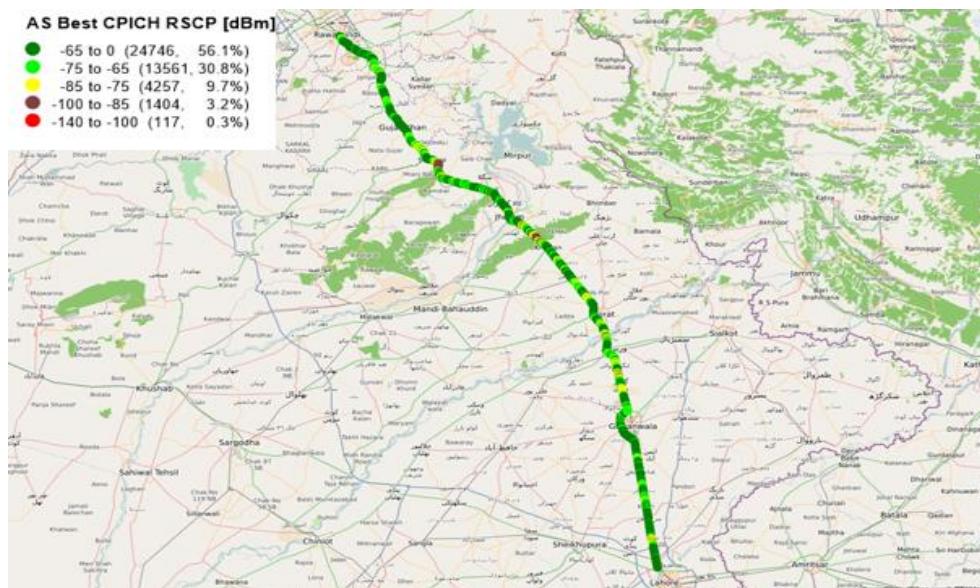
JAZZ 3G NETWORK COVERAGE – LAHORE TO RAWALPINDI (N-5)



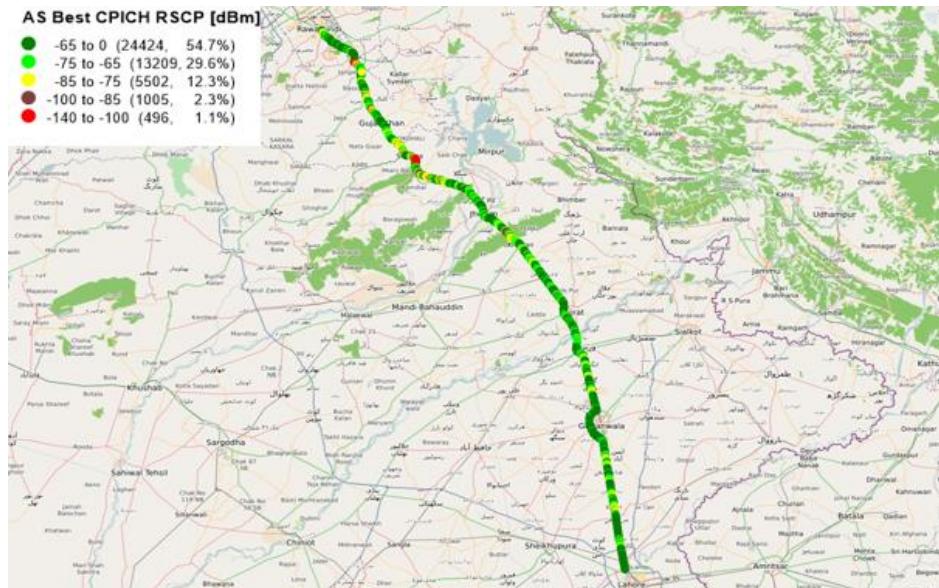
TELENOR 3G NETWORK COVERAGE – LAHORE TO RAWALPINDI (N-5)



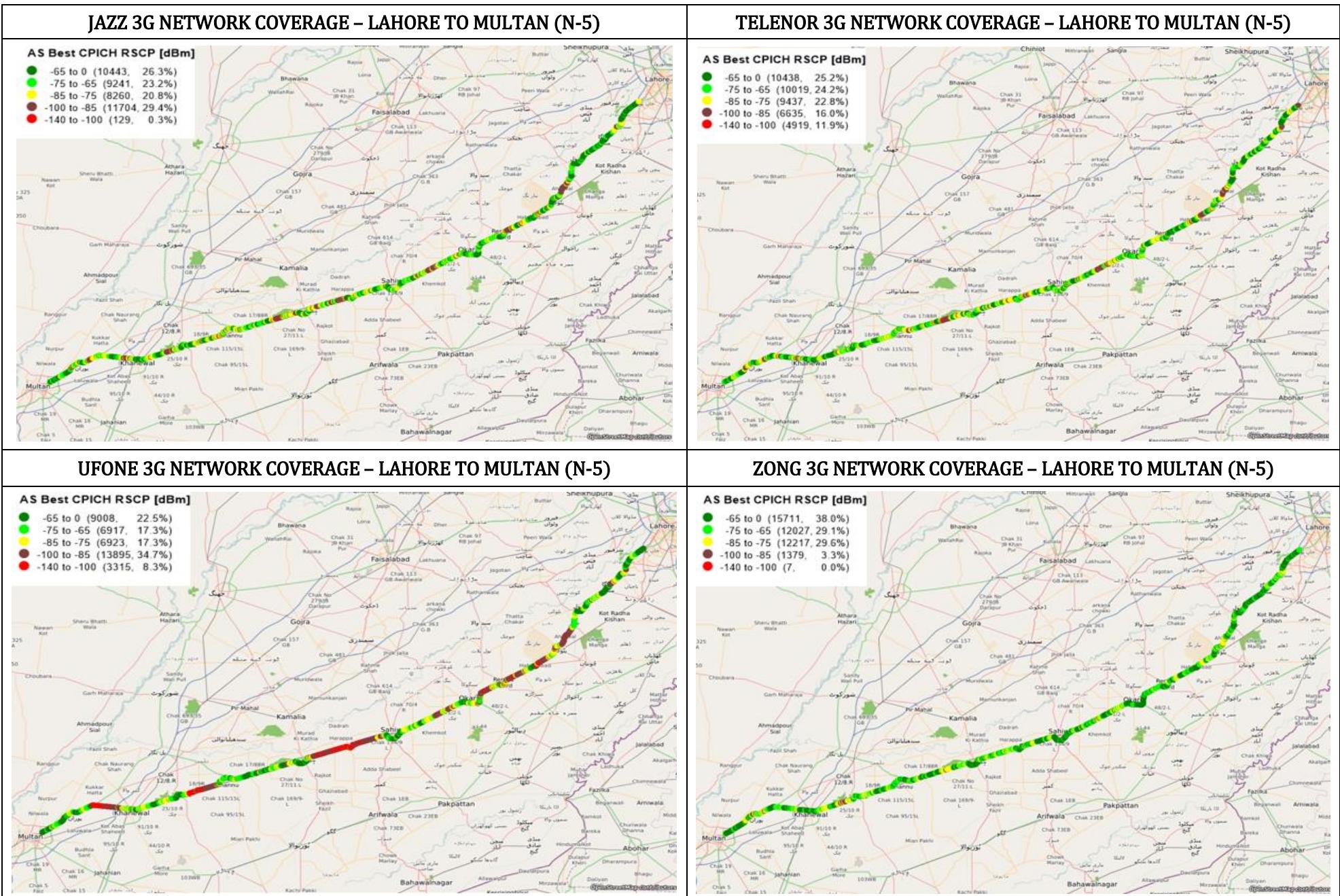
UFONE 3G NETWORK COVERAGE – LAHORE TO RAWALPINDI (N-5)



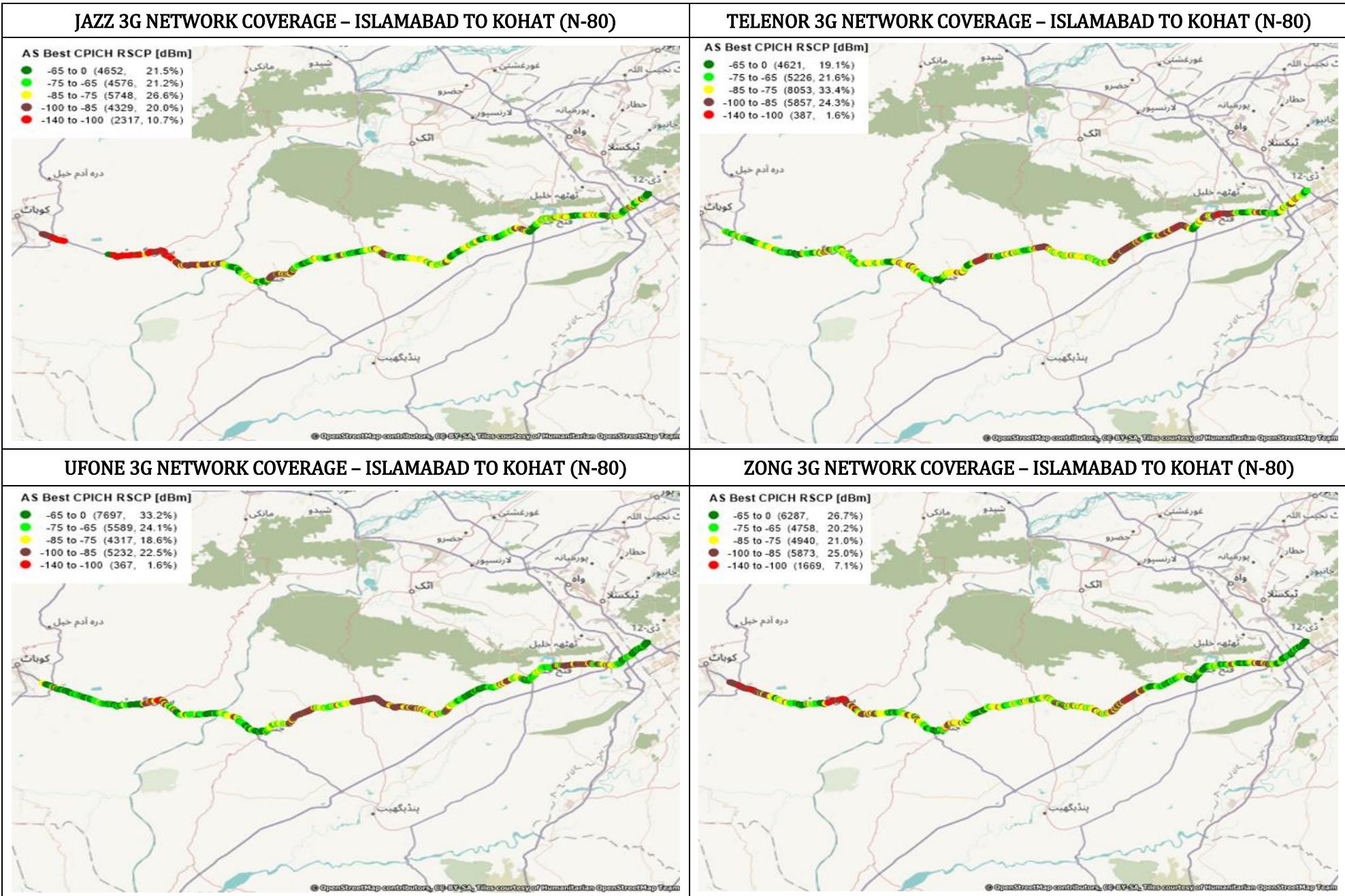
ZONG 3G NETWORK COVERAGE – LAHORE TO RAWALPINDI (N-5)



3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

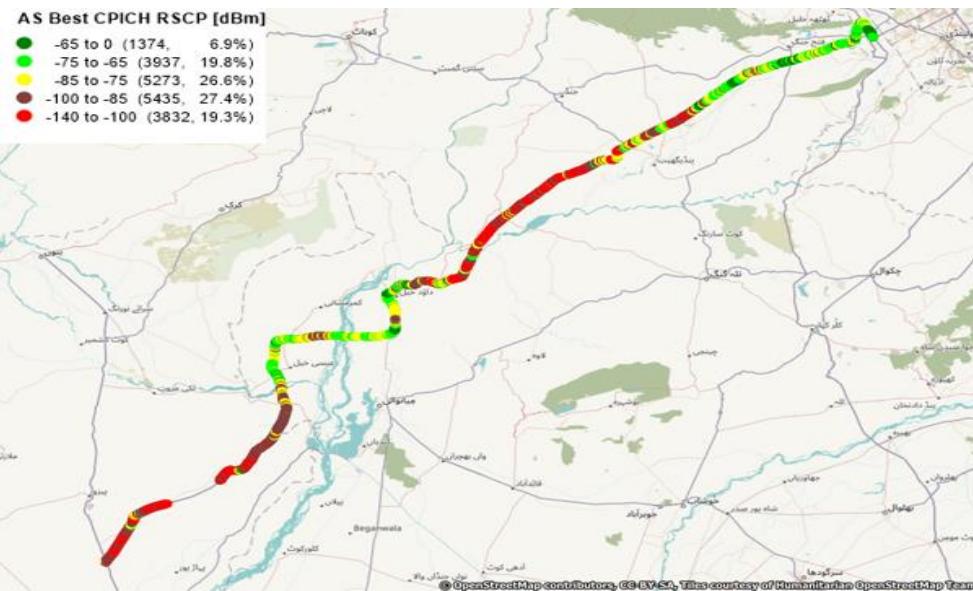


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

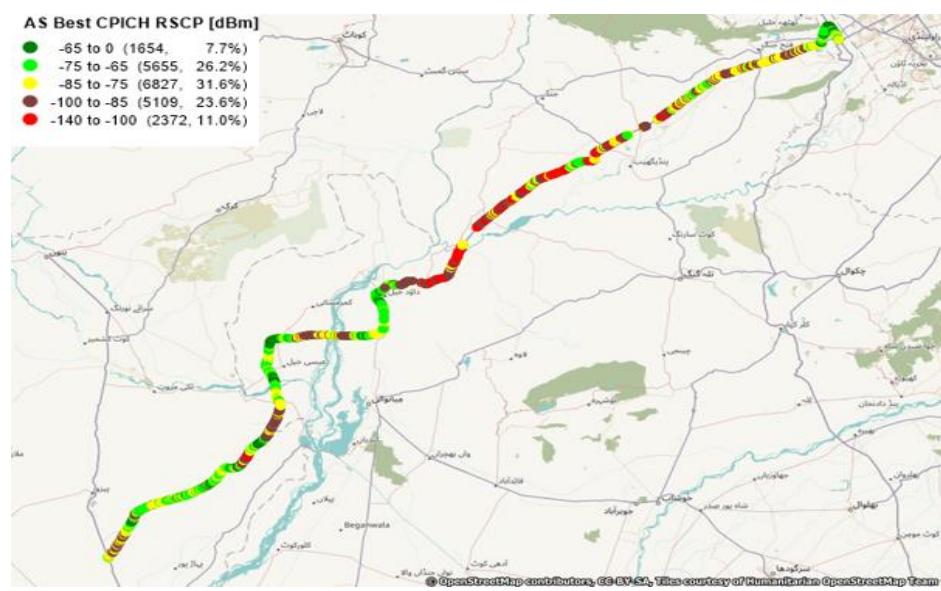


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

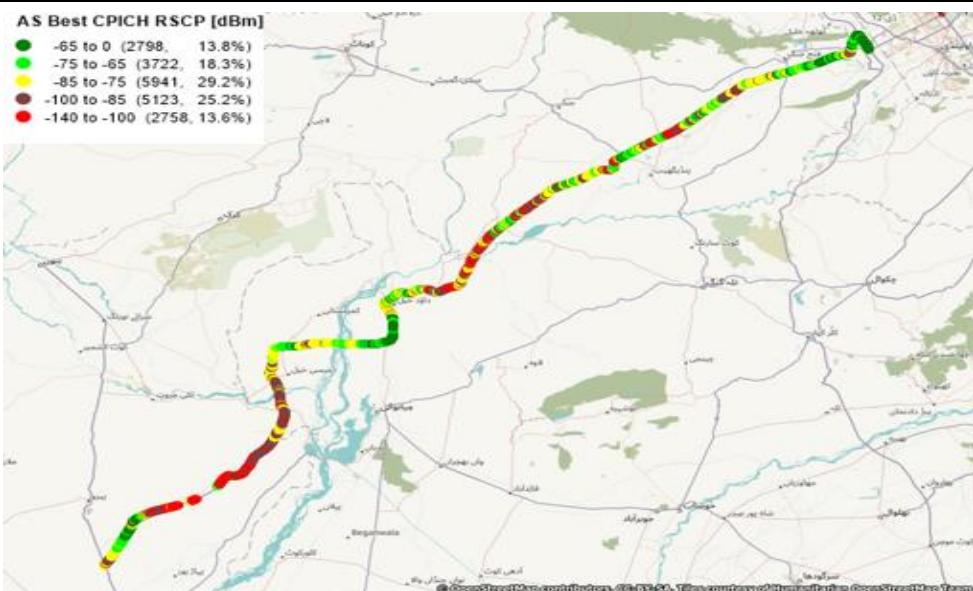
JAZZ 3G NETWORK COVERAGE – ISLAMABAD TO D.I KHAN (M-14)



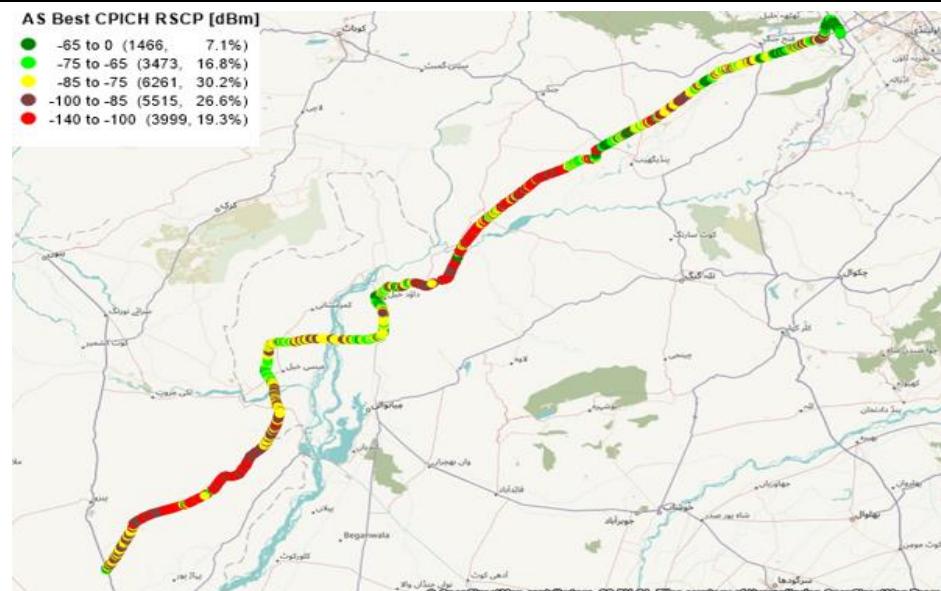
TELENOR 3G NETWORK COVERAGE – ISLAMABAD TO D.I KHAN (M-14)



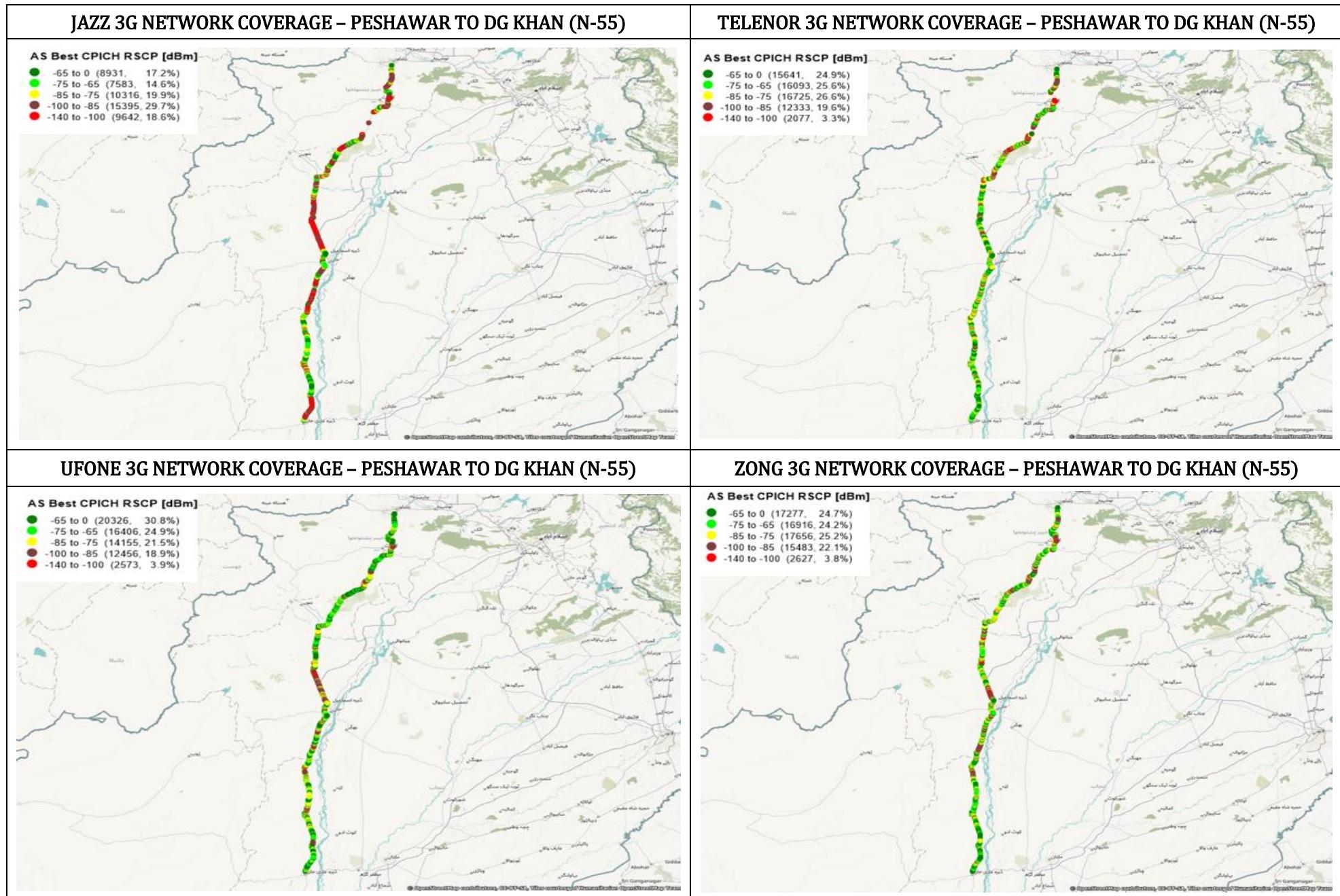
UFONE 3G NETWORK COVERAGE – ISLAMABAD TO D.I KHAN (M-14)



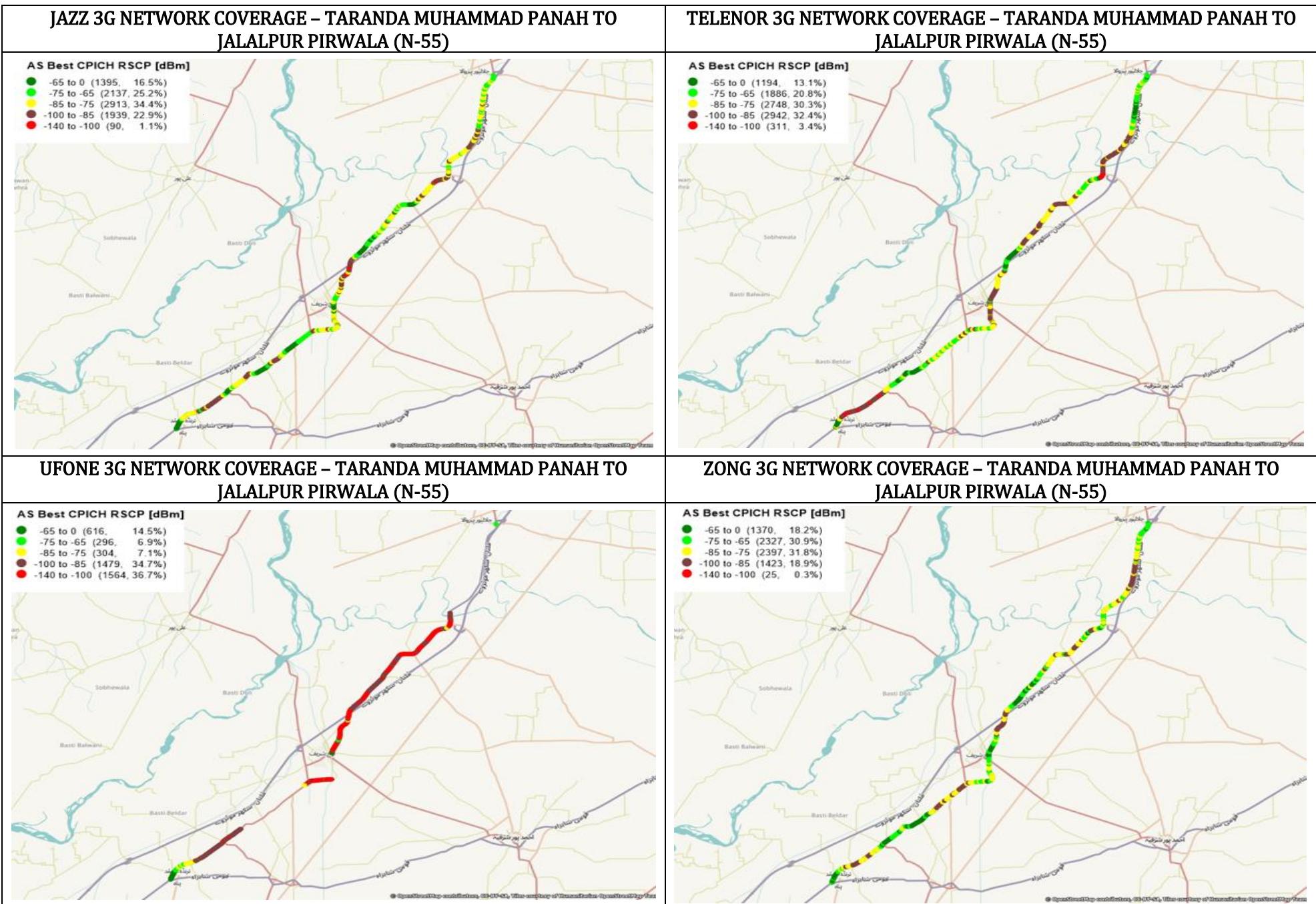
ZONG 3G NETWORK COVERAGE – ISLAMABAD TO D.I KHAN (M-14)



3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

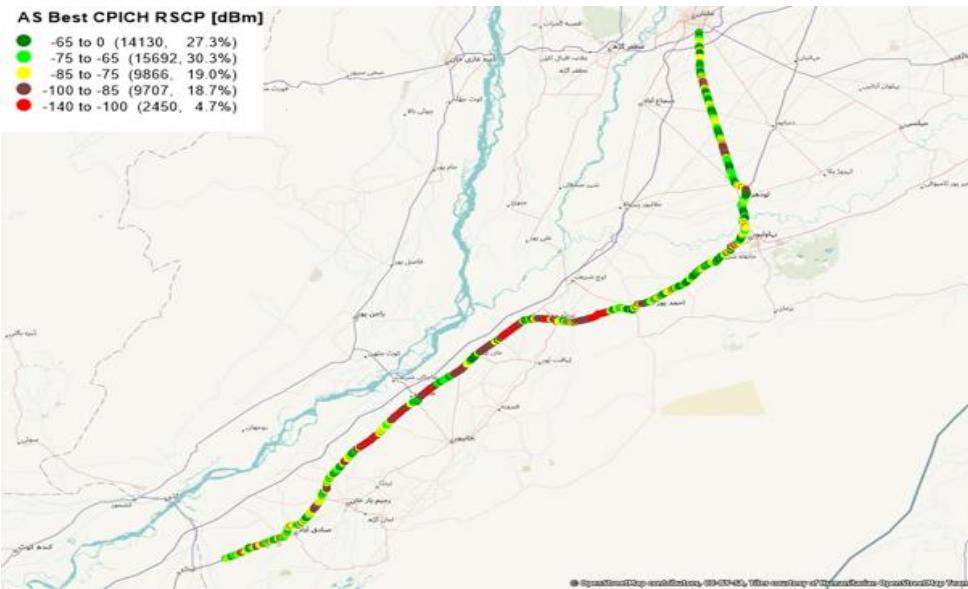


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

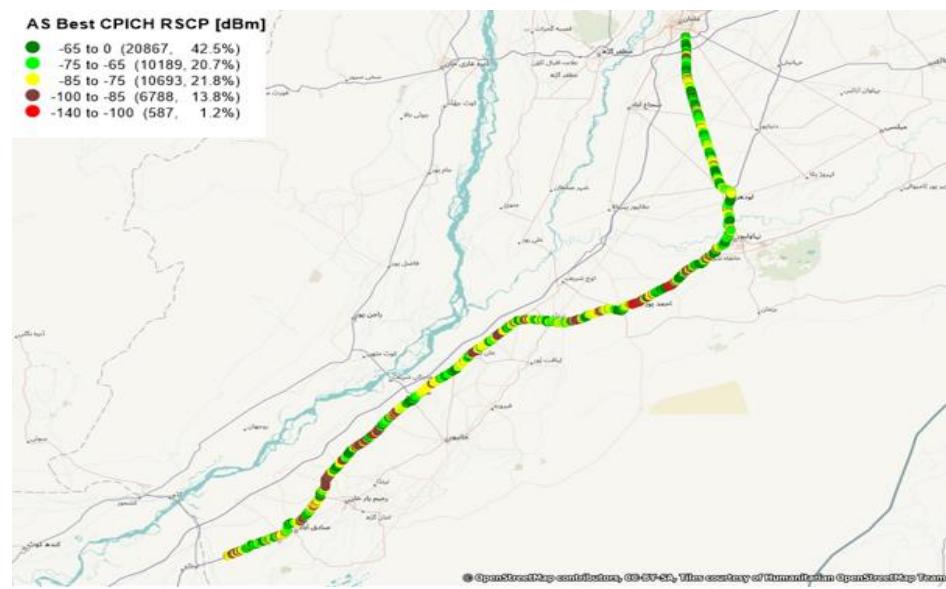


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

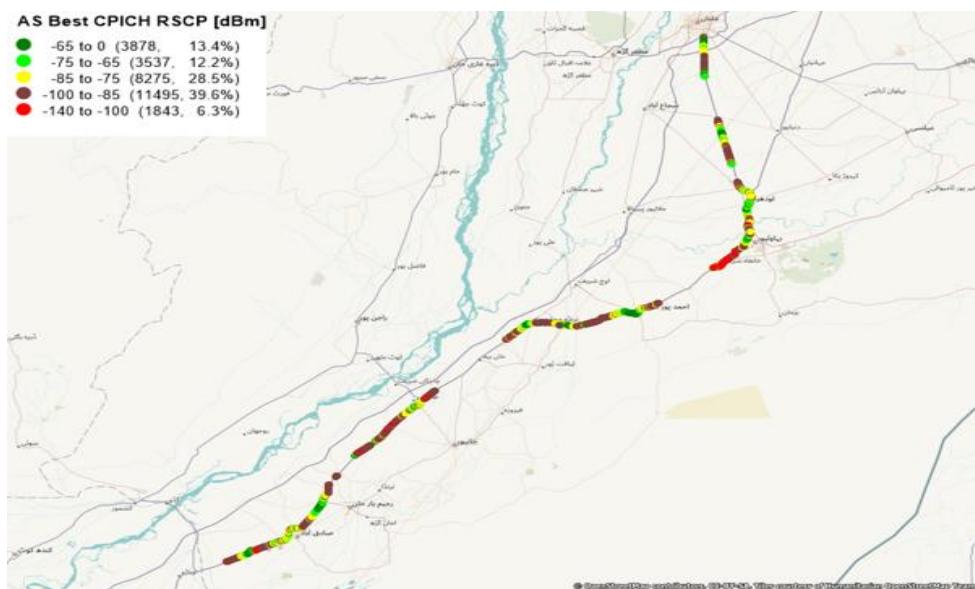
JAZZ 3G NETWORK COVERAGE – KOT SABZAL TO MULTAN (N-5)



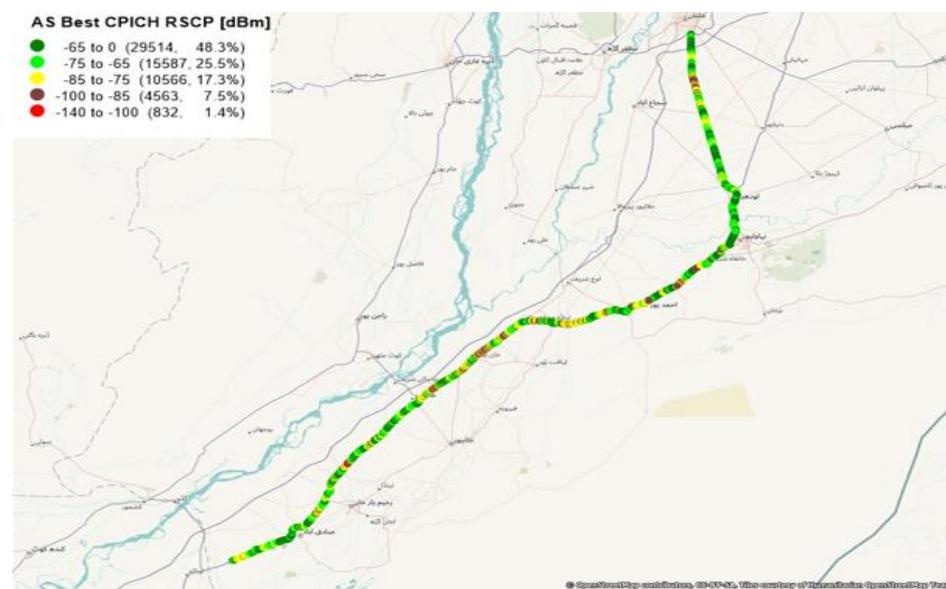
TELENOR 3G NETWORK COVERAGE – KOT SABZAL TO MULTAN (N-5)



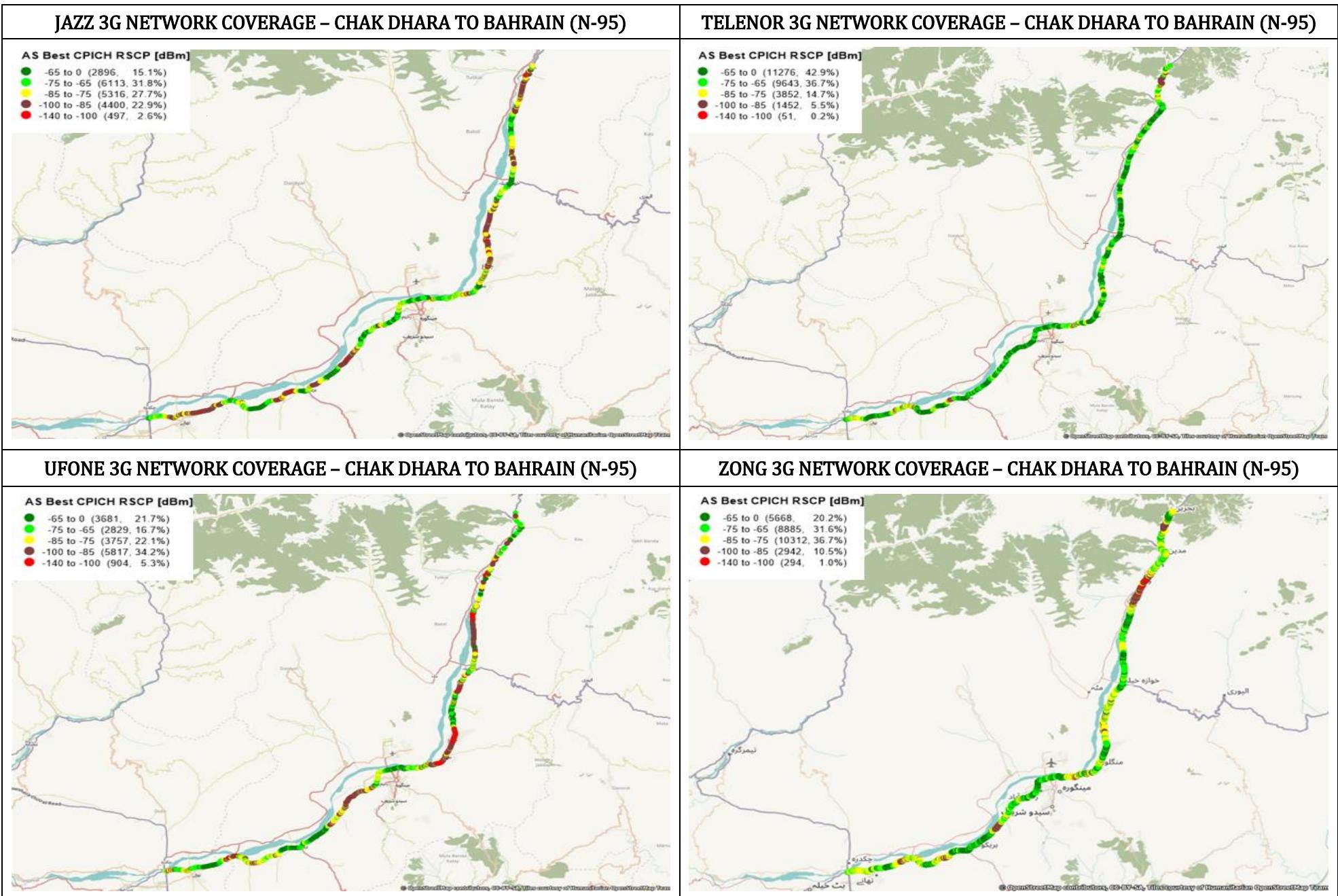
UFONE 3G NETWORK COVERAGE – KOT SABZAL TO MULTAN (N-5)



ZONG 3G NETWORK COVERAGE – KOT SABZAL TO MULTAN (N-5)

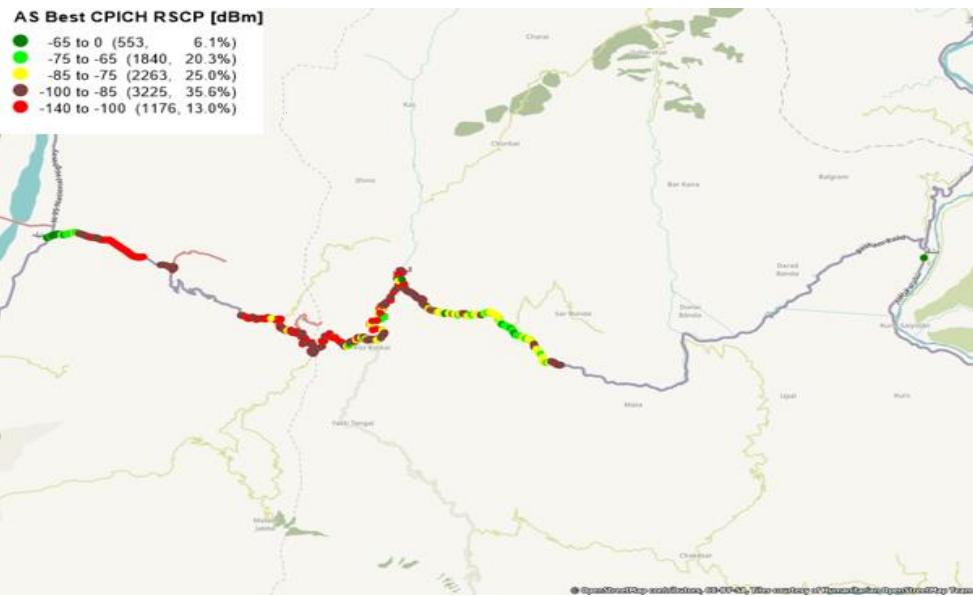


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

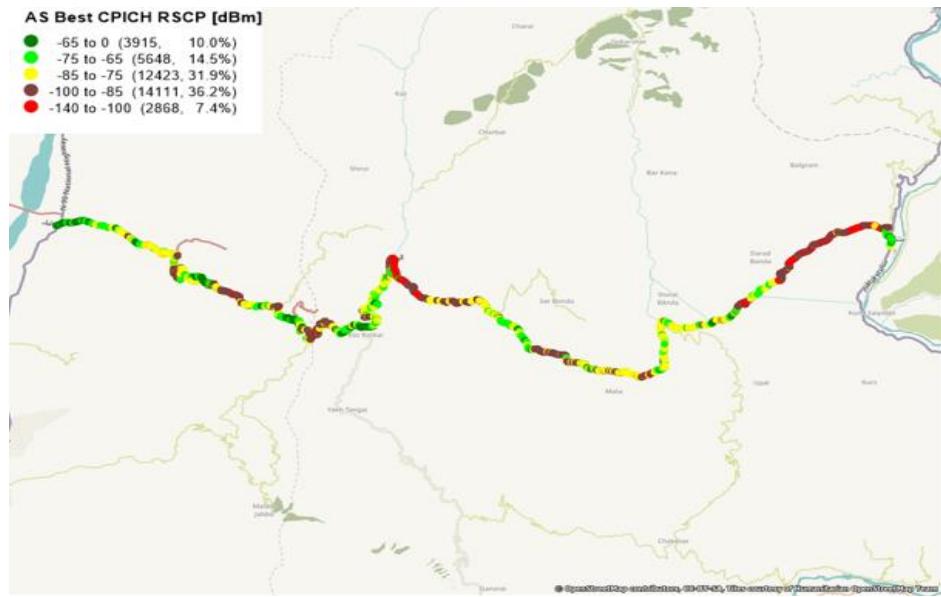


3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

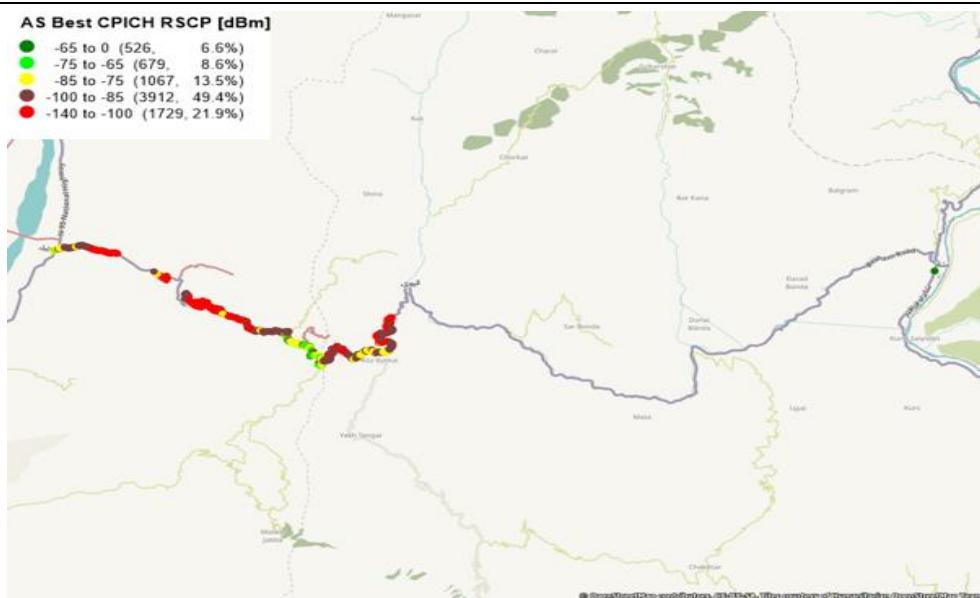
JAZZ 3G NETWORK COVERAGE – KHAWAZKHEL TO BEHSAM (N-90)



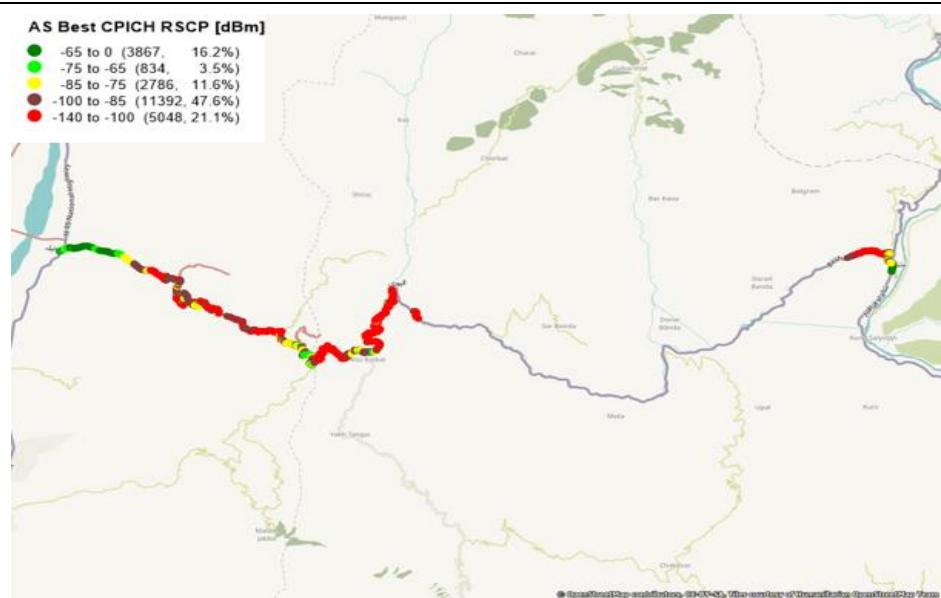
TELENOR 3G NETWORK COVERAGE – KHAWAZ KHEL TO BEHSAM(N-90)



UFONE 3G NETWORK COVERAGE – KHAWAZ KHEL TO BEHSAM (N-90)



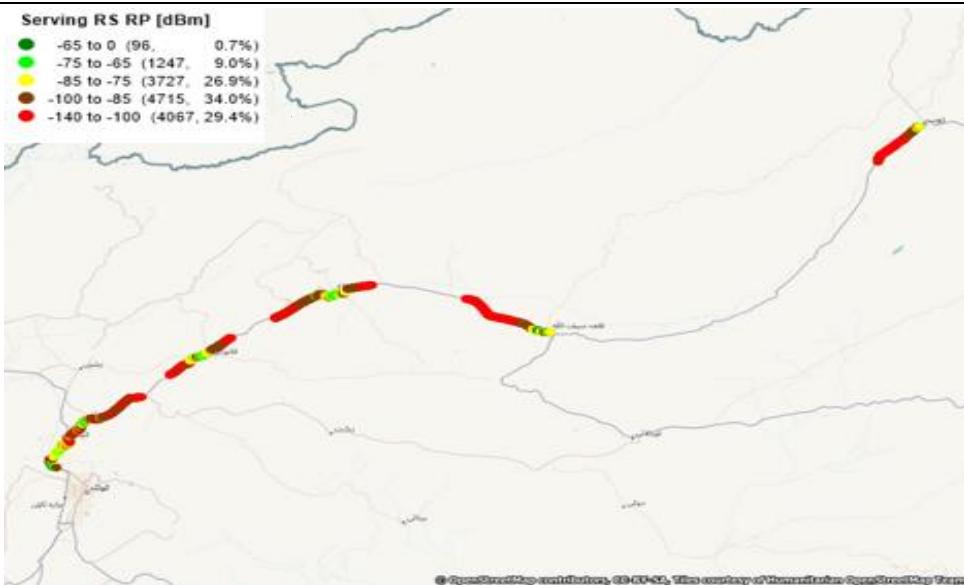
ZONG 3G NETWORK COVERAGE – KHAWAZ KHEL TO BEHSAM (N-90)



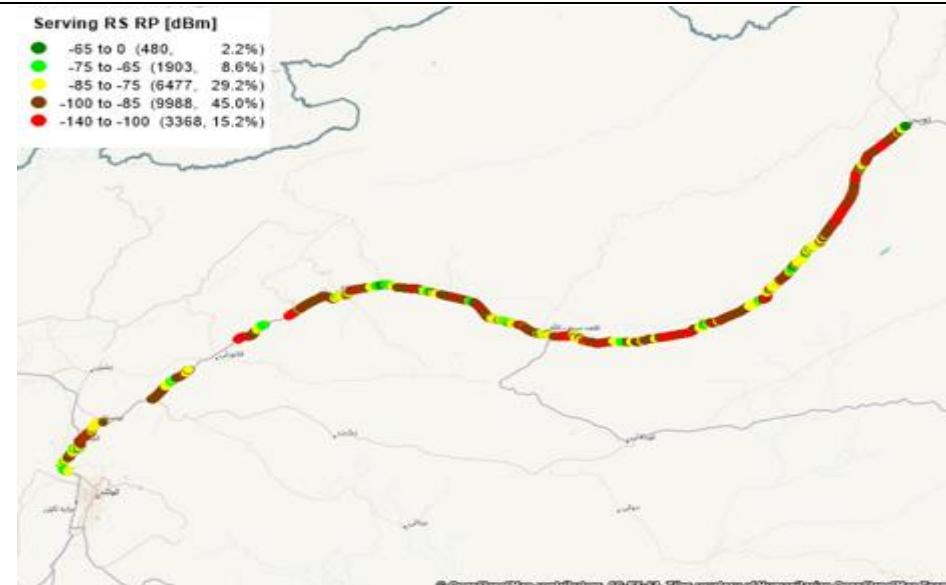
MOBILE BROADBAND 4G COVERAGE MAPS

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

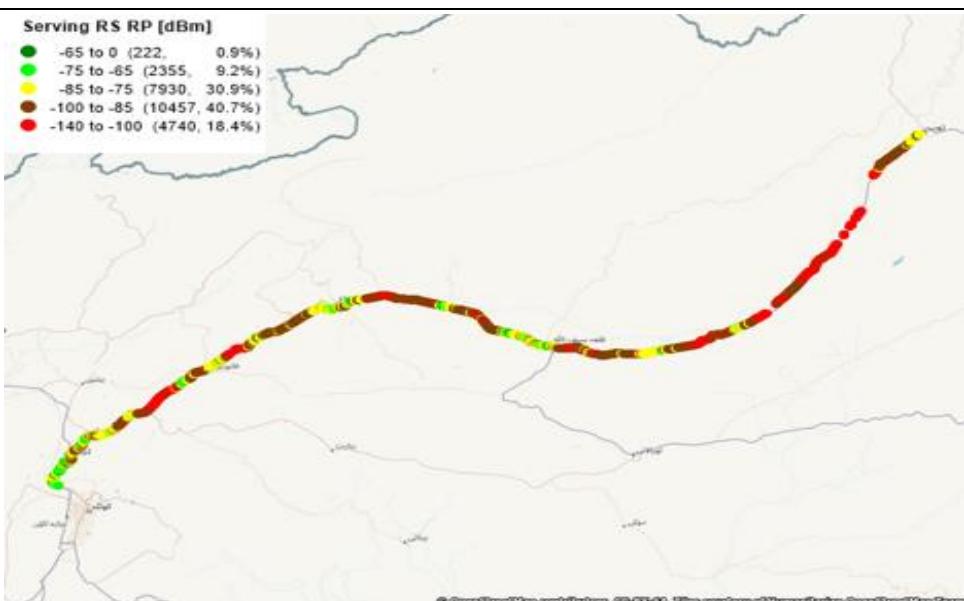
JAZZ 4G NETWORK COVERAGE – ZHOB TO QUETTA (N-50)



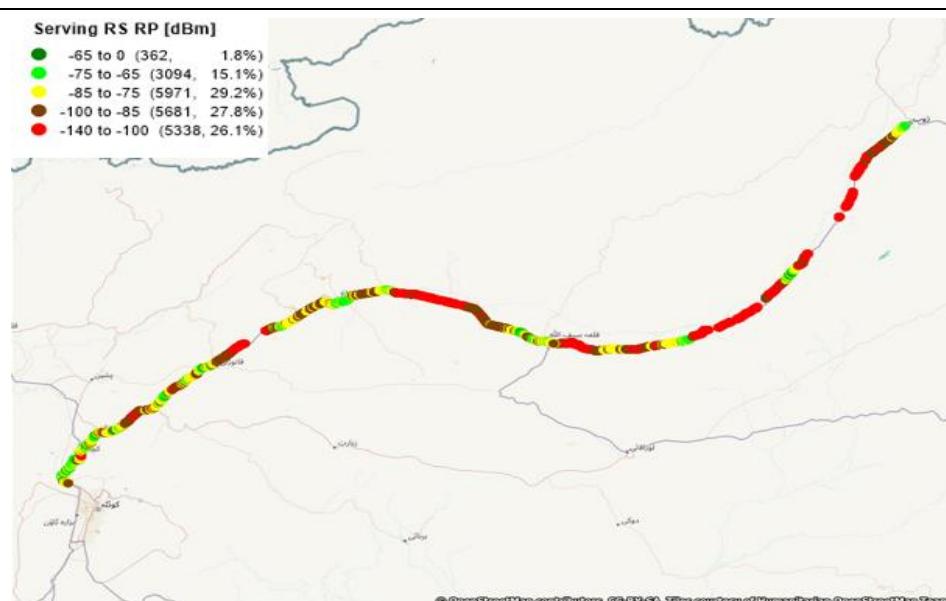
TELENOR 4G NETWORK COVERAGE – ZHOB TO QUETTA (N-50)



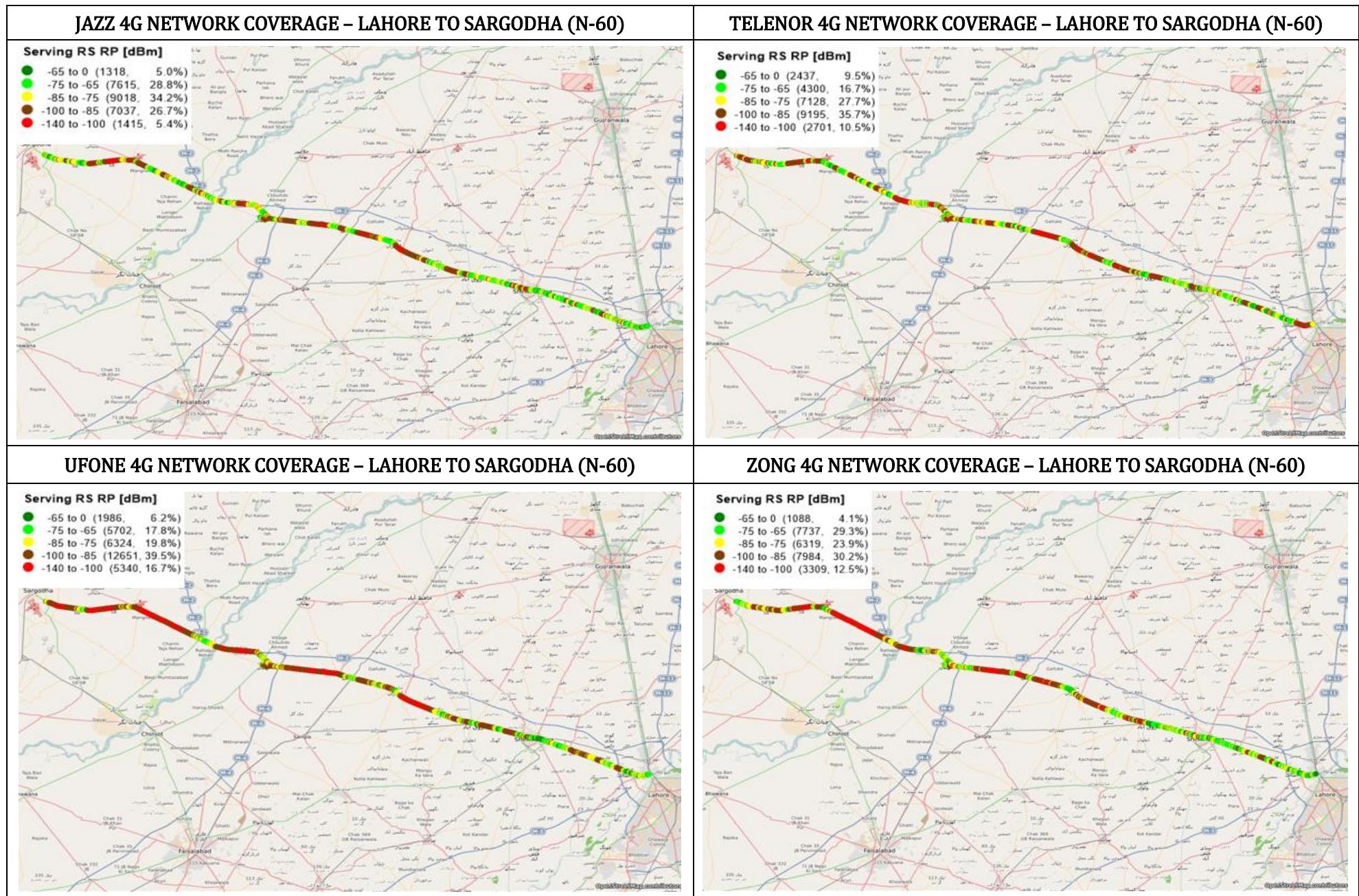
Ufone 4G NETWORK COVERAGE – ZHOB TO QUETTA (N-50)



ZONG 4G NETWORK COVERAGE – ZHOB TO QUETTA (N-50)

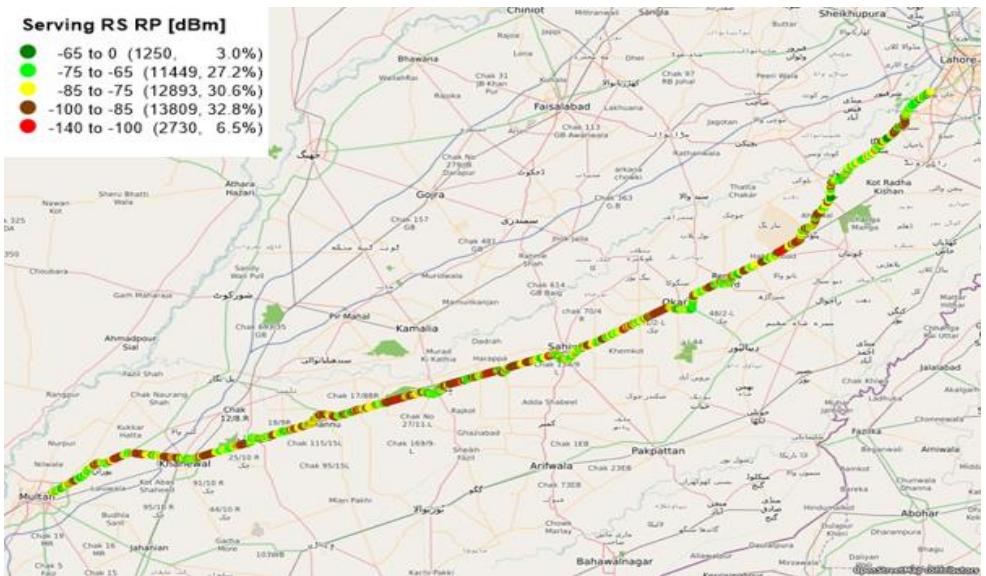


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

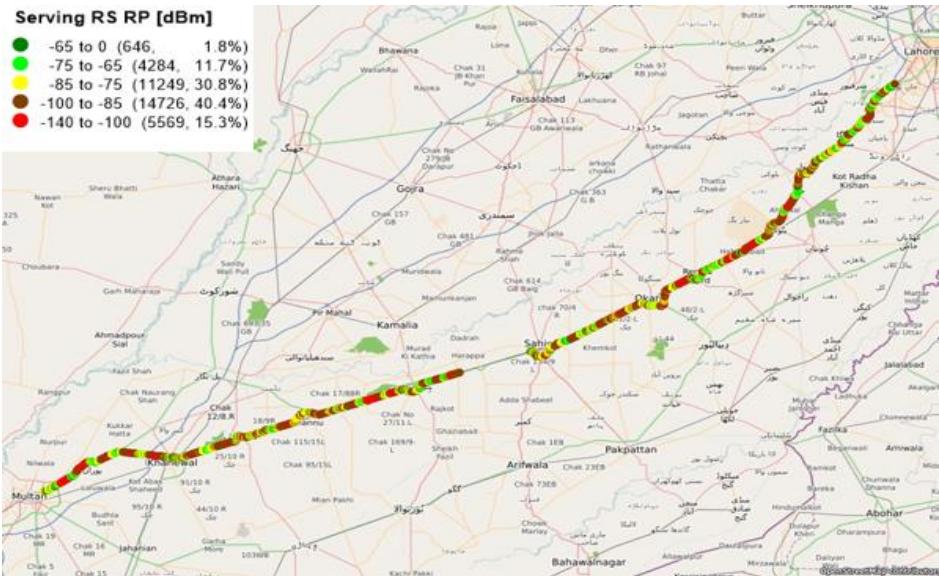


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

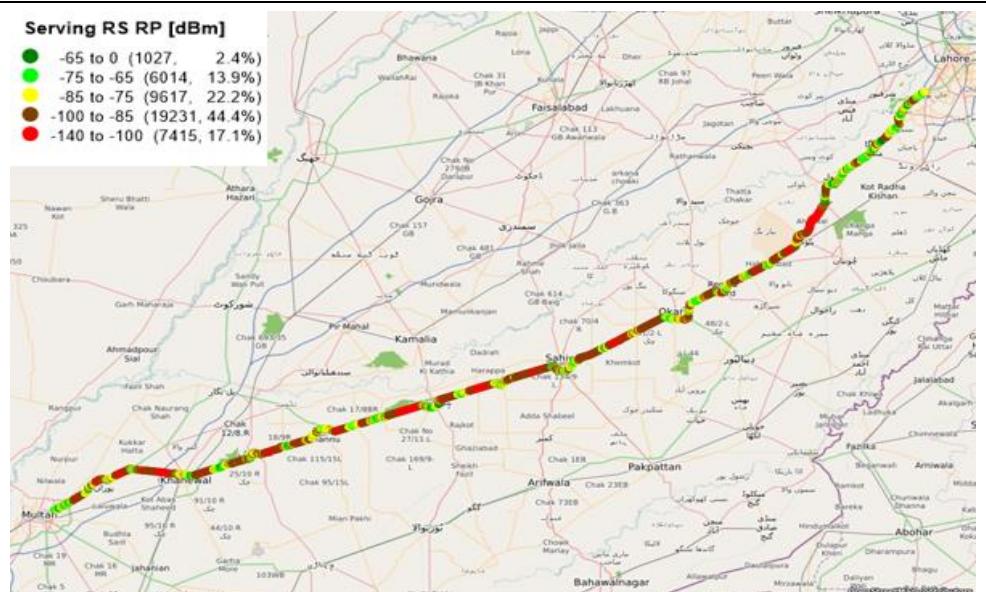
JAZZ 4G NETWORK COVERAGE – LAHORE TO MULTAN (N-5)



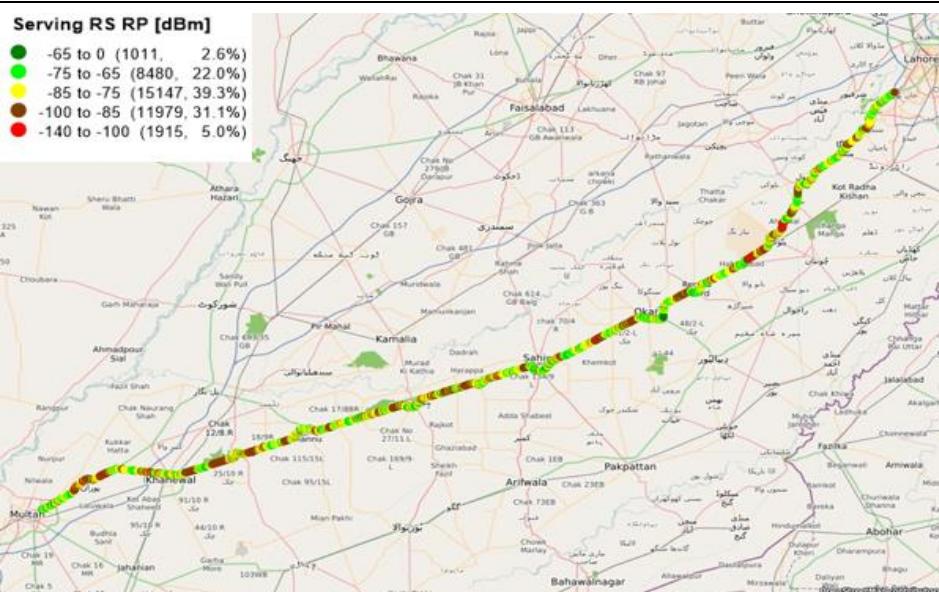
TELENOR 4G NETWORK COVERAGE – LAHORE TO MULTAN (N-5)



UFONE 4G NETWORK COVERAGE – LAHORE TO MULTAN (N-5)

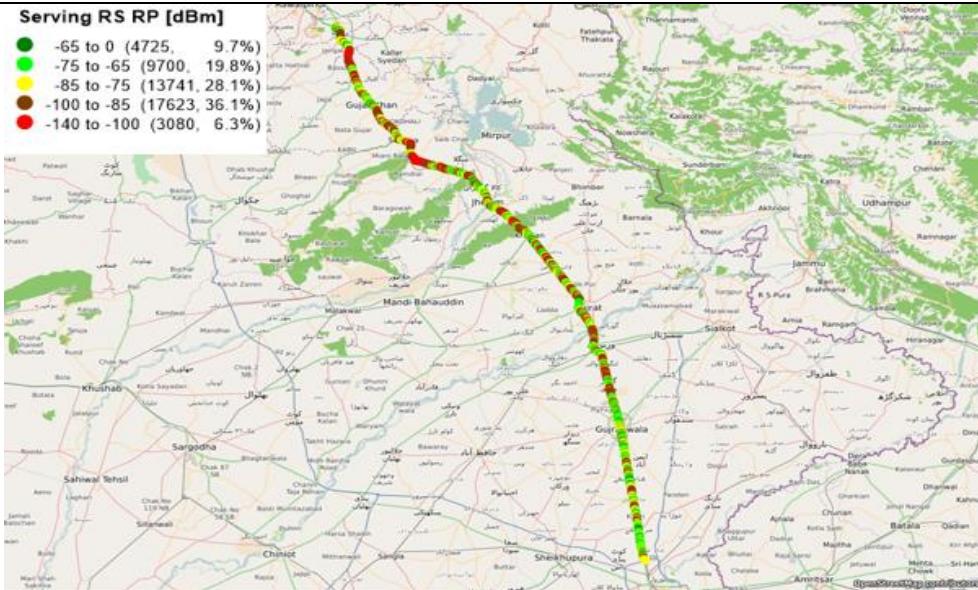


ZONG 4G NETWORK COVERAGE – LAHORE TO MULTAN (N-5)

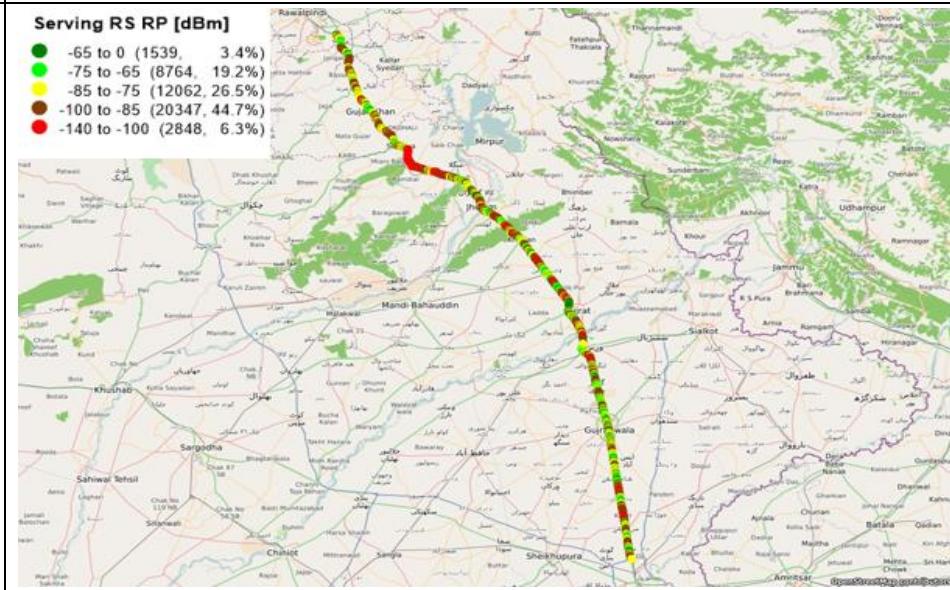


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

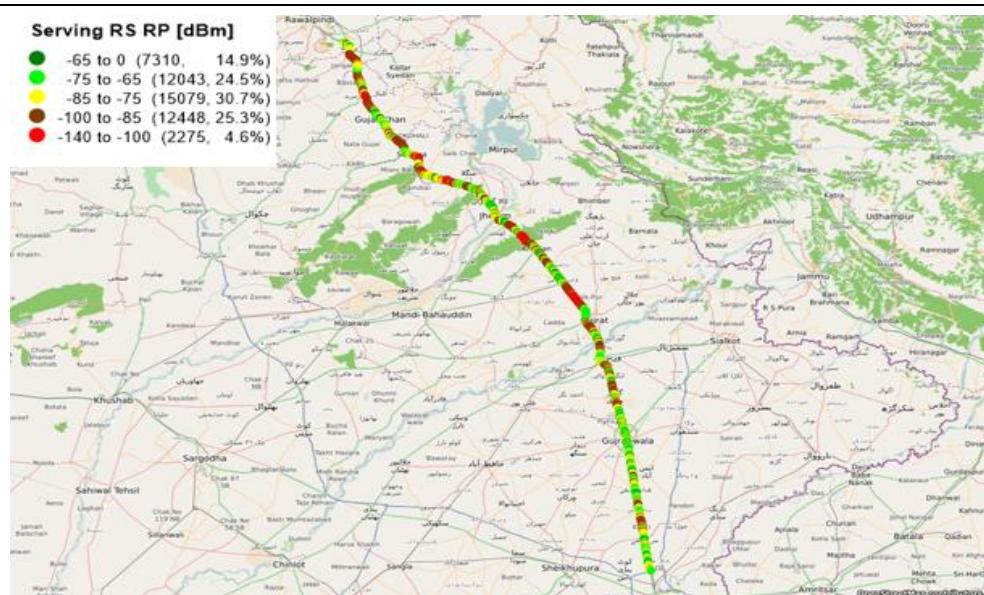
JAZZ 4G NETWORK COVERAGE – LAHORE TO RAWALPINDI (N-5)



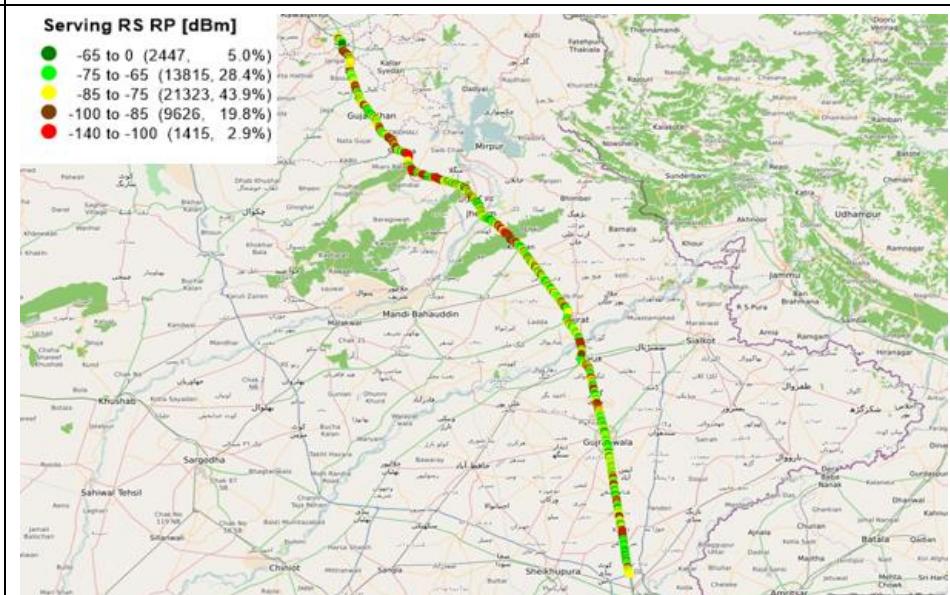
TELENOR 4G NETWORK COVERAGE – LAHORE TO RAWALPINDI (N-5)



UFONE 4G NETWORK COVERAGE – LAHORE TO RAWALPINDI (N-5)

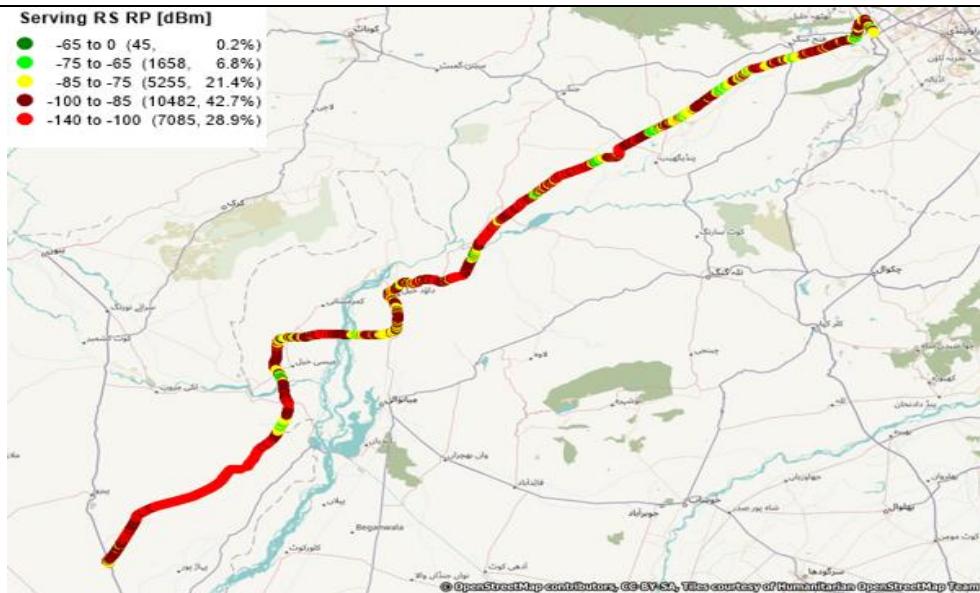


ZONG 4G NETWORK COVERAGE – LAHORE TO RAWALPINDI (N-5)

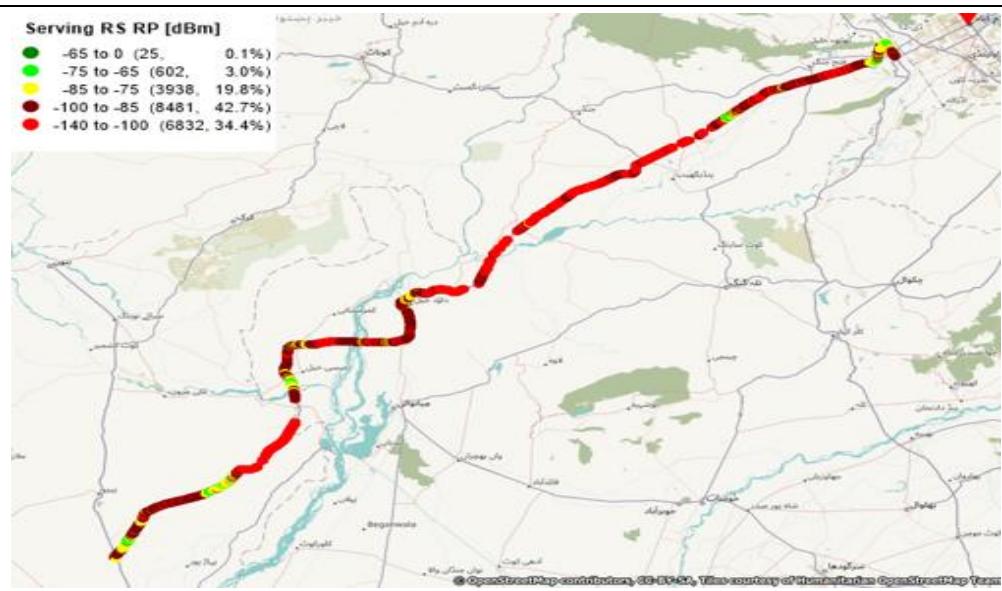


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

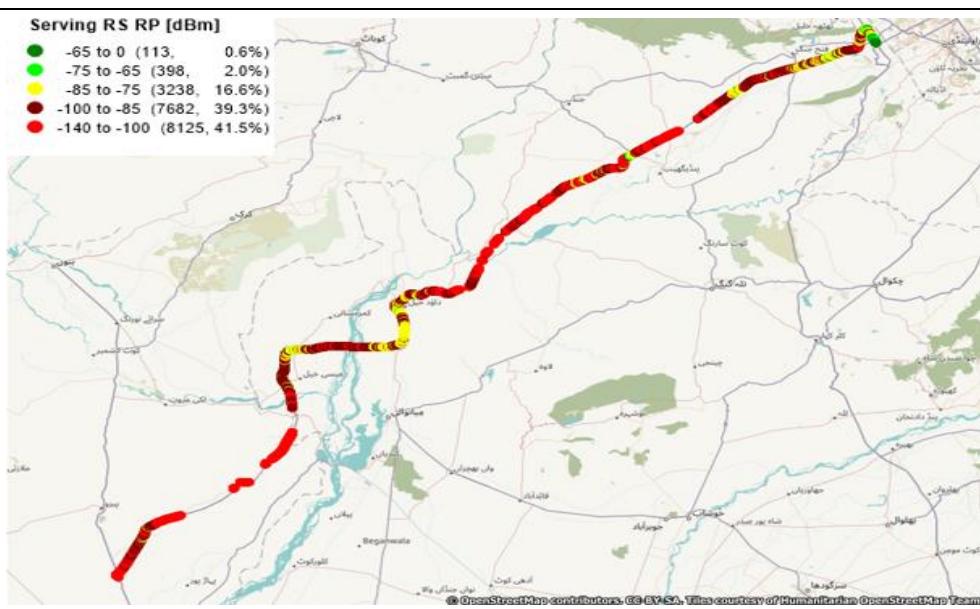
JAZZ 4G NETWORK COVERAGE – ISLAMABAD TO D.I KHAN (M-14)



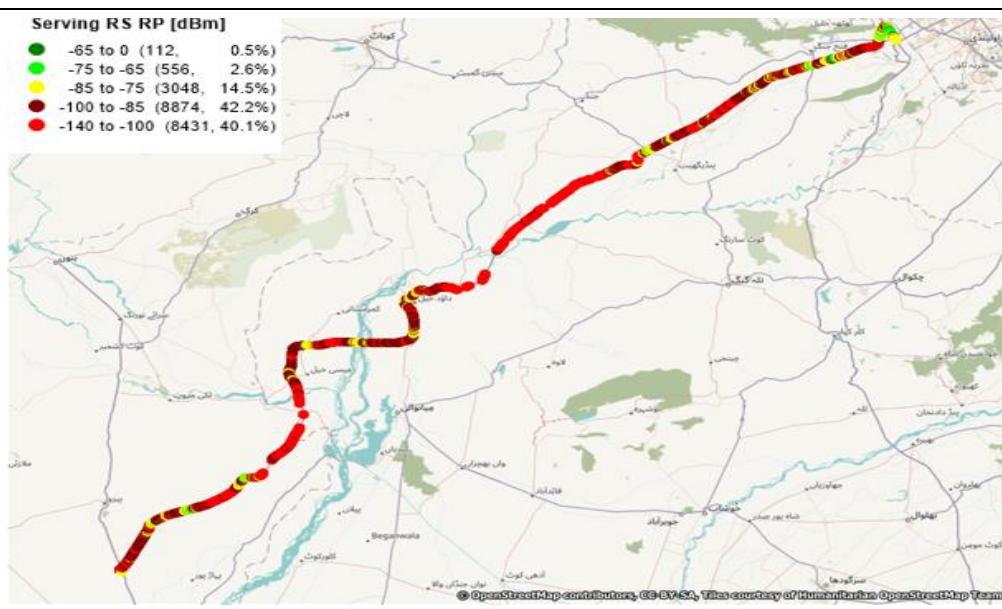
TELENOR 4G NETWORK COVERAGE – ISLAMABAD TO D.I KHAN (M-14)



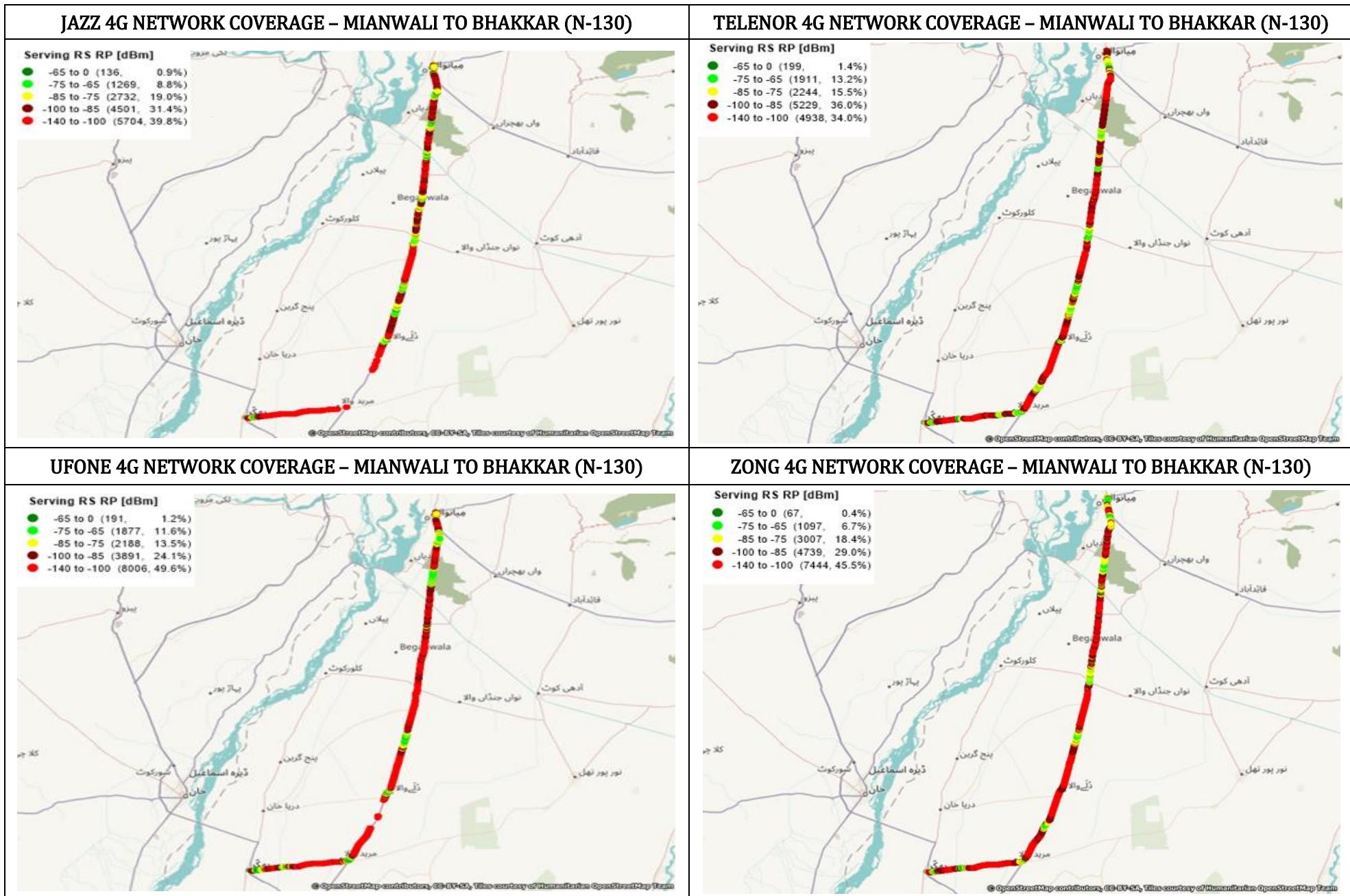
UFONE 4G NETWORK COVERAGE – ISLAMABAD TO D.I KHAN (M-14)



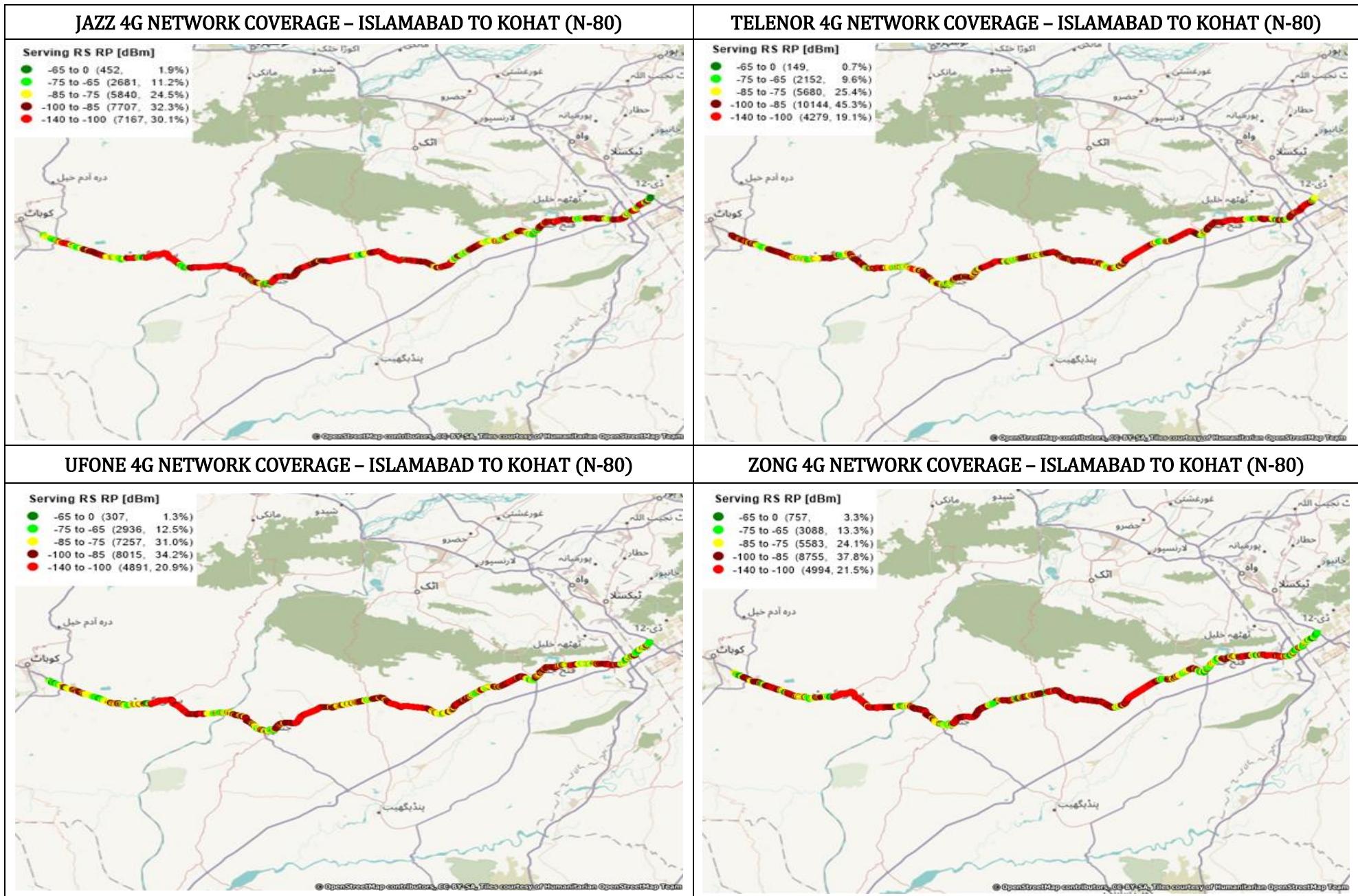
ZONG 4G NETWORK COVERAGE – ISLAMABAD TO D.I KHAN (M-14)



4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

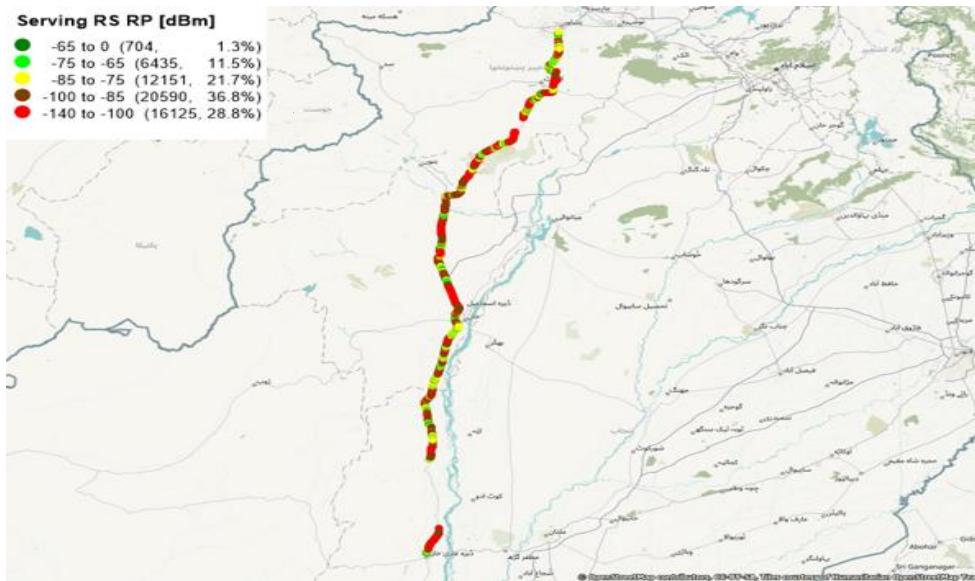


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

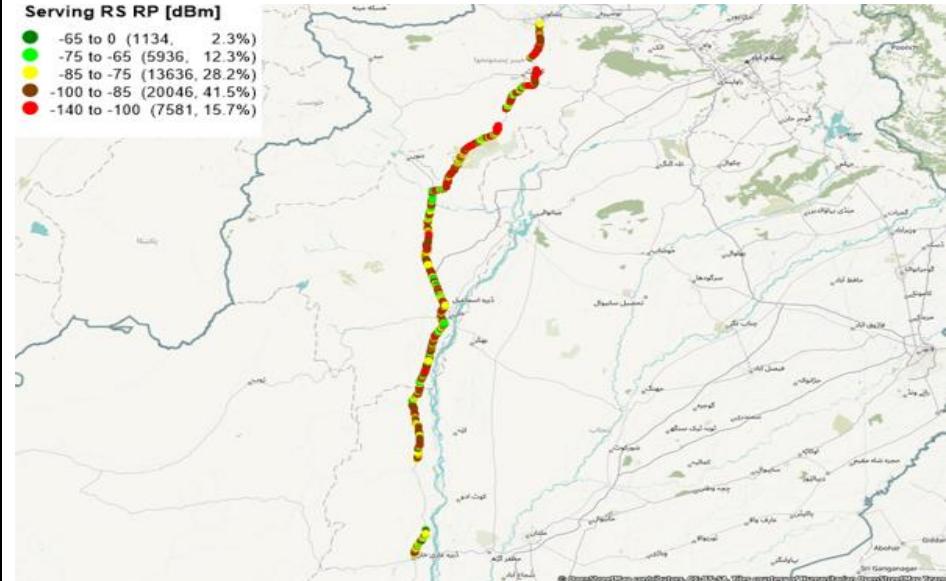


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

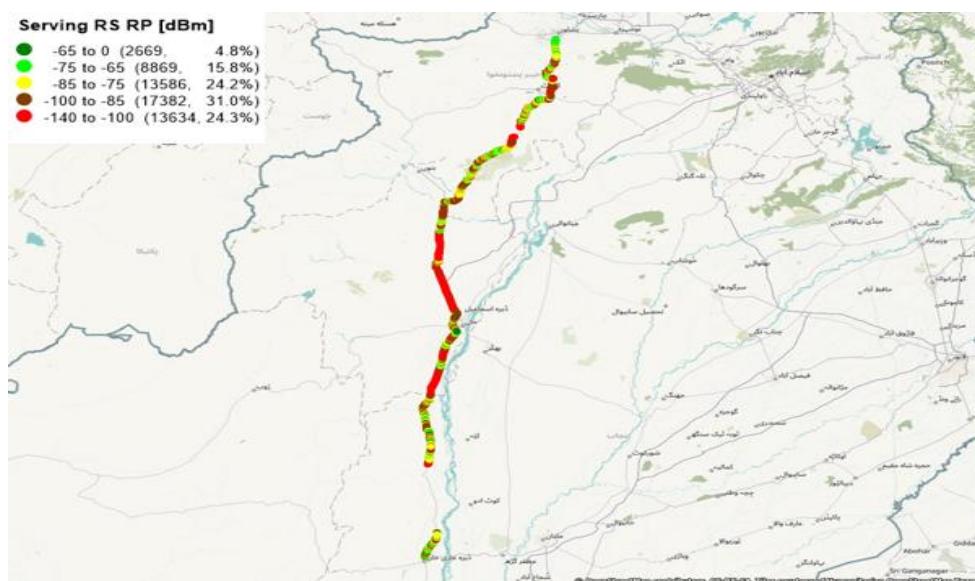
JAZZ 4G NETWORK COVERAGE – PESHAWAR TO DG KHAN (N-55)



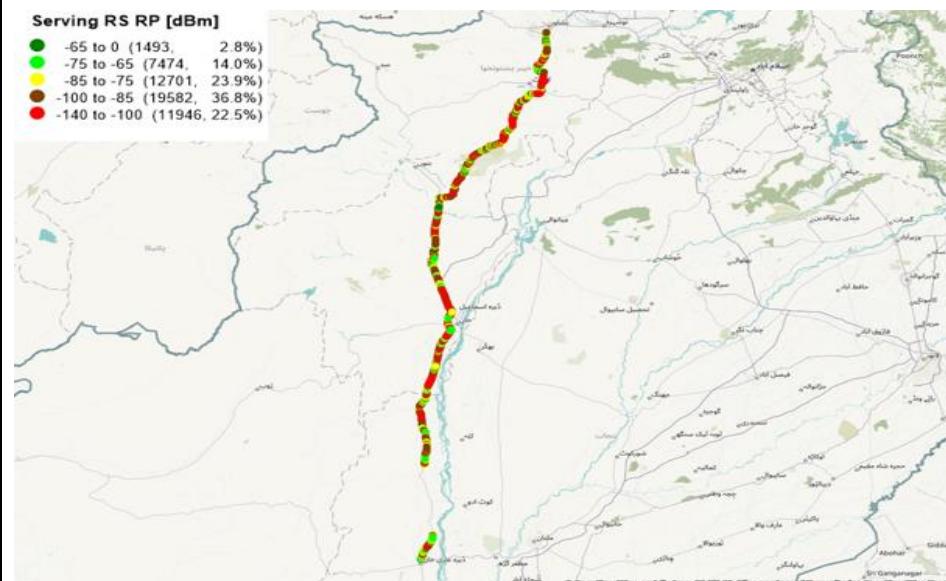
TELENOR 4G NETWORK COVERAGE – PESHAWAR TO DG KHAN (N-55)



UFONE 4G NETWORK COVERAGE – PESHAWAR TO DG KHAN (N-55)

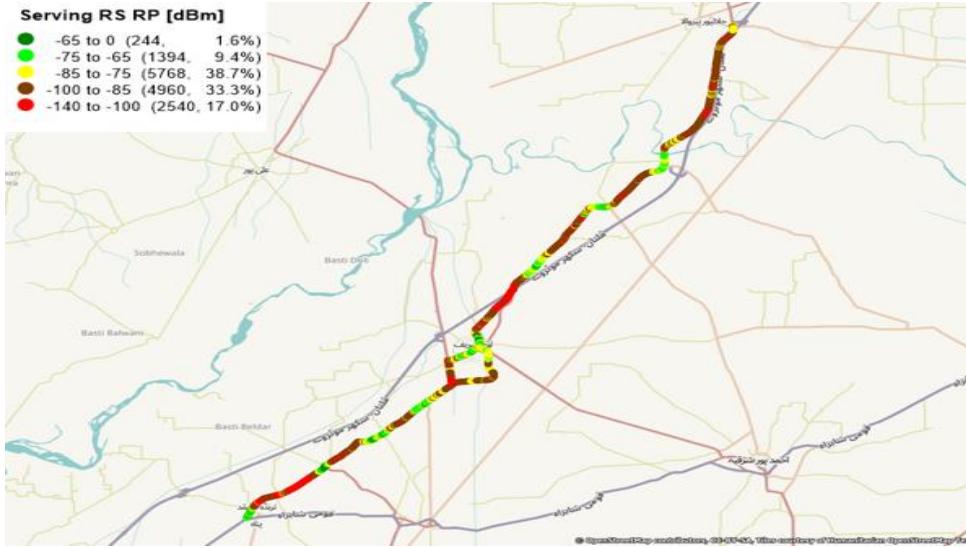


ZONG 4G NETWORK COVERAGE – PESHAWAR TO DG KHAN (N-55)

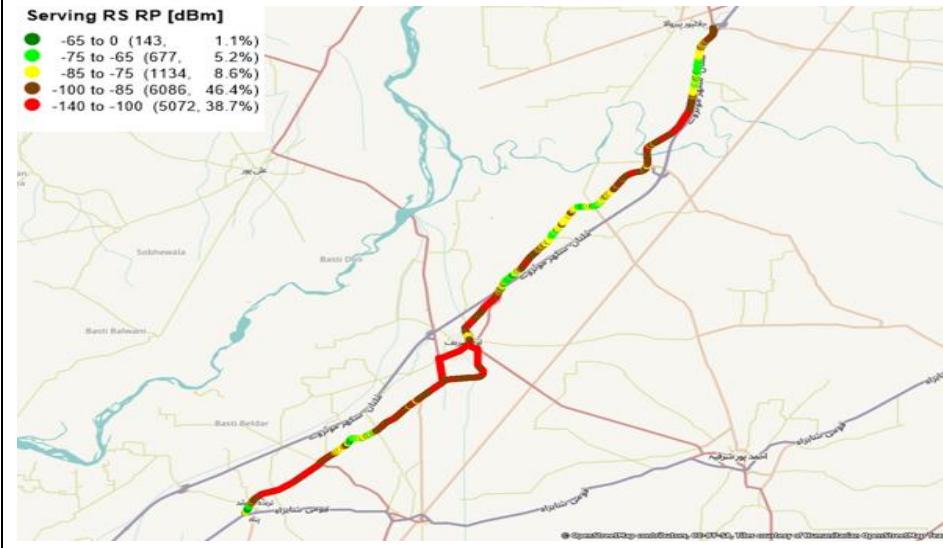


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

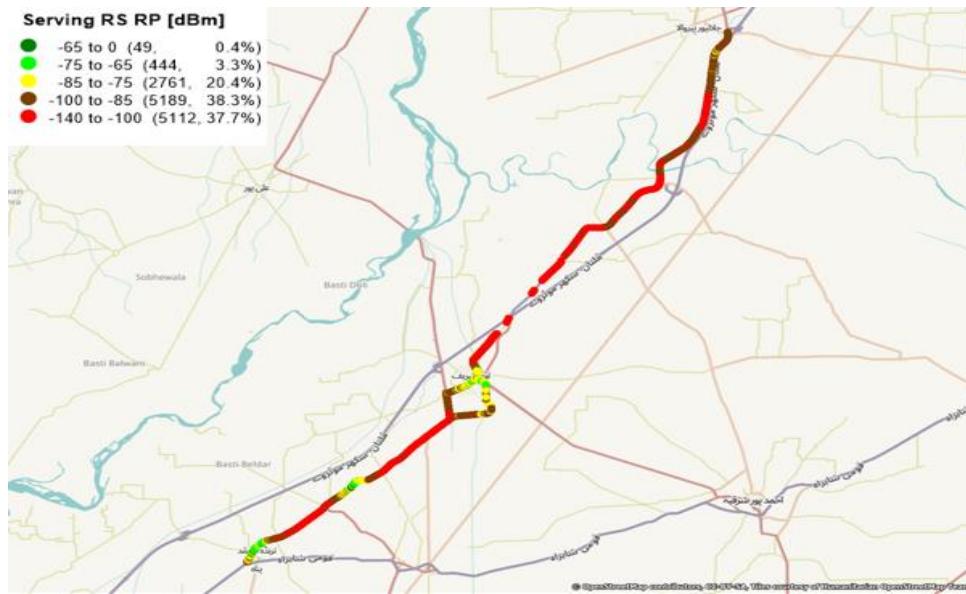
JAZZ 4G NETWORK COVERAGE – TARANDA MUHAMMAD PANAH TO JALALPUR PIRWALA (N-115)



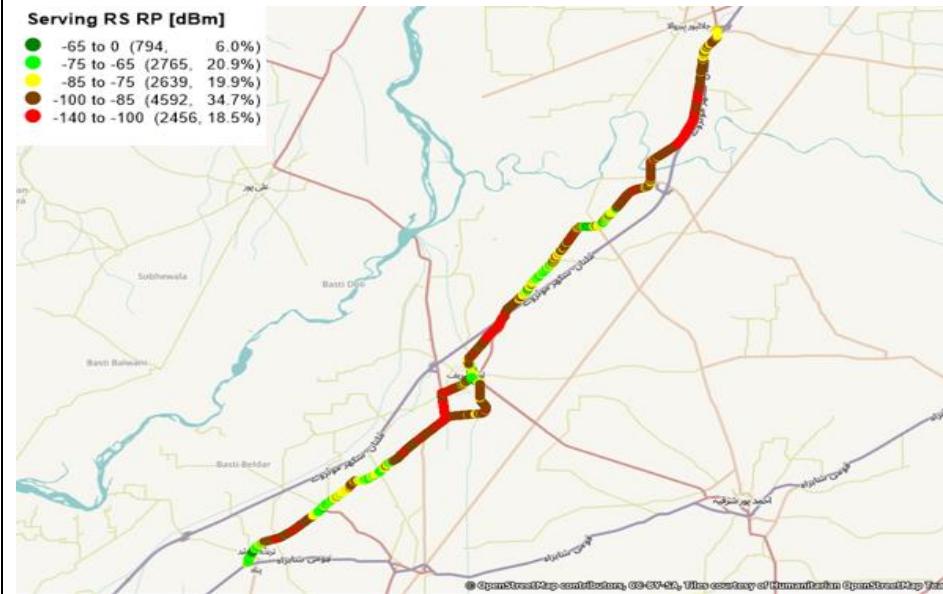
TELENOR 4G NETWORK COVERAGE – TARANDA MUHAMMAD PANAH TO JALALPUR PIRWALA (N-115)



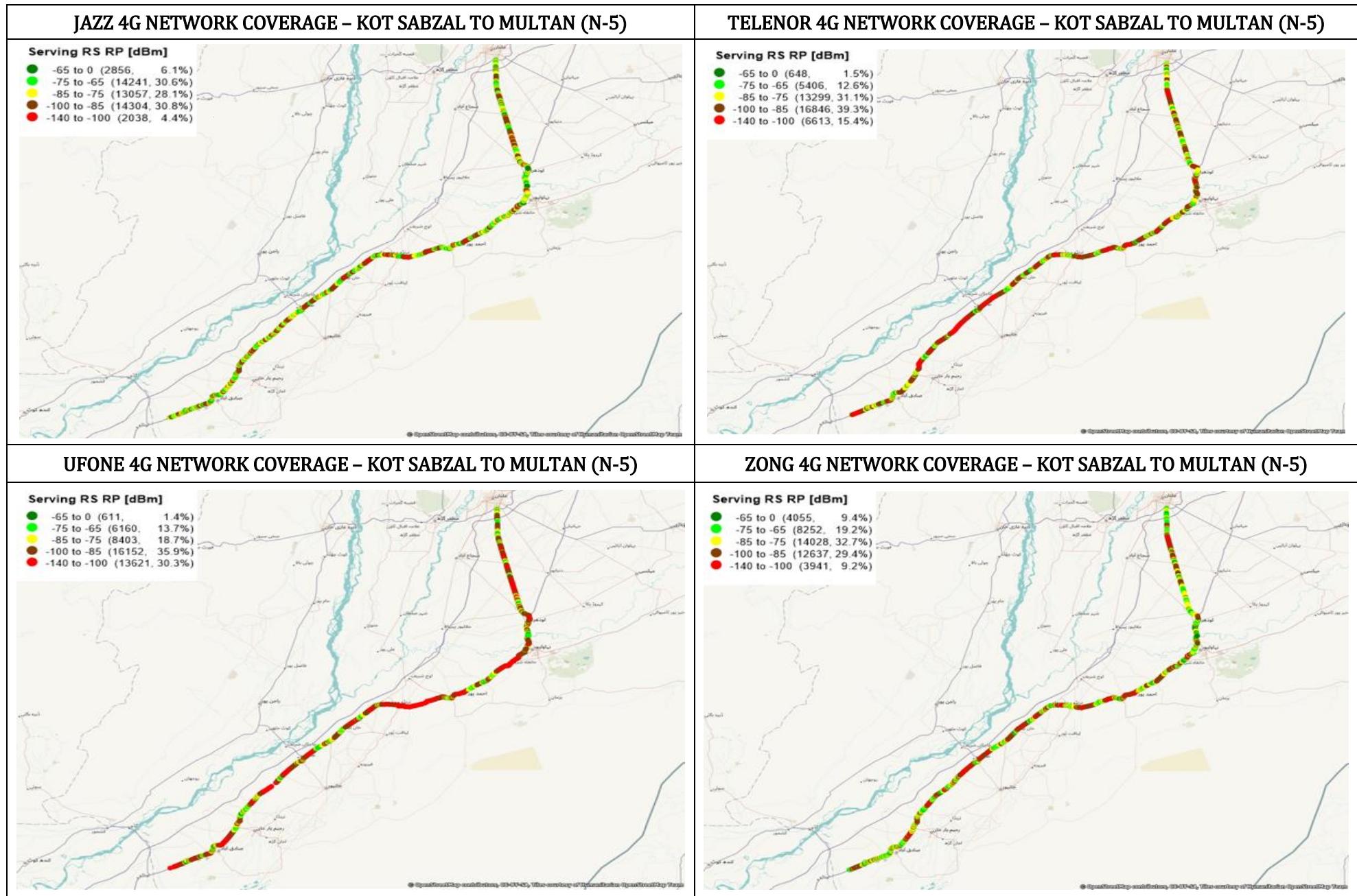
UFONE 4G NETWORK COVERAGE – TARANDA MUHAMMAD PANAH TO JALALPUR PIRWALA (N-115)



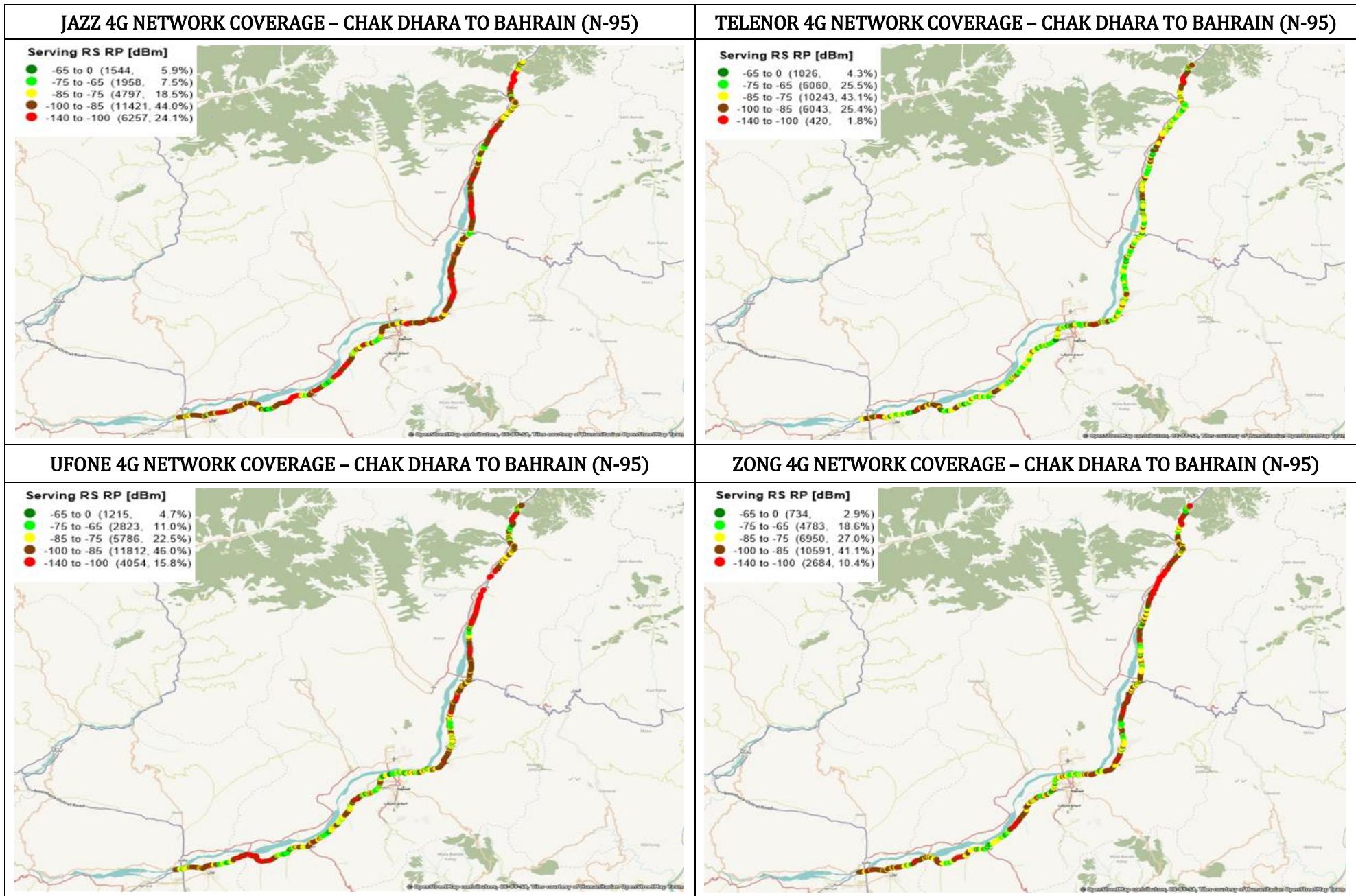
ZONG 4G NETWORK COVERAGE – TARANDA MUHAMMAD PANAH TO JALALPUR PIRWALA (N-115)



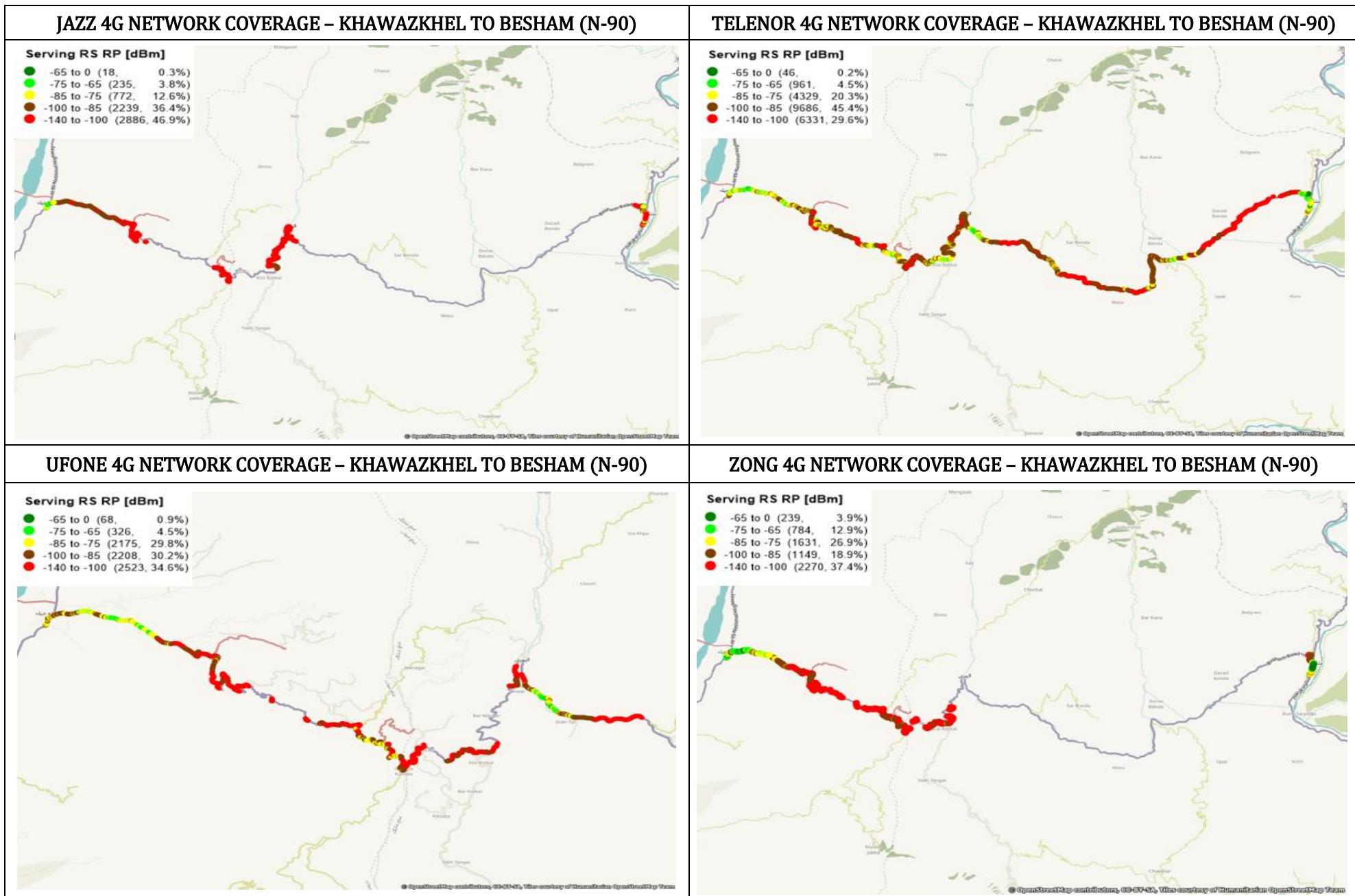
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)



4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

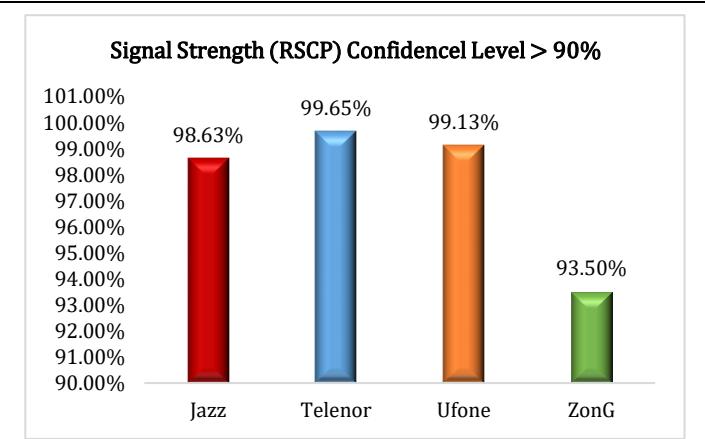
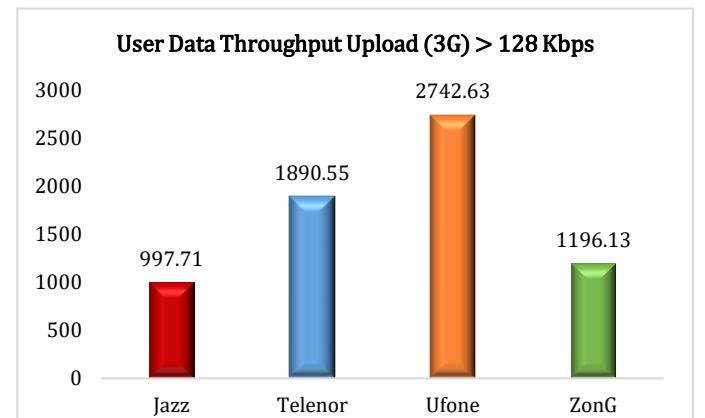
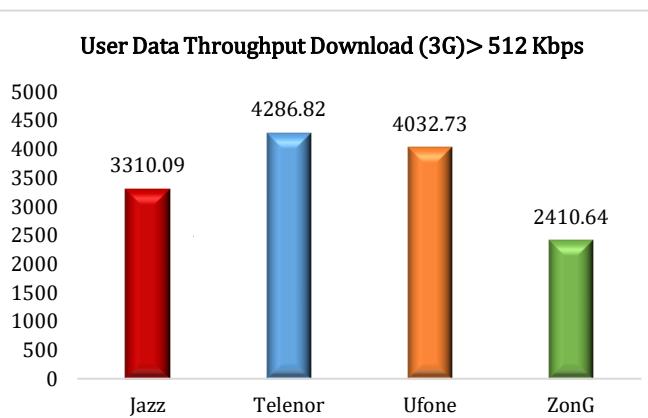


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

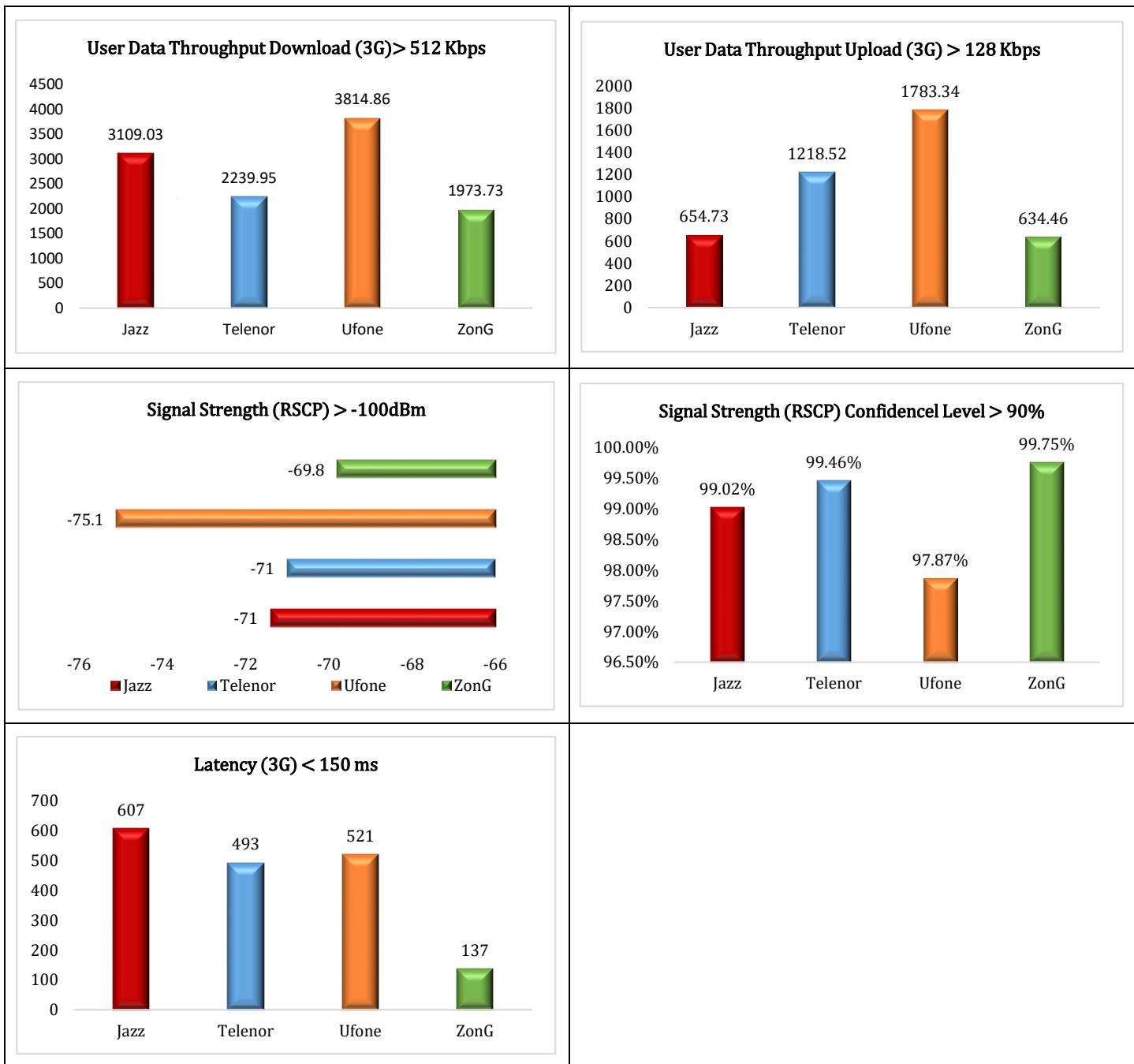


MOBILE BROADBAND 3G KPIs RESULT

QUALITY OF SERVICE SURVEY RESULTS (3G) – QUETTA TO ZHOB (N-50)



QUALITY OF SERVICE SURVEY RESULTS (3G) – LAHORE TO SARGODHA (N-60)

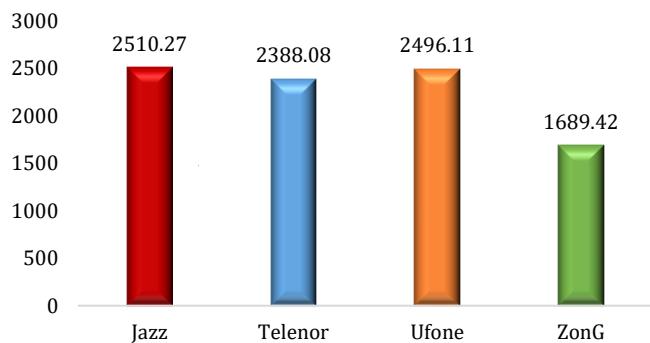


QUALITY OF SERVICE SURVEY RESULTS (3G) – LAHORE TO RAWALPINDI (N-5)

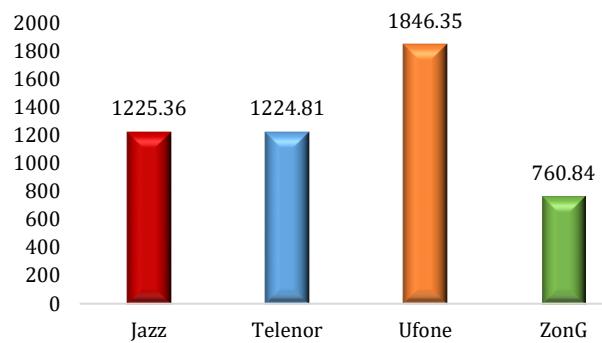


QUALITY OF SERVICE SURVEY RESULTS (3G) – LAHORE TO MULTAN (N-5)

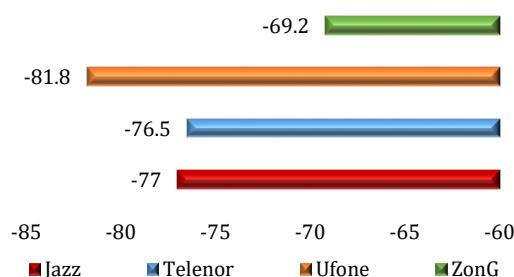
User Data Throughput Download (3G)> 512 Kbps



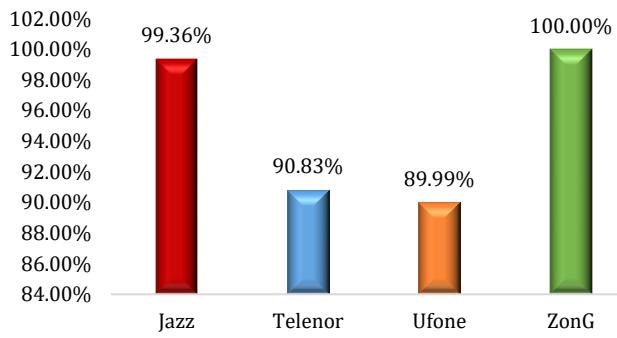
User Data Throughput Upload (3G) > 128 Kbps



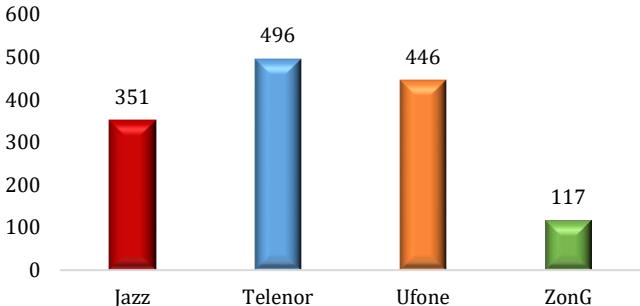
Signal Strength (RSCP) > -100dBm



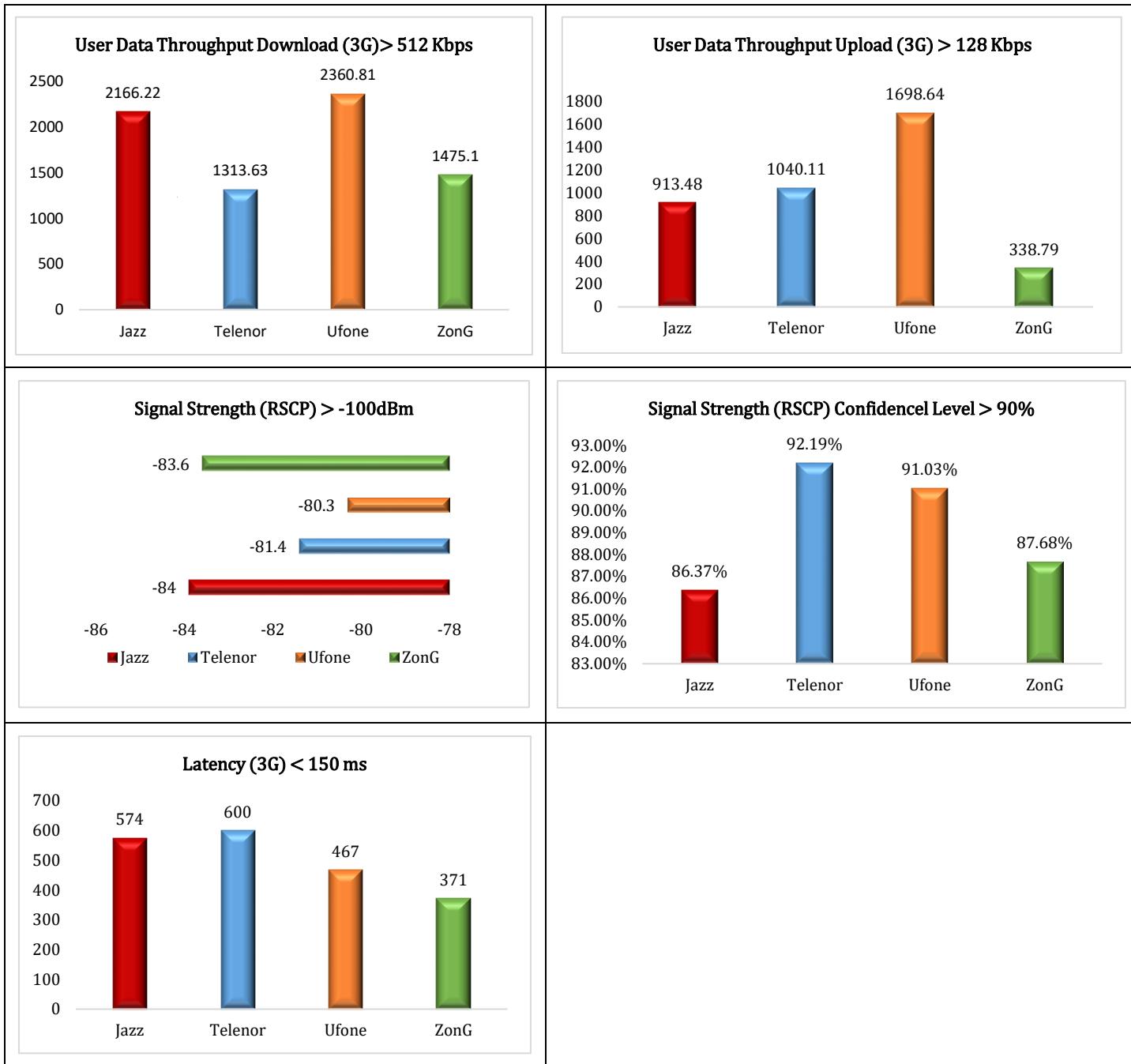
Signal Strength (RSCP) Confidence Level > 90%



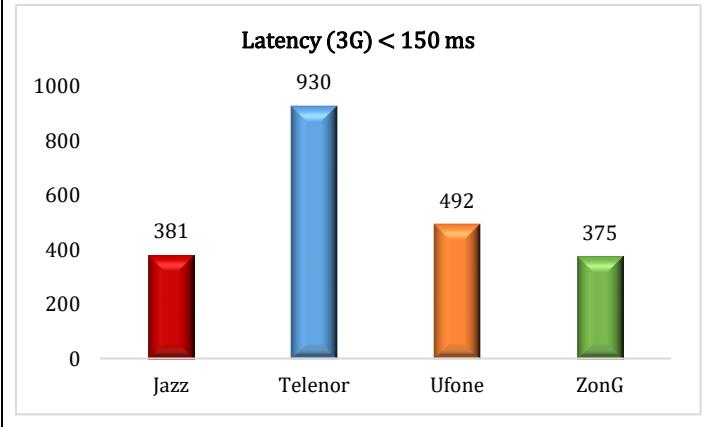
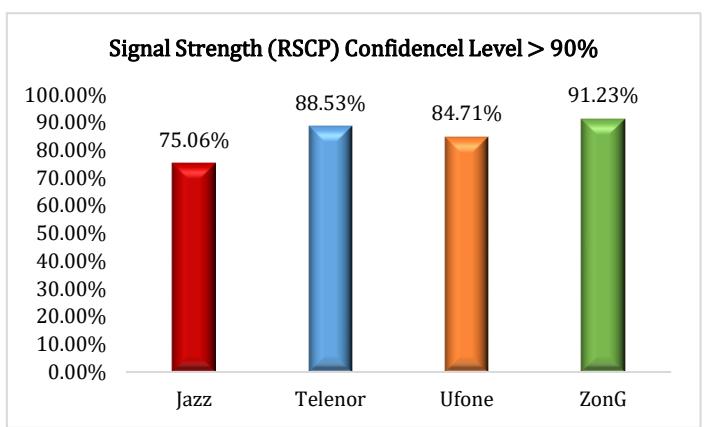
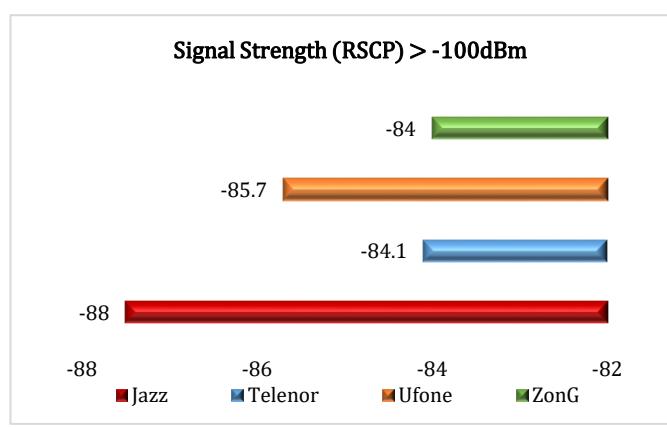
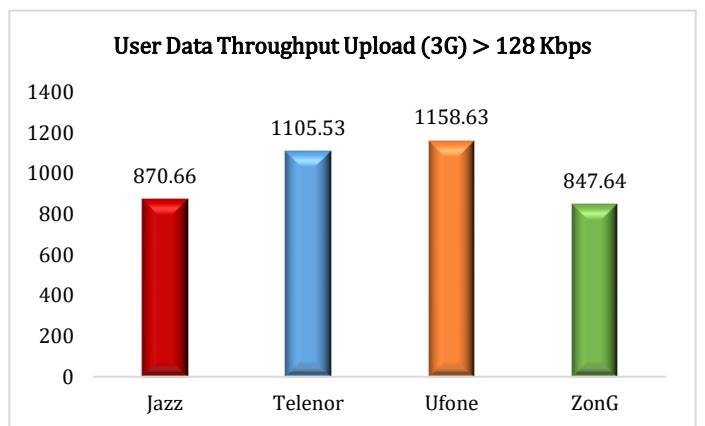
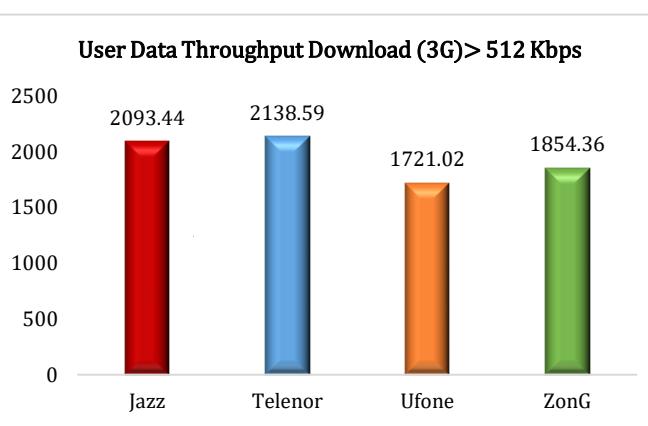
Latency (3G) < 150 ms



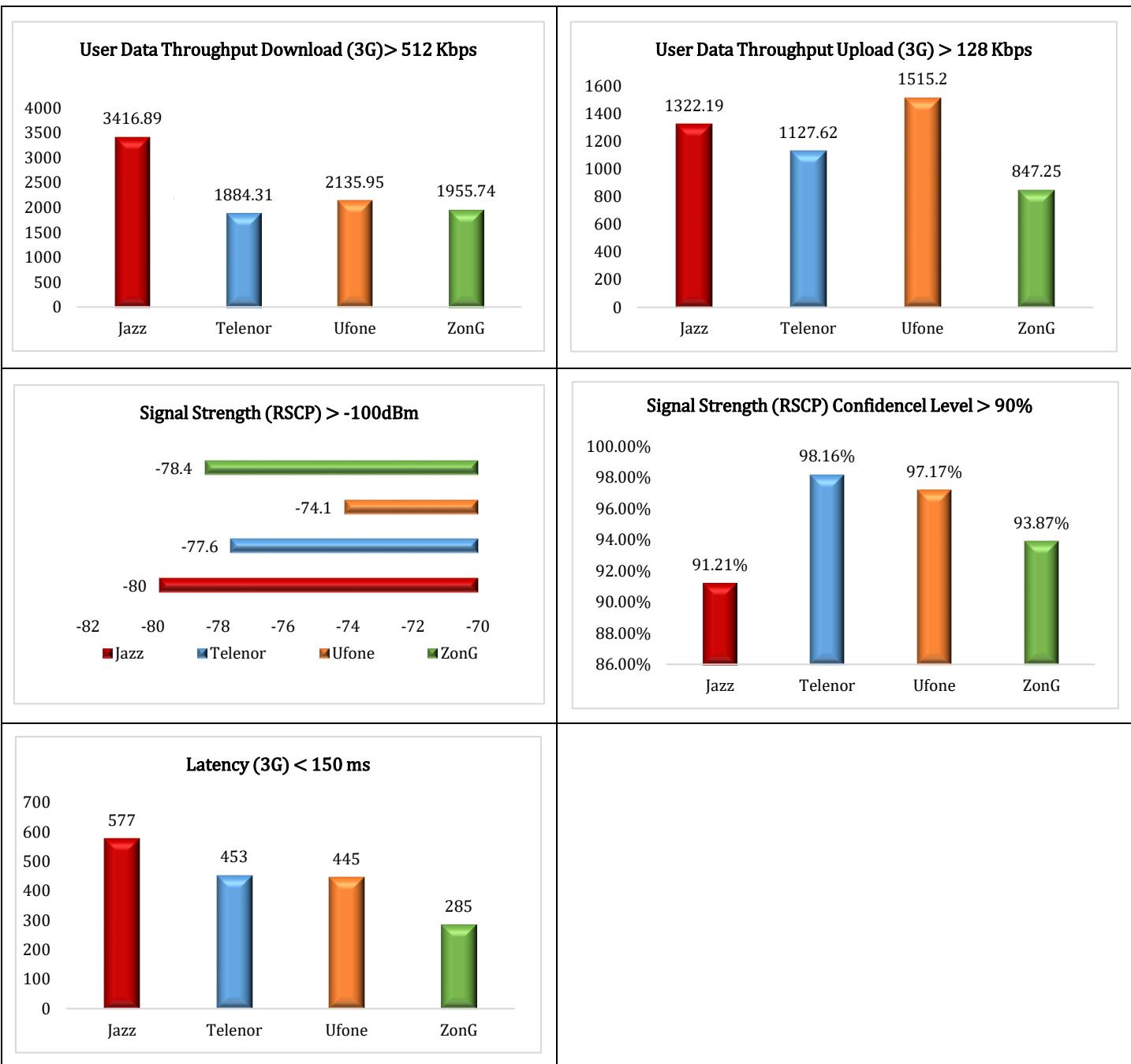
QUALITY OF SERVICE SURVEY RESULTS (3G) – ISLAMABAD TO D.I KHAN (M-14)



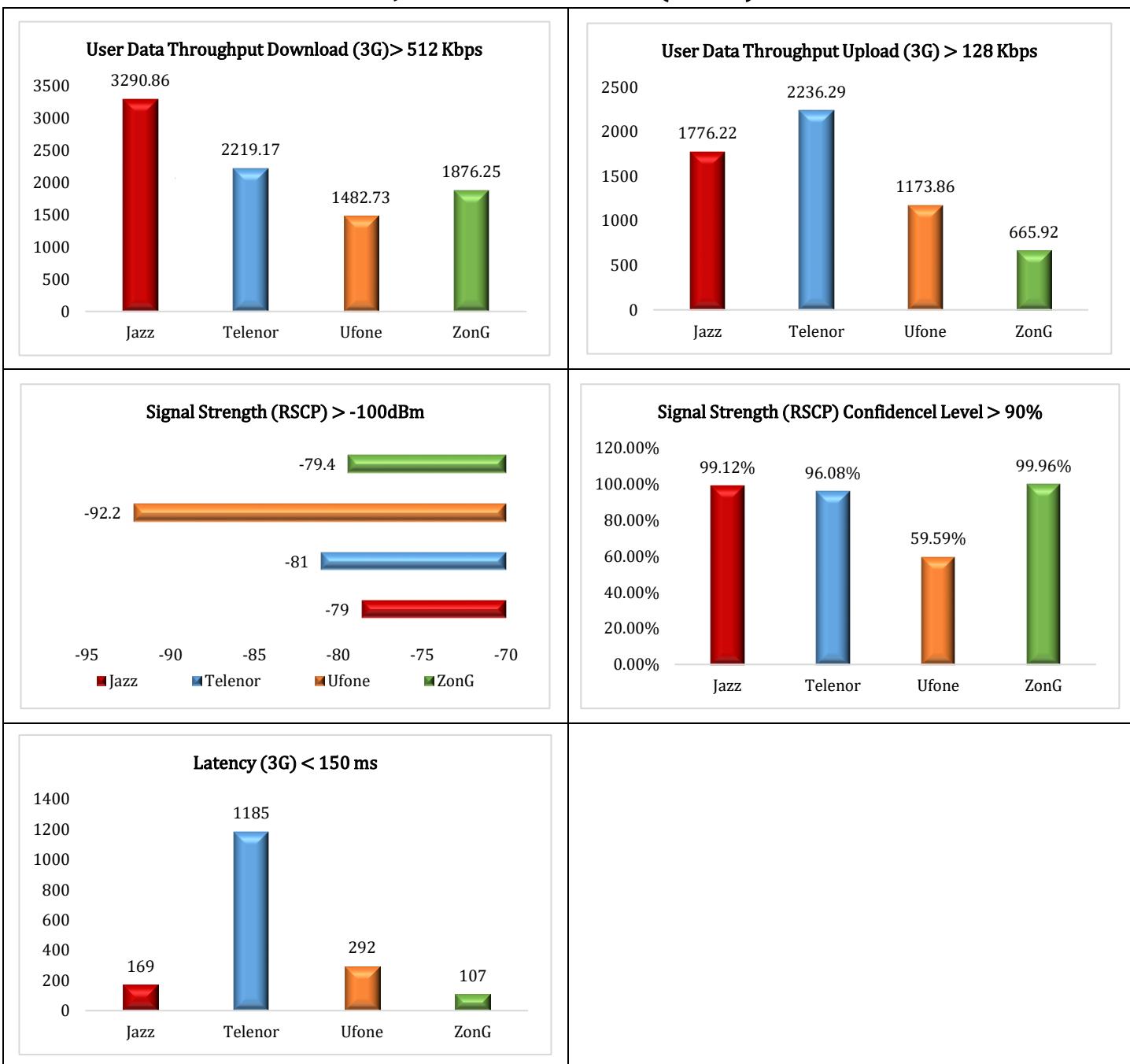
QUALITY OF SERVICE SURVEY RESULTS (3G) – MIANWALI TO BHAKKAR (N-130)



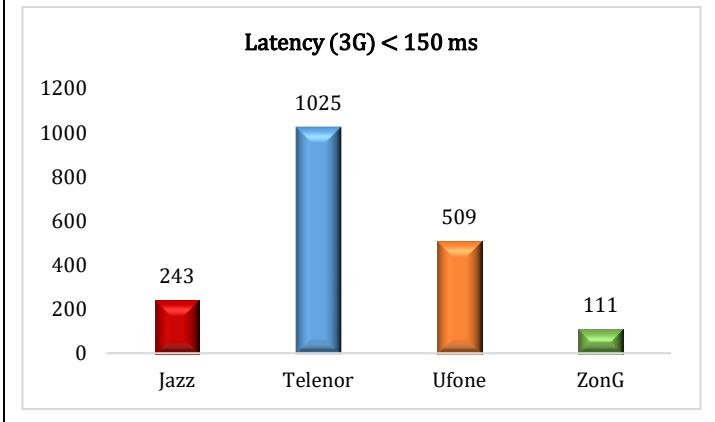
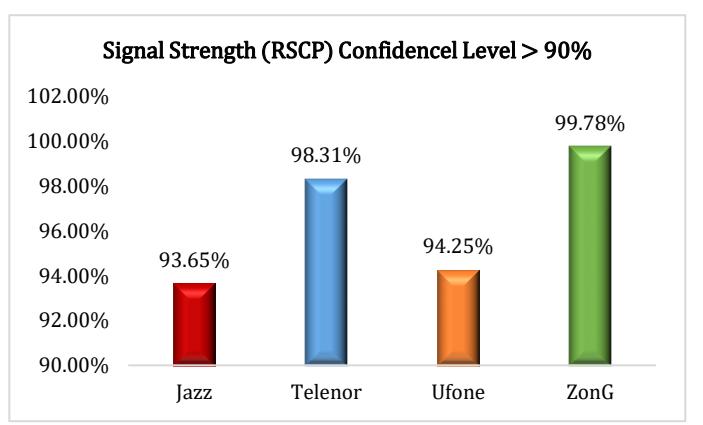
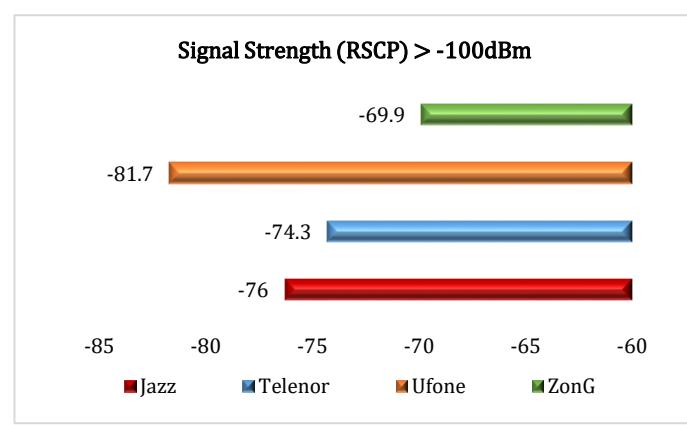
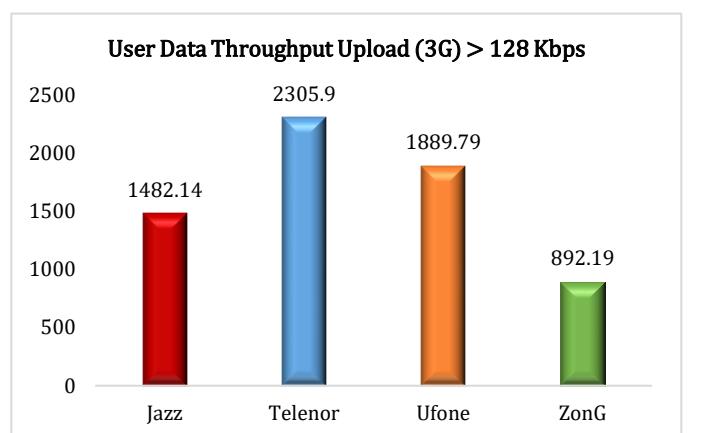
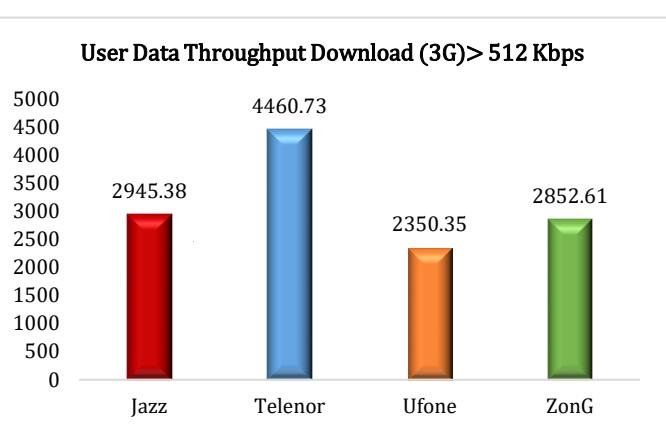
QUALITY OF SERVICE SURVEY RESULTS (3G) – ISLAMABAD TO KOHAT (N-80)



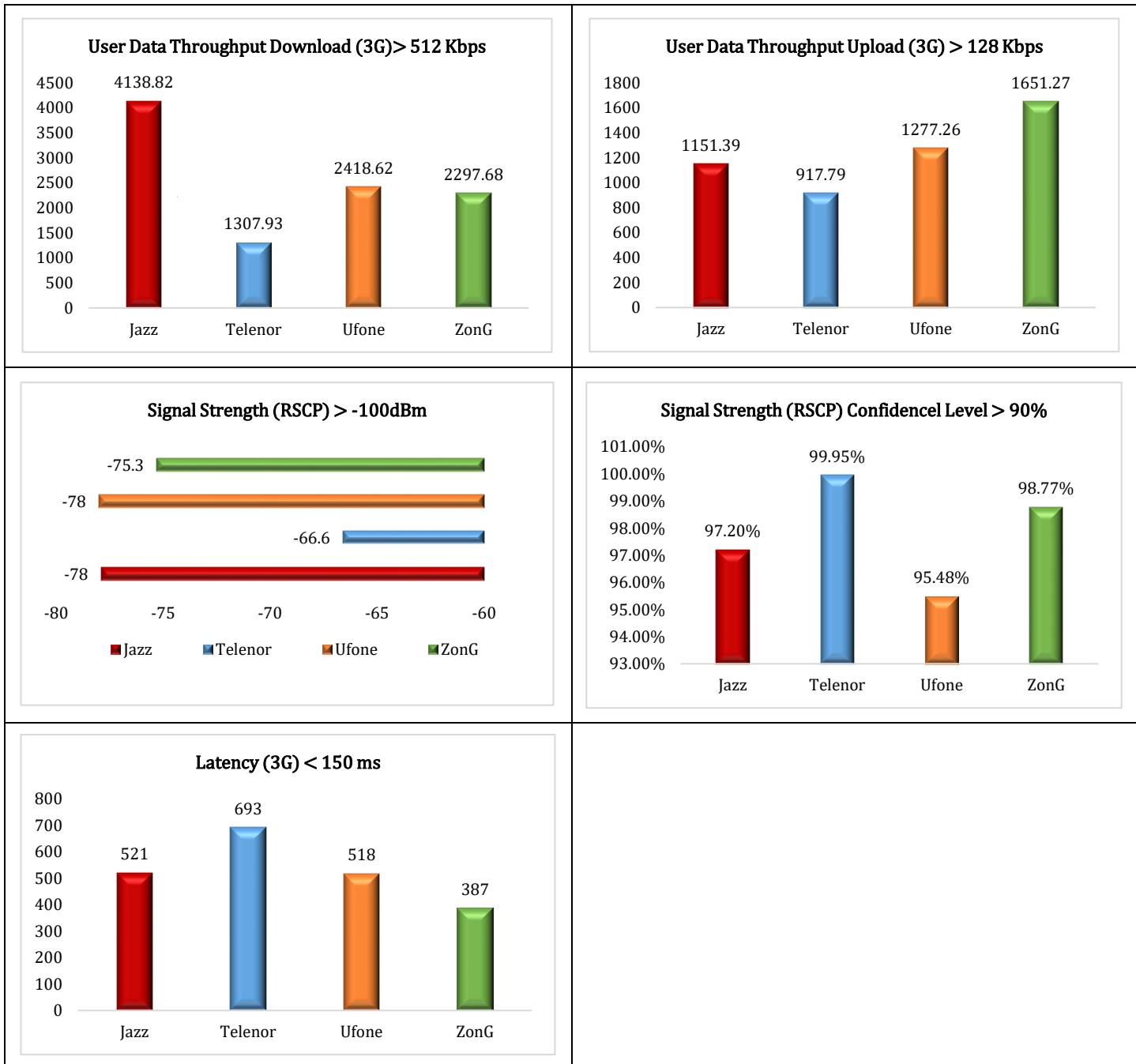
QUALITY OF SERVICE SURVEY RESULTS (3G) – TARANDA MUHAMMAD PANNAH TO JALALPUR PIRWALA (N-115)



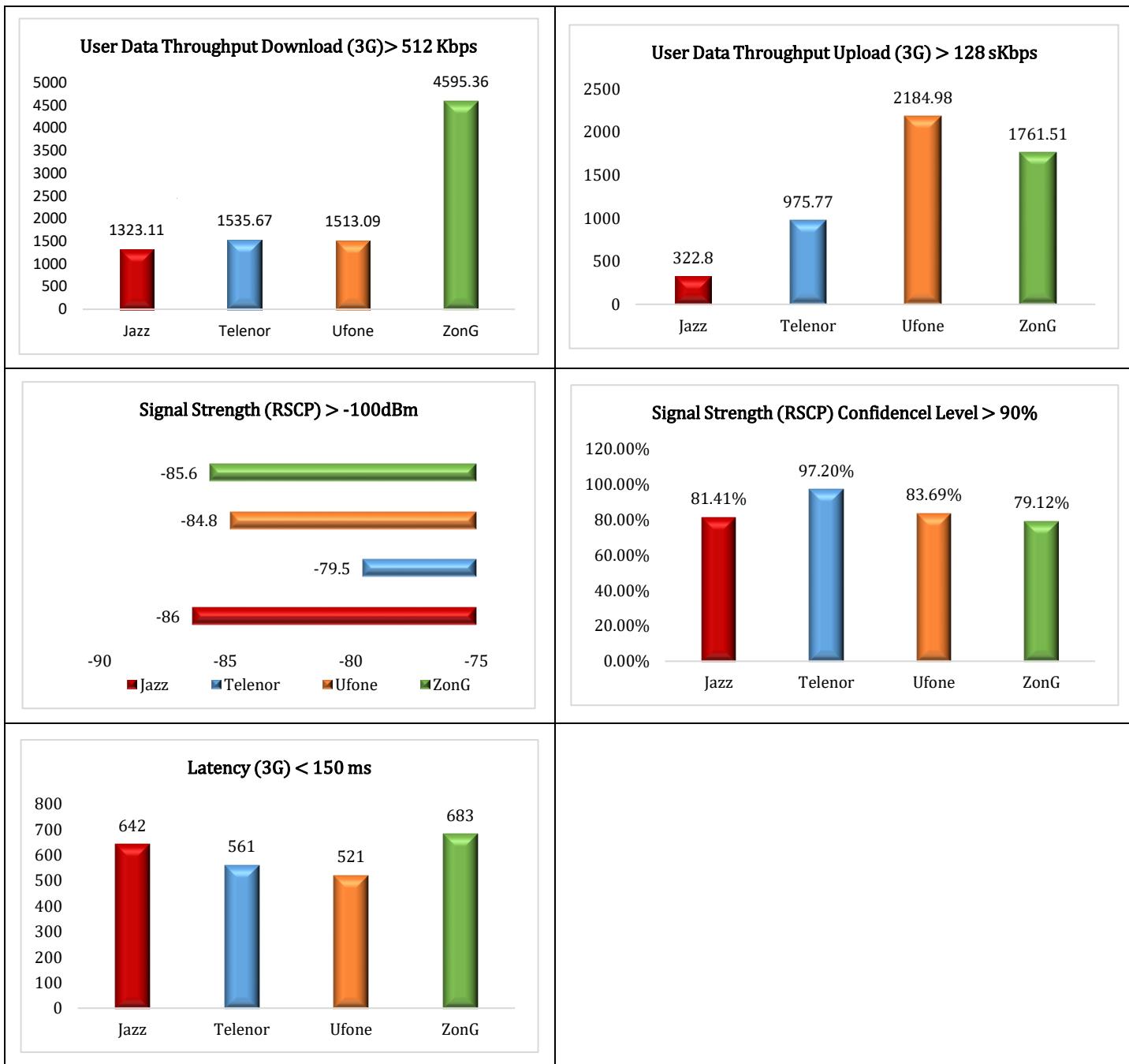
QUALITY OF SERVICE SURVEY RESULTS (3G) – KOT SABZAL TO MULTAN (N-5)



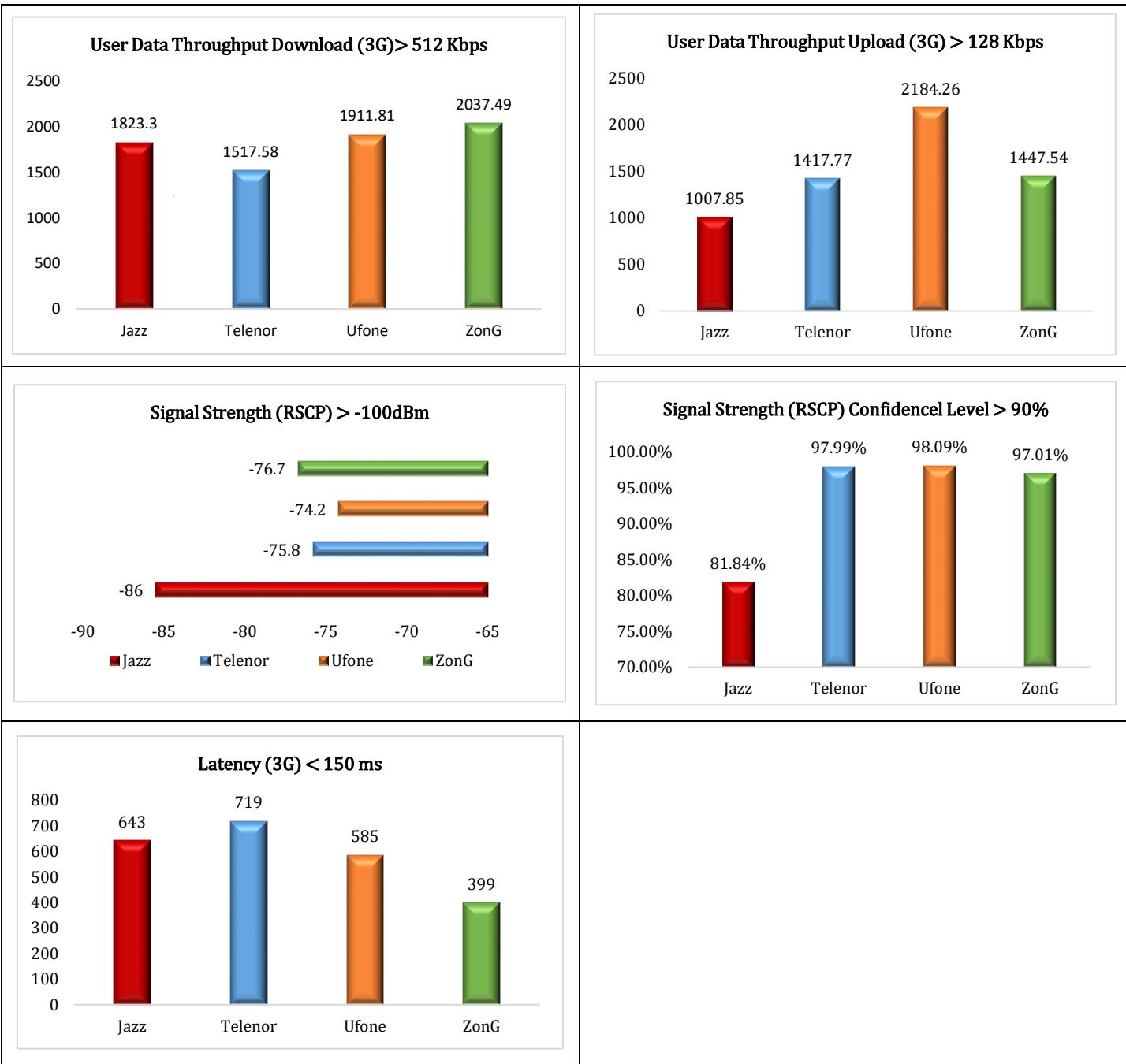
QUALITY OF SERVICE SURVEY RESULTS (3G) – CHAK DHARA TO BAHRAIN (N-95)



QUALITY OF SERVICE SURVEY RESULTS (3G) – KHAWAZKHEL TO BESHAM (N-90)

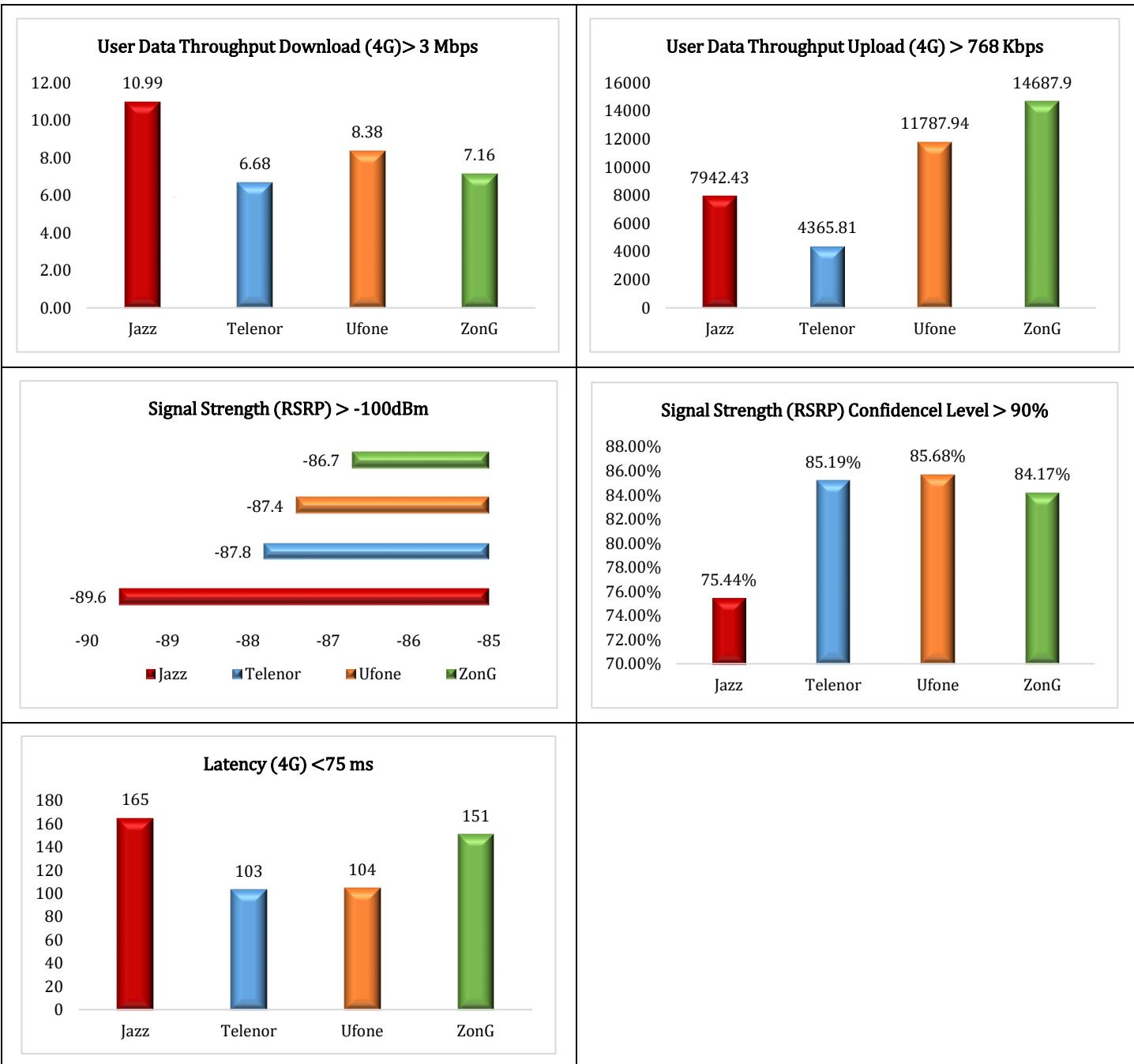


QUALITY OF SERVICE SURVEY RESULTS (3G) – PESHAWAR TO DG KHAN (N-55)

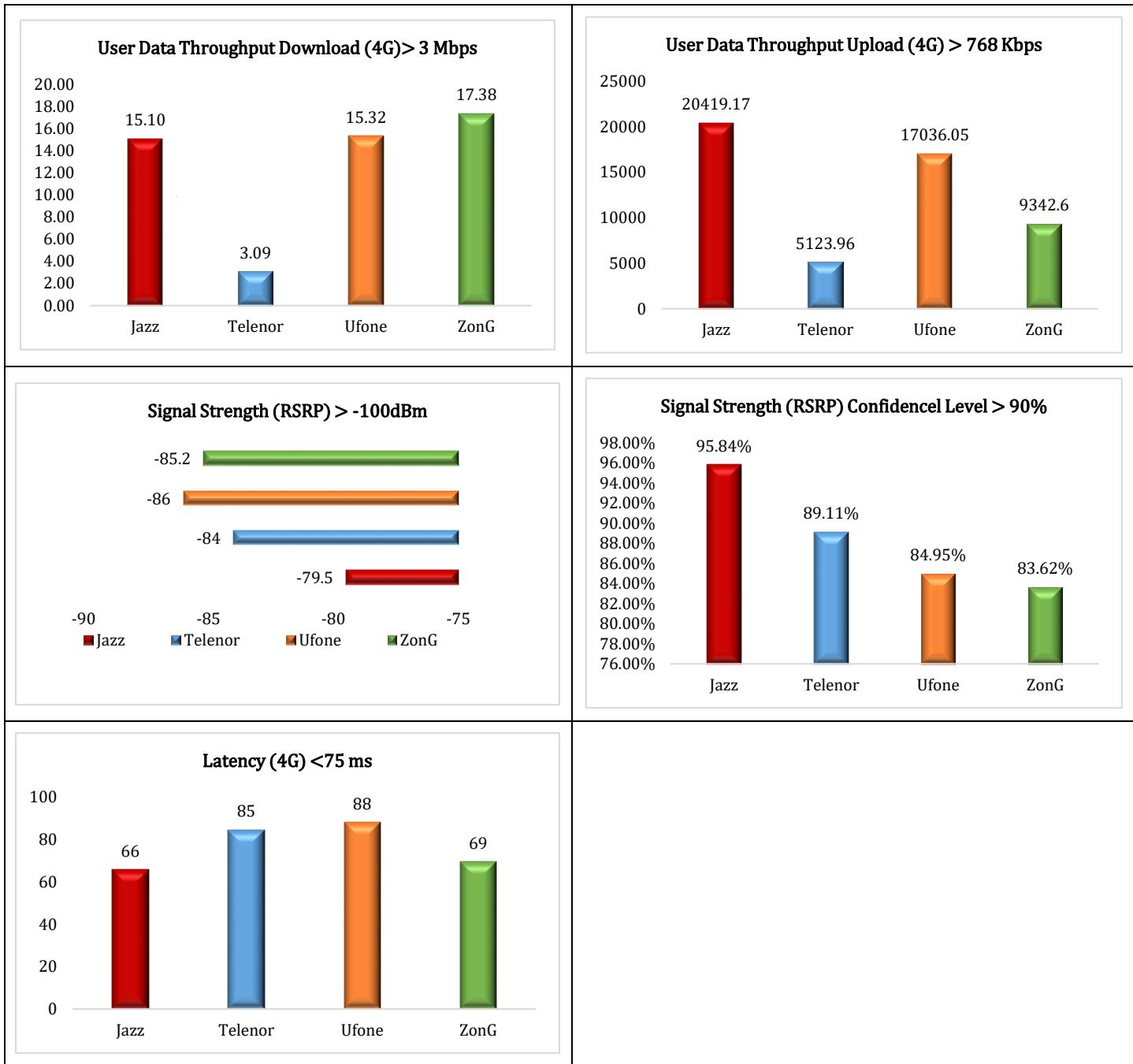


MOBILE BROADBAND 4G KPIs RESULT

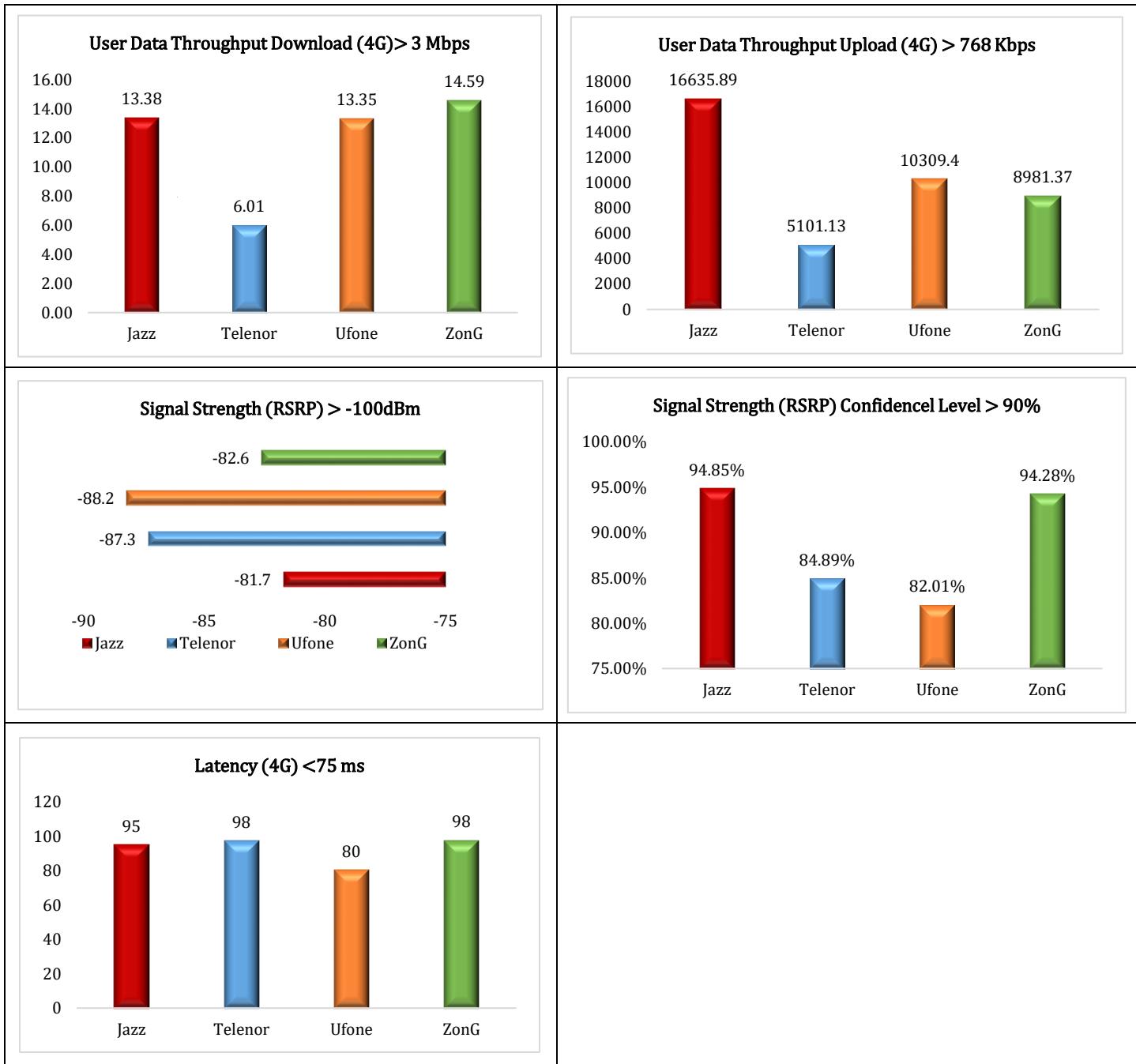
QUALITY OF SERVICE SURVEY RESULTS (4G) – ZHOB TO QUETTA (N-50)



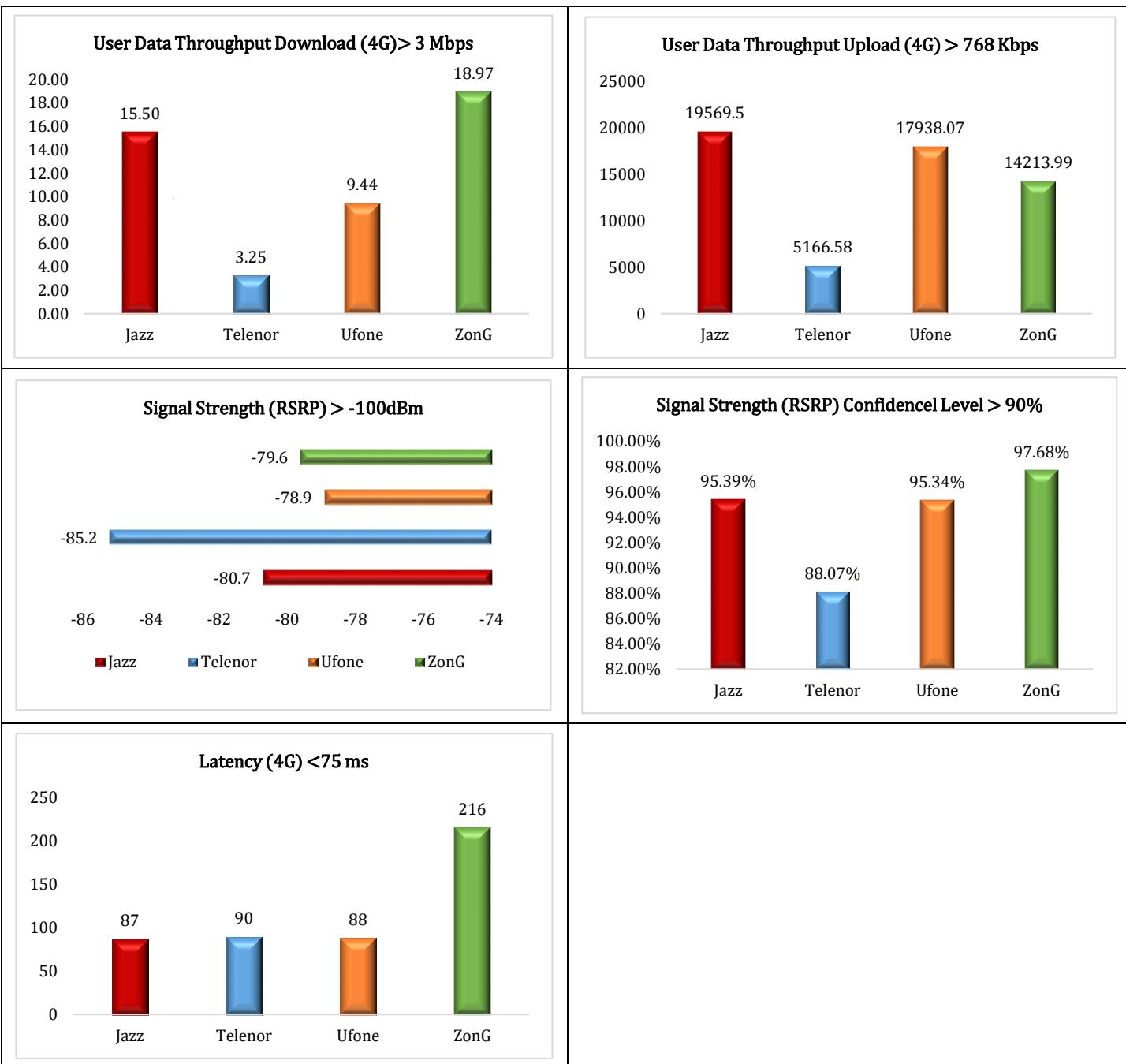
QUALITY OF SERVICE SURVEY RESULTS (4G) – LAHORE TO SARGODHA (N-60)



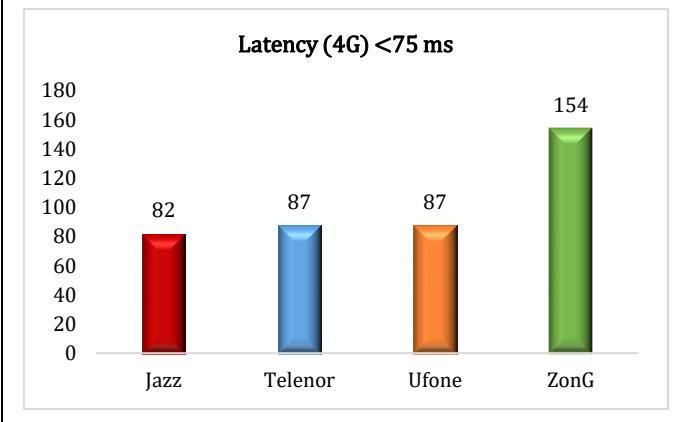
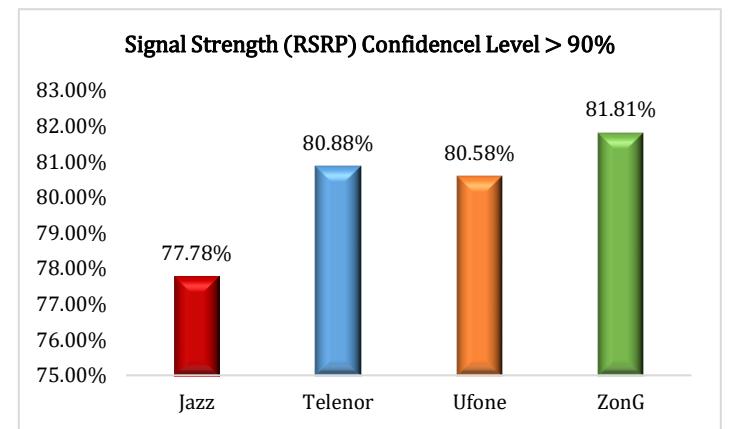
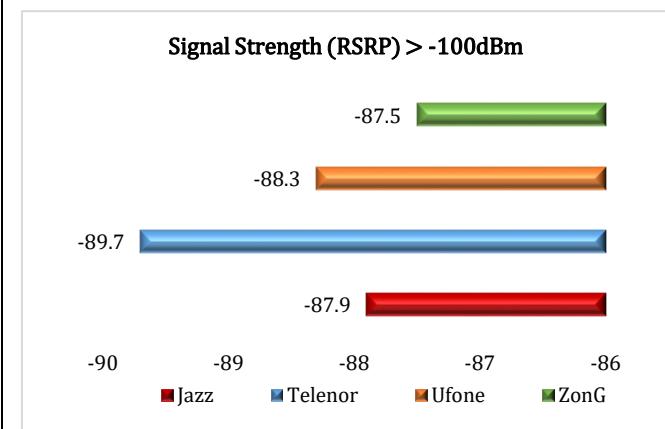
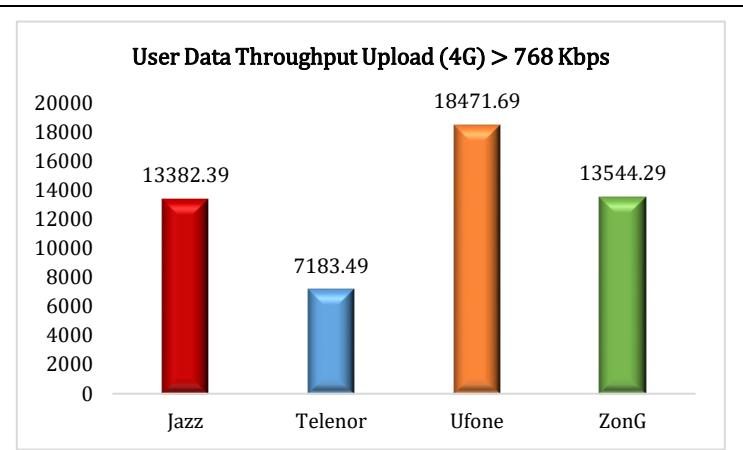
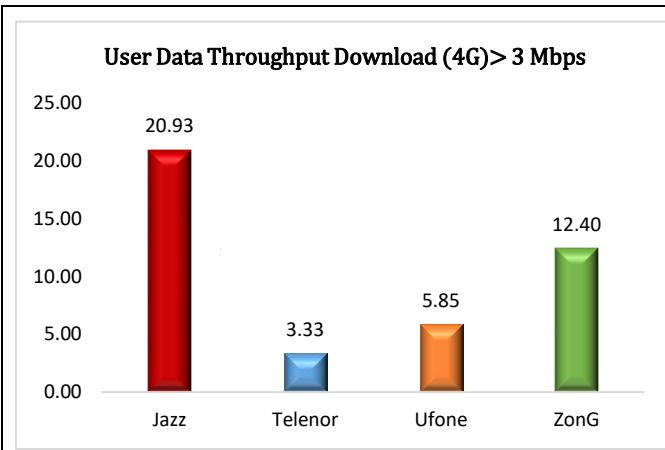
QUALITY OF SERVICE SURVEY RESULTS (4G) – LAHORE TO MULTAN (N-5)



QUALITY OF SERVICE SURVEY RESULTS (4G) – LAHORE TO RAWALPINDI (N-5)



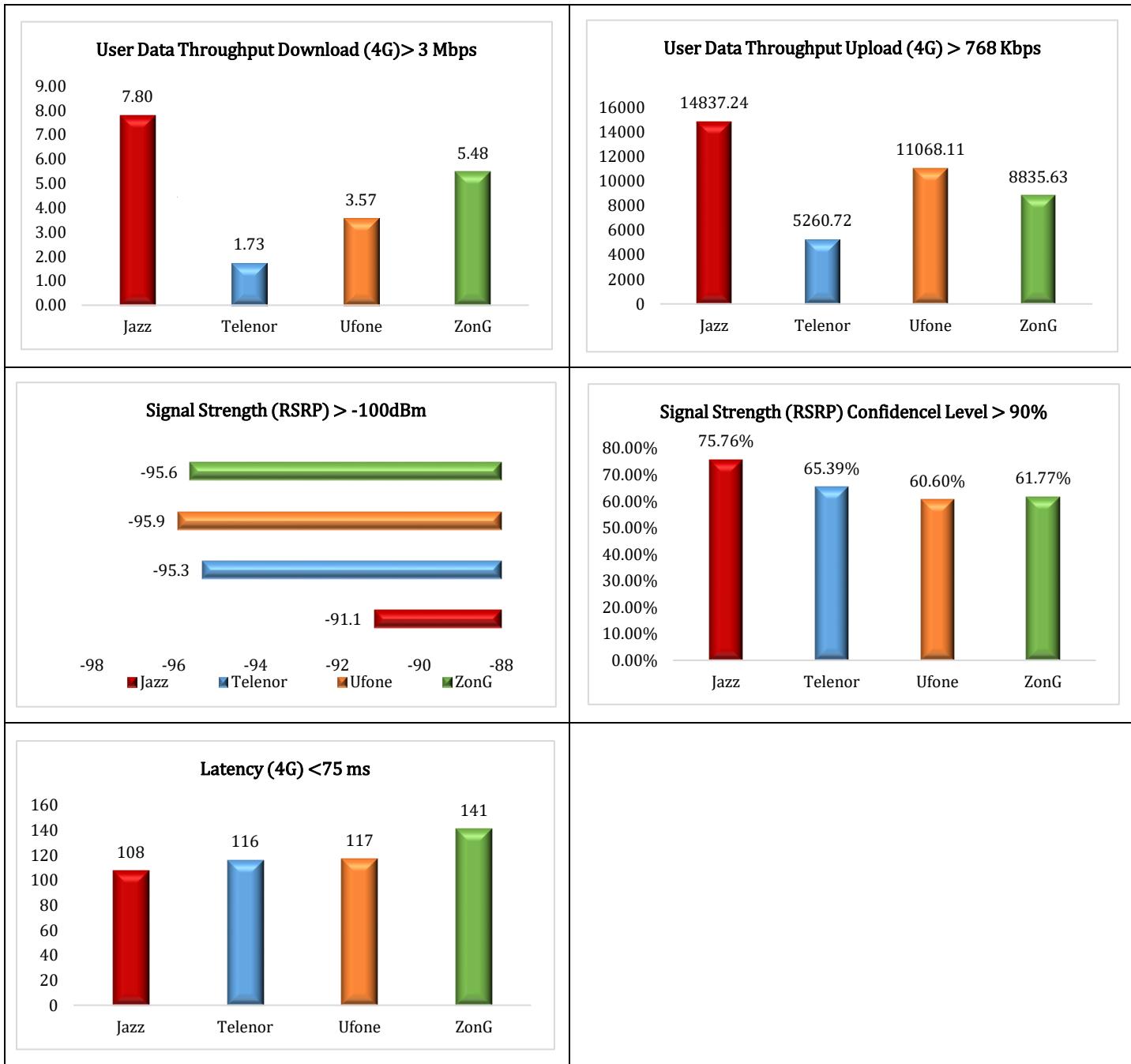
QUALITY OF SERVICE SURVEY RESULTS (4G) – ISLAMABAD TO KOHAT (N-80)



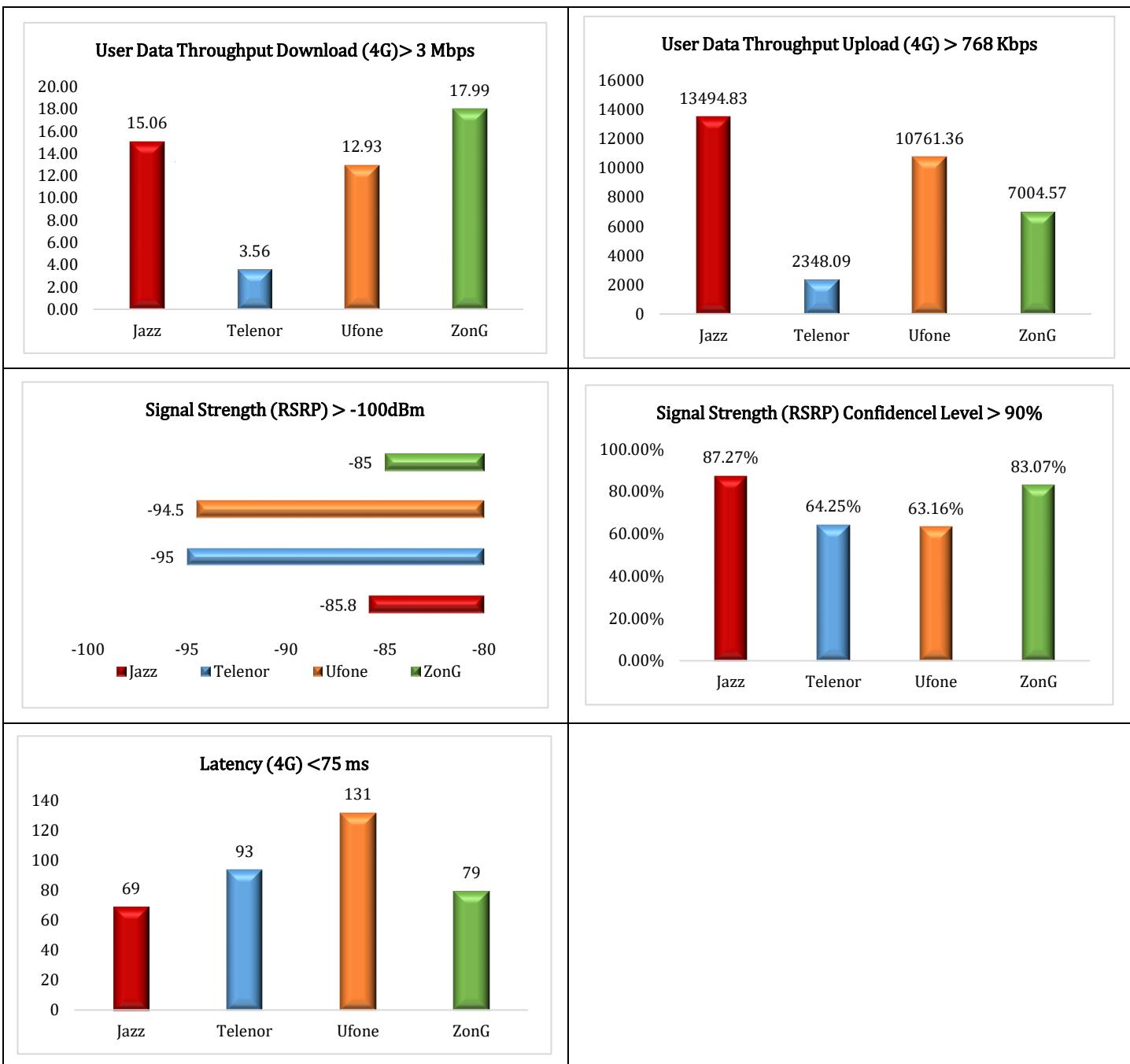
QUALITY OF SERVICE SURVEY RESULTS (4G) – MIANWALI TO BHAKKAR (N-130)



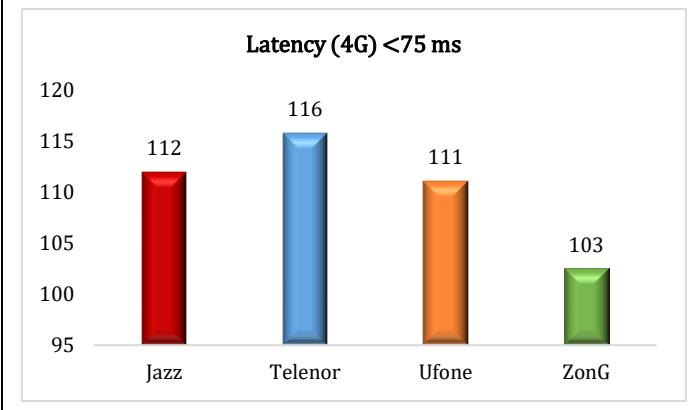
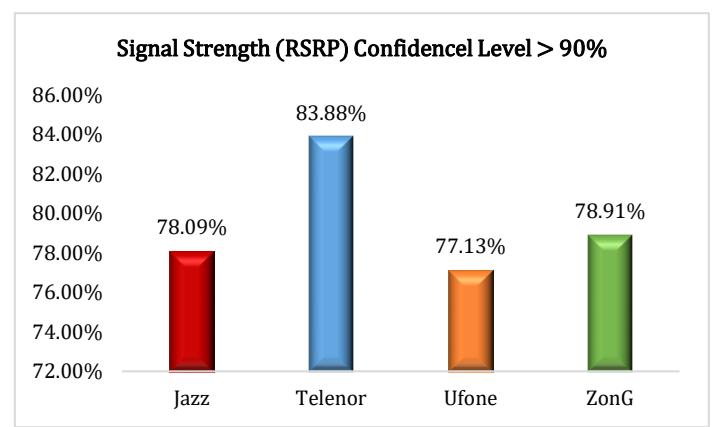
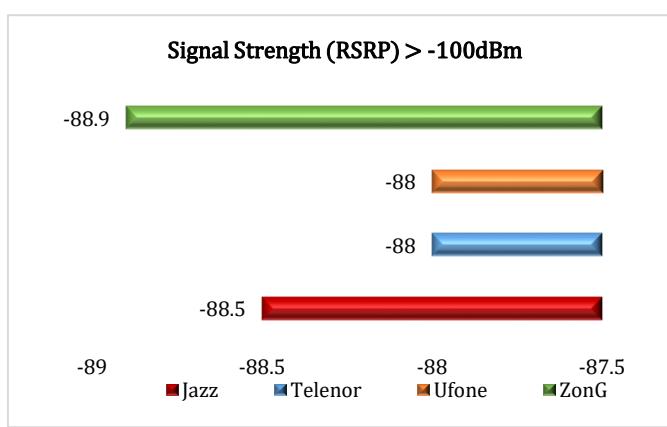
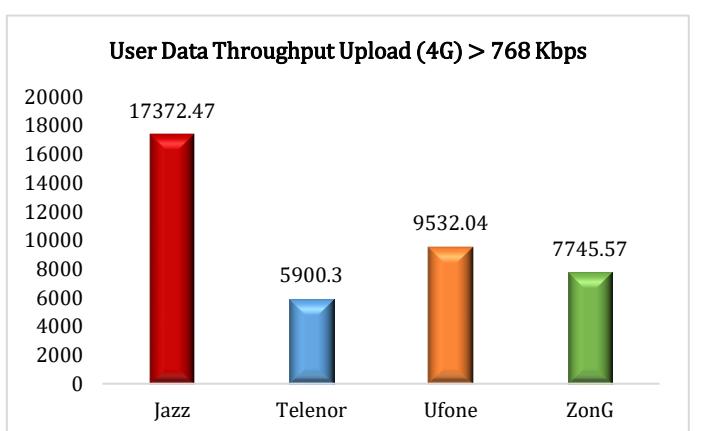
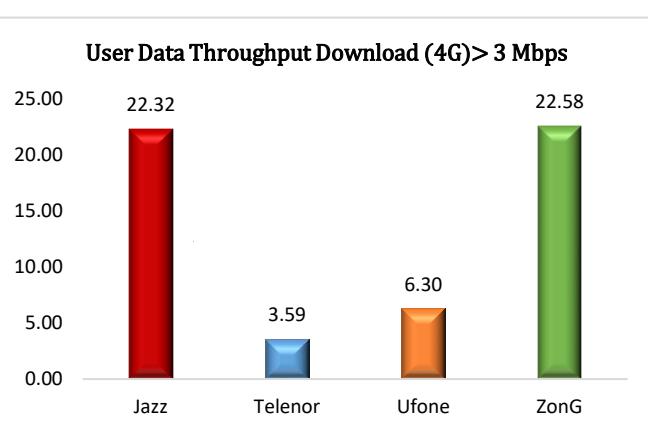
QUALITY OF SERVICE SURVEY RESULTS (4G) – ISLAMABAD TO D.I KHAN (M-14)



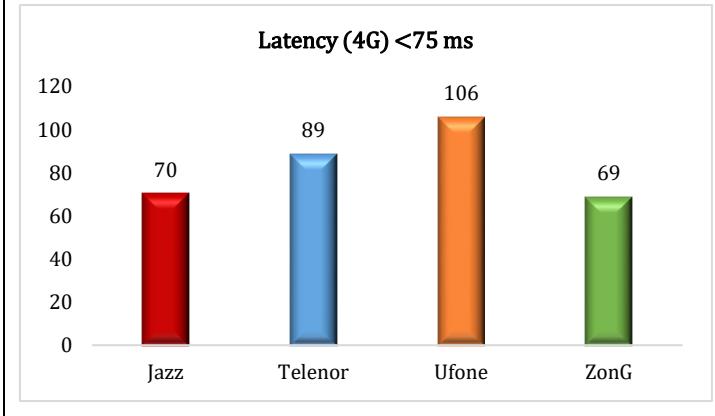
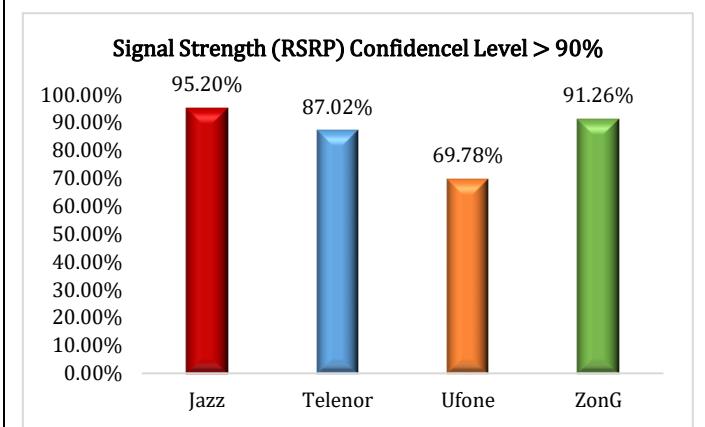
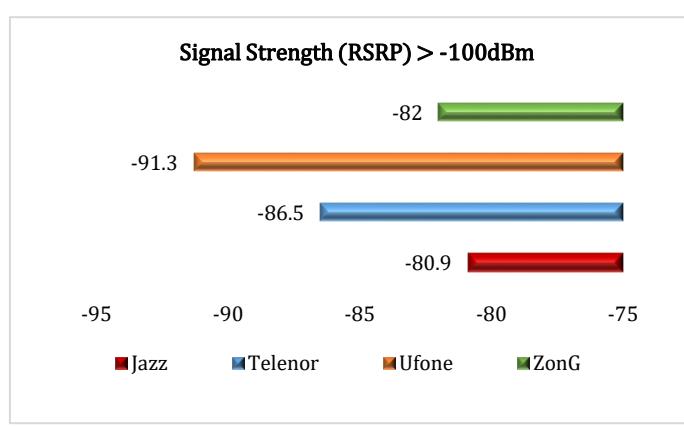
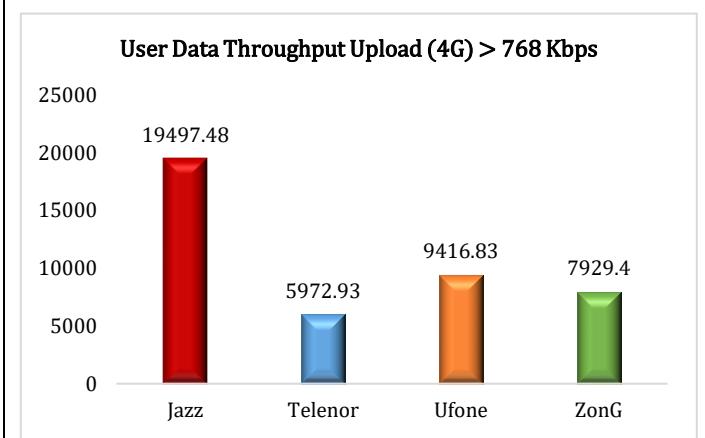
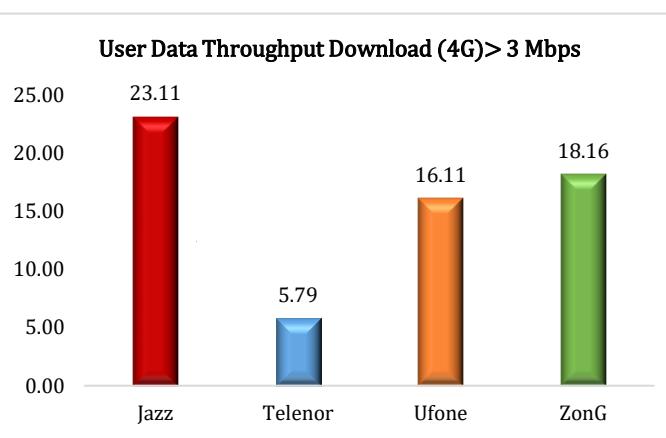
QUALITY OF SERVICE SURVEY RESULTS (4G) – TARANDA MUHAMMAD PANNAH TO JALALPUR PIRWALA (N-115)



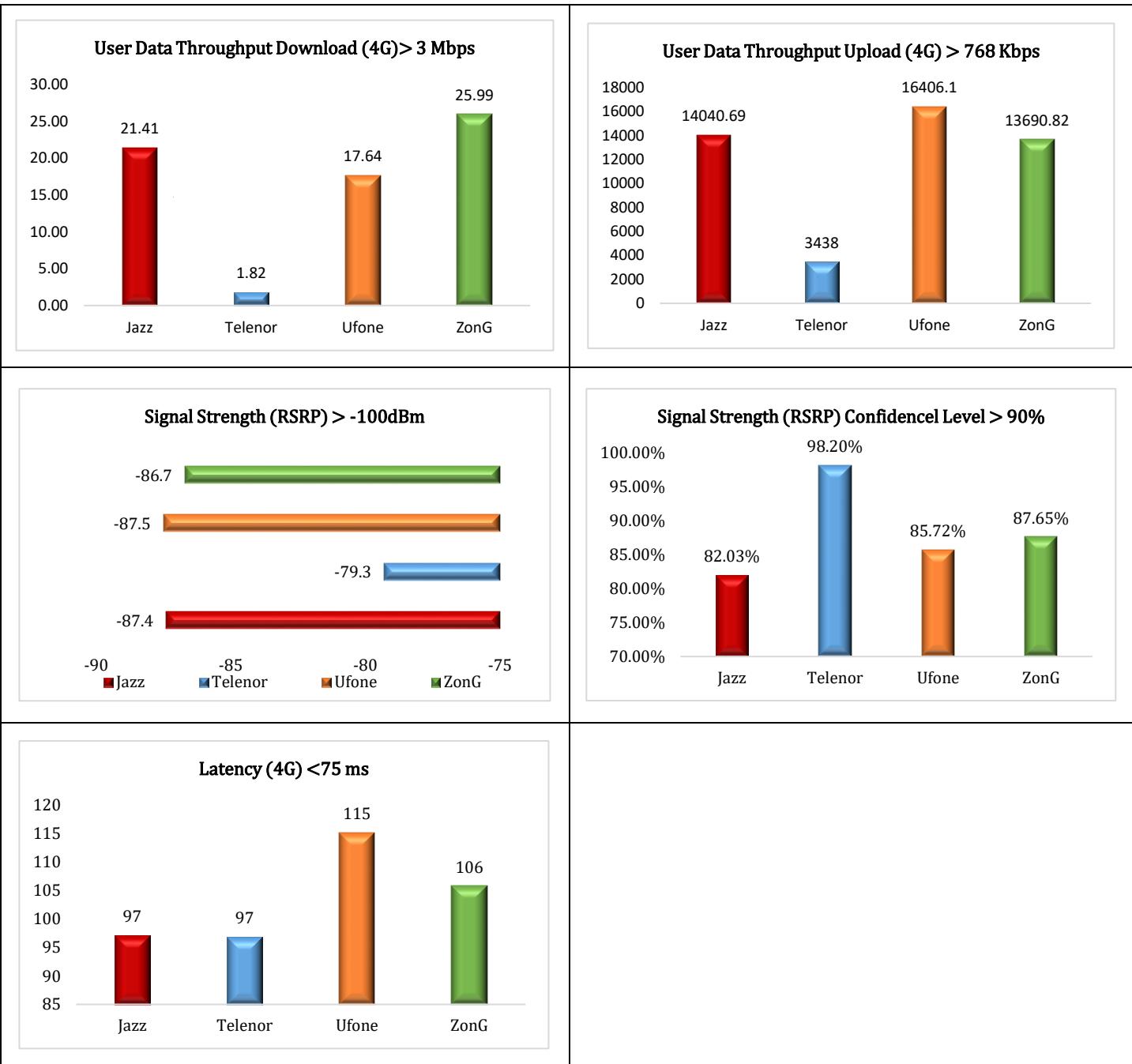
QUALITY OF SERVICE SURVEY RESULTS (4G) – PESHAWAR TO DG KHAN (N-55)



QUALITY OF SERVICE SURVEY RESULTS (4G) – KOT SABZAL TO MULTAN (N-5)



QUALITY OF SERVICE SURVEY RESULTS (4G) – CHAK DHARA TO BAHRAIN (N-95)

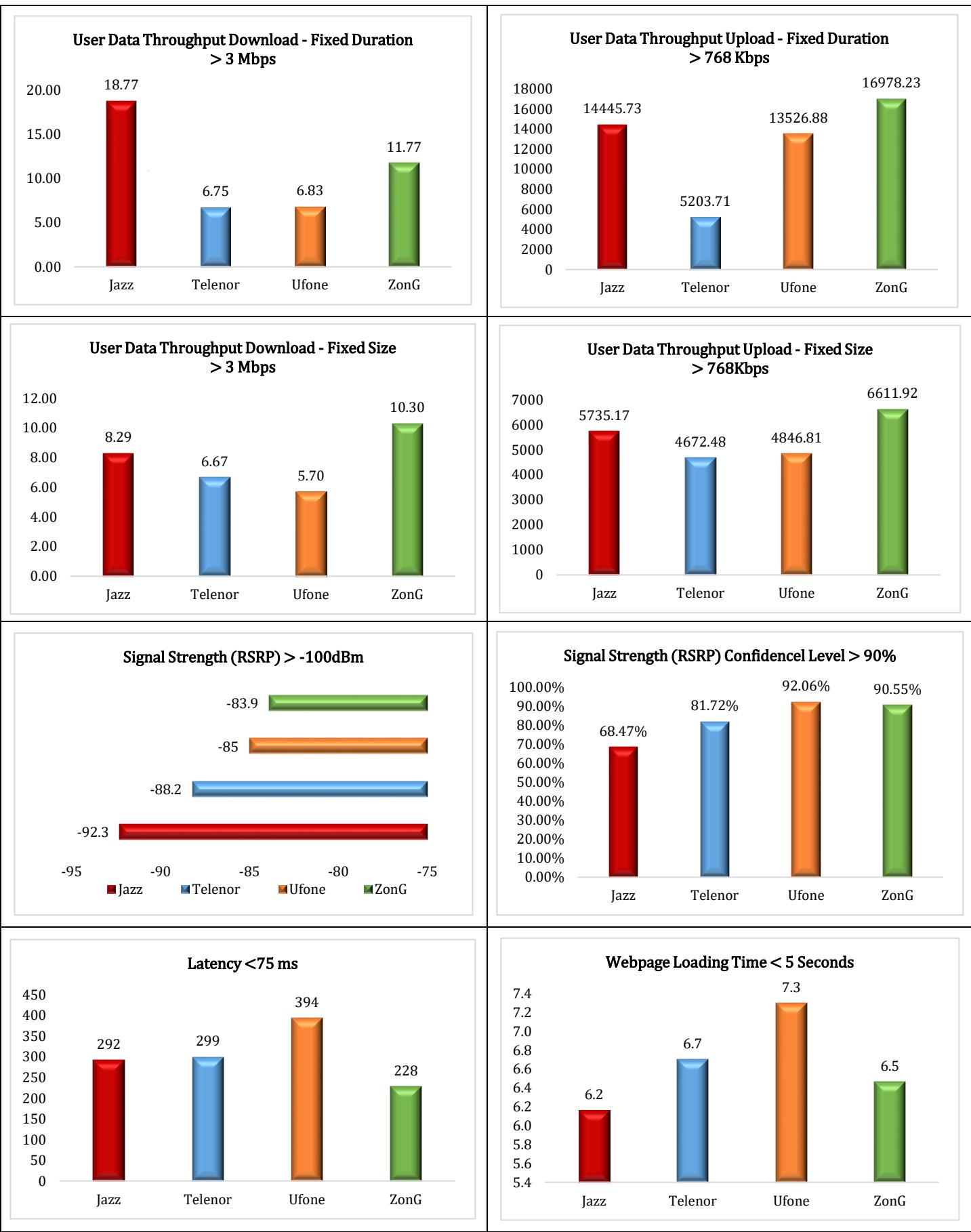


QUALITY OF SERVICE SURVEY RESULTS (4G) – KHAWAZKHEL TO BEHSAM (N-90)

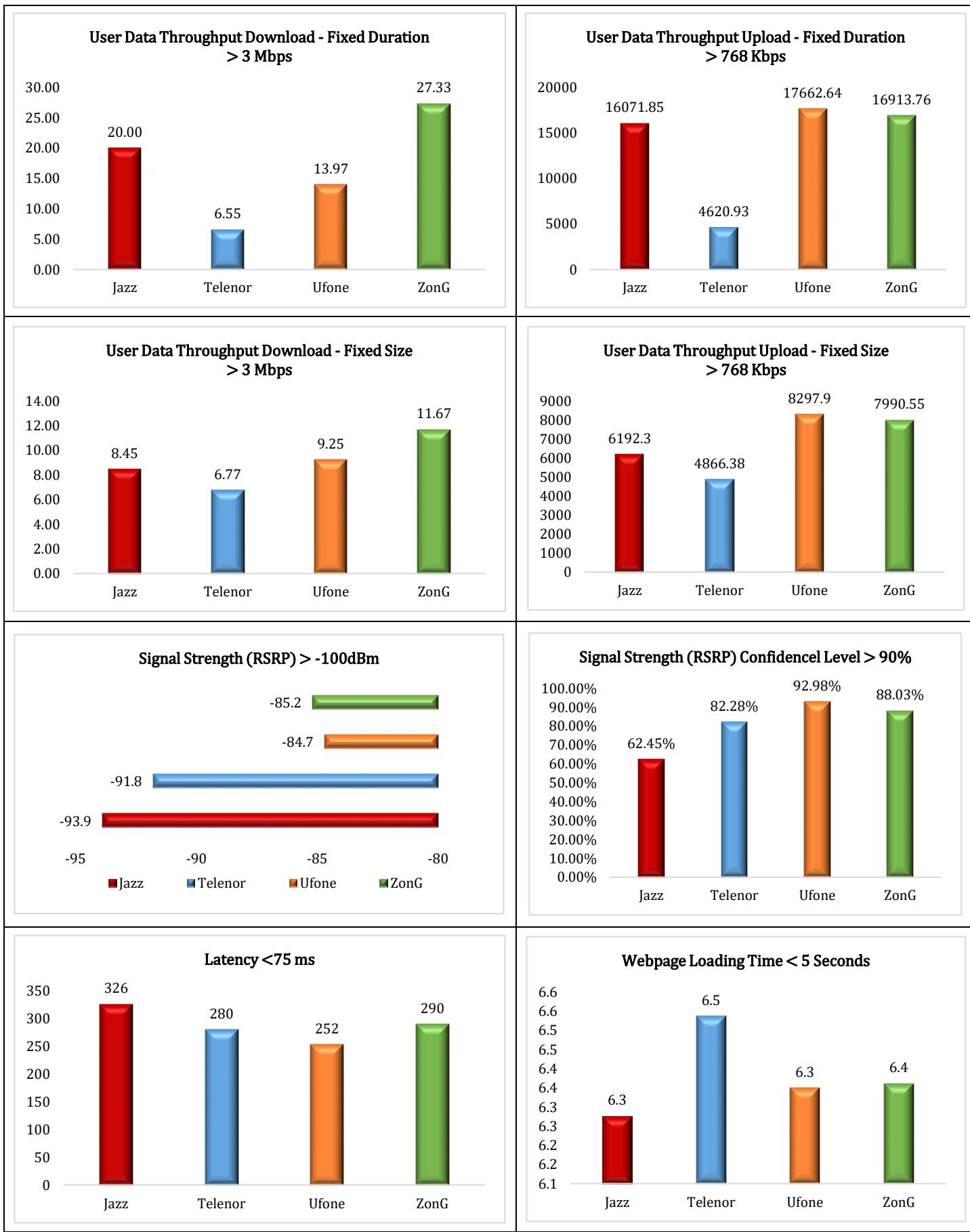


MOBILE BROADBAND AUTOMODE KPIs RESULT

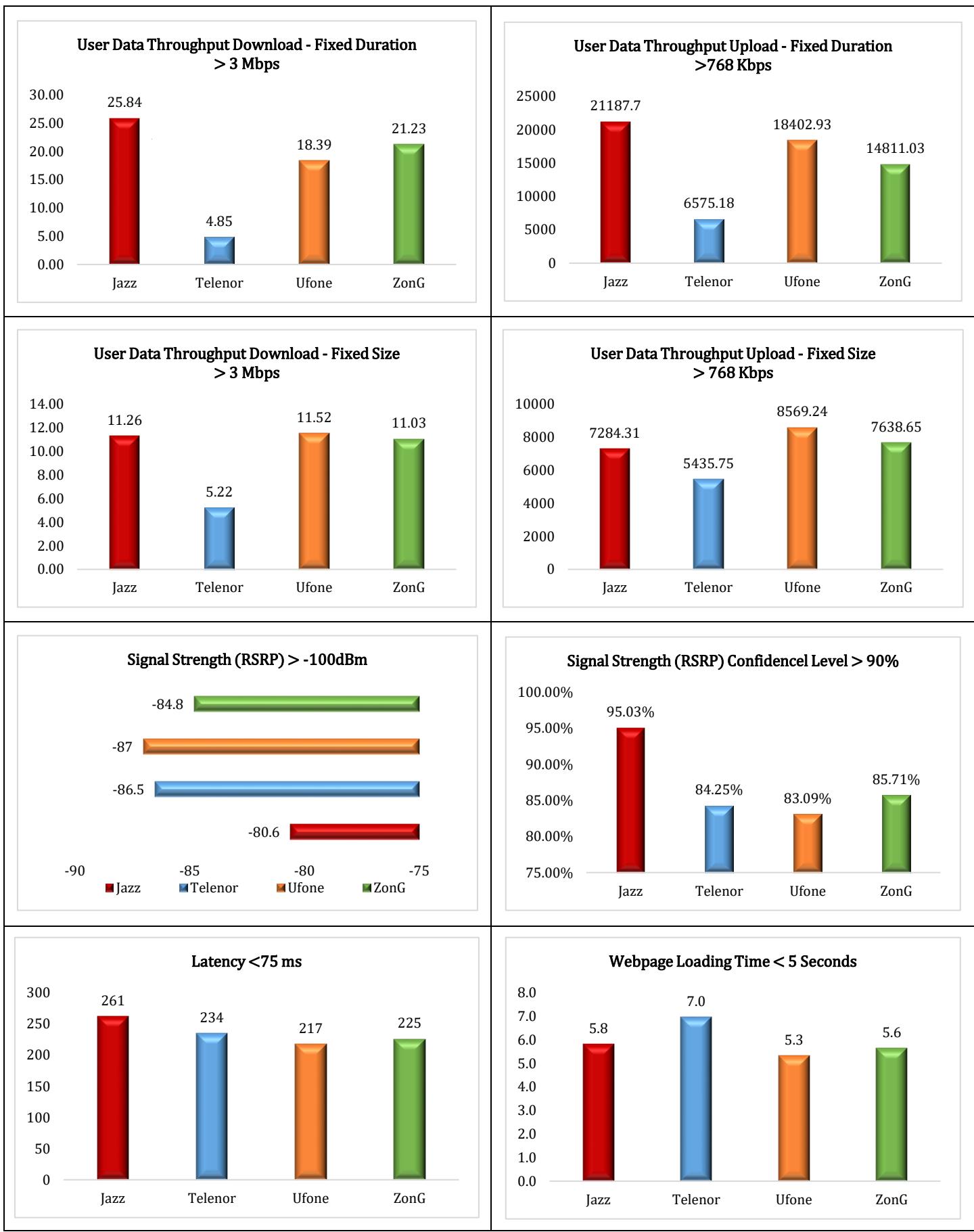
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – ZHOB TO QUETTA (N-50)



QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – QUETTA TO ZHOB (N-50)



QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – LAHORE TO SARGODHA (N-60)



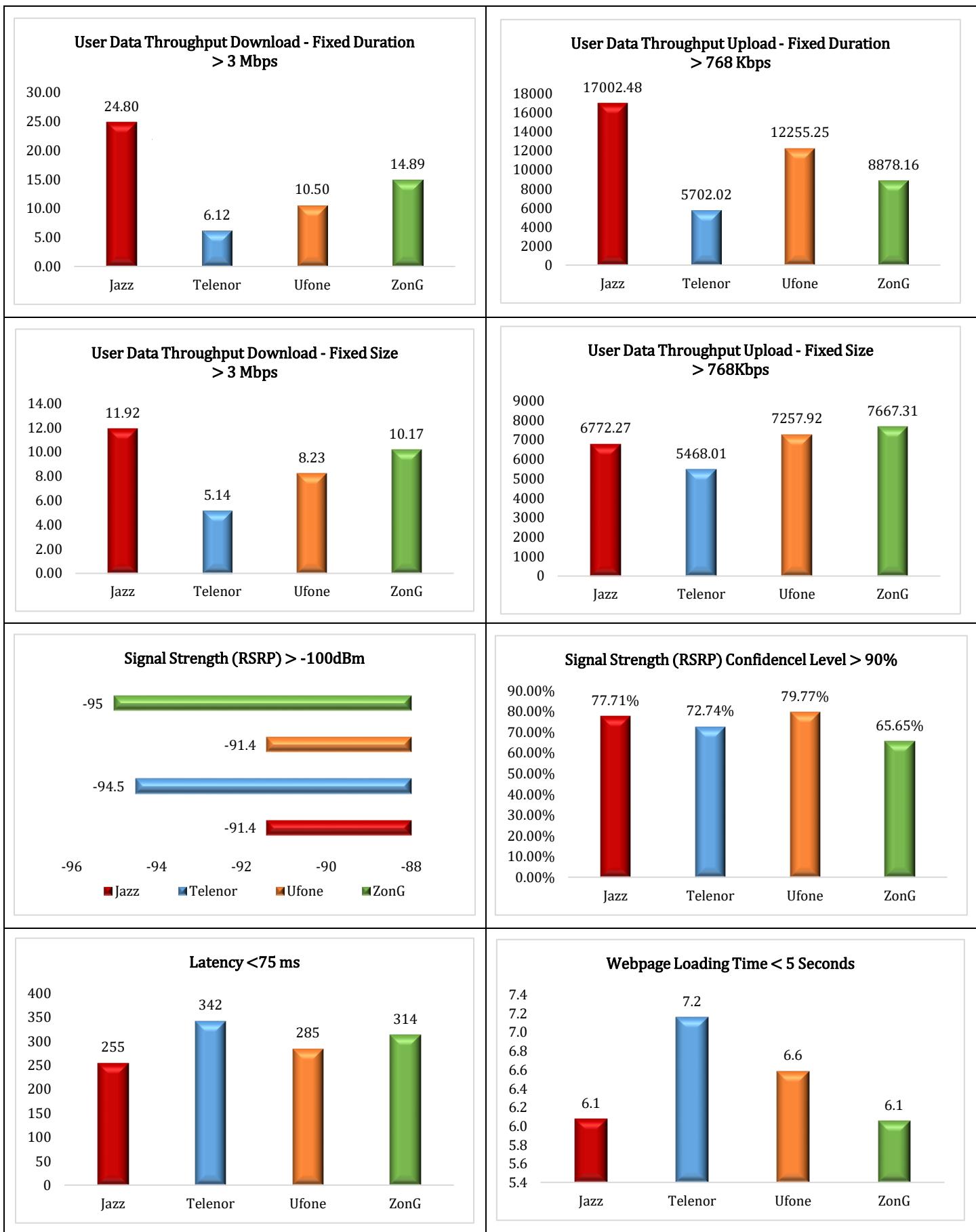
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – LAHORE TO MULTAN (N-5)



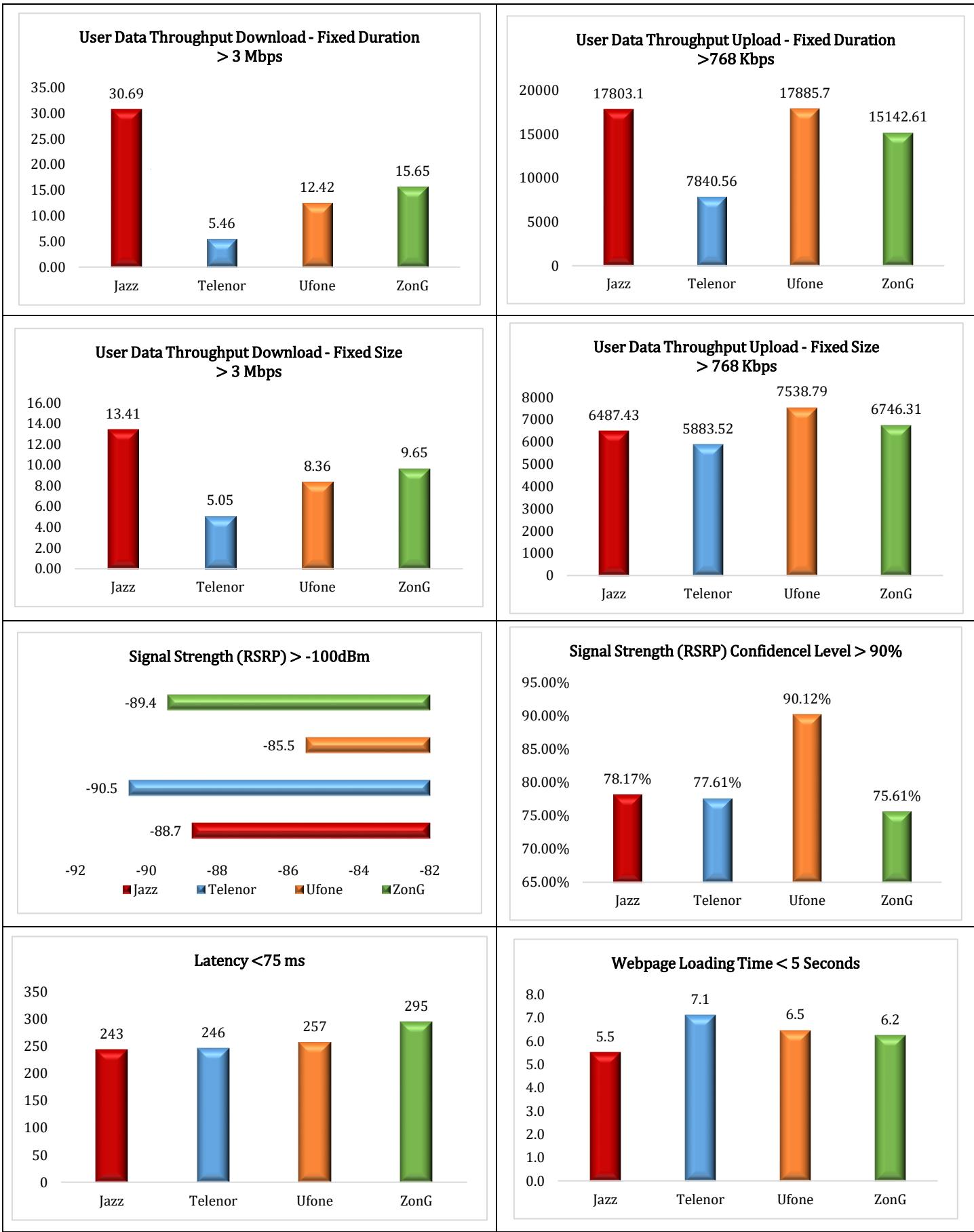
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – LAHORE TO RAWALPINDI (N-5)



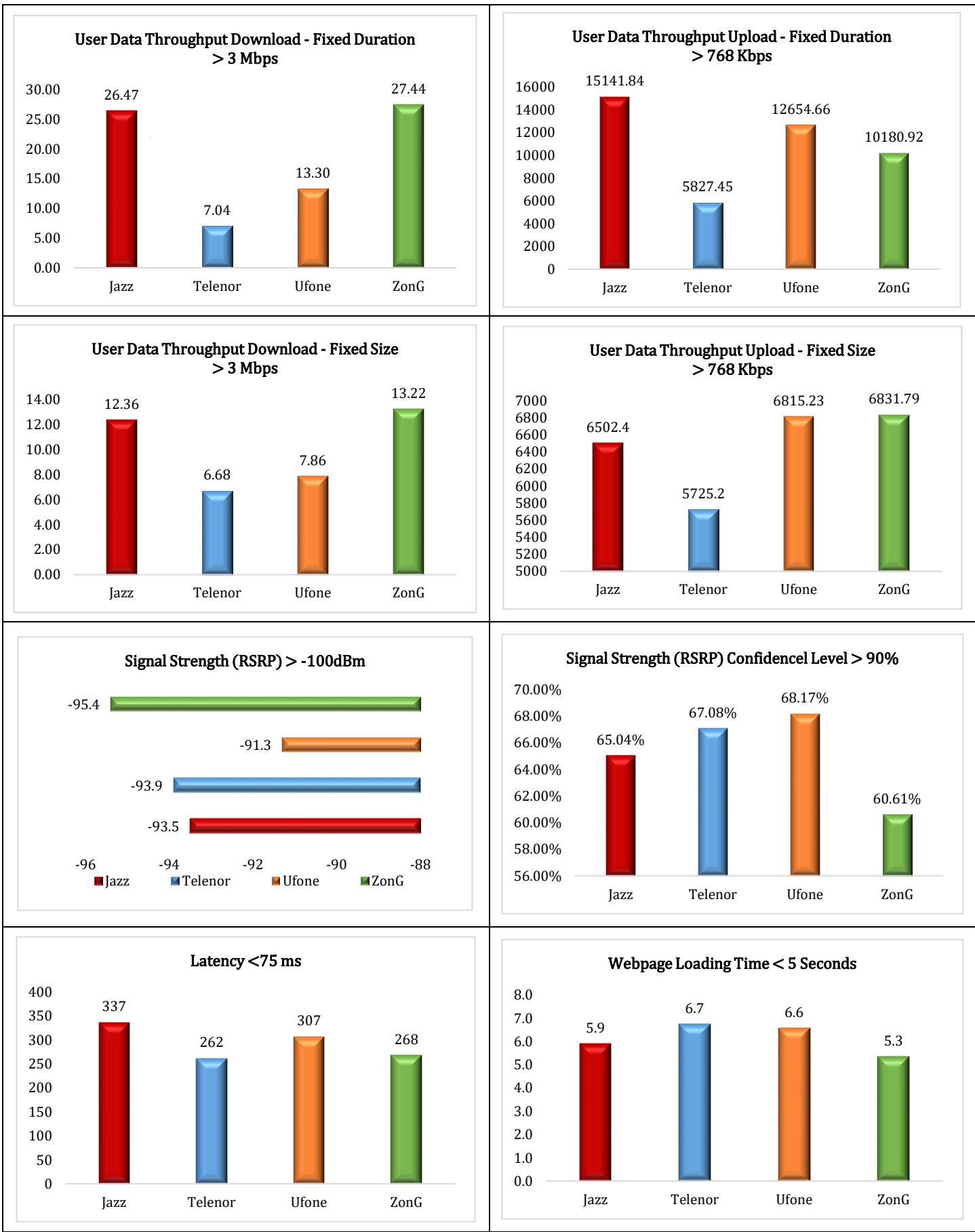
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – ISLAMABAD TO D.I KHAN (M-14)



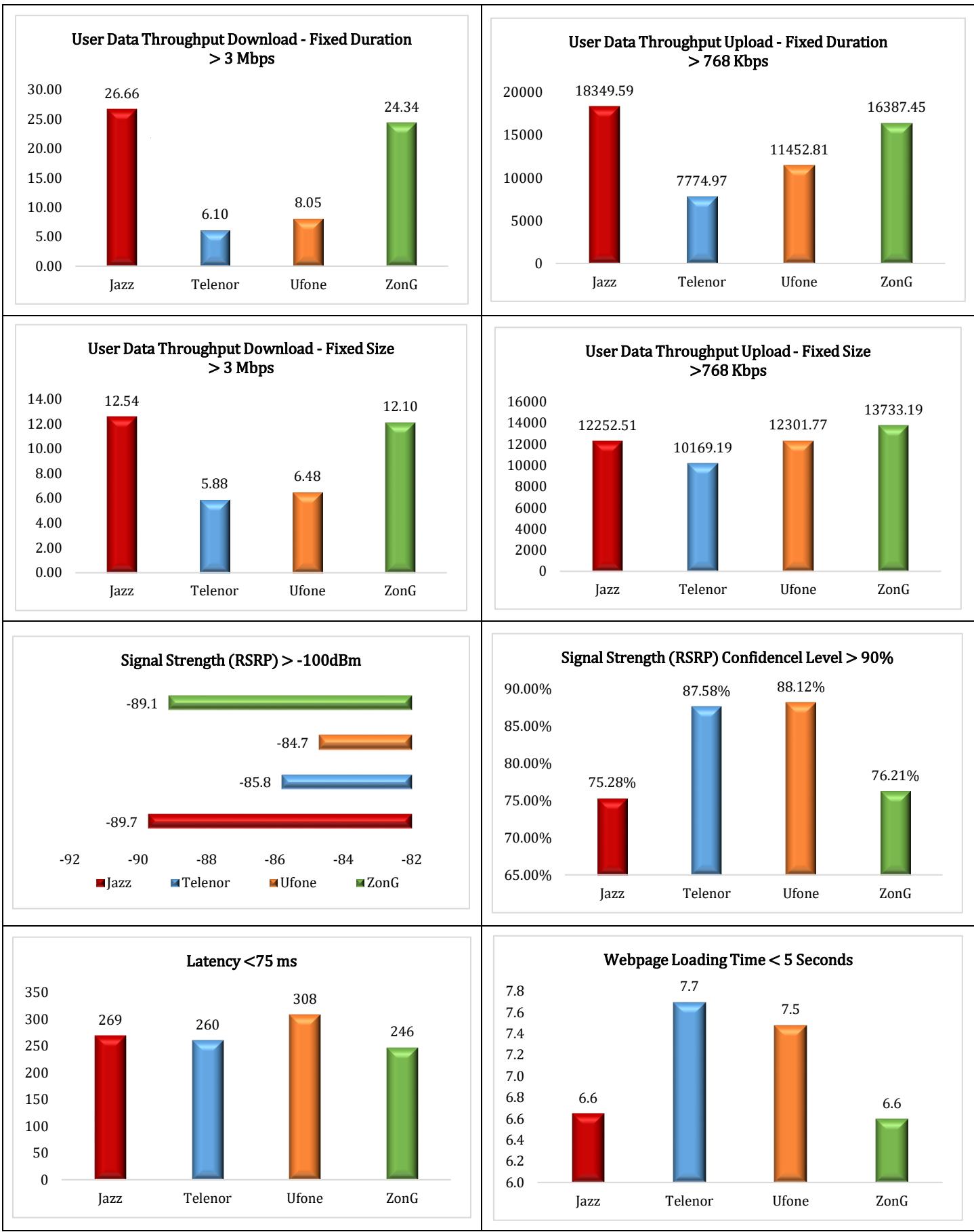
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – ISLAMABAD TO KOHAT (N-80)



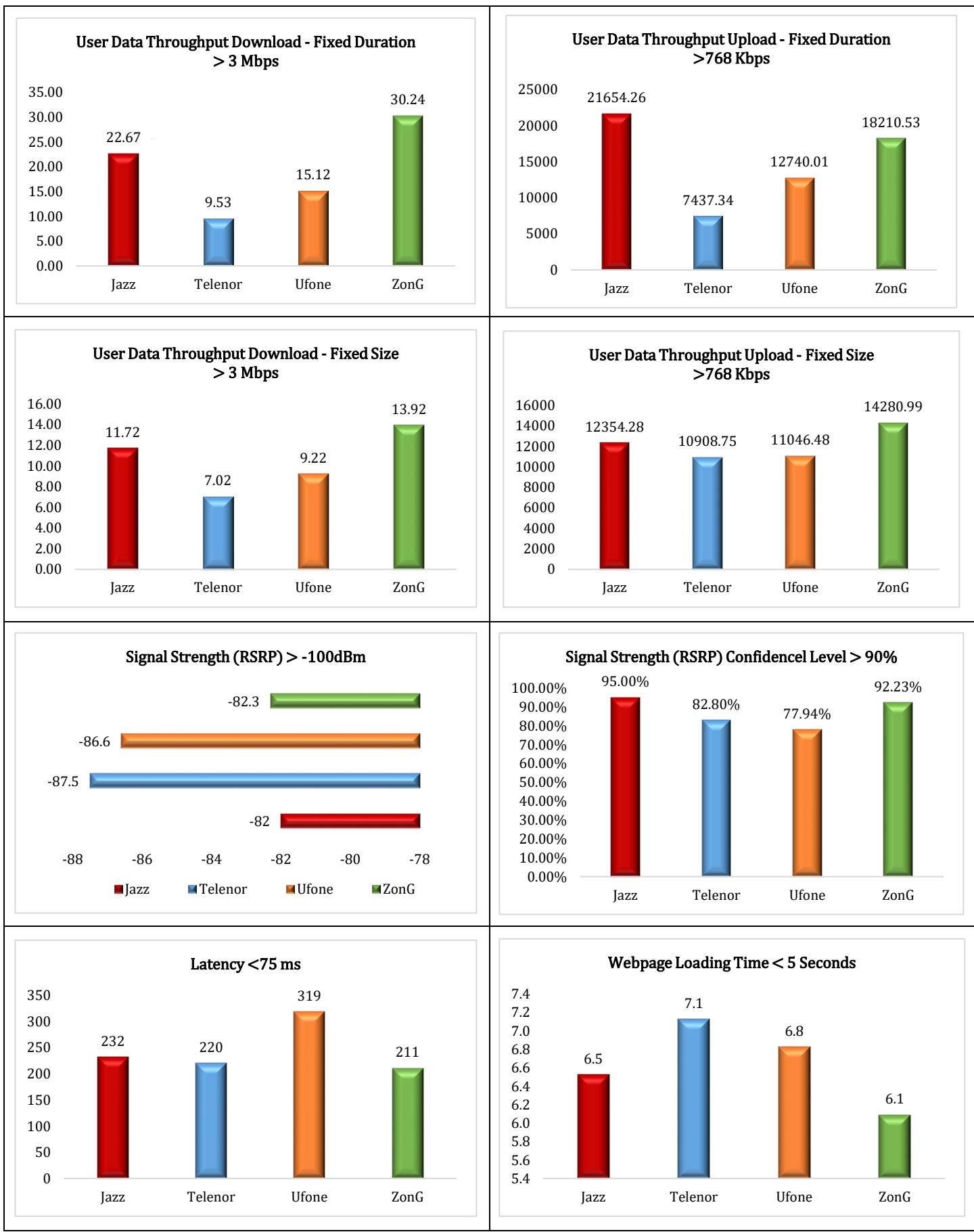
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – MIANWALI TO BHAKKAR (N-130)



QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – PESHAWAR TO DG KHAN (N-55)

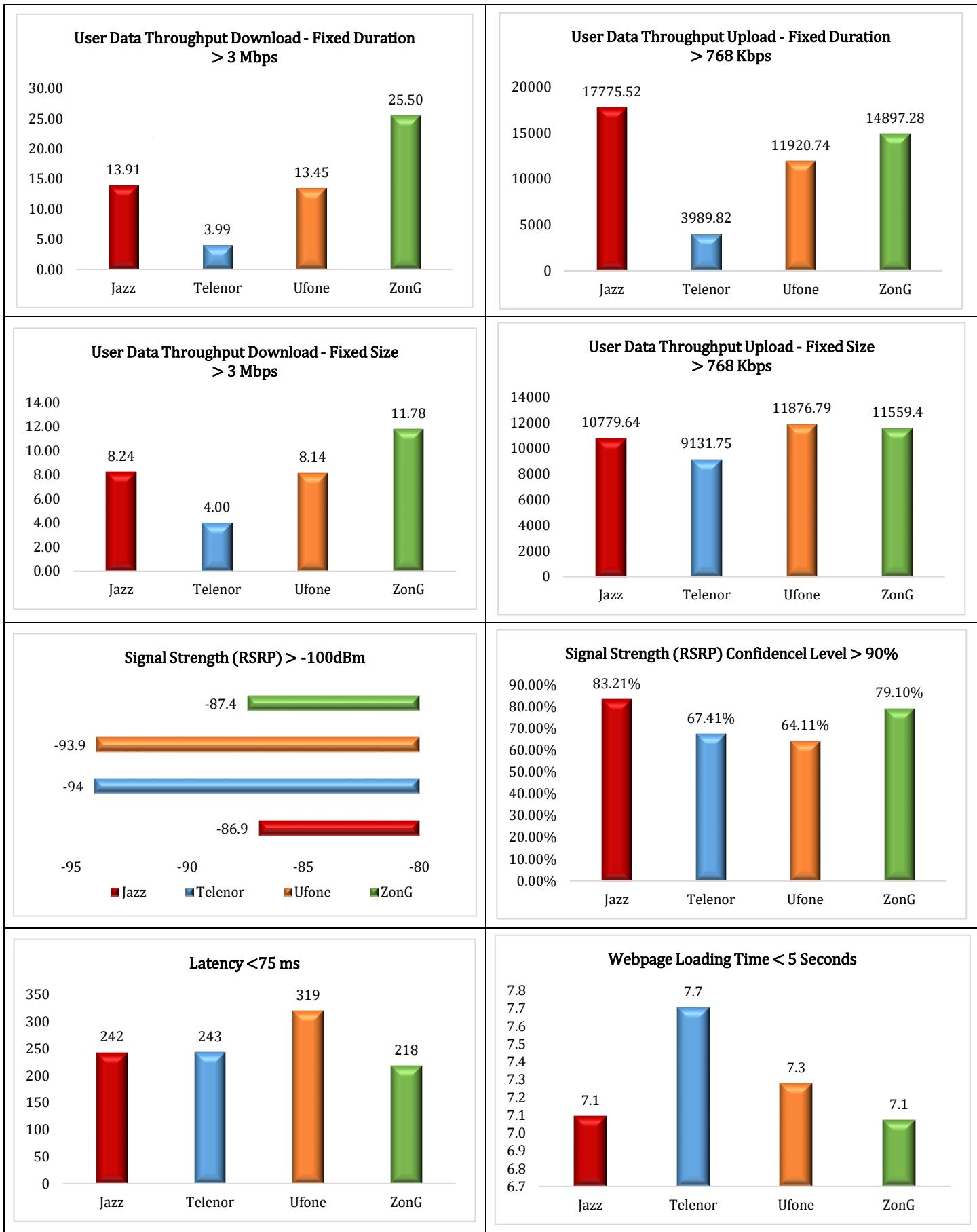


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – KOT SABZAL TO MULTAN (N-5)

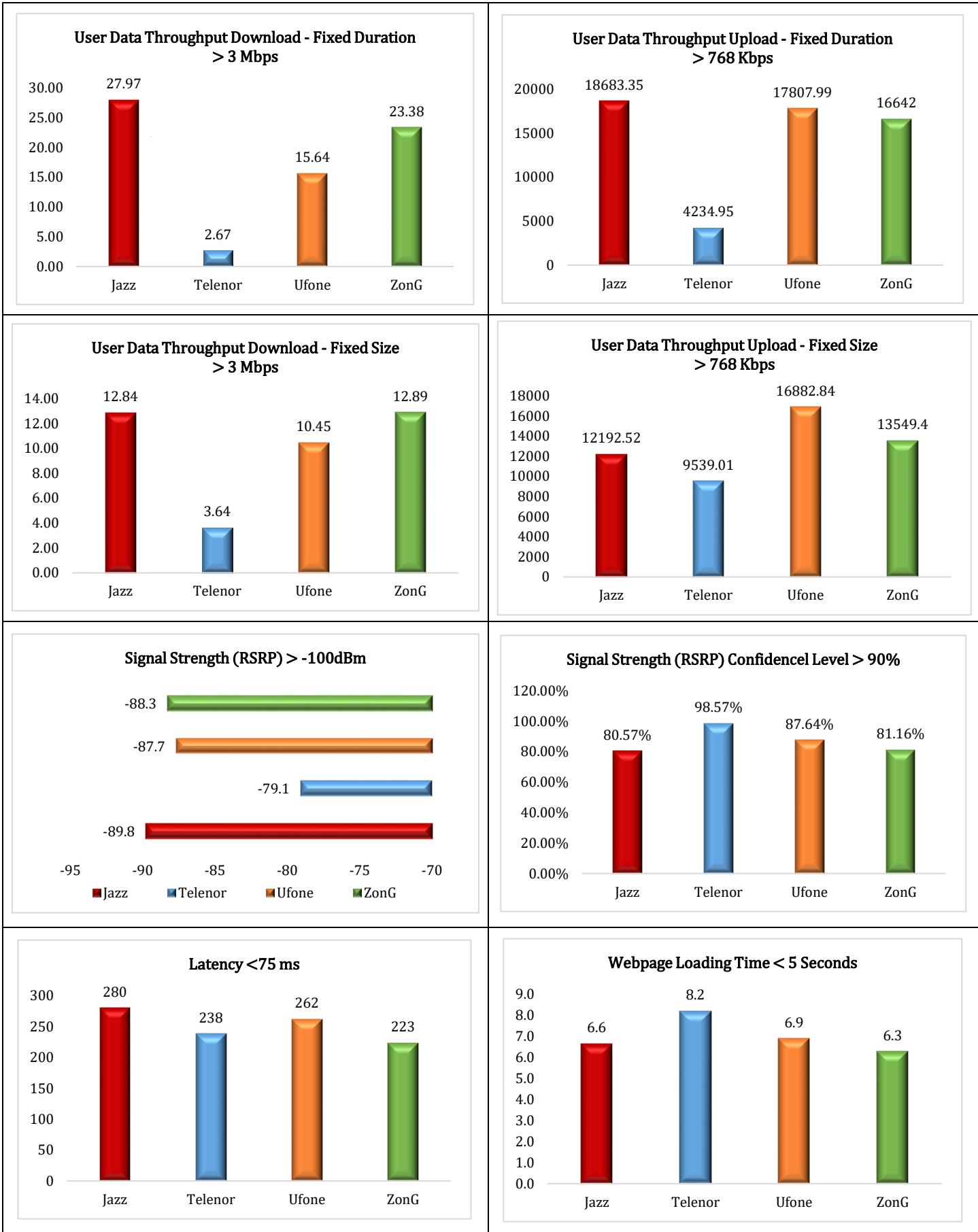


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – TARRANDA MUHAMMAD

PANAH TO JALALPUR PIRWALA (N-115)



QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – CHAK DHARA TO BAHRAIN (N-95)

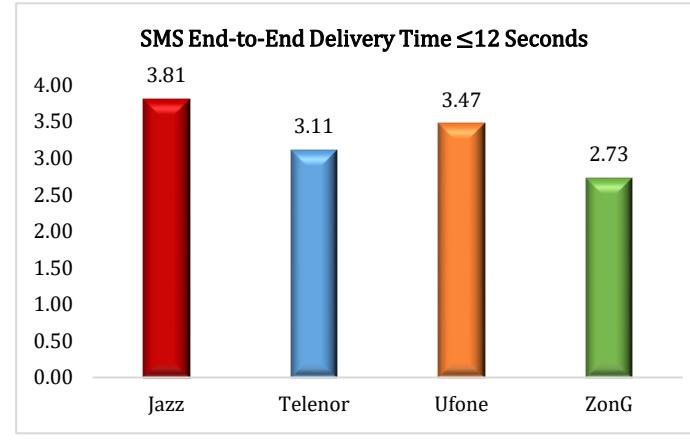
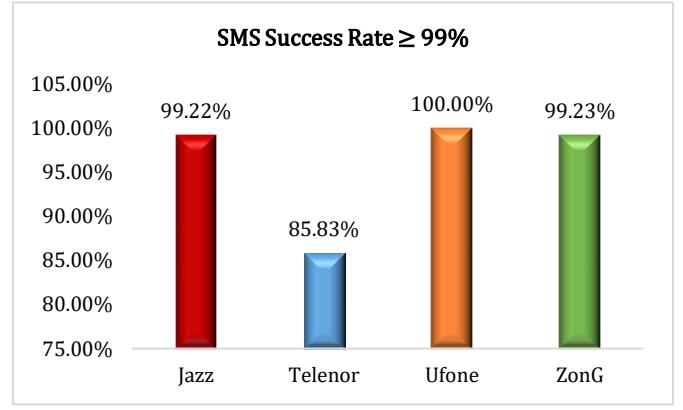
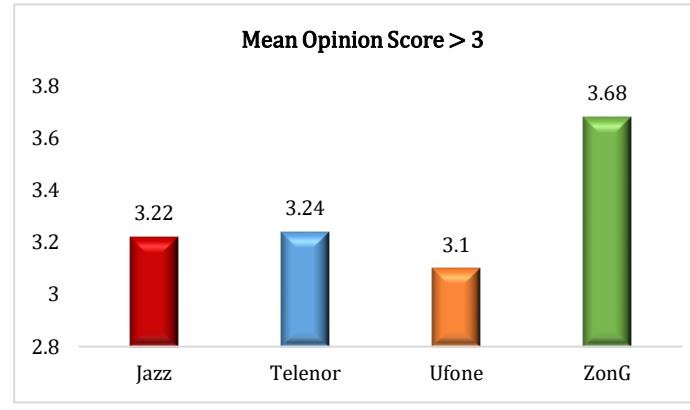
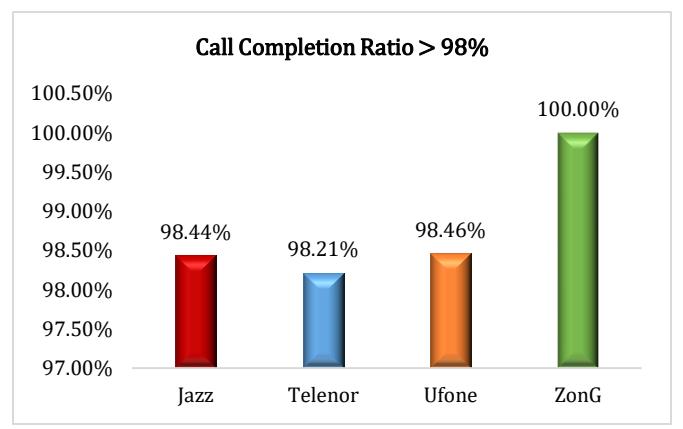
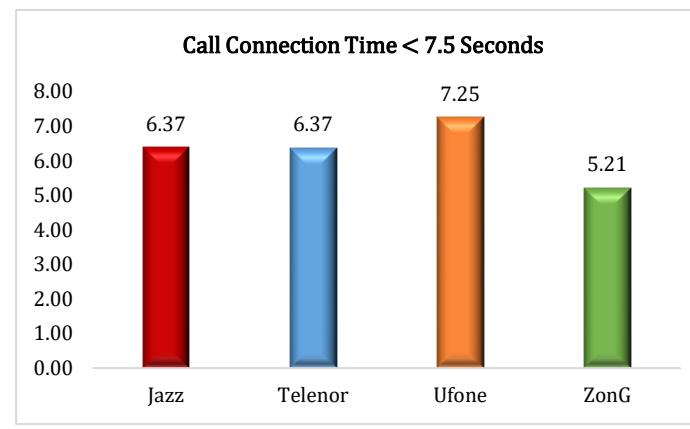
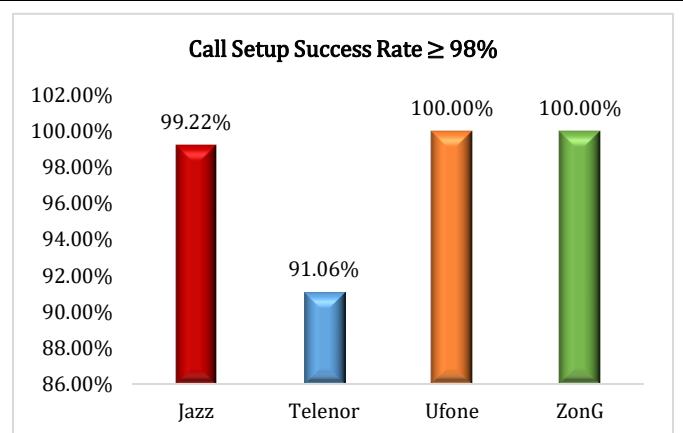
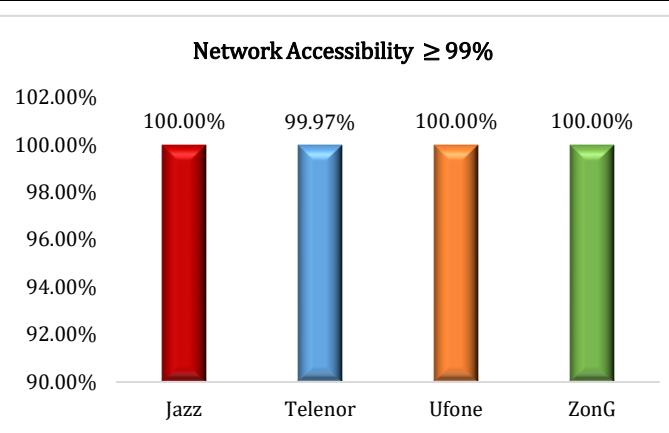


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – KHAWAZKHEL BESHAM (N-90)

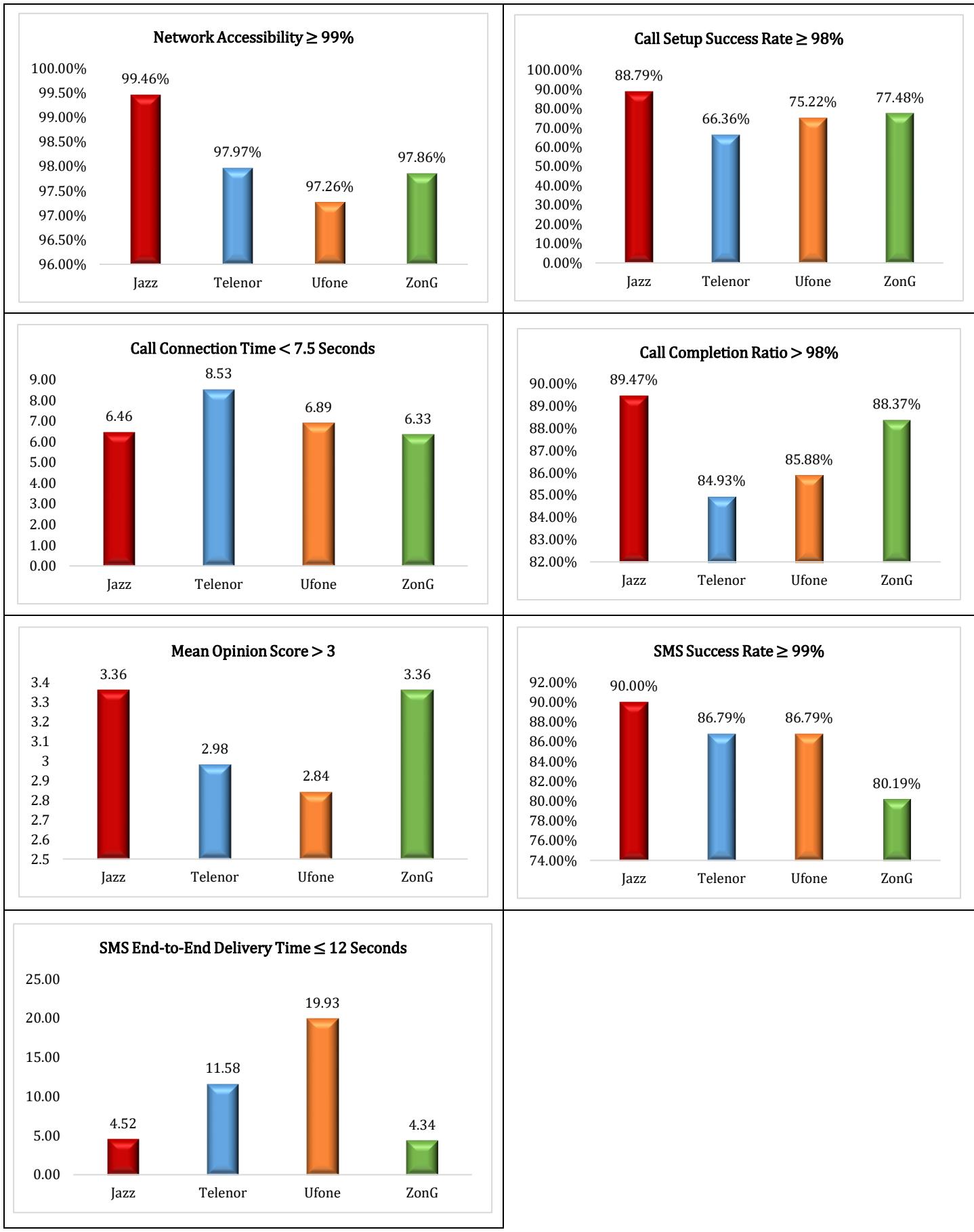


VOICE & SMS RESULT

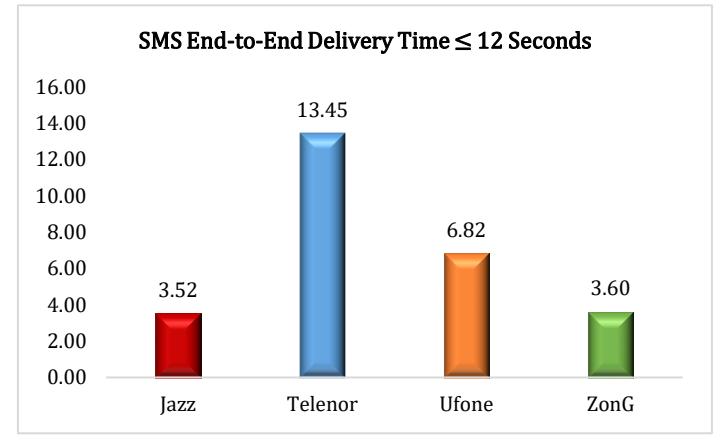
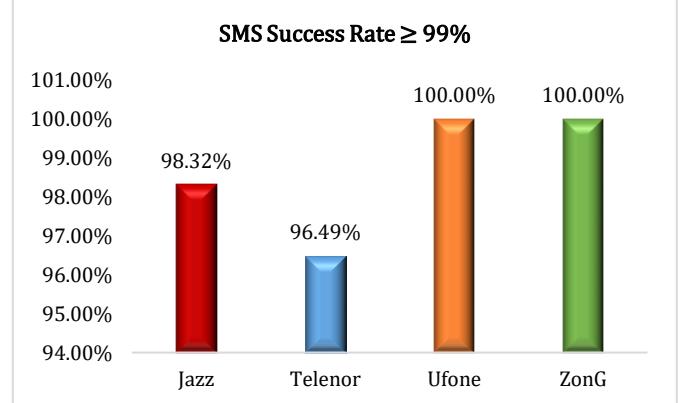
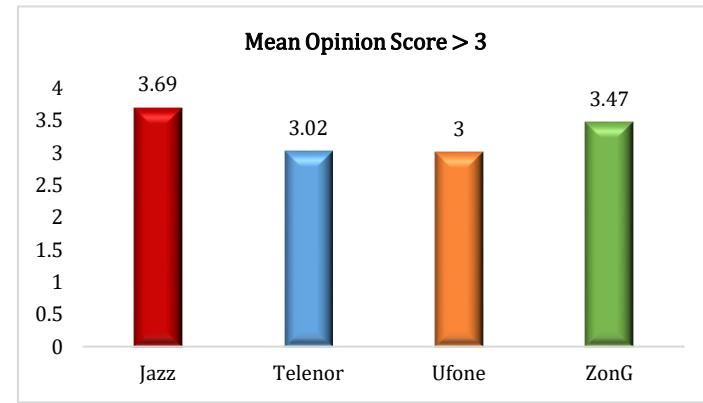
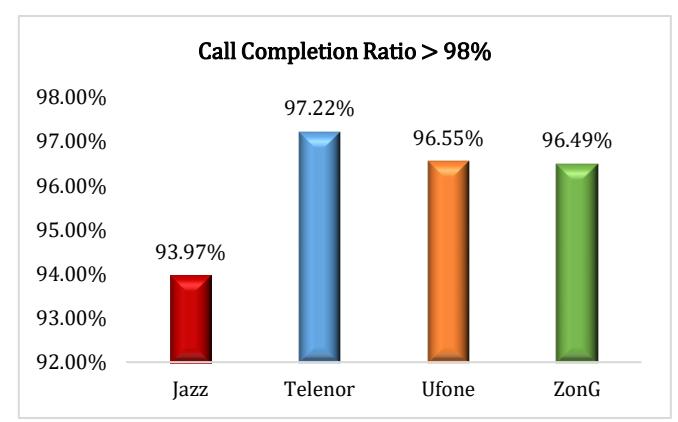
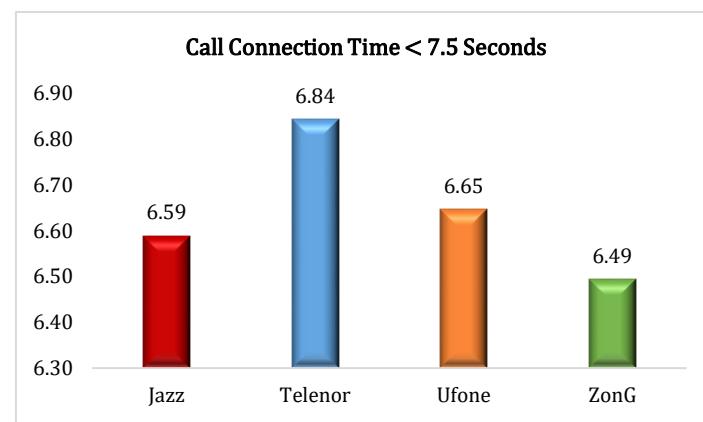
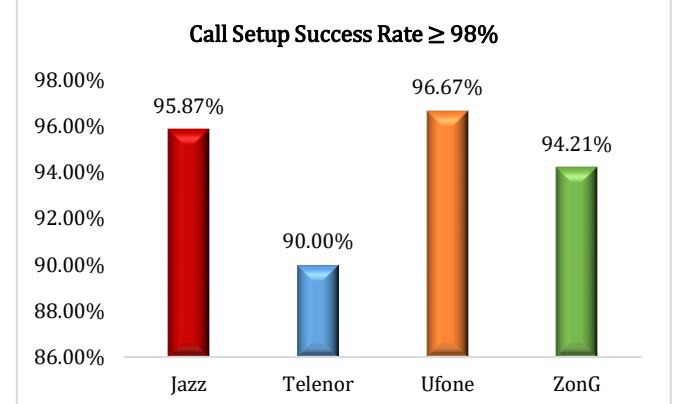
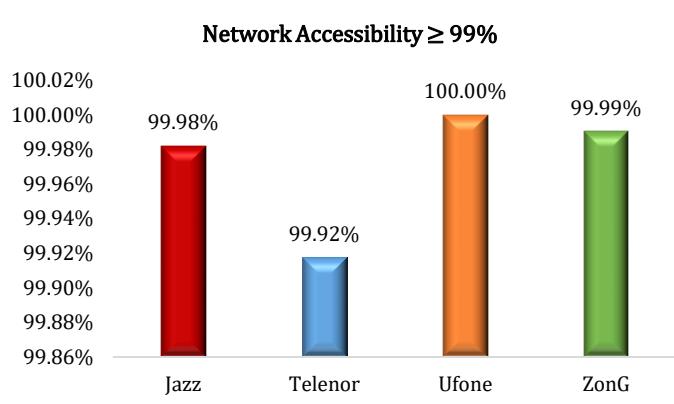
QUALITY OF SERVICE SURVEY RESULTS – CHAK DHARA TO BAHRAIN (N-95)



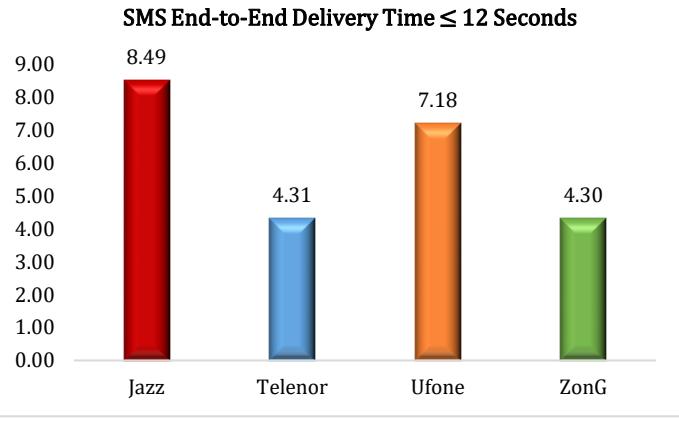
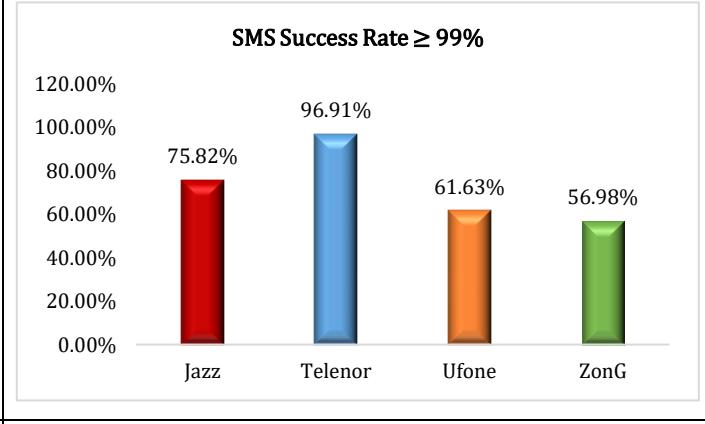
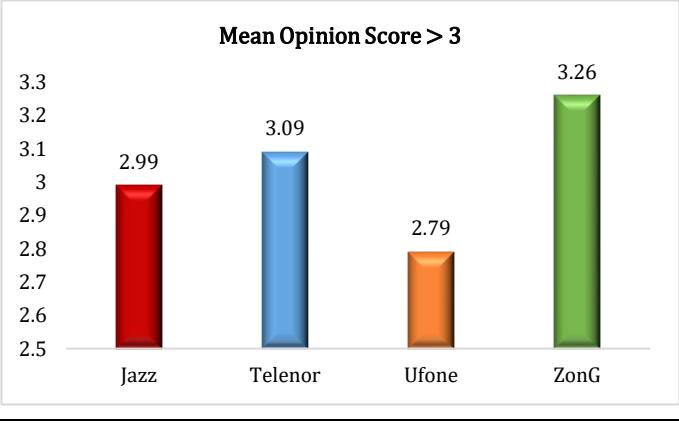
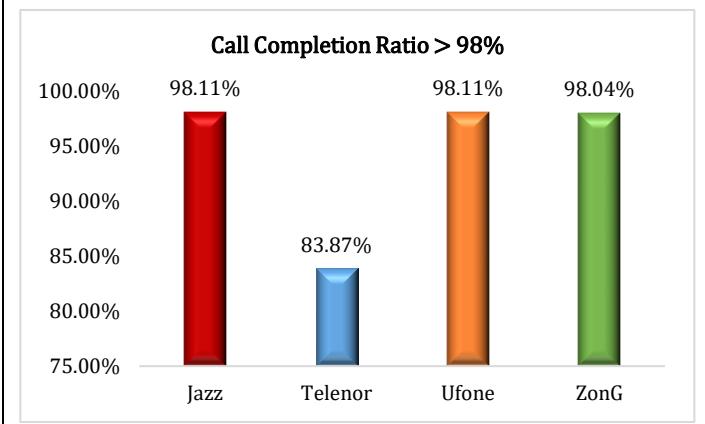
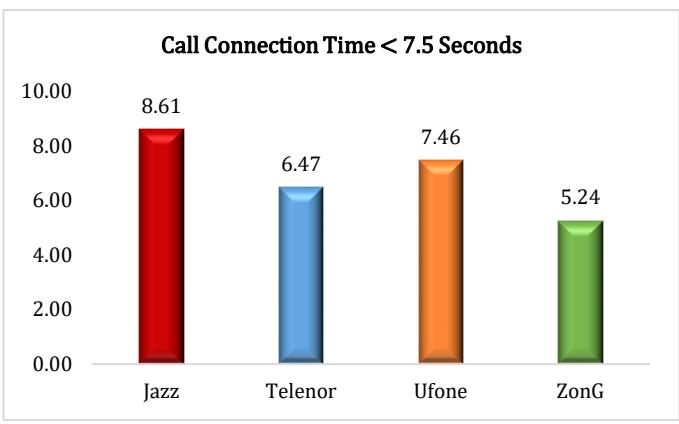
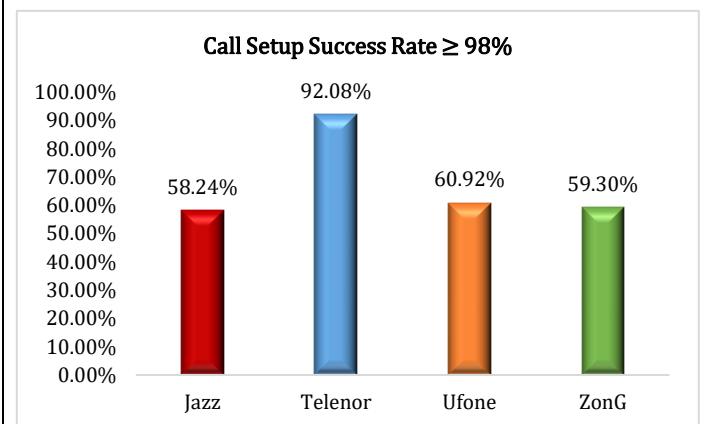
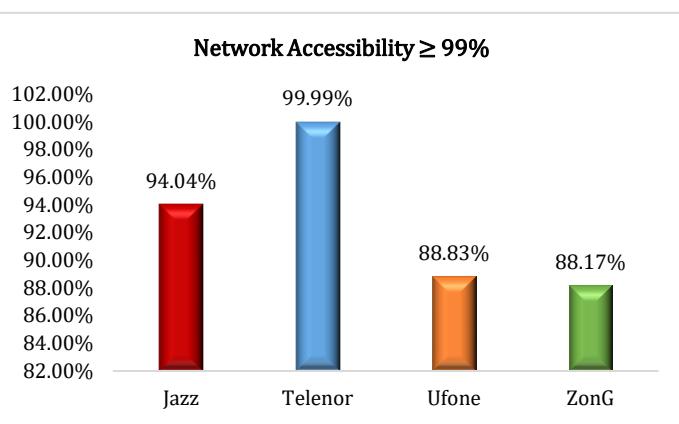
QUALITY OF SERVICE SURVEY RESULTS – ISLAMABAD TO DI KHAN (M-14)



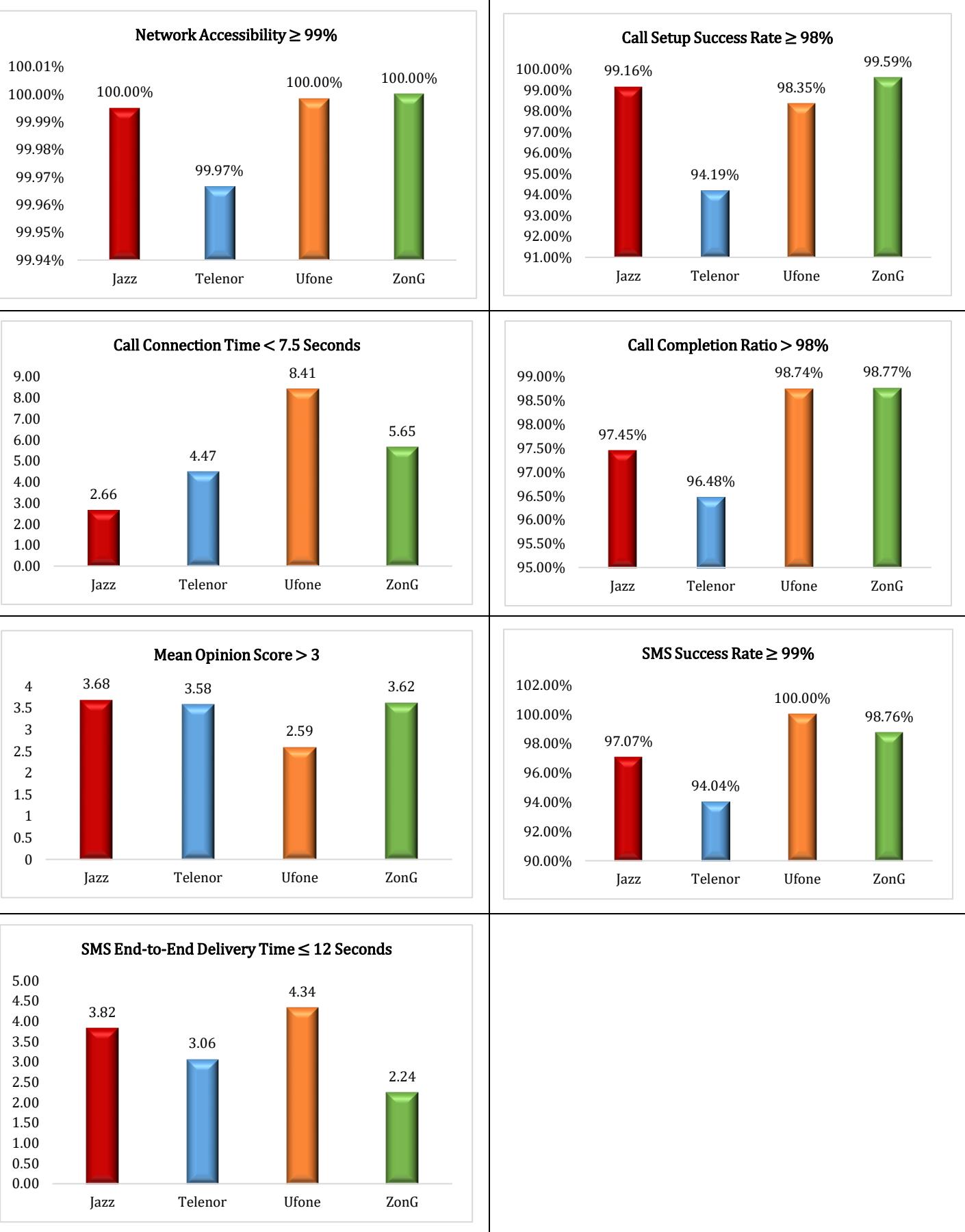
QUALITY OF SERVICE SURVEY RESULTS – ISLAMABAD TO KOHAT (N-80)



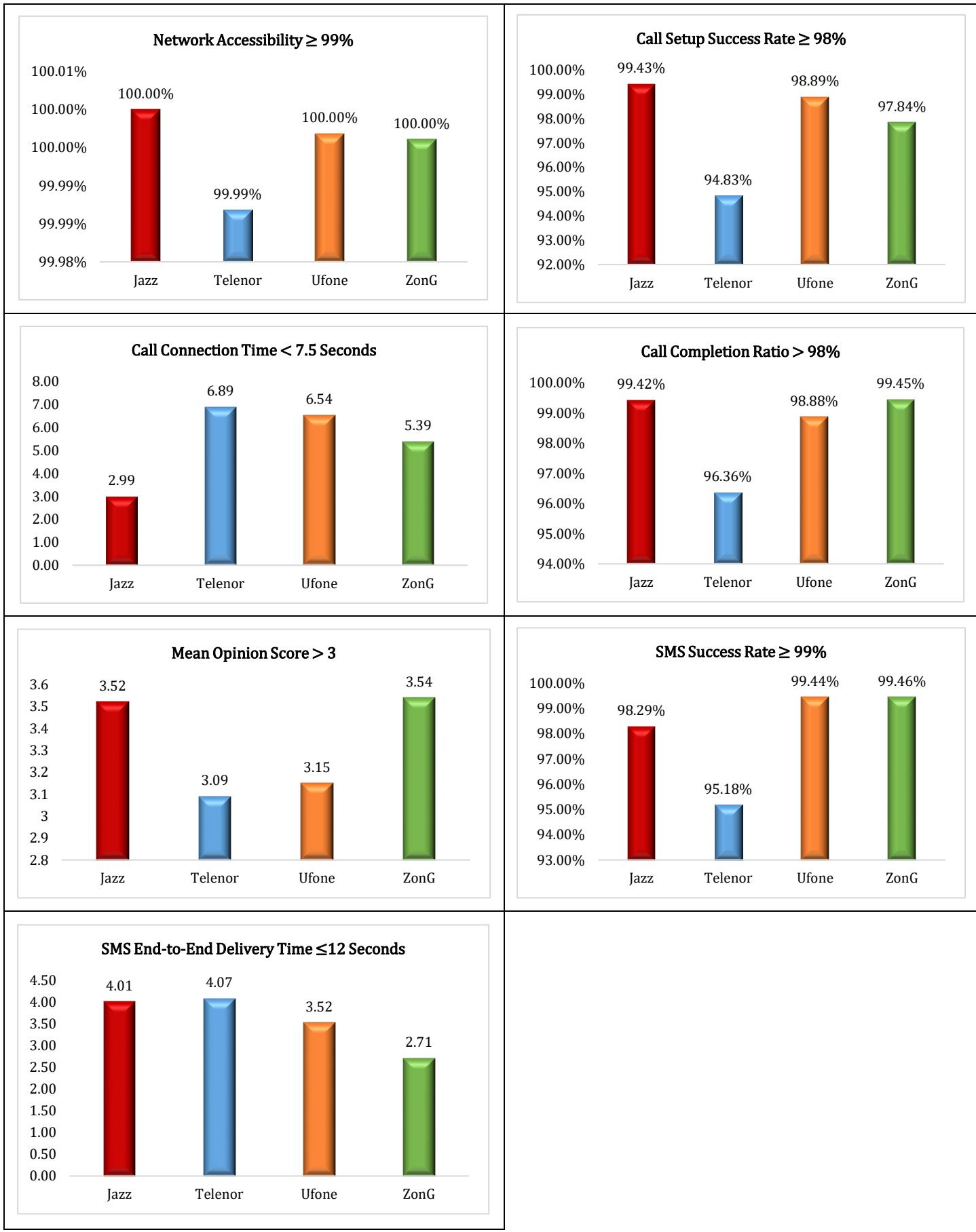
QUALITY OF SERVICE SURVEY RESULTS – KHAWAZ KHEL TO BEHSAM (N-90)



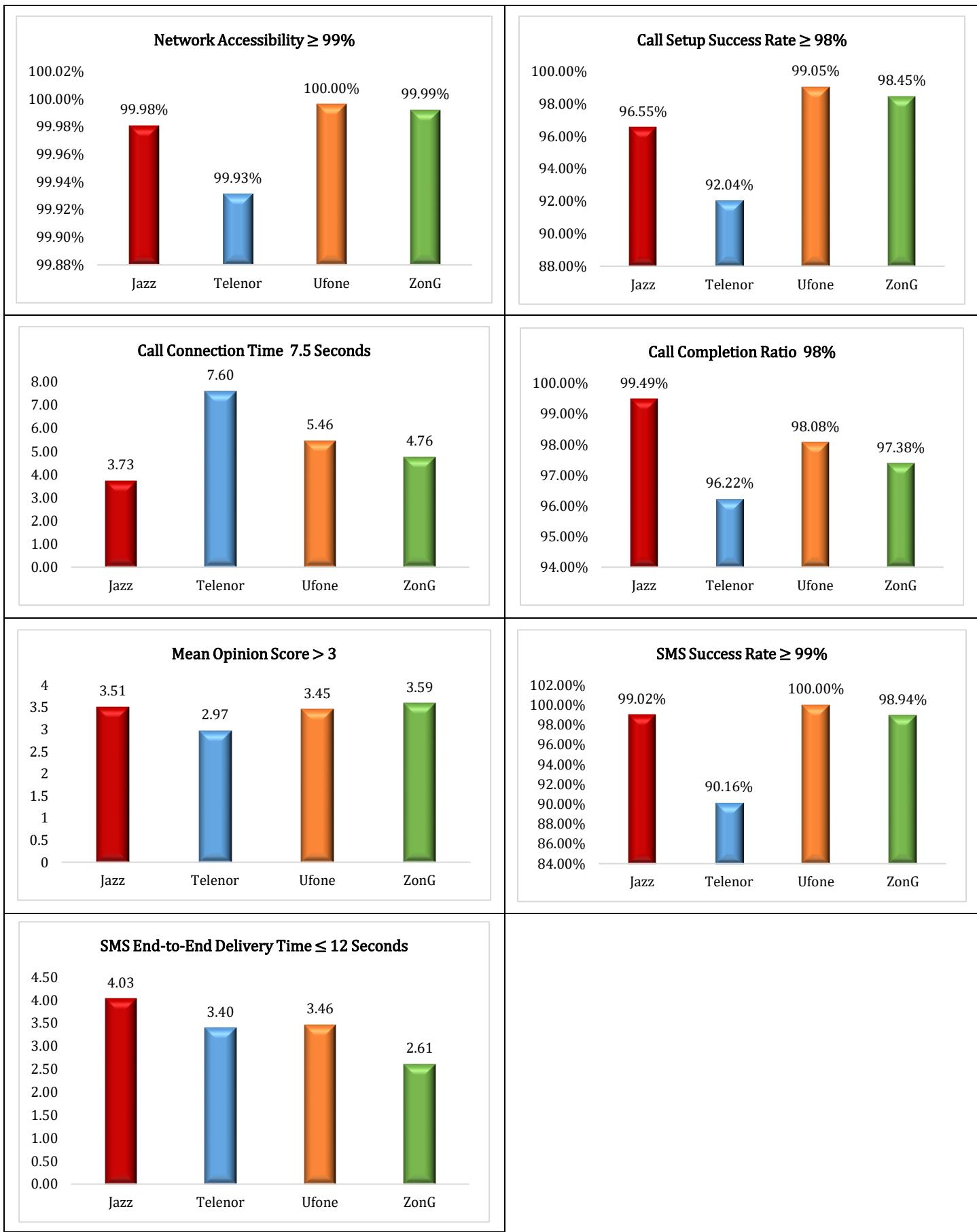
QUALITY OF SERVICE SURVEY RESULTS – KOT SABZAL MULTAN (N-5)



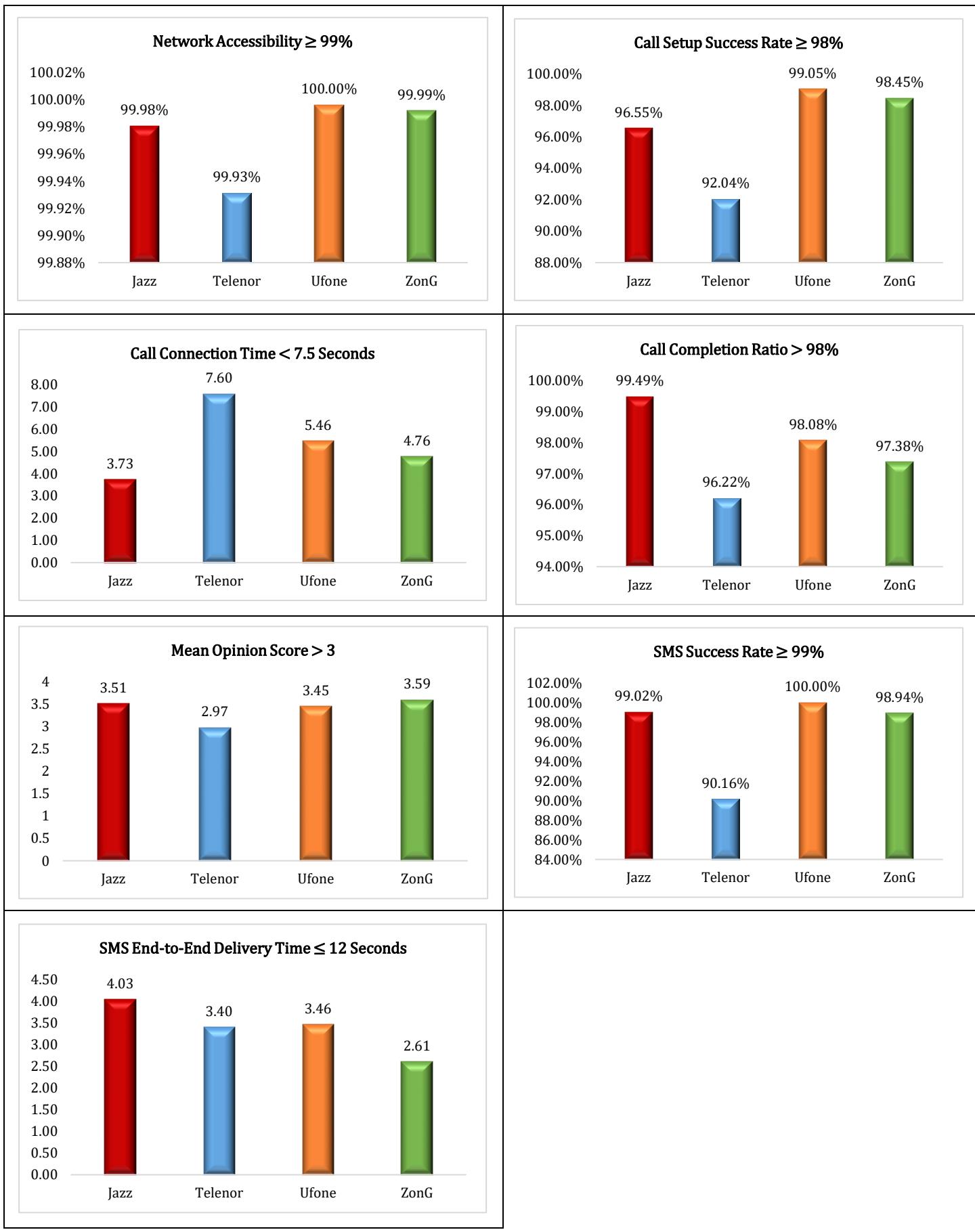
QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO MULTAN (N-5)



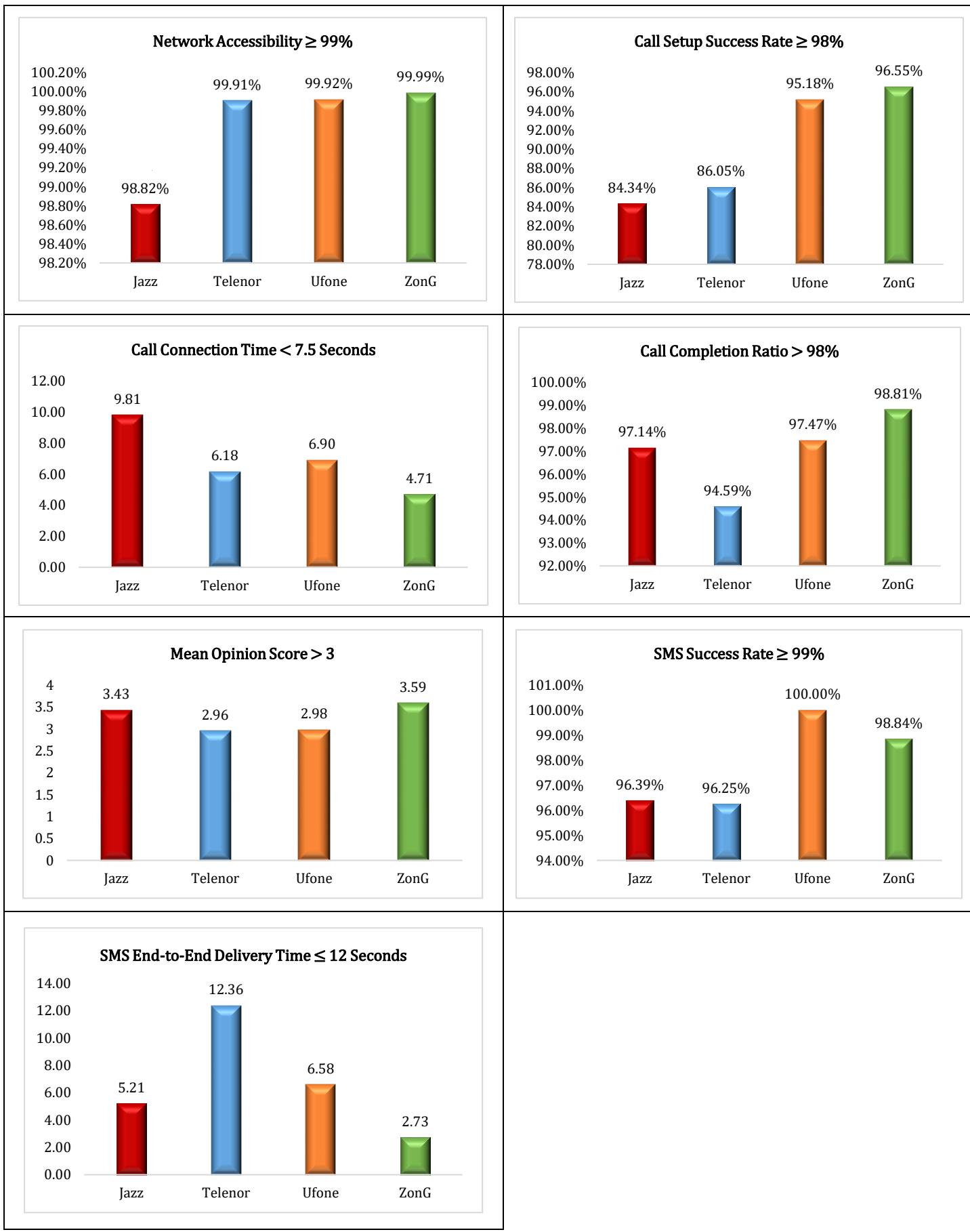
QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO RAWALPINDI (N-5)



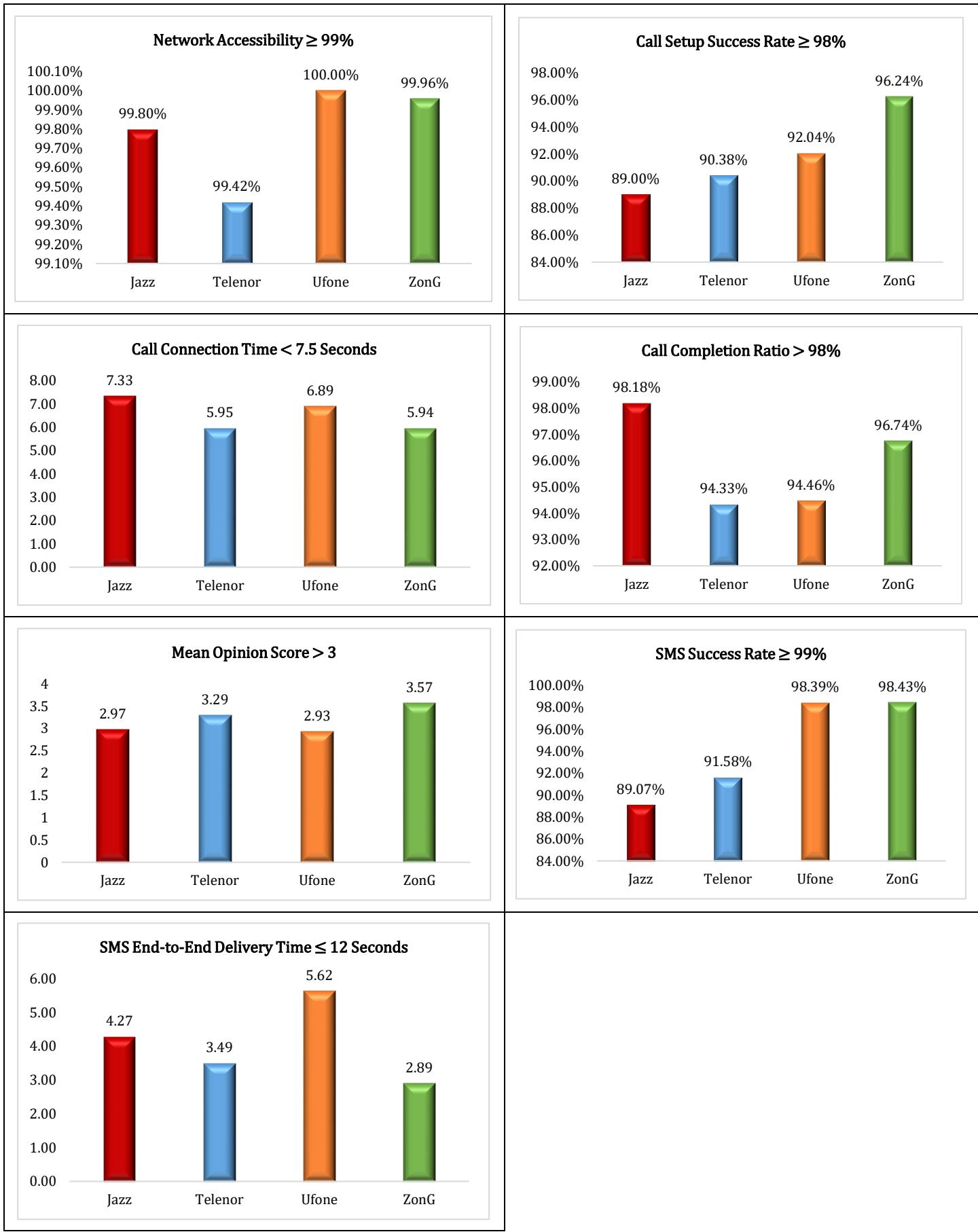
QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO SARGODHA (N-60)



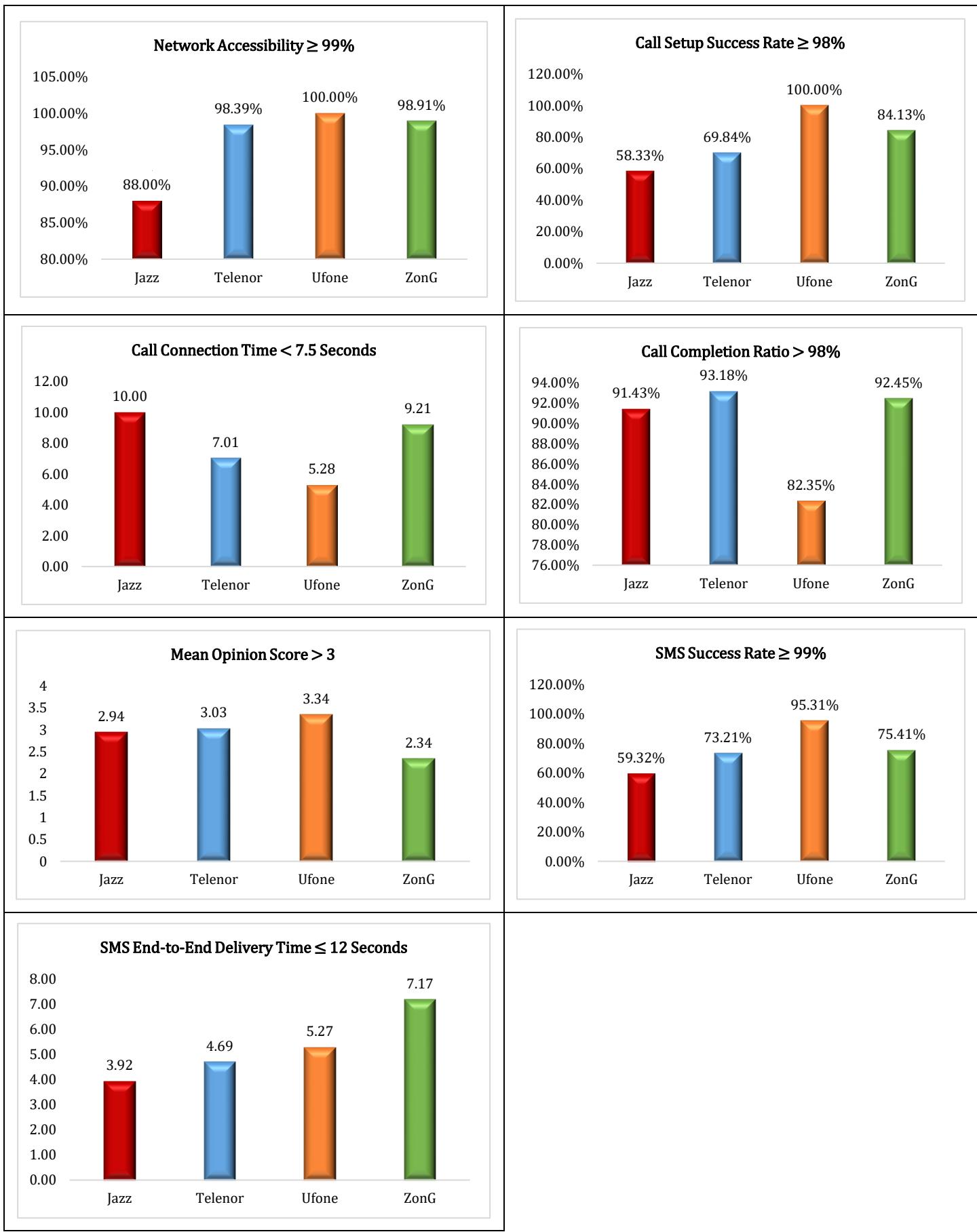
QUALITY OF SERVICE SURVEY RESULTS – MIANWALI TO BHAKKAR (N-130)



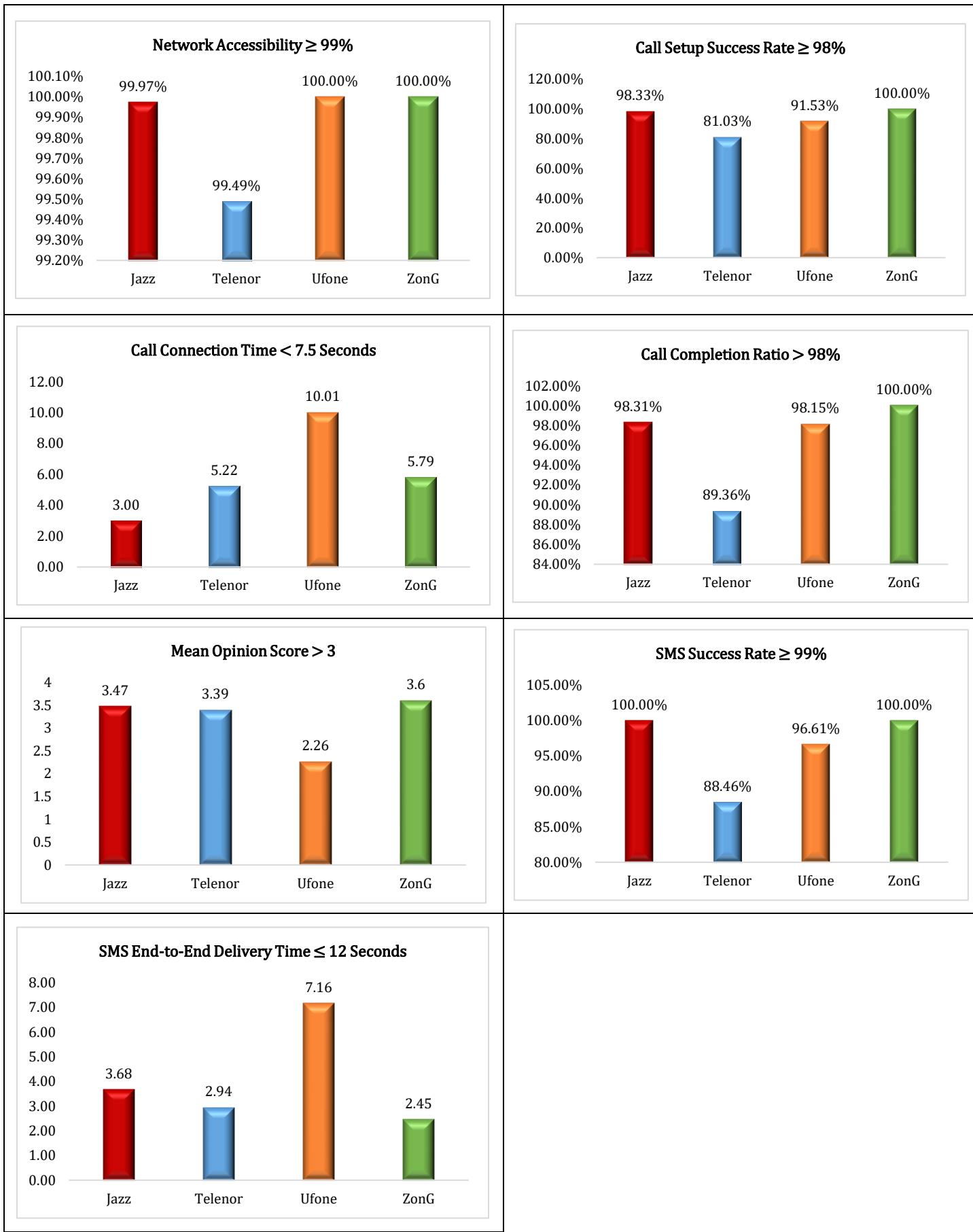
QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO DG KHAN (N-55)



QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO ZHOB (N-50)



QUALITY OF SERVICE SURVEY RESULTS – TARANDA MUHAMMAD PANAH TO JALALPUR PIRWALA (N-115)



QUALITY OF SERVICE SURVEY RESULTS – ZHOB TO QUETTA (N-50)

