INDEPENDENT QUALITY OF SERVICE SURVEY IN PAKISTAN – CITIES

SECOND QUARTER 2023

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

INDEPENDENT QUALITY OF SERVICE SURVEY REPORT

INTRODUCTION

1.1. In order to measure the performance and service quality of Cellular Mobile Operators (CMOs), an independent Quality of Service (QoS) Survey has been carried out in Nineteen (19) x Cities of Balochistan, Khyber Pakhtunkhwa, Islamabad Capital Territory (ICT), Punjab and Sindh during 2nd Quarter i.e. April~ June 2023. The names of cities along with survey dates are mentioned in **Table 1.1: QoS Survey Cities & Dates**:

S. #.	City	Province	Days	Survey Dates
1	QUETTA	BALOCHISTAN	3	8th/9th~16th May,2023
2	GAWADAR		2	15th ~16th May,2023
3	KUCHLAK		3	23rd ~25th May,2023
4	MACH		4	29th May ~ 1st June,2023
5	PISHIN		4	5th ~8th June,2023
6	CHARSADDA	KHYBER PAKHTUNKHWA	4	2nd ~5th May,2023
7	HANGU		4	15th ~18th May,2023
8	LOWER DIR		3	22nd ~24th May,2023
9	ABBOTTABAD		3	31st May ~2nd June,2023
10	MANSEHRA		3	5th ~7th June,2023
11	ISLAMABAD	ICT	6	2nd~5th,8th~9th May,2023
12	BAHAWALPUR	PUNJAB	3	2nd ~ 4th May,2023
13	SHEIKHUPURA		3	3rd~5th May,2023
14	KOT RADHA KISHAN		3	23rd~25th May,2023
15	PASROOR		3	8th~9th, 30th May,2023
16	SARGODHA		4	23rd~26th May,2023
17	SUKKUR	SINDH	3	2nd~4th May,2023
18	MATIARI		3	2nd~4th May,2023
19	UMERKOT		4	23rd~26th May,2023

Table 1.1: QoS Survey Dates

DRIVE TEST DETAILS

2.1. The QoS survey was carried out using Automated QoS Monitoring & Benchmarking Tool i.e. **"SMARTBENCHMARKER**". Drive test teams selected survey routes in such a manner to cover main roads, service roads and majority of sectors/colonies. During the survey, mobile handsets for Voice Calls, SMS were kept in technology auto detect mode, whereas, in case of Mobile Broadband/Data Sessions, the mobile handsets were kept both in auto detect and 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. City 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								
City	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	99.84%	93.97%	99.05%	99.84%	Yes	Yes	Yes	Yes
BAHAWALPUR	95.49%	91.74%	**87.36%**	98.81%	Yes	Yes	**No**	Yes
CHARSADDA	**84.52%**	**70.63%**	99.40%	98.68%	**No**	**No**	Yes	Yes
GWADAR	90.60%	96.57%	99.27%	96.38%	Yes	Yes	Yes	Yes
QUETTA	99.62%	97.04%	99.09%	99.61%	Yes	Yes	Yes	Yes
ISLAMABAD	97.47%	96.68%	99.71%	98.89%	Yes	Yes	Yes	Yes
KOT RADHA KISHAN	99.13%	**88.75%**	98.06%	99.20%	Yes	**No**	Yes	Yes
SHEIKHUPURA	99.64%	97.11%	98.57%	100.00%	Yes	Yes	Yes	Yes
HANGU	**87.46%**	**40.77%**	99.78%	**72.76%**	**No**	**No**	Yes	**No**
KUCHLAK	95.97%	**77.87%**	99.66%	98.49%	Yes	**No**	Yes	Yes
ABBOTTABAD	94.50%	96.16%	98.49%	97.70%	Yes	Yes	Yes	Yes
LOWER DIR	98.95%	98.56%	97.76%	**85.25%**	Yes	Yes	Yes	**No**
MANSEHRA	96.97%	98.46%	97.81%	98.84%	Yes	Yes	Yes	Yes
MATIARI	99.90%	**89.80%**	92.50%	95.66%	Yes	**No**	Yes	Yes
MACH	**83.20%**	90.99%	95.80%	90.04%	**No**	Yes	Yes	Yes
PASROOR	98.35%	97.82%	98.61%	98.40%	Yes	Yes	Yes	Yes
PISHIN	96.33%	**79.92%**	99.07%	98.64%	Yes	**No**	Yes	Yes
SARGODHA	97.61%	90.61%	96.28%	94.38%	Yes	Yes	Yes	Yes
UMERKOT	**89.76%**	98.32%	90.40%	97.26%	**No**	Yes	Yes	Yes

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								
City	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	99.76%	95.56%	98.94%	99.67%	Yes	Yes	Yes	Yes
BAHAWALPUR	99.10%	97.97%	94.41%	99.98%	Yes	Yes	Yes	Yes
CHARSADDA	**89.37%**	**81.52%**	98.78%	97.83%	**No**	**No**	Yes	Yes
GWADAR	96.74%	97.92%	99.48%	98.81%	Yes	Yes	Yes	Yes
QUETTA	99.71%	98.52%	99.11%	99.79%	Yes	Yes	Yes	Yes
ISLAMABAD	98.36%	96.05%	99.67%	99.30%	Yes	Yes	Yes	Yes
KOT RADHA KISHAN	99.71%	91.46%	99.13%	98.31%	Yes	Yes	Yes	Yes
SHEIKHUPURA	99.77%	94.19%	98.90%	99.87%	Yes	Yes	Yes	Yes
HANGU	93.52%	**69.50%**	99.99%	**80.27%**	Yes	**No**	Yes	**No**
KUCHLAK	97.31%	90.16%	99.81%	99.97%	Yes	Yes	Yes	Yes
ABBOTTABAD	96.84%	98.68%	97.88%	98.76%	Yes	Yes	Yes	Yes
LOWER DIR	99.20%	99.40%	98.67%	92.47%	Yes	Yes	Yes	Yes
MANSEHRA	97.43%	99.43%	97.46%	98.59%	Yes	Yes	Yes	Yes
MATIARI	99.53%	**86.01%**	**86.54%**	96.10%	Yes	**No**	**No**	Yes
MACH	**85.21%**	92.44%	93.85%	91.34%	**No**	Yes	Yes	Yes
PASROOR	98.19%	96.38%	97.90%	98.62%	Yes	Yes	Yes	Yes
PISHIN	97.61%	**83.29%**	99.13%	98.41%	Yes	**No**	Yes	Yes
SARGODHA	98.30%	95.14%	92.76%	97.56%	Yes	Yes	Yes	Yes
UMERKOT	92.07%	97.43%	93.19%	92.90%	Yes	Yes	Yes	Yes

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

3.2. **3G SIGNAL STRENGTH IN TECNHOLOGY AUTO DETECT MODE**. During the survey, 3G signal strength samples were also 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. City 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								
City	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	N/A	100.00%	N/A	N/A	N/A	Yes	N/A	N/A
BAHAWALPUR	N/A	N/A	99.63%	100.00%	N/A	N/A	Yes	Yes
CHARSADDA	100.00%	99.72%	100.00%	100.00%	Yes	Yes	Yes	Yes
GWADAR	N/A	98.95%	100.00%	97.30%	N/A	Yes	Yes	Yes
QUETTA	99.38%	100.00%	100.00%	100.00%	Yes	Yes	Yes	Yes
ISLAMABAD	100.00%	100.00%	100.00%	100.00%	Yes	Yes	Yes	Yes
KOT RADHA KISHAN	N/A	N/A	100.00%	N/A	N/A	N/A	Yes	N/A
SHEIKHUPURA	N/A	N/A	100.00%	N/A	N/A	N/A	Yes	N/A
HANGU	91.48%	97.68%	100.00%	98.00%	Yes	Yes	Yes	Yes
KUCHLAK	99.93%	99.21%	100.00%	99.95%	Yes	Yes	Yes	Yes
ABBOTTABAD	N/A	100.00%	100.00%	N/A	N/A	Yes	Yes	N/A
LOWER DIR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MANSEHRA	100.00%	100.00%	100.00%	N/A	Yes	Yes	Yes	N/A
MATIARI	N/A	100.00%	100.00%	**48.22%**	N/A	Yes	Yes	**No**
MACH	100.00%	**35.00%**	99.56%	100.00%	Yes	**No**	Yes	Yes
PASROOR	N/A	N/A	100.00%	N/A	N/A	N/A	Yes	N/A
PISHIN	**62.34%**	94.88%	100.00%	**81.52%**	**No**	Yes	Yes	**No**
SARGODHA	N/A	100.00%	100.00%	100.00%	N/A	Yes	Yes	Yes
UMERKOT	**33.33%**	100.00%	99.23%	N/A	**No**	Yes	Yes	N/A
Note: N/A means No Fallback to 3G Network								

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								
City	Signal Strength Percentage				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	98.75%	100.00%	99.93%	100.00%	Yes	Yes	Yes	Yes
BAHAWALPUR	100.00%	100.00%	99.99%	100.00%	Yes	Yes	Yes	Yes
CHARSADDA	100.00%	99.47%	100.00%	100.00%	Yes	Yes	Yes	Yes
GWADAR	99.99%	100.00%	100.00%	100.00%	Yes	Yes	Yes	Yes
QUETTA	99.38%	100.00%	100.00%	100.00%	Yes	Yes	Yes	Yes
ISLAMABAD	100.00%	100.00%	100.00%	100.00%	Yes	Yes	Yes	Yes
KOT RADHA KISHAN	100.00%	99.59%	100.00%	100.00%	Yes	Yes	Yes	Yes
SHEIKHUPURA	100.00%	100.00%	99.95%	100.00%	Yes	Yes	Yes	Yes
HANGU	91.66%	96.42%	100.00%	98.34%	Yes	Yes	Yes	Yes
KUCHLAK	99.92%	99.21%	100.00%	99.88%	Yes	Yes	Yes	Yes
ABBOTTABAD	99.83%	100.00%	99.90%	100.00%	Yes	Yes	Yes	Yes
LOWER DIR	99.15%	99.95%	96.86%	100.00%	Yes	Yes	Yes	Yes
MANSEHRA	100.00%	100.00%	98.74%	100.00%	Yes	Yes	Yes	Yes
MATIARI	100.00%	100.00%	100.00%	99.68%	Yes	Yes	Yes	Yes
MACH	98.75%	99.51%	100.00%	98.04%	Yes	Yes	Yes	Yes
PASROOR	100.00%	100.00%	100.00%	100.00%	Yes	Yes	Yes	Yes
PISHIN	99.21%	99.39%	100.00%	99.77%	Yes	Yes	Yes	Yes
SARGODHA	99.42%	100.00%	99.87%	100.00%	Yes	Yes	Yes	Yes
UMERKOT	93%	100%	100%	100%	Yes	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 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, 3G and 2G signal strength, Number of Tests, Upload and Download User Data Throughput, Webpage Loading Time and Latency detail is mentioned in **Table4.1: Data Tests Statistics.**

DESCRIPTION					JAZZ	TELENOR	UFONE	ZONG
AUTO DETECT MODE	CAPACITY TEST		DOWNLOAD	ATTEMPTS	5658	5438	5650	5632
				SPEED (Mbps)	20.238	5.065	7.519	18.407
			UPLOAD	ATTEMPTS	5673	5452	5664	5644
				SPEED (Mbps)	19.97	4.916	16.285	17.059
	DATA TRANSFER TEST		DOWNLOAD	ATTEMPTS	4826	4701	4763	4809
				SPEED (Mbps)	10.033	4.895	6.563	9.823
			UPLOAD	ATTEMPTS	5720	5700	5703	5688
				SPEED (Mbps)	7.307	4.916	8.456	8.733
	BROWSING TEST		ATTEMPTS		22786	21882	22739	22655
			LOADING TIME (Seconds)		6.2	7.96	7.42	6.77
	PING TEST		ATTEMPTS		5742	5739	5742	5712
			LATENCY (msec)		136.26	104.3	105.52	84.06
	AVERAGE 4G SIGNAL STRENGTH (RSRP) dBm				-79.7	-83.1	-79.7	-79
	AVERAGE 3G SIGNAL STRENGTH (RSCP) dBm				-77.55	-75.14	-61.8	-69.94
LOCKED MODE	4G	DATA TRANSFER TEST	DOWNLOAD	ATTEMPTS	2794	2670	2794	2794
				SPEED (Mbps)	19.879	3.875	6.943	18.183
			UPLOAD	ATTEMPTS	2786	2661	2783	2785
				SPEED (Mbps)	22.09	5.311	15.965	19.194
		PING TEST	ATTEMPTS		2834	2708	2834	2834
			LATENCY (msec)		87.37	67.35	66.93	71.11
		AVERAGE 4G SIGNAL STRENGTH (RSRP) dBm			-80.5	-84.5	-79.8	-79.9
	3G	DATA TRANSFER TEST	DOWNLOAD	ATTEMPTS	2013	2636	2775	2748
				SPEED (Mbps)	2.07	2.072	2.984	2.713
			UPLOAD	ATTEMPTS	1929	2624	2765	2740
				SPEED (Mbps)	1.101	1.507	2.579	1.881
		PING TEST	ATTEMPTS		2821	2823	2820	2820
			LATENCY (msec)		472.79	510.97	474.24	113.29
		AVERAGE 3G SIGNAL STRENGTH (RSCP) dBm			-67.45	-68.82	-64.99	-65.53

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 3Mbps of 4G/LTE & 512Kbps 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] ≥ 3Mbps,** (ii). **Table 4.3: Download User Data Throughput Technology Auto Detect Mode [Fixed Size] ≥ 3Mbps**, (iii). **Table 4.4: Download User Data Throughput IN 4G/LTE Technology Locked Mode [Fixed Duration] ≥ 3Mbps & Table 4.5: Download User Data Throughput IN 3G Technology Locked Mode [Fixed Duration] ≥ 512Kbps**.

DOWNLOAD USER DATA THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE (FIXED DURATION)								
City	Download User Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	21.27	10.79	14.12	18.21	First	Fourth	Third	Second
BAHAWALPUR	19.53	10.87	11.77	24.00	Second	Fourth	Third	First
CHARSADDA	8.33	**2.92**	**2.88**	6.16	First	**Third**	**Fourth**	Second
GWADAR	25.10	5.53	4.68	33.52	Second	Third	Fourth	First
QUETTA	19.43	4.04	3.73	13.62	First	Third	Fourth	Second
ISLAMABAD	29.19	5.33	7.38	19.90	First	Fourth	Third	Second
KOT RADHA KISHAN	15.93	5.09	7.95	23.38	Second	Fourth	Third	First
SHEIKHUPURA	23.74	7.24	8.69	20.68	First	Fourth	Third	Second
HANGU	6.12	3.26	**2.30**	8.01	Second	Third	**Fourth**	First
KUCHLAK	15.04	6.67	6.04	10.84	First	Third	Fourth	Second
ABBOTTABAD	22.83	3.82	5.92	20.64	First	Fourth	Third	Second
LOWER DIR	11.87	**2.05**	9.95	17.81	Second	**Fourth**	Third	First
MANSEHRA	24.22	**2.60**	5.82	16.34	First	**Fourth**	Third	Second
MATIARI	16.22	**1.20**	18.58	33.24	Third	**Fourth**	Second	First
MACH	38.67	6.01	**2.98**	20.02	First	Third	**Fourth**	Second
PASROOR	18.85	**1.43**	5.76	21.14	Second	**Fourth**	Third	First
PISHIN	18.74	10.06	3.18	13.64	First	Third	Fourth	Second
SARGODHA	22.44	7.93	15.15	22.90	Second	Fourth	Third	First
UMERKOT	32.53	4.92	15.05	26.10	First	Fourth	Third	Second

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

DOWNLOAD USER DATA THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE (FIXED SIZE)								
City	Download User Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	13.06	7.59	10.55	11.59	First	Fourth	Third	Second
BAHAWALPUR	11.88	7.01	8.10	11.59	First	Fourth	Third	Second
CHARSADDA	4.85	3.52	3.49	5.29	Second	Third	Fourth	First
GWADAR	7.53	4.94	4.57	14.42	Second	Third	Fourth	First
QUETTA	11.77	5.33	4.49	8.22	First	Third	Fourth	Second
ISLAMABAD	12.92	5.15	6.31	11.70	First	Fourth	Third	Second
KOT RADHA KISHAN	9.28	4.75	7.42	13.19	Second	Fourth	Third	First
SHEIKHUPURA	11.73	6.00	7.12	10.47	First	Fourth	Third	Second
HANGU	4.55	3.60	**2.98**	4.95	Second	Third	**Fourth**	First
KUCHLAK	10.01	7.23	6.39	8.32	First	Third	Fourth	Second
ABBOTTABAD	11.77	4.62	5.82	11.33	First	Fourth	Third	Second
LOWER DIR	8.67	3.50	7.78	10.81	Second	Fourth	Third	First
MANSEHRA	12.69	3.63	6.01	9.48	First	Fourth	Third	Second
MATIARI	11.80	**1.91**	10.85	12.51	Second	**Fourth**	Third	First
MACH	14.98	6.63	5.00	11.69	First	Third	Fourth	Second
PASROOR	9.48	**2.56**	5.17	11.10	Second	**Fourth**	Third	First
PISHIN	11.98	6.85	3.66	9.26	First	Third	Fourth	Second
SARGODHA	12.13	5.86	9.11	11.22	First	Fourth	Third	Second
UMERKOT	13.20	5.54	10.77	12.82	First	Fourth	Third	Second

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

DOWNLOAD USER DATA THROUGHPUT IN 4G/LTE TECHNOLOGY LOCKED MODE (FIXED DURATION)								
City	Download User Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	22.34	11.11	13.54	16.92	First	Fourth	Third	Second
BAHAWALPUR	25.01	8.29	12.44	24.73	First	Fourth	Third	Second
CHARSADDA	19.85	3.46	3.71	19.54	First	Fourth	Third	Second
GWADAR	15.69	**1.67**	**2.10**	19.54	Second	**Fourth**	**Third**	First
QUETTA	20.38	4.90	3.77	12.74	First	Third	Fourth	Second
ISLAMABAD	24.69	**2.50**	6.43	20.14	First	**Fourth**	Third	Second
KOT RADHA KISHAN	10.80	4.06	7.59	29.09	Second	Fourth	Third	First
SHEIKHUPURA	16.95	4.41	7.68	19.57	Second	Fourth	Third	First
HANGU	15.38	4.16	**2.73**	15.55	Second	Third	**Fourth**	First
KUCHLAK	16.83	7.23	5.97	11.54	First	Third	Fourth	Second
ABBOTTABAD	19.52	**2.49**	5.53	15.33	First	**Fourth**	Third	Second
LOWER DIR	9.09	**1.59**	11.41	17.94	Third	**Fourth**	Second	First
MANSEHRA	20.74	**1.73**	4.90	11.01	First	**Fourth**	Third	Second
MATIARI	19.10	**0.88**	19.20	25.95	Third	**Fourth**	Second	First
MACH	41.10	4.49	**1.71**	14.86	First	Third	**Fourth**	Second
PASROOR	12.48	**0.73**	3.06	14.87	Second	**Fourth**	Third	First
PISHIN	22.04	7.99	3.22	12.71	First	Third	Fourth	Second
SARGODHA	26.76	5.83	9.62	15.91	First	Fourth	Third	Second
UMERKOT	37.14	**2.33**	12.45	19.51	First	**Fourth**	Third	Second

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

DOWNLOAD USER DATA THROUGHPUT IN 3G TECHNOLOGY LOCKED MODE (FIXED DURATION)								
City	Download User Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	2339.96	4633.5	4224.01	1655.74	Third	First	Second	Fourth
BAHAWALPUR	972.39	2926.68	3995.99	3460.14	Fourth	Third	First	Second
CHARSADDA	2536.21	1780.6	2440.74	1351.41	First	Third	Second	Fourth
GWADAR	2269.68	2126.73	3126.87	3127.66	Third	Fourth	Second	First
QUETTA	2082.55	1291.98	2383.95	1456.16	Second	Fourth	First	Third
ISLAMABAD	2453.45	2329.68	3263.65	2098.13	Second	Third	First	Fourth
KOT RADHA KISHAN	3786.1	2622.45	3738.78	4236.46	Second	Fourth	Third	First
SHEIKHUPURA	1959.49	2867.51	3327.15	2906.27	Fourth	Third	First	Second
HANGU	3072.82	2193.34	2132.12	4069	Second	Third	Fourth	First
KUCHLAK	1729.95	1356.62	4180.4	1643.09	Second	Fourth	First	Third
ABBOTTABAD	1852.56	1584.23	2529.04	1667.47	Second	Fourth	First	Third
LOWER DIR	1818.19	1201.95	3027.02	2541.63	Third	Fourth	First	Second
MANSEHRA	1887.62	1250.17	2287.58	2064.28	Third	Fourth	First	Second
MATIARI	2392.82	3163.66	2395.15	2312.9	Third	First	Second	Fourth
MACH	N/A	2952.48	3020.48	4809.64	N/A	Third	Second	First
PASROOR	1316.7	528	2258.24	3651.64	Third	Fourth	Second	First
PISHIN	4255.19	3763.15	2187.15	1181.63	First	Second	Third	Fourth
SARGODHA	1479.7	2431.56	3999.65	2782.72	Fourth	Third	First	Second
UMERKOT	N/A	1183.83	2856.57	3314.59	N/A	Third	Second	First

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

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 786Kbps of 4G/LTE & 128Kbps 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] ≥ 768Kbps,** (ii). **Table 4.7: Upload User Data Throughput Technology Auto Detect Mode**

[Fixed Size] ≥ 768Kbps, (iii). **Table 4.8: Upload User Data Throughput in 4G/LTE Technology Locked Mode [Fixed Duration] ≥ 768Kbps** & (iv). **Table 4.9: Upload User Data Throughput in 3G Technology Locked Mode [Fixed Duration] ≥ 128Kbps.**

UPLOAD USER DATA THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE (FIXED DURATION)								
City	Upload User Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	25312.02	7941.84	23715.76	25224.52	First	Fourth	Third	Second
BAHAWALPUR	21164.24	7790.95	17922.41	22462.04	Second	Fourth	Third	First
CHARSADDA	6783.78	3374.1	5641.91	6261.69	First	Fourth	Third	Second
GWADAR	20414.2	4749.16	15560.03	18516.45	First	Fourth	Third	Second
QUETTA	25768.98	3658.02	16502.62	15394.8	First	Fourth	Second	Third
ISLAMABAD	22746.34	7086.78	18316.56	15278.37	First	Fourth	Second	Third
KOT RADHA KISHAN	26860.64	6350.13	20292.56	16711.84	First	Fourth	Second	Third
SHEIKHUPURA	27045.06	8559.03	15958.22	24309.09	First	Fourth	Third	Second
HANGU	4504.68	2599.49	4449.68	3597.49	First	Fourth	Second	Third
KUCHLAK	24248.42	4650.12	18747.64	16607.53	First	Fourth	Second	Third
ABBOTTABAD	25565.83	6503.83	16850.2	19422.11	First	Fourth	Third	Second
LOWER DIR	16555.49	3401.19	20922.26	17466.45	Third	Fourth	First	Second
MANSEHRA	26442.7	3955.71	18518.48	19710.08	First	Fourth	Third	Second
MATIARI	24214.47	4528.11	23439.44	29915.92	Second	Fourth	Third	First
MACH	23566.95	2641.85	15786.57	18156.3	First	Fourth	Third	Second
PASROOR	24020.87	2899.79	15961.16	27273.31	Second	Fourth	Third	First
PISHIN	25499.71	3310.56	18281.87	15961.38	First	Fourth	Second	Third
SARGODHA	20392.98	7822.01	19736.37	21298.93	Second	Fourth	Third	First
UMERKOT	20795.27	5614.9	22339.42	26116.67	Third	Fourth	Second	First

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

UPLOAD USER DATA THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE (FIXED SIZE)								
City	Upload User Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	8167.58	6084.85	8477.68	8142.93	Second	Fourth	First	Third
BAHAWALPUR	13861.97	10807.85	14546.27	12001.2	Second	Fourth	First	Third
CHARSADDA	5713.53	5947.91	8973.19	6121.08	Fourth	Third	First	Second
GWADAR	4971.96	3212.12	6749.48	6795.67	Third	Fourth	Second	First
QUETTA	7616.25	3908.09	8104.39	6543.72	Second	Fourth	First	Third
ISLAMABAD	8042.42	6014.27	7879.78	8555.44	Second	Fourth	Third	First
KOT RADHA KISHAN	7473.29	4936.98	8532.87	8277.21	Third	Fourth	First	Second
SHEIKHUPURA	7062.78	6029.64	7365.07	7697.7	Third	Fourth	Second	First
HANGU	5256.15	4380.59	6600.04	5520.16	Third	Fourth	First	Second
KUCHLAK	7189.01	4516.37	7764.51	8464.35	Third	Fourth	Second	First
ABBOTTABAD	12940.16	10690.83	13462.38	15392.46	Third	Fourth	Second	First
LOWER DIR	9834.68	8933.44	14055.46	12795.12	Third	Fourth	First	Second
MANSEHRA	15034.77	9035.28	16676.37	16189.76	Third	Fourth	First	Second
MATIARI	8243.24	4718.4	8560.44	8466.75	Third	Fourth	First	Second
MACH	7490.18	3242.58	6951.03	9306.3	Second	Fourth	Third	First
PASROOR	6937.73	3967.84	7182.33	9053.07	Third	Fourth	Second	First
PISHIN	7501.41	3928.54	6983.53	6936.99	First	Fourth	Second	Third
SARGODHA	11287.64	8832.64	14079.95	13768.28	Third	Fourth	First	Second
UMERKOT	6610.83	5193.58	9076.9	8115.71	Third	Fourth	First	Second

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

UPLOAD USER DATA THROUGHPUT IN 4G TECHNOLOGY LOCKED MODE (FIXED DURATION)								
City	Upload User Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	25296.16	6583.92	22434.03	22005.5	First	Fourth	Second	Third
BAHAWALPUR	20112.04	6932.49	17081.91	20704.52	Second	Fourth	Third	First
CHARSADDA	20585.38	6670.14	16509.27	23512.04	Second	Fourth	Third	First
GWADAR	18750.48	6338.92	14214.57	8413.74	First	Fourth	Second	Third
QUETTA	24932.98	4042.08	15705.89	12826.01	First	Fourth	Second	Third
ISLAMABAD	21580.27	5810.8	14444.14	15379.18	First	Fourth	Third	Second
KOT RADHA KISHAN	25329.49	5969.83	17275.58	23104.88	First	Fourth	Third	Second
SHEIKHUPURA	24588.02	7687.65	16582.58	19201.22	First	Fourth	Third	Second
HANGU	23092.25	5458.11	13642.84	15844.73	First	Fourth	Third	Second
KUCHLAK	18747.18	3512.71	16410.66	15908.18	First	Fourth	Second	Third
ABBOTTABAD	26814.77	6053.73	16307.21	17551.25	First	Fourth	Third	Second
LOWER DIR	16414.1	2822.36	17016.25	18251.52	Third	Fourth	Second	First
MANSEHRA	28559.98	3693.91	17470.17	16499.75	First	Fourth	Second	Third
MATIARI	24703.69	3922.55	21044.44	25370.06	Second	Fourth	Third	First
MACH	22514.32	2585.51	14121.67	13699.32	First	Fourth	Second	Third
PASROOR	21901.78	2279.73	14962.07	24635.67	Second	Fourth	Third	First
PISHIN	25293.55	3684.02	16611.27	16956.16	First	Fourth	Third	Second
SARGODHA	23662.54	5931.77	16919.72	20345.94	First	Fourth	Third	Second
UMERKOT	16550.65	4777.4	16402.01	18799.97	Second	Fourth	Third	First

Table 4.8: Upload User Data Throughput Technology Locked Mode [Fixed Duration] ≥ 768Kbps

UPLOAD USER DATA THROUGHPUT IN 3G TECHNOLOGY LOCKED MODE (FIXED DURATION)								
City	Upload User Data Throughput [Kbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	1386.51	2647.26	2620.96	1996.41	Fourth	First	Second	Third
BAHAWALPUR	1442.35	2182.59	2982.26	2208.55	Fourth	Third	First	Second
CHARSADDA	1202.51	1796.23	2135.31	1568.35	Fourth	Second	First	Third
GWADAR	725.79	2011.73	2698.71	1589.55	Fourth	Second	First	Third
QUETTA	1343.3	1543.74	2015.31	1712.12	Fourth	Third	First	Second
ISLAMABAD	1088.59	1069.67	2395.25	817.8	Second	Third	First	Fourth
KOT RADHA KISHAN	731.07	1559.61	3084.41	2656.84	Fourth	Third	First	Second
SHEIKHUPURA	278.43	1430.4	2439.91	1781.76	Fourth	Third	First	Second
HANGU	1267.94	1445.21	2867.92	1878.99	Fourth	Third	First	Second
KUCHLAK	1623.13	1634.06	2610.84	1896.36	Fourth	Third	First	Second
ABBOTTABAD	1601.45	1203.44	2412.66	804.2	Second	Third	First	Fourth
LOWER DIR	701.15	1272.28	2390.25	1847.91	Fourth	Third	First	Second
MANSEHRA	1694.28	1199.07	2554.65	771.58	Second	Third	First	Fourth
MATIARI	1472.65	2301.79	2500.62	2914.7	Fourth	Third	Second	First
MACH	N/A	2037.77	2185.2	2370.28	N/A	Third	Second	First
PASROOR	205.33	657.54	2680.73	2015.28	Fourth	Third	First	Second
PISHIN	1318.11	1588.13	1664.34	1503.42	Fourth	Second	First	Third
SARGODHA	1024.14	1519.87	2835.93	1934.56	Fourth	Third	First	Second
UMERKOT	N/A	1384.68	1852.94	3153.01	N/A	Third	Second	First

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

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.**

WEBPAGE LOADING TIME IN TECHNOLOGY AUTO DETECT MODE IN CITIES								
City	Webpage Loading Time [seconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	3.99	5.37	4.82	5.80	Yes	No	Yes	No
BAHAWALPUR	5.28	6.94	6.99	6.54	No	No	No	No
CHARSADDA	7.85	8.02	8.31	7.90	No	No	No	No
GWADAR	8.62	6.91	7.30	7.37	No	No	No	No
QUETTA	4.29	7.15	6.26	6.31	Yes	No	No	No
ISLAMABAD	5.11	6.73	6.29	5.07	No	No	No	No
KOT RADHA KISHAN	4.86	7.69	5.23	4.20	Yes	No	No	Yes
SHEIKHUPURA	5.28	6.13	5.62	4.45	No	No	No	Yes
HANGU	7.48	8.15	8.48	8.26	No	No	No	No
KUCHLAK	4.49	6.52	6.41	6.31	Yes	No	No	No
ABBOTTABAD	6.70	7.83	7.69	8.27	No	No	No	No
LOWER DIR	7.04	8.36	6.98	6.69	No	No	No	No
MANSEHRA	6.28	8.67	7.04	6.44	No	No	No	No
MATIARI	4.48	8.64	6.68	5.37	Yes	No	No	No
MACH	4.20	6.65	6.22	5.75	Yes	No	No	No
PASROOR	5.97	8.57	6.37	4.35	No	No	No	Yes
PISHIN	4.51	6.54	7.47	6.58	Yes	No	No	No
SARGODHA	5.22	7.09	6.79	6.30	No	No	No	No
UMERKOT	4.04	6.50	6.45	5.29	Yes	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.**

LATENCY IN TECHNOLOGY AUTO DETECT MODE								
City	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	46	39	33	57	Yes	Yes	Yes	Yes
BAHAWALPUR	82	69	79	55	No	Yes	No	Yes
CHARSADDA	410	213	286	144	No	No	No	No
GWADAR	208	80	53	98	No	No	Yes	No
QUETTA	58	89	51	67	Yes	No	Yes	Yes
ISLAMABAD	73	71	65	94	Yes	Yes	Yes	No
KOT RADHA KISHAN	89	55	58	43	No	Yes	Yes	Yes
SHEIKHUPURA	77	52	163	49	No	Yes	No	Yes
HANGU	422	324	338	154	No	No	No	No
KUCHLAK	58	85	55	61	Yes	No	Yes	Yes
ABBOTTABAD	82	55	83	115	No	Yes	No	No
LOWER DIR	114	71	76	80	No	Yes	No	No
MANSEHRA	71	69	68	63	Yes	Yes	Yes	Yes
MATIARI	50	39	63	33	Yes	Yes	Yes	Yes
MACH	74	57	61	43	Yes	Yes	Yes	Yes
PASROOR	125	59	112	57	No	Yes	No	Yes
PISHIN	46	70	67	72	Yes	Yes	Yes	Yes
SARGODHA	59	66	74	57	Yes	Yes	Yes	Yes
UMERKOT	43	71	33	36	Yes	Yes	Yes	Yes

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

LATENCY IN 4G/LTE TECHNOLOGY LOCKED MODE								
City	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	41	41	32	53	Yes	Yes	Yes	Yes
BAHAWALPUR	**81**	65	**81**	64	**No**	Yes	**No**	Yes
CHARSADDA	**92**	68	50	**87**	**No**	Yes	Yes	**No**
GWADAR	**232**	68	65	**86**	**No**	Yes	Yes	**No**
QUETTA	61	**78**	42	**91**	Yes	**No**	Yes	**No**
ISLAMABAD	65	73	61	**110**	Yes	Yes	Yes	**No**
KOT RADHA KISHAN	**83**	50	61	55	**No**	Yes	Yes	Yes
SHEIKHUPURA	**93**	56	72	58	**No**	Yes	Yes	Yes
HANGU	**80**	**99**	**88**	**86**	**No**	**No**	**No**	**No**
KUCHLAK	46	60	57	59	Yes	Yes	Yes	Yes
ABBOTTABAD	**84**	54	68	69	**No**	Yes	Yes	Yes
LOWER DIR	**119**	**83**	75	**108**	**No**	**No**	Yes	**No**
MANSEHRA	**80**	74	68	**78**	**No**	Yes	Yes	**No**
MATIARI	50	38	47	44	Yes	Yes	Yes	Yes
MACH	74	71	65	51	Yes	Yes	Yes	Yes
PASROOR	**164**	60	**114**	53	**No**	Yes	**No**	Yes
PISHIN	46	64	61	56	Yes	Yes	Yes	Yes
SARGODHA	69	**84**	**80**	57	Yes	**No**	**No**	Yes
UMERKOT	43	68	30	34	Yes	Yes	Yes	Yes

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

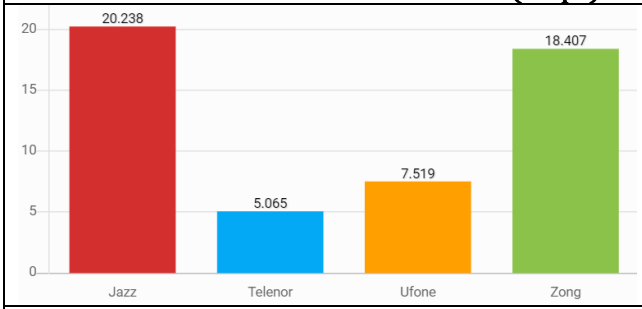
LATENCY IN 3G TECHNOLOGY LOCKED MODE								
City	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
SUKKUR	**164**	**915**	**420**	**165**	**No**	**No**	**No**	**No**
BAHAWALPUR	**846**	**1067**	**479**	107	**No**	**No**	**No**	Yes
CHARSADDA	**533**	**203**	**462**	135	**No**	**No**	**No**	Yes
GWADAR	**833**	**750**	**515**	**312**	**No**	**No**	**No**	**No**
QUETTA	**164**	**914**	**492**	117	**No**	**No**	**No**	Yes
ISLAMABAD	**488**	**347**	**455**	**170**	**No**	**No**	**No**	**No**
KOT RADHA KISHAN	**504**	**445**	**478**	63	**No**	**No**	**No**	Yes
SHEIKHUPURA	**529**	**591**	**517**	77	**No**	**No**	**No**	Yes
HANGU	**537**	**424**	**501**	130	**No**	**No**	**No**	Yes
KUCHLAK	131	**875**	**499**	107	Yes	**No**	**No**	Yes
ABBOTTABAD	**558**	**248**	**538**	132	**No**	**No**	**No**	Yes
LOWER DIR	**564**	**368**	**419**	135	**No**	**No**	**No**	Yes
MANSEHRA	**563**	**216**	**464**	147	**No**	**No**	**No**	Yes
MATIARI	**208**	**823**	**520**	76	**No**	**No**	**No**	Yes
MACH	N/A	**777**	**490**	75	N/A	**No**	**No**	Yes
PASROOR	**581**	**407**	**518**	60	**No**	**No**	**No**	Yes
PISHIN	103	**1006**	**105**	100	Yes	**No**	Yes	Yes
SARGODHA	**424**	**969**	487	74	**No**	**No**	**No**	Yes
UMERKOT	N/A	**729**	**506**	61	N/A	**No**	**No**	Yes

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

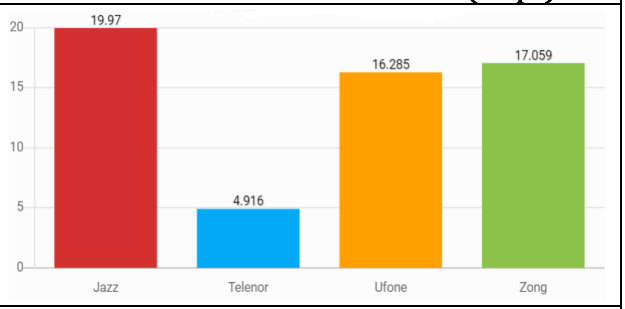
4.6. The overall Download/Upload speed, Latency, Web Page Loading Time and Resource Block Utilization were measured in different tests. The detailed results can be seen in attached graphs.

TECHNOLOGY AUTO DETECT MODE TESTING

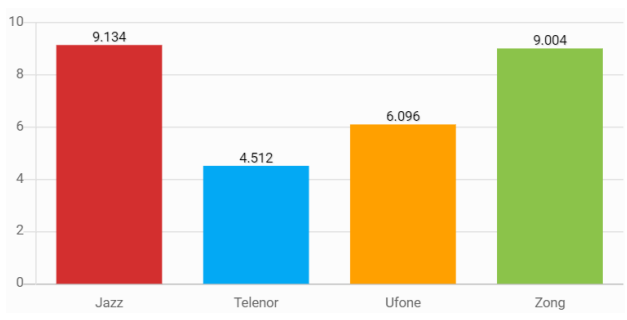
CAPACITY TEST DOWNLOAD SPEED (Mbps)



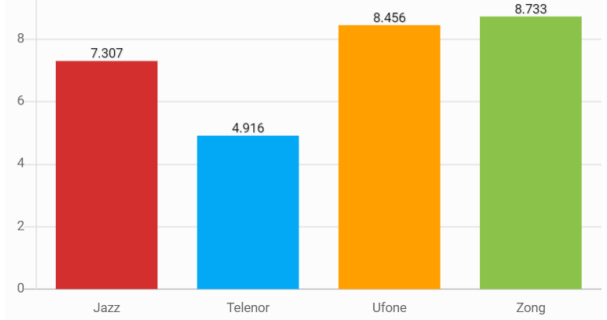
CAPACITY TEST UPLOAD SPEED (Mbps)



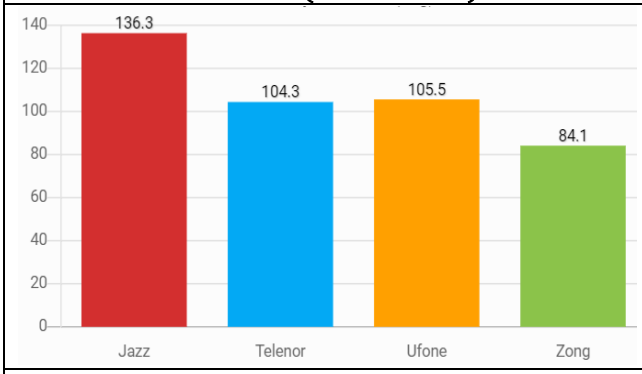
DATA TRANSFER DOWNLOAD SPEED (Mbps)



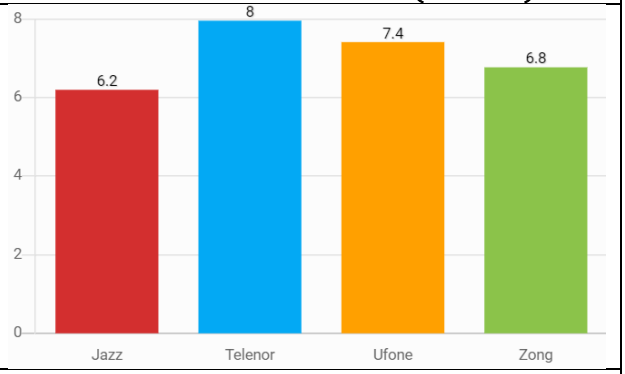
DATA TRANSFER UPLOAD SPEED (Mbps)



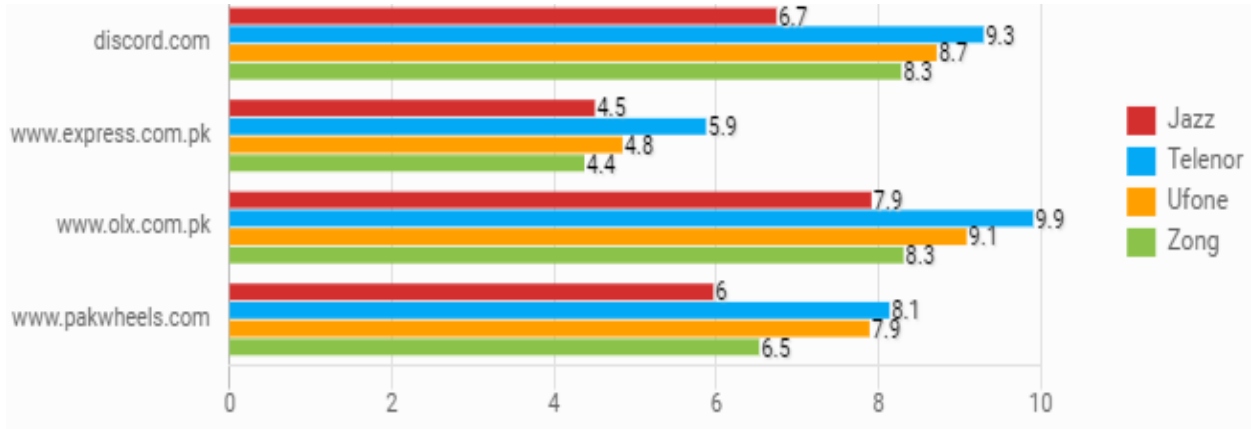
LATENCY (milliseconds)

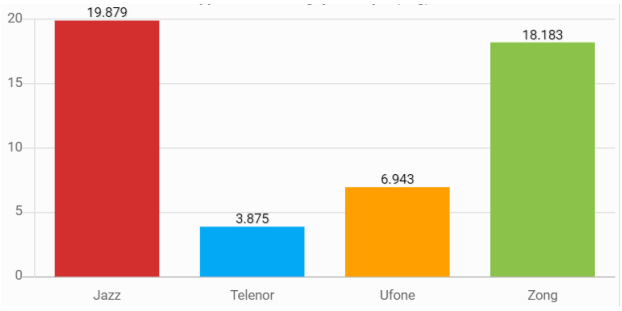
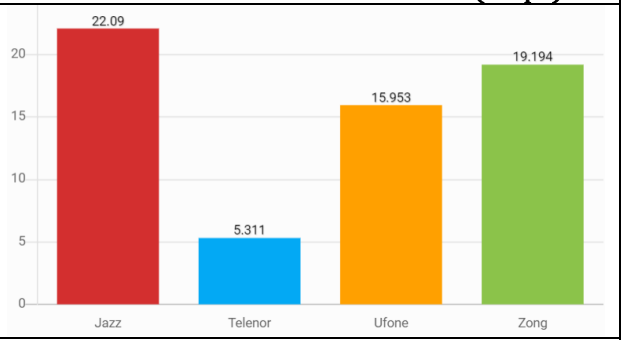
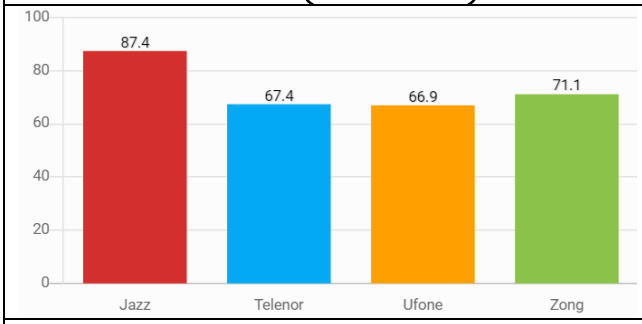
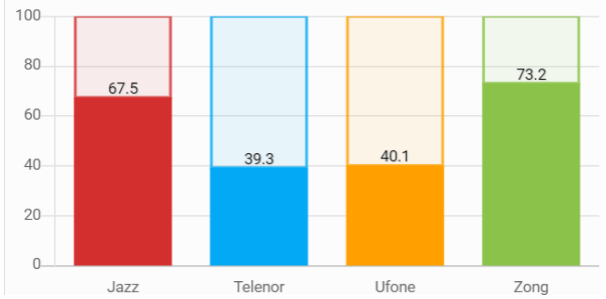
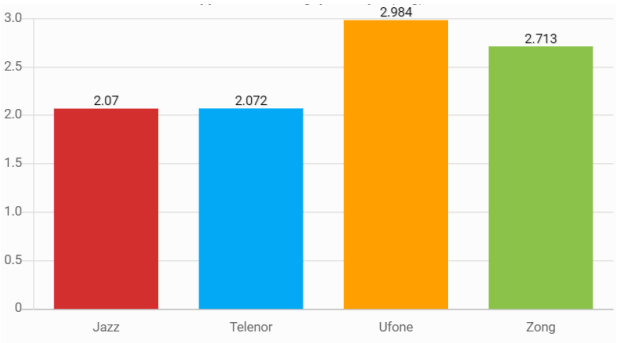
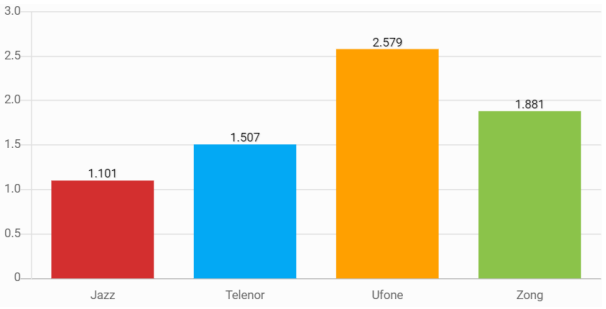
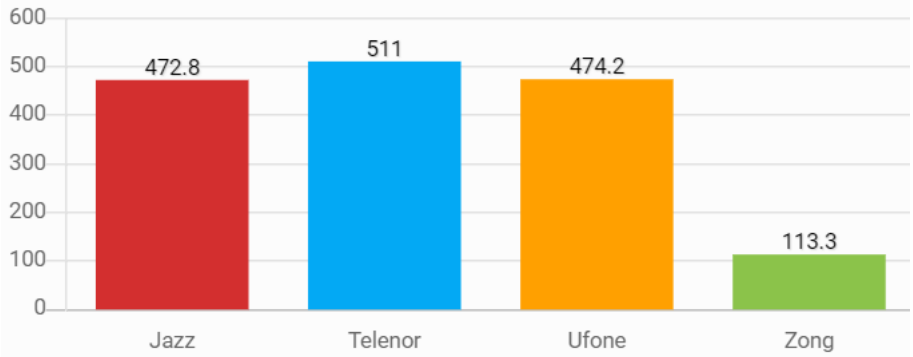


WEBPAGE LOADING TIME (Seconds)



WEBPAGE LOADING TIME PER PAGE (Seconds)



4G/LTE TECHNOLOGY LOCKED MODE	
DATA TRANSFER DOWNLOAD SPEED (Mbps)	DATA TRANSFER UPLOAD SPEED (Mbps)
	
LATENCY (milliseconds)	RESOURCE BLOCK USAGE DOWNLOAD
	
3G TECHNOLOGY LOCKED MODE	
DATA TRANSFER DOWNLOAD SPEED (Mbps)	DATA TRANSFER UPLOAD SPEED (Mbps)
	
LATENCY (milliseconds)	
	

VOICE SERVICE

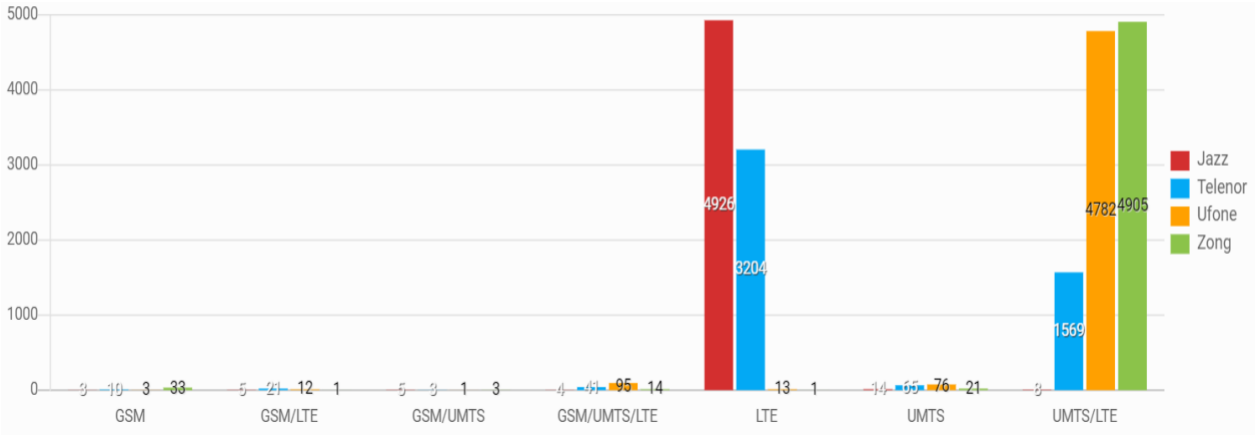
5.1. A total of **19,838 Call attempts** were made and out of which **415 were failed attempts**. In **19,423 successful call attempts**, **149 calls dropped** prior to completion of two minutes duration, whereas, **19,274 calls remained connected** for the complete duration of two minutes. The company wise call statistics is shown in **Table 5.1: Call Statistics.**

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
TOTAL CALLS ATTEMPTS	4965	4913	4982	4978
FAILED CALLS ATTEMPTS	51	231	56	77
ESTABLISHED CALLS ATTEMPTS	4914	4682	4926	4901
DROPPED CALLS ATTEMPTS	34	66	38	11
COMPLETED CALLS ATTEMPTS	4880	4616	4888	4890
CALL SETUP SUCCESS RATE (%)	98.97	**95.3**	98.88	98.45
CALL SETUP TIME (Sec)	**8.17**	**9.53**	6.63	7
CALL COMPLETION RATE (%)	**92**	**93.34**	98.81	98.58
ISHO SUCCESS RATE (%)	100	100	**97.53**	-
RAB SETUP SUCCESS RATE (%)	100	99.94	100	100
MEAN OPINION SCORE	3.77	3.59	3.52	3.65
MEAN OPINION SCORE EXCESS RATIO – MOS <1.6 (%)	**4.69**	**2.34**	0.76	0.41
TOTAL SPEECH TEST	49479	46842	49538	49528

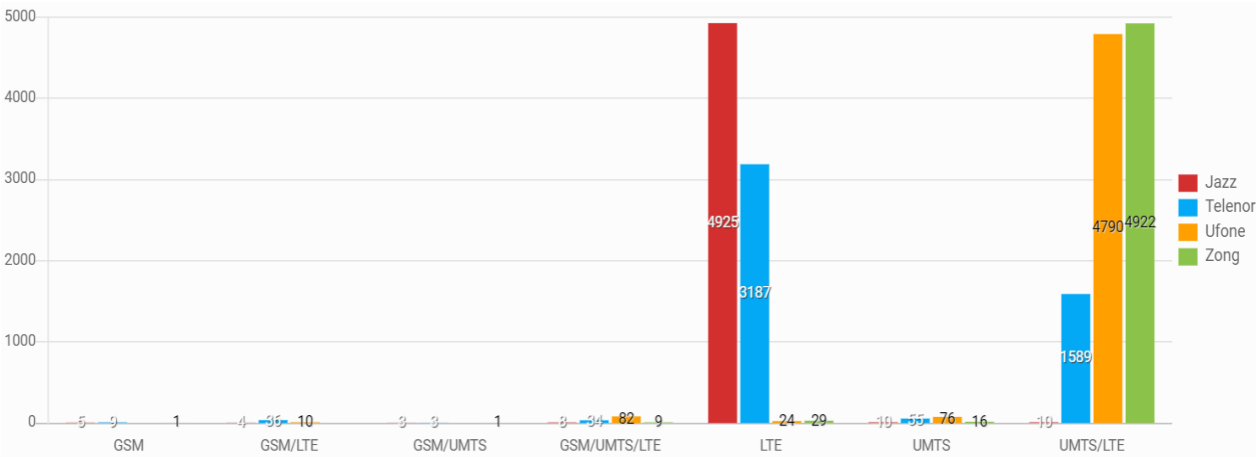
Table5.1: Call Statistics

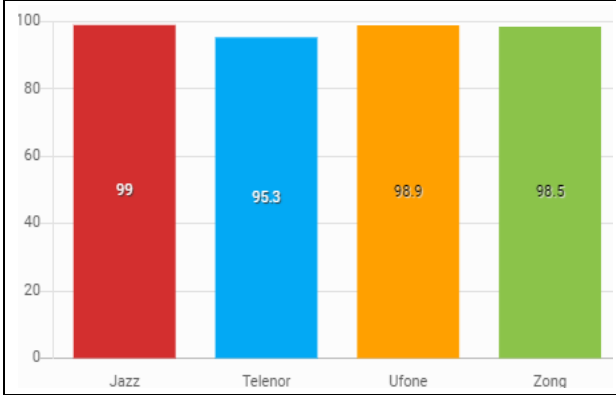
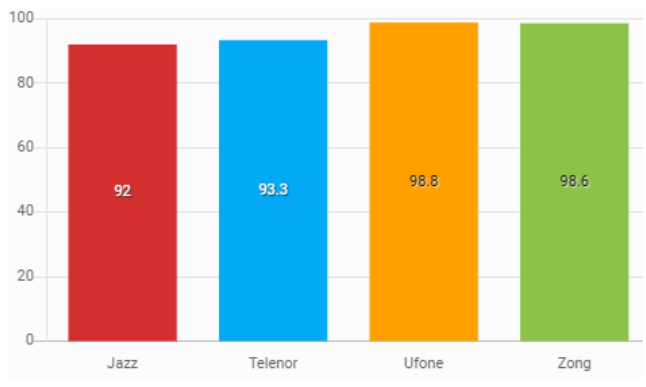
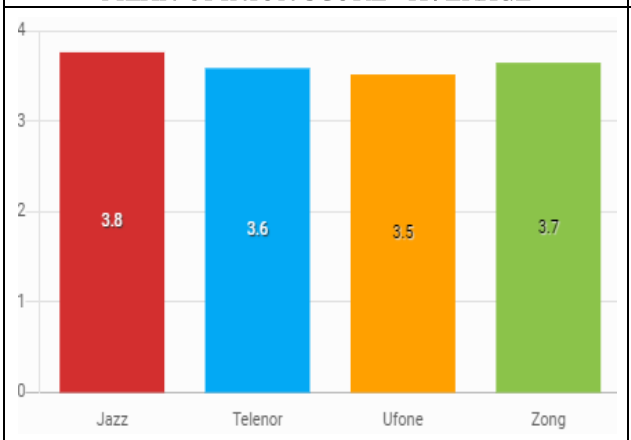
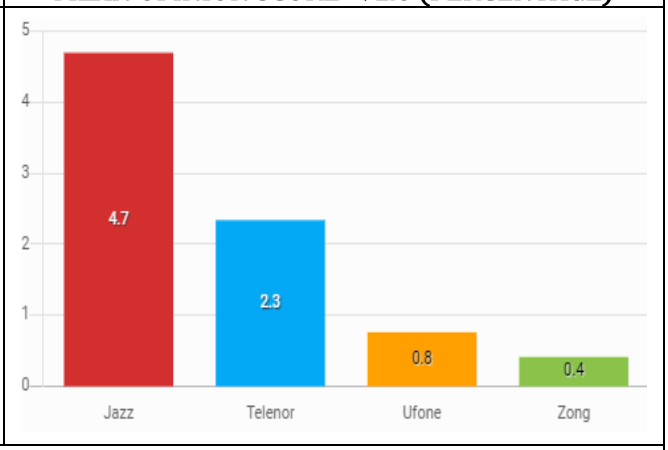
5.2. The overall Call Setup Success Rate and Call Retain ability along with Mean Opinion Score (MOS), the percentage of mute calls and MOS with respect to Voice CODEC is shown as under:

TECHNOLOGY WISE DISTRIBUTION OF CALLS – A PARTY

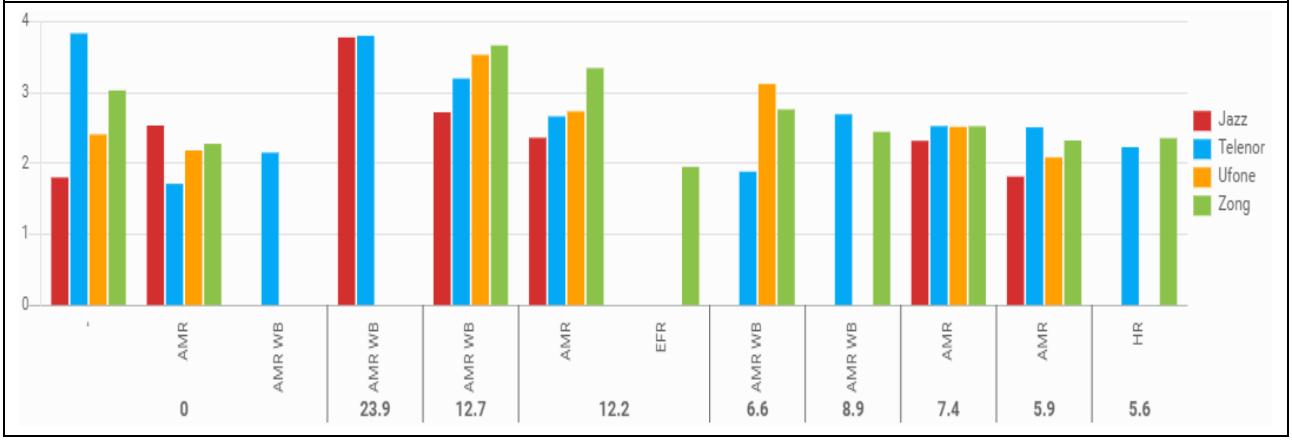


TECHNOLOGY WISE DISTRIBUTION OF CALLS – B PARTY



CALL SETUP SUCCESS RATE	CALL RETAINABILITY
	
MEAN OPINION SCORE - AVERAGE	**MEAN OPINION SCORE < 1.6 (PERCENTAGE)**
	

MEAN OPINION SCORE – VOICE CODEC



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 **19 x surveyed cities** of Pakistan. The compliance level of threshold values of voice QoS KPIs is shown in each **Table 5.2: Voice QoS KPIs Compliance Level** , **Table 5.3: Voice QoS KPIs Compliance Level** and **Table 5.4: Voice QoS KPIs Compliance Level.**

CMO	KPIS	THRESHOLD	SUKKUR	BAHAWALPUR	CHARSADDA	GWADAR	QUETTA	ISLAMABAD
Jazz	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
Telenor	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	**No**	Yes	Yes	Yes	**No**	**No**
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	Yes	**No**
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
Ufone	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	**No**	Yes	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	**No**	Yes	Yes	Yes	**No**
	RSSR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
ZonG	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	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

CMO	KPIS	THRESHOLD	KOT RADHA KISHAN	SHEIKHUPURA	HANGU	KUCHLAK	ABBOTTABAD	LOWER DIR	MANSEHRA
Jazz	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	Yes	Yes	Yes	**No**	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	**No**	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Telenor	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	**No**	**No**	Yes	**No**	Yes	**No**
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes	**No**
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ufone	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	Yes	Yes	Yes	**No**	Yes	**No**
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	**No**	Yes	Yes	Yes	**No**
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ZonG	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	Yes	Yes	**No**	Yes	**No**	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	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 5.3: Voice QoS KPIs Compliance Level

CMO	KPIs	THRESHOLD	MATIARI	MACH	PASROOR	PISHIN	SARGODHA	UMERKOT
Jazz	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	**No**	Yes	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
Telenor	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	**No**	**No**	**No**	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	**No**	Yes	**No**	**No**	**No**
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
Ufone	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
ZonG	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	No	**No**	Yes	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	≥ 98%	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	> 98%	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 5.4: Voice QoS KPIs Compliance Level

SMS SERVICE

6.1. A total of **19,720 SMS sending attempts** were conducted, out of which **19,658 SMS** were **successfully transmitted** by A-Party while **19,396 SMS** were **successfully received** at B-Party. The company wise SMS Statistics are shown in **Table 6.1: SMS Statistics.** The compliance level of threshold values of SMS QoS KPIs in each surveyed city is shown in **Table 6.2: SMS QoS KPIs Compliance**

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
SMS SEND REQUEST	4961	4815	4961	4943
SMS SUCCESSFULLY TRANSMITTED	4956	4792	4945	4927
SMS SUCCESSFULLY RECEIVED	4926	4611	4937	4885
SMS RECEIVE SUCCESS RATE (%)	99.29	95.76	99.52	98.83
END-TO-END DELIVERY TIME (Sec)	3.61	5.68	2.9	2.56

Table 6.1: SMS Statistics

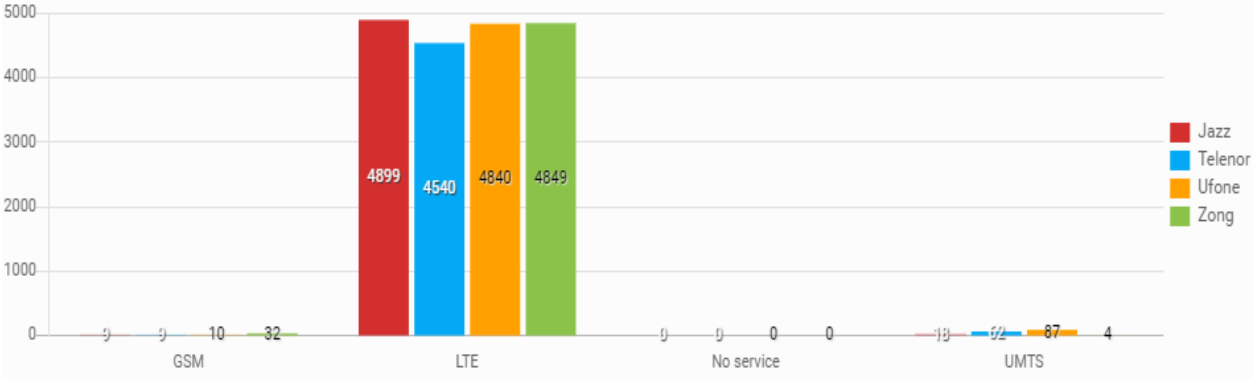
SMS SERVICE									
Operator		Jazz		Telenor		Ufone		Zong	
SMS QoS KPI		SR	DT	SR	DT	SR	DT	SR	DT
Surveyed Cities	SUKKUR	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	BAHAWALPUR	Yes	Yes	**No**	Yes	**No**	Yes	Yes	Yes
	CHARSADDA	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	GWADAR	Yes	Yes	**No**	Yes	Yes	Yes	**No**	Yes
	QUETTA	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	ISLAMABAD	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	KOT RADHA KISHAN	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SHEIKHUPURA	**No**	Yes	**No**	Yes	Yes	Yes	**No**	Yes
	HANGU	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	KUCHLAK	Yes	Yes	Yes	Yes	Yes	Yes	**No**	Yes
	ABBOTTABAD	**No**	Yes	Yes	Yes	Yes	Yes	**No**	Yes
	LOWER DIR	Yes	Yes	**No**	Yes	Yes	Yes	**No**	Yes
	MANSEHRA	Yes	Yes	**No**	Yes	Yes	Yes	**No**	Yes
	MATIARI	Yes	Yes	**No**	Yes	**No**	Yes	**No**	Yes
	MACH	**No**	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	PASROOR	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	PISHIN	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	SARGODHA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	UMERKOT	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes

** Note SMS QoS KPIs: Success Rate (SR) ≥ 99%, Delivery Time (DT) ≤ 12 Seconds*

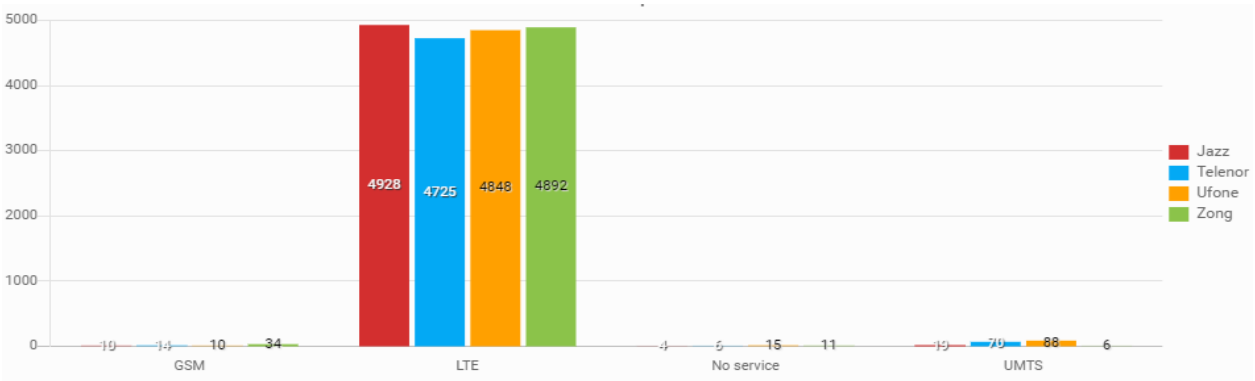
Table 6.2: SMS QoS KPIs Compliance

6.3. The SMS Send Request & Successful Reception by Technology, Average Success Rate & End to End Delivery Time and Delivery Duration by Technology are shown in the graphs.

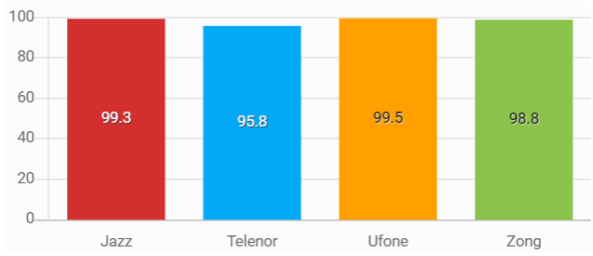
SMS SEND REQUEST BY TECHNOLOGY



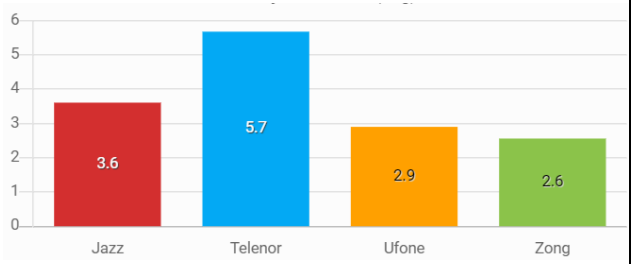
SMS SUCCESSFUL RECEPTION BY TECHNOLOGY



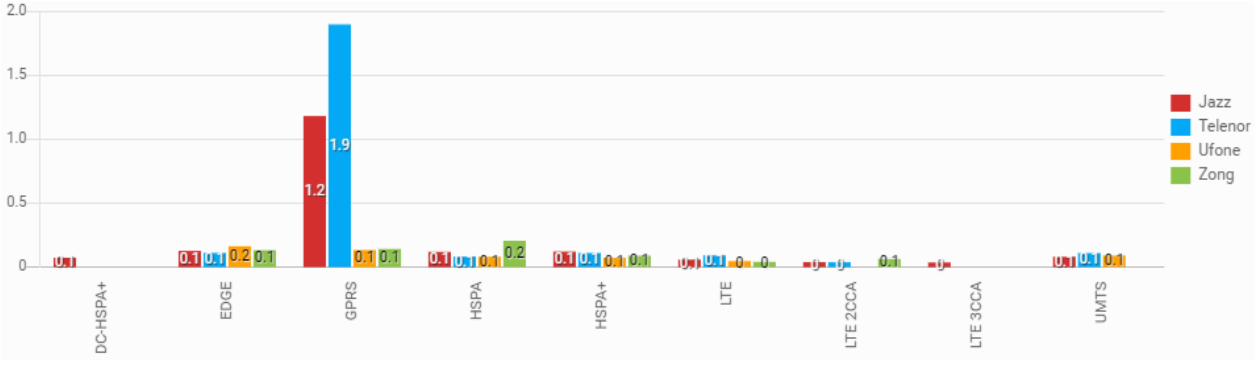
SMS RECEIVE SUCCESS RATE (%)



SMS END TO END DELIVERY TIME (SECONDS)



SMS DELIVERY DURATION BY TECHNOLOGY



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 19 x surveyed cities of Punjab, KPK and Balochistan.

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 Cities Technology Auto Detect Mode						Standing
		Compliant			Non-Compliant			
		4G	3G	Total	4G	3G	Total	
1.	Ufone	18	17	35	1	0	1	1st
2.	ZonG	17	9	26	2	2	4	2nd
3.	Telenor	13	13	26	6	1	7	3rd
4.	Jazz	15	7	22	4	2	6	4th

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

S. #.	Operator	Compliance Level – Number of Cities Technology Locked Mode						Standing
		Compliant			Non-Compliant			
		4G	3G	Total	4G	3G	Total	
1.	ZonG	18	19	37	1	-	1	1st
2.	Ufone	18	19	37	1	-	1	1st
3.	Jazz	17	19	36	2	-	2	2nd
4.	Telenor	15	19	34	4	-	4	3rd

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 Cities								Standing	
		Technology Auto Detect Mode								Fixed Duration	Fixed Size
		Fixed Duration				Fixed Size					
		1st	2nd	3rd	4th	1st	2nd	3rd	4th		
2.	Jazz	11	7	1	-	12	7	-	-	1st	1st
1.	ZonG	8	11	-	-	7	12	-	-	2nd	2nd
3.	Ufone	-	1	11	7	-	-	12	7	3rd	3rd
4.	Telenor	-	-	7	12	-	-	7	12	4th	4th

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

S. #.	Operator	Highest Download Throughput – Number of Cities								Standing	
										Fixed Duration	
		4G Locked Mode				3G Locked Mode				4G	3G
		Fixed Duration				Fixed Duration					
		1st	2nd	3rd	4th	1st	2nd	3rd	4th		
1.	Jazz	12	5	2	-	2	6	6	3	1st	3rd
2.	ZonG	7	12	-	-	6	5	3	5	2nd	2nd
3.	Ufone	-	2	12	5	9	7	2	1	3rd	1st
4.	Telenor	-	-	5	14	2	1	8	8	4th	4th

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 Cities								Standing	
		Technology Auto Detect Mode								Fixed Duration	Fixed Size
		Fixed Duration				Fixed Size					
		1st	2nd	3rd	4th	1st	2nd	3rd	4th		
1.	Jazz	13	4	2	-	1	5	12	1	1st	3rd
2.	ZonG	5	8	6	-	7	8	4	-	2nd	2nd
3.	Ufone	1	7	11	-	11	6	2	-	3rd	1st
4.	Telenor	-	-	-	19	-	-	1	18	4th	4th

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

S. #.	Operator	Highest Upload Throughput – Number of Cities								Standing	
		4G Locked Mode				3G Locked Mode					
		Fixed Duration				Fixed Duration					
		1st	2nd	3rd	4th	1st	2nd	3rd	4th	4G	3G
1.	Jazz	13	5	1	-	-	3	-	14	1st	4th
2.	ZonG	6	7	6	-	3	9	4	3	2nd	2nd
3.	Ufone	-	7	12	-	15	4	-	-	3rd	1st
4.	Telenor	-	-	-	19	1	3	15	-	4th	3rd

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 Cities		Standing
		Compliant	Non-Compliant	
1.	Jazz	8	11	1st
2.	ZonG	3	16	2nd
3.	Ufone	1	18	3rd
4.	Telenor	-	19	4th

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 Cities								Standing
		Compliant				Non-Compliant				
		Auto	4G	3G	Total	Auto	4G	3G	Total	
1.	ZonG	13	12	16	41	6	7	3	16	1st
2.	Telenor	14	15	-	29	5	4	19	28	2nd
3.	Ufone	12	15	1	28	7	4	18	29	3rd
4.	Jazz	10	9	2	21	9	10	15	34	4th

Table 8.8: CMOs Standing in Latency

c. VOICE SERVICE. The categorization of each CMOs, as per the maximum compliant of Voice QoS KPIs is shown in **Table 8.9: CMOs Standing in Voice Service.**

S. #.	Operator	Voice QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	Jazz	130	3	1st
2.	ZonG	129	4	2nd
3.	Ufone	126	7	3rd
4.	Telenor	117	16	4th

Table 8.9: CMOs Standing in Voice Service

d. SMS SERVICE. The categorization of each CMOs, as per the maximum compliant of SMS QoS KPIs is shown in **Table 8.10: CMOs Standing in SMS Service.**

S. #.	Operator	Voice QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	Ufone	36	2	1st
2.	Jazz	35	3	2nd
3.	Zong	31	7	3rd
4.	Telenor	24	14	4th

Table 8.10: CMOs Standing in SMS Service

e. **OVERALL STANDING.** The overall standing of each CMOs in different category of services is mentioned in **Table 8.11: CMOs Overall Standing in QoS Survey.**

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

Table 8.11: CMOs Overall Standing in QoS Survey

Annex -A(Coverage Maps)

3G LOCK MODE

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

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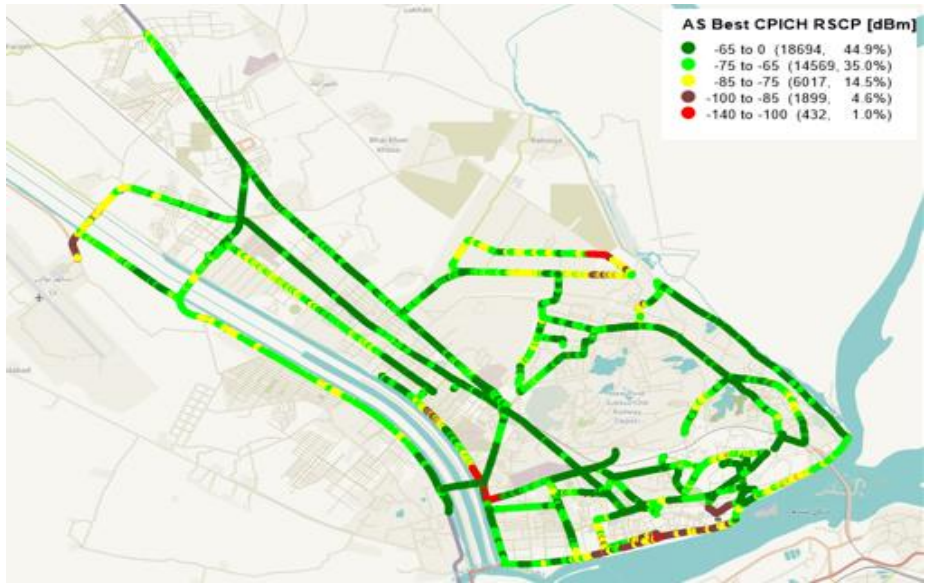
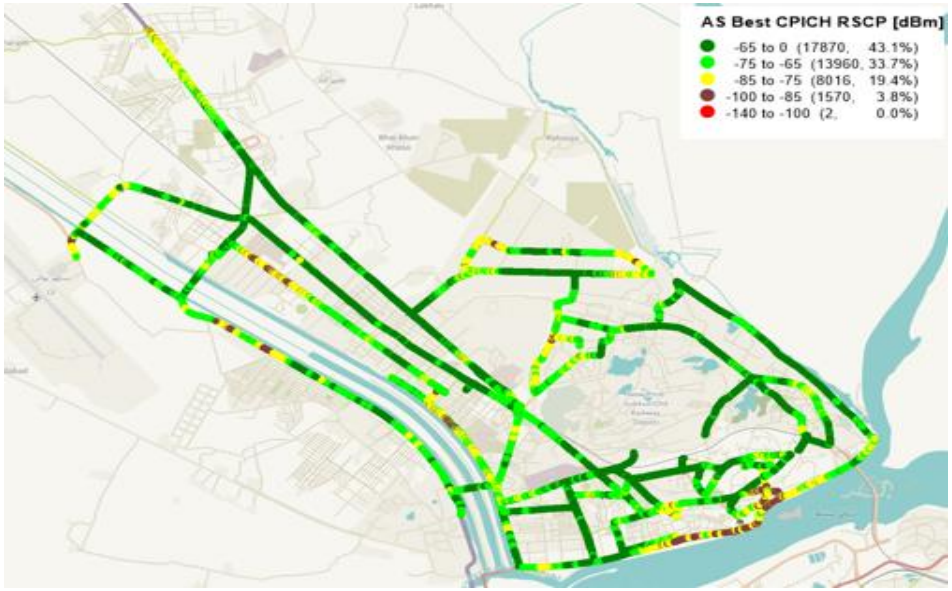
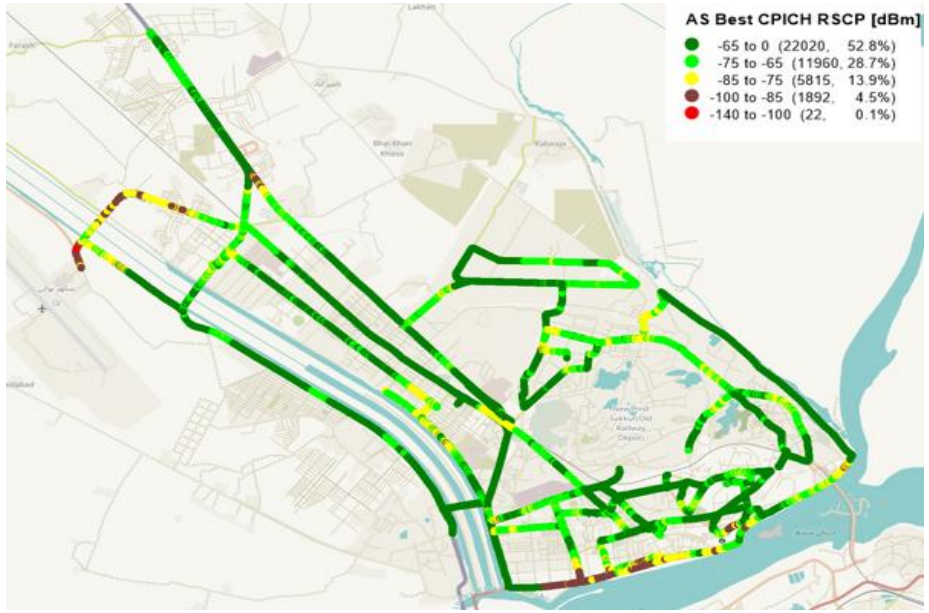
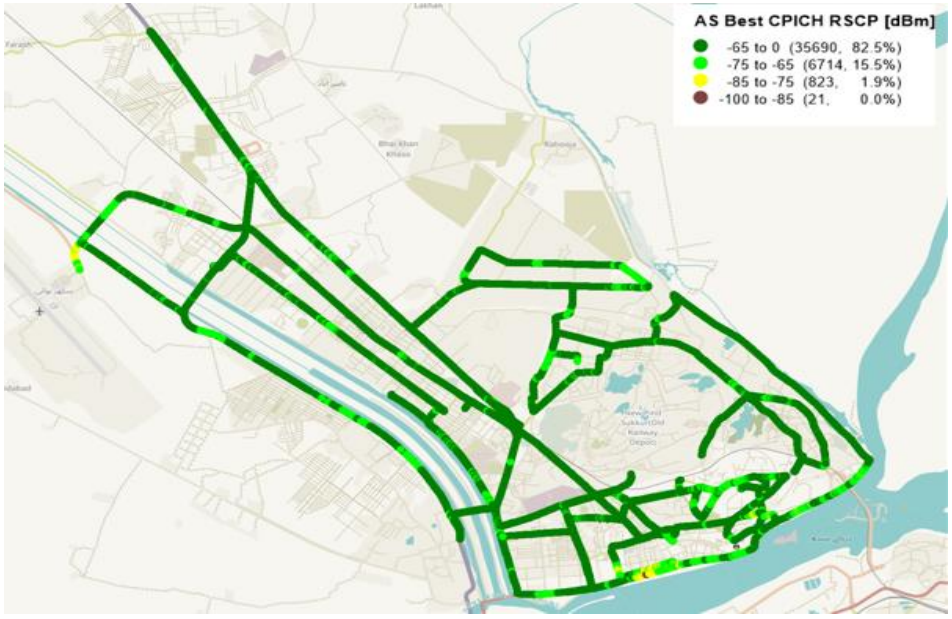
	
UFONE 3G NETWORK COVERAGE – SUKKUR	**ZONG 3G NETWORK COVERAGE – SUKKUR**
	

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

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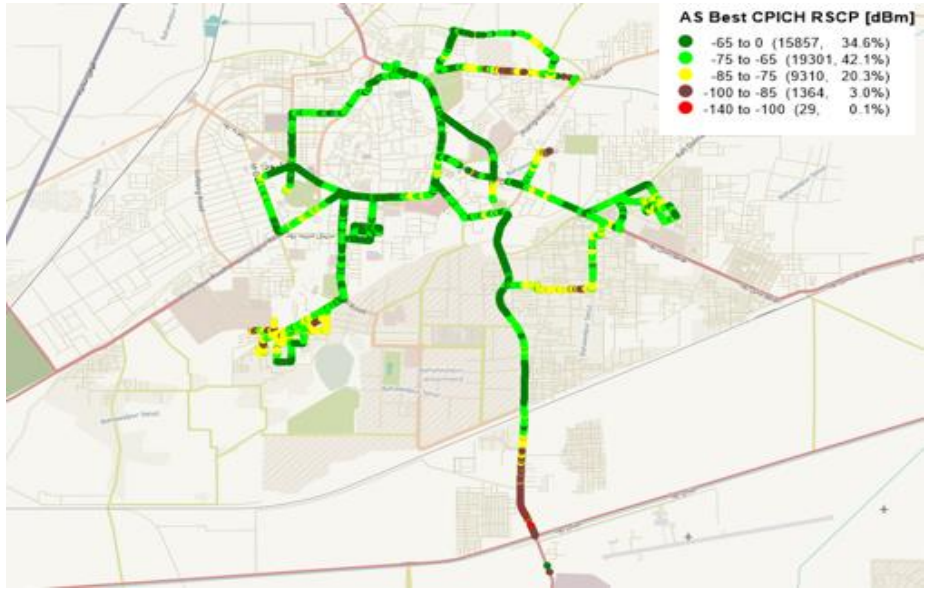	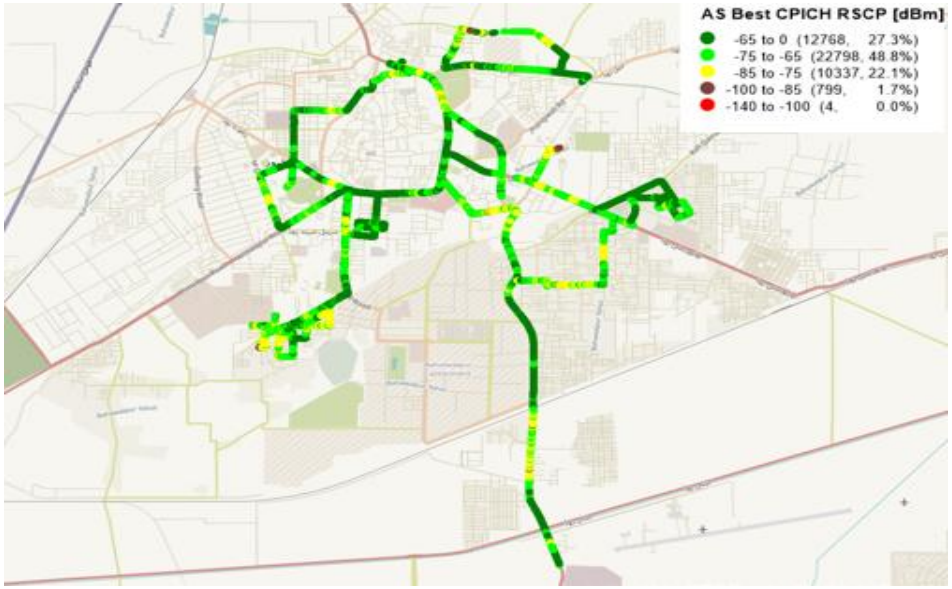
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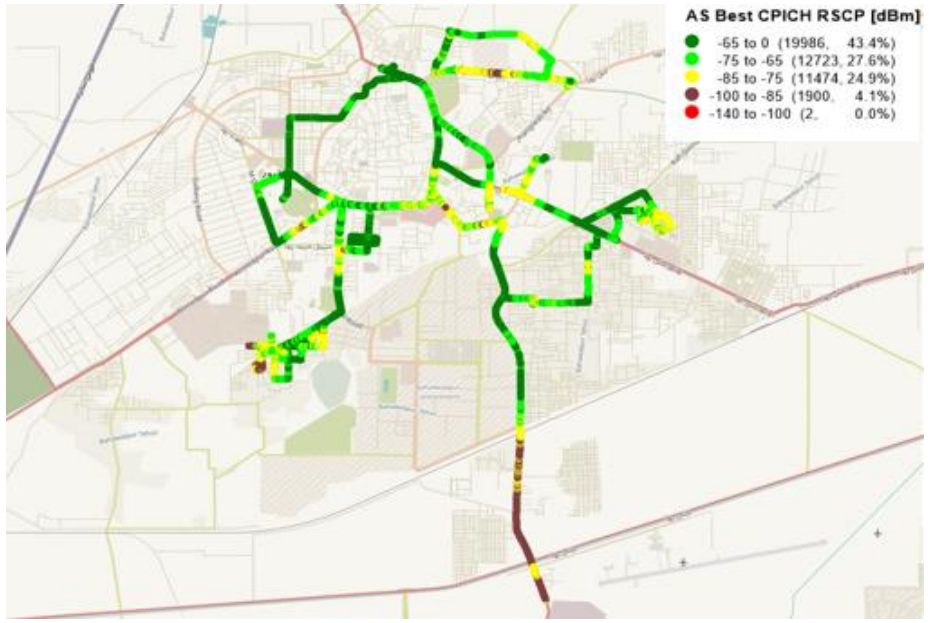	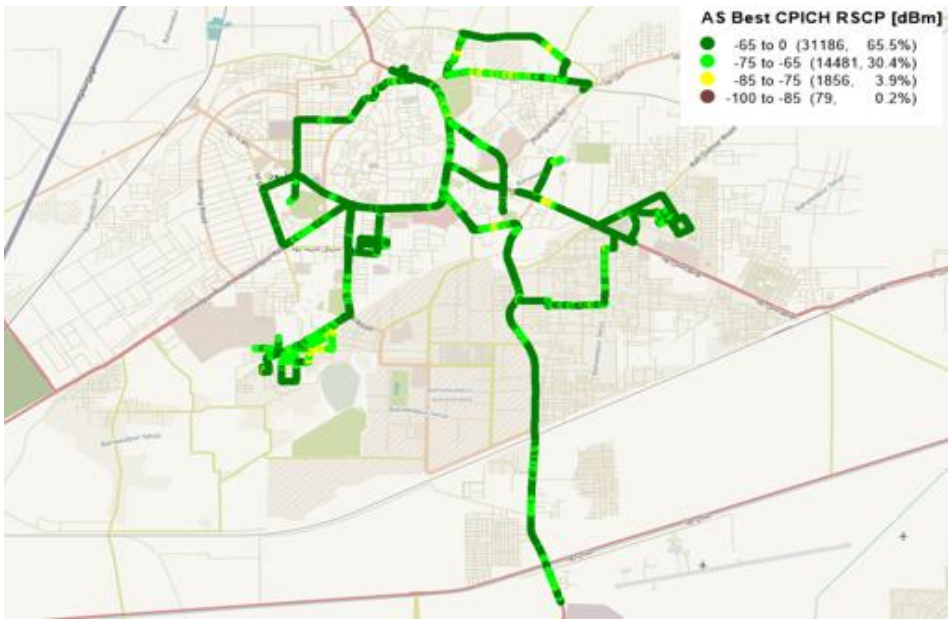

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

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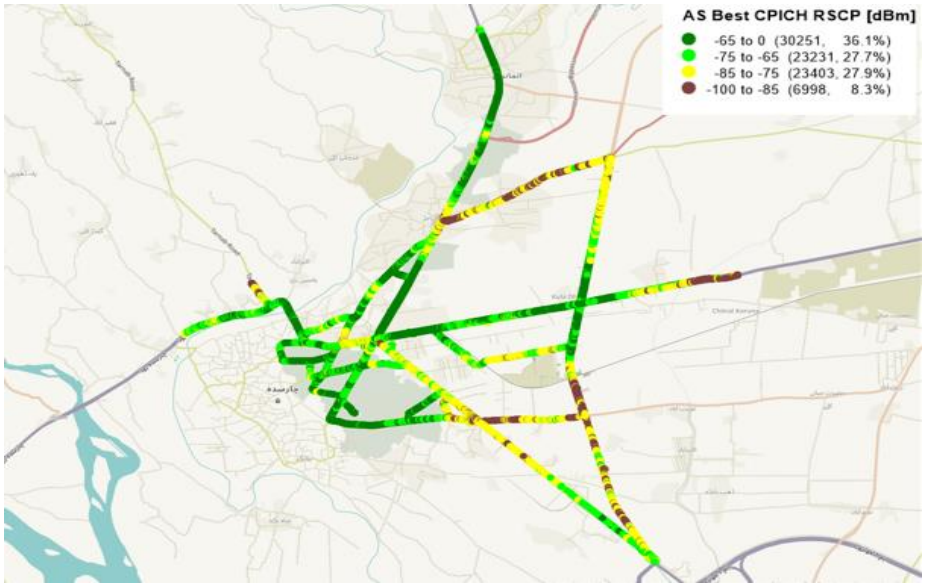	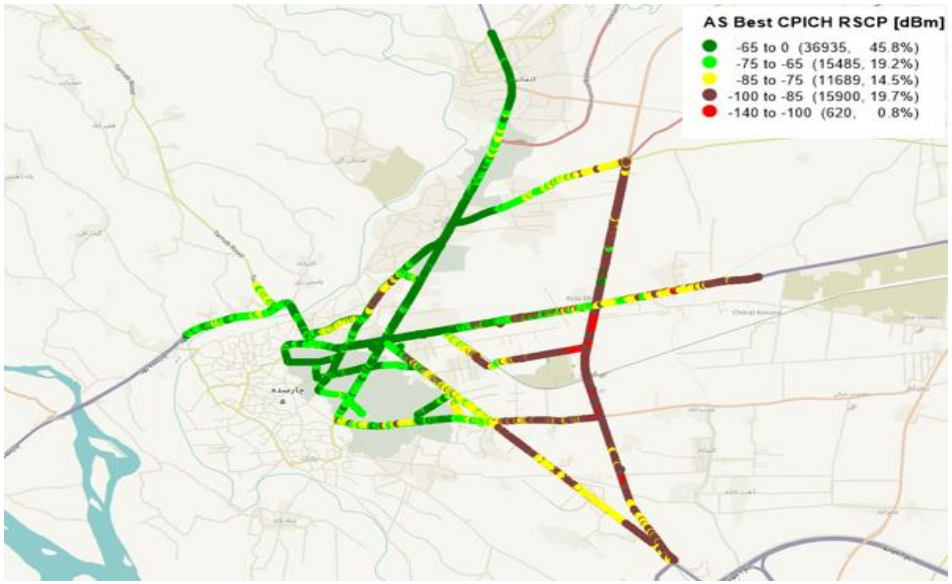
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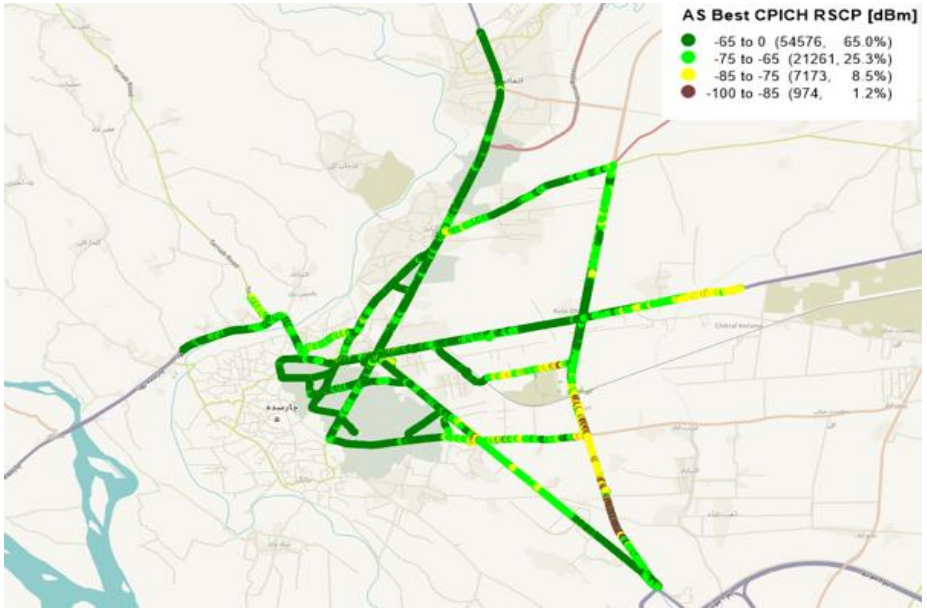	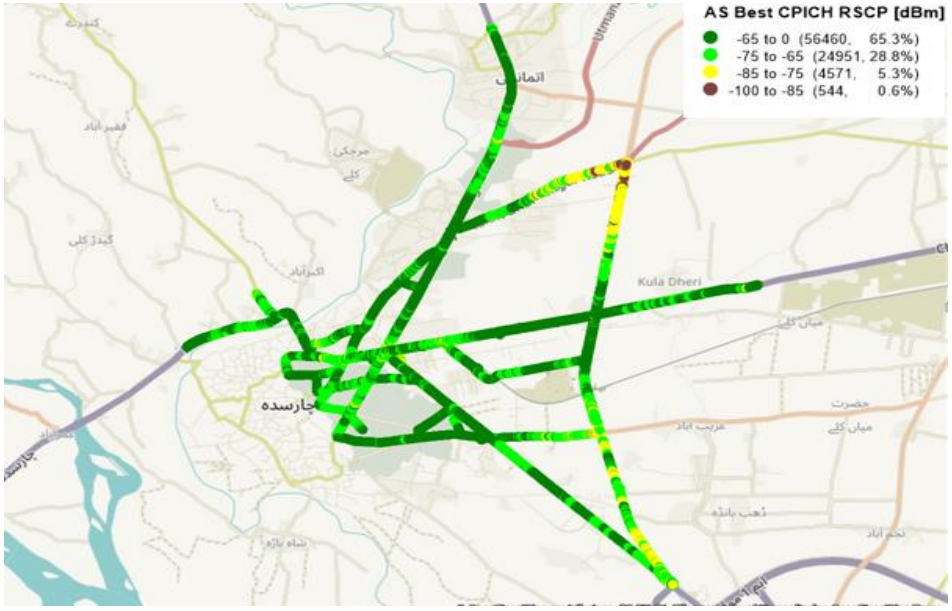

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G NETWORK COVERAGE – GWADAR	TELENOR 3G NETWORK COVERAGE – GWADAR
UFONE 3G NETWORK COVERAGE – GWADAR	**ZONG 3G NETWORK COVERAGE – GWADAR**

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

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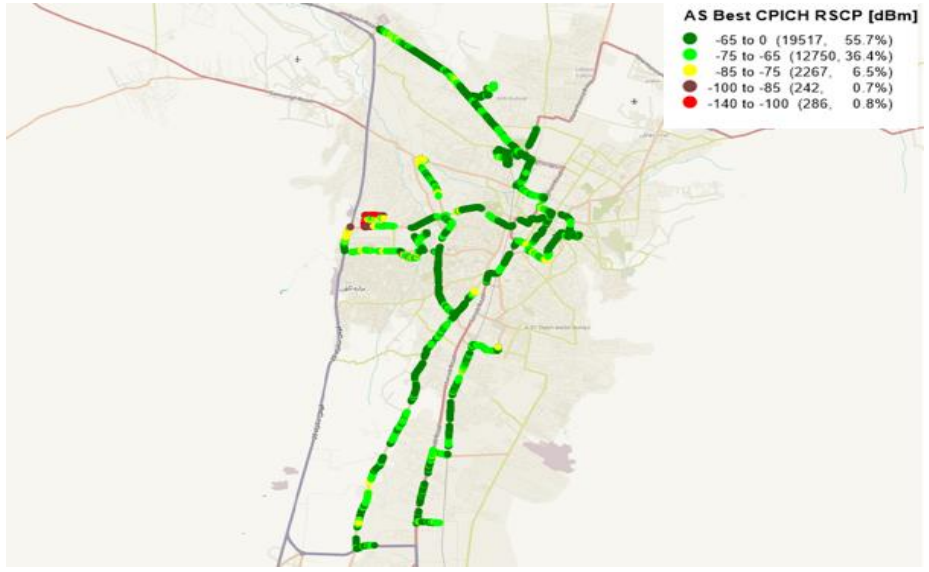	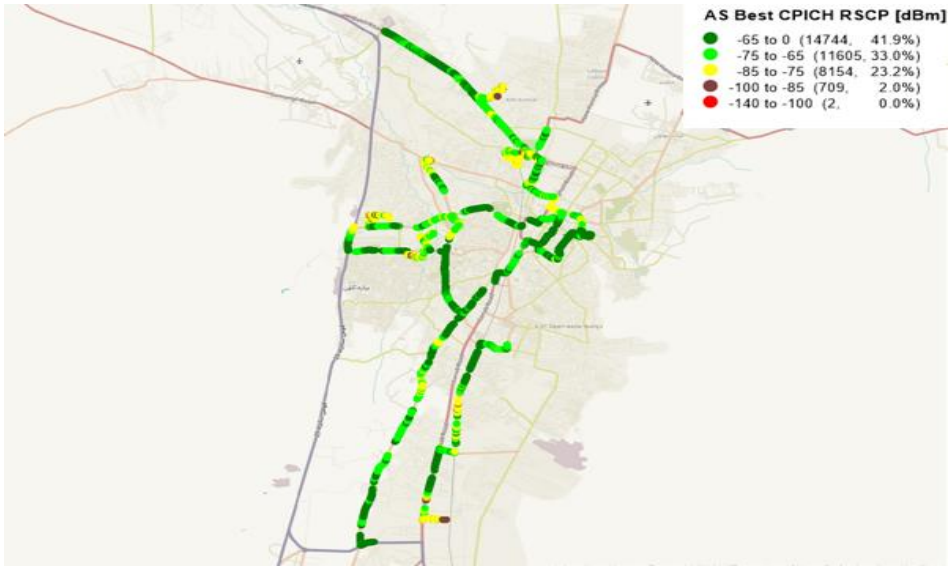
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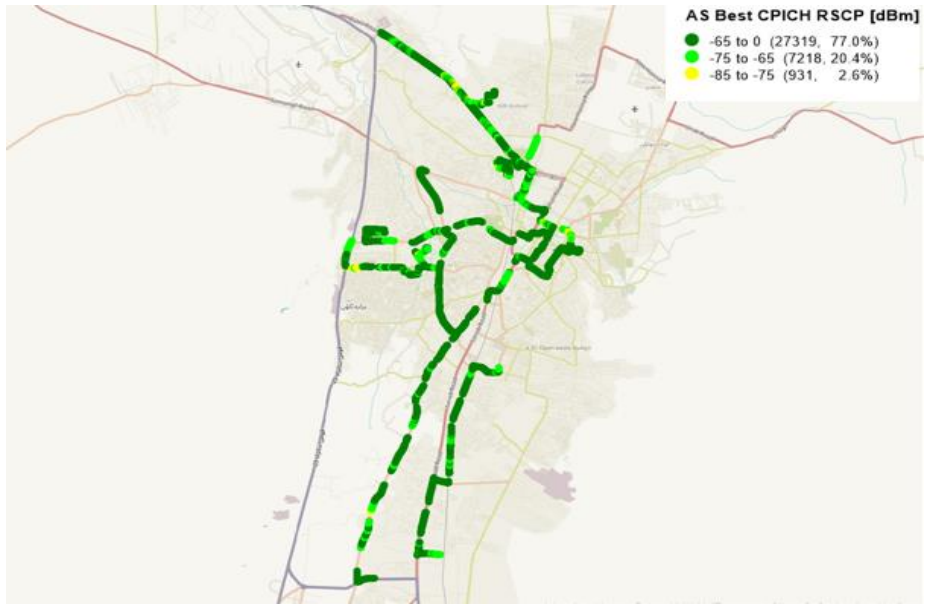
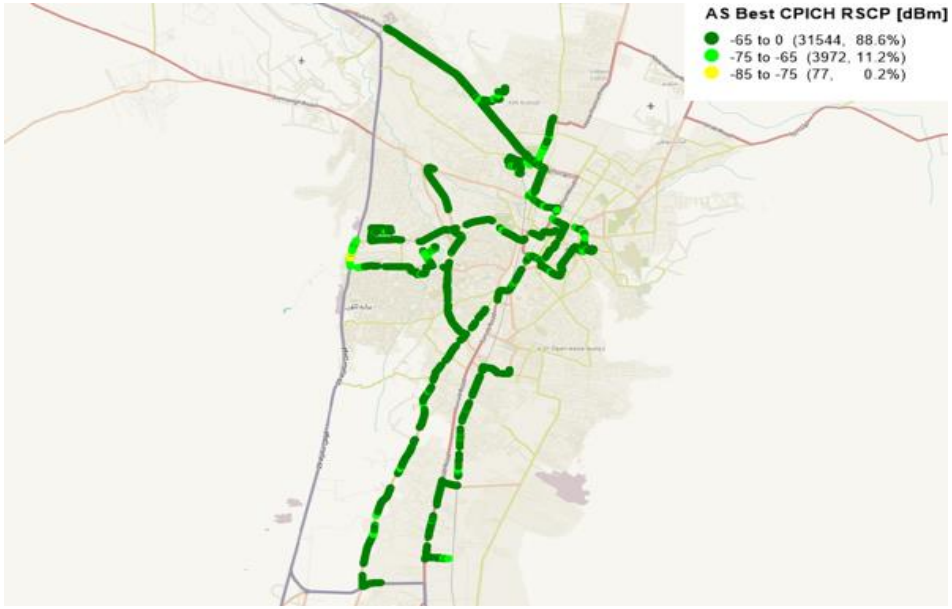
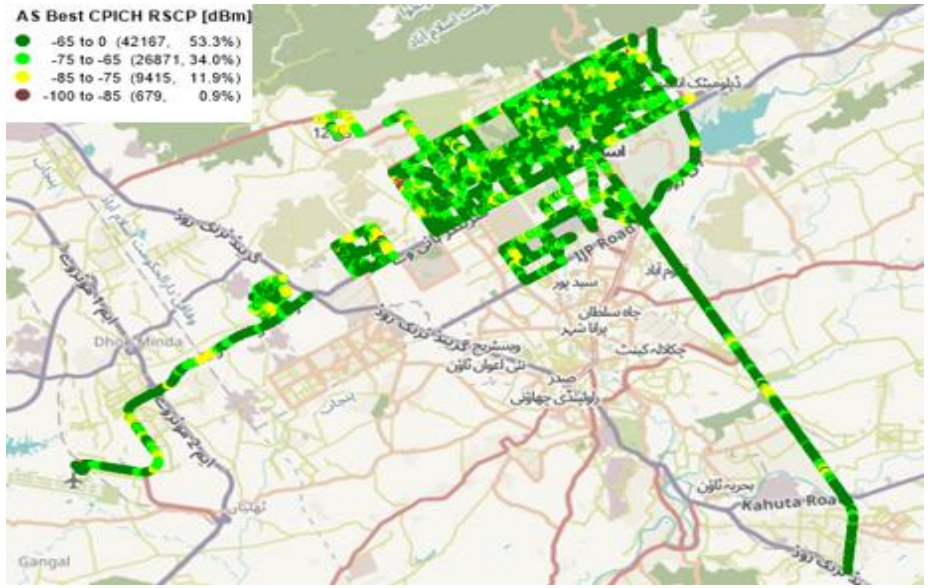
	

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G NETWORK COVERAGE – ISLAMABAD



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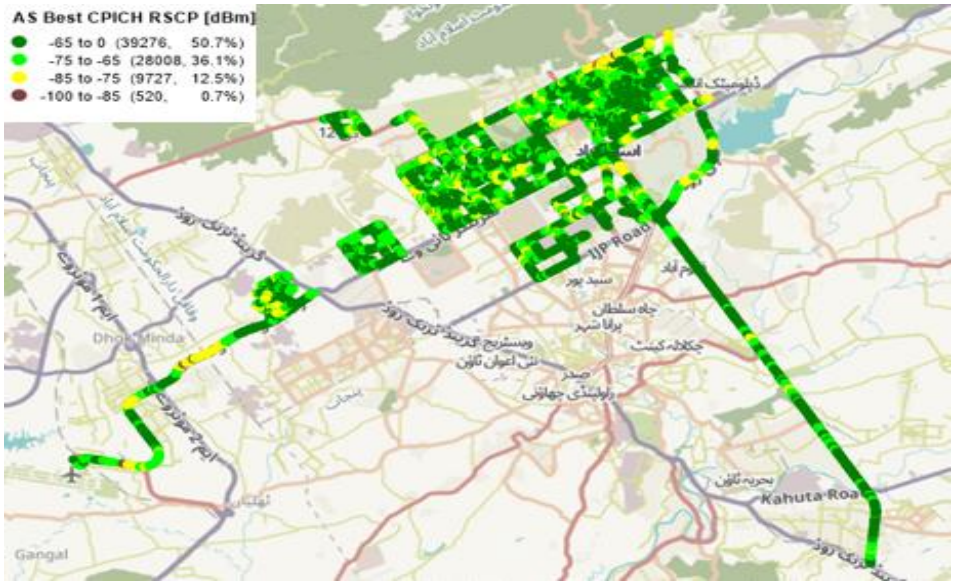
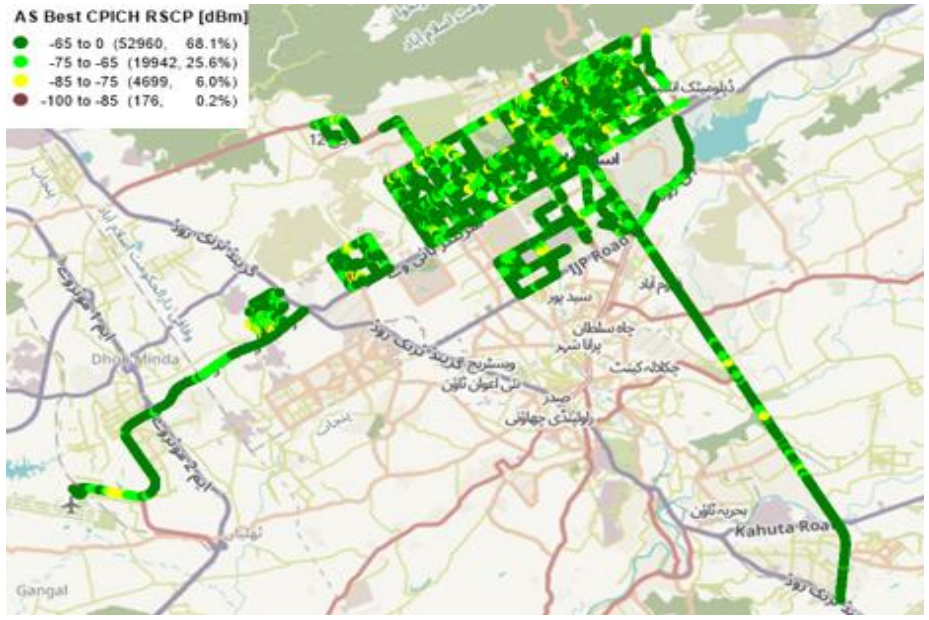


UFONE 3G NETWORK COVERAGE – ISLAMABAD



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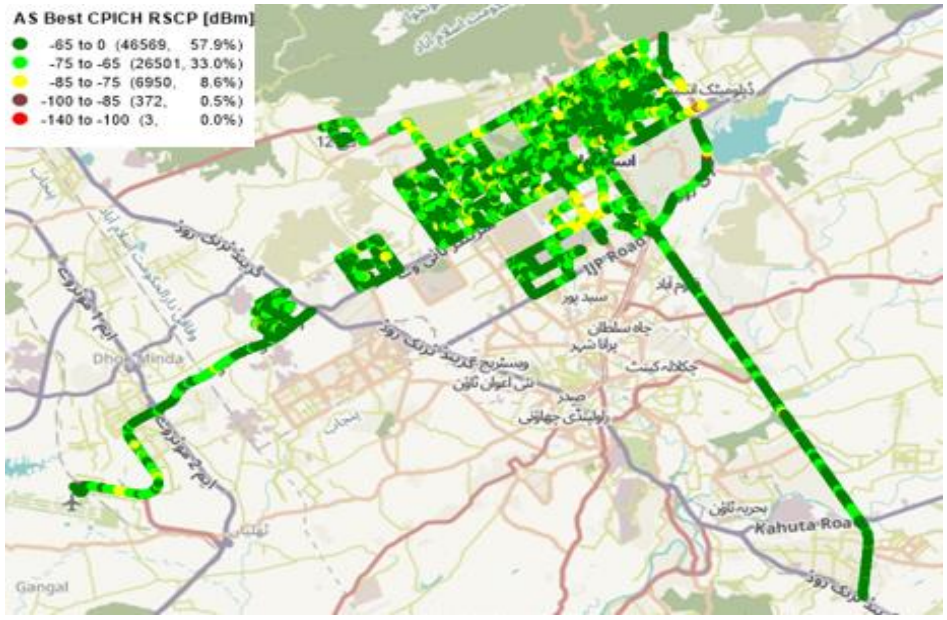

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

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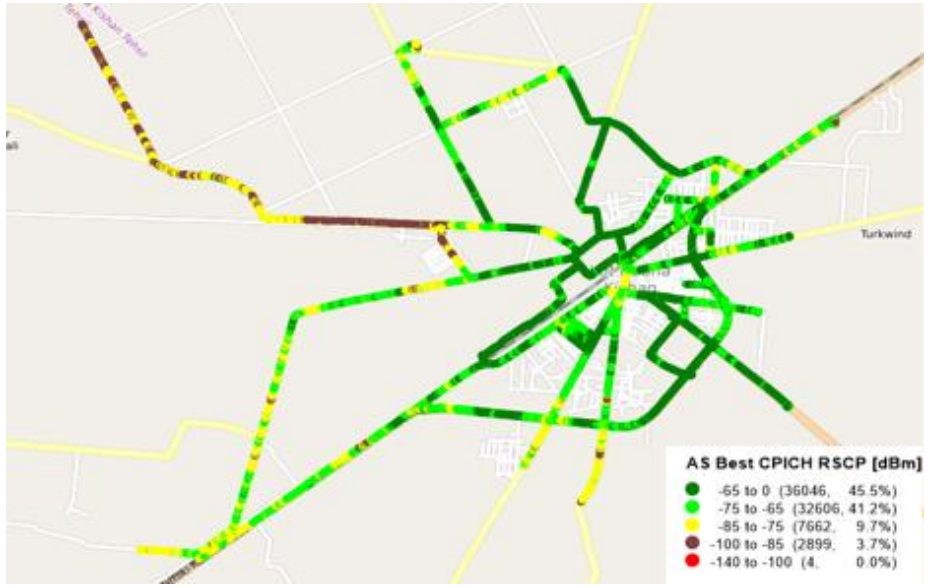	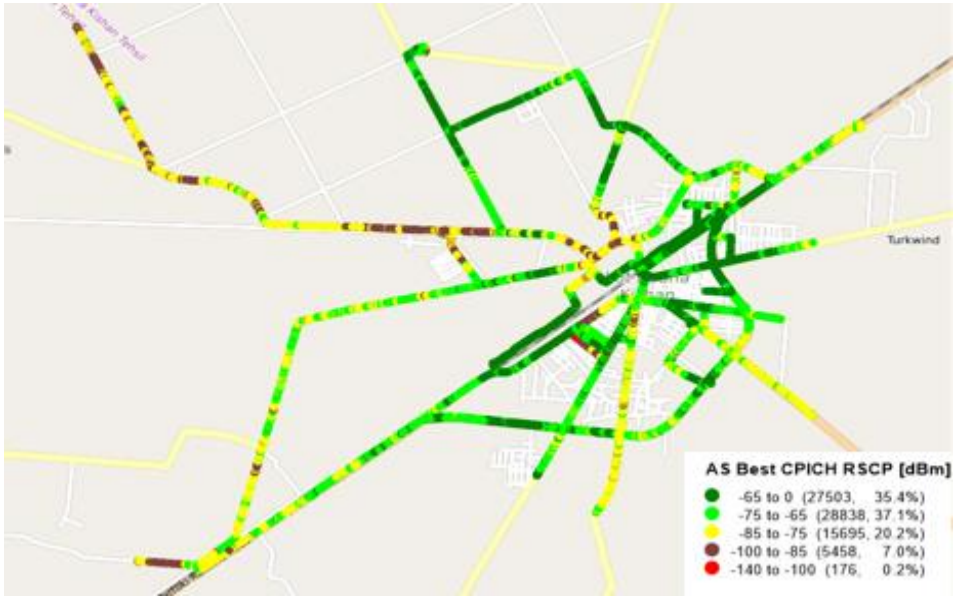
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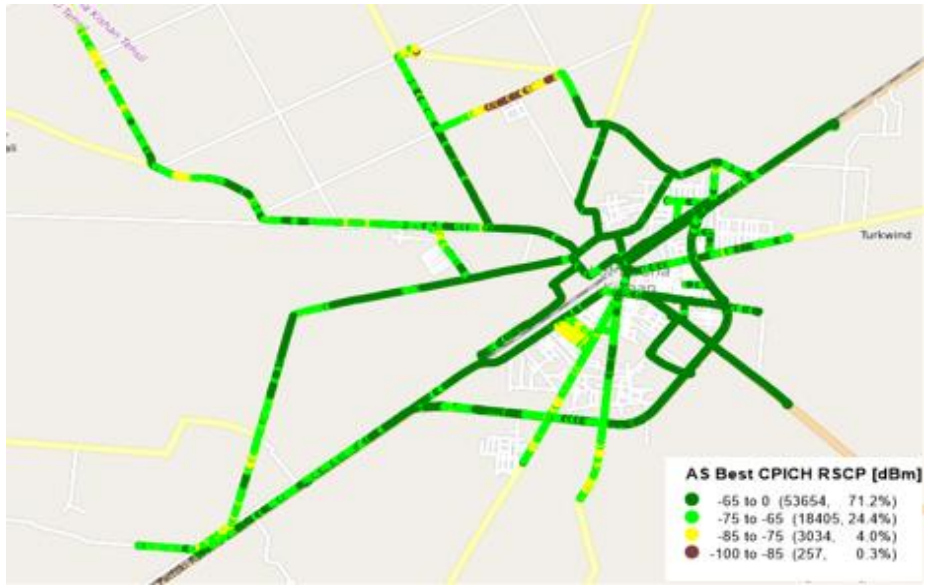	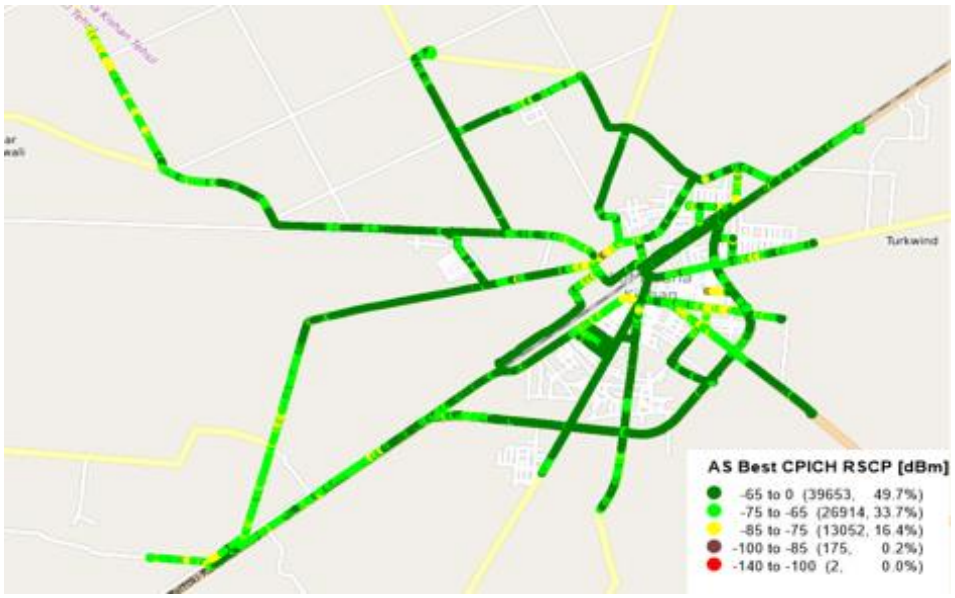

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

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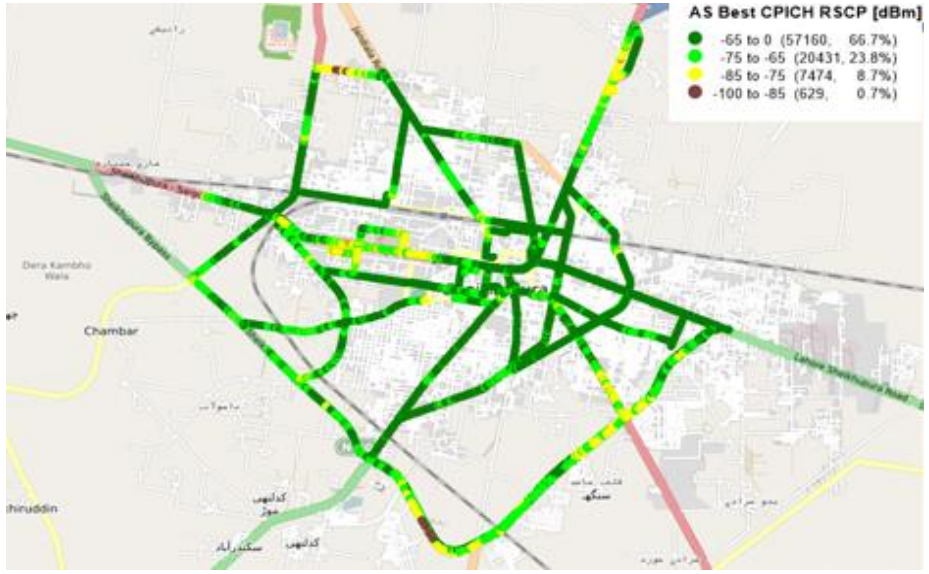	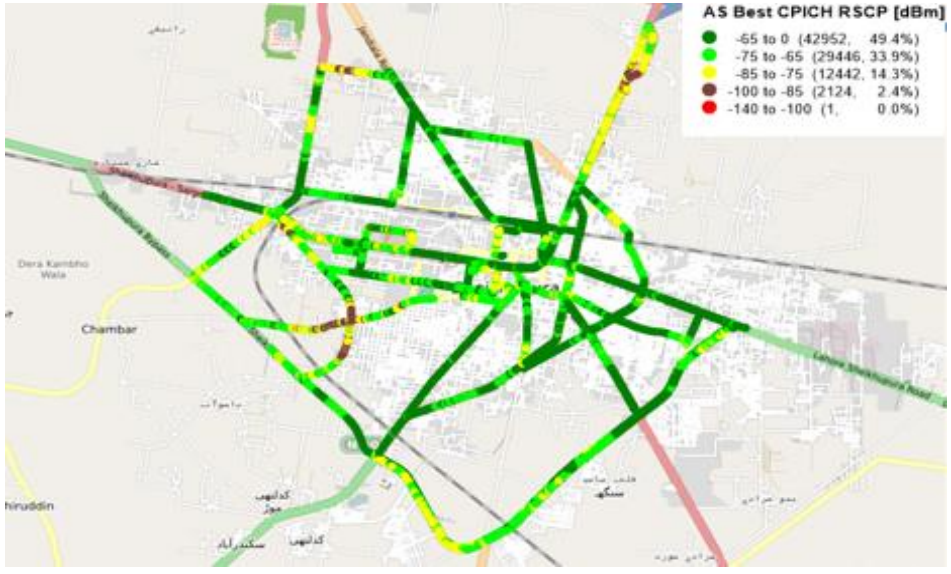
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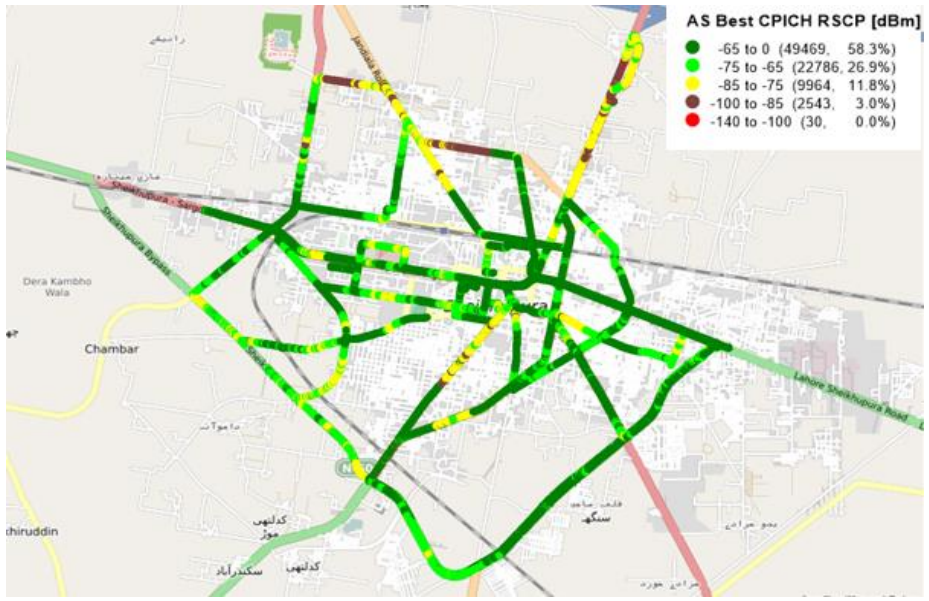	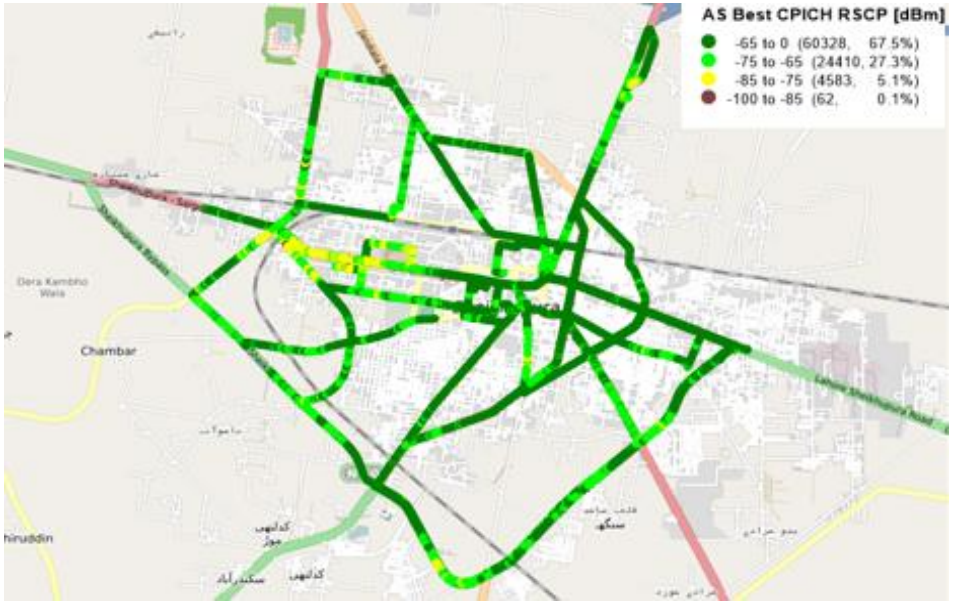

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

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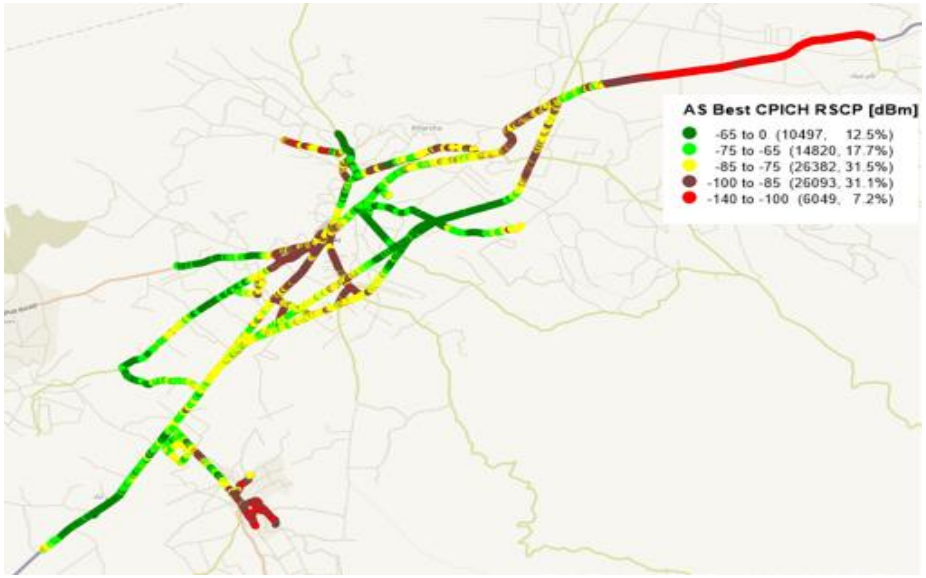	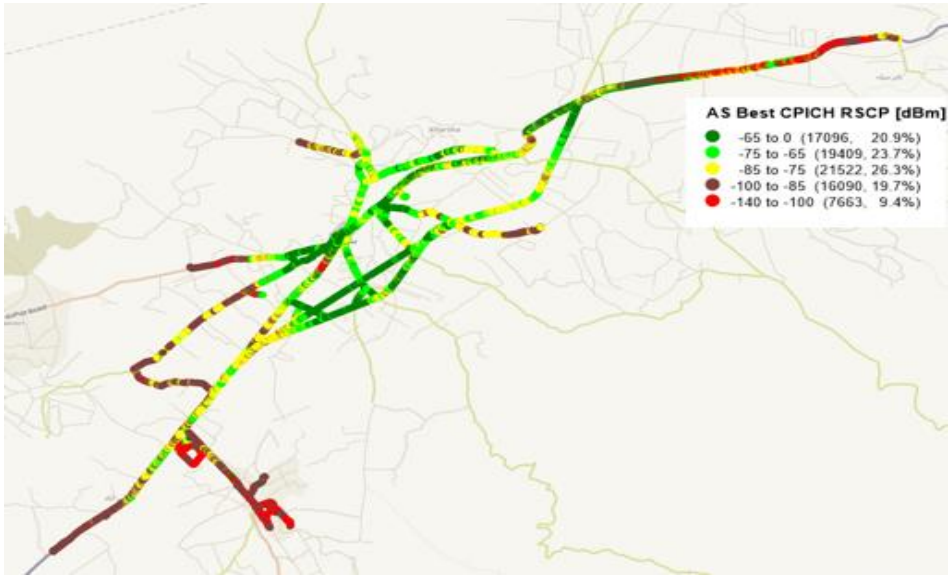
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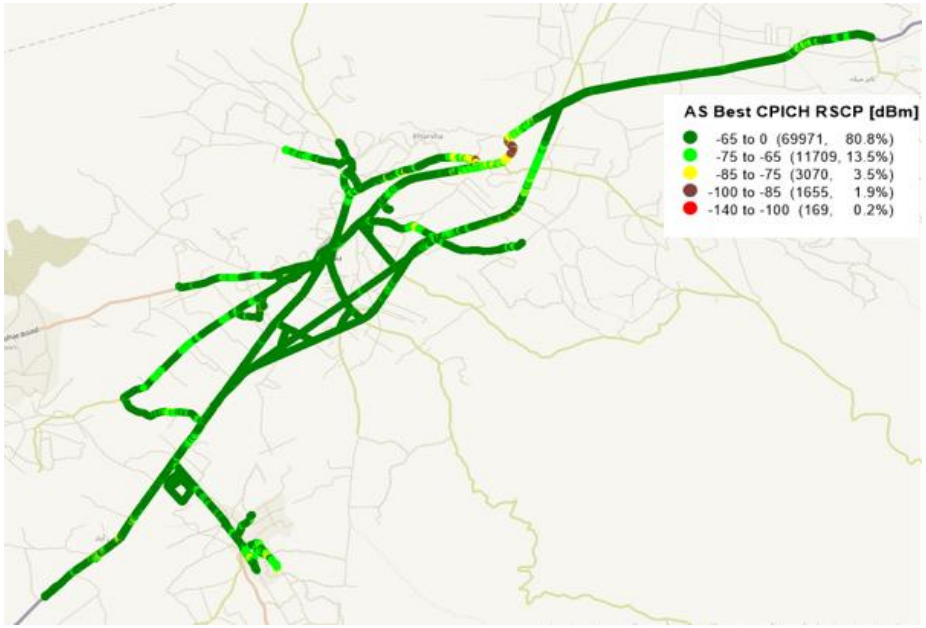
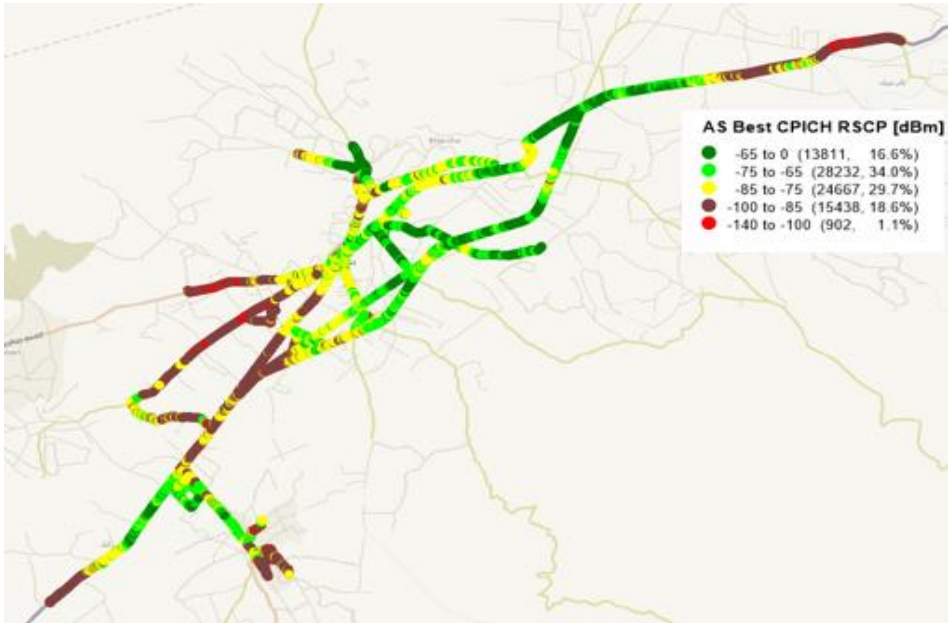
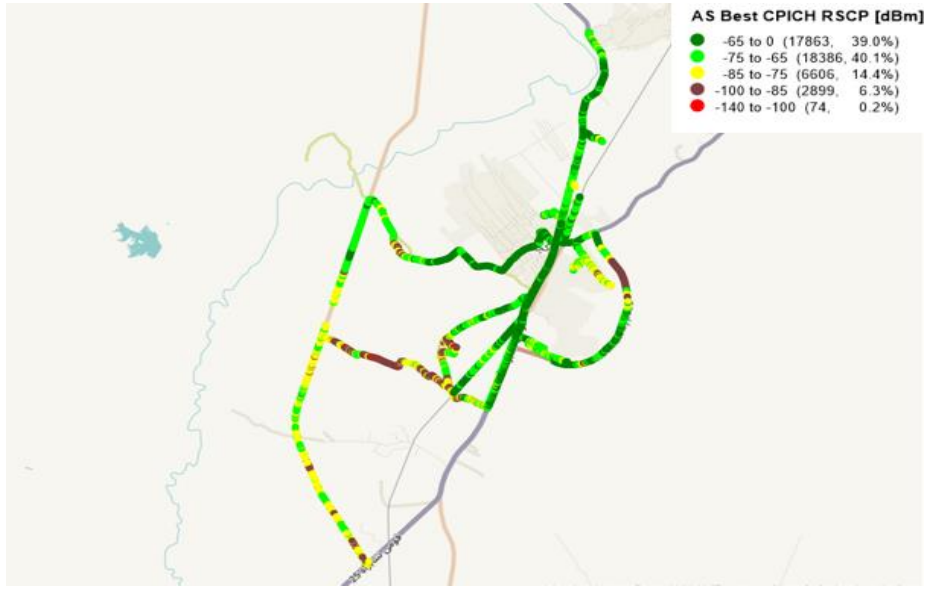
	

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G NETWORK COVERAGE – KUCHLAK



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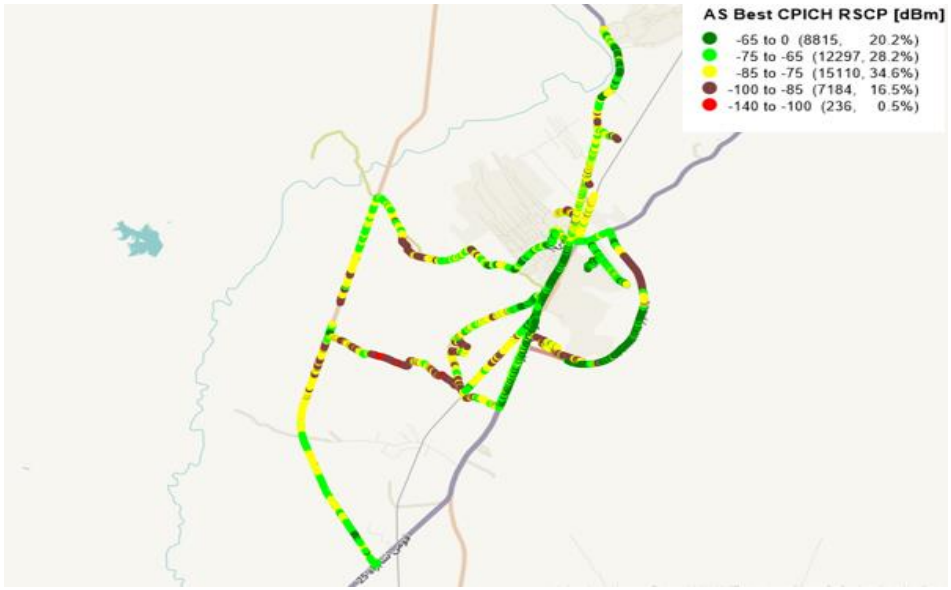
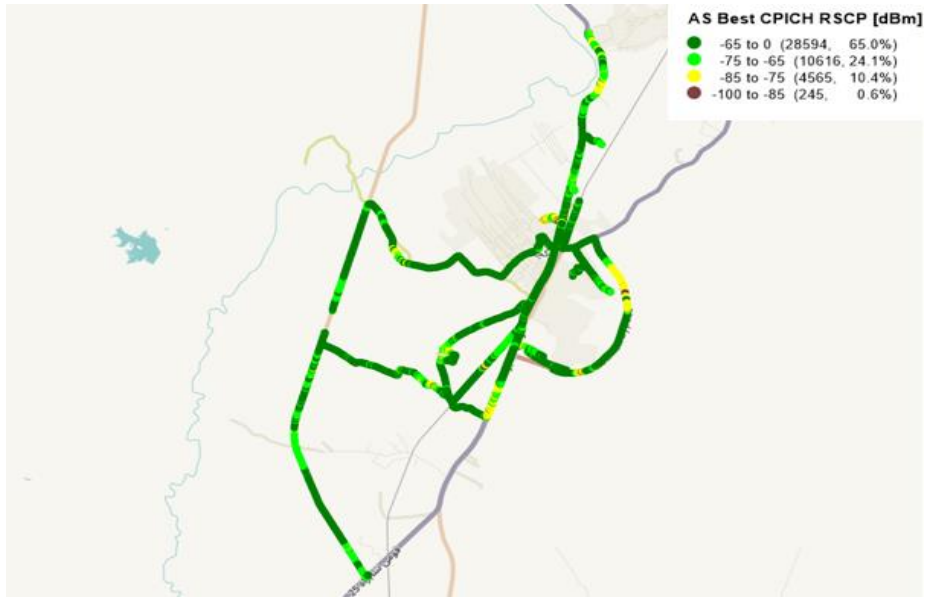
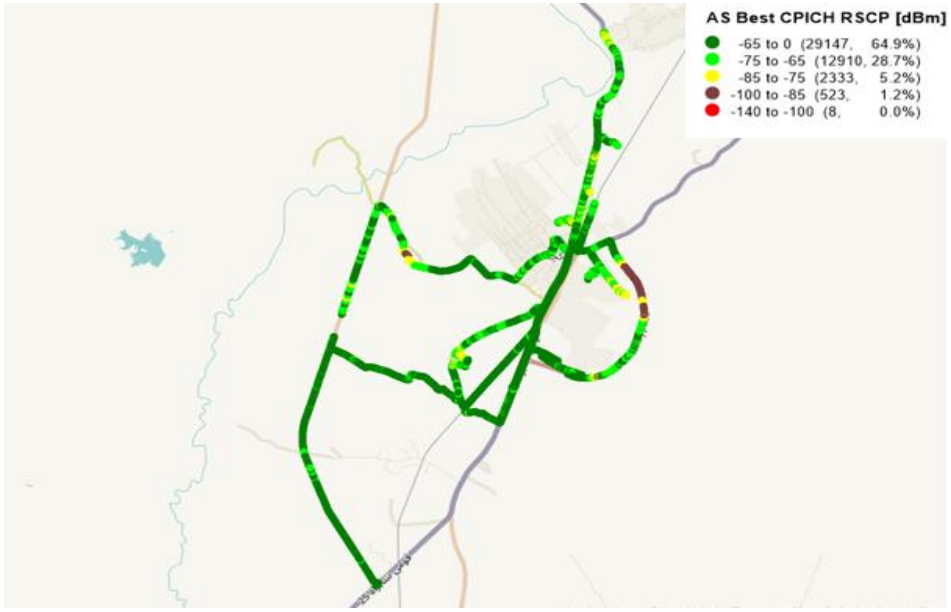


UFONE 3G NETWORK COVERAGE – KUCHLAK



ZONG 3G NETWORK COVERAGE – KUCHLAK



3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

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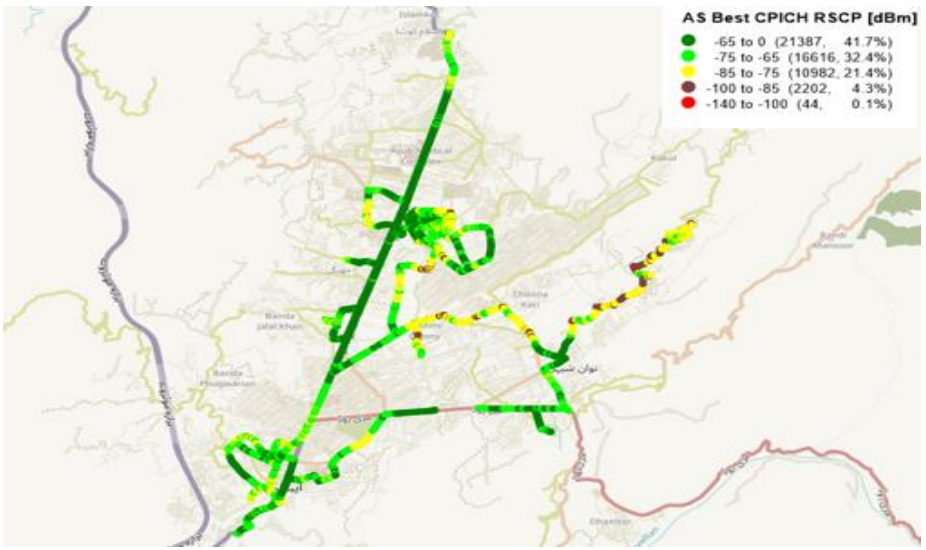	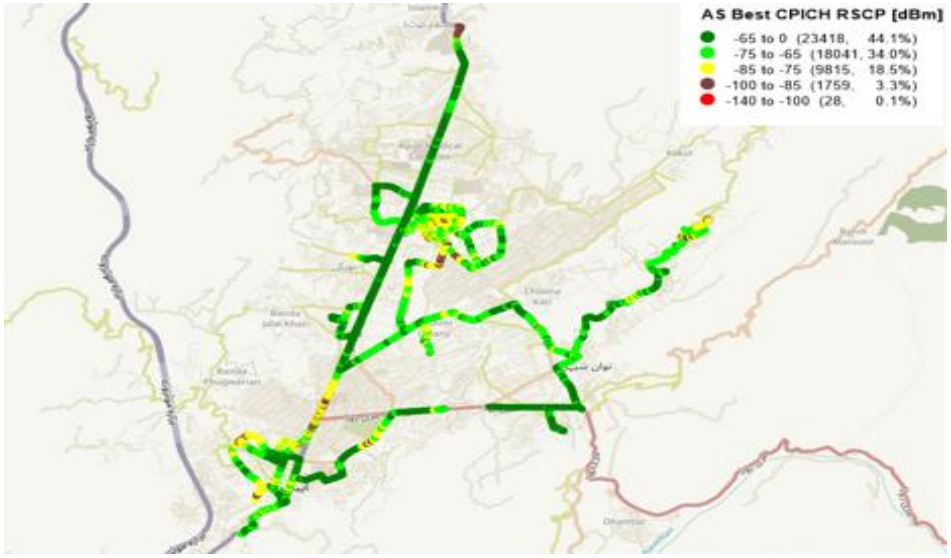
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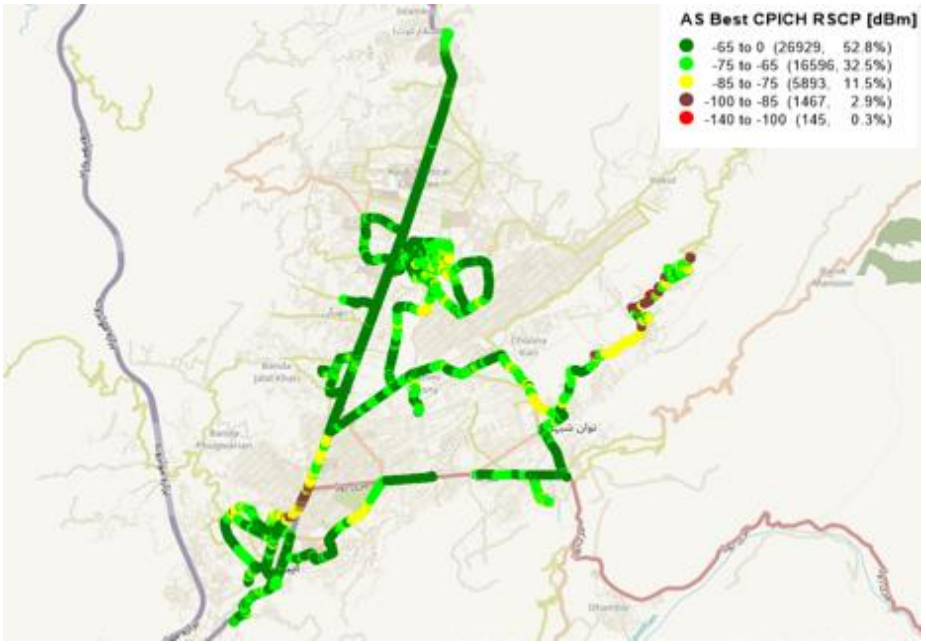	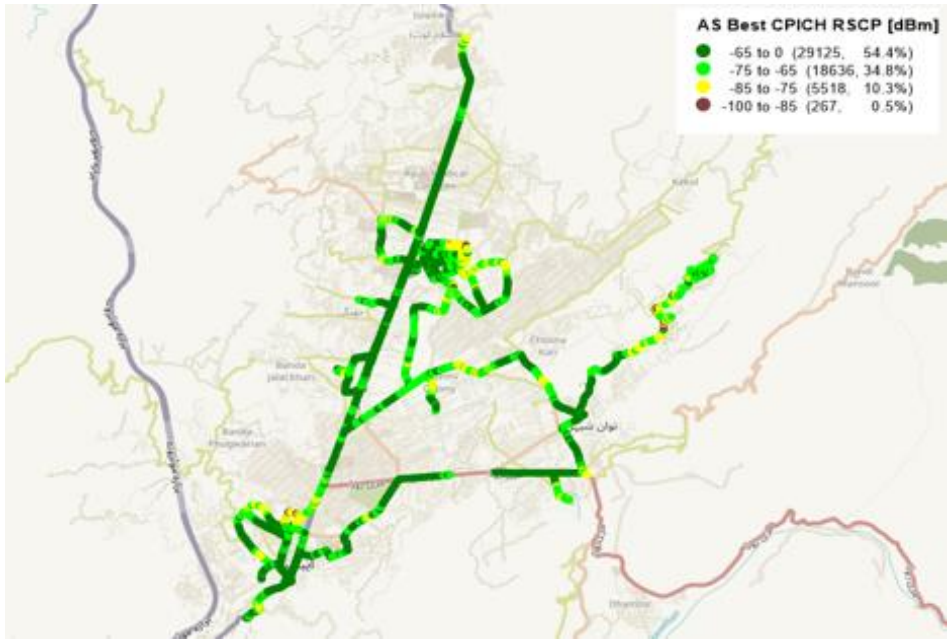

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

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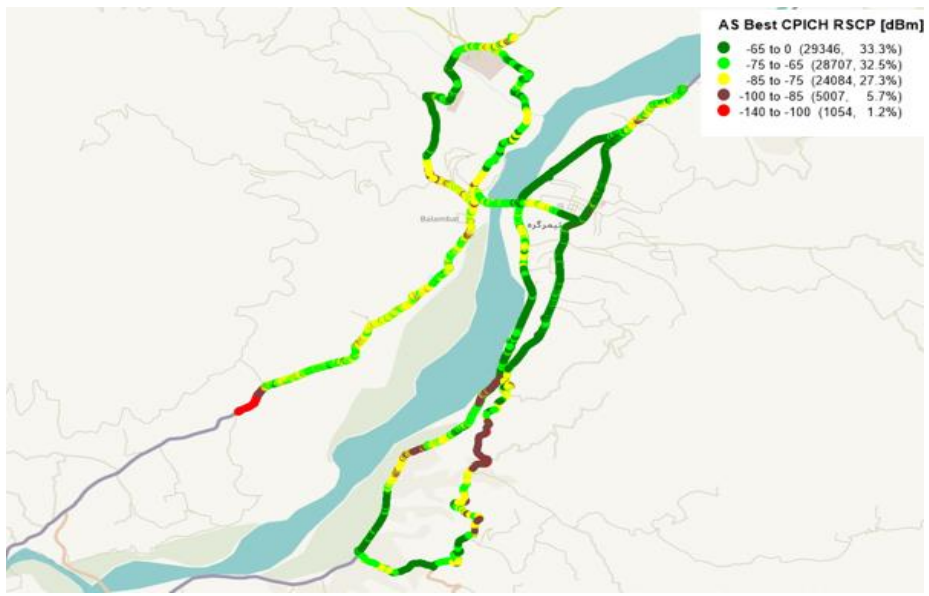	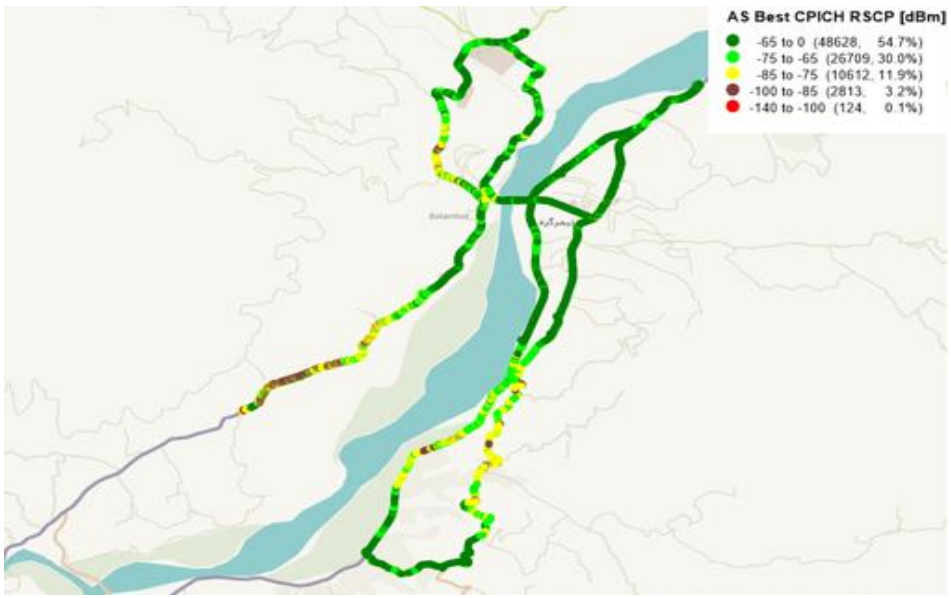
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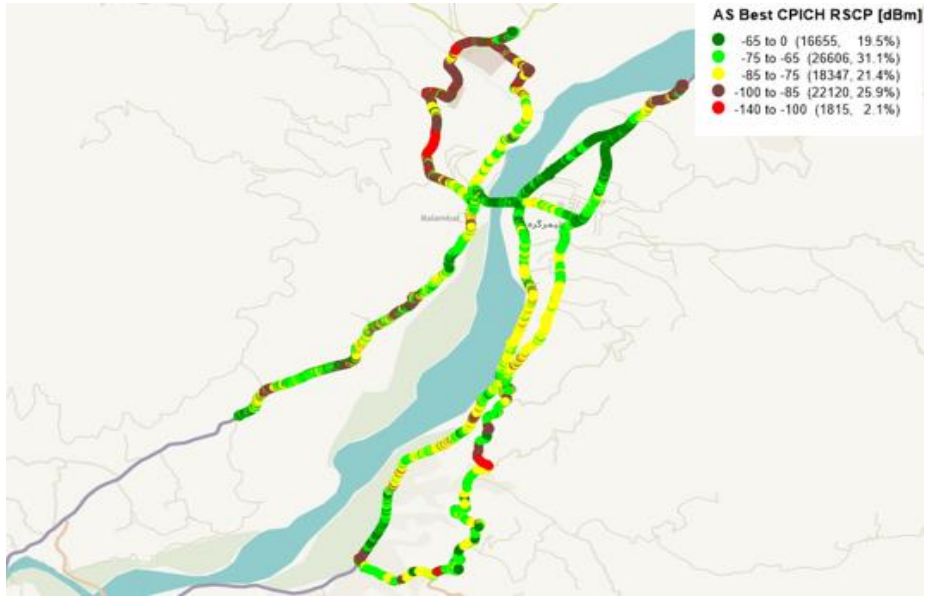
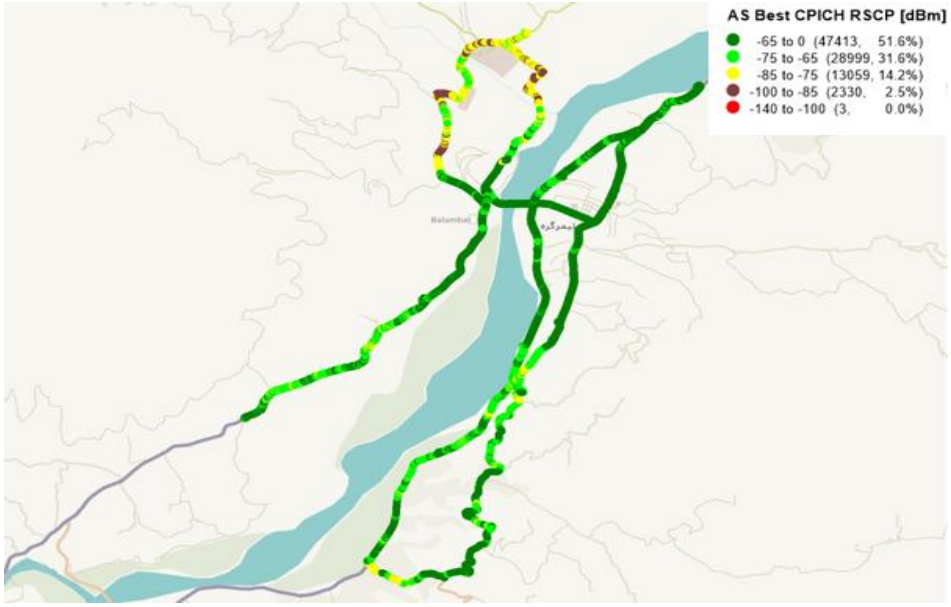
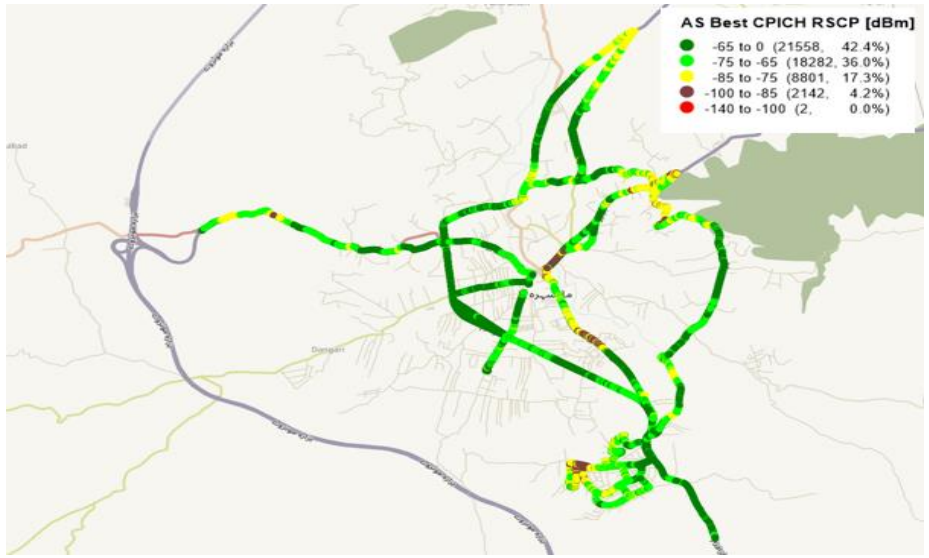
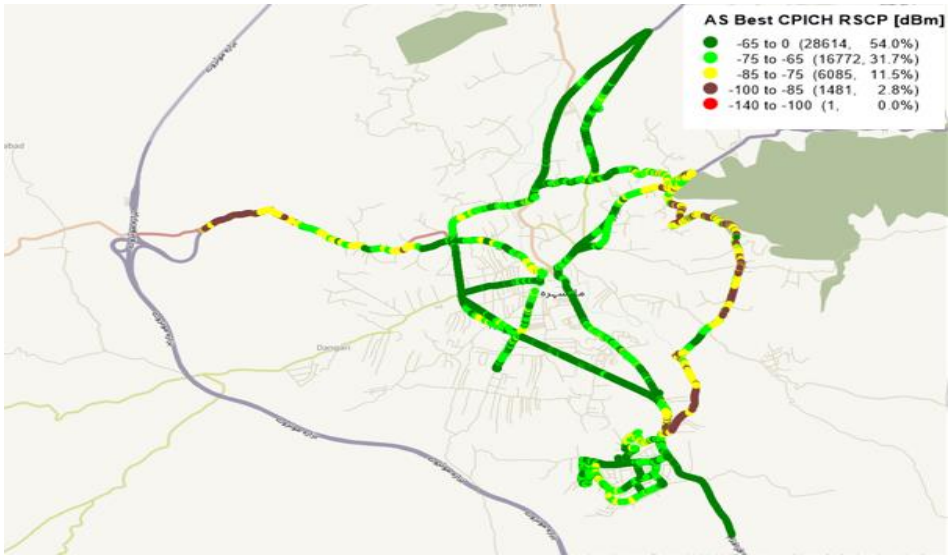
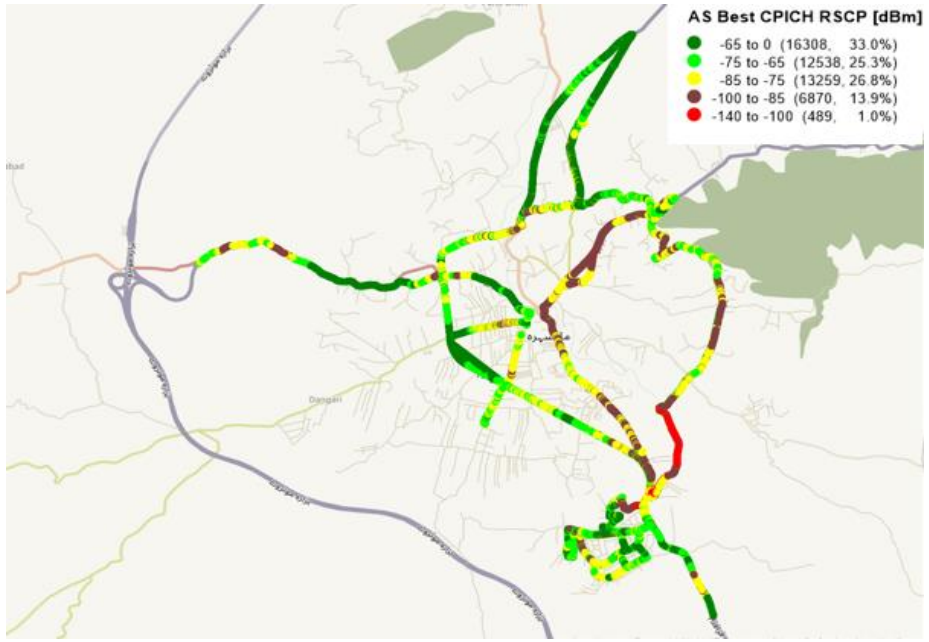
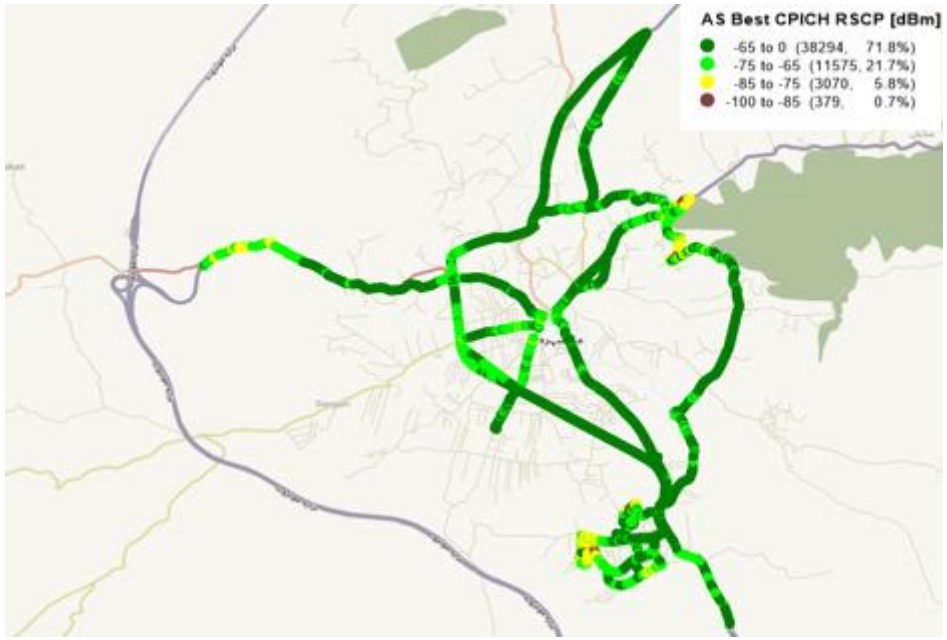
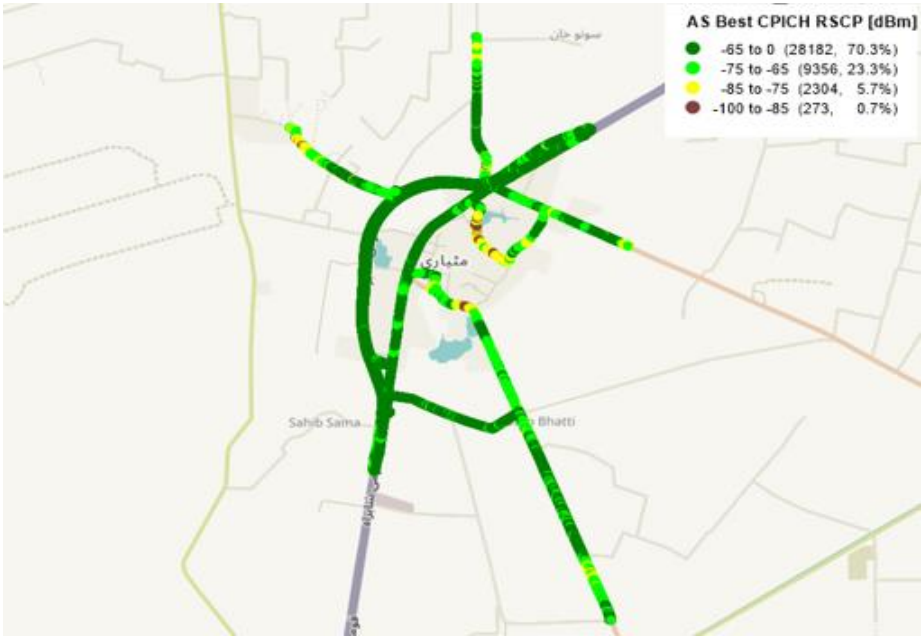
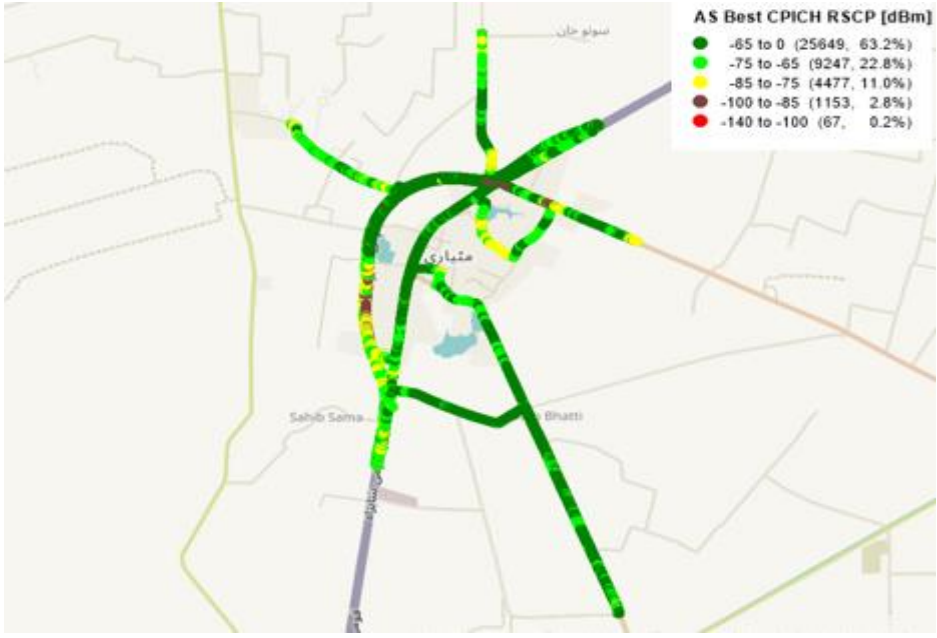
	

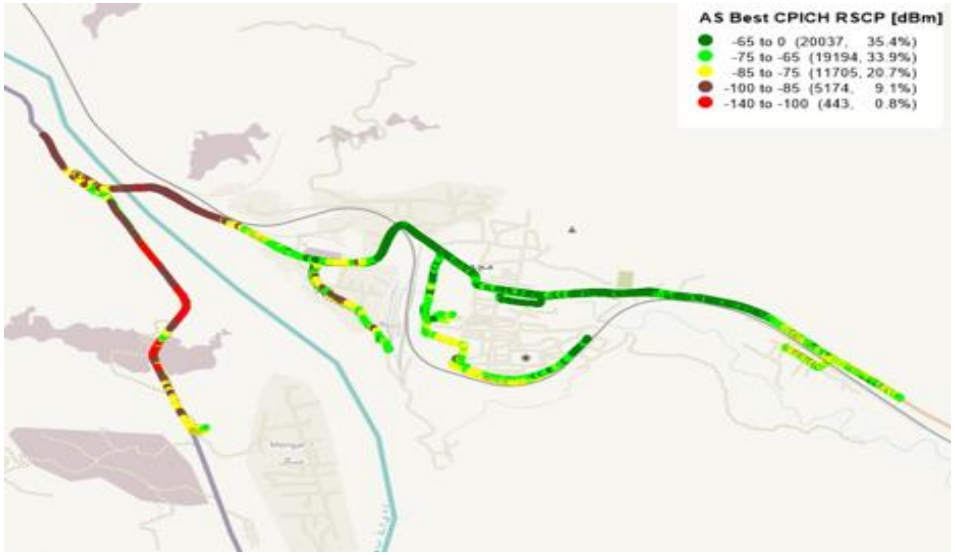
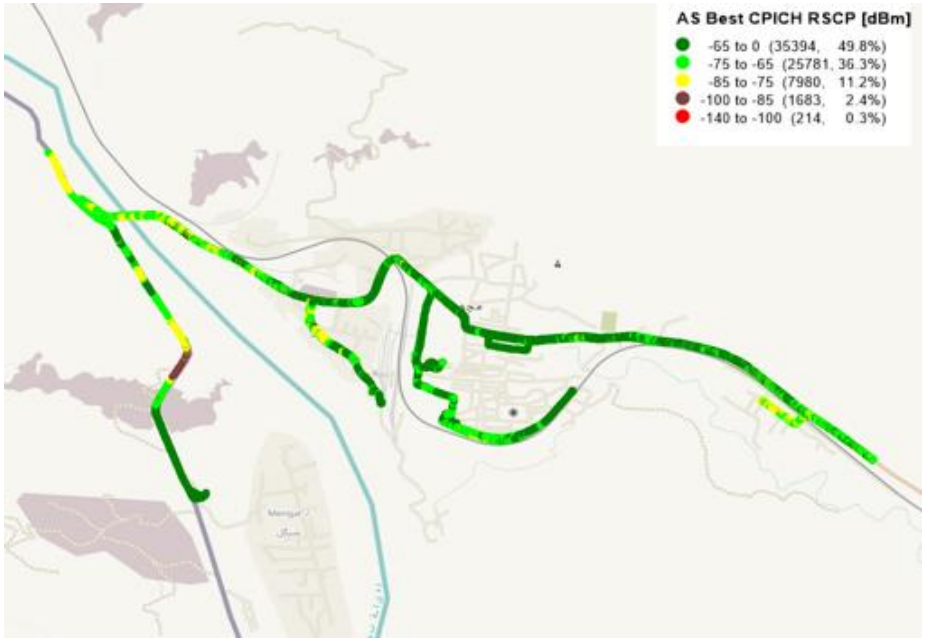
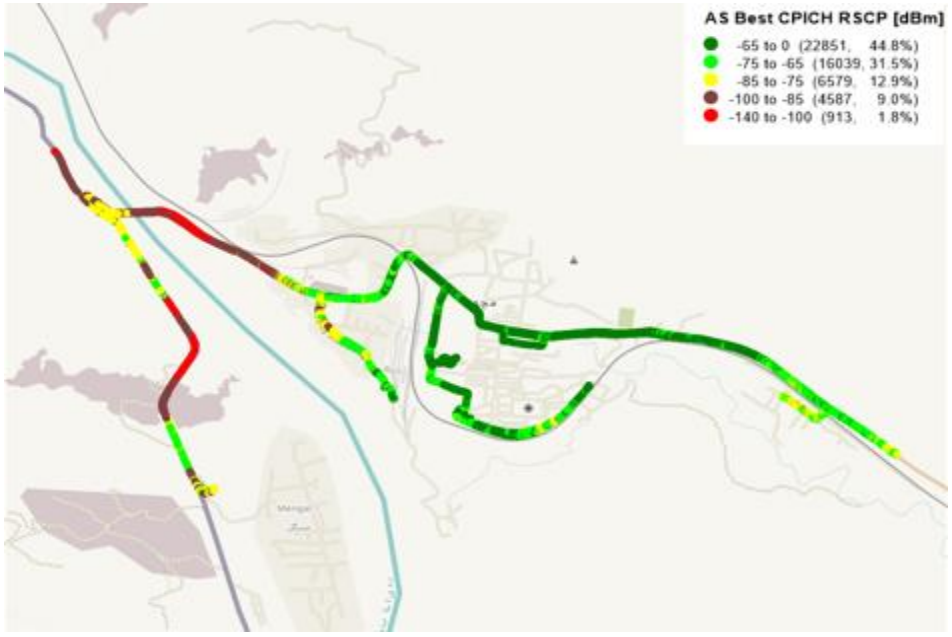
3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G NETWORK COVERAGE – MANSEHRA	TELENOR 3G NETWORK COVERAGE – MANSEHRA
	
UFONE 3G NETWORK COVERAGE – MANSEHRA	**ZONG 3G NETWORK COVERAGE – MANSEHRA**
	

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

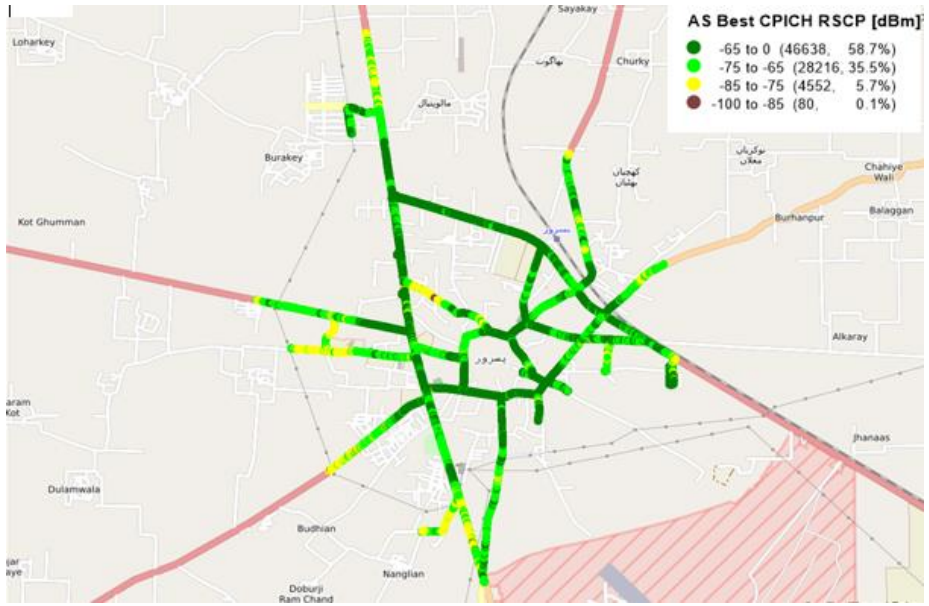
JAZZ 3G NETWORK COVERAGE – MATIARI	TELENOR 3G NETWORK COVERAGE – MATIARI
UFONE 3G NETWORK COVERAGE – MATIARI	**ZONG 3G NETWORK COVERAGE – MATIARI**
	

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

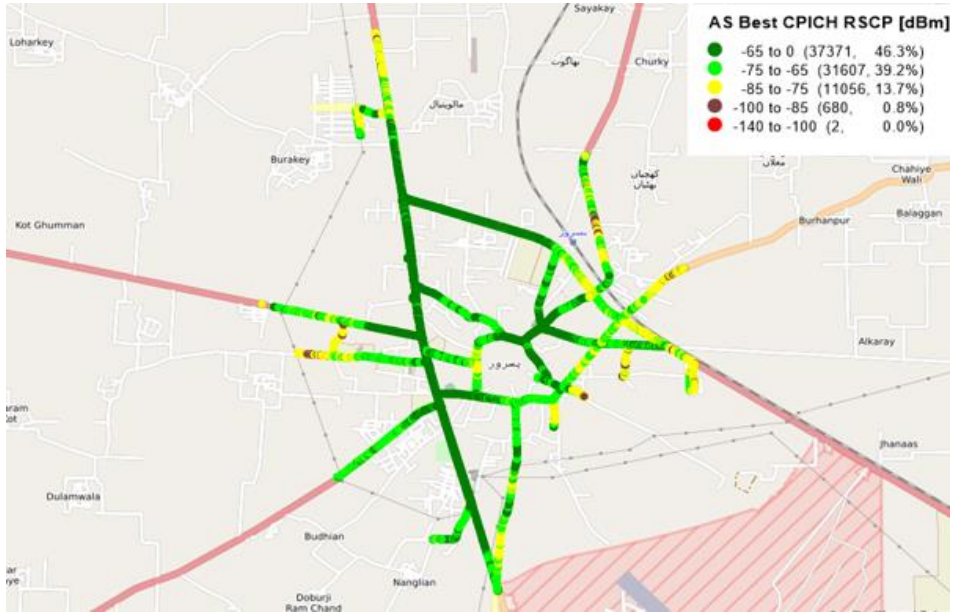
JAZZ 3G NETWORK COVERAGE –MACH	TELENOR 3G NETWORK COVERAGE – MACH
N/A	
UFONE 3G NETWORK COVERAGE – MACH	**ZONG 3G NETWORK COVERAGE – MACH**
	

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

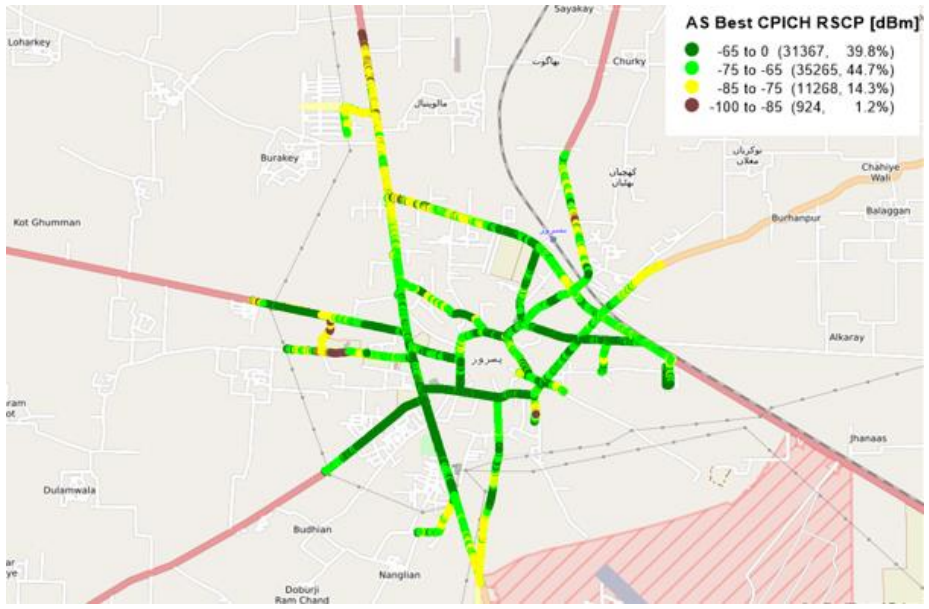
JAZZ 3G NETWORK COVERAGE – PASROOR



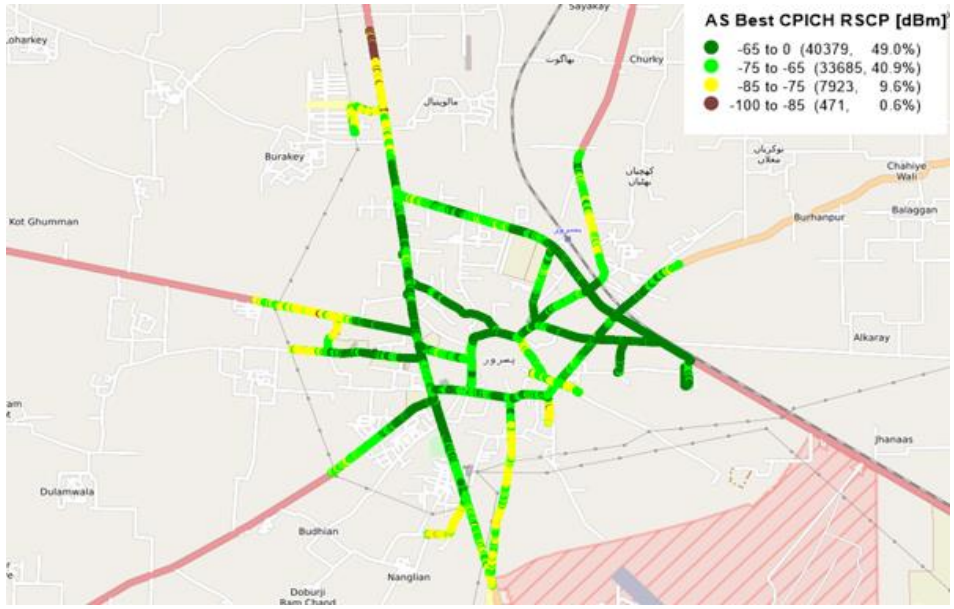
TELENOR 3G NETWORK COVERAGE – PASROOR



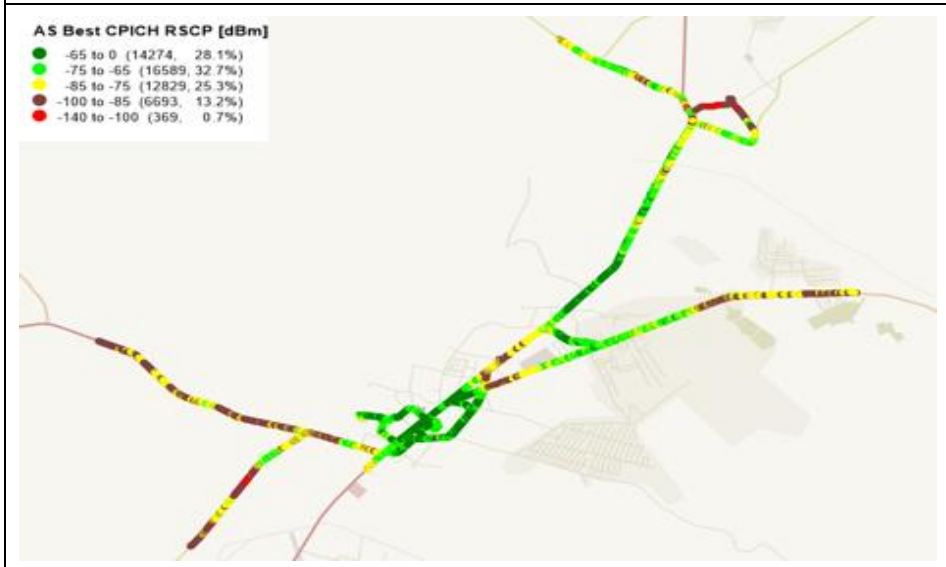
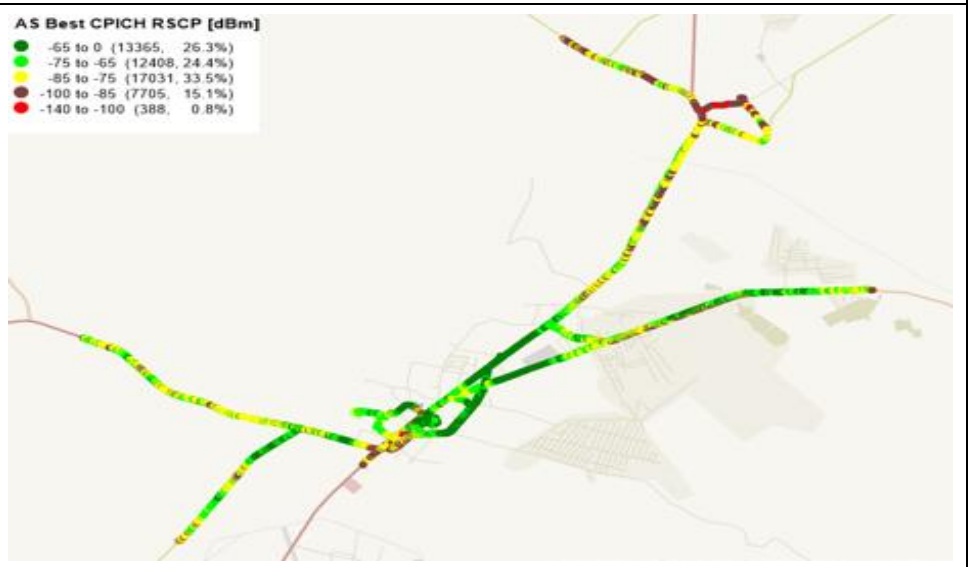
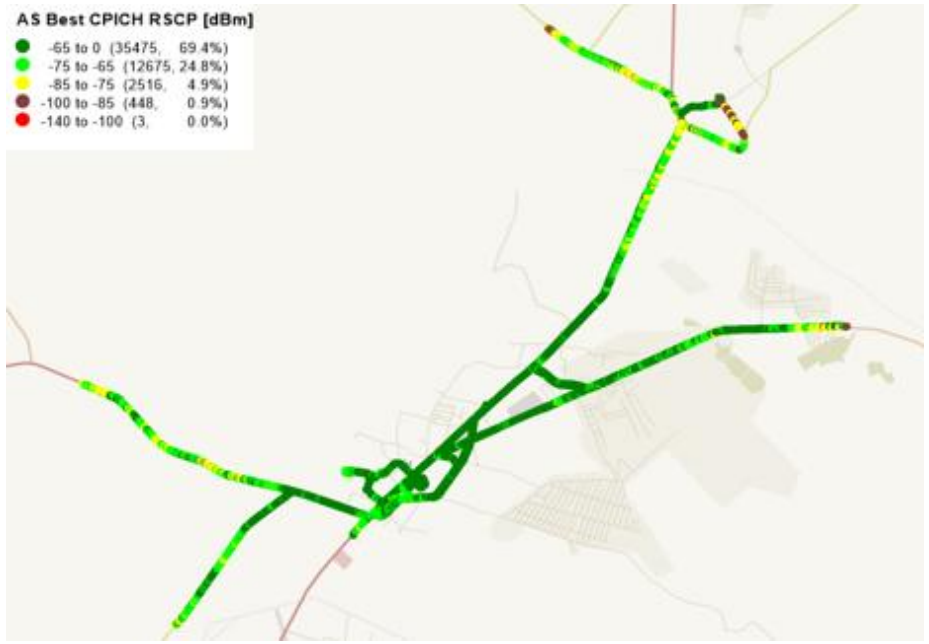
UFONE 3G NETWORK COVERAGE – PASROOR



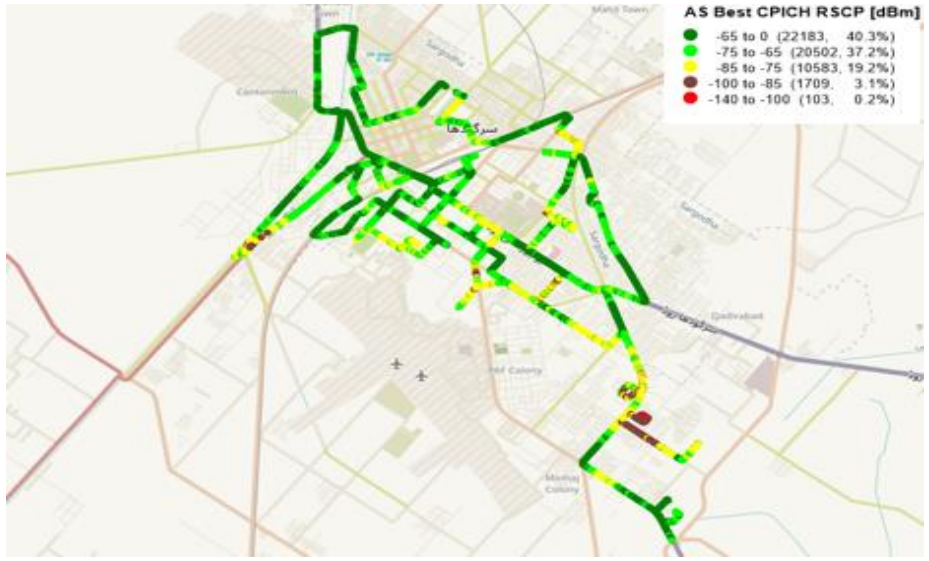
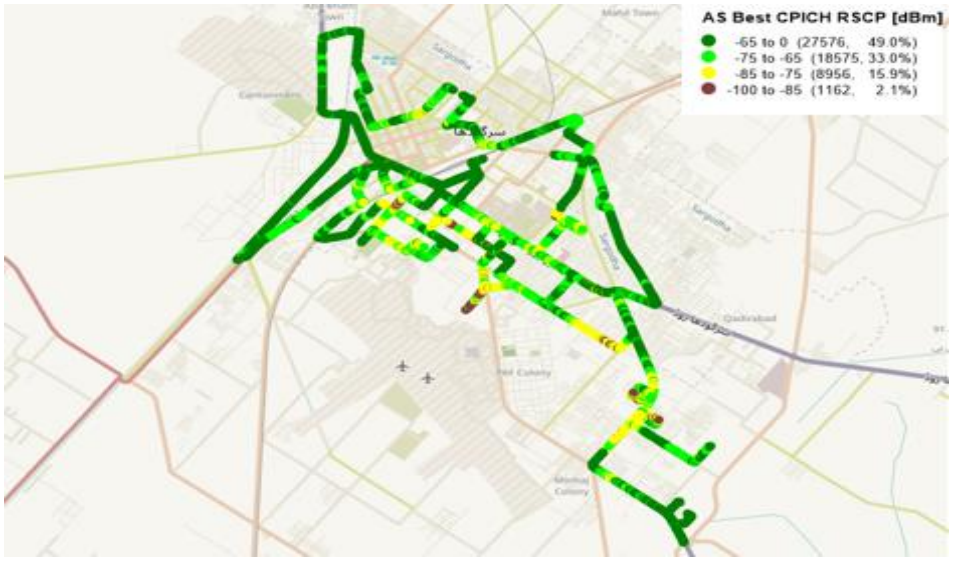
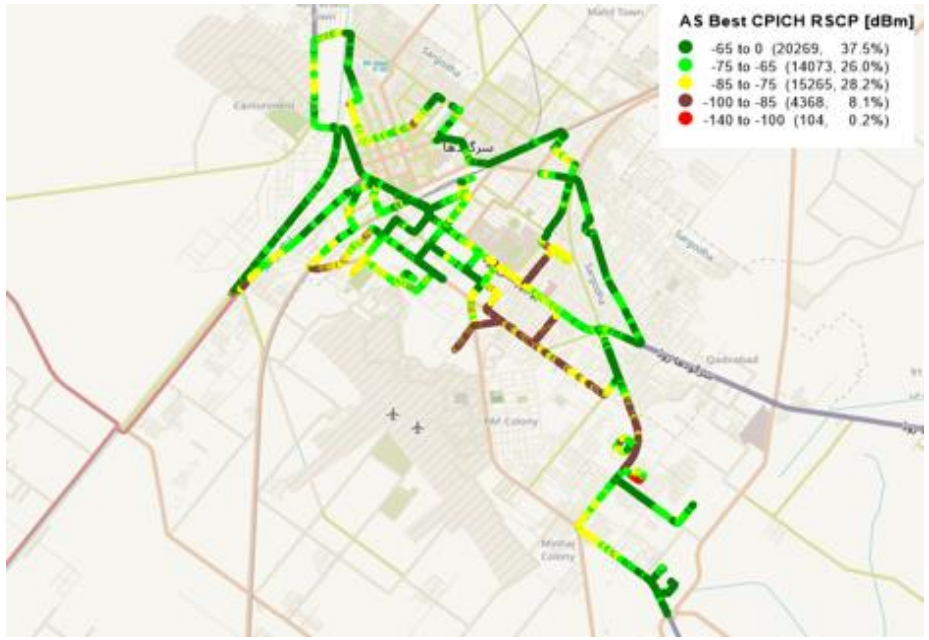
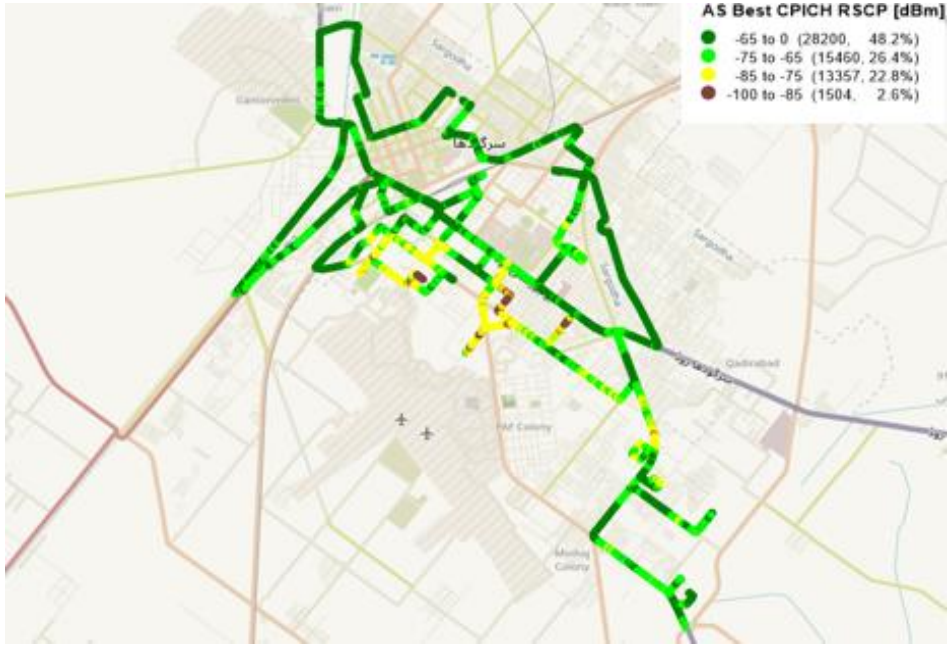
ZONG 3G NETWORK COVERAGE – PASROOR



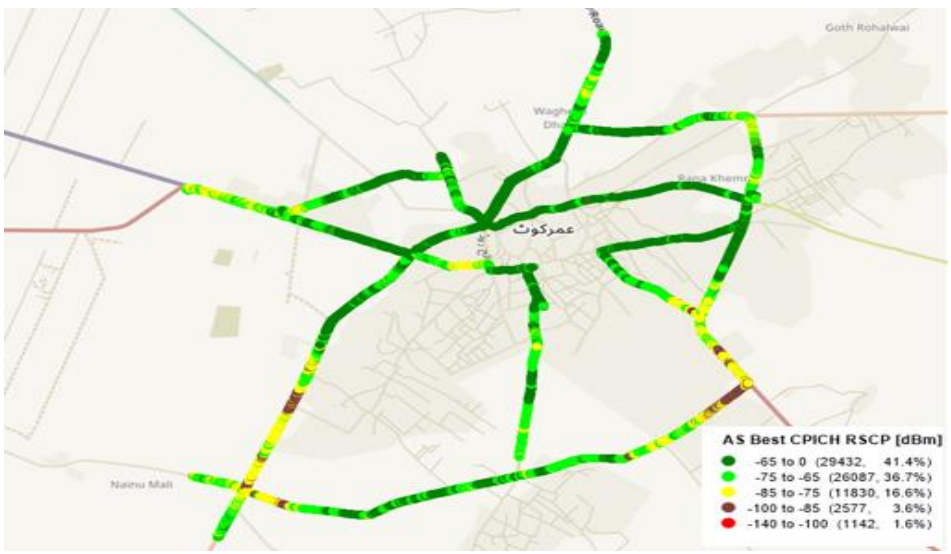
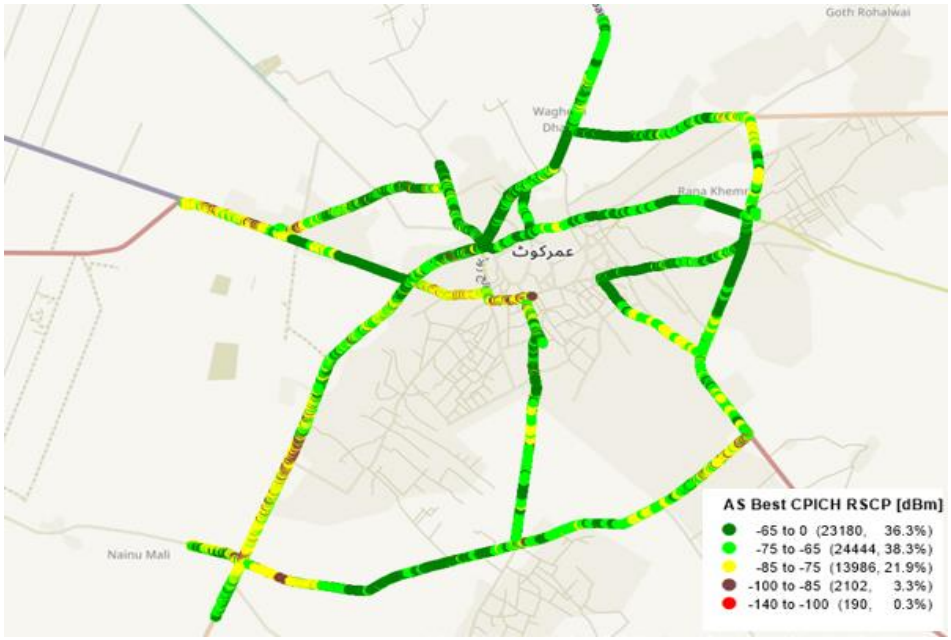
3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G NETWORK COVERAGE –PISHIN	TELENOR 3G NETWORK COVERAGE –PISHIN
	
UFONE 3G NETWORK COVERAGE – PISHIN	**ZONG 3G NETWORK COVERAGE – PISHIN**
	

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G NETWORK COVERAGE –SARGODHA	TELENOR 3G NETWORK COVERAGE –SARGODHA
	
UFONE 3G NETWORK COVERAGE –SARGODHA	**ZONG 3G NETWORK COVERAGE –SARGODHA**
	

3G MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

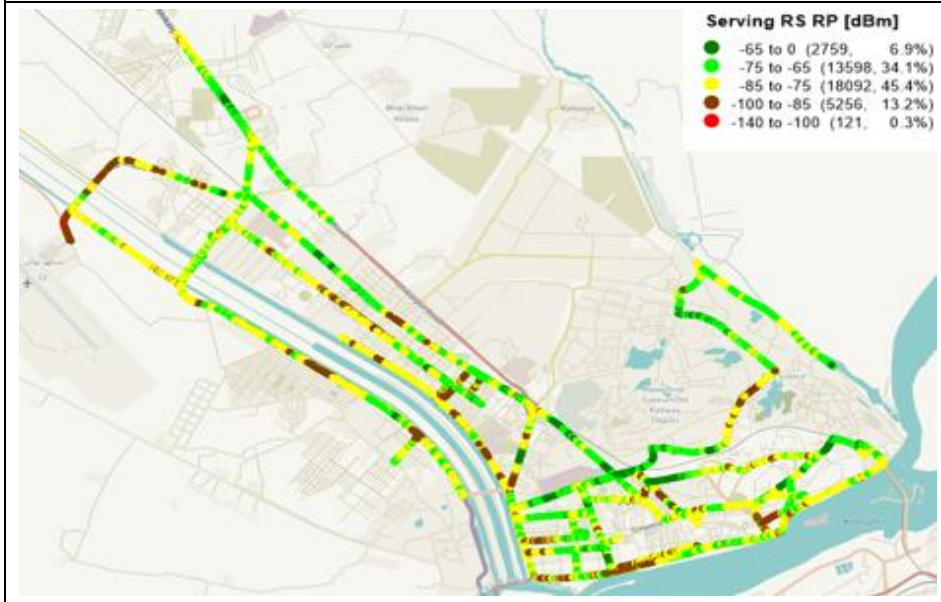
JAZZ 3G NETWORK COVERAGE –UMER KOT	TELENOR 3G NETWORK COVERAGE – UMER KOT
	
UFONE 3G NETWORK COVERAGE – UMER KOT	**ZONG 3G NETWORK COVERAGE – UMER KOT**
	

Annex -A(Coverage Maps)

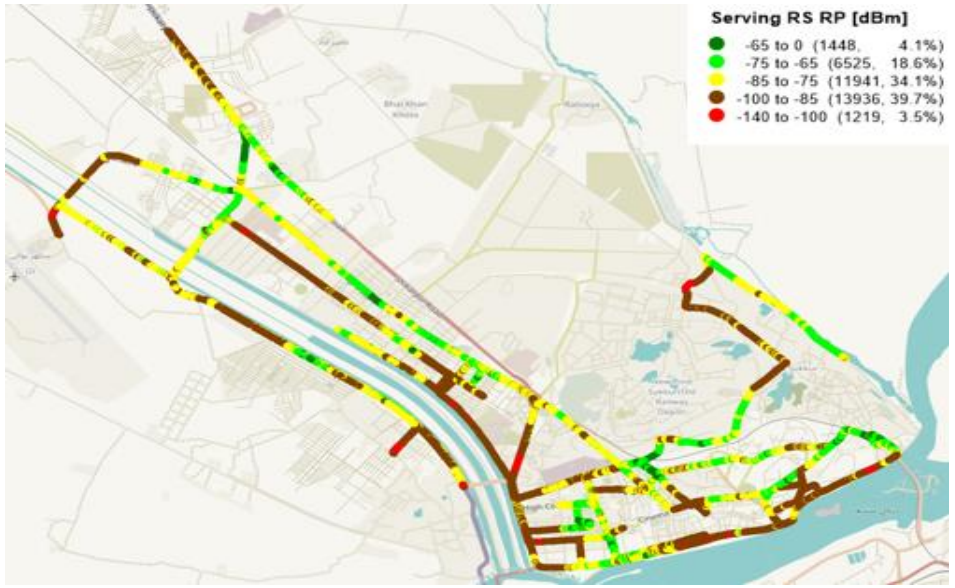
4G LOCK MODE

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

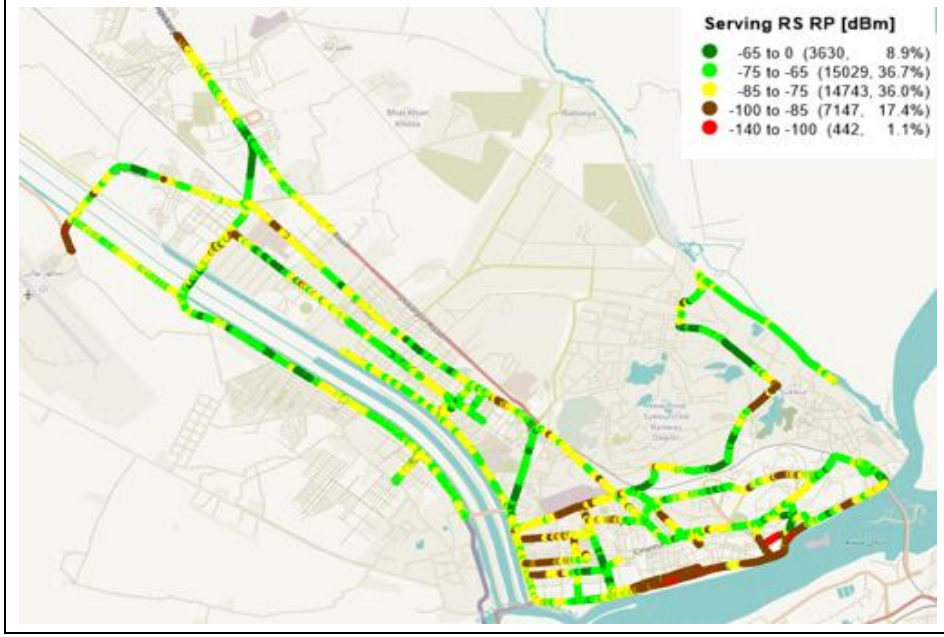
JAZZ 4G NETWORK COVERAGE – SUKKUR



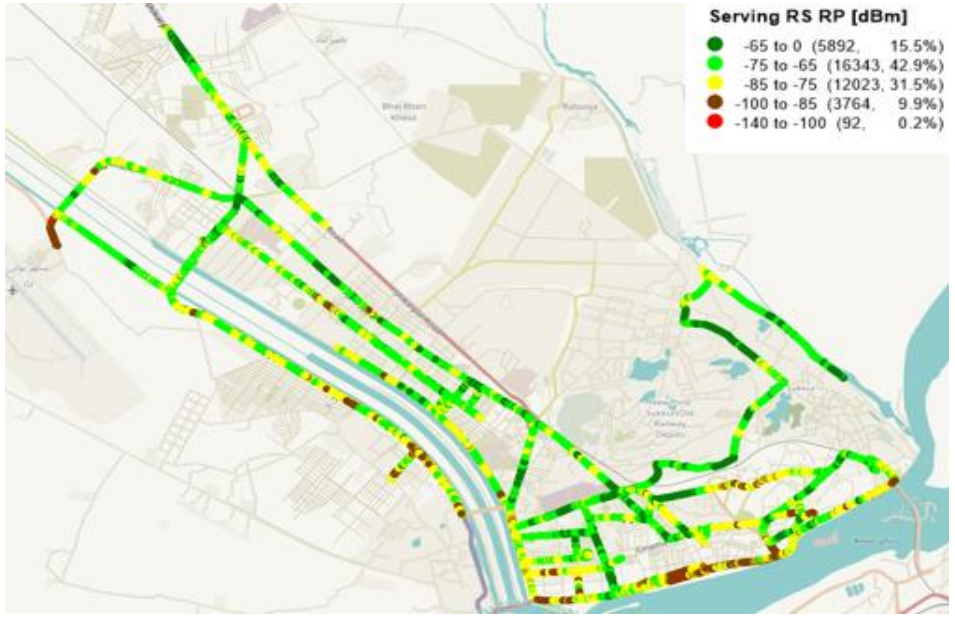
TELENOR 4G NETWORK COVERAGE – SUKKUR



UFONE 4G NETWORK COVERAGE – SUKKUR

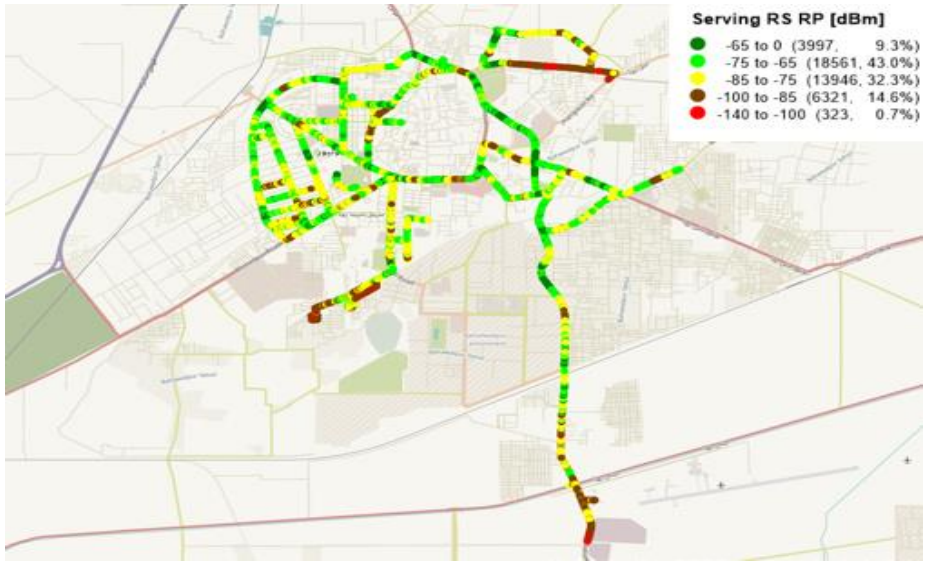


ZONG 4G NETWORK COVERAGE – SUKKUR

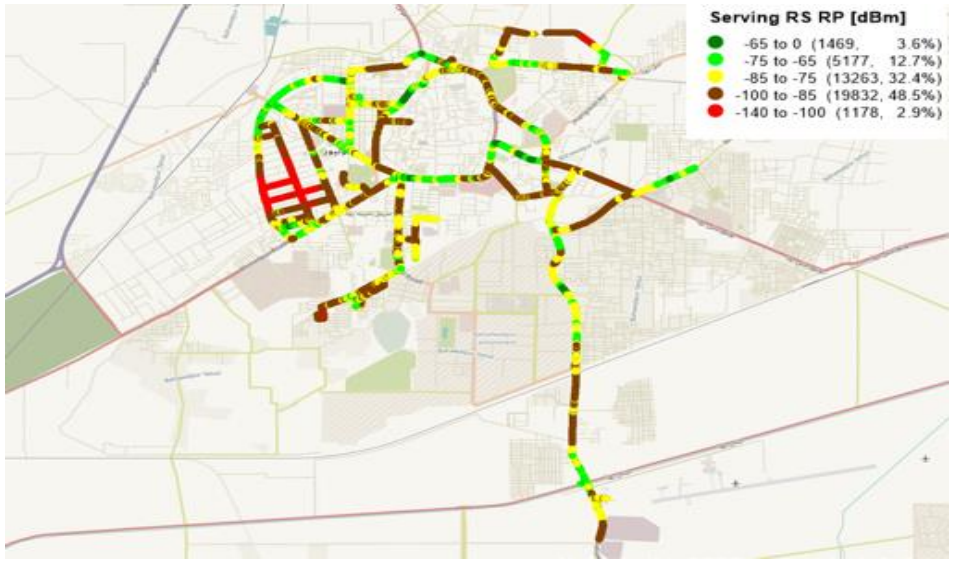


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

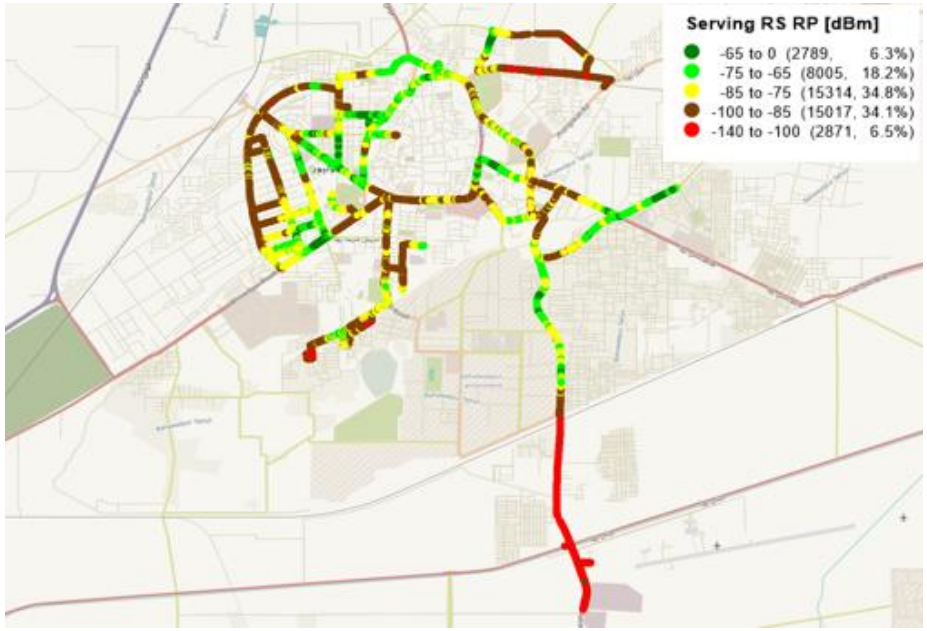
JAZZ 4G NETWORK COVERAGE – BAHAWALPUR



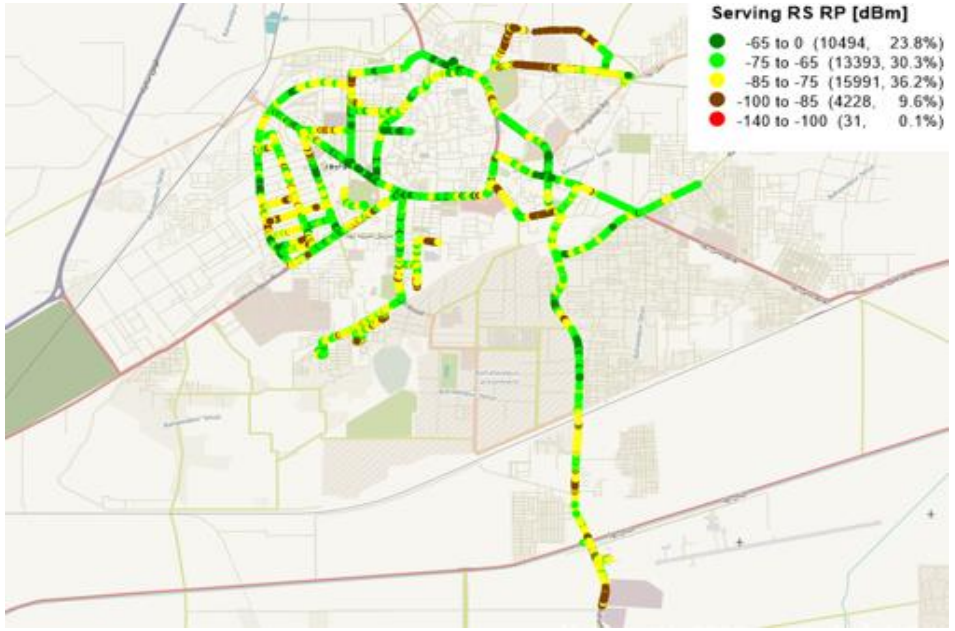
TELENOR 4G NETWORK COVERAGE – BAHAWALPUR



UFONE 4G NETWORK COVERAGE – BAHAWALPUR

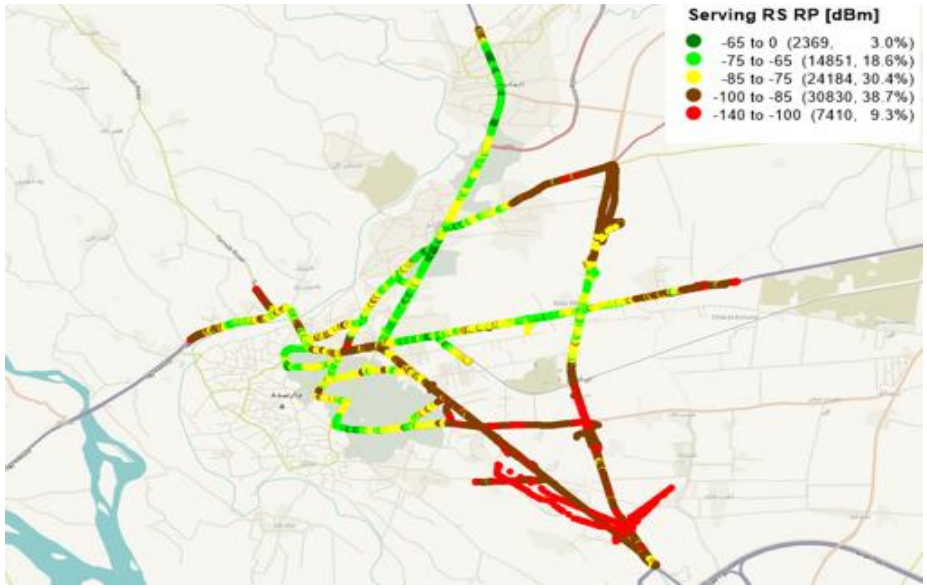


ZONG 4G NETWORK COVERAGE – BAHAWALPUR

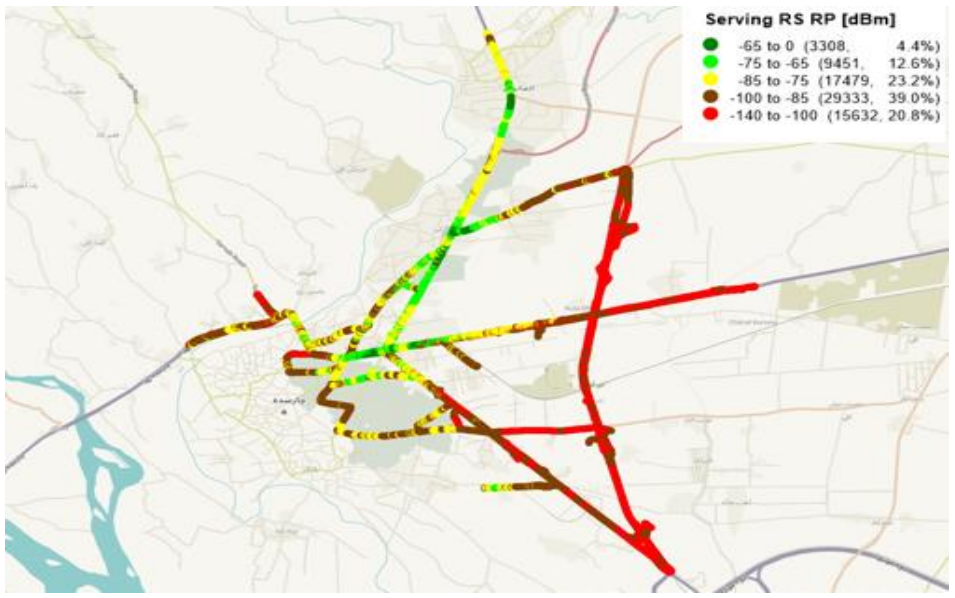


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

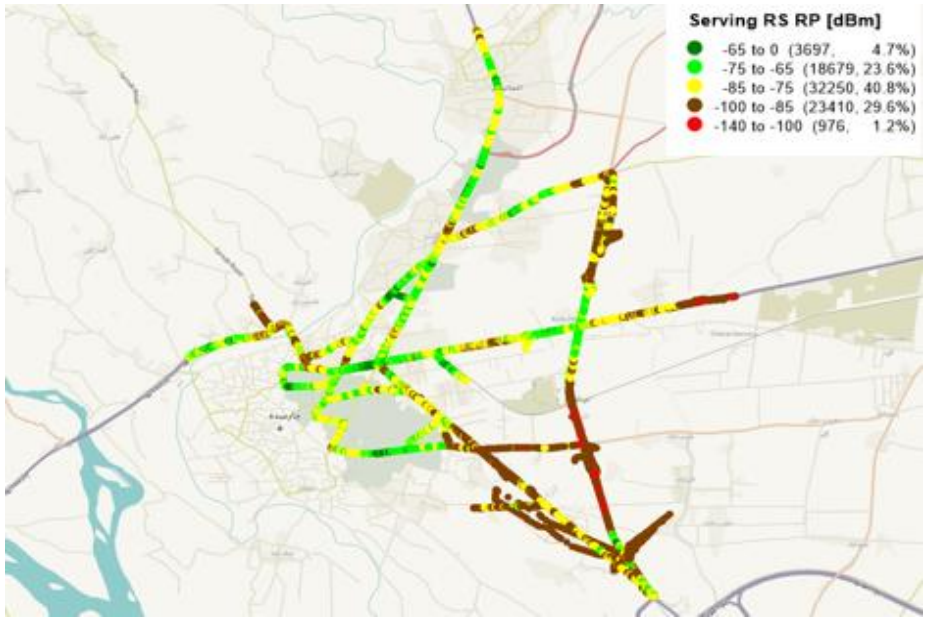
JAZZ 4G NETWORK COVERAGE – CHARSADDA



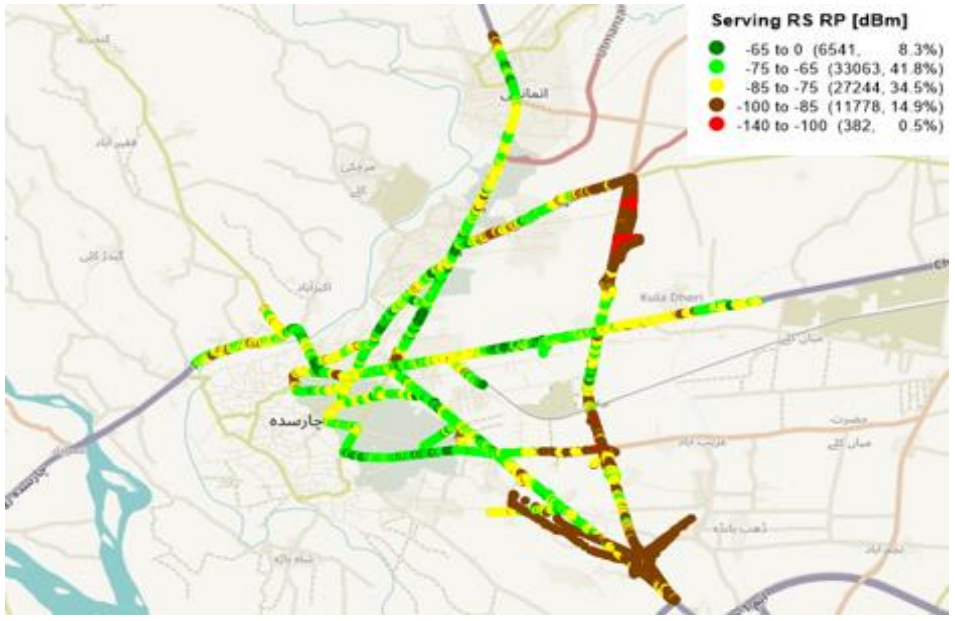
TELENOR 4G NETWORK COVERAGE – CHARSADDA



UFONE 4G NETWORK COVERAGE – CHARSADDA



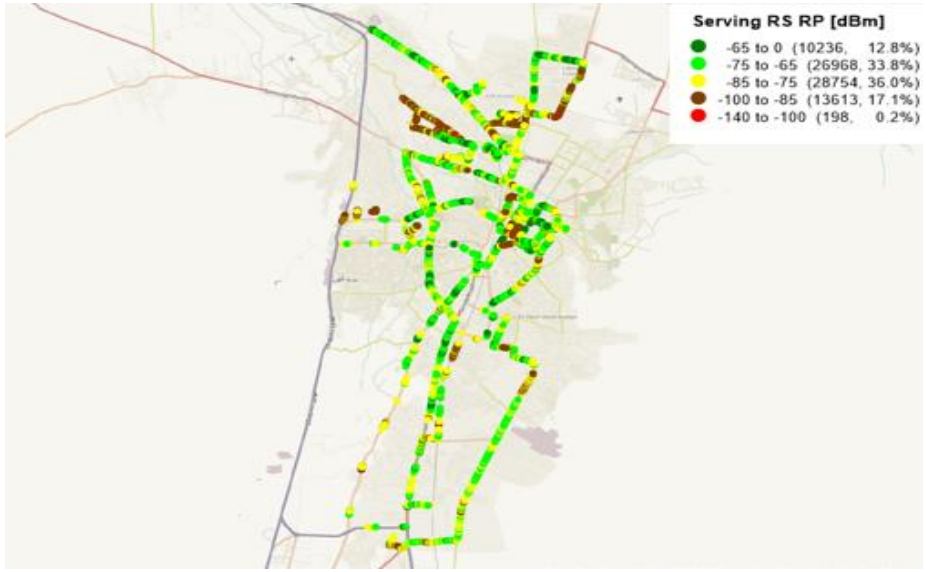
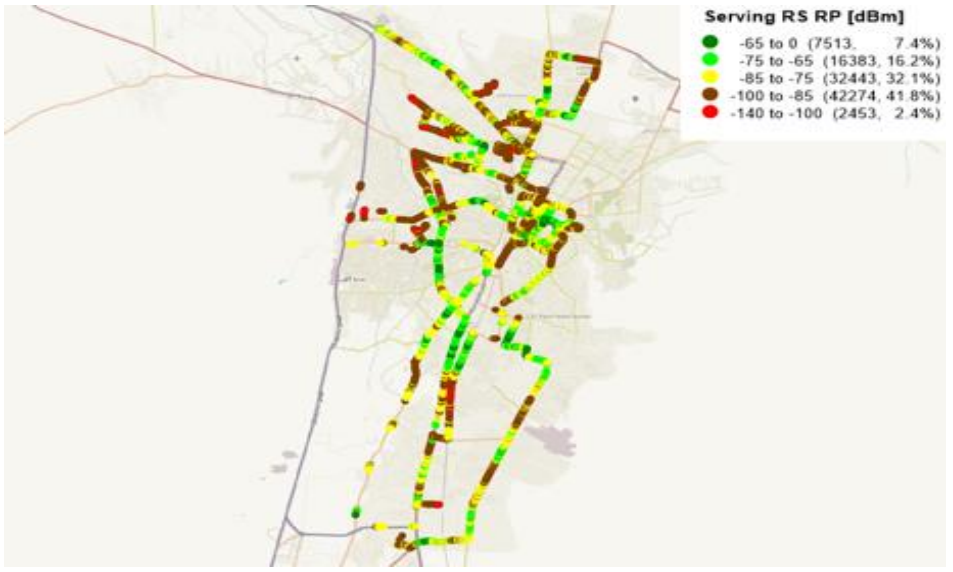
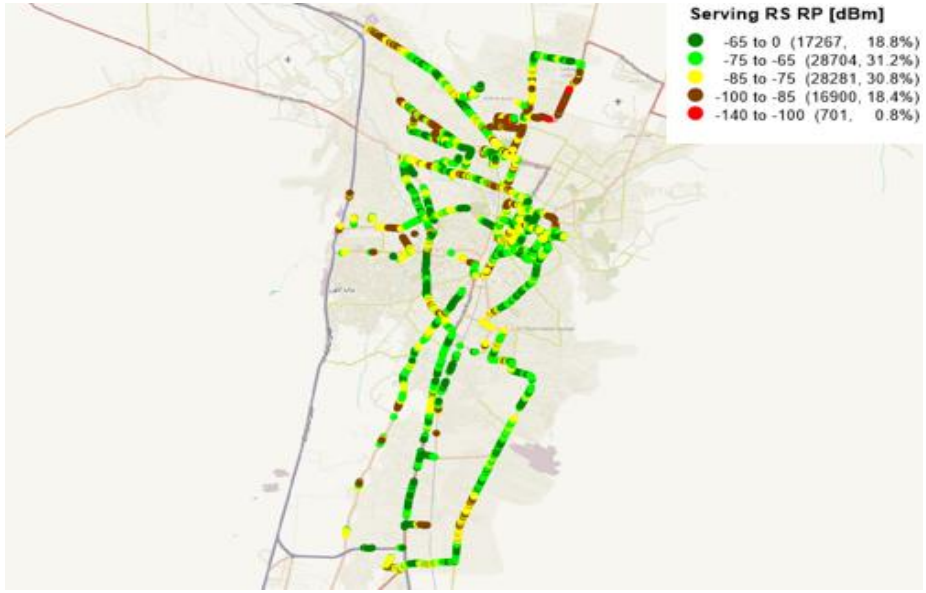
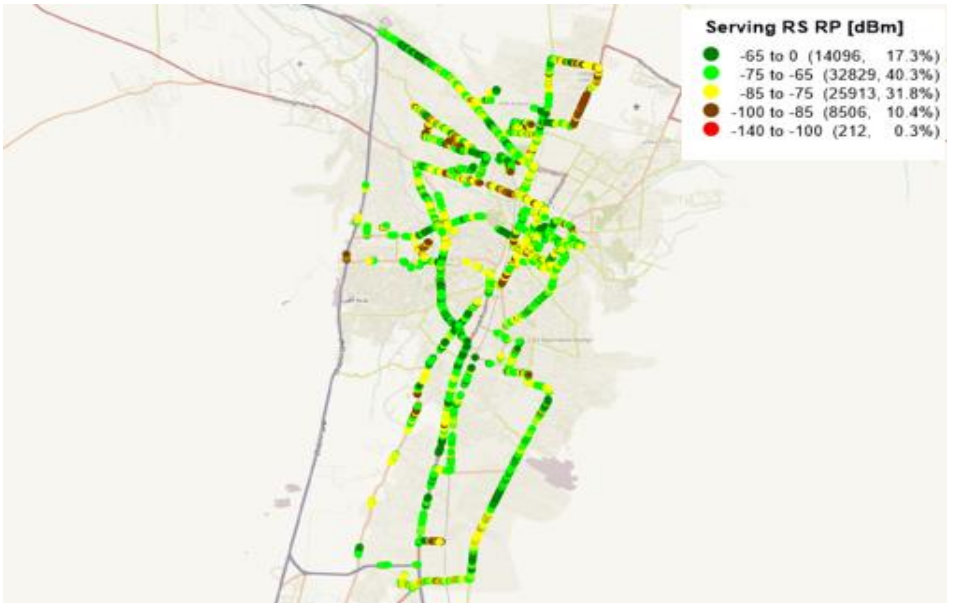
ZONG 4G NETWORK COVERAGE – CHARSADDA



4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

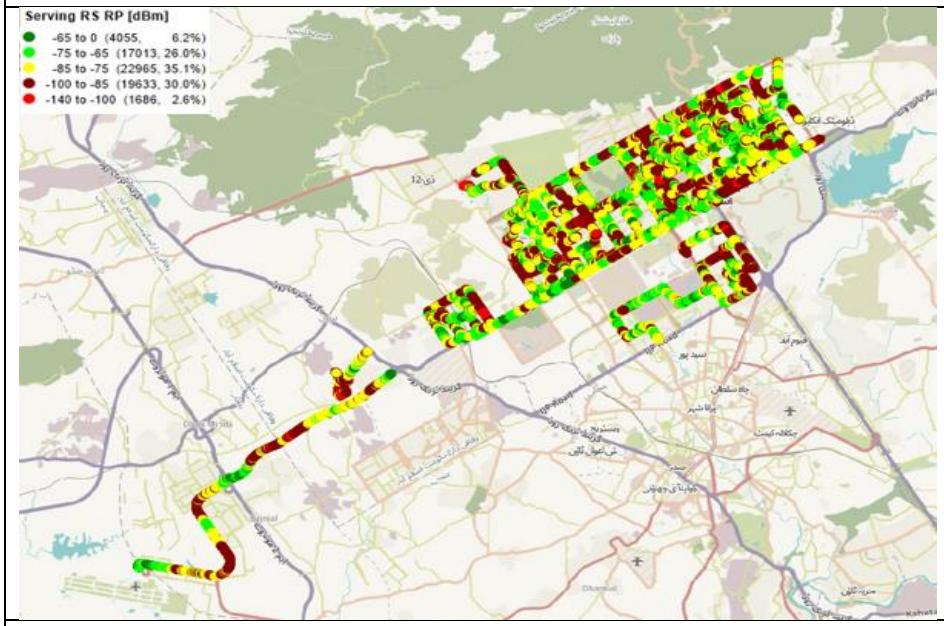
JAZZ 4G NETWORK COVERAGE – GWADAR	TELENOR 4G NETWORK COVERAGE – GWADAR
UFONE 4G NETWORK COVERAGE – GWADAR	**ZONG 4G NETWORK COVERAGE – GWADAR**

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

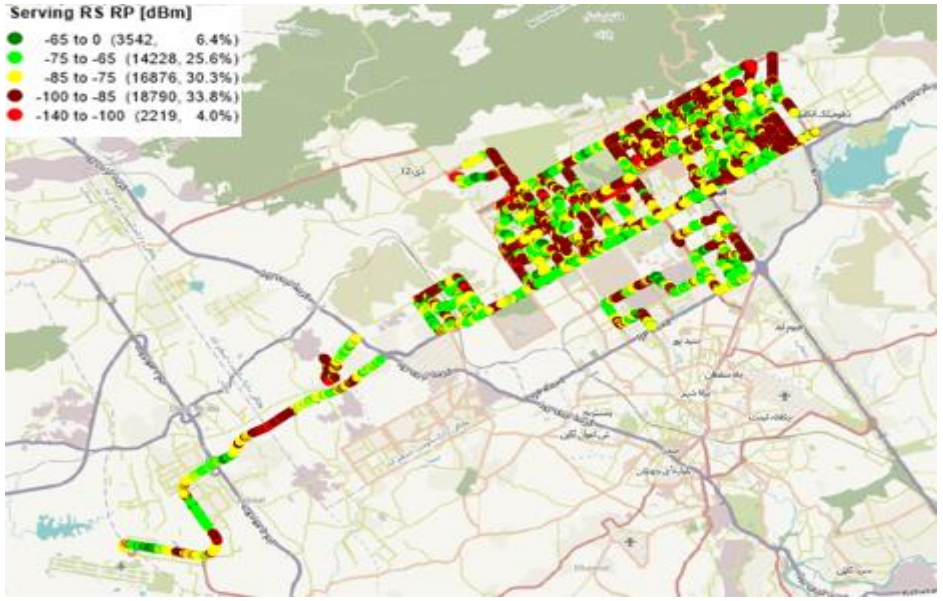
JAZZ 4G NETWORK COVERAGE – QUETTA	TELENOR 4G NETWORK COVERAGE – QUETTA
	
UFONE 4G NETWORK COVERAGE – QUETTA	**ZONG 4G NETWORK COVERAGE – QUETTA**
	

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

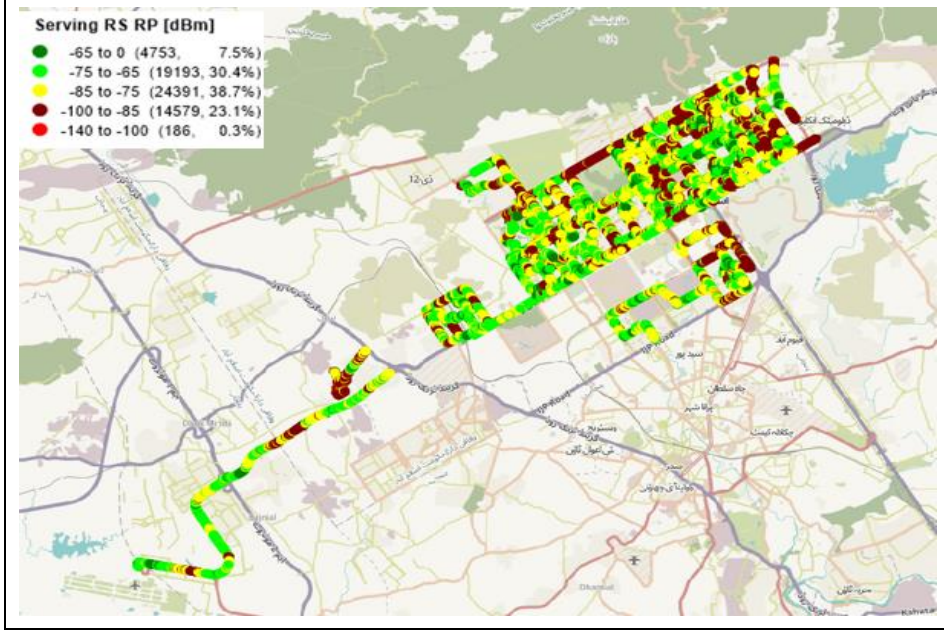
JAZZ 4G NETWORK COVERAGE – ISLAMABAD



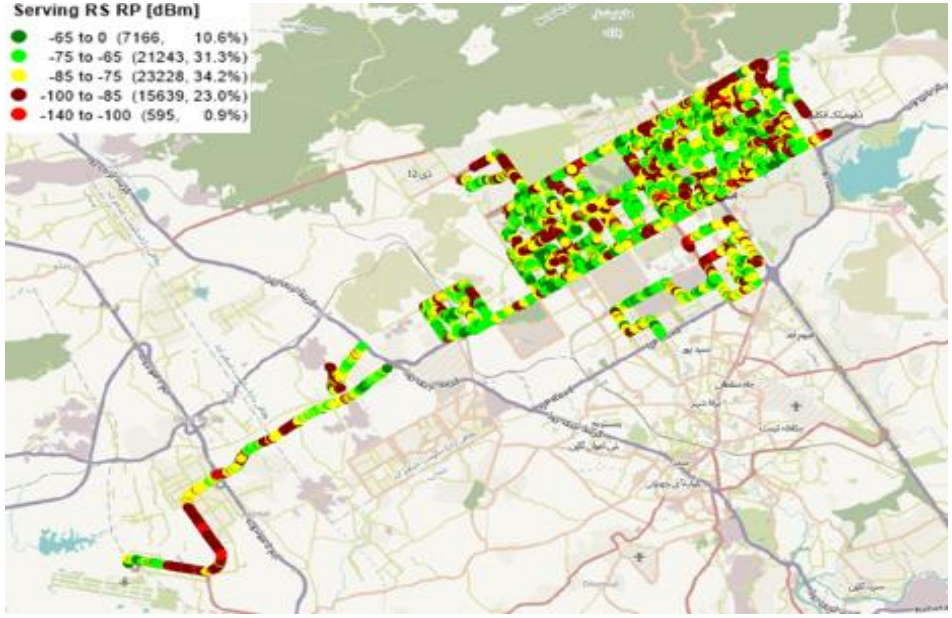
TELENOR 4G NETWORK COVERAGE – ISLAMABAD



UFONE 4G NETWORK COVERAGE – ISLAMABAD

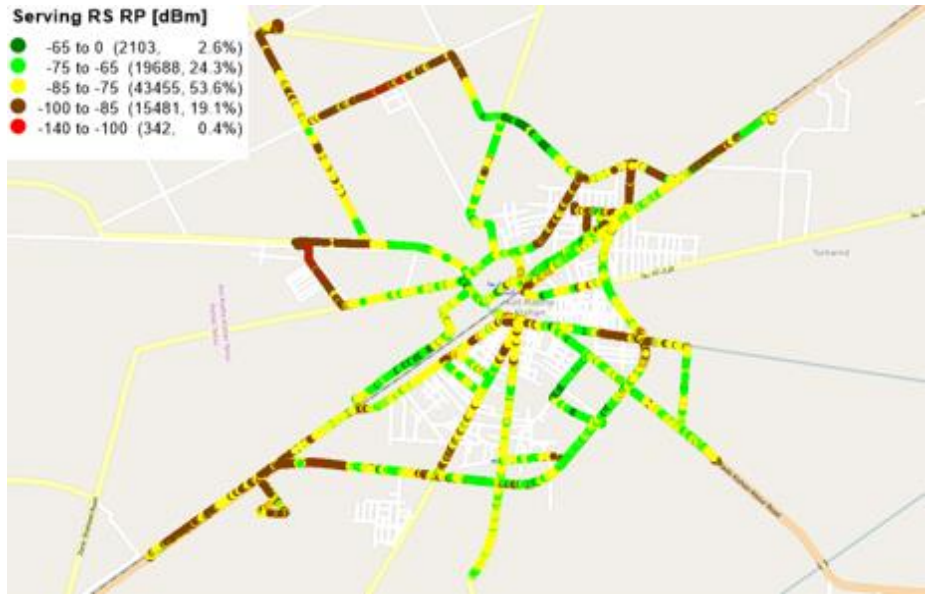


ZONG 4G NETWORK COVERAGE – ISLAMABAD



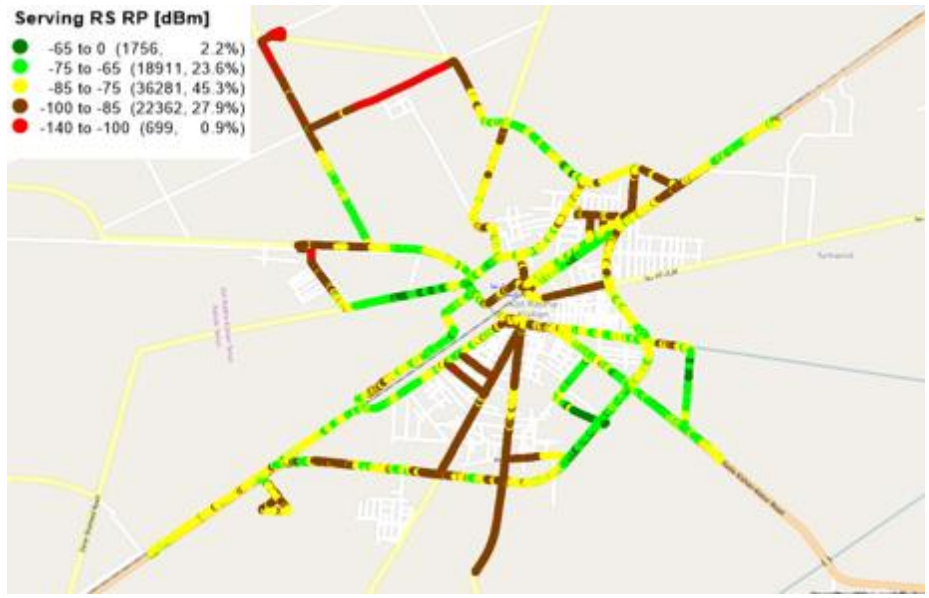
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – KOT RADHA KISHAN

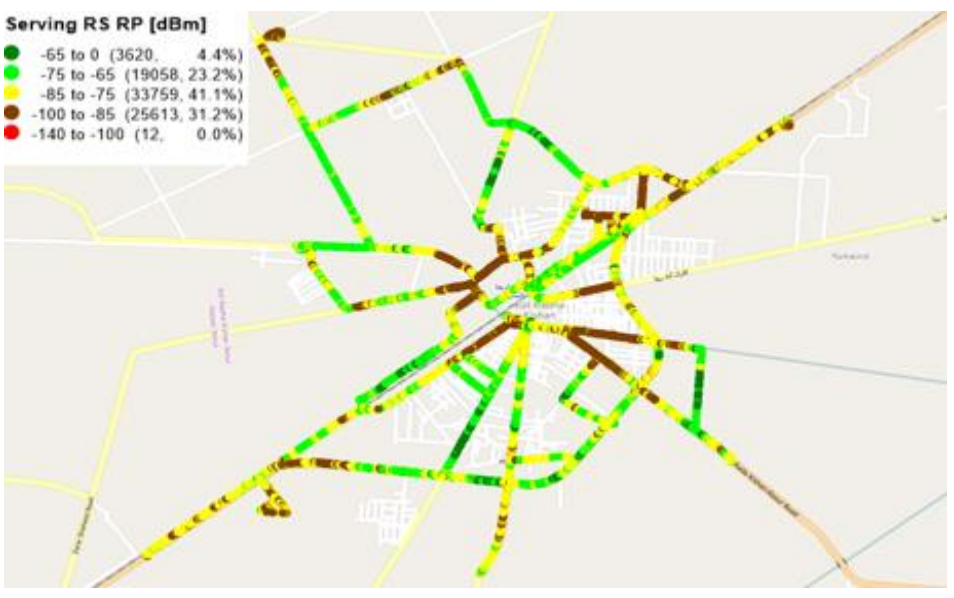


TELENOR 4G NETWORK COVERAGE –KOT RADHA KISHAN

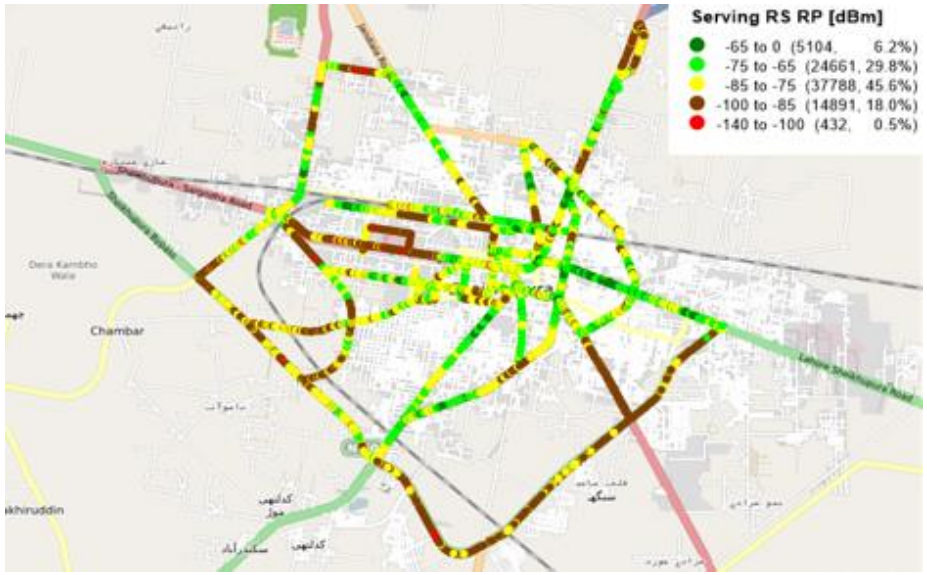
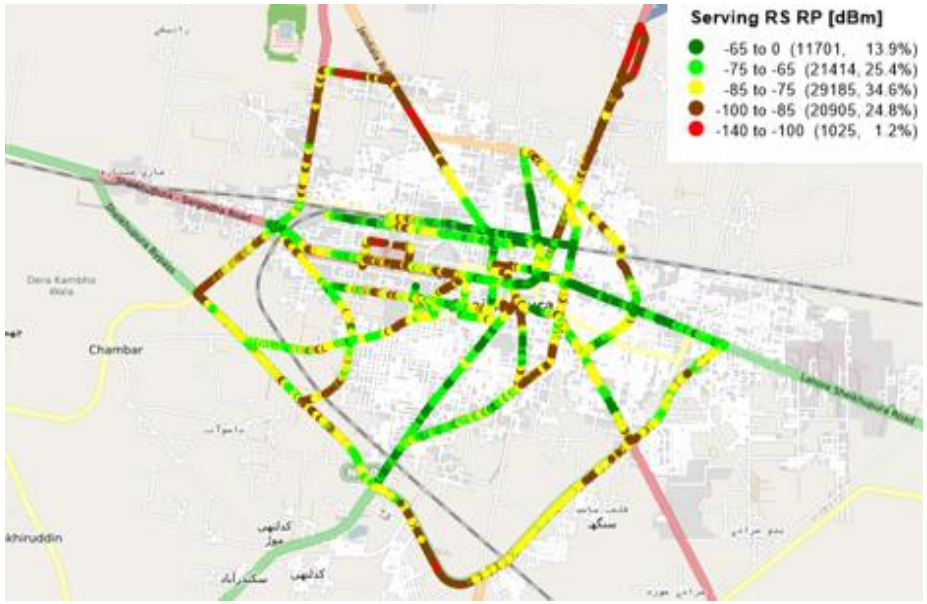
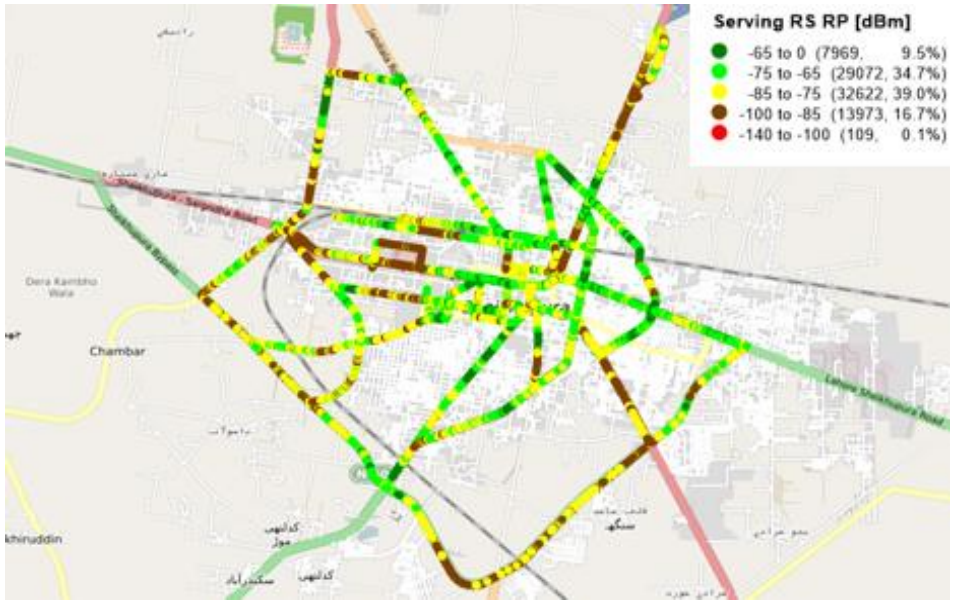
UFONE 4G NETWORK COVERAGE – KOT RADHA KISHAN



ZONG 4G NETWORK COVERAGE – KOT RADHA KISHAN

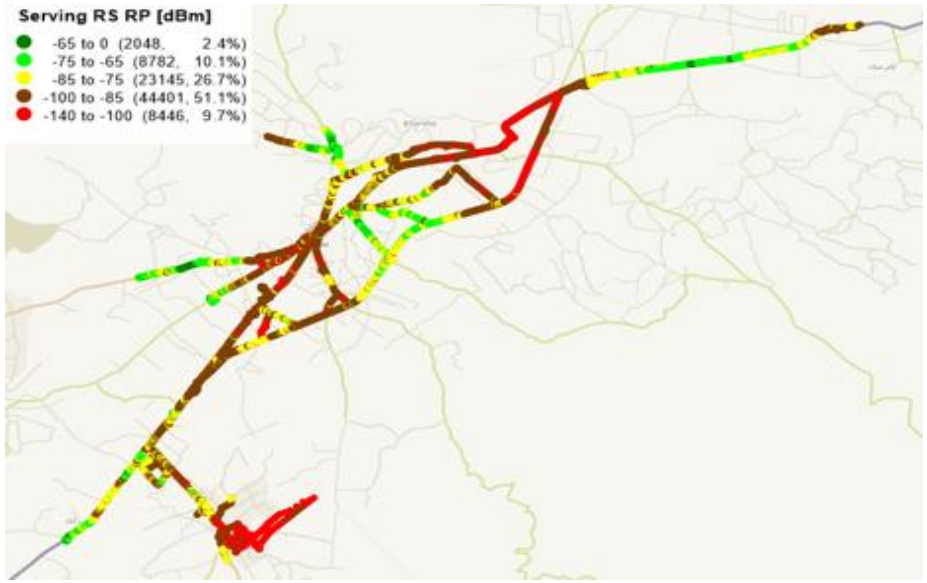


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

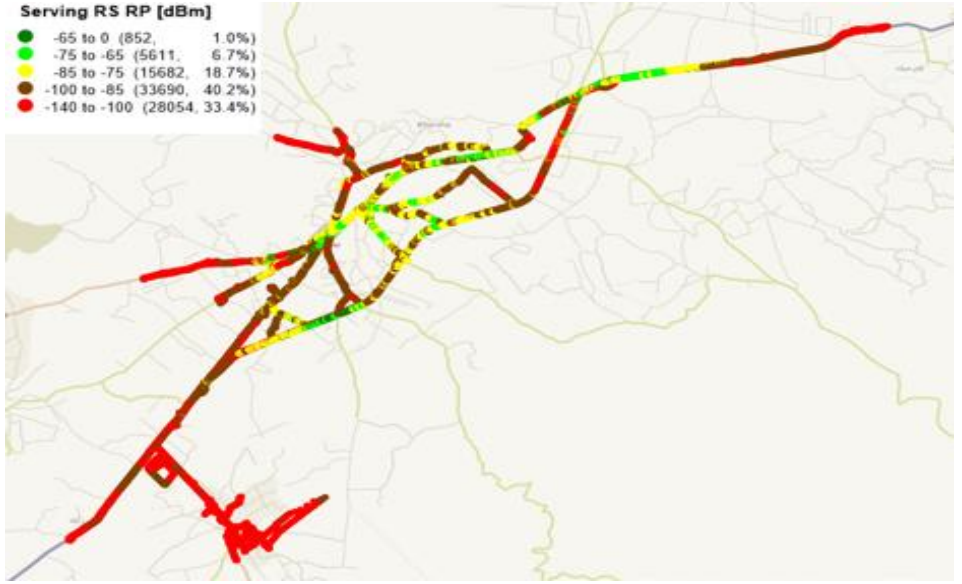
JAZZ 4G NETWORK COVERAGE – SHEIKHUPURA	TELENOR 4G NETWORK COVERAGE – SHEIKHUPURA
	
UFONE 4G NETWORK COVERAGE – SHEIKHUPURA	**ZONG 4G NETWORK COVERAGE – SHEIKHUPURA**
	

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

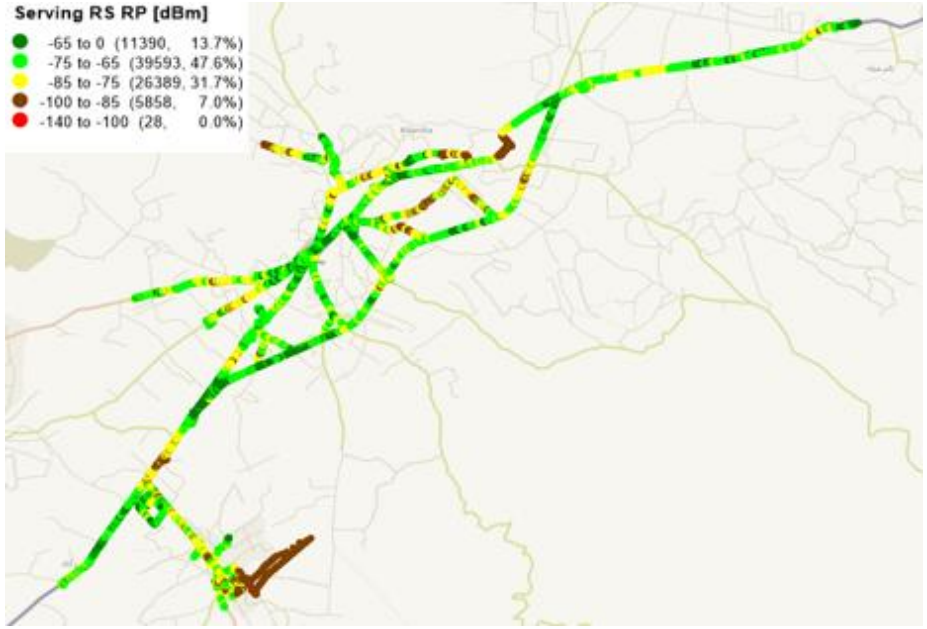
JAZZ 4G NETWORK COVERAGE – HANGU



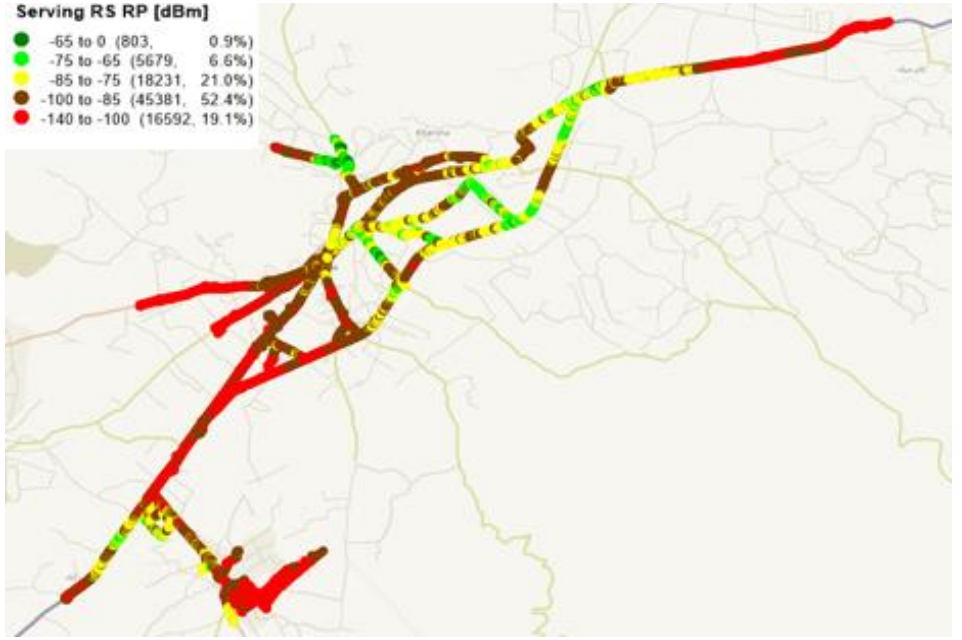
TELENOR 4G NETWORK COVERAGE – HANGU



UFONE 4G NETWORK COVERAGE – HANGU

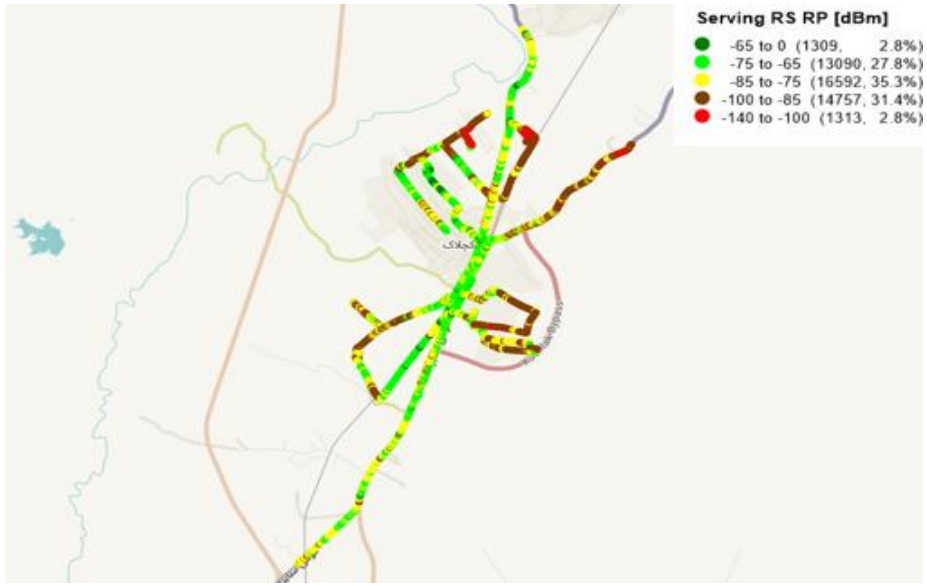


ZONG 4G NETWORK COVERAGE – HANGU

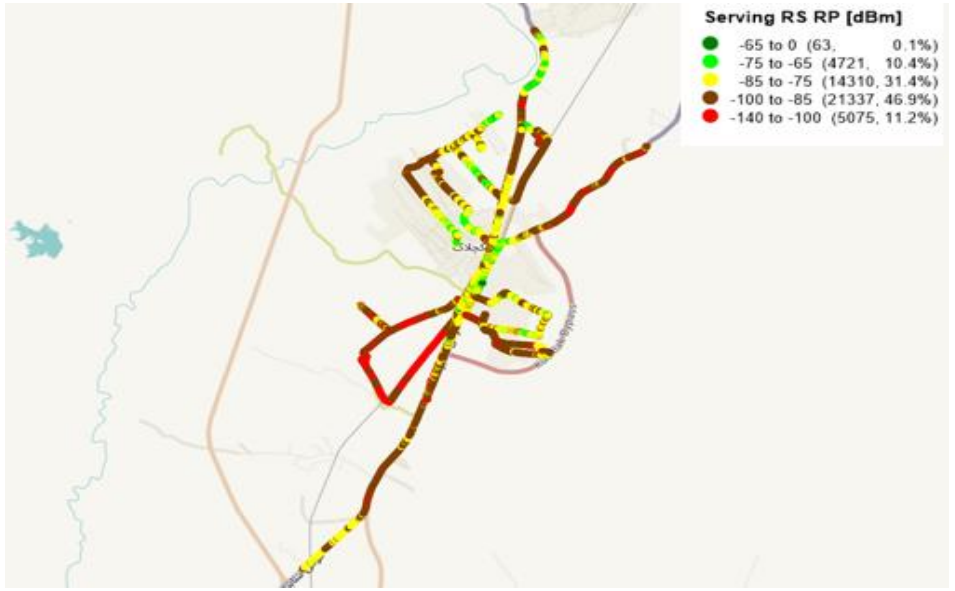


4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

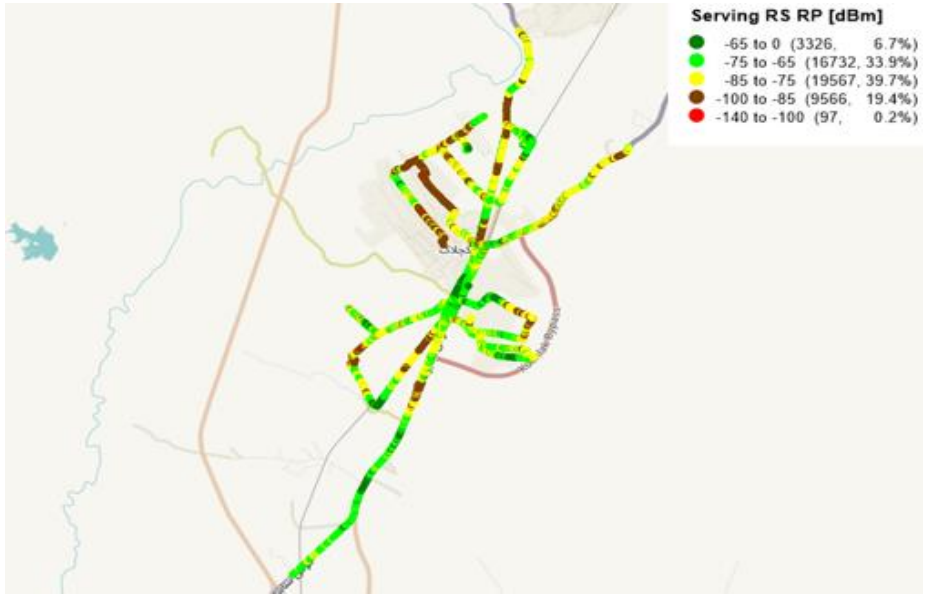
JAZZ 4G NETWORK COVERAGE – KUCHLAK



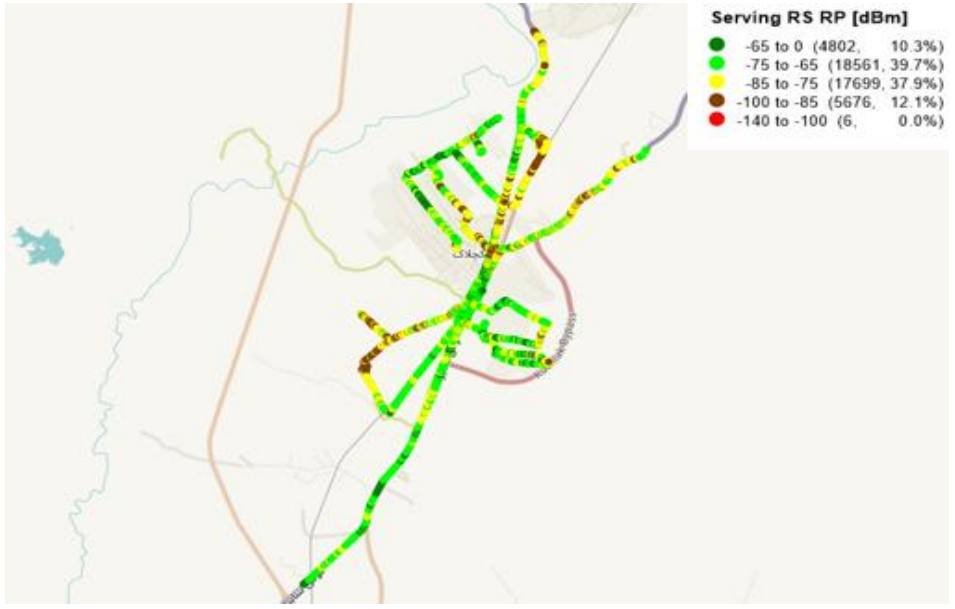
TELENOR 4G NETWORK COVERAGE – KUCHLAK



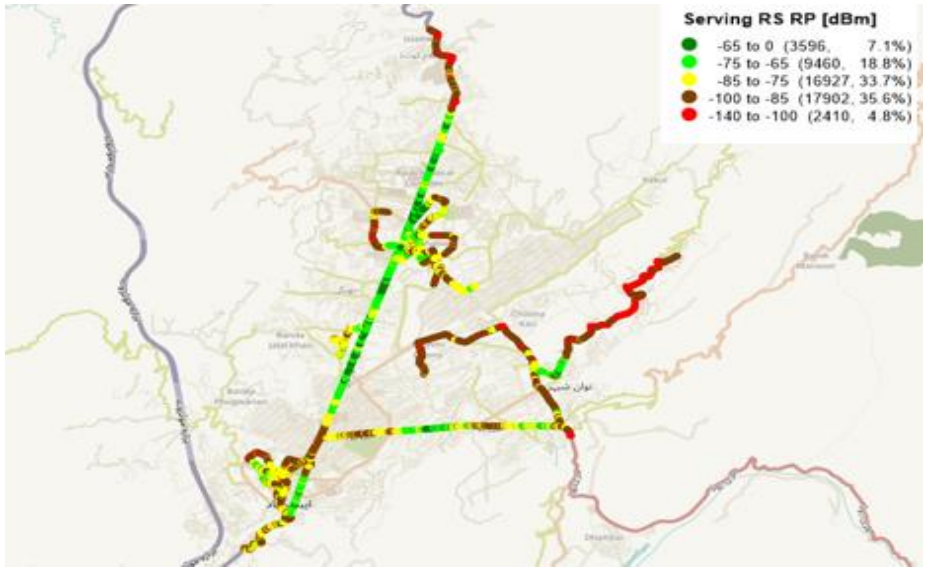
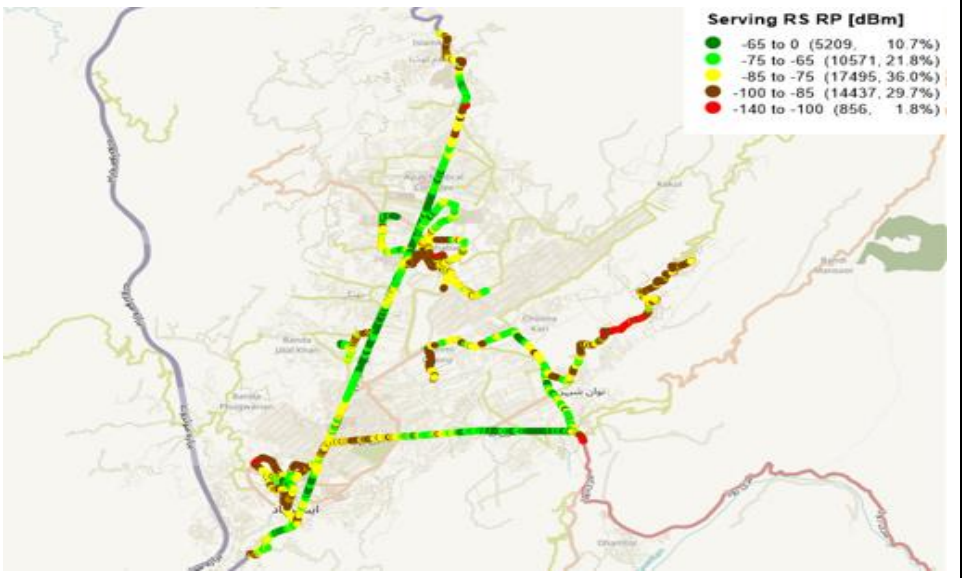
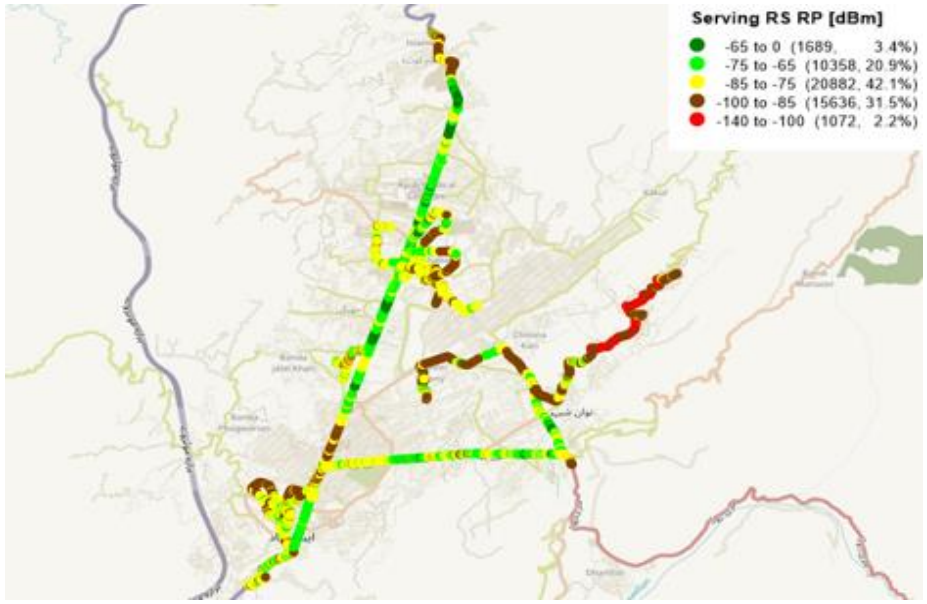
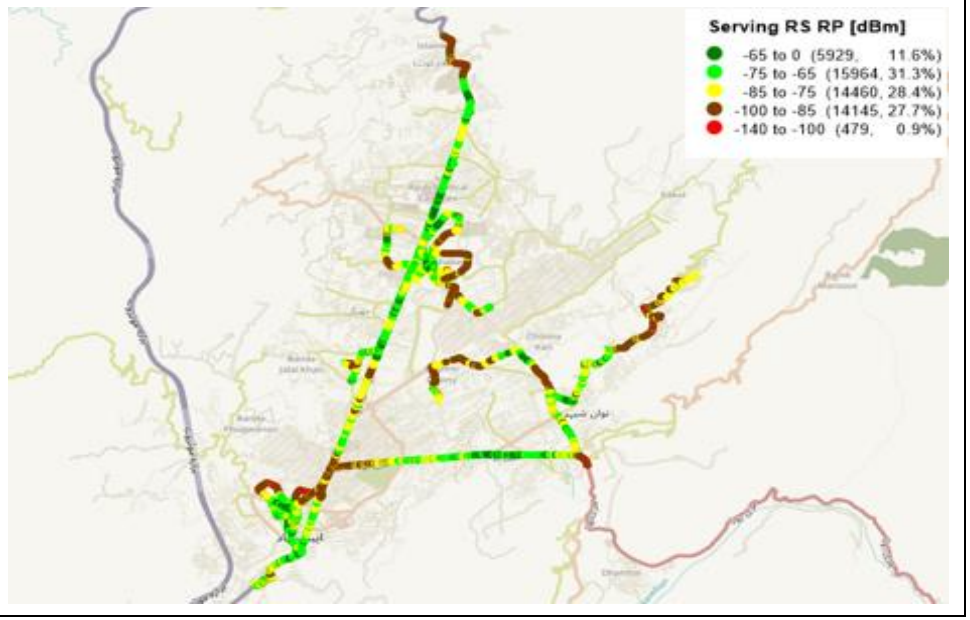
UFONE 4G NETWORK COVERAGE – KUCHLAK



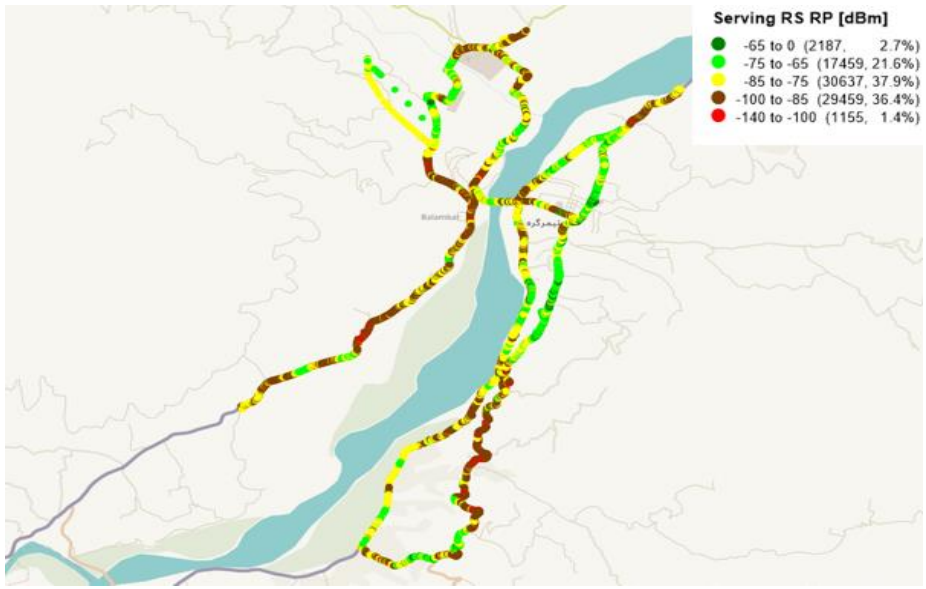
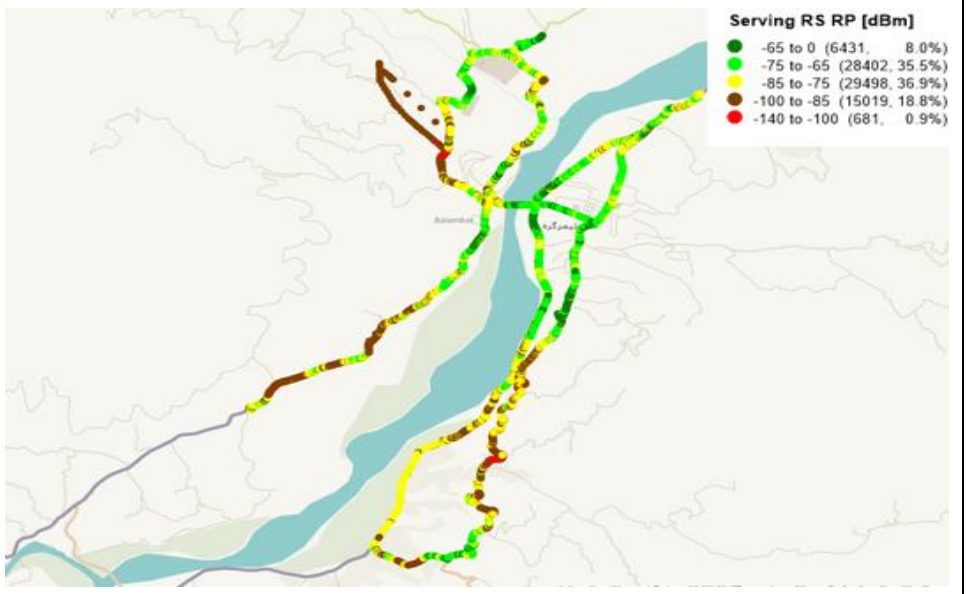
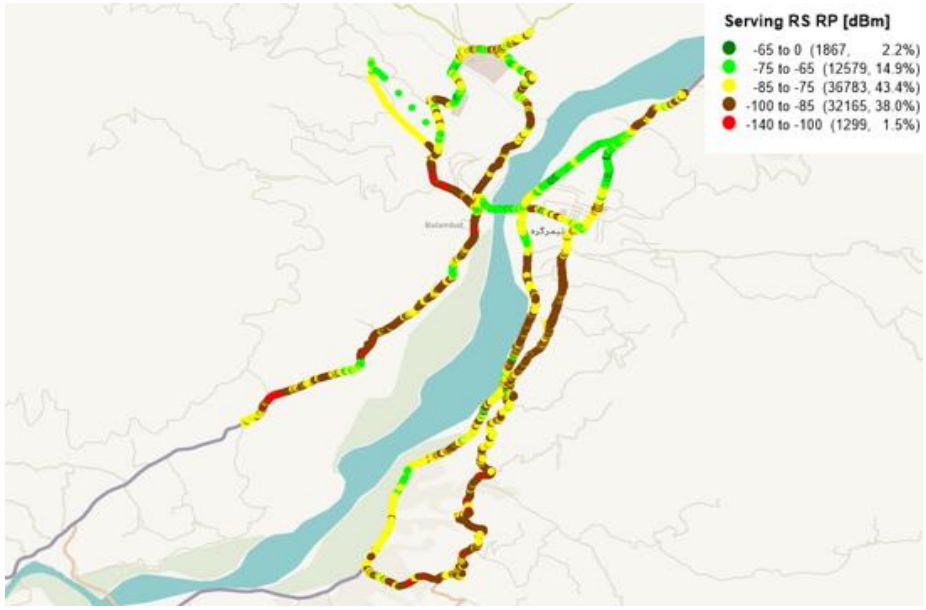
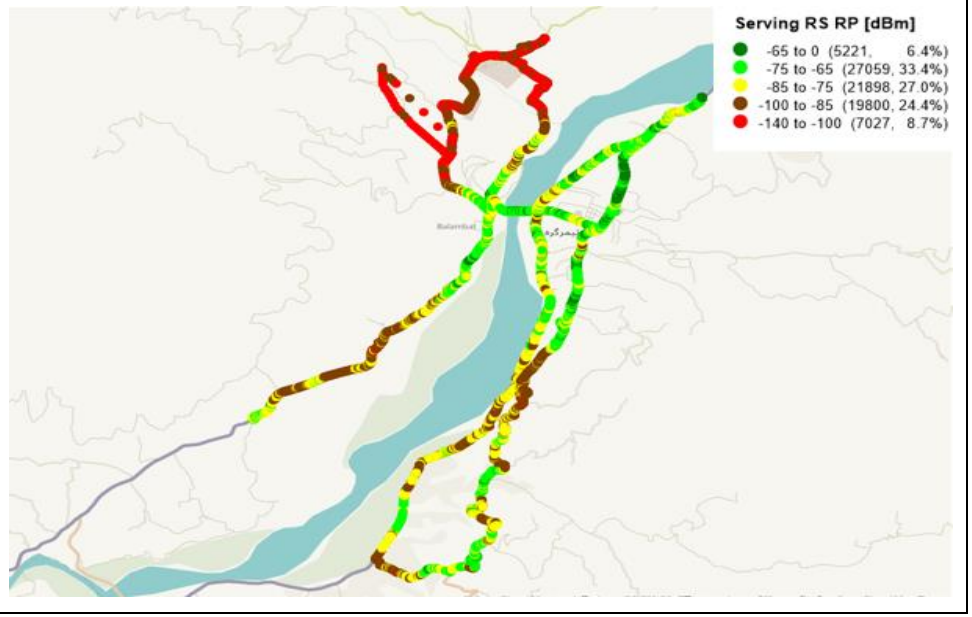
ZONG 4G NETWORK COVERAGE – KUCHLAK



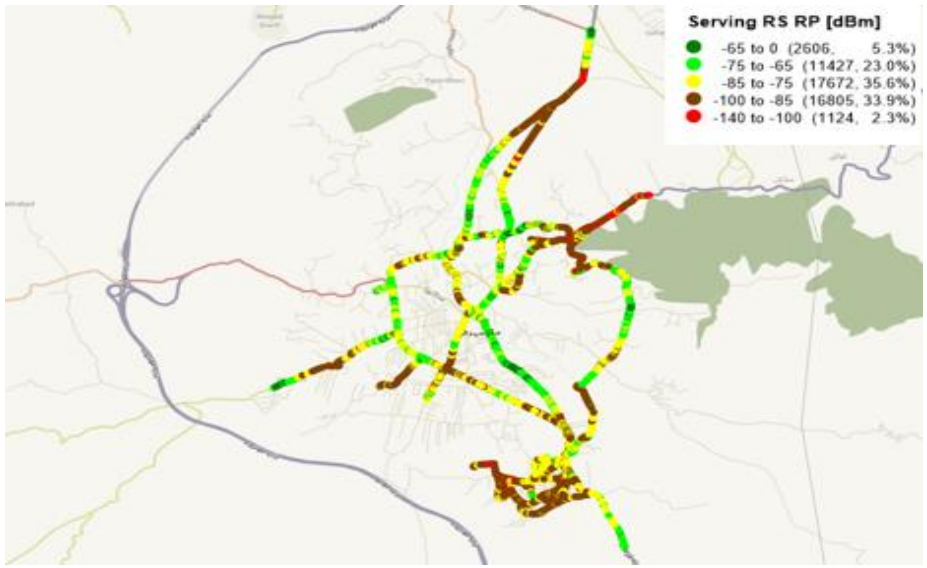
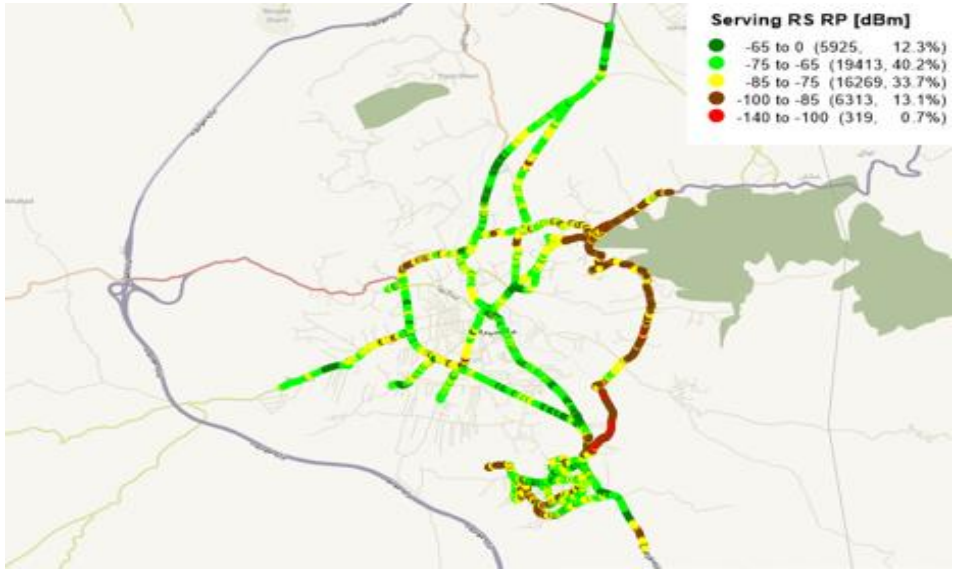
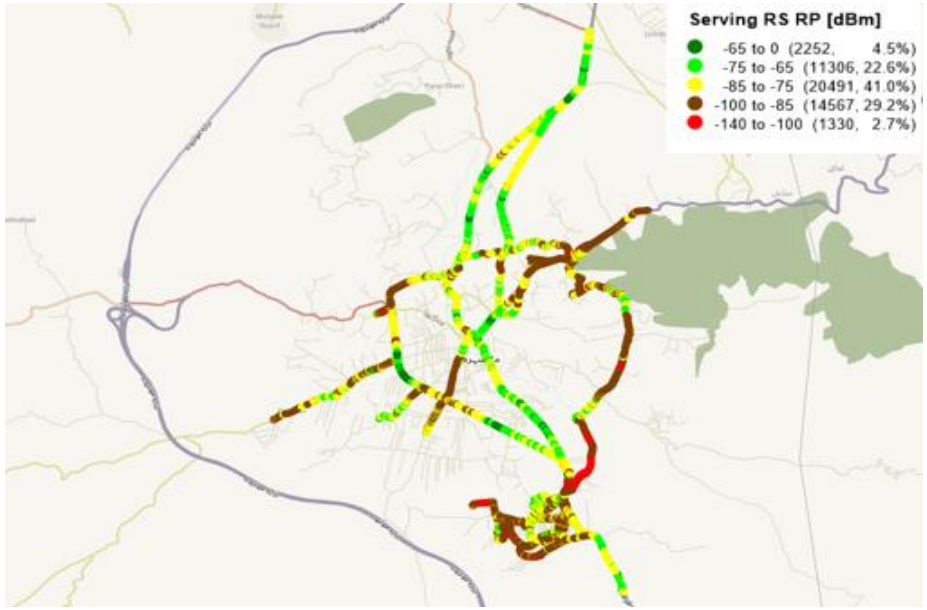
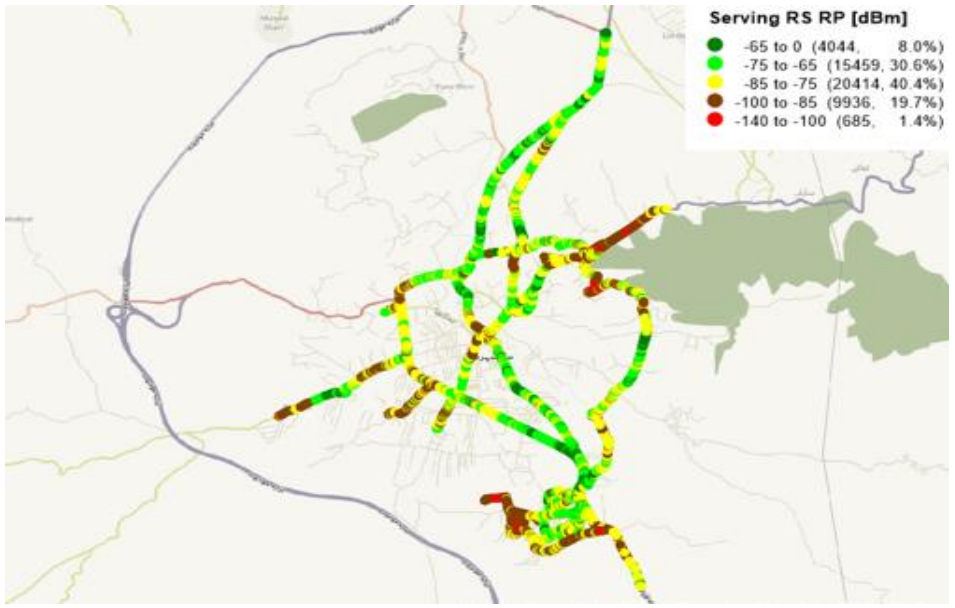
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – ABBOTTABAD	TELENOR 4G NETWORK COVERAGE – ABBOTTABAD
	
UFONE 4G NETWORK COVERAGE – ABBOTTABAD	**ZONG 4G NETWORK COVERAGE – ABBOTTABAD**
	

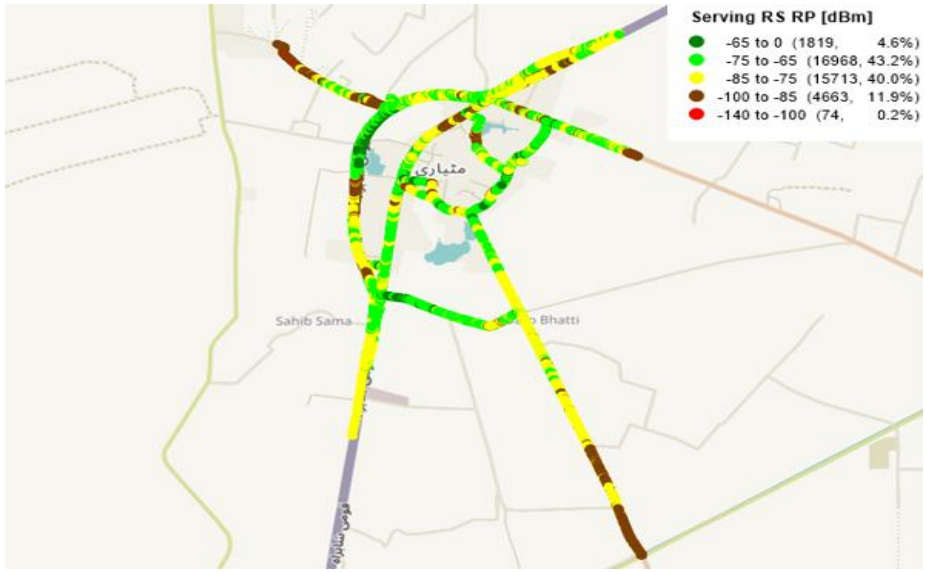
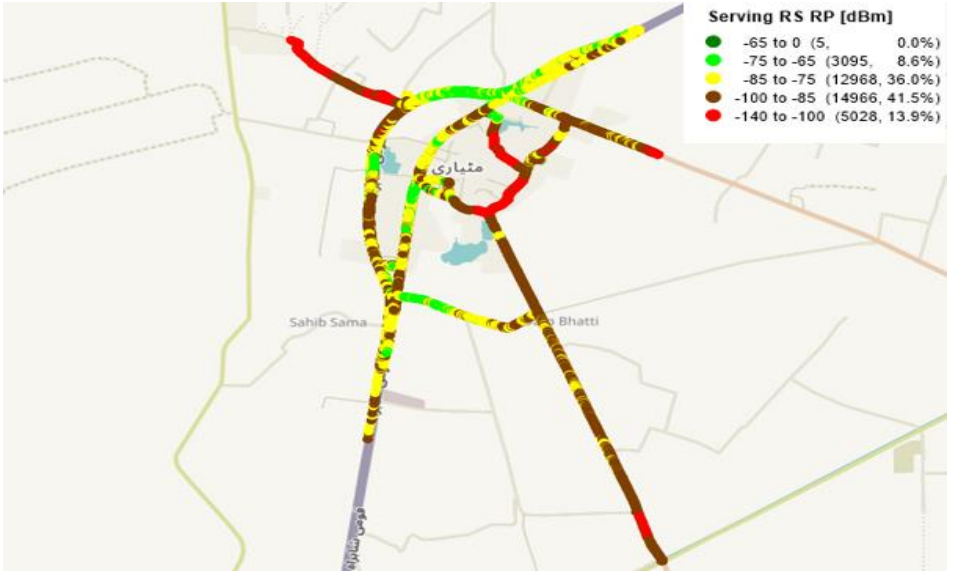
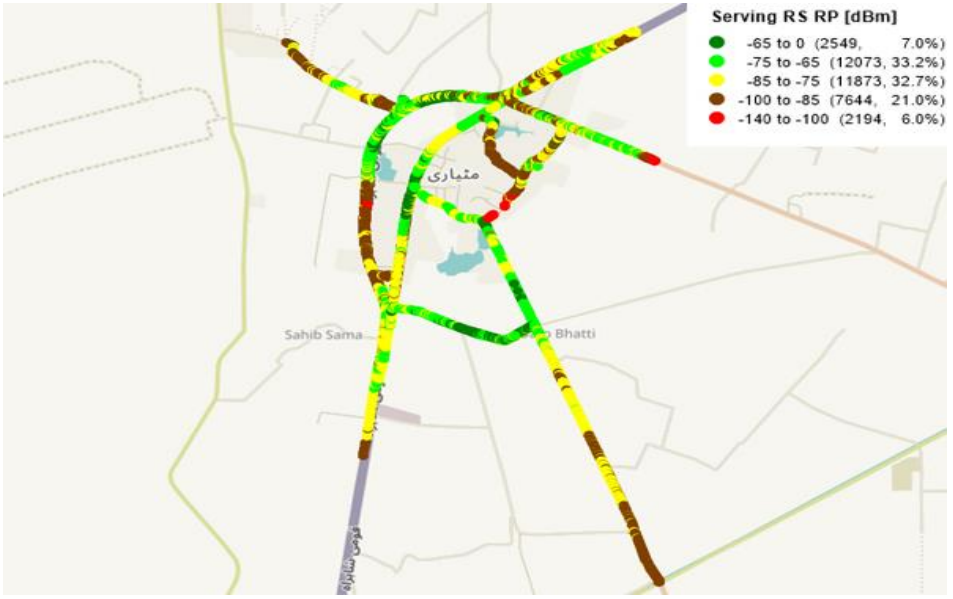
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – LOWER DIR	TELENOR 4G NETWORK COVERAGE – LOWER DIR
	
UFONE 4G NETWORK COVERAGE – LOWER DIR	**ZONG 4G NETWORK COVERAGE – LOWER DIR**
	

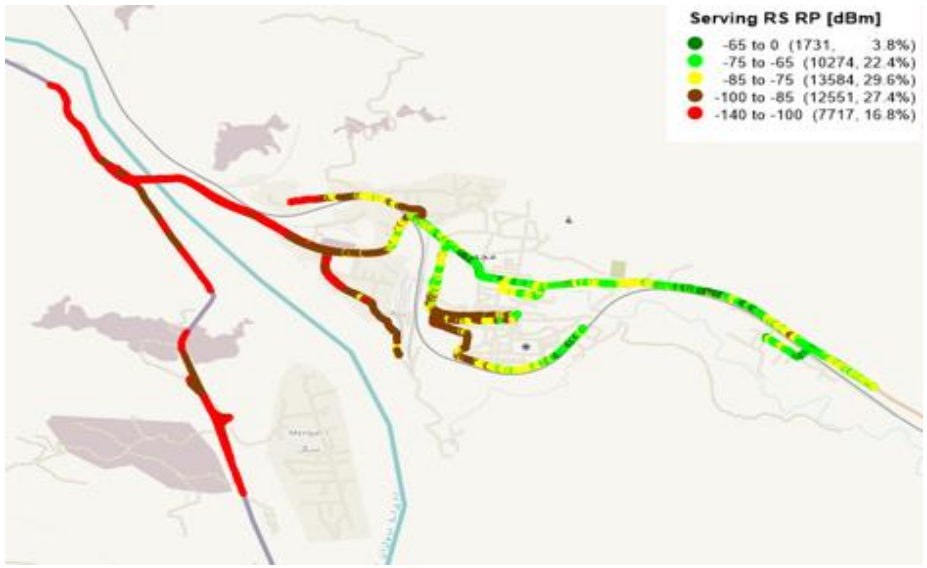
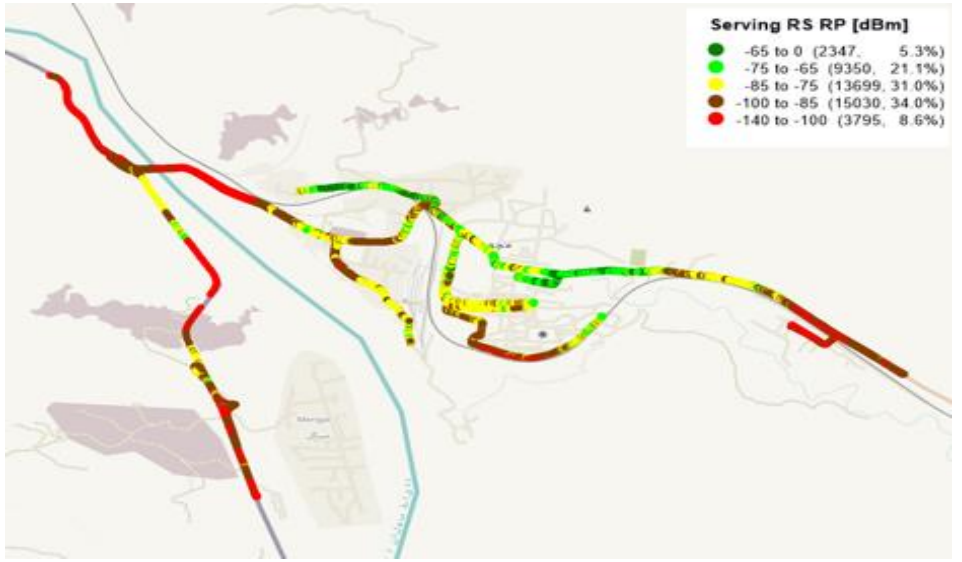
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE –MANSEHRA	TELENOR 4G NETWORK COVERAGE – MANSEHRA
	
UFONE 4G NETWORK COVERAGE – MANSEHRA	**ZONG 4G NETWORK COVERAGE – MANSEHRA**
	

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE –MATIARI	TELENOR 4G NETWORK COVERAGE – MATIARI
	
UFONE 4G NETWORK COVERAGE – MATIARI	**ZONG 4G NETWORK COVERAGE – MATIARI**
	

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE –MACH	TELENOR 4G NETWORK COVERAGE – MACH
	
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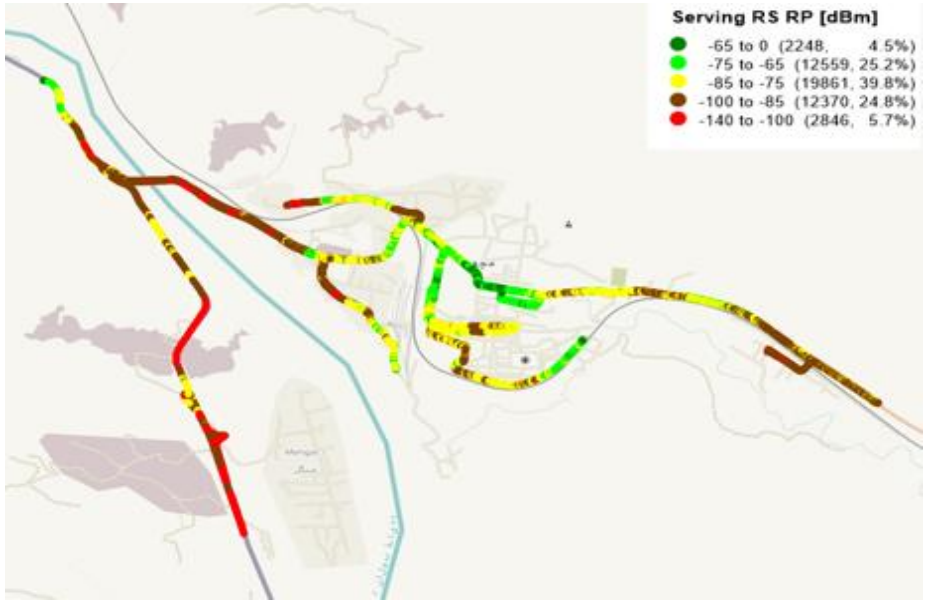
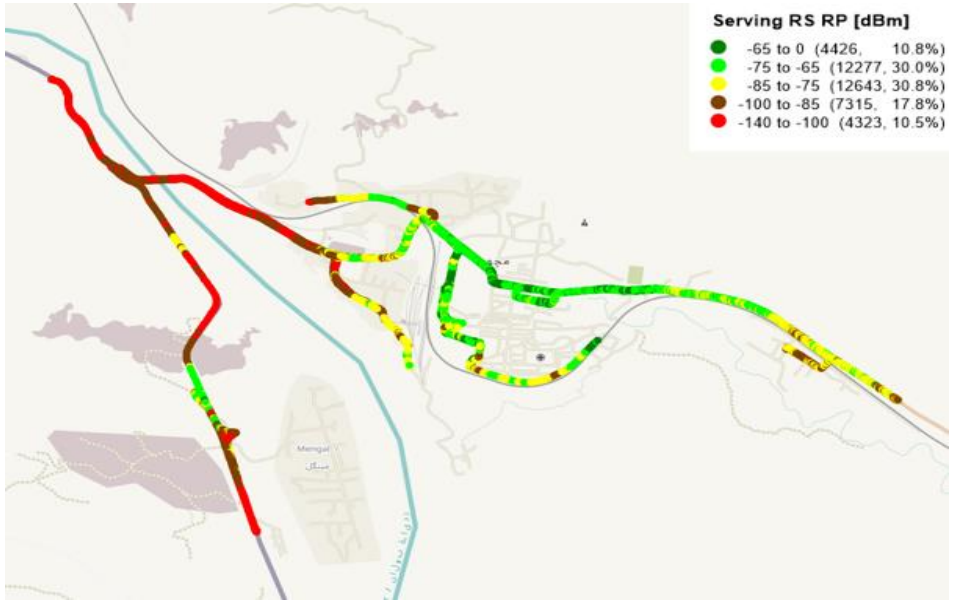
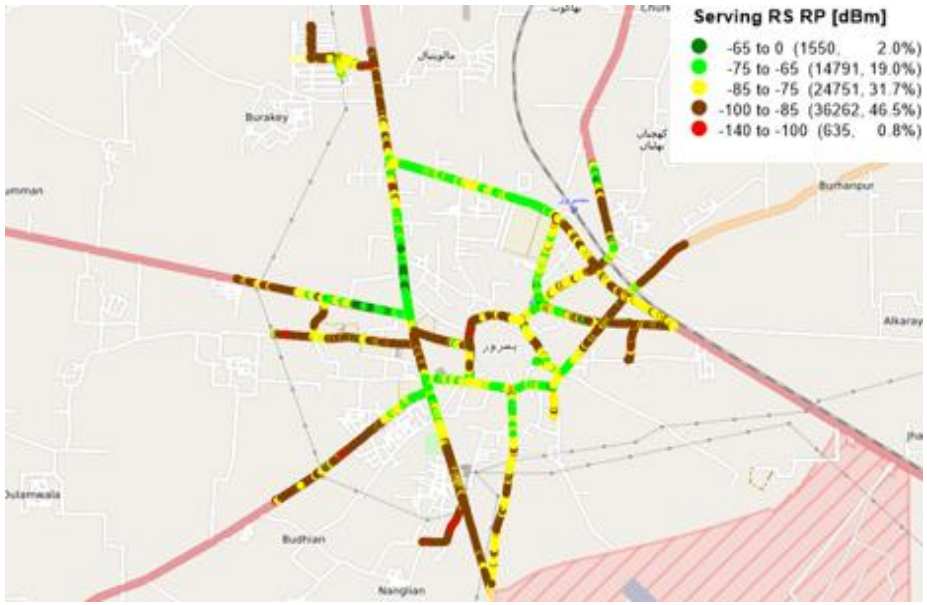
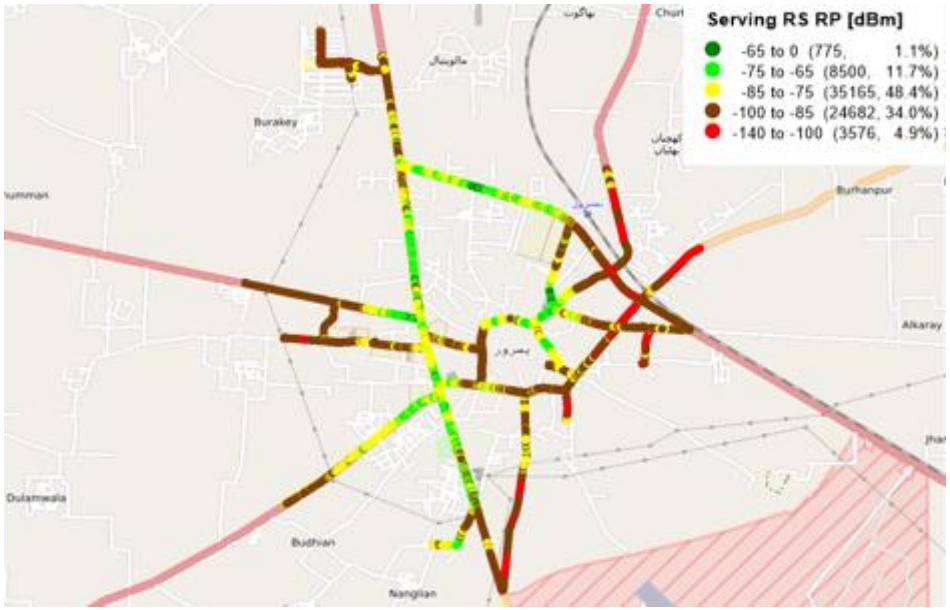
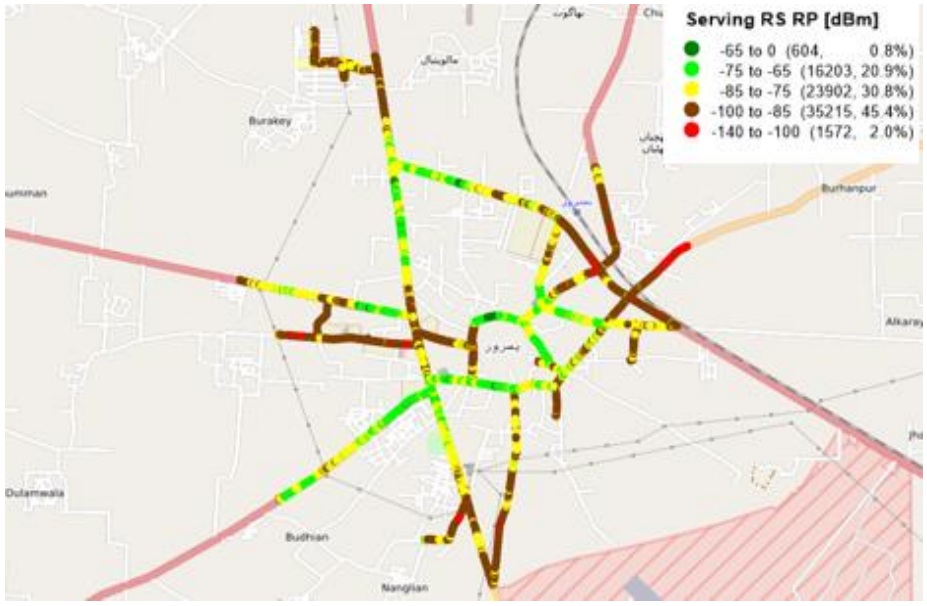
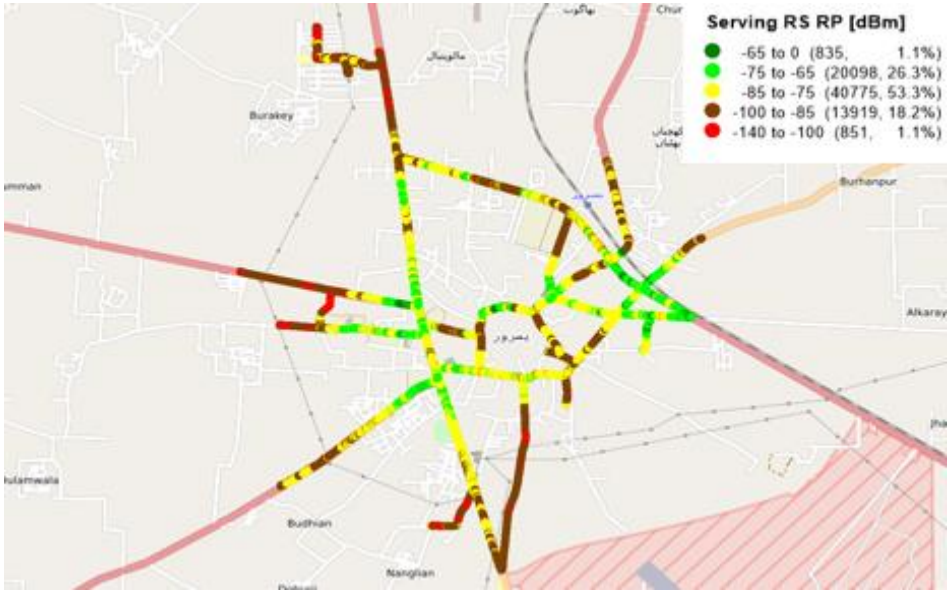
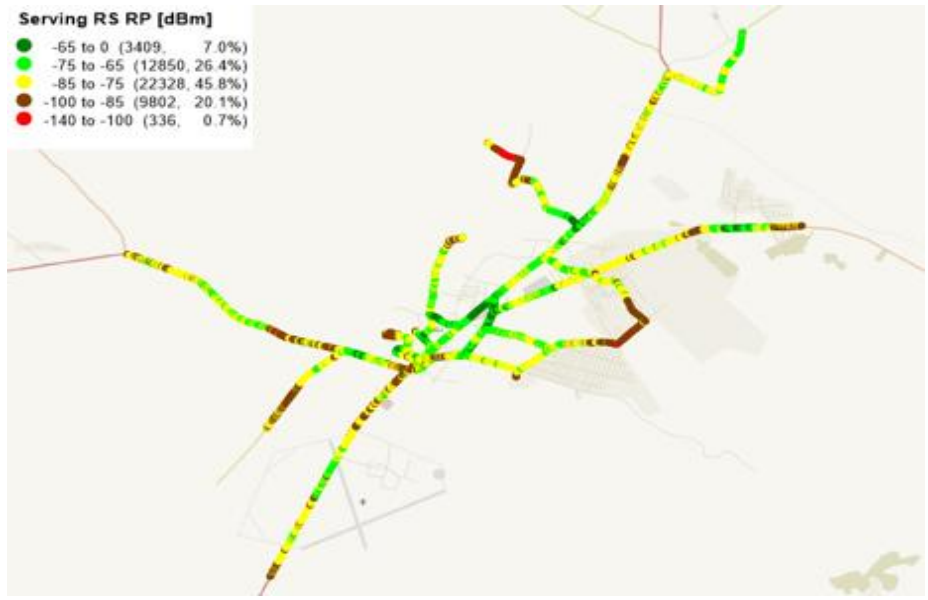
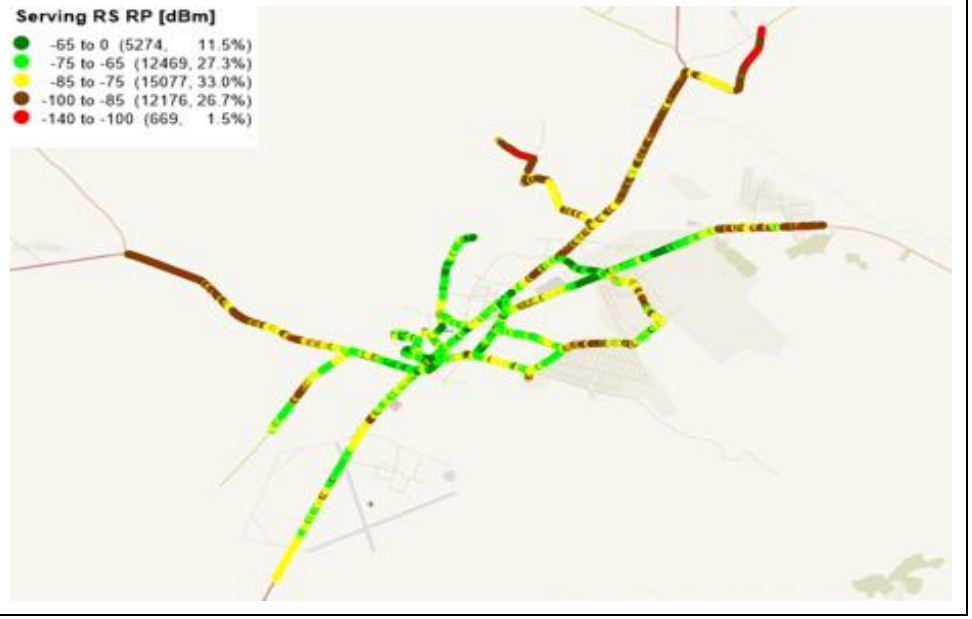
	

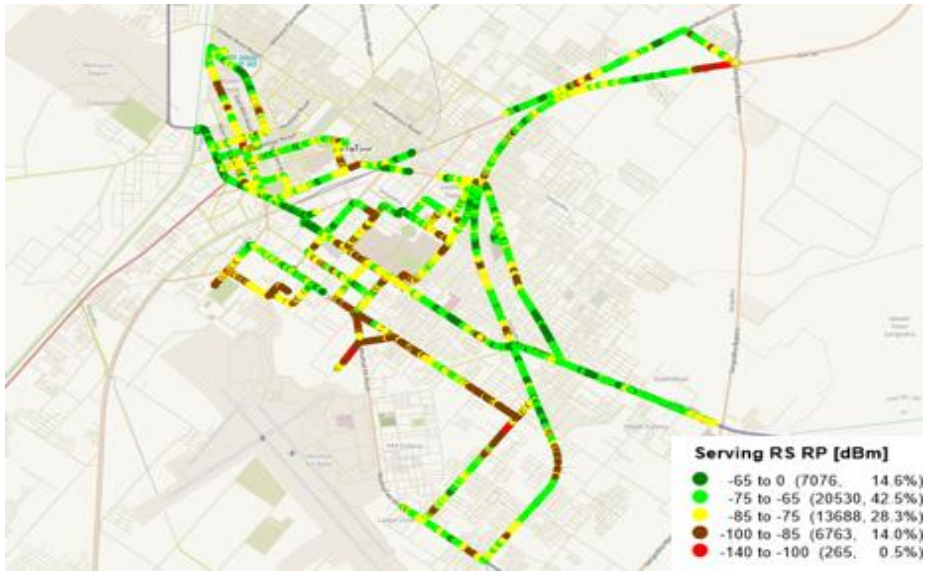
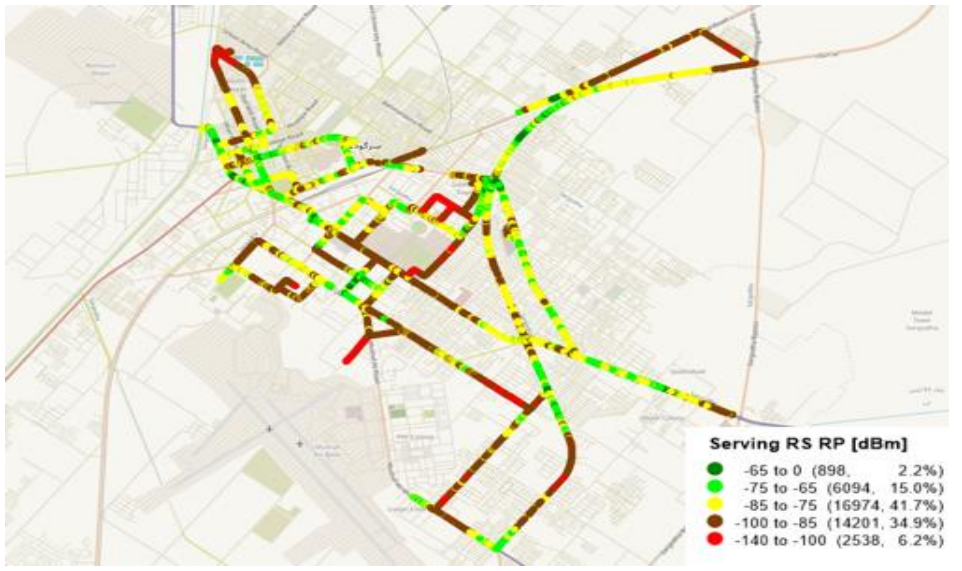
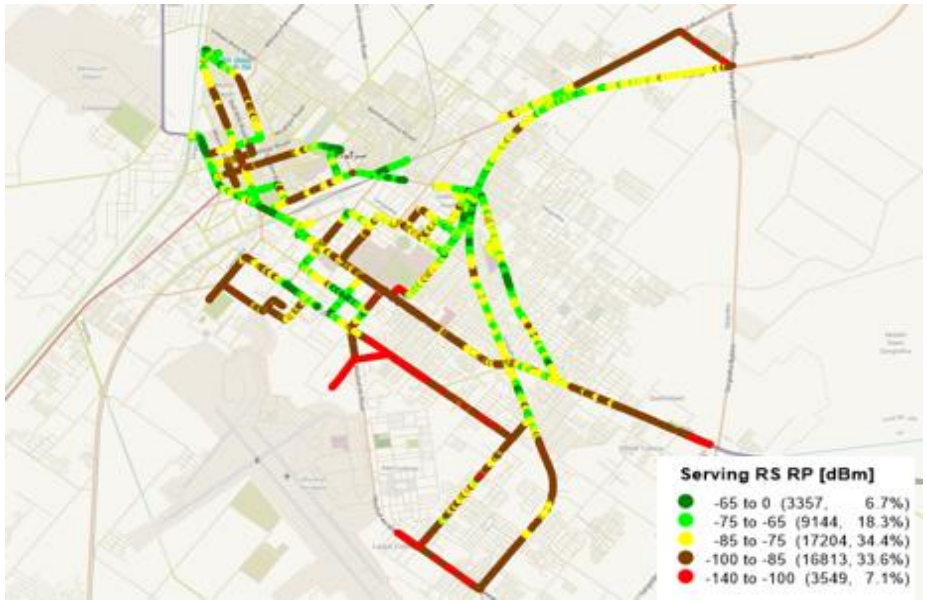
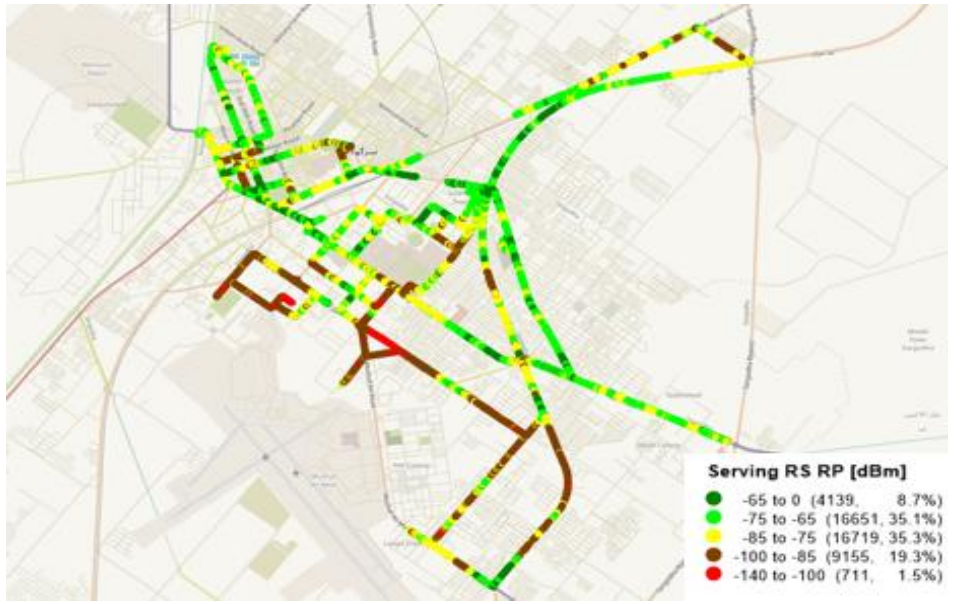
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – PASROOR	TELENOR 4G NETWORK COVERAGE – PASROOR
	
UFONE 4G NETWORK COVERAGE – PASROOR	**ZONG 4G NETWORK COVERAGE – PASROOR**
	

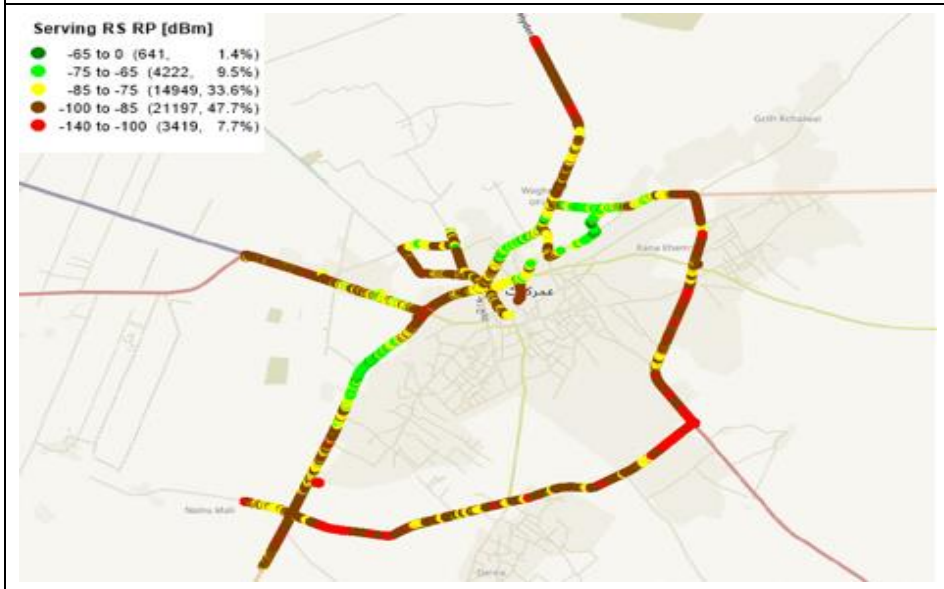
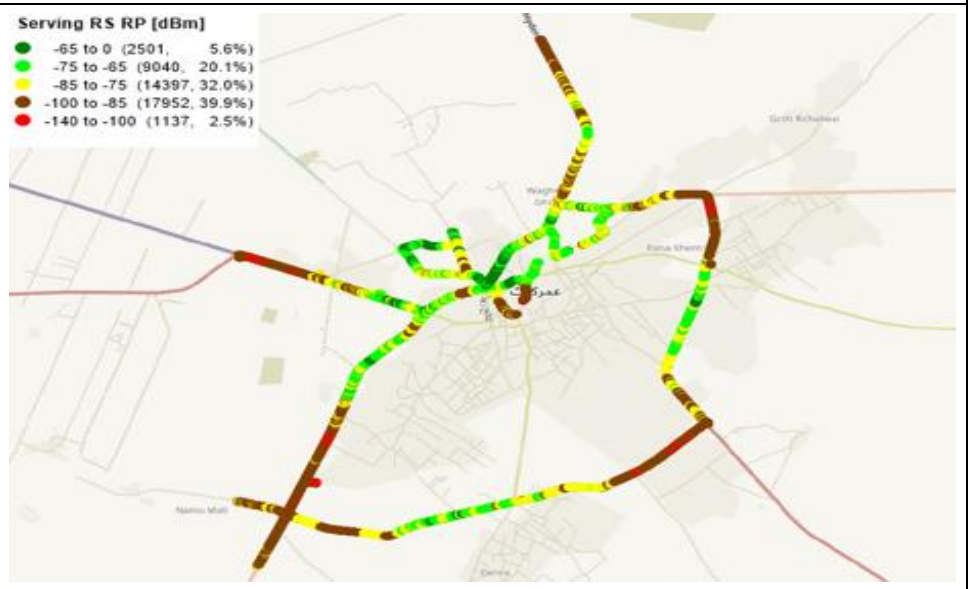
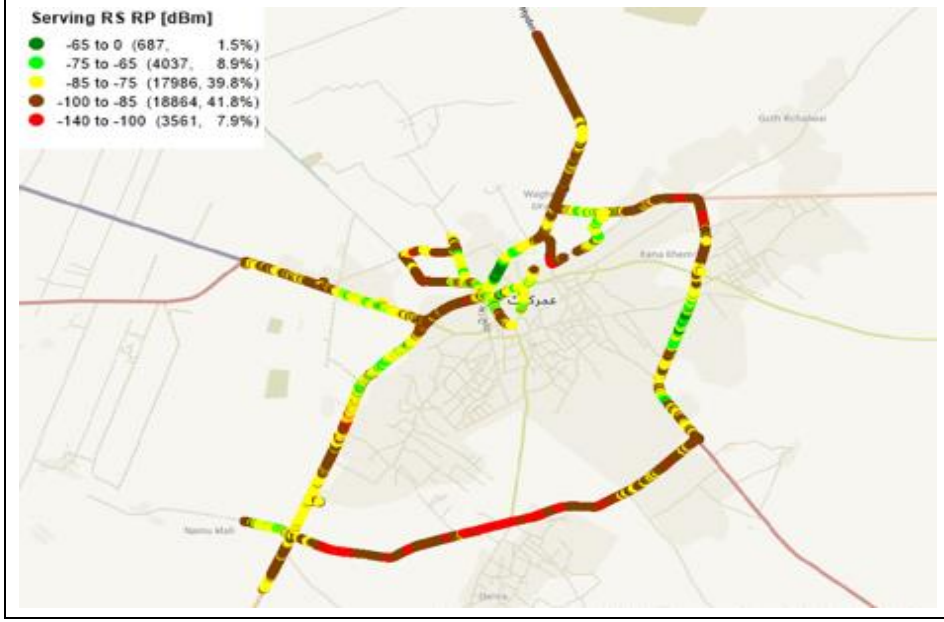
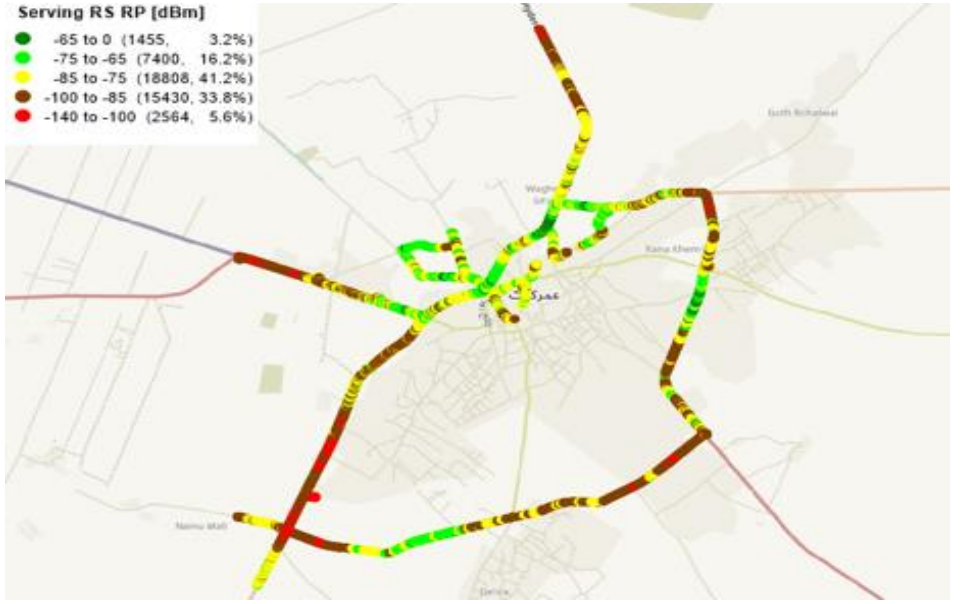
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – PISHIN	TELENOR 4G NETWORK COVERAGE –PISHIN
UFONE 4G NETWORK COVERAGE – PISHIN	**ZONG 4G NETWORK COVERAGE – PISHIN**
	

4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – SARGODHA	TELENOR 4G NETWORK COVERAGE –SARGODHA
	
UFONE 4G NETWORK COVERAGE – SARGODHA	**ZONG 4G NETWORK COVERAGE – SARGODHA**
	

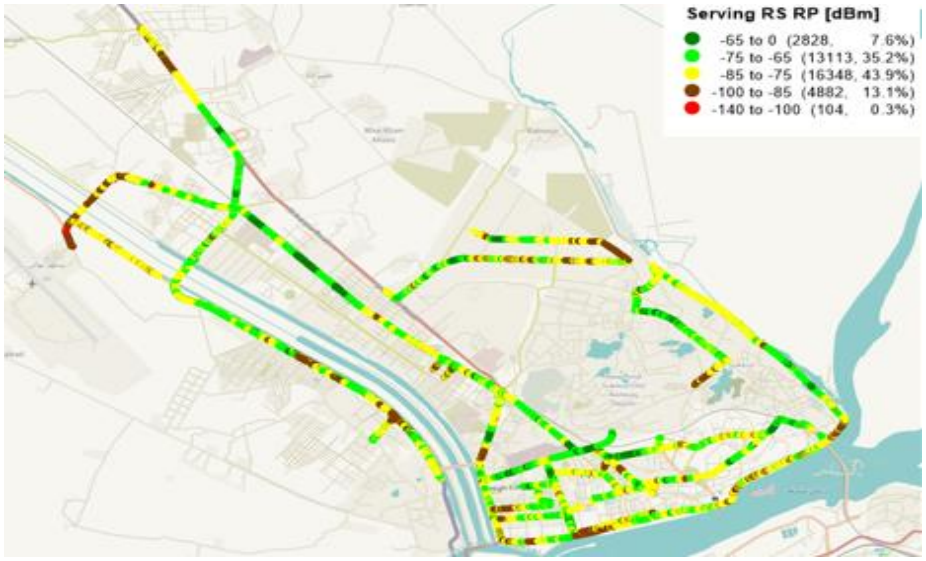
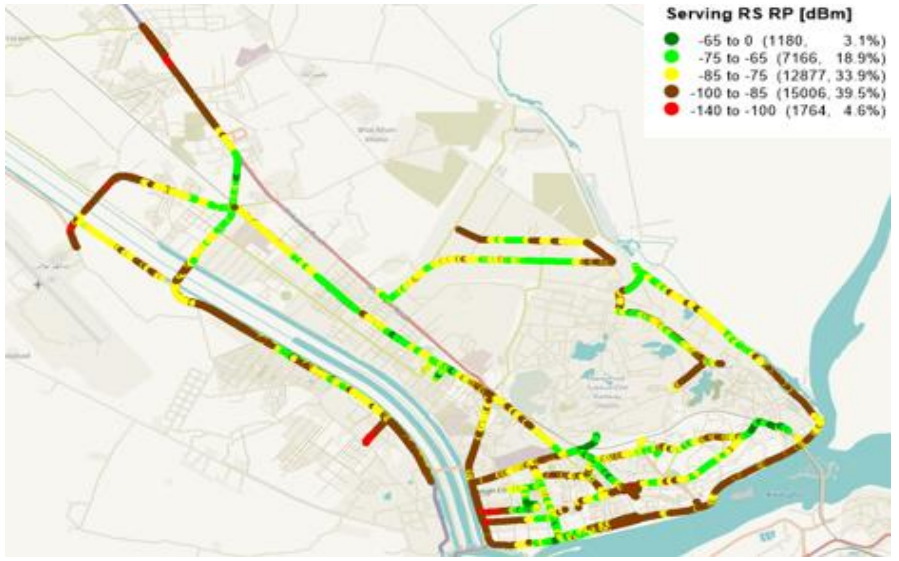
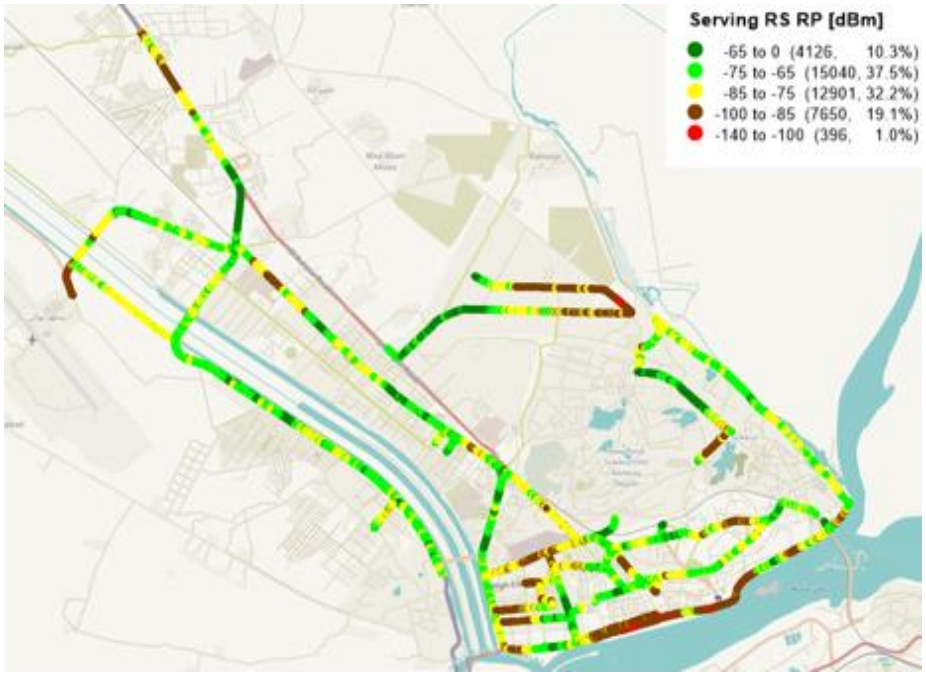
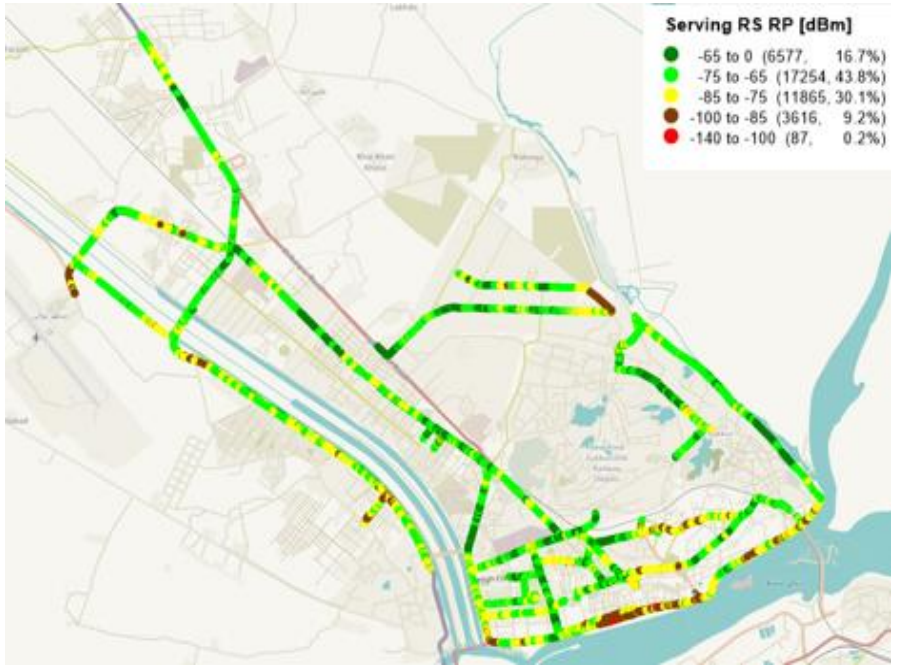
4G MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – UMER KOT	TELENOR 4G NETWORK COVERAGE – UMER KOT
	
UFONE 4G NETWORK COVERAGE – UMER KOT	**ZONG 4G NETWORK COVERAGE – UMER KOT**
	

Annex -A(Coverage Maps)

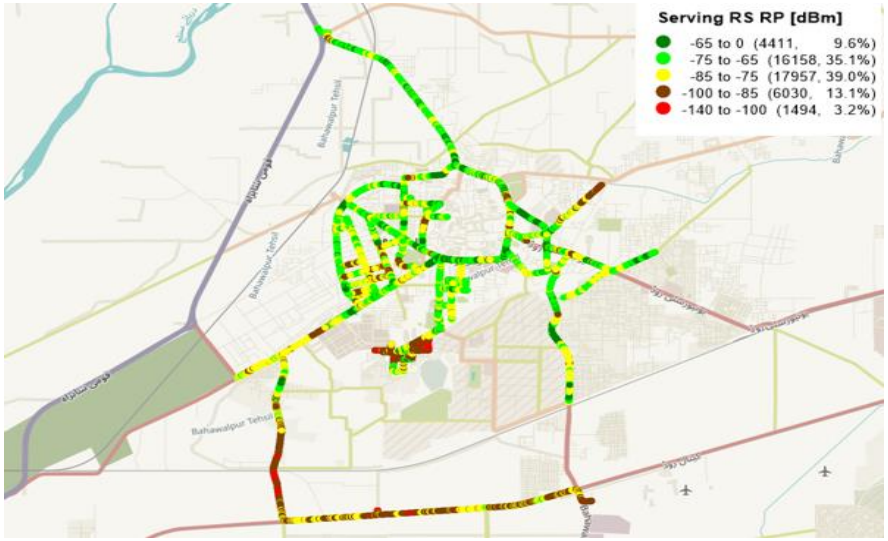
AUTOMODE

AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

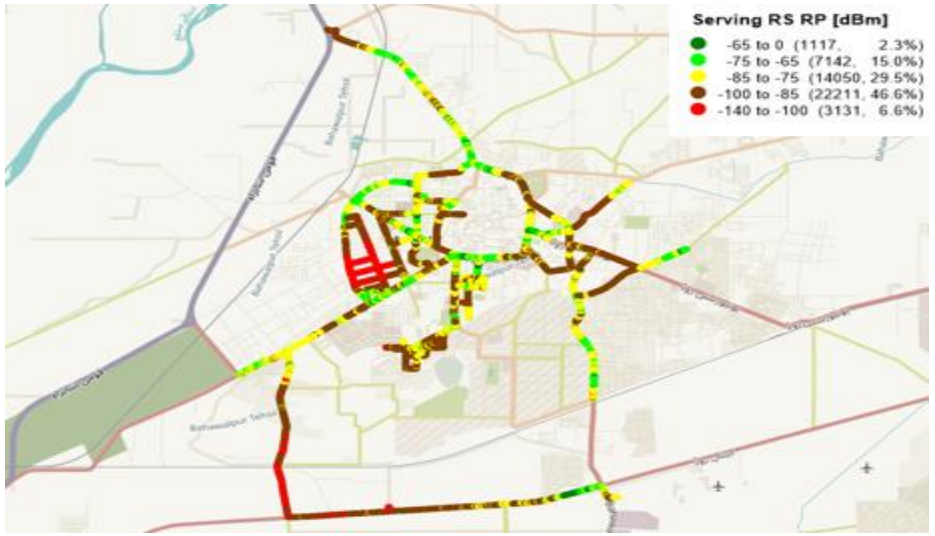
JAZZ AUTOMODE NETWORK COVERAGE – SUKKUR	TELENOR AUTOMODE NETWORK COVERAGE – SUKKUR
	
UFONE AUTOMODE NETWORK COVERAGE – SUKKUR	**ZONG AUTOMODE NETWORK COVERAGE – SUKKUR**
	

AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

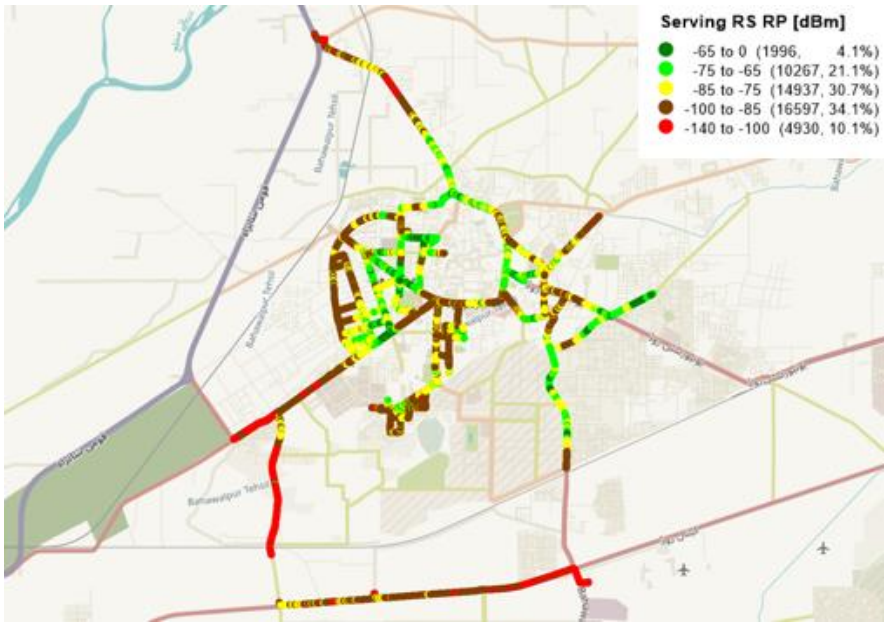
JAZZ AUTOMODE NETWORK COVERAGE – BAHAWALPUR



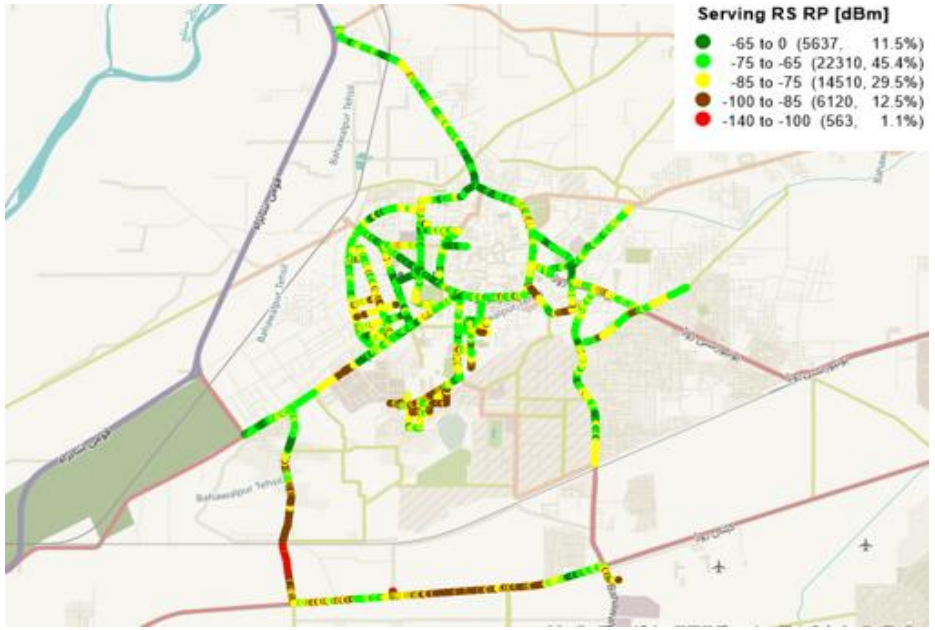
TELENOR AUTOMODE NETWORK COVERAGE – BAHAWALPUR



UFONE AUTOMODE NETWORK COVERAGE – BAHAWALPUR

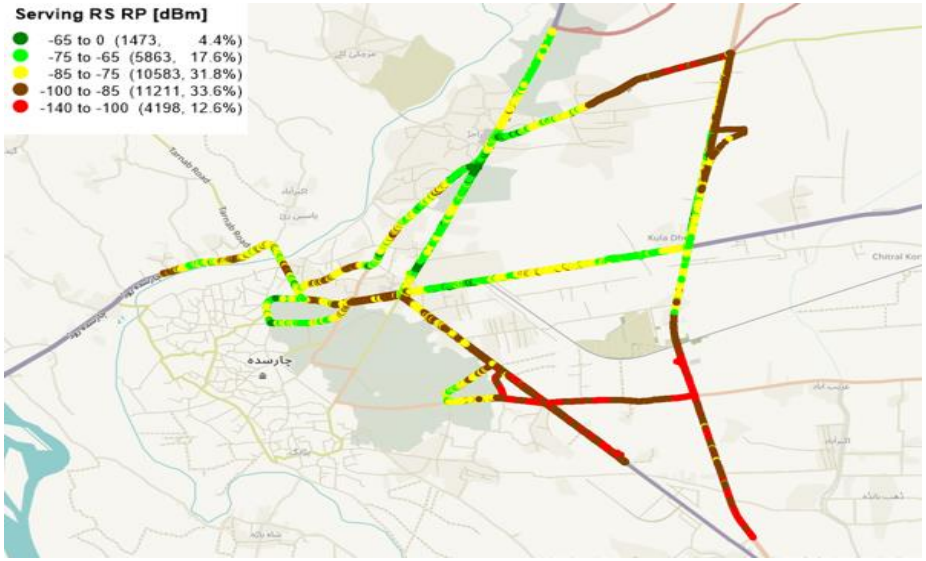


ZONG AUTOMODE NETWORK COVERAGE – BAHAWALPUR

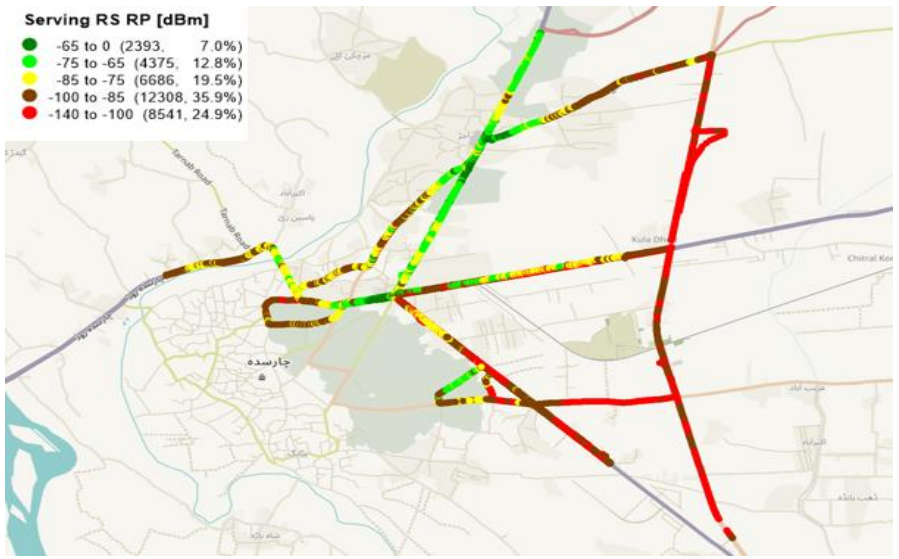


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – CHARSADDA



TELENOR AUTOMODE NETWORK COVERAGE – CHARSADDA



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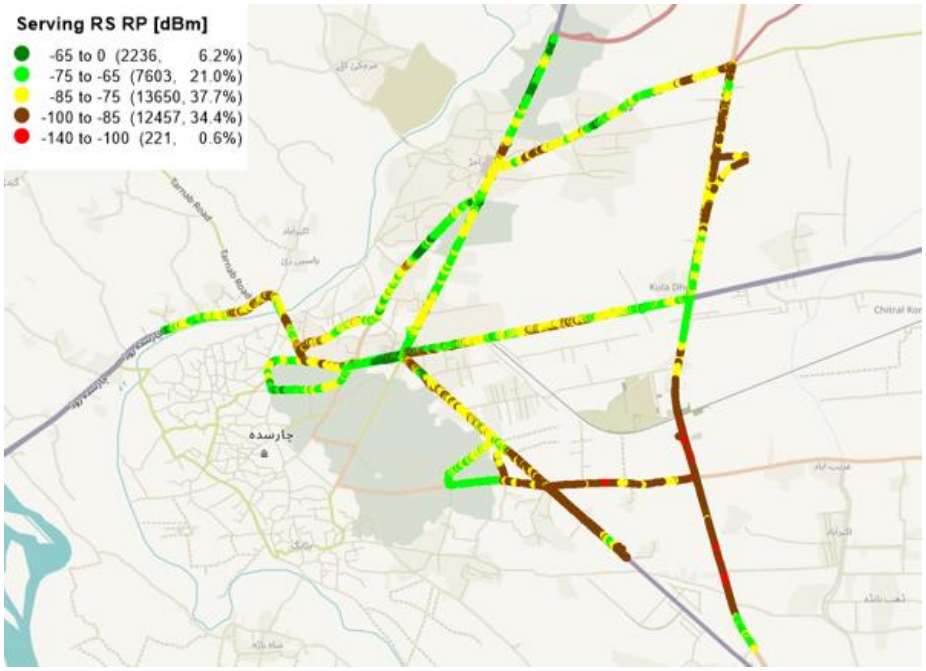

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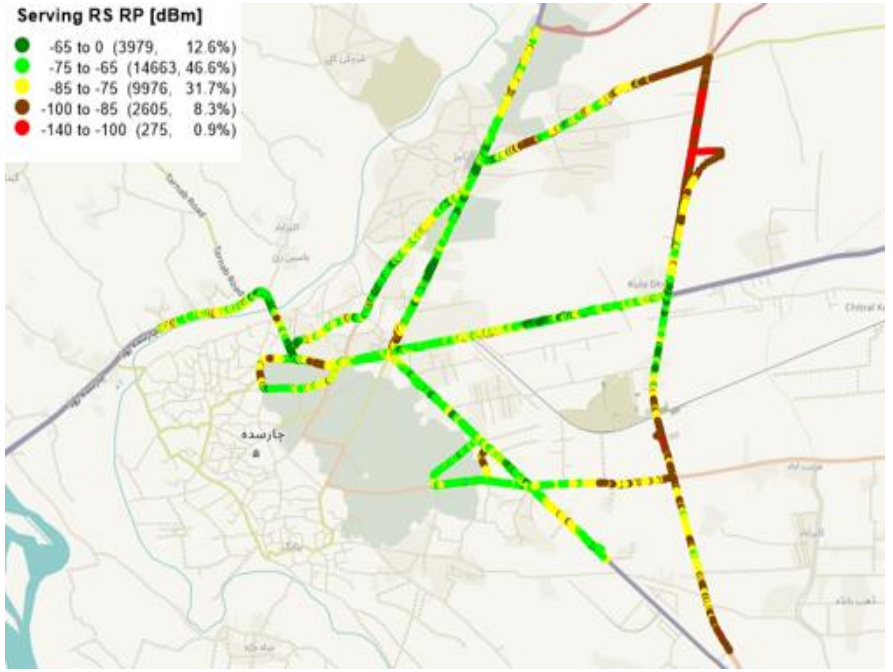
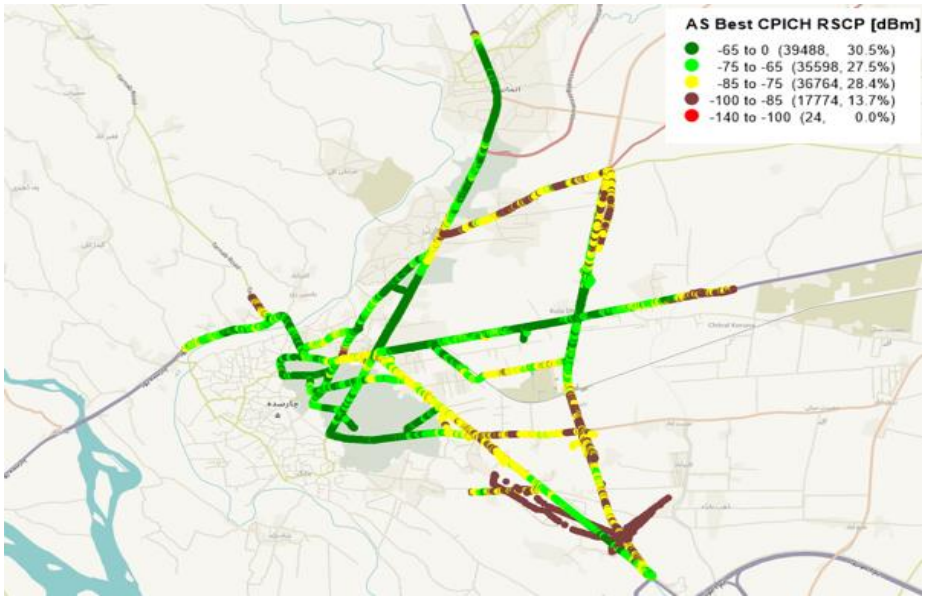


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ AUTOMODE NETWORK COVERAGE – CHARSADDA



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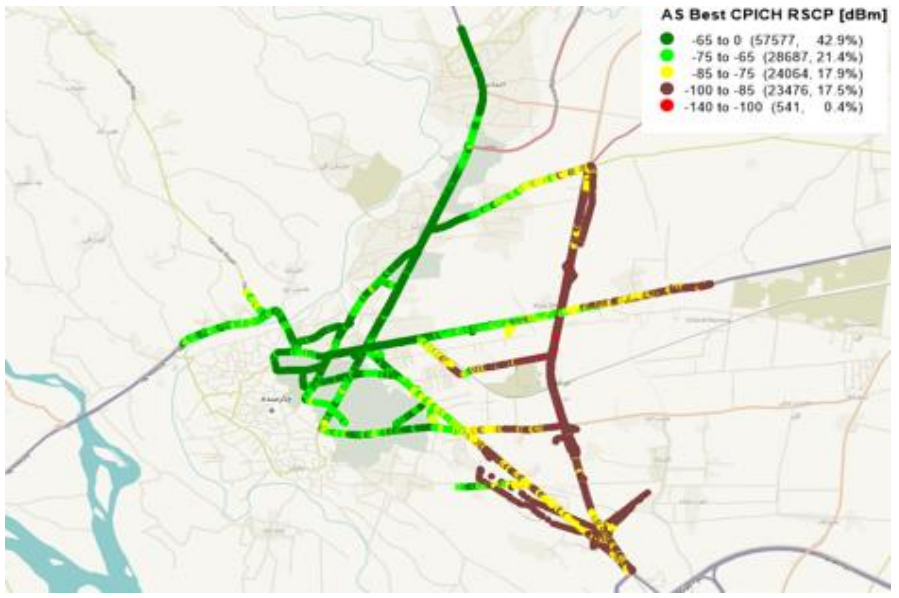

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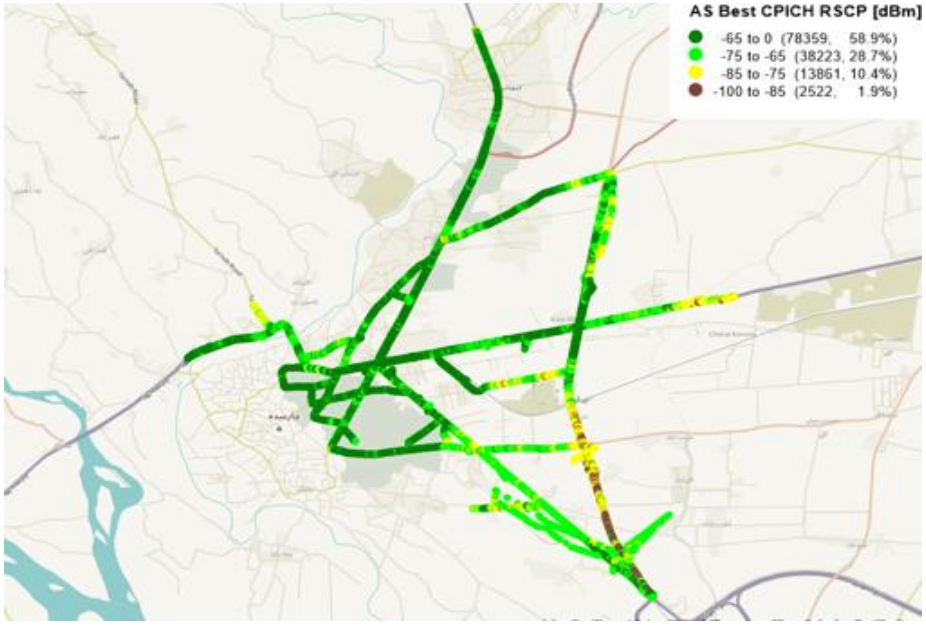

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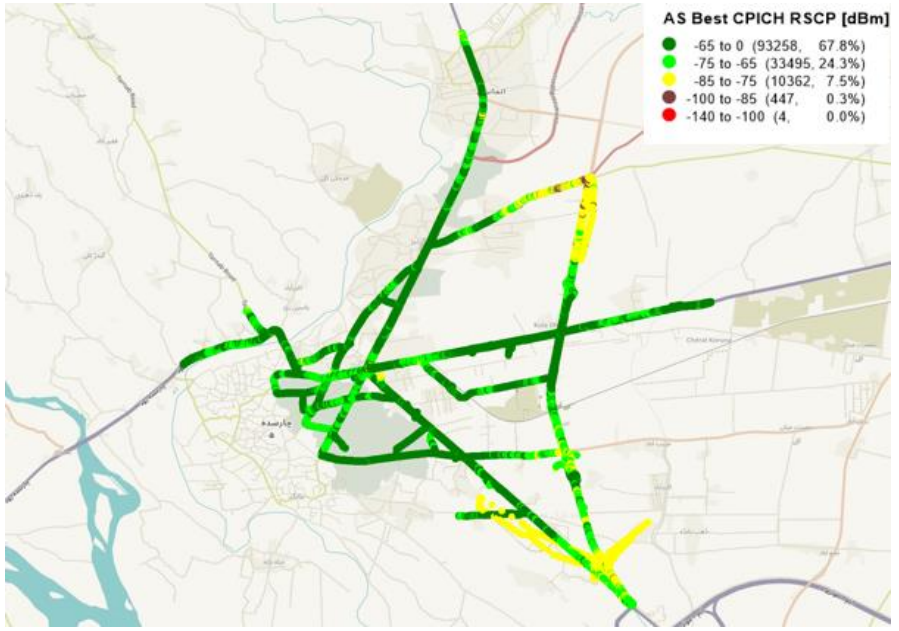
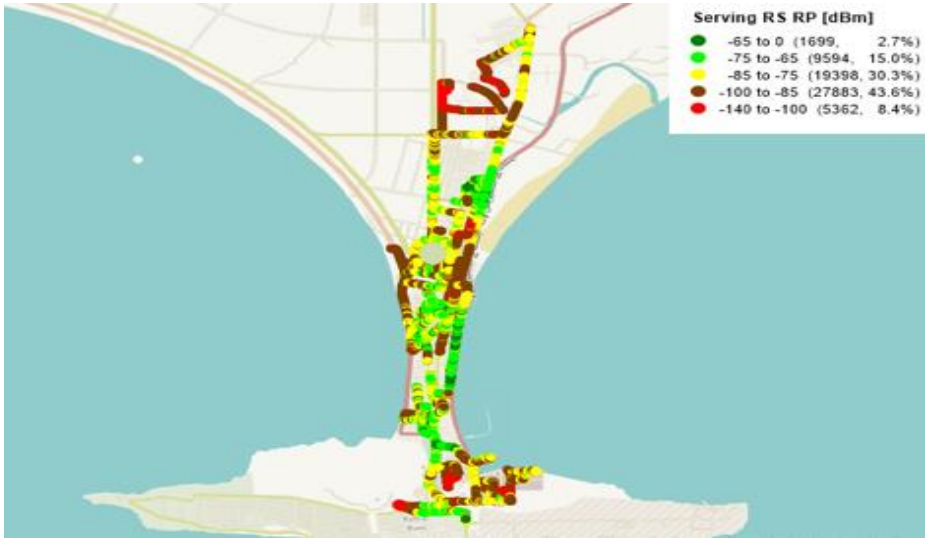


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – GWADAR



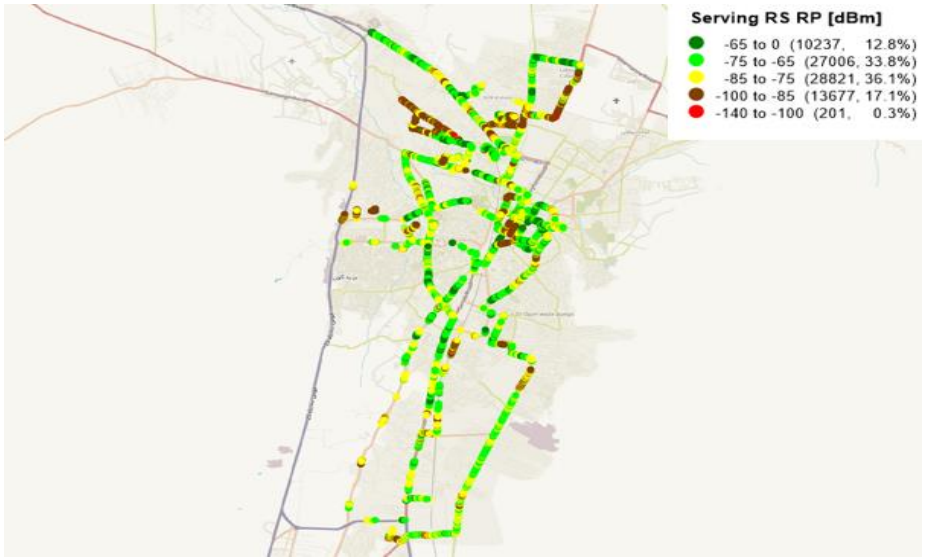
TELENOR AUTOMODE NETWORK COVERAGE – GWADAR

UFONE AUTOMODE NETWORK COVERAGE – GWADAR

ZONG AUTOMODE NETWORK COVERAGE – GWADAR

AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – QUETTA



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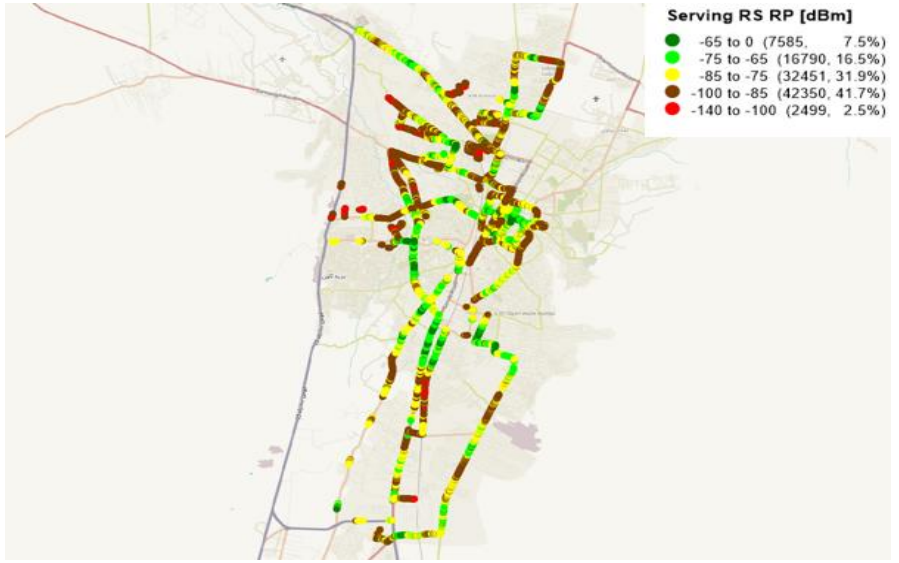

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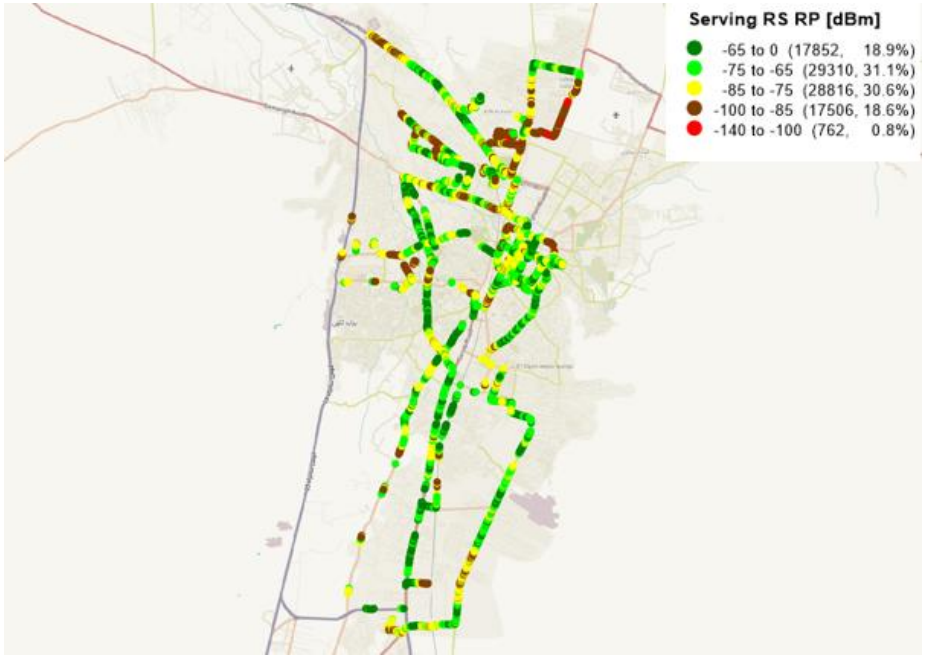

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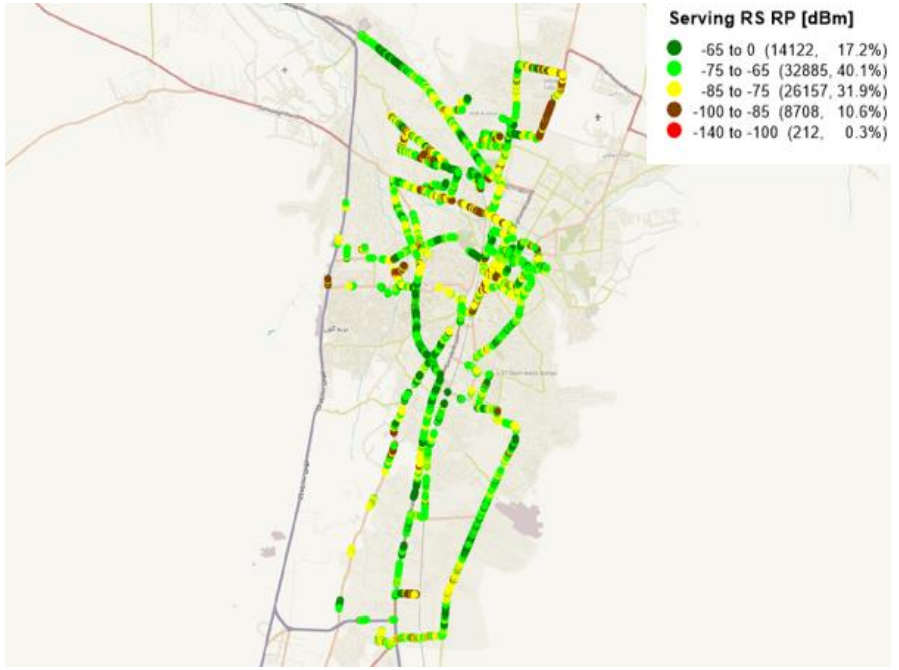
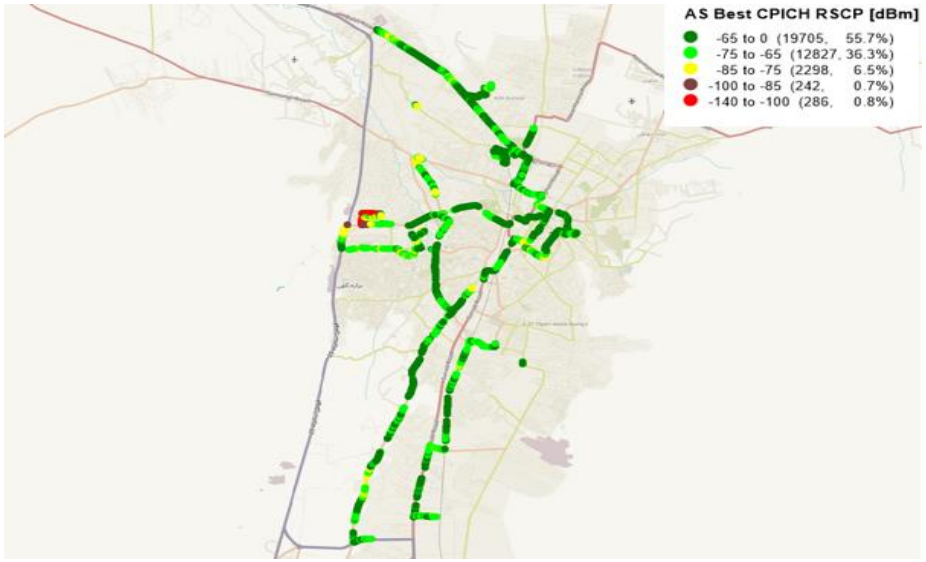


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G AUTOMODE NETWORK COVERAGE – QUETTA



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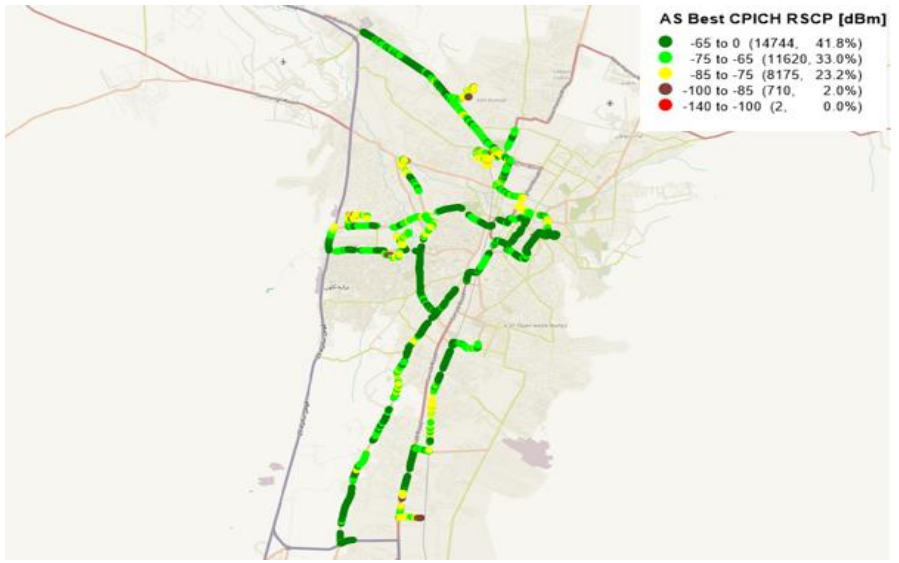

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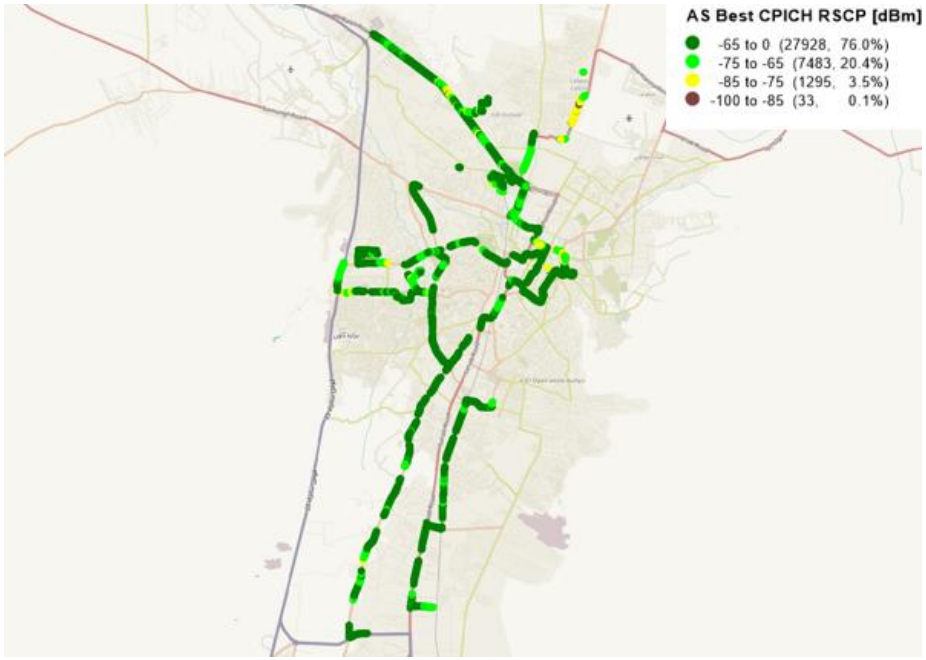

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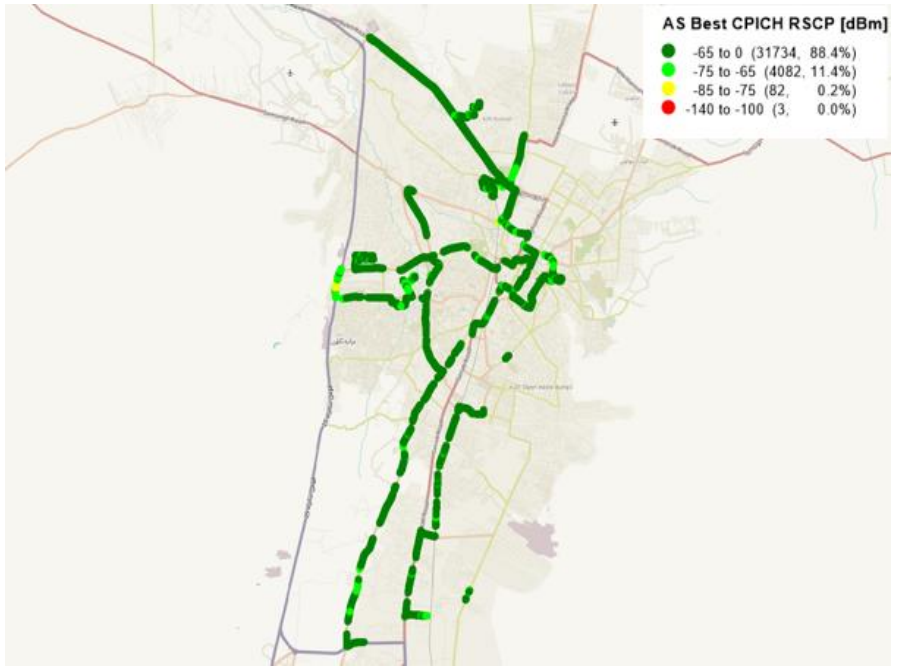
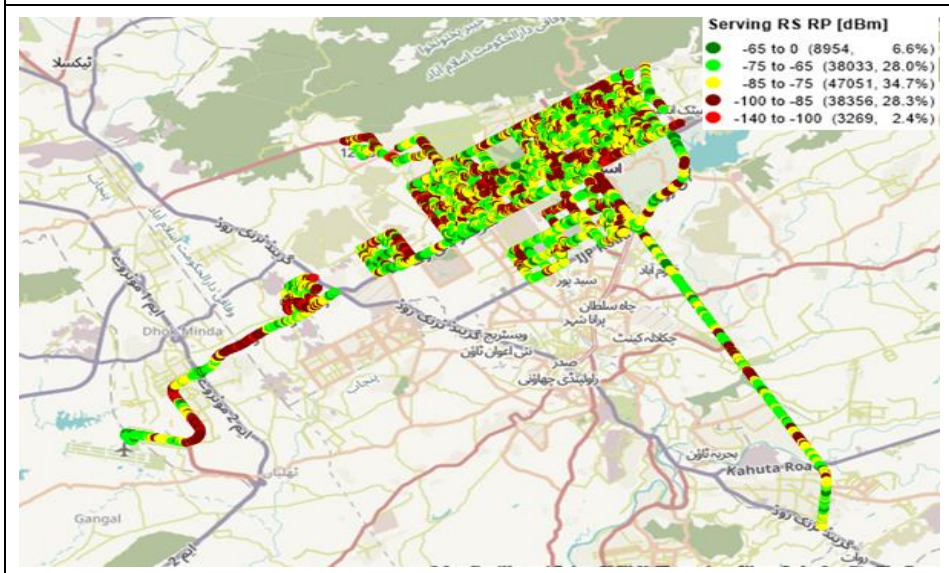


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – ISLAMABAD



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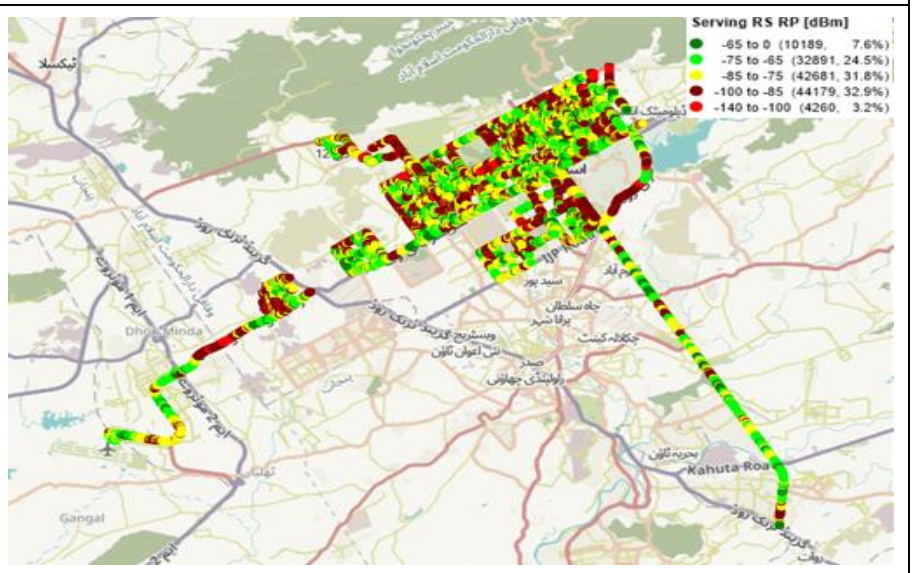

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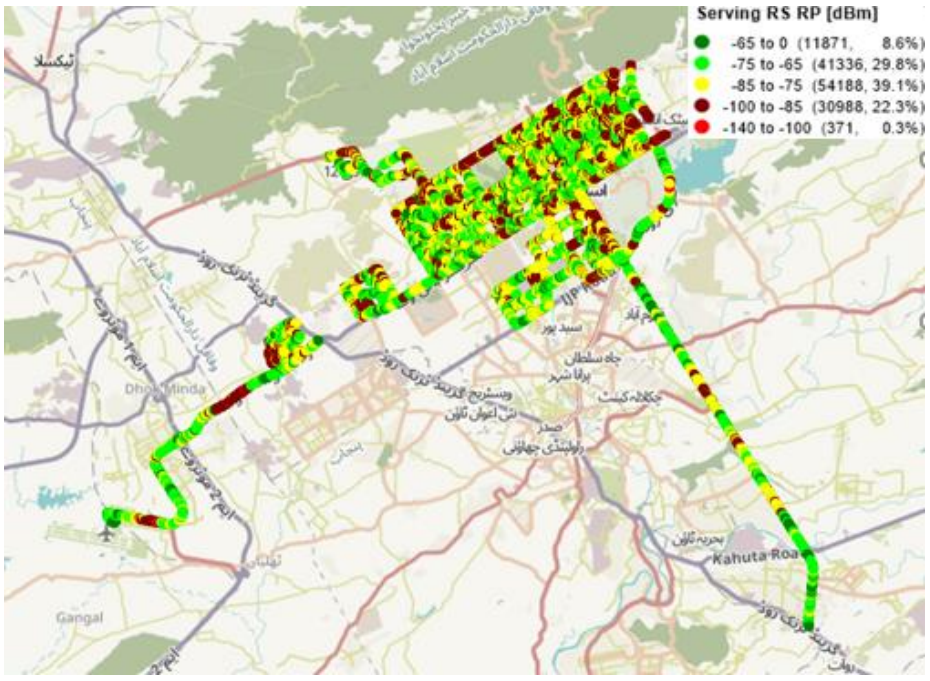

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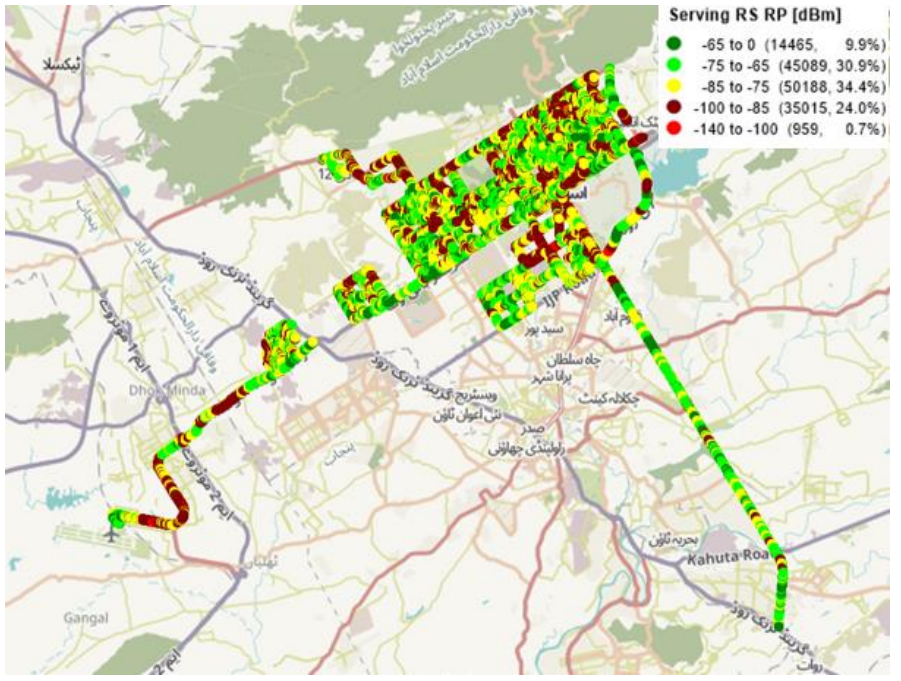
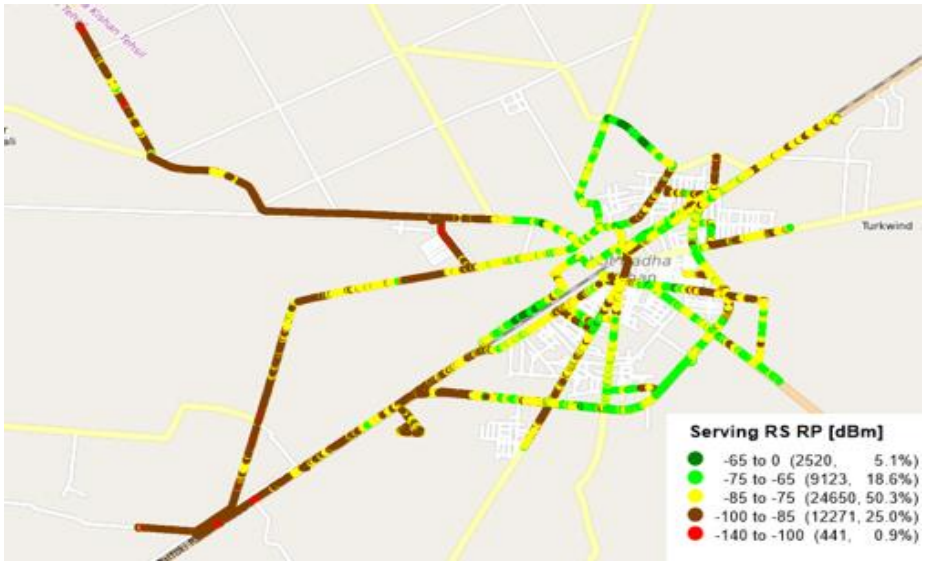


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – KOT RADHA KISHAN



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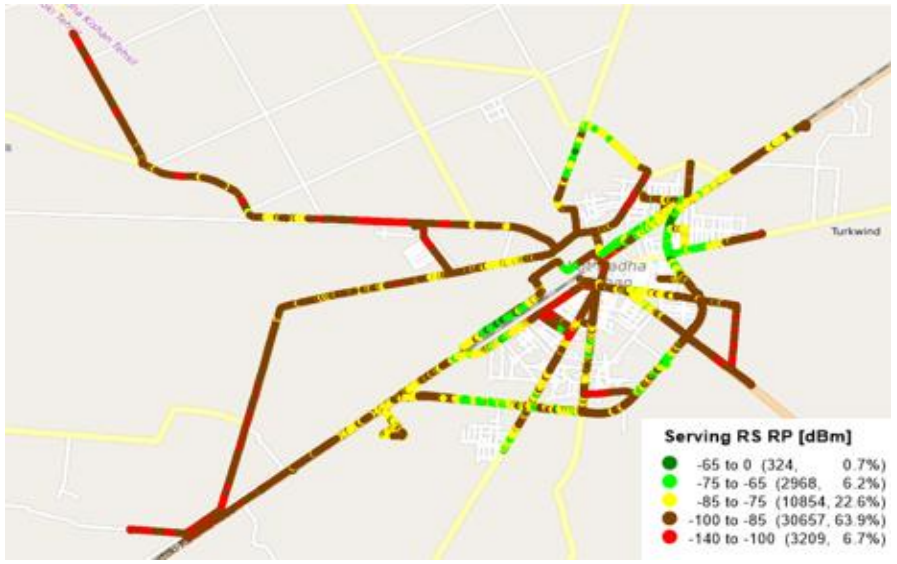

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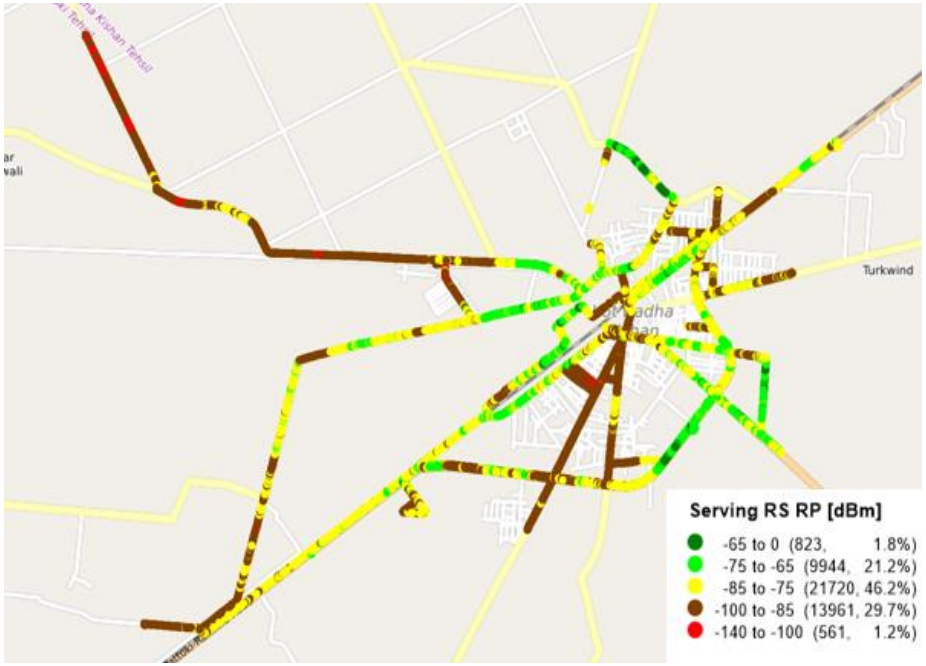

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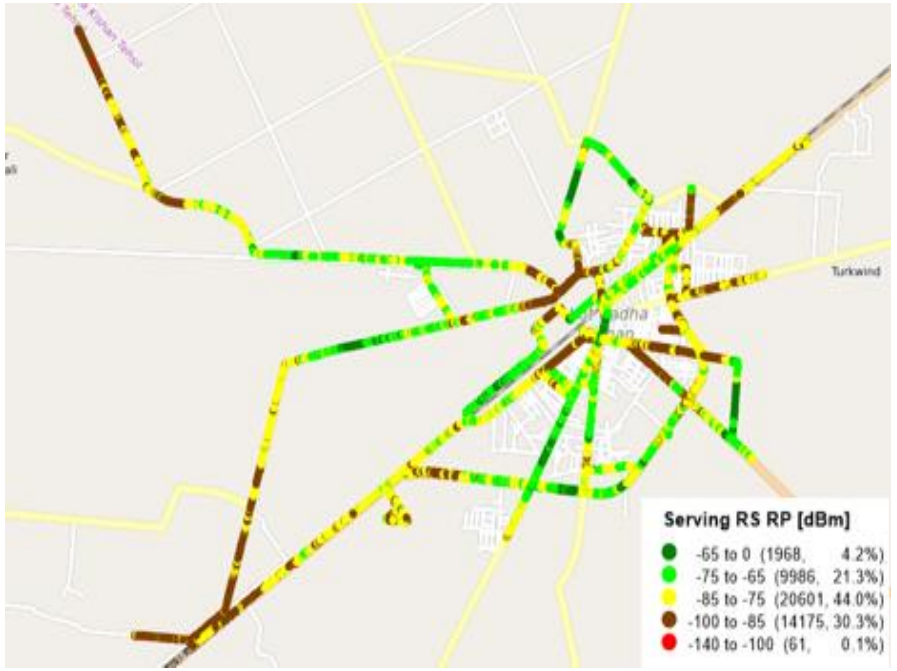
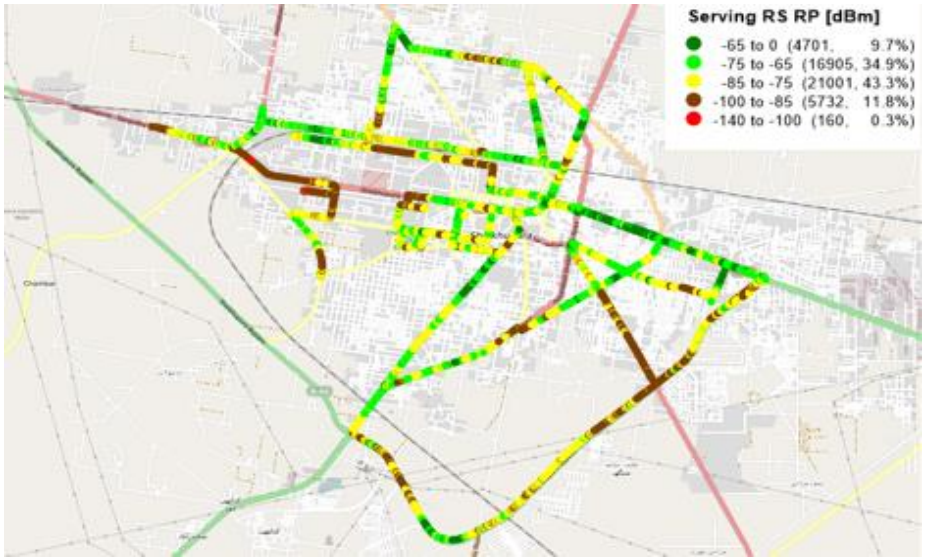


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – SHEIKHUPURA



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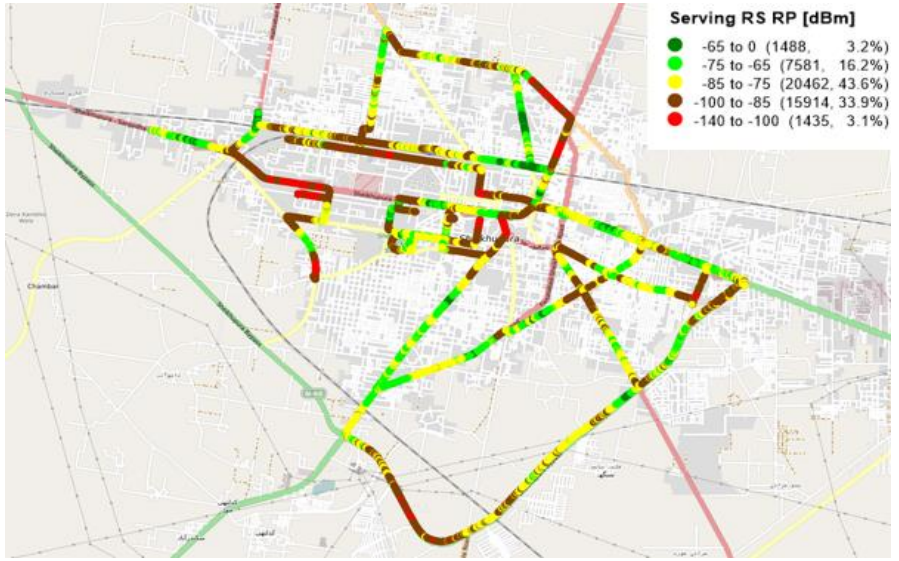

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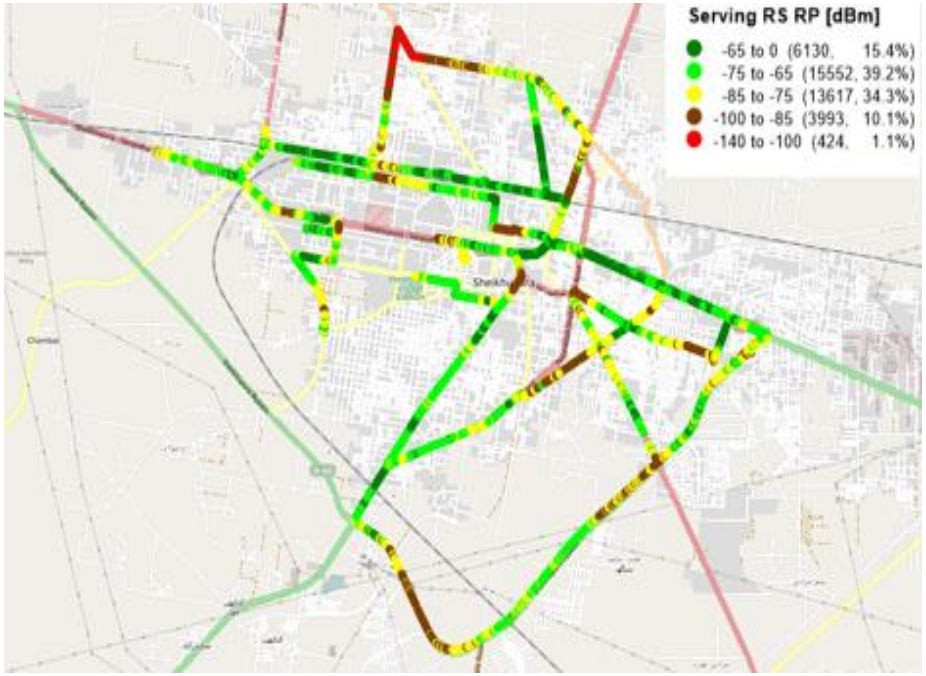

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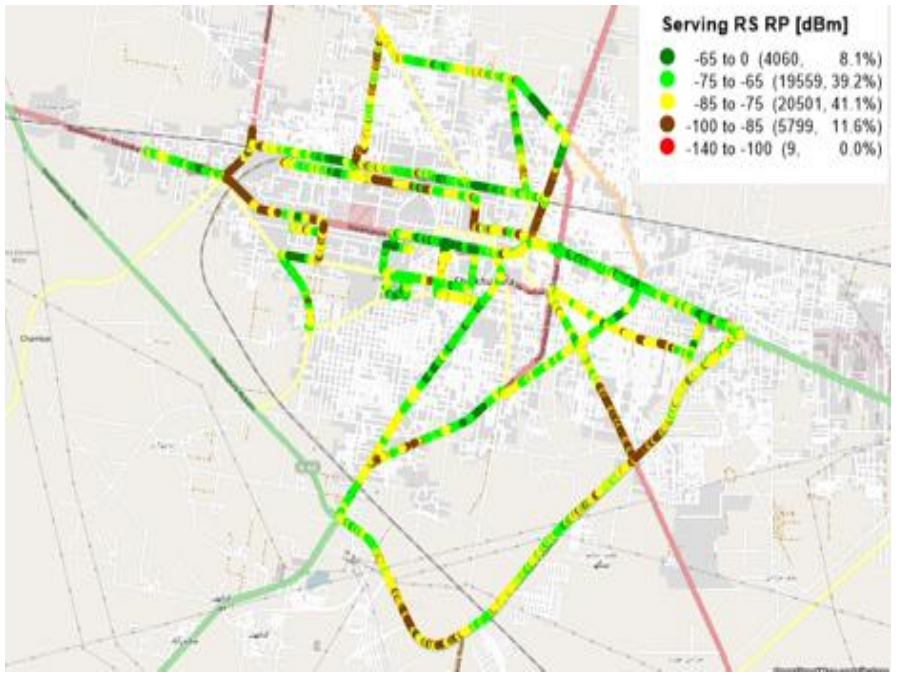
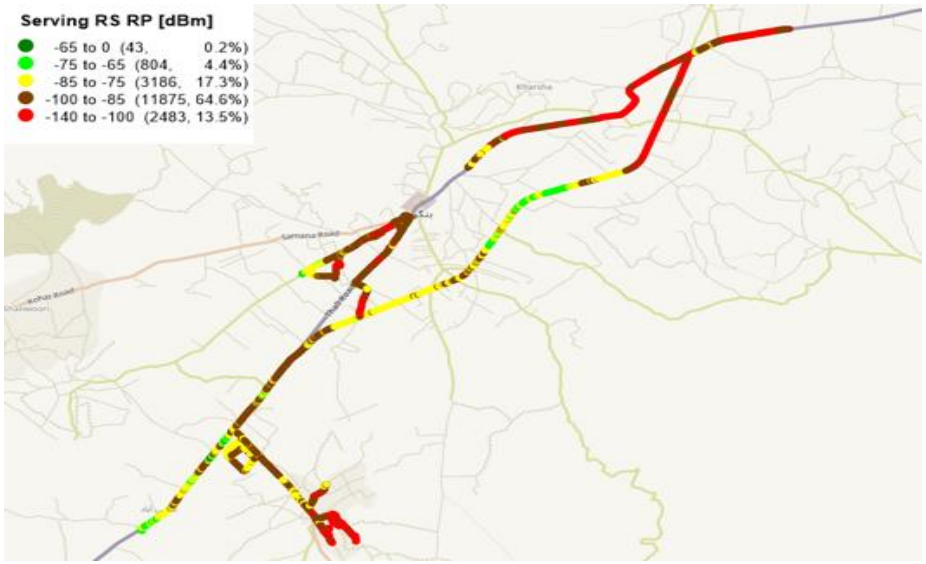


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – HANGU



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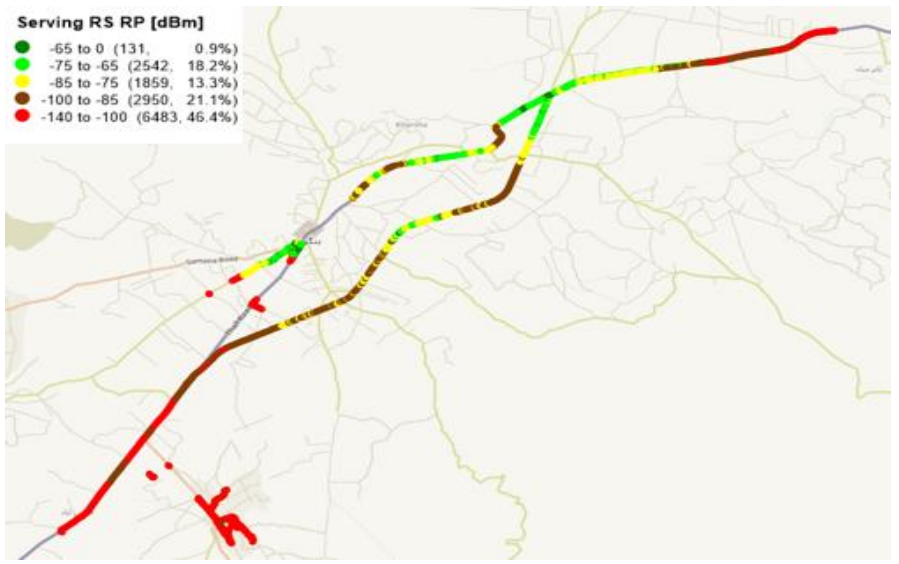

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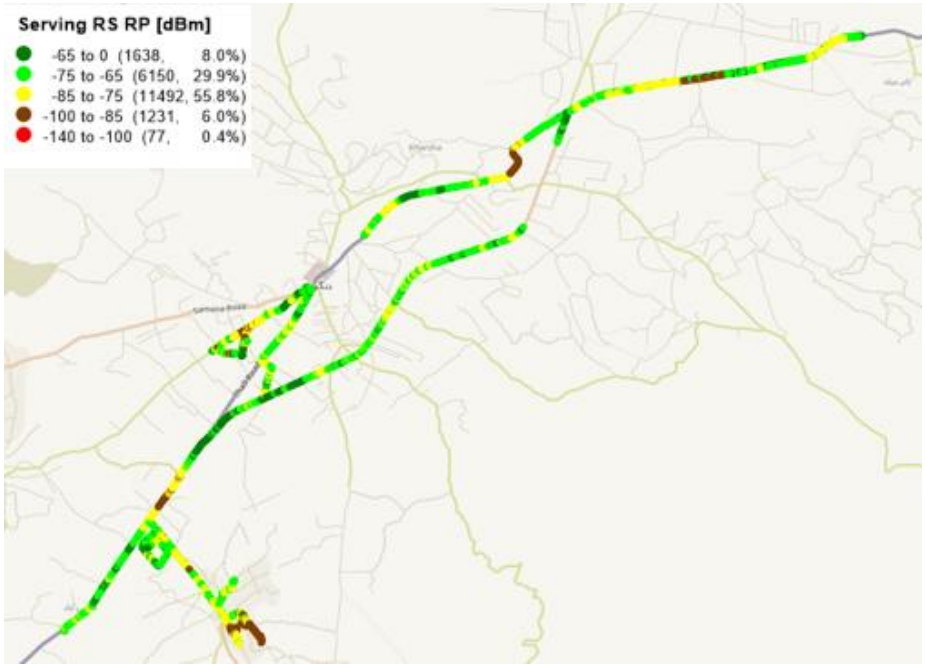

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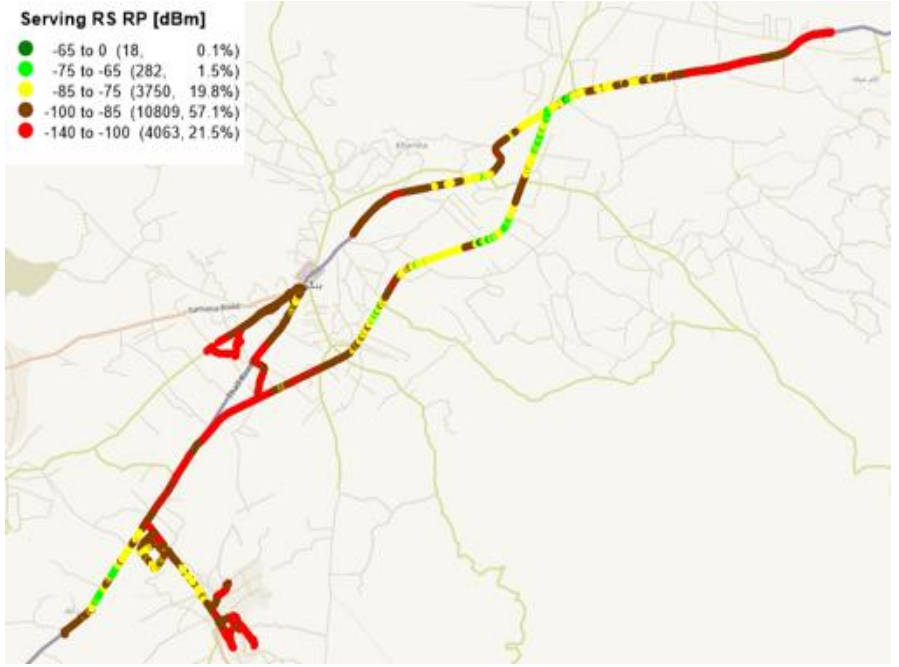
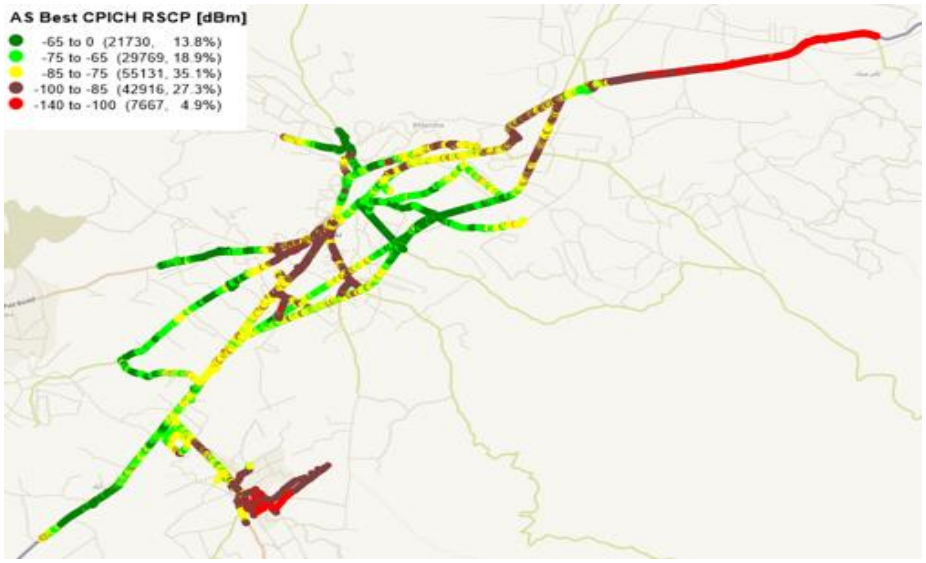


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G AUTOMODE NETWORK COVERAGE – HANGU



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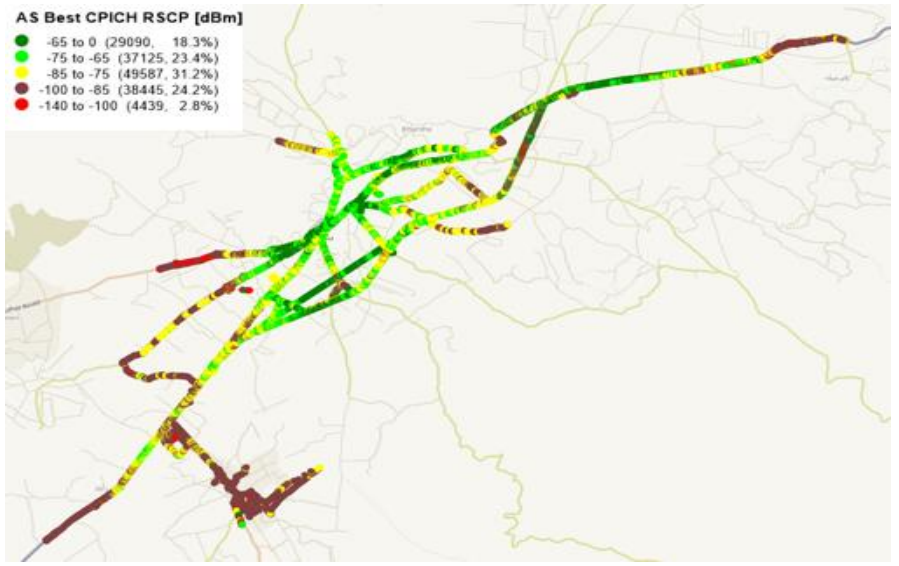

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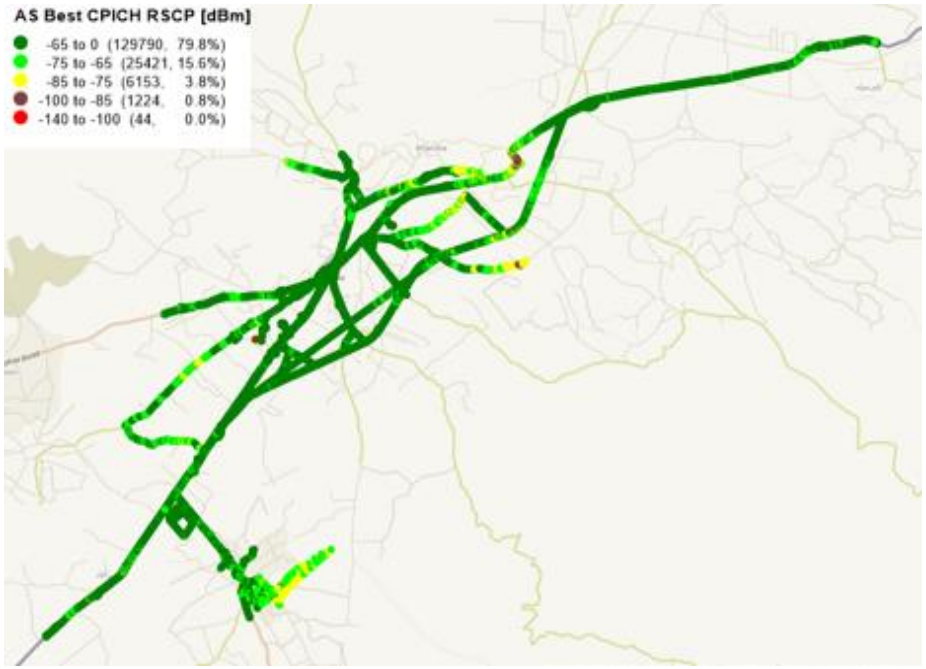

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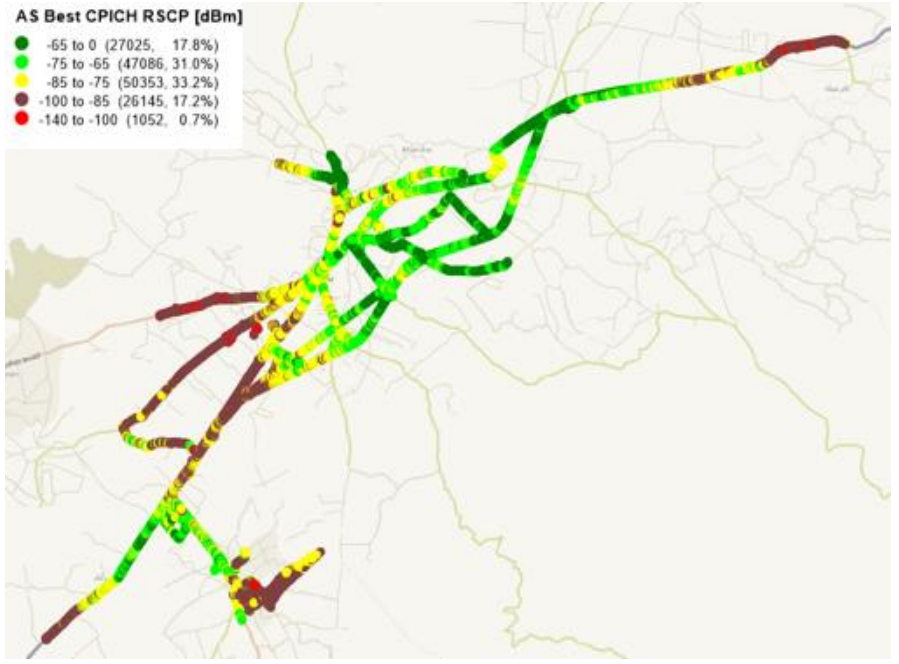
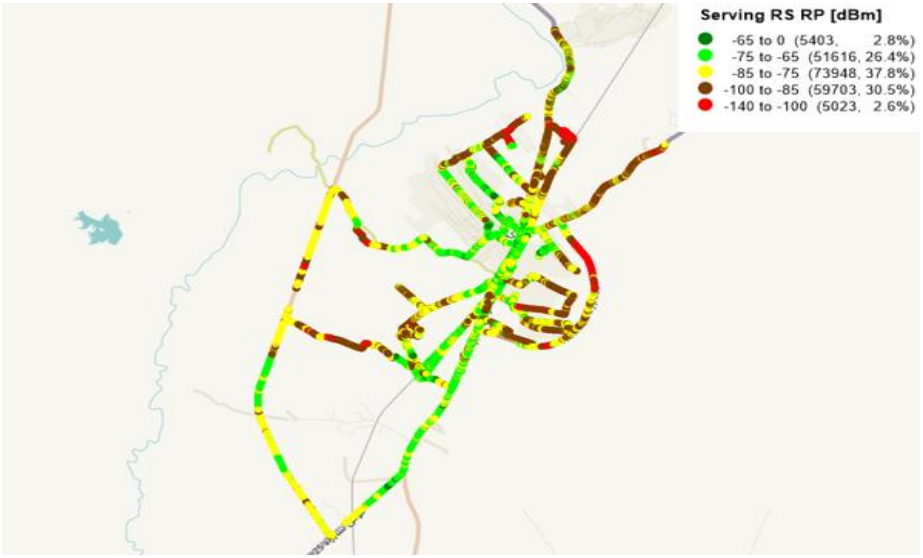


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – KUCHLAK



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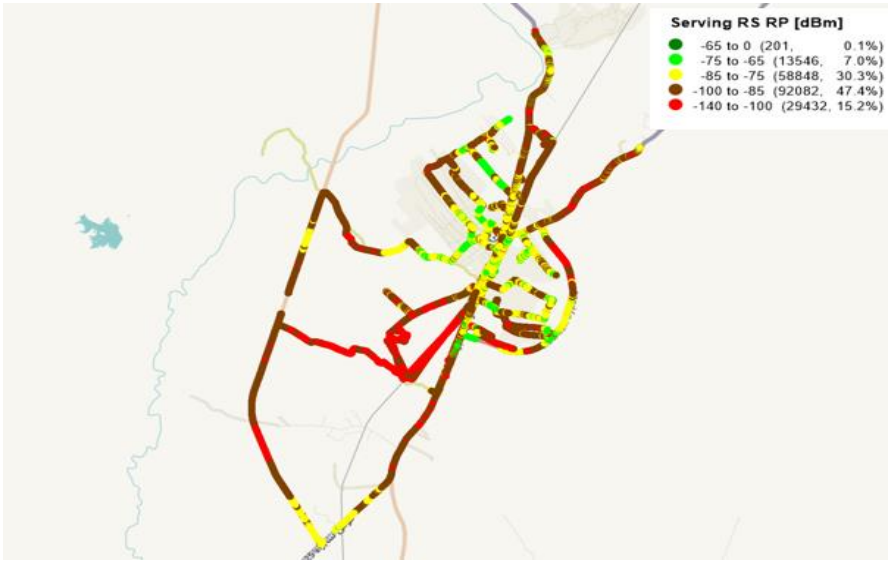

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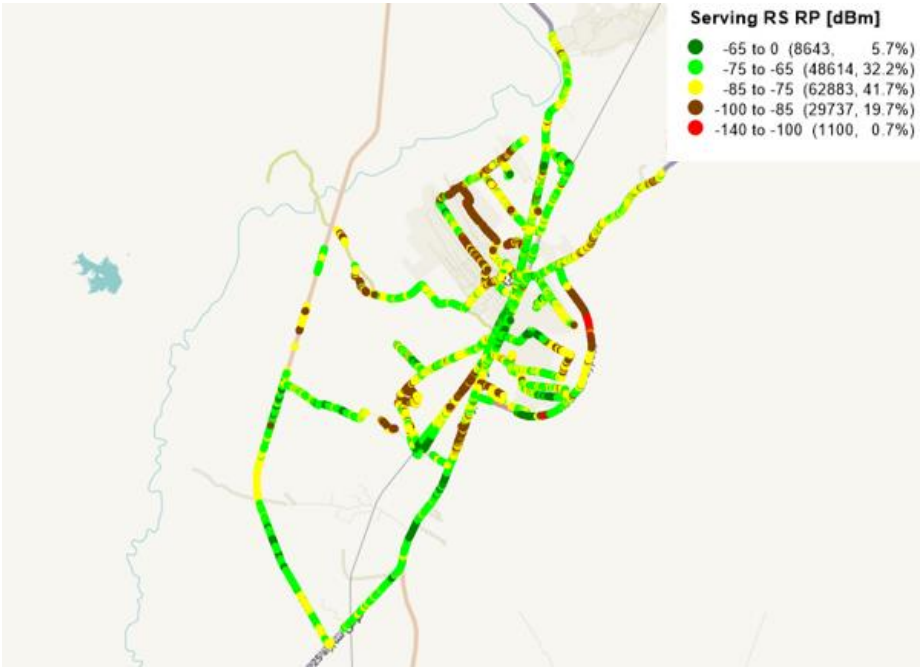

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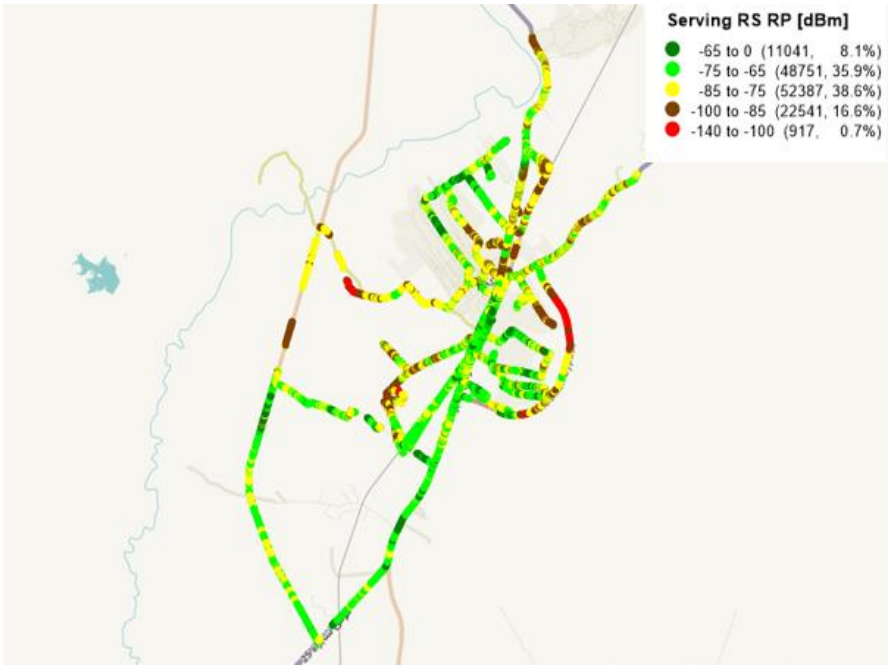
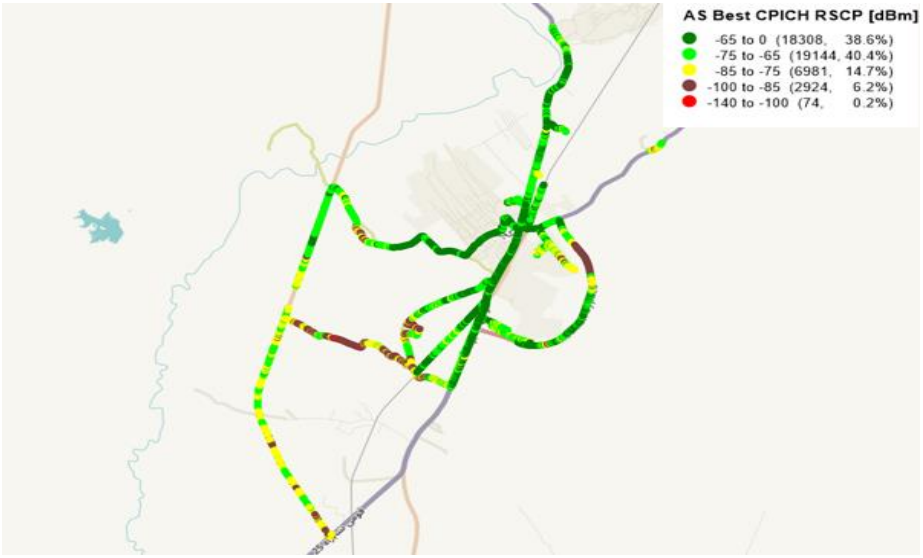


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ 3G AUTOMODE NETWORK COVERAGE – KUCHLAK



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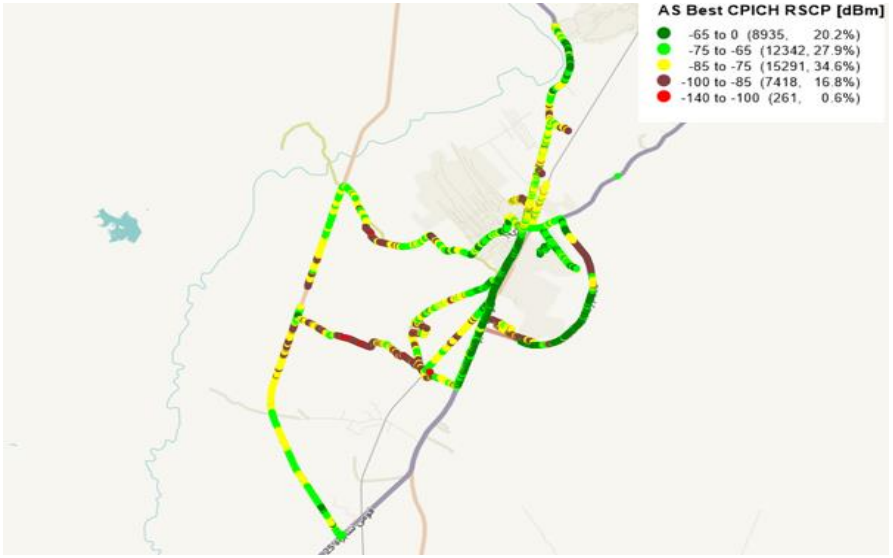

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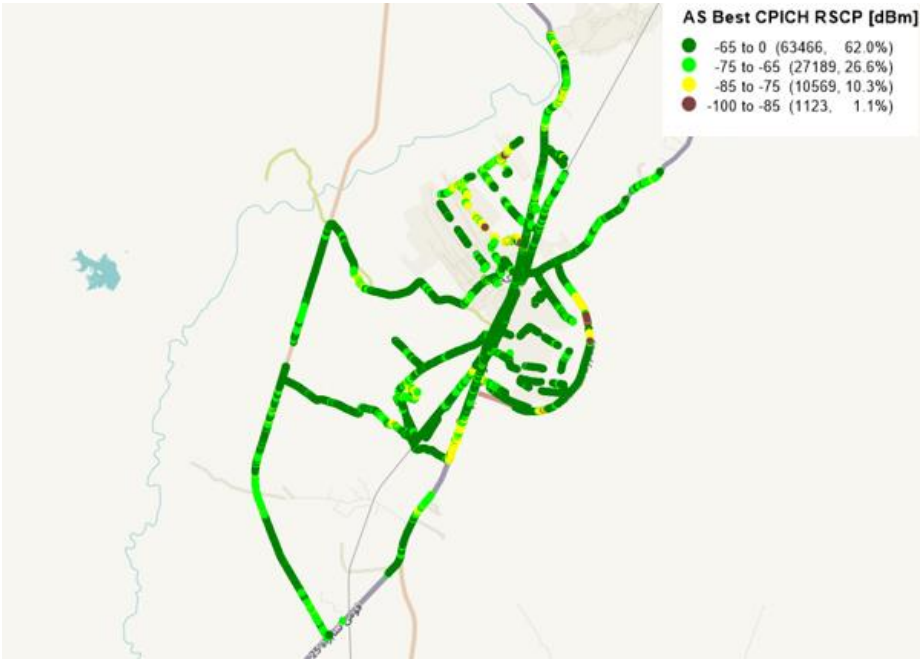

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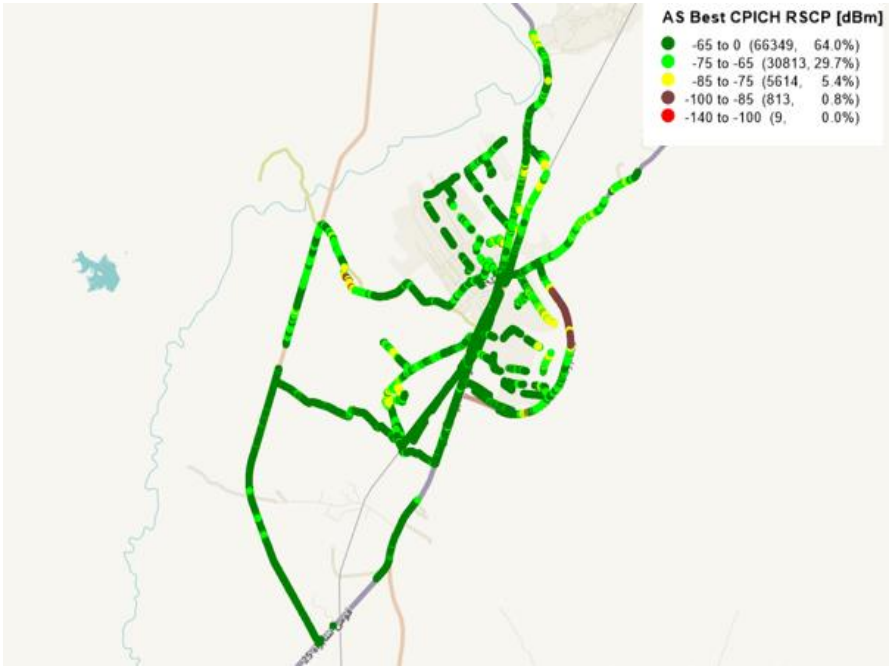
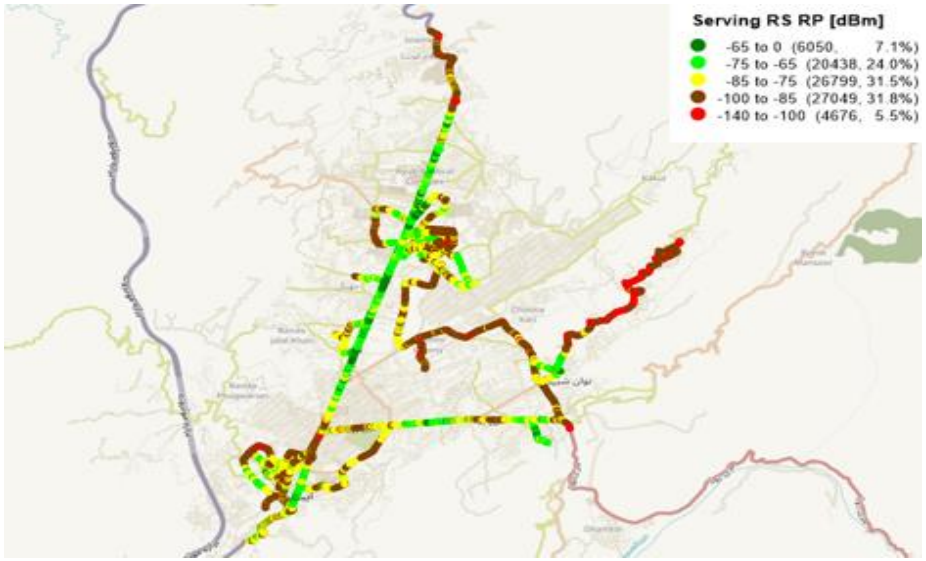


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – ABBOTTABAD



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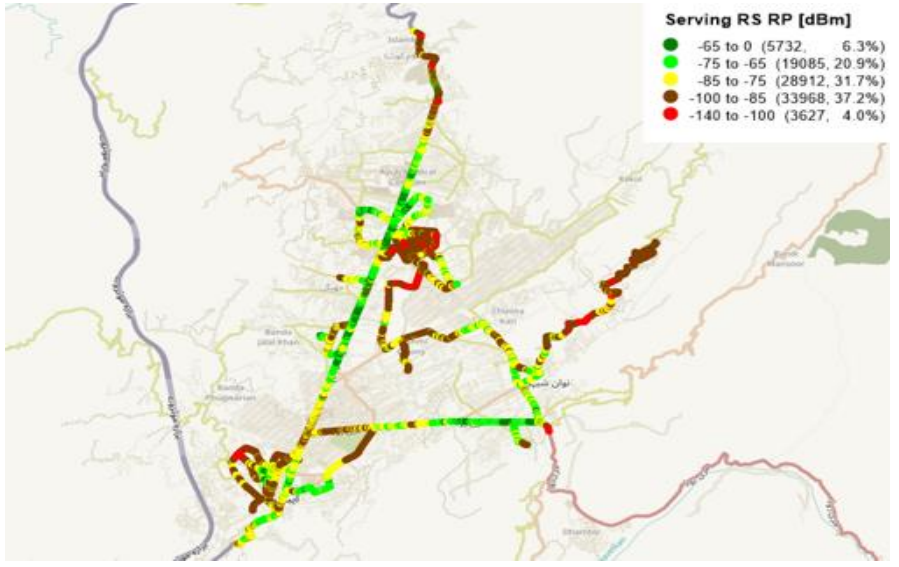
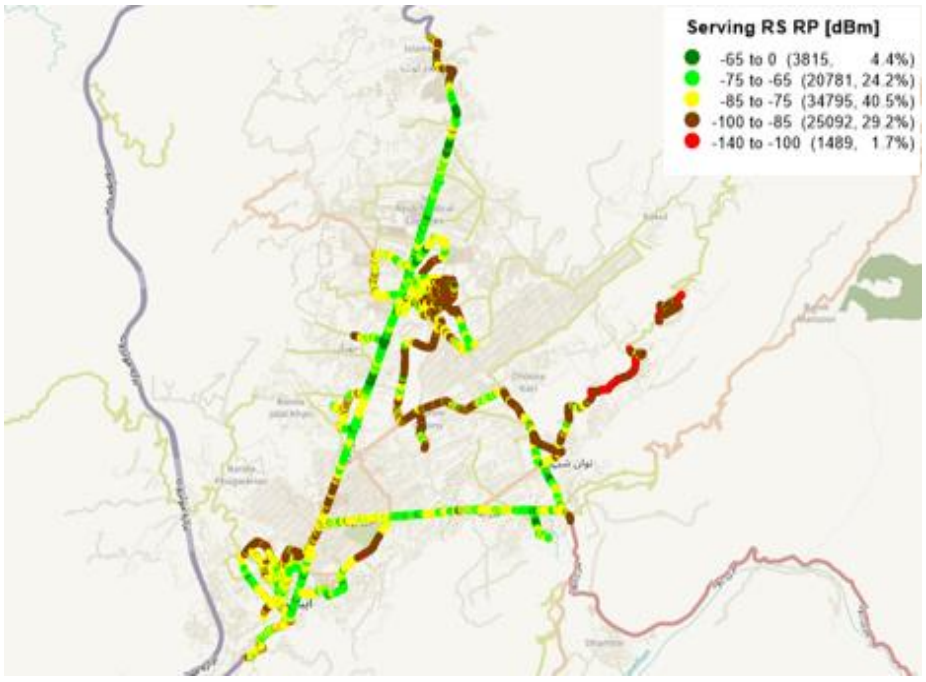
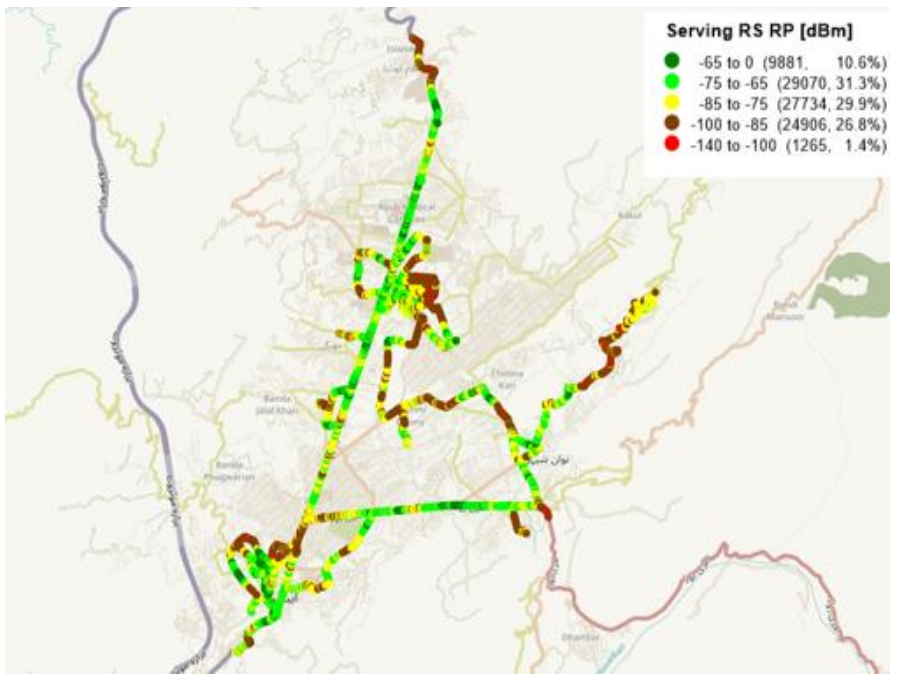


UFONE AUTOMODE NETWORK COVERAGE – ABBOTTABAD

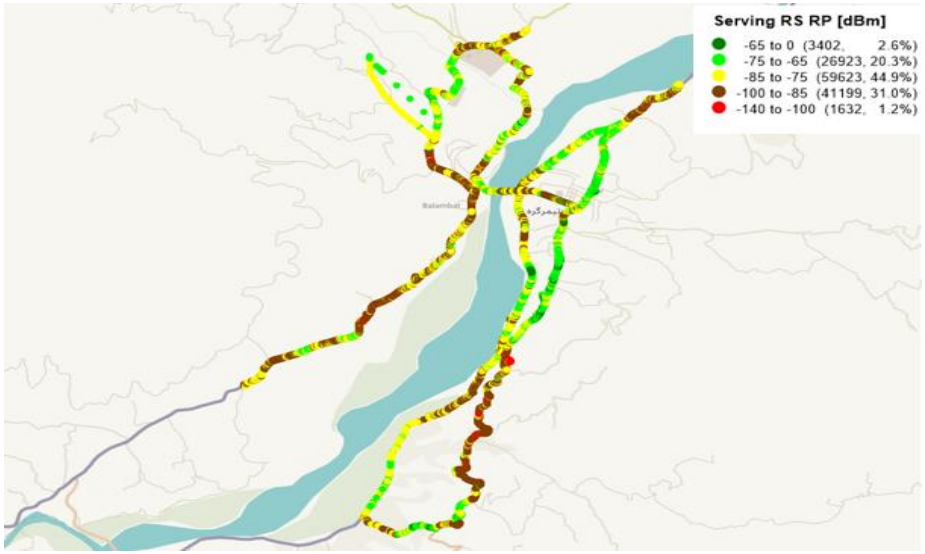


ZONG AUTOMODE NETWORK COVERAGE – ABBOTTABAD

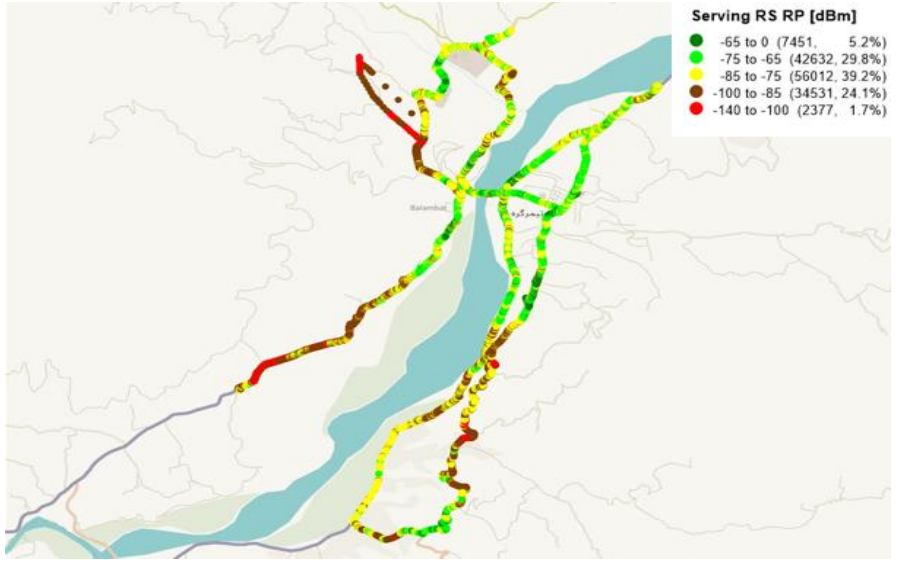


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

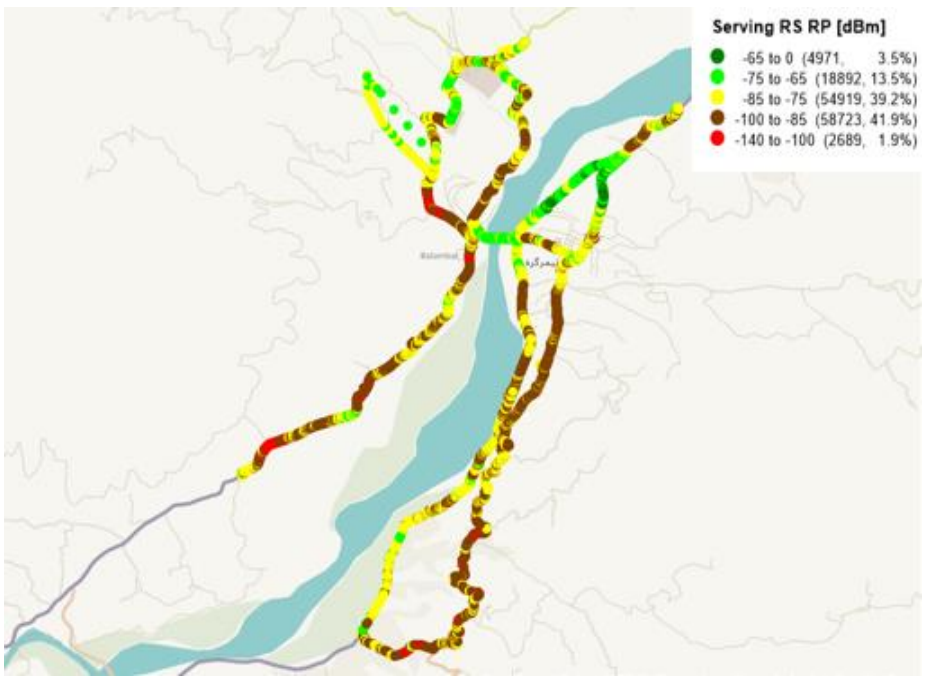
JAZZ AUTOMODE NETWORK COVERAGE – LOWER DIR



TELENOR AUTOMODE NETWORK COVERAGE – LOWER DIR



UFONE AUTOMODE NETWORK COVERAGE – LOWER DIR



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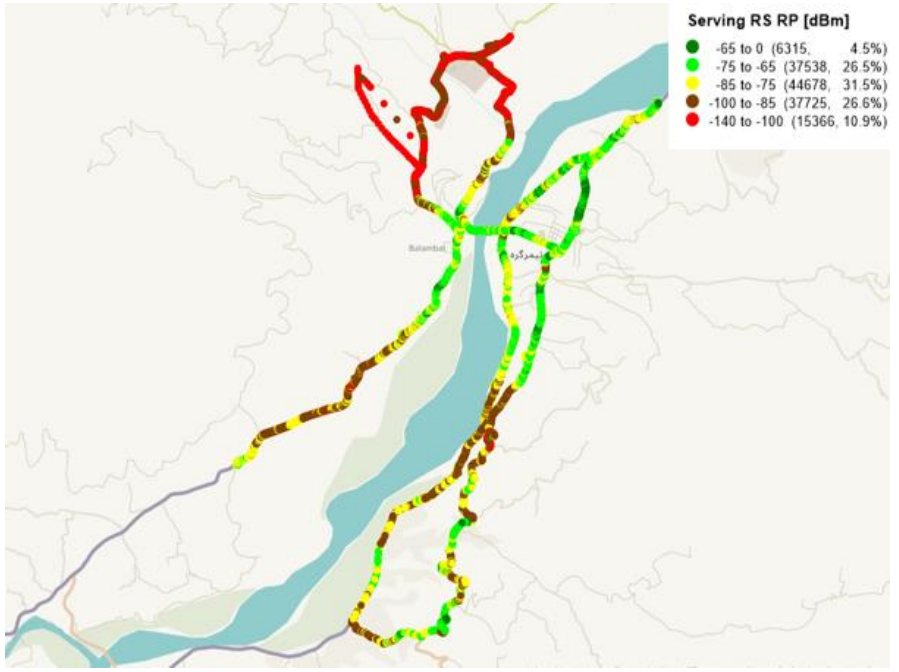
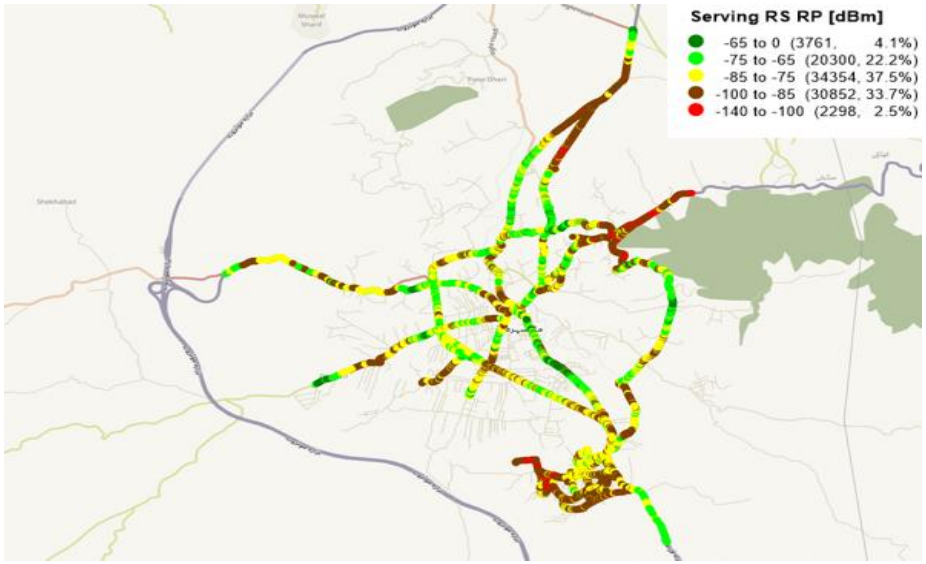
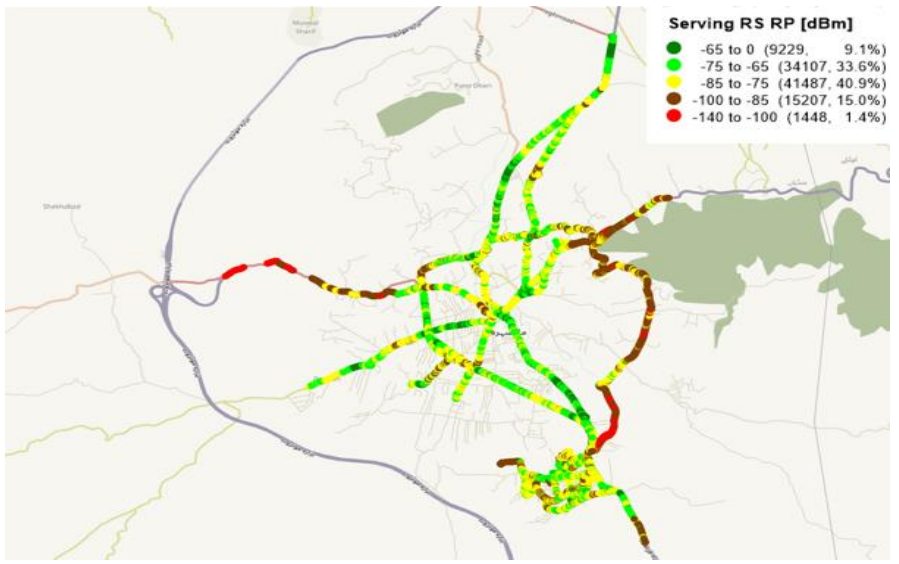


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – MANSEHRA



TELENOR AUTOMODE NETWORK COVERAGE – MANSEHRA



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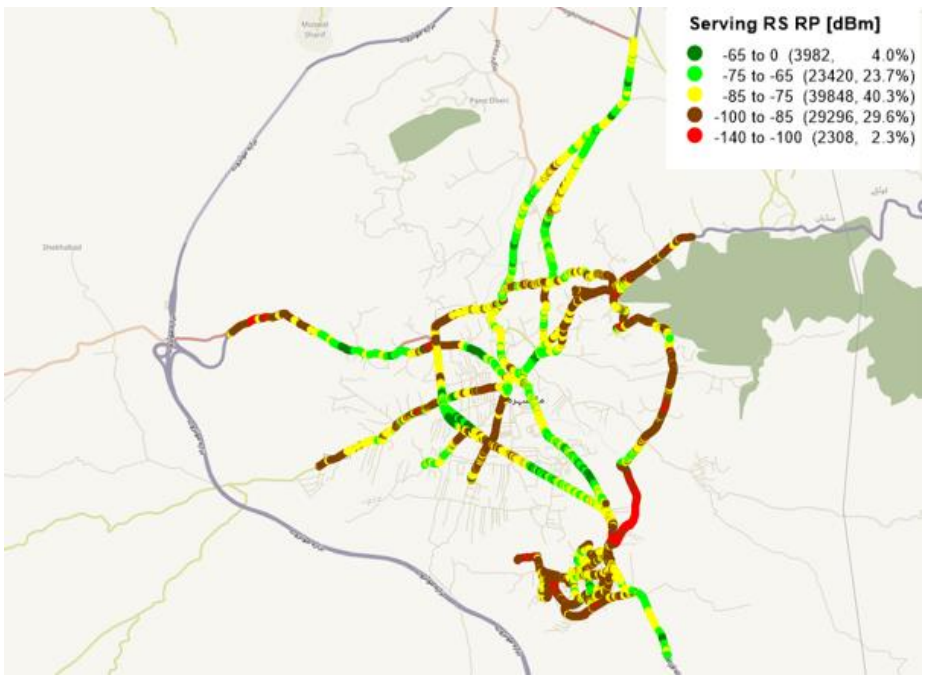

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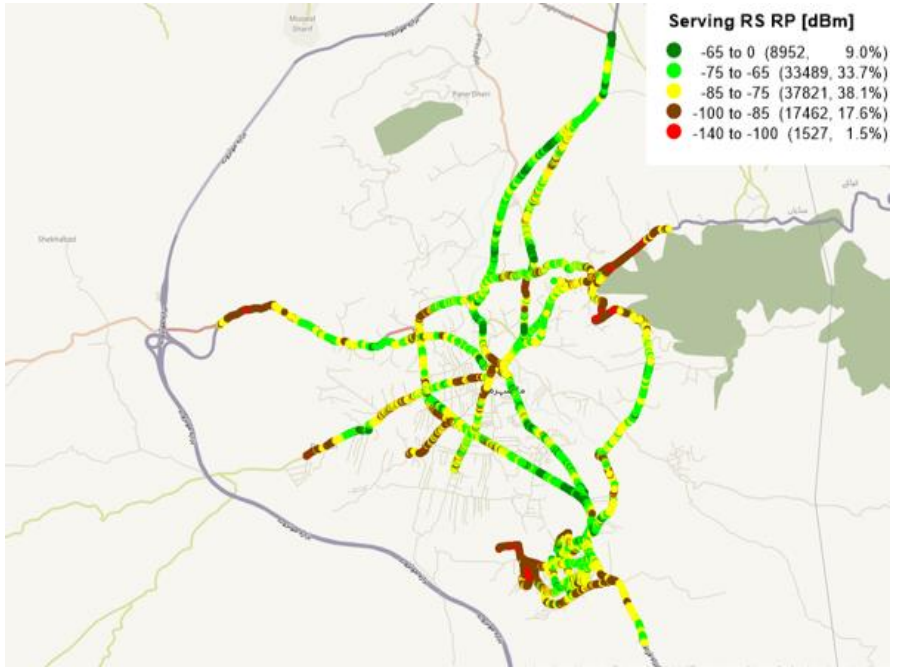
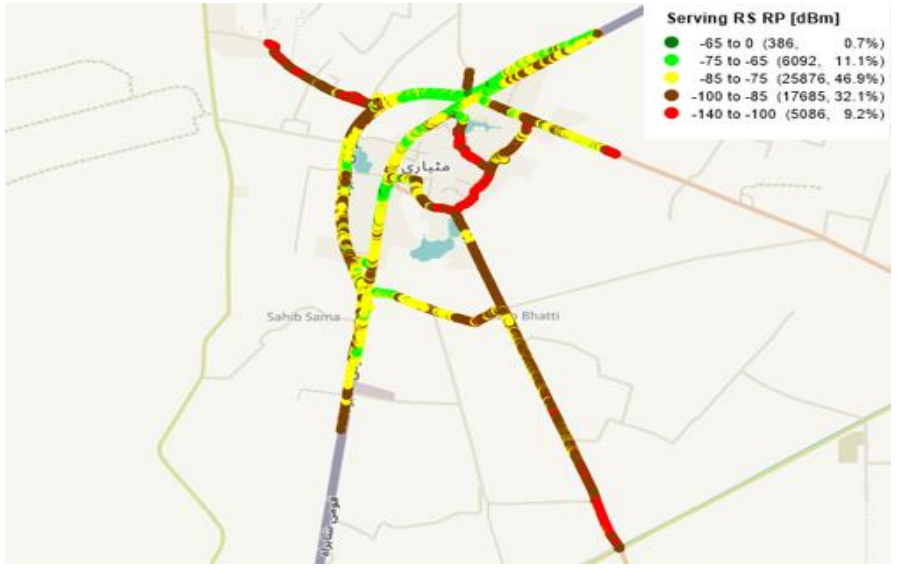


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

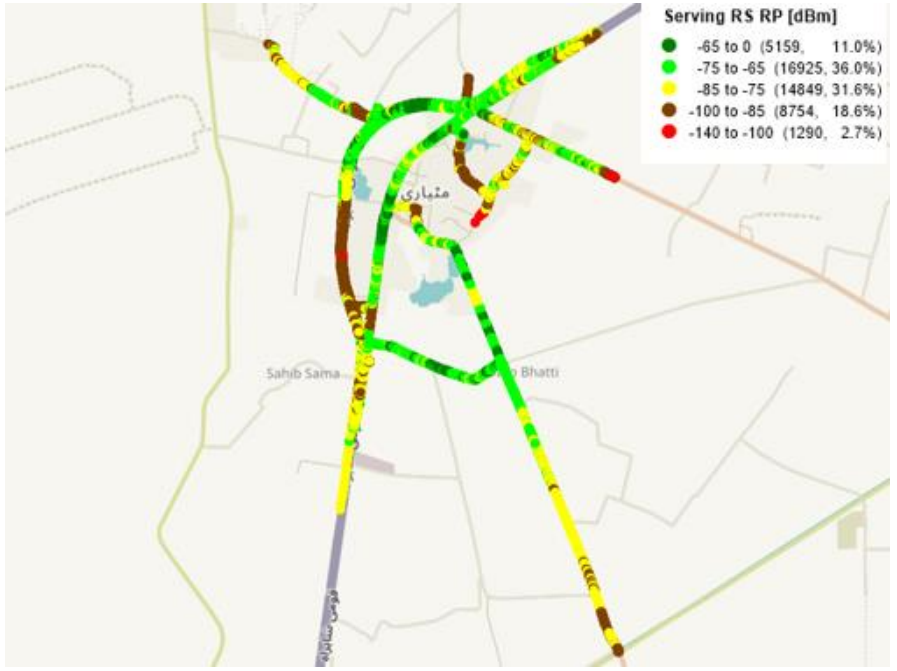
JAZZ AUTOMODE NETWORK COVERAGE – MATIARI

TELENOR AUTOMODE NETWORK COVERAGE – MATIARI



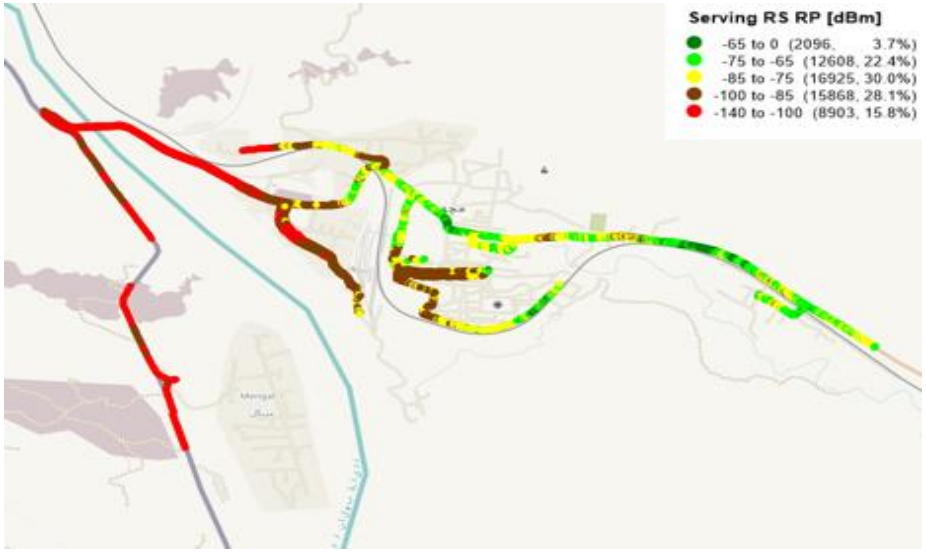
UFONE AUTOMODE NETWORK COVERAGE – MATIARI

ZONG AUTOMODE NETWORK COVERAGE – MATIARI

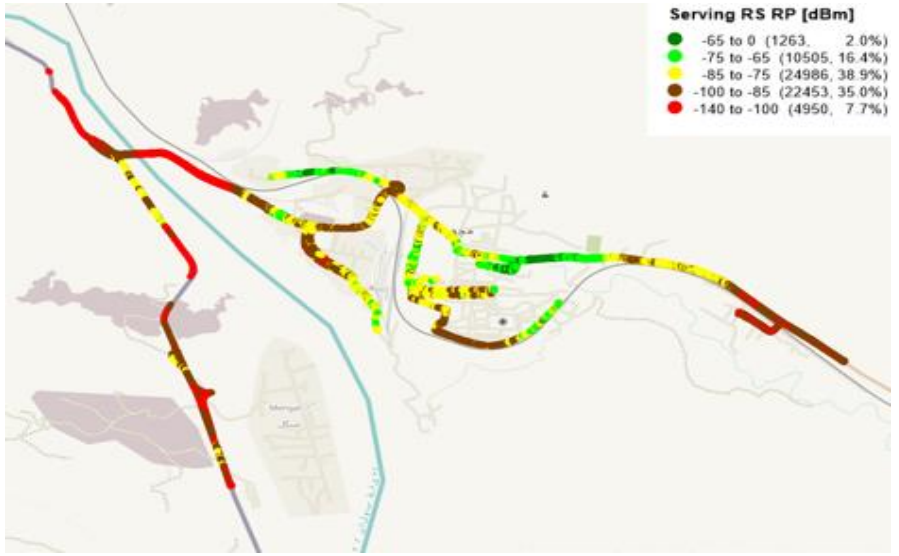


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

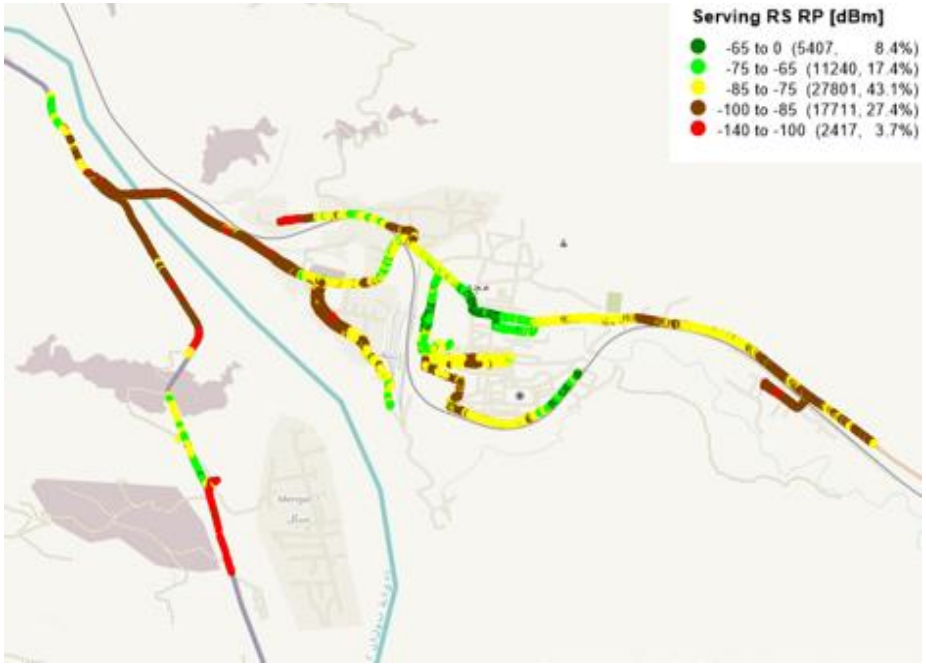
JAZZ AUTOMODE NETWORK COVERAGE – MACH



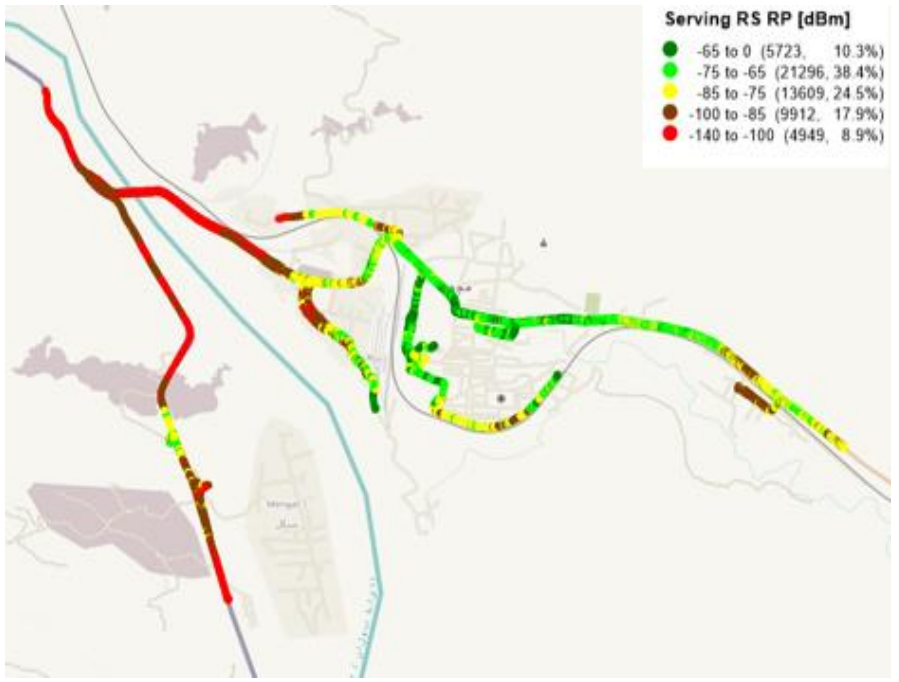
TELENOR AUTOMODE NETWORK COVERAGE – MACH



UFONE AUTOMODE NETWORK COVERAGE – MACH

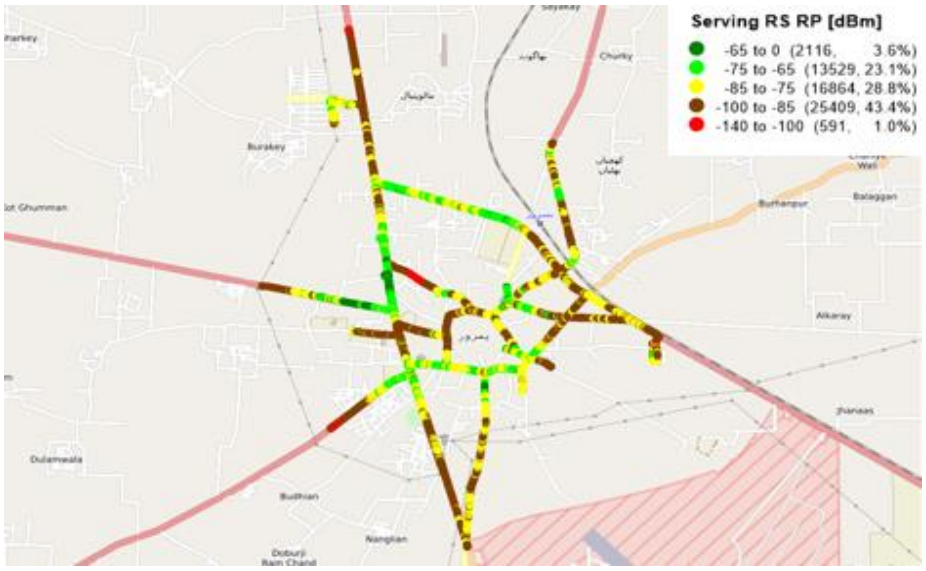


ZONG AUTOMODE NETWORK COVERAGE – MACH



AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – PASROOR



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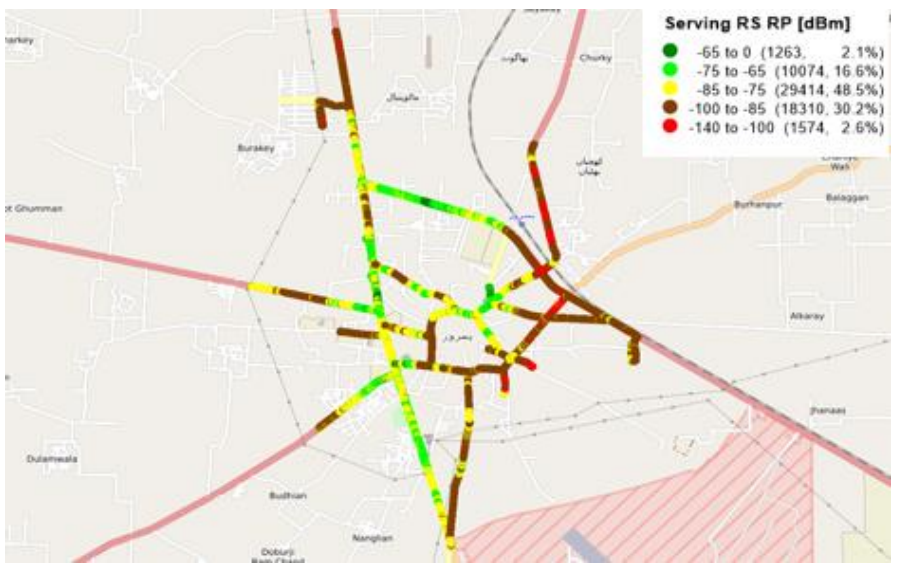

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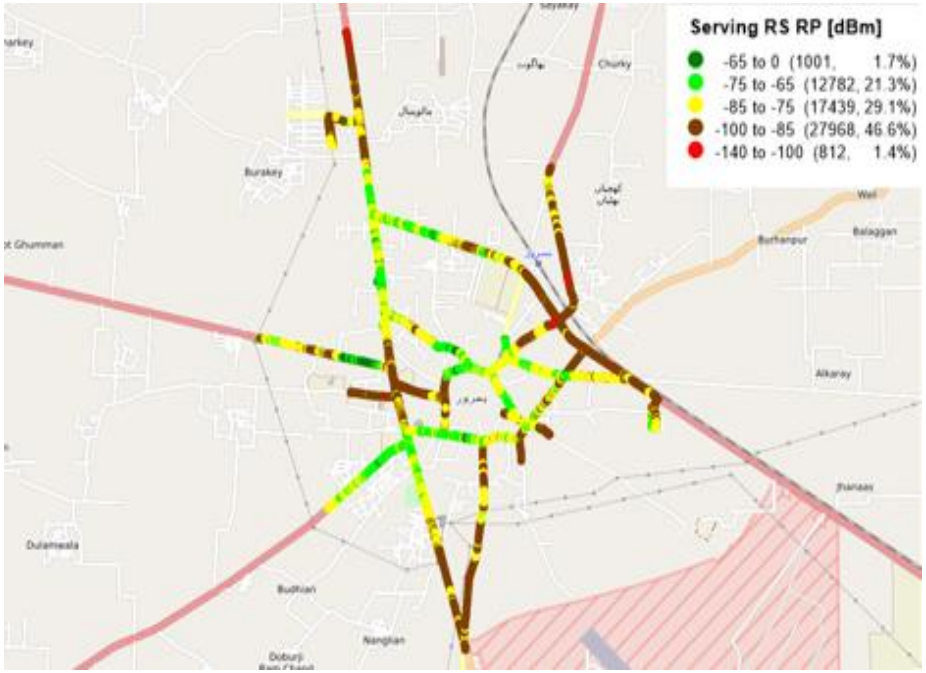
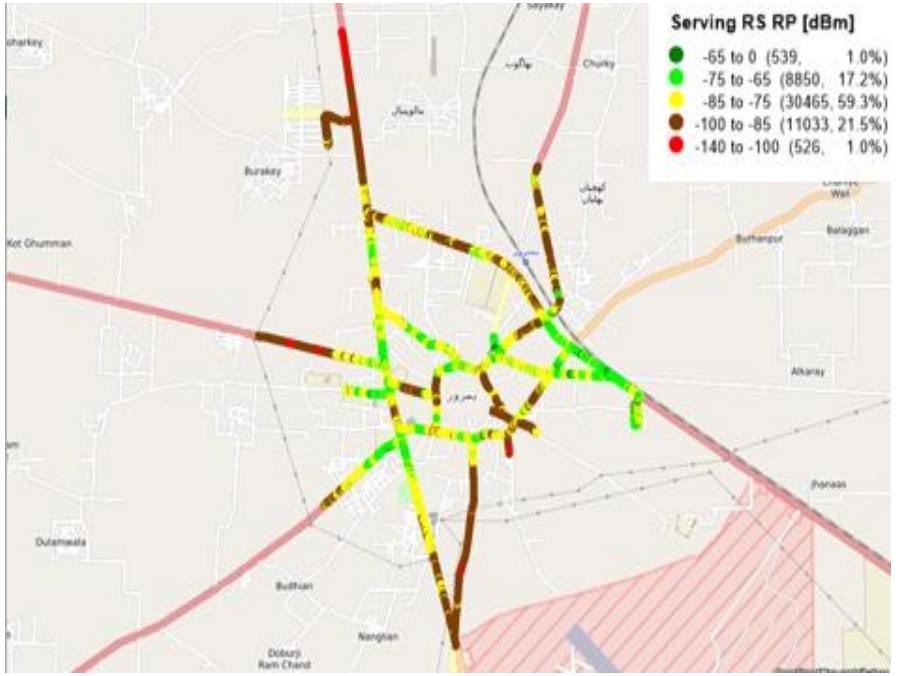
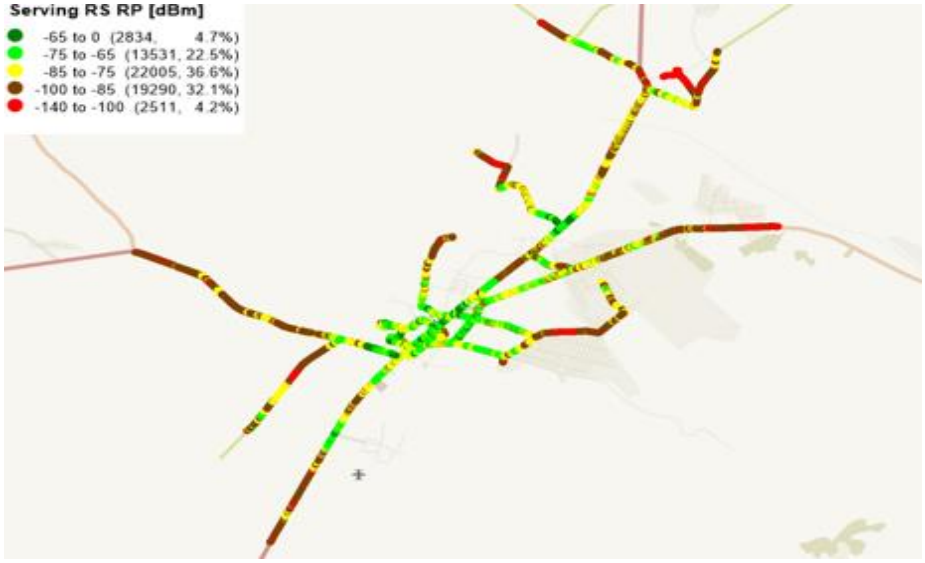


ZONG AUTOMODE NETWORK COVERAGE – PASROOR



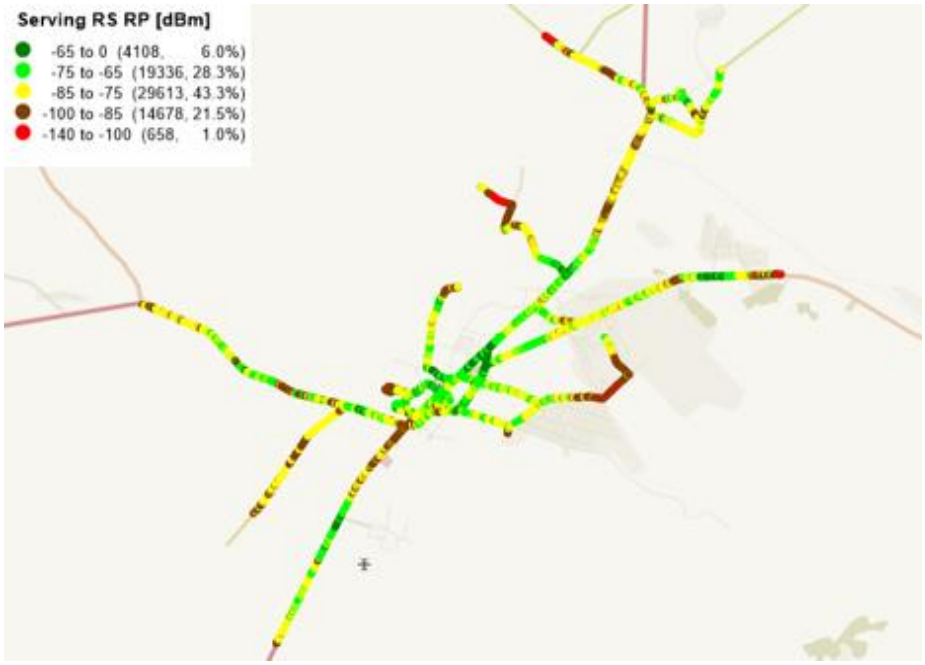
AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – PISHIN

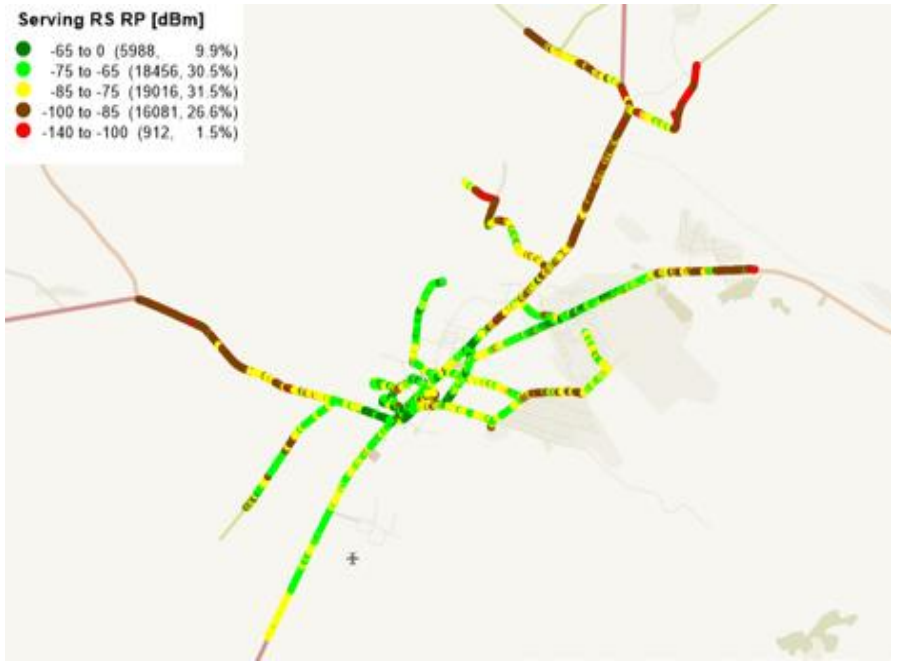


TELENOR AUTOMODE NETWORK COVERAGE – PISHIN

UFONE AUTOMODE NETWORK COVERAGE – PISHIN

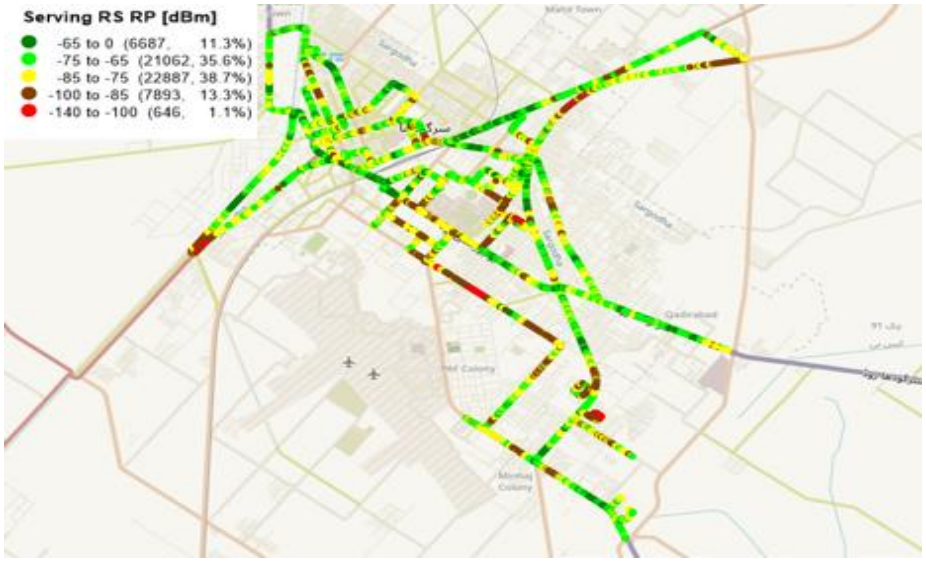


ZONG AUTOMODE NETWORK COVERAGE – PISHIN



AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – SARGODHA



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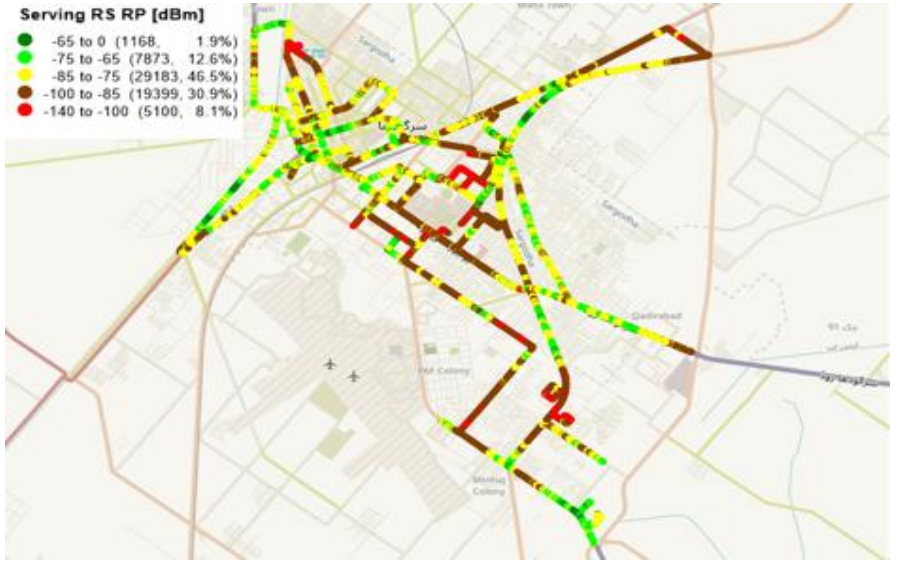

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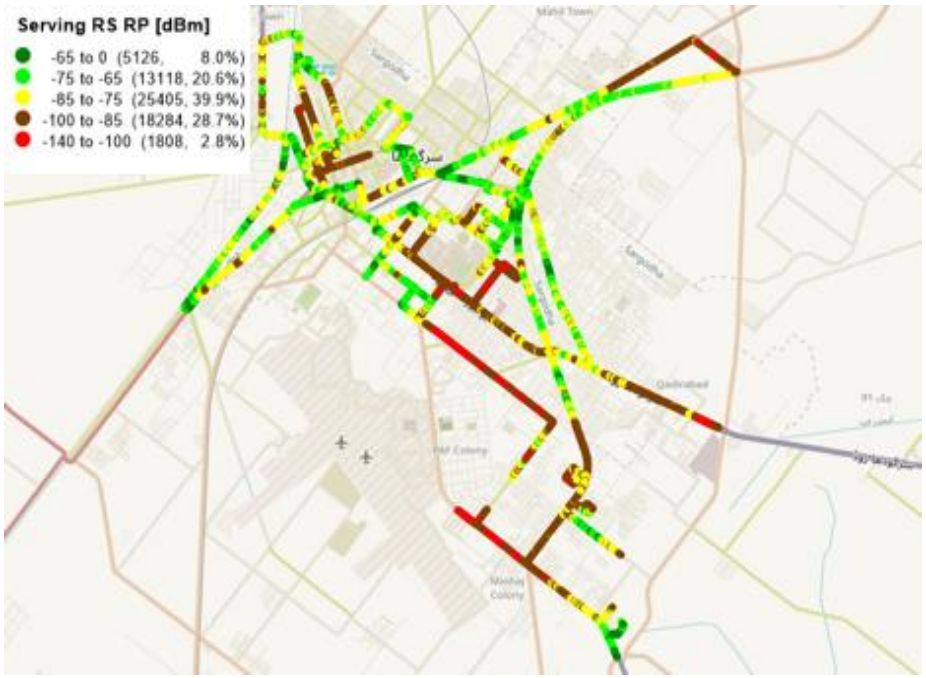

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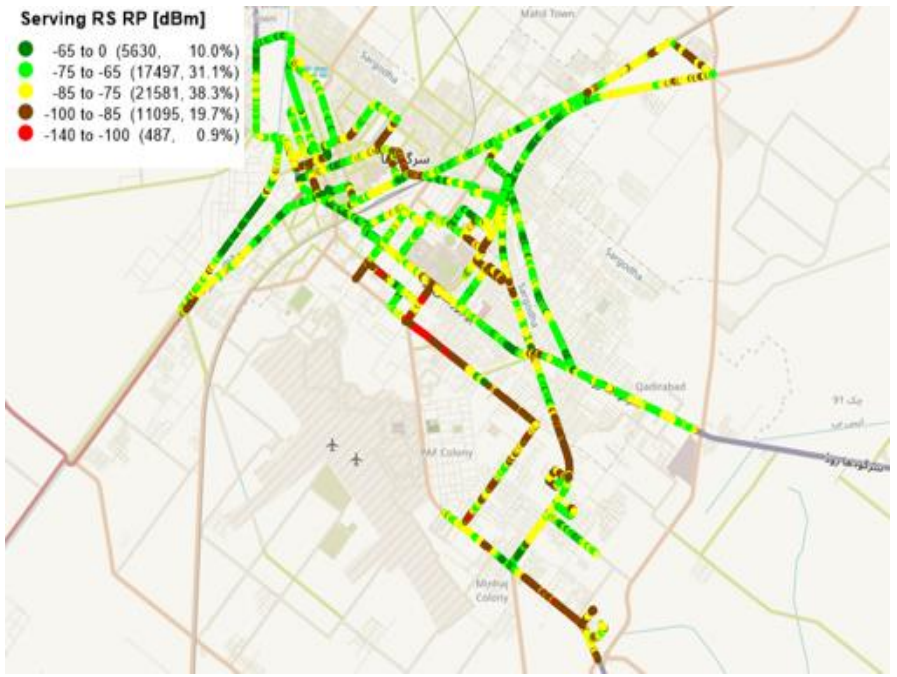
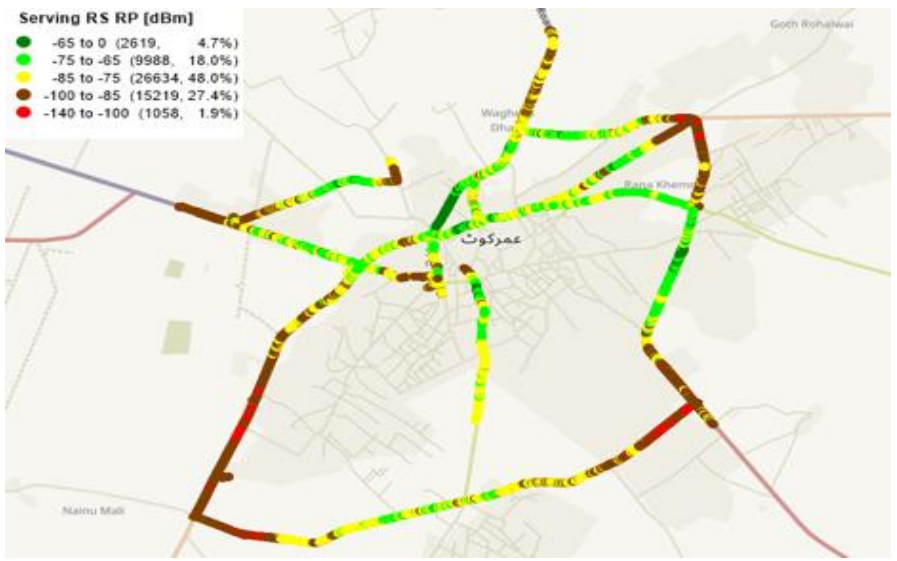


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ AUTOMODE NETWORK COVERAGE – UMER KOT

TELENOR AUTOMODE NETWORK COVERAGE – UMER KOT



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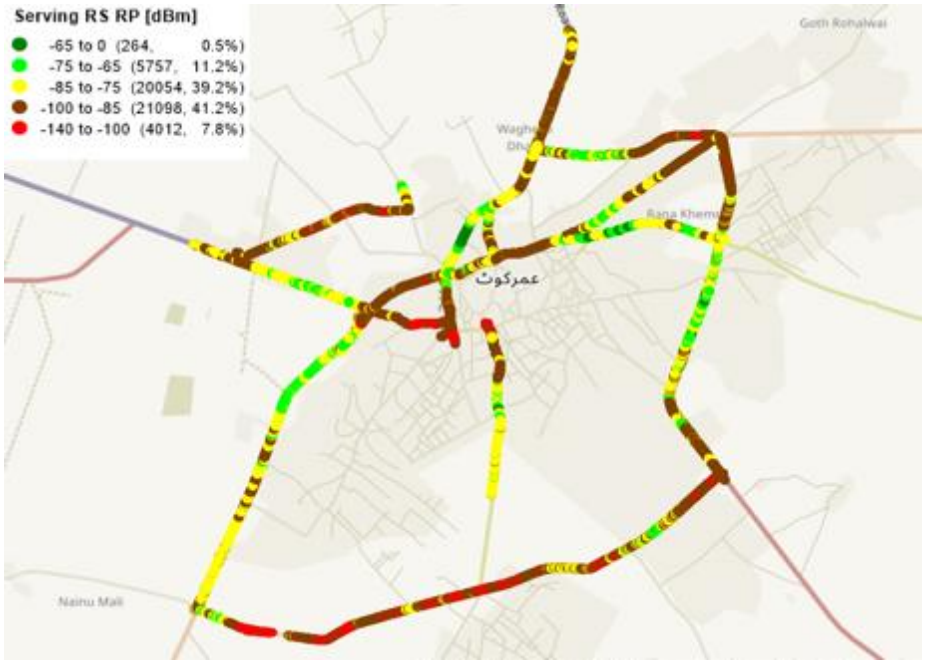

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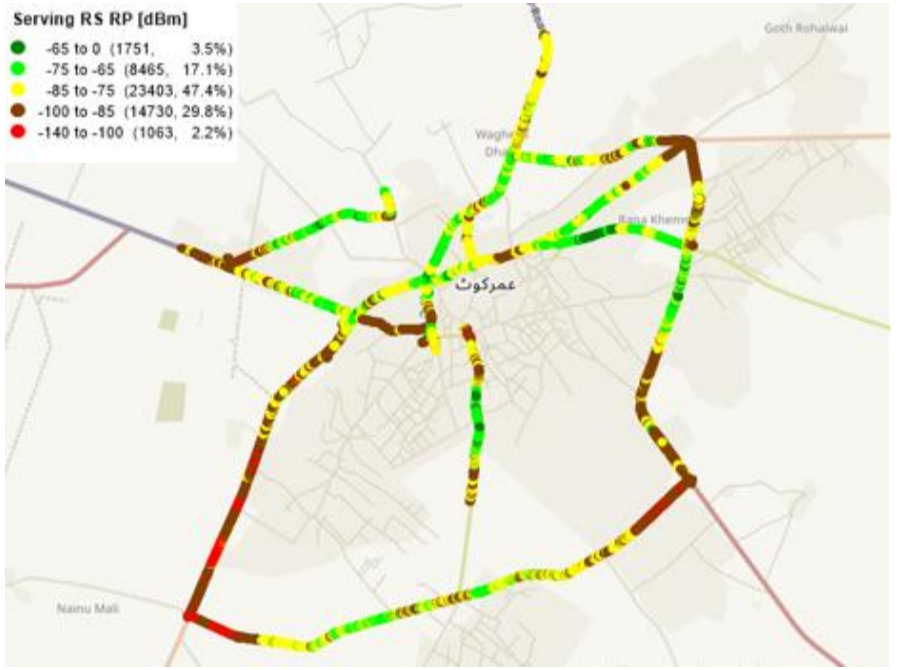
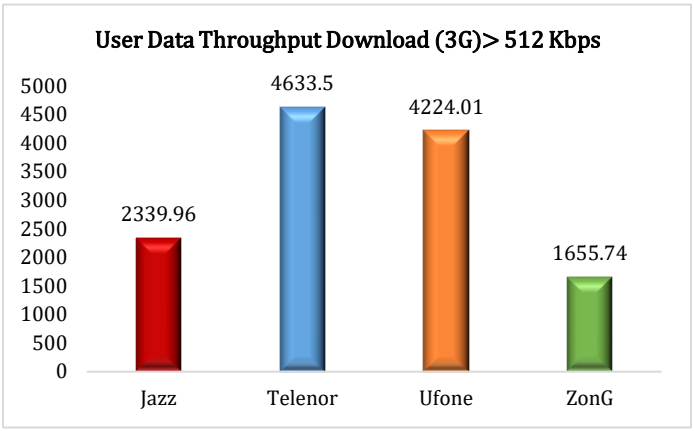
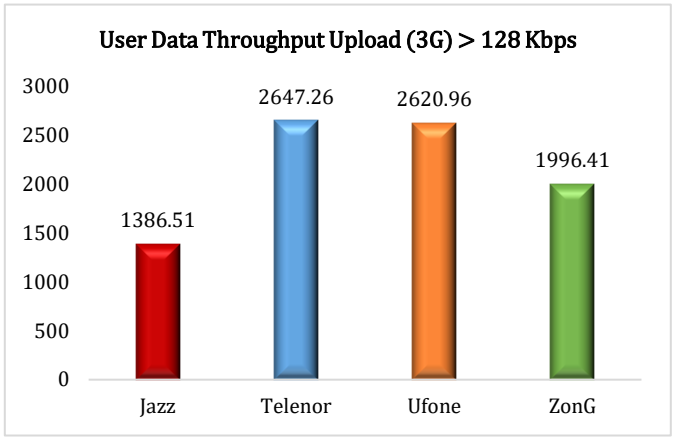


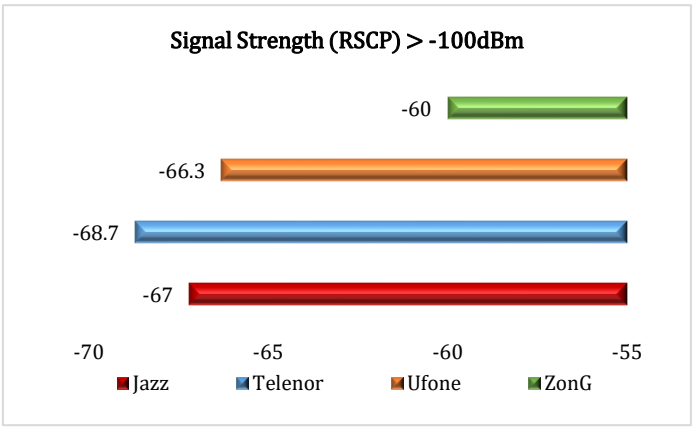
Annex -B(Data QoS Results)

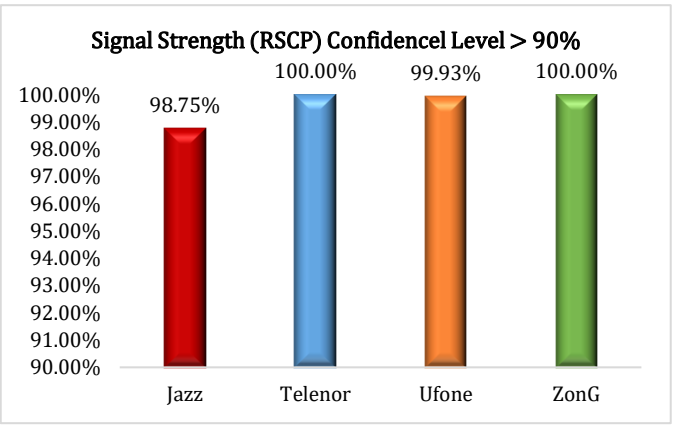
3G LOCK MODE

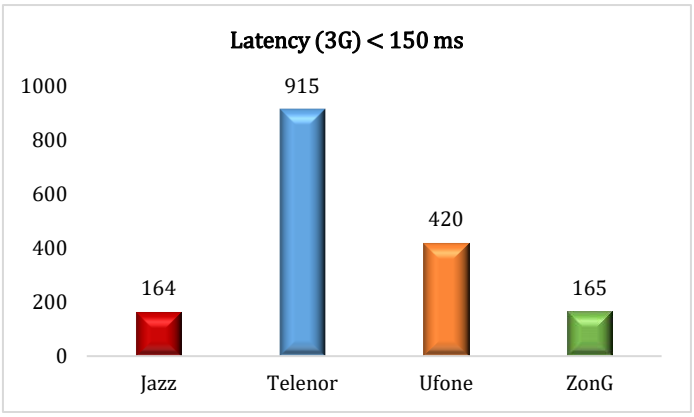
QUALITY OF SERVICE SURVEY RESULTS (3G) –SUKKUR



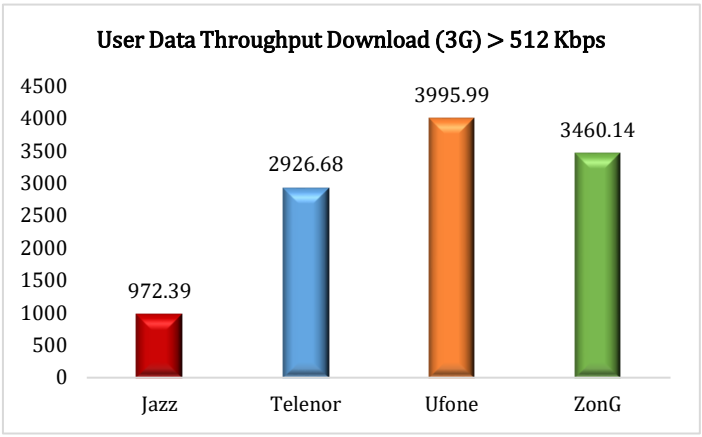


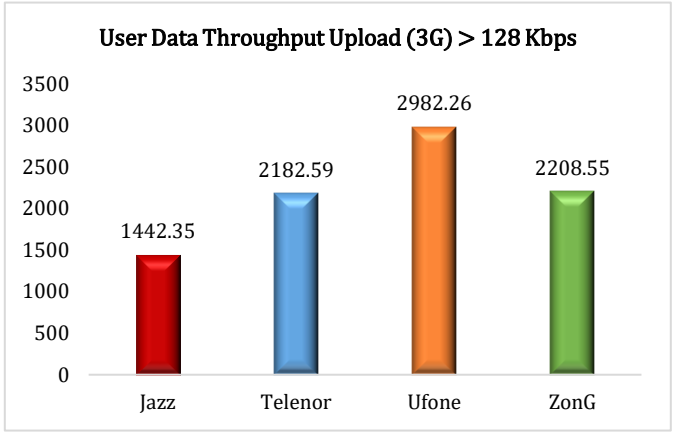


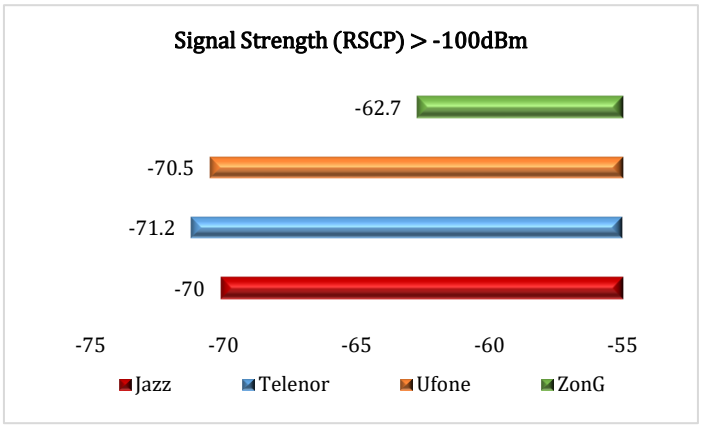


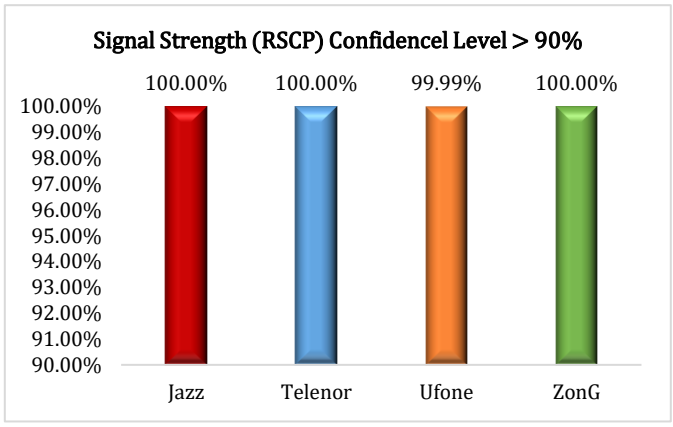


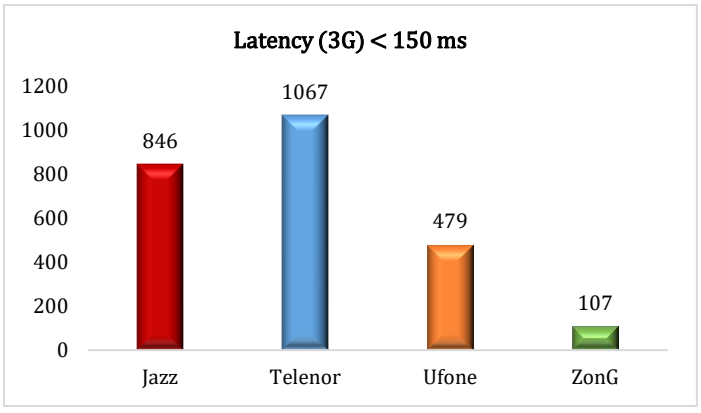
QUALITY OF SERVICE SURVEY RESULTS (3G) –BAHAWALPUR



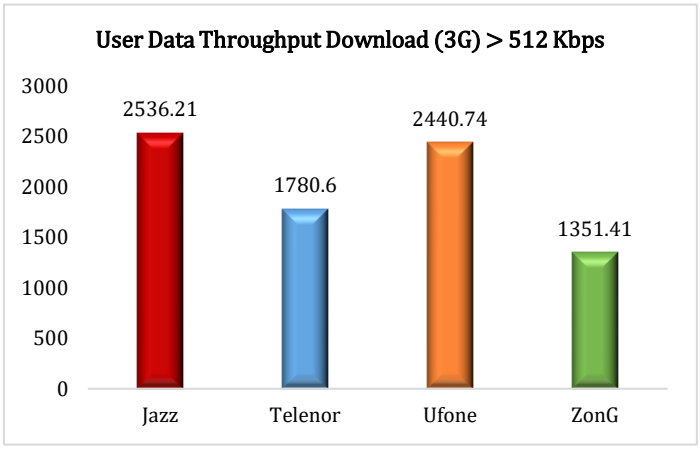


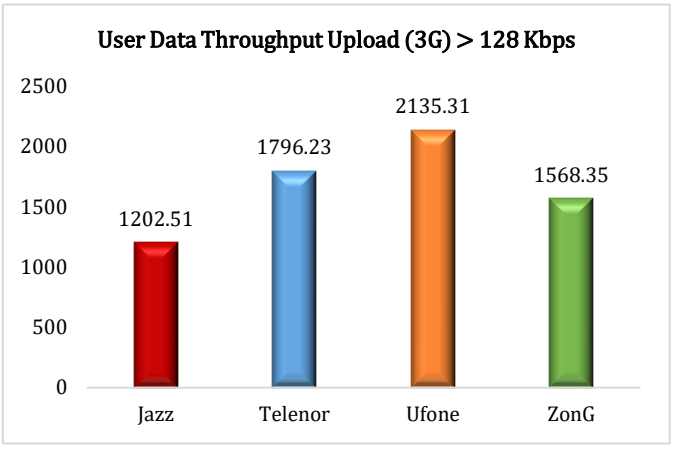


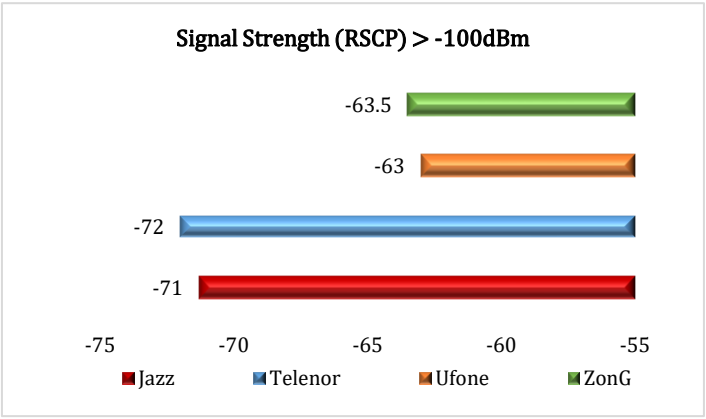


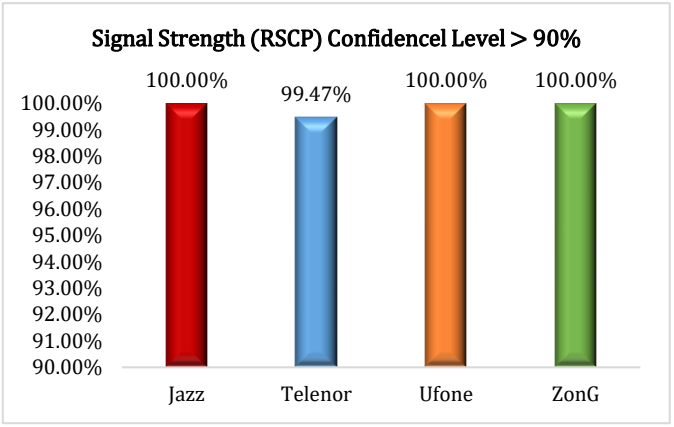


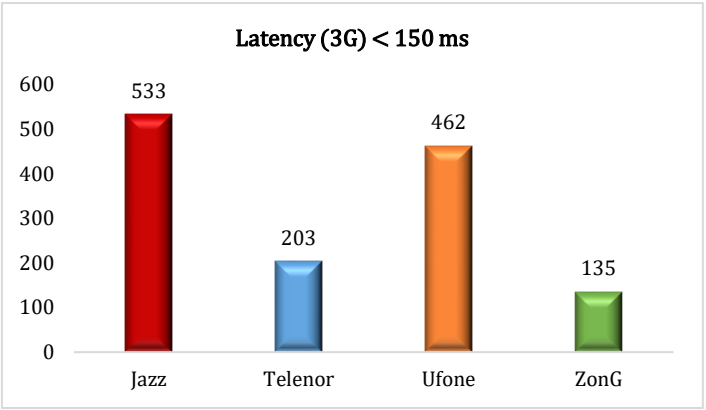
QUALITY OF SERVICE SURVEY RESULTS (3G) – CHARSADDA



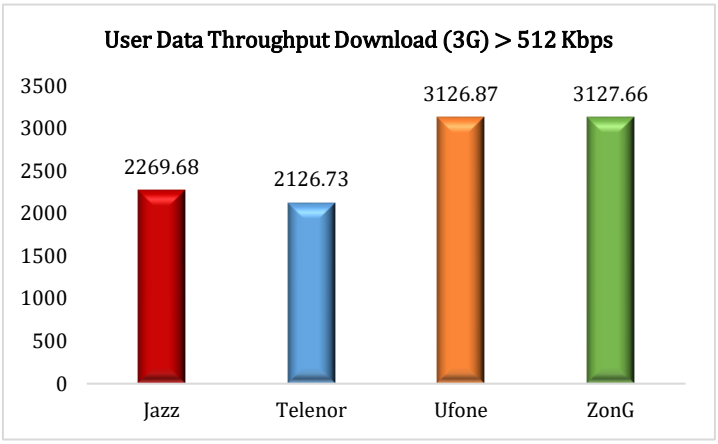


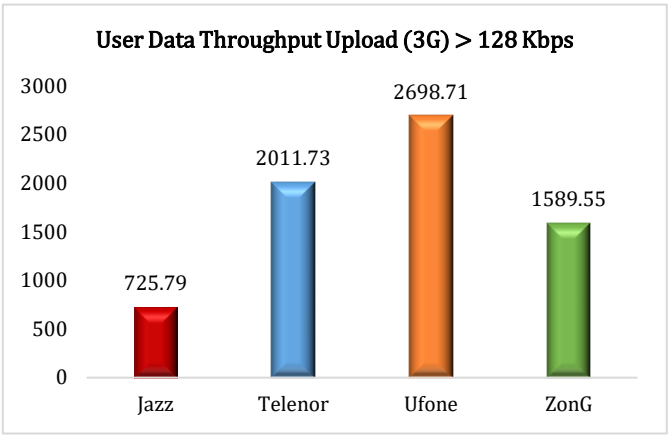


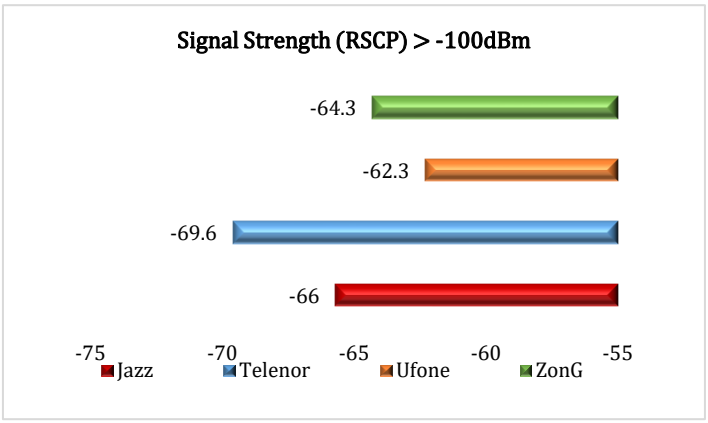


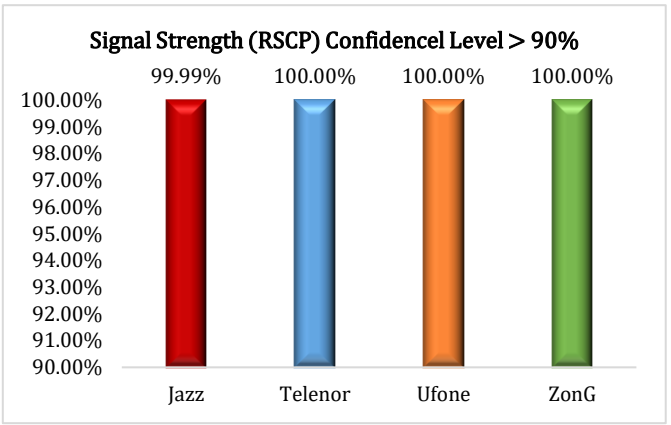


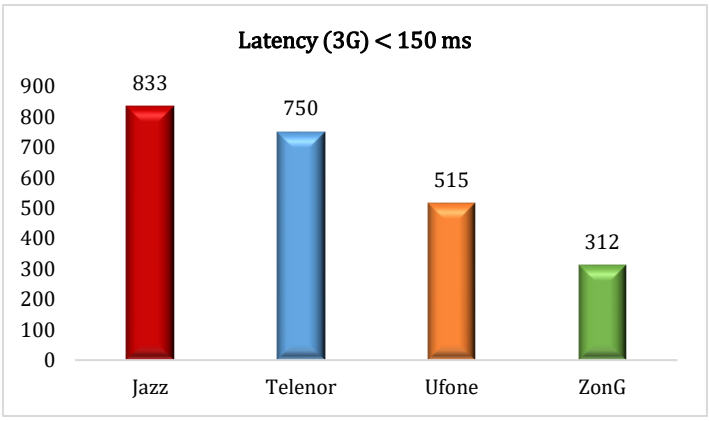
QUALITY OF SERVICE SURVEY RESULTS (3G) – GWADAR



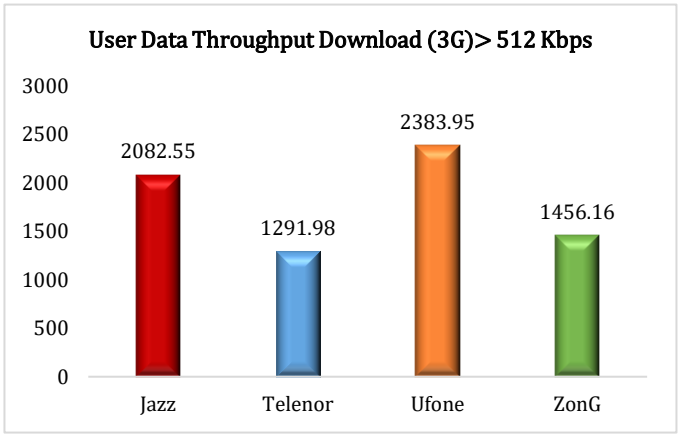


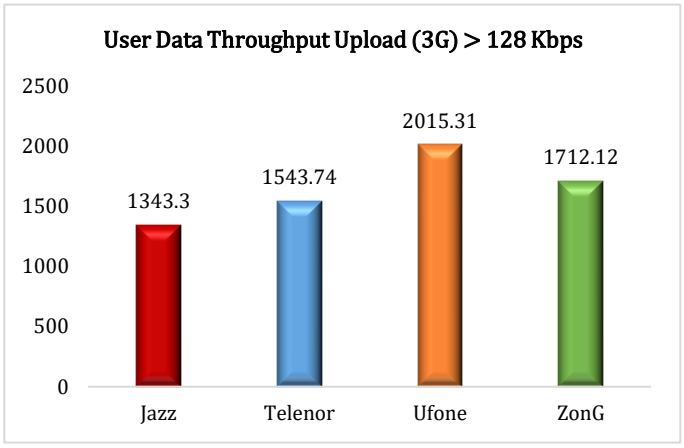


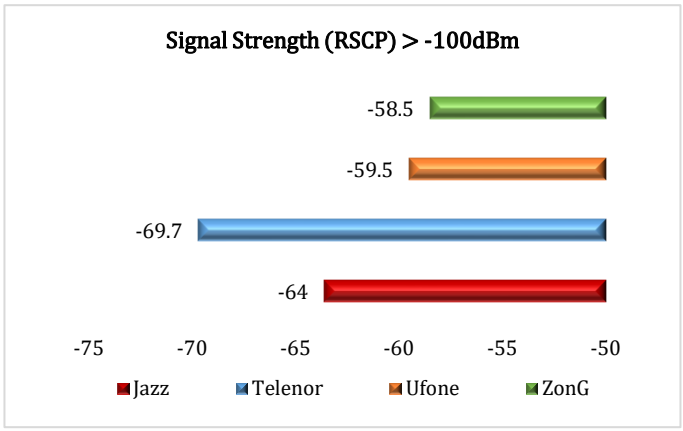


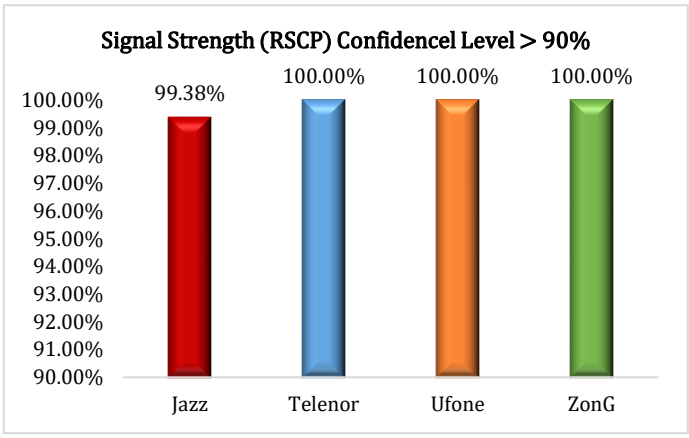


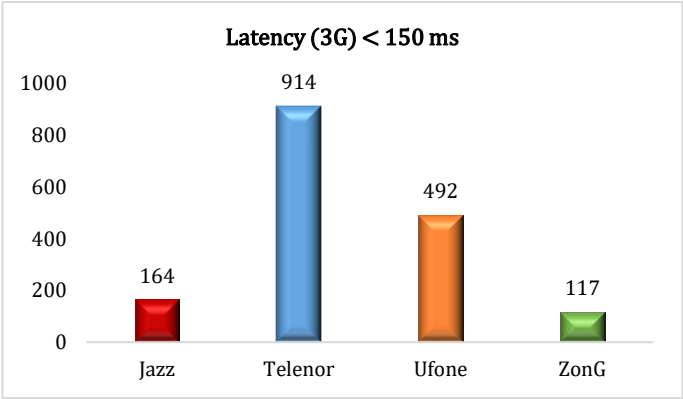
QUALITY OF SERVICE SURVEY RESULTS (3G) –QUETTA



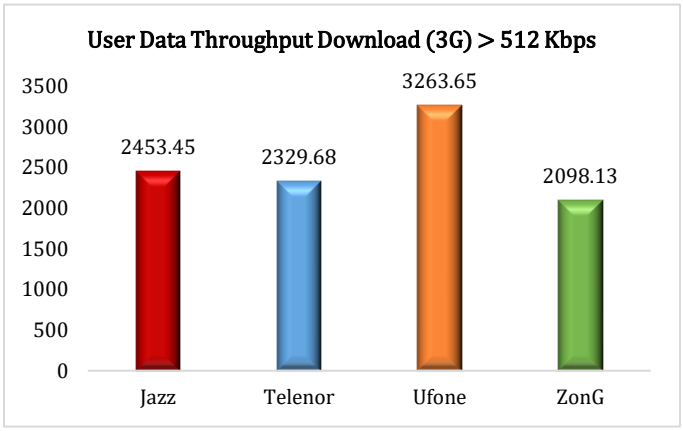


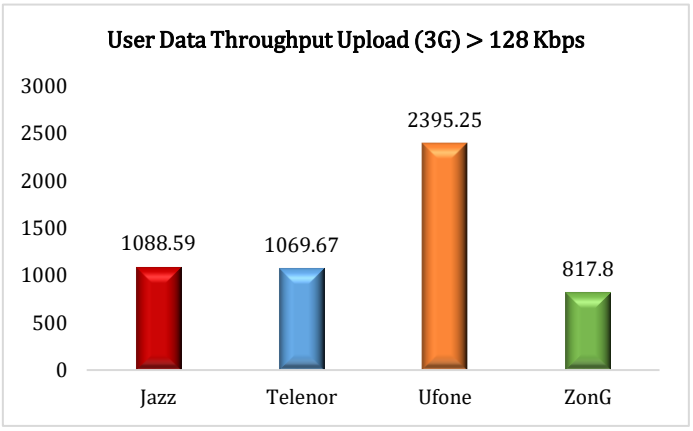


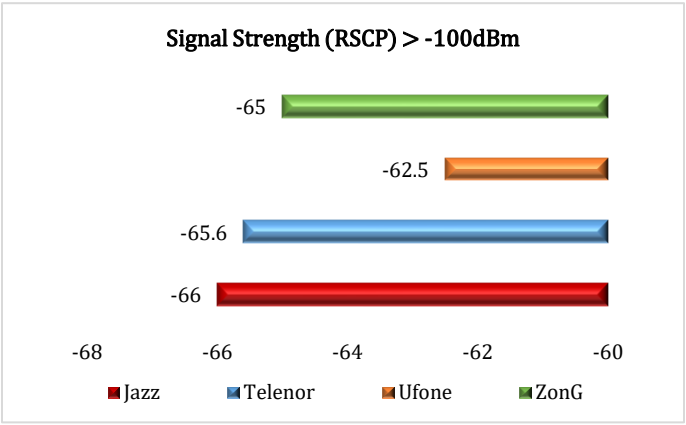


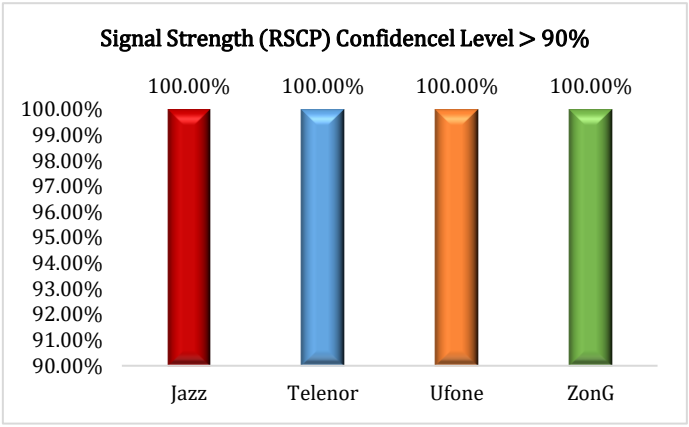


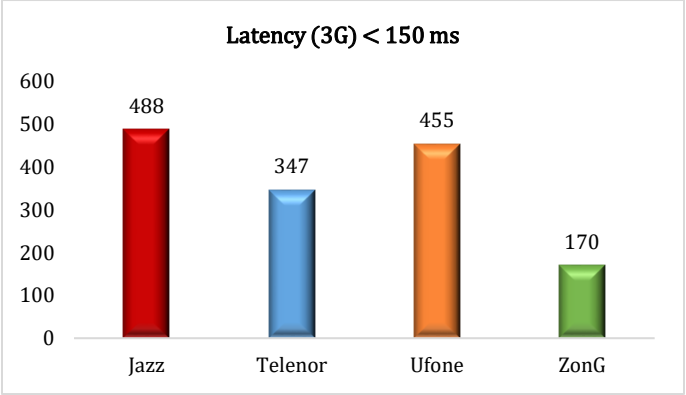
QUALITY OF SERVICE SURVEY RESULTS (3G) –ISLAMABAD



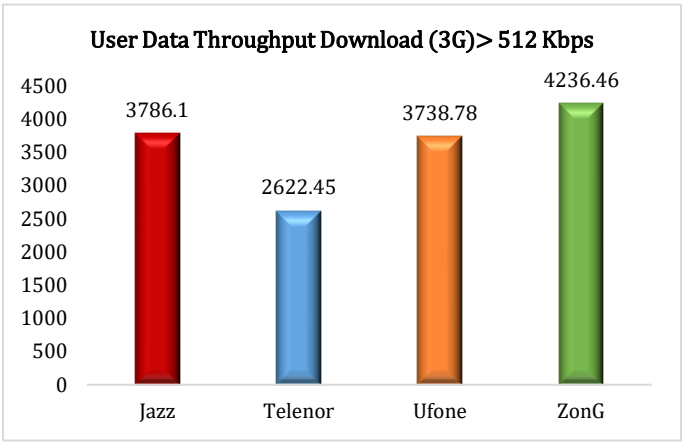


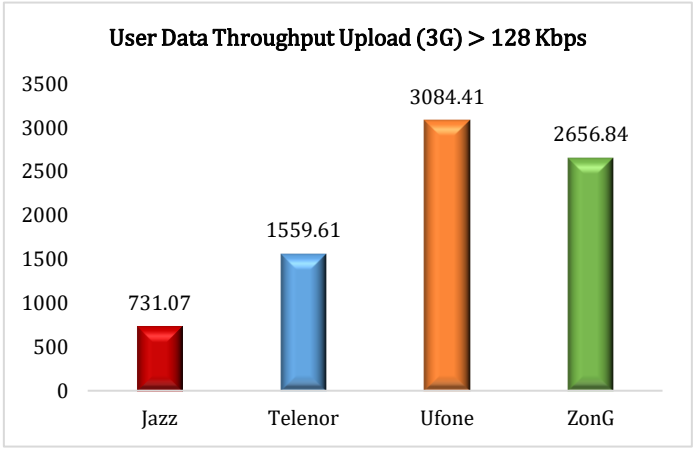


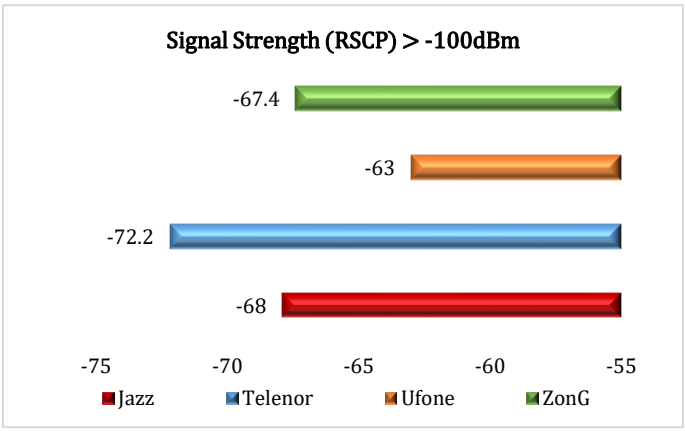


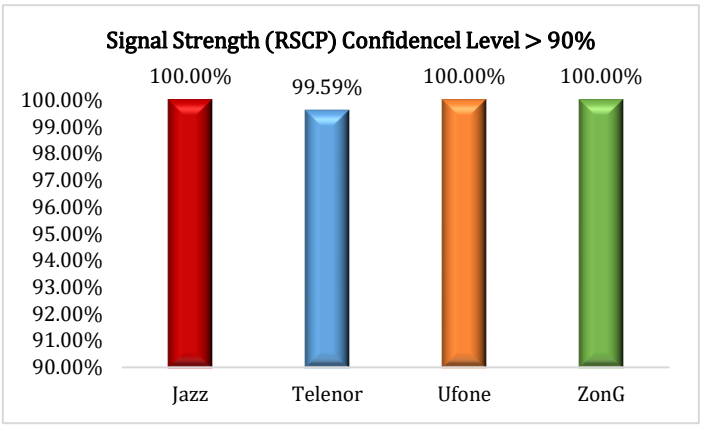


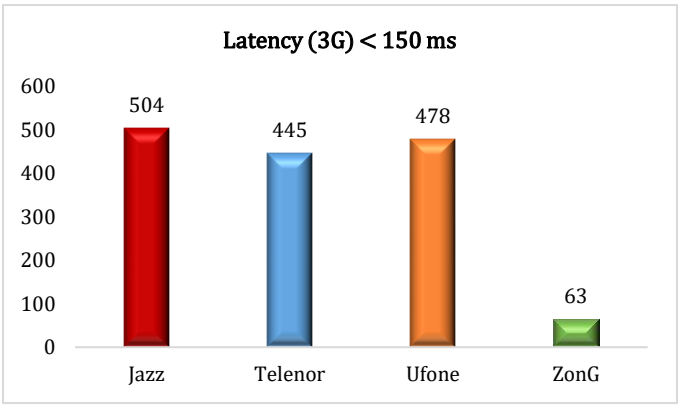
QUALITY OF SERVICE SURVEY RESULTS (3G) –KOT RADHA KISHAN



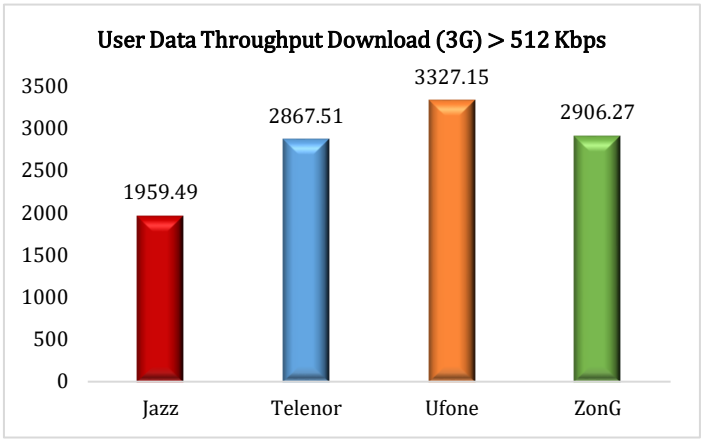


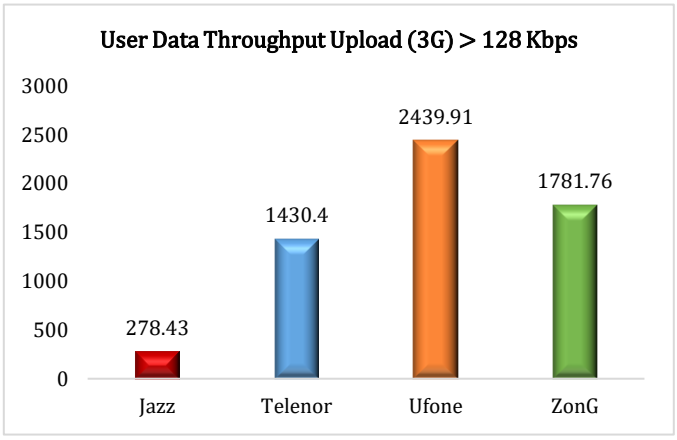


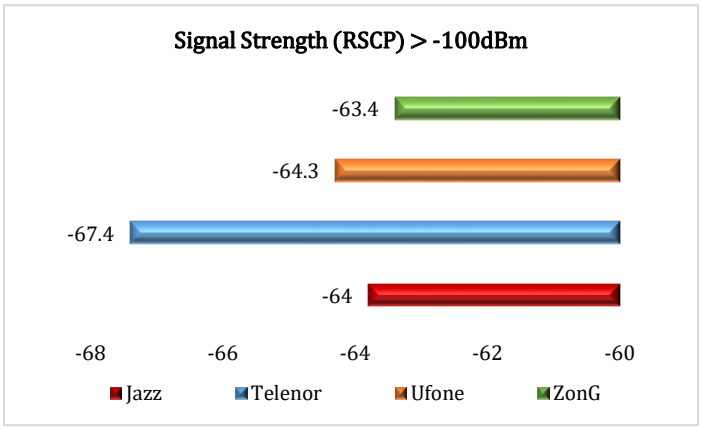


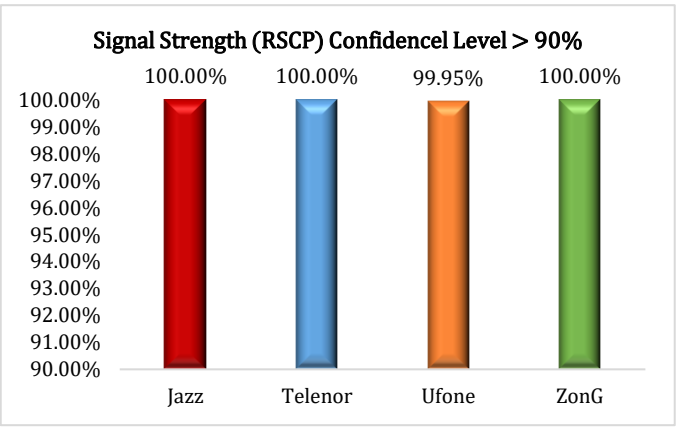


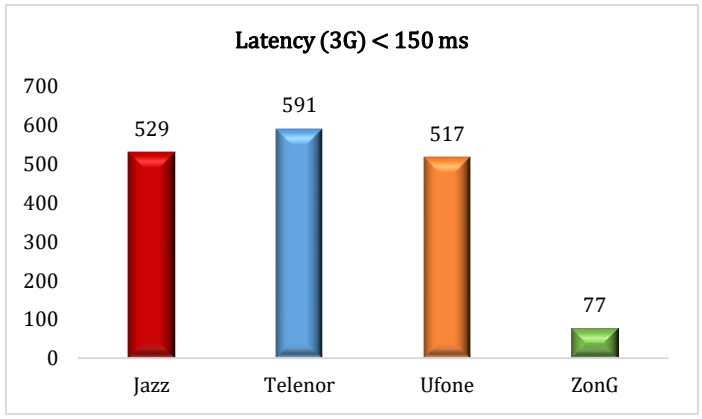
QUALITY OF SERVICE SURVEY RESULTS (3G) –SHEIKHUPURA



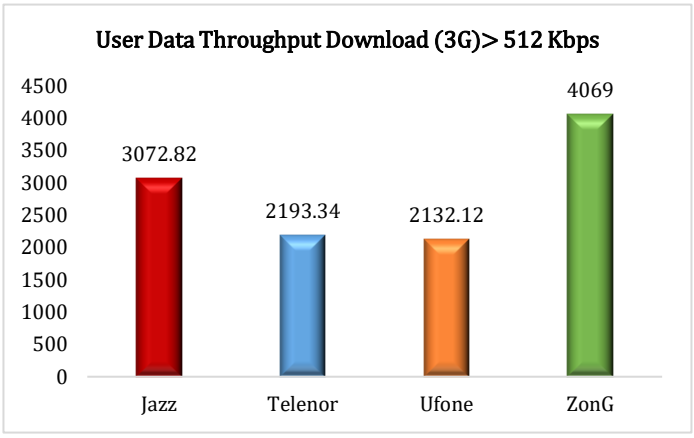


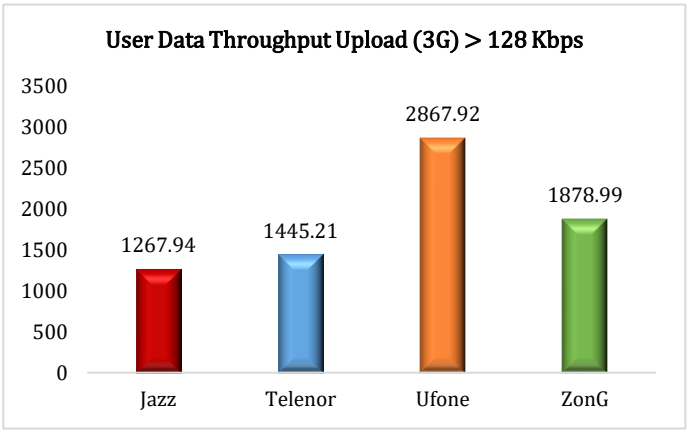


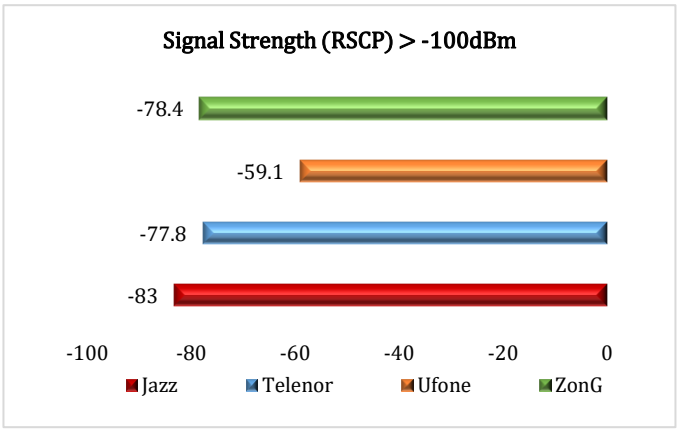


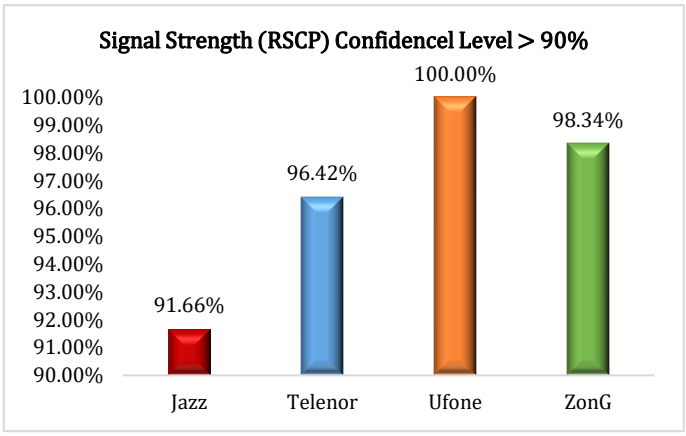


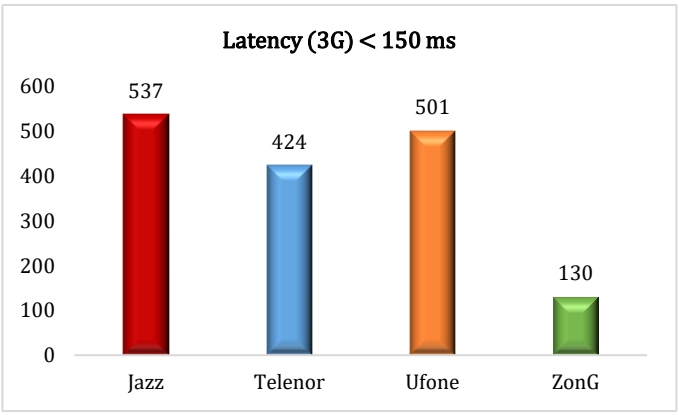
QUALITY OF SERVICE SURVEY RESULTS (3G) –HANGU



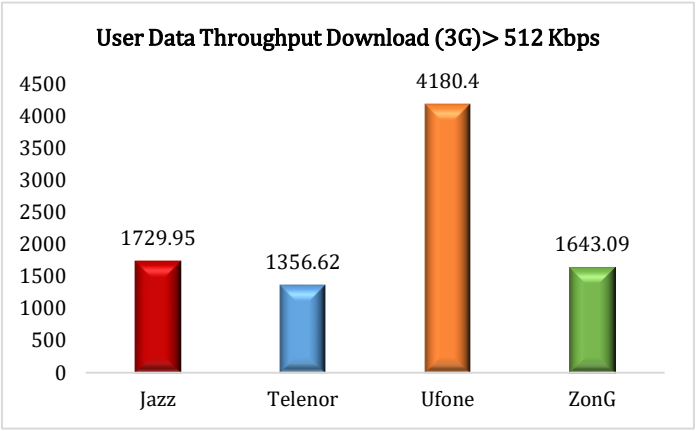


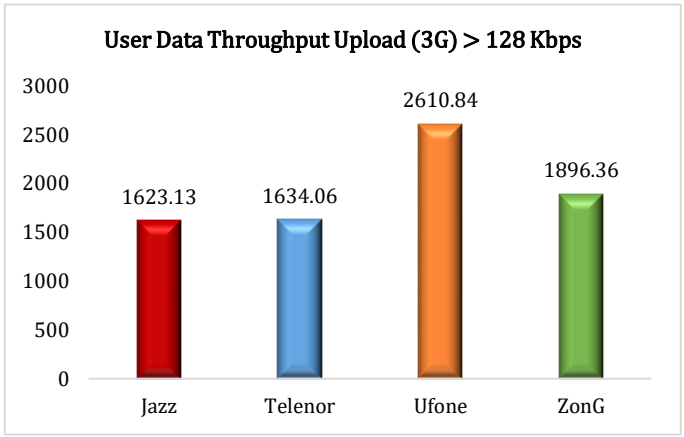


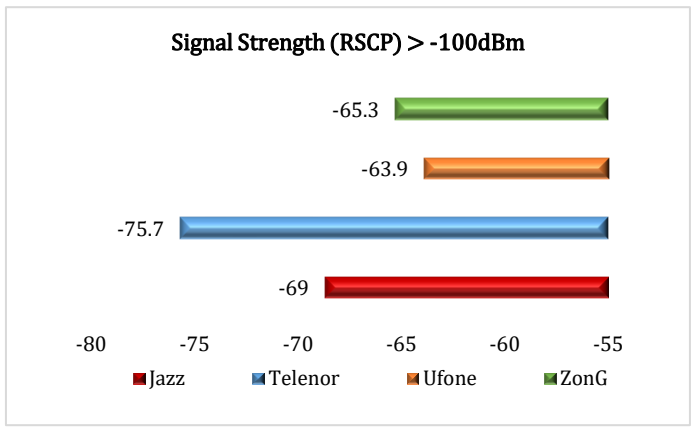


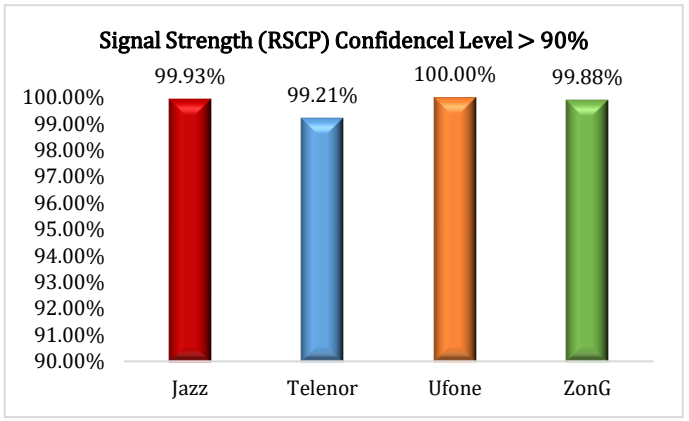


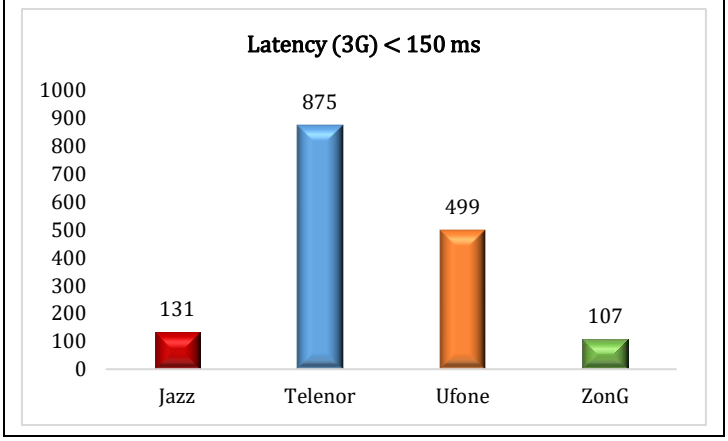
QUALITY OF SERVICE SURVEY RESULTS (3G) –KUCHLAK



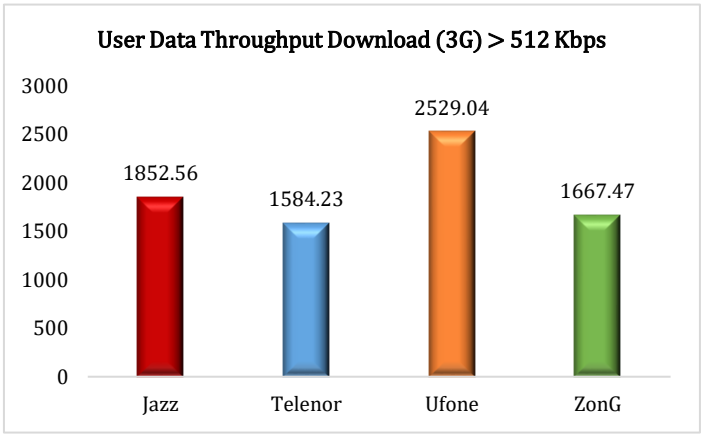


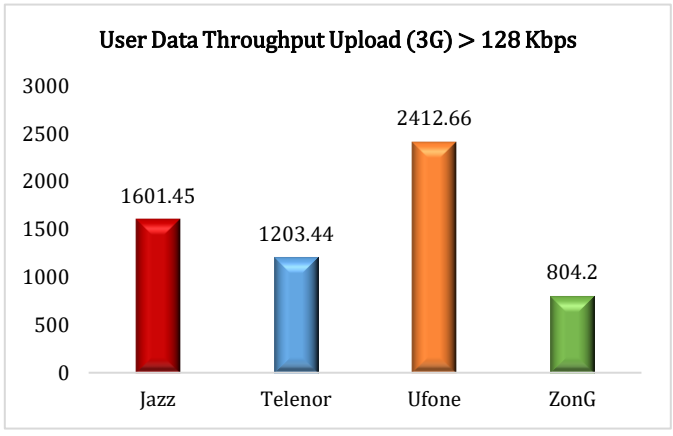


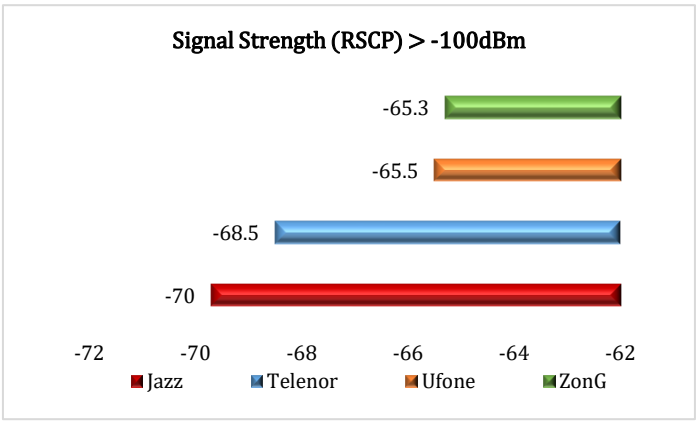


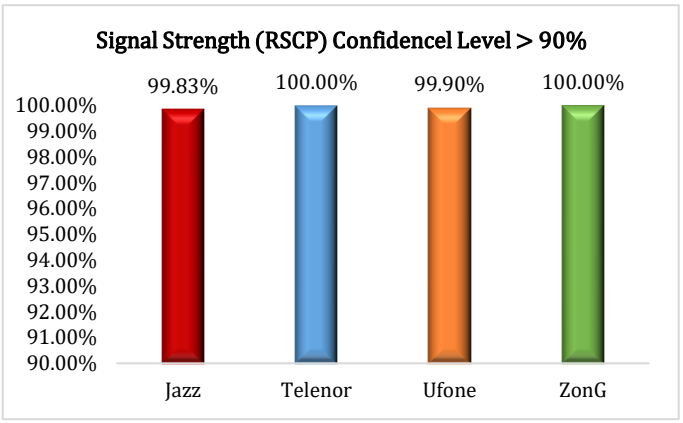


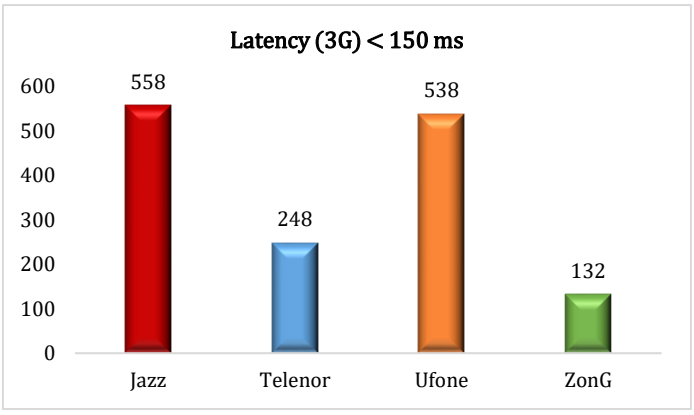
QUALITY OF SERVICE SURVEY RESULTS (3G) –ABBOTTABAD



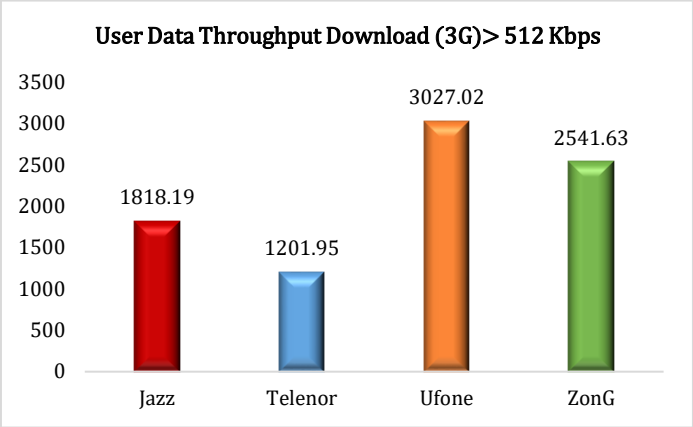


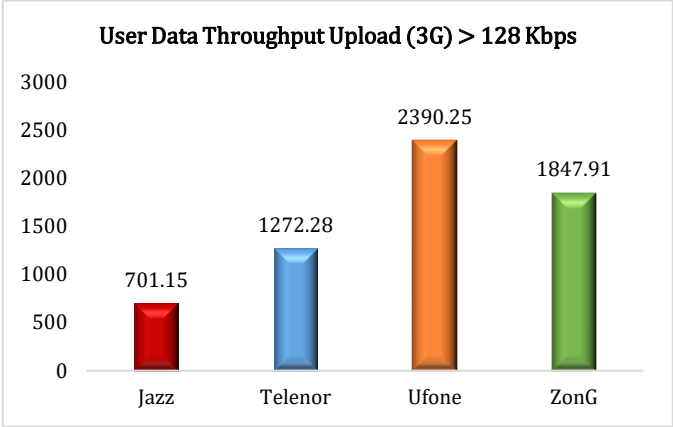


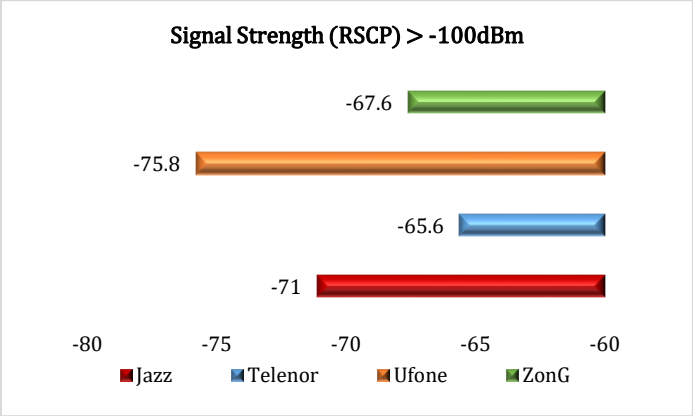


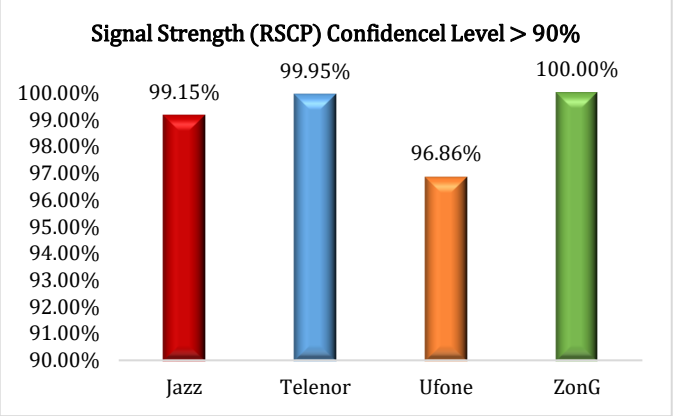


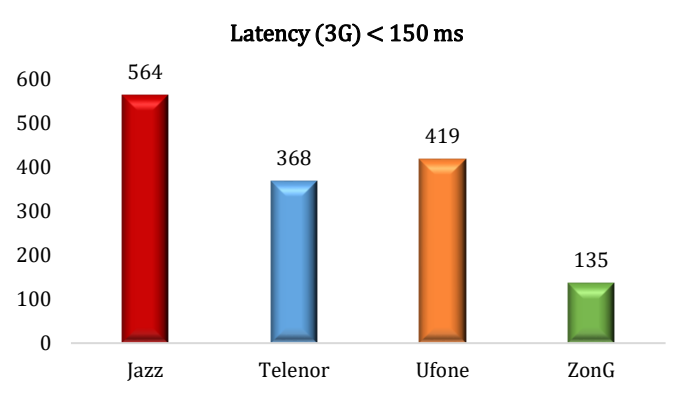
QUALITY OF SERVICE SURVEY RESULTS (3G) –LOWER DIR



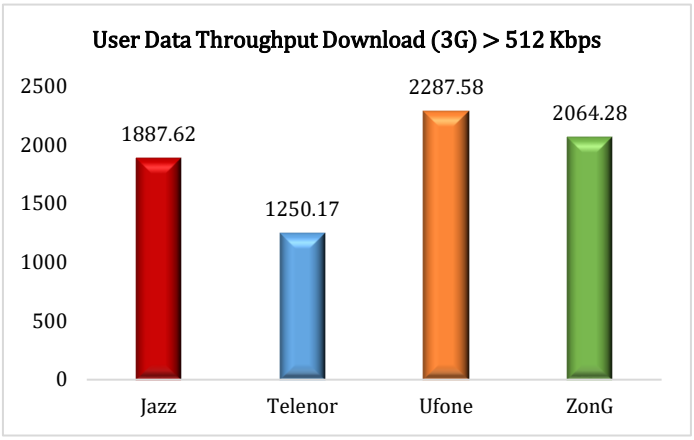


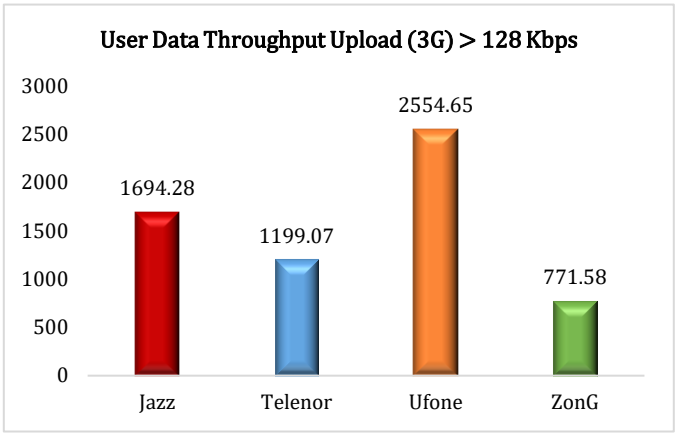


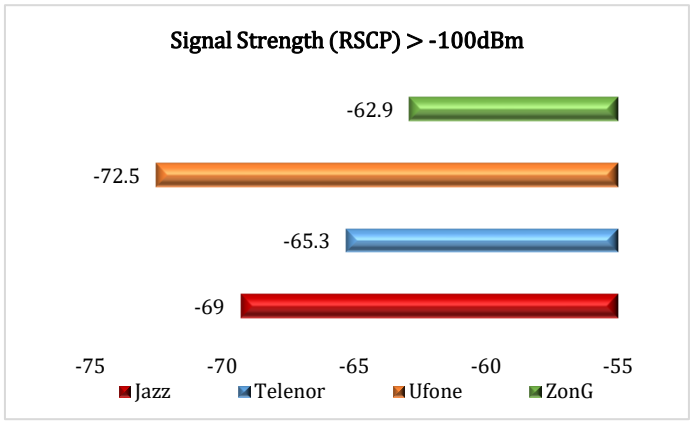


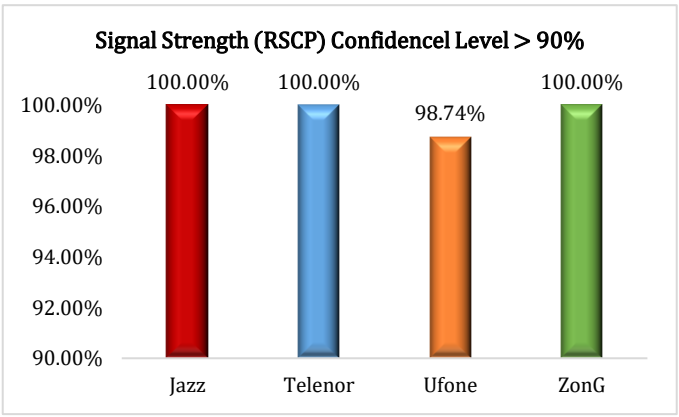


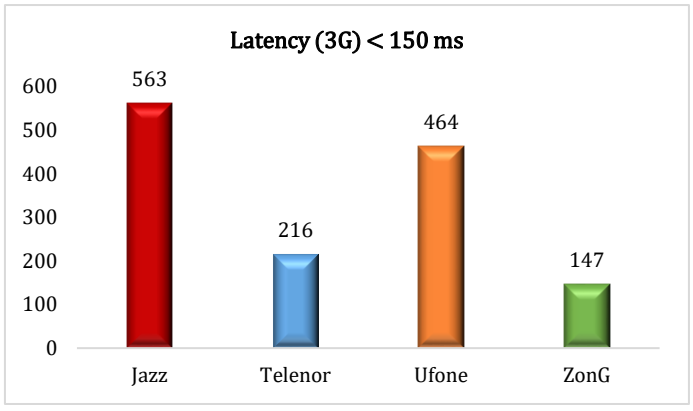
QUALITY OF SERVICE SURVEY RESULTS (3G) –MANSEHRA



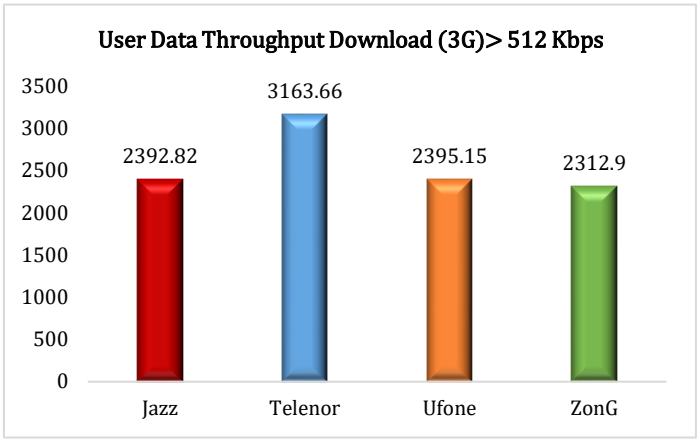


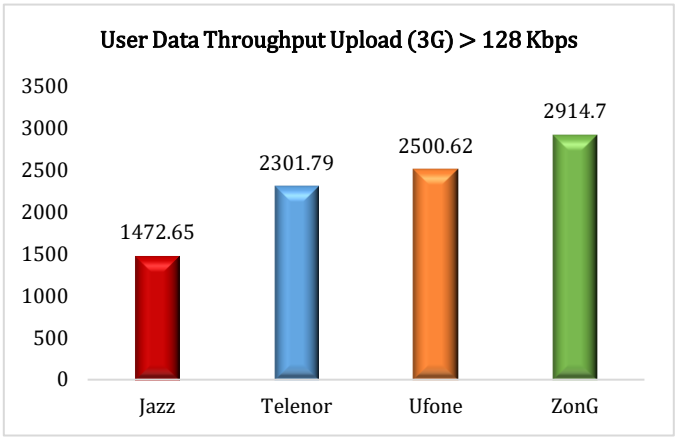


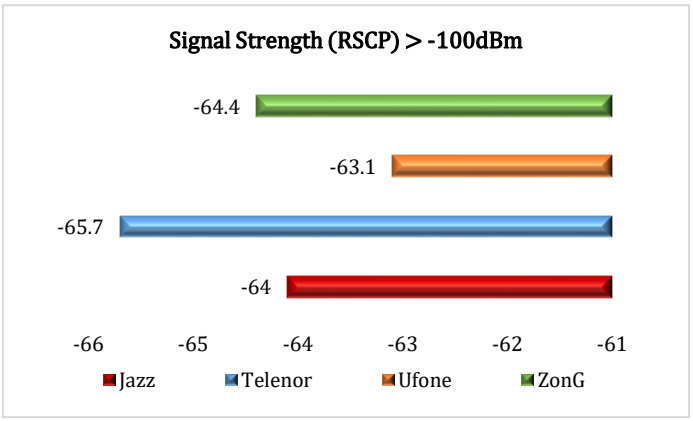


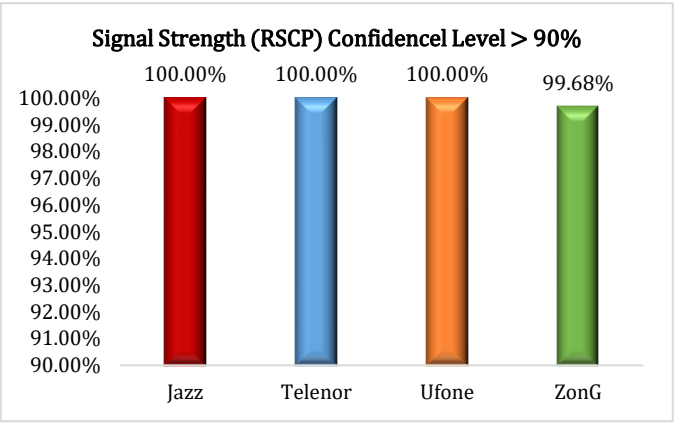


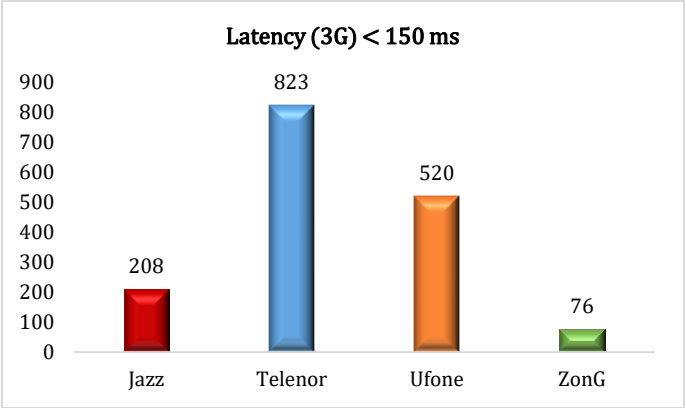
QUALITY OF SERVICE SURVEY RESULTS (3G) –MATIARI



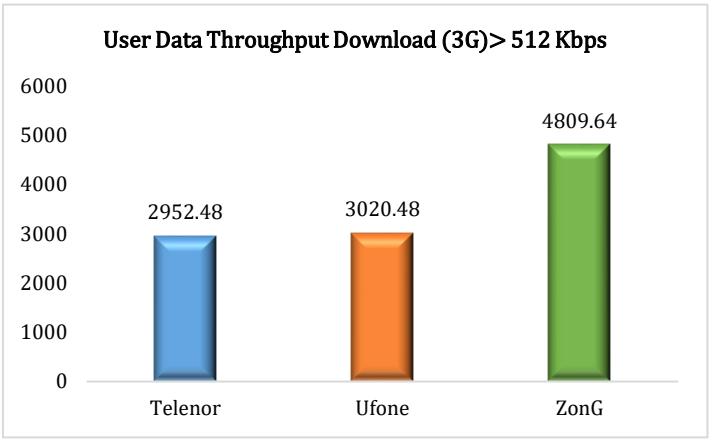


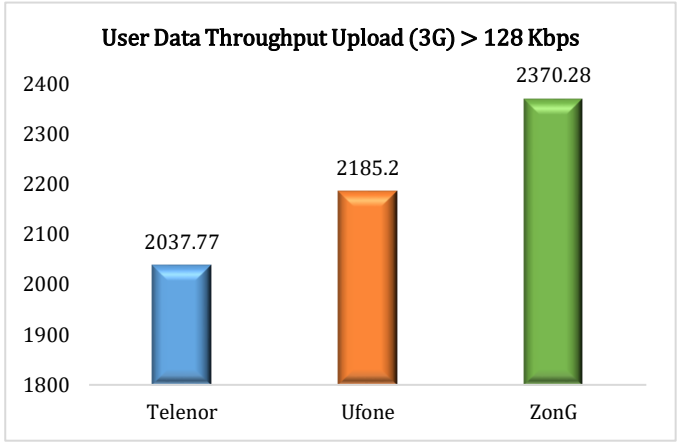


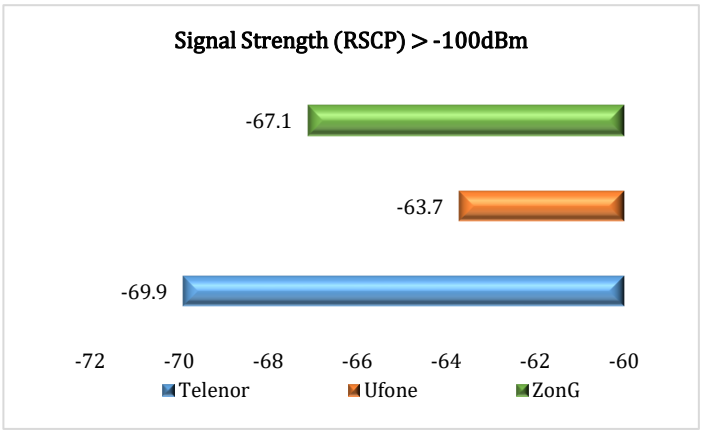


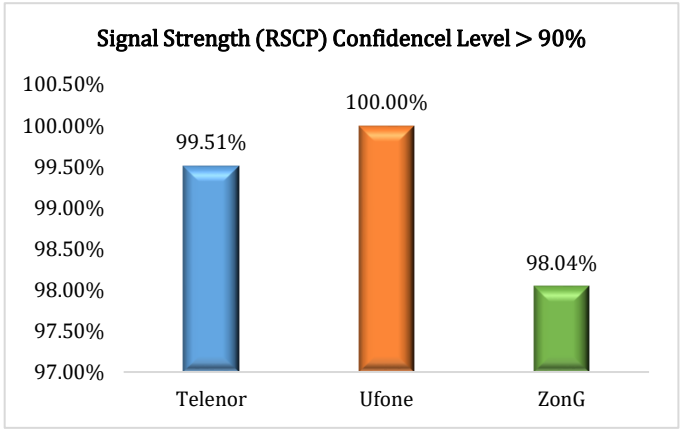


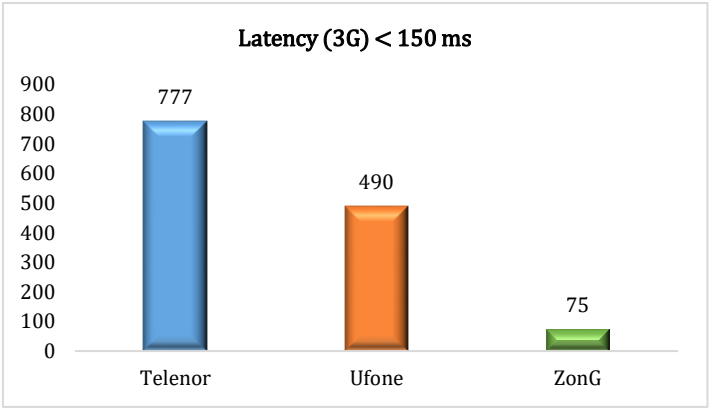
QUALITY OF SERVICE SURVEY RESULTS (3G) –MACH



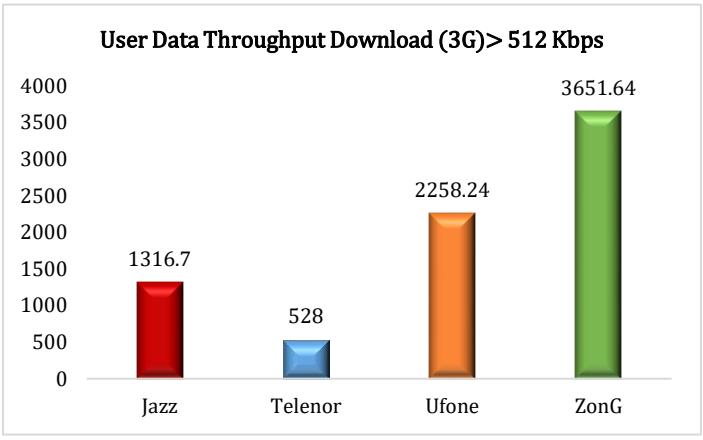


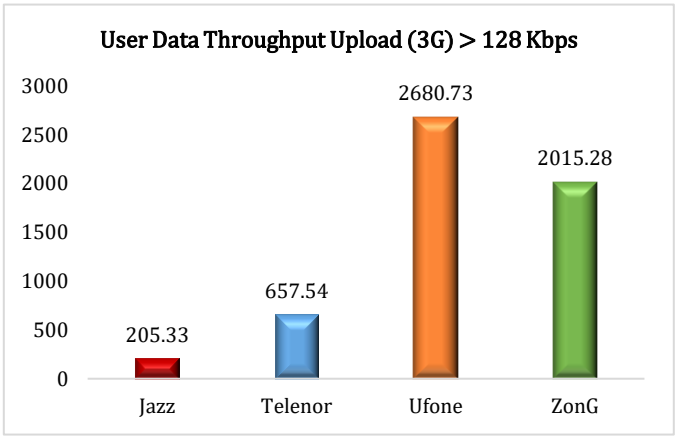


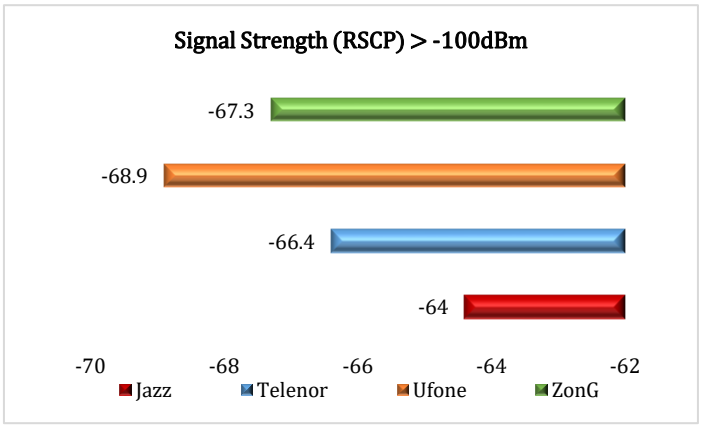


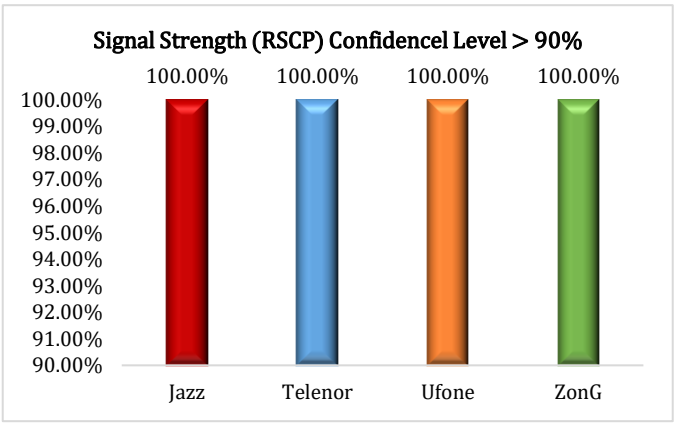


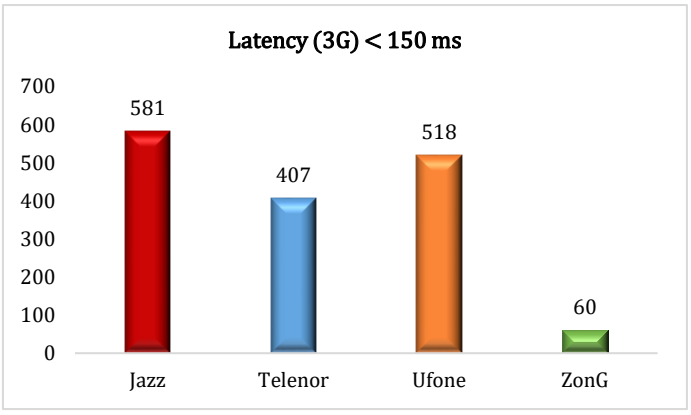
QUALITY OF SERVICE SURVEY RESULTS (3G) –PASROOR



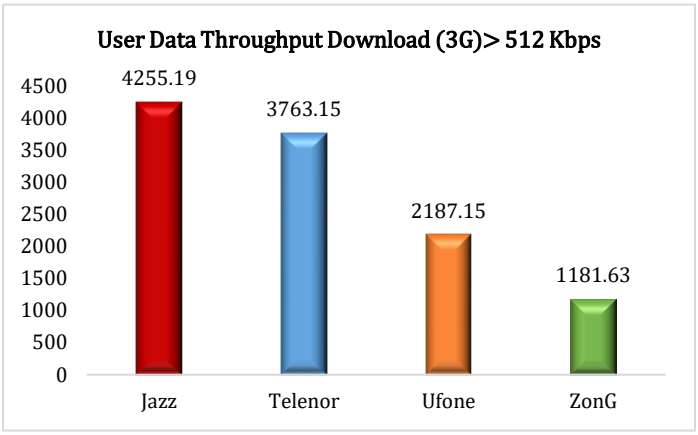


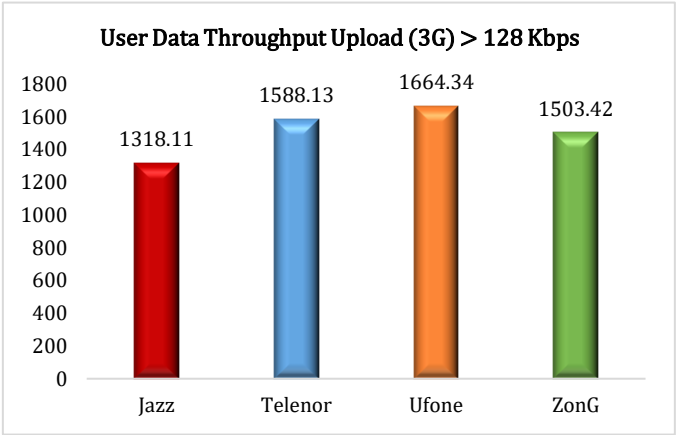


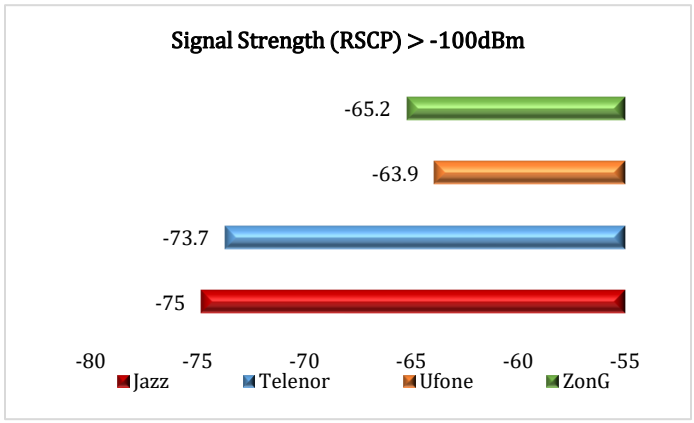


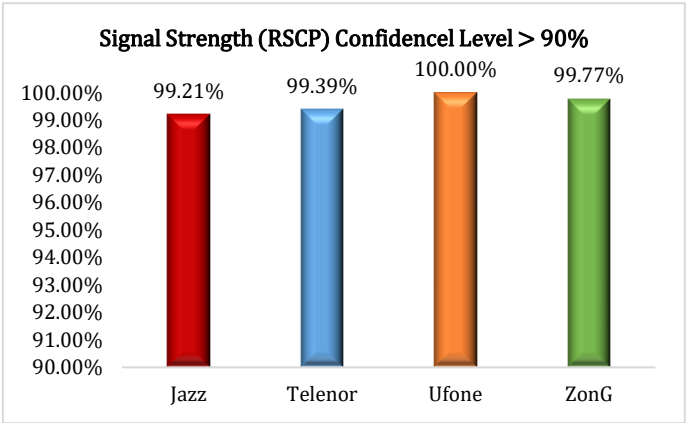


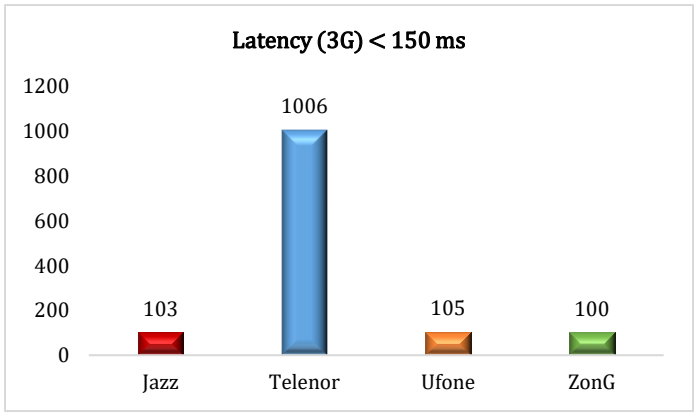
QUALITY OF SERVICE SURVEY RESULTS (3G) –PISHIN



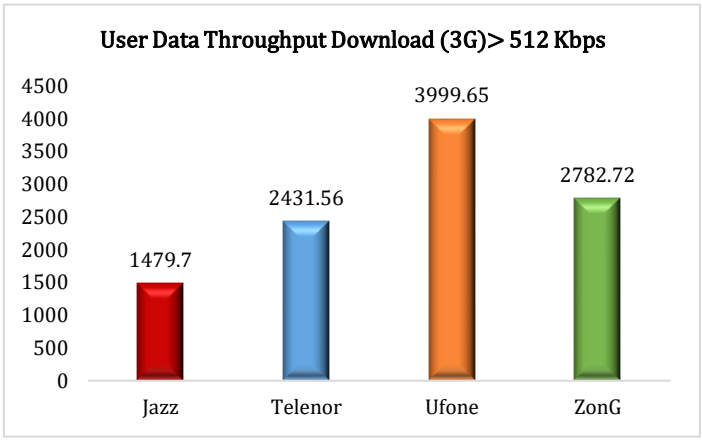


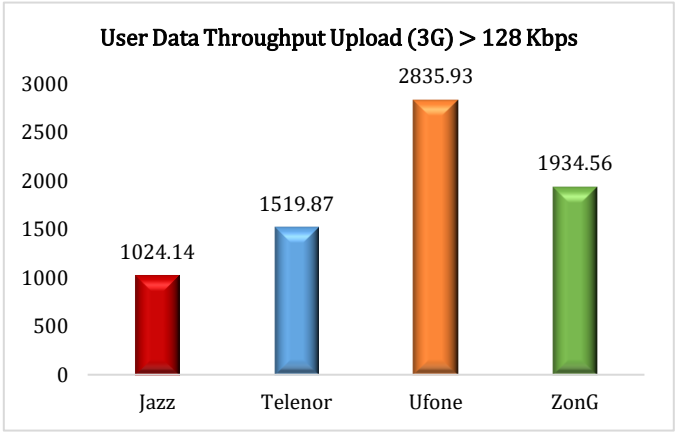


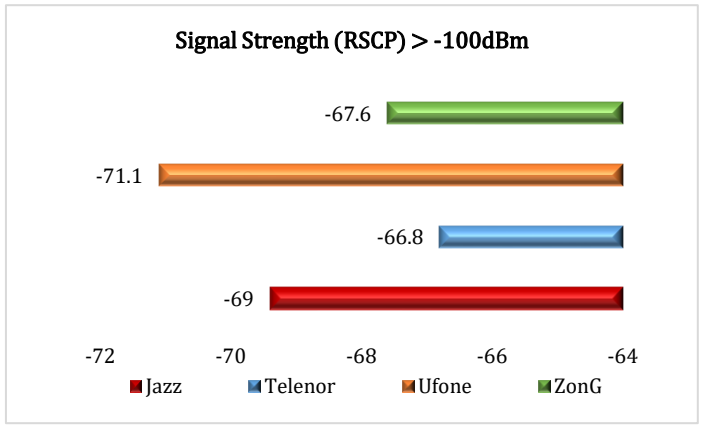


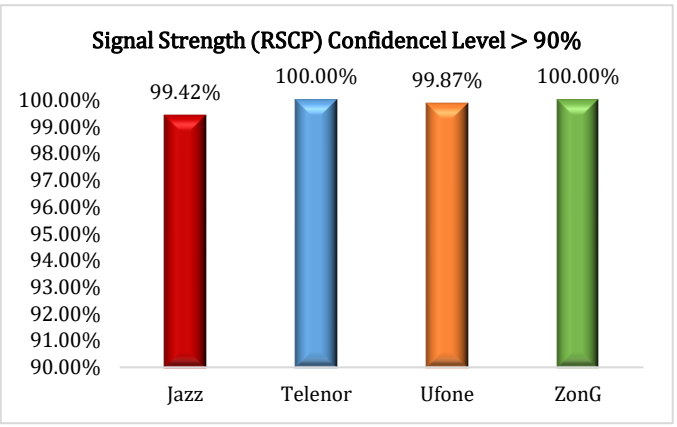


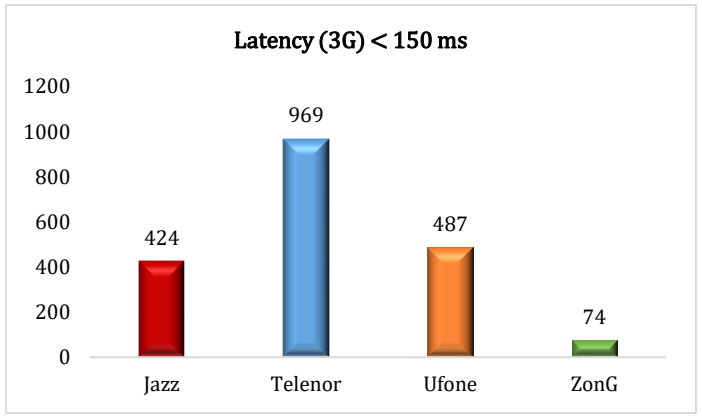
QUALITY OF SERVICE SURVEY RESULTS (3G) –SARGODHA



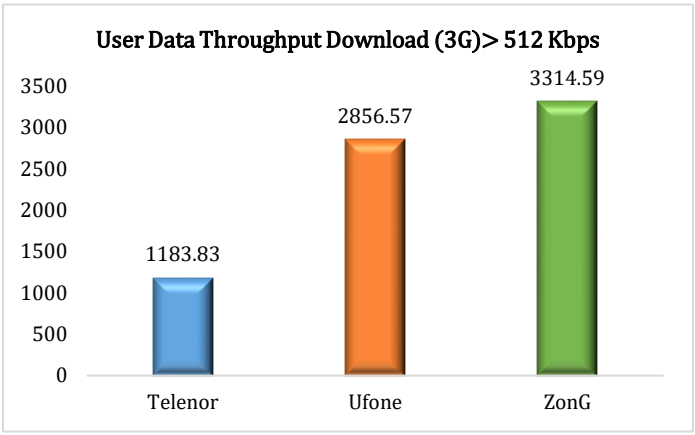


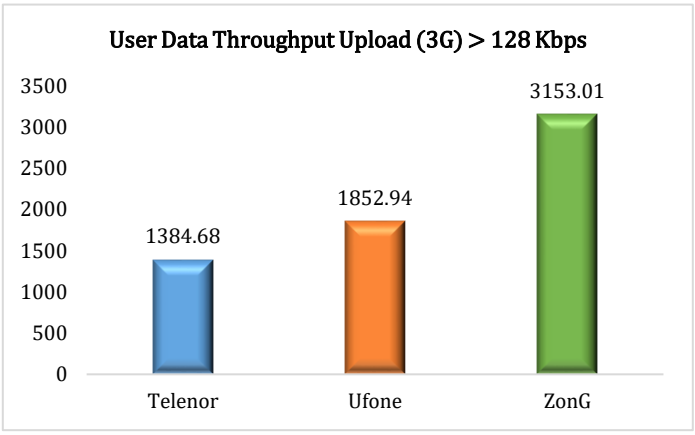


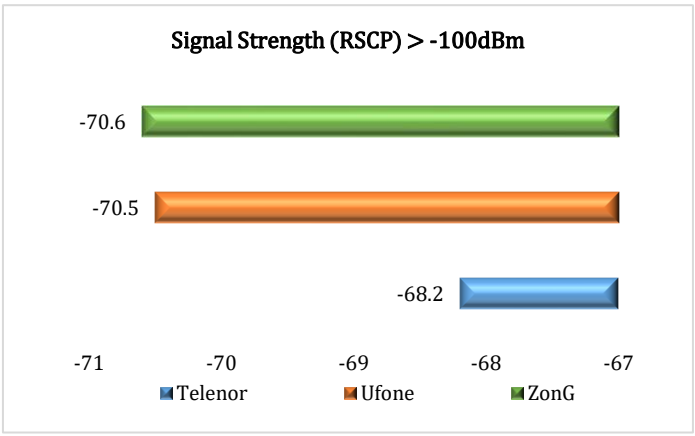


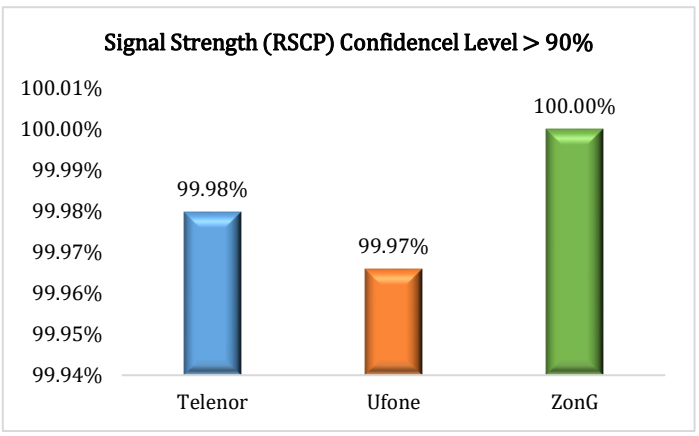


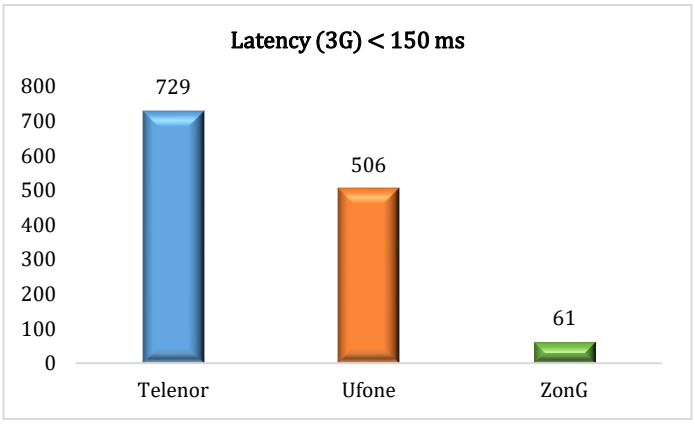
QUALITY OF SERVICE SURVEY RESULTS (3G) –UMER KOT







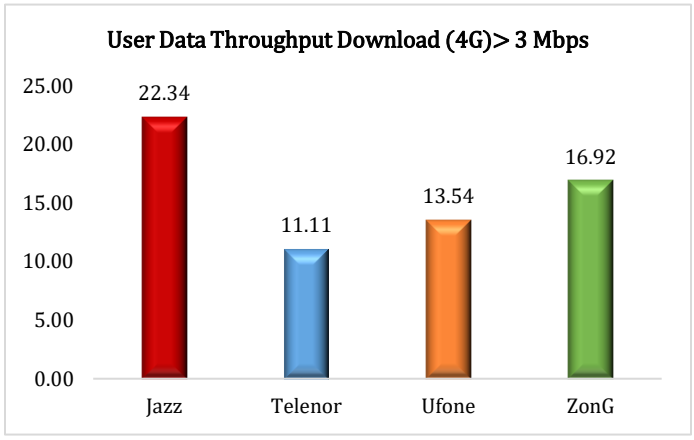


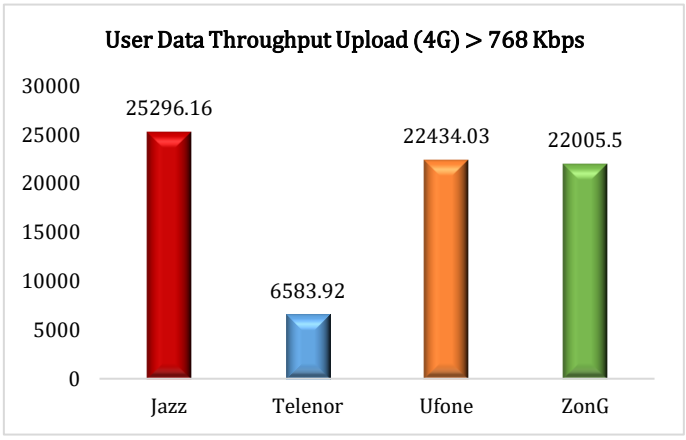


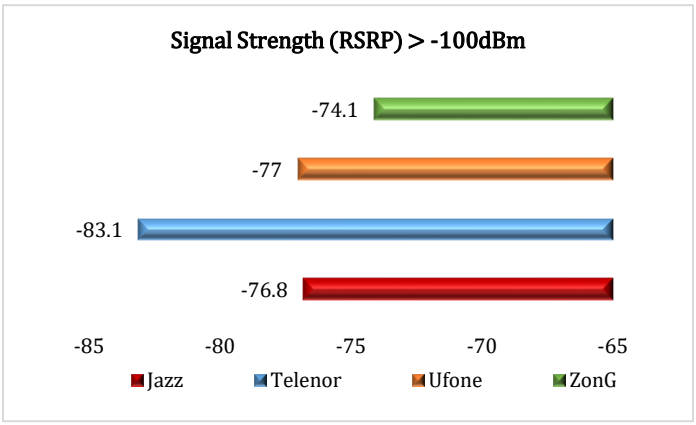
Annex -B(Data QoS Results)

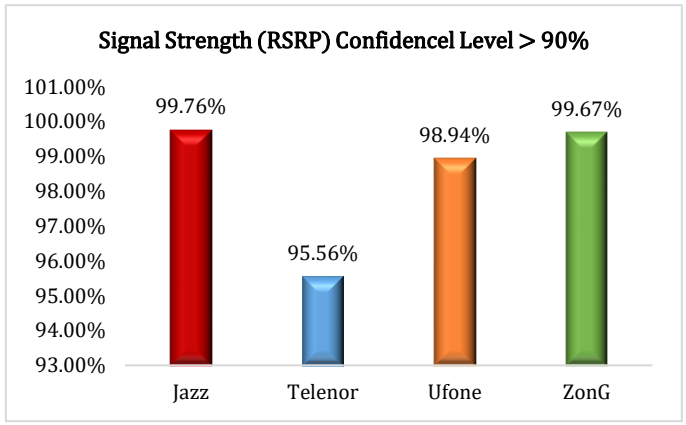
4G LOCK MODE

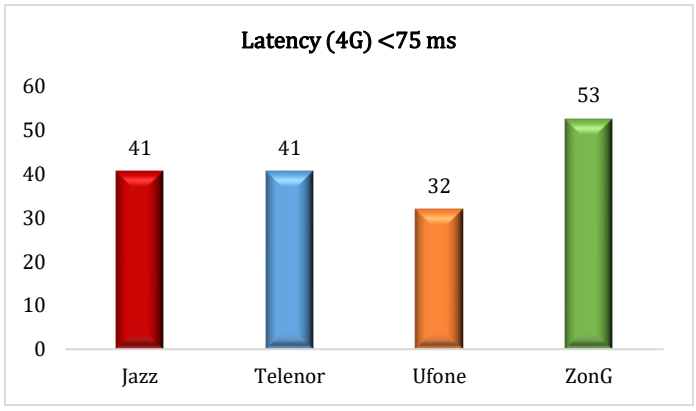
QUALITY OF SERVICE SURVEY RESULTS (4G) – SUKKUR



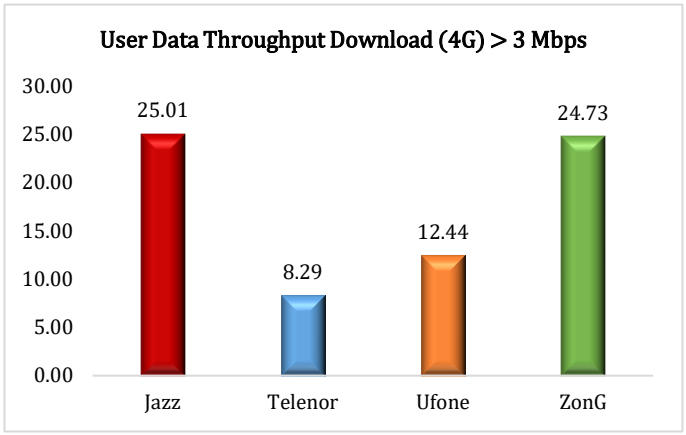


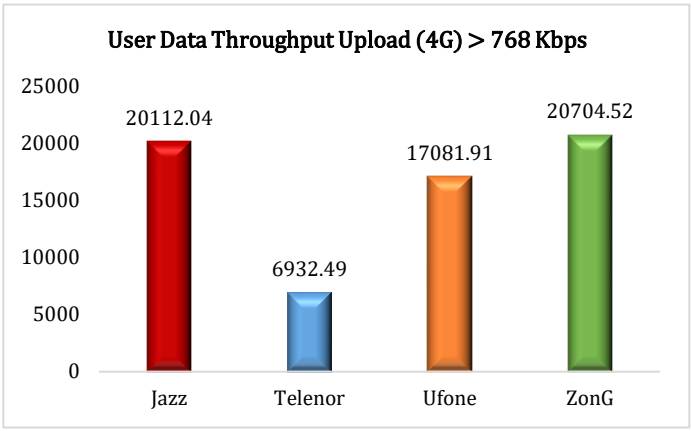


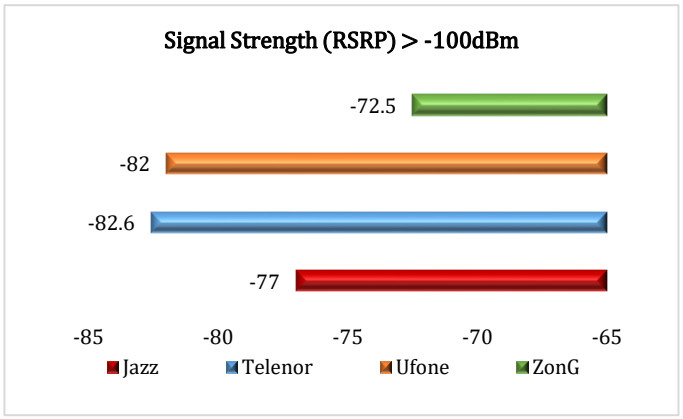


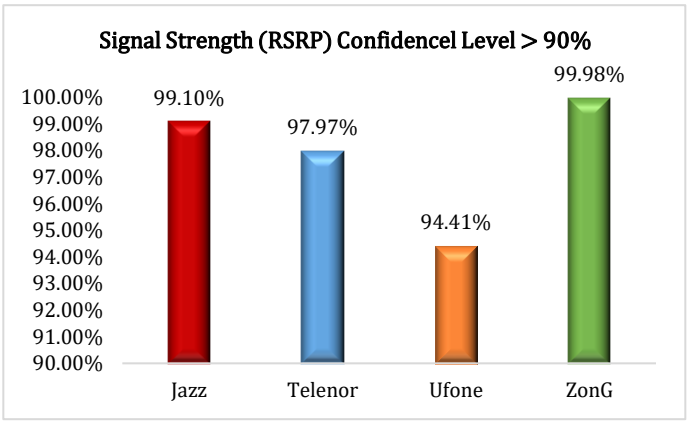


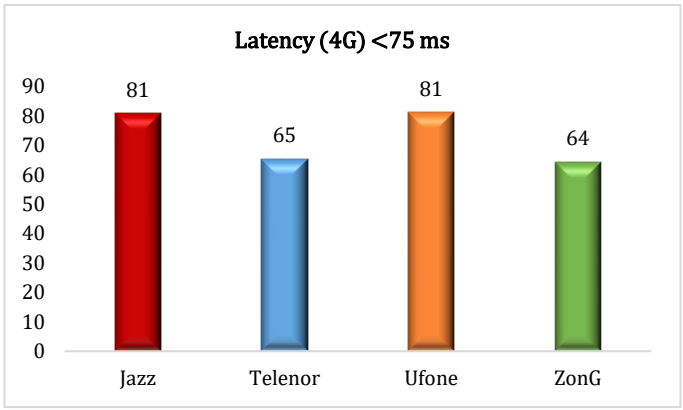
QUALITY OF SERVICE SURVEY RESULTS (4G) –BAHAWALPUR



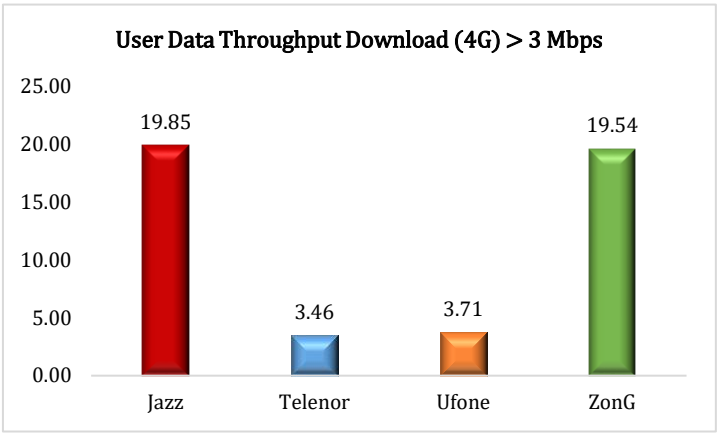


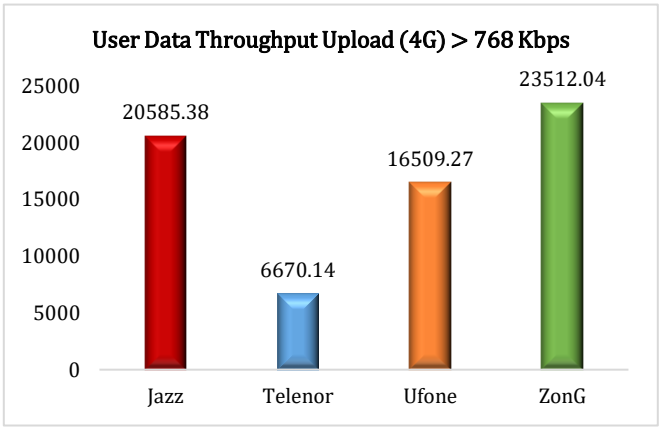


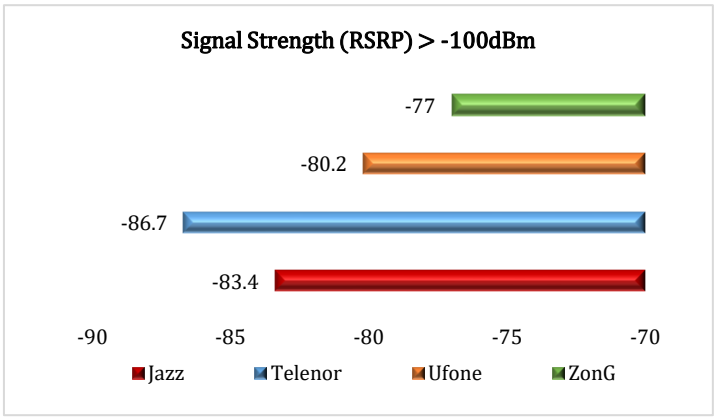


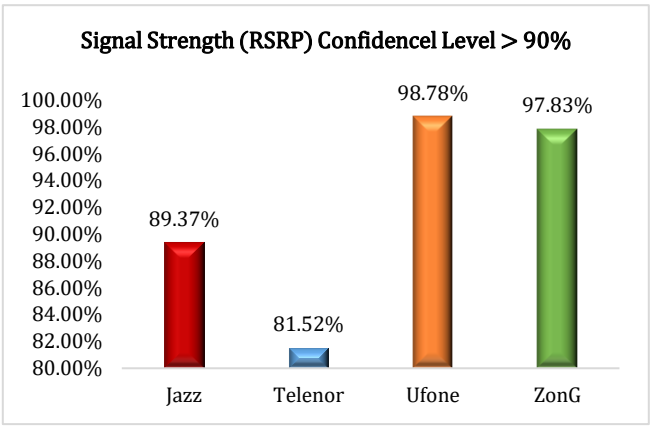


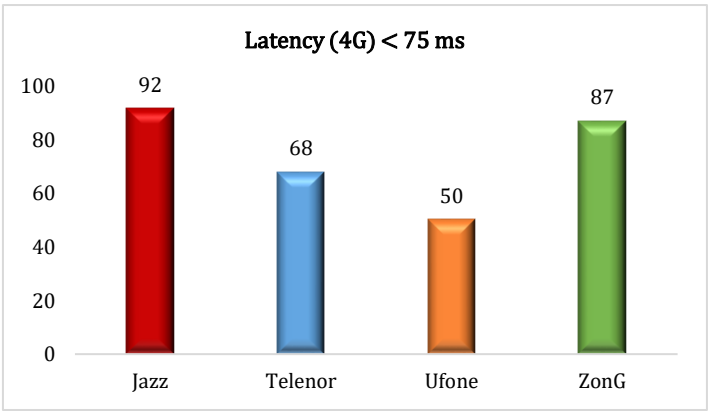
QUALITY OF SERVICE SURVEY RESULTS (4G) – CHARSADDA



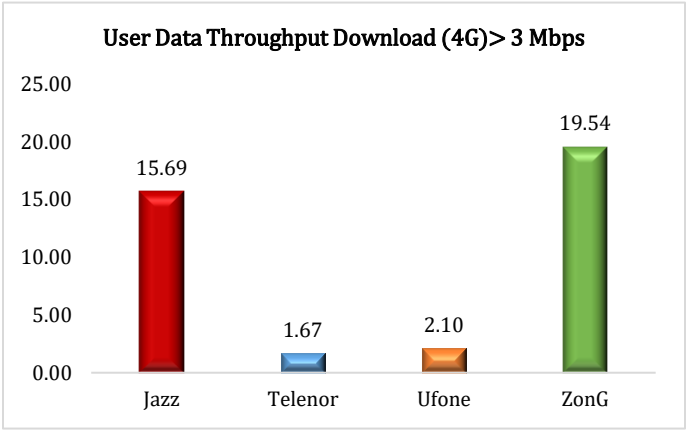


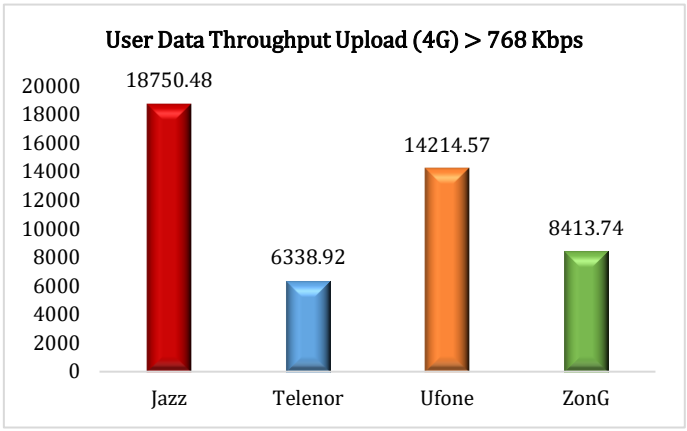


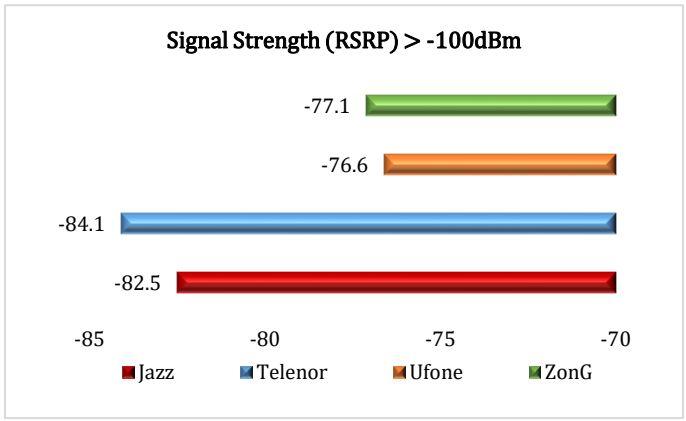


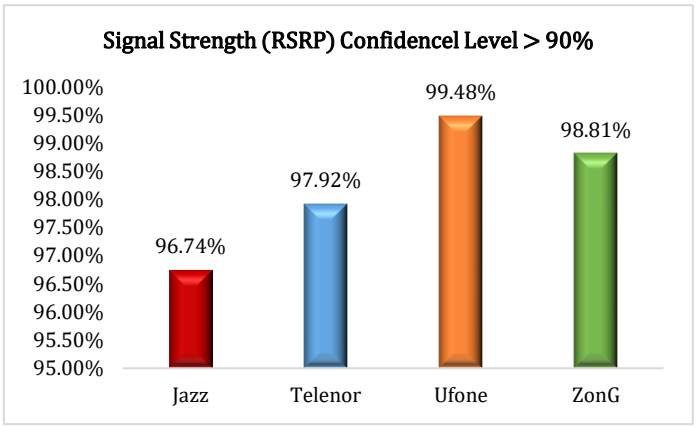


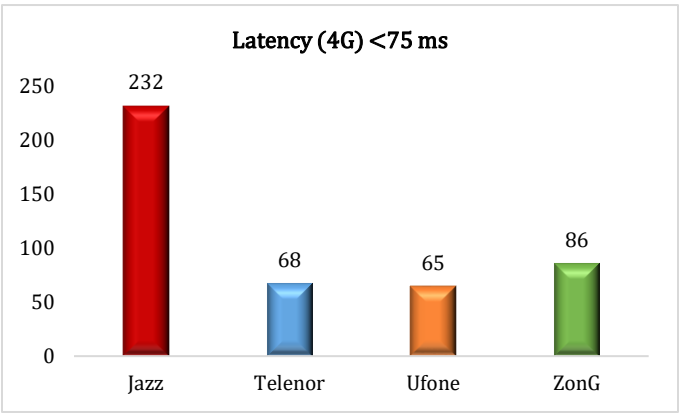
QUALITY OF SERVICE SURVEY RESULTS (4G) –GWADAR



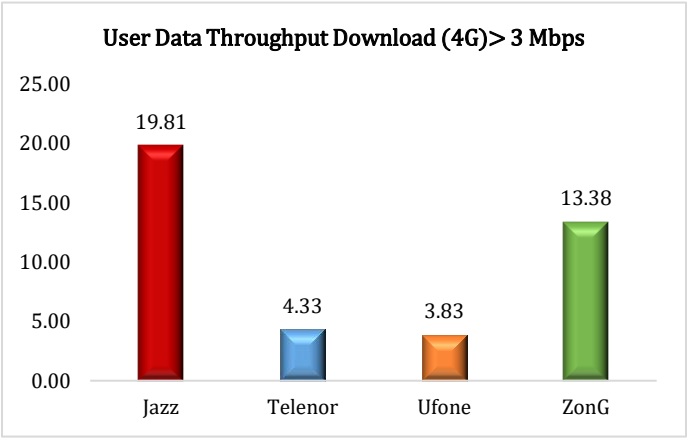


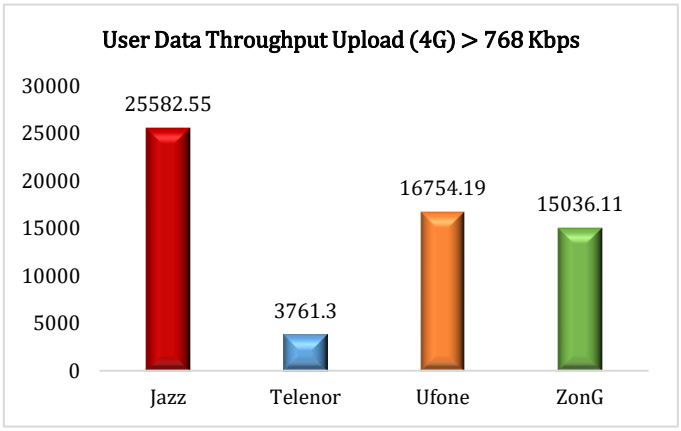


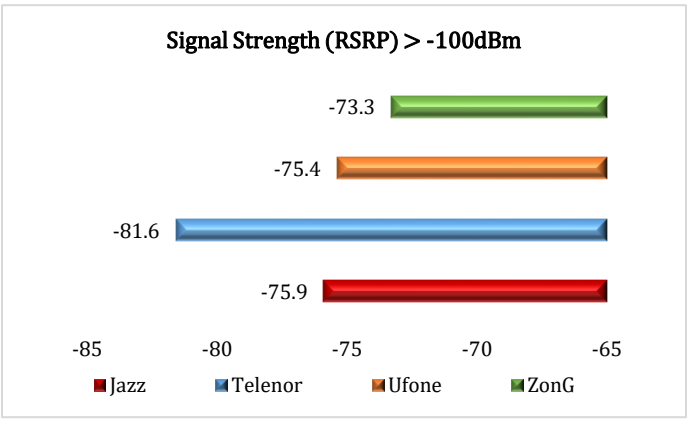


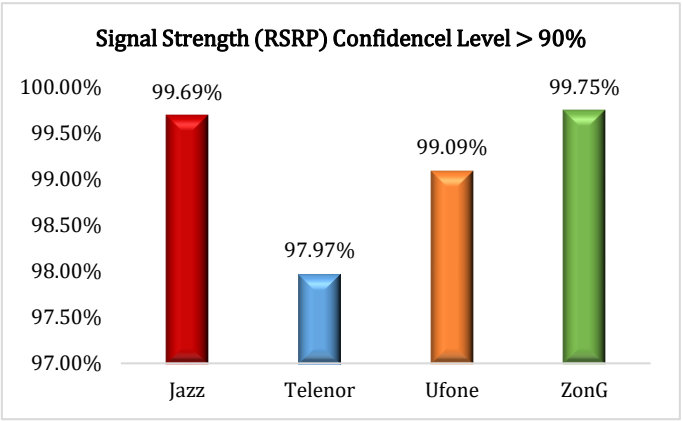


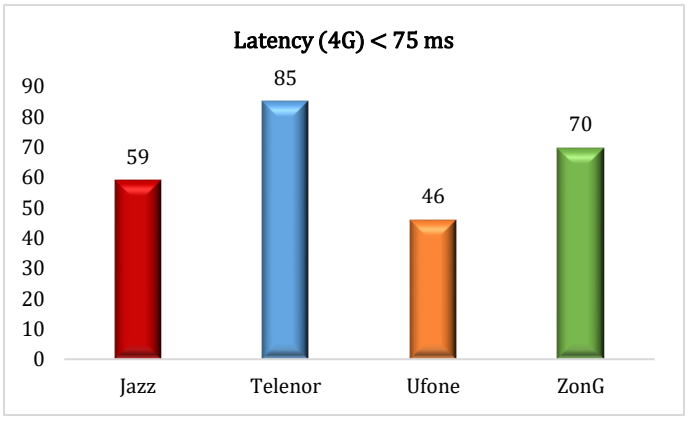
QUALITY OF SERVICE SURVEY RESULTS (4G) – QUETTA



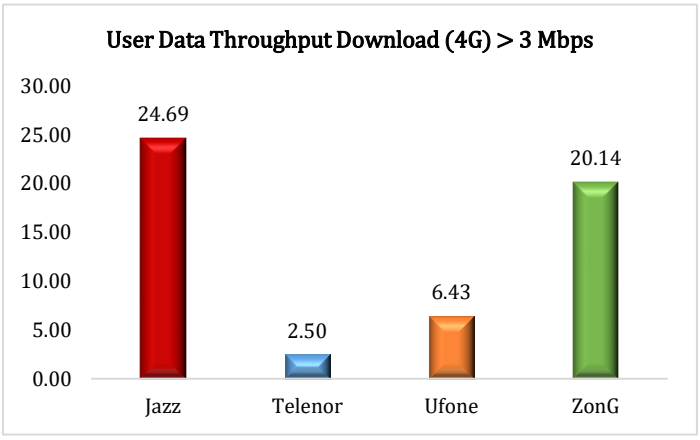


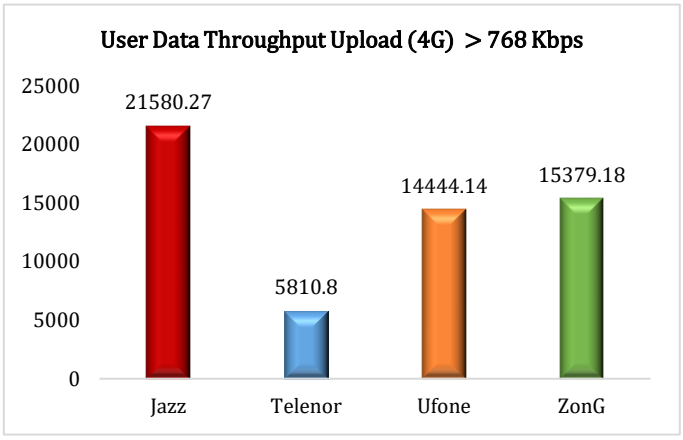


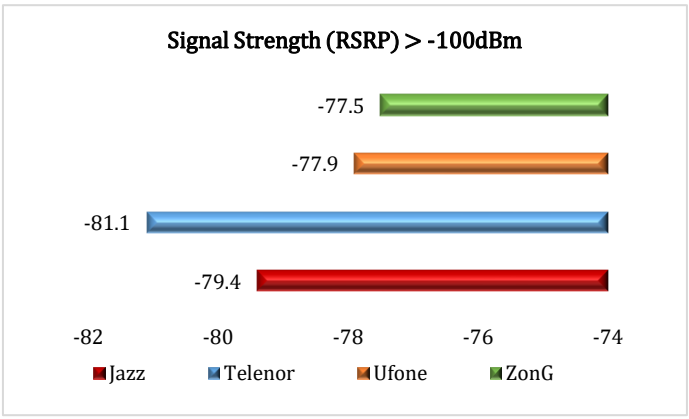


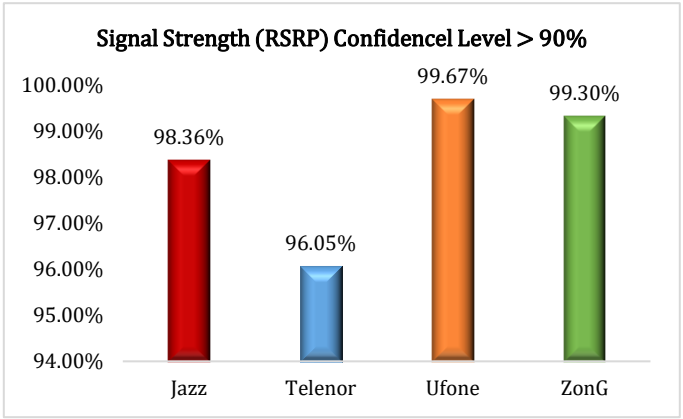


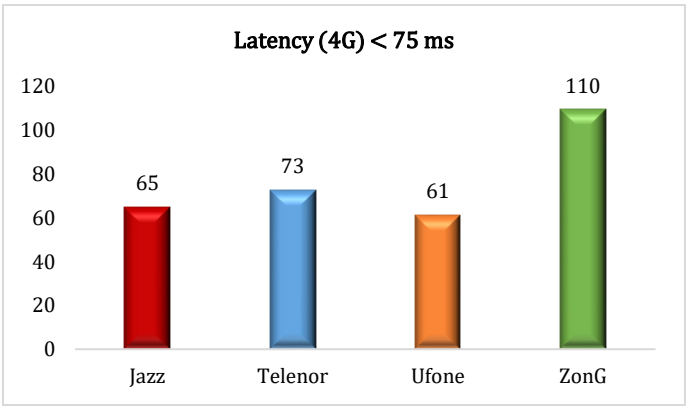
QUALITY OF SERVICE SURVEY RESULTS (4G) – ISLAMABAD



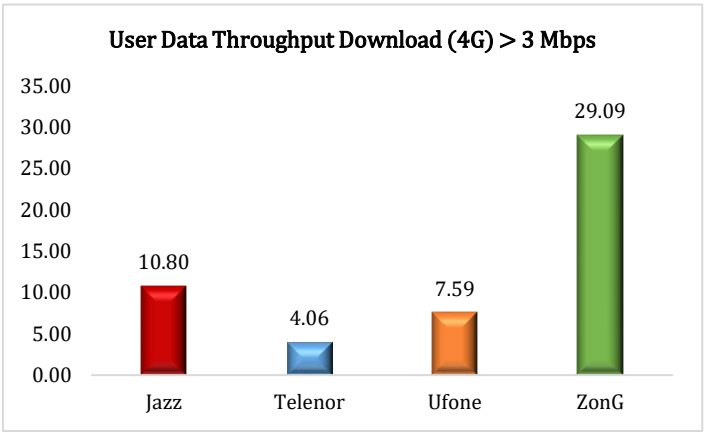


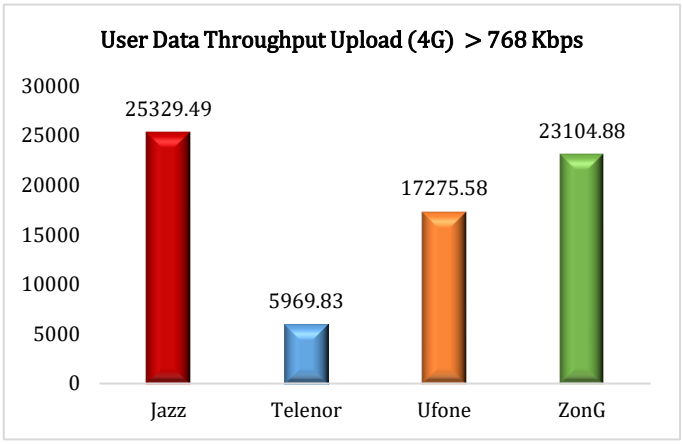


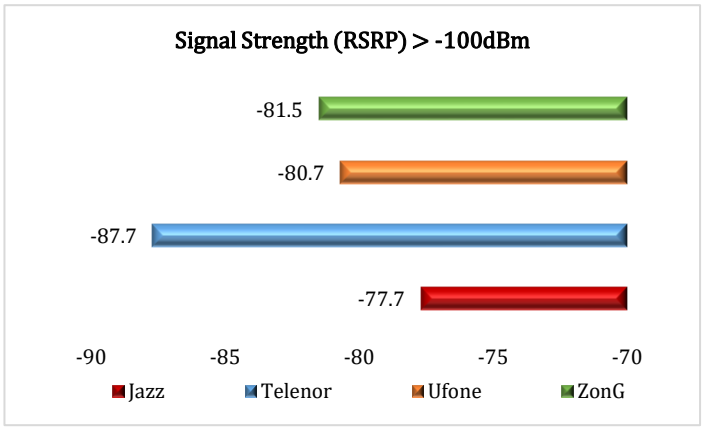


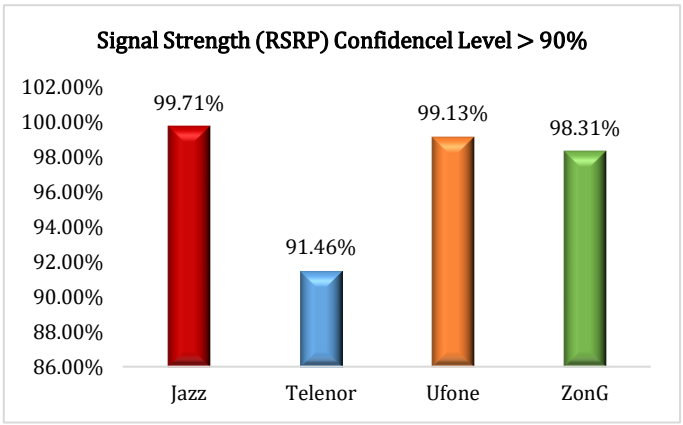


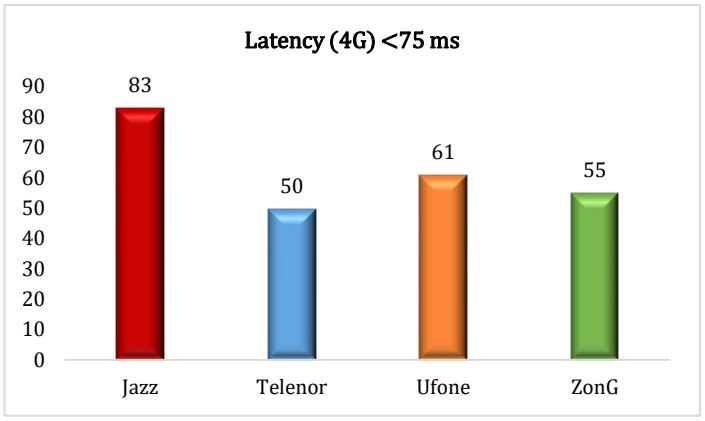
QUALITY OF SERVICE SURVEY RESULTS (4G) – KOT RADHA KISHAN



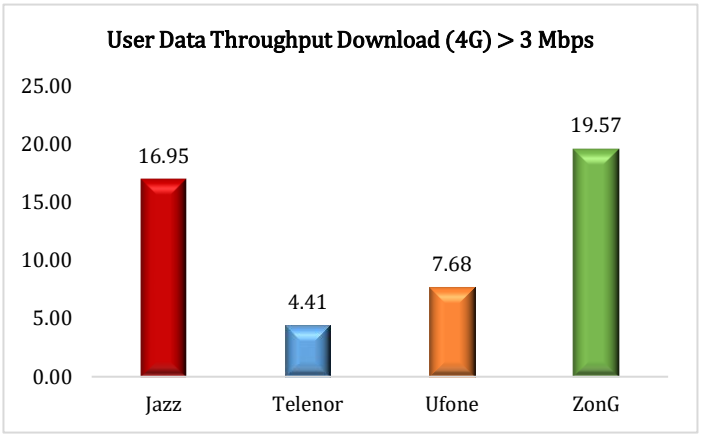


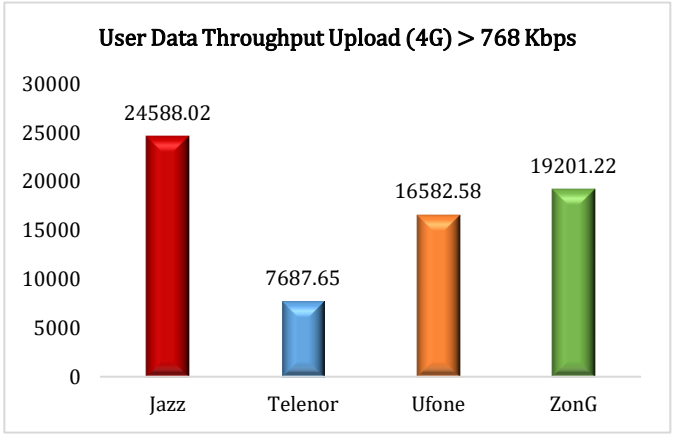


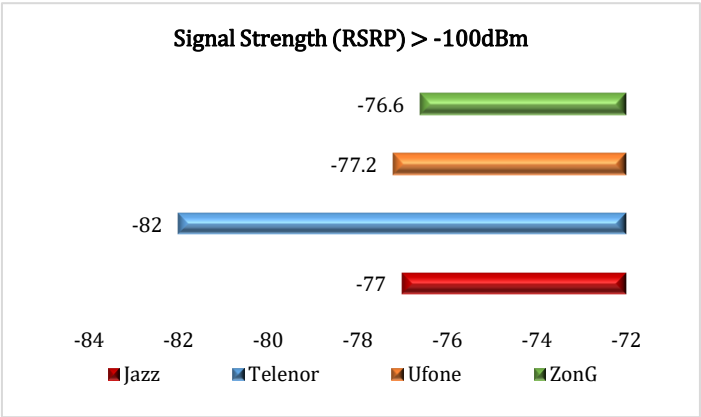


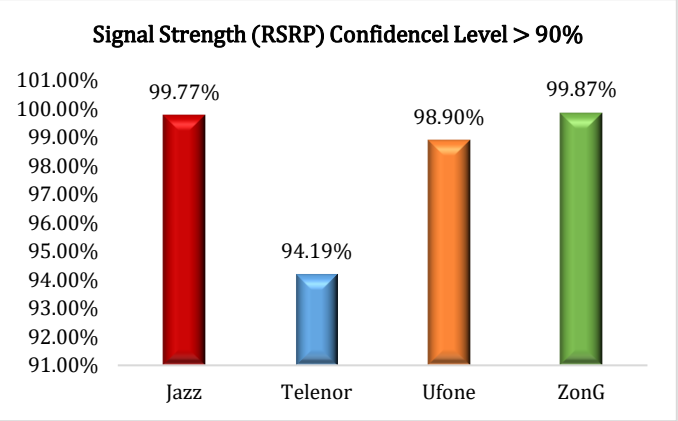


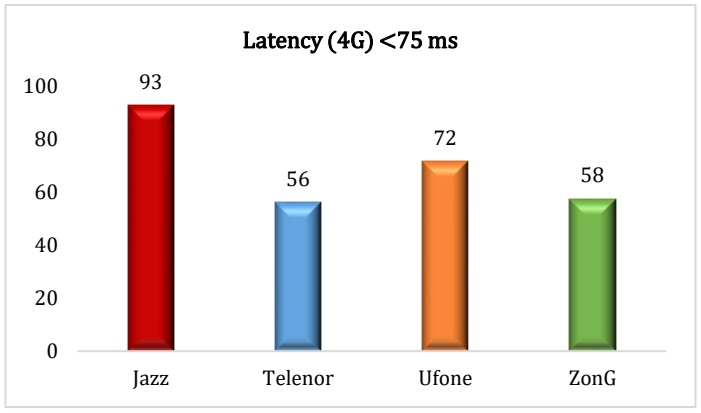
QUALITY OF SERVICE SURVEY RESULTS (4G) – SHEIKHUPURA



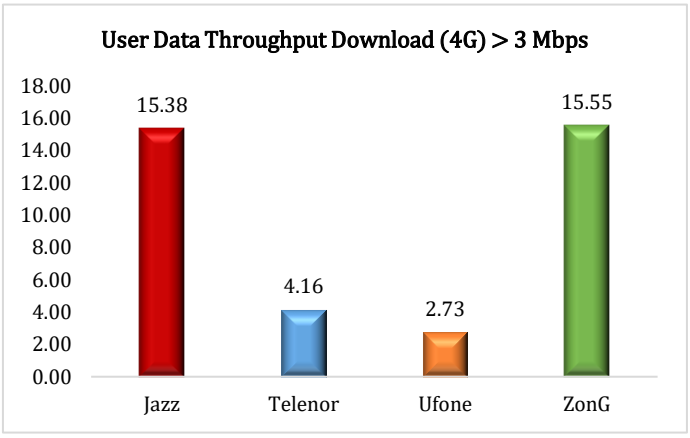


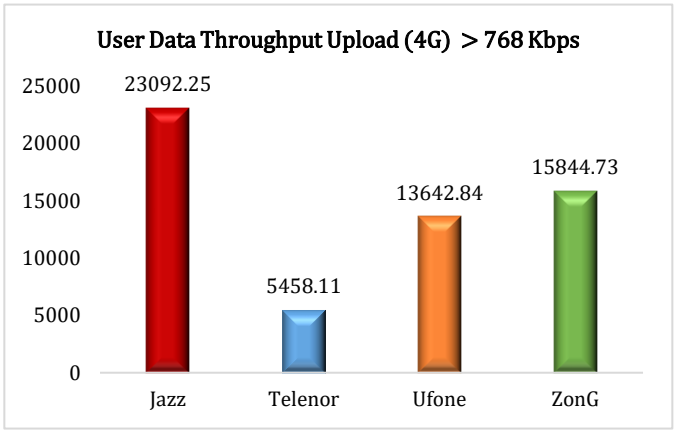


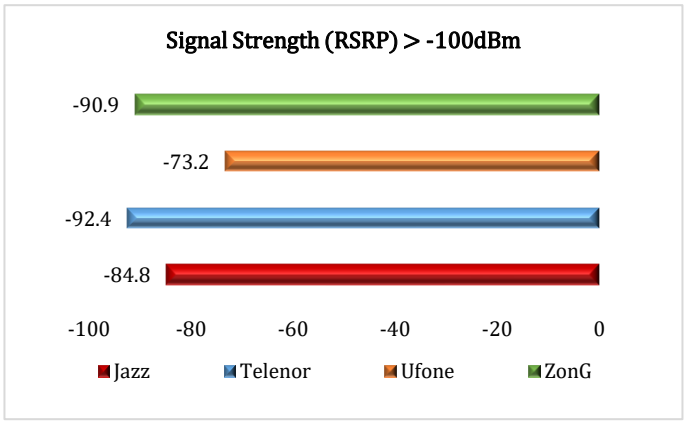


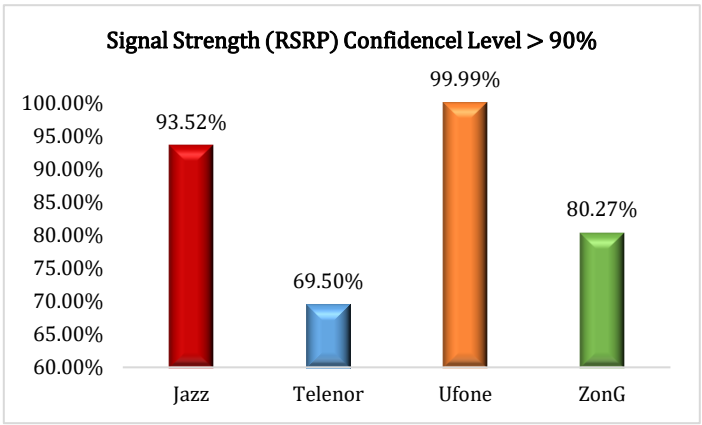


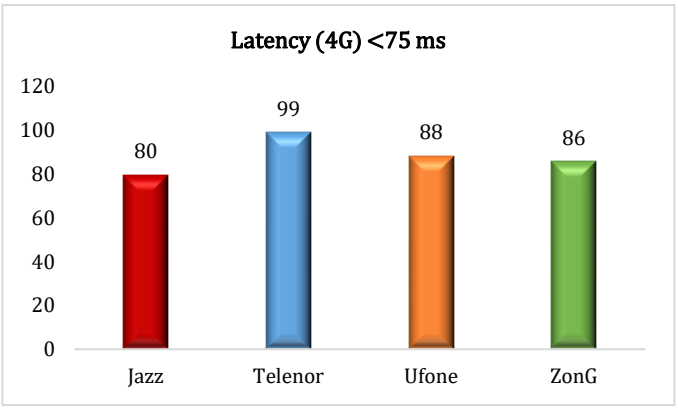
QUALITY OF SERVICE SURVEY RESULTS (4G) – HANGU



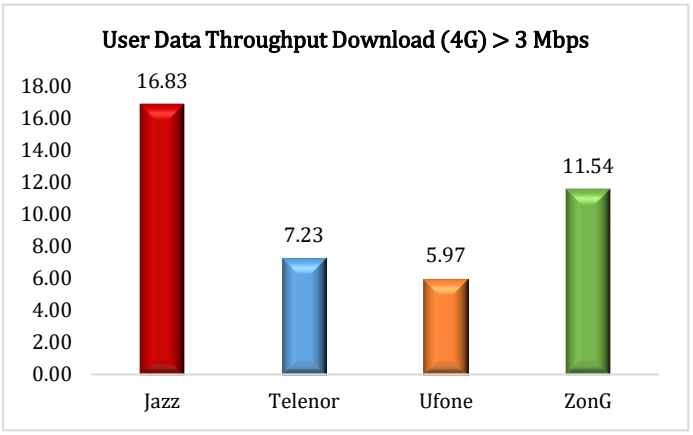


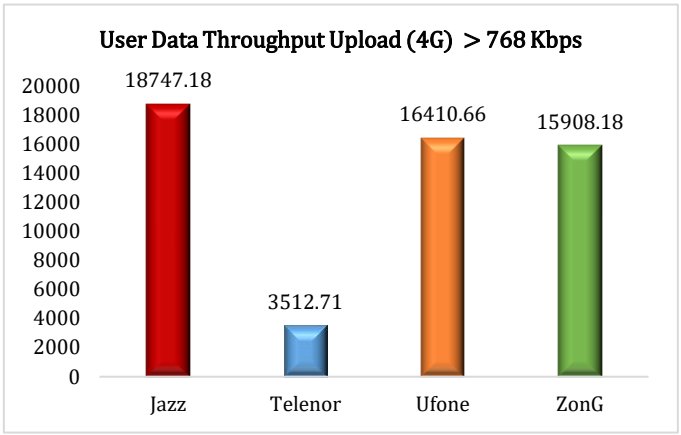


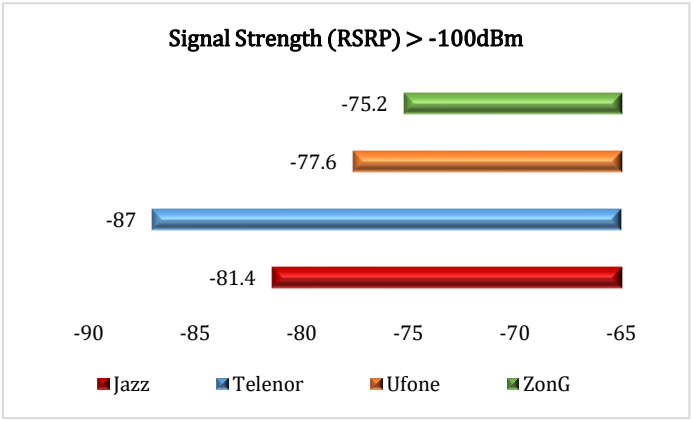


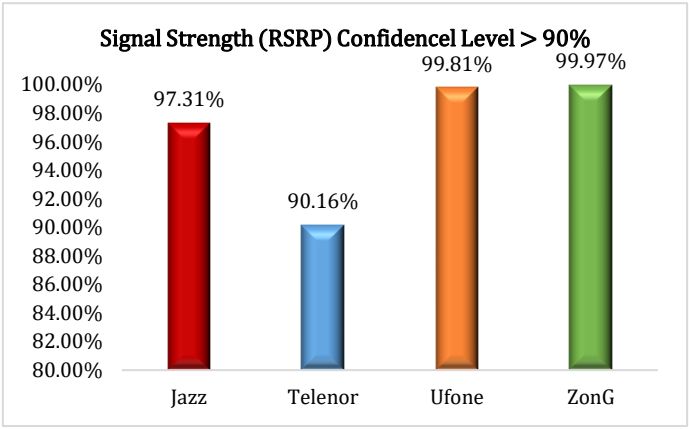


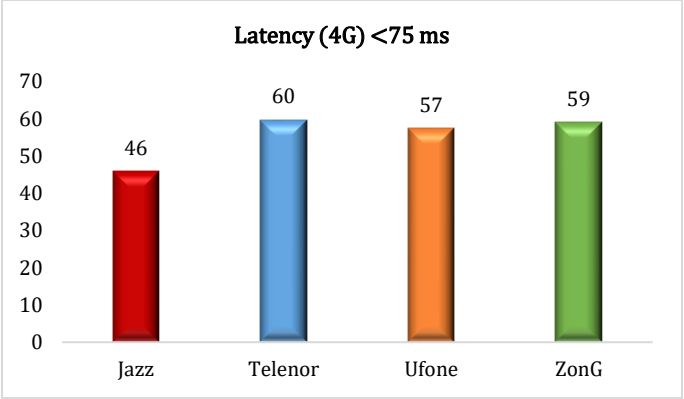
QUALITY OF SERVICE SURVEY RESULTS (4G) – KUCHLAK



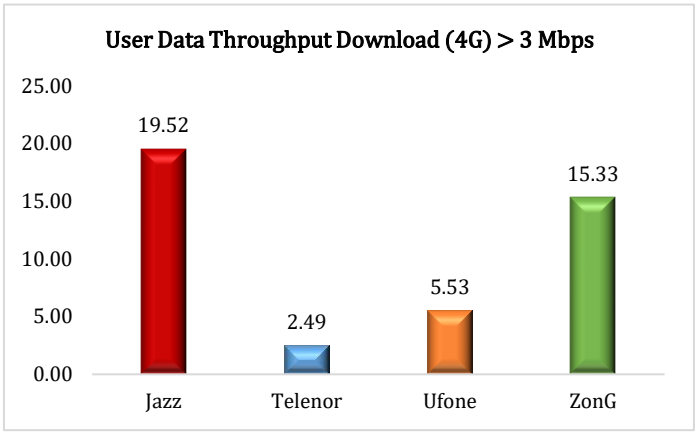


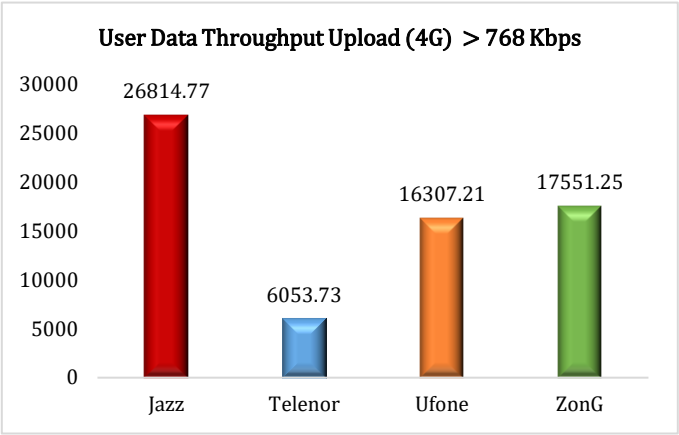


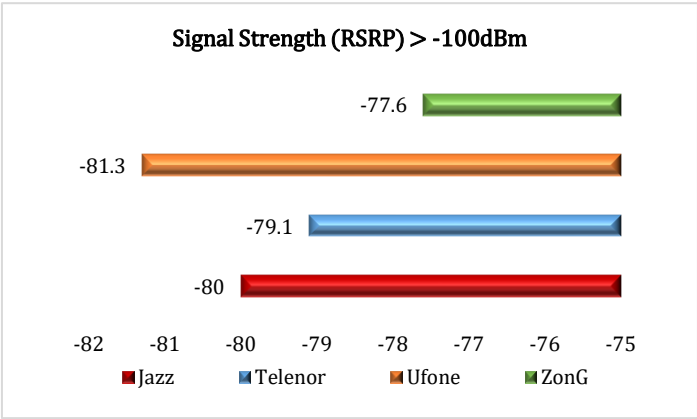


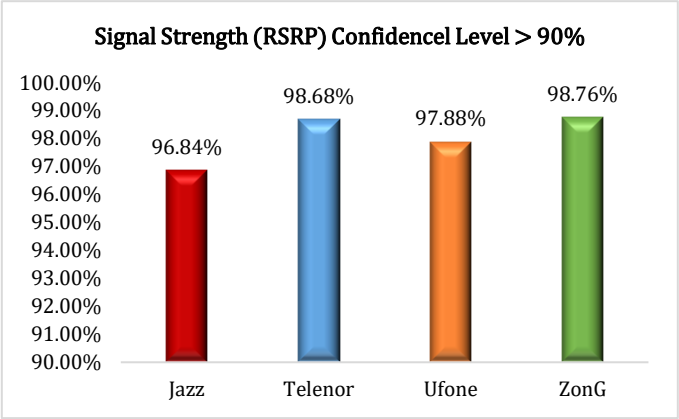


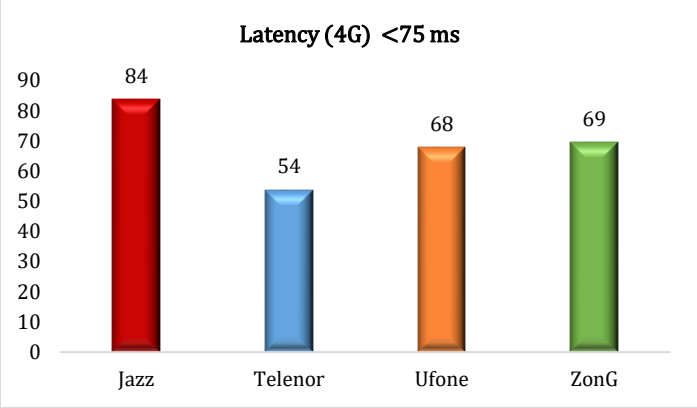
QUALITY OF SERVICE SURVEY RESULTS (4G) –ABBOTTABAD



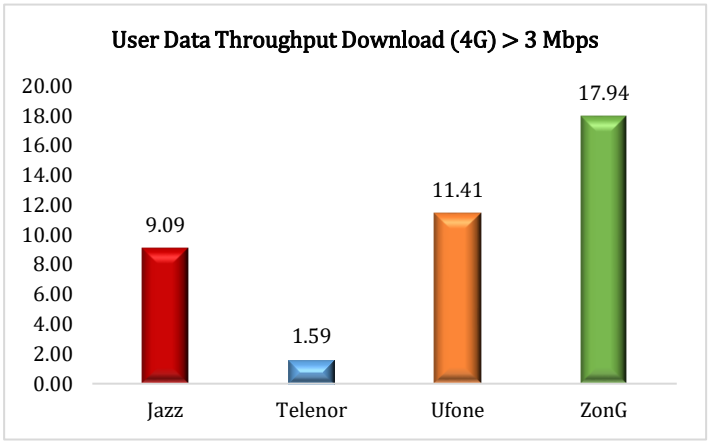


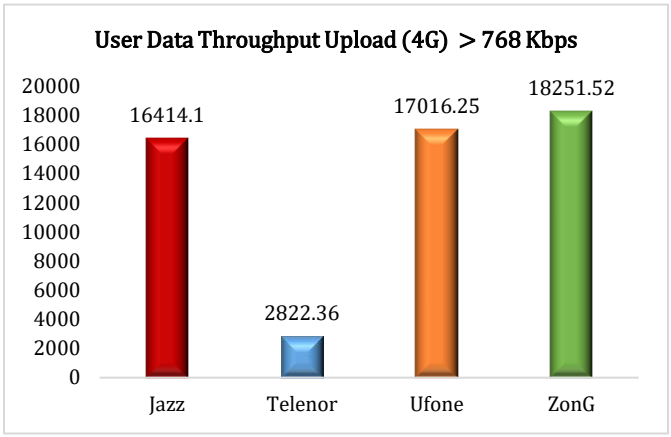


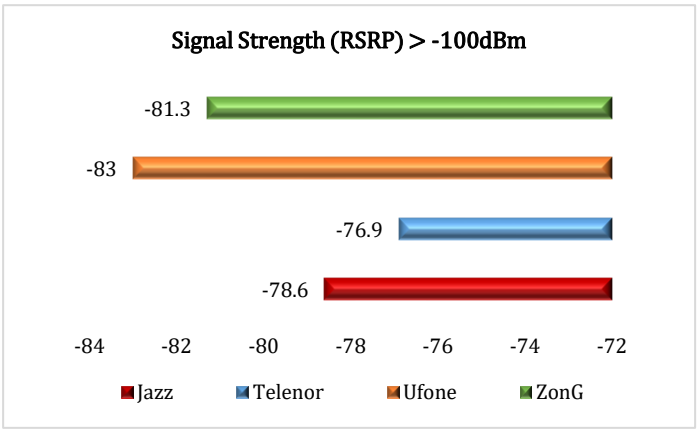


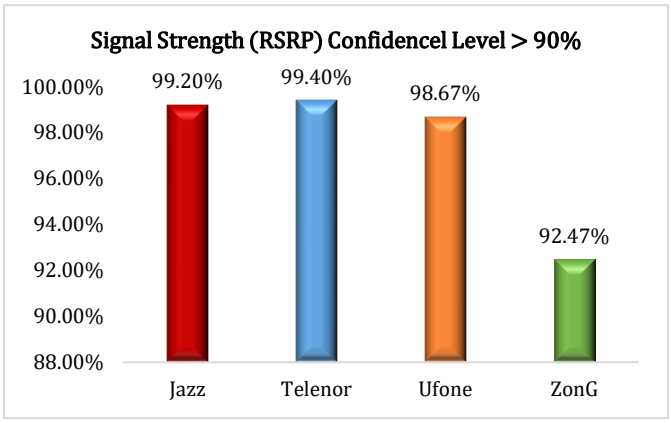


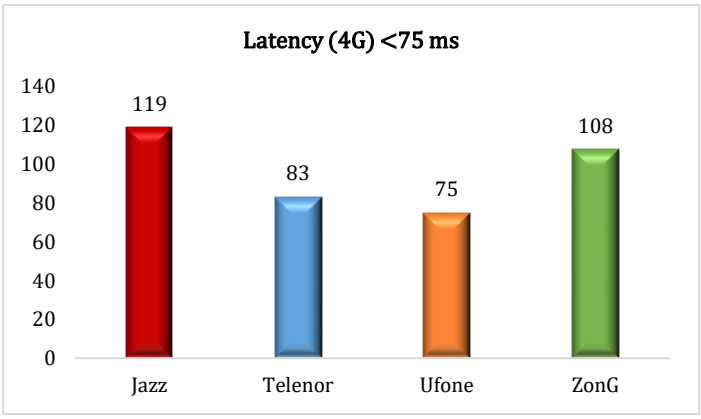
QUALITY OF SERVICE SURVEY RESULTS (4G) – LOWER DIR



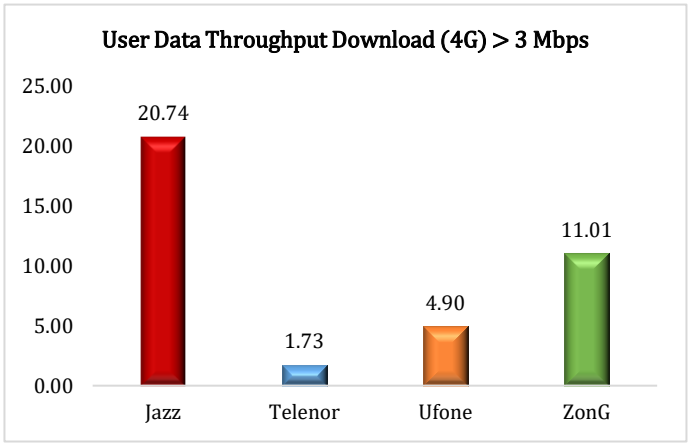


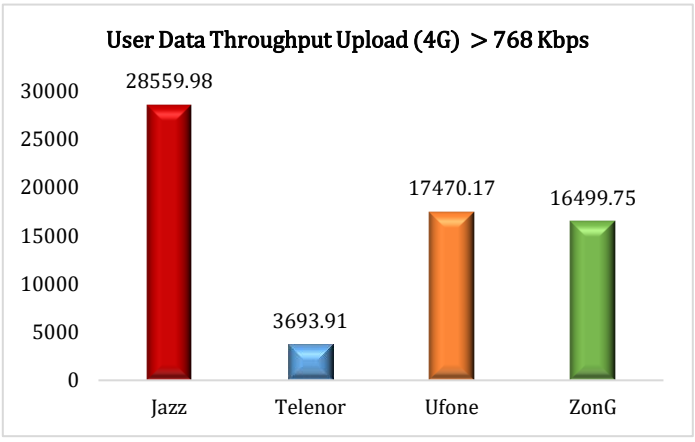


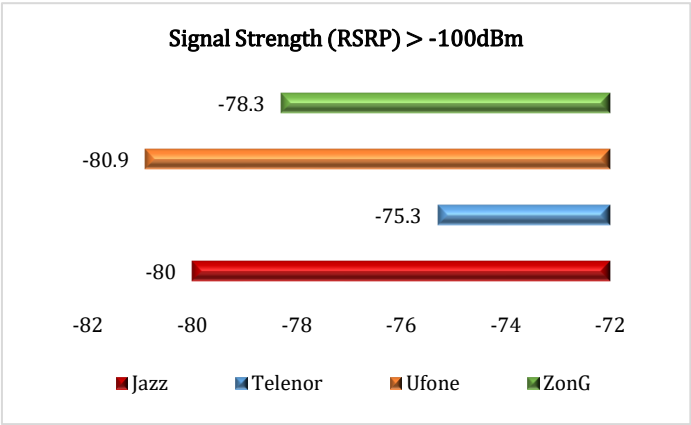


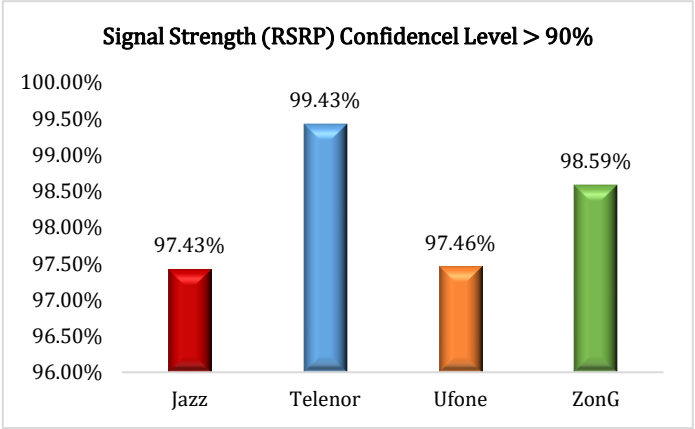


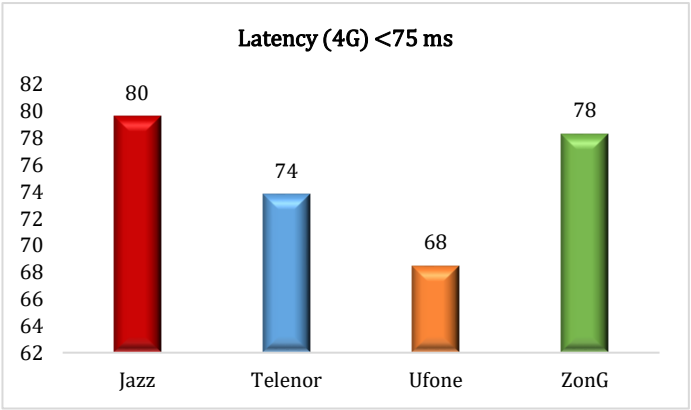
QUALITY OF SERVICE SURVEY RESULTS (4G) – MANSEHRA



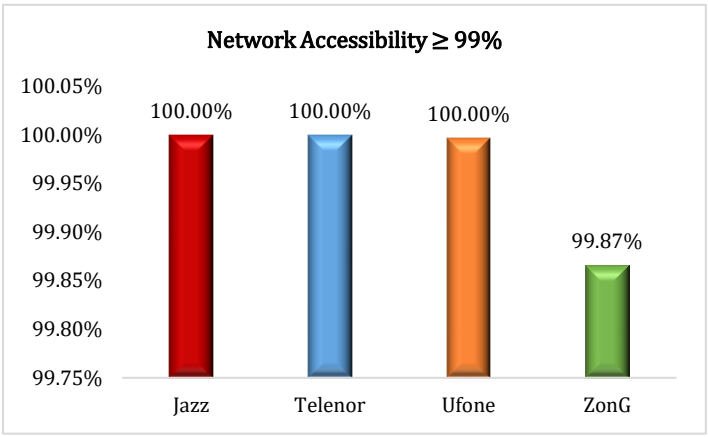


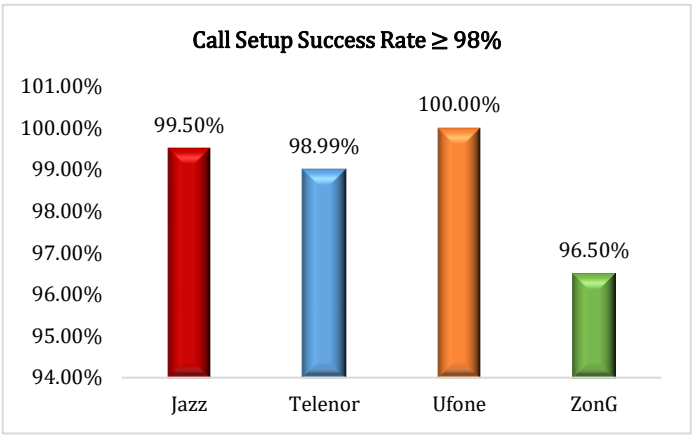


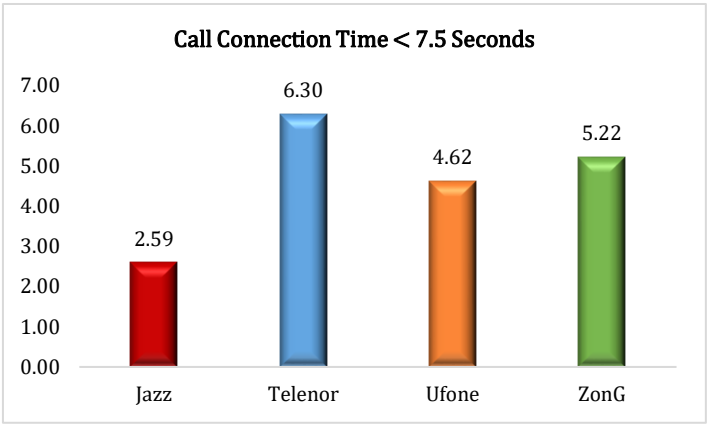


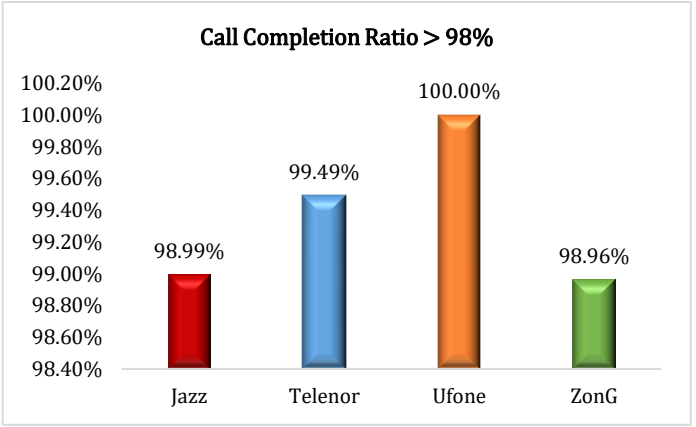


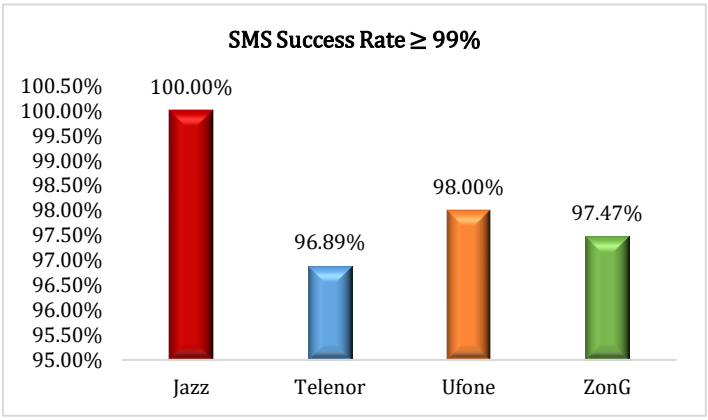
QUALITY OF SERVICE SURVEY RESULTS – MATIARI

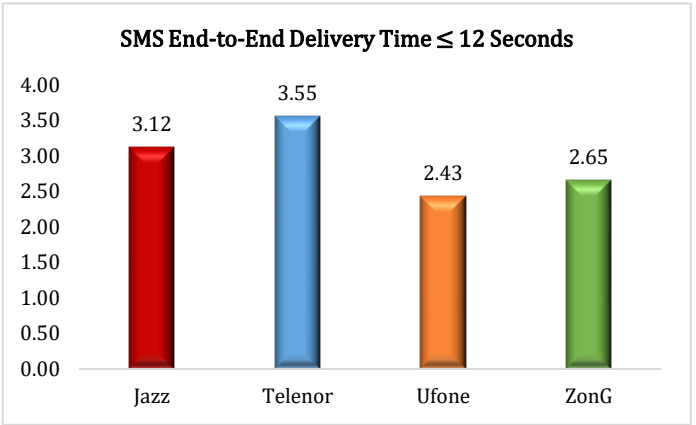


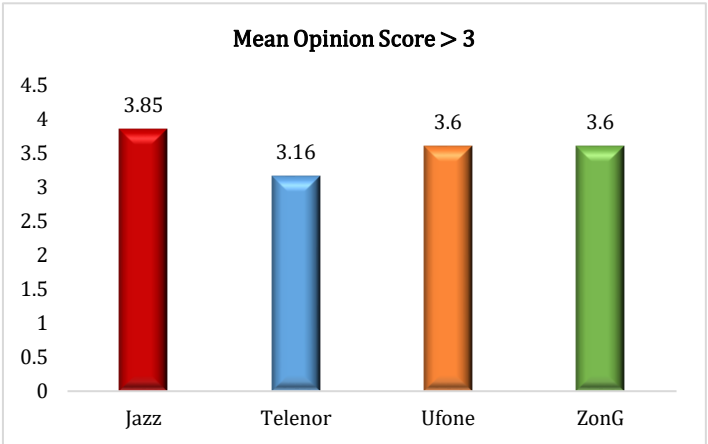




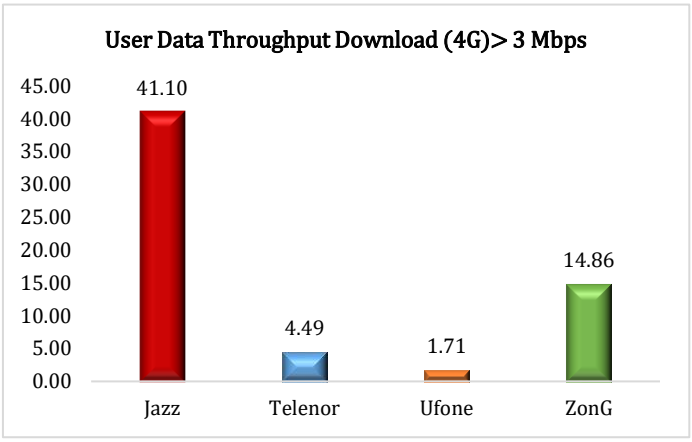


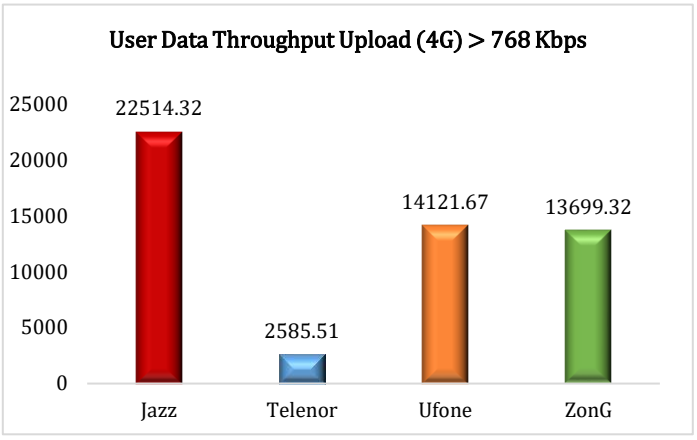


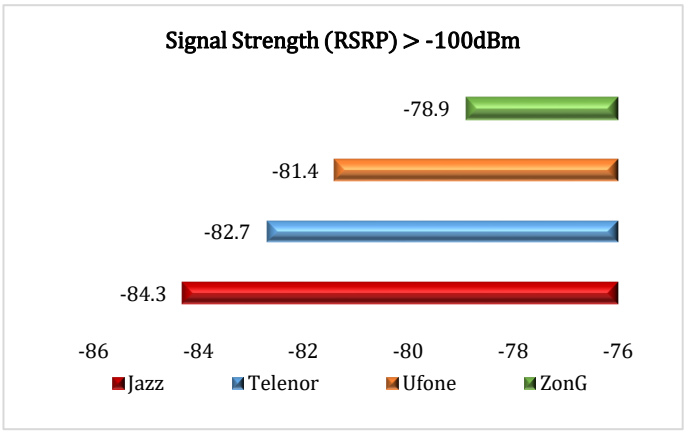


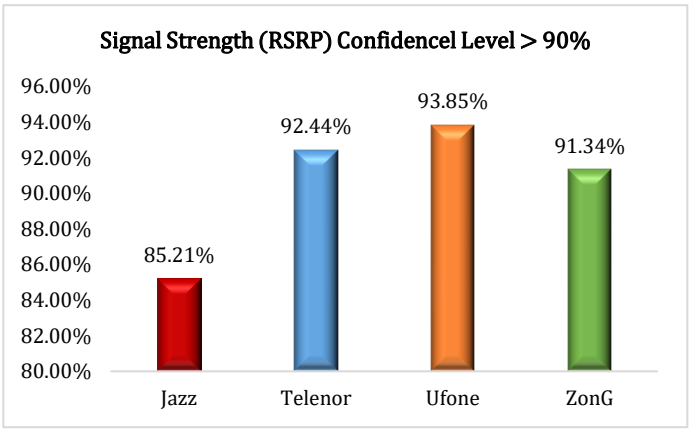


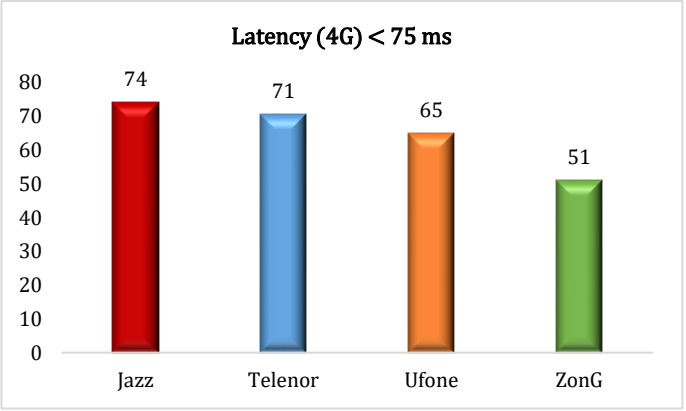
QUALITY OF SERVICE SURVEY RESULTS (4G) – MACH



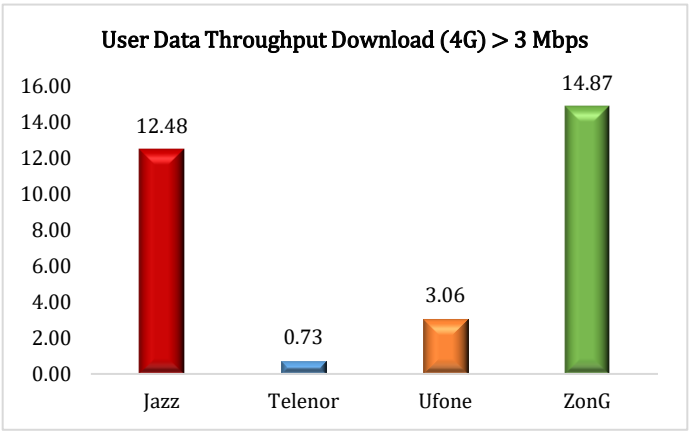


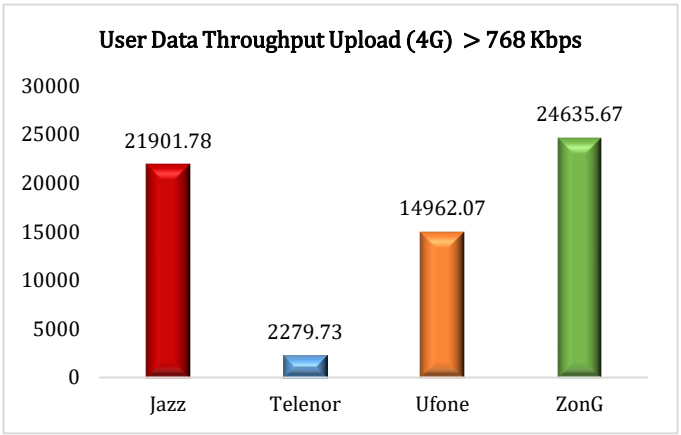


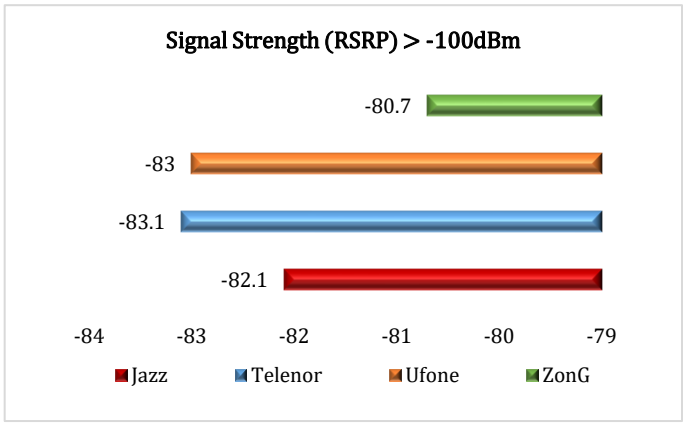


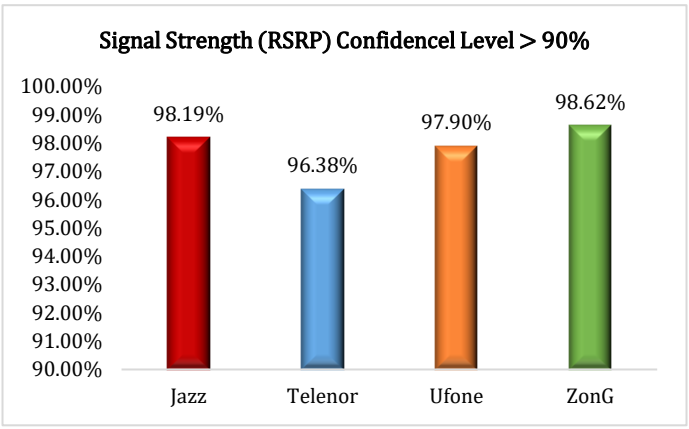


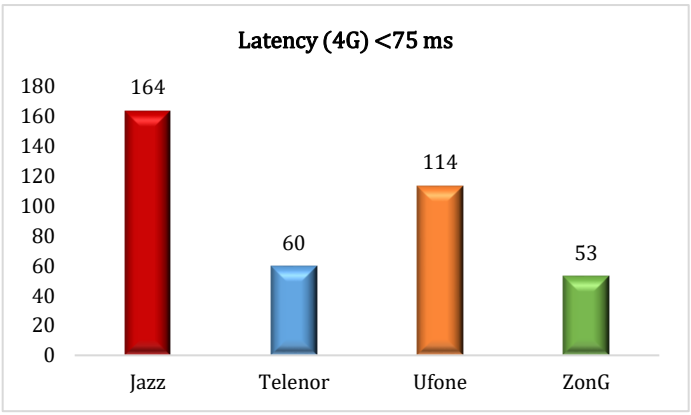
QUALITY OF SERVICE SURVEY RESULTS (4G) – PASROOR



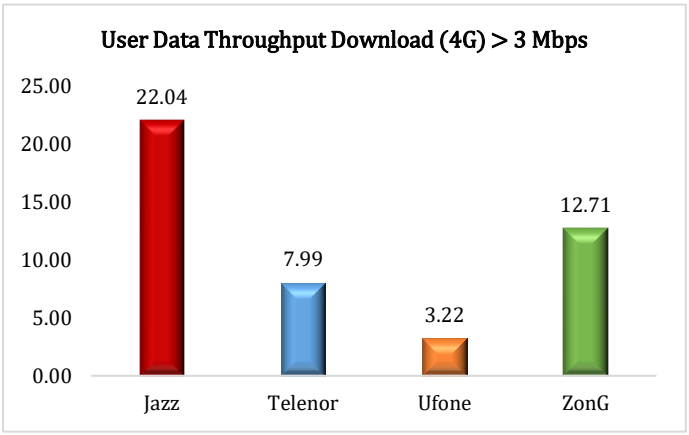


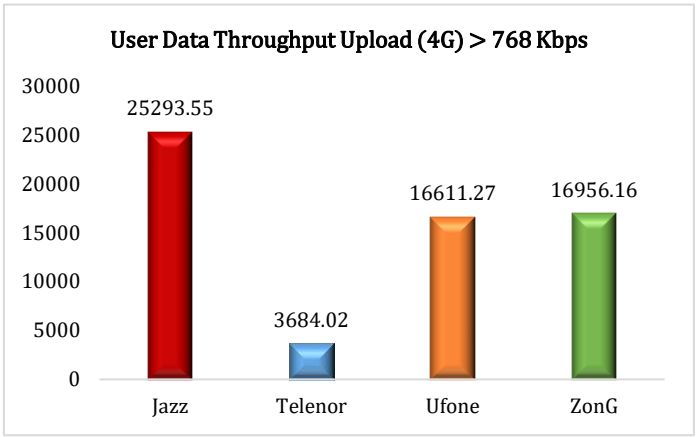


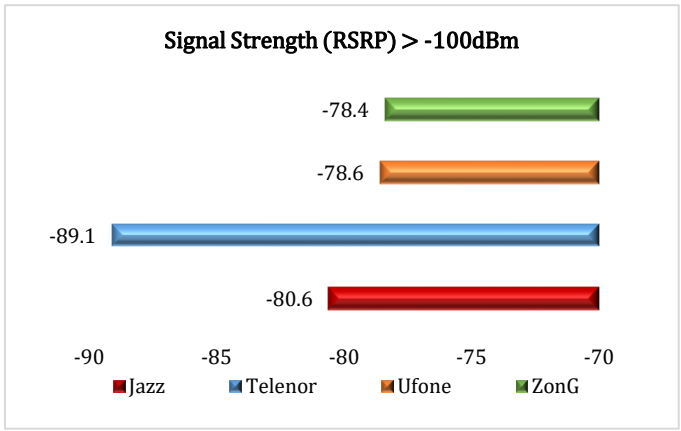


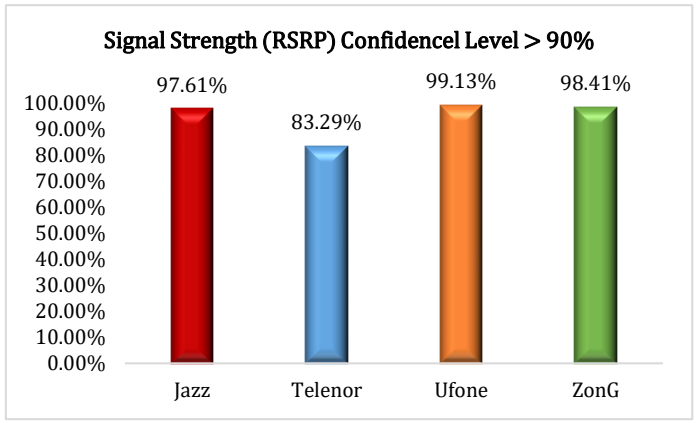


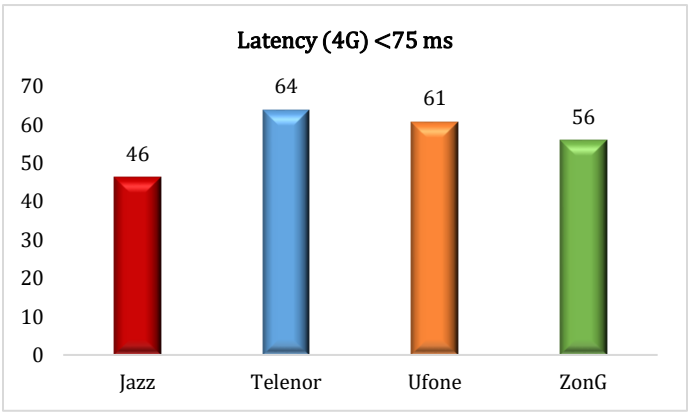
QUALITY OF SERVICE SURVEY RESULTS (4G) – PISHIN



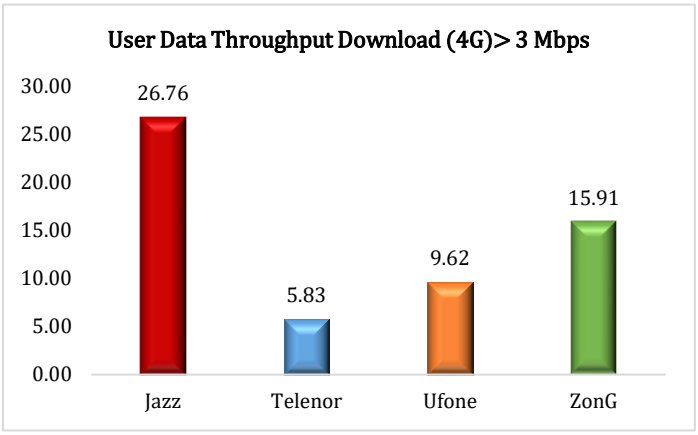


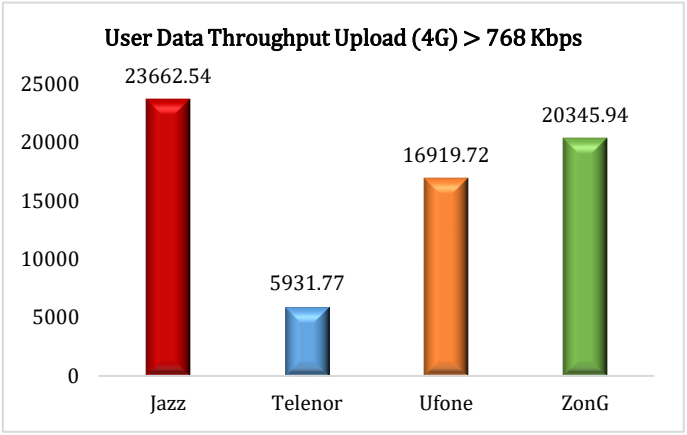


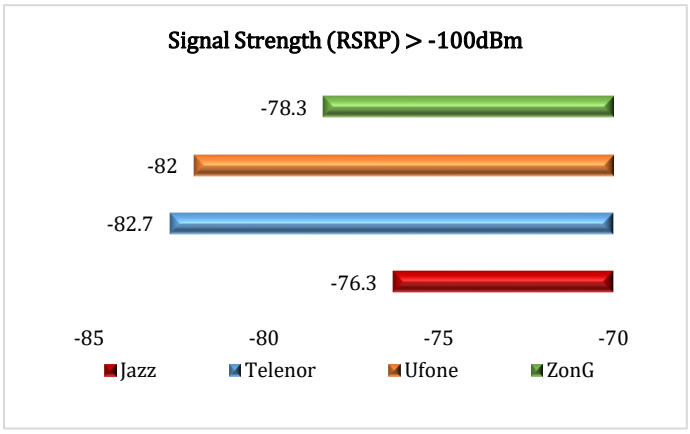


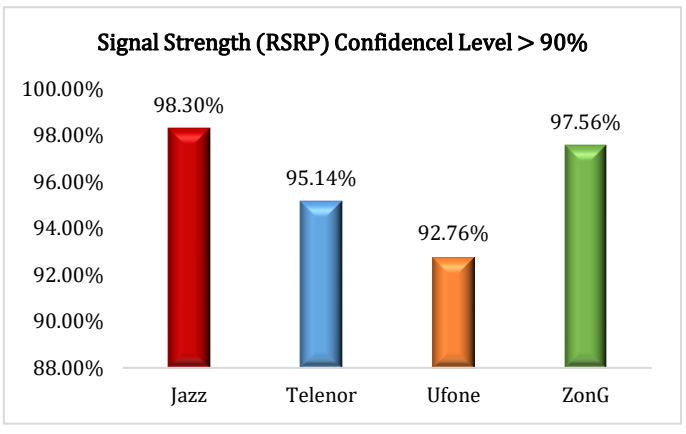


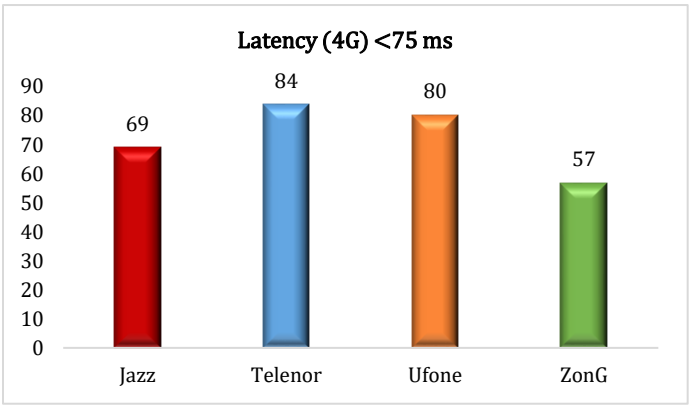
QUALITY OF SERVICE SURVEY RESULTS (4G) – SARGODHA



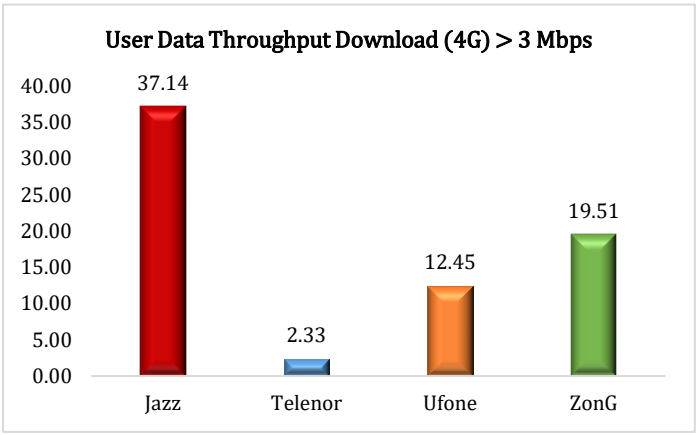


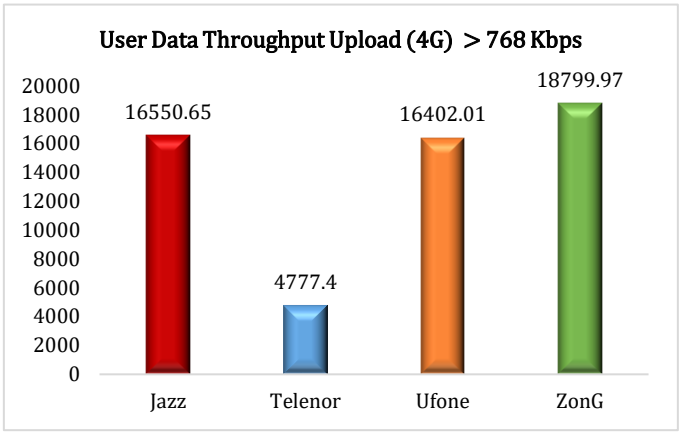


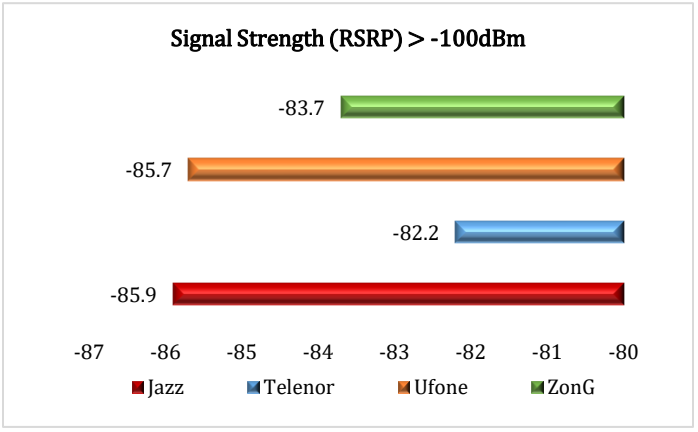


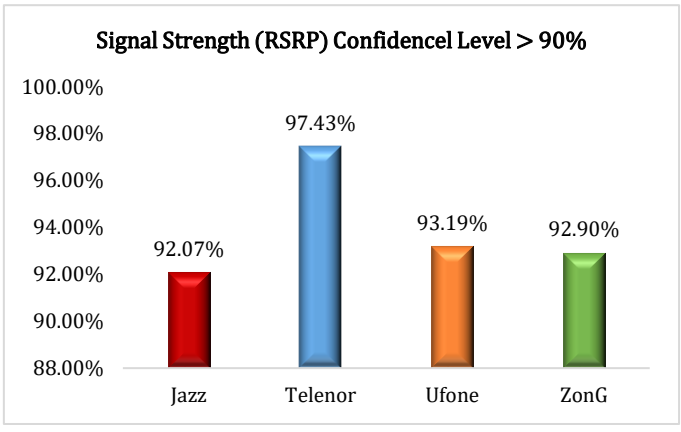


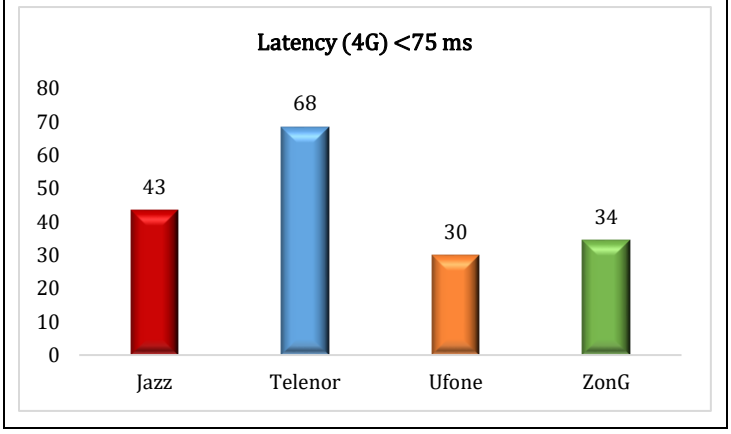
QUALITY OF SERVICE SURVEY RESULTS (4G) – UMER KOT







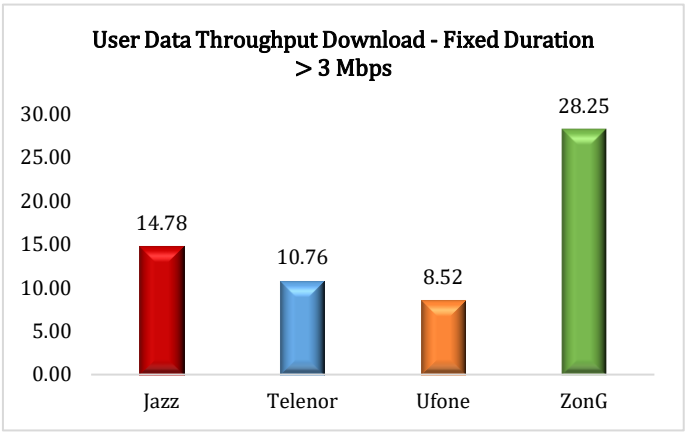


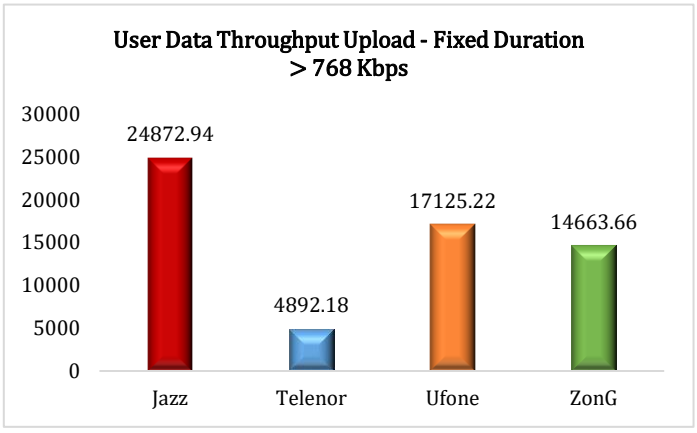


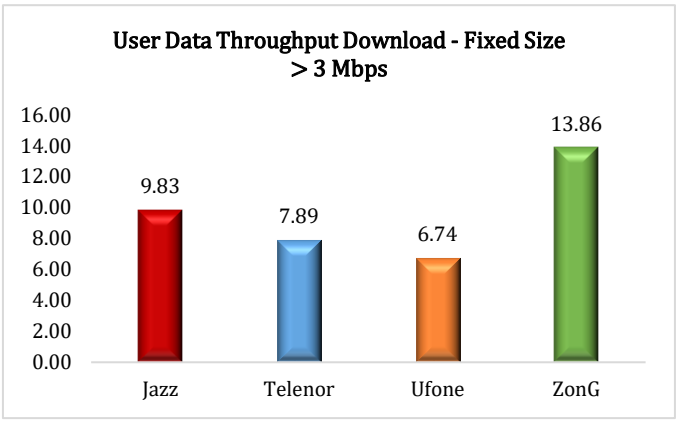
Annex -B(Data QoS Results)

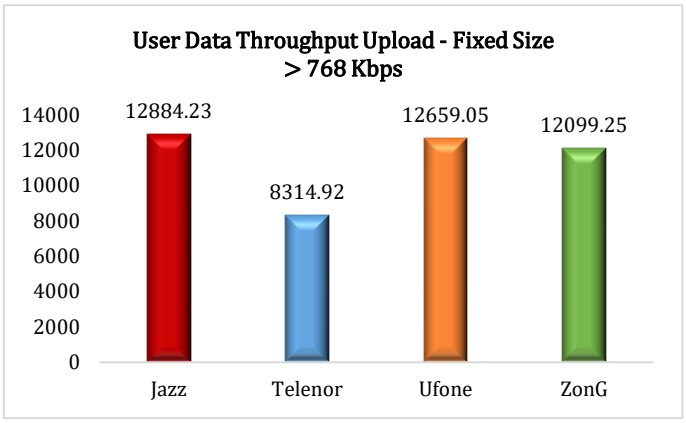
AUTOMODE

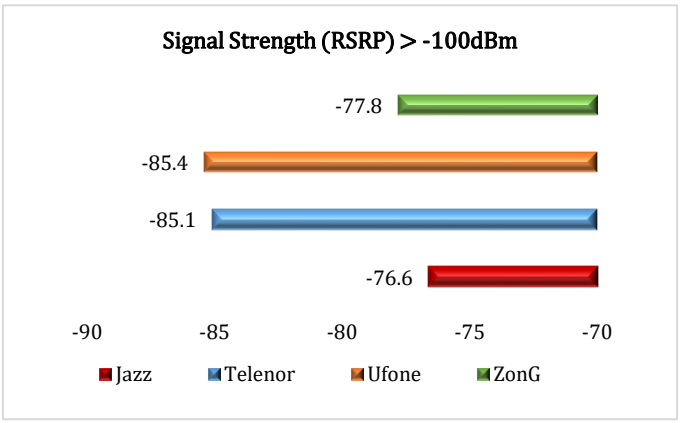
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – SUKKUR

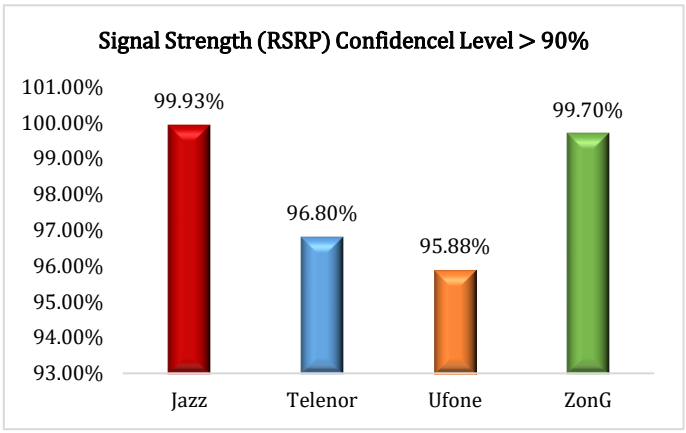


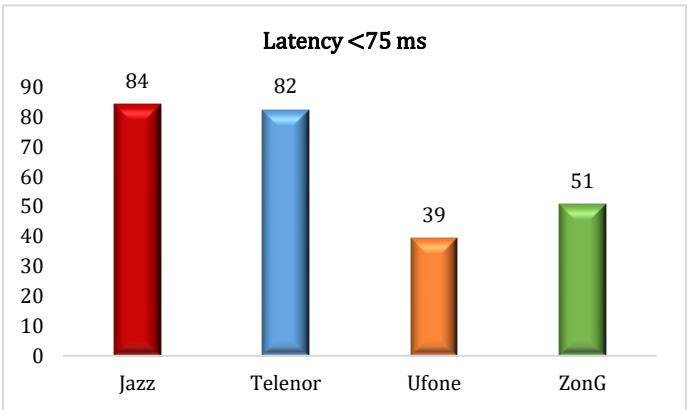


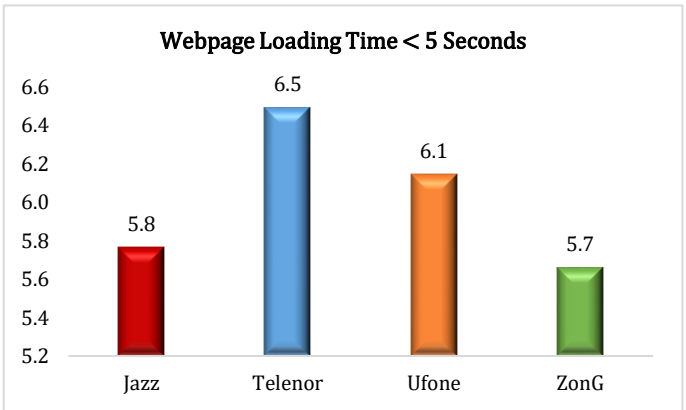




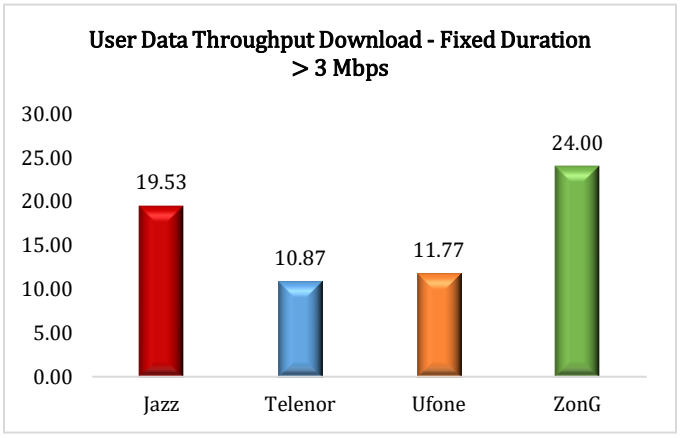


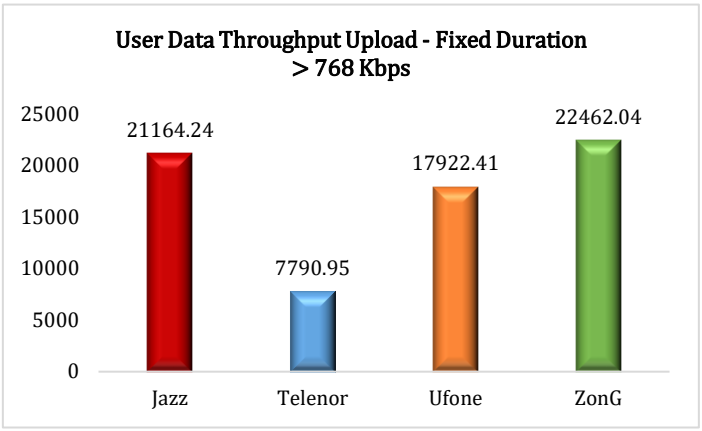


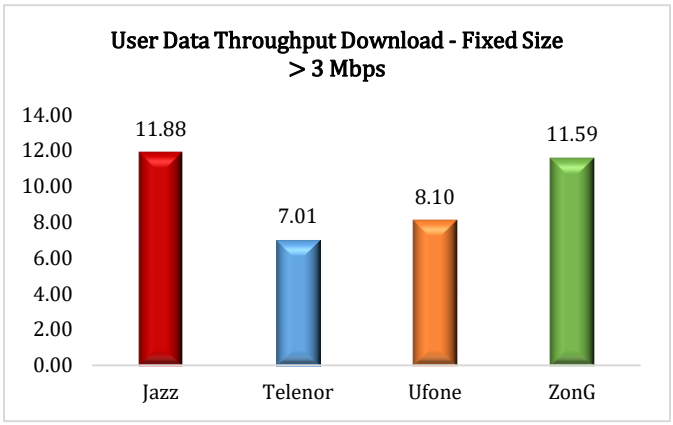


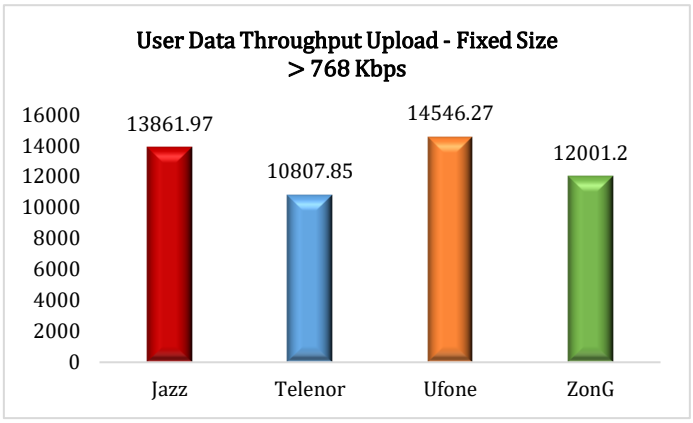


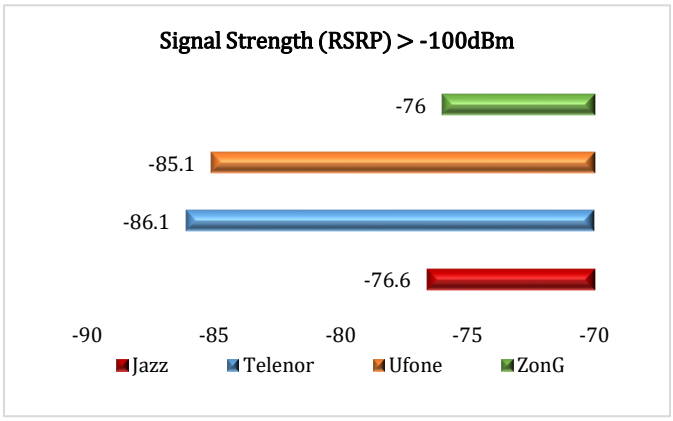
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – BAHAWALPUR

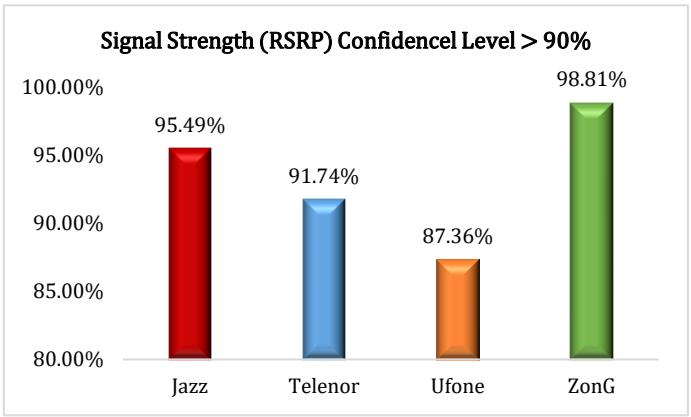


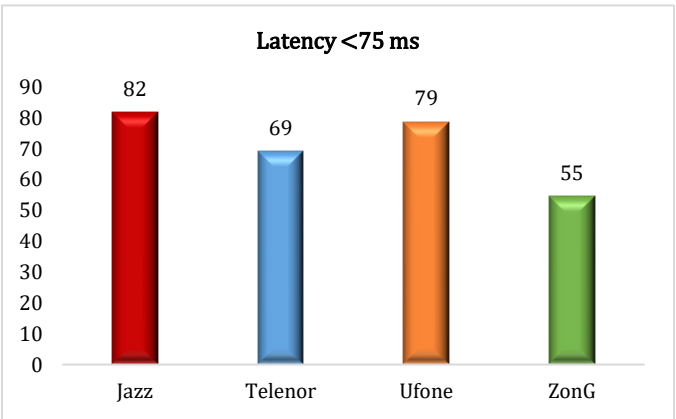


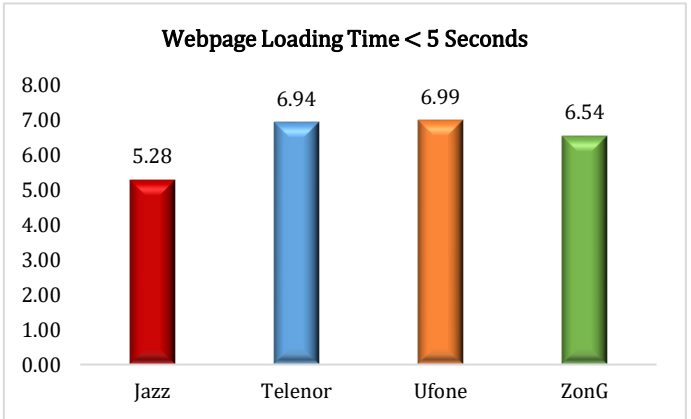




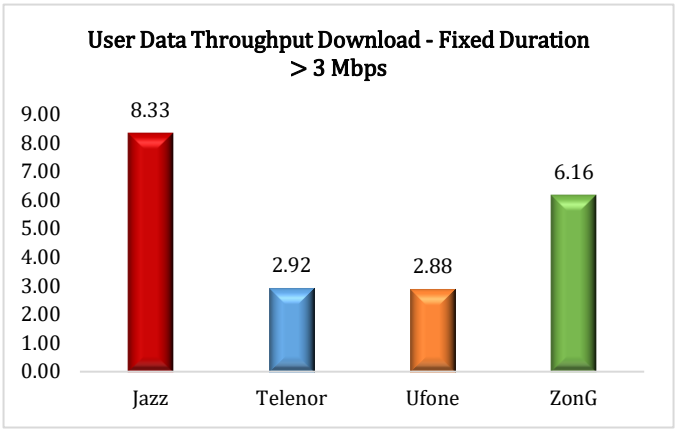


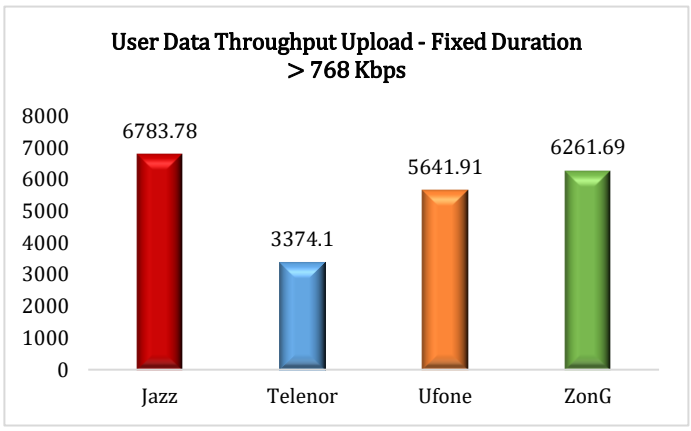


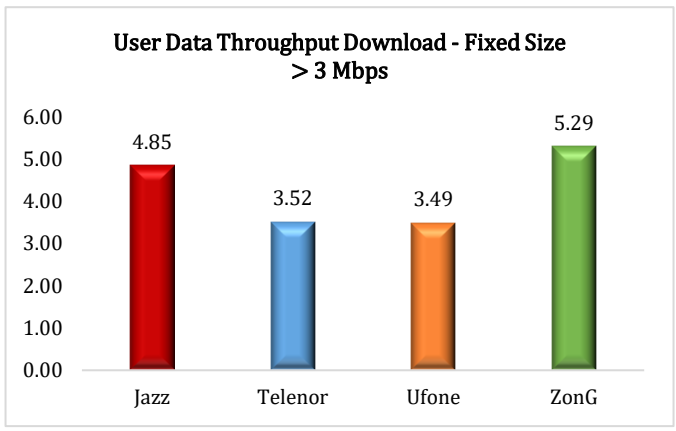


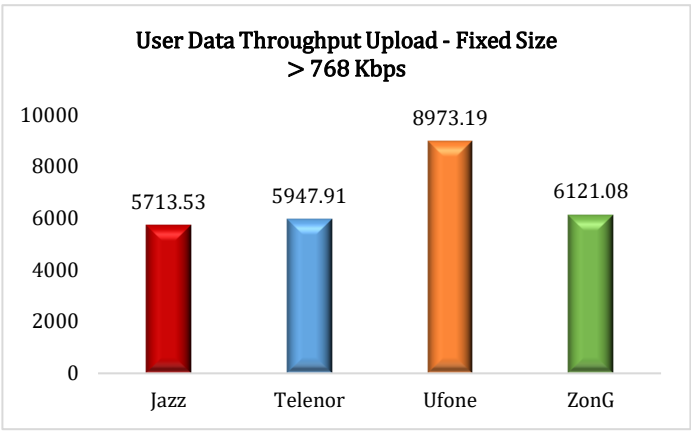


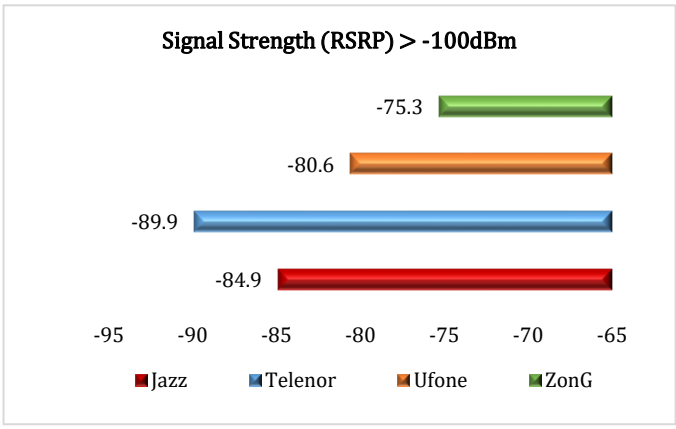
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – CHARSADDA

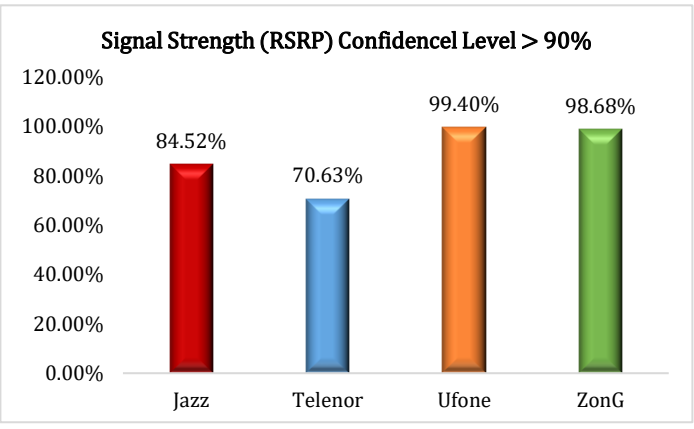


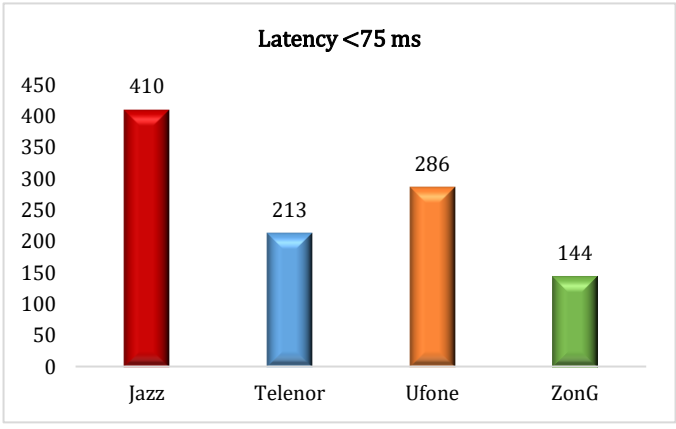


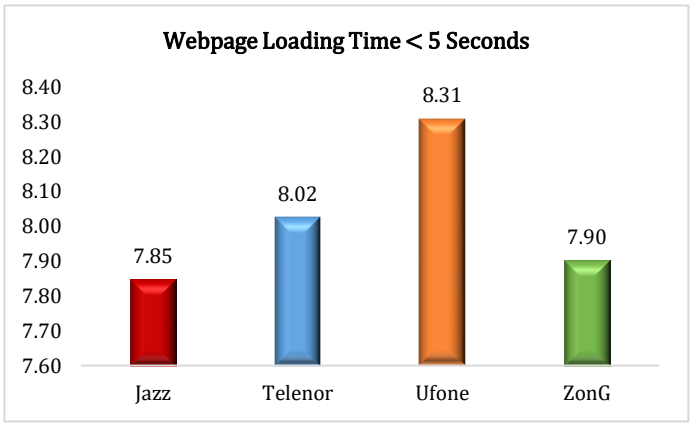




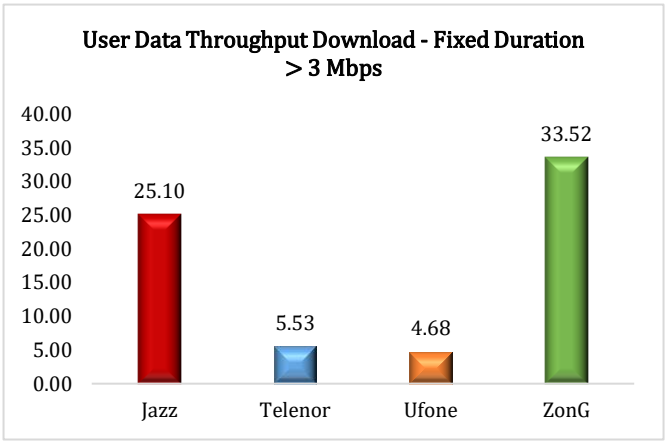


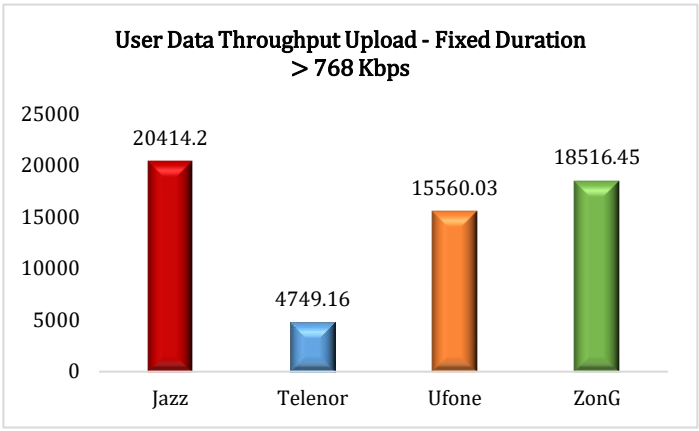


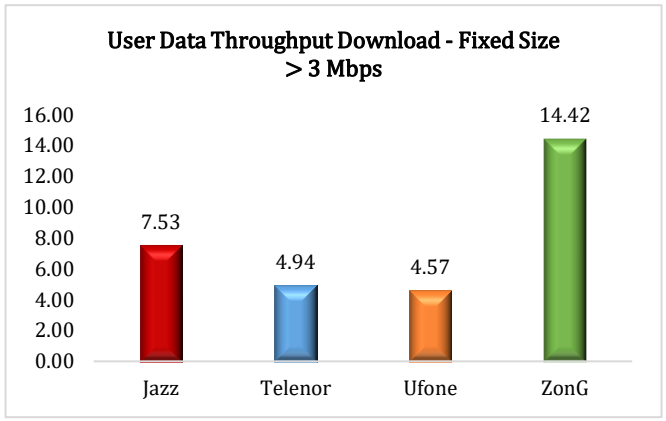


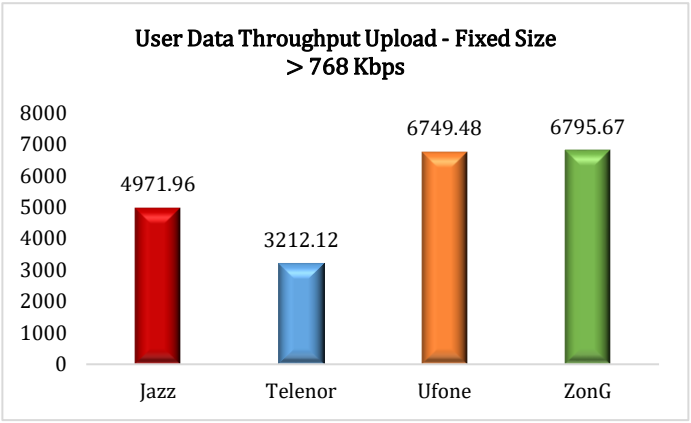


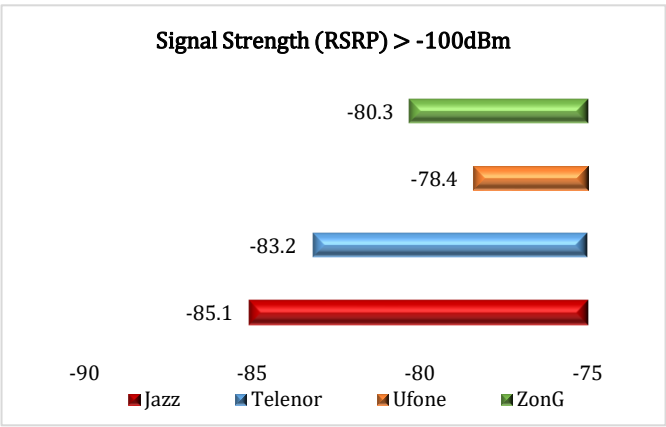
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – GWADAR

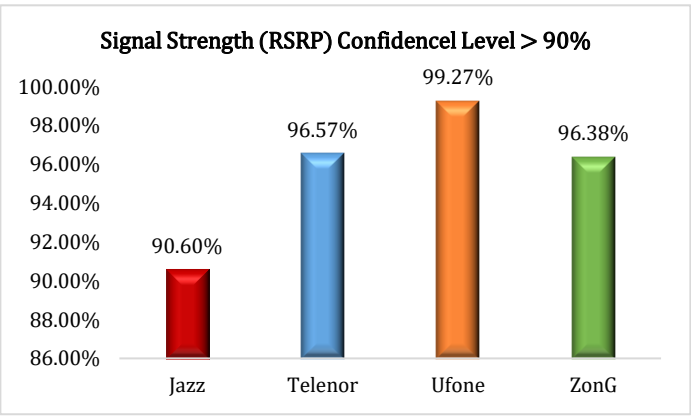


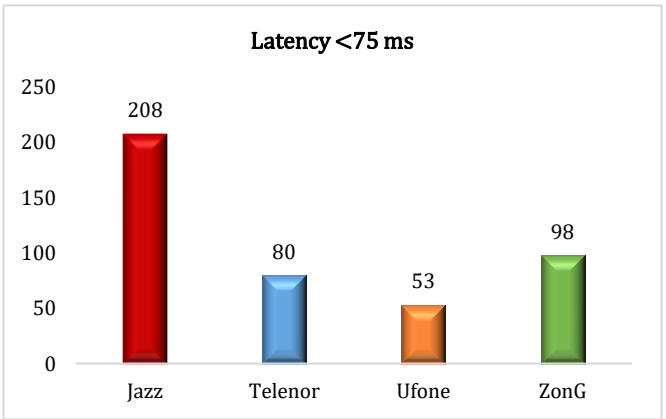


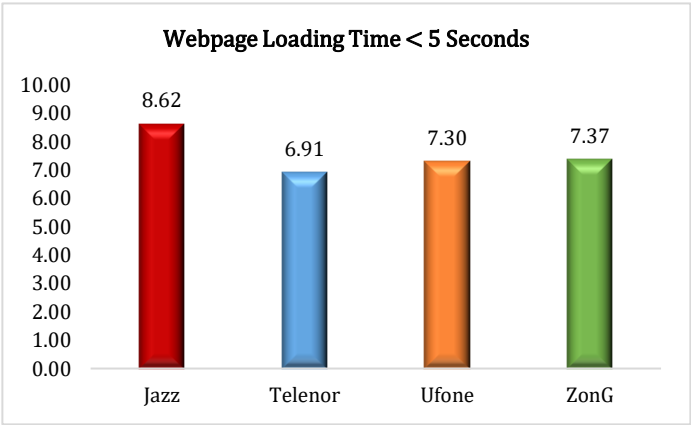




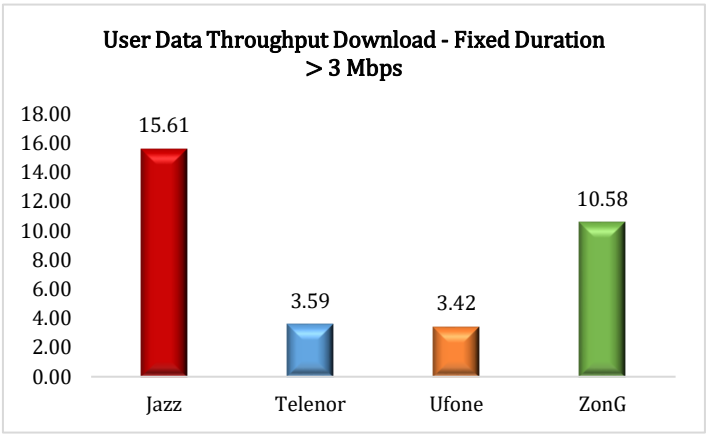


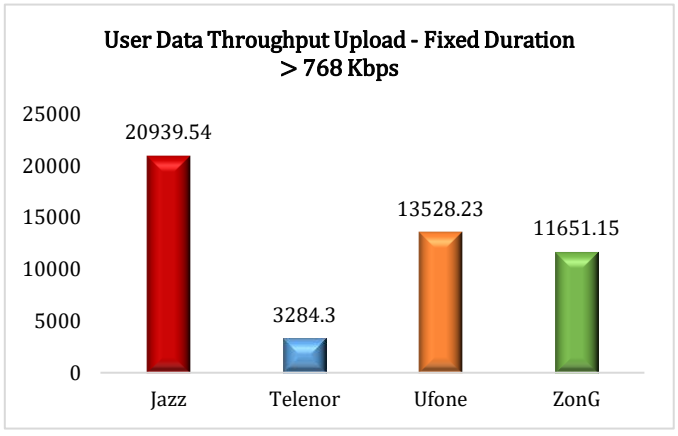


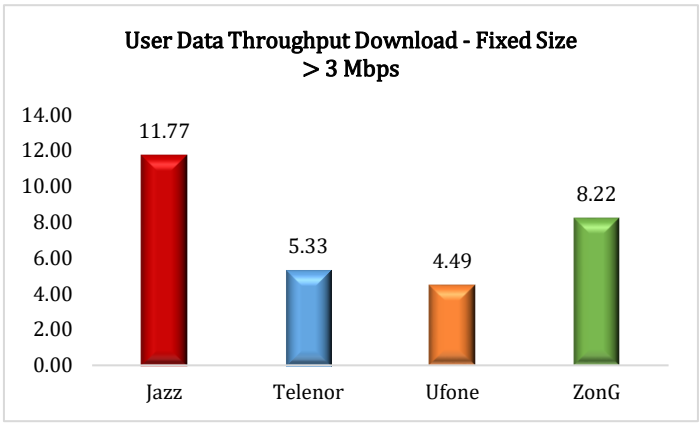


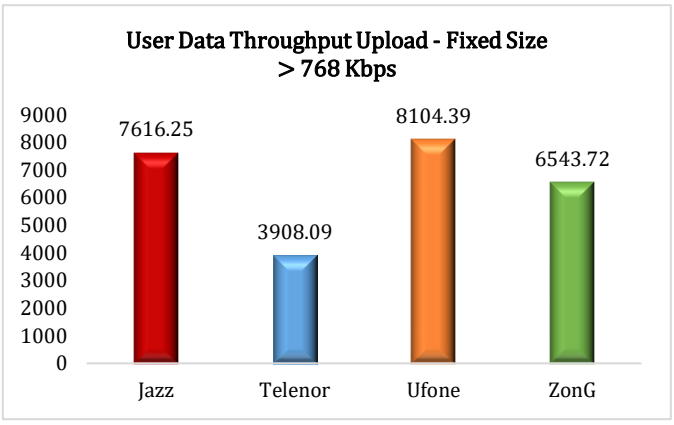


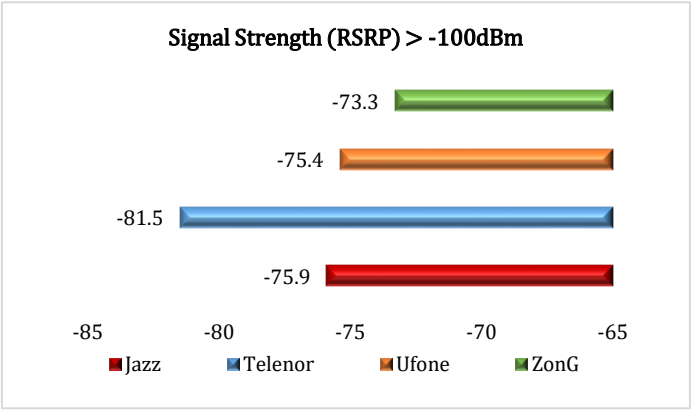
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – QUETTA

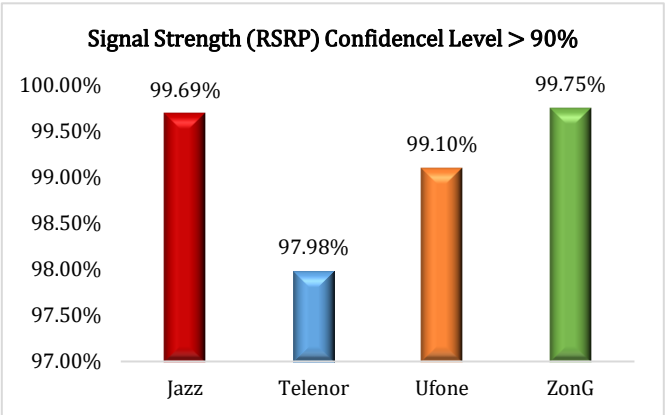


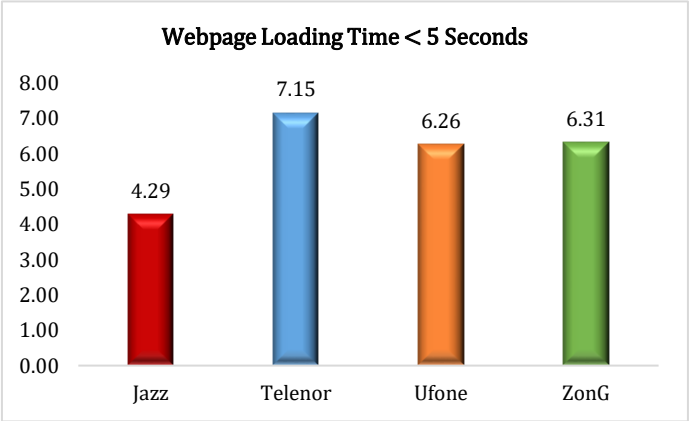


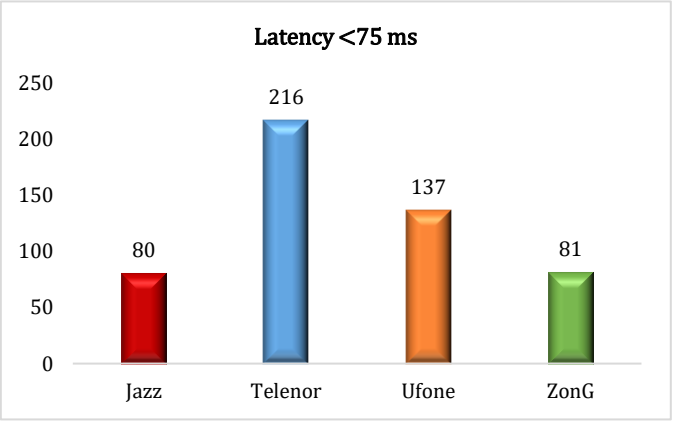




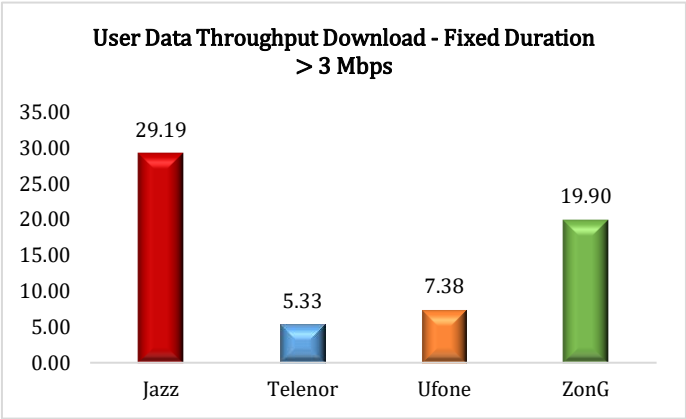


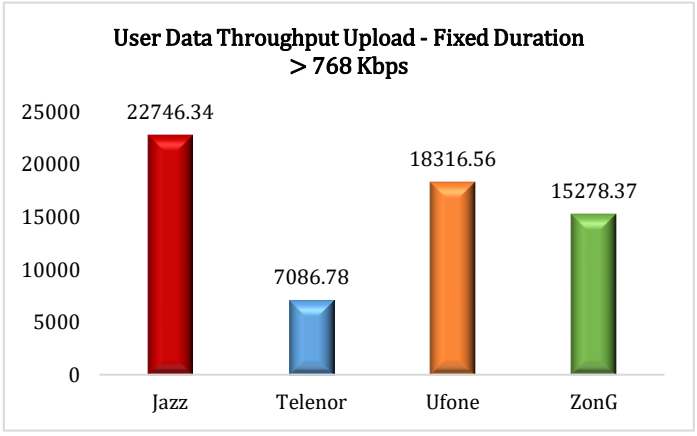


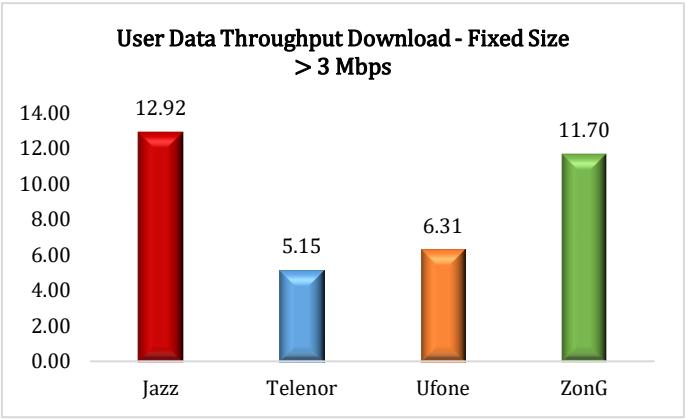


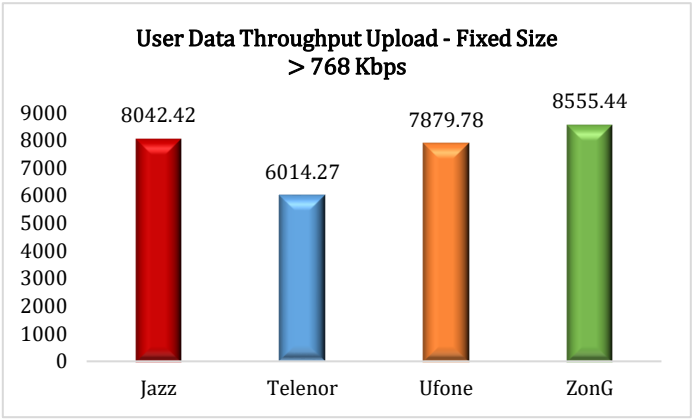


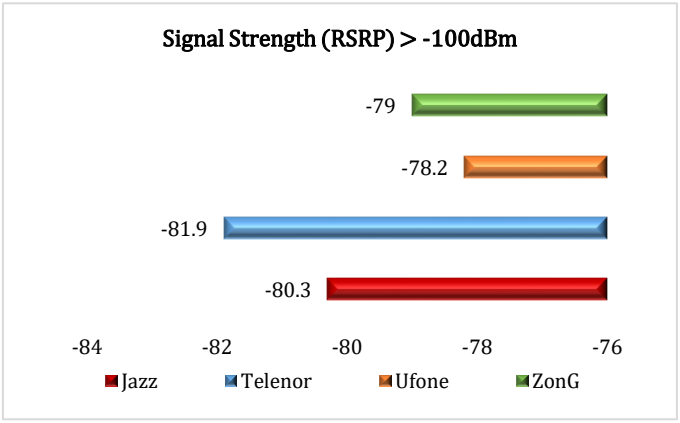
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – ISLAMABAD

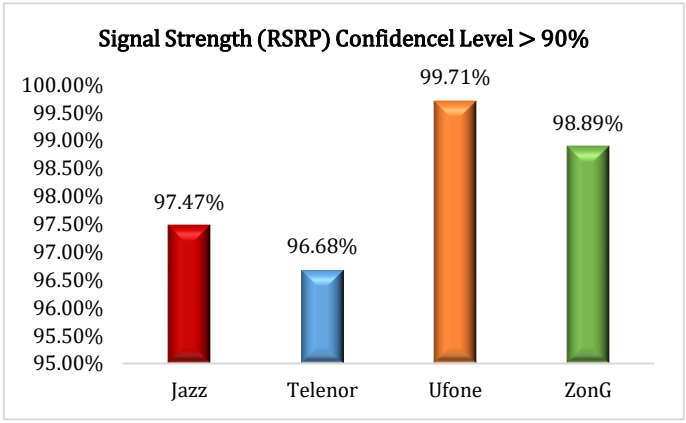


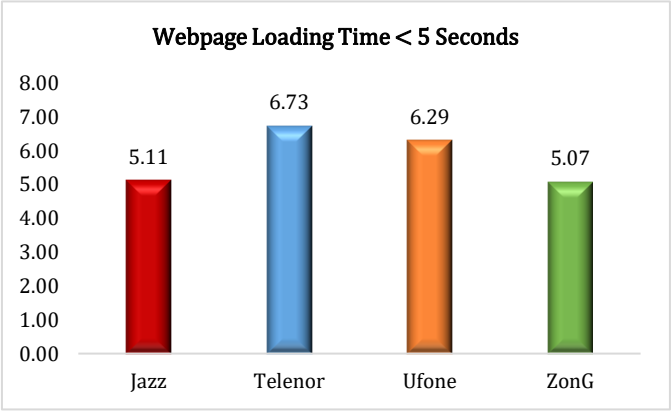


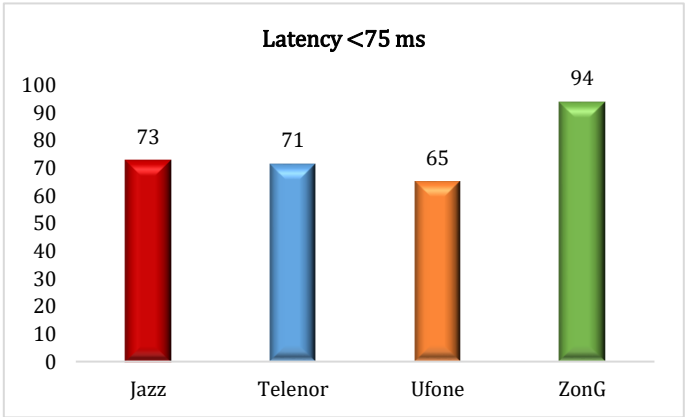




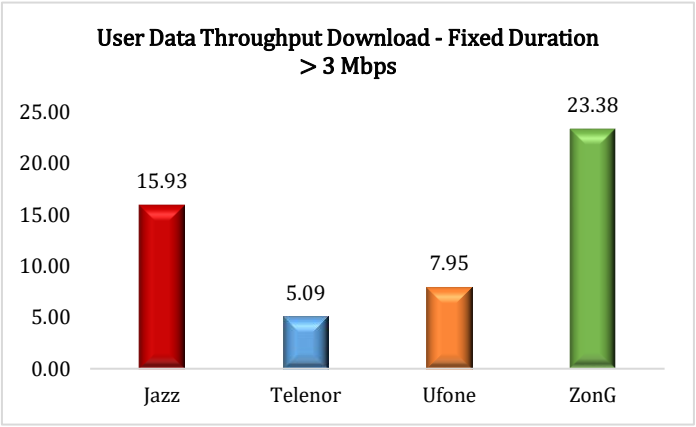


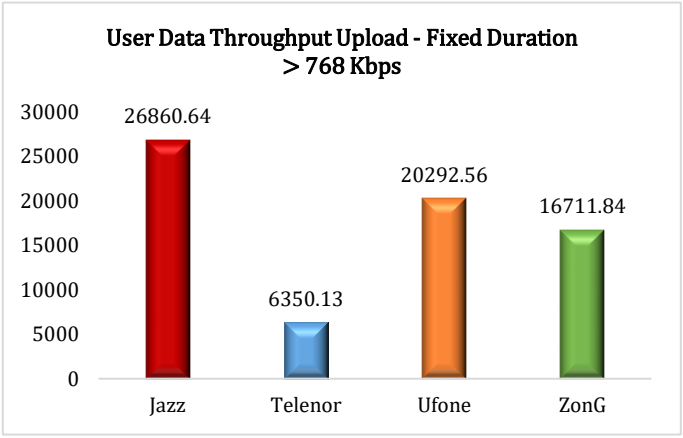


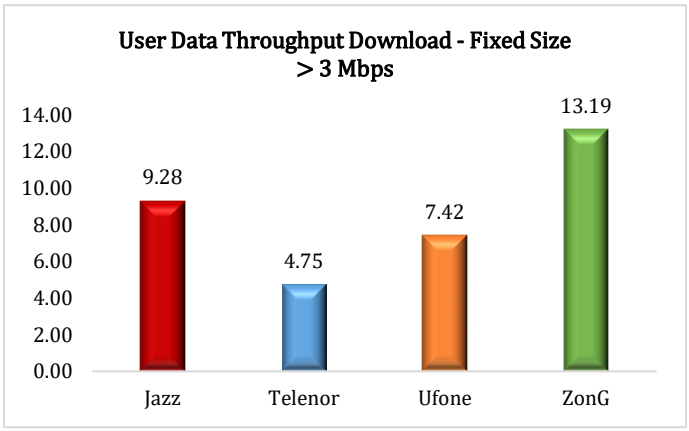


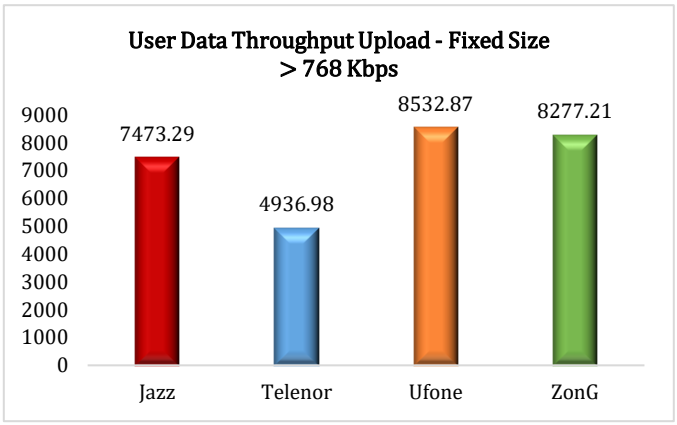


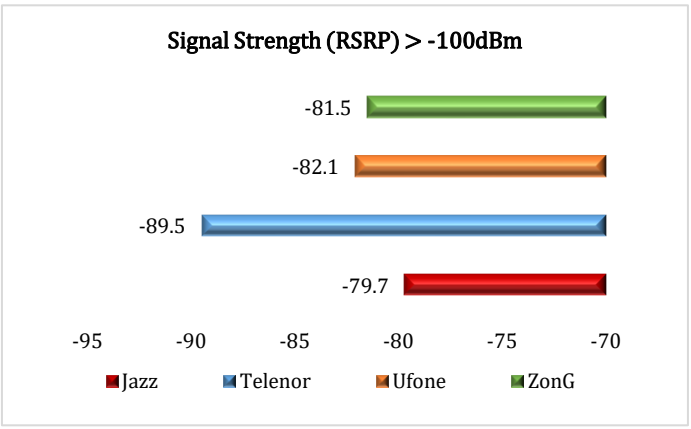
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – KOT RADHA KISHAN

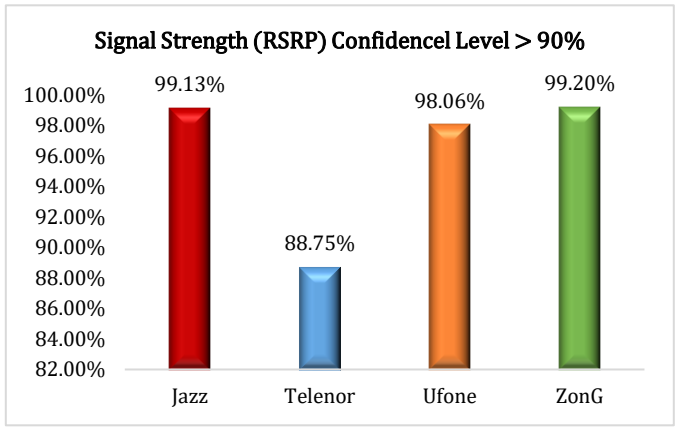


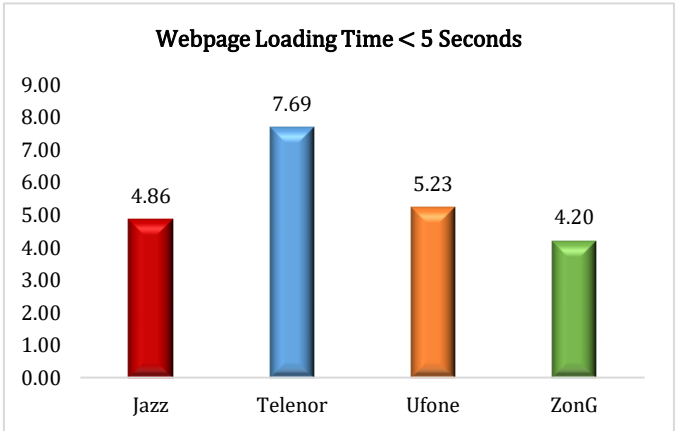


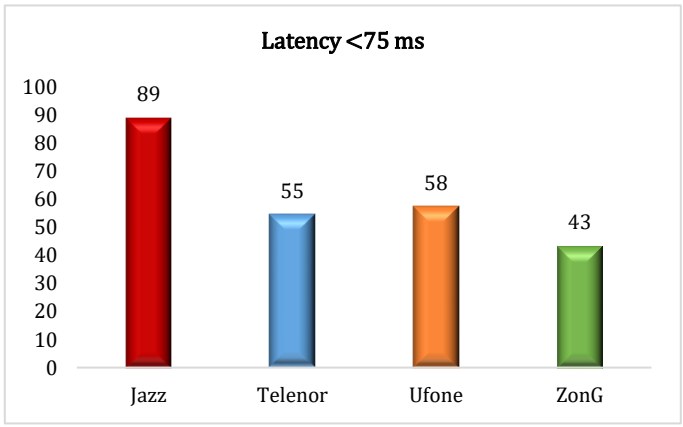




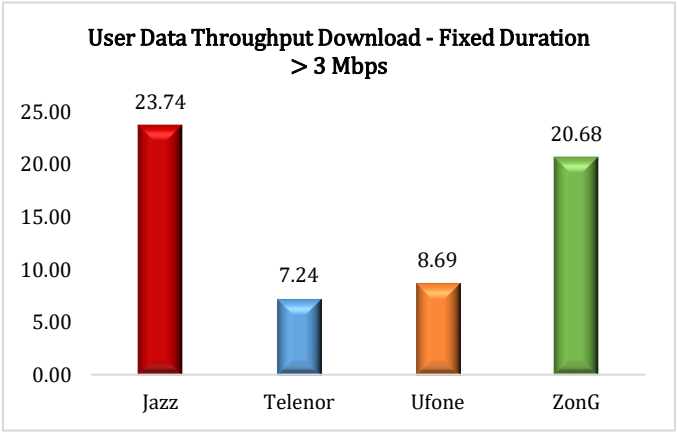


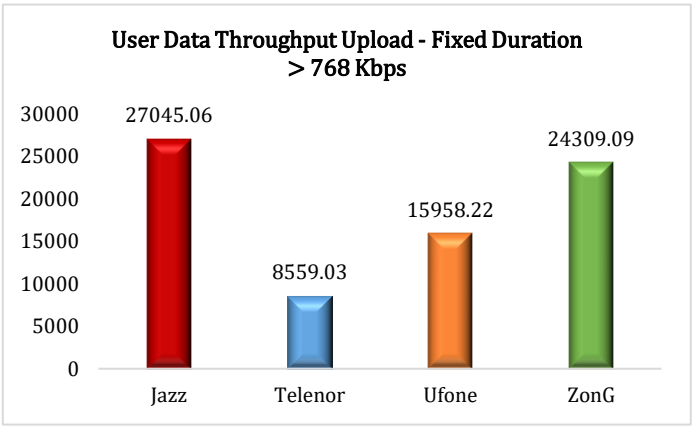


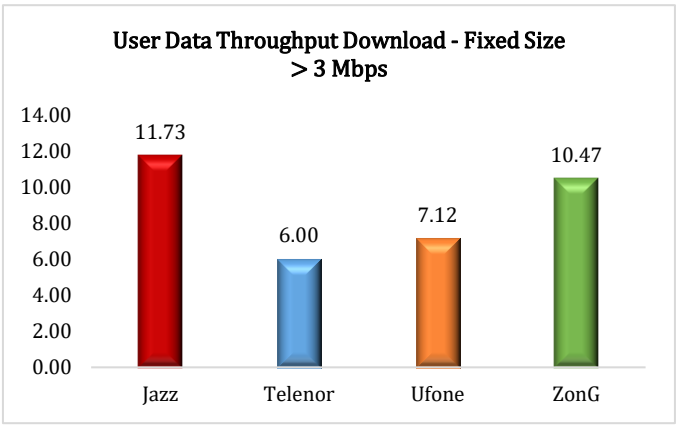


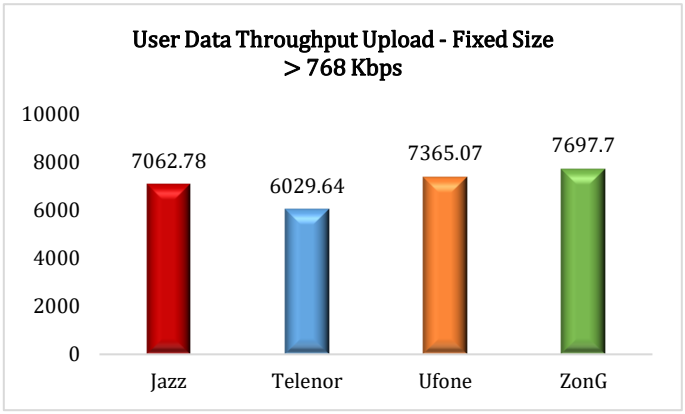


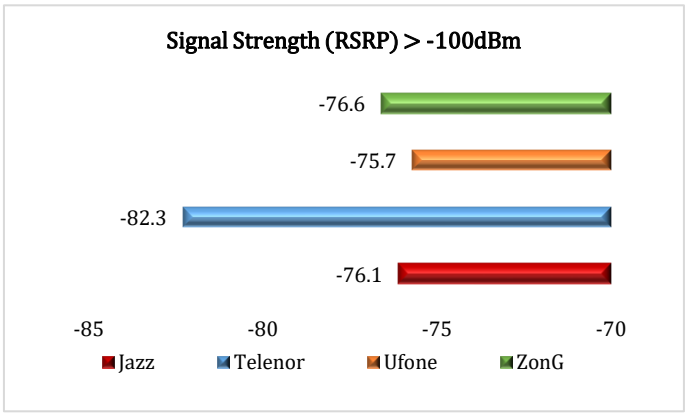
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – SHEIKHUPURA

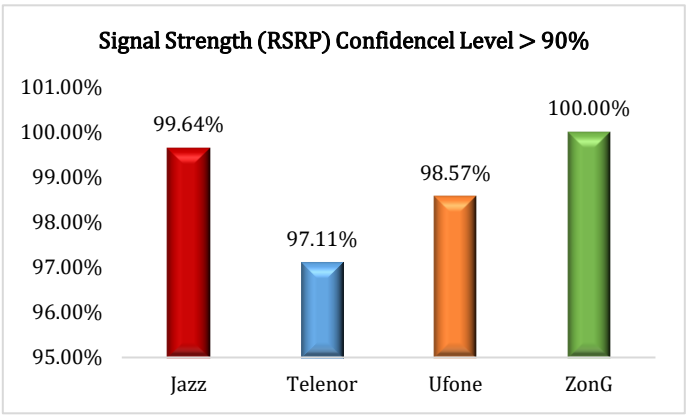


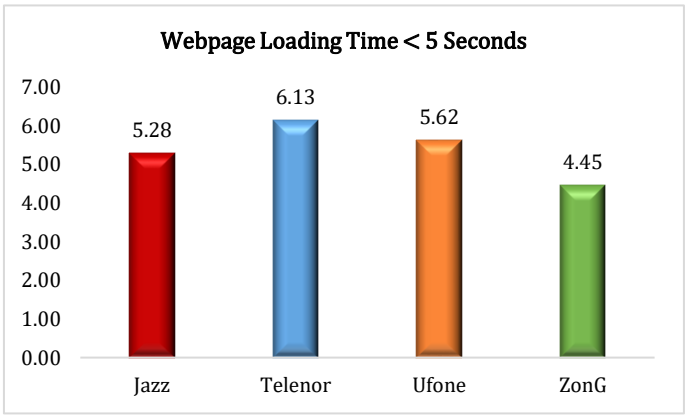


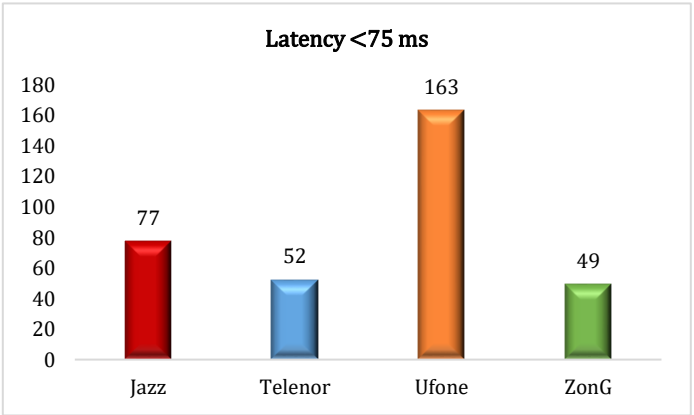




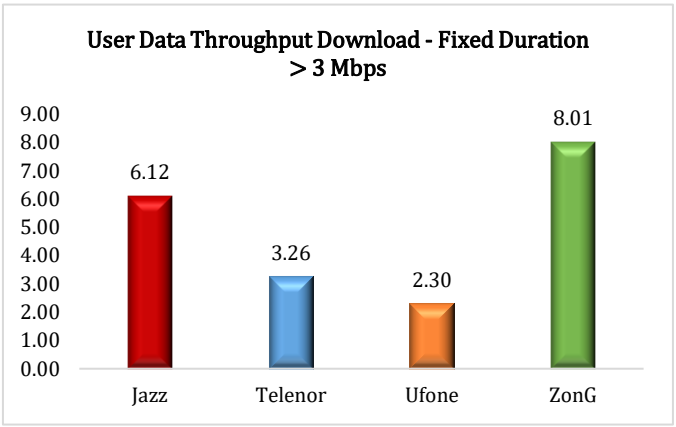


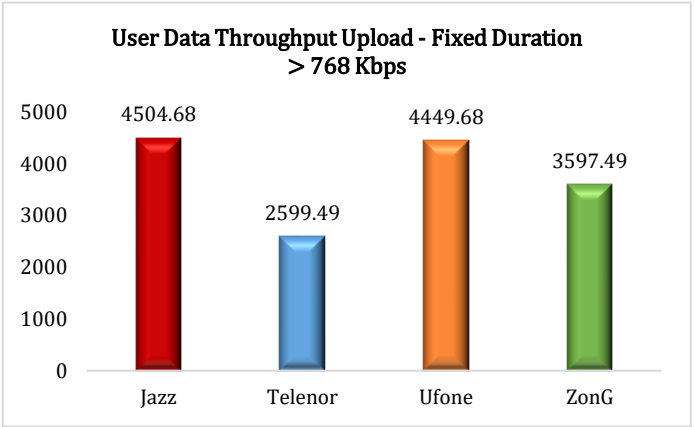


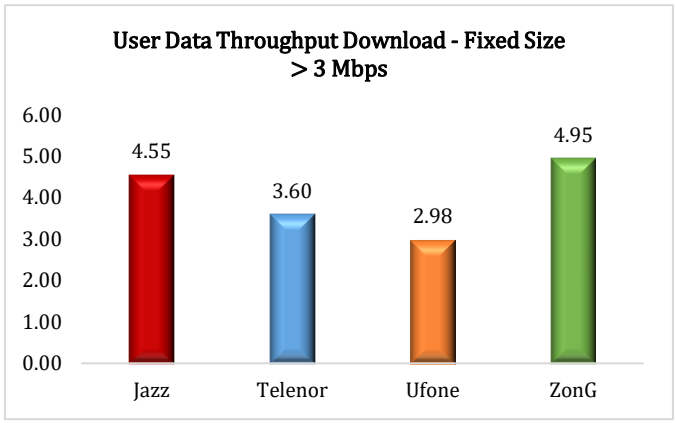


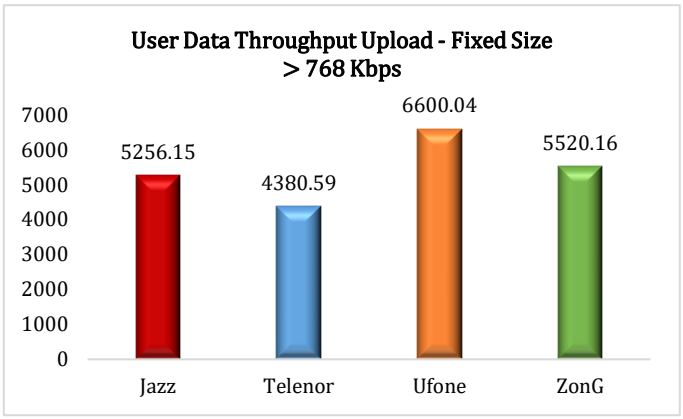


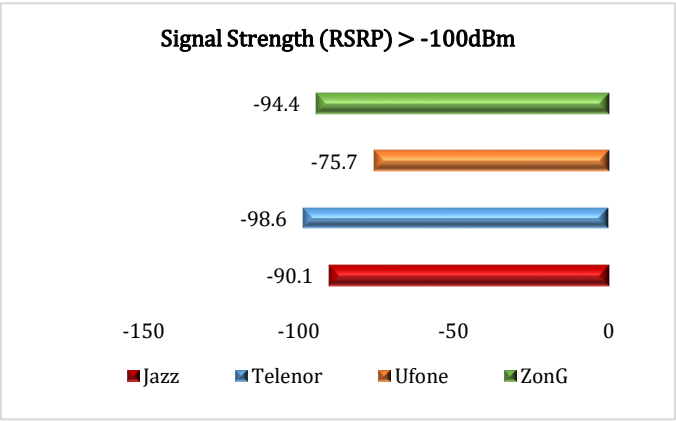
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – HANGU

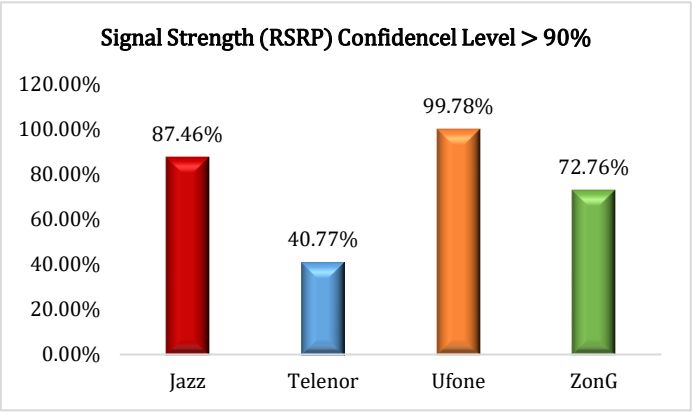


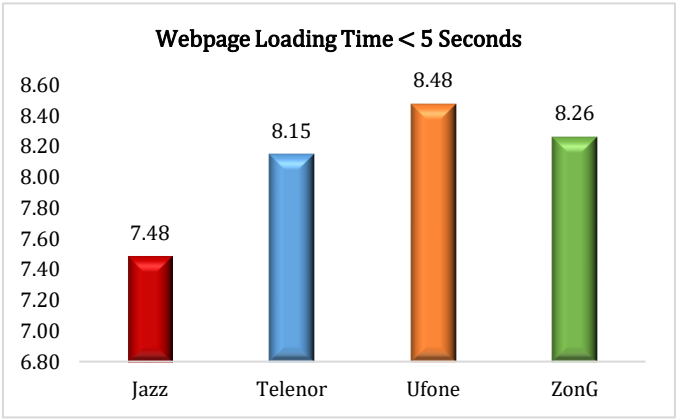


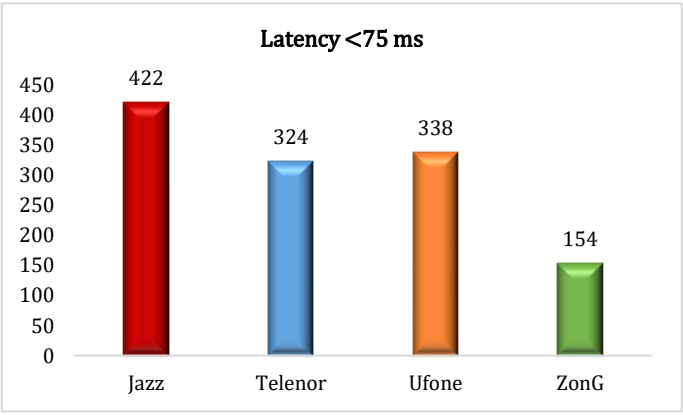




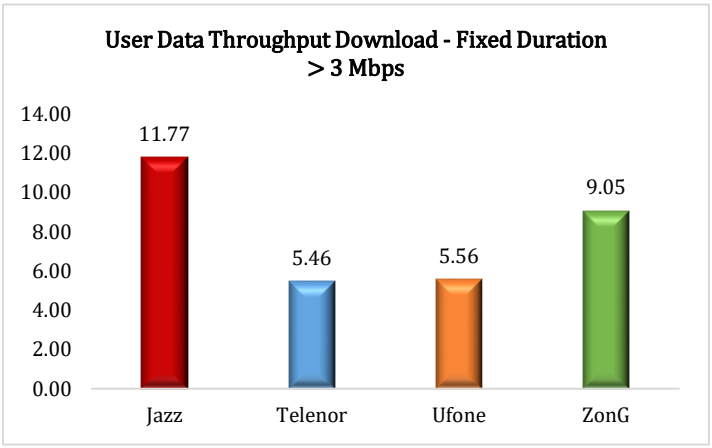


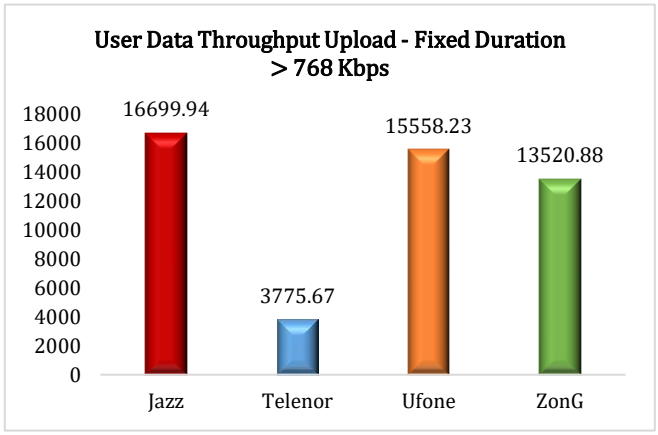


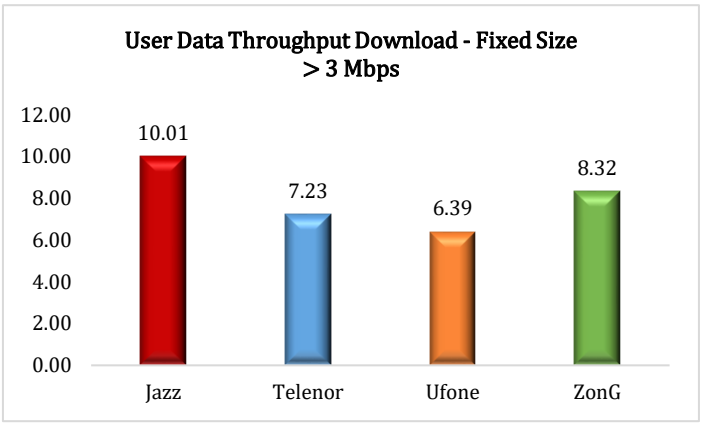


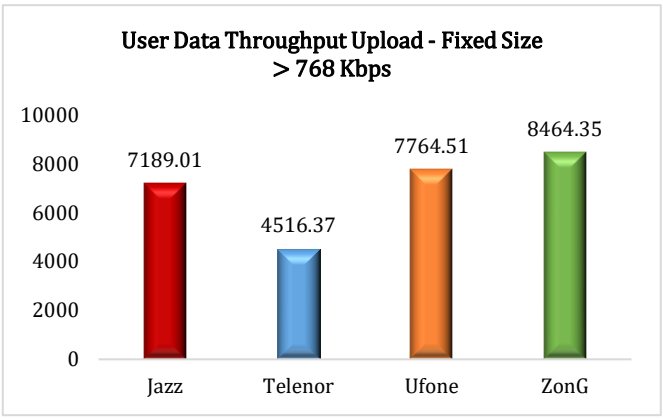


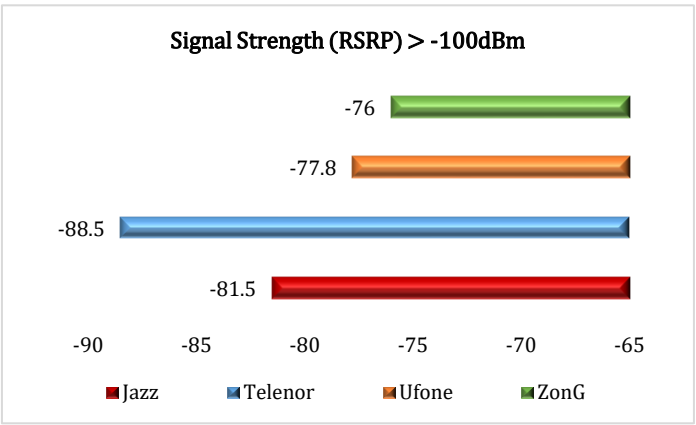
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – KUCHLAK

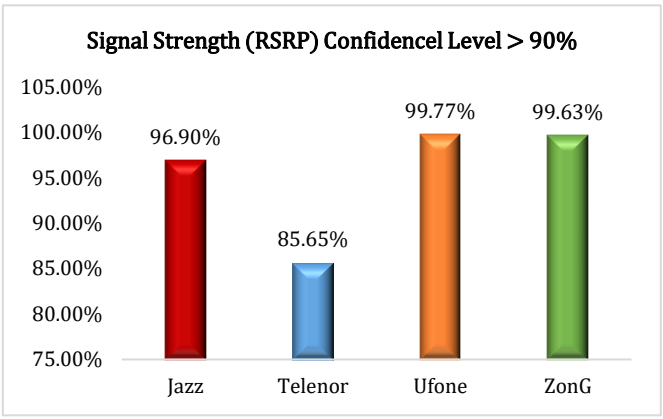


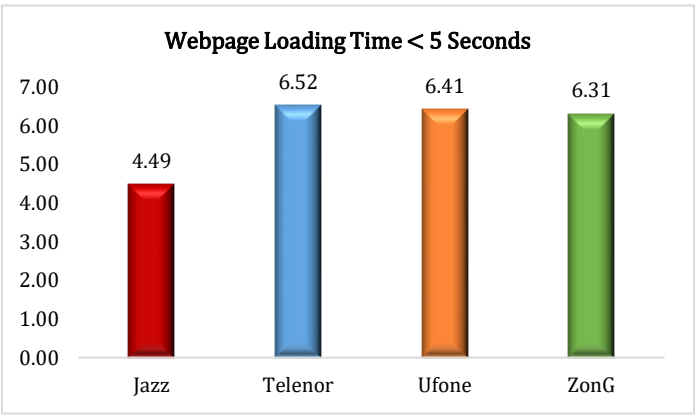


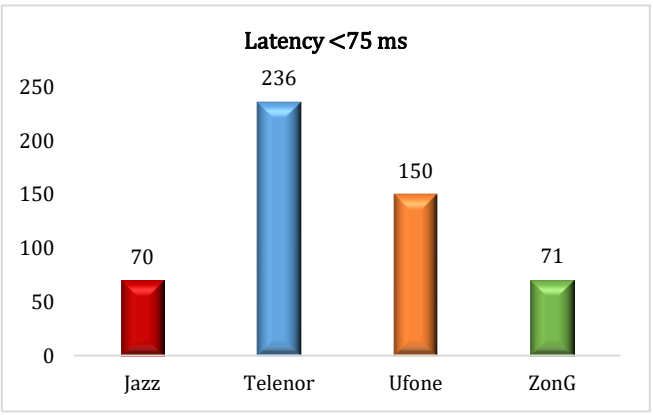




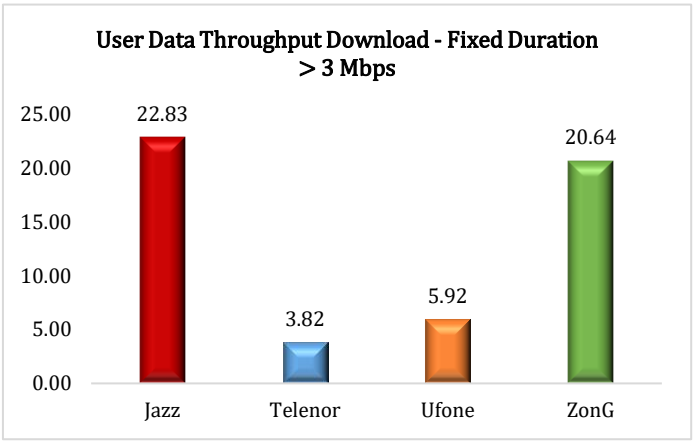


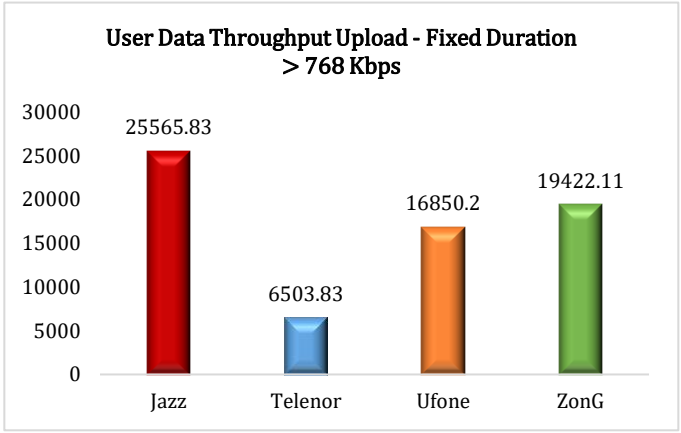


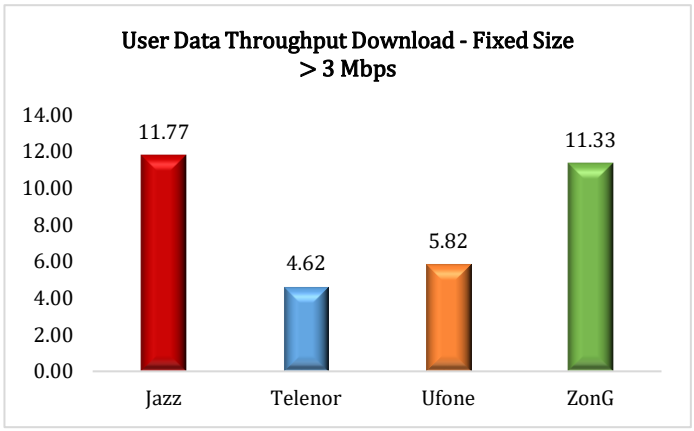


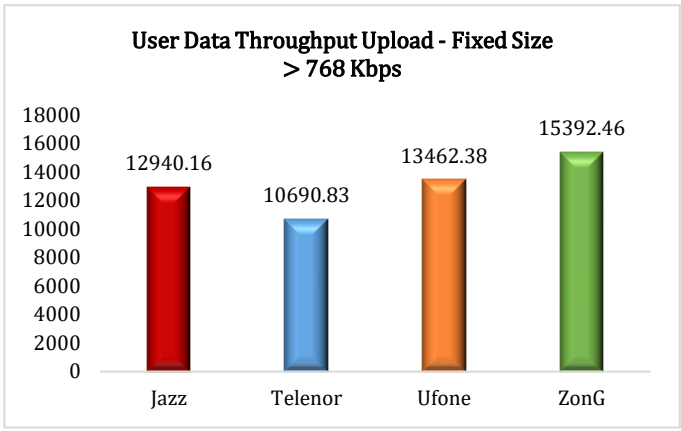


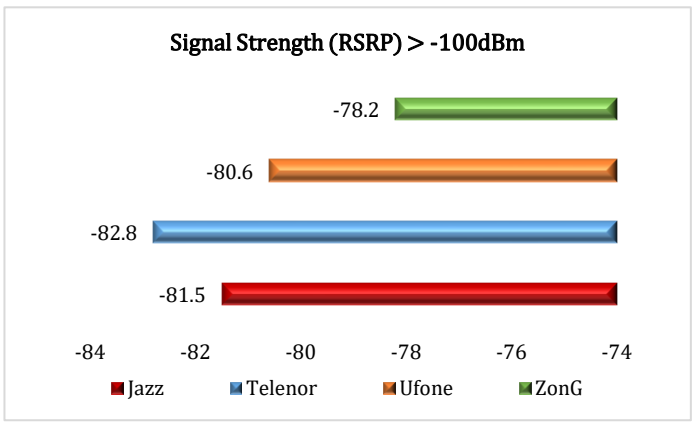
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – ABBOTTABAD

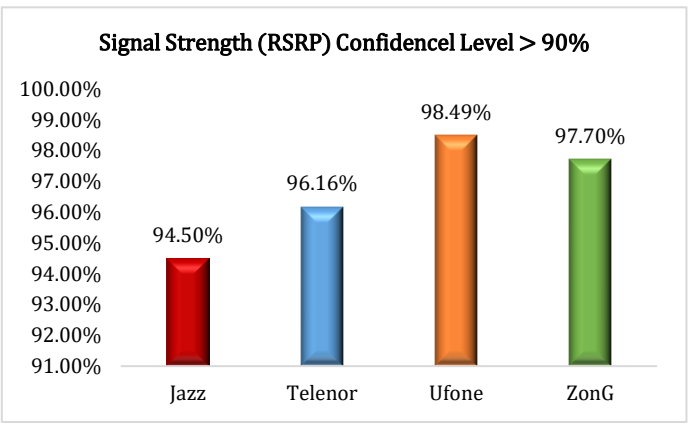


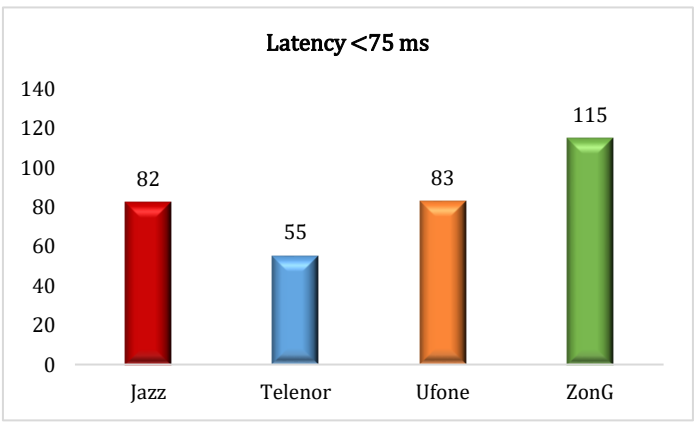


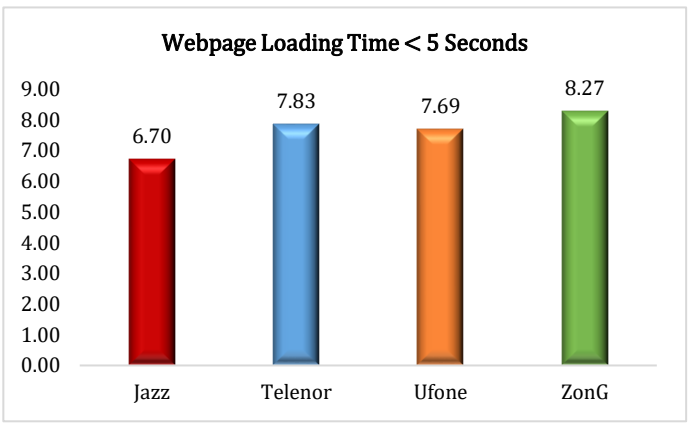




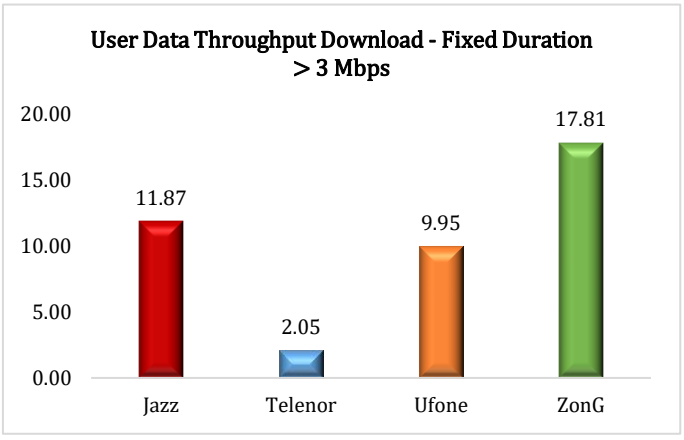


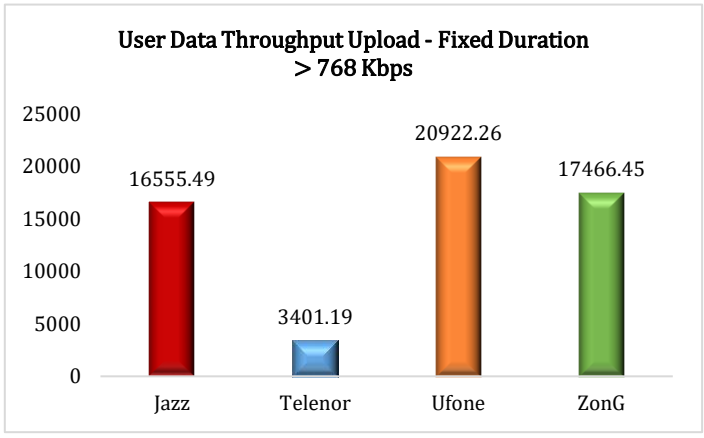


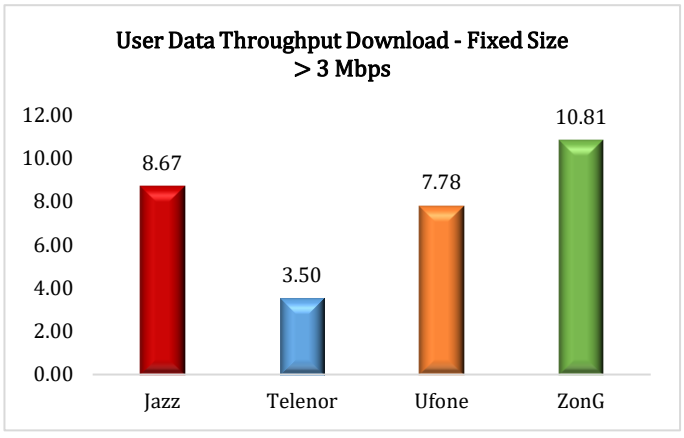


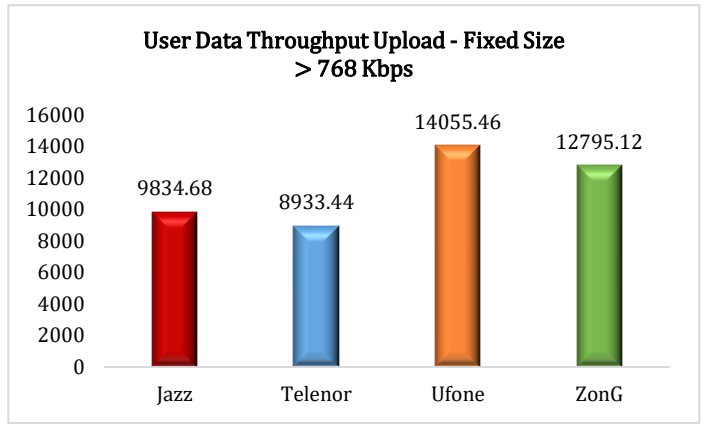


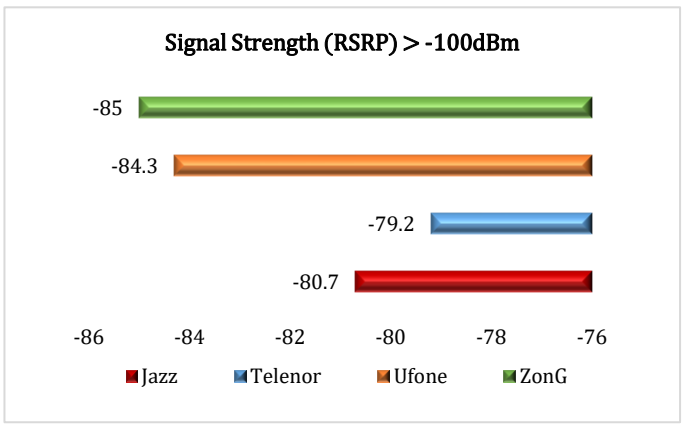
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – LOWER DIR

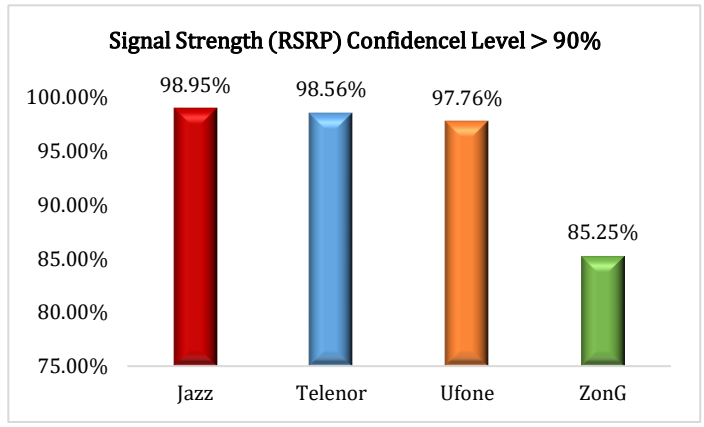


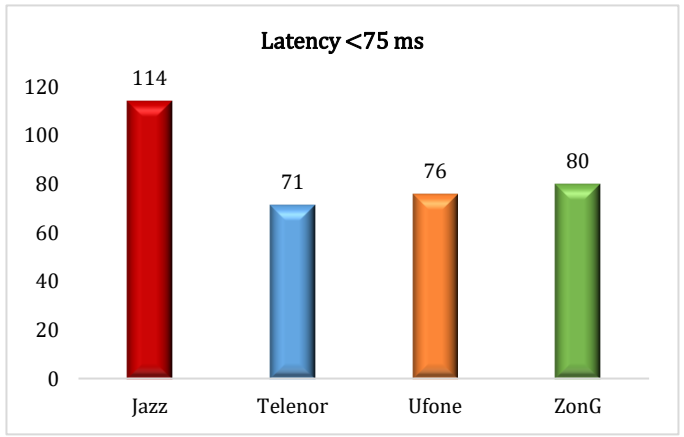


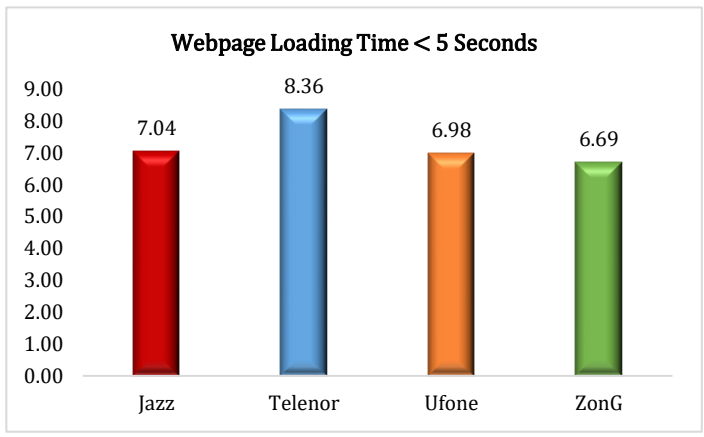




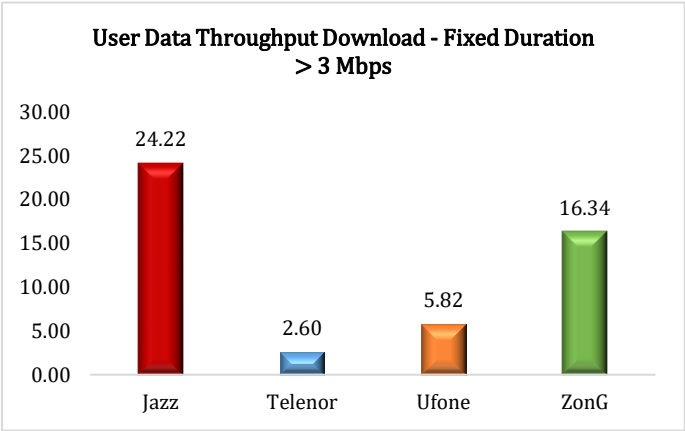


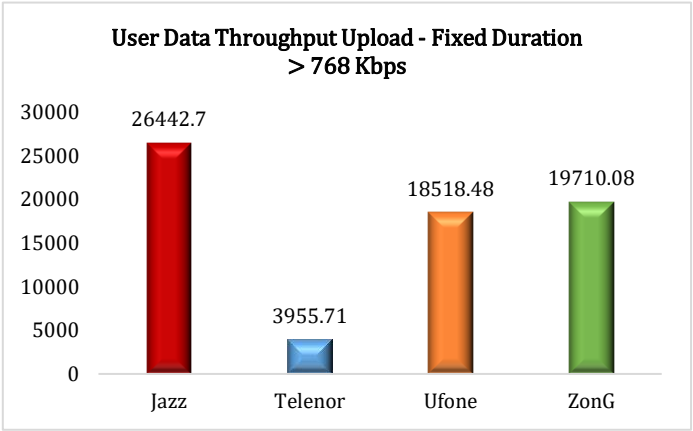


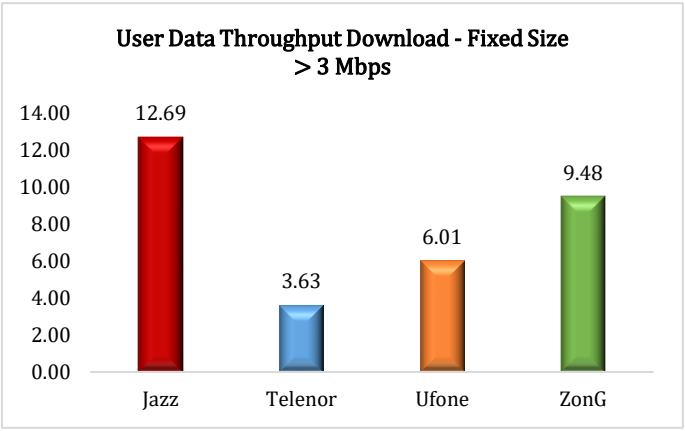


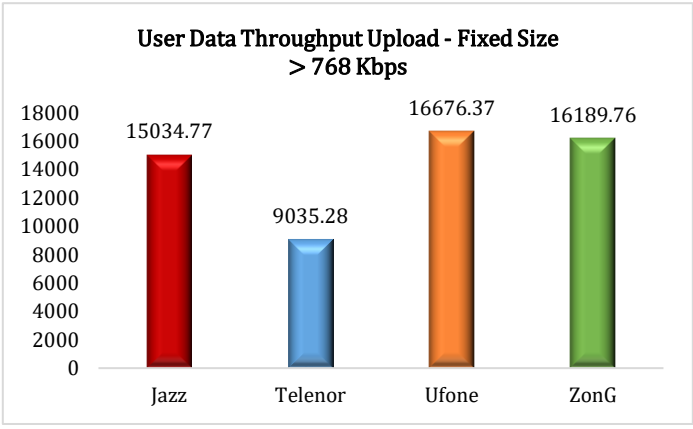


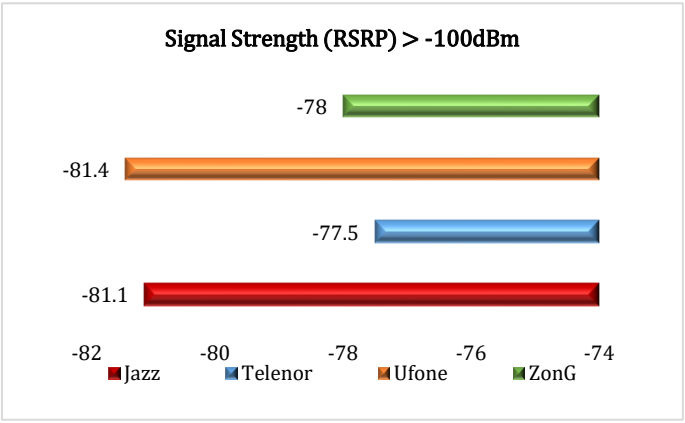
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – MANSEHRA

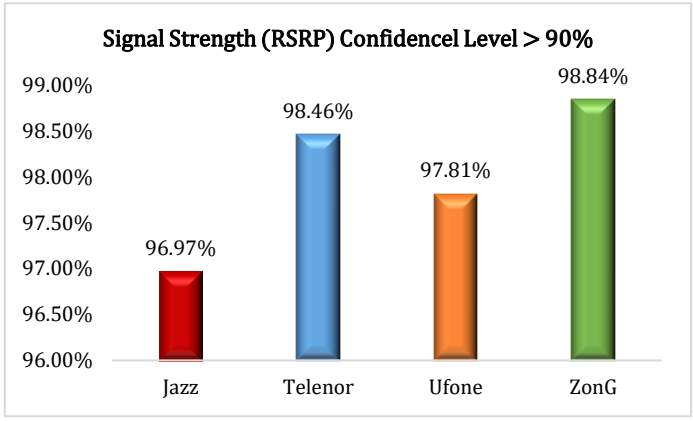


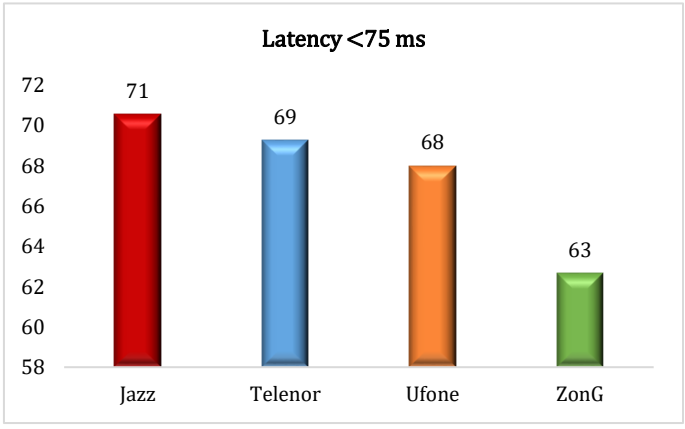


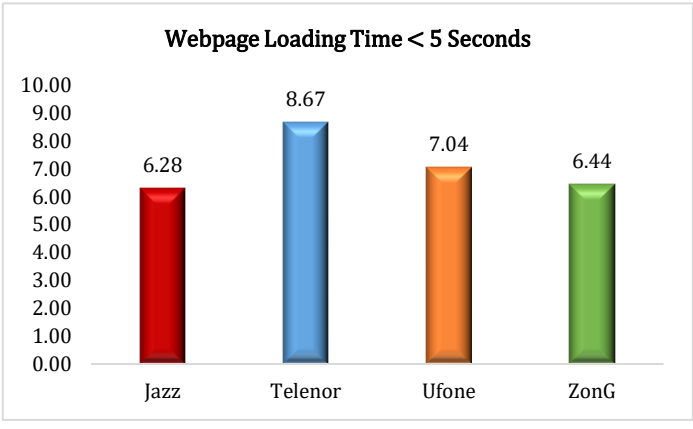




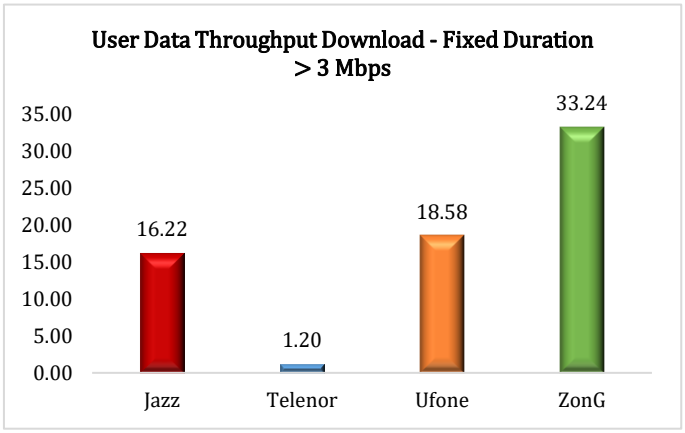


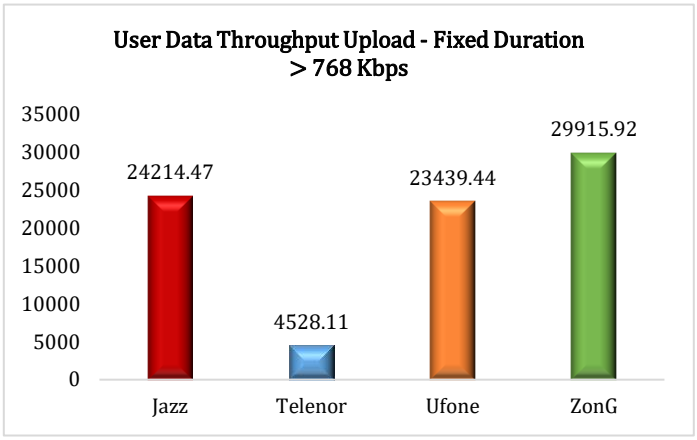


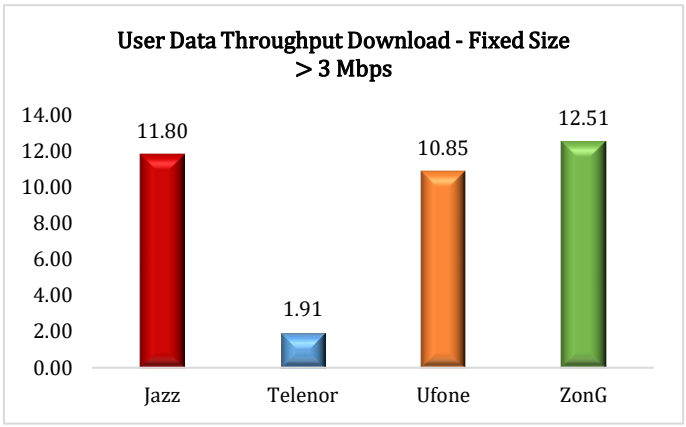


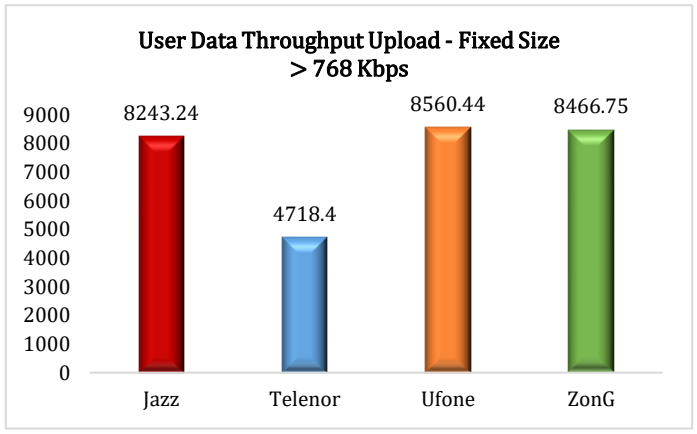


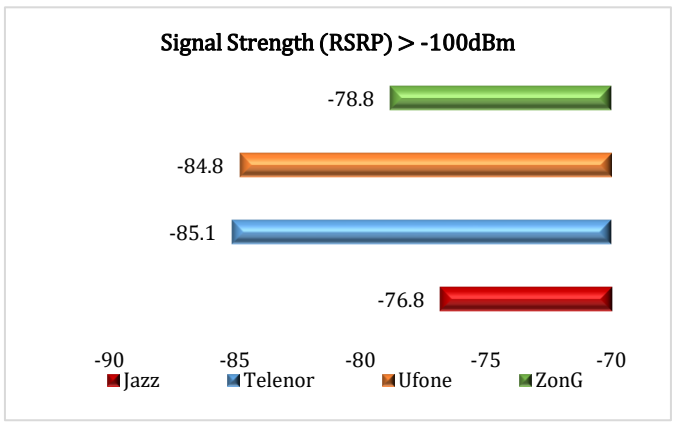
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – MATIARI

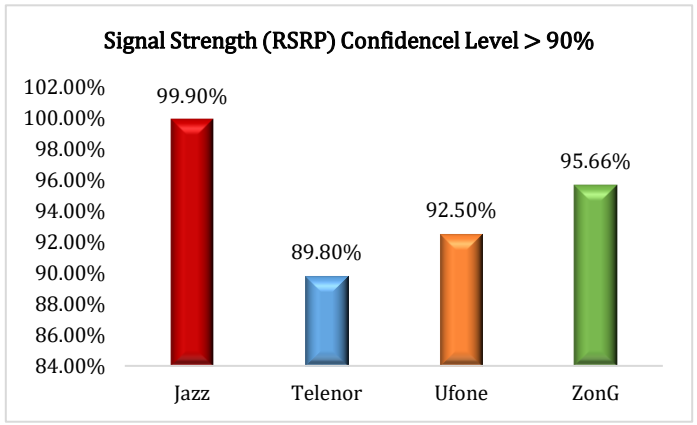


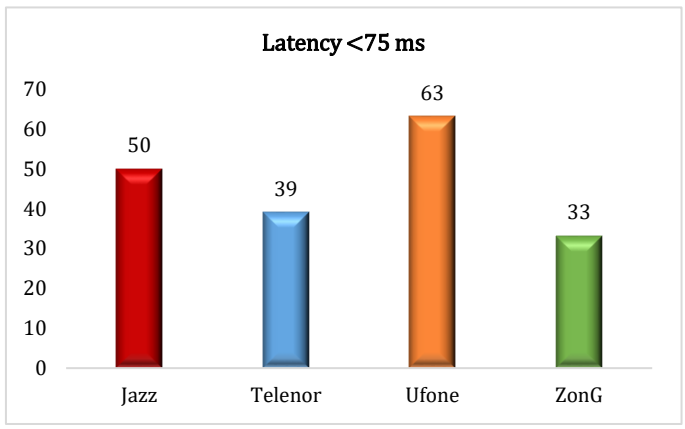


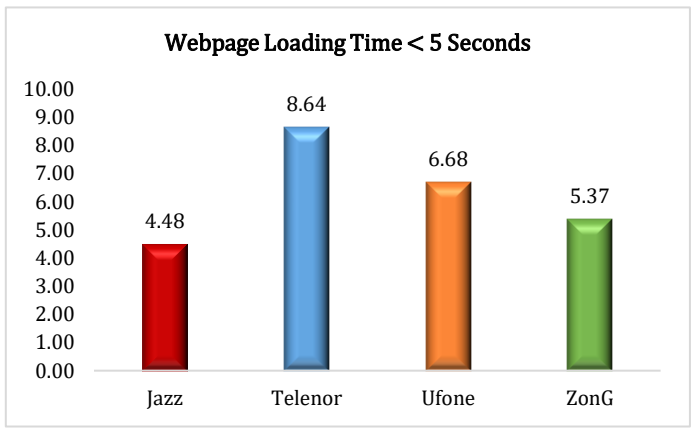




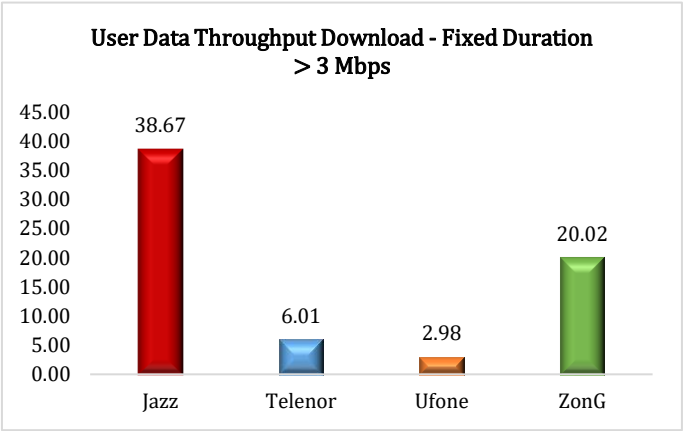


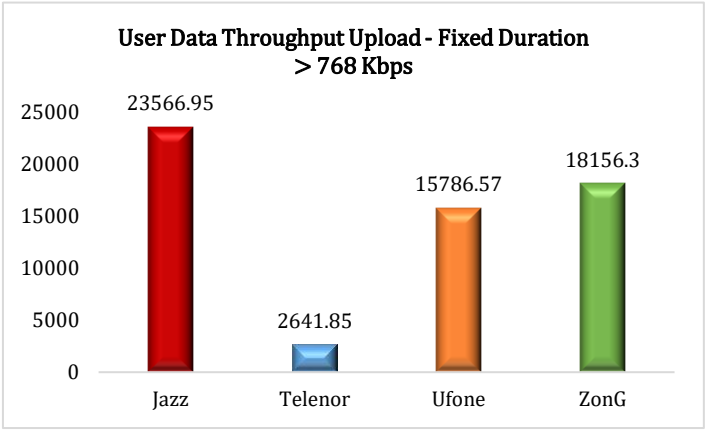


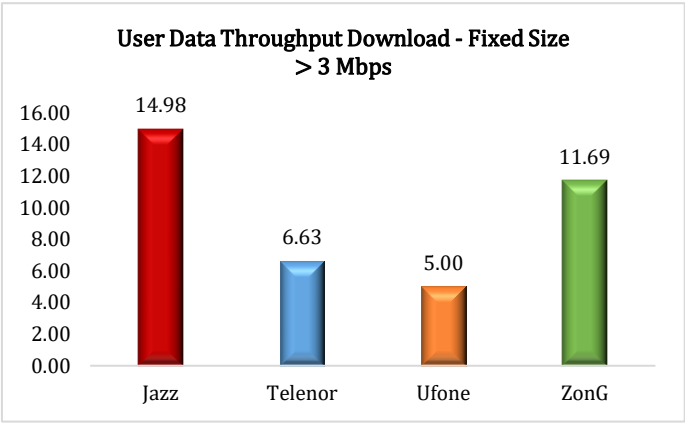


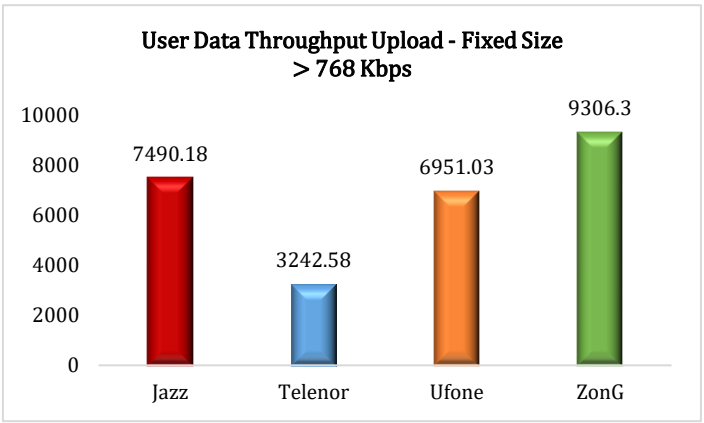


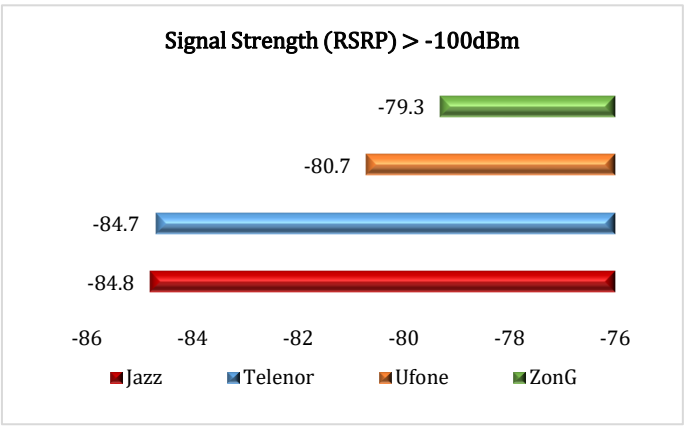
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – MACH

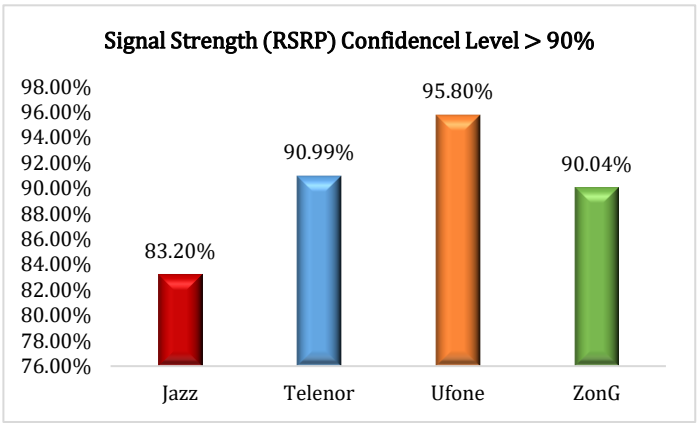


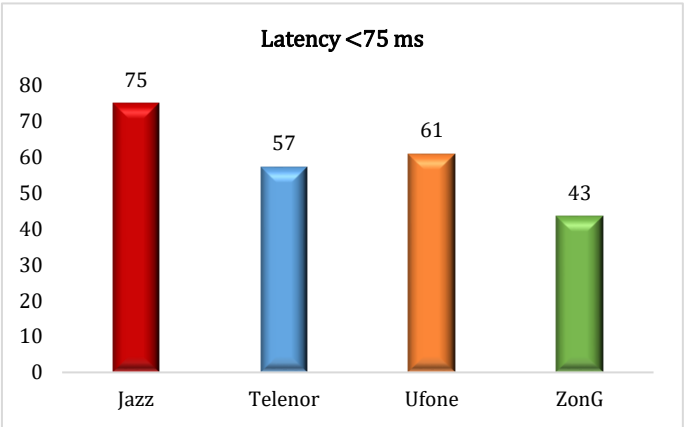


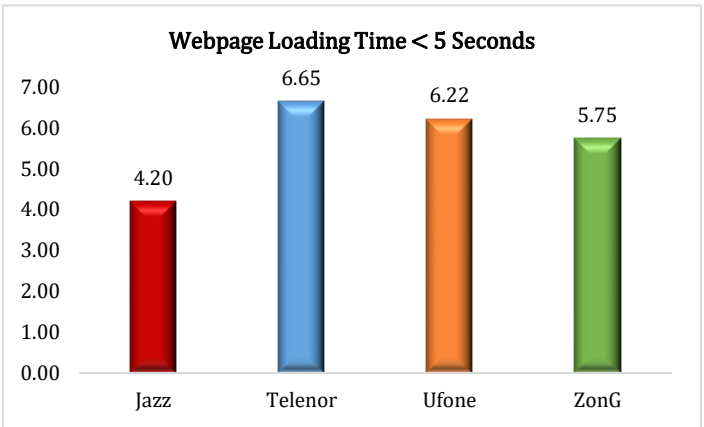




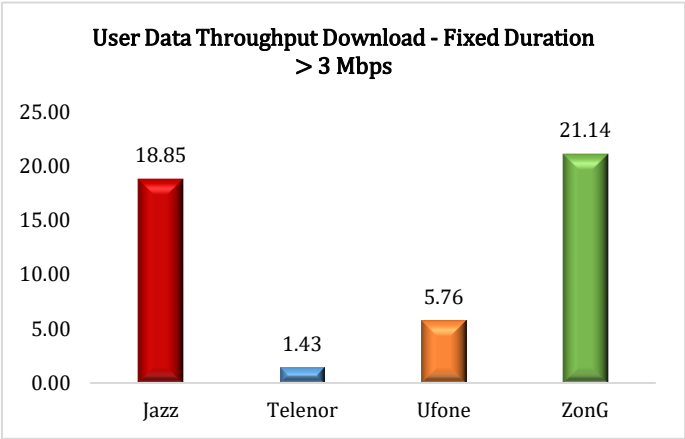


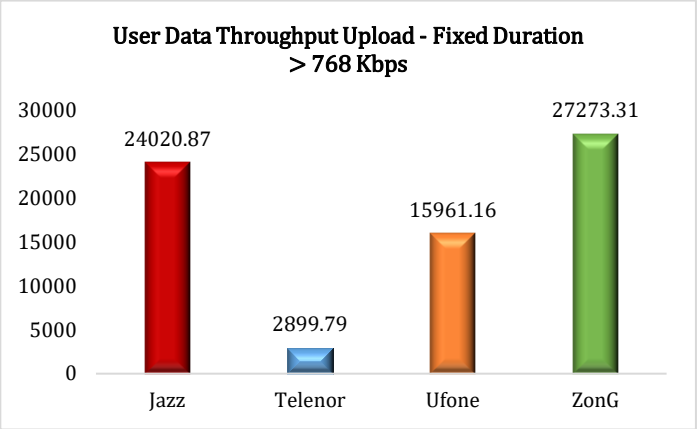


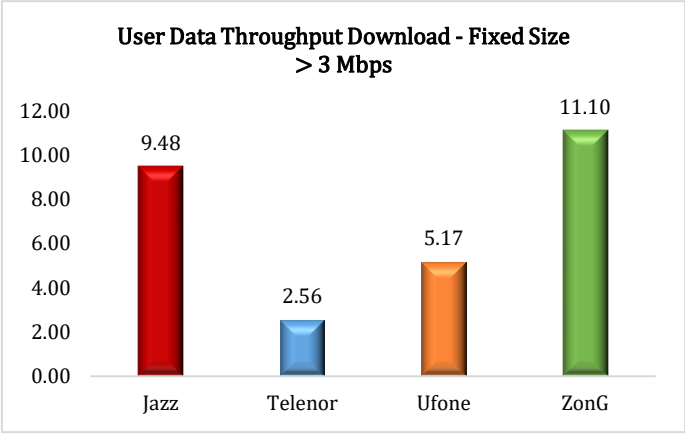


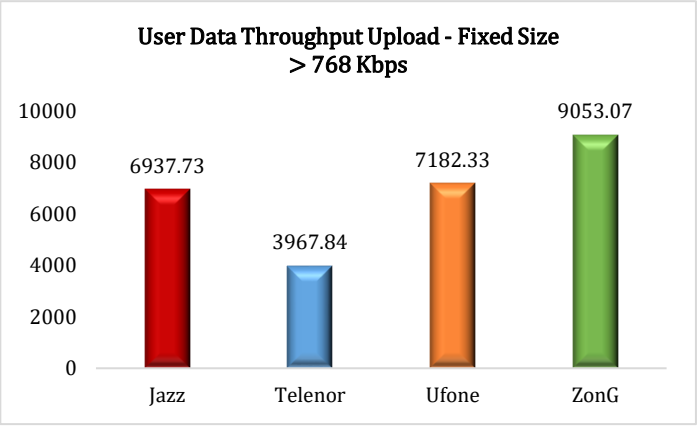


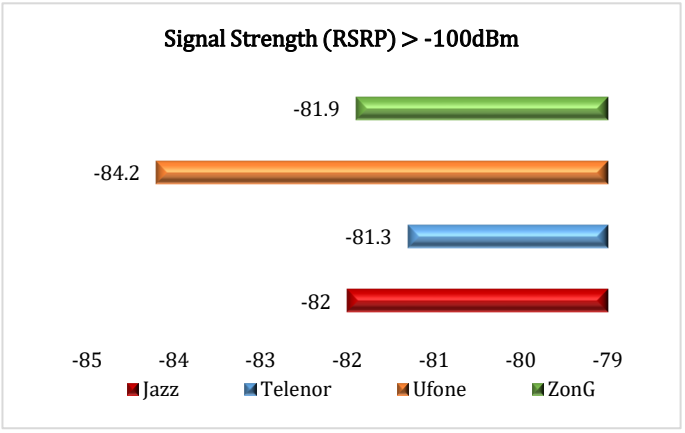
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – PASROOR

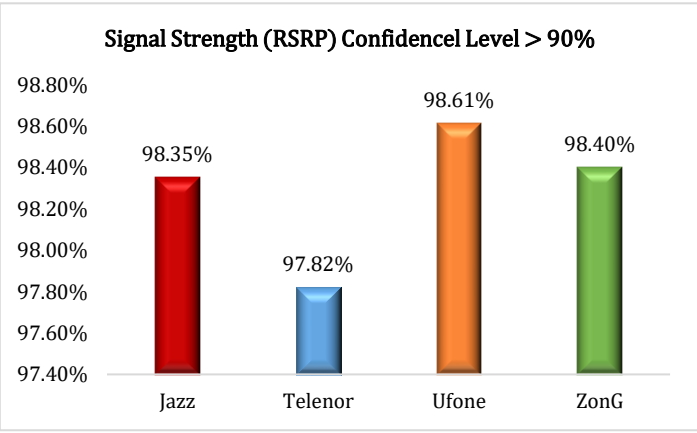


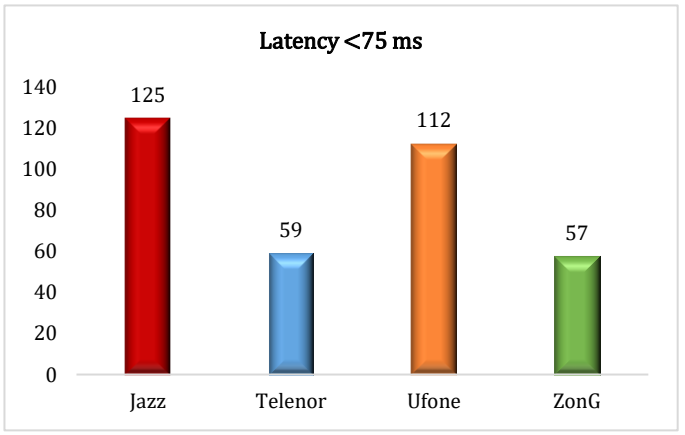


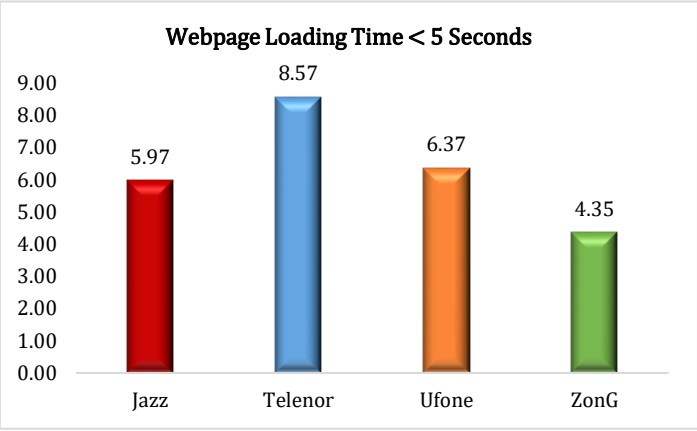




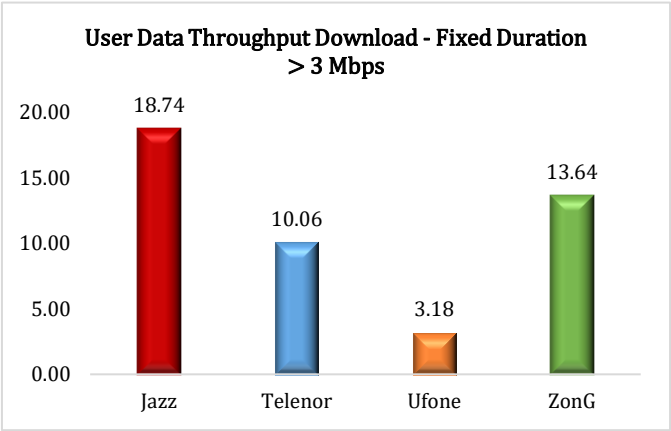


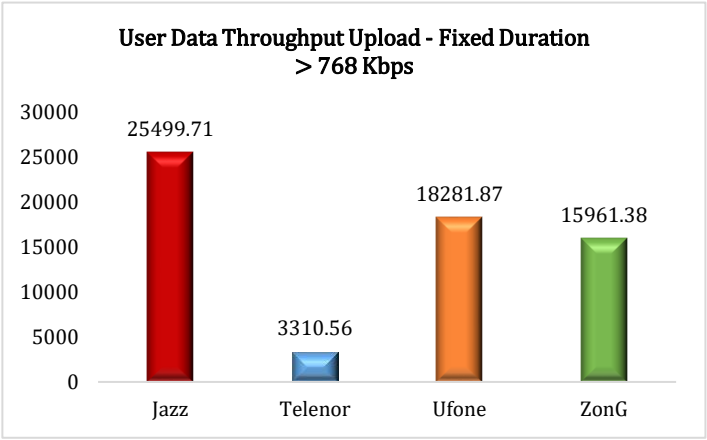


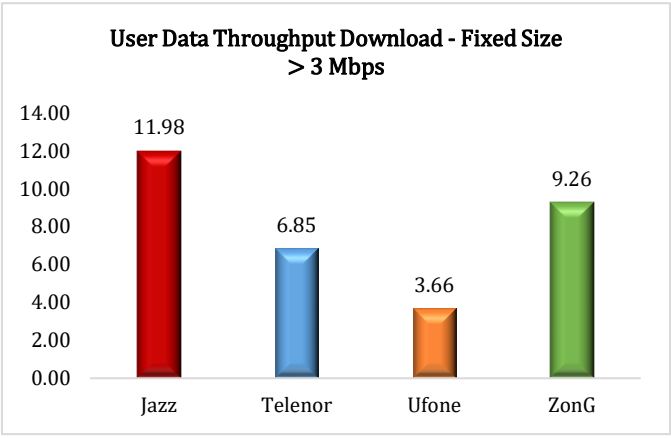


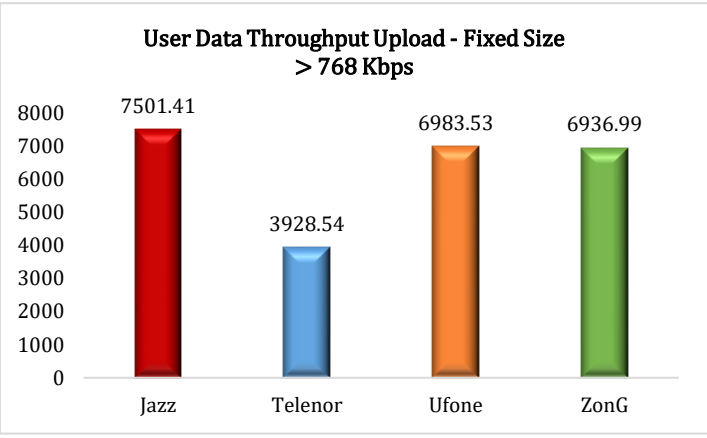


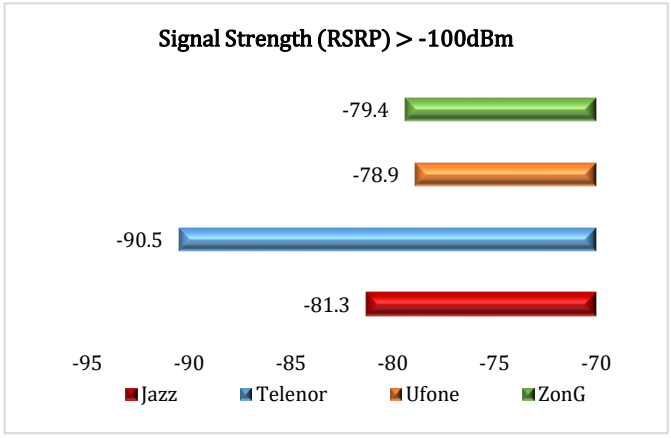
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – PISHIN

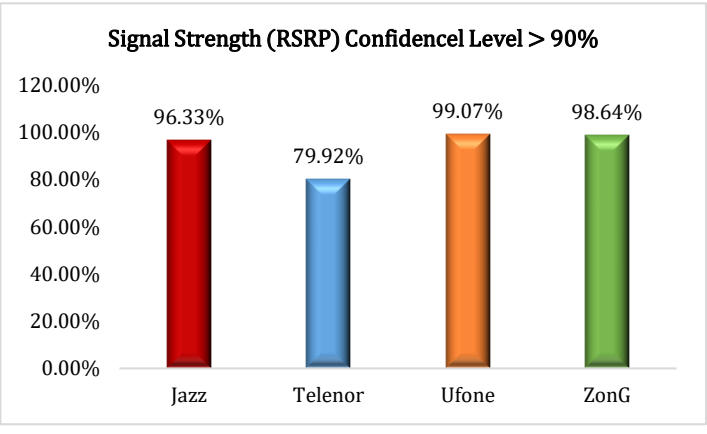


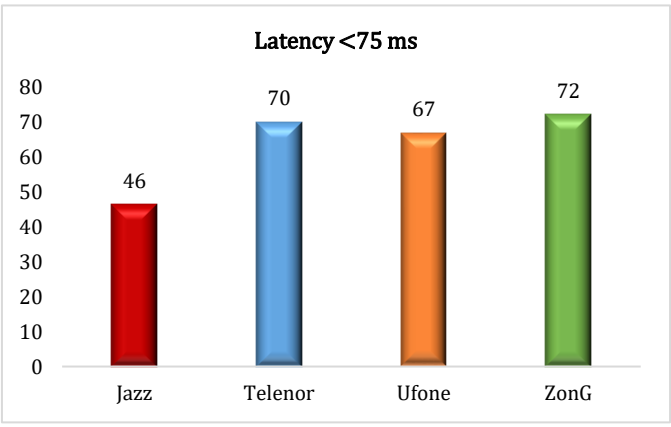


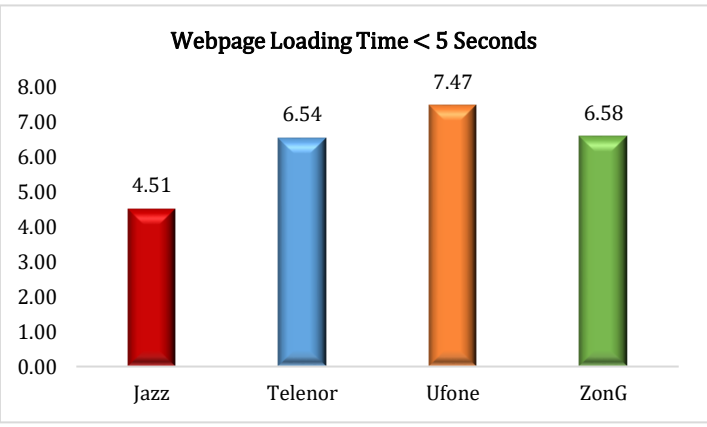




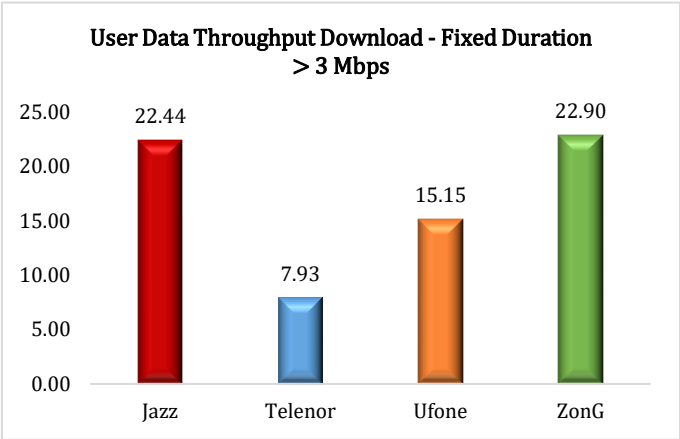


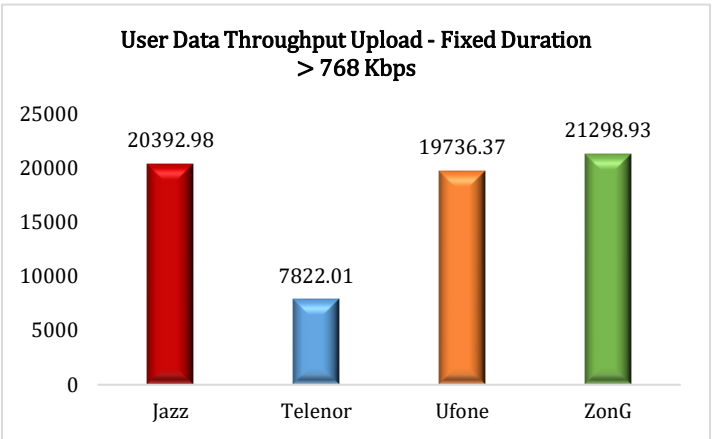


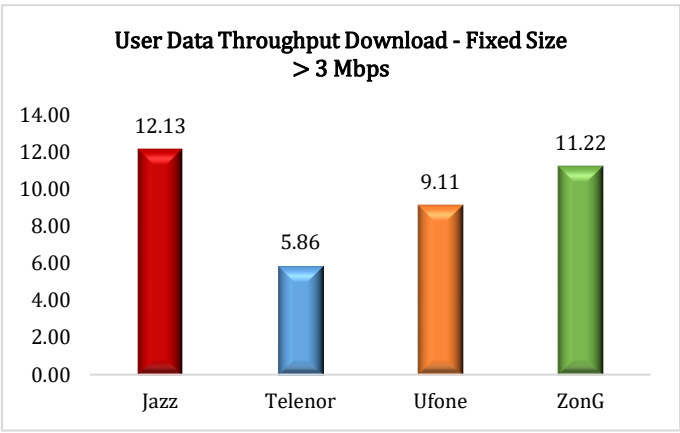


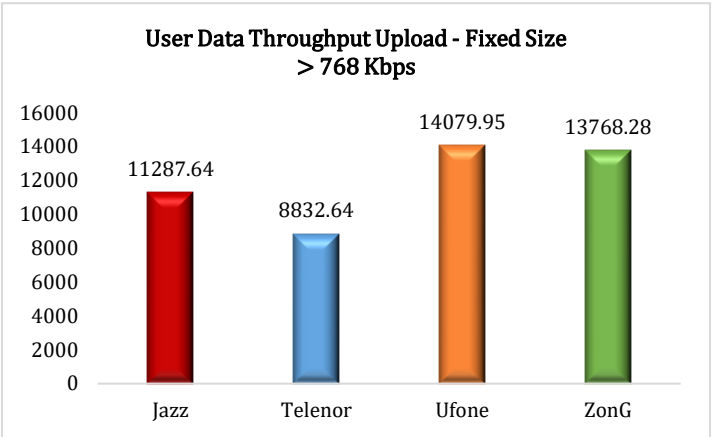


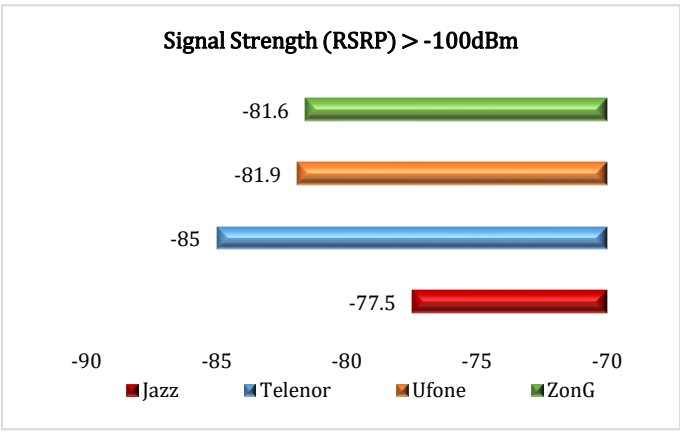
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) –SARGODHA

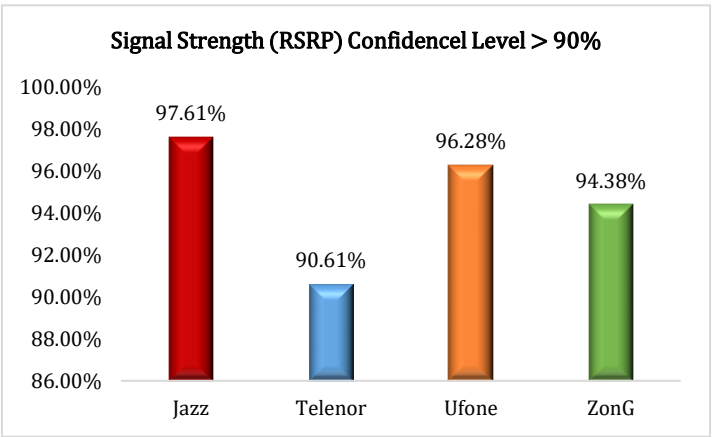


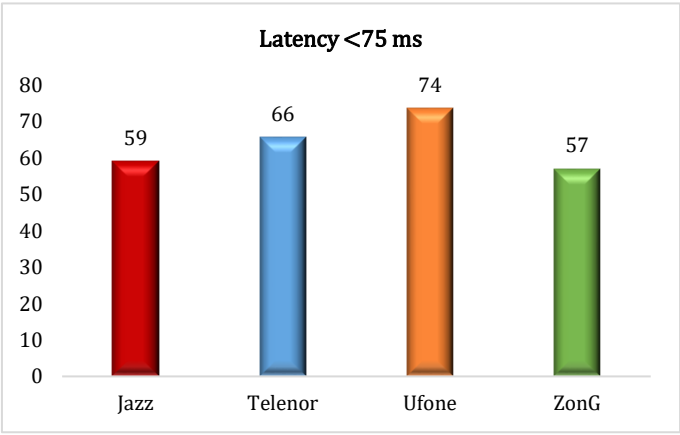


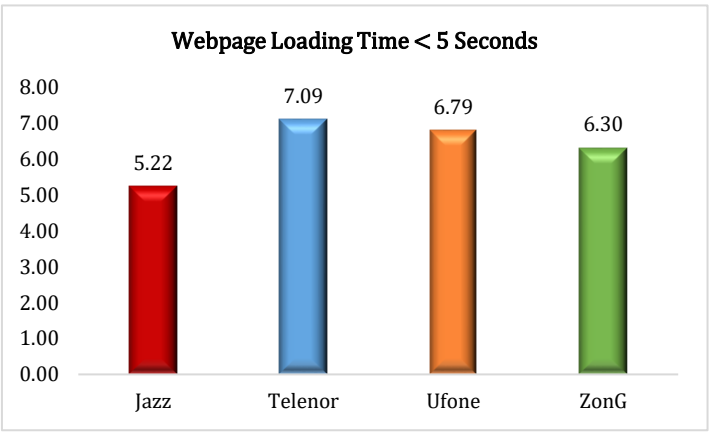




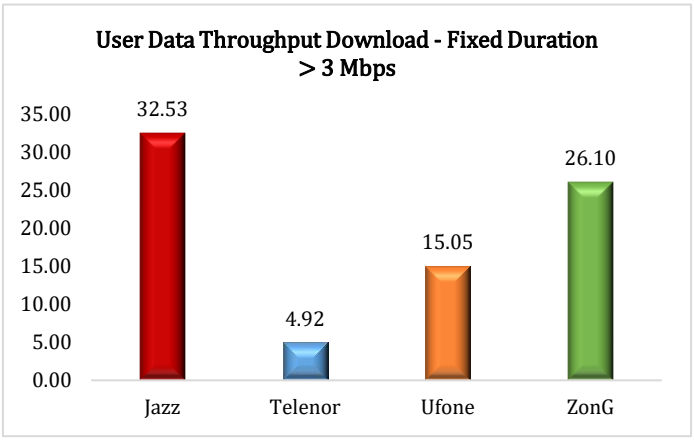


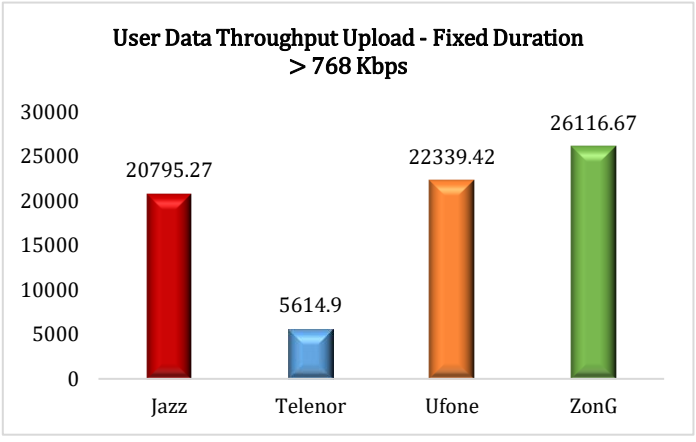


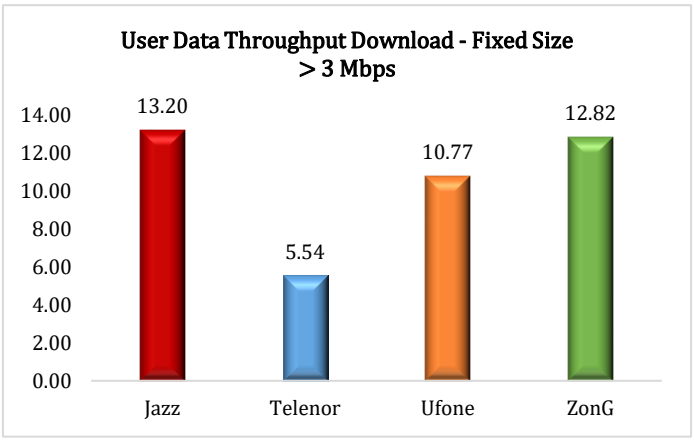


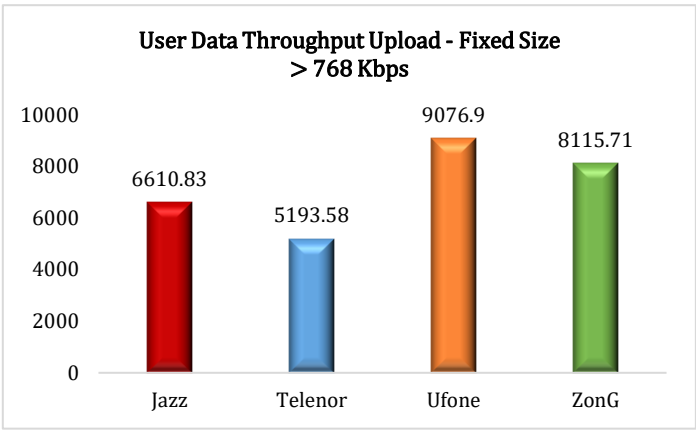


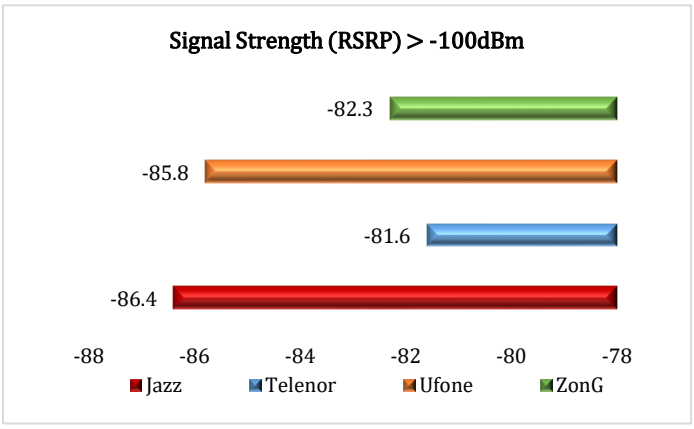
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – UMER KOT

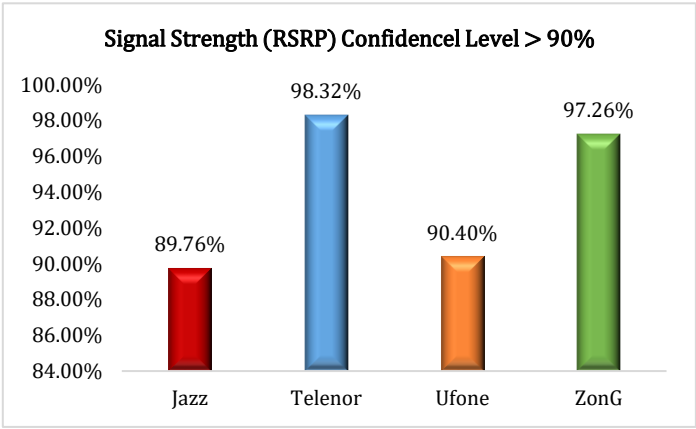


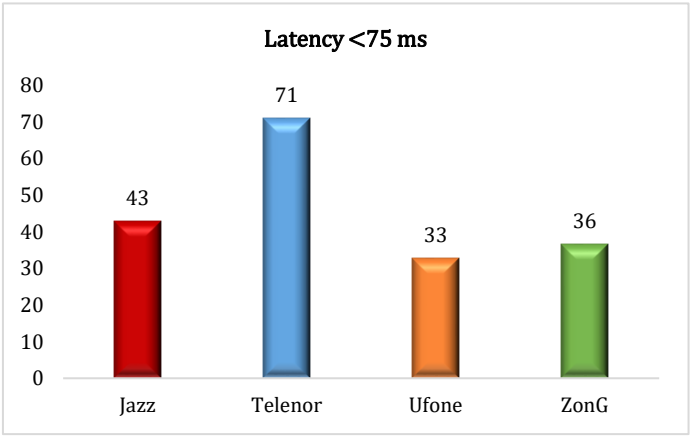


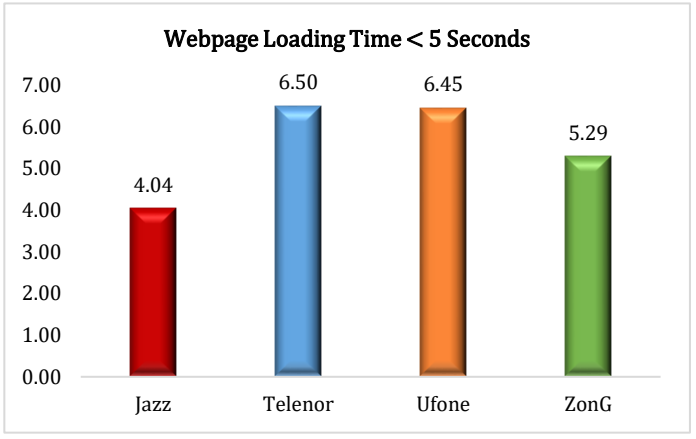








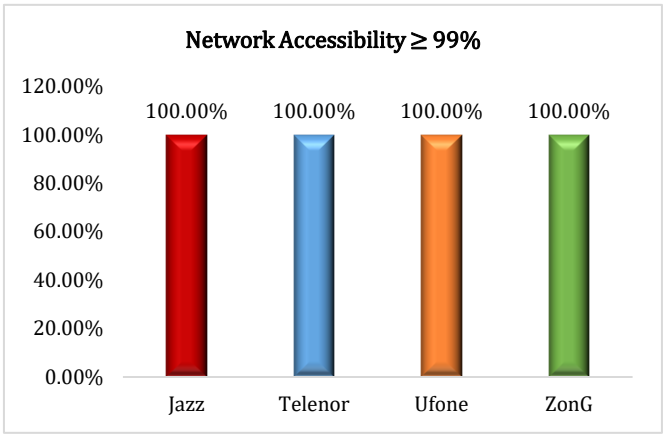


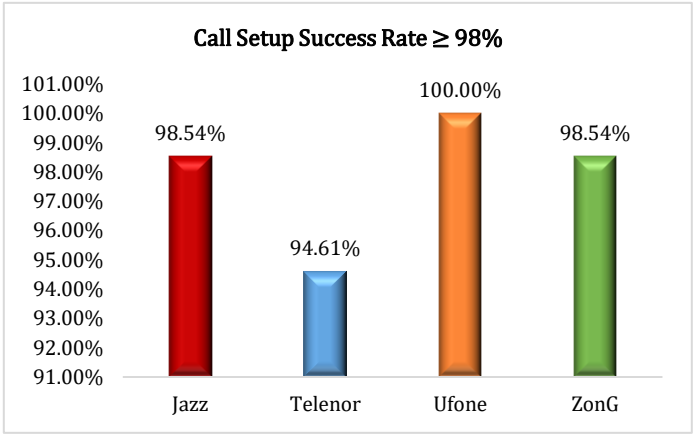


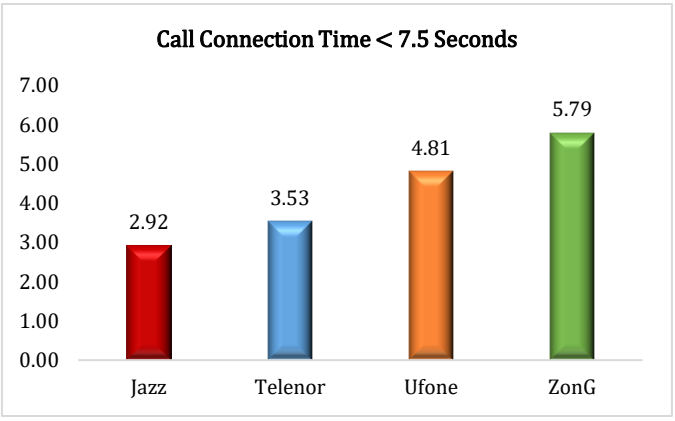
Annex -C(Voice & SMS Results)

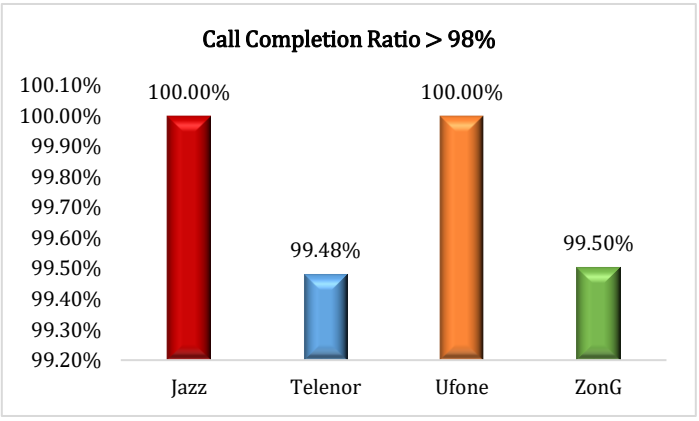
VOICE AUTOMODE

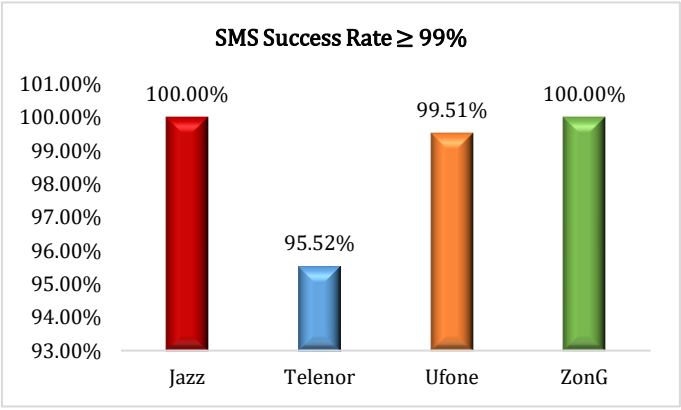
QUALITY OF SERVICE SURVEY RESULTS – SUKKUR

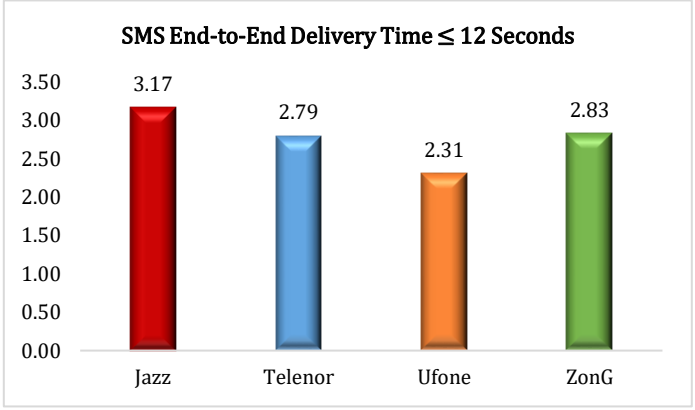


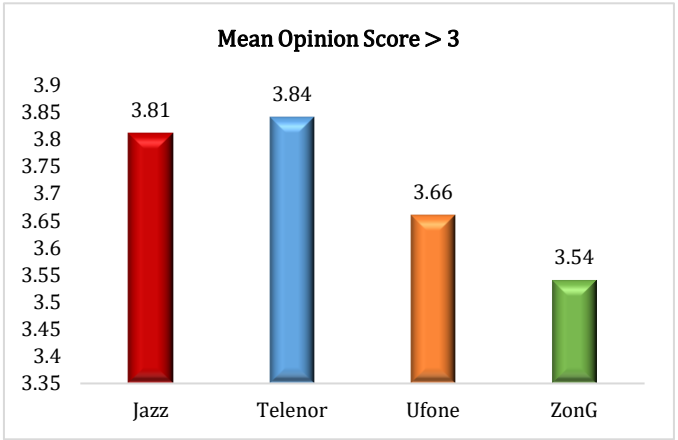




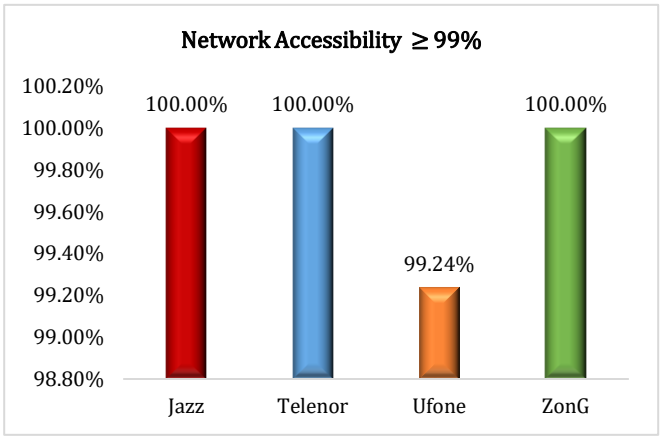


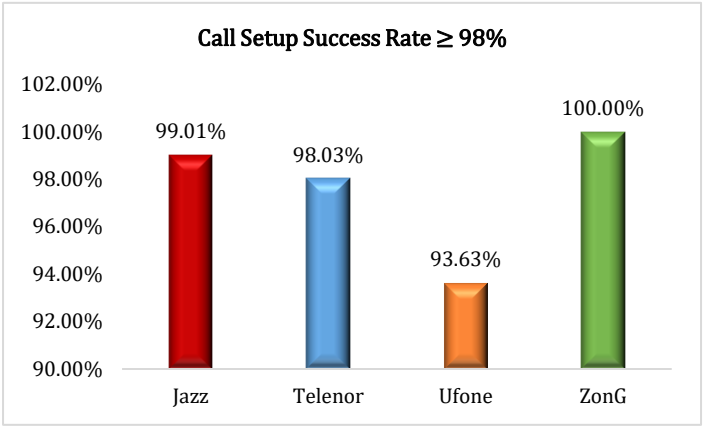


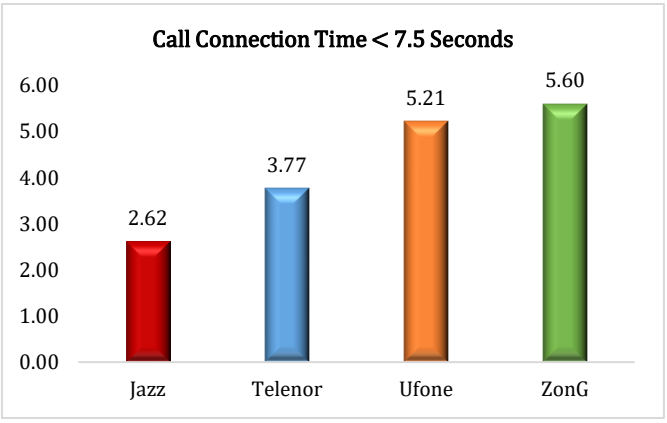


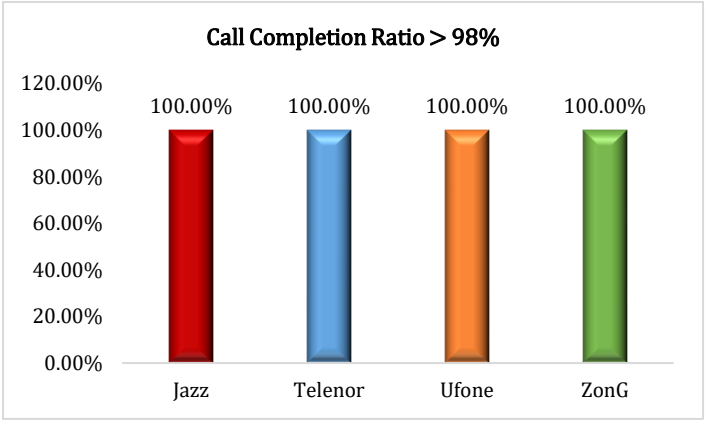


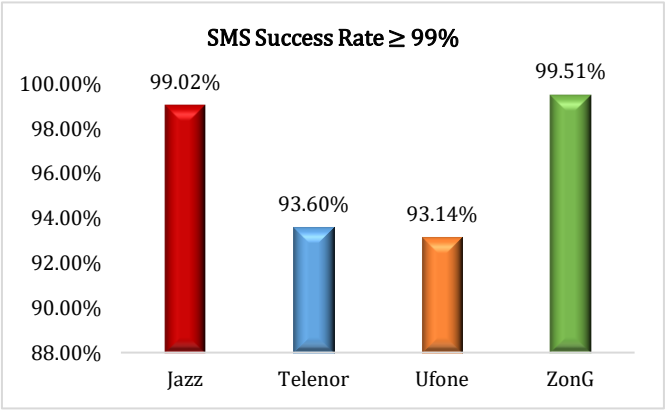
QUALITY OF SERVICE SURVEY RESULTS – BAHAWALPUR

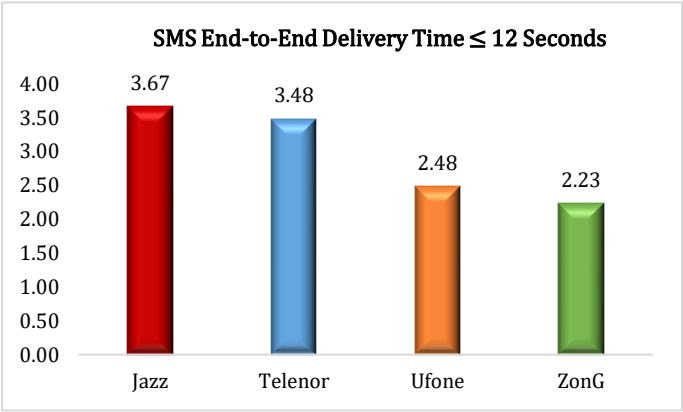


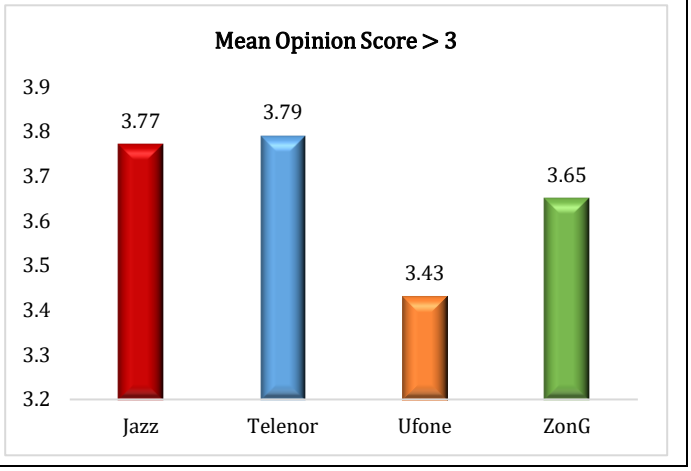




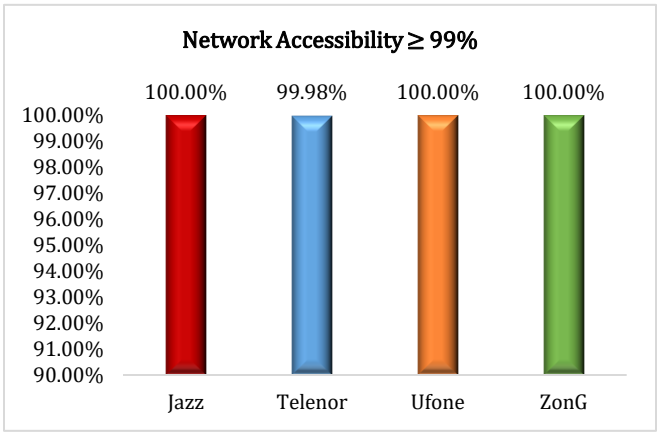


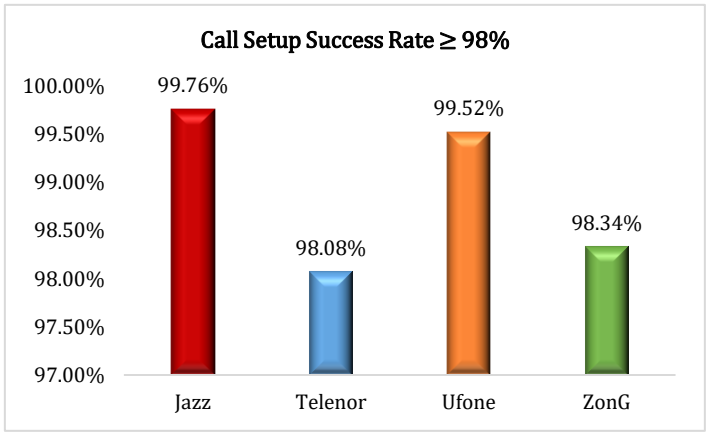


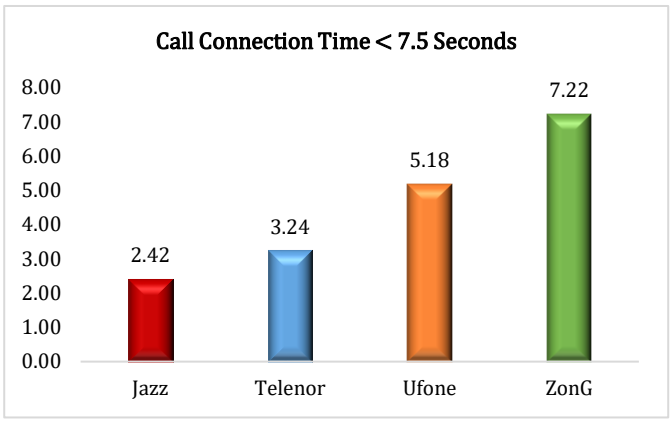


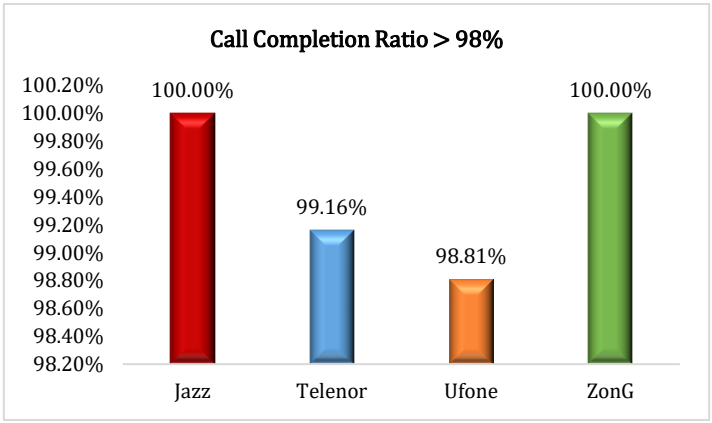


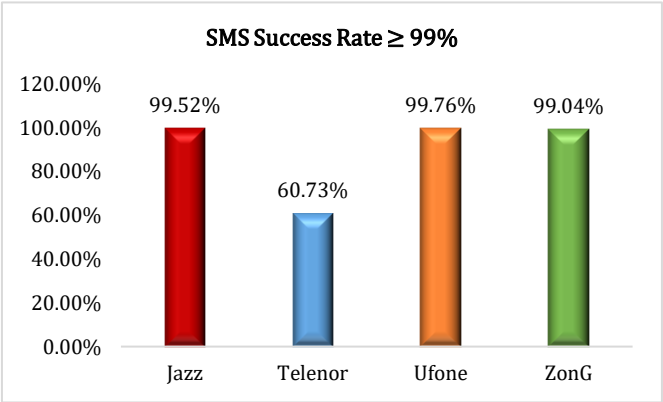
QUALITY OF SERVICE SURVEY RESULTS – CHARSADDA

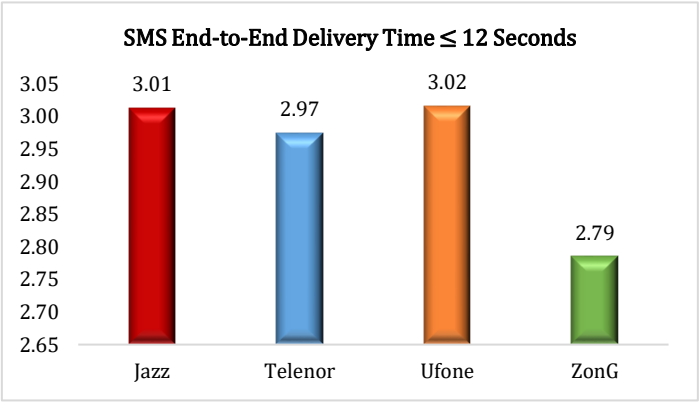


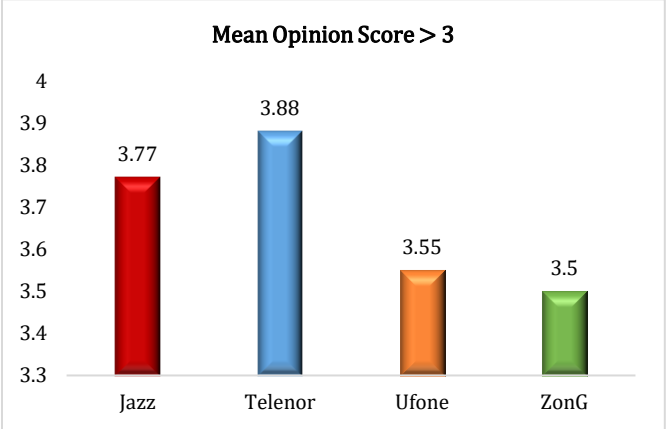




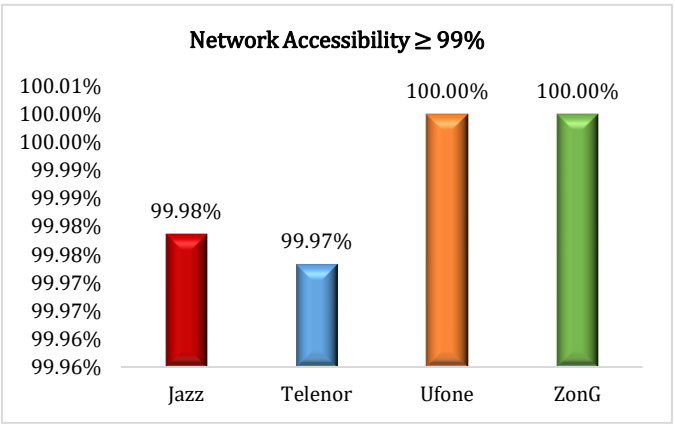


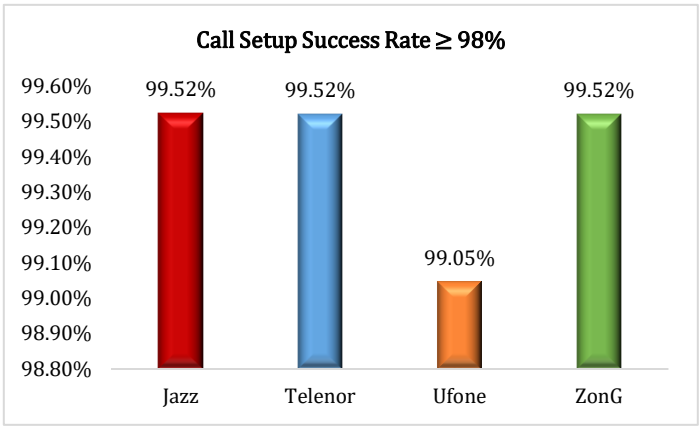


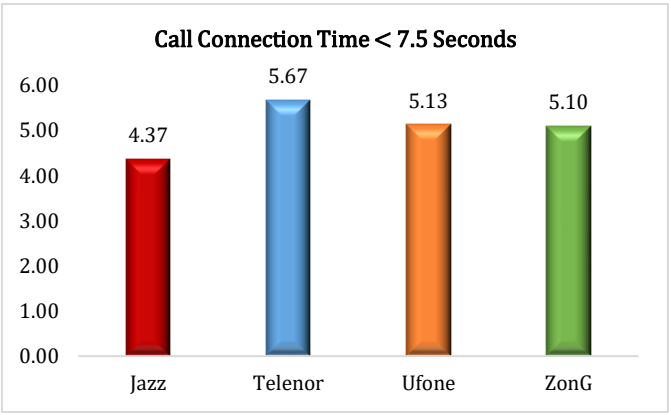


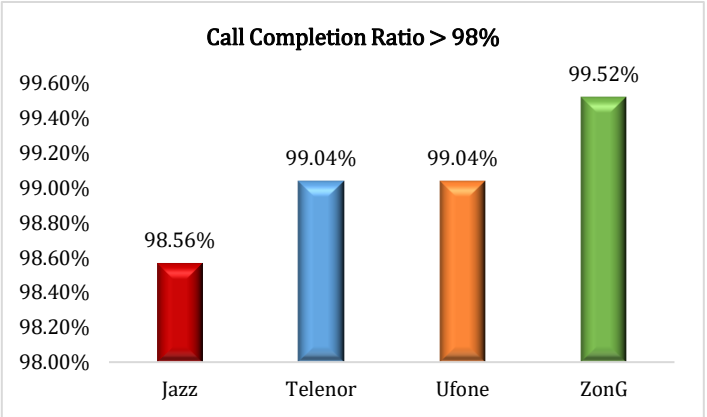


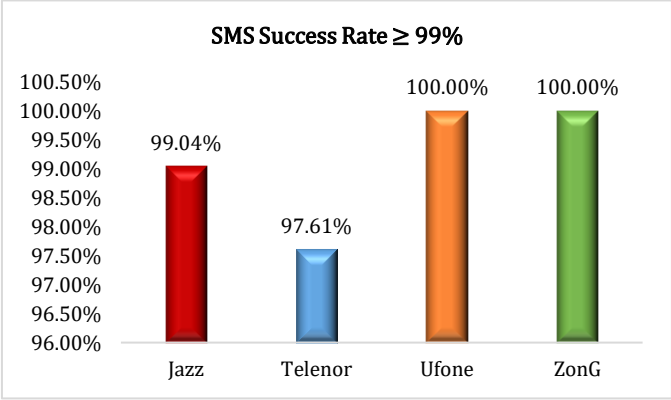
QUALITY OF SERVICE SURVEY RESULTS – GWADAR

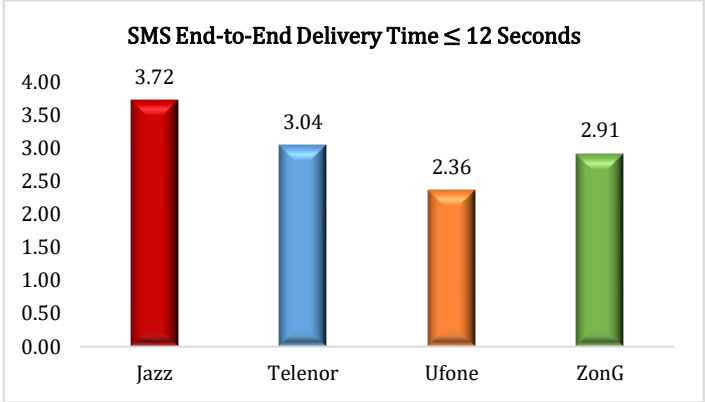


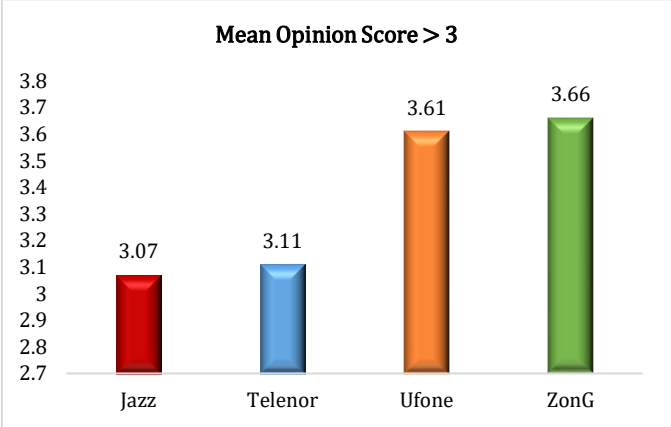




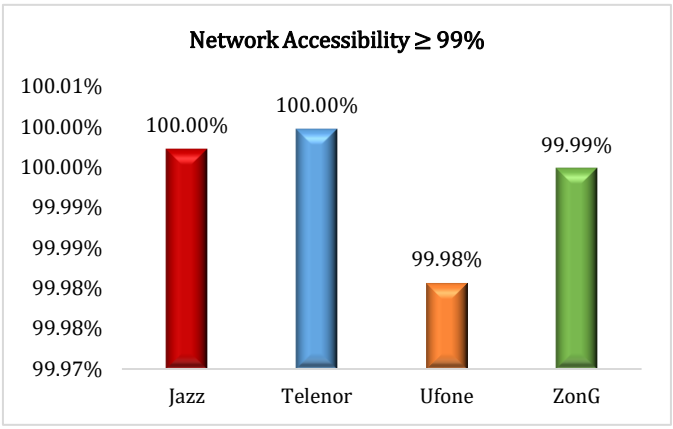


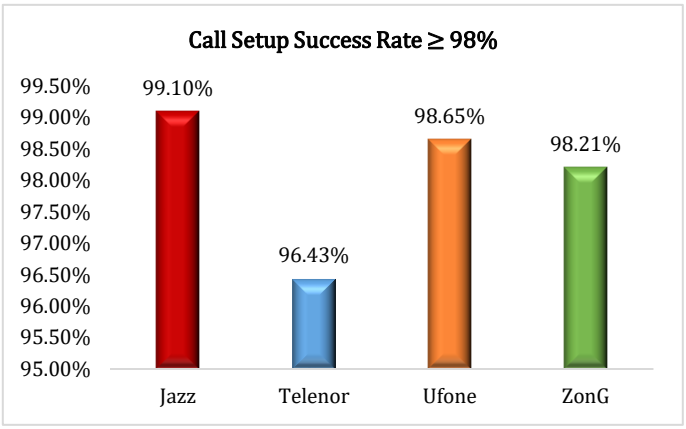


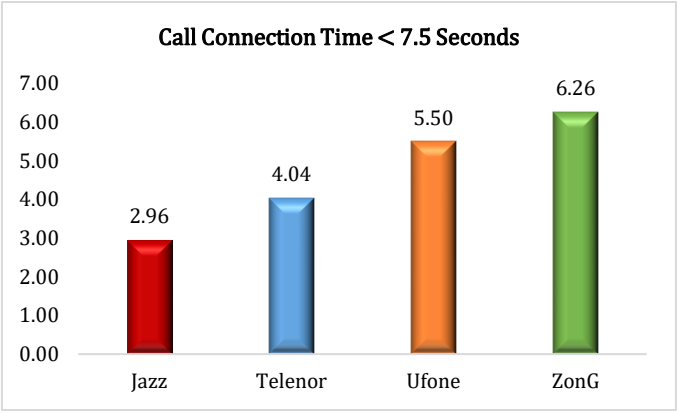


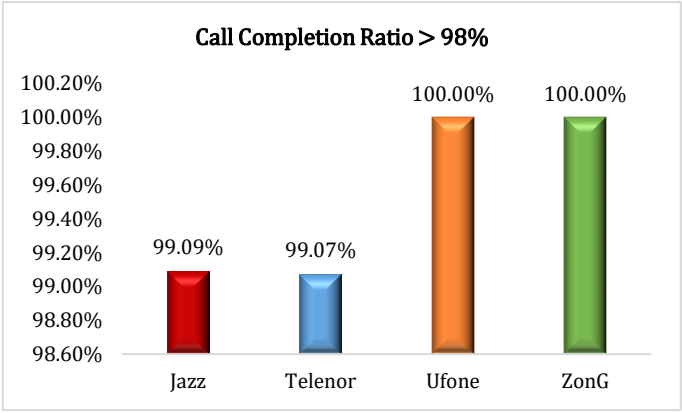


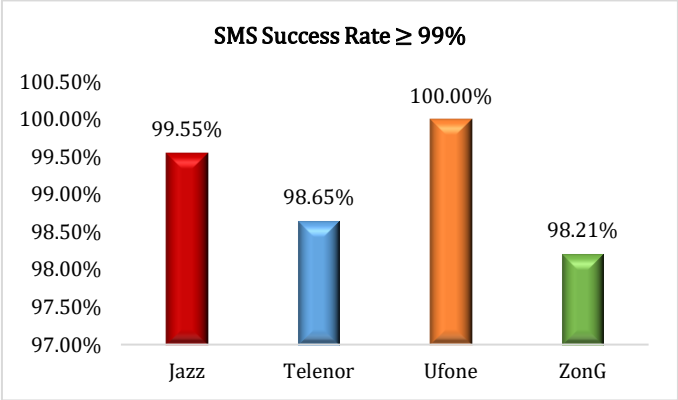
QUALITY OF SERVICE SURVEY RESULTS – QUETTA

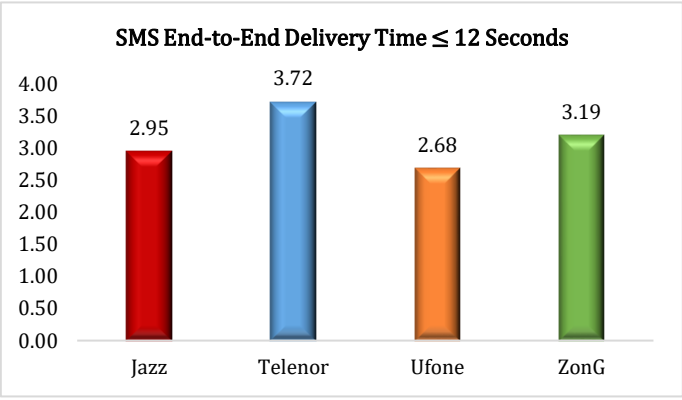


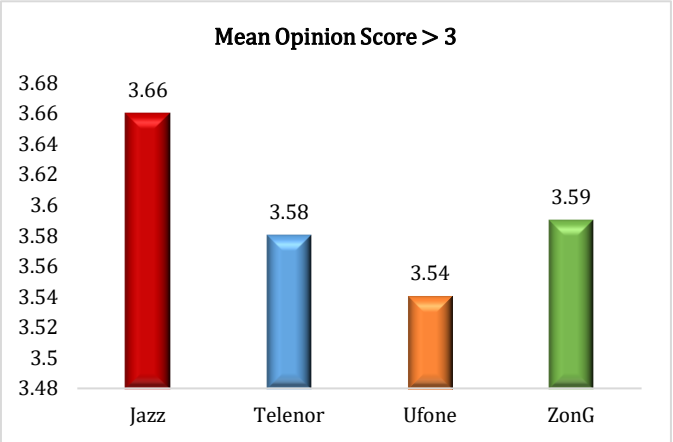




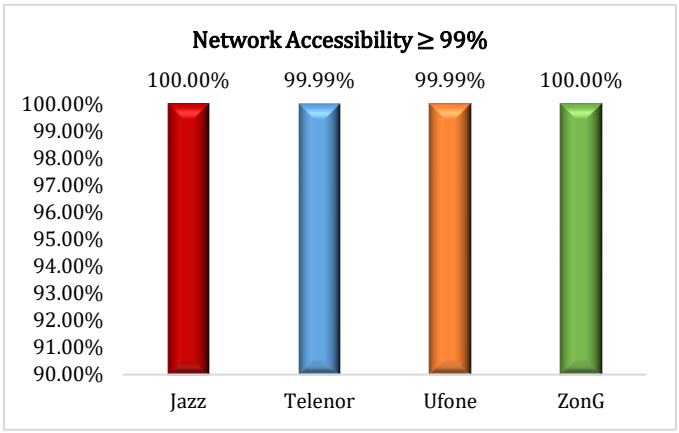


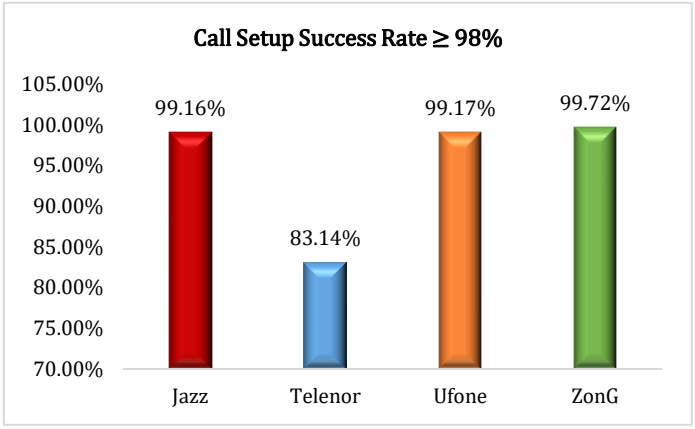


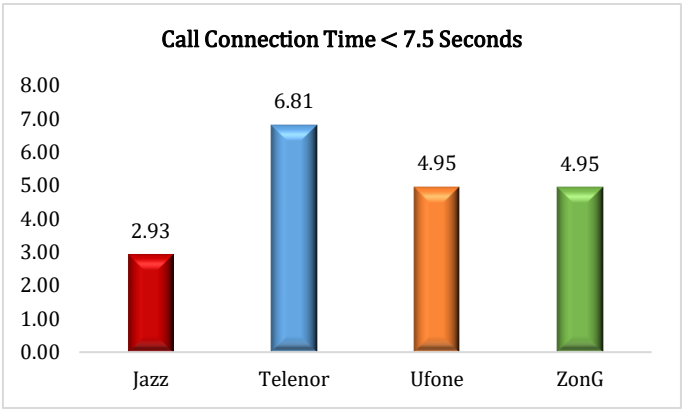


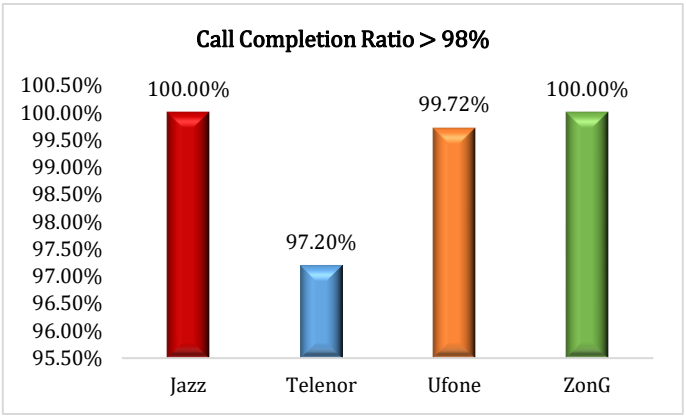


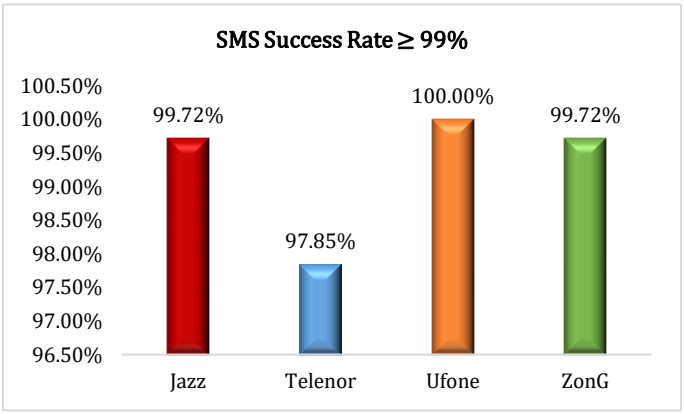
QUALITY OF SERVICE SURVEY RESULTS – ISLAMABAD

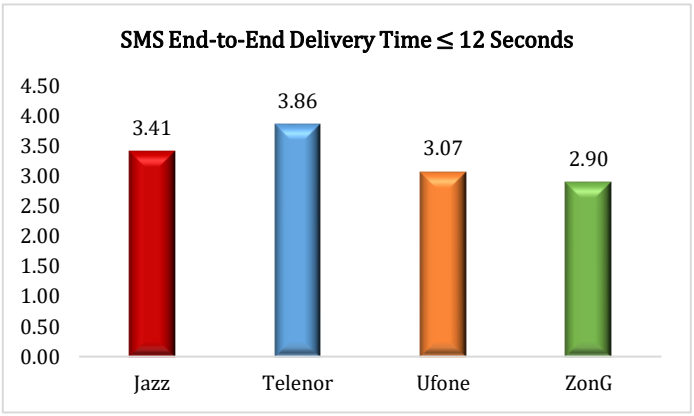


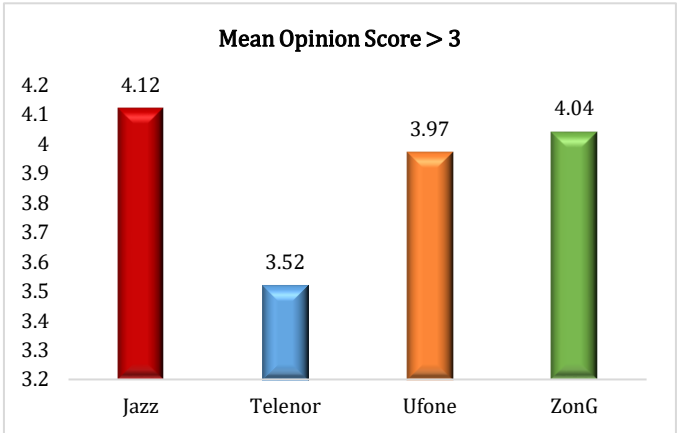




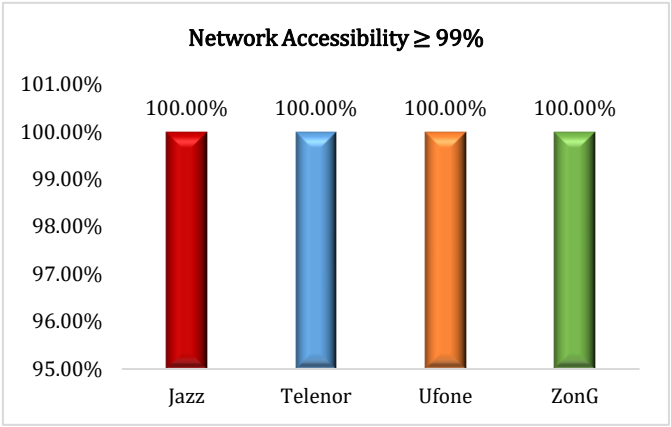


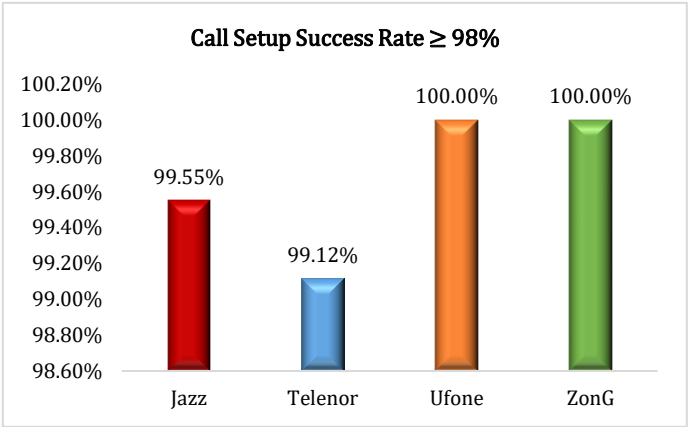


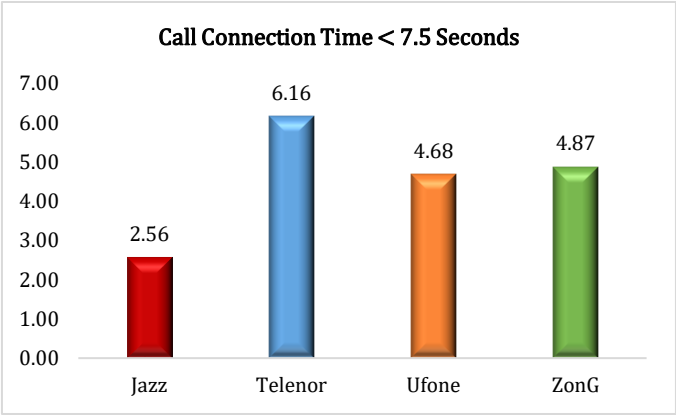


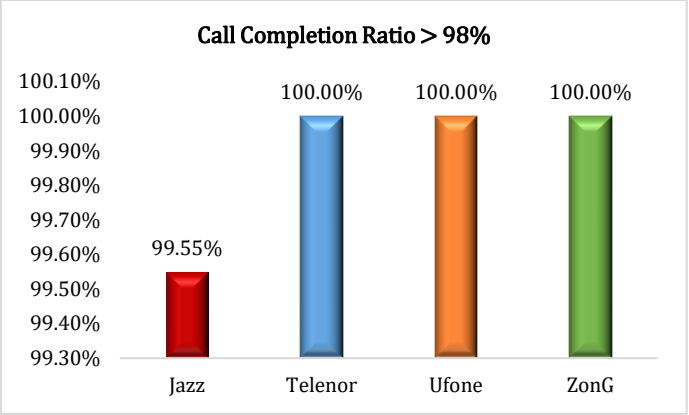


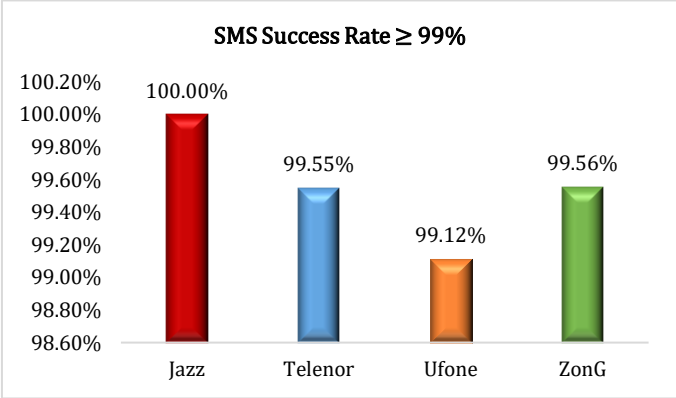
QUALITY OF SERVICE SURVEY RESULTS – KOT RADHA KISHAN

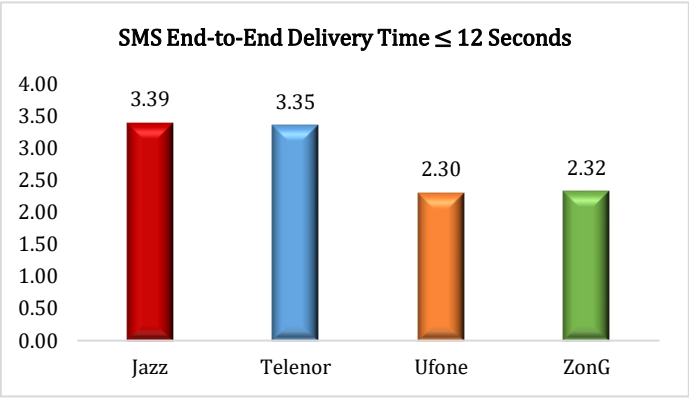


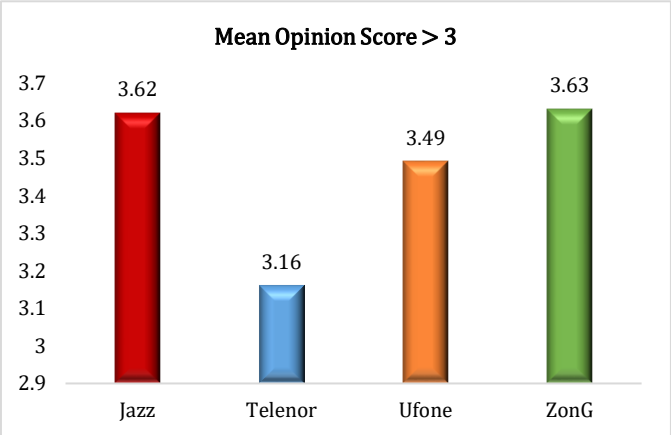




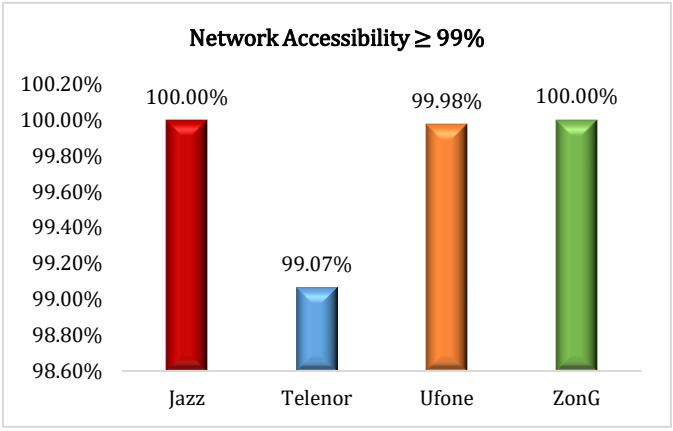


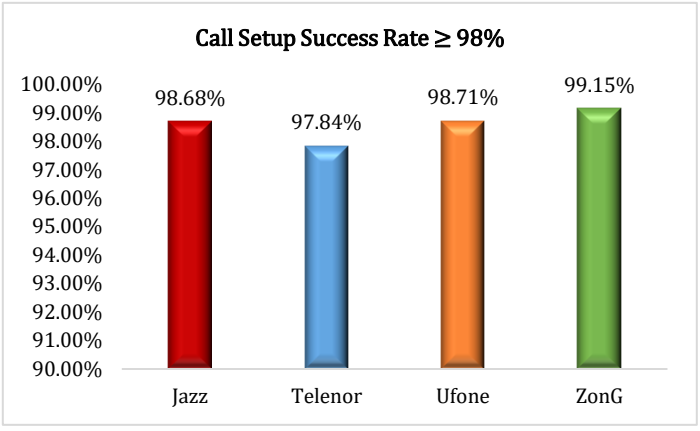


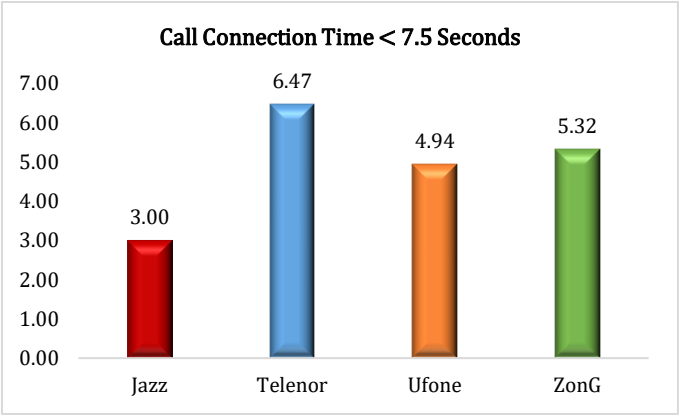


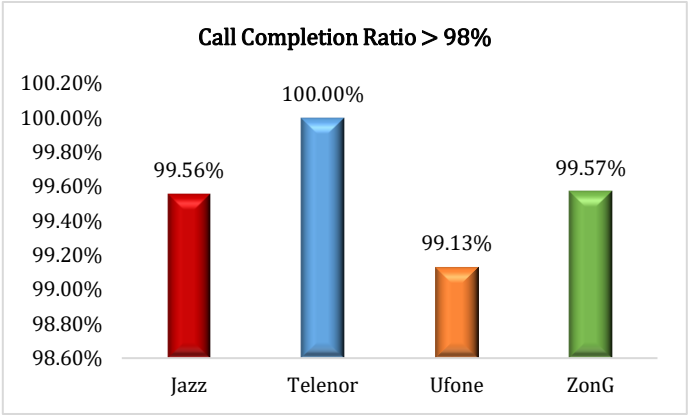


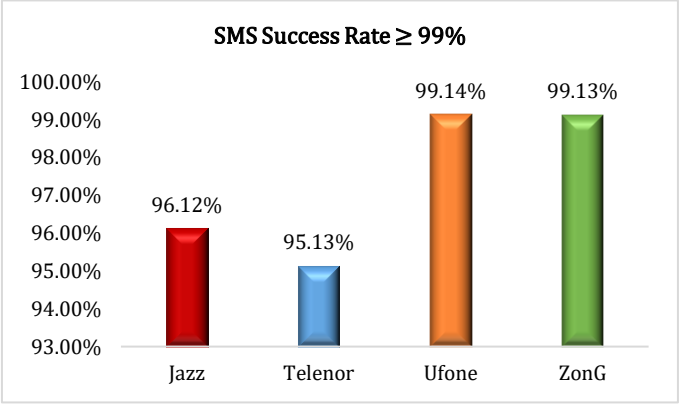
QUALITY OF SERVICE SURVEY RESULTS – SHEIKHUPURA

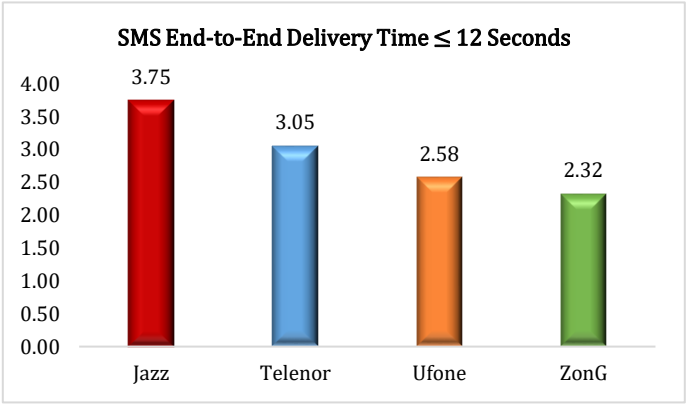


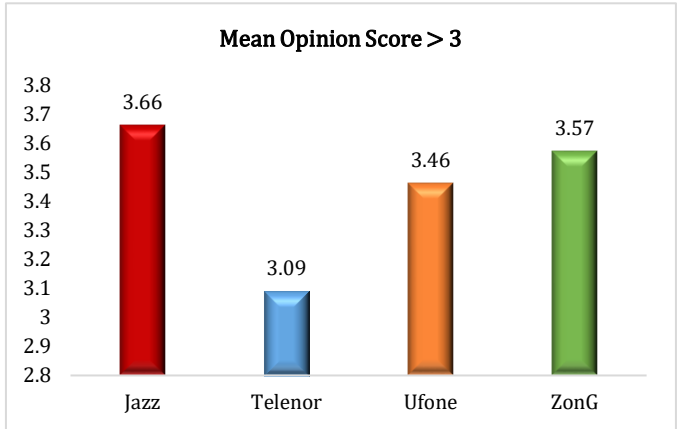




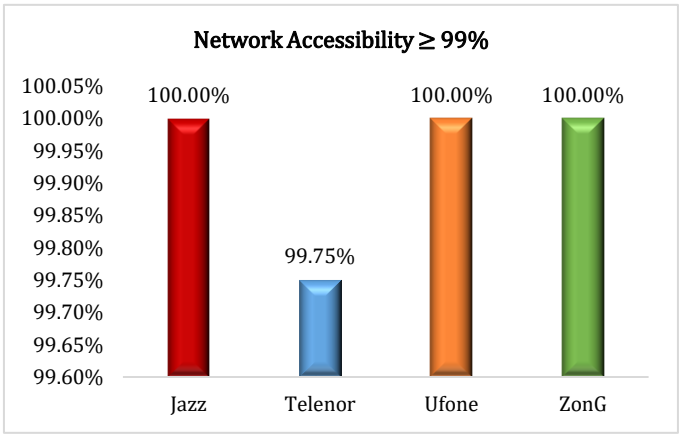


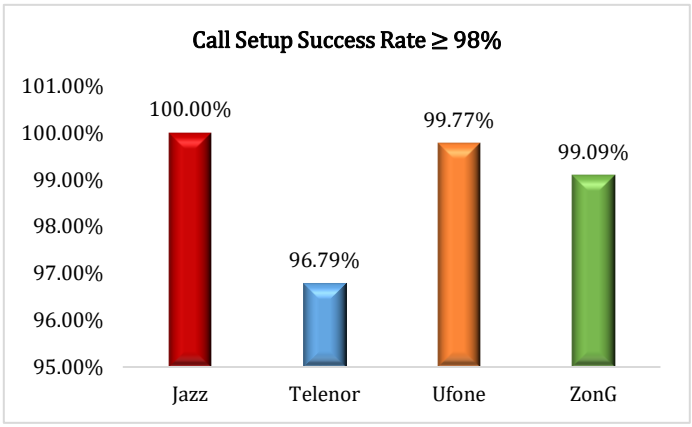


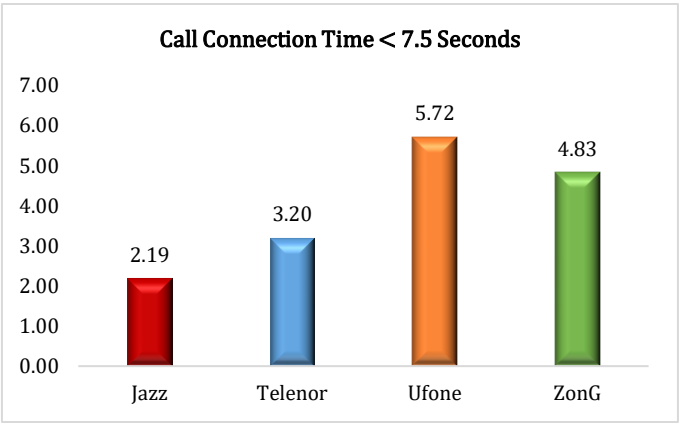


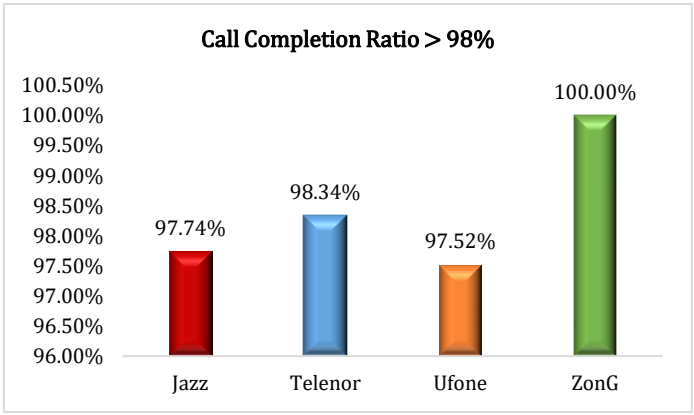


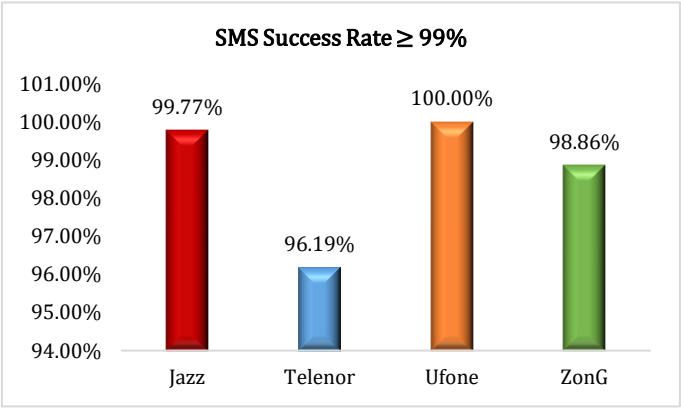
QUALITY OF SERVICE SURVEY RESULTS – HANGU

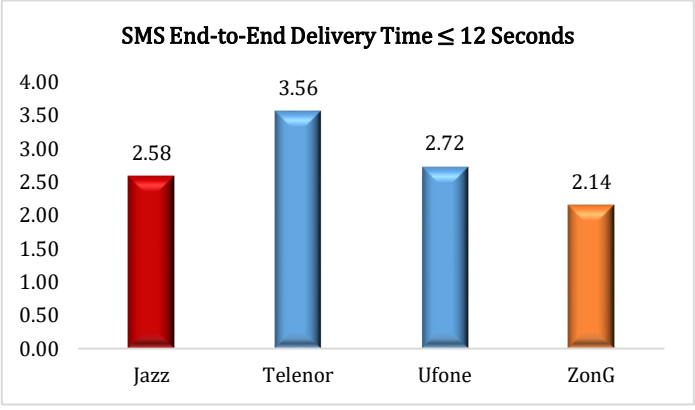


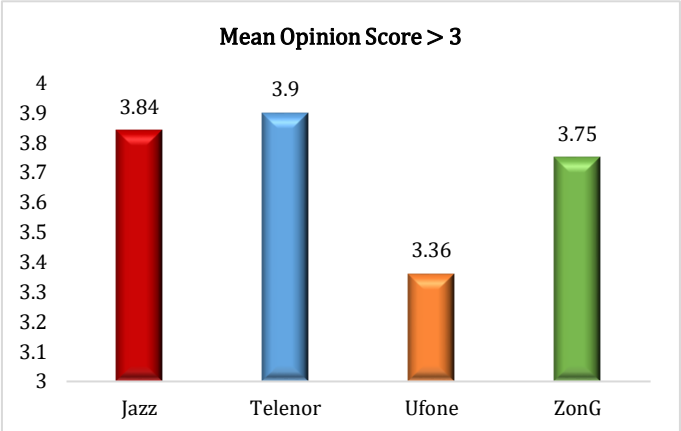




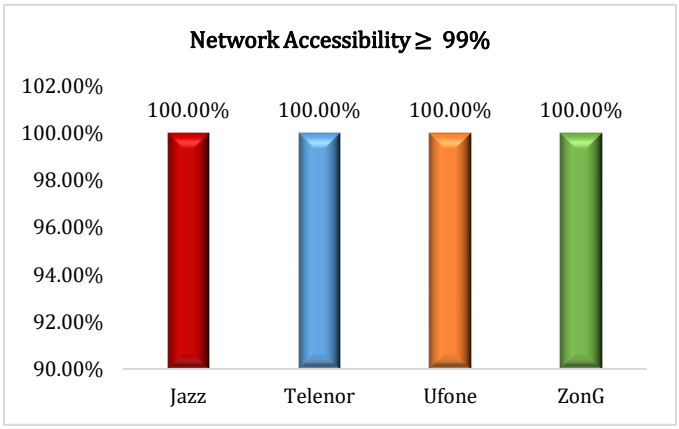


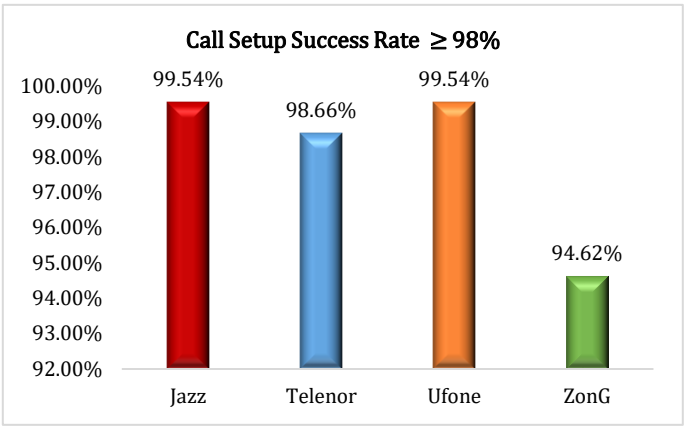


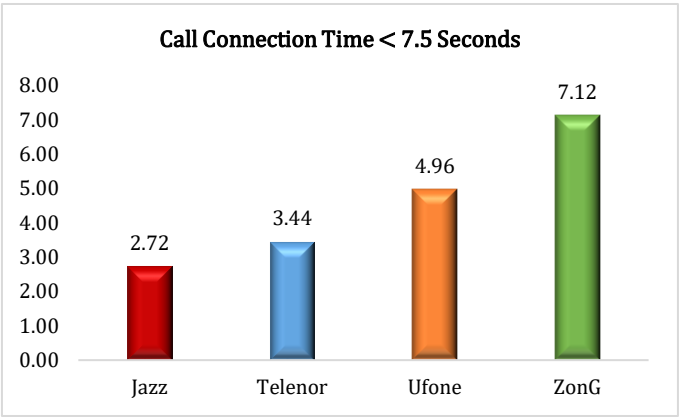


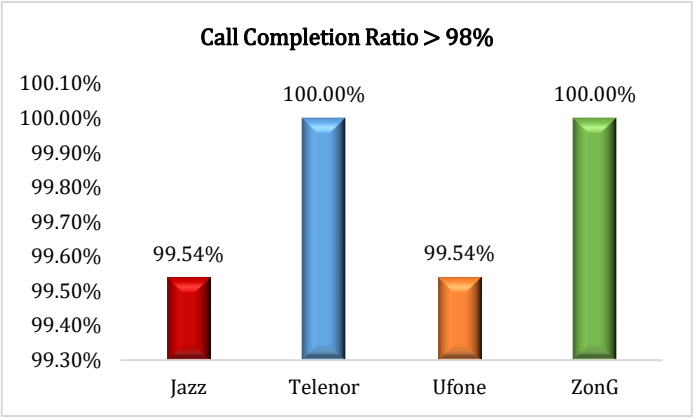


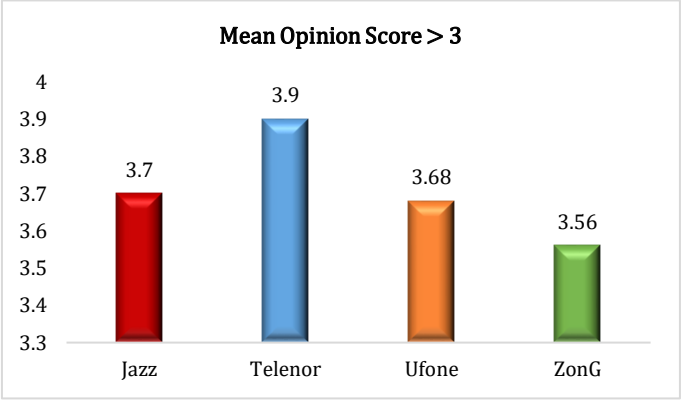
QUALITY OF SERVICE SURVEY RESULTS – KUCHLAK

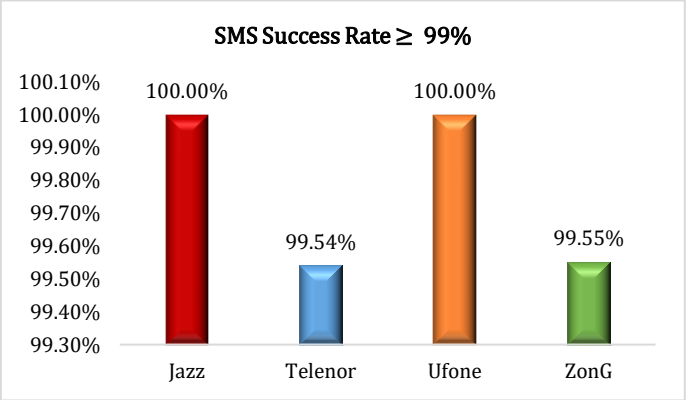


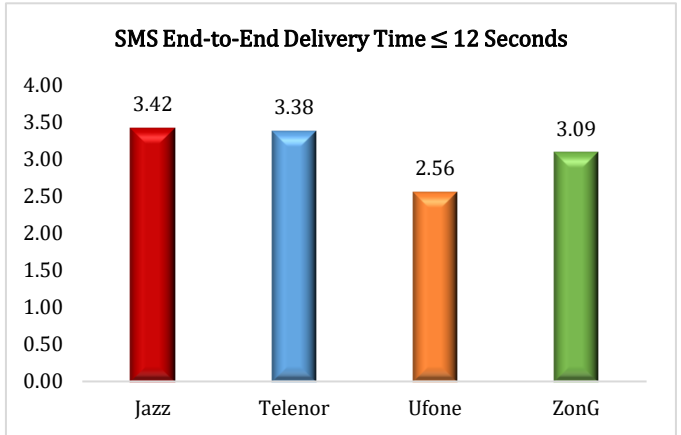




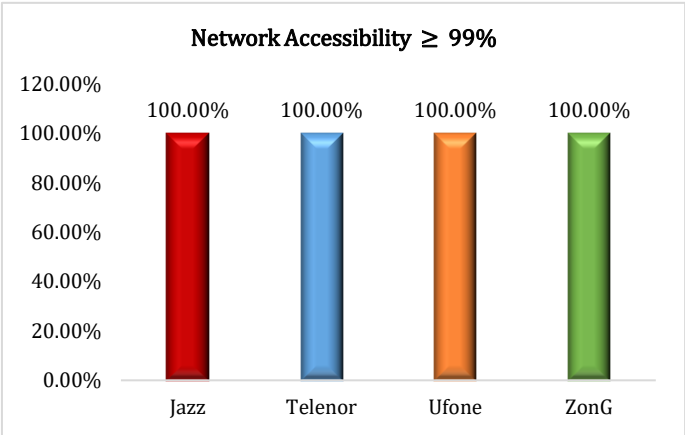


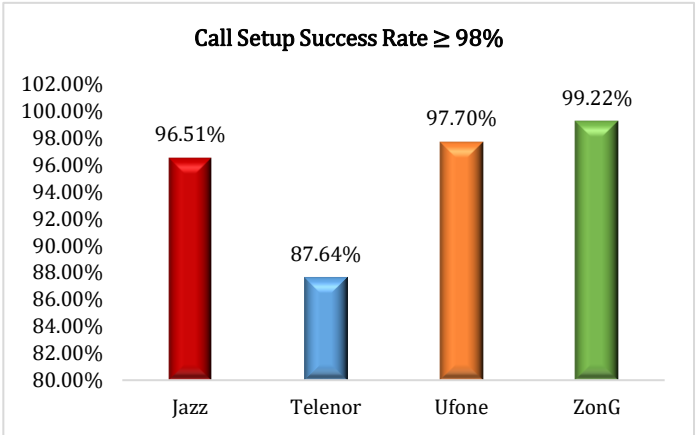


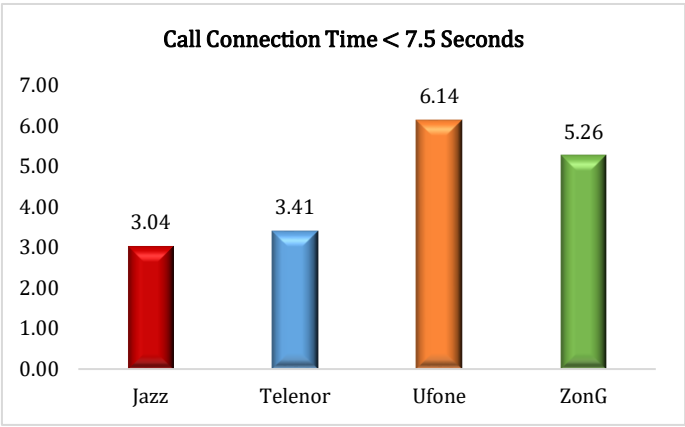


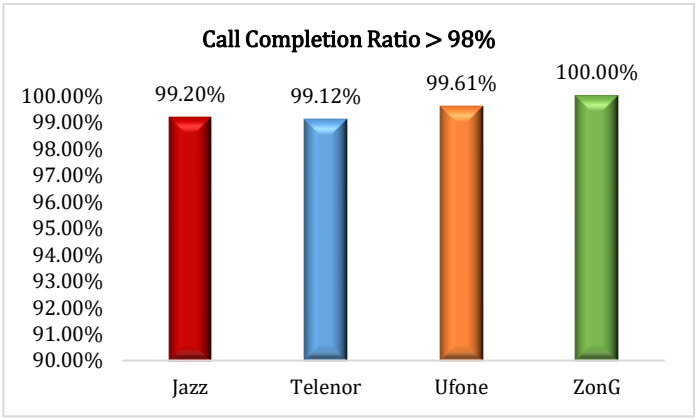


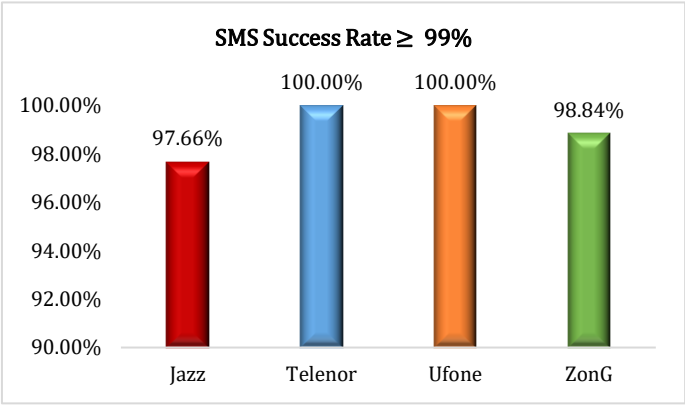
QUALITY OF SERVICE SURVEY RESULTS – ABBOTTABAD

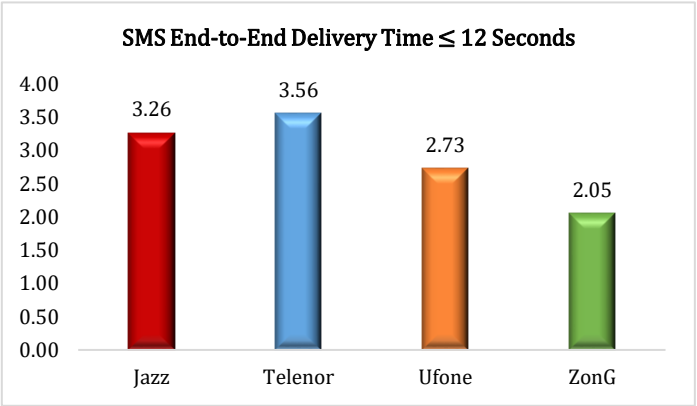


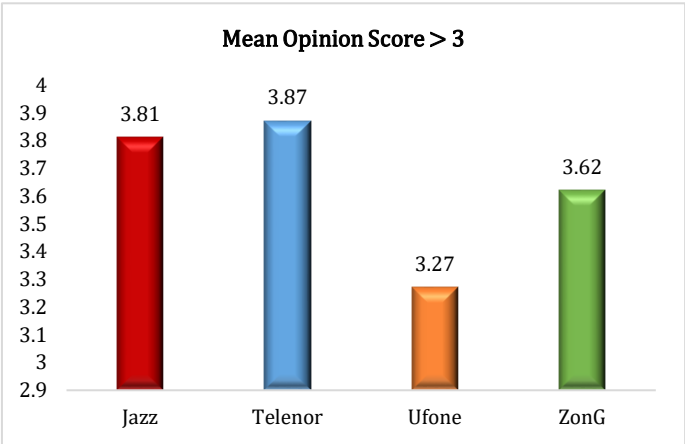




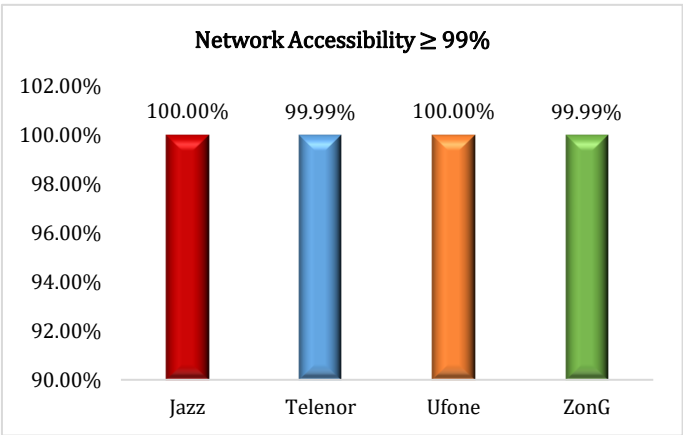


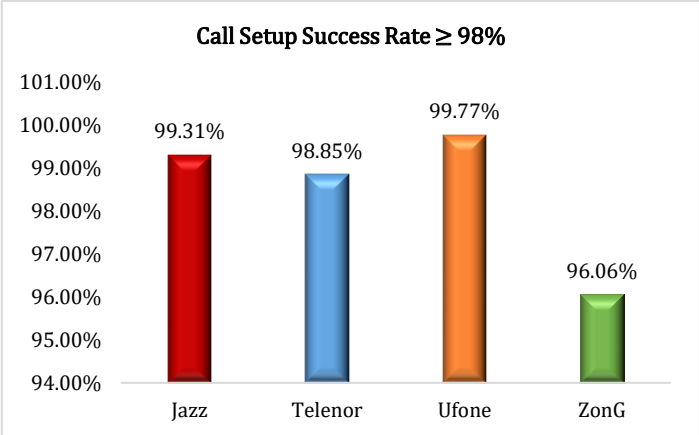


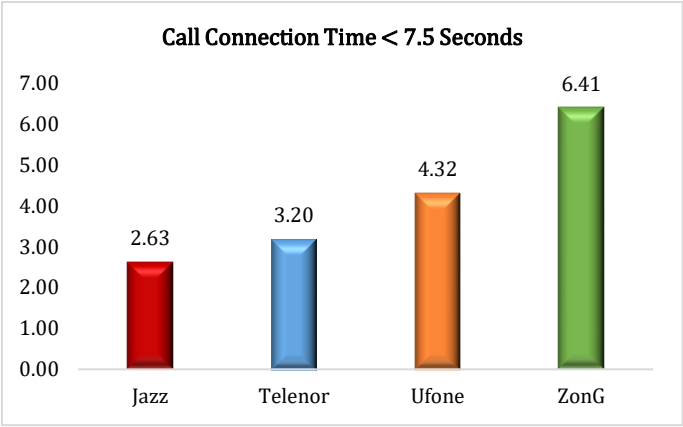


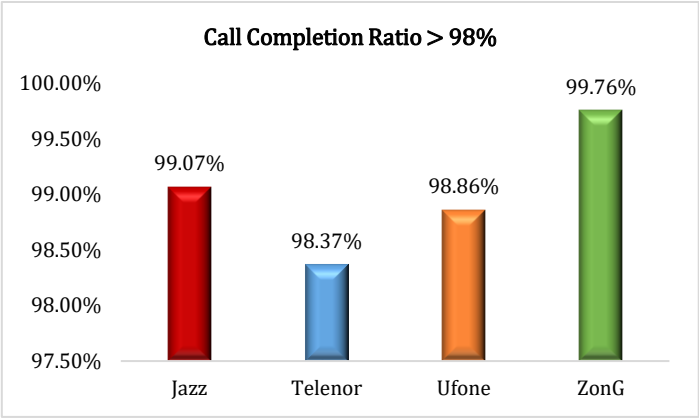


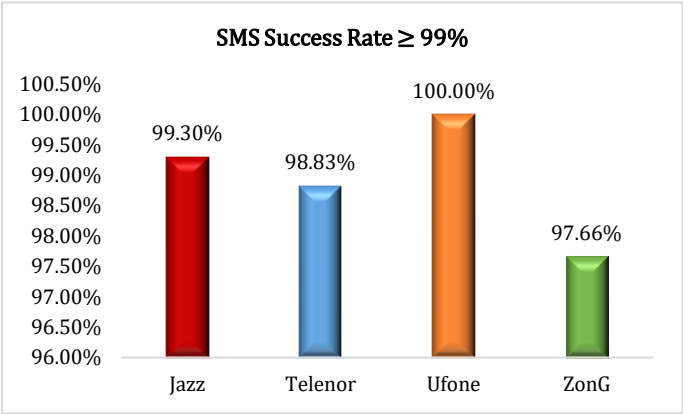
QUALITY OF SERVICE SURVEY RESULTS – LOWER DIR

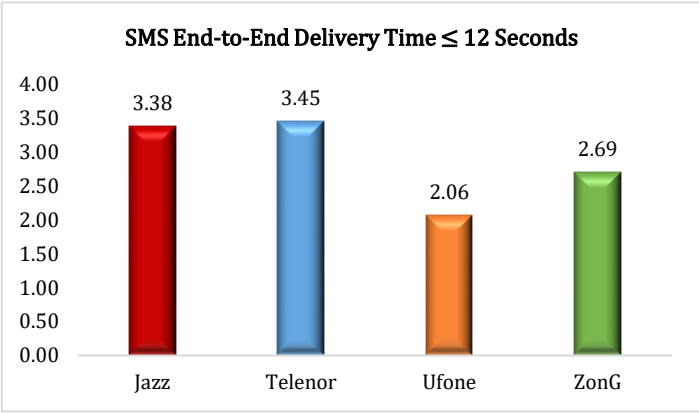


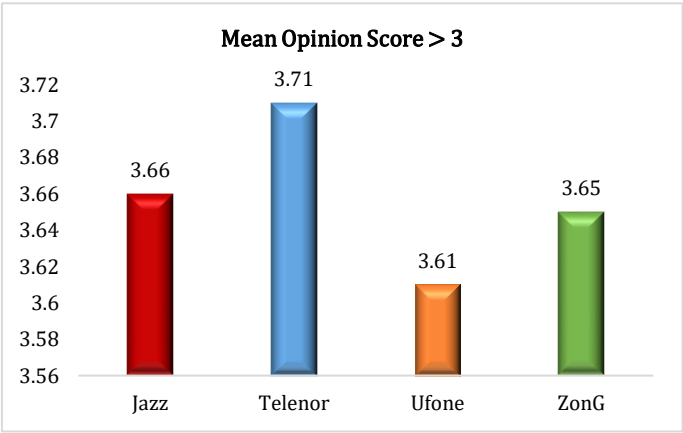




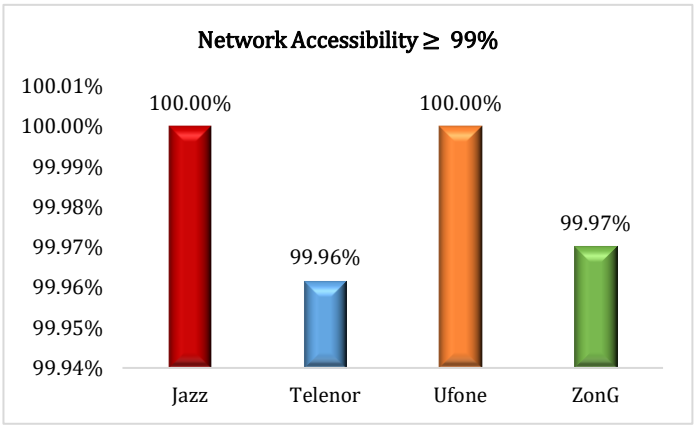


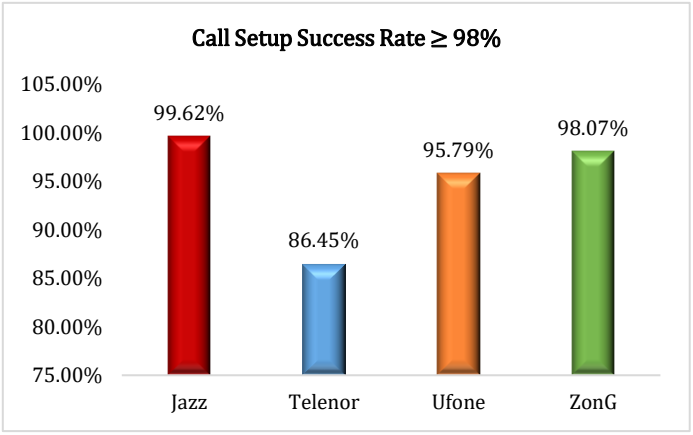


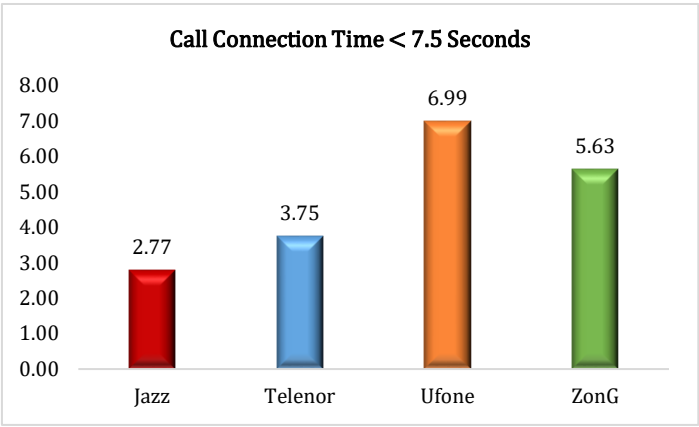


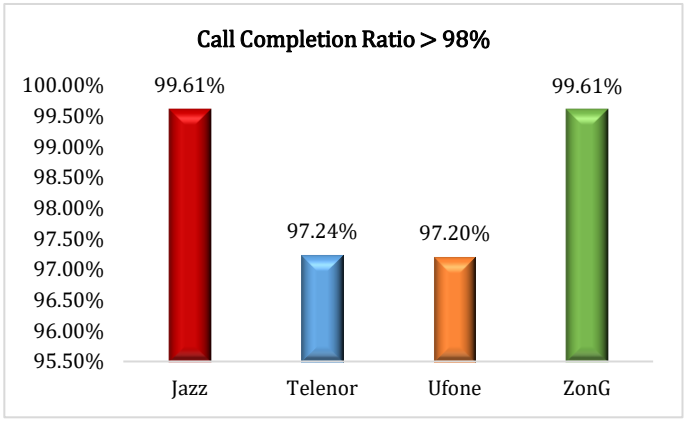


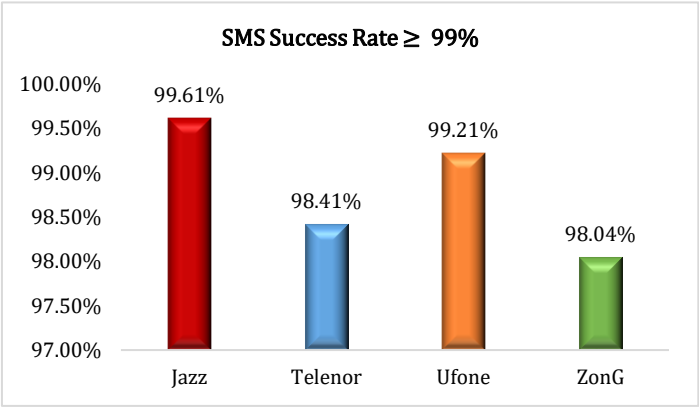
QUALITY OF SERVICE SURVEY RESULTS – MANSEHRA

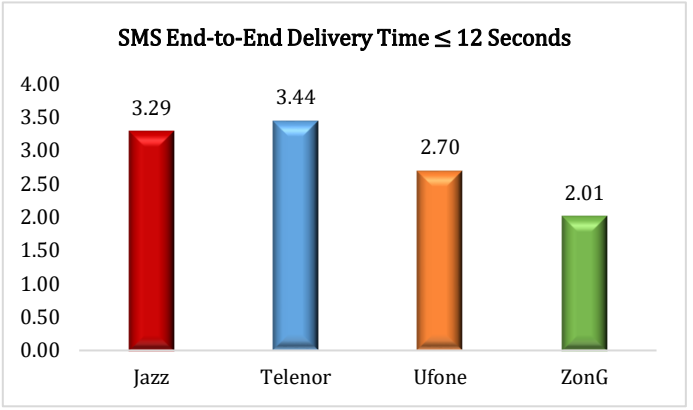


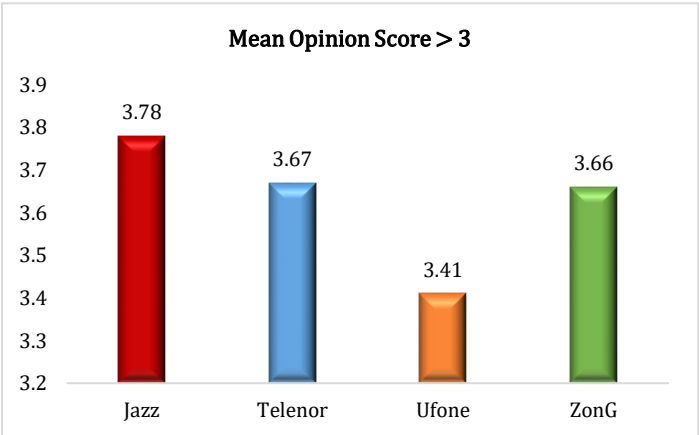




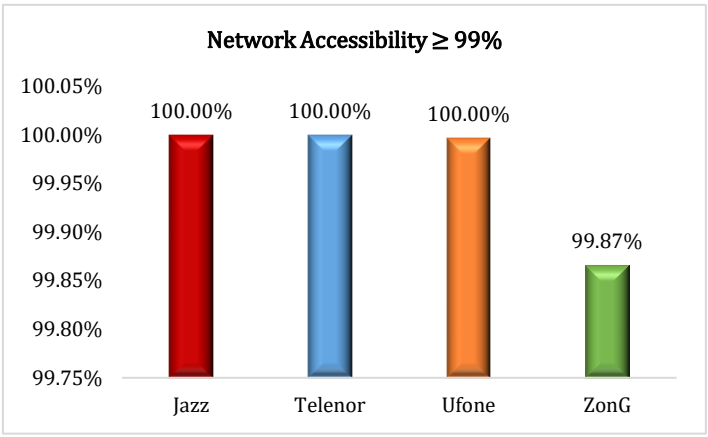


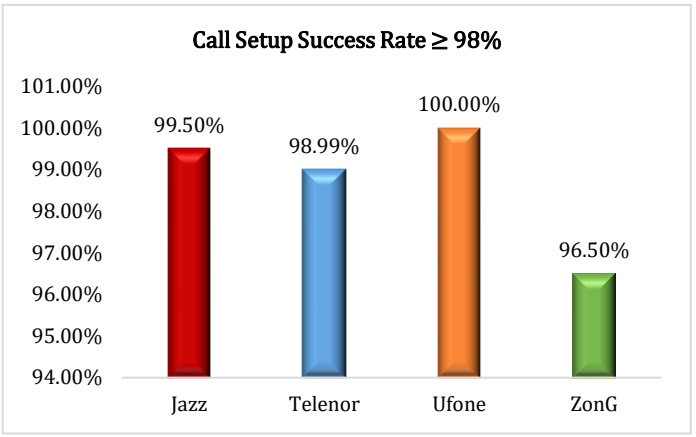


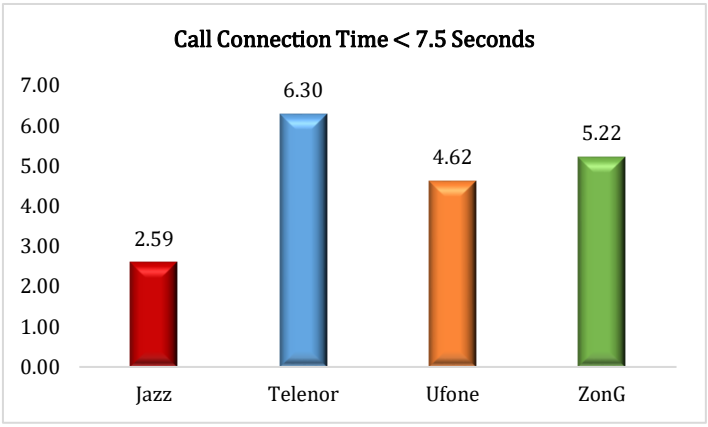


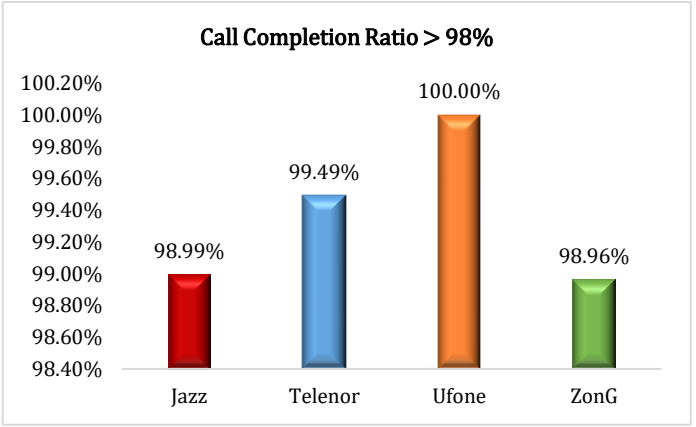


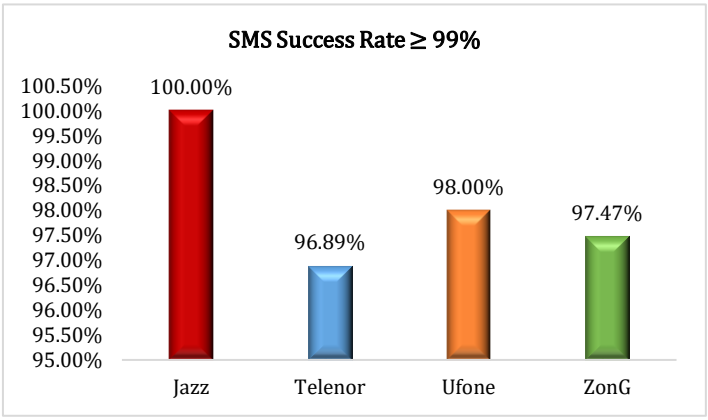
QUALITY OF SERVICE SURVEY RESULTS – MATIARI

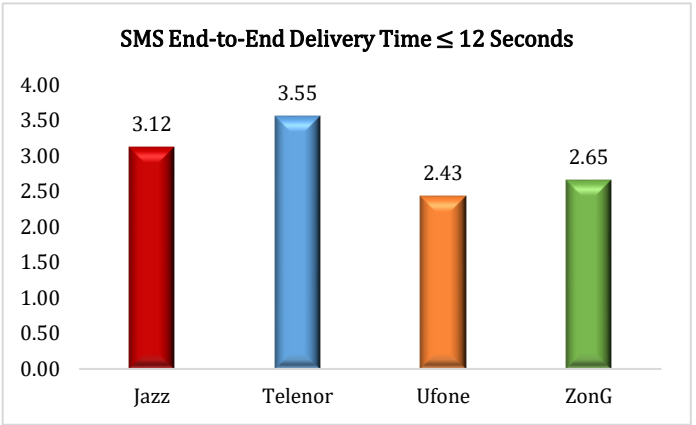


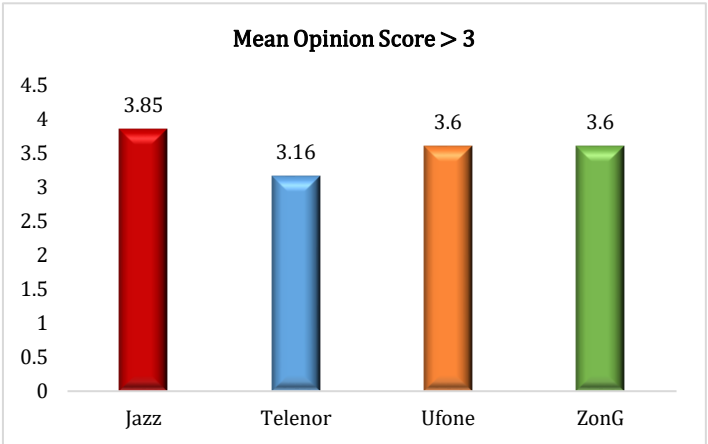




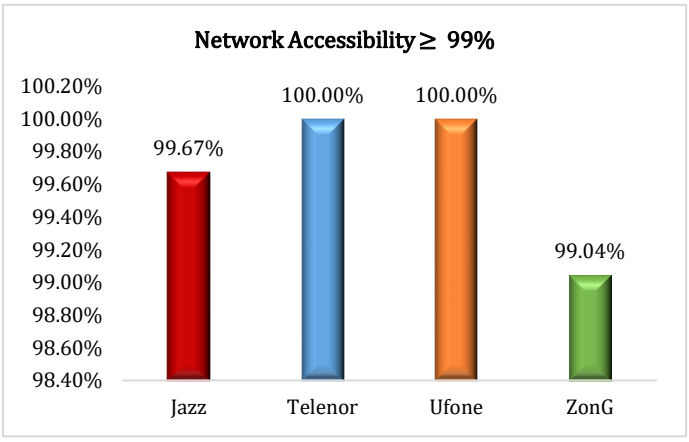


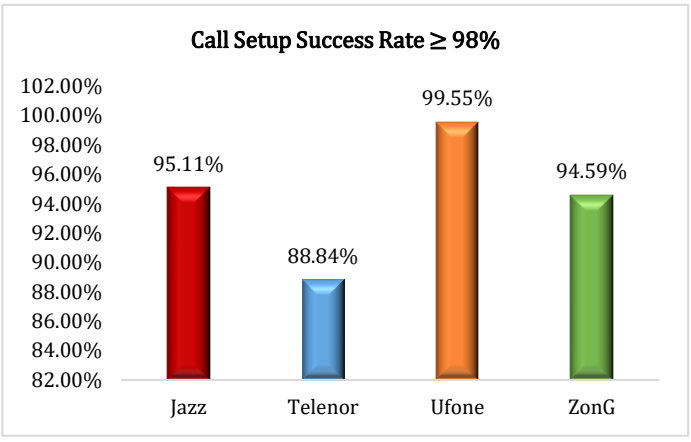


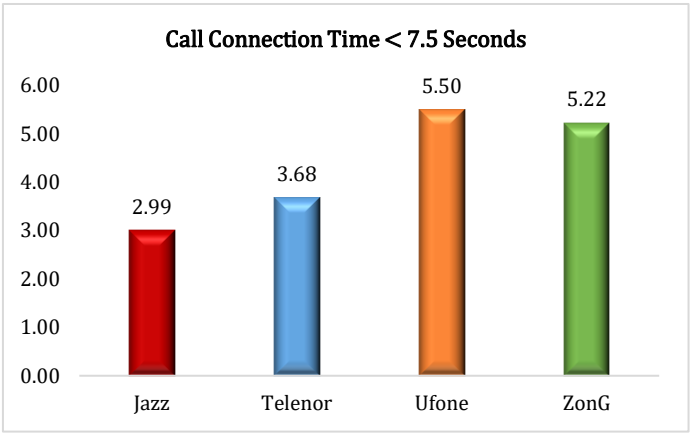


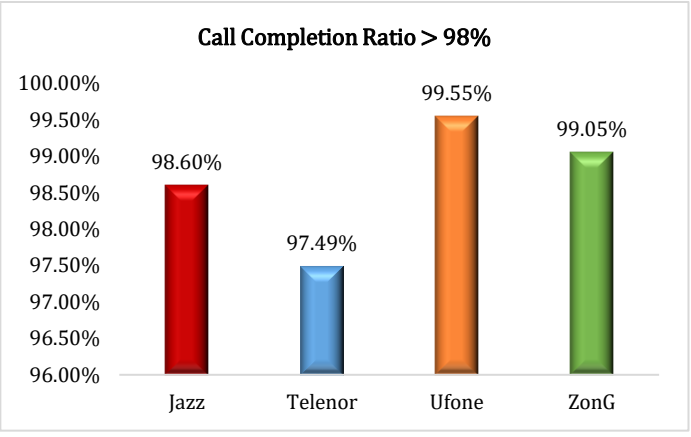


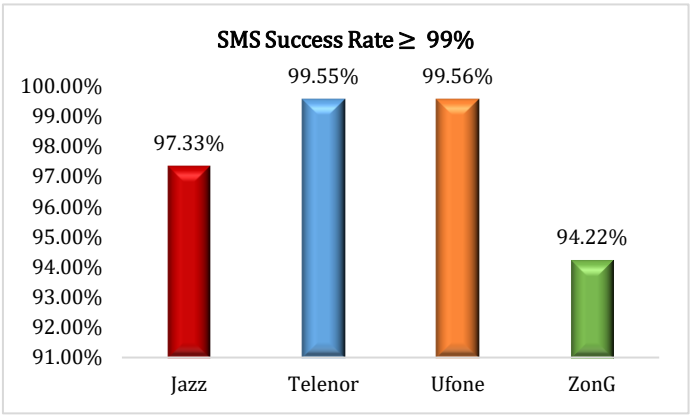
QUALITY OF SERVICE SURVEY RESULTS – MACH

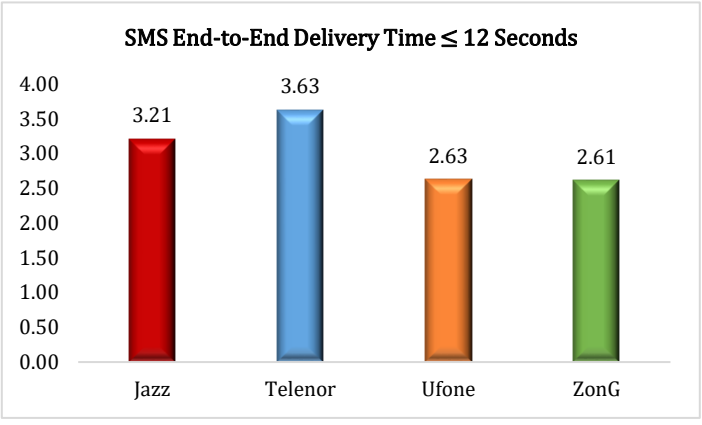


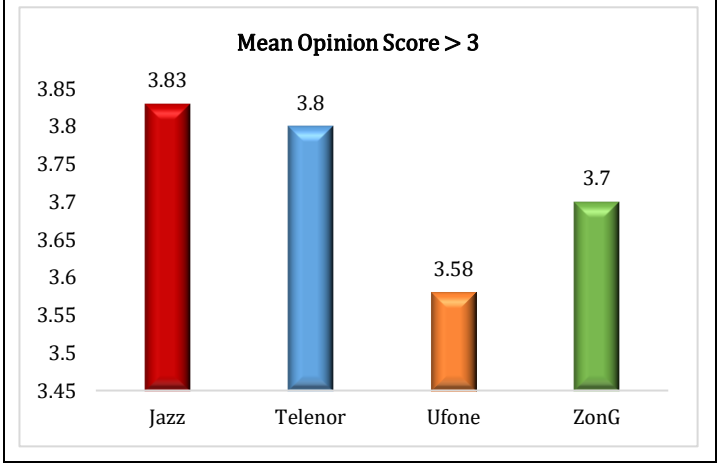




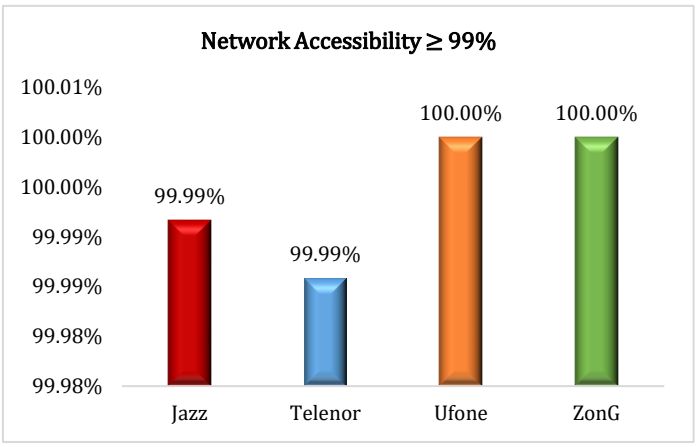


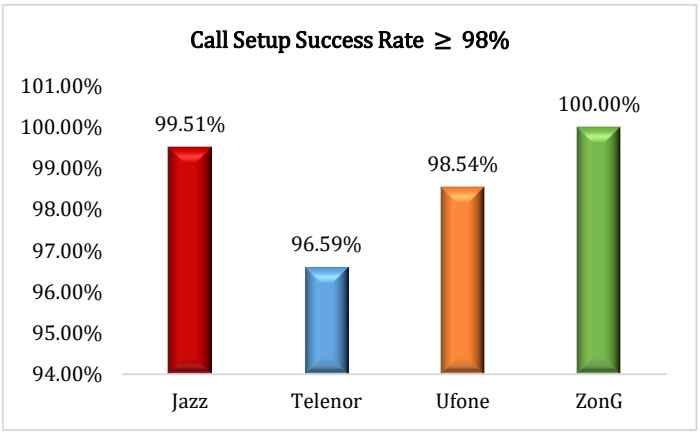


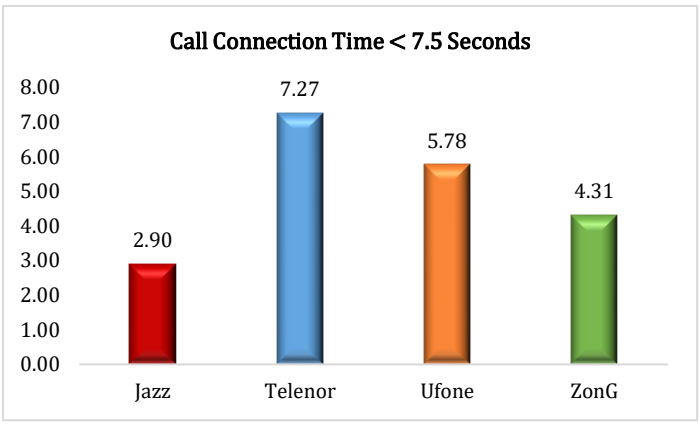


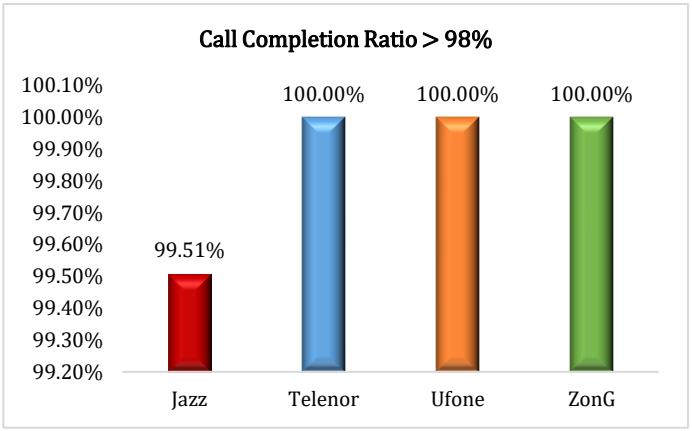


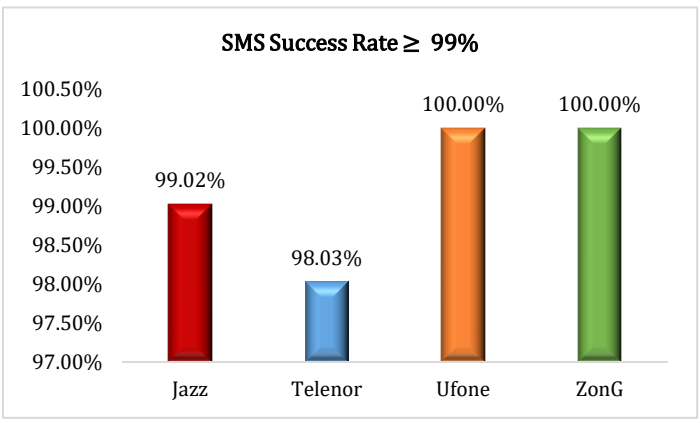
QUALITY OF SERVICE SURVEY RESULTS – PASROOR

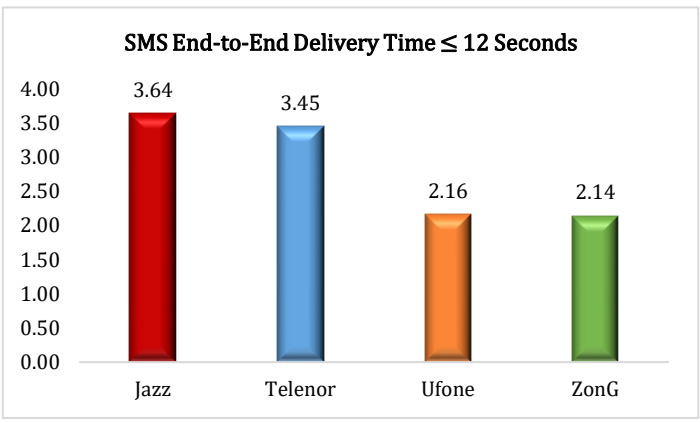


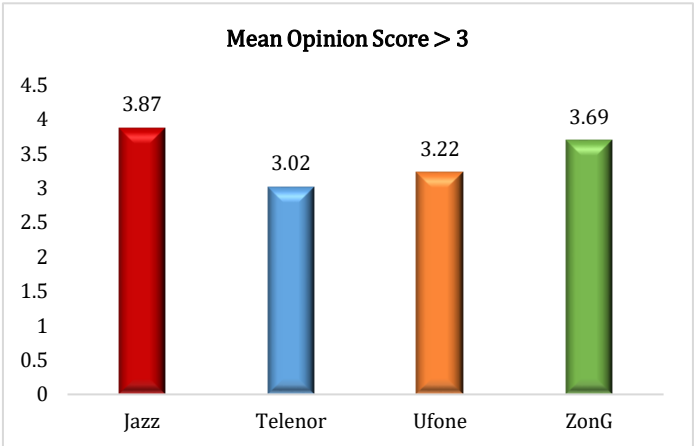




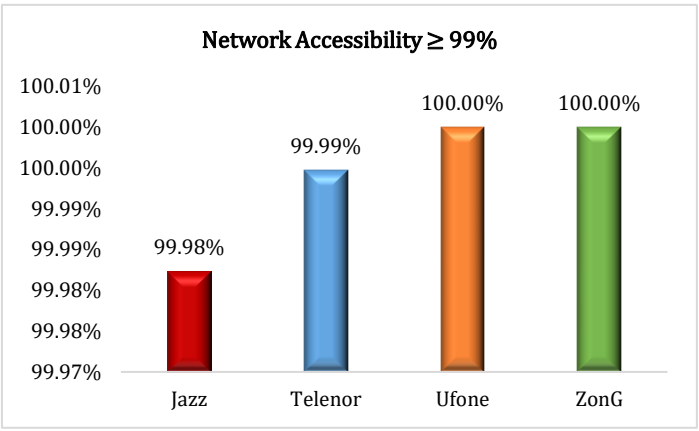


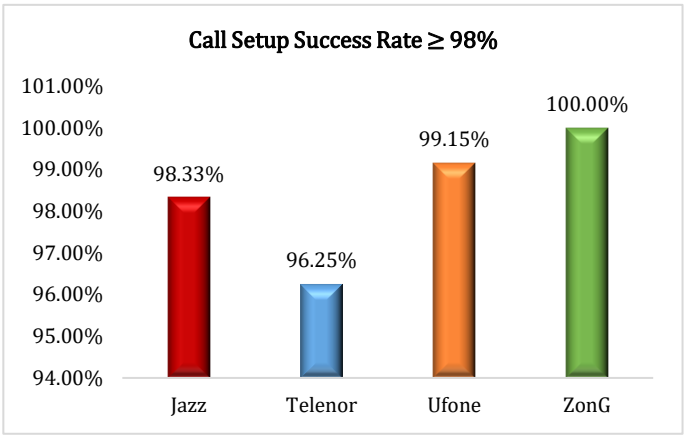


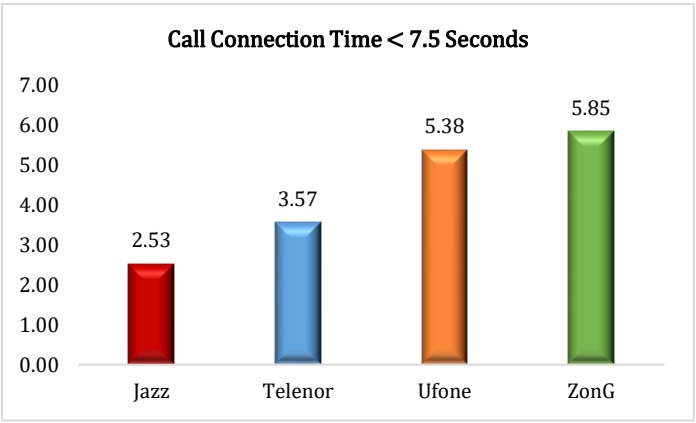


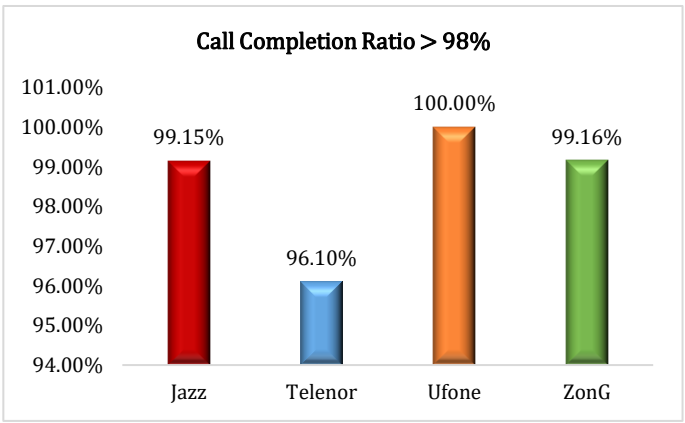


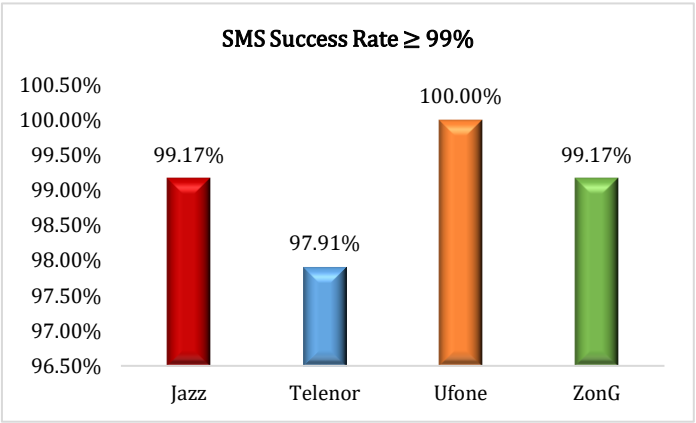
QUALITY OF SERVICE SURVEY RESULTS – PISHIN

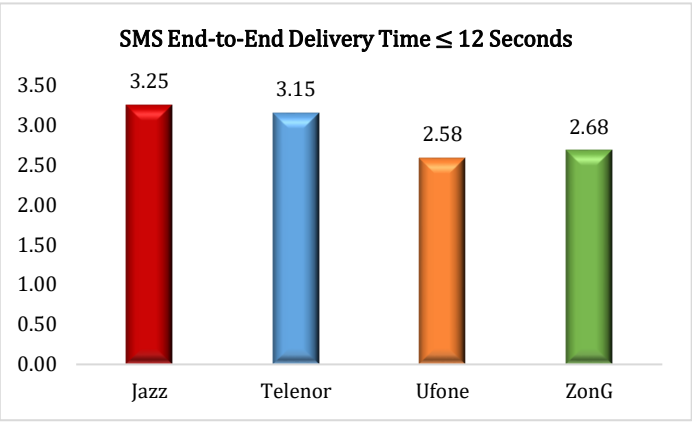


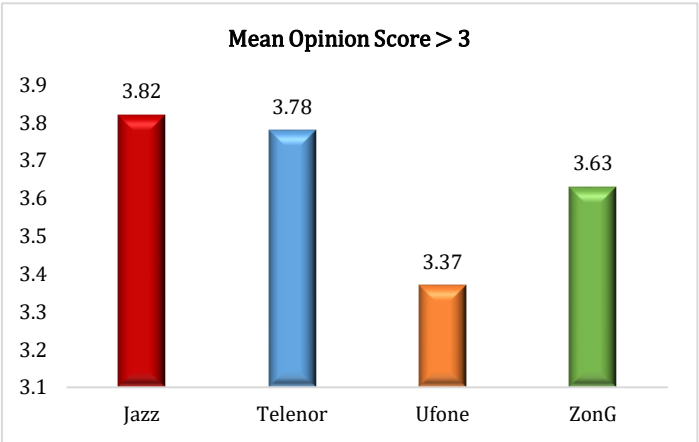




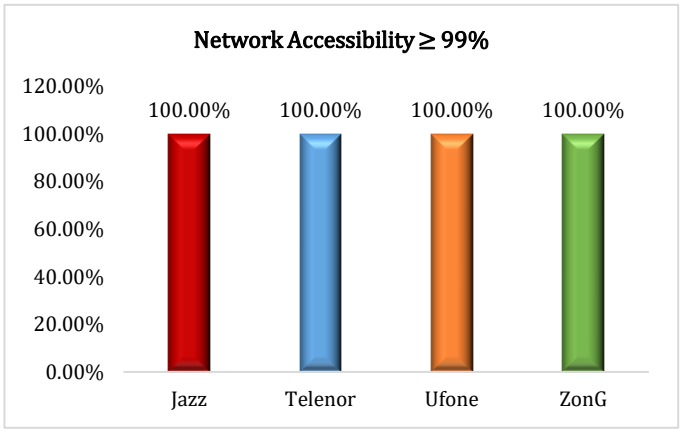


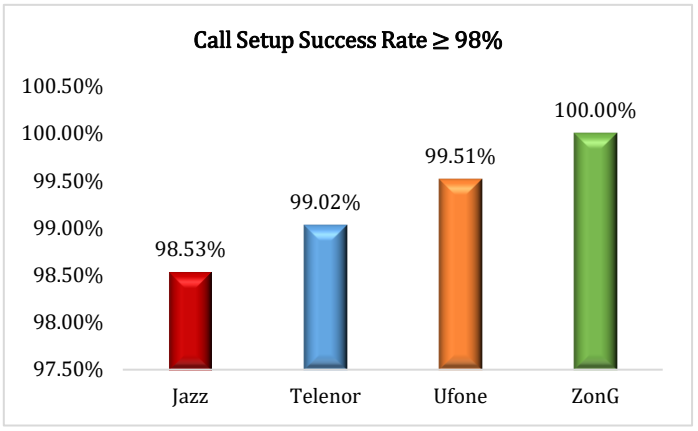


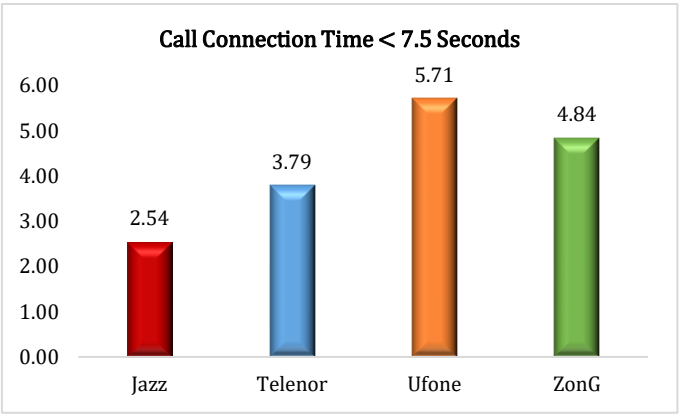


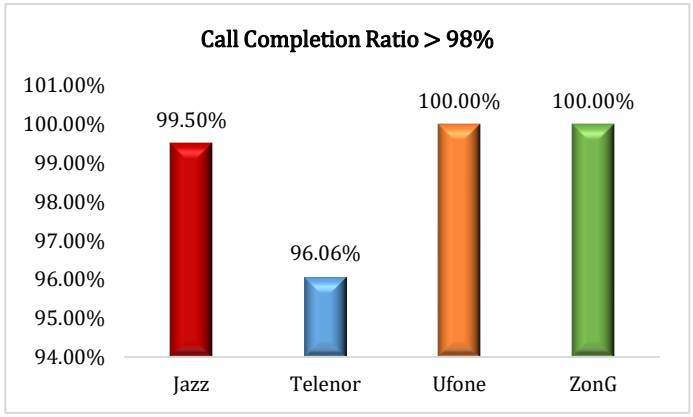


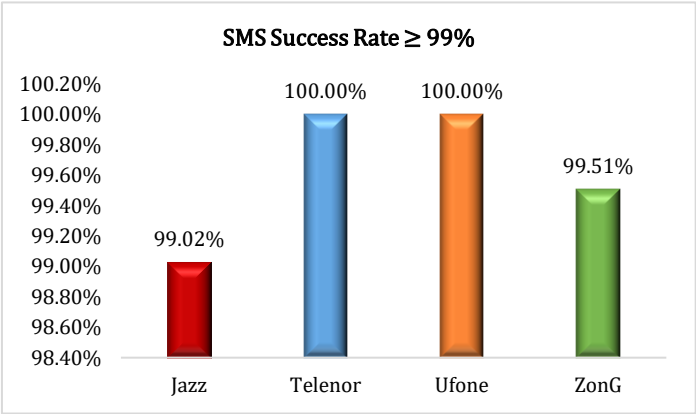
QUALITY OF SERVICE SURVEY RESULTS – SARGODHA

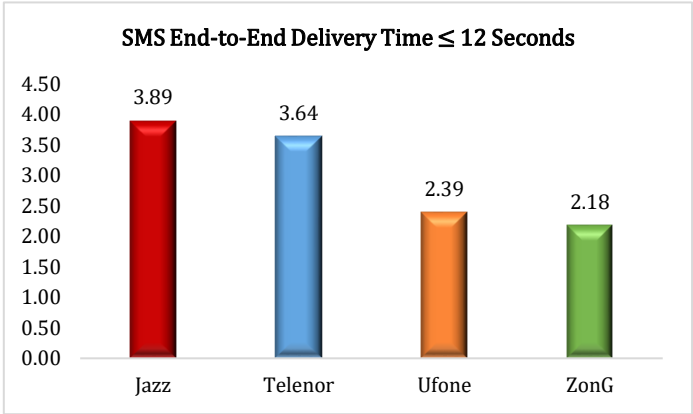


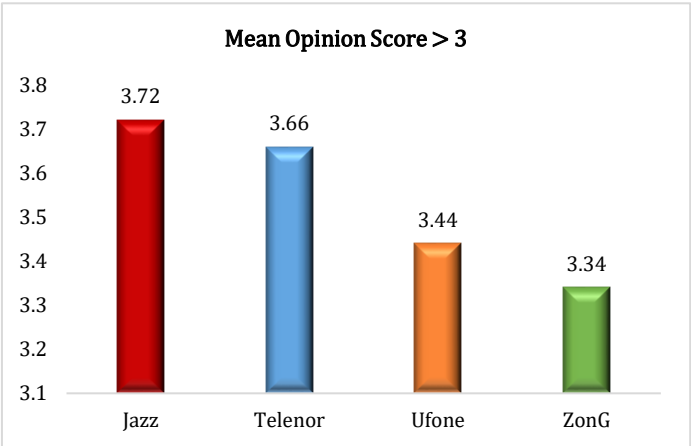
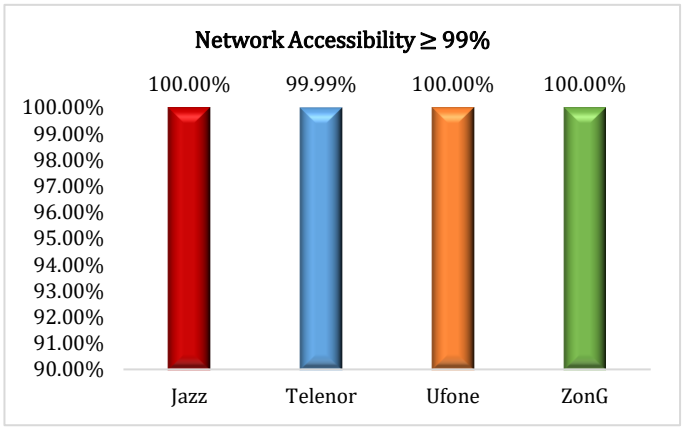
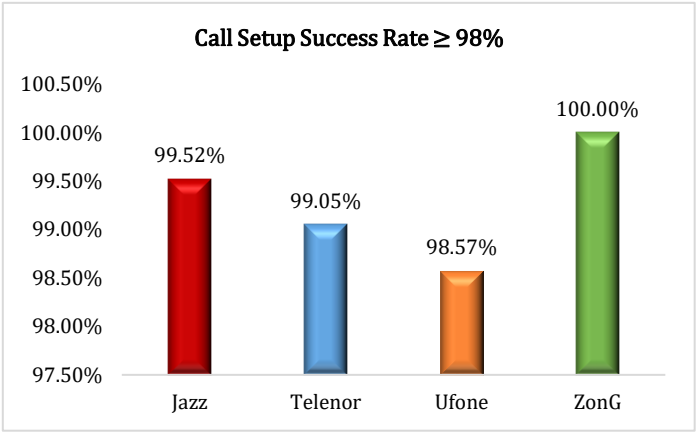
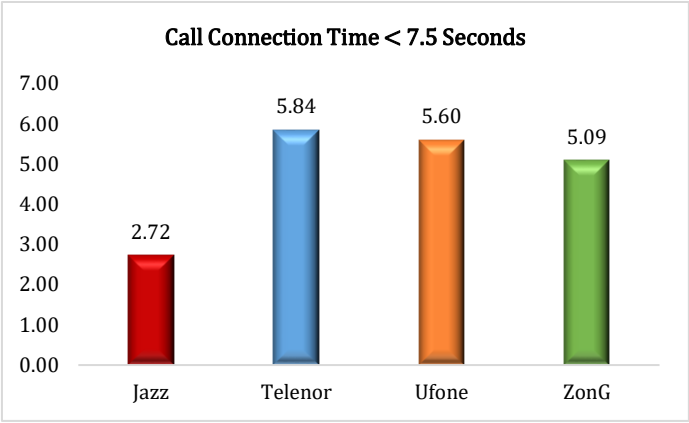
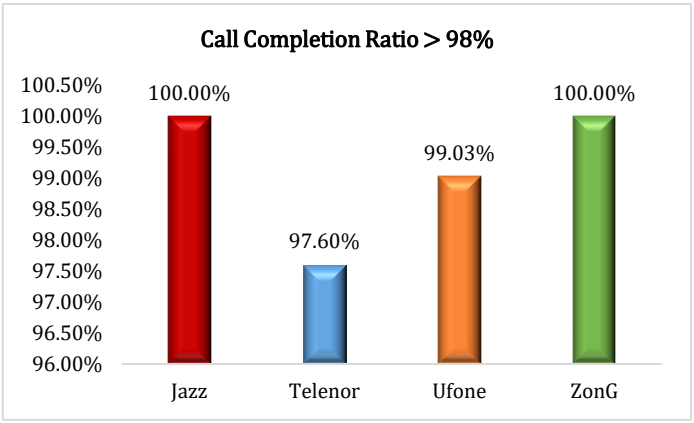
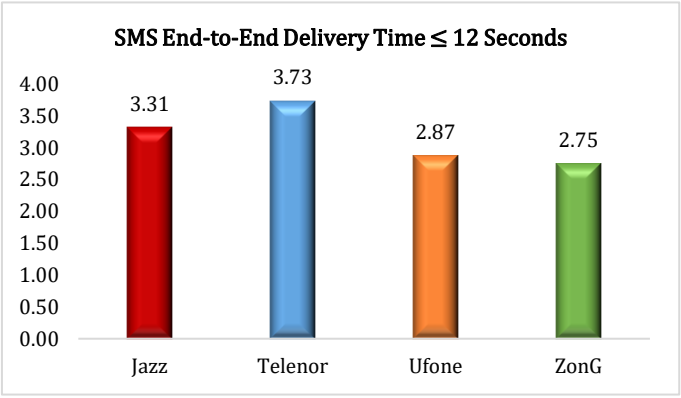
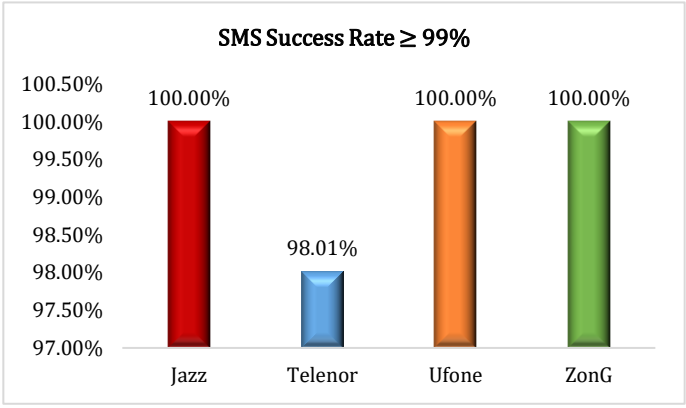
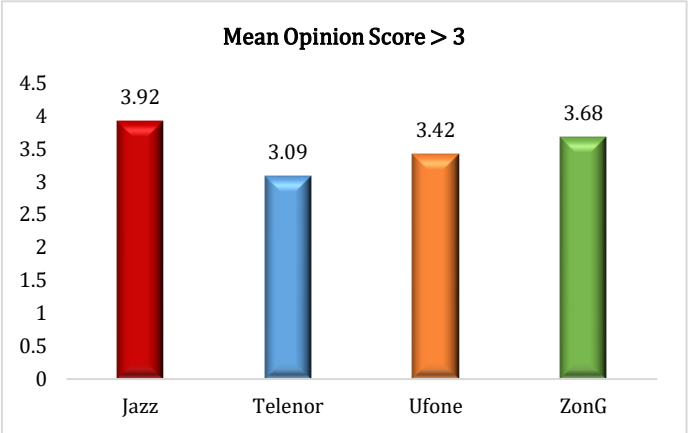












QUALITY OF SERVICE SURVEY RESULTS – UMER KOT