

INDEPENDENT QUALITY OF SERVICE **SURVEY IN PAKISTAN – CITIES**

THIRD 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 Seventeen (17) x Cities of Khyber Pakhtunkhwa, Punjab and Sindh during 3rd Quarter i.e. July~ Sep 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	SWABI	KHYBER PAKHTUNKHWA	3	15 th ~17 th August 2023
2	UPPER DIR		3	21 st ~23 rd August 2023
3	ABBOTTABAD		4	5 th ~8 th September 2023
4	BUNER		3	11 th ~13 th September 2023
5	SHAHKOT	PUNJAB	4	15 th ~18 th August 2023
6	WAH/ TAXILA		4	16 th ~18 th & 21 st August 2023
7	LAHORE		4	21 st ~24 th August 2023
8	KAHROR PACCA		3	22 nd ~24 th August 2023
9	GUJAR KHAN		4	22 nd ~25 th August 2023
10	SHUJABAD		4	28 th ~31 st August 2023
11	RAWALPINDI		4	29 th August~1 st September 2023
12	MURIDKE	4	12 th ~15 th September 2023	
13	LARKANA	SINDH	3	22 nd ~24 th August 2023
14	KHAIRPUR		3	29 th ~31 st August 2023
15	JACOBABAD		3	4 th ~6 th September 2023
16	SUJAWAL		3	13 th ~15 th September 2023
17	MITHI		3	19 th ~21 st September 2023

Table 1.1: QoS Survey Dates and Samples

DRIVE TEST DETAILS

2.1. The QoS survey was carried out using Automated QoS Monitoring & Benchmarking Tool i.e. "**SMARTBENCHMARKER**". Drive test teams selected survey routes in such a manner to cover main roads, service roads and majority of sectors/colonies. During the survey, mobile handsets for Voice Calls, SMS and Mobile Broadband/Data Sessions were kept in technology auto detect mode.

MOBILE NETWORK COVERAGE

3.1. **4G / LTE SIGNAL STRENGTH**. During the survey, while conducting data test in technology auto detect 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 **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 Auto Detect Mode								
City	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
UPPER DIR	83.87%	89.27%	95.20%	95.70%	No	No	Yes	Yes
LARKANA	99.10%	87.30%	99.27%	99.90%	Yes	No	Yes	Yes
LAHORE	99.72%	92.65%	98.51%	99.82%	Yes	Yes	Yes	Yes
KHAIRPUR	98.20%	78.58%	94.67%	96.84%	Yes	No	Yes	Yes

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
KAHROR PACCA	97.51%	62.73%	77.12%	97.86%	Yes	No	No	Yes
SHAHKOT	96.90%	94.23%	96.48%	97.46%	Yes	Yes	Yes	Yes
GUJAR KHAN	98.91%	96.07%	99.28%	98.26%	Yes	Yes	Yes	Yes
WAH/ TAXILA	94.11%	94.19%	99.21%	94.53%	Yes	Yes	Yes	Yes
RAWALPINDI	94.46%	95.21%	99.71%	99.01%	Yes	Yes	Yes	Yes
BUNER	89.79%	86.59%	91.94%	78.32%	No	No	Yes	No
JACOBABAD	95.54%	91.06%	99.83%	99.28%	Yes	Yes	Yes	Yes
SUJAWAL	96.27%	98.59%	95.72%	98.13%	Yes	Yes	Yes	Yes
MITHI	96.53%	93.51%	97.78%	73.51%	Yes	Yes	Yes	No
ABBOTTABAD	96.05%	97.51%	99.27%	96.58%	Yes	Yes	Yes	Yes
SHUJABAD	94.98%	83.44%	81.25%	97.92%	Yes	No	No	Yes
SWABI	84.01%	90.01%	97.73%	98.88%	No	Yes	Yes	Yes
MURIDKE	99.14%	81.35%	88.68%	95.39%	Yes	No	No	Yes

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

3.2. **3G SIGNAL STRENGTH IN TECHNOLOGY 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. 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 **Table 3.2: 3G Signal Strength Technology Auto Detect 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
UPPER DIR	71.0%	84.85%	88.91%	90.45%	No	No	No	Yes
LARKANA	N/A	100.0%	100.0%	N/A	N/A	Yes	Yes	N/A
LAHORE	N/A	99.51%	100.0%	N/A	N/A	Yes	Yes	N/A
KHAIRPUR	N/A	100.0%	83.55%	100.0%	N/A	Yes	No	Yes
KAHROR PACCA	N/A	74.55%	N/A	N/A	N/A	No	N/A	N/A
SHAHKOT	N/A	N/A	100.0%	N/A	N/A	N/A	Yes	N/A
GUJAR KHAN	N/A	N/A	100.0%	N/A	N/A	N/A	Yes	N/A
WAH/ TAXILA	N/A	100.0%	100.0%	N/A	N/A	Yes	Yes	N/A
RAWALPINDI	N/A	100.0%	N/A	100.0%	N/A	Yes	N/A	Yes
BUNER	85.10%	100.0%	100.0%	44.68%	No	Yes	Yes	No
JACOBABAD	N/A	N/A	100.0%	N/A	N/A	N/A	Yes	N/A
SUJAWAL	N/A	N/A	100.0%	100.0%	N/A	N/A	Yes	Yes
MITHI	N/A	38.59%	93.57%	77.73%	N/A	No	Yes	No
ABBOTTABAD	100.0%	100.0%	99.79%	N/A	Yes	Yes	Yes	N/A
SHUJABAD	N/A	100.0%	N/A	N/A	N/A	Yes	N/A	N/A
SWABI	N/A	91.67%	100.0%	N/A	N/A	Yes	Yes	N/A
MURIDKE	N/A	N/A	100.0%	N/A	N/A	N/A	Yes	N/A

Note: N/A means No Fallback to 3G Network

Table 3.2: 3G Signal Strength Technology Auto Detect Mode -100 dBm with 90% Confidence Level

MOBILE BROADBAND SERVICE

4.1. **DATA SESSIONS IN TECHNOLOGY AUTO DETECT 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 webpages were checked and in case of Latency, different website(s) were pinged to measure Round Trip Time (RTT)/Latency. The 4G/LTE and 3G signal strengths, Number of Tests, Upload and Download User Data Throughput, Webpage Loading Time and Latency detail is mentioned in **Table 4.1: Data Tests Statistics.**

		DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG	
AUTO DETECT MODE	CAPACITY TEST	DOWNLOAD	ATTEMPTS	6409	6368	6393	6414
			SPEED (Mbps)	22.727	6.379	10.695	23.747
		UPLOAD	ATTEMPTS	6420	6382	6404	6423
			SPEED (Mbps)	22.341	6.1	17.565	19.809
	DATA TRANSFER TEST	DOWNLOAD	ATTEMPTS	6271	6388	6160	6429
			SPEED (Mbps)	9.995	5.62	7.41	9.924
		UPLOAD	ATTEMPTS	6452	6422	6434	6453
			SPEED (Mbps)	5.802	3.865	5.578	5.718
	BROWSING TEST	ATTEMPTS		25687	25578	25597	25717
		LOADING TIME (Seconds)		3.35	3.52	3.67	3.3
	PING TEST	ATTEMPTS		6469	6458	6458	6469
		LATENCY (msec)		106.36	64.99	62.45	79.4
AVERAGE 4G SIGNAL STRENGTH (RSRP) dBm			-81.2	-85.2	-80.4	-79.4	
AVERAGE 3G SIGNAL STRENGTH (RSCP) dBm			-83.26	-78.09	-75.22	-82.55	

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 are shown in (i). **Table 4.2: Download User Data Throughput Technology Auto Detect Mode [Fixed Duration] \geq 3Mbps,** (ii). **Table 4.3: Download User Data Throughput Technology Auto Detect Mode [Fixed Size] \geq 3Mbps,**

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
UPPER DIR	13.11	2.33	21.04	14.27	Third	Fourth	First	Second
LARKANA	19.08	5.57	7.38	23.37	Second	Fourth	Third	First
LAHORE	17.37	9.76	13.62	33.34	Second	Fourth	Third	First
KHAIRPUR	16.75	12.34	6.81	22.88	Second	Third	Fourth	First
KAHROR PACCA	17.62	13.51	5.35	21.17	Second	Third	Fourth	First
SHAHKOT	22.06	6.67	16.20	18.08	First	Fourth	Third	Second
GUJAR KHAN	28.30	2.20	11.12	28.56	Second	Fourth	Third	First
WAH/ TAXILA	22.35	2.23	13.55	20.85	First	Fourth	Third	Second
RAWALPINDI	30.89	4.33	8.96	21.62	First	Fourth	Third	Second
BUNER	30.44	2.29	3.45	16.87	First	Fourth	Third	Second
JACOBABAD	23.70	10.99	10.03	23.66	First	Third	Fourth	Second

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
SUJAWAL	35.88	3.75	27.37	29.90	First	Fourth	Third	Second
MITHI	30.56	4.11	11.33	36.56	Second	Fourth	Third	First
ABBOTTABAD	21.49	4.03	7.54	20.56	First	Fourth	Third	Second
SHUJABAD	18.03	8.66	2.02	30.38	Second	Third	Fourth	First
SWABI	23.63	2.02	5.39	14.21	First	Fourth	Third	Second
MURIDKE	20.61	10.40	13.45	24.98	Second	Fourth	Third	First

Table4.2: Download User Data Throughput Technology Auto Detect Mode [Fixed Duration] \geq 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
UPPER DIR	7.00	4.50	10.29	9.07	Third	Fourth	First	Second
LARKANA	11.83	5.52	6.05	11.28	First	Fourth	Third	Second
LAHORE	10.40	7.47	10.28	14.39	Second	Fourth	Third	First
KHAIRPUR	9.14	8.73	6.62	11.90	Second	Third	Fourth	First
KAHROR PACCA	10.70	9.19	5.73	13.00	Second	Third	Fourth	First
SHAHKOT	12.78	6.46	11.27	10.13	First	Fourth	Second	Third
GUJAR KHAN	13.40	3.83	7.58	12.08	First	Fourth	Third	Second
WAH/ TAXILA	11.13	3.51	8.73	10.76	First	Fourth	Third	Second
RAWALPINDI	13.17	4.89	7.60	11.45	First	Fourth	Third	Second
BUNER	11.67	3.25	4.70	8.43	First	Fourth	Third	Second
JACOBABAD	13.22	7.57	7.64	11.59	First	Fourth	Third	Second
SUJAWAL	15.45	3.45	14.53	13.85	First	Fourth	Second	Third
MITHI	13.57	5.30	8.31	10.95	First	Fourth	Third	Second
ABBOTTABAD	10.9	4.9	6.7	10.5	First	Fourth	Third	Second
SHUJABAD	10.8	7.0	3.4	14.9	Second	Third	Fourth	First
SWABI	11.6	3.6	5.4	8.5	First	Fourth	Third	Second
MURIDKE	10.5	7.3	8.9	12.4	Second	Fourth	Third	First

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

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 4.4: Upload User Data Throughput Technology Auto Detect Mode [Fixed Duration] \geq 768Kbps**, (ii). **Table 4.5: Upload User Data Throughput Technology Auto Detect Mode [Fixed Size] \geq 768Kbps**,

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
UPPER DIR	9507.45	3170.27	17244.33	13612.93	Third	Fourth	First	Second
LARKANA	24512.48	4702.53	20062.1	23229.12	First	Fourth	Third	Second
LAHORE	23461.84	8847.7	20101.42	22446.8	First	Fourth	Third	Second
KHAIRPUR	24993.93	6974.67	17714.76	23106.16	First	Fourth	Third	Second
KAHROR PACCA	30147.08	5254.37	12927.14	19185.98	First	Fourth	Third	Second
SHAHKOT	28517.78	4735.65	19663.35	24699.69	First	Fourth	Third	Second
GUJAR KHAN	29127.13	6331.51	20642.18	18486.91	First	Fourth	Second	Third
WAH/ TAXILA	20938.3	6911.5	21533.72	18357.29	Second	Fourth	First	Third
RAWALPINDI	23112.06	6676.87	18659.59	19165.98	First	Fourth	Third	Second

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
BUNER	12076.96	6402.05	11474.17	14910.37	Second	Fourth	Third	First
JACOBABAD	21392.15	5395.46	20752.6	24100.5	Second	Fourth	Third	First
SUJAWAL	30264.2	8667.95	24412.42	26721.56	First	Fourth	Third	Second
MITHI	27408.96	5363.88	21042.25	14055.58	First	Fourth	Second	Third
ABBOTTABAD	24644.38	5952.18	16826.93	16966.41	First	Fourth	Third	Second
SHUJABAD	18676.77	4130.71	10026.45	20404.5	Second	Fourth	Third	First
SWABI	16598.01	4779.99	15172.14	17896.14	Second	Fourth	Third	First
MURIDKE	27363.76	8960.83	19725.39	23908.06	First	Fourth	Third	Second

Table 4.4: Upload User Data Throughput Technology Auto Detect Mode [Fixed Duration] \geq 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
UPPER DIR	4927.35	3068.89	5575.65	5381.32	Third	Fourth	First	Second
LARKANA	6606.51	4256.48	7313.52	6148.18	Second	Fourth	First	Third
LAHORE	7698.76	5448.96	7130.36	6750.15	First	Fourth	Second	Third
KHAIRPUR	6051.87	5106.27	6749.1	6724.66	Third	Fourth	First	Second
KAHROR PACCA	7344.14	3887.46	5608.74	5704.35	First	Fourth	Third	Second
SHAHKOT	8255.79	3669.27	7264.38	7217.23	First	Fourth	Second	Third
GUJAR KHAN	8416.55	4617.48	7797.97	6288.04	First	Fourth	Second	Third
WAH/ TAXILA	6595.94	4806.2	6713.08	7549.82	Third	Fourth	Second	First
RAWALPINDI	7460.44	4827.62	7021.3	8039.07	Second	Fourth	Third	First
BUNER	6027.38	4254.6	5553.95	5629.37	First	Fourth	Third	Second
JACOBABAD	6513.63	3991.51	6460.68	6941.84	Second	Fourth	Third	First
SUJAWAL	8739.95	5786.09	7771.44	7785.5	First	Fourth	Third	Second
MITHI	7910.93	3836.52	7066.35	5297.96	First	Fourth	Second	Third
ABBOTTABAD	6948.94	4392.97	6117.5	7318.75	Second	Fourth	Third	First
SHUJABAD	6214.58	3394.36	5405.01	5699.26	First	Fourth	Third	Second
SWABI	5912.57	3846.93	5942.12	6338.53	Third	Fourth	Second	First
MURIDKE	6260.61	5286.31	6539.18	6778.73	Third	Fourth	Second	First

Table 4.5: Upload User Data Throughput Technology Auto Detect Mode [Fixed Size] \geq 768Kbps

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 are shown in **Table 4.6: Webpage Loading Time < 5 Seconds.**

WEBPAGE LOADING TIME IN IN TECHNOLOGY AUTO DETECT MODE								
City	Webpage Loading Time [seconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
UPPER DIR	3.60	3.59	3.78	3.05	Yes	Yes	Yes	Yes
LARKANA	2.42	2.98	3.37	2.82	Yes	Yes	Yes	Yes
LAHORE	2.84	2.72	3.02	2.41	Yes	Yes	Yes	Yes
KHAIRPUR	2.50	2.70	3.20	2.70	Yes	Yes	Yes	Yes
KAHROR PACCA	2.57	3.58	3.73	2.61	Yes	Yes	Yes	Yes
SHAHKOT	2.41	3.01	2.31	2.17	Yes	Yes	Yes	Yes
GUJAR KHAN	3.12	3.03	3.28	2.92	Yes	Yes	Yes	Yes

WEBPAGE LOADING TIME IN IN TECHNOLOGY AUTO DETECT MODE								
City	Webpage Loading Time [seconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
WAH/ TAXILA	3.05	3.34	2.72	3.05	Yes	Yes	Yes	Yes
RAWALPINDI	2.87	2.90	2.89	2.91	Yes	Yes	Yes	Yes
BUNER	2.78	3.02	2.73	2.69	Yes	Yes	Yes	Yes
JACOBABAD	2.40	2.80	3.40	2.40	Yes	Yes	Yes	Yes
SUJAWAL	2.07	2.65	3.02	2.29	Yes	Yes	Yes	Yes
MITHI	2.01	2.90	3.05	2.61	Yes	Yes	Yes	Yes
ABBOTTABAD	2.79	2.71	2.56	3.01	Yes	Yes	Yes	Yes
SHUJABAD	2.95	2.98	3.04	2.90	Yes	Yes	Yes	Yes
SWABI	2.87	2.68	3.31	3.18	Yes	Yes	Yes	Yes
MURIDKE	3.09	2.60	2.65	2.15	Yes	Yes	Yes	Yes

Table 4.6: 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 are shown in. **Table 4.7: Latency in Technology Auto Detect Mode < 75 milliseconds.**

LATENCY IN TECHNOLOGY AUTO DETECT MODE								
City	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
UPPER DIR	182	96	90	127	No	No	No	No
LARKANA	68	70	43	57	Yes	Yes	Yes	Yes
LAHORE	63	52	55	47	Yes	Yes	Yes	Yes
KHAIRPUR	72	54	64	55	Yes	Yes	Yes	Yes
KAHROR PACCA	66	79	45	62	Yes	No	Yes	Yes
SHAHKOT	65	60	56	55	Yes	Yes	Yes	Yes
GUJAR KHAN	163	61	52	131	No	Yes	Yes	No
WAH/ TAXILA	101	68	52	88	No	Yes	Yes	No
RAWALPINDI	81	71	58	116	No	Yes	Yes	No
BUNER	219	69	116	108	No	Yes	No	No
JACOBABAD	96	51	56	50	No	Yes	Yes	Yes
SUJAWAL	44	38	31	47	Yes	Yes	Yes	Yes
MITHI	45	69	51	60	Yes	Yes	Yes	Yes
ABBOTTABAD	100	55	67	111	No	Yes	Yes	No
SHUJABAD	97	188	54	58	No	No	Yes	Yes
SWABI	154	66	91	104	No	Yes	No	No
MURIDKE	135	52	55	46	No	Yes	Yes	Yes

Table 4.7: Latency in Technology Auto Detect Mode < 75 milliseconds

4.6. **OOKLA SPEED TEST.** In addition, Ookla Speed Test was also carried out to measure Download and Upload User Data Throughput and Round-Trip Time/Latency. The Number of Tests, Upload and Download User Data Throughput and Latency detail is mentioned in **Table 4.8: Ookla Tests Statistics.** Whereas the City wise results of Ookla Download Throughout, Upload Throughout and Latency are shown in (i). **Table 4.9: Ookla Download Throughout in Technology Auto Detect Mode,** (ii). **Table 4.10: Ookla Upload Throughout in Technology Auto Detect Mode,** (iii) **Table 4.11 Ookla Latency in Technology Auto Detect Mode < 75 Milliseconds.**

DESCRIPTION				JAZZ	TELENOR	UFONE	ZONG	
Ookla Tests	THROUGHPUT TEST	DOWNLOAD	ATTEMPTS	8309	8284	8308	8295	
			SPEED (Mbps)	28.361	4.916	11.909	23.291	
		UPLOAD	ATTEMPTS	8309	8284	8308	8295	
			SPEED (Mbps)	21.793	5.827	20.066	20.24	
	PING TEST	ATTEMPTS			8309	8284	8308	8295
		LATENCY (msec)			34.3	43.3	42	52.5

Table 4.8: Ookla Tests Statistics

OOKLA DOWNLOAD THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE								
Cities	Download Throughput (Mbps)				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
UPPER DIR	10.86	3.16	11.36	17.84	Third	Fourth	Second	First
LARKANA	30.20	7.20	8.90	20.00	First	Fourth	Third	Second
LAHORE	23.15	10.88	16.15	32.24	Second	Fourth	Third	First
KHAIRPUR	24.49	15.50	8.86	32.00	Second	Third	Fourth	First
SHAHKOT	30.09	10.52	21.96	23.18	First	Fourth	Third	Second
GUJAR KHAN	32.95	2.13	9.83	17.98	First	Fourth	Third	Second
WAH/ TAXILA	29.45	2.21	17.33	21.65	First	Fourth	Third	Second
RAWALPINDI	33.39	3.96	9.43	17.54	First	Fourth	Third	Second
BUNER	40.78	2.42	5.47	22.75	First	Fourth	Third	Second
JACOBABAD	33.4	12.3	11.06	33.1	First	Third	Fourth	Second
SUJAWAL	48.46	4.29	19.02	40.88	First	Fourth	Third	Second
MITHI	46.04	3.72	13.64	18.93	First	Fourth	Third	Second
ABBOTTABAD	14.56	3.39	6.59	16.77	Second	Fourth	Third	First
SWABI	31.27	1.89	7.18	19.92	First	Fourth	Third	Second
MURIDKE	11.11	22.31	14.93	31.33	Fourth	Second	Third	First

Table 4.9: Ookla Download Throughput in Technology Auto Detect Mode

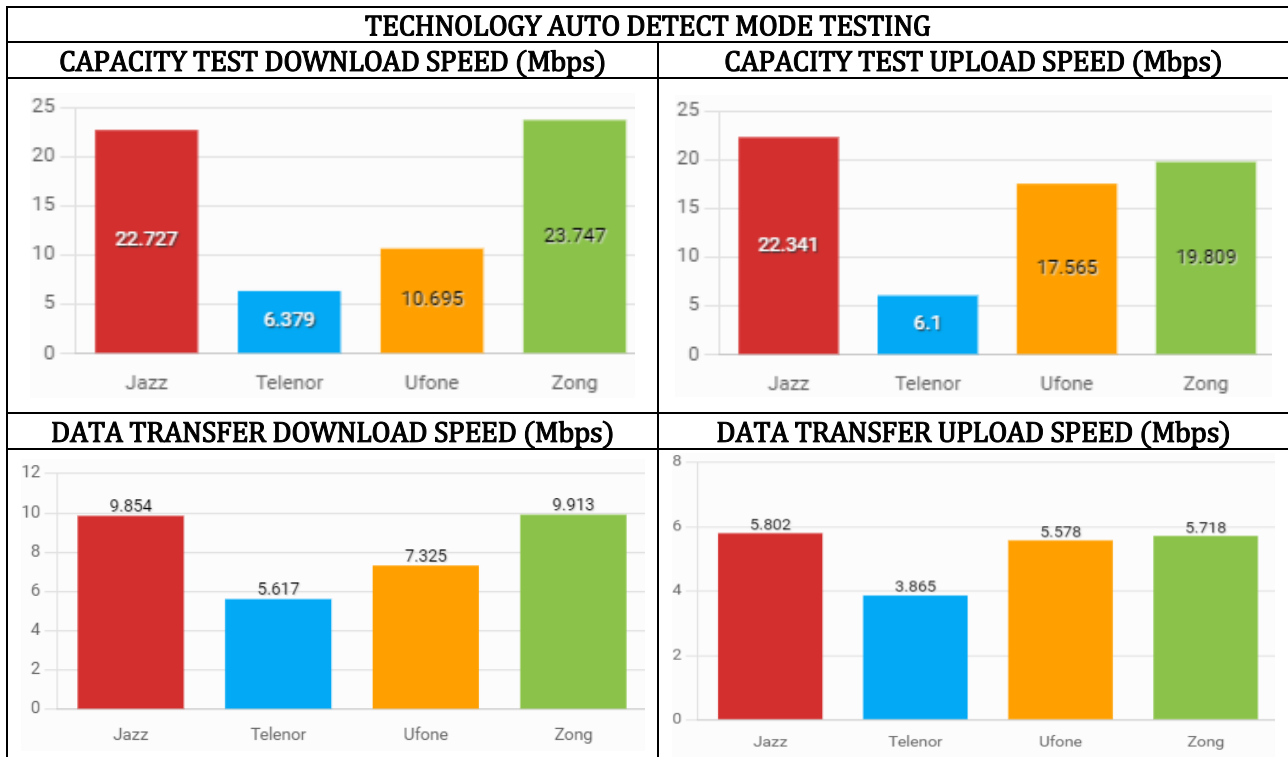
OOKLA UPLOAD THROUGHPUT IN TECHNOLOGY AUTO DETECT MODE								
Cities	Upload Throughput (Kbps)				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
UPPER DIR	11065	3282	19139	14674	Third	Fourth	First	Second
LARKANA	3925	600	2875	2688	First	Fourth	Second	Third
LAHORE	25093	9296	24083	22899	First	Fourth	Second	Third
KHAIRPUR	3300	713	2325	3675	Second	Fourth	Third	First
SHAHKOT	33617	5476	24671	30238	First	Fourth	Third	Second
GUJAR KHAN	30928	5316	22251	13600	First	Fourth	Second	Third
WAH/ TAXILA	22982	6303	23838	18667	Second	Fourth	First	Third
RAWALPINDI	21782	5885	17791	13816	First	Fourth	Second	Third
BUNER	13262	7324	16522	13043	Second	Fourth	First	Third
JACOBABAD	2725	600	2738	4475	Third	Fourth	Second	First
SUJAWAL	25136	8283	14910	32259	Second	Fourth	Third	First
MITHI	15552	5947	25324	9073	Second	Fourth	First	Third
ABBOTTABAD	15691	4040	11510	15064	First	Fourth	Third	Second
SWABI	21012	4590	18413	23622	Second	Fourth	Third	First
MURIDKE	9286	31008	24276	30220	Fourth	First	Third	Second

Table 4.10: Ookla Upload Throughput in Technology Auto Detect Mode

OOKLA LATENCY IN TECHNOLOGY AUTO DETECT MODE								
City	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
UPPER DIR	42	55	74	90	Yes	Yes	Yes	No
LARKANA	26	51	34	32	Yes	Yes	Yes	Yes
LAHORE	33	20	36	18	Yes	Yes	Yes	Yes
KHAIRPUR	25	57	33	30	Yes	Yes	Yes	Yes
SHAHKOT	20	25	39	33	Yes	Yes	Yes	Yes
GUJAR KHAN	20	44	23	71	Yes	Yes	Yes	Yes
WAH/ TAXILA	21	33	22	32	Yes	Yes	Yes	Yes
RAWALPINDI	21	30	27	46	Yes	Yes	Yes	Yes
BUNER	67	43	41	81	Yes	Yes	Yes	No
JACOBABAD	35	39	41	34	Yes	Yes	Yes	Yes
SUJAWAL	24	26	25	24	Yes	Yes	Yes	Yes
MITHI	26	36	29	34	Yes	Yes	Yes	Yes
ABBOTTABAD	37	74	54	84	Yes	Yes	Yes	No
SWABI	32	56	48	39	Yes	Yes	Yes	Yes
MURIDKE	21	56	40	19	Yes	Yes	Yes	Yes

Table 4.11: Ookla Latency in Technology Auto Detect Mode < 75 Milliseconds

4.6. Overall results of Download and Upload Throughputs in Capacity Tests, Data Transfer Tests, Latency (overall) and Latency (Per Web Page), can be seen in attached graphs.





VOICE SERVICE

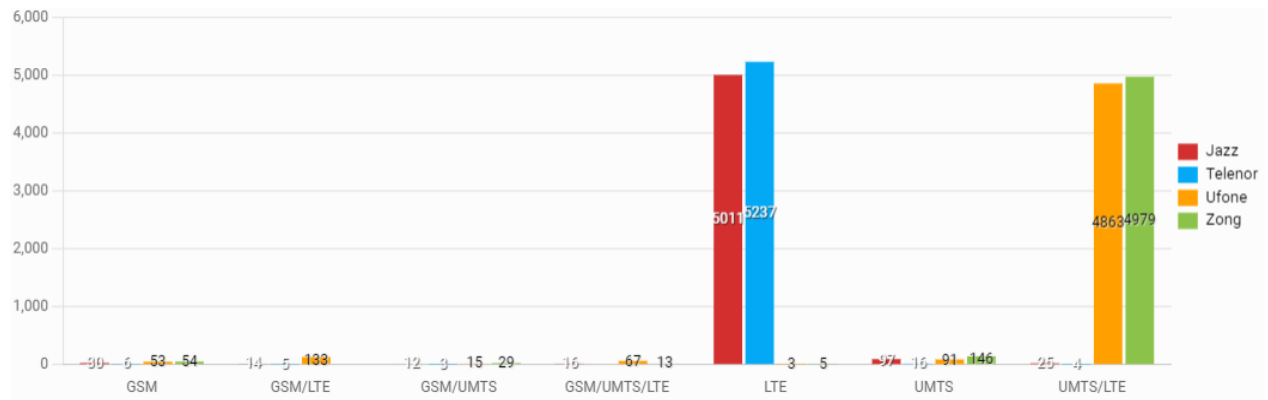
5.1. A total of 20,929 Call attempts were made and out of which 485 were failed attempts. In 20,444 successful call attempts, 184 calls dropped prior to completion of two minutes duration, whereas, 20,260 calls remained connected for the complete duration of two minutes. The company wise call statistics is shown in Table 5.1: Call Statistics.

DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
TOTAL CALLS ATTEMPTS	5205	5273	5225	5226
FAILED CALLS ATTEMPTS	85	170	78	152
ESTABLISHED CALLS ATTEMPTS	5120	5103	5147	5074
DROPPED CALLS ATTEMPTS	45	37	66	36
COMPLETED CALLS ATTEMPTS	5075	5066	5081	5038
CALL SETUP SUCCESS RATE (%)	98.37	96.78	98.51	97.09
CALL SETUP TIME (Sec)	5.59 s	8.85 s	6.54 s	6.76 s
CALL COMPLETION RATE (%)	99.34	91.3	98.09	97.77
ISHO SUCCESS RATE (%)	100	-	100	-
RAB SETUP SUCCESS RATE (%)	100	100	99.96	100
MEAN OPINION SCORE	3.77	3.82	3.46	3.52
MEAN OPINION SCORE EXCESS RATIO - MOS <1.6 (%)	4	2.55	2.04	2.47
TOTAL SPEECH TEST	51382	51253	51706	51181

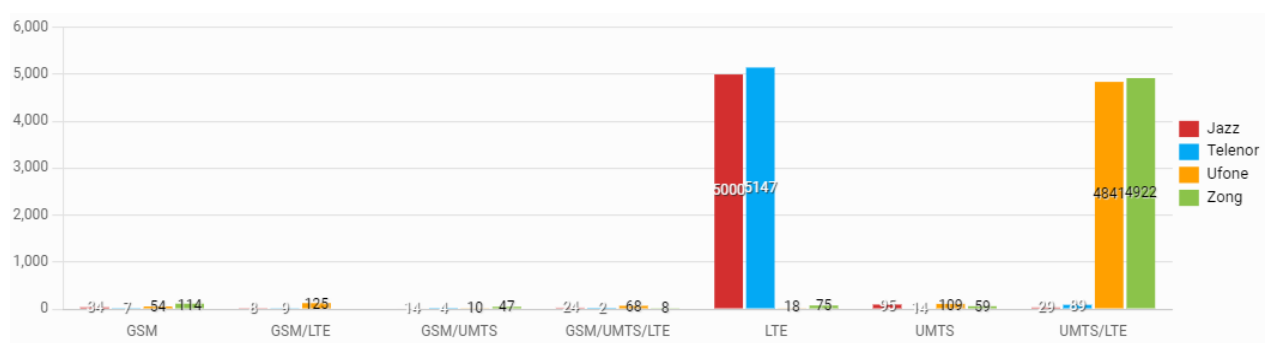
Table5.1: Call Statistics

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

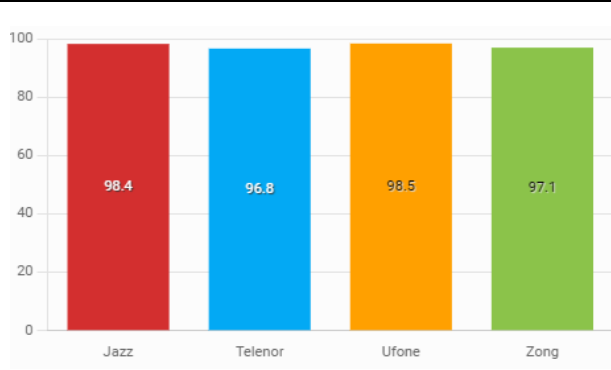
TECHNOLOGY WISE DISTRIBUTION OF CALLS – A PARTY



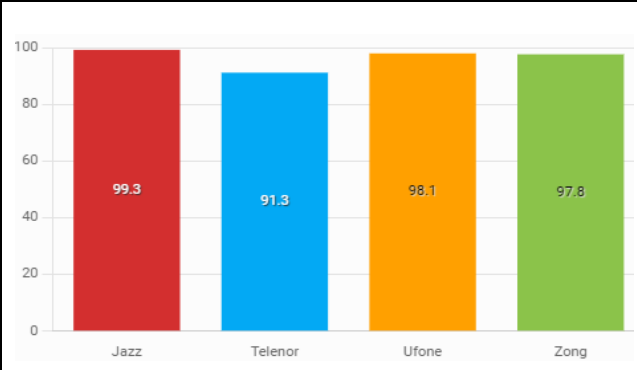
TECHNOLOGY WISE DISTRIBUTION OF CALLS – B PARTY



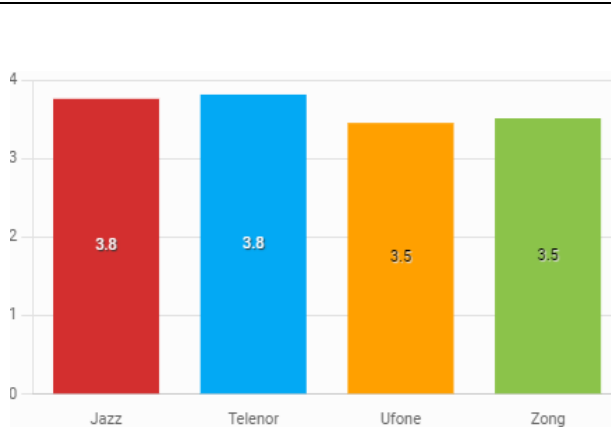
CALL SETUP SUCCESS RATE



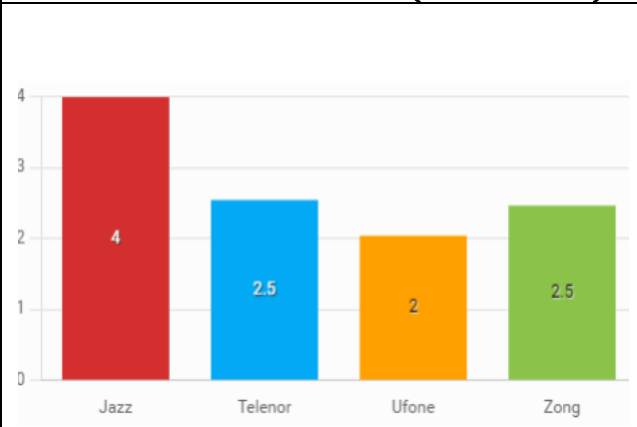
CALL RETAINABILITY

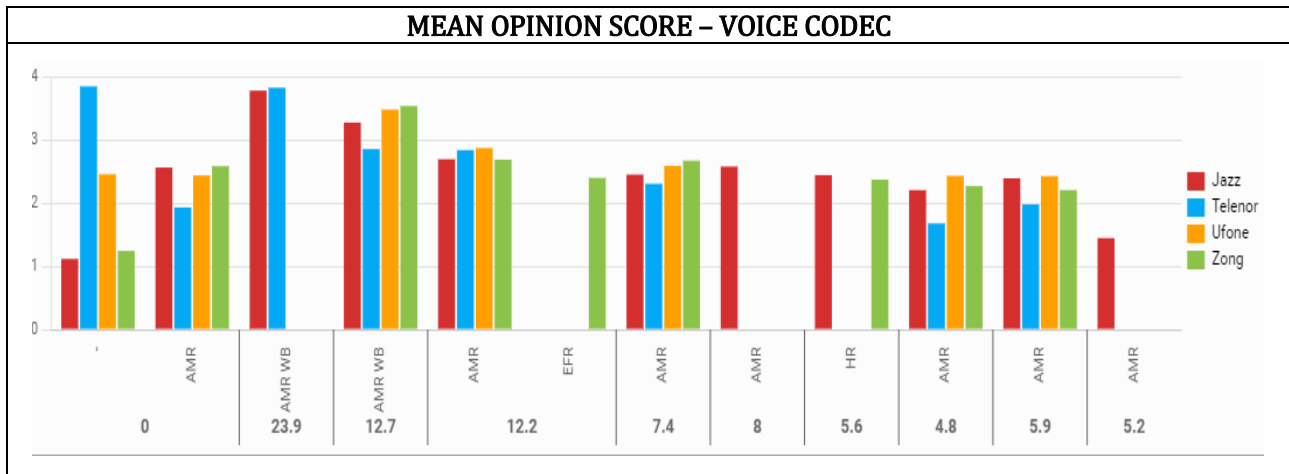


MEAN OPINION SCORE - AVERAGE



MEAN OPINION SCORE < 1.6 (PERCENTAGE)





5.3. The 7 x QoS KPIs (*i.e. Network Accessibility, Call Setup Success Rate, Call Setup Time, Call Completion Rate, Mean Opinion Score, Inter System Handover Success Rate & RAB Setup Success Rate*) have been measured while testing voice services in **17 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**.

<i>CMO</i>	KPIS	THRESHOLD	UPPER DIR	LARKANA	LAHORE	KHAIRPUR	KAHROR PACCA	SHAHKOT
<i>Jazz</i>	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	No	Yes	Yes	Yes	No	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	No	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
<i>Telenor</i>	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	Yes	No	Yes	Yes	No	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	Yes	No	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
<i>Ufone</i>	NA	≥ 99%	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	No	Yes	Yes	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	Yes	Yes	Yes	No	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
<i>ZonG</i>	NA	≥ 99%	No	Yes	Yes	Yes	Yes	Yes
	CSSR	≥ 98%	No	Yes	N/A	Yes	Yes	N/A
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	> 98%	No	Yes	N/A	Yes	Yes	N/A
	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

<i>CMO</i>	KPIS	THRESHOLD	GUJAR KHAN	WAH/ TAXILA	RAWALPINDI	BUNER	JACOBABAD	SUJAWAL
<i>Jazz</i>	NA	$\geq 99\%$	Yes	Yes	Yes	Yes	No	Yes
	CSSR	$\geq 98\%$	Yes	Yes	Yes	No	No	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	$> 98\%$	Yes	Yes	Yes	No	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	$\geq 98\%$	Yes	Yes	Yes	No	Yes	Yes
	RSSR	$> 98\%$	Yes	Yes	Yes	Yes	Yes	Yes
<i>Telenor</i>	NA	$\geq 99\%$	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	$\geq 98\%$	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	$> 98\%$	Yes	Yes	No	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	$\geq 98\%$	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	$> 98\%$	Yes	Yes	Yes	Yes	Yes	Yes
<i>Ufone</i>	NA	$\geq 99\%$	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	$\geq 98\%$	Yes	Yes	No	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	$> 98\%$	Yes	No	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes	Yes
	ISHO	$\geq 98\%$	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	$> 98\%$	Yes	Yes	Yes	Yes	Yes	Yes
<i>ZonG</i>	NA	$\geq 99\%$	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	$\geq 98\%$	Yes	Yes	Yes	Yes	Yes	No
	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	$\geq 98\%$	Yes	Yes	Yes	Yes	Yes	Yes
	RSSR	$> 98\%$	Yes	Yes	Yes	Yes	Yes	Yes

Table 5.3: Voice QoS KPIs Compliance Level

<i>CMO</i>	KPIs	THRESHOLD	ABBOTTABAD	SHUJABAD	SWABI	MURIDKE	MITHI
<i>Jazz</i>	NA	$\geq 99\%$	Yes	Yes	Yes	Yes	Yes
	CSSR	$\geq 98\%$	Yes	No	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes
	CCR	$> 98\%$	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes
	ISHO	$\geq 98\%$	Yes	Yes	Yes	Yes	Yes
	RSSR	$> 98\%$	Yes	Yes	Yes	Yes	Yes
<i>Telenor</i>	NA	$\geq 99\%$	Yes	Yes	Yes	Yes	Yes
	CSSR	$\geq 98\%$	No	No	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes
	CCR	$> 98\%$	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes
	ISHO	$\geq 98\%$	Yes	Yes	Yes	Yes	Yes
	RSSR	$> 98\%$	Yes	Yes	Yes	Yes	Yes
<i>Ufone</i>	NA	$\geq 99\%$	Yes	Yes	Yes	Yes	Yes
	CSSR	$\geq 98\%$	Yes	No	Yes	Yes	Yes
	CCT	≤ 7.5 sec	Yes	No	Yes	Yes	Yes
	CCR	$> 98\%$	No	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes
	ISHO	$\geq 98\%$	Yes	Yes	Yes	Yes	Yes
	RSSR	$> 98\%$	Yes	Yes	Yes	Yes	Yes
<i>ZonG</i>	NA	$\geq 99\%$	Yes	Yes	Yes	Yes	Yes
	CSSR	$\geq 98\%$	Yes	Yes	Yes	No	Yes
	CCT	≤ 7.5 sec	Yes	Yes	Yes	Yes	Yes
	CCR	$> 98\%$	Yes	Yes	Yes	Yes	Yes
	MOS	≥ 3	Yes	Yes	Yes	Yes	Yes
	ISHO	$\geq 98\%$	Yes	Yes	Yes	Yes	Yes
	RSSR	$> 98\%$	Yes	Yes	Yes	Yes	Yes

Table 5.4: Voice QoS KPIs Compliance Level

SMS SERVICE

6.1. A total of **20878 SMS sending attempts** were conducted, out of which **20751 SMS** were **successfully transmitted** by A-Party while **20609 SMS** were **successfully received** at B-Party. The company wise SMS Statistics are shown in **Table 6.1: SMS Statistics** while City wise compliance is shown in **Table 6.2: SMS QoS KPIs Compliance Level**

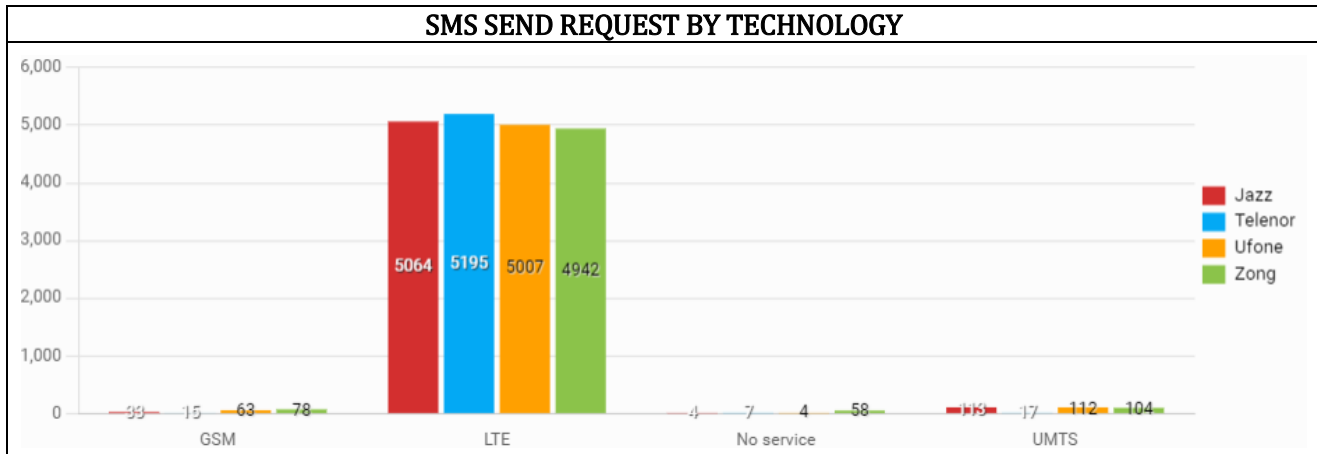
DESCRIPTION	JAZZ	TELENOR	UFONE	ZONG
SMS SEND REQUEST	5276	5234	5186	5182
SMS SUCCESSFULLY TRANSMITTED	5265	5215	5171	5100
SMS SUCCESSFULLY RECEIVED	5239	5168	5141	5061
SMS RECEIVE SUCCESS RATE (%)	99.3 %	98.74 %	99.13 %	97.66 %
END-TO-END DELIVERY TIME (Sec)	3.17	3.43	2.57	2.63

Table 6.1: SMS Statistics

Operator		Jazz		Telenor		Ufone		ZonG	
SMS KPI		Success Rate	Delivery Time	Success Rate	Delivery Time	Success Rate	Delivery Time	Success Rate	Delivery Time
Surveyed Cities	UPPER DIR	No	Yes	No	Yes	No	Yes	No	Yes
	LARKANA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	LAHORE	Yes	Yes	No	Yes	Yes	Yes	No	Yes
	KHAIRPUR	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	KAHROR PACCA	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	SHAHKOT	No	Yes	No	Yes	Yes	Yes	No	Yes
	GUJAR KHAN	No	Yes	No	Yes	Yes	Yes	Yes	Yes
	WAH/ TAXILA	Yes	Yes	No	Yes	Yes	Yes	No	Yes
	RAWALPINDI	Yes	Yes	No	Yes	Yes	Yes	No	Yes
	BUNER	No	Yes	No	Yes	Yes	Yes	Yes	Yes
	JACOBABAD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SUJAWAL	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
	MITHI	Yes	Yes	Yes	Yes	No	Yes	No	Yes
	ABBOTTABAD	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	SHUJABAD	No	Yes	No	Yes	No	Yes	Yes	Yes
SWABI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
MURIDKE	Yes	Yes	No	Yes	Yes	Yes	No	Yes	

Table 6.2: SMS QoS KPIs Compliance Level

6.2. 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.





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 17 x surveyed cities of Punjab, KPK and Sindh.

- 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 Mode is shown in **Table 8.1: CMOs Standing in Mobile Network Coverage – Technology Auto Detect.**

S. #.	Operator	Compliance Level – Number of Cities Technology Auto Detect Mode						Standing
		Compliant			Non-Compliant			
		4G	3G	Total	4G	3G	Total	
1.	Ufone	14	12	26	3	2	5	1 st
2.	ZonG	15	4	19	2	2	4	2 nd
4.	Jazz	14	1	15	3	2	5	3 rd
3.	Telenor	10	9	19	7	3	10	4 th

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

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 8.2: CMOs Standing in User Download Data Throughput – Technology Auto Detect Mode.**

S. #.	Operator	Highest Download Throughput – Number of Cities								Standing	
		Technology Auto Detect Mode								Fixed Duration	Fixed Size
		Fixed Duration				Fixed Size					
		1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th		
1.	ZonG	8	9	-	-	5	10	2	-	1 st	2 nd
2.	Jazz	8	8	1	-	11	5	1	-	2 nd	1 st
3.	Ufone	1	-	12	4	1	2	11	3	3 rd	3 rd
4.	Telenor	-	-	4	13	-	-	3	14	4 th	4 th

Table 8.2: CMOs Standing in User Download Data Throughput– Technology Auto Detect 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 8.3: CMOs Standing in User Upload Data Throughput – Technology Auto Detect Mode**

S. #.	Operator	Highest Upload Throughput – Number of Cities								Standing	
		Technology Auto Detect Mode								Fixed Duration	Fixed Size
		Fixed Duration				Fixed Size					
		1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th		
1.	Jazz	11	5	1	-	8	4	5	-	1 st	1 st
2.	ZonG	4	10	3	-	6	6	5	-	2 nd	2 nd
3.	Ufone	2	2	13	-	3	7	7	-	3 rd	3 rd
4.	Telenor	-	-	-	17	-	-	-	17	4 th	4 th

Table 8.3: CMOs Standing in User Upload Data Throughput – Technology Auto Detect 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 8.4: CMOs Standing in Webpage Loading Time**.

S. #.	Operator	Webpage Loading Time - Number of Cities		Standing
		Compliant	Non-Compliant	
1.	Jazz	17	-	1 st
2.	ZonG	17	-	1 st
3.	Ufone	17	-	1 st
4.	Telenor	17	-	1 st

Table 8.4: 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 8.5: CMOs Standing in Latency**.

S. #.	Operator	Latency - Number of Cities		Standing
		Compliant	Non-Compliant	
1.	Telenor	14	3	1 st
2.	Ufone	14	3	1 st
3.	ZonG	10	7	2 nd
4.	Jazz	7	10	3 rd

Table 8.5: CMOs Standing in Latency

- v. Ookla. The Ookla Throughput Testing Results for Download and Upload, as per the highest to lowest obtained results, are shown in (i) **Table 8.6: CMOs Standing in Ookla Download Throughput**. (ii) **Table 8.7: CMOs Standing in Ookla Upload Throughput**. (ii) **Table 8.8: CMOs Standing in Ookla Latency**.

S. #.	Operator	Ookla Download Throughput – Number of Cities				Standing
		1 st	2 nd	3 rd	4 th	
1.	Jazz	10	3	1	1	1 st
2.	ZonG	5	12	-	-	2 nd
3.	Ufone	-	1	12	2	3 rd
4.	Telenor	-	1	2	12	4 th

Table 8.6: CMOs Standing in User Download Data Throughput– Technology Auto Detect Mode

S. #.	Operator	Ookla Upload Throughput – Number of Cities				Standing
		1 st	2 nd	3 rd	4 th	
1.	Jazz	6	6	2	1	1 st
2.	Ufone	4	5	6	-	2 nd
3.	ZonG	4	4	7	-	3 rd
4.	Telenor	1	-	-	14	4 th

Table 8.7: CMOs Standing in User Download Data Throughput– Technology Auto Detect Mode

S. #.	Operator	Ookla Latency - Number of Cities		Standing
		Compliant	Non-Compliant	
1.	Telenor	15	0	1 st
2.	Ufone	15	0	1 st
3.	Jazz	15	0	1 st
4.	ZonG	12	3	2 nd

Table 8.8: CMOs Standing in Ookla Latency

- b. **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.	ZonG	110	5	1 st
2.	Telenor	113	6	2 nd
3.	Ufone	111	8	3 rd
4.	Jazz	110	9	4 th

Table 8.9: CMOs Standing in Voice Service

- c. **OVERALL STANDING.** The overall standing of each CMOs in different category of services is mentioned in **Table 8.10: CMOs Overall Standing in QoS Survey.**

S. #.	Service		STANDING				
			1 st	2 nd	3 rd	4 th	
1.	Mobile Network Coverage		Ufone	ZonG	Jazz	Telenor	
2.	Mobile Broadband	Fixed Duration	Download	ZonG	Jazz	Ufone	Telenor
			Upload	Jazz	ZonG	Ufone	Telenor
		Fixed Size	Download	Jazz	ZonG	Ufone	Telenor
			Upload	Jazz	ZonG	Ufone	Telenor
		Ookla	Download	Jazz	ZonG	Ufone	Telenor
			Upload	Jazz	Ufone	ZonG	Telenor
		Web Page Loading Time		Jazz ZonG Ufone Telenor	-	-	-
		Latency	Automode	Ufone Telenor	ZonG	Jazz	-
Ookla	Jazz Ufone Telenor		ZonG	-	-		
3.	Voice		ZonG	Telenor	Ufone	Jazz	

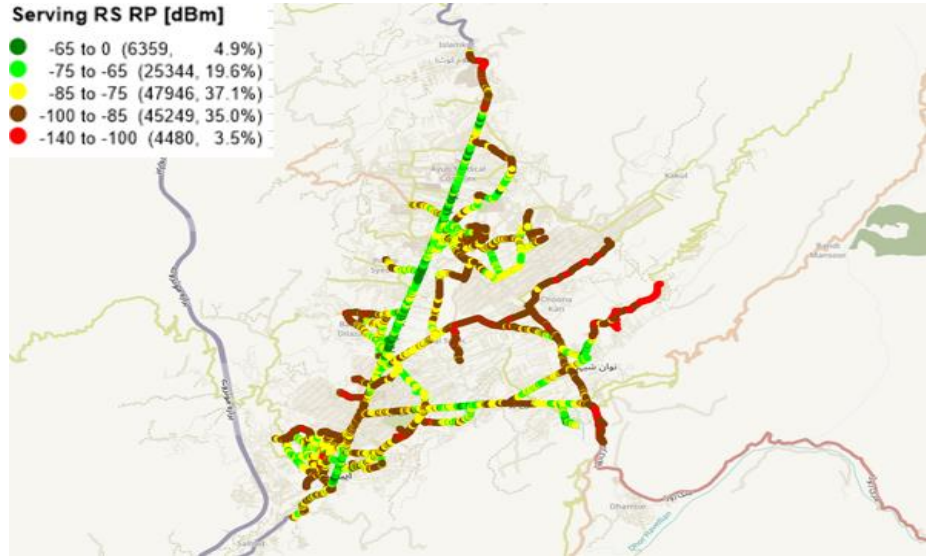
Table 8.10: CMOs Overall Standing in QoS Survey

Annex -A(Coverage Maps)

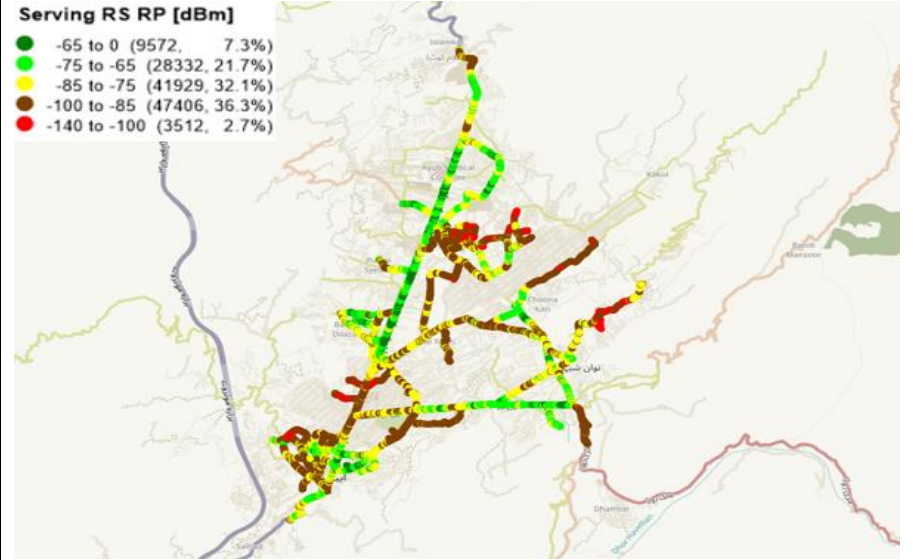
AUTOMODE

AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

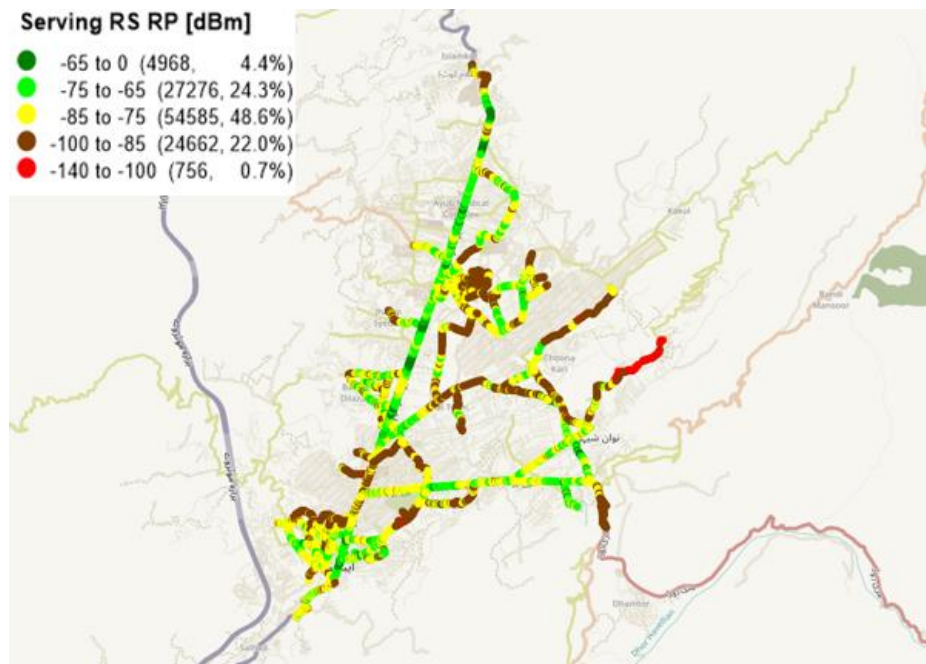
JAZZ AUTOMODE NETWORK COVERAGE – ABBOTTABAD



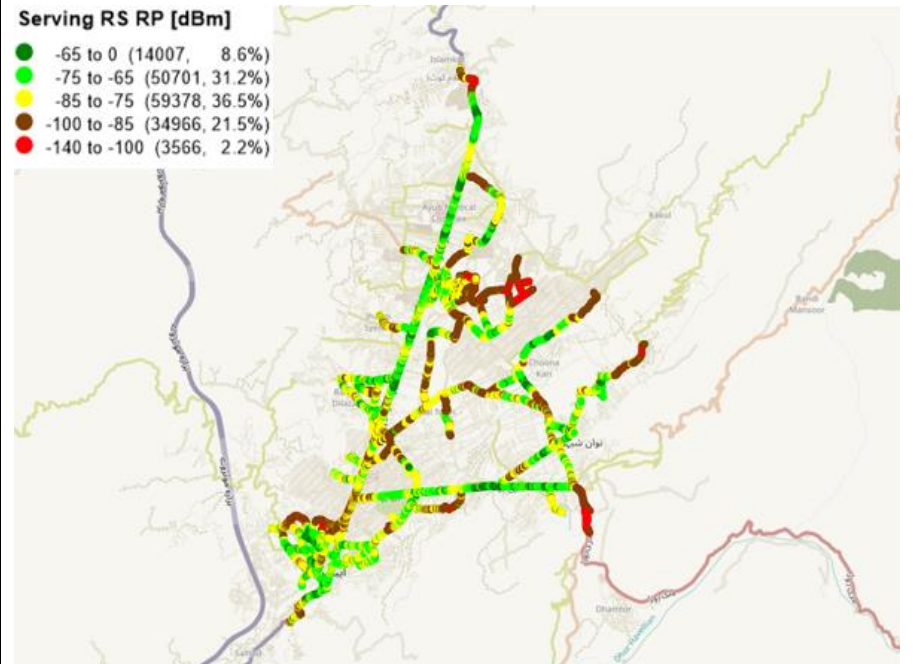
TELENOR AUTOMODE NETWORK COVERAGE – ABBOTTABAD



UFONE AUTOMODE NETWORK COVERAGE – ABBOTTABAD

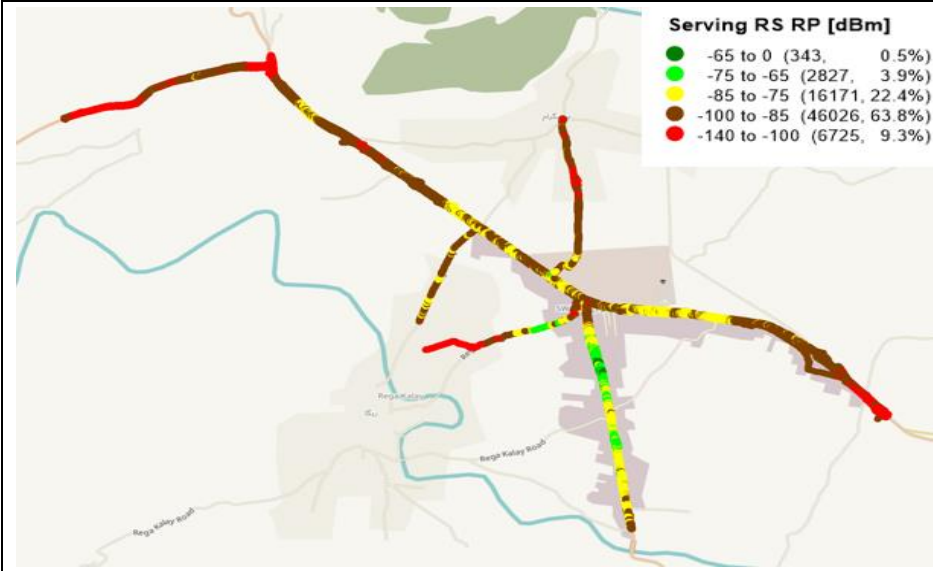


ZONG AUTOMODE NETWORK COVERAGE – ABBOTTABAD

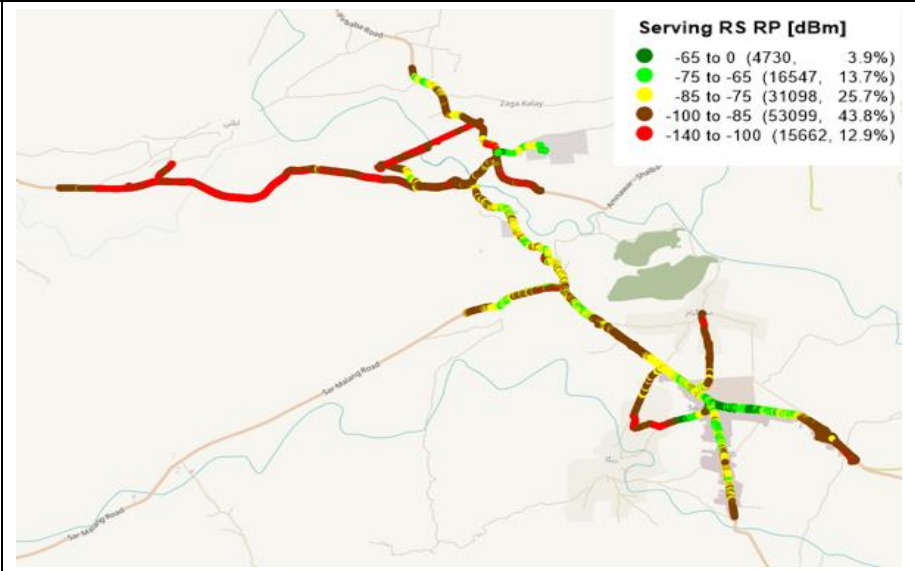


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

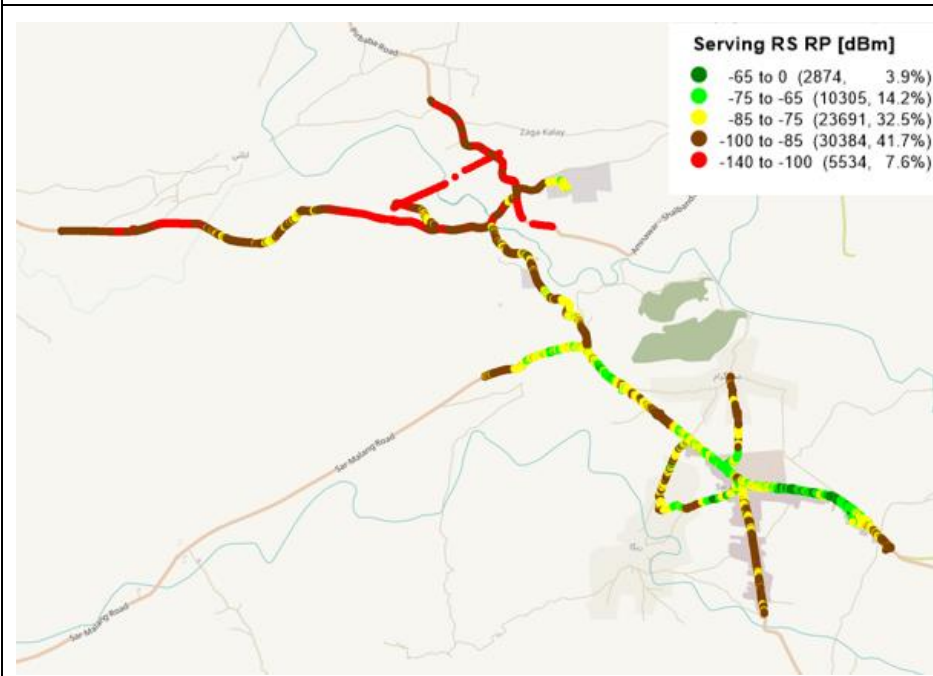
JAZZ AUTOMODE NETWORK COVERAGE – BUNER



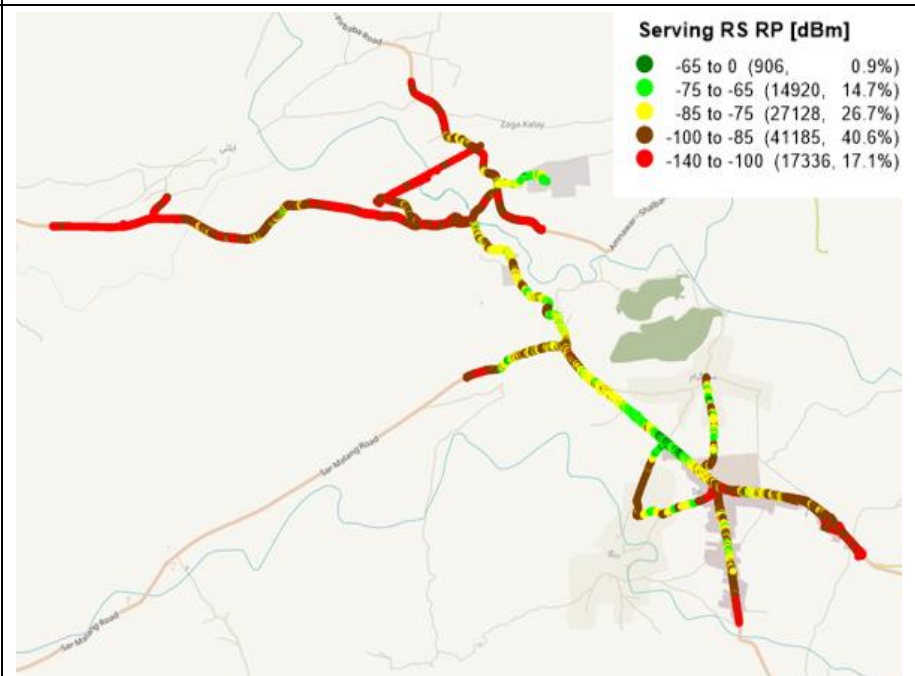
TELENOR AUTOMODE NETWORK COVERAGE – BUNER



UFONE AUTOMODE NETWORK COVERAGE – BUNER

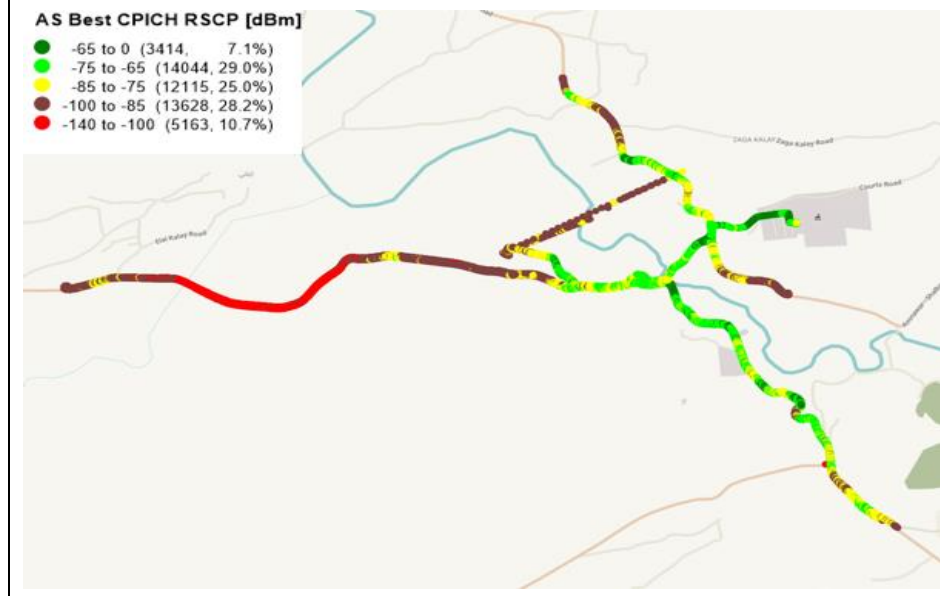


ZONG AUTOMODE NETWORK COVERAGE – BUNER

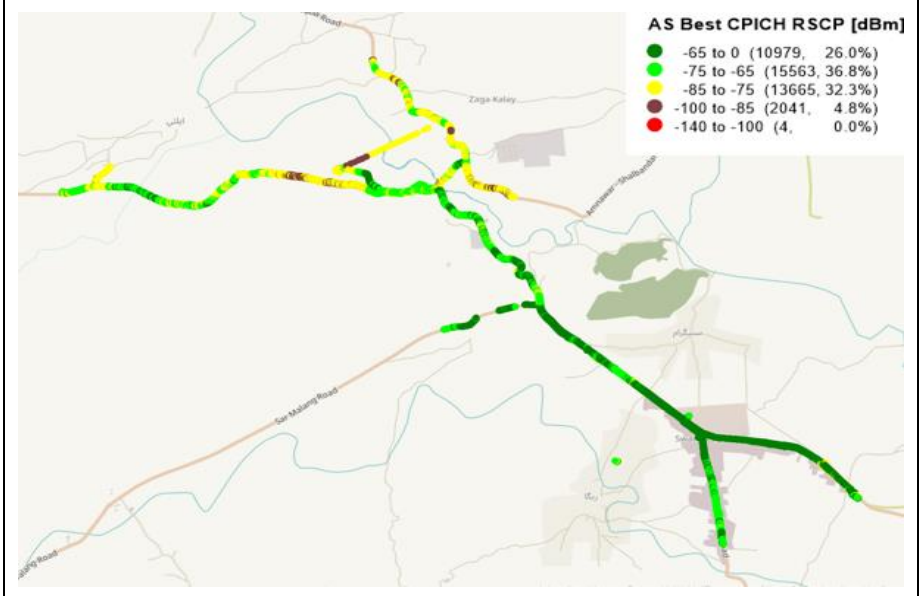


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

JAZZ AUTOMODE NETWORK COVERAGE – BUNER

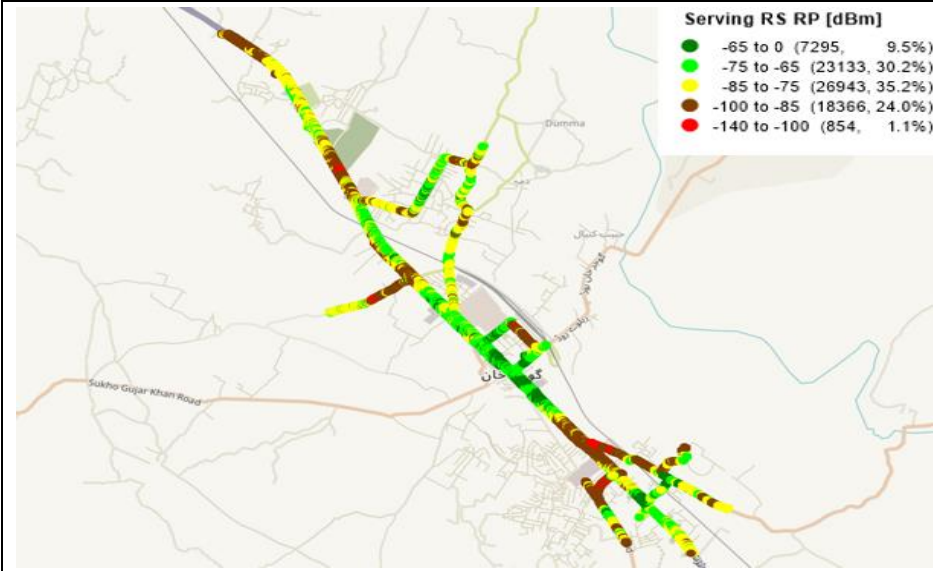


UFONE AUTOMODE NETWORK COVERAGE – BUNER

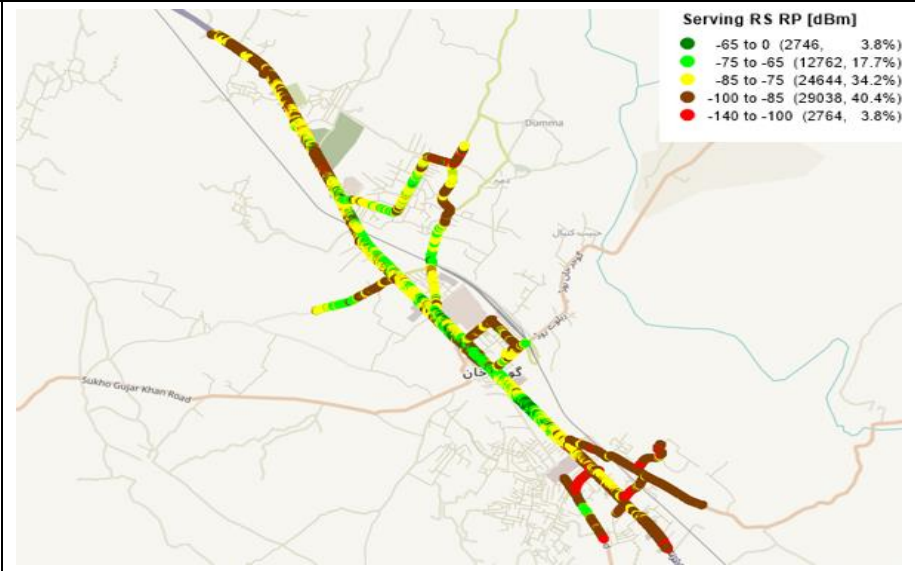


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

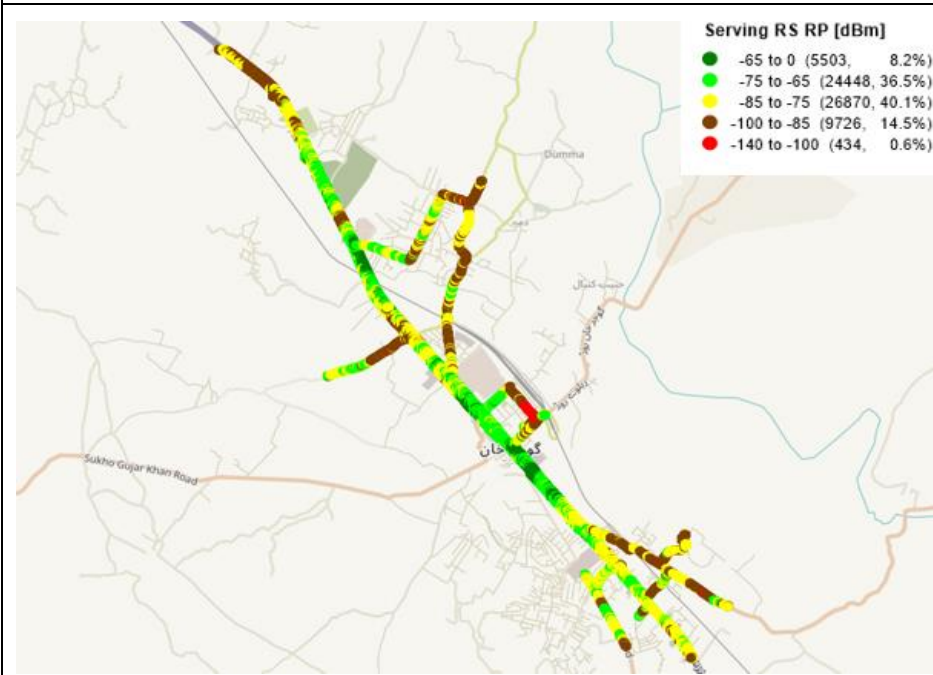
JAZZ AUTOMODE NETWORK COVERAGE – GUJAR KHAN



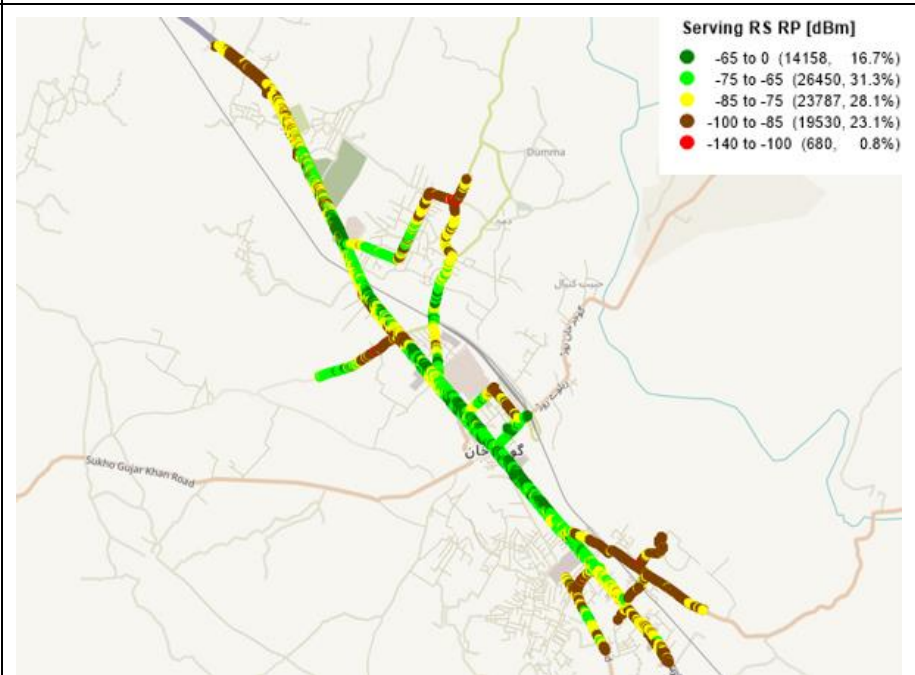
TELENOR AUTOMODE NETWORK COVERAGE – GUJAR KHAN



UFONE AUTOMODE NETWORK COVERAGE – GUJAR KHAN

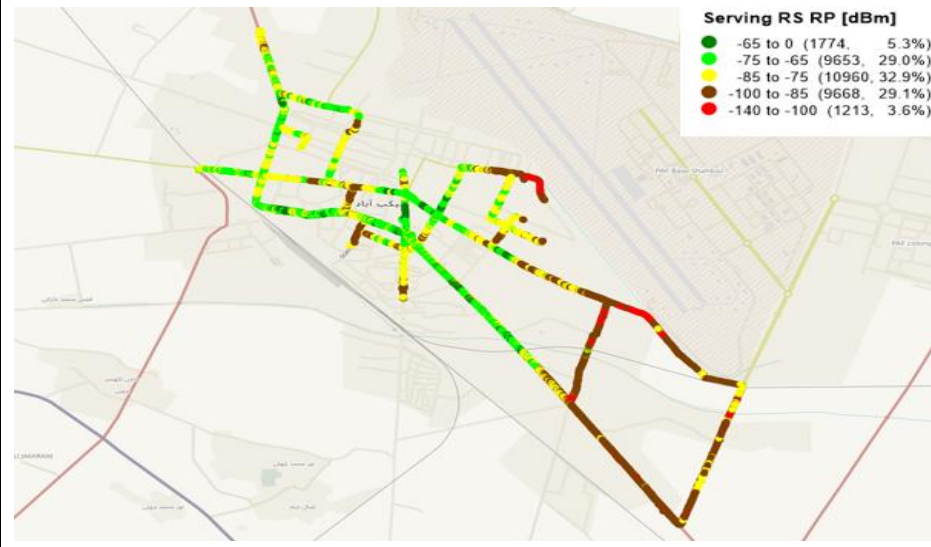


ZONG AUTOMODE NETWORK COVERAGE – GUJAR KHAN

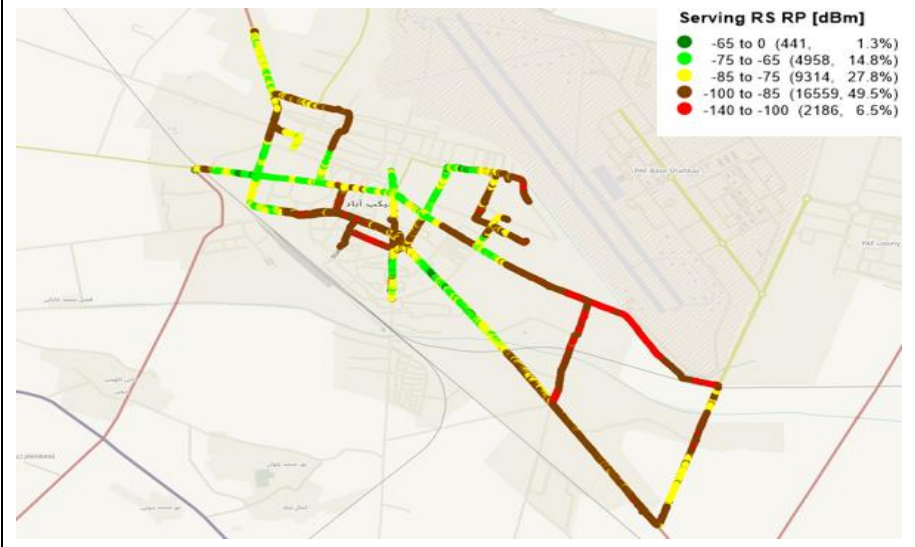


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

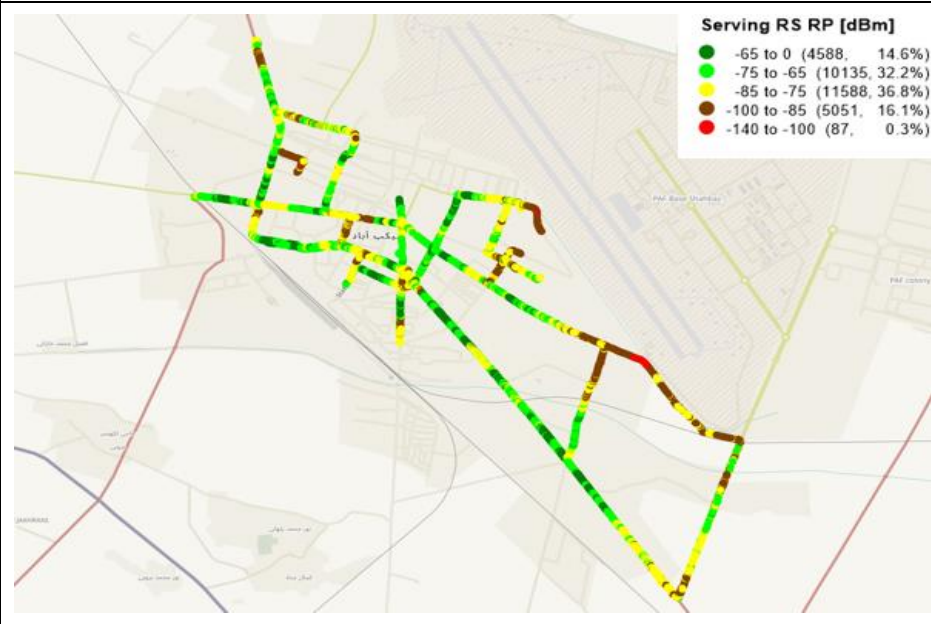
JAZZ AUTOMODE NETWORK COVERAGE – JACOBABAD



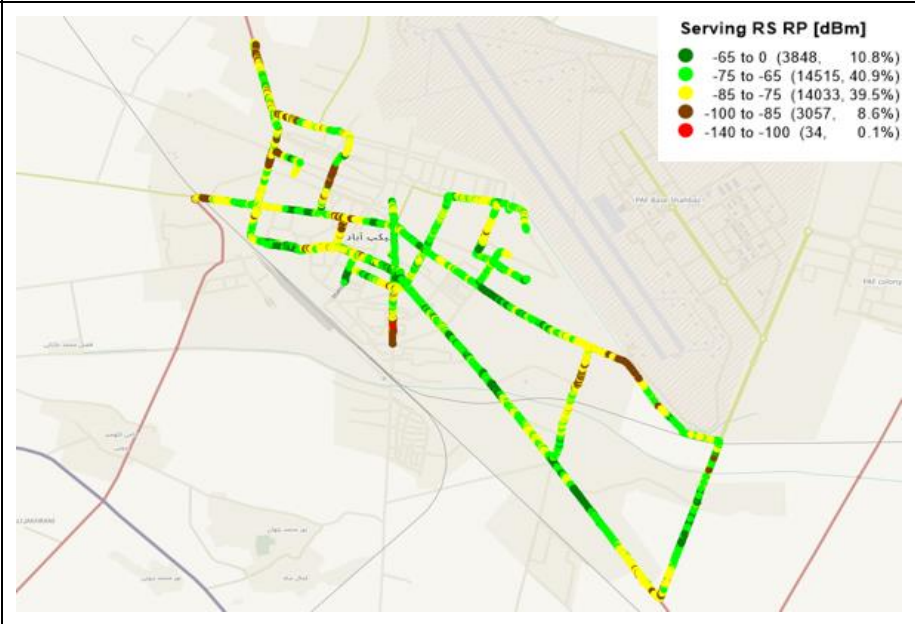
TELENOR AUTOMODE NETWORK COVERAGE – JACOBABAD



UFONE AUTOMODE NETWORK COVERAGE – JACOBABAD

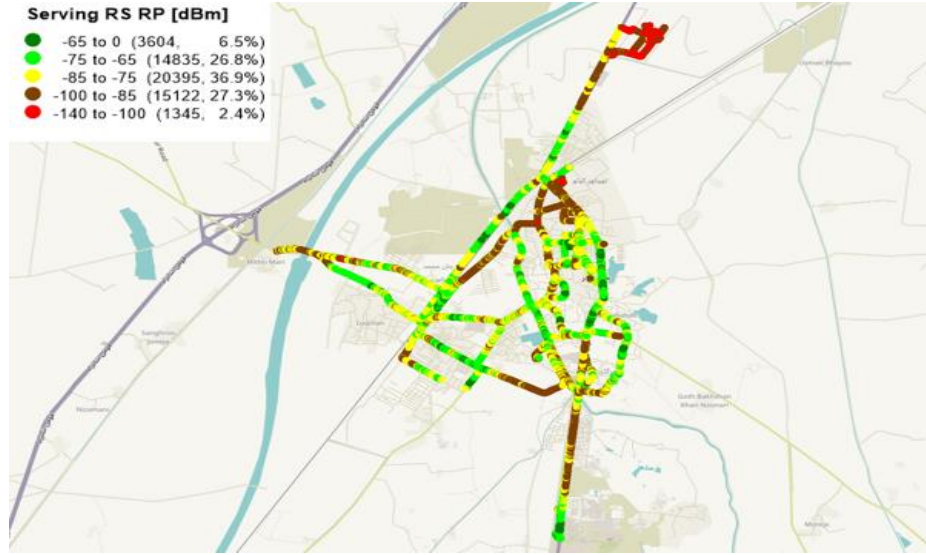


ZONG AUTOMODE NETWORK COVERAGE – JACOBABAD

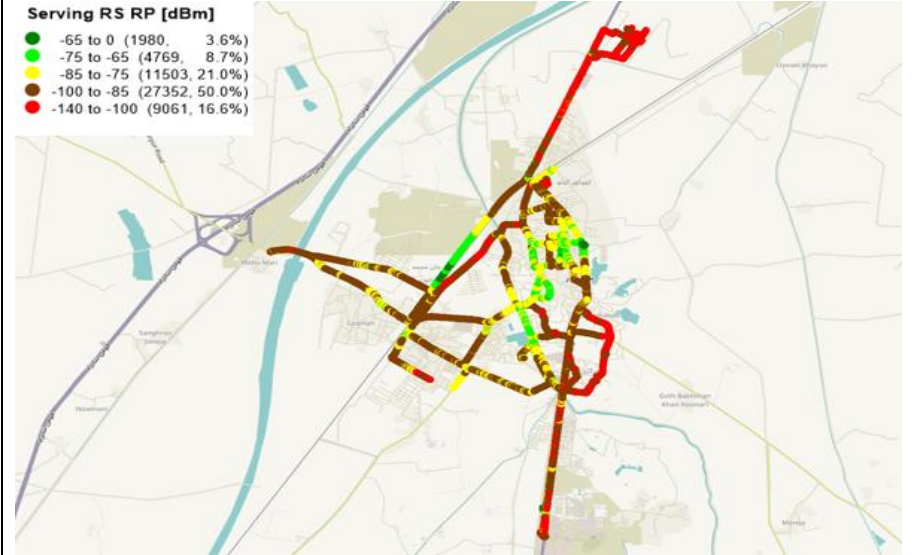


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

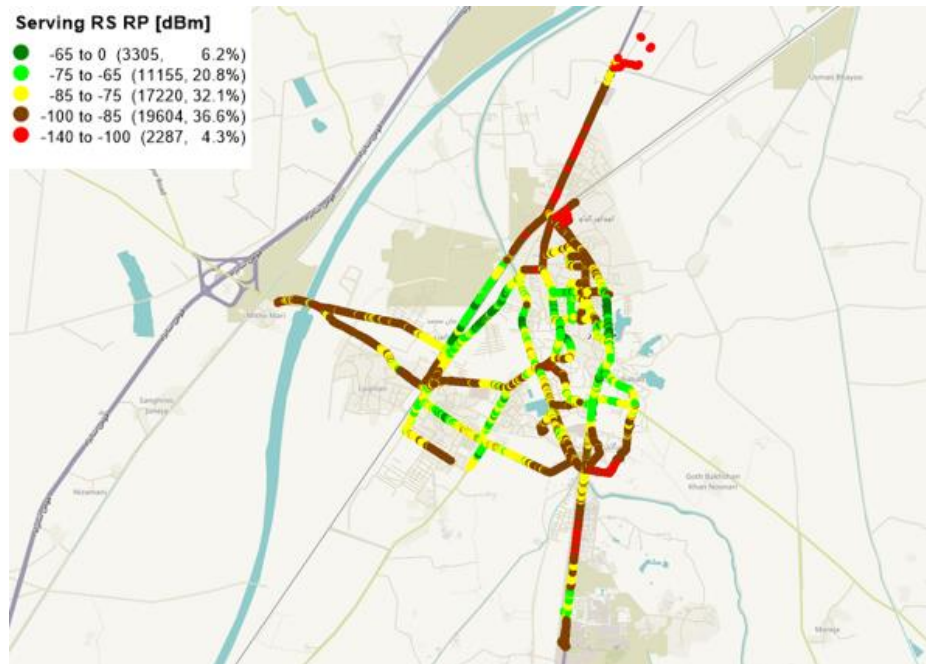
JAZZ AUTOMODE NETWORK COVERAGE – KHAIRPUR



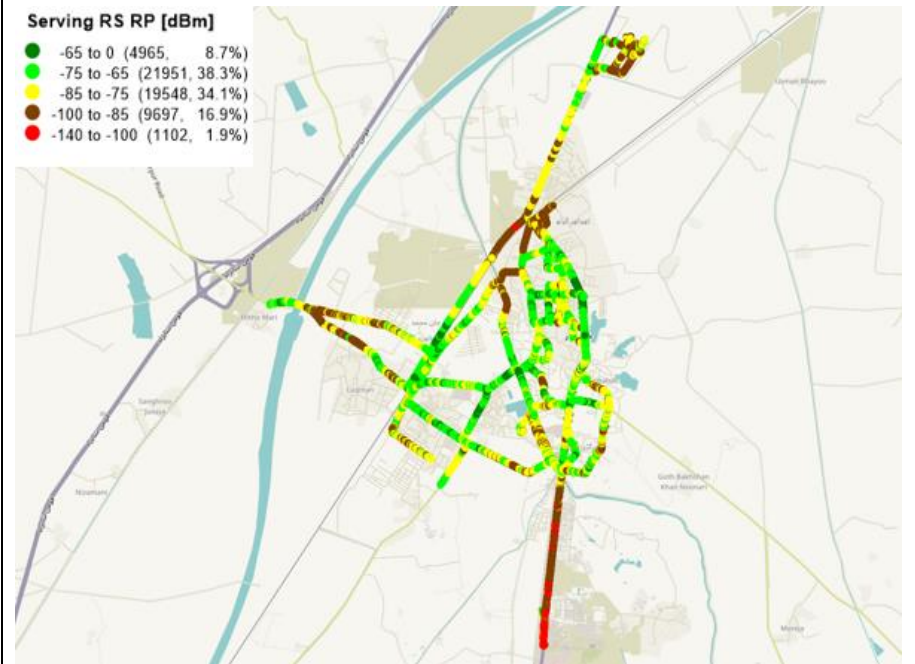
TELENOR AUTOMODE NETWORK COVERAGE – KHAIRPUR



UFONE AUTOMODE NETWORK COVERAGE – KHAIRPUR



ZONG AUTOMODE NETWORK COVERAGE – KHAIRPUR

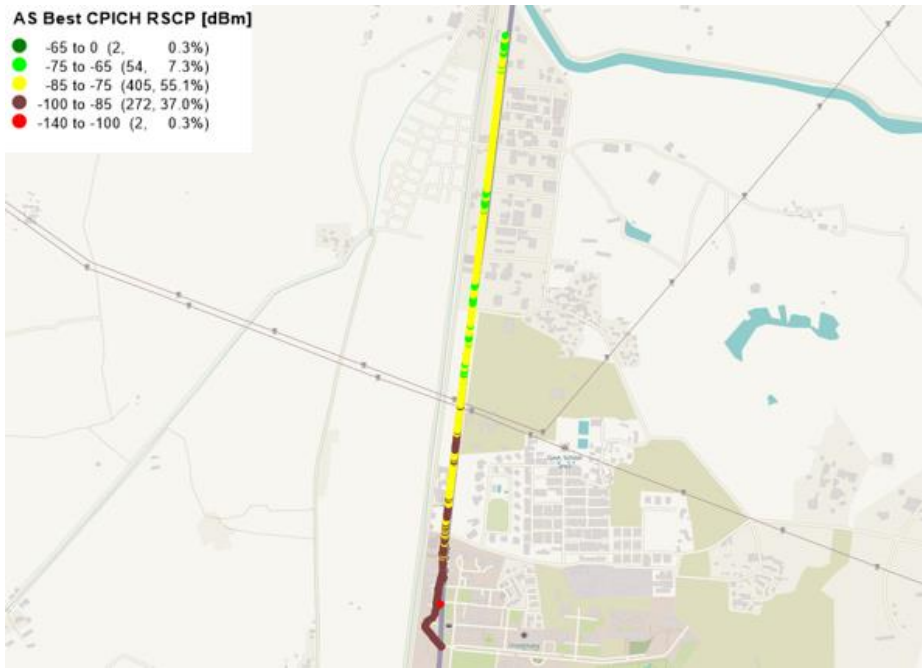


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

ZONG 3G AUTOMODE NETWORK COVERAGE – KHAIRPUR

AS Best CPICH RSCP [dBm]

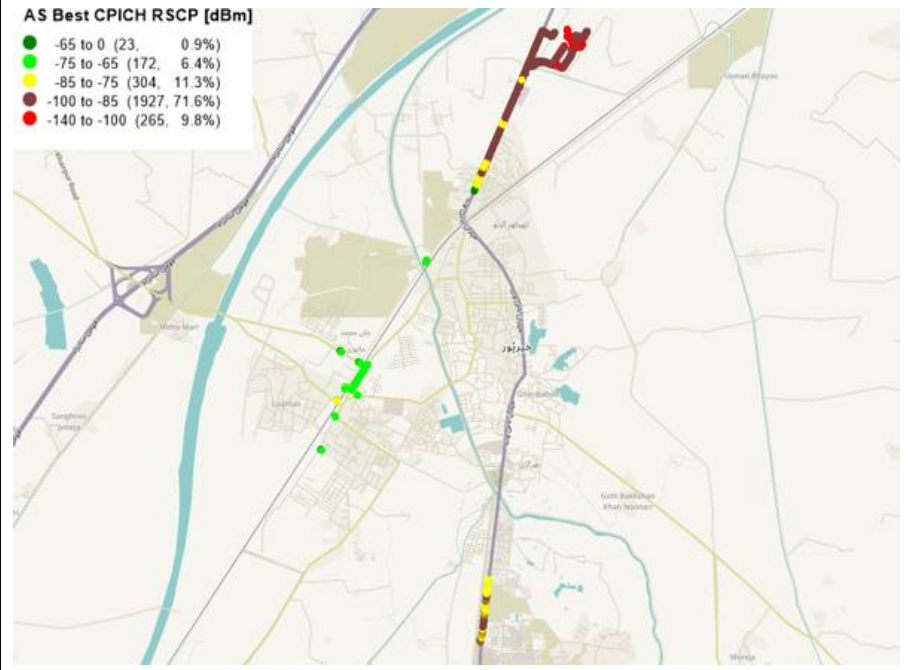
- -65 to 0 (2, 0.3%)
- -75 to -65 (54, 7.3%)
- -85 to -75 (405, 55.1%)
- -100 to -85 (272, 37.0%)
- -140 to -100 (2, 0.3%)



UFONE 3G AUTOMODE NETWORK COVERAGE – KHAIRPUR

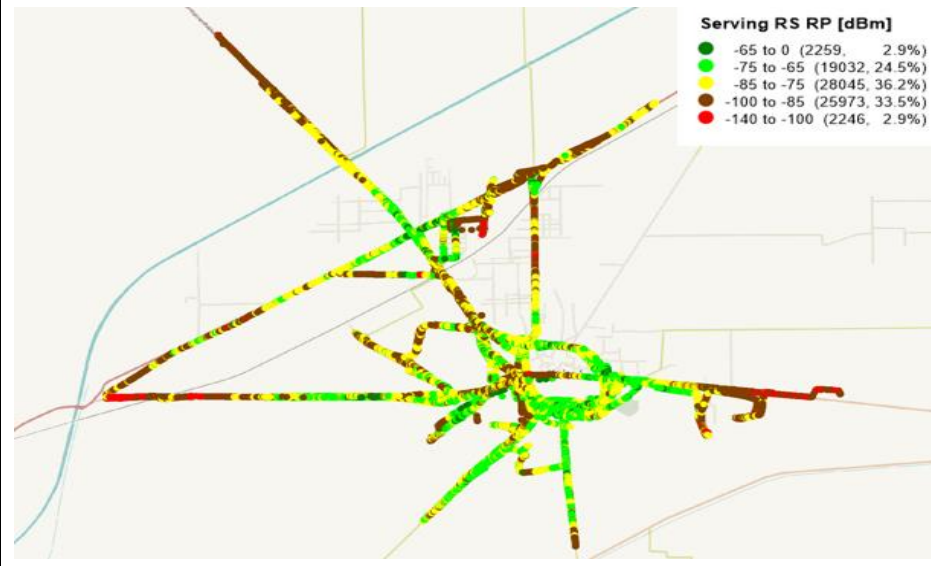
AS Best CPICH RSCP [dBm]

- -65 to 0 (23, 0.9%)
- -75 to -65 (172, 6.4%)
- -85 to -75 (304, 11.3%)
- -100 to -85 (1927, 71.6%)
- -140 to -100 (265, 9.8%)



AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

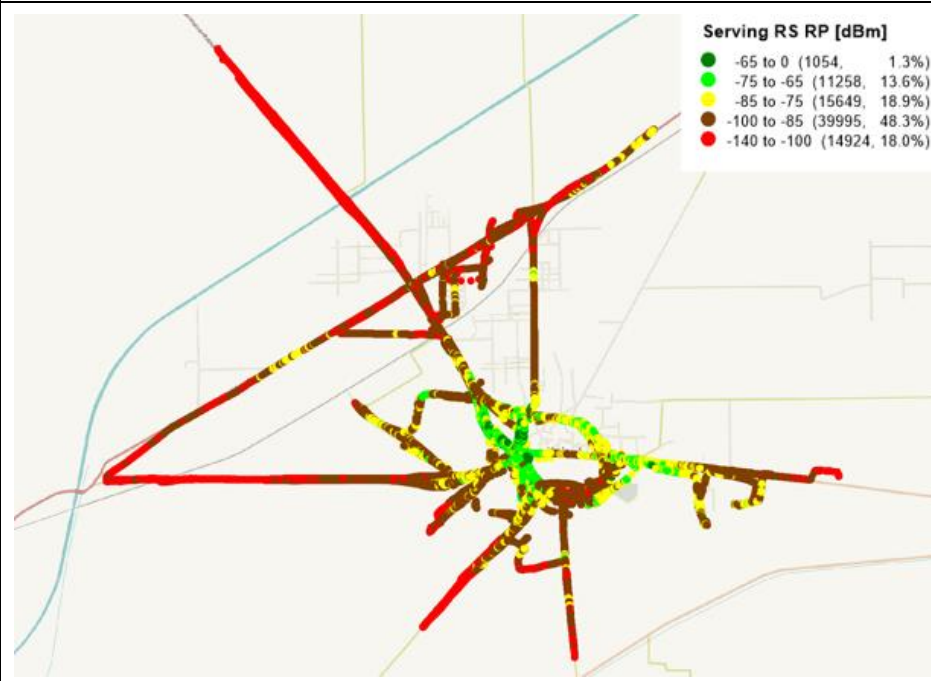
JAZZ AUTOMODE NETWORK COVERAGE – KHAROR PACCA



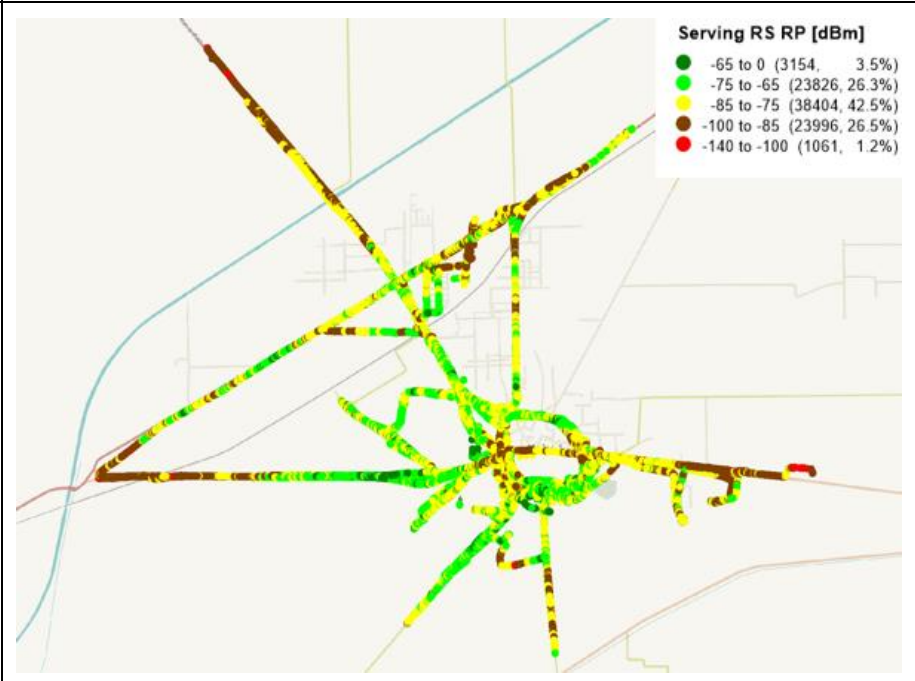
TELENOR AUTOMODE NETWORK COVERAGE – KHAROR PACCA



UFONE AUTOMODE NETWORK COVERAGE – KHAROR PACCA

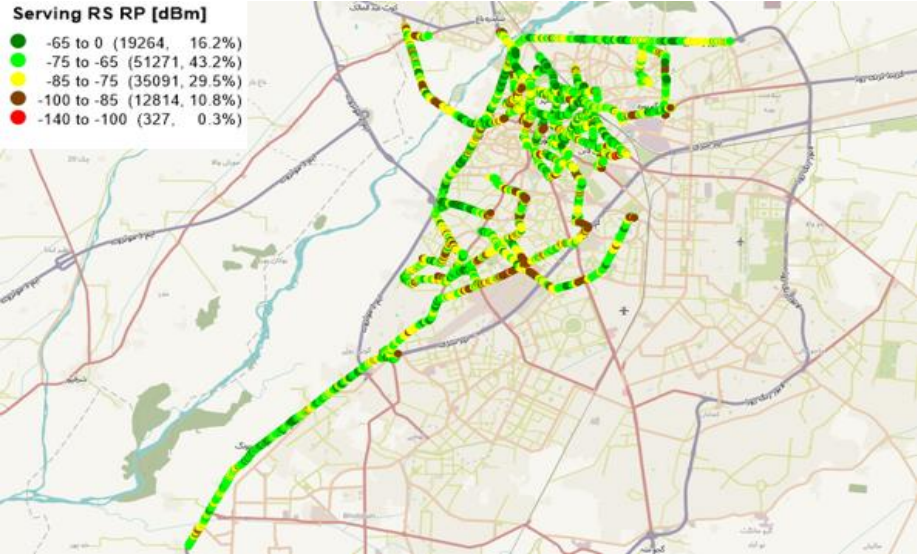


ZONG AUTOMODE NETWORK COVERAGE – KHAROR PACCA

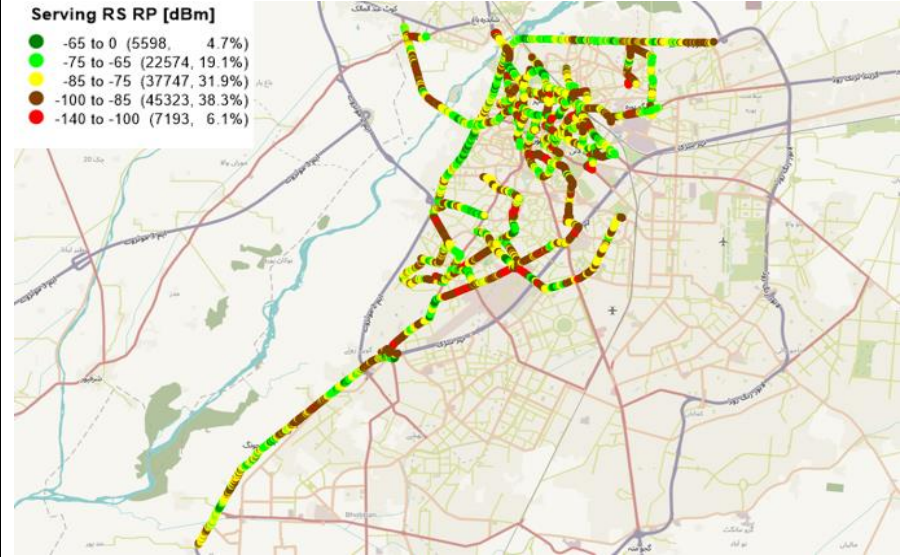


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

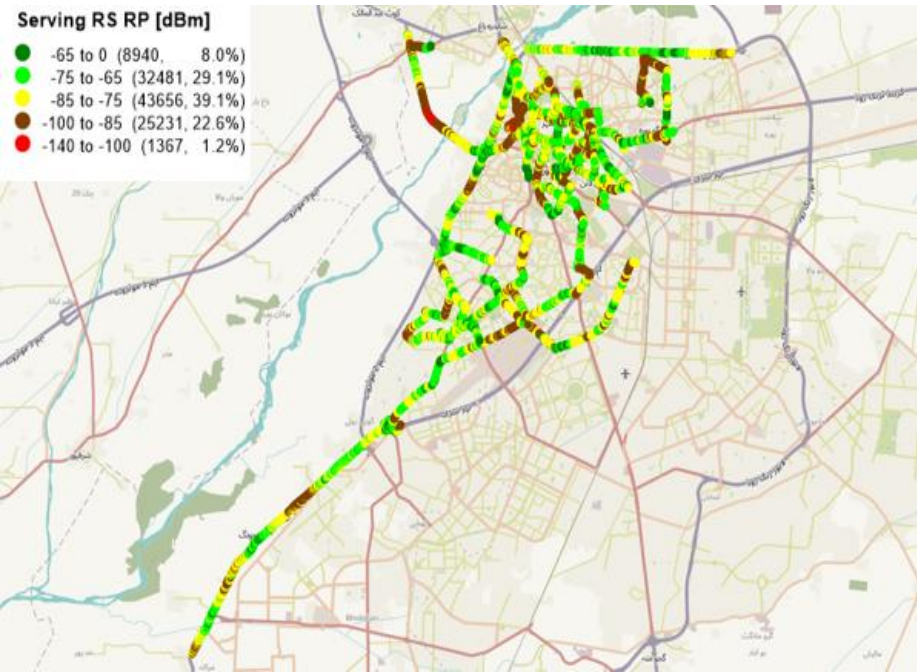
JAZZ AUTOMODE NETWORK COVERAGE – LAHORE



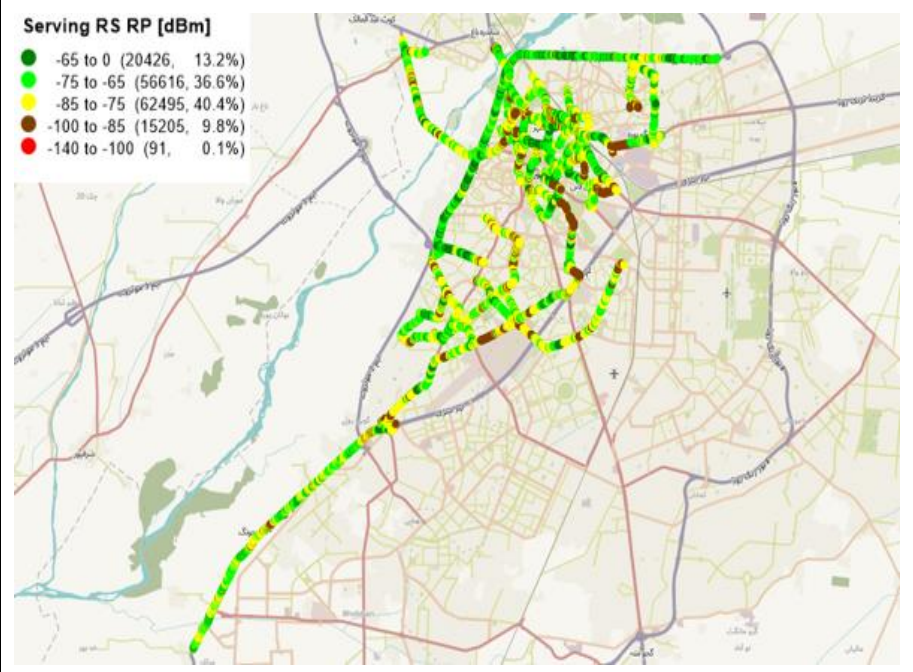
TELENOR AUTOMODE NETWORK COVERAGE – LAHORE



UFONE AUTOMODE NETWORK COVERAGE – LAHORE

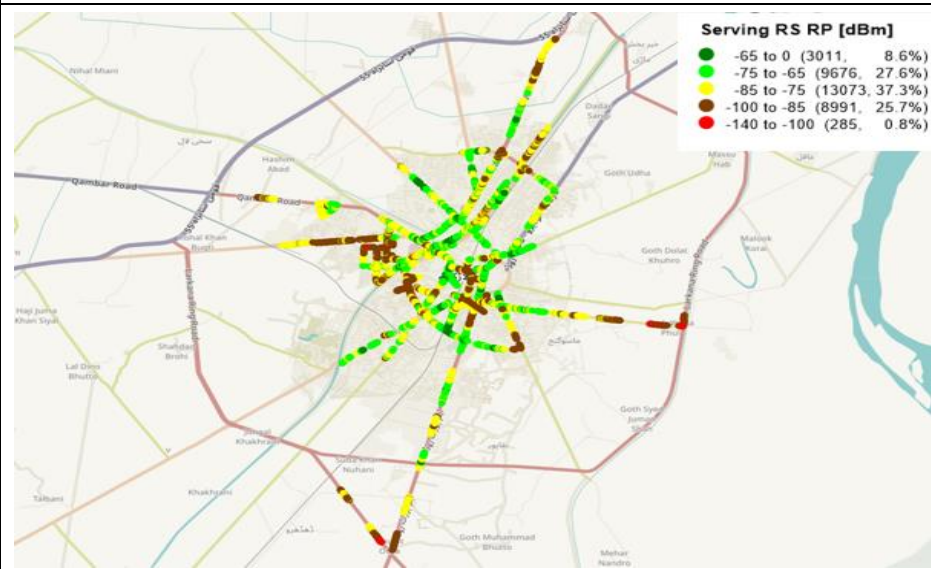


ZONG AUTOMODE NETWORK COVERAGE – LAHORE

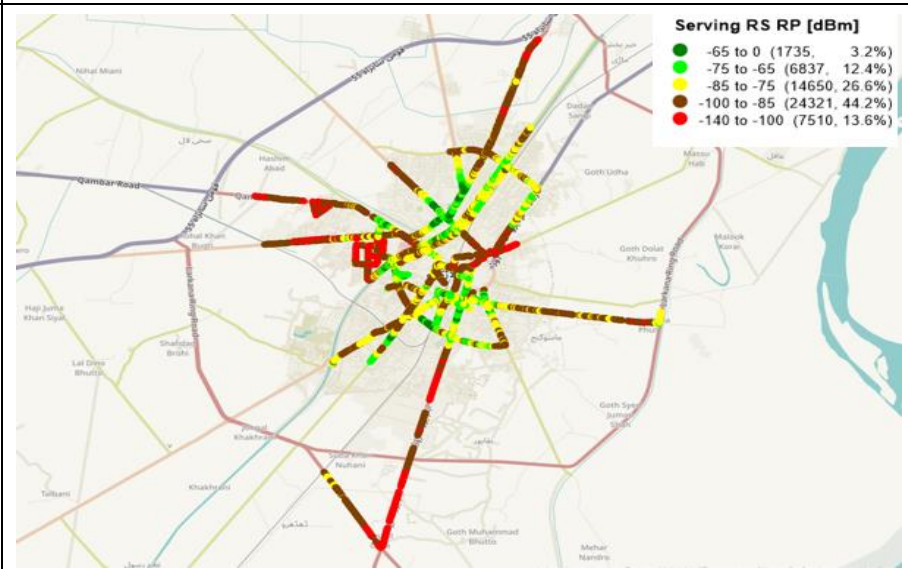


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

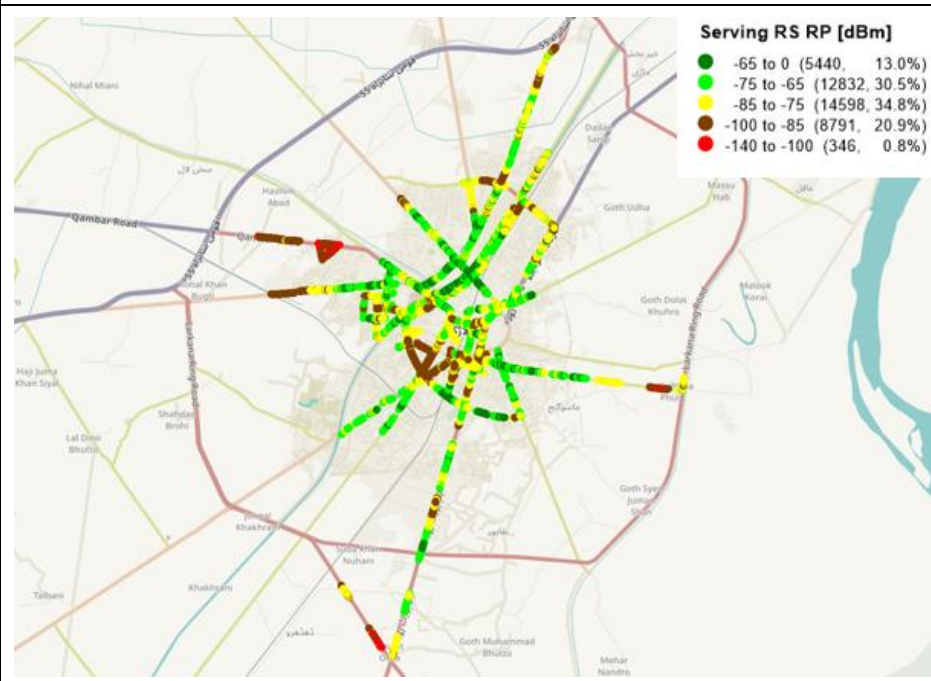
JAZZ AUTOMODE NETWORK COVERAGE – LARKANA



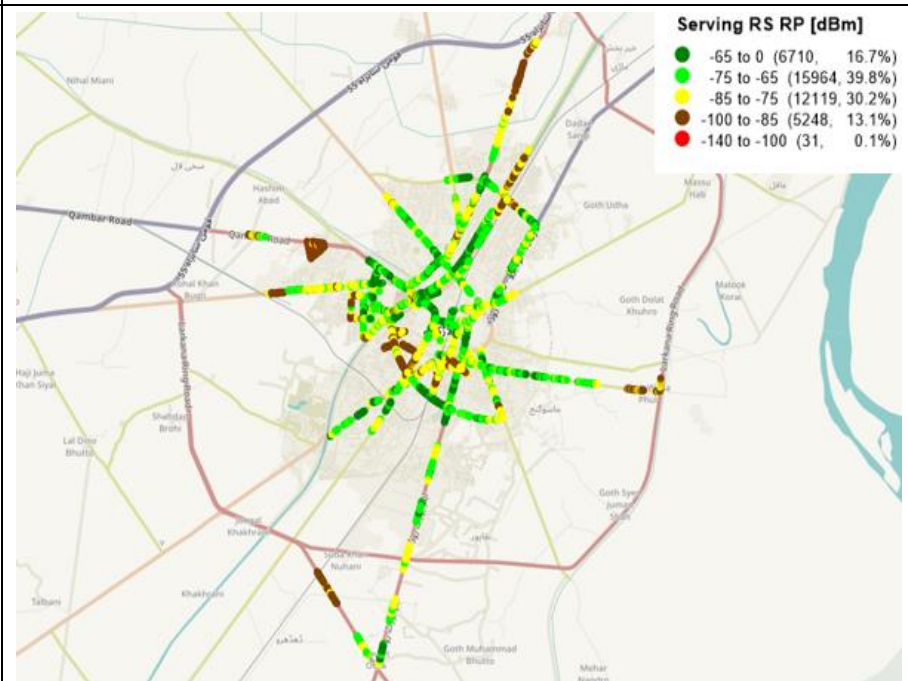
TELENOR AUTOMODE NETWORK COVERAGE – LARKANA



UFONE AUTOMODE NETWORK COVERAGE – LARKANA



ZONG AUTOMODE NETWORK COVERAGE – LARKANA



AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

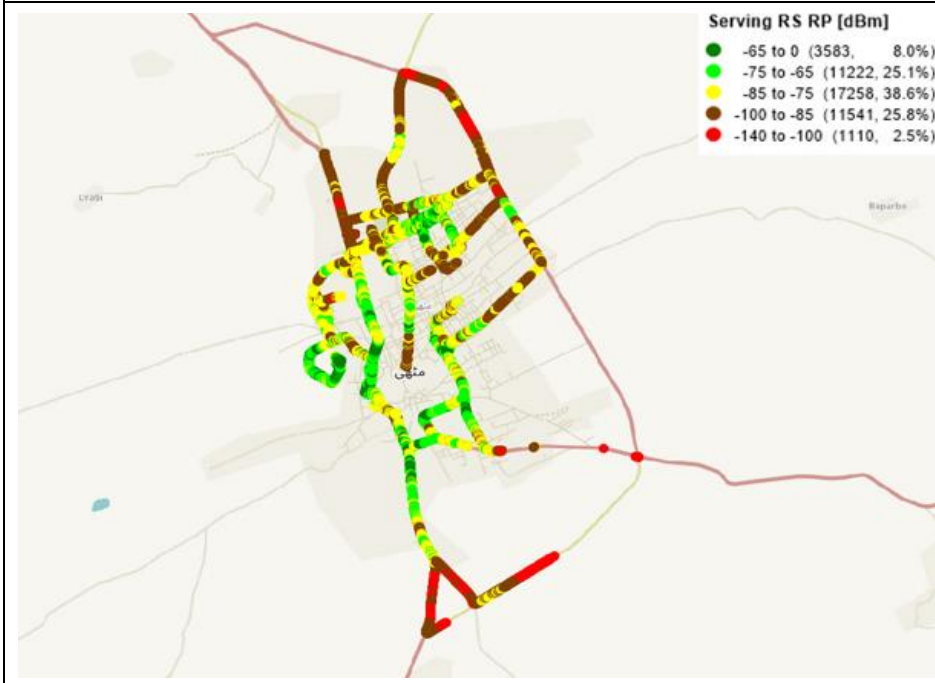
JAZZ AUTOMODE NETWORK COVERAGE – MITHI



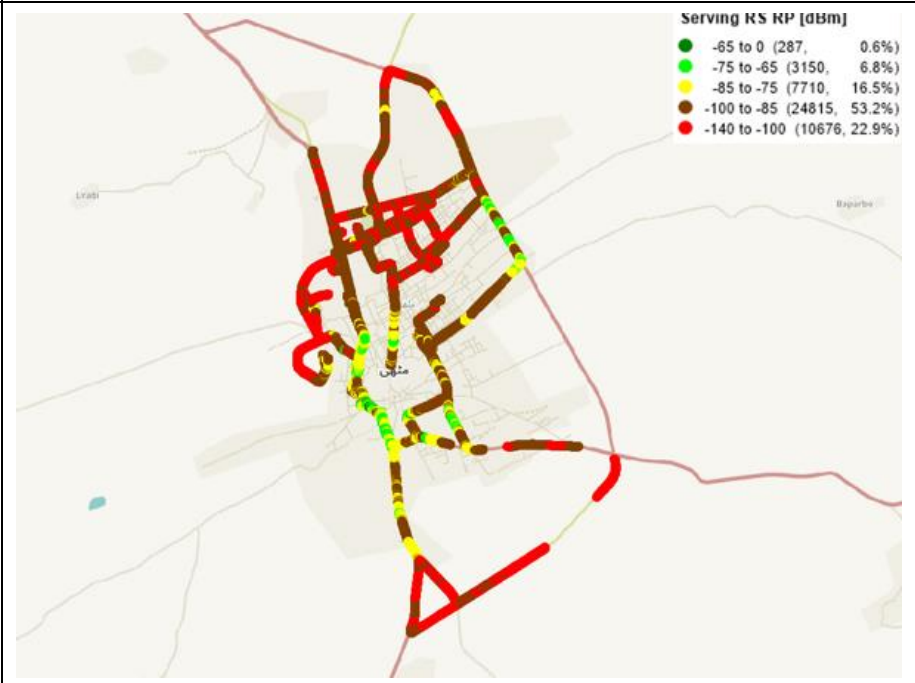
TELENOR AUTOMODE NETWORK COVERAGE – MITHI



UFONE AUTOMODE NETWORK COVERAGE – MITHI

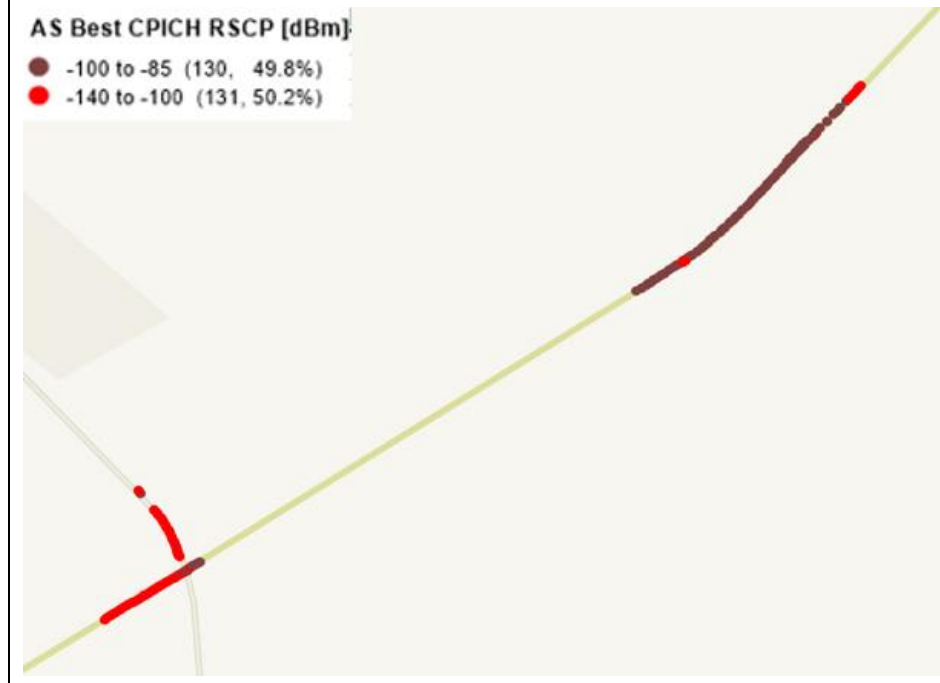


ZONG AUTOMODE NETWORK COVERAGE – MITHI

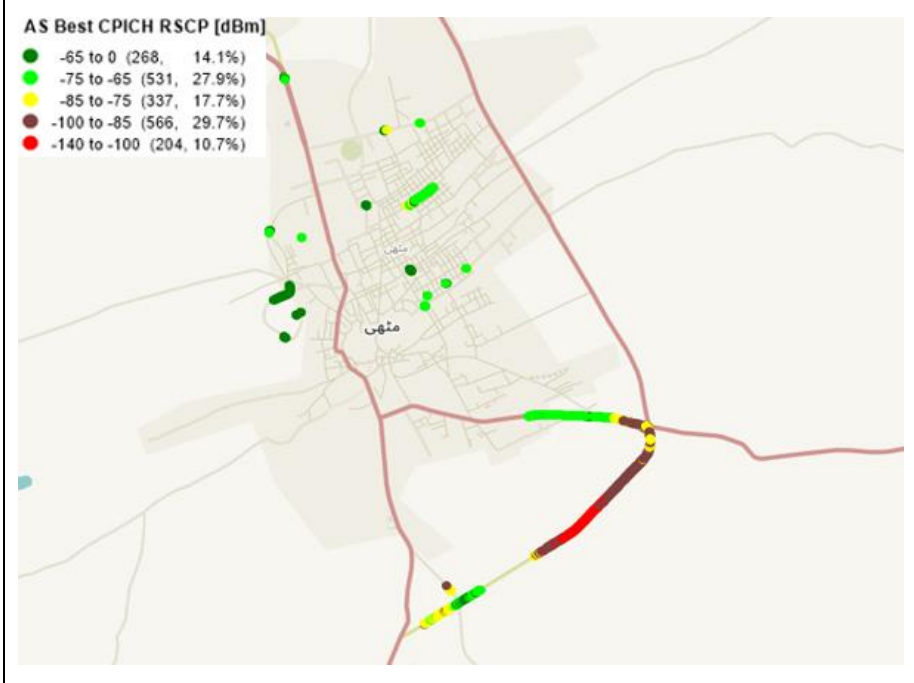


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

TELENOR 3G AUTOMODE NETWORK COVERAGE – MITHI

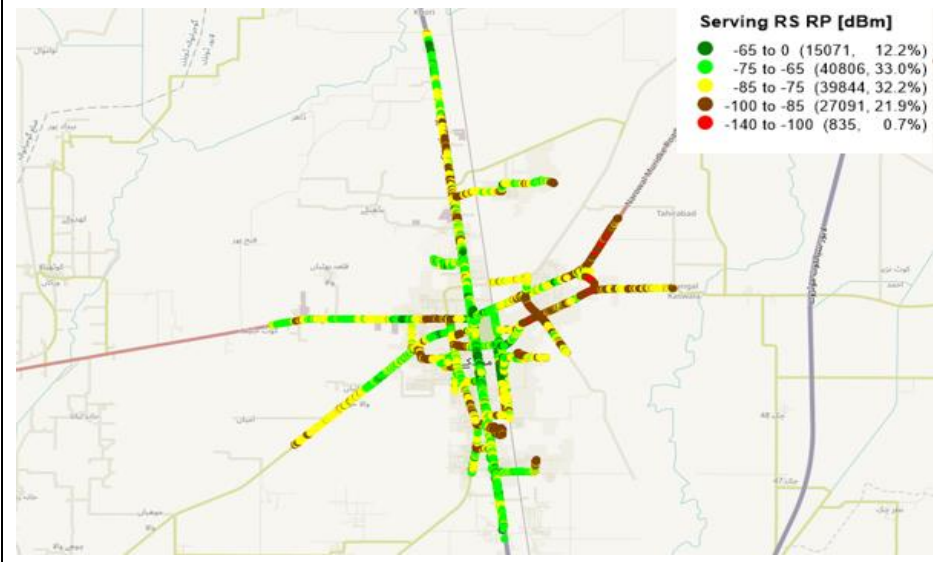


UFONE 3G AUTOMODE NETWORK COVERAGE – MITHI

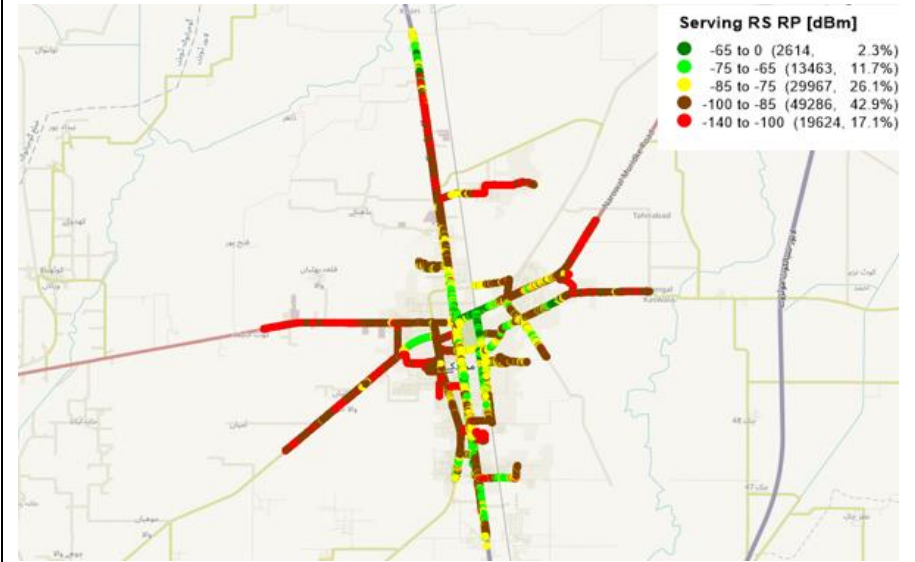


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

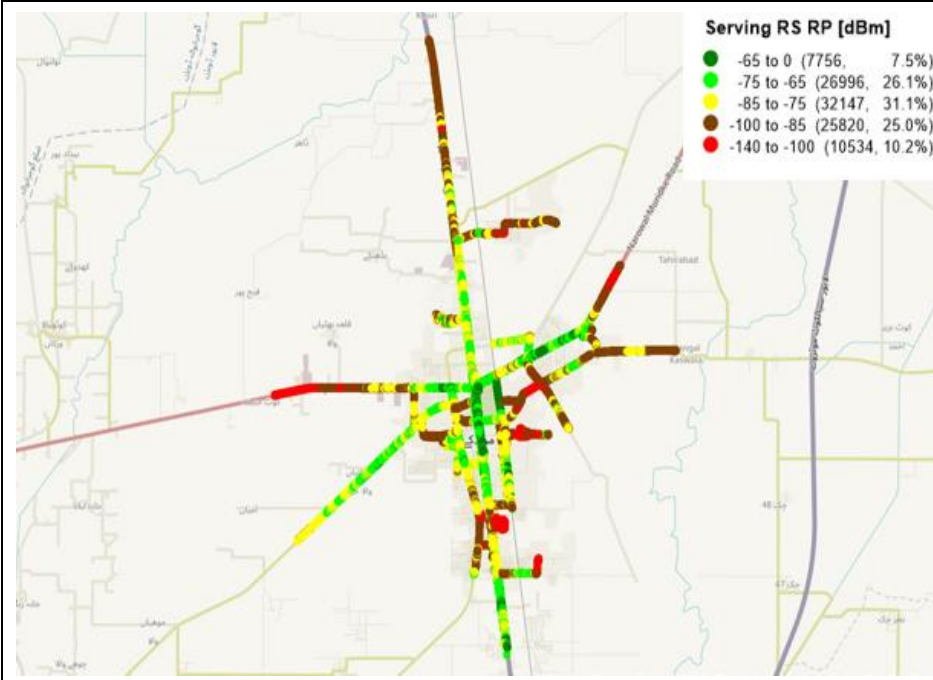
JAZZ AUTOMODE NETWORK COVERAGE – MURIDKE



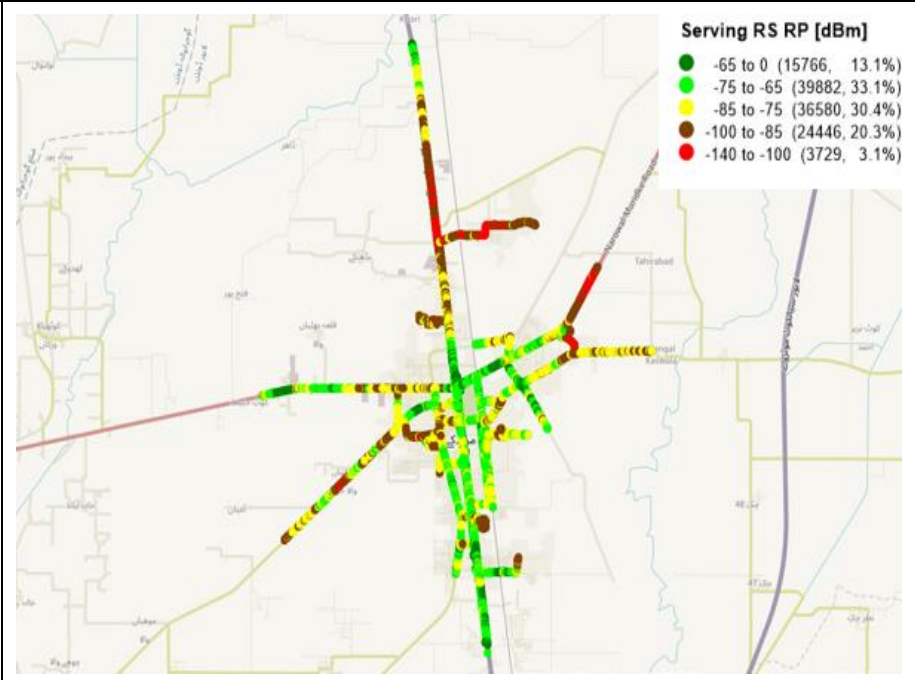
TELENOR AUTOMODE NETWORK COVERAGE – MURIDKE



UFONE AUTOMODE NETWORK COVERAGE – MURIDKE

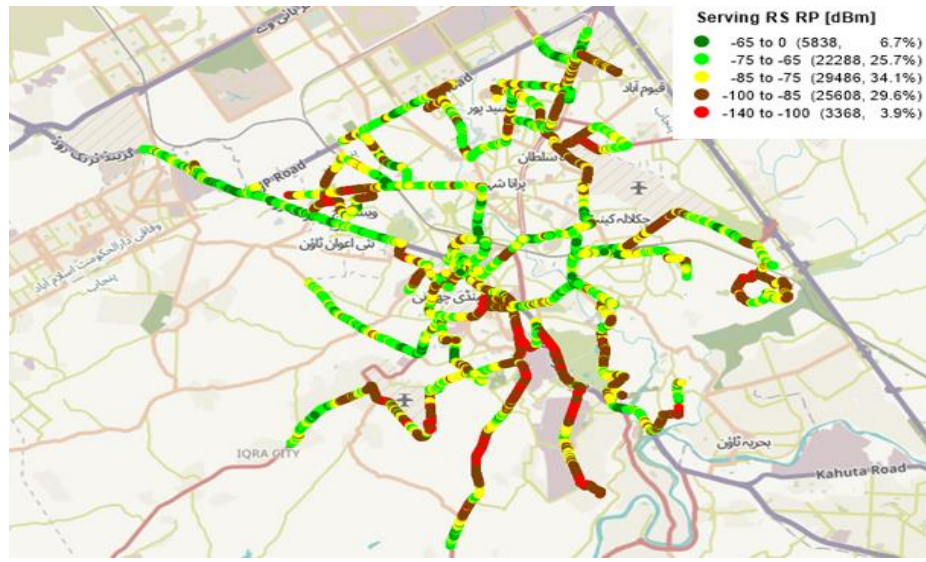


ZONG AUTOMODE NETWORK COVERAGE – MURIDKE

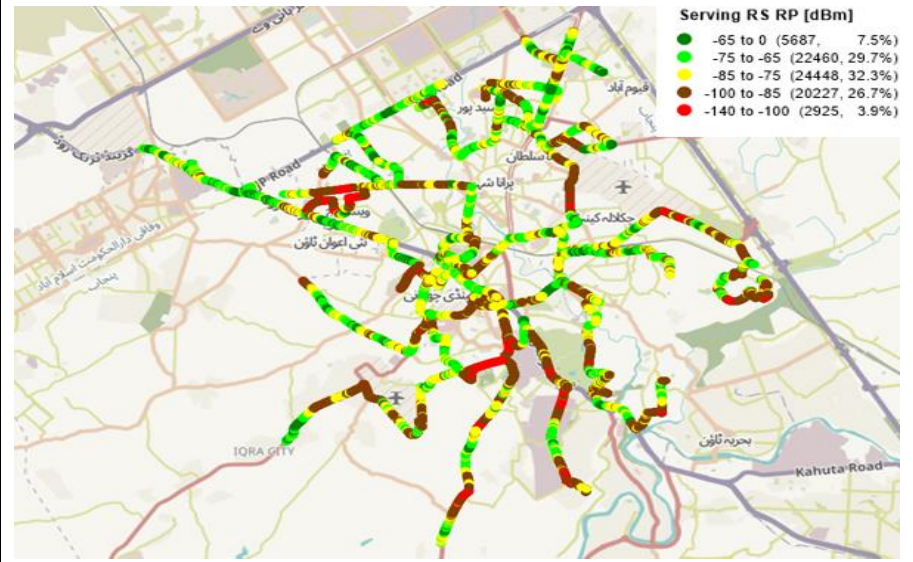


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

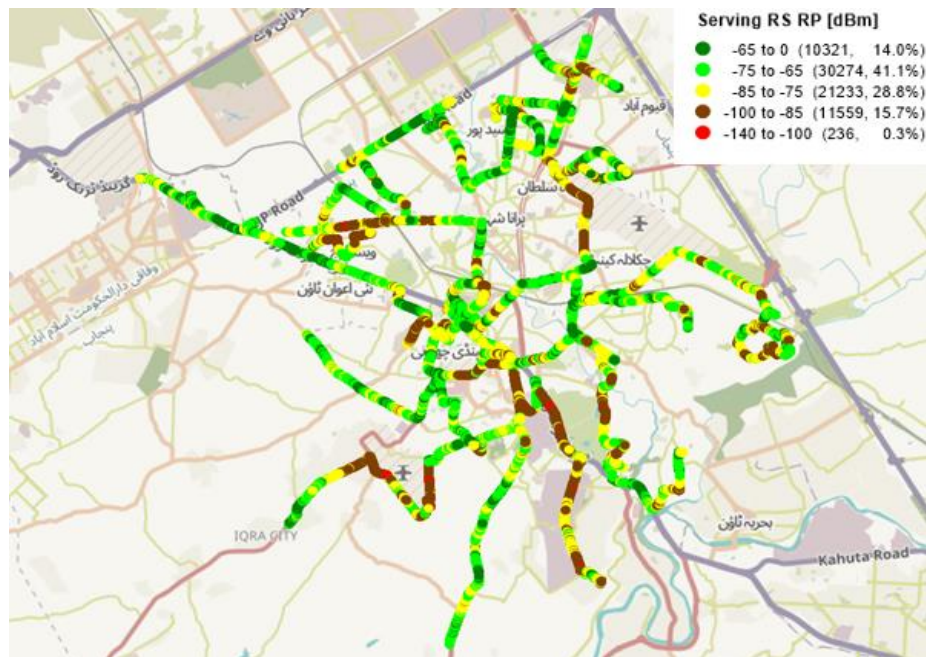
JAZZ AUTOMODE NETWORK COVERAGE – RAWALPINDI



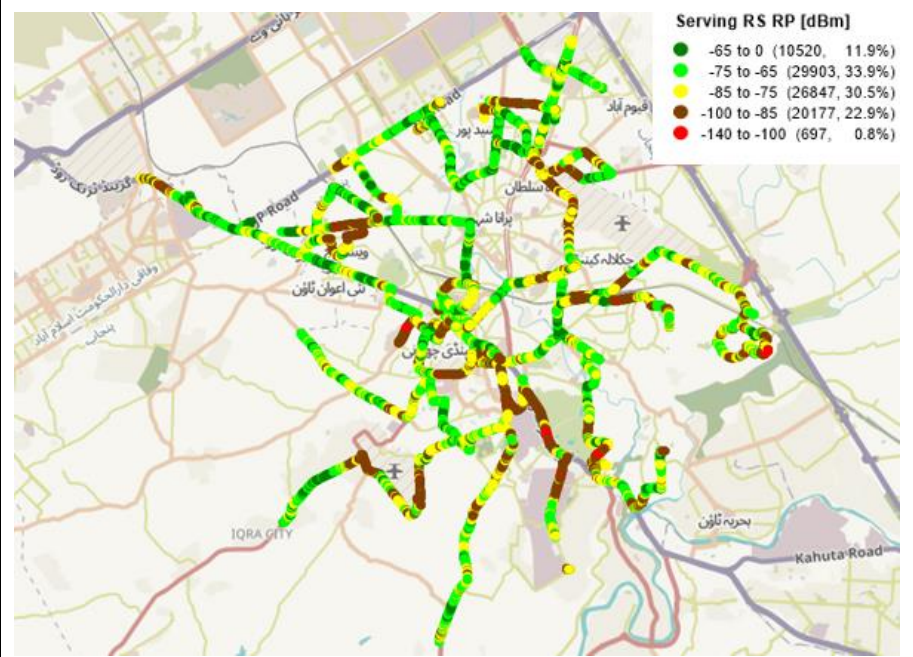
TELENOR AUTOMODE NETWORK COVERAGE – RAWALPINDI



UFONE AUTOMODE NETWORK COVERAGE – RAWALPINDI

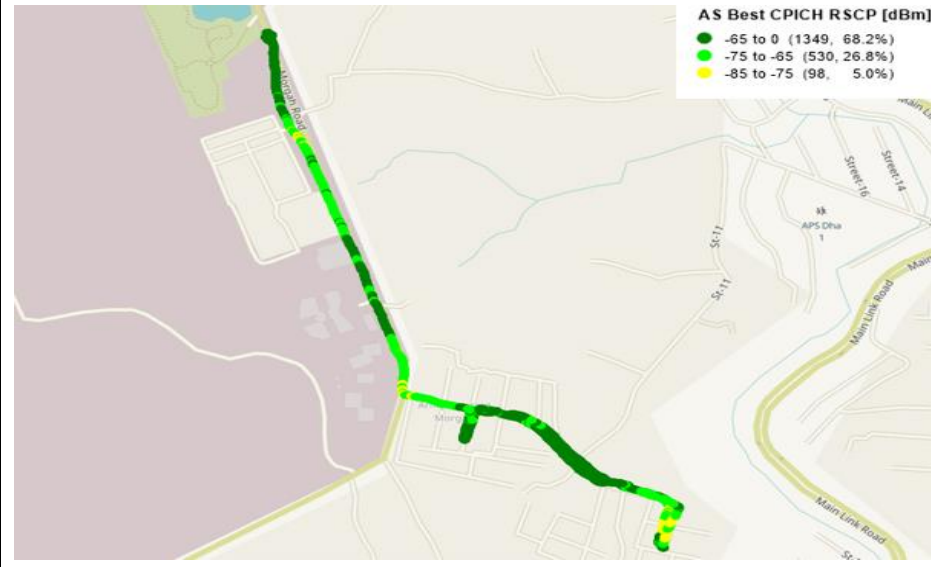


ZONG AUTOMODE NETWORK COVERAGE – RAWALPINDI

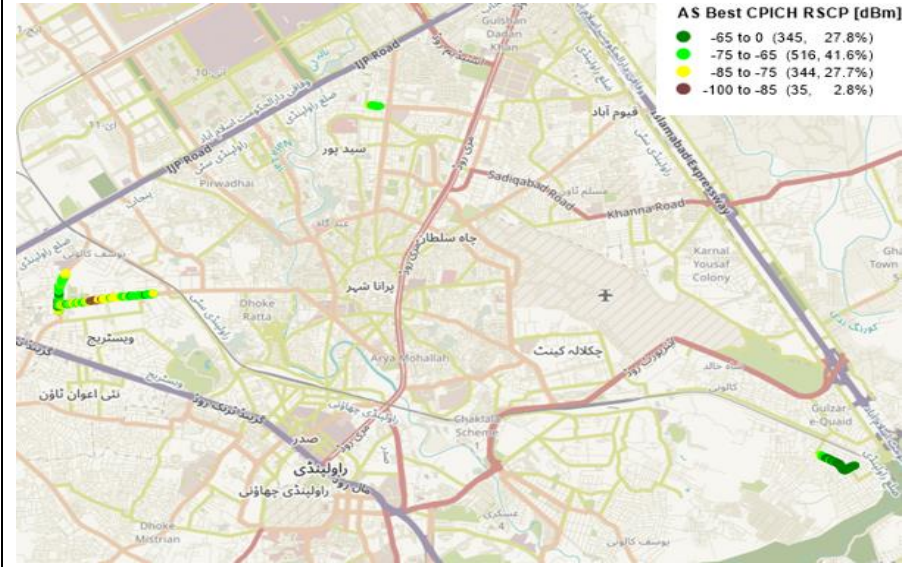


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

ZONG 3G AUTOMODE NETWORK COVERAGE – RAWALPINDI

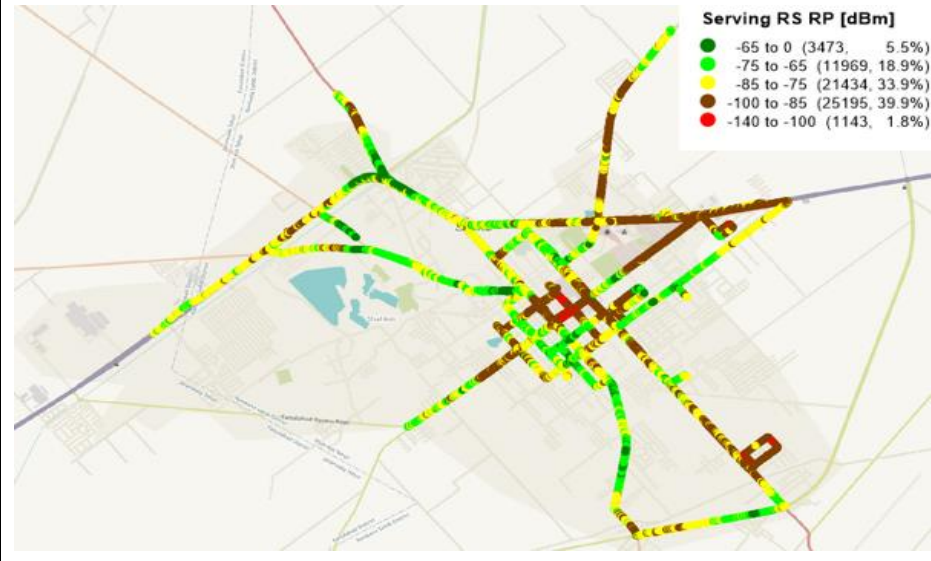


TELENOR 3G AUTOMODE NETWORK COVERAGE – QUETA CITY

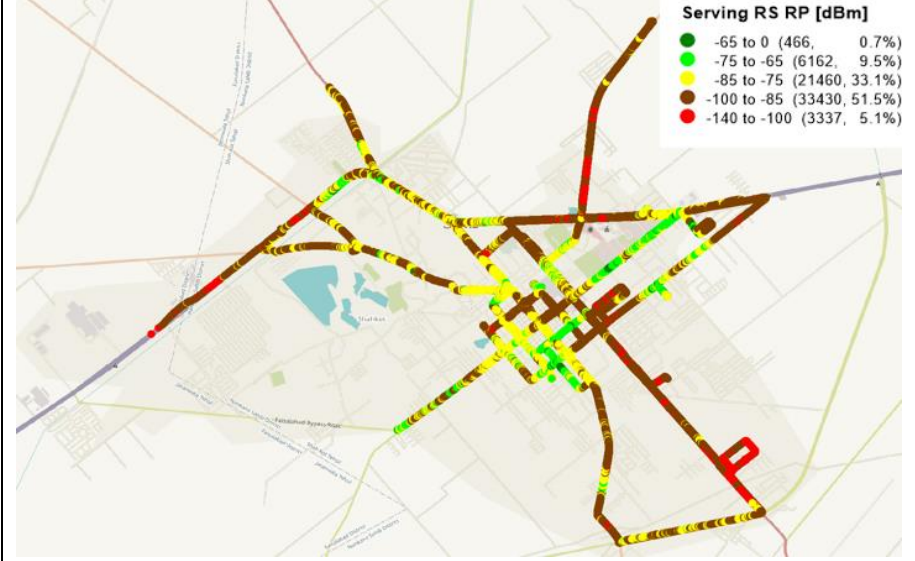


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

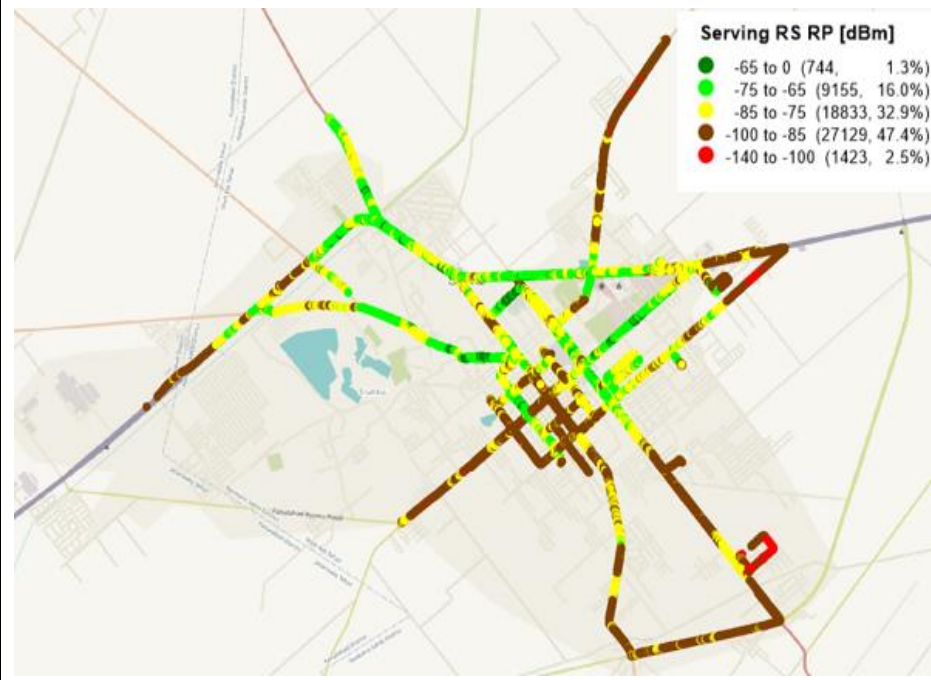
JAZZ AUTOMODE NETWORK COVERAGE – SHAHKOT



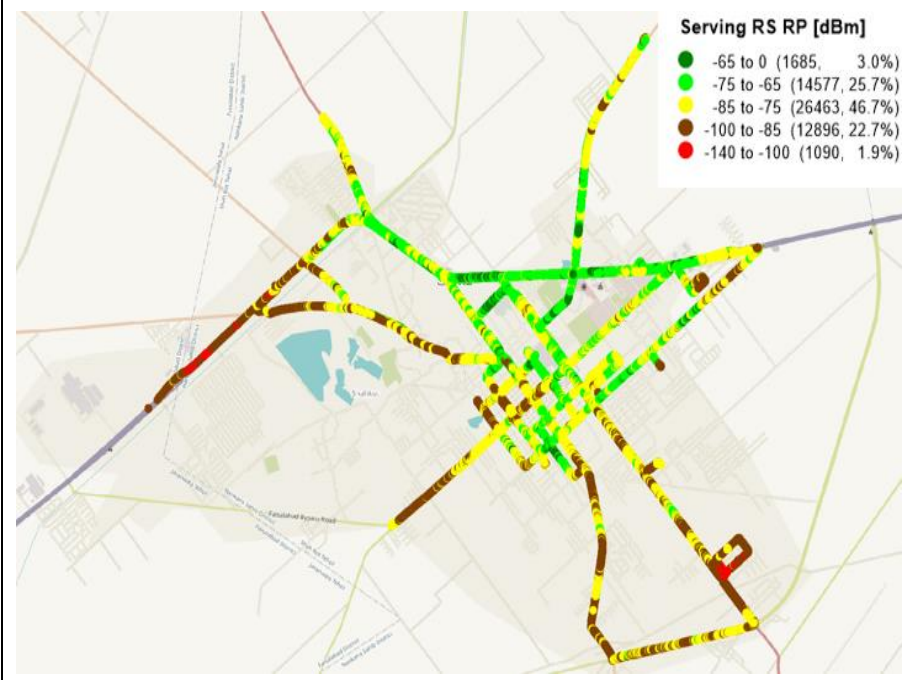
TELENOR AUTOMODE NETWORK COVERAGE – SHAHKOT



UFONE AUTOMODE NETWORK COVERAGE – SHAHKOT

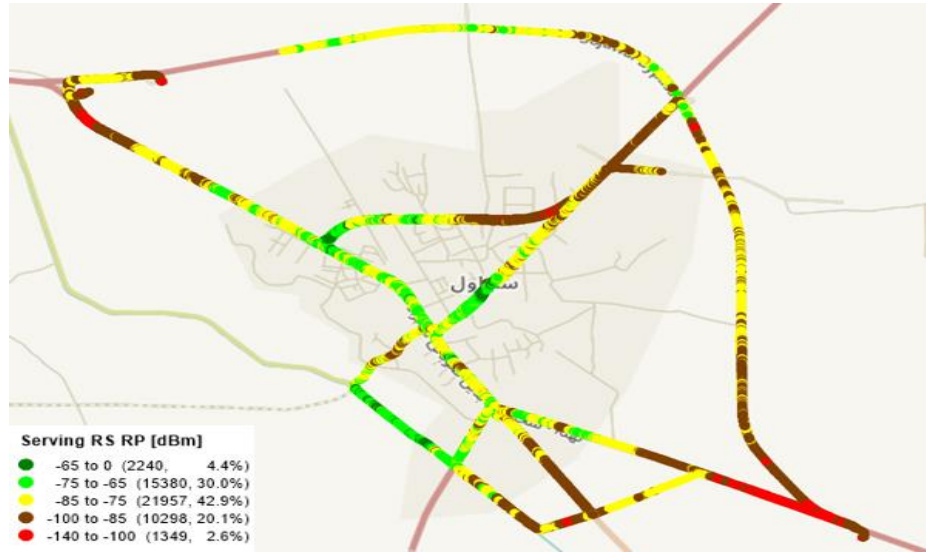


ZONG AUTOMODE NETWORK COVERAGE – SHAHKOT

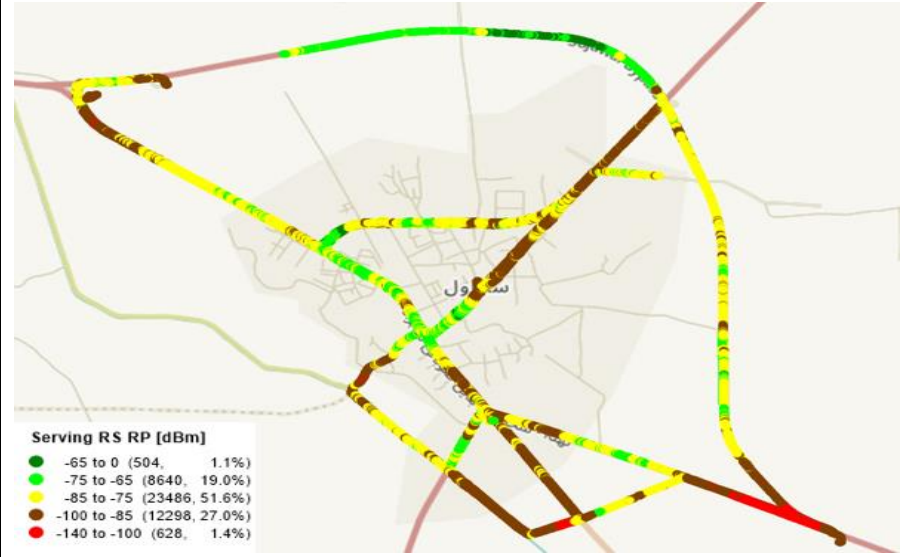


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

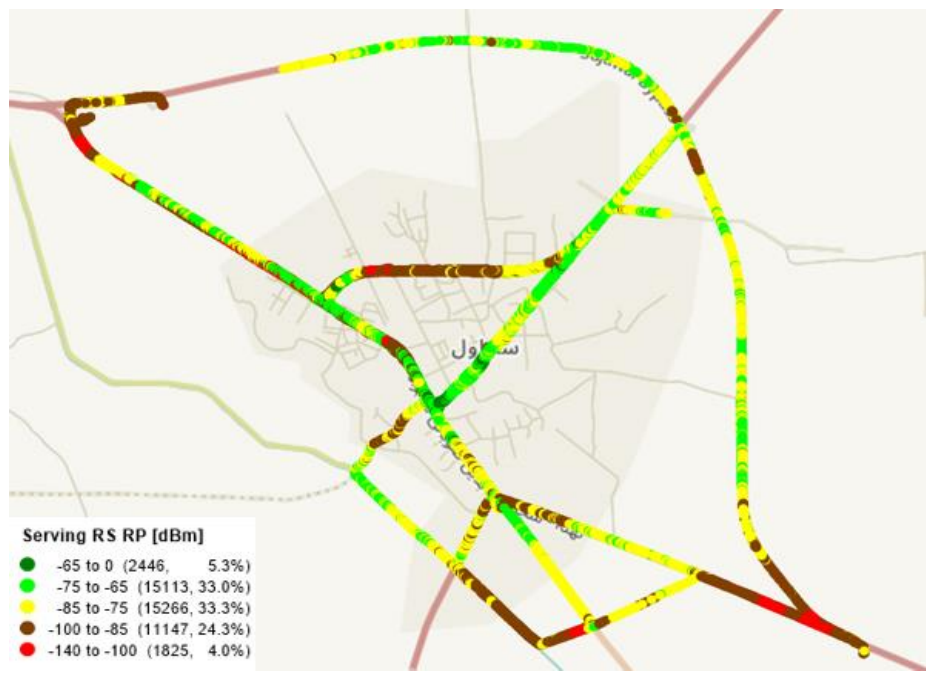
JAZZ AUTOMODE NETWORK COVERAGE – SUJAWAL



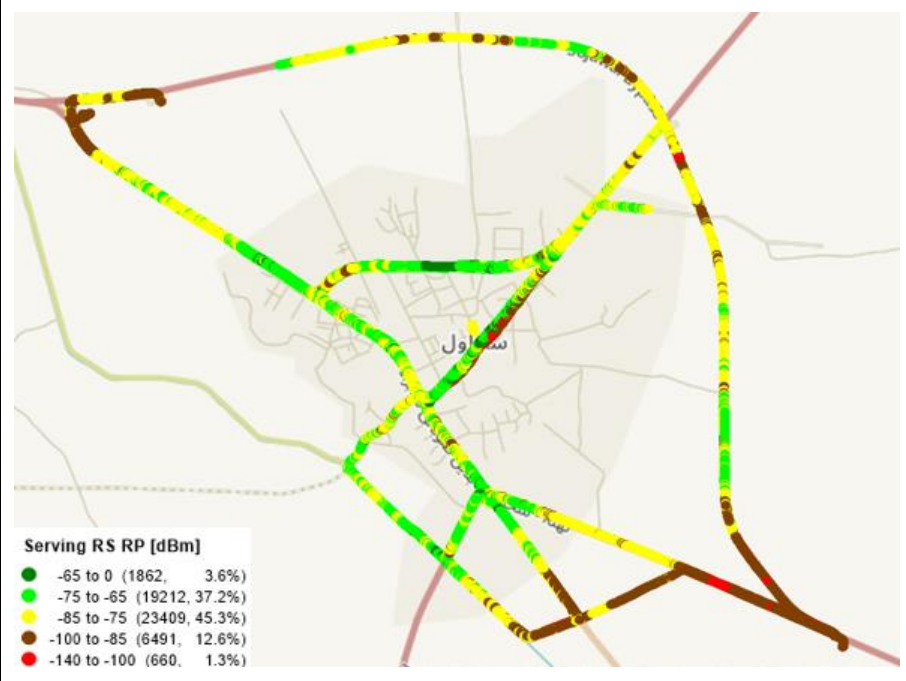
TELENOR AUTOMODE NETWORK COVERAGE – SUJAWAL



UFONE AUTOMODE NETWORK COVERAGE – SUJAWAL

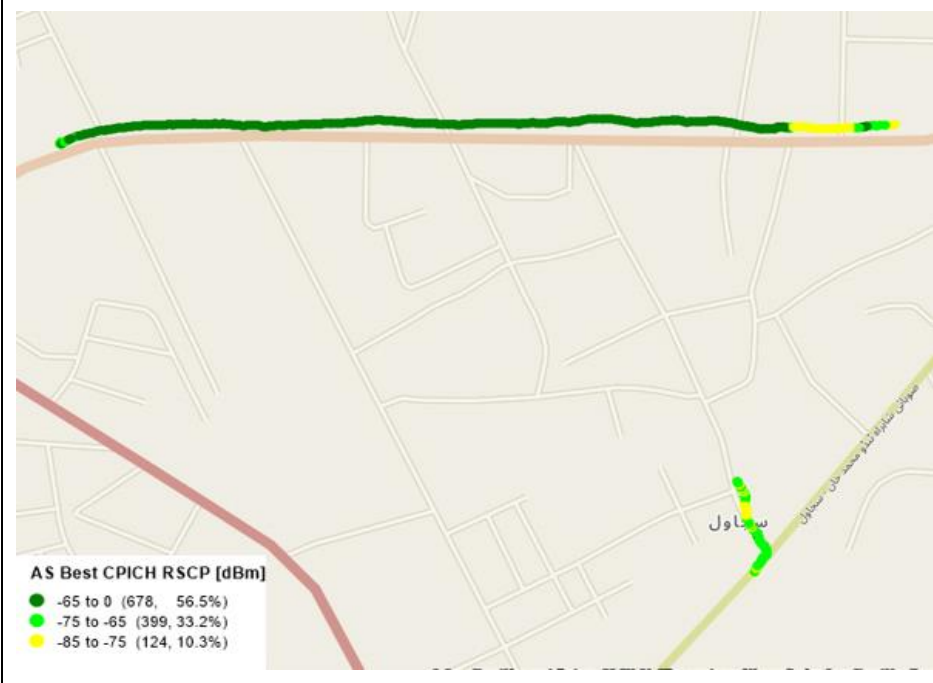


ZONG AUTOMODE NETWORK COVERAGE – SUJAWAL



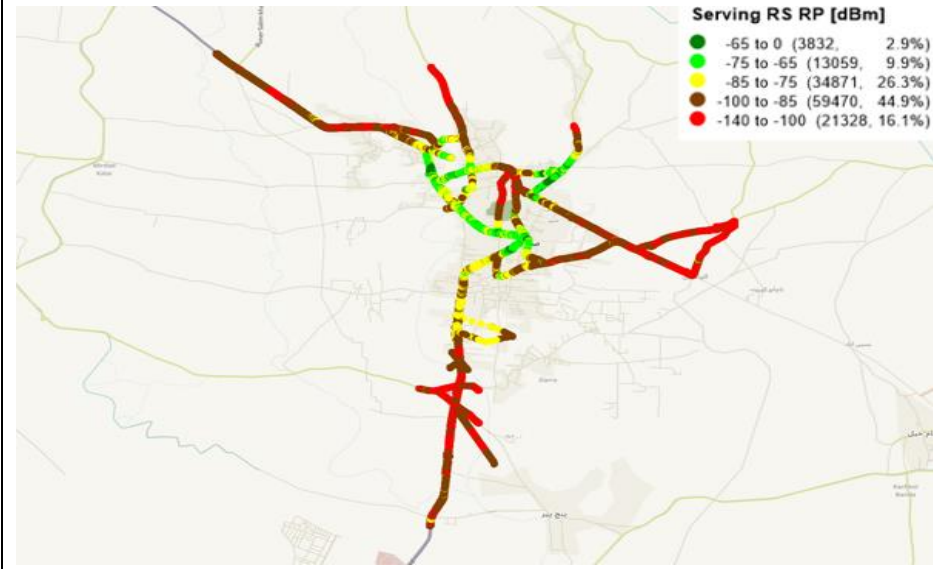
AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

ZONG 3G AUTOMODE NETWORK COVERAGE – SUJAWAL

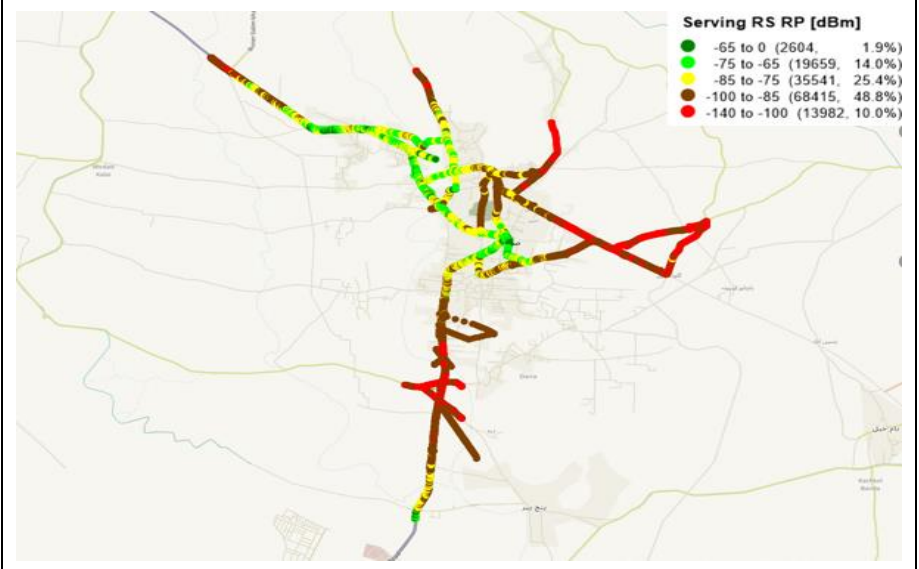


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

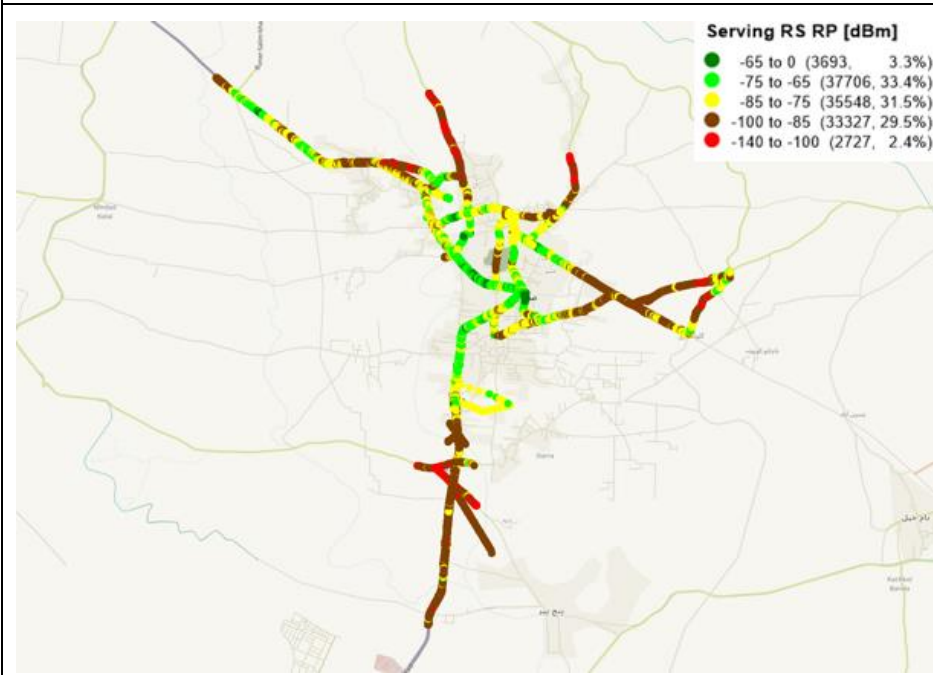
JAZZ AUTOMODE NETWORK COVERAGE – SWABI



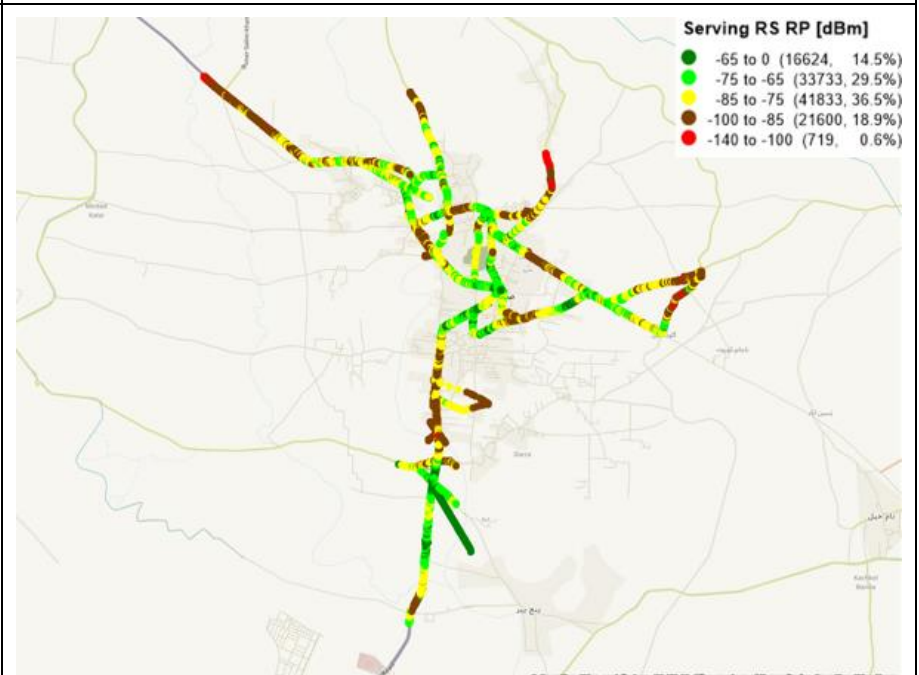
TELENOR AUTOMODE NETWORK COVERAGE – SWABI



UFONE AUTOMODE NETWORK COVERAGE – SWABI



ZONG AUTOMODE NETWORK COVERAGE – SWABI

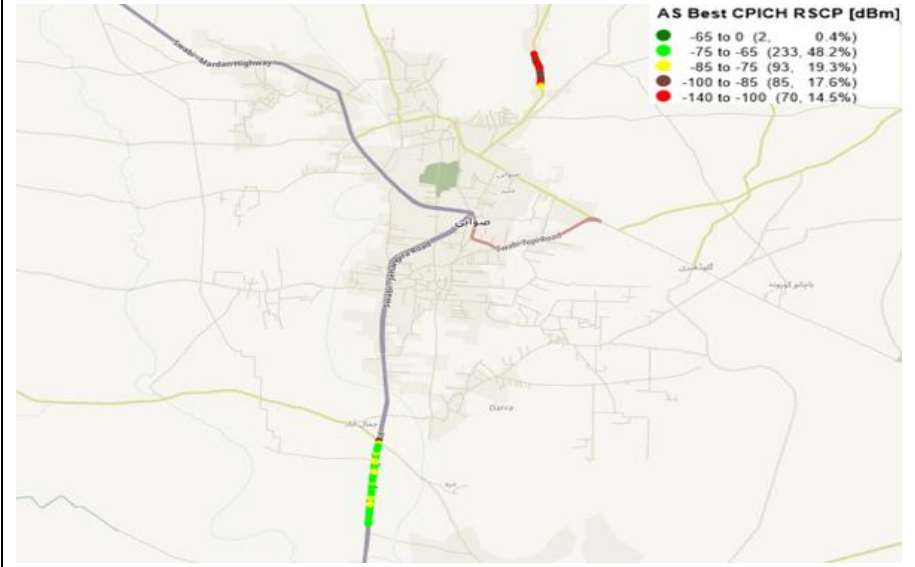


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

UFONE 3G AUTOMODE NETWORK COVERAGE – SWABI

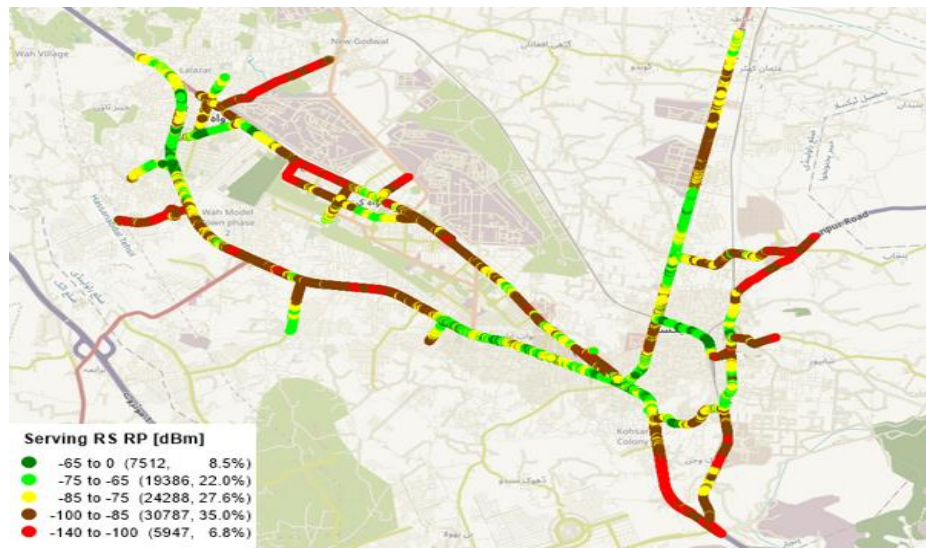


TELENOR 3G AUTOMODE NETWORK COVERAGE – SWABI

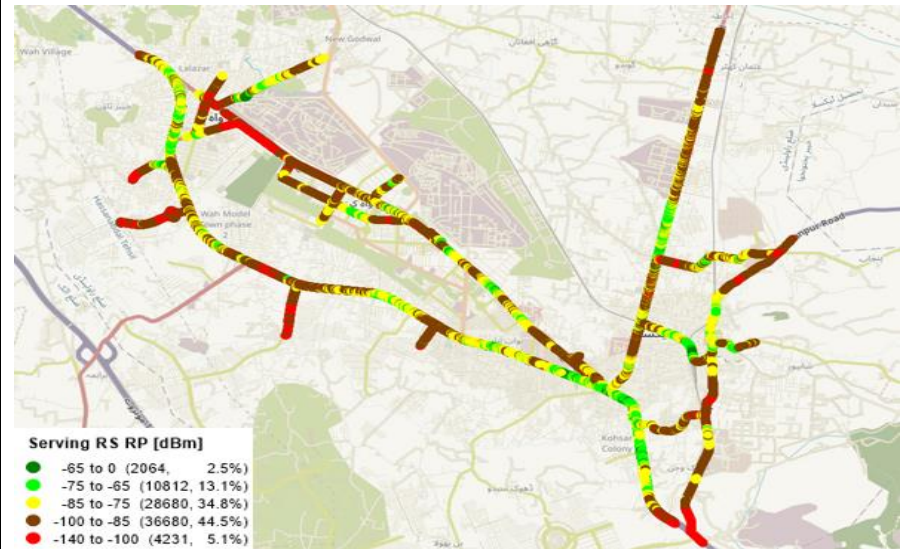


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

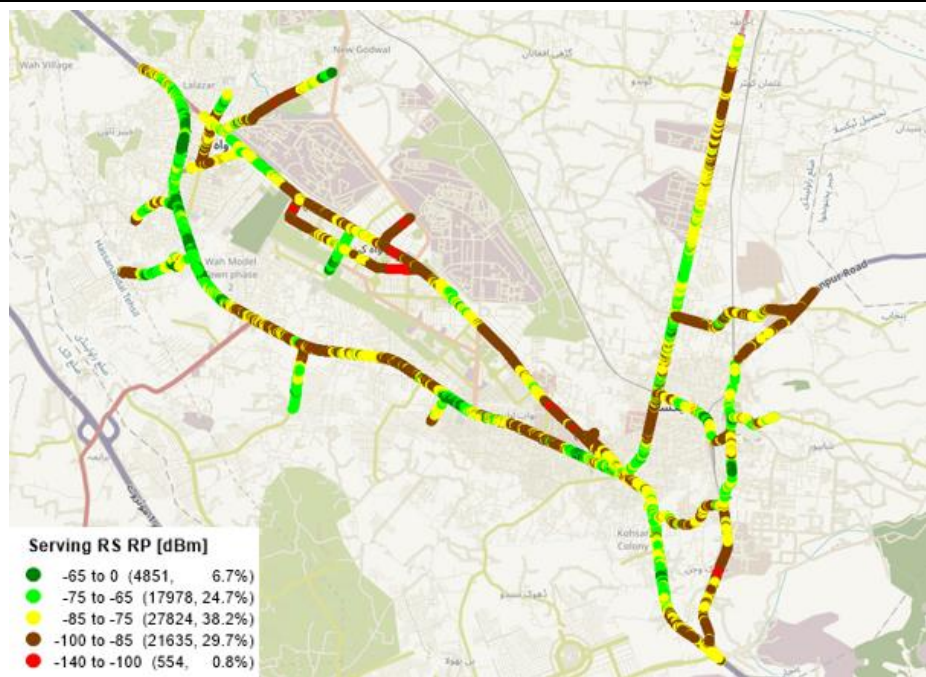
JAZZ NETWORK COVERAGE – TAXILA & WAH CANTT



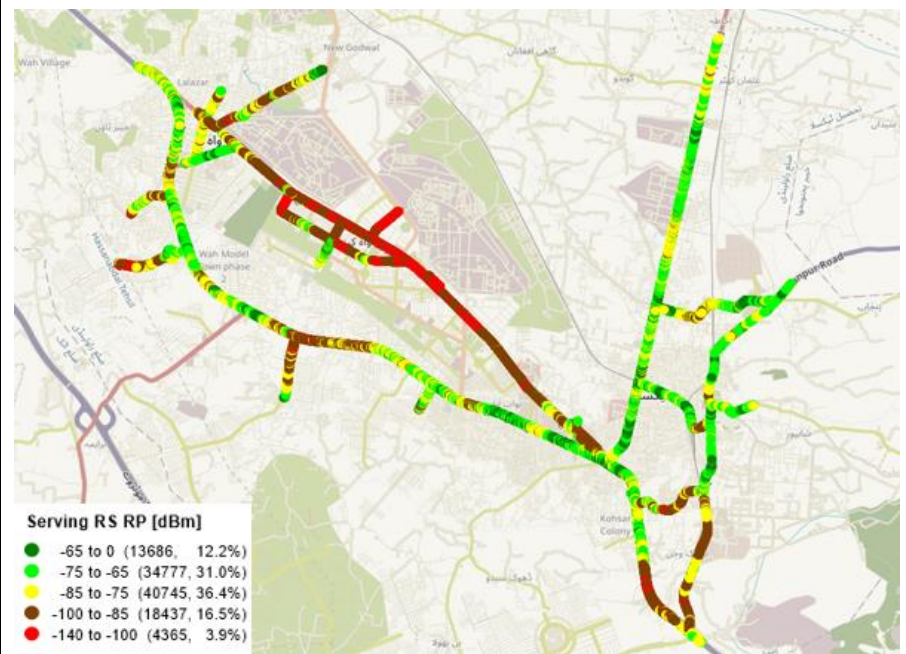
TELENOR NETWORK COVERAGE – TAXILA & WAH CANTT



UFONE NETWORK COVERAGE – TAXILA & WAH CANTT

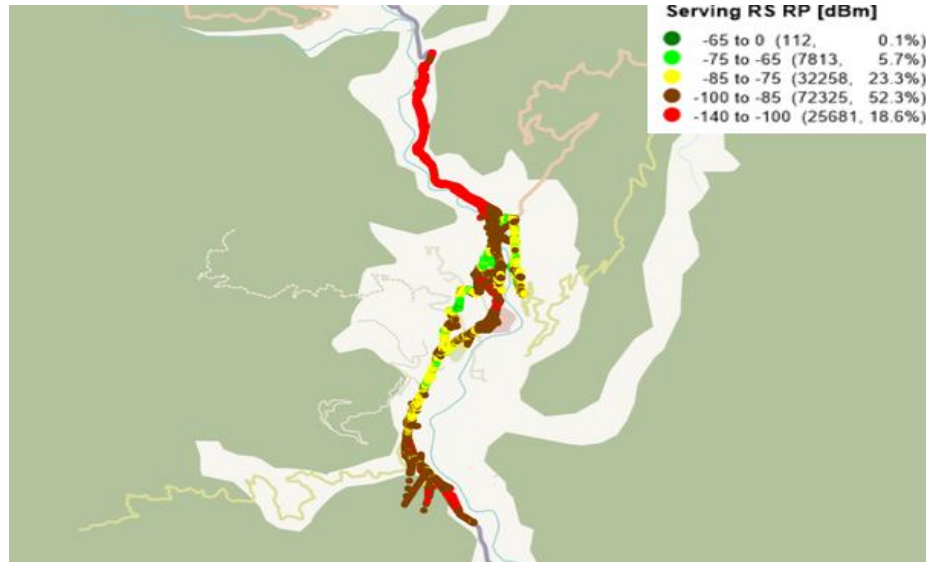


ZONG NETWORK COVERAGE – TAXILA & WAH CANTT

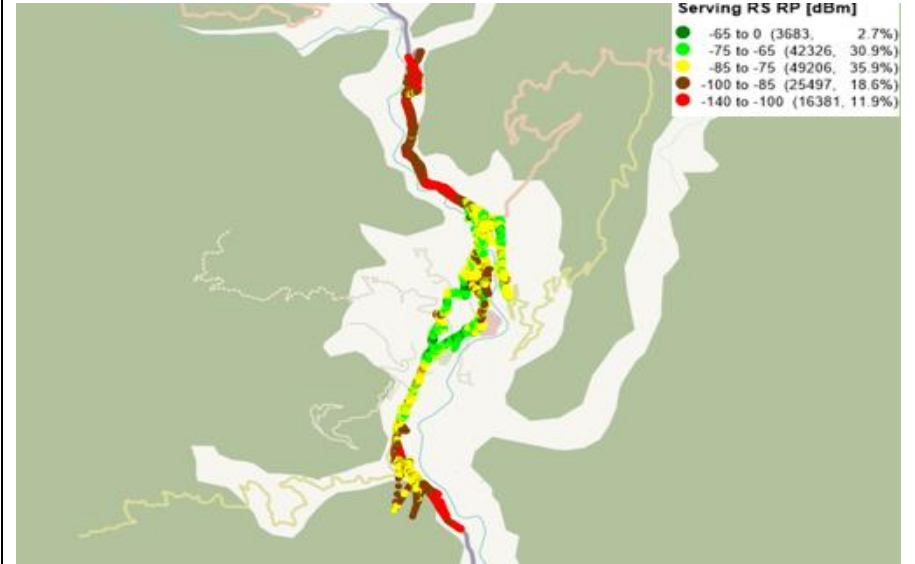


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

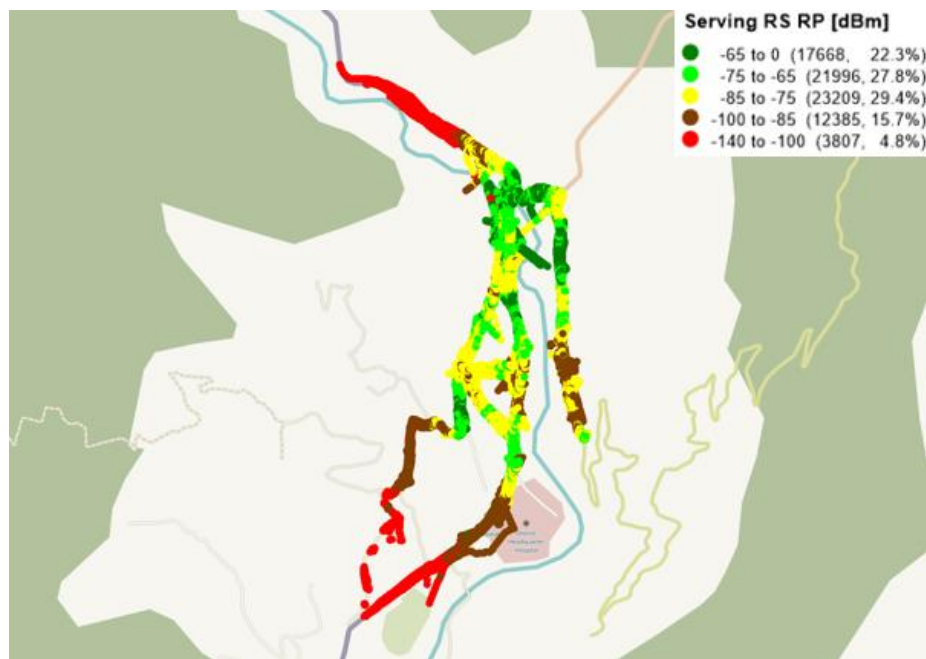
JAZZ AUTOMODE NETWORK COVERAGE – UPPER DIR



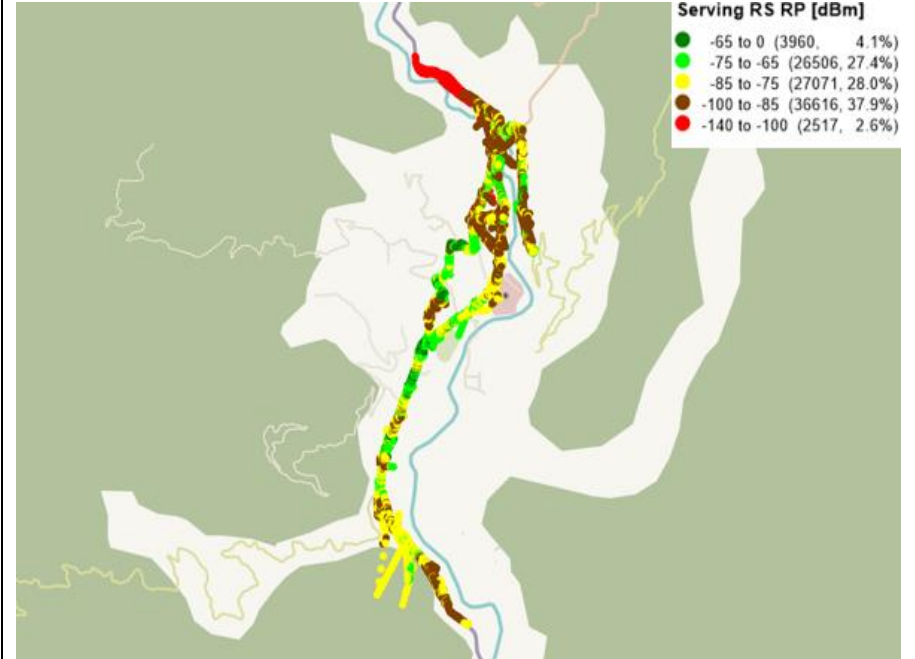
TELENOR AUTOMODE NETWORK COVERAGE – UPPER DIR



UFONE AUTOMODE NETWORK COVERAGE – UPPER DIR

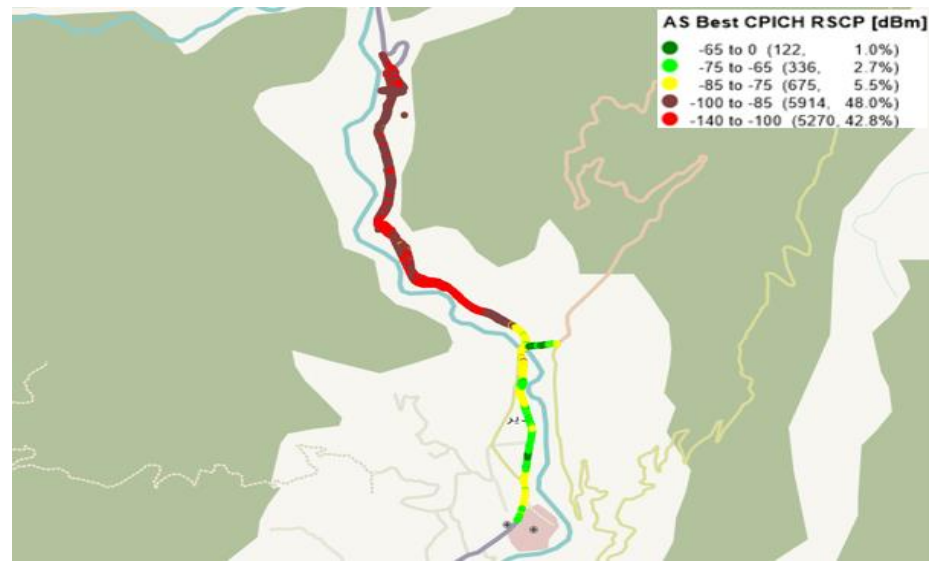


ZONG AUTOMODE NETWORK COVERAGE – UPPER DIR

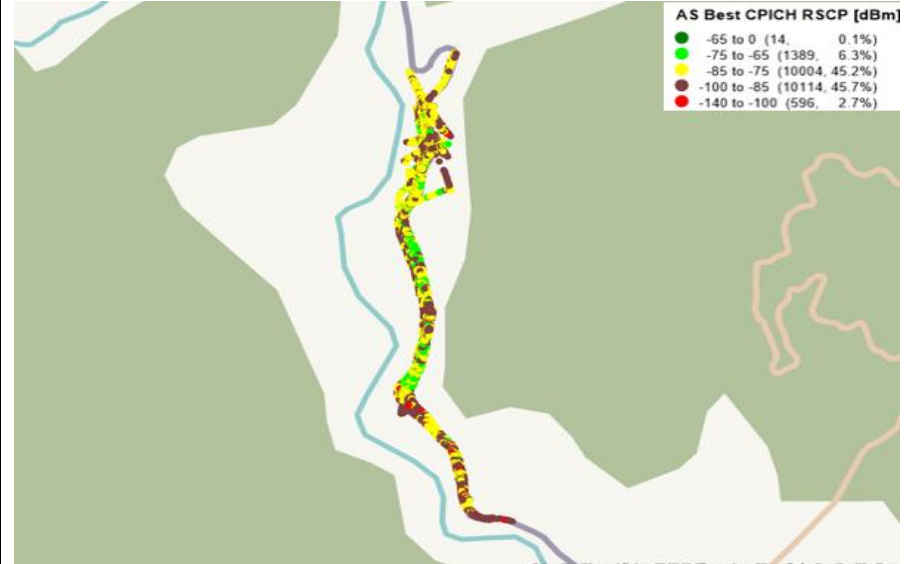


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

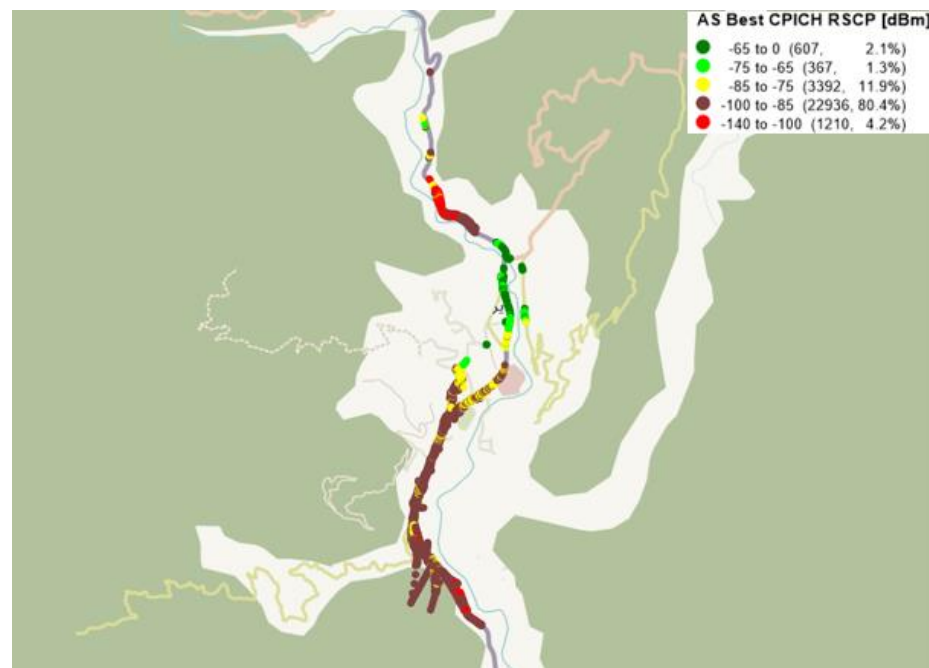
JAZZ 3G AUTOMODE NETWORK COVERAGE – UPPER DIR



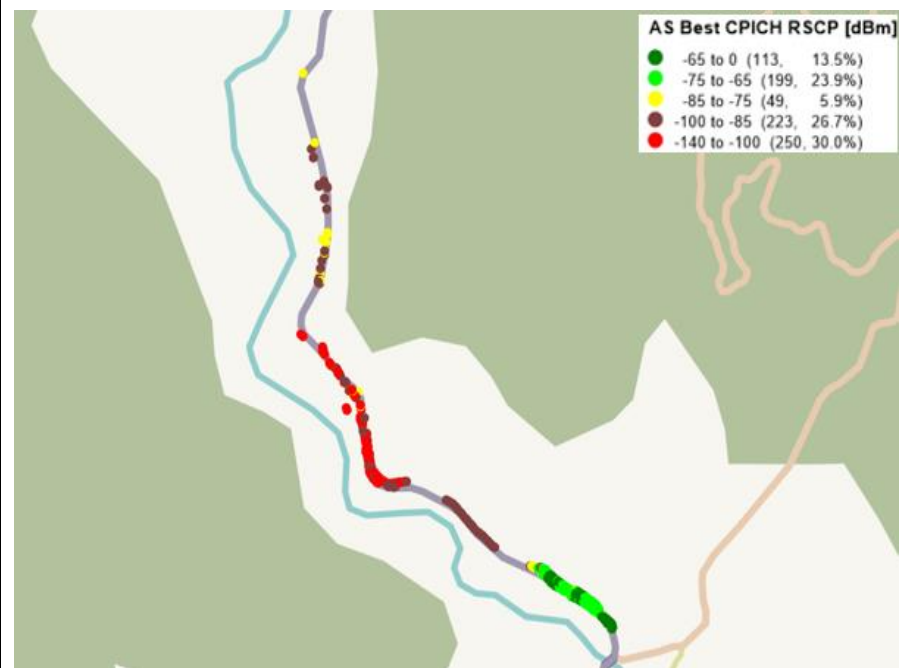
TELENOR 3G AUTOMODE NETWORK COVERAGE – UPPER DIR



UFONE 3GAUTOMODE NETWORK COVERAGE – UPPER DIR



ZONG 3G AUTOMODE NETWORK COVERAGE – UPPER DIR

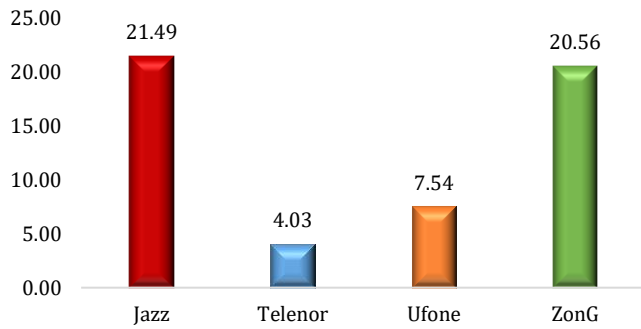


Annex -A1 (Data QoS Results)

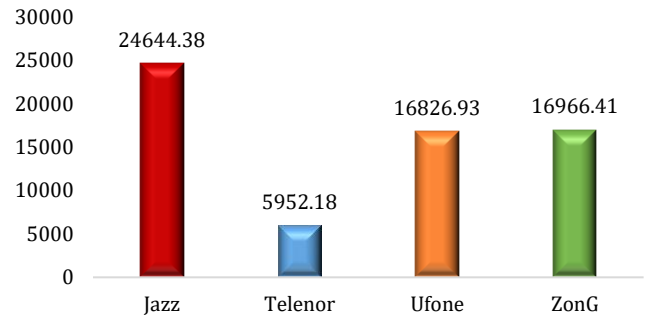
AUTOMODE

QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – ABBOTTABAD

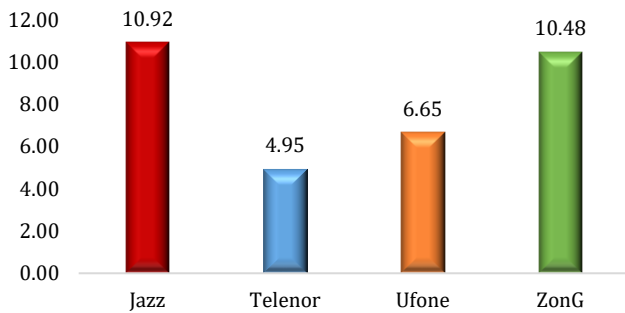
**User Data Throughput Download - Fixed Duration
> 3 Mbps**



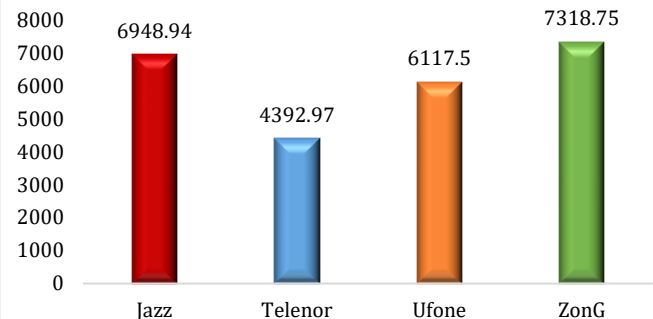
**User Data Throughput Upload - Fixed Duration
> 768 Kbps**



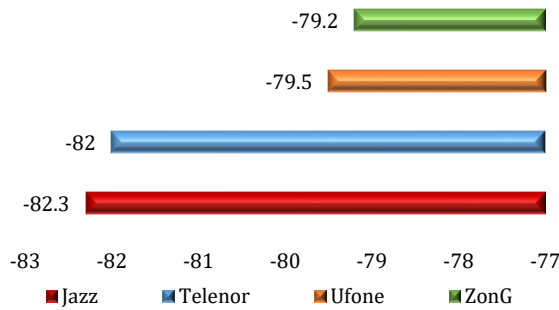
**User Data Throughput Download - Fixed Size
> 3 Mbps**



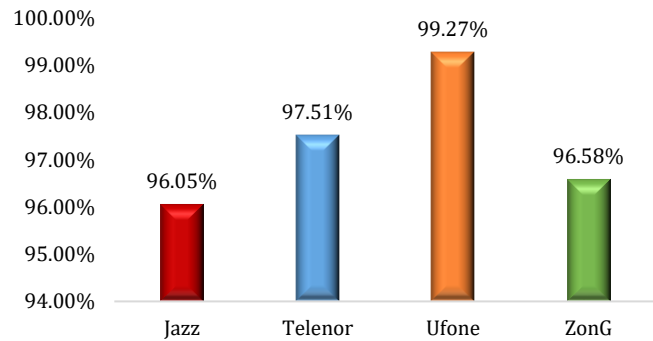
**User Data Throughput Upload - Fixed Size
> 768 Kbps**



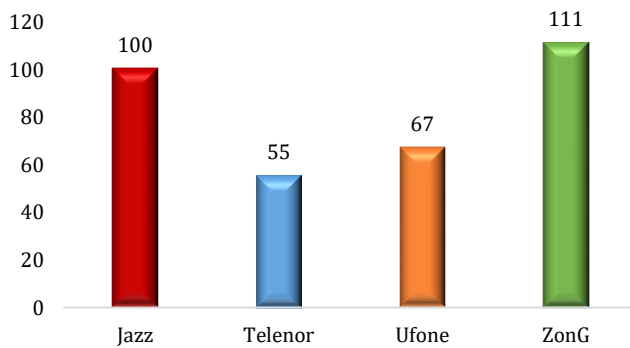
Signal Strength (RSRP) > -100dBm



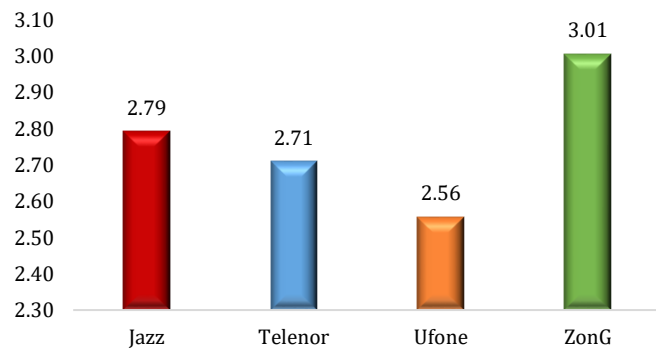
Signal Strength (RSRP) Confidencel Level > 90%



Latency < 75 ms

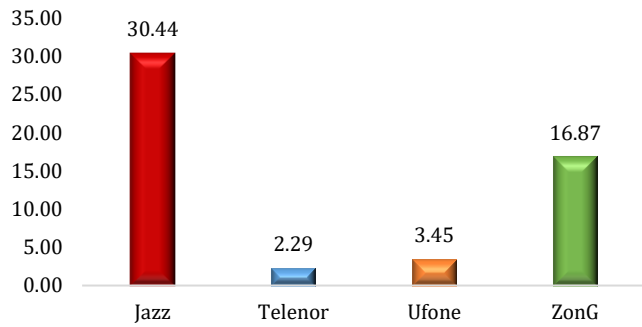


Webpage Loading Time < 5 Seconds

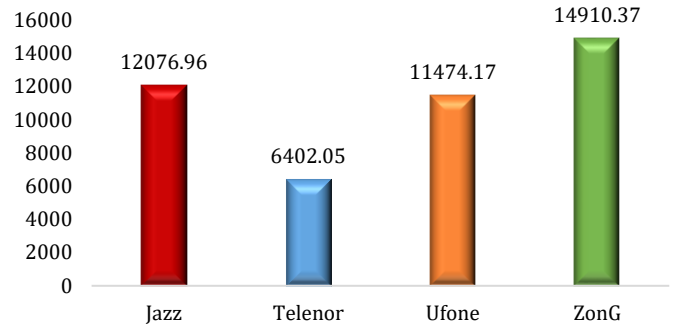


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – BUNER

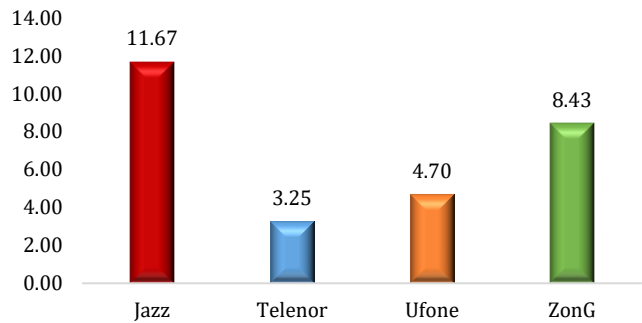
User Data Throughput Download - Fixed Duration > 3 Mbps



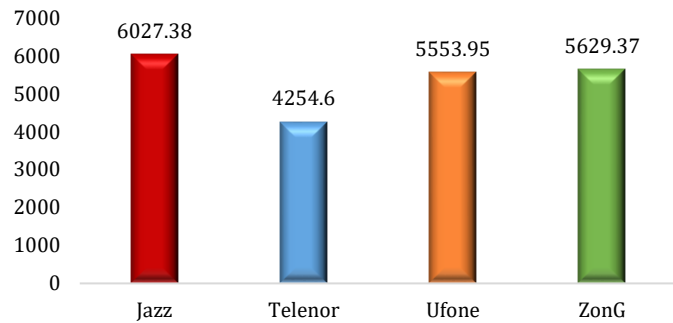
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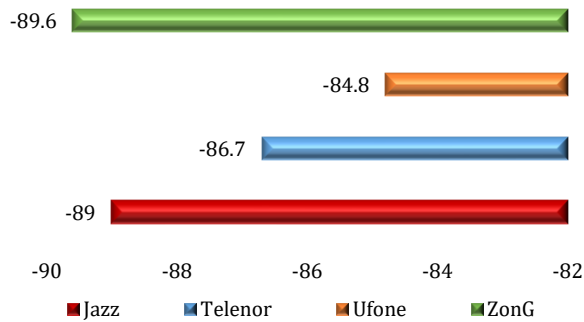
User Data Throughput Download - Fixed Size > 3 Mbps



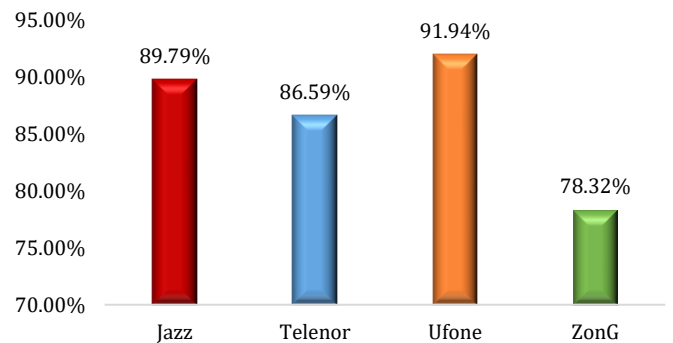
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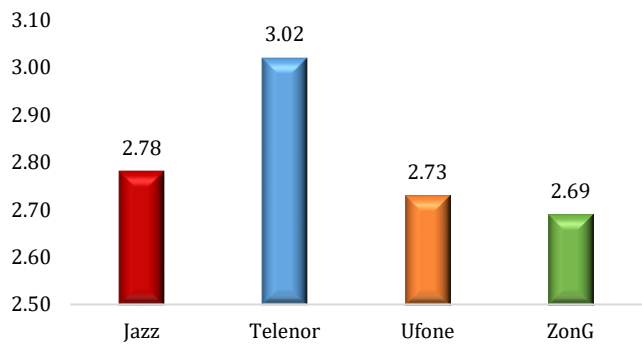
Signal Strength (RSRP) > -100dBm



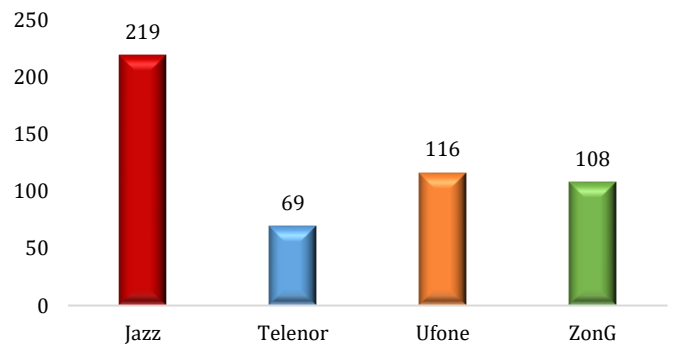
Signal Strength (RSRP) Confidencel Level > 90%



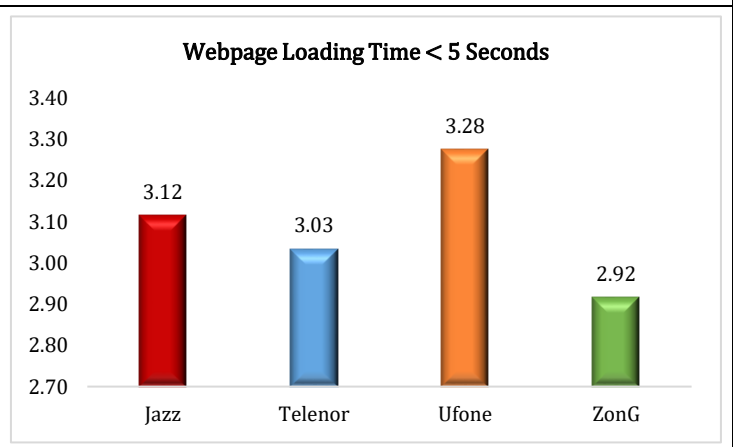
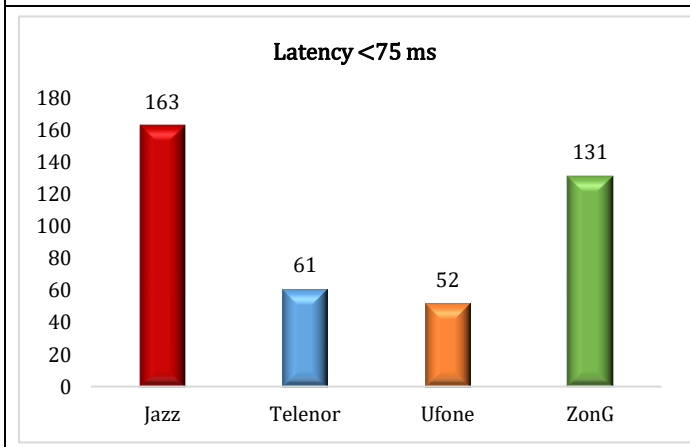
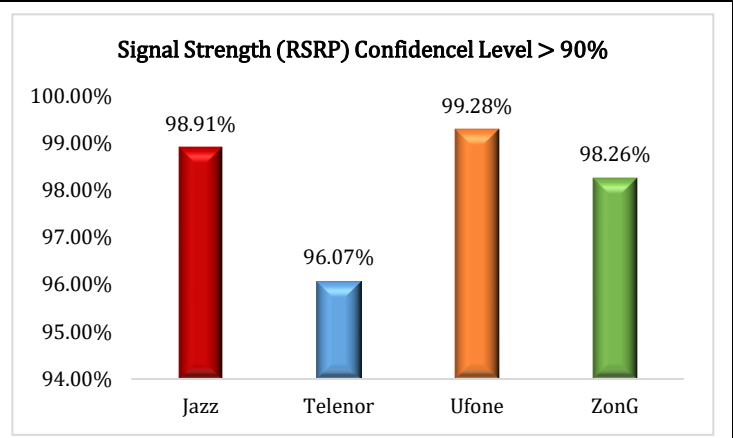
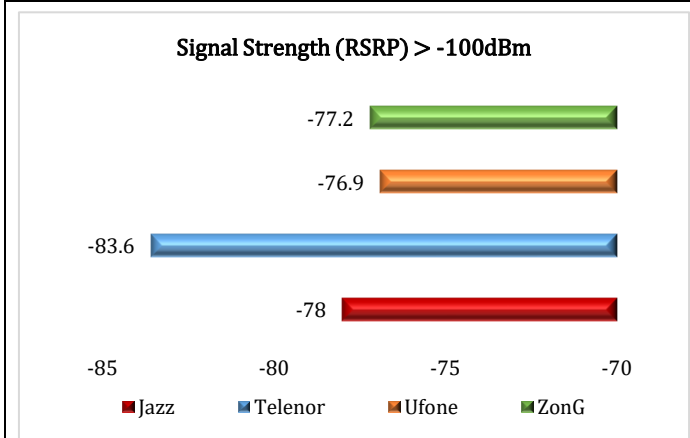
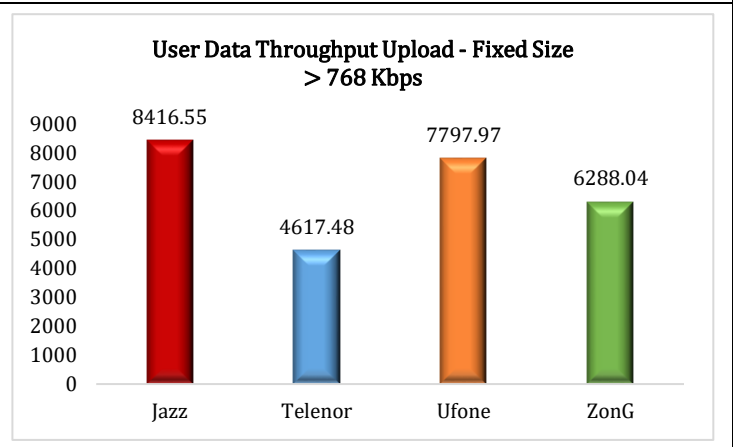
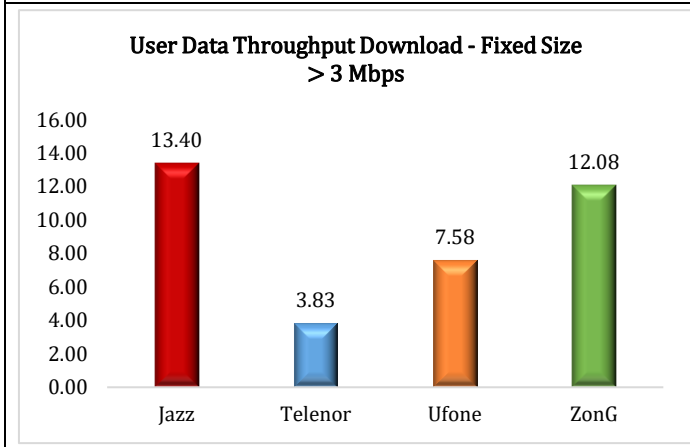
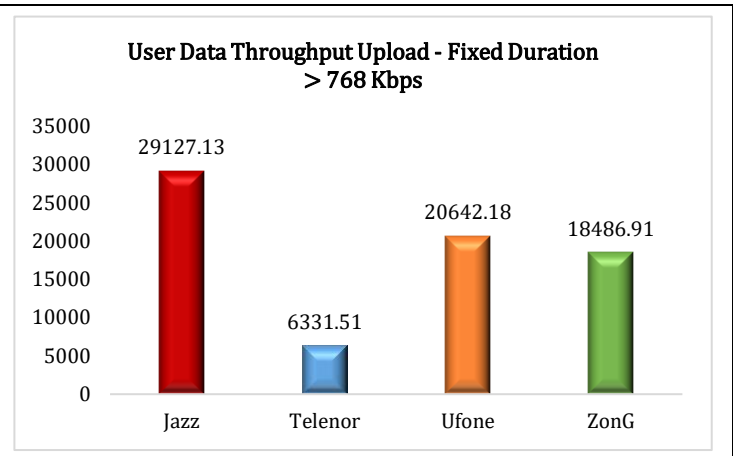
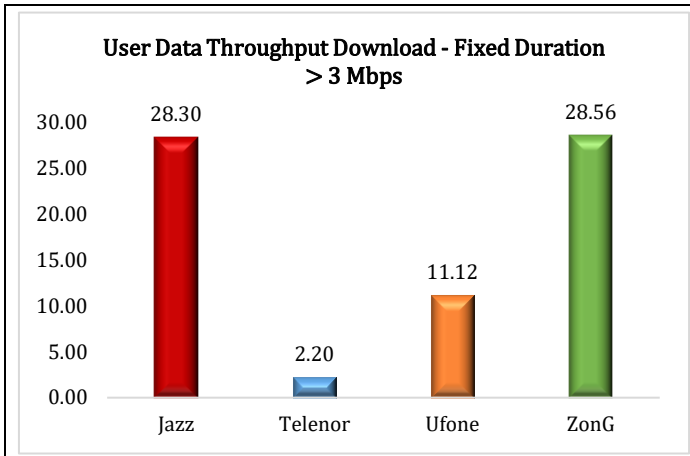
Webpage Loading Time < 5 Seconds



Latency < 75 ms

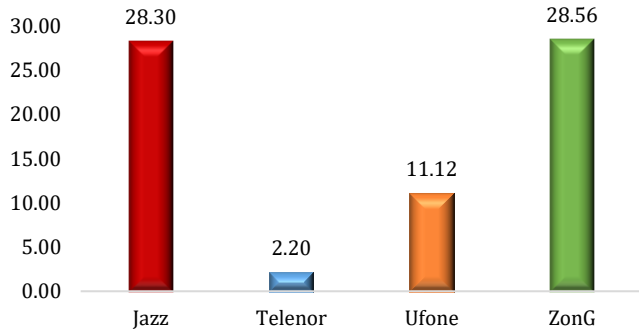


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – GUJAR KHAN

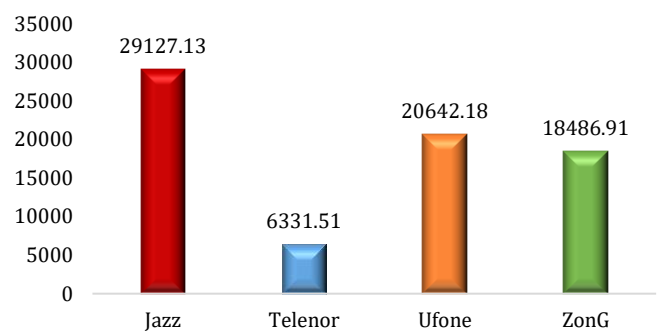


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – JACOBABAD

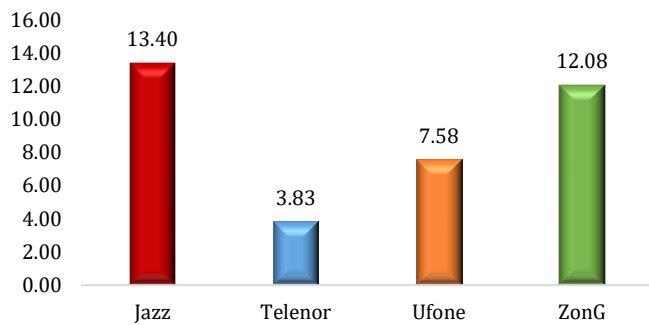
User Data Throughput Download - Fixed Duration > 3 Mbps



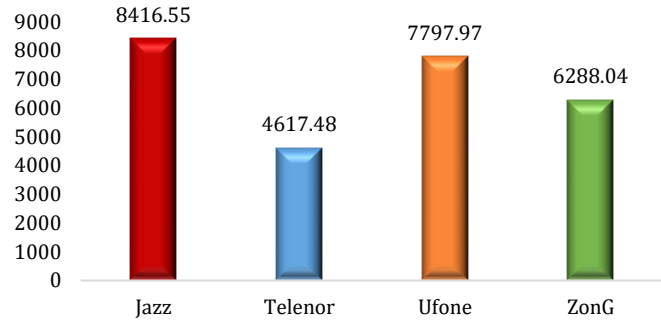
User Data Throughput Upload - Fixed Duration > 768 Kbps



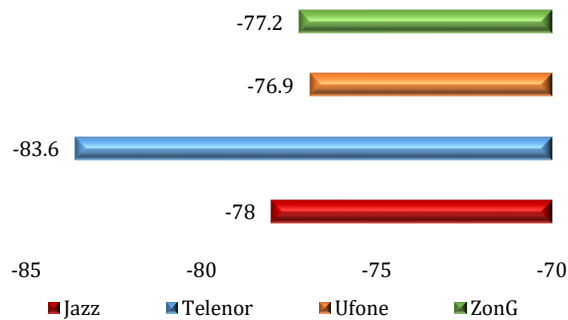
User Data Throughput Download - Fixed Size > 3 Mbps



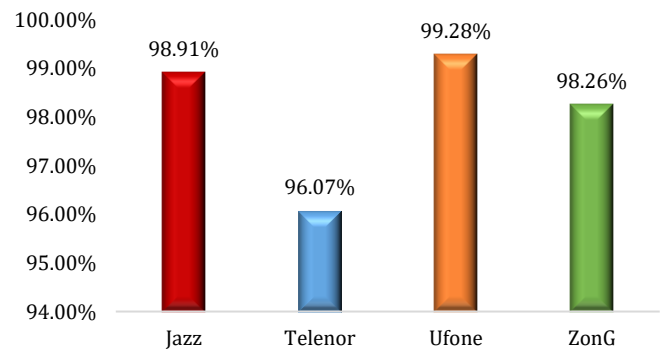
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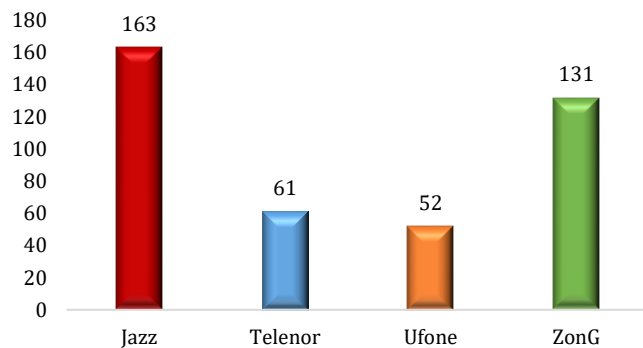
Signal Strength (RSRP) > -100dBm



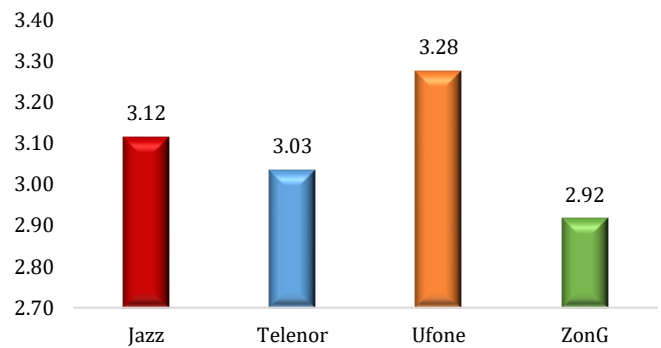
Signal Strength (RSRP) Confidencel Level > 90%



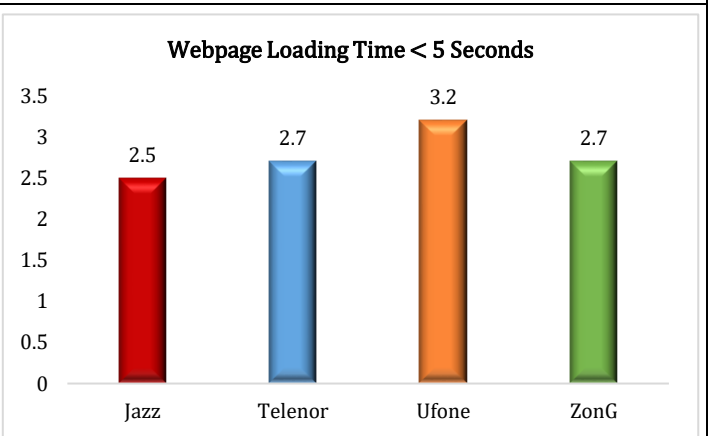
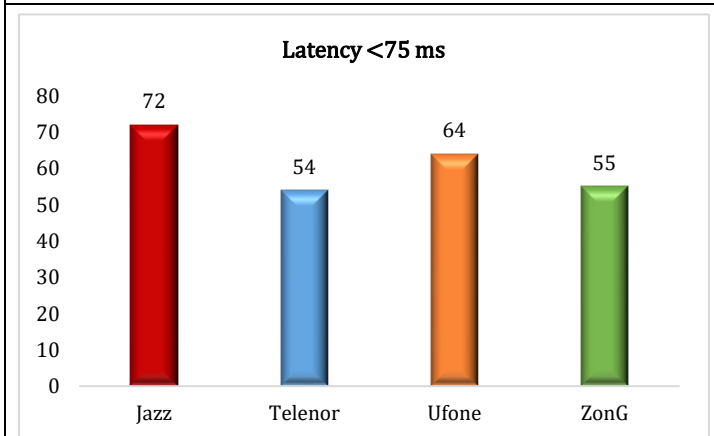
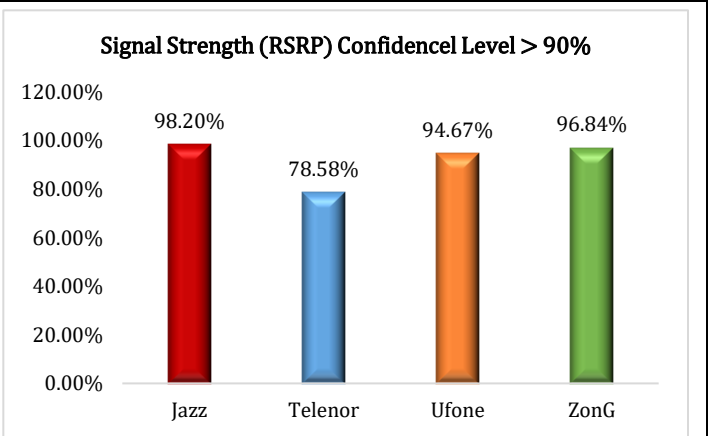
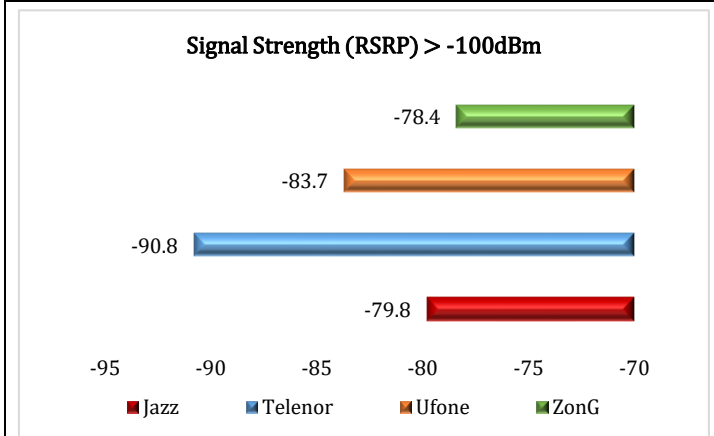
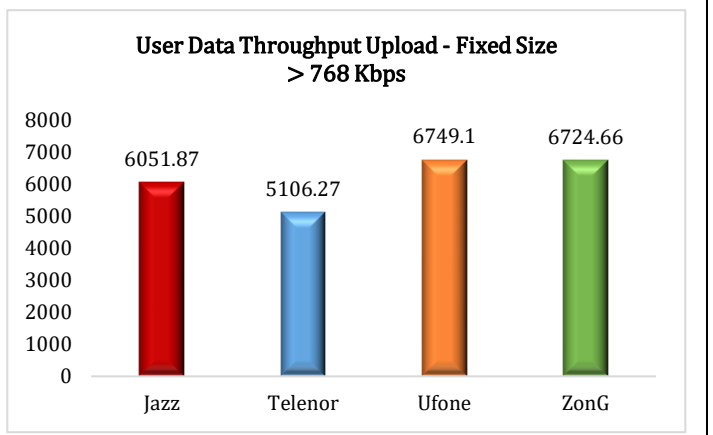
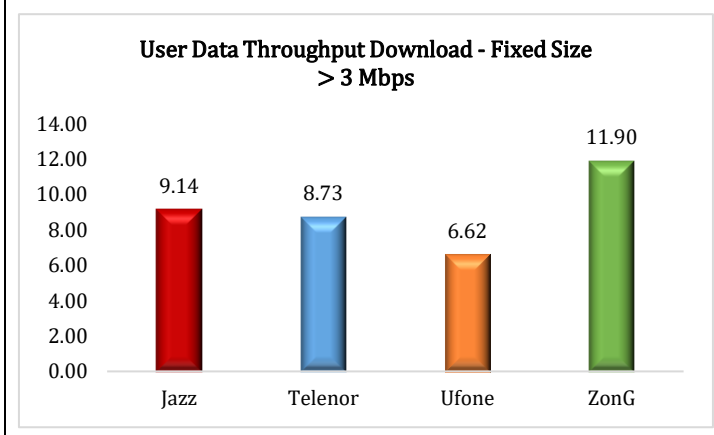
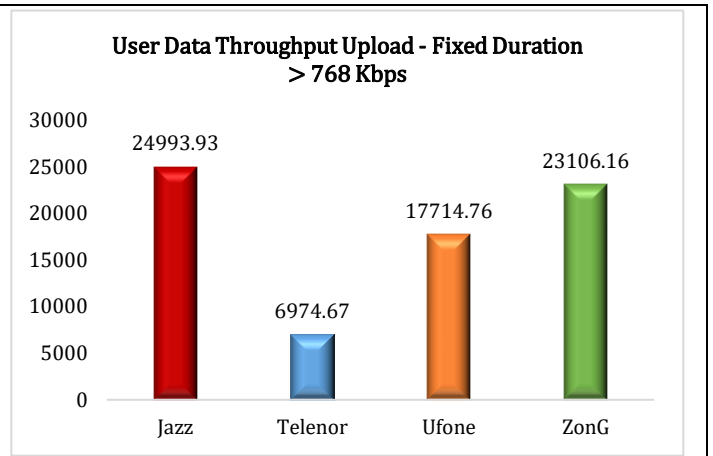
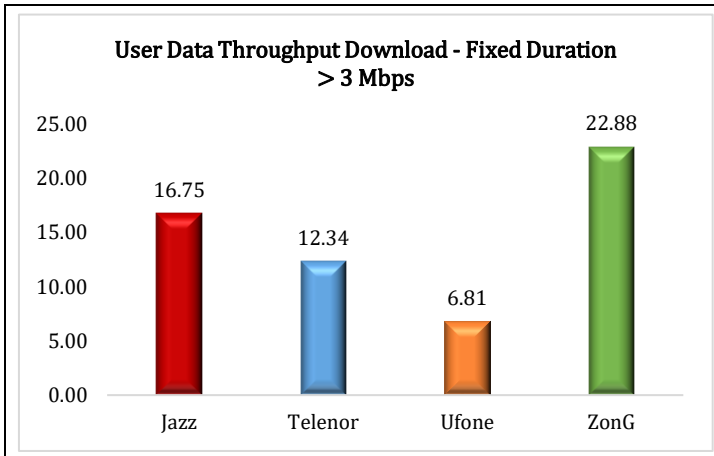
Latency < 75 ms



Webpage Loading Time < 5 Seconds

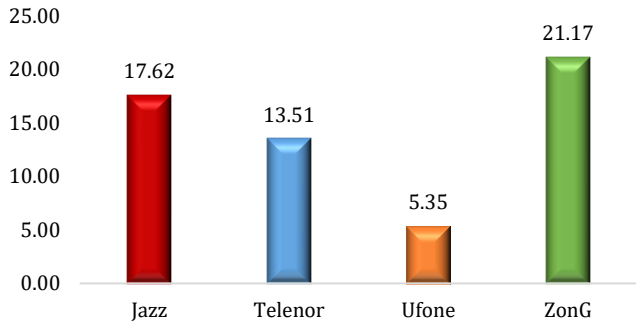


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – KHAIRPUR

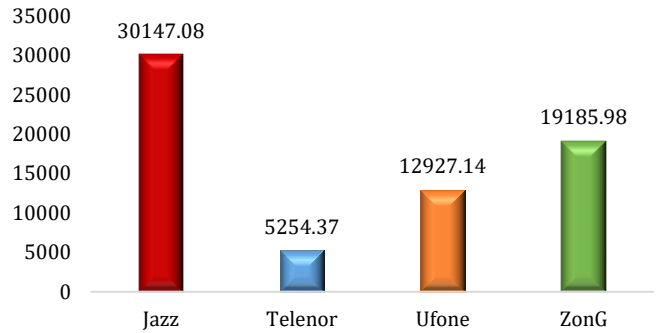


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – KHAROORPACCA

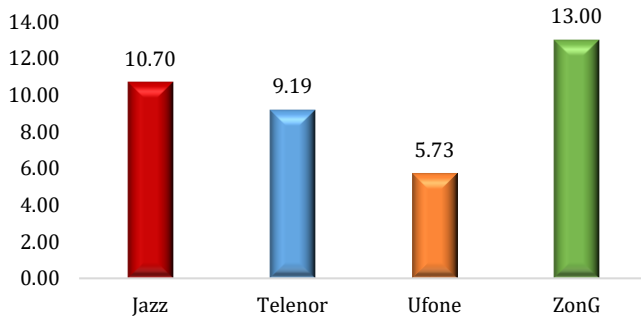
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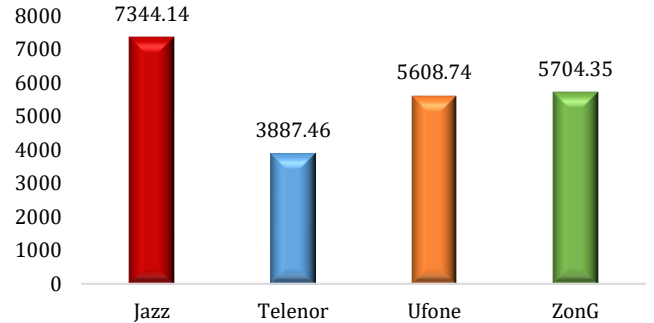
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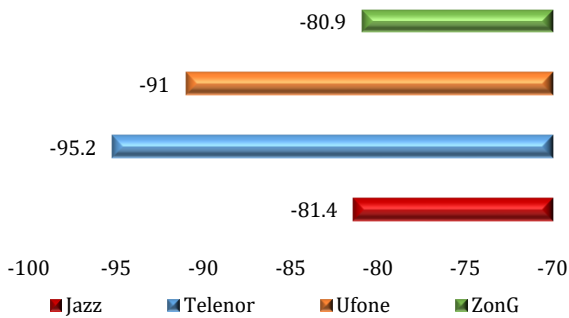
User Data Throughput Download - Fixed Size > 3 Mbps



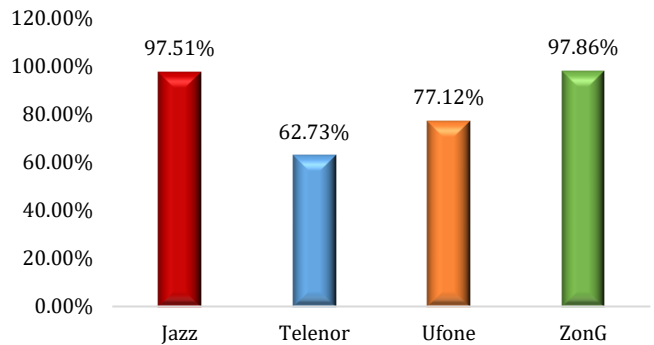
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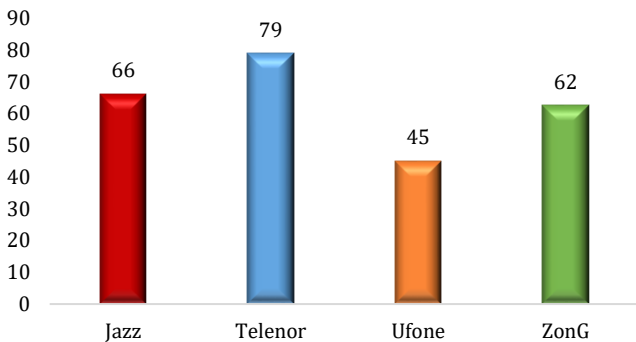
Signal Strength (RSRP) > -100dBm



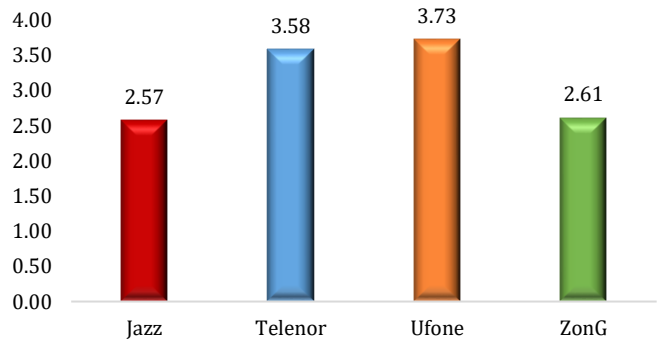
Signal Strength (RSRP) Confidencel Level > 90%



Latency < 75 ms

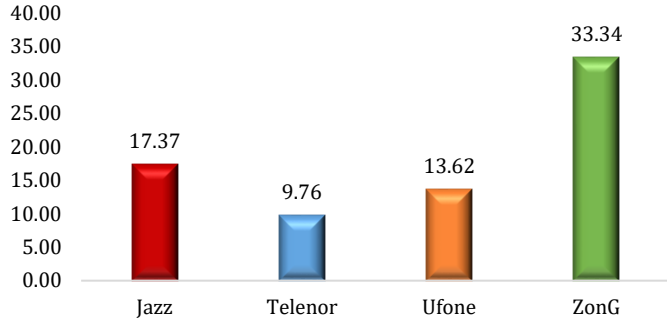


Webpage Loading Time < 5 Seconds

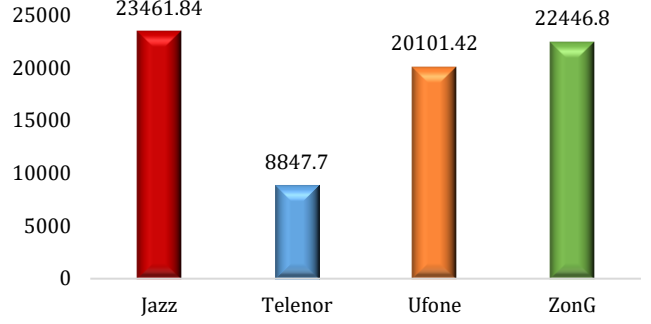


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – LAHORE

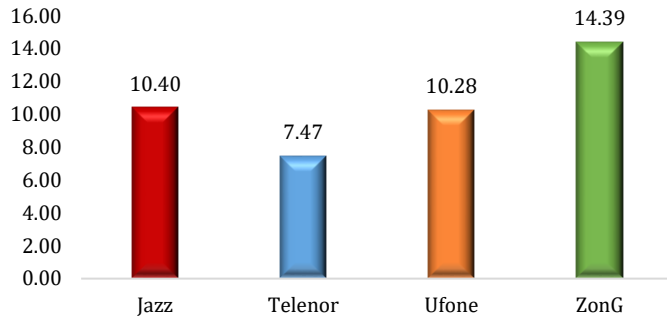
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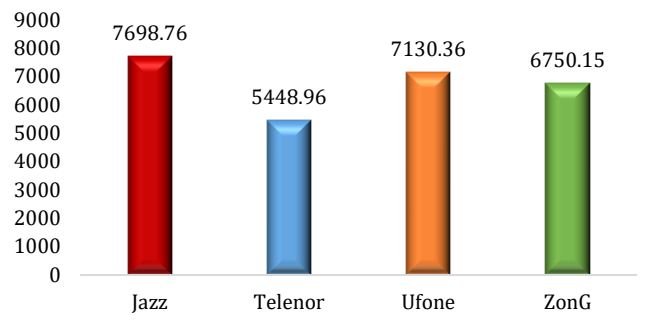
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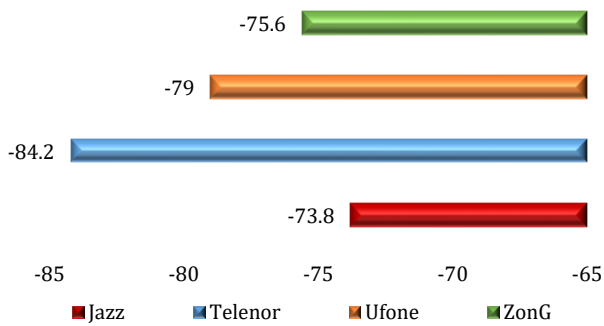
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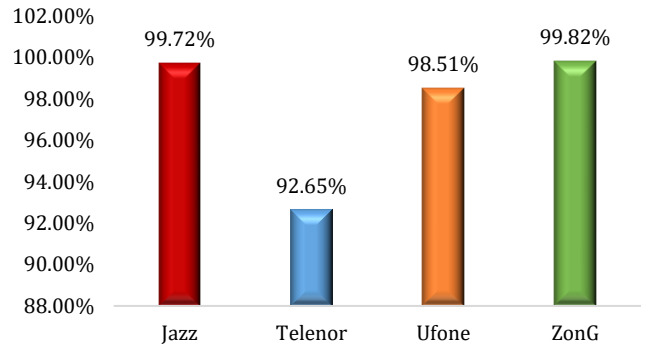
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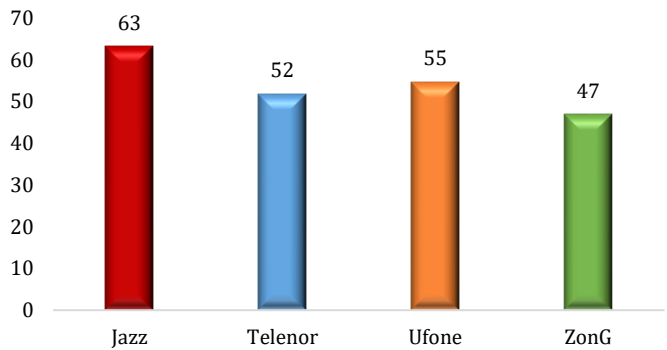
Signal Strength (RSRP) > -100dBm



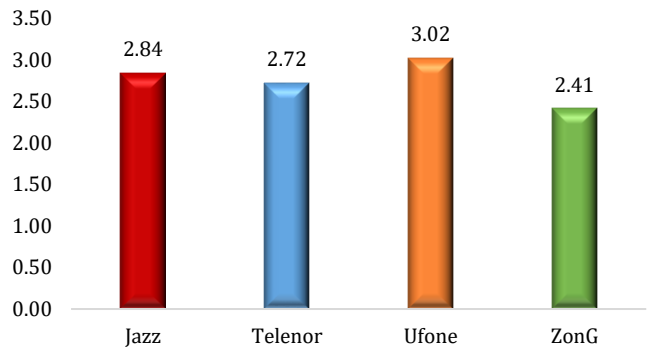
Signal Strength (RSRP) Confidencel Level > 90%



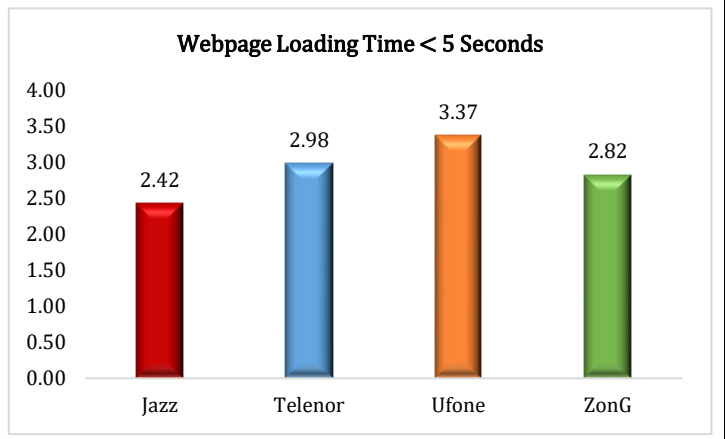
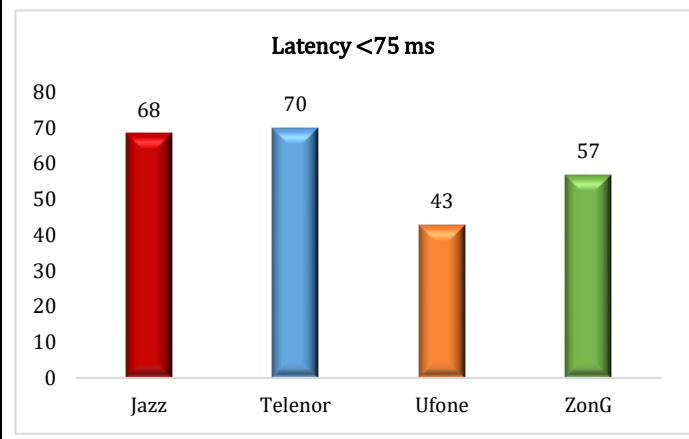
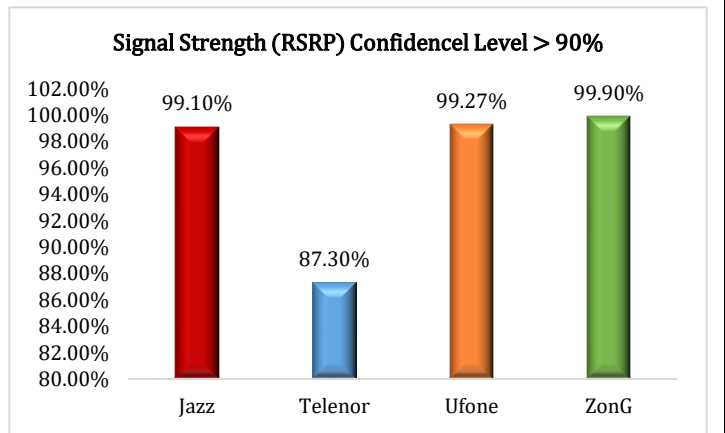
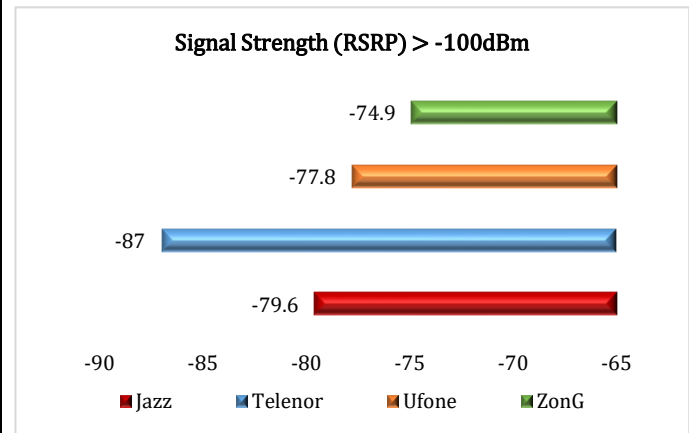
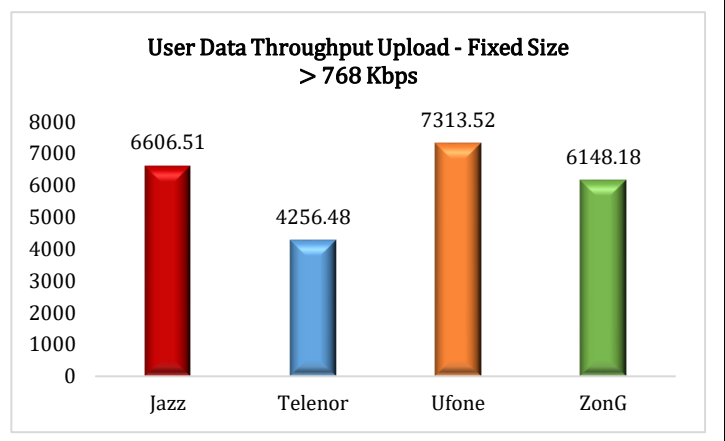
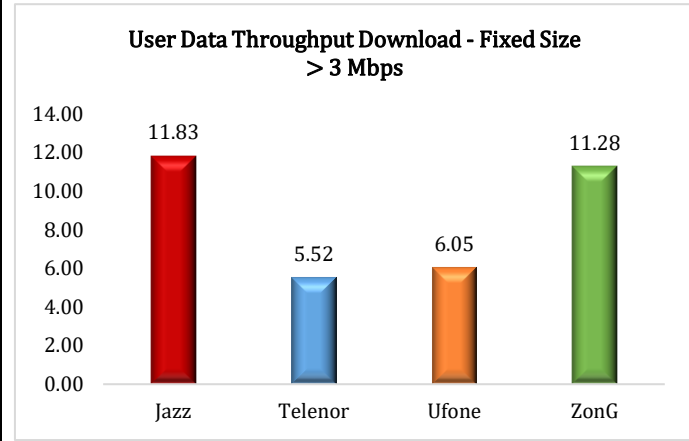
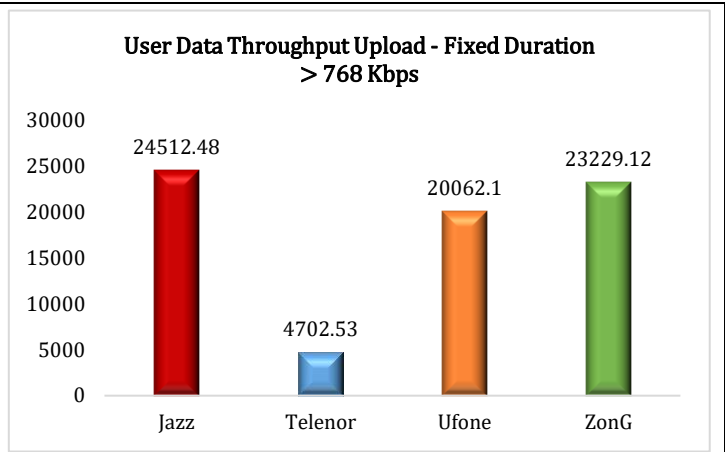
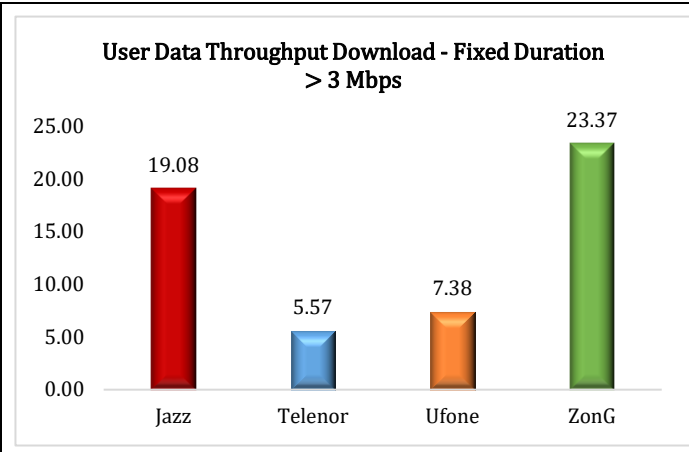
Latency < 75 ms



Webpage Loading Time < 5 Seconds

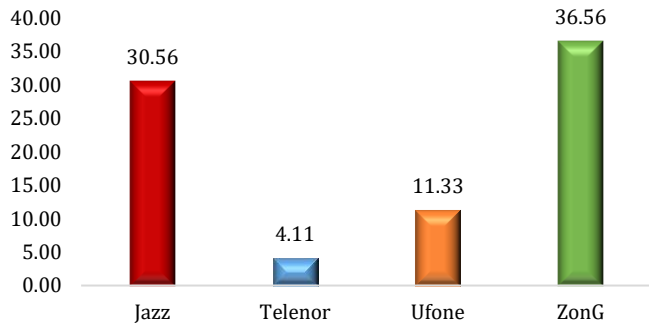


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – LARKANA

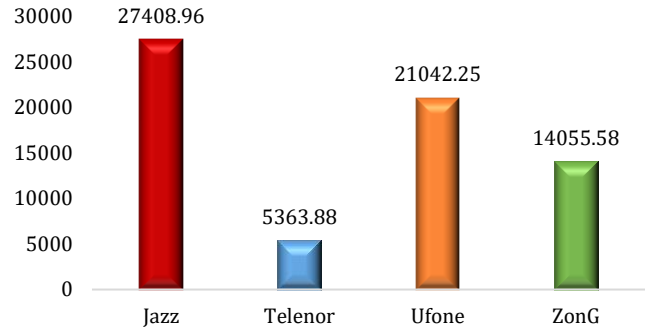


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – MITHI

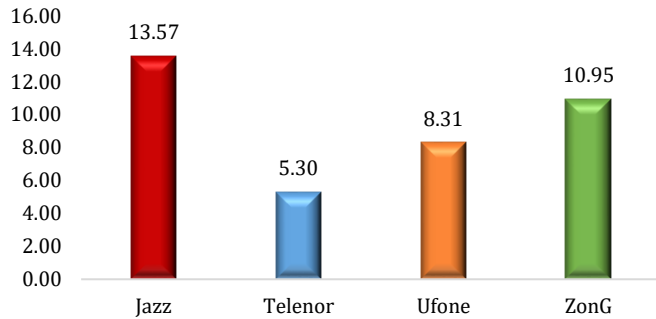
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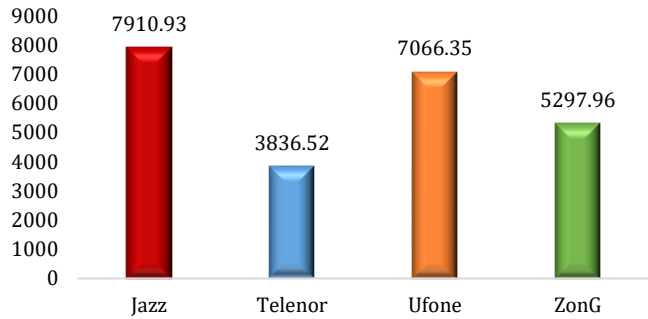
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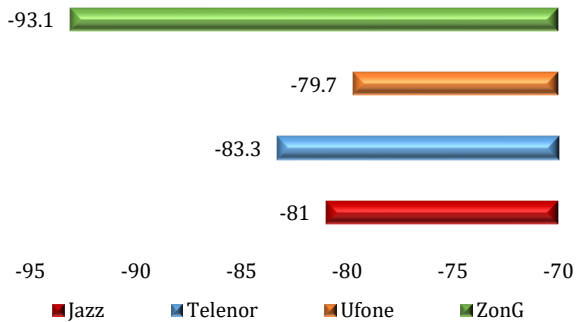
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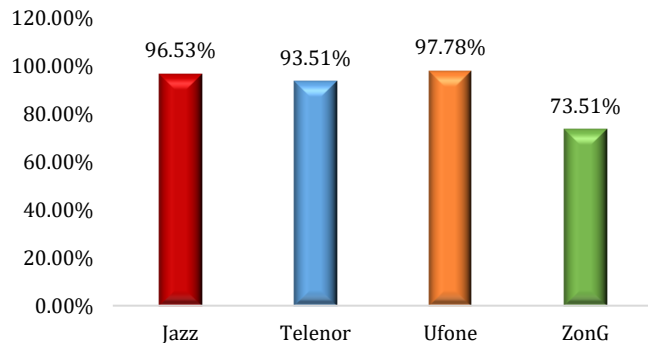
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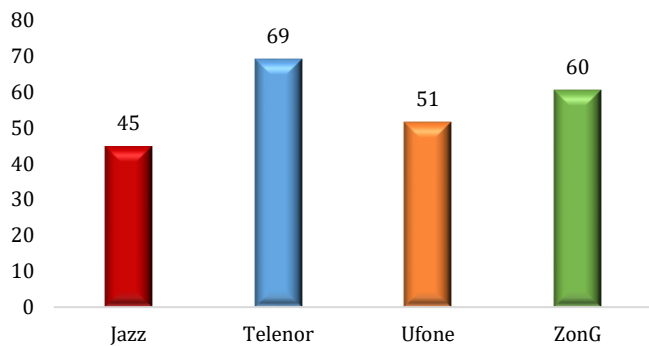
Signal Strength (RSRP) > -100dBm



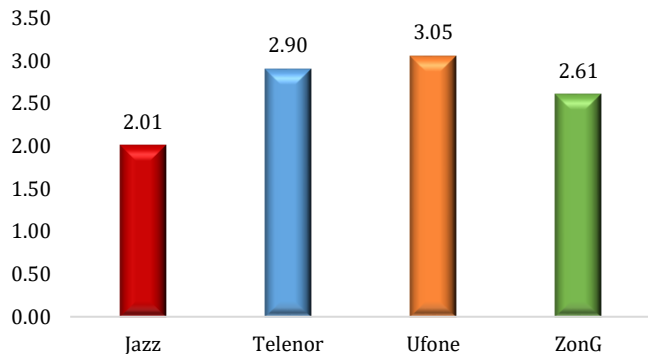
Signal Strength (RSRP) Confidencel Level > 90%



Latency <75 ms

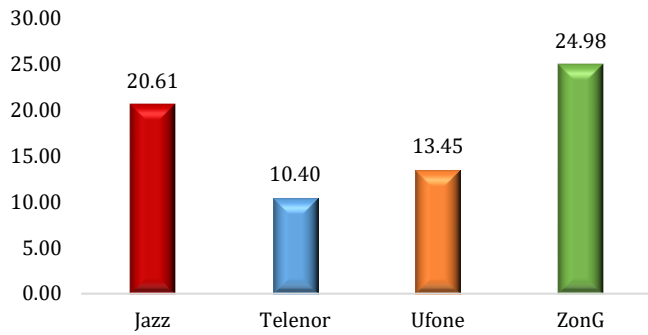


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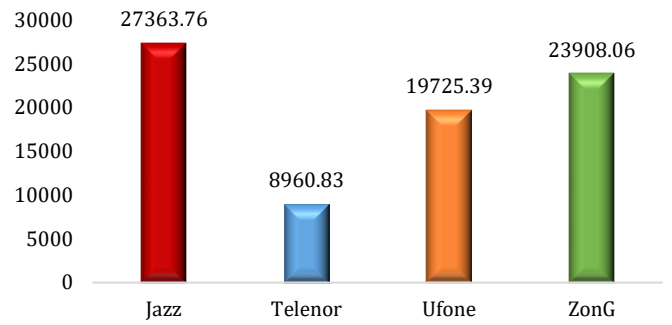


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – MURIDKE

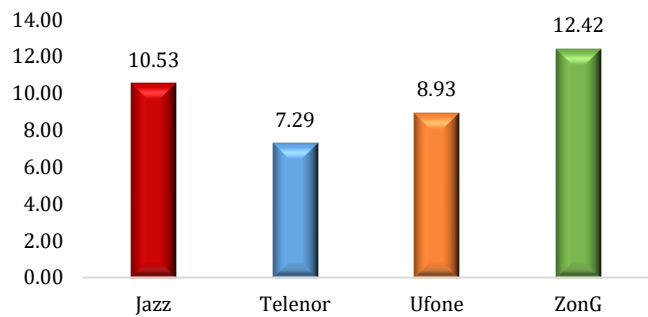
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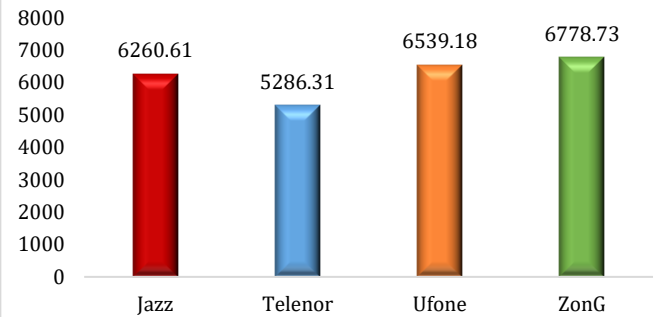
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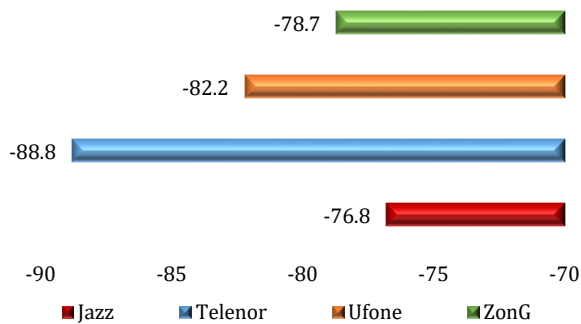
User Data Throughput Download - Fixed Size > 3 Mbps



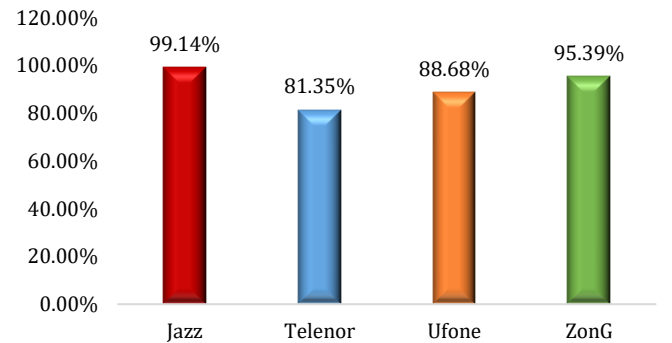
User Data Throughput Upload - Fixed Size > 768 Kbps



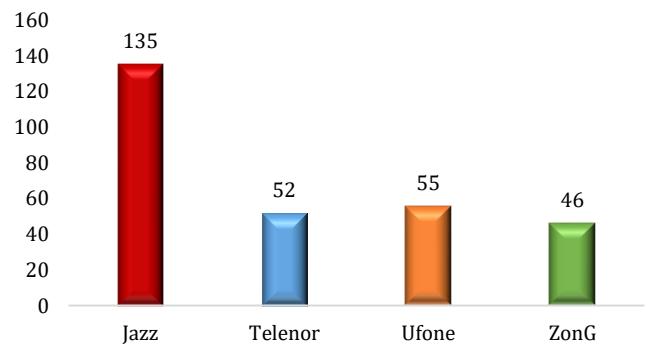
Signal Strength (RSRP) > -100dBm



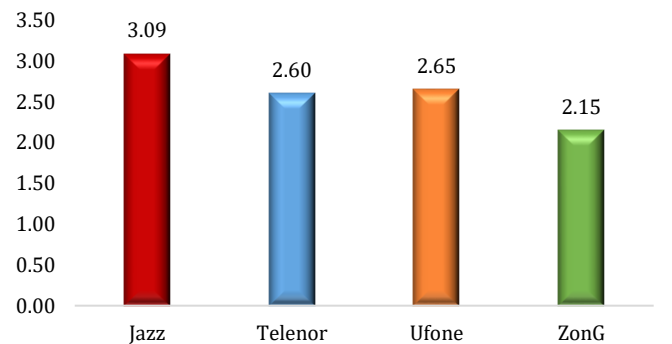
Signal Strength (RSRP) Confidencel Level > 90%



Latency <75 ms

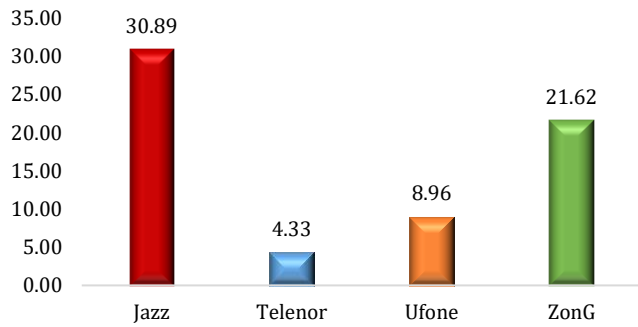


Webpage Loading Time < 5 Seconds

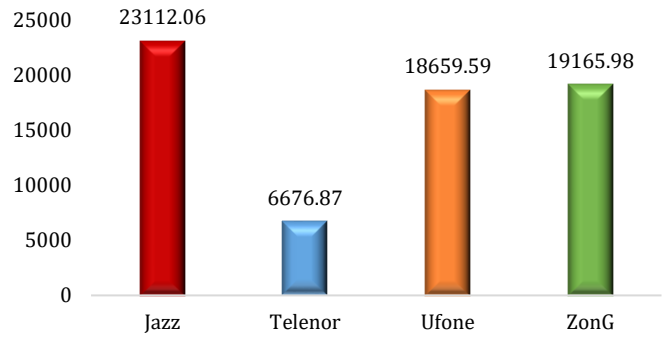


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – RAWALPINDI

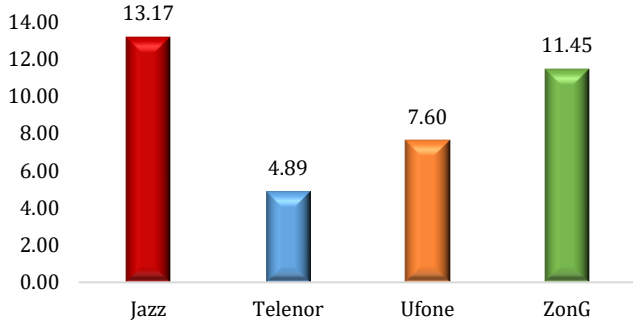
User Data Throughput Download - Fixed Duration > 3 Mbps



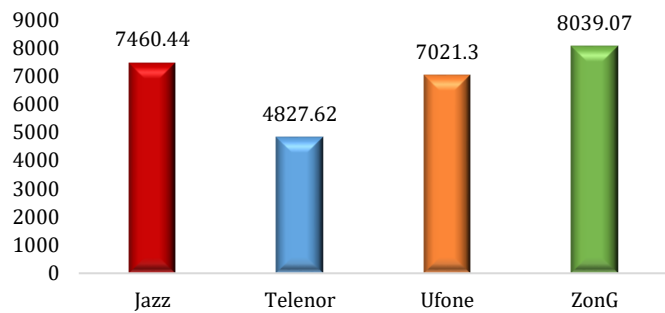
User Data Throughput Upload - Fixed Duration > 768 Kbps



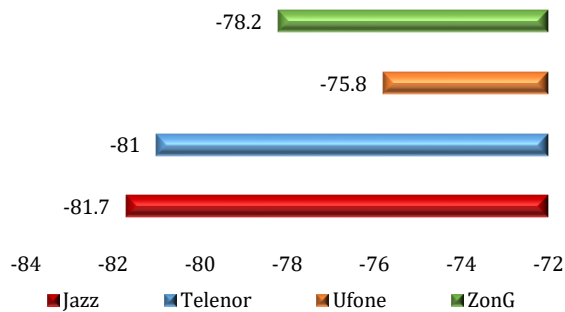
User Data Throughput Download - Fixed Size > 3 Mbps



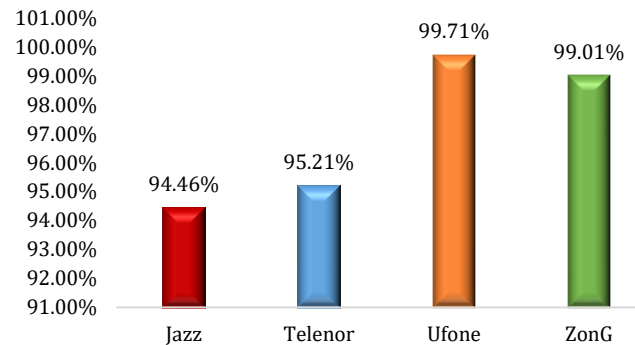
User Data Throughput Upload - Fixed Size > 768 Kbps



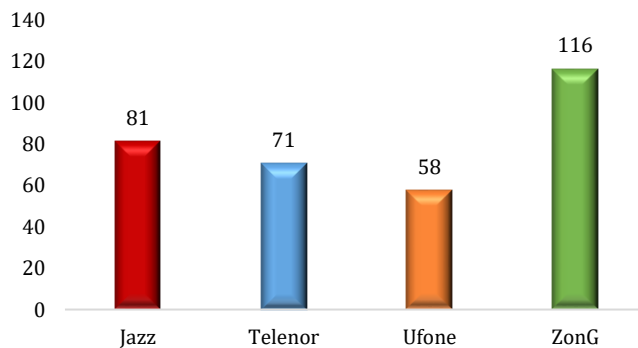
Signal Strength (RSRP) > -100dBm



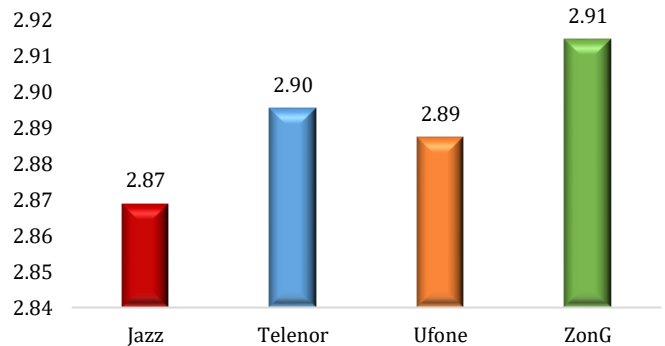
Signal Strength (RSRP) Confidencel Level > 90%



Latency < 75 ms

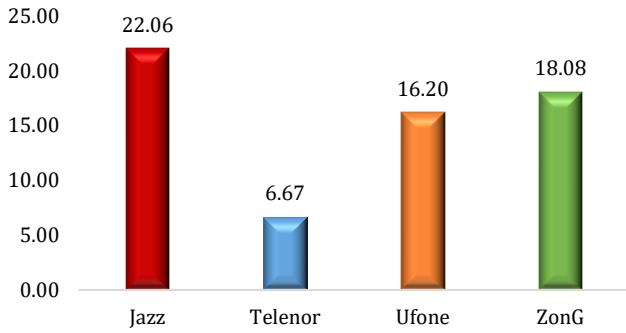


Webpage Loading Time < 5 Seconds

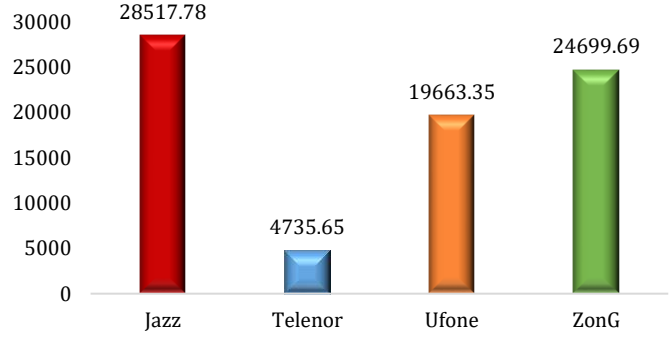


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) - SHAHKOT

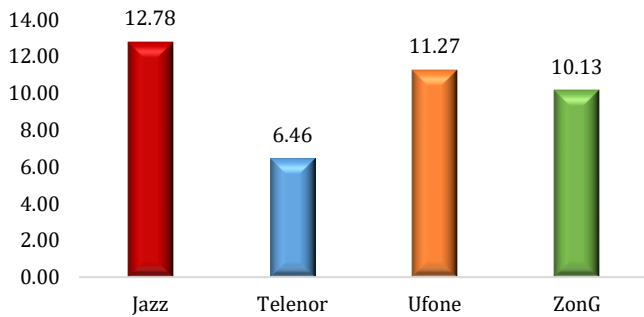
User Data Throughput Download - Fixed Duration > 3 Mbps



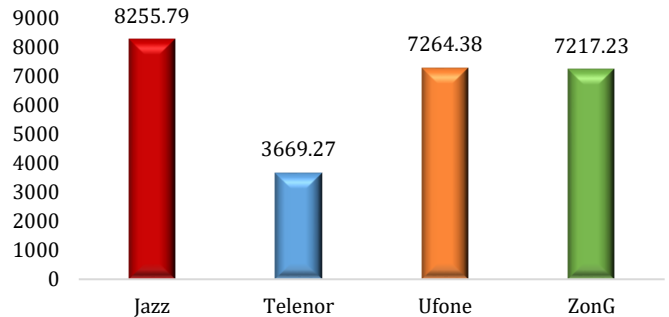
User Data Throughput Upload - Fixed Duration > 768 Kbps



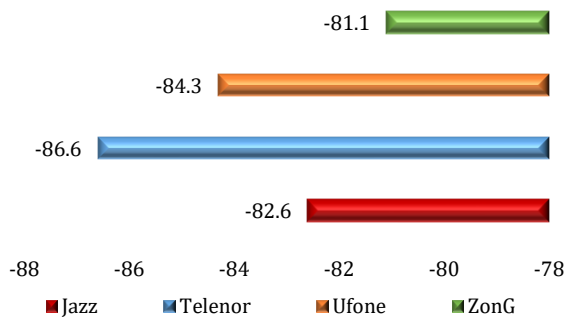
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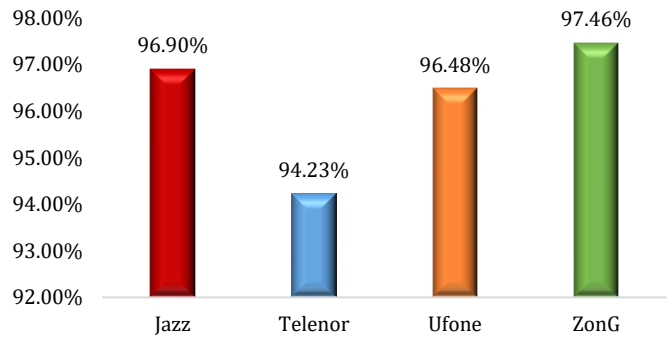
User Data Throughput Upload - Fixed Size > 768 Kbps



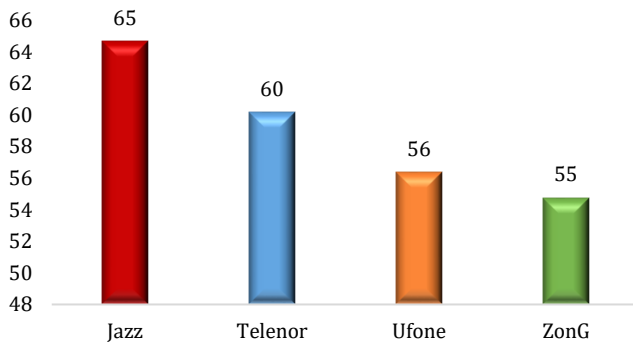
Signal Strength (RSRP) > -100dBm



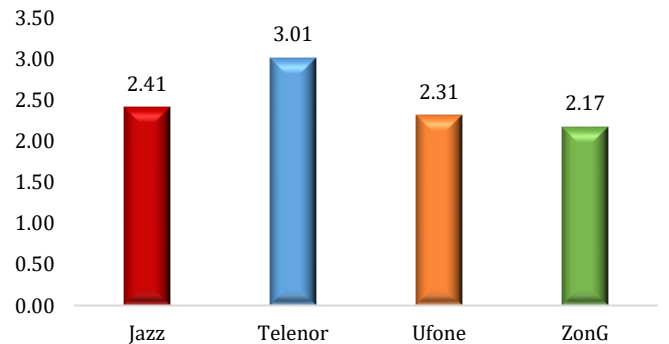
Signal Strength (RSRP) Confidencel Level > 90%



Latency < 75 ms

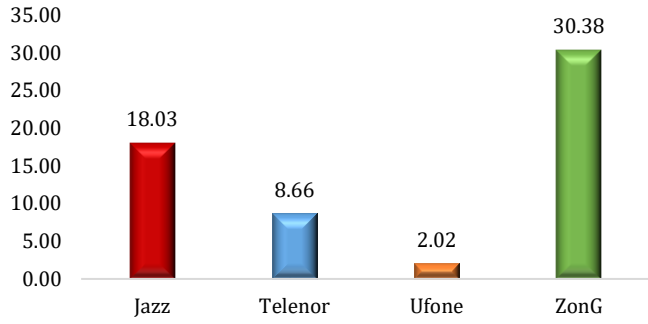


Webpage Loading Time < 5 Seconds

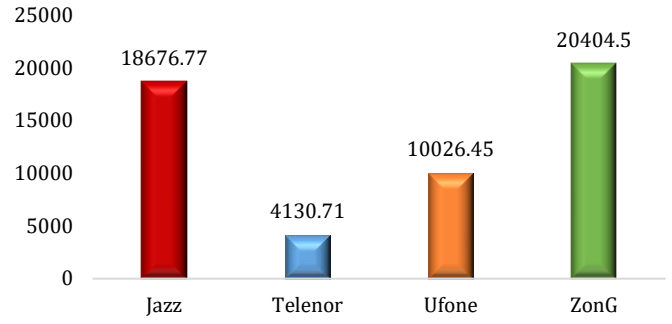


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – SHUJABAD

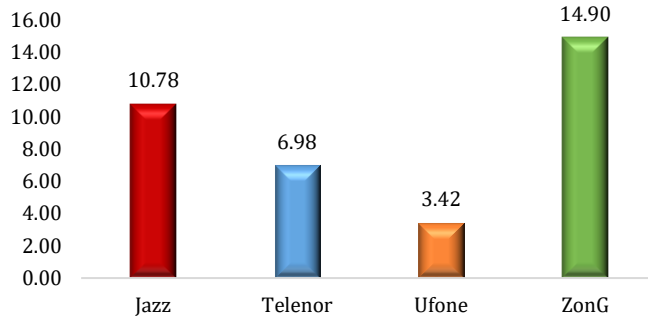
User Data Throughput Download - Fixed Duration > 3 Mbps



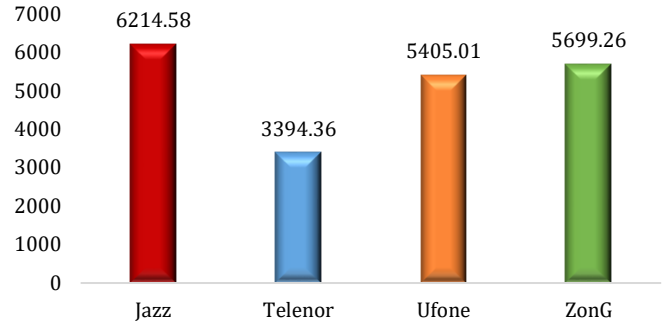
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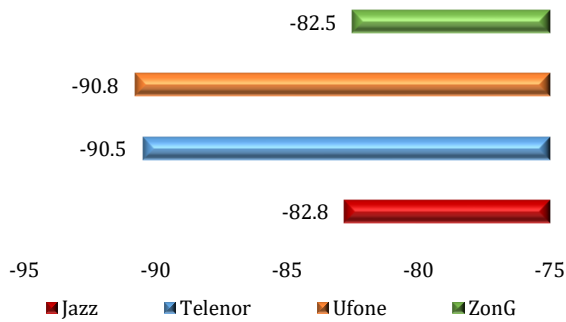
User Data Throughput Download - Fixed Size > 3 Mbps



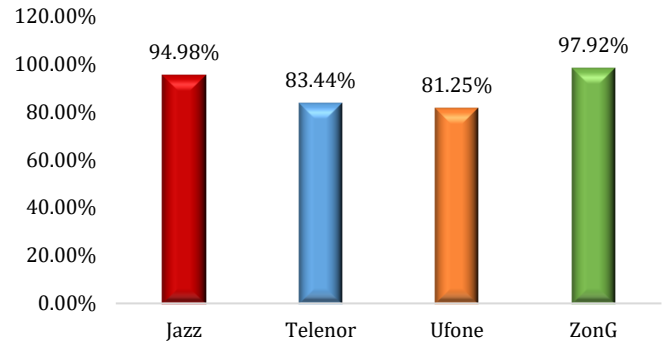
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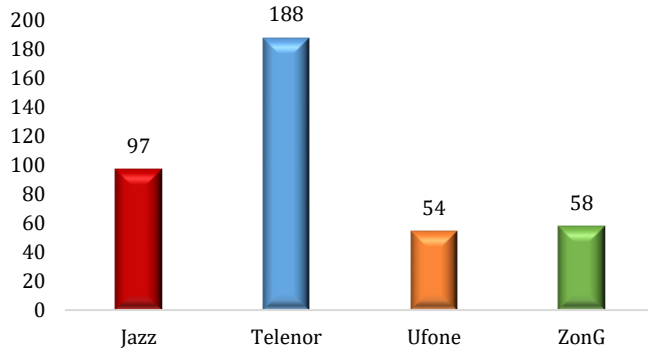
Signal Strength (RSRP) > -100dBm



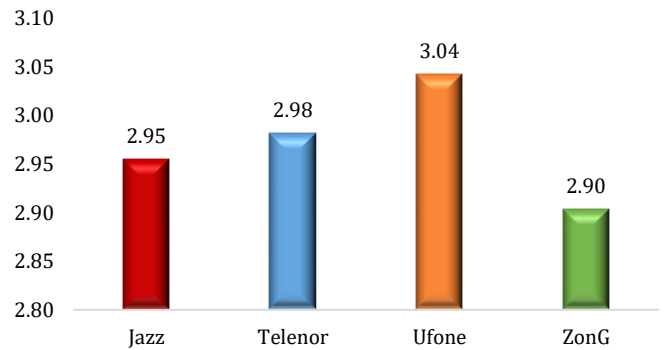
Signal Strength (RSRP) Confidencel Level > 90%



Latency <75 ms

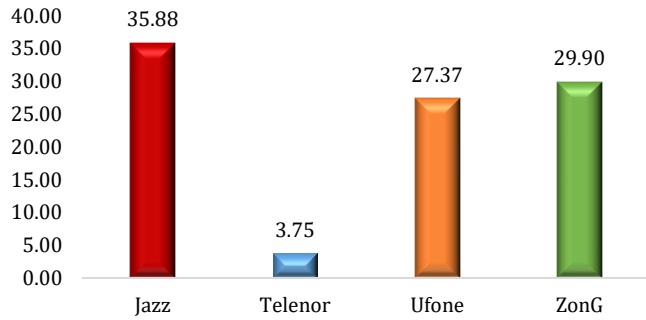


Webpage Loading Time < 5 Seconds

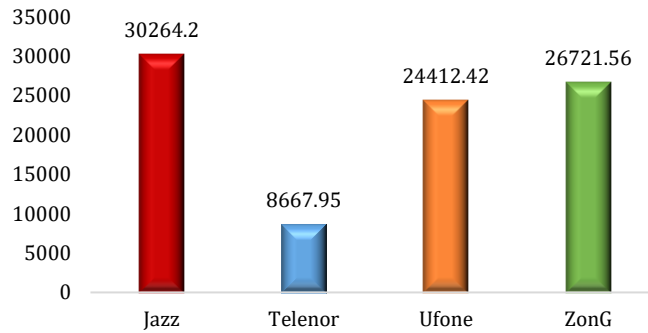


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – SUJAWAL

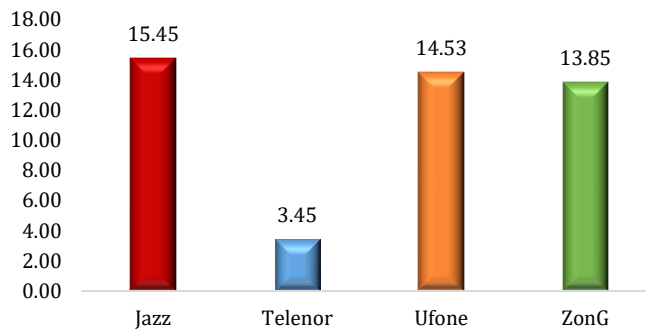
User Data Throughput Download - Fixed Duration > 3 Mbps



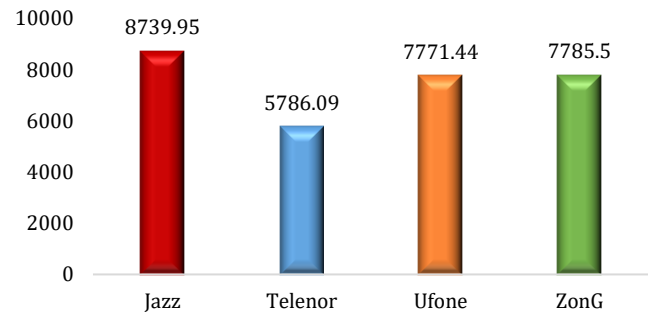
User Data Throughput Upload - Fixed Duration > 768 Kbps



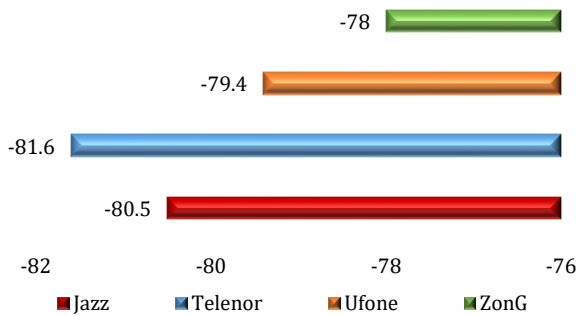
User Data Throughput Download - Fixed Size > 3 Mbps



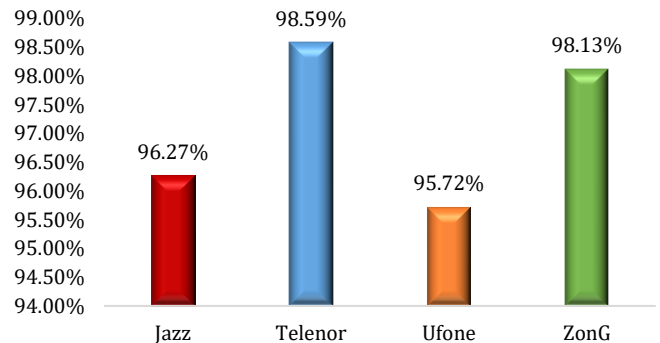
User Data Throughput Upload - Fixed Size > 768 Kbps



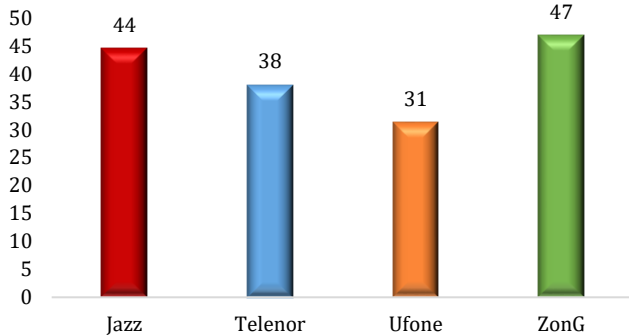
Signal Strength (RSRP) > -100dBm



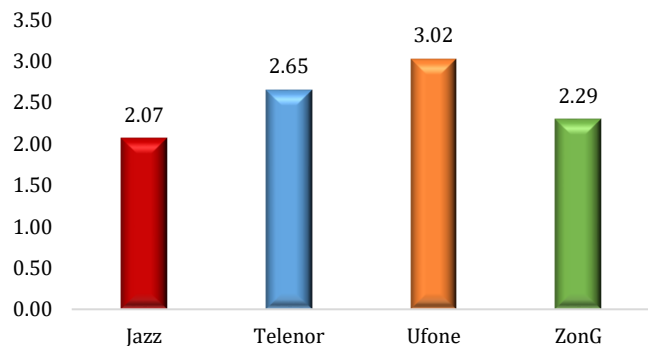
Signal Strength (RSRP) Confidencel Level > 90%



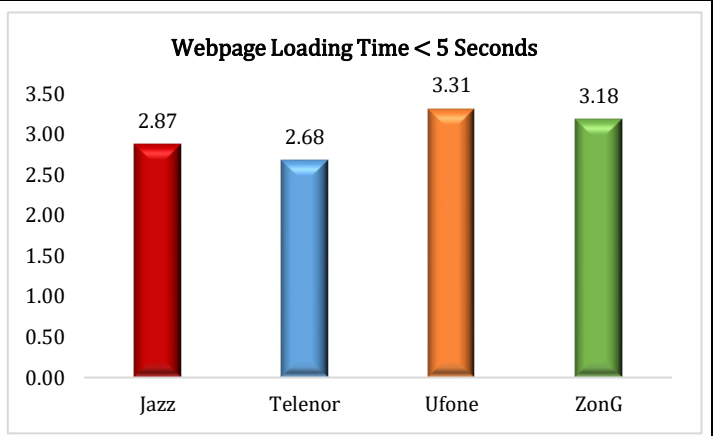
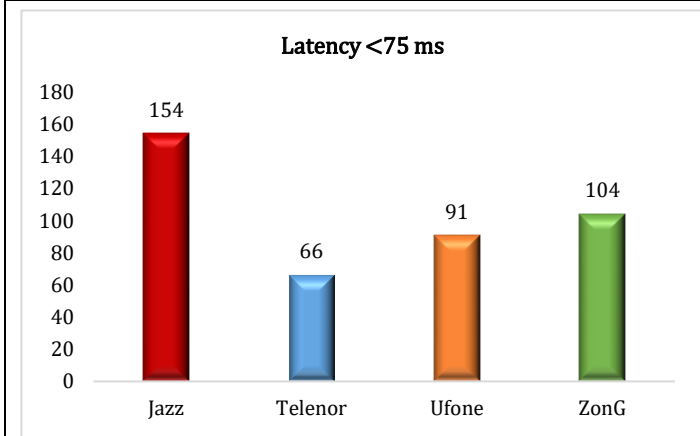
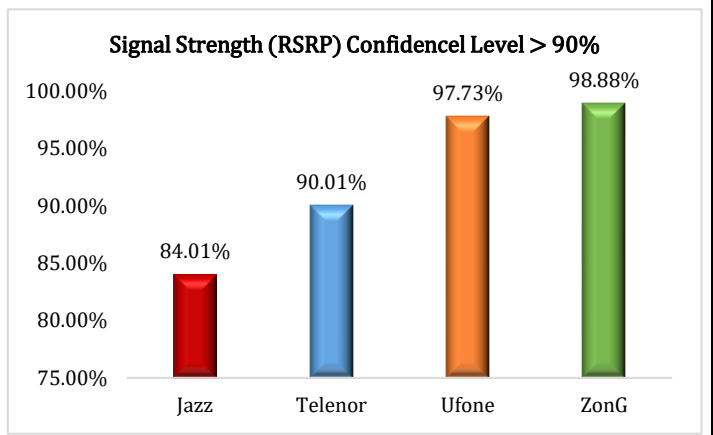
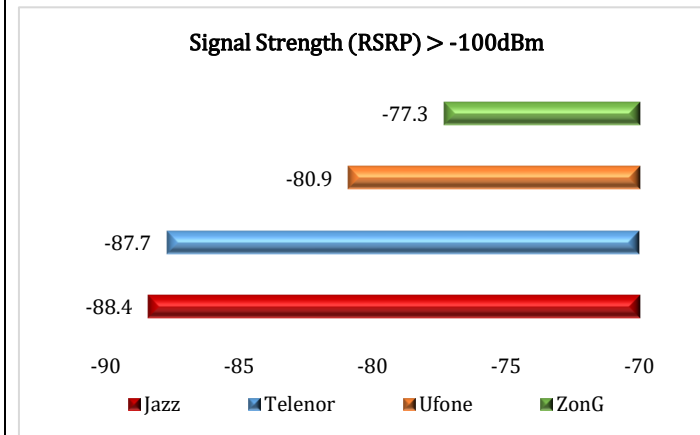
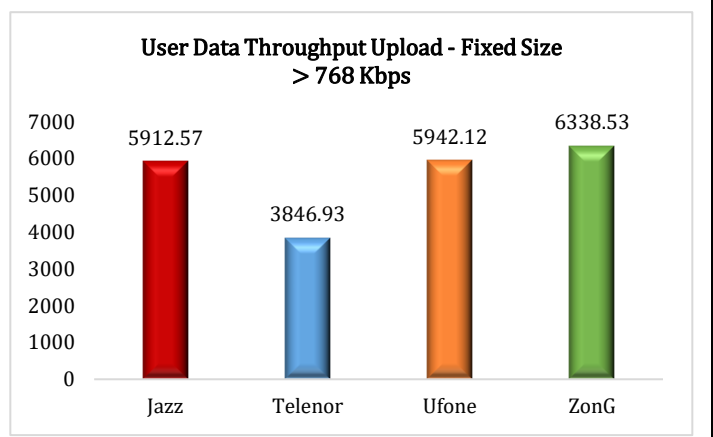
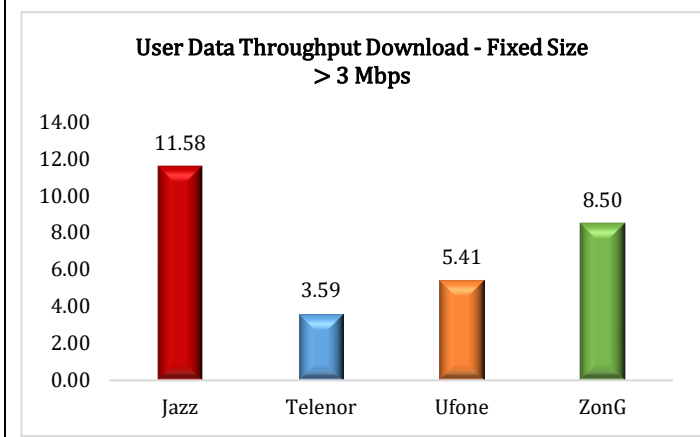
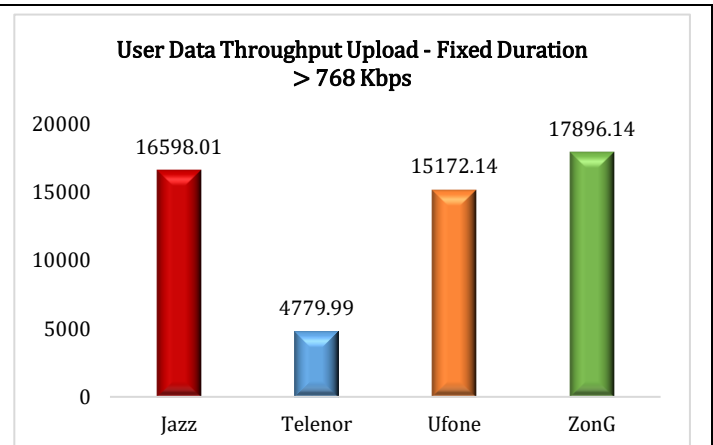
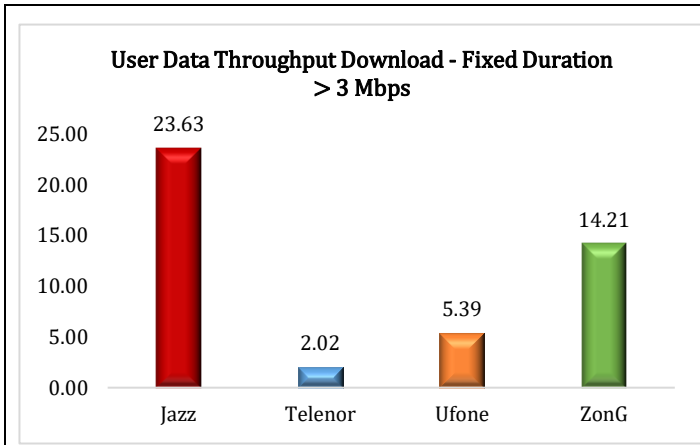
Latency <75 ms



Webpage Loading Time < 5 Seconds

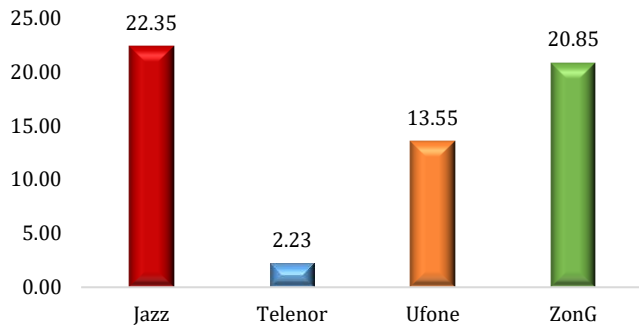


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – SWABI

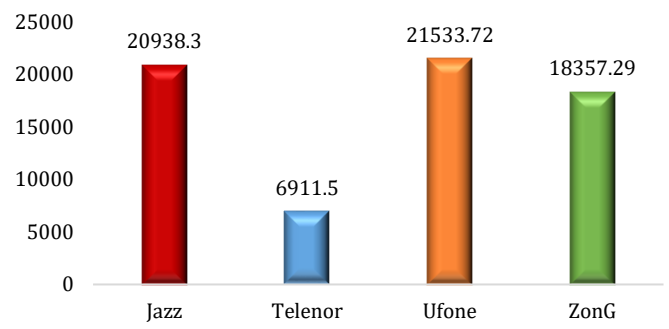


QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – TAXILA & WAH CANTT

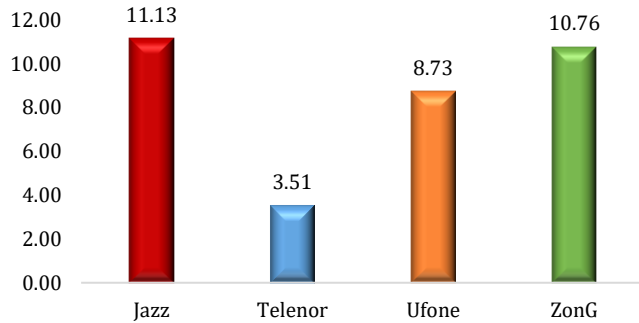
User Data Throughput Download - Fixed Duration > 3 Mbps



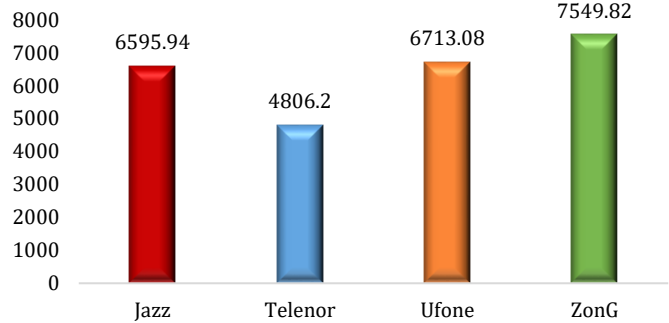
User Data Throughput Upload - Fixed Duration > 768 Kbps



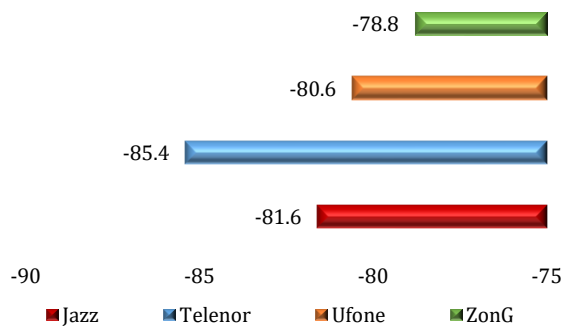
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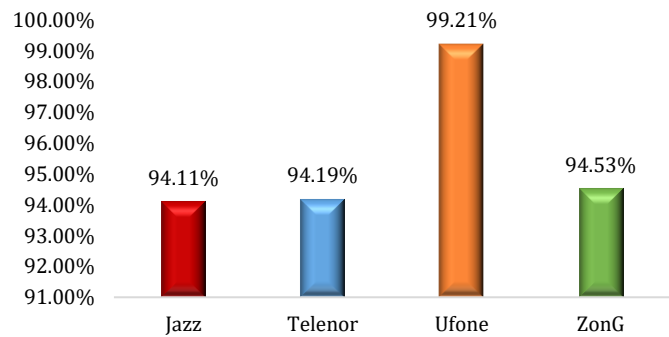
User Data Throughput Upload - Fixed Size > 768 Kbps



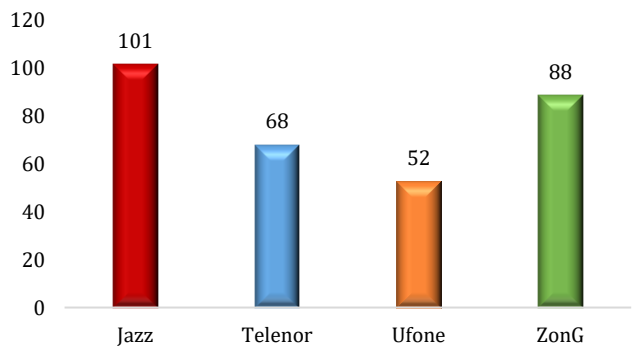
Signal Strength (RSRP) > -100dBm



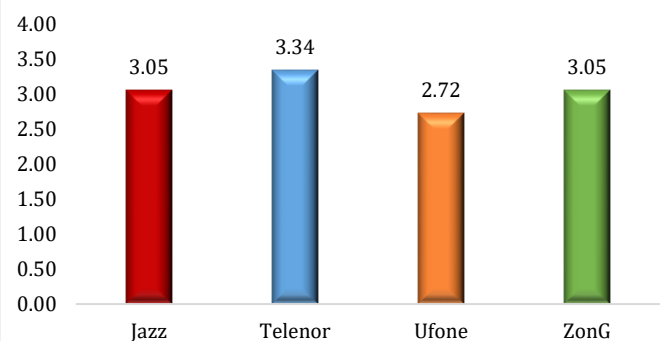
Signal Strength (RSRP) Confidencel Level > 90%



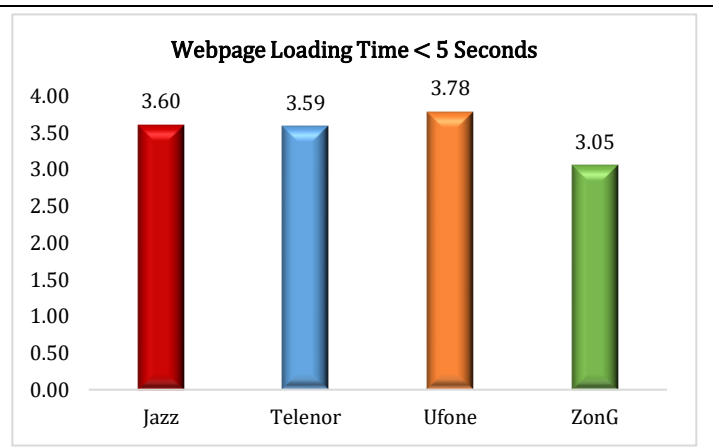
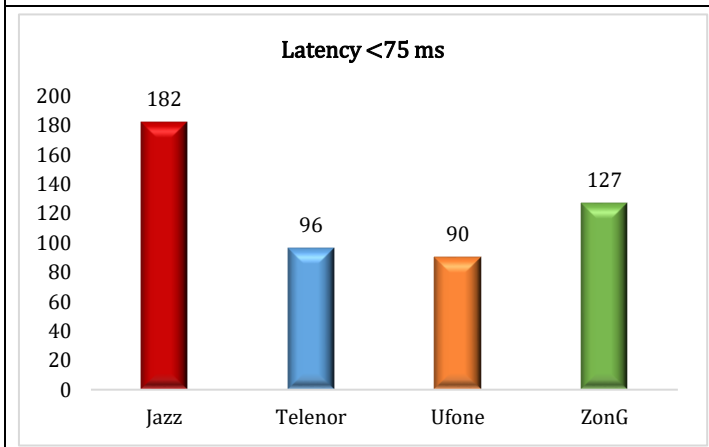
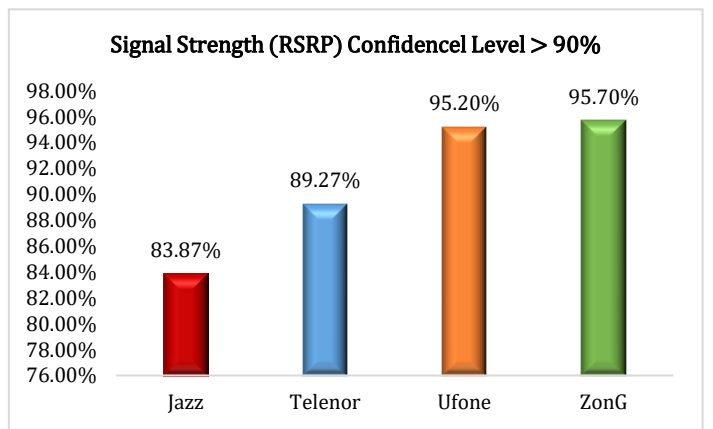
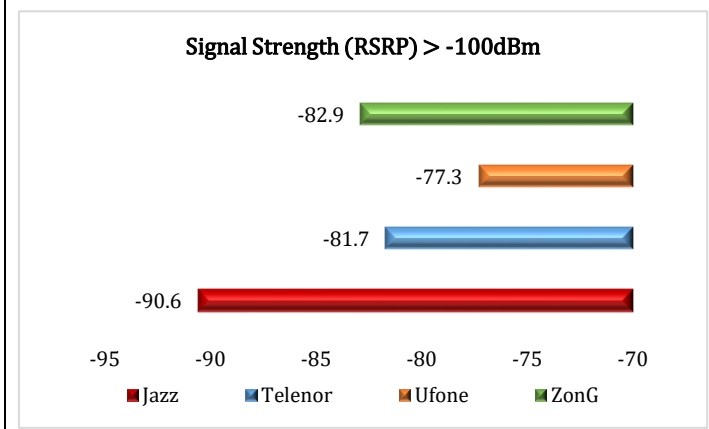
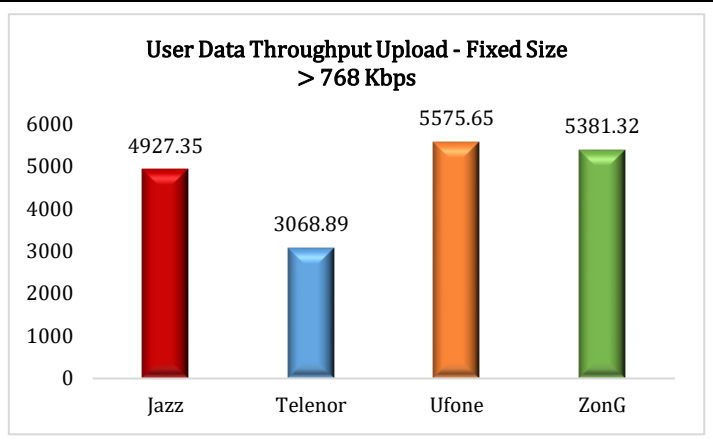
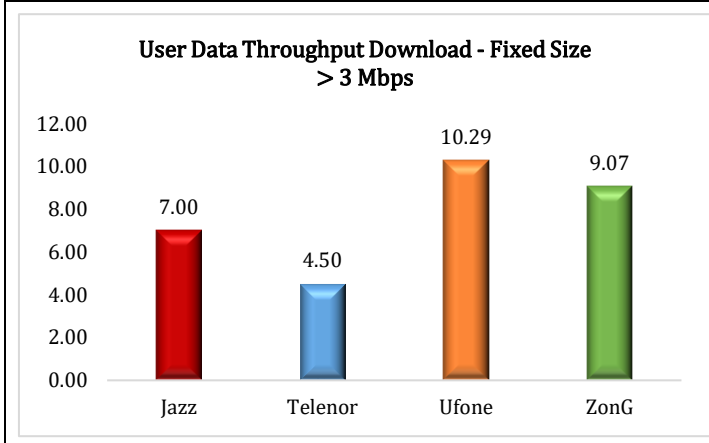
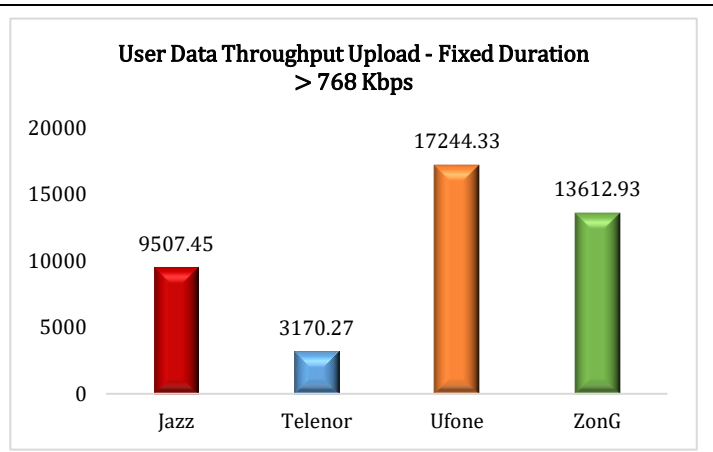
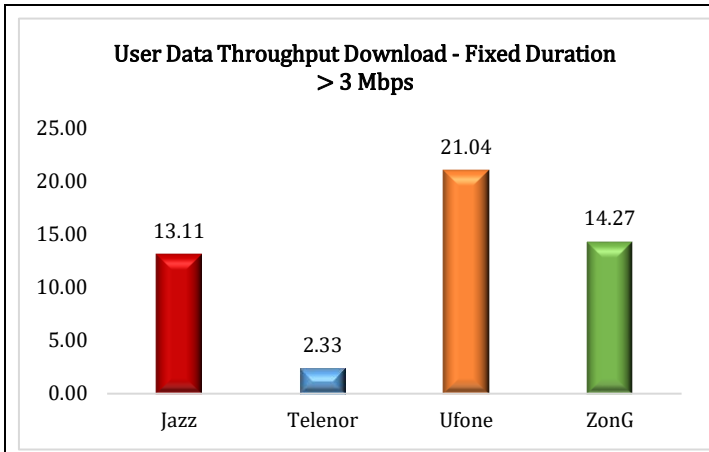
Latency <75 ms



Webpage Loading Time < 5 Seconds



QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – UPPER DIR



Annex -B(Coverage Maps)

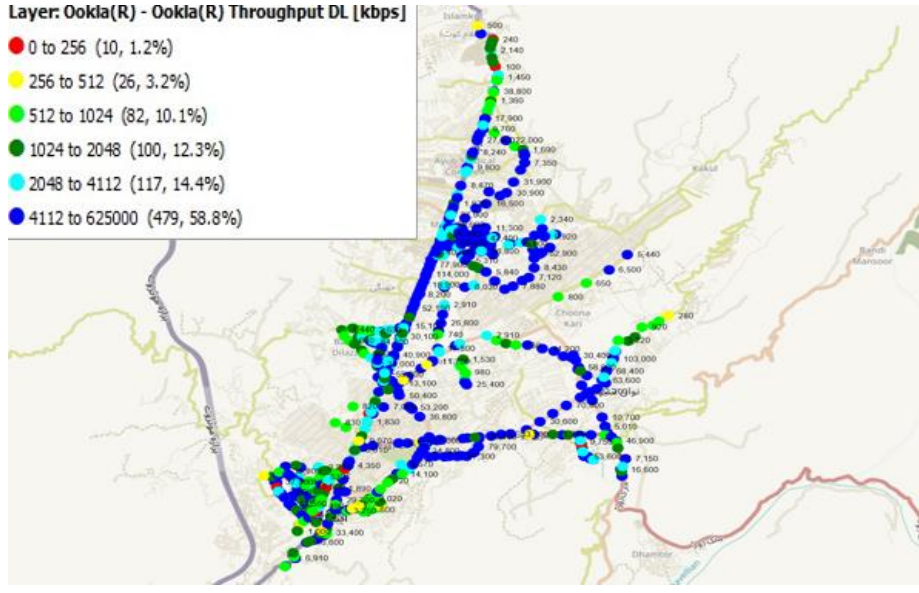
OOKLA

OOKLA SPEED TEST RESULTS

JAZZ DOWNLOAD THROUGHPUT – ABBOTTABAD

Layer: Ookla(R) - Ookla(R) Throughput DL [kbps]

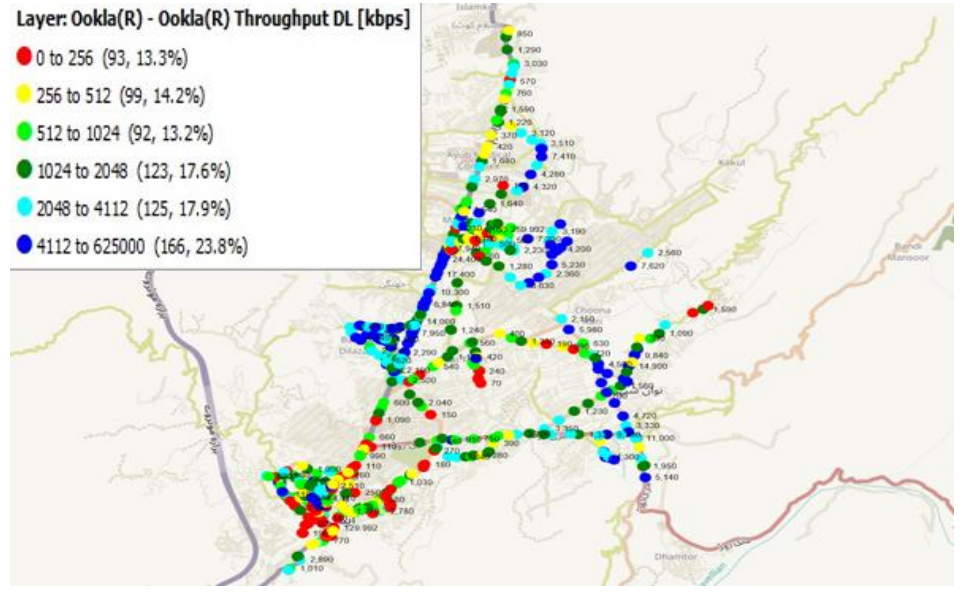
- 0 to 256 (10, 1.2%)
- 256 to 512 (26, 3.2%)
- 512 to 1024 (82, 10.1%)
- 1024 to 2048 (100, 12.3%)
- 2048 to 4112 (117, 14.4%)
- 4112 to 625000 (479, 58.8%)



TELENOR DOWNLOAD THROUGHPUT – ABBOTTABAD

Layer: Ookla(R) - Ookla(R) Throughput DL [kbps]

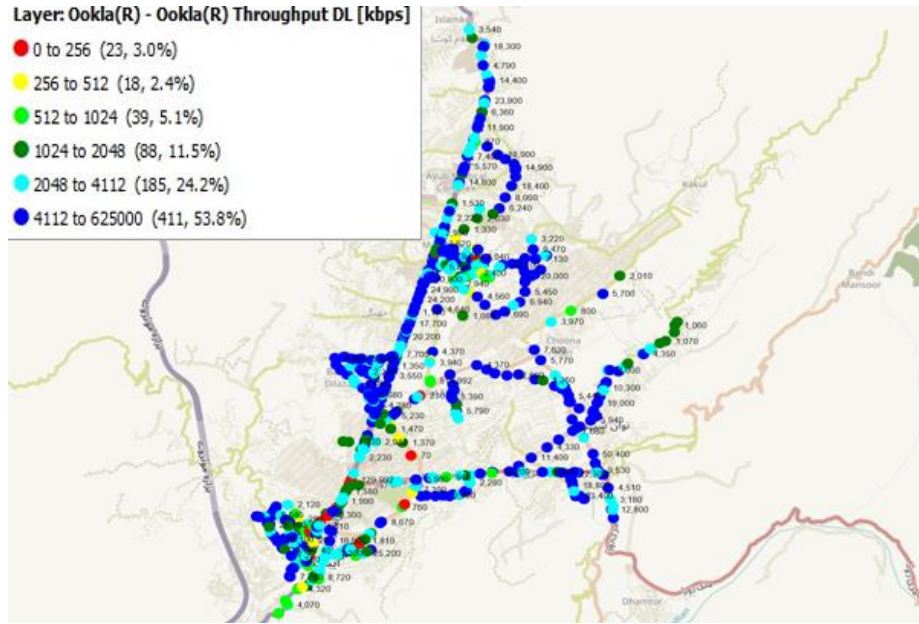
- 0 to 256 (93, 13.3%)
- 256 to 512 (99, 14.2%)
- 512 to 1024 (92, 13.2%)
- 1024 to 2048 (123, 17.6%)
- 2048 to 4112 (125, 17.9%)
- 4112 to 625000 (166, 23.8%)



UFONE DOWNLOAD THROUGHPUT – ABBOTTABAD

Layer: Ookla(R) - Ookla(R) Throughput DL [kbps]

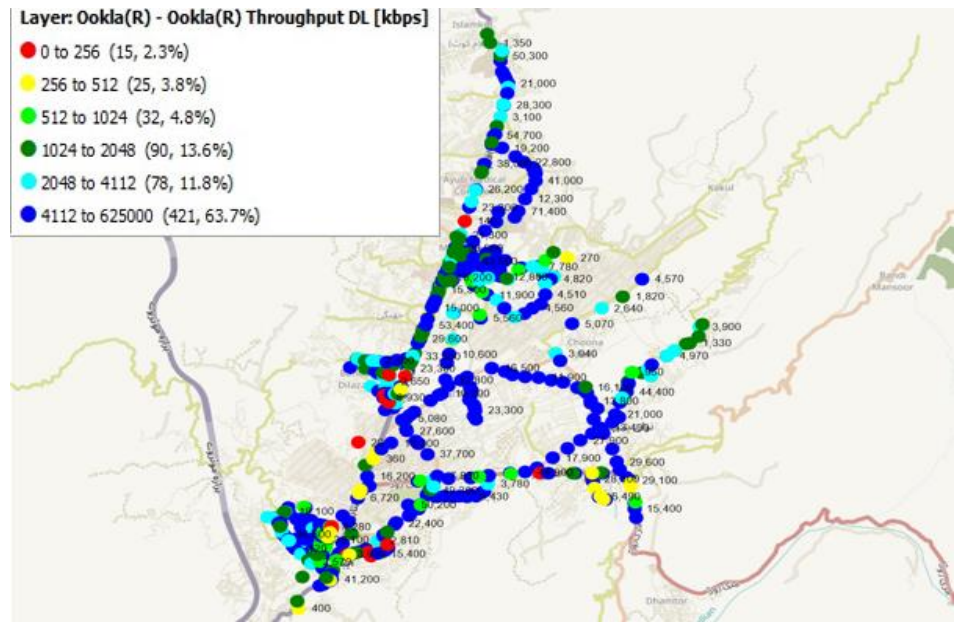
- 0 to 256 (23, 3.0%)
- 256 to 512 (18, 2.4%)
- 512 to 1024 (39, 5.1%)
- 1024 to 2048 (88, 11.5%)
- 2048 to 4112 (185, 24.2%)
- 4112 to 625000 (411, 53.8%)



ZONG DOWNLOAD THROUGHPUT – ABBOTTABAD

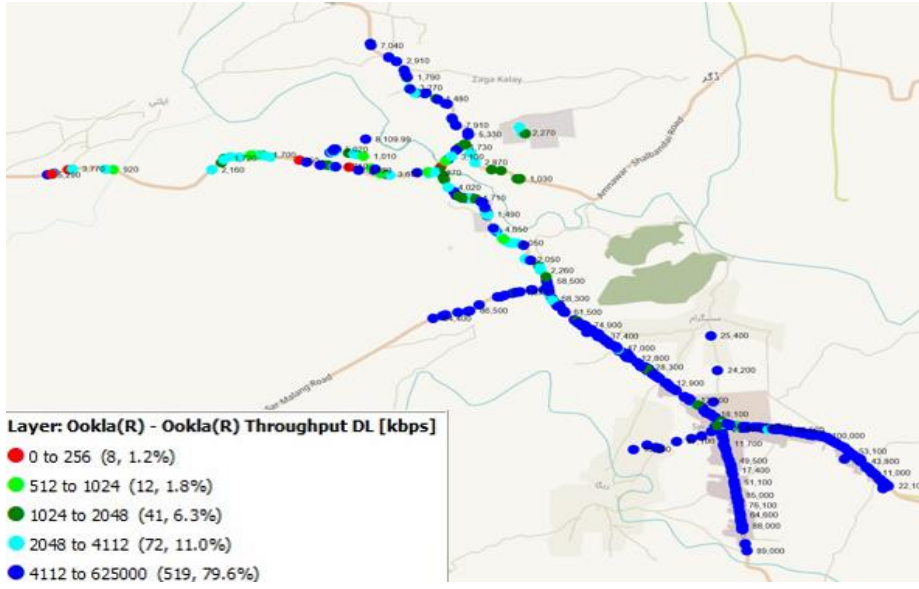
Layer: Ookla(R) - Ookla(R) Throughput DL [kbps]

- 0 to 256 (15, 2.3%)
- 256 to 512 (25, 3.8%)
- 512 to 1024 (32, 4.8%)
- 1024 to 2048 (90, 13.6%)
- 2048 to 4112 (78, 11.8%)
- 4112 to 625000 (421, 63.7%)

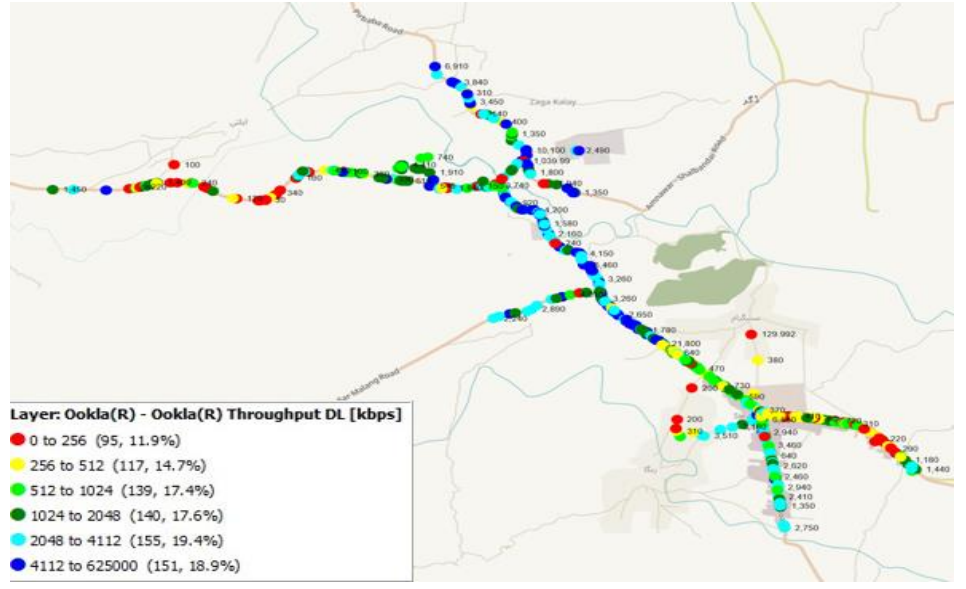


OOKLA SPEED TEST RESULTS

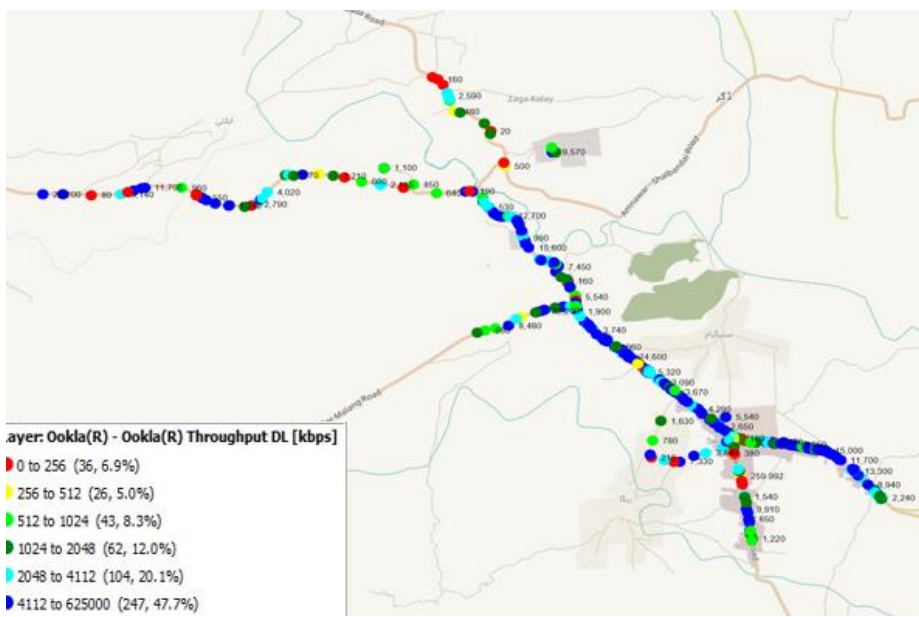
JAZZ DOWNLOAD THROUGHPUT – BUNER



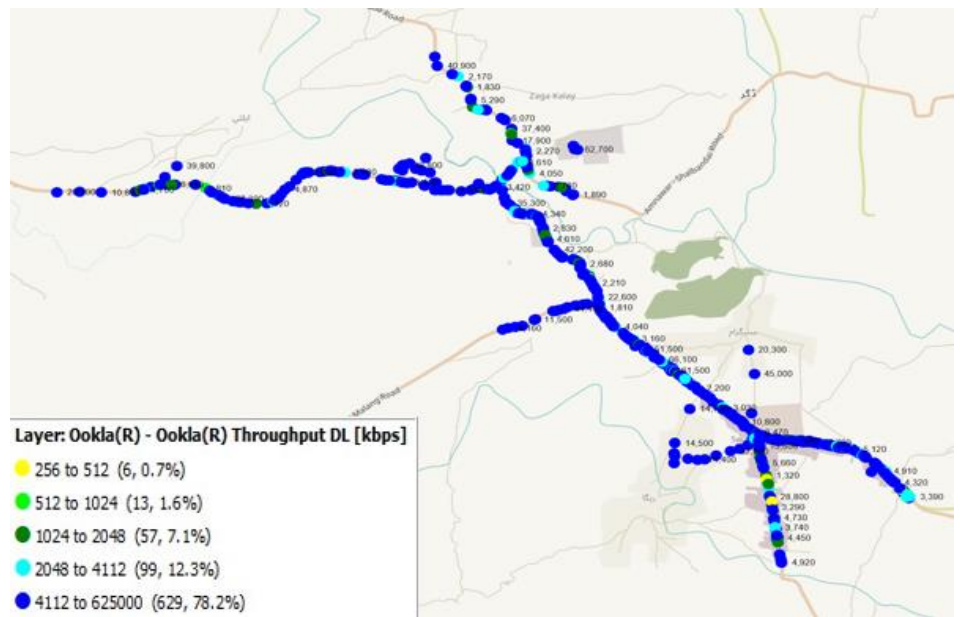
TELENOR DOWNLOAD THROUGHPUT – BUNER



UFONE DOWNLOAD THROUGHPUT – BUNER

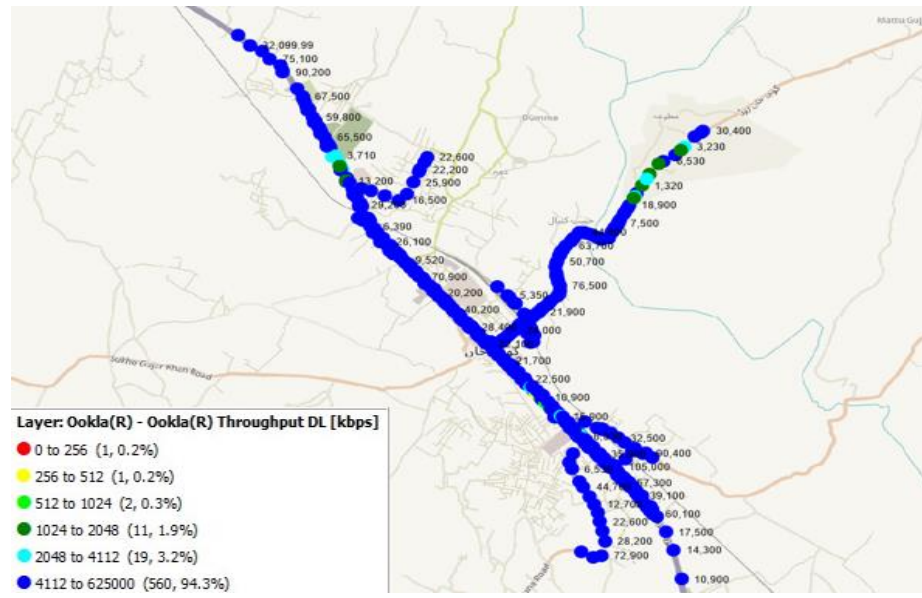


ZONG DOWNLOAD THROUGHPUT – BUNER

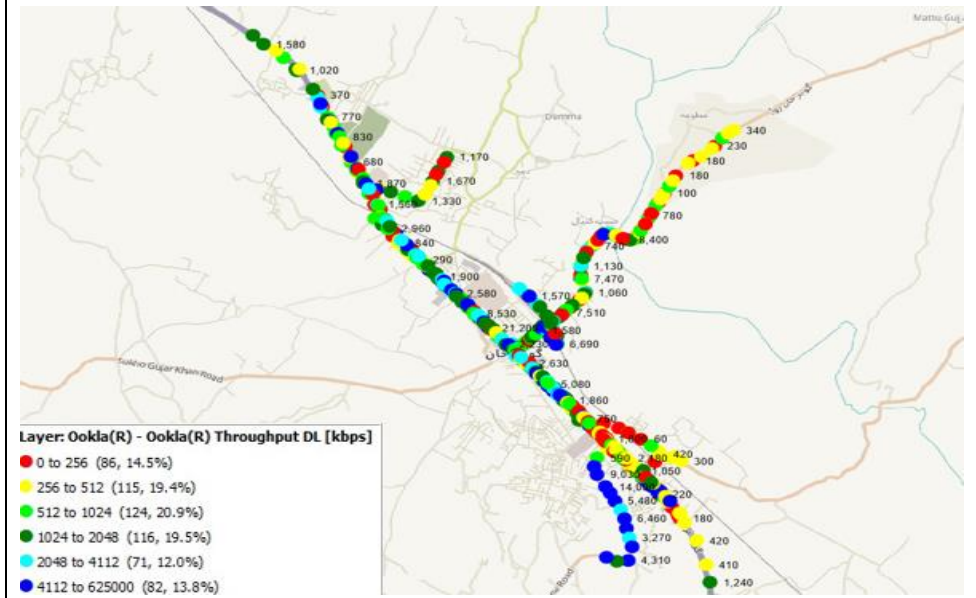


OOKLA SPEED TEST RESULTS

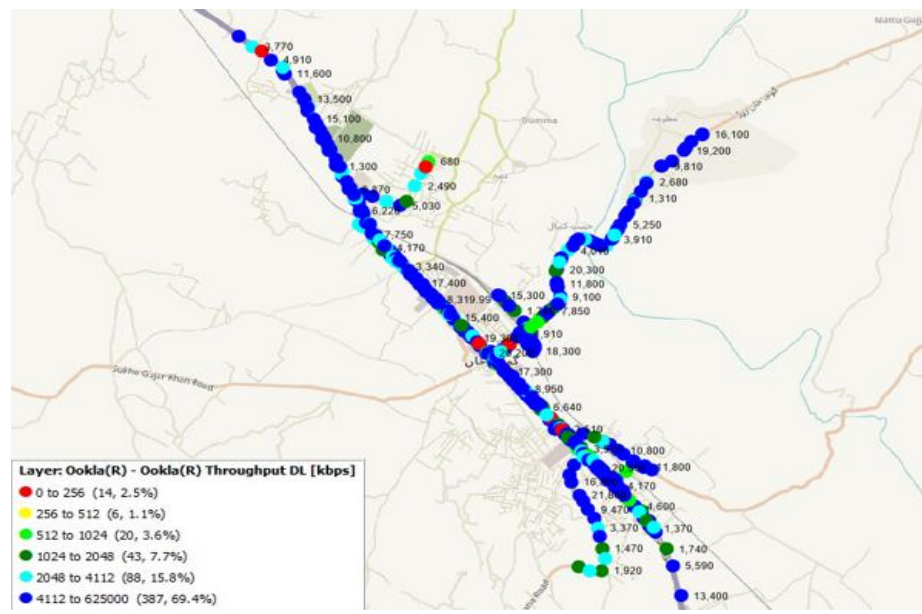
JAZZ DOWNLOAD THROUGHPUT – GUJAR KHAN



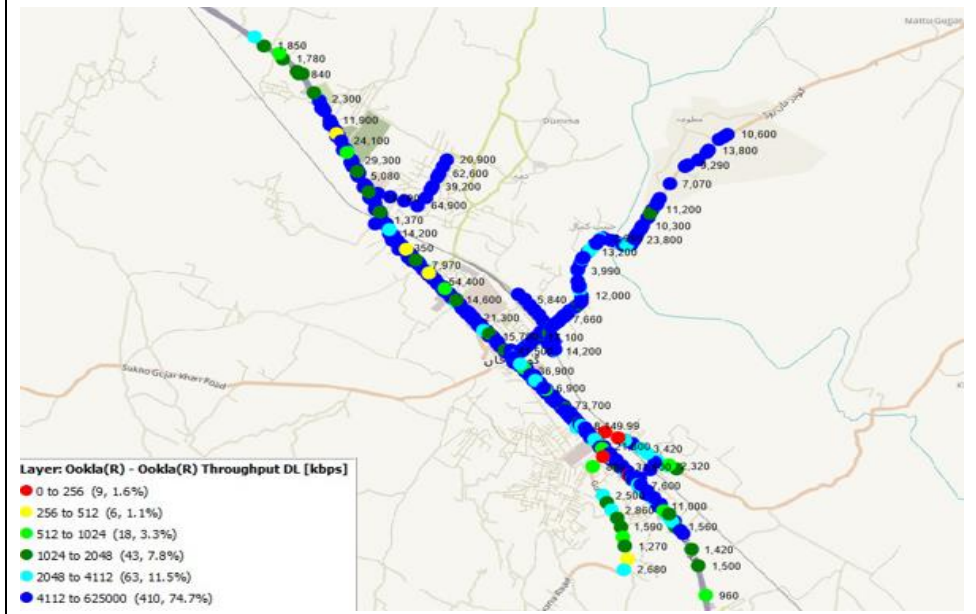
TELENOR DOWNLOAD THROUGHPUT – GUJAR KHAN



UFONE DOWNLOAD THROUGHPUT – GUJAR KHAN

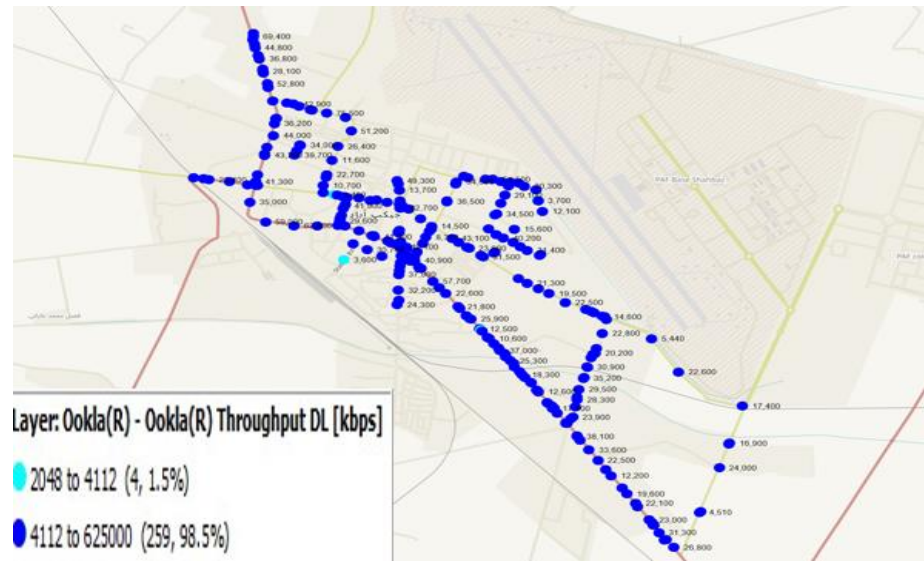


ZONG DOWNLOAD THROUGHPUT – GUJAR KHAN

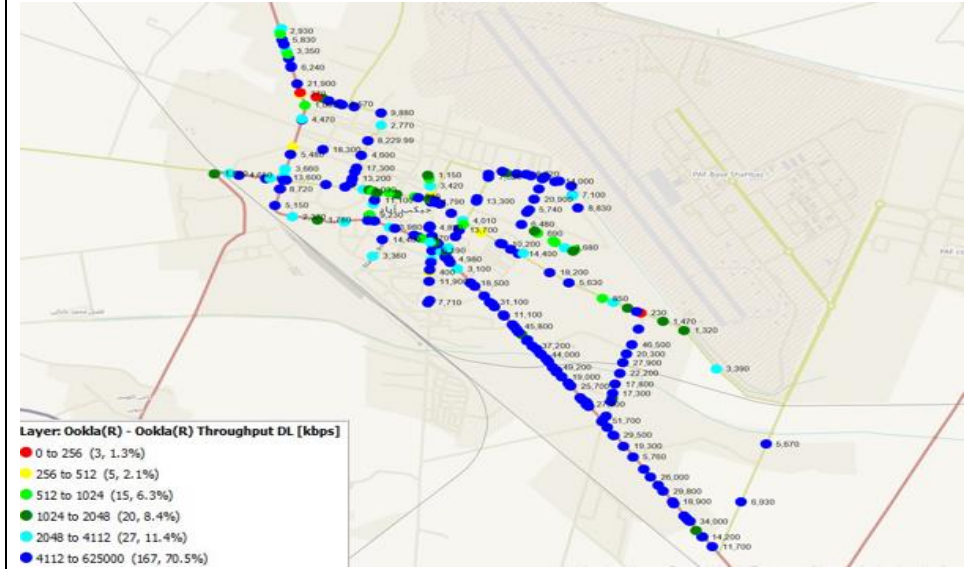


OOKLA SPEED TEST RESULTS

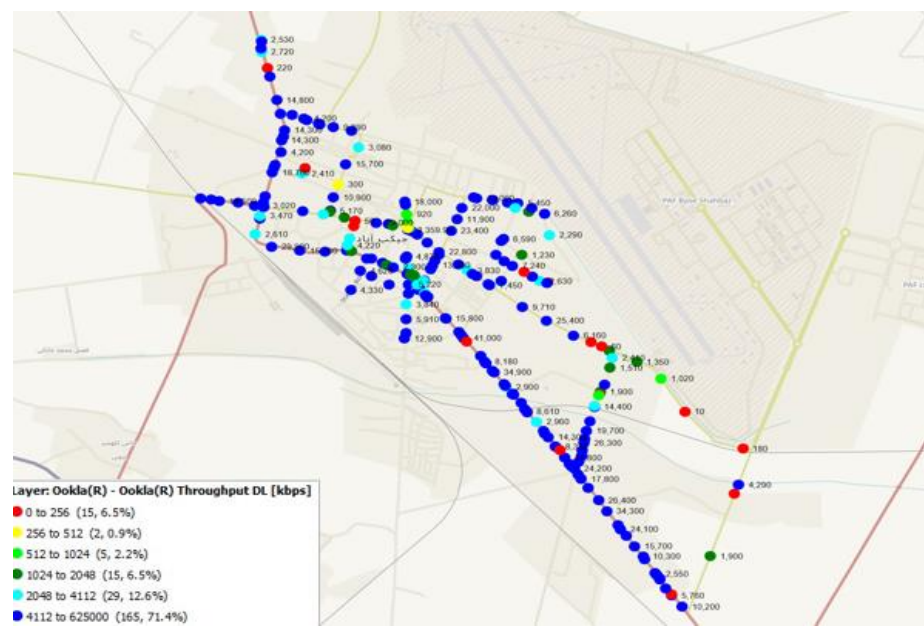
JAZZ DOWNLOAD THROUGHPUT - JACOBABAD



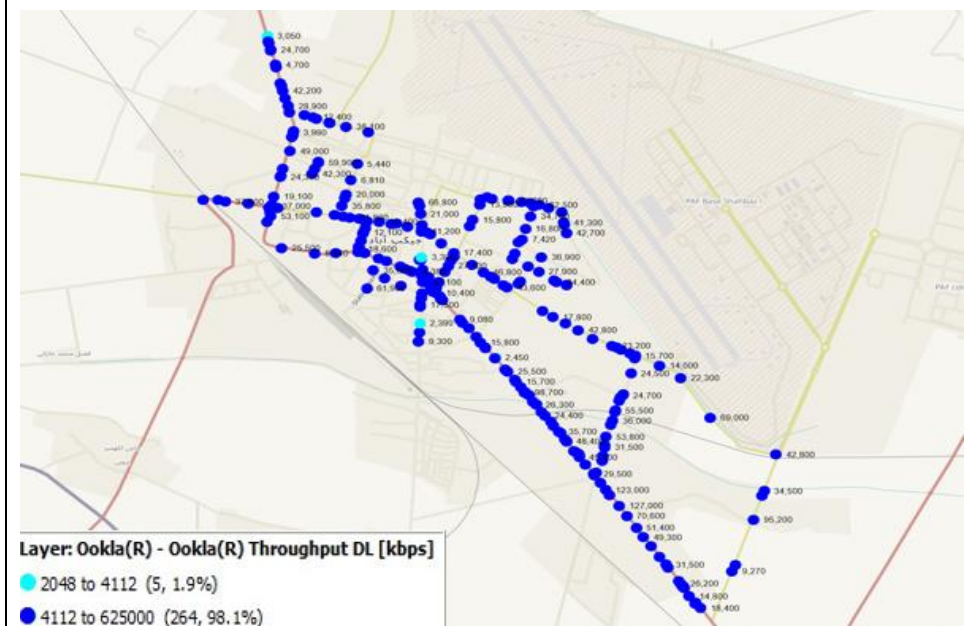
TELENOR DOWNLOAD THROUGHPUT - JACOBABAD



UFONE DOWNLOAD THROUGHPUT - JACOBABAD

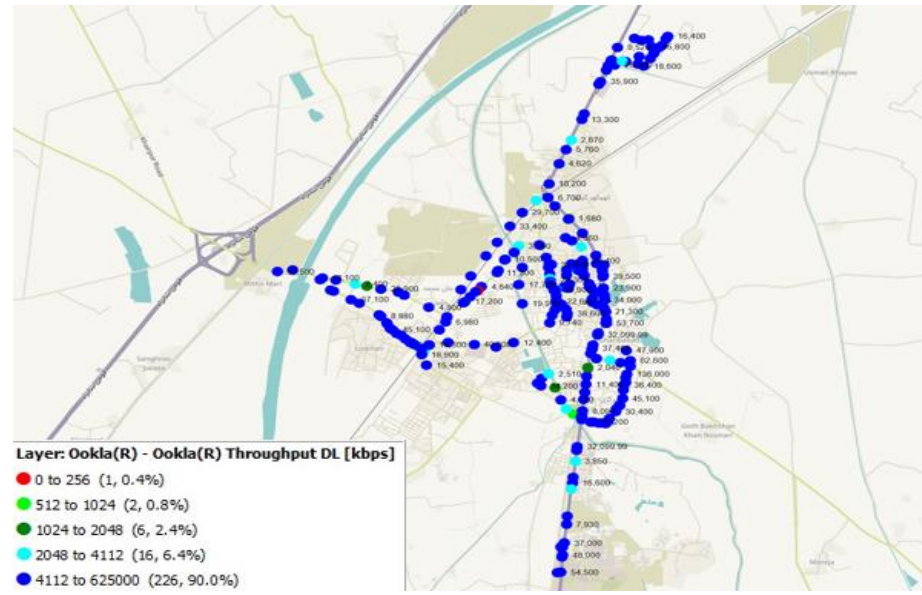


ZONG DOWNLOAD THROUGHPUT - JACOBABAD

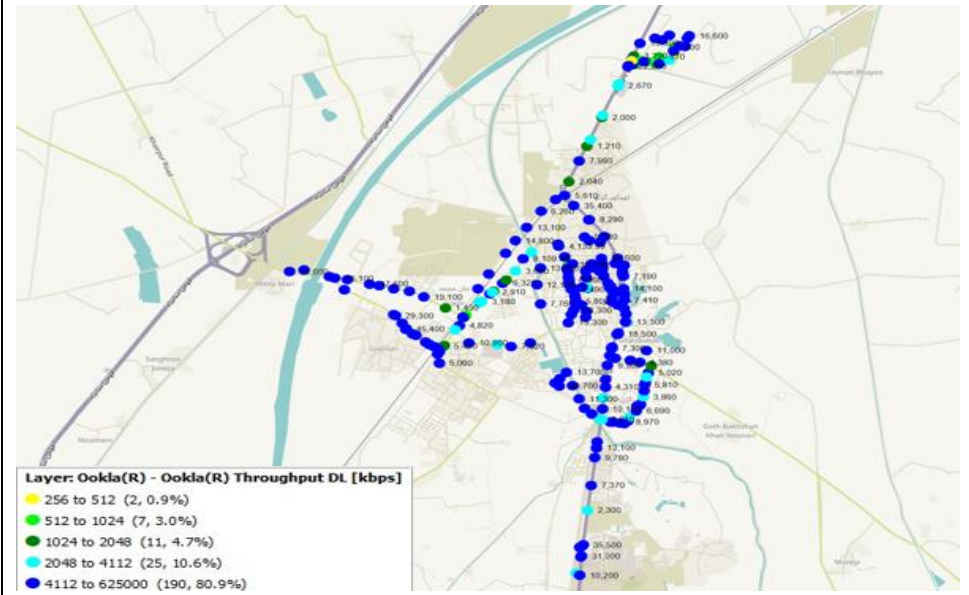


OOKLA SPEED TEST RESULTS

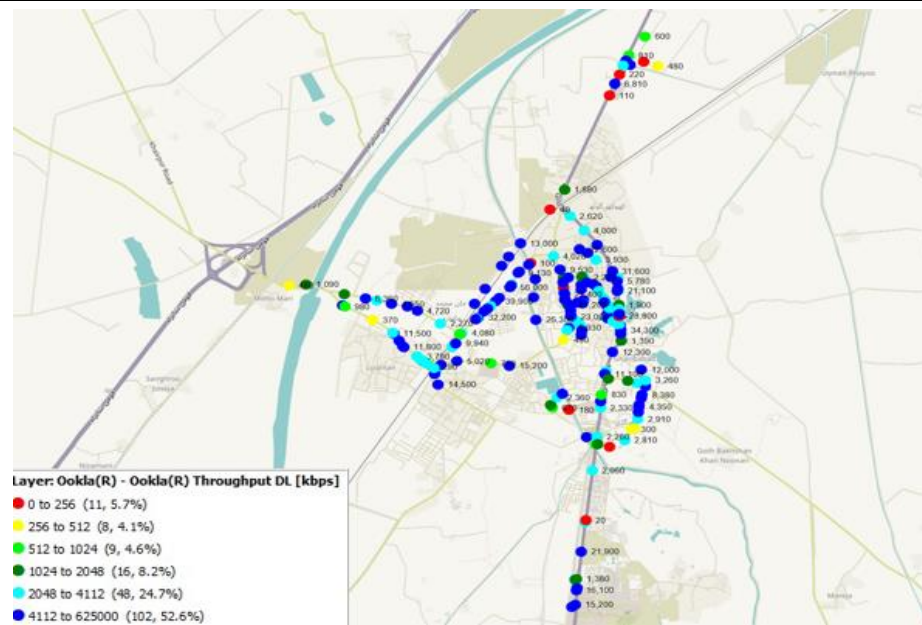
JAZZ DOWNLOAD THROUGHPUT - KHAIRPUR



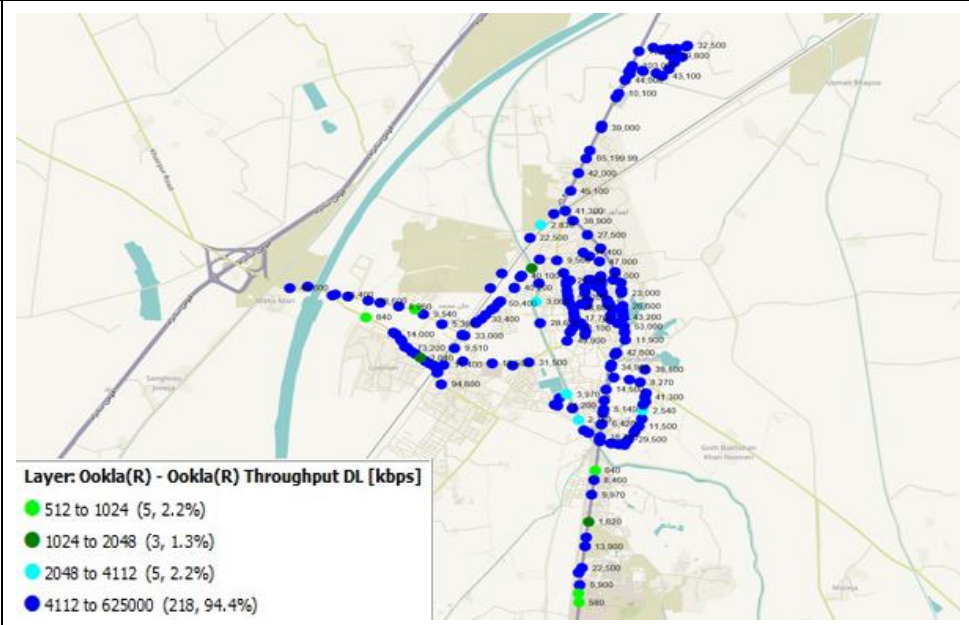
TELENOR DOWNLOAD THROUGHPUT - KHAIRPUR



UFONE DOWNLOAD THROUGHPUT - KHAIRPUR

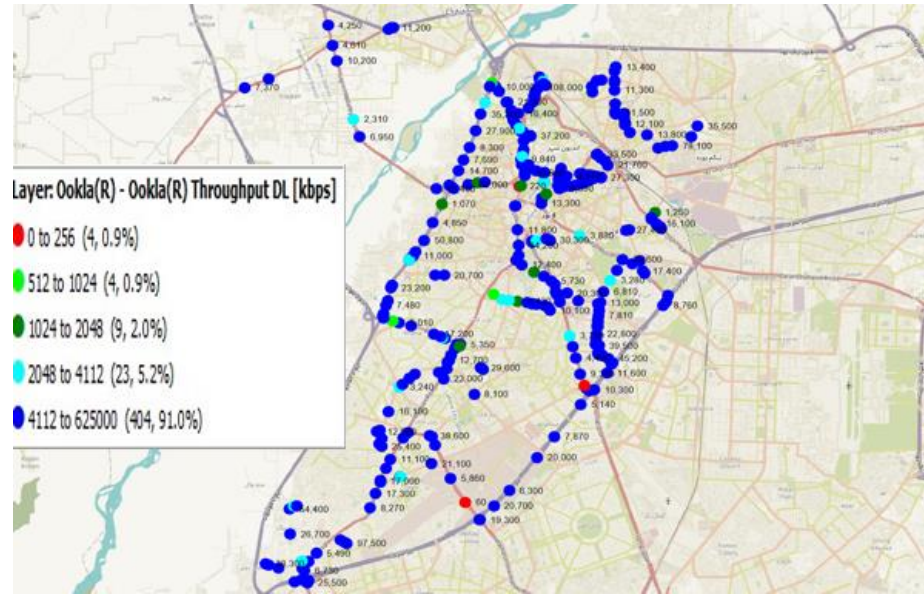


ZONG DOWNLOAD THROUGHPUT - KHAIRPUR

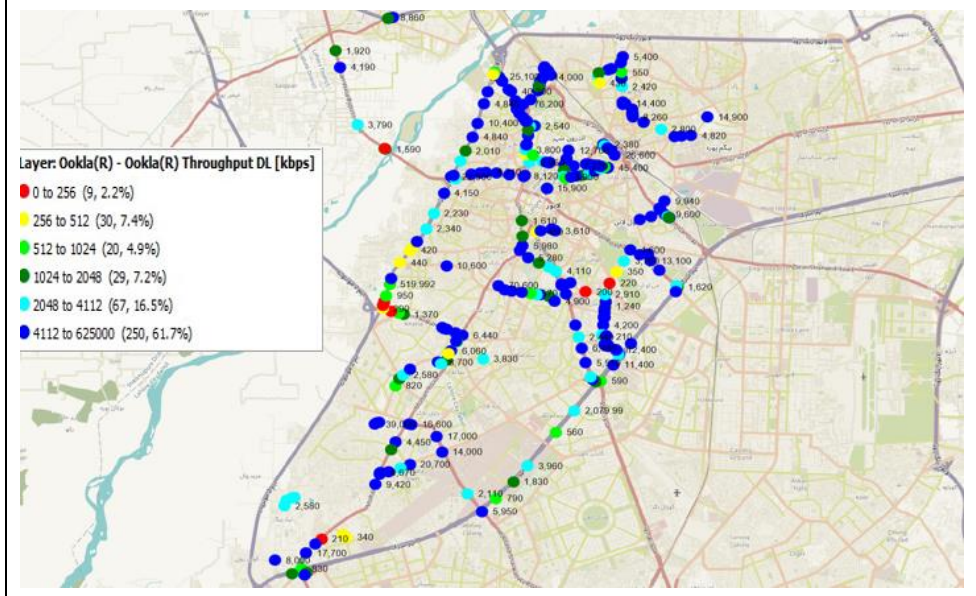


OOKLA SPEED TEST RESULTS

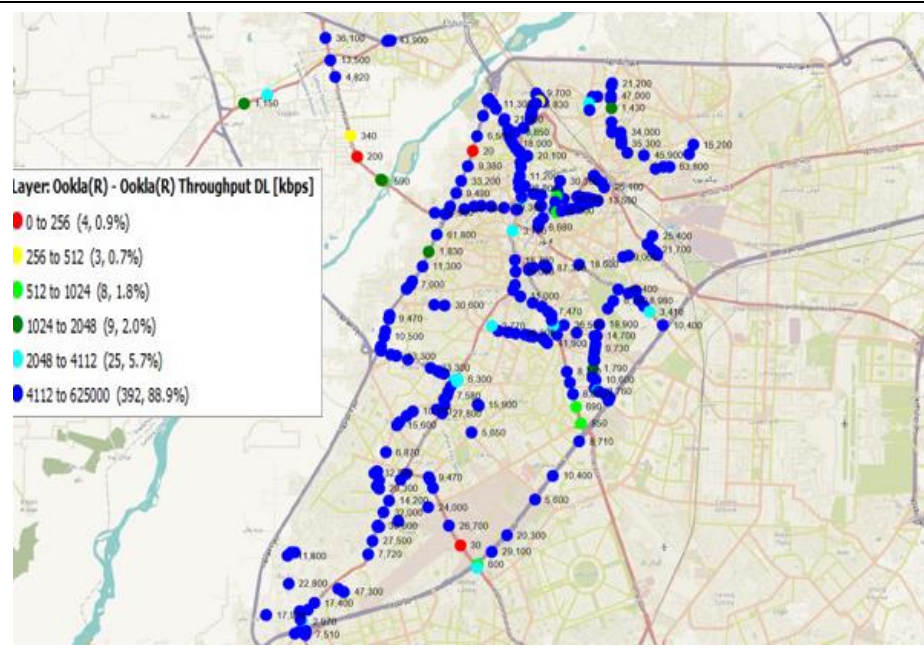
JAZZ DOWNLOAD THROUGHPUT - LAHORE



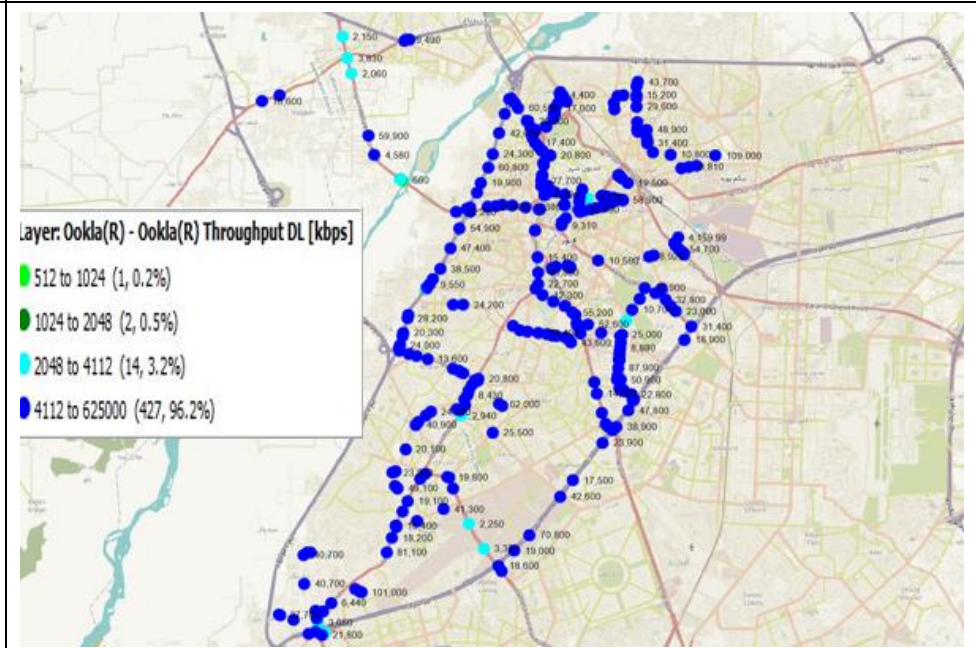
TELENOR DOWNLOAD THROUGHPUT - LAHORE



UFONE DOWNLOAD THROUGHPUT - LAHORE

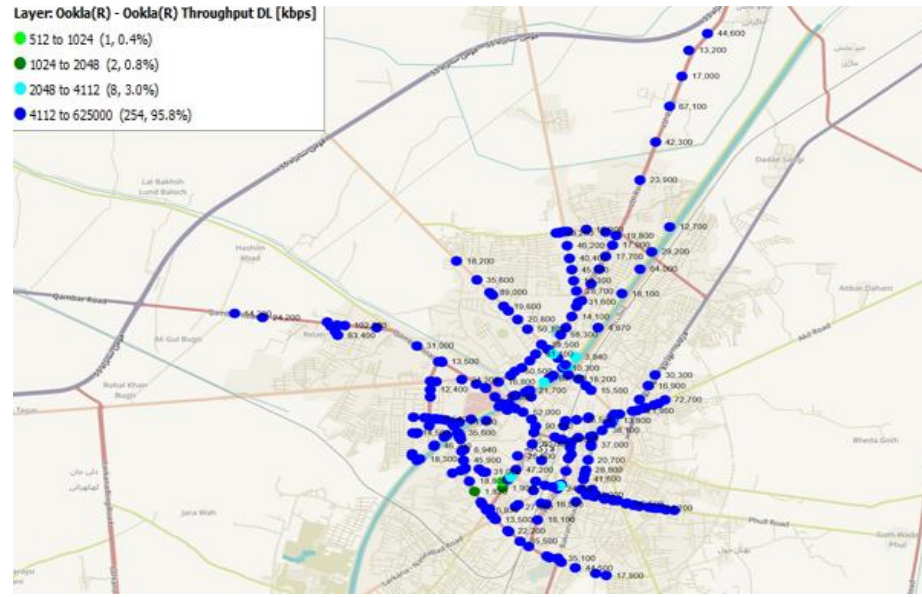


ZONG DOWNLOAD THROUGHPUT - LAHORE

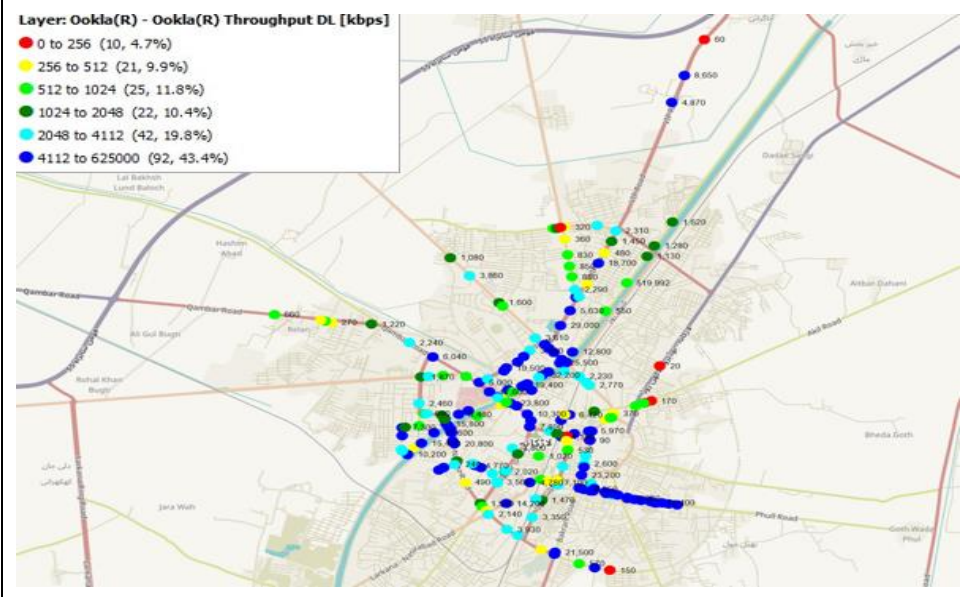


OOKLA SPEED TEST RESULTS

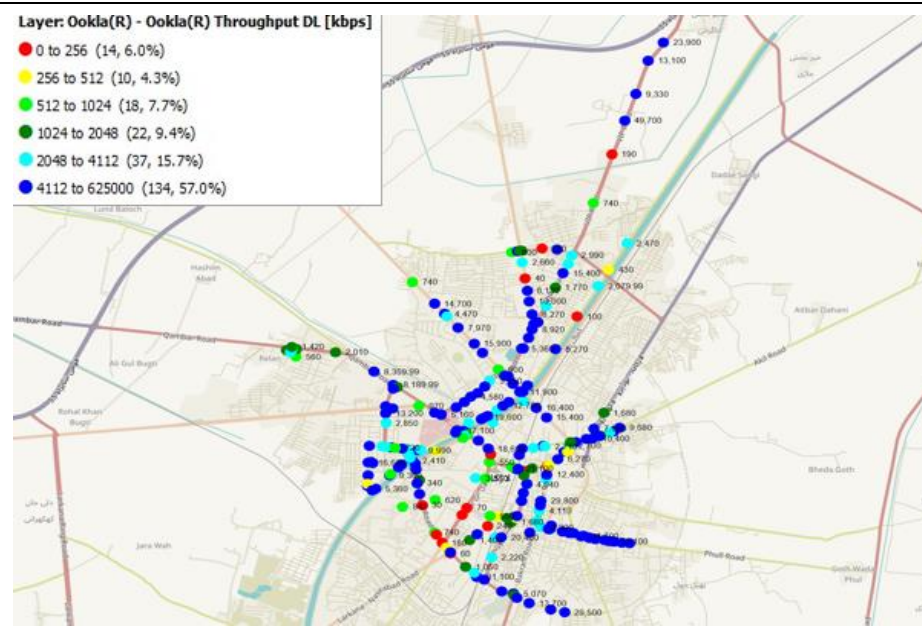
JAZZ DOWNLOAD THROUGHPUT - LARKANA



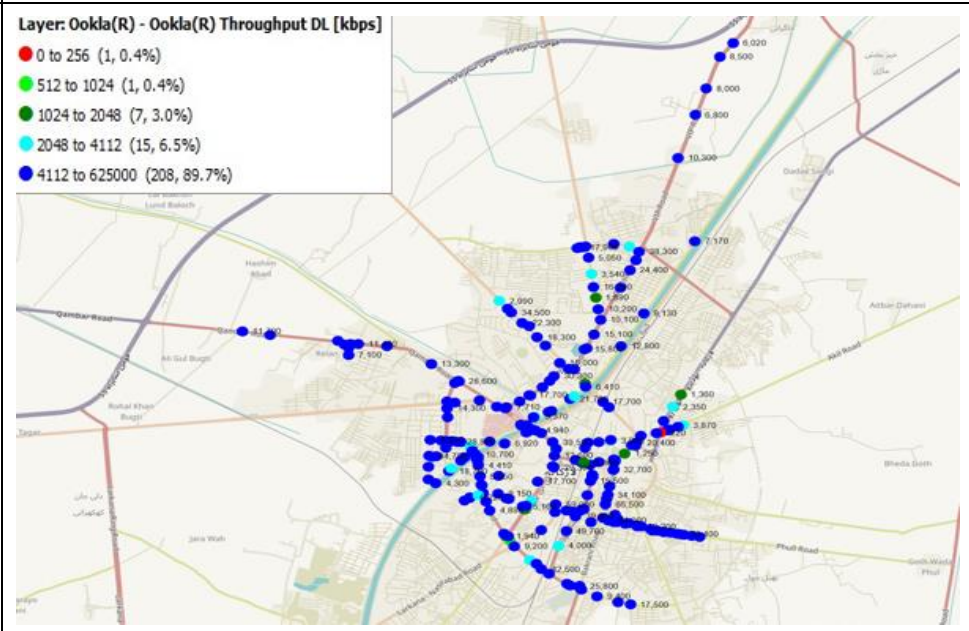
TELENOR DOWNLOAD THROUGHPUT- LARKANA



UFONE DOWNLOAD THROUGHPUT- LARKANA



ZONG DOWNLOAD THROUGHPUT - LARKANA



OOKLA SPEED TEST RESULTS

JAZZ DOWNLOAD THROUGHPUT – MITHI

Layer: Ookla(R) - Ookla(R) Throughput DL [kbps]

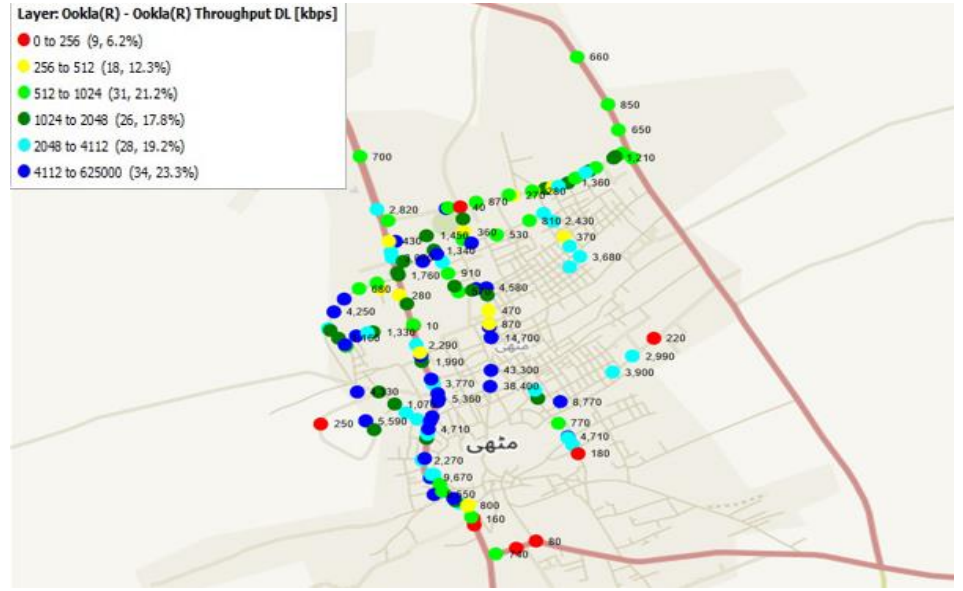
● 4112 to 625000 (210, 100.0%)



TELENOR DOWNLOAD THROUGHPUT – MITHI

Layer: Ookla(R) - Ookla(R) Throughput DL [kbps]

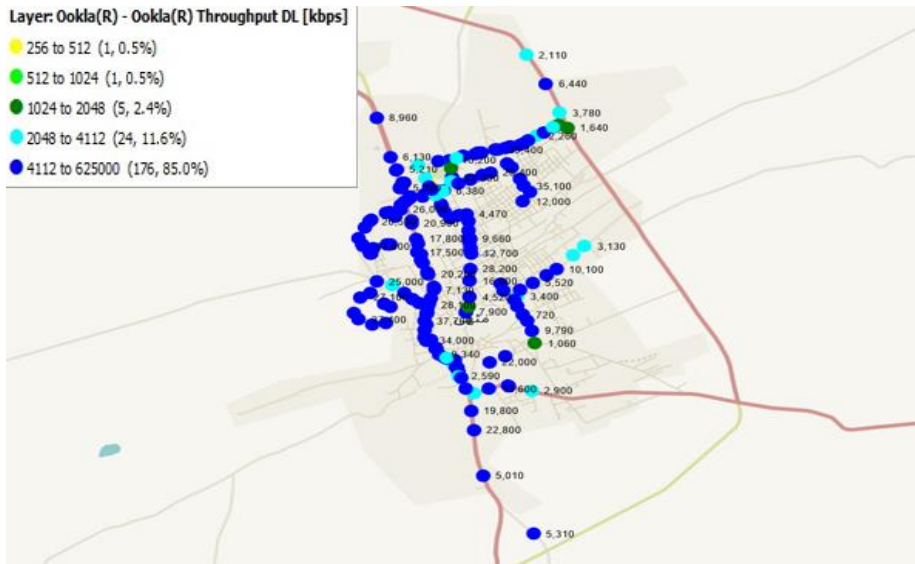
- 0 to 256 (9, 6.2%)
- 256 to 512 (18, 12.3%)
- 512 to 1024 (31, 21.2%)
- 1024 to 2048 (26, 17.8%)
- 2048 to 4112 (28, 19.2%)
- 4112 to 625000 (34, 23.3%)



UFONE DOWNLOAD THROUGHPUT – MITHI

Layer: Ookla(R) - Ookla(R) Throughput DL [kbps]

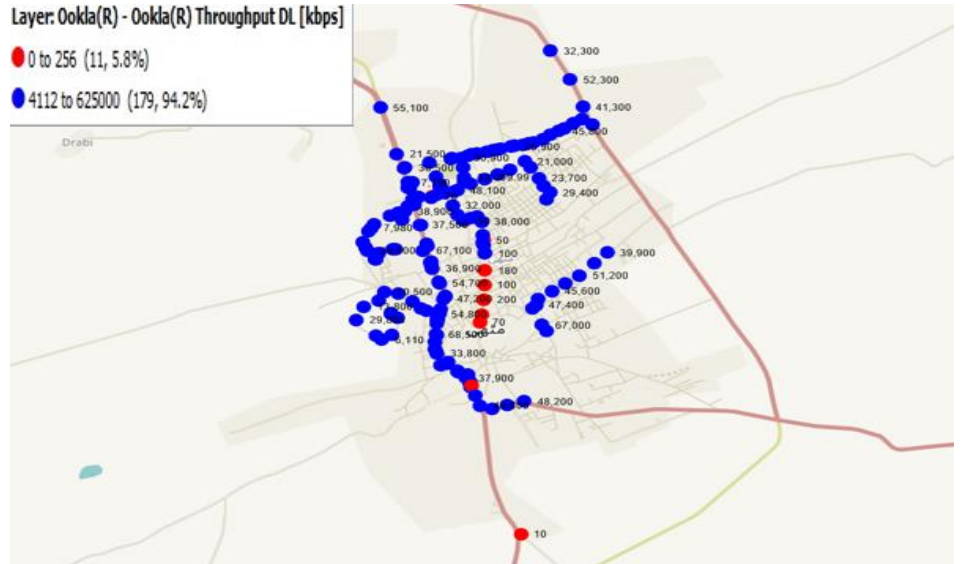
- 256 to 512 (1, 0.5%)
- 512 to 1024 (1, 0.5%)
- 1024 to 2048 (5, 2.4%)
- 2048 to 4112 (24, 11.6%)
- 4112 to 625000 (176, 85.0%)



ZONG DOWNLOAD THROUGHPUT – MITHI

Layer: Ookla(R) - Ookla(R) Throughput DL [kbps]

- 0 to 256 (11, 5.8%)
- 4112 to 625000 (179, 94.2%)



OOKLA SPEED TEST RESULTS

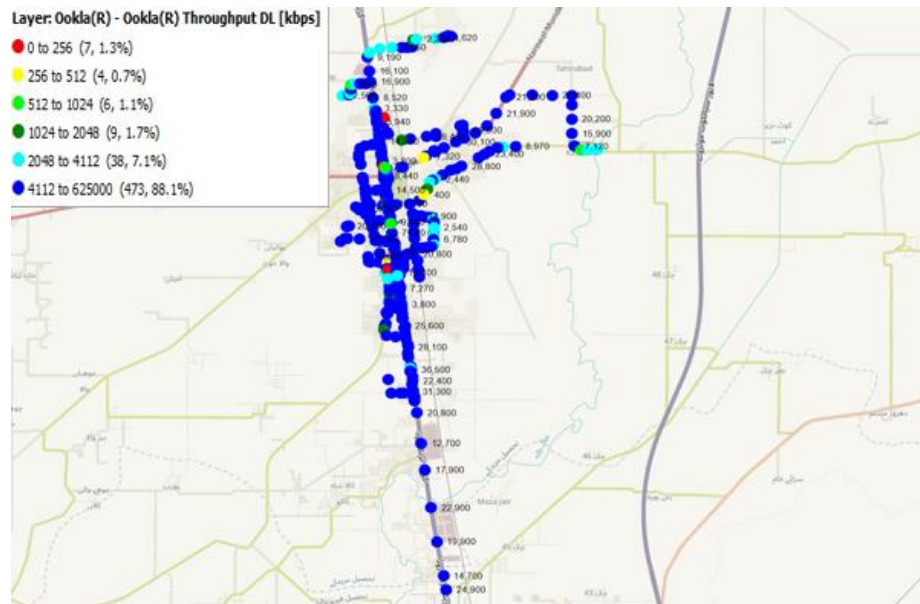
JAZZ DOWNLOAD THROUGHPUT – MURIDKE



TELENOR DOWNLOAD THROUGHPUT – MURIDKE



UFONE DOWNLOAD THROUGHPUT – MURIDKE

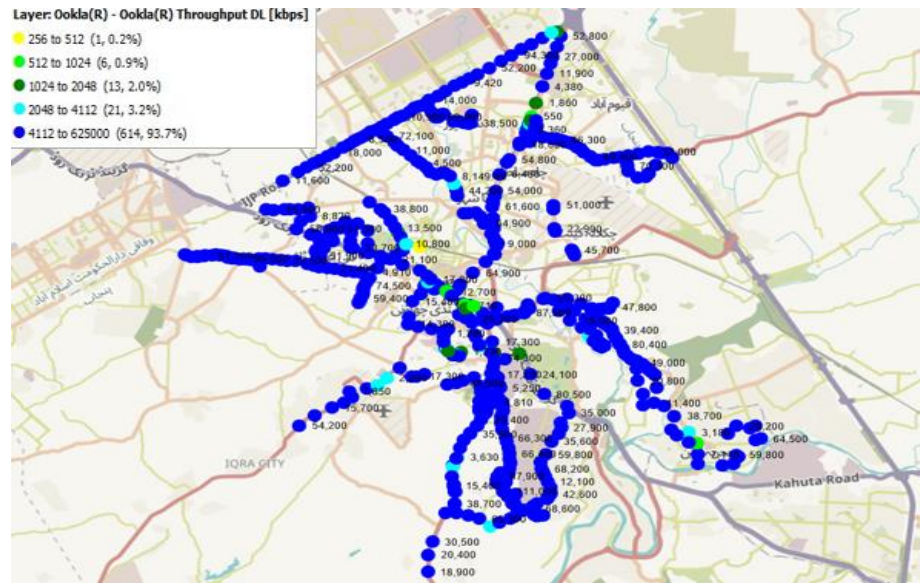


ZONG DOWNLOAD THROUGHPUT – MURIDKE

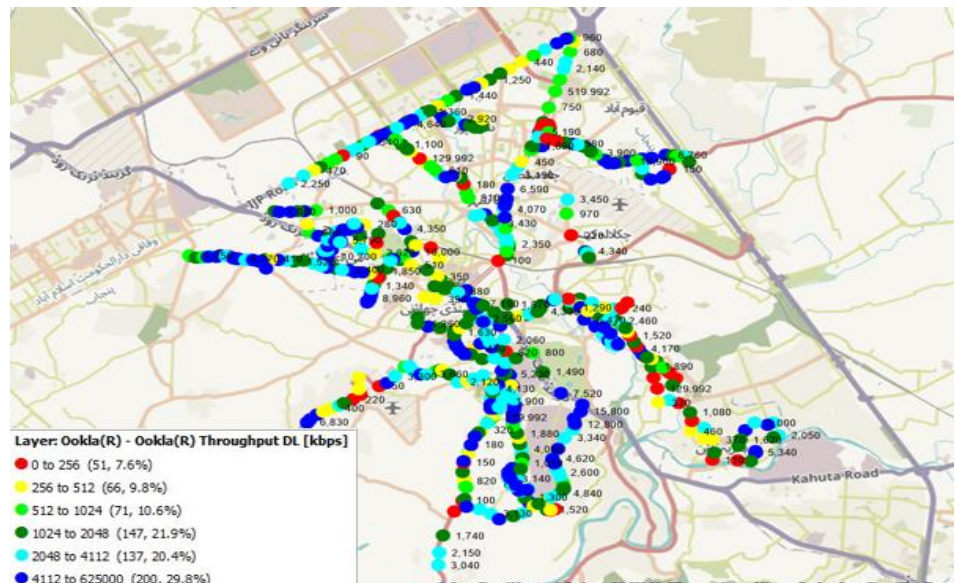


OOKLA SPEED TEST RESULTS

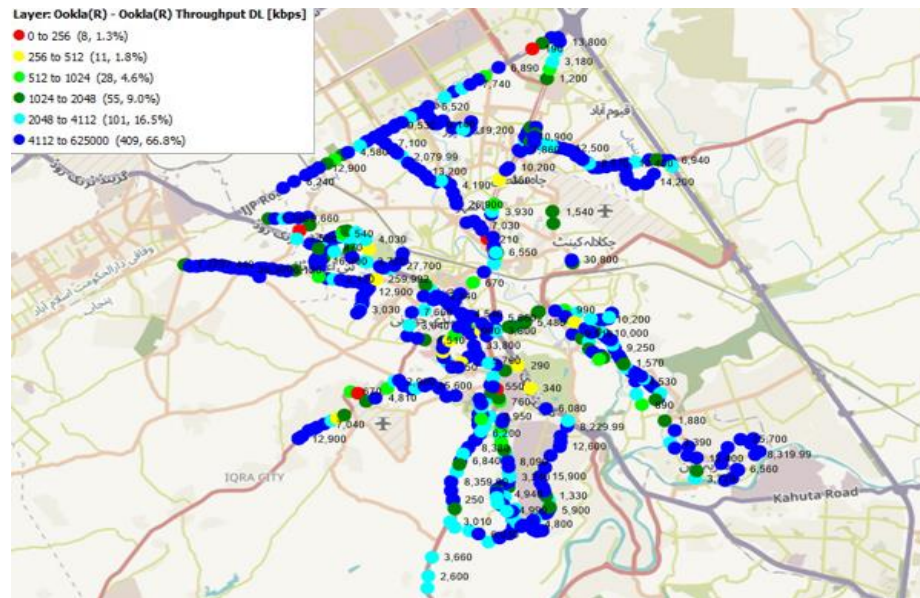
JAZZ DOWNLOAD THROUGHPUT - RAWALPINDI



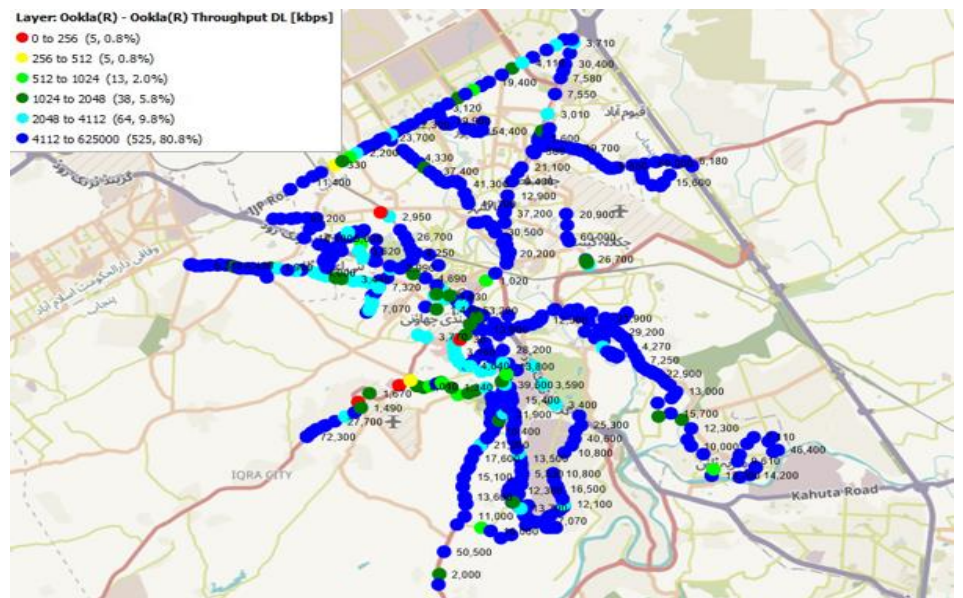
TELENOR DOWNLOAD THROUGHPUT - RAWALPINDI



UFONE DOWNLOAD THROUGHPUT - RAWALPINDI

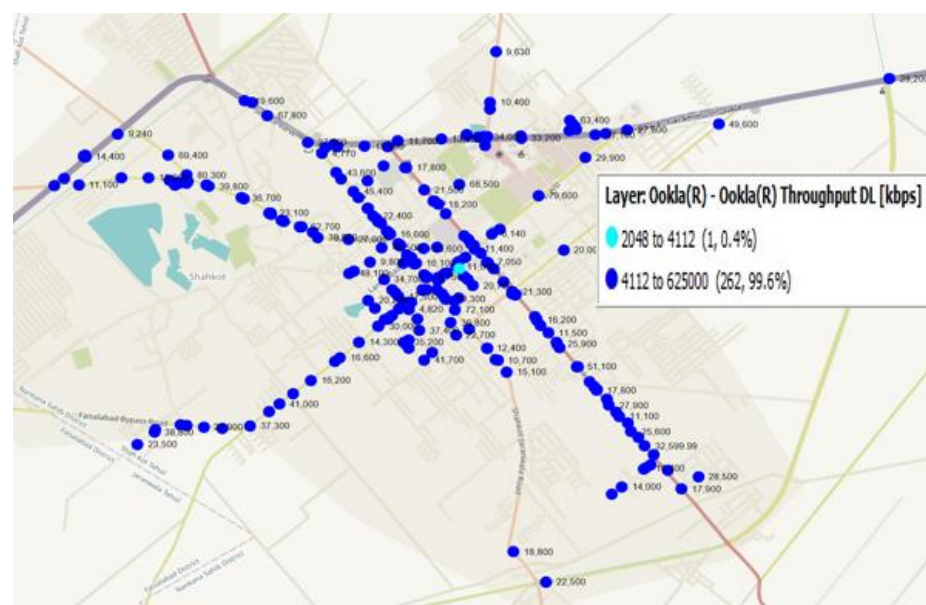


ZONG DOWNLOAD THROUGHPUT - RAWALPINDI

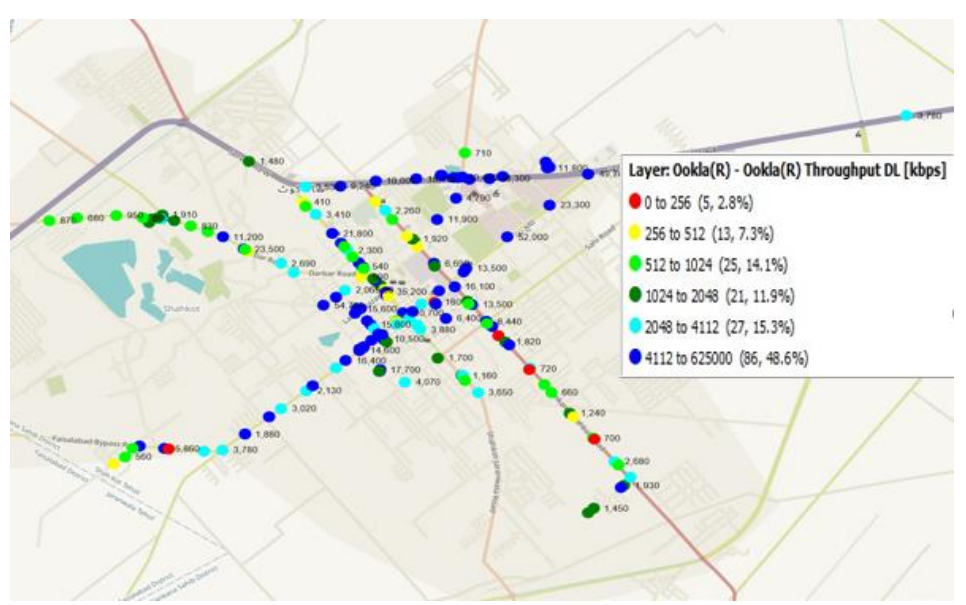


OOKLA SPEED TEST RESULTS

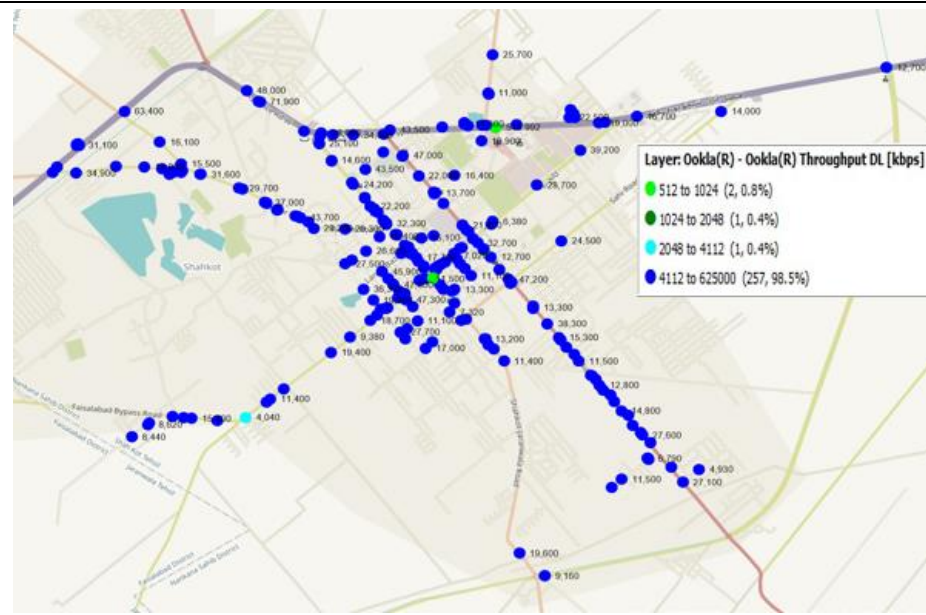
JAZZ DOWNLOAD THROUGHPUT – SHAHKOT



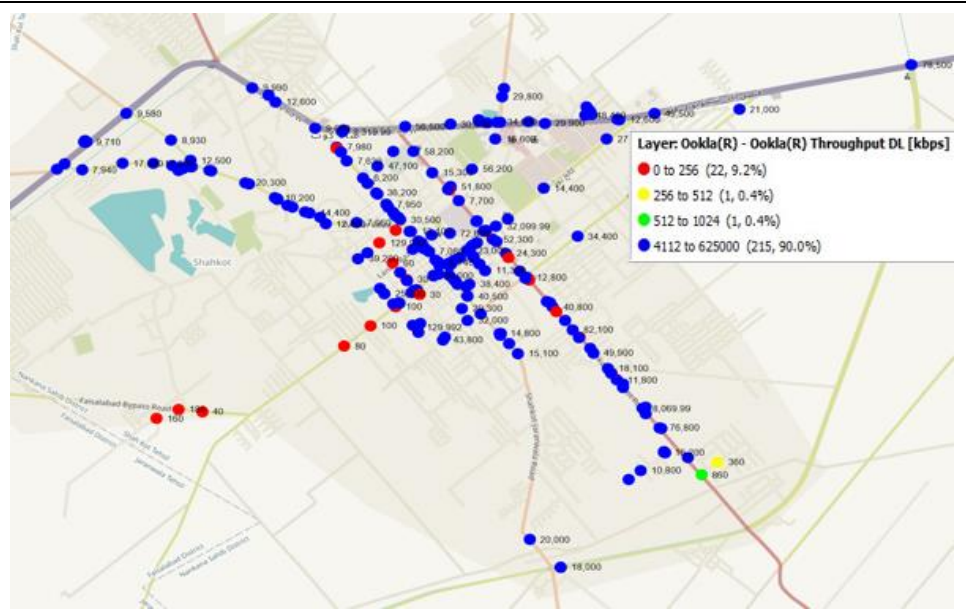
TELENOR DOWNLOAD THROUGHPUT – SHAHKOT



UFONE DOWNLOAD THROUGHPUT – SHAHKOT



ZONG DOWNLOAD THROUGHPUT – SHAHKOT



OOKLA SPEED TEST RESULTS

JAZZ DOWNLOAD THROUGHPUT – SUJAWAL



TELENOR DOWNLOAD THROUGHPUT – SUJAWAL



UFONE DOWNLOAD THROUGHPUT – SUJAWAL

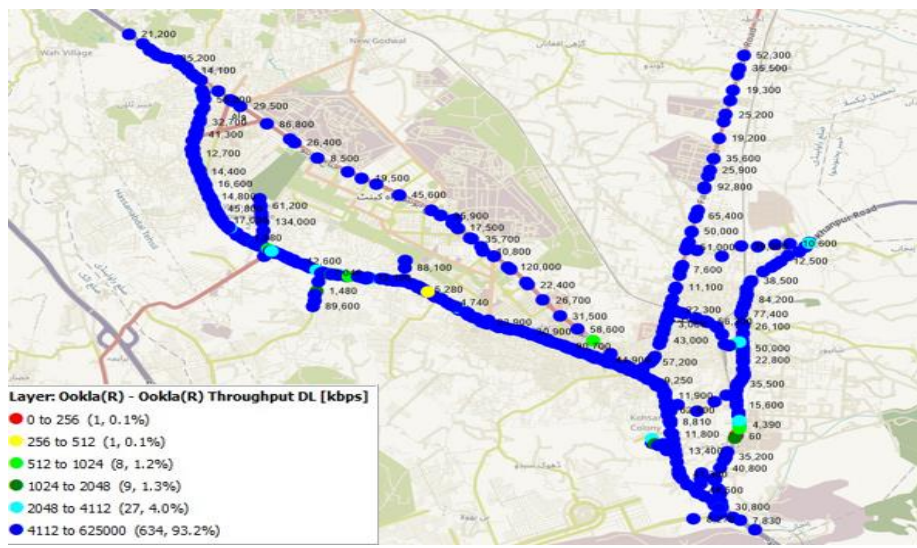


ZONG DOWNLOAD THROUGHPUT – SUJAWAL

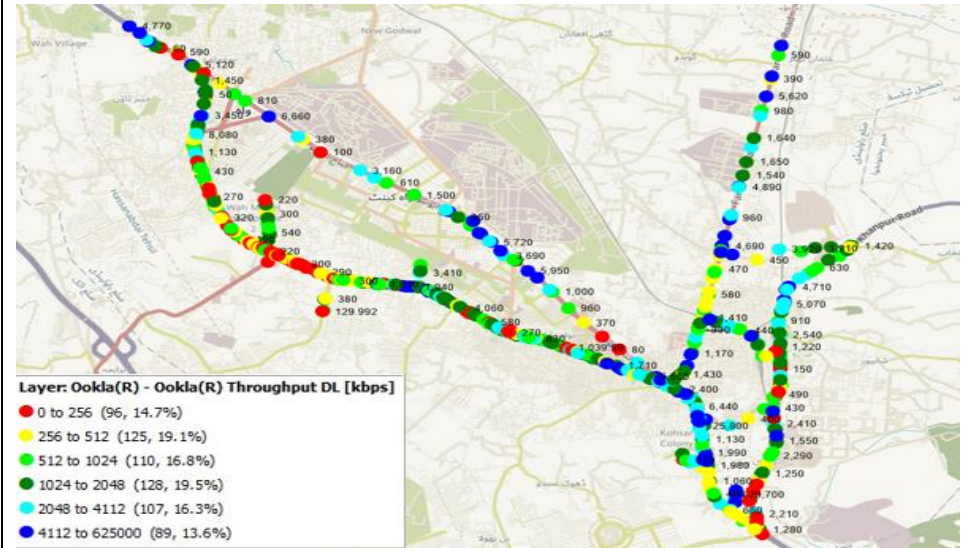


OOKLA SPEED TEST RESULTS

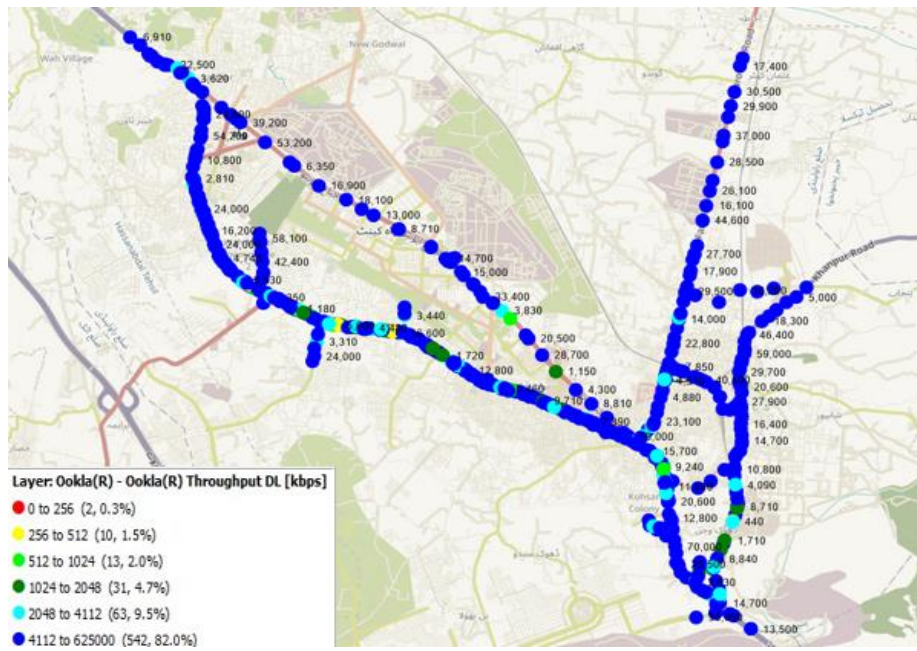
JAZZ DOWNLOAD THROUGHPUT – TAXILA & WAH CANTT



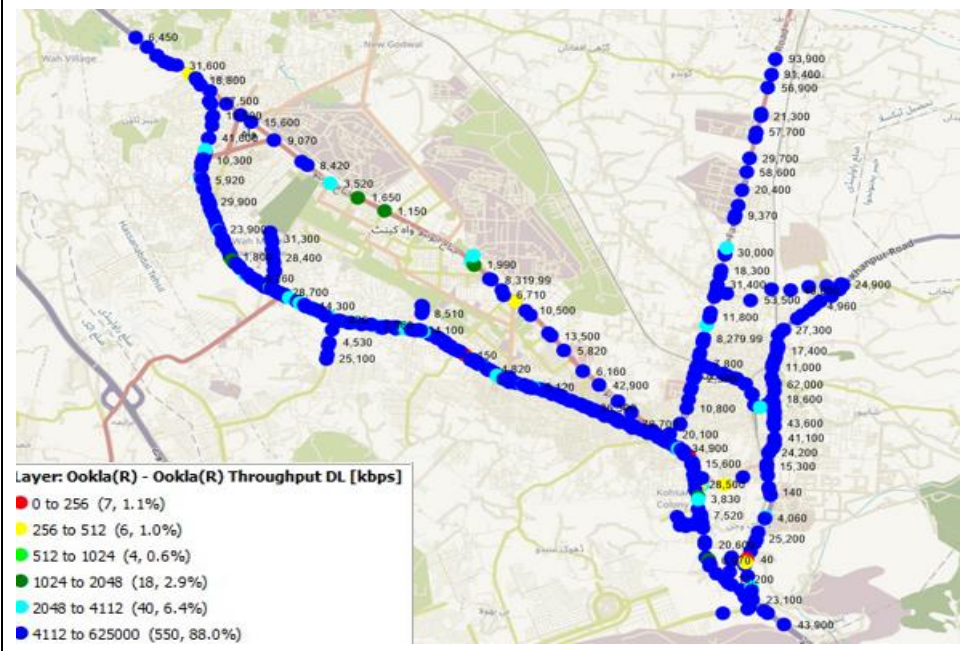
TELEOR DOWNLOAD THROUGHPUT – TAXILA & WAH CANTT



UFONE DOWNLOAD THROUGHPUT – TAXILA & WAH CANTT

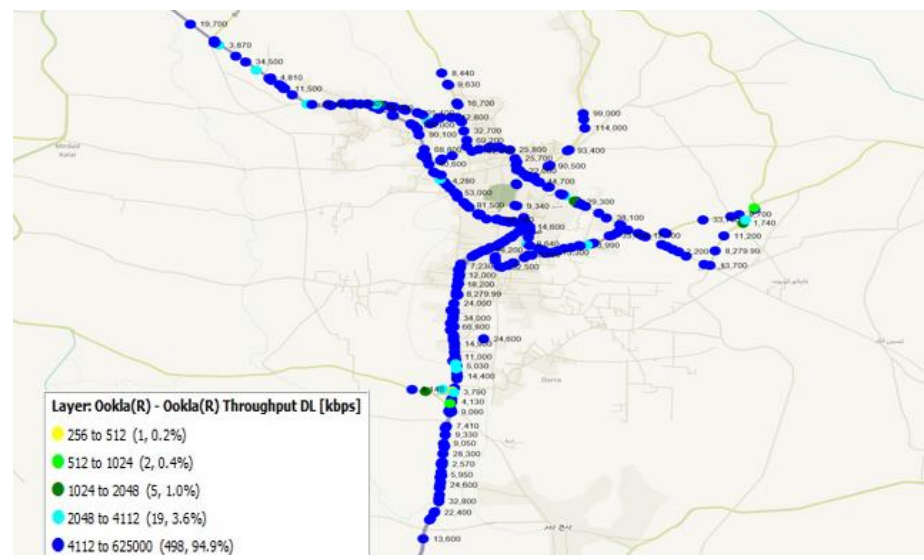


ZONG DOWNLOAD THROUGHPUT – TAXILA & WAH CANTT



OOKLA SPEED TEST RESULTS

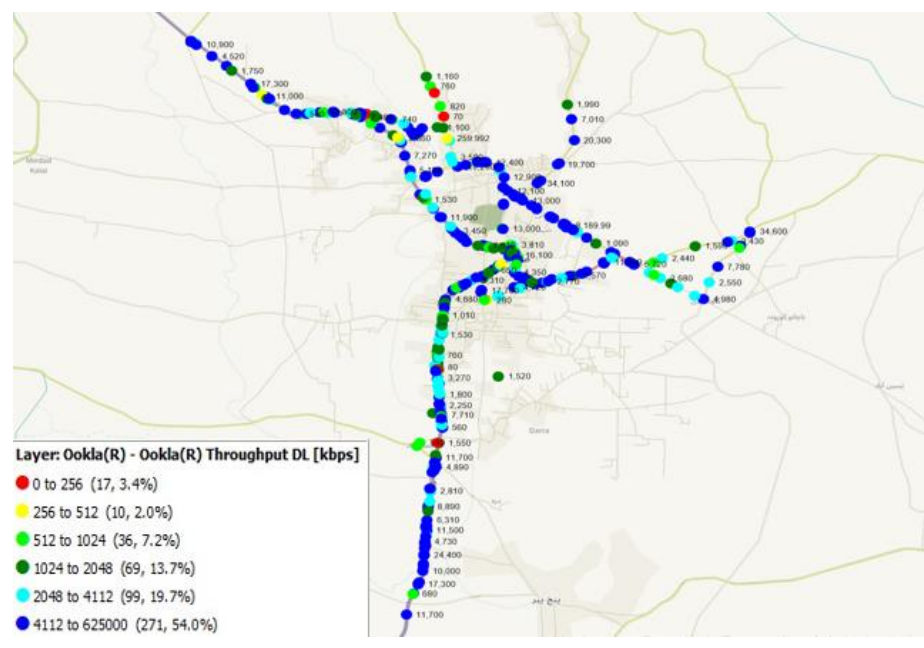
JAZZ DOWNLOAD THROUGHPUT – SWABI



TELENOR DOWNLOAD THROUGHPUT – SWABI



UFONE DOWNLOAD THROUGHPUT – SWABI

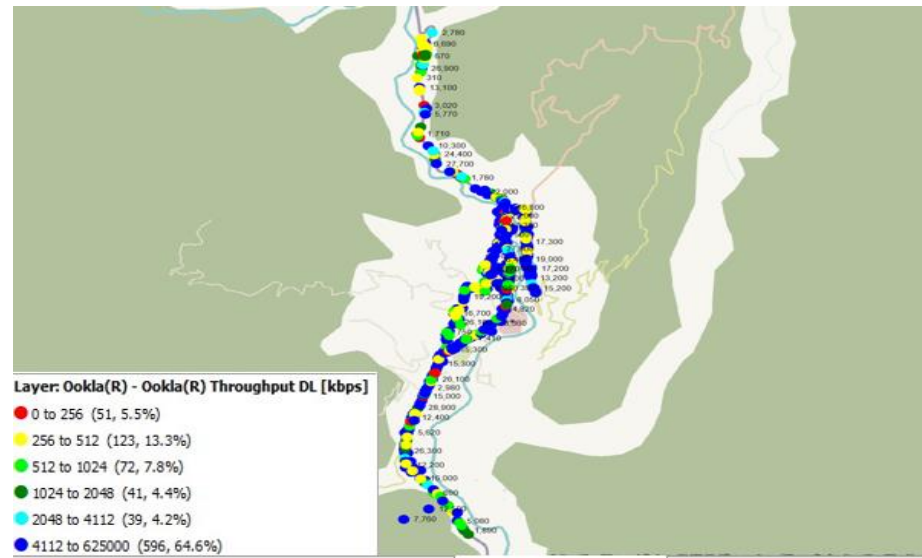


ZONG DOWNLOAD THROUGHPUT – SWABI

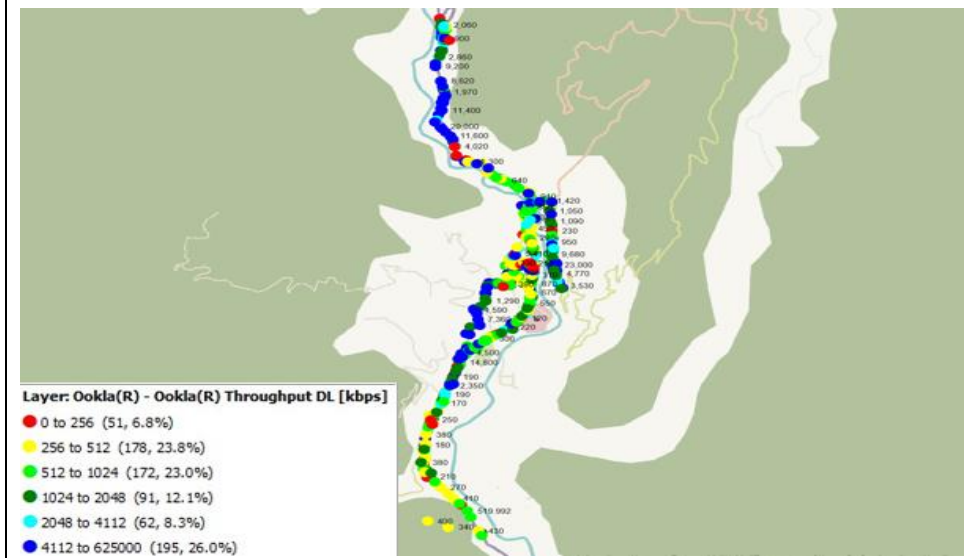


OOKLA SPEED TEST RESULTS

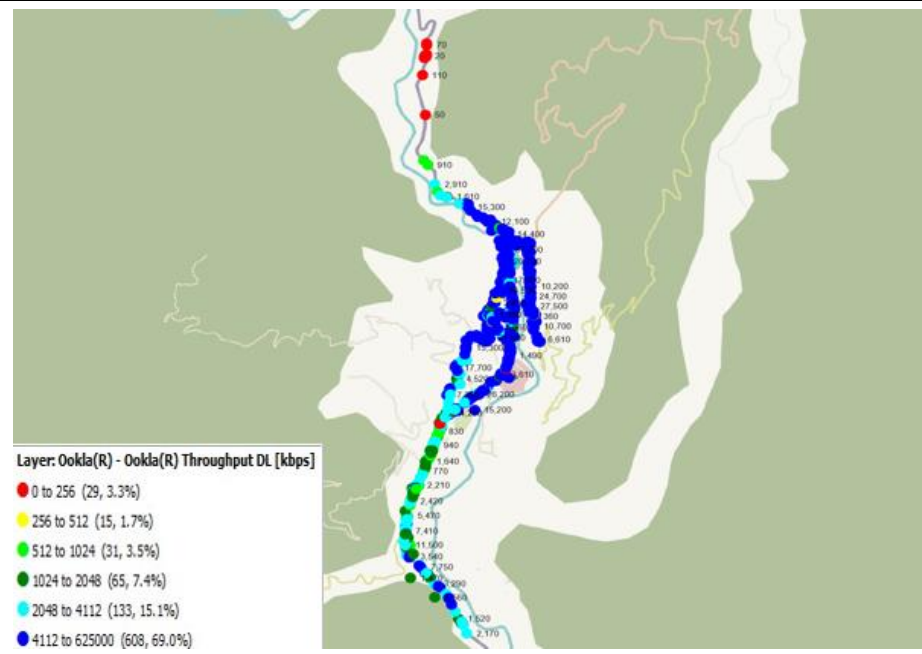
JAZZ DOWNLOAD THROUGHPUT - UPPER DIR



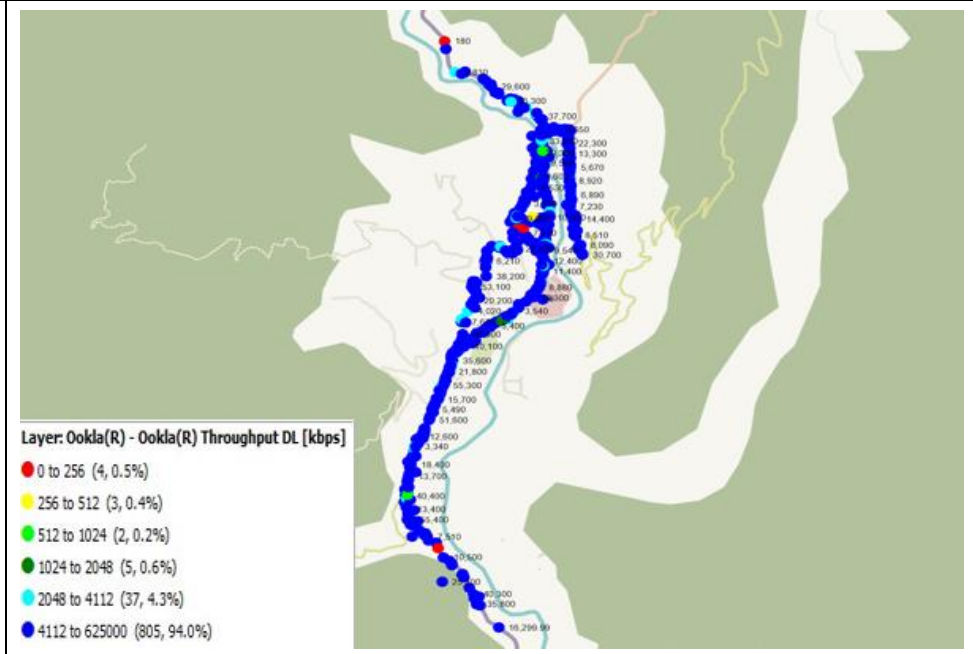
TELENOR DOWNLOAD THROUGHPUT - UPPER DIR



UFONE DOWNLOAD THROUGHPUT - UPPER DIR



ZONG DOWNLOAD THROUGHPUT - UPPER DIR

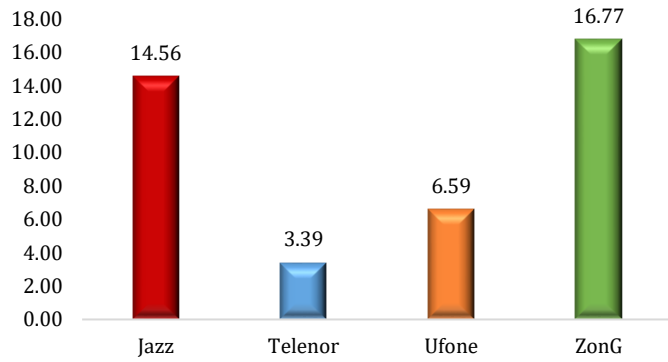


Annex -B1 (Data QoS Results)

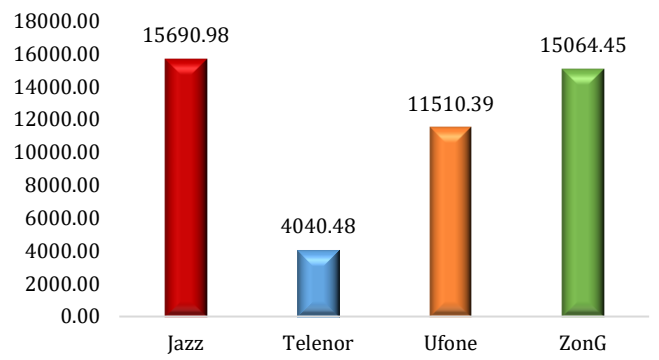
OOKLA

QUALITY OF SERVICE SURVEY RESULTS (Ookla) – ABBOTTABAD

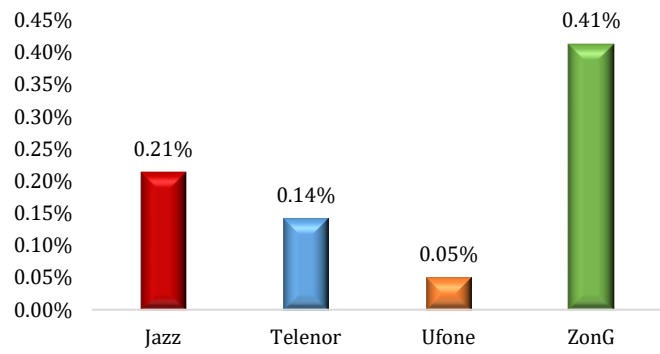
User Data Throughput Download > 3 Mbps



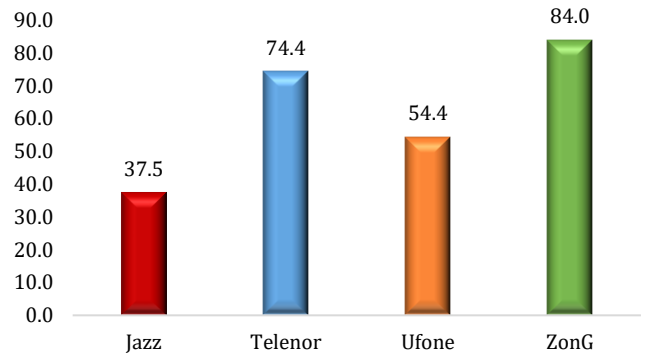
User Data Throughput Upload > 768 Kbps



Packet Loss

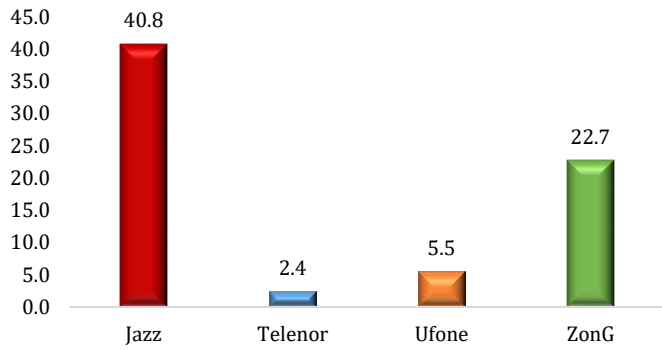


Latency < 75 ms

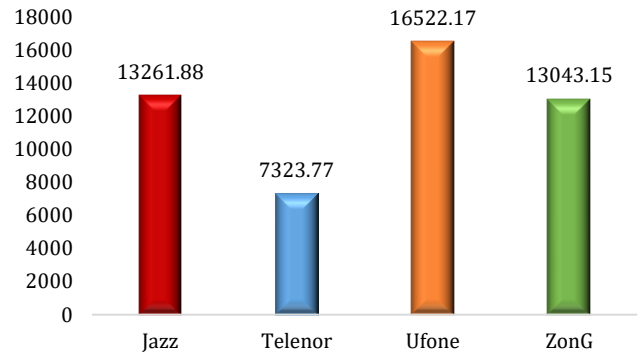


QUALITY OF SERVICE SURVEY RESULTS (Ookla) –BUNER

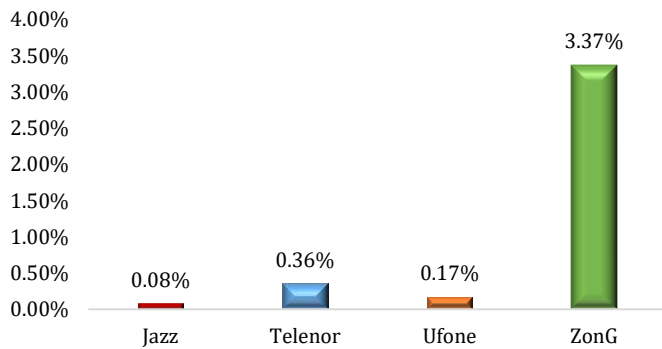
User Data Throughput Download > 3 Mbps



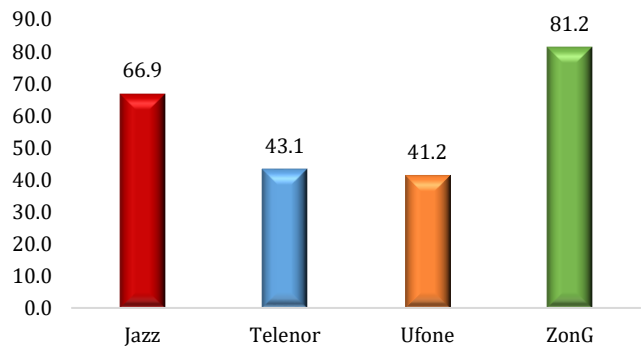
User Data Throughput Upload > 768 Kbps



Packet Loss

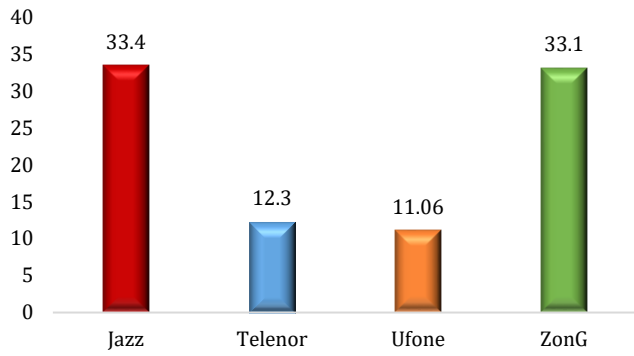


Latency <75 ms

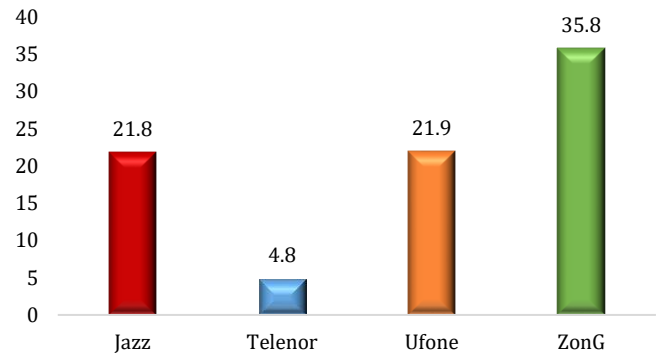


QUALITY OF SERVICE SURVEY RESULTS (Ookla) – JACOBABAD

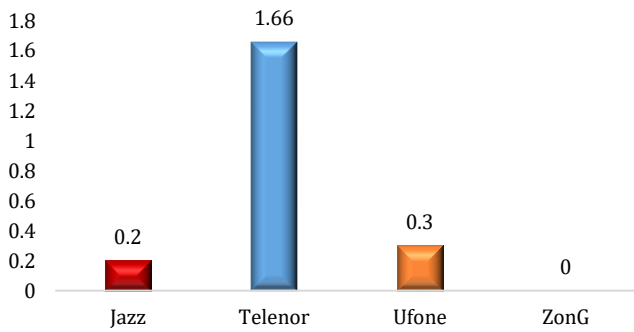
User Data Throughput Download > 3 Mbps



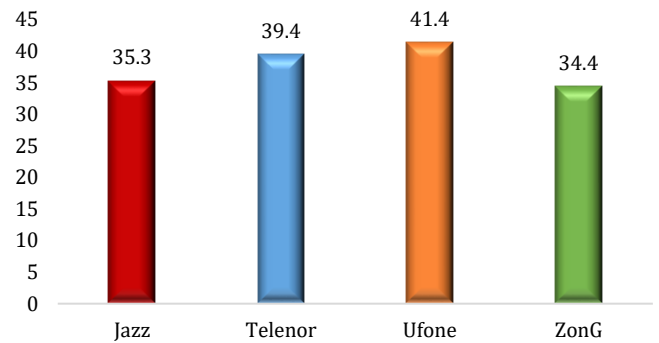
User Data Throughput Upload > 768 Kbps



Packet Loss

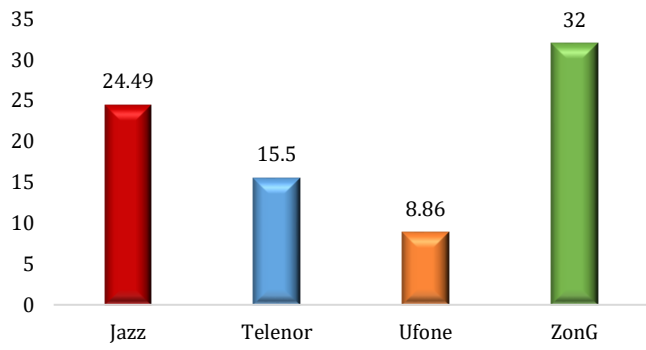


Latency < 75 ms

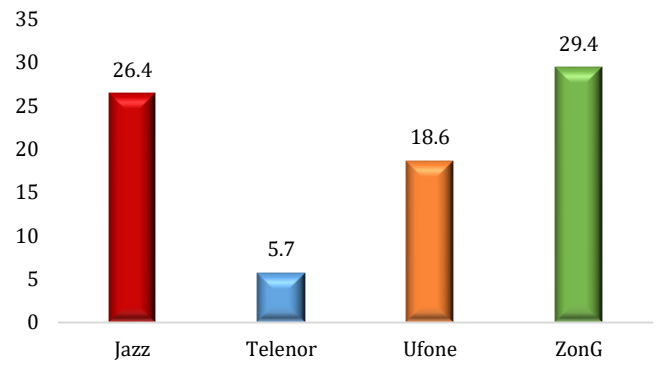


QUALITY OF SERVICE SURVEY RESULTS (Ookla) –KHAIRPUR

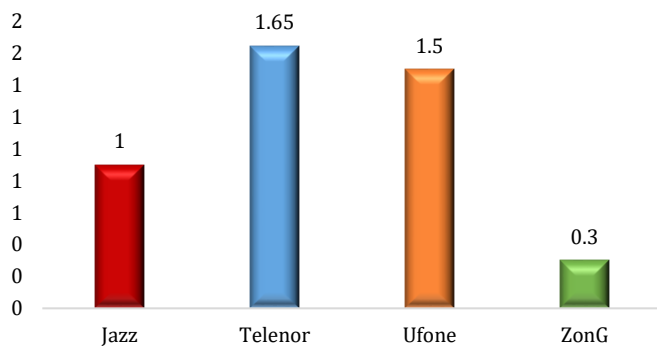
User Data Throughput Download > 3 Mbps



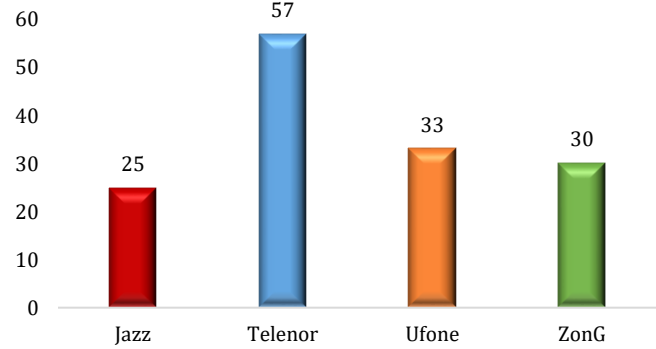
User Data Throughput Upload > 768 Kbps



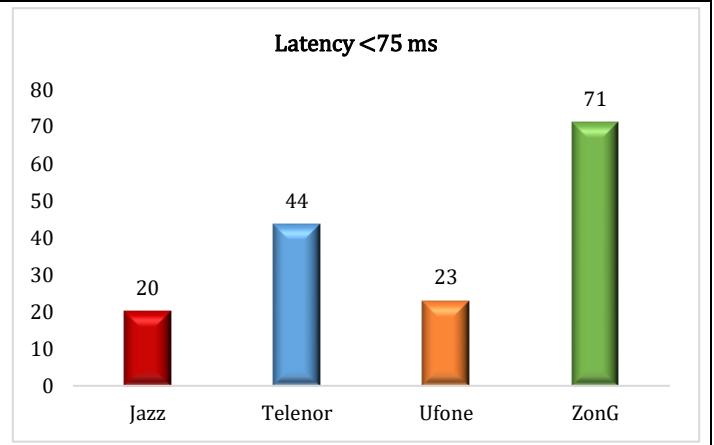
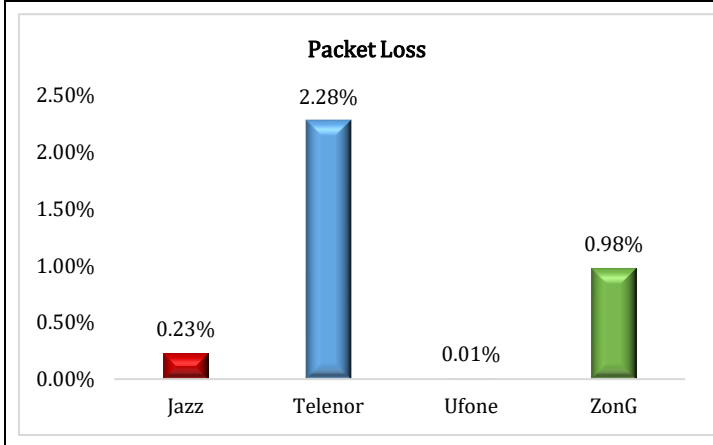
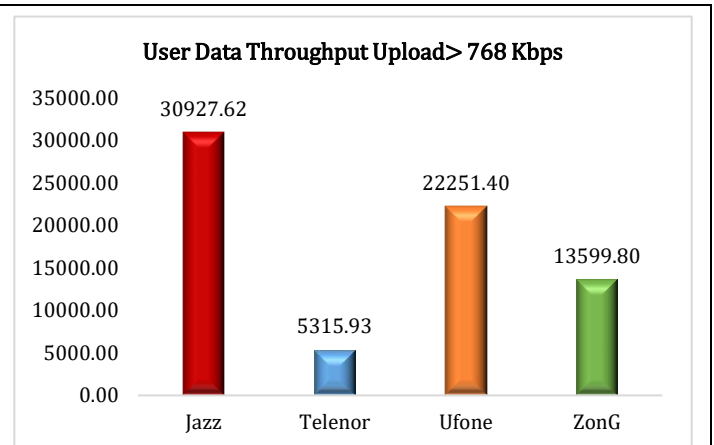
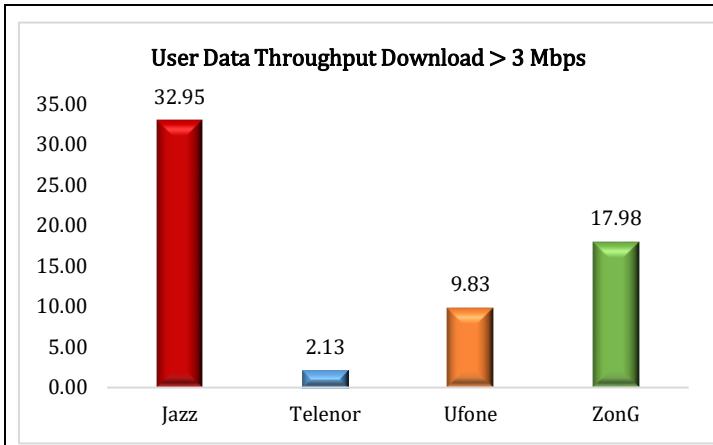
Packet Loss



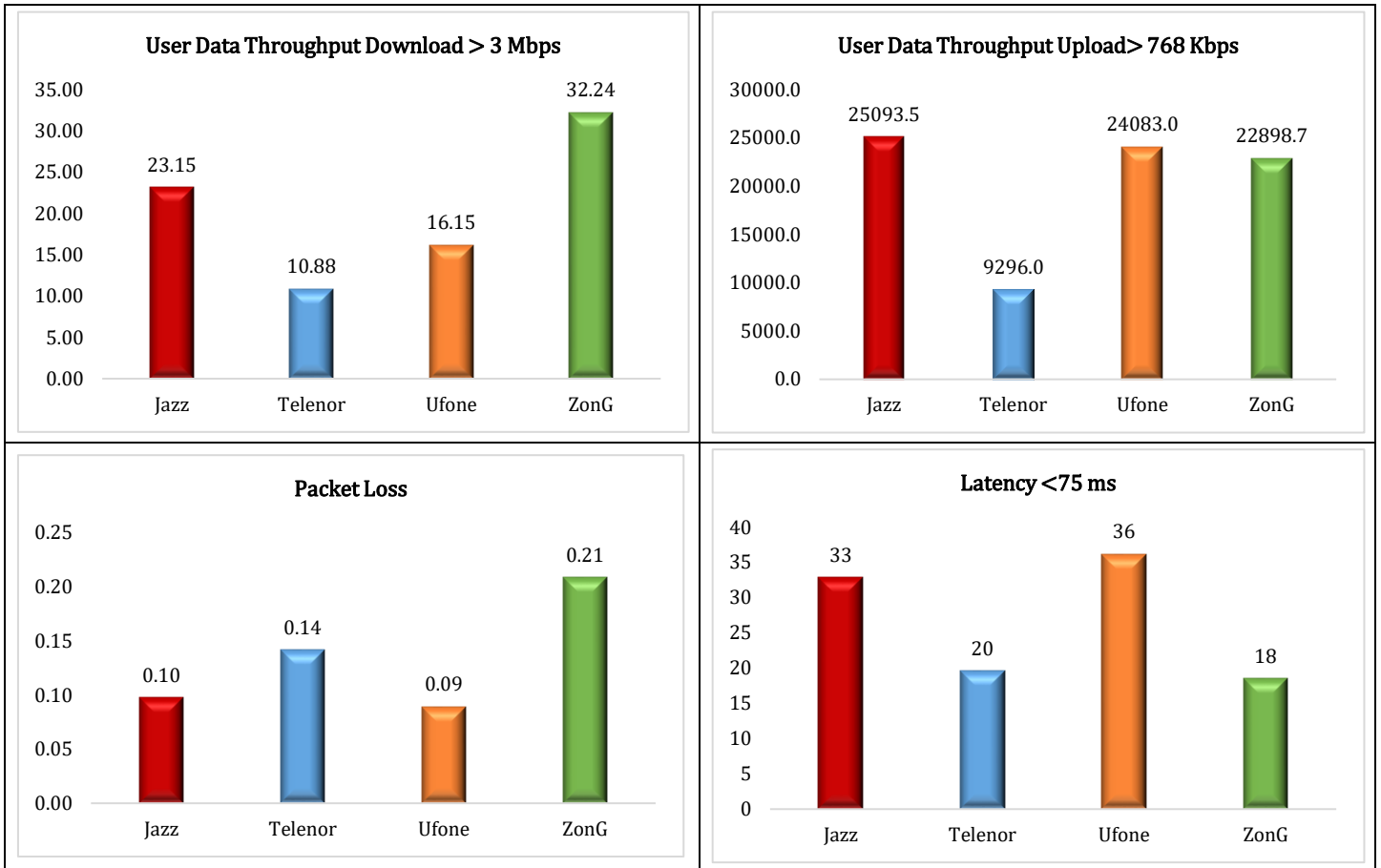
Latency < 75 ms



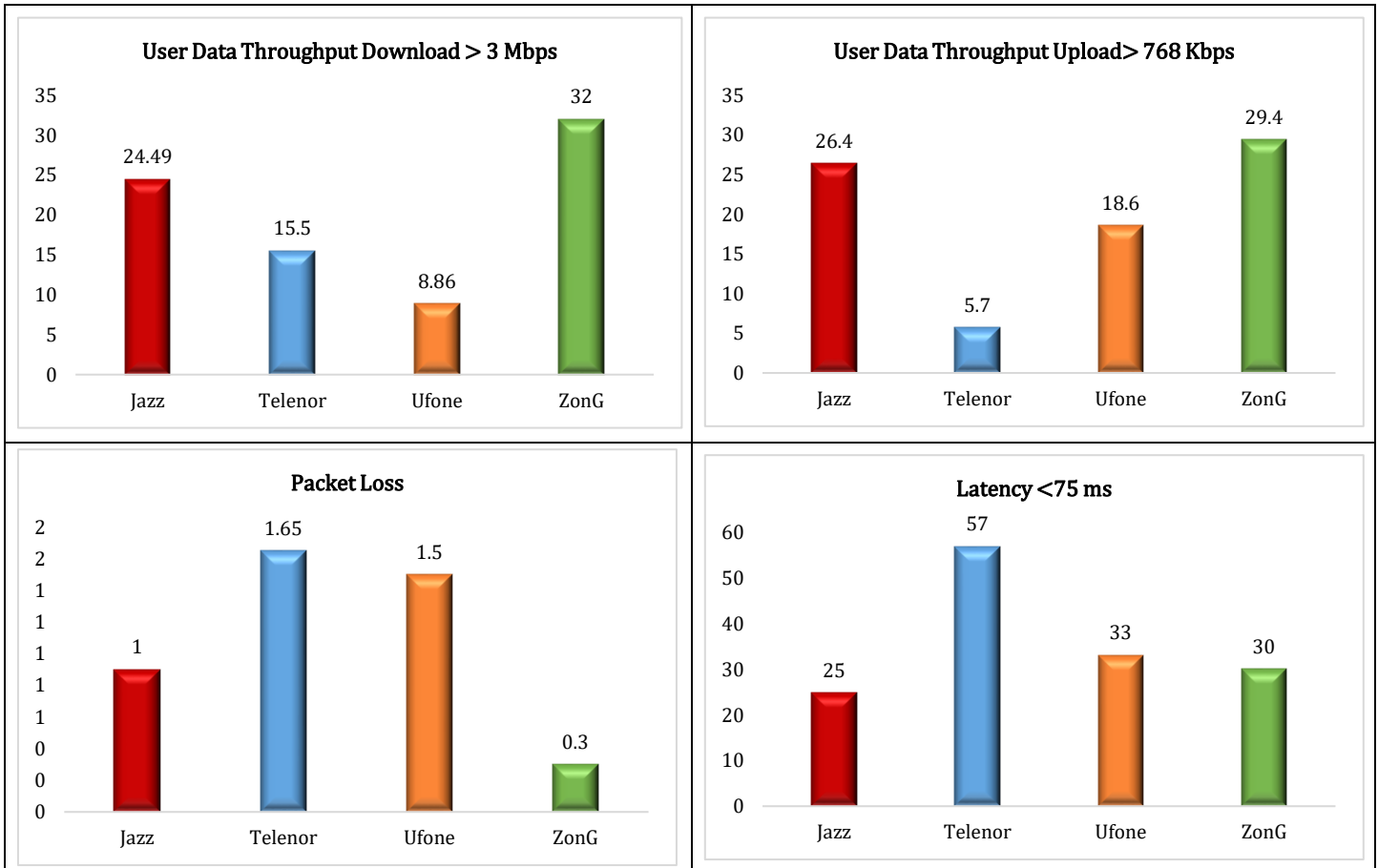
QUALITY OF SERVICE SURVEY RESULTS (Ookla) – GUJAR KHAN



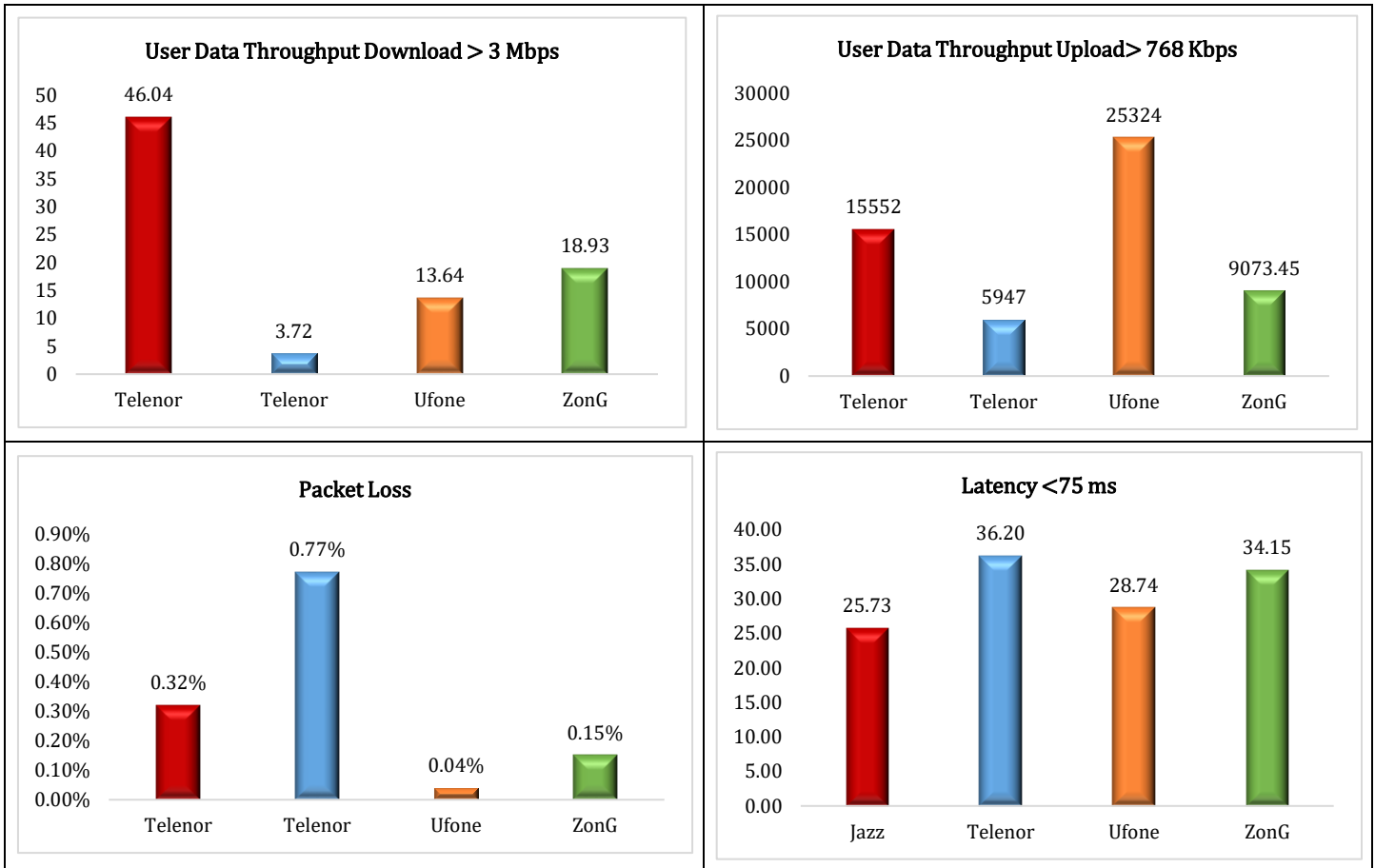
QUALITY OF SERVICE SURVEY RESULTS (Ookla) –LAHORE



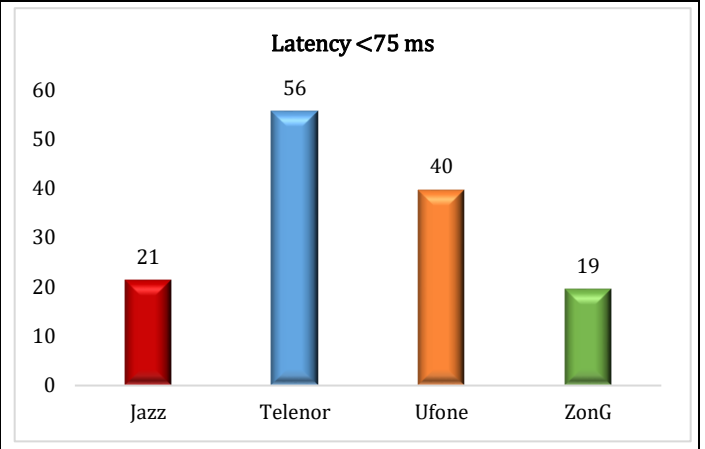
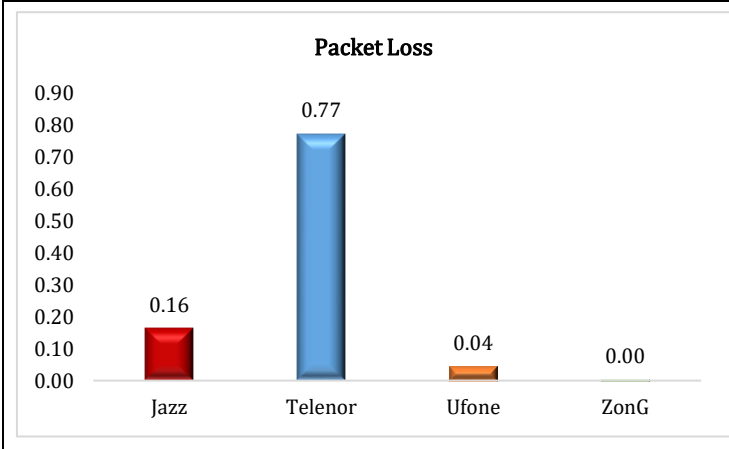
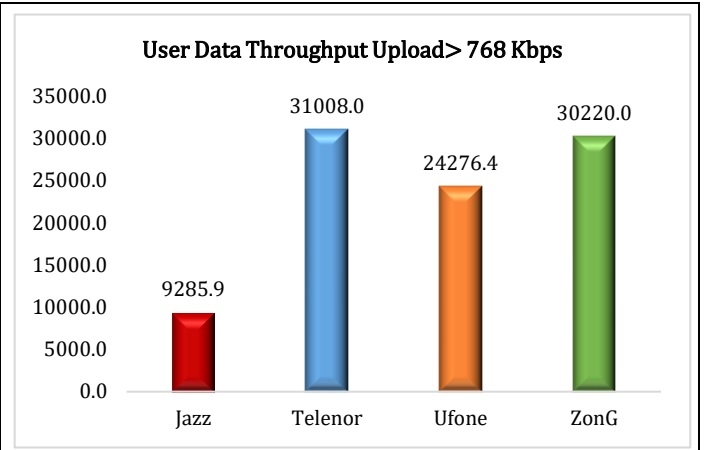
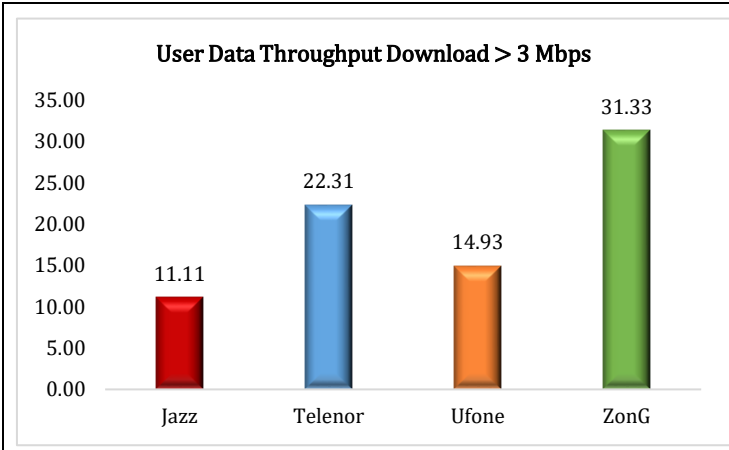
QUALITY OF SERVICE SURVEY RESULTS (Ookla) -LARKANA



QUALITY OF SERVICE SURVEY RESULTS (Ookla) – MITHI

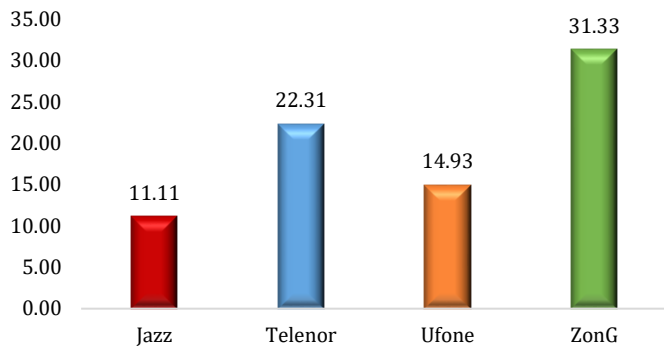


QUALITY OF SERVICE SURVEY RESULTS (Ookla) –MURIDKE

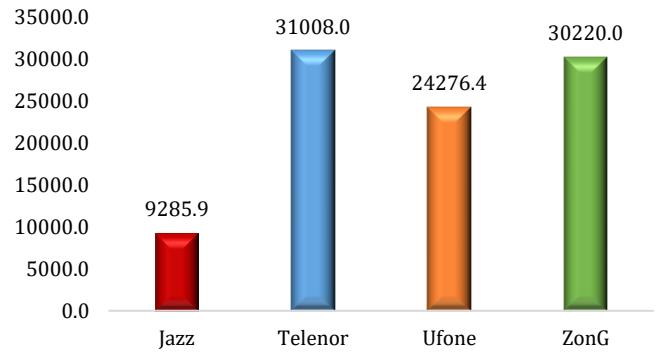


QUALITY OF SERVICE SURVEY RESULTS (Ookla) –RAWALPINDI

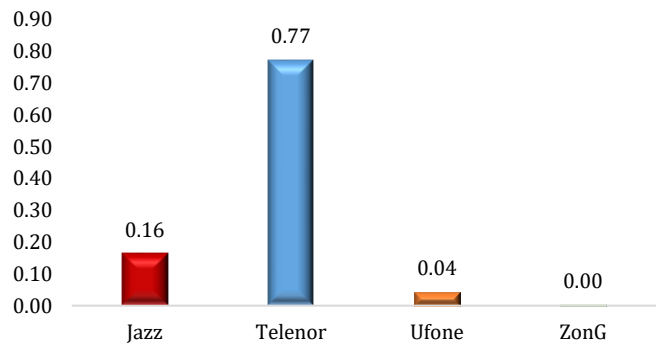
User Data Throughput Download > 3 Mbps



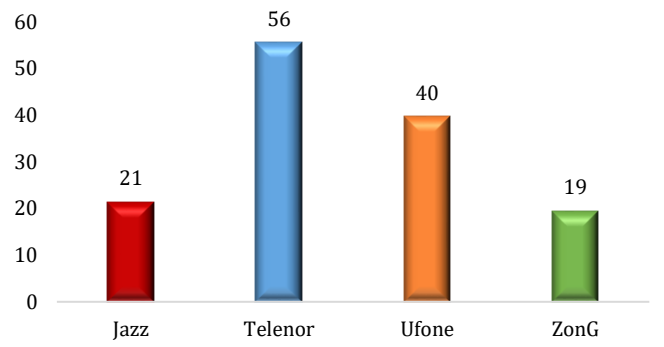
User Data Throughput Upload > 768 Kbps



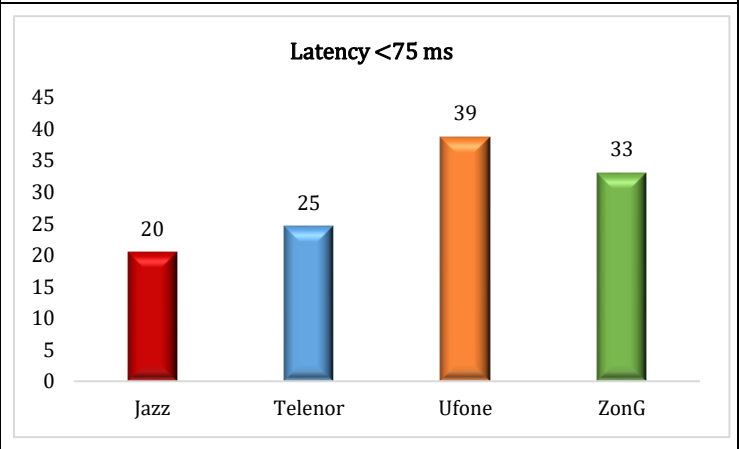
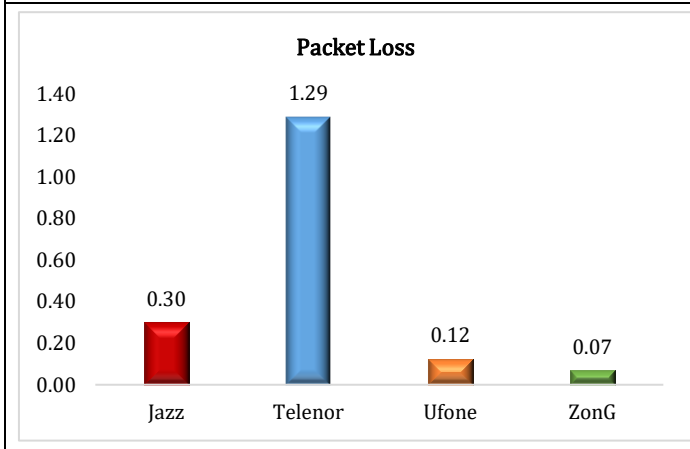
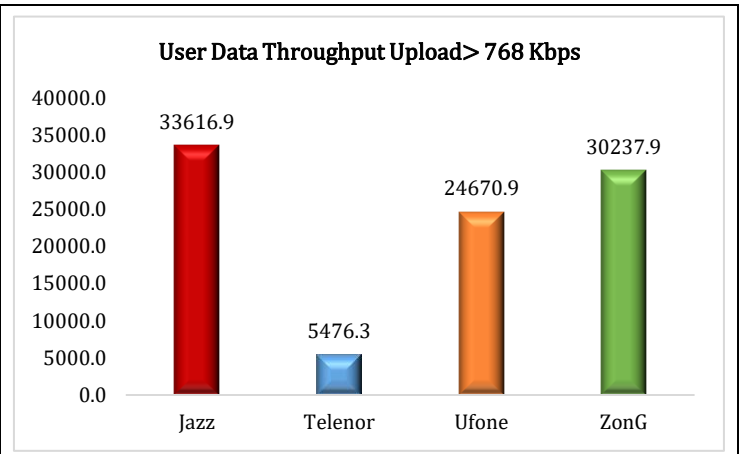
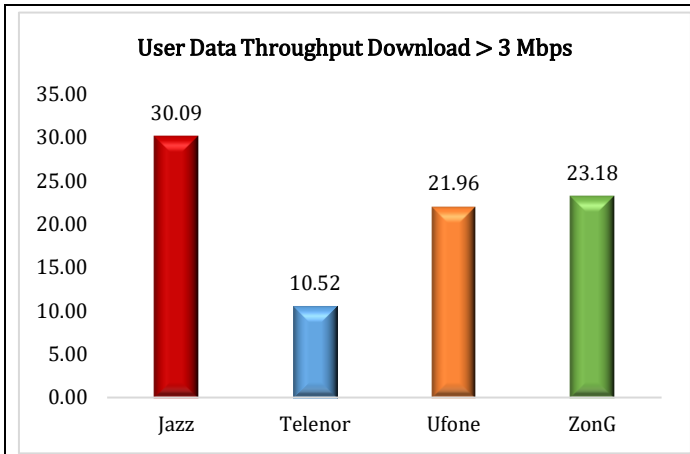
Packet Loss



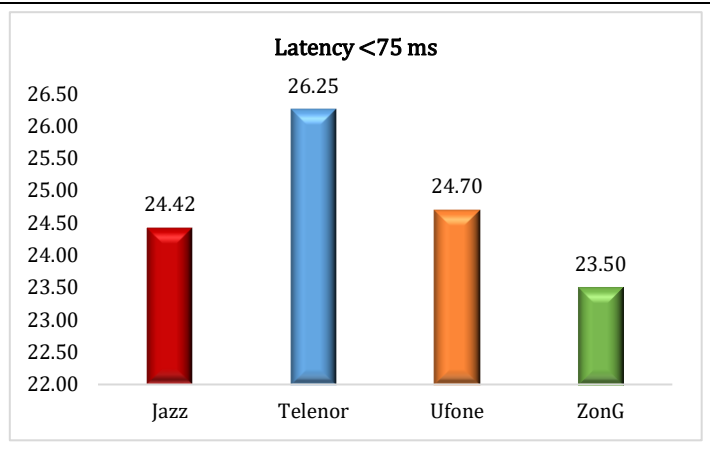
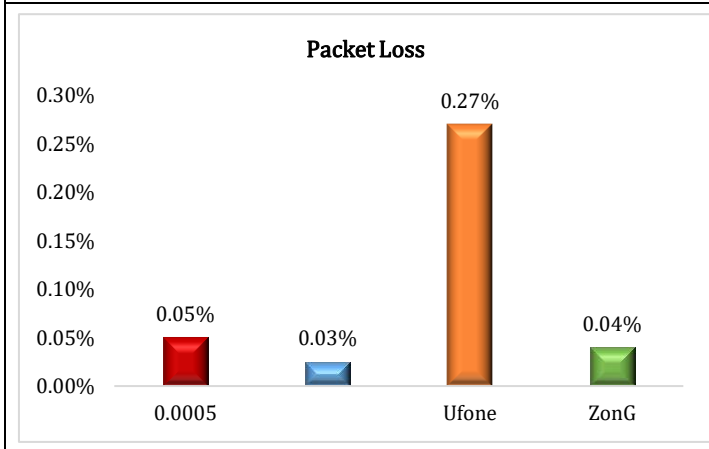
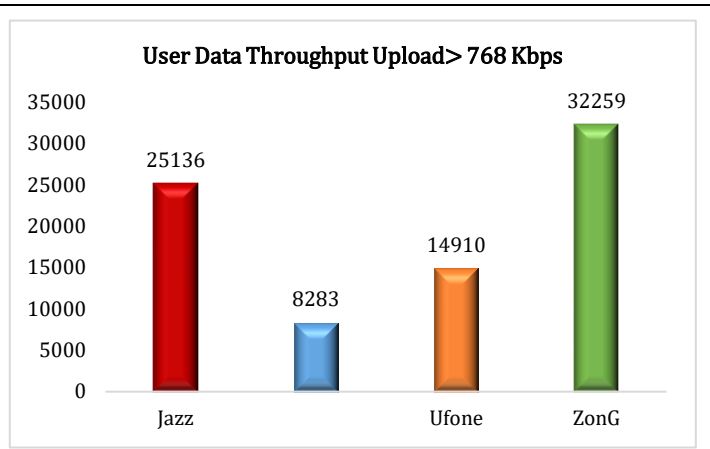
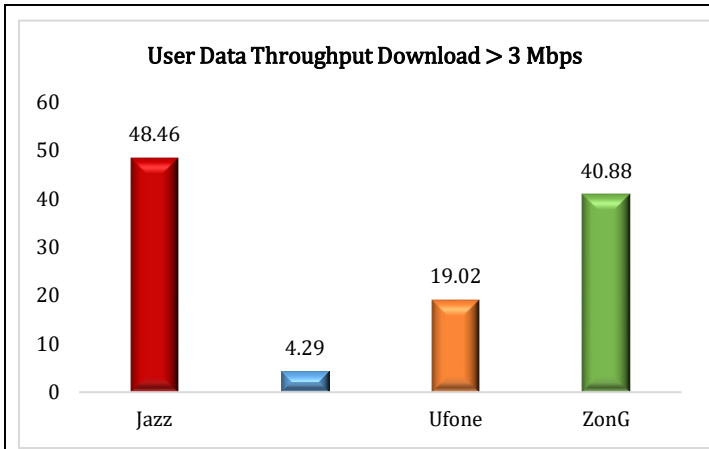
Latency <75 ms



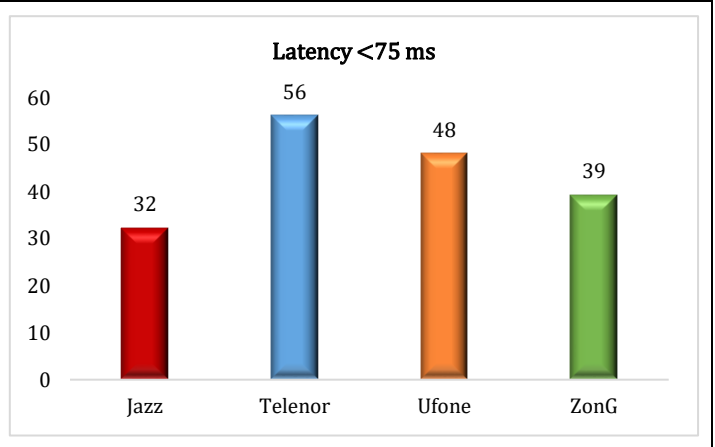
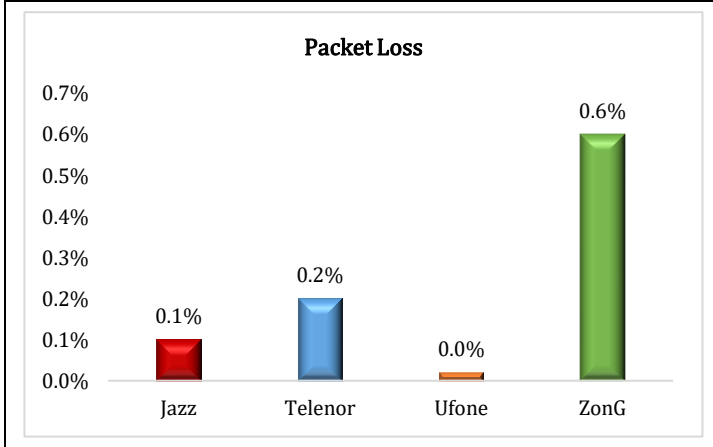
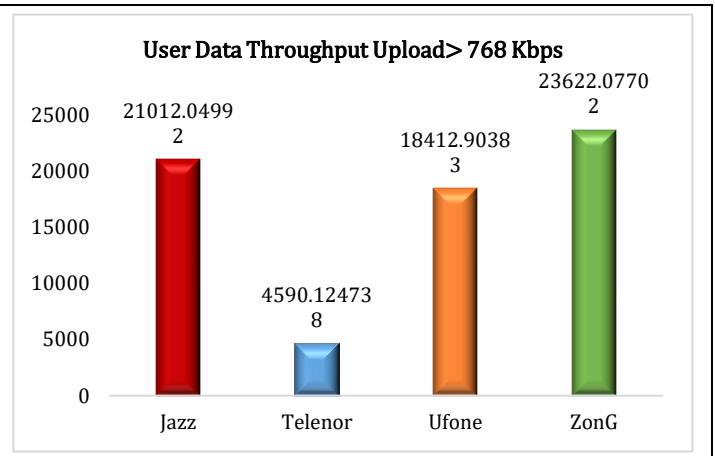
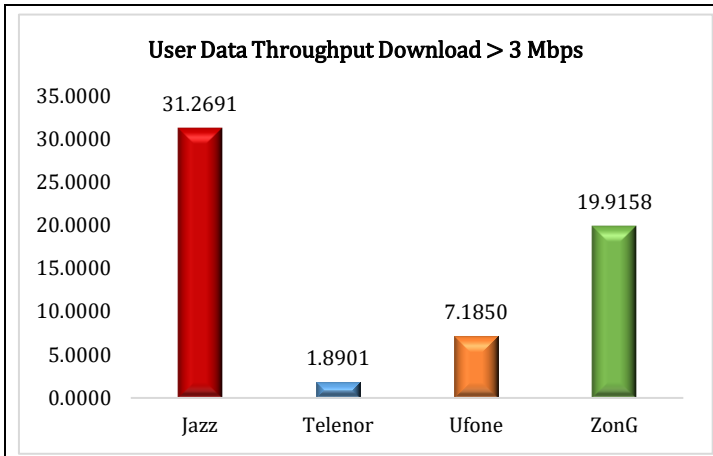
QUALITY OF SERVICE SURVEY RESULTS (Ookla) –SHAHKOT



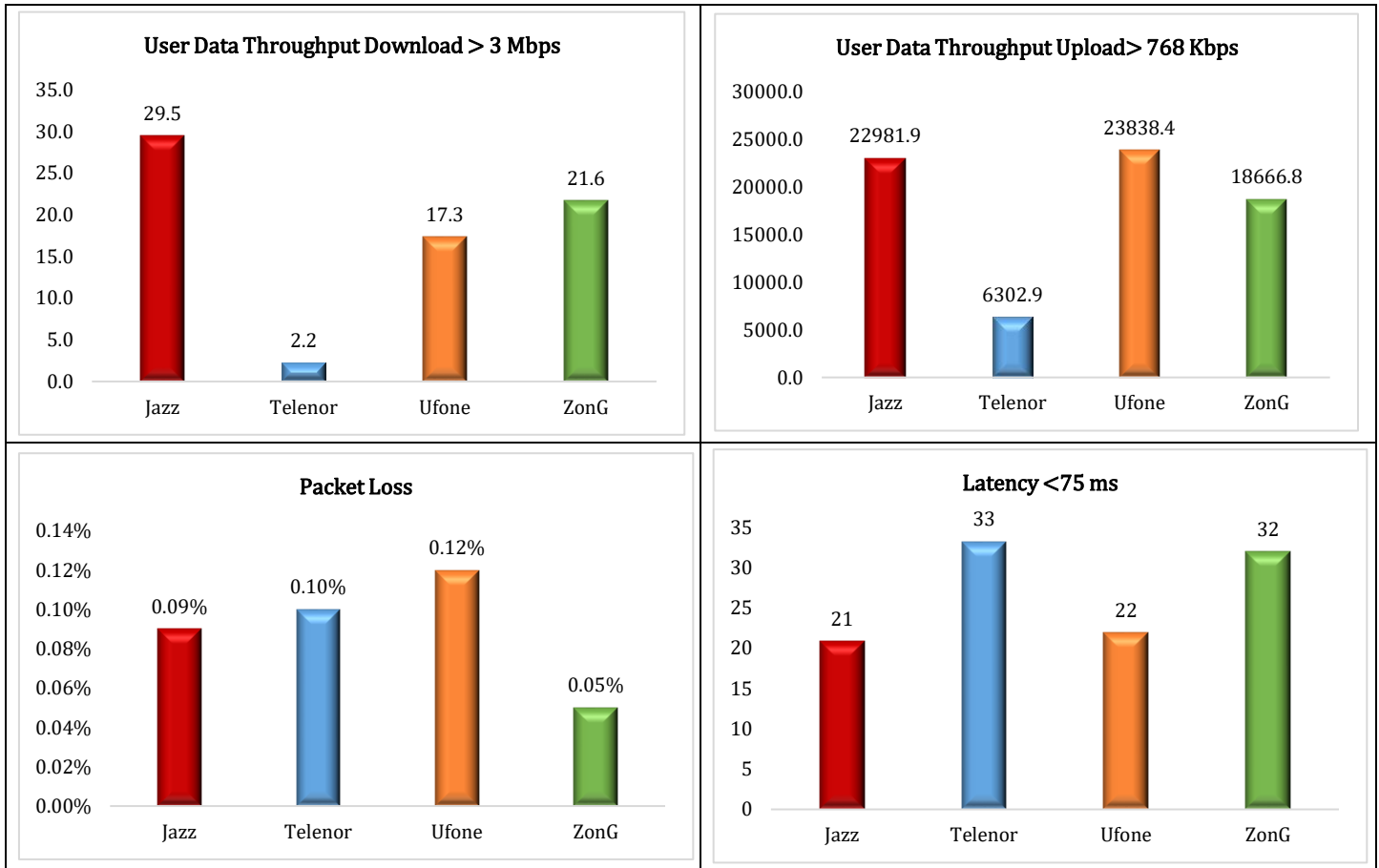
QUALITY OF SERVICE SURVEY RESULTS (Ookla) -SUJAWAL



QUALITY OF SERVICE SURVEY RESULTS (Ookla) –SWABI

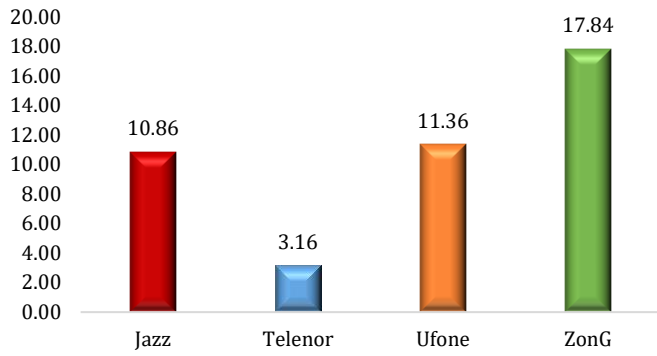


QUALITY OF SERVICE SURVEY RESULTS (Ookla) – TAXILA & WAH CANTT

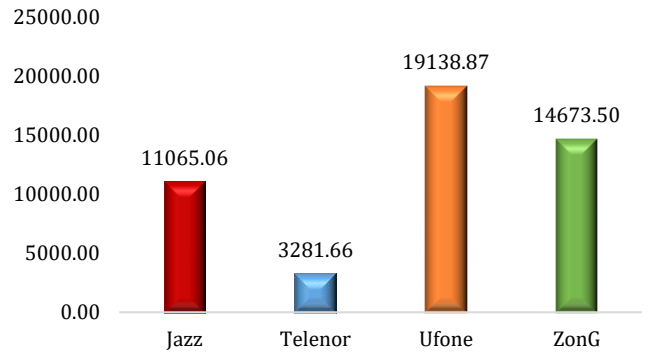


QUALITY OF SERVICE SURVEY RESULTS (Ookla) –UPPER DIR

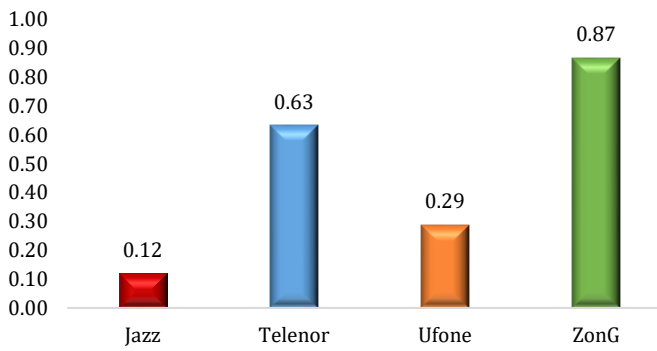
User Data Throughput Download > 3 Mbps



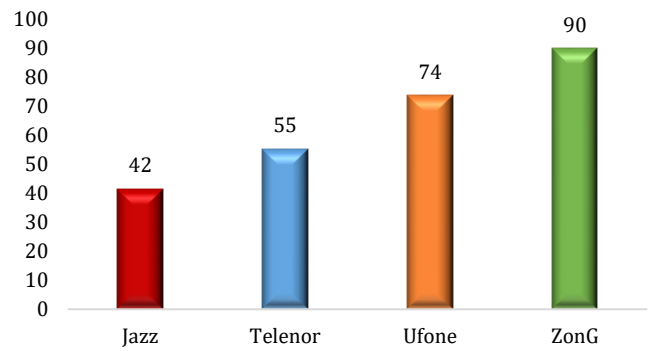
User Data Throughput Upload > 768 Kbps



Packet Loss(%)



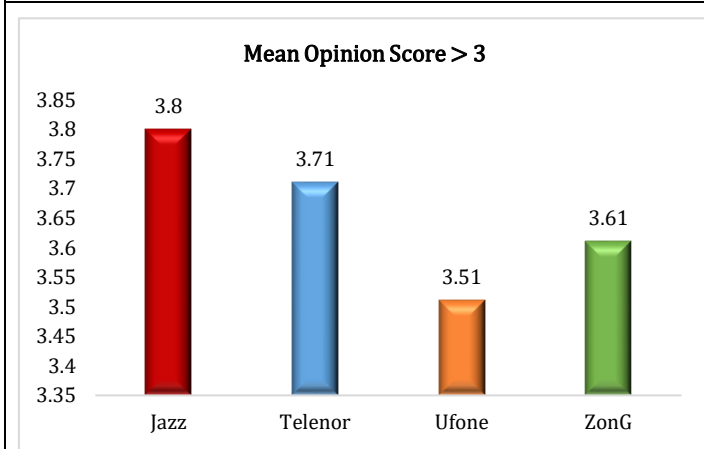
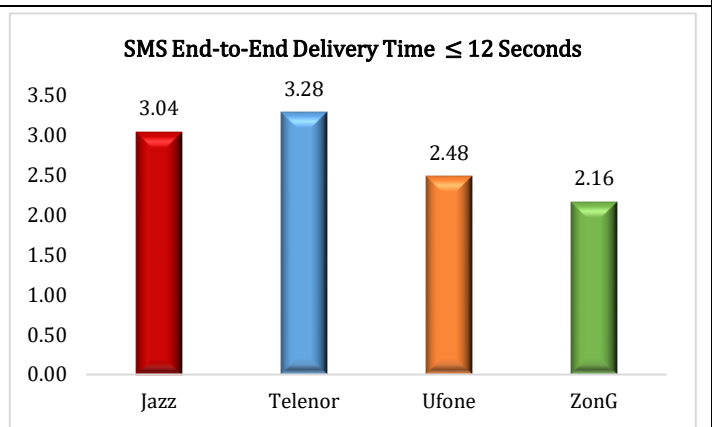
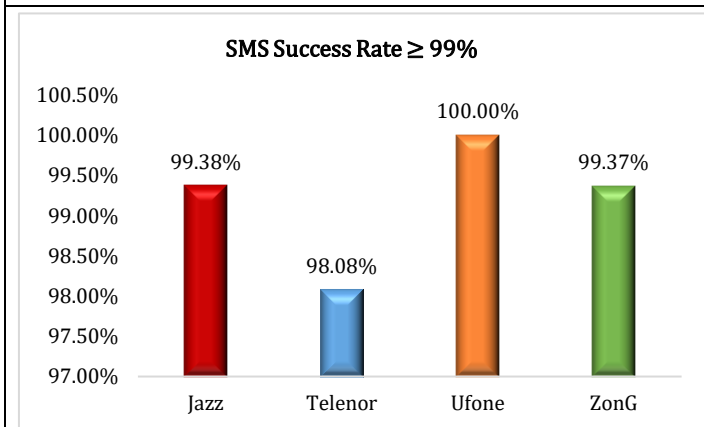
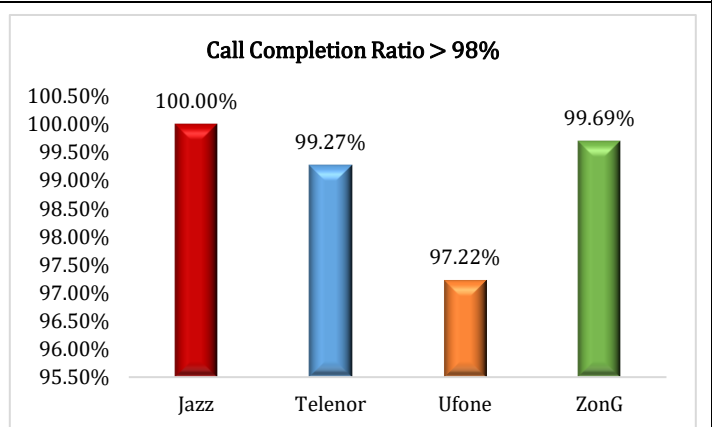
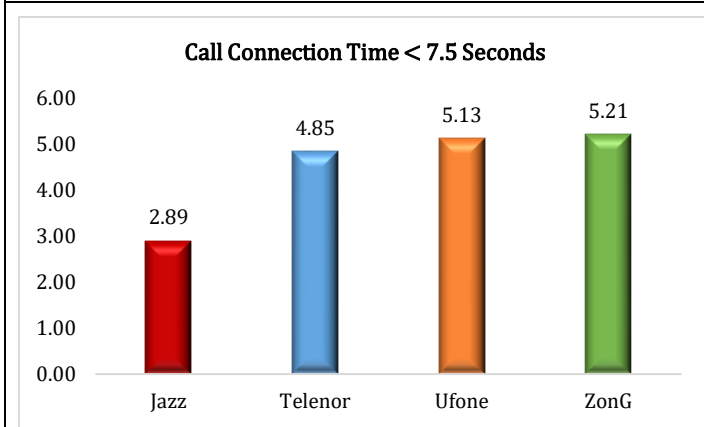
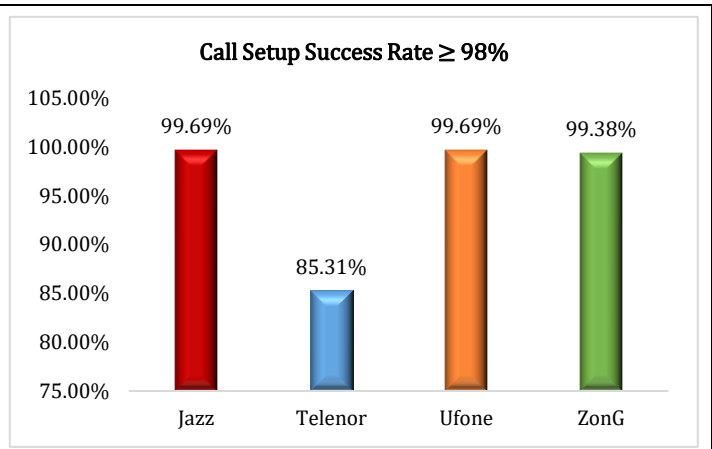
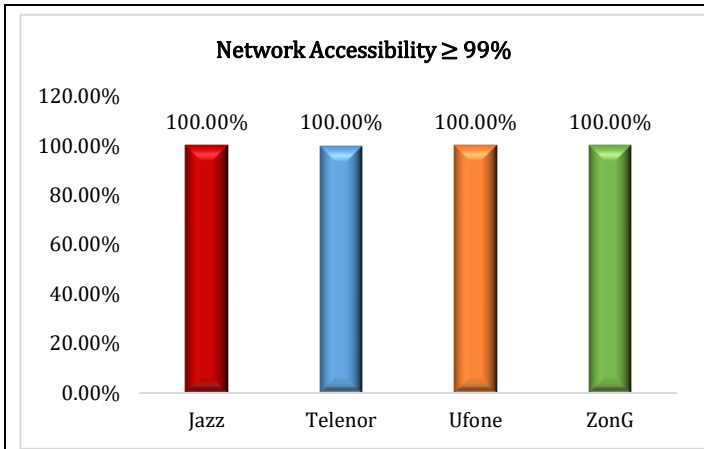
Latency <75 ms



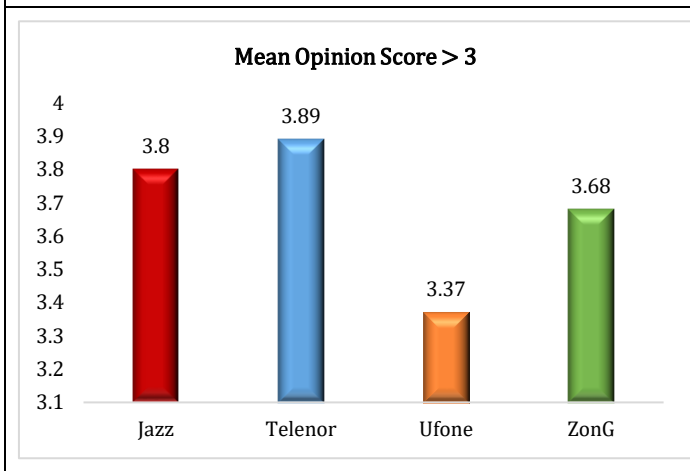
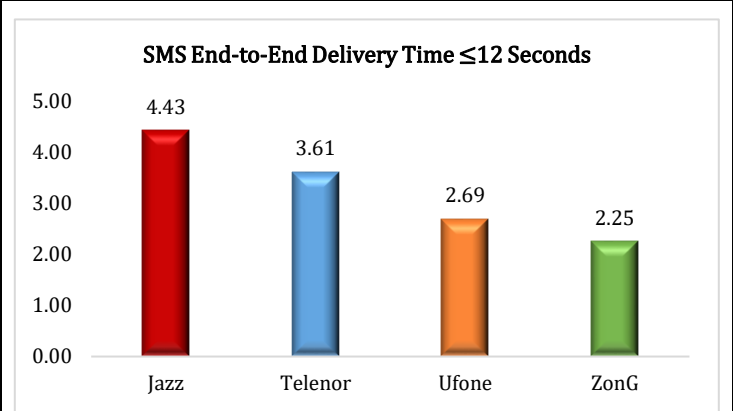
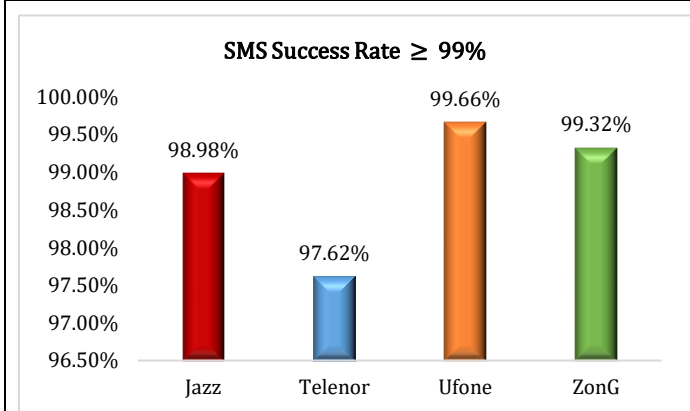
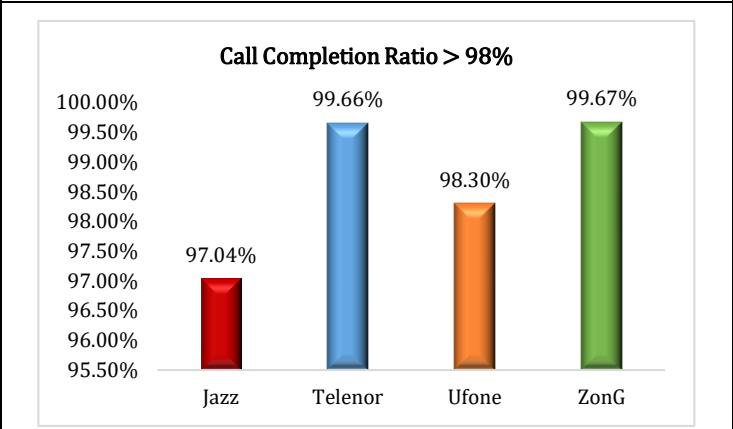
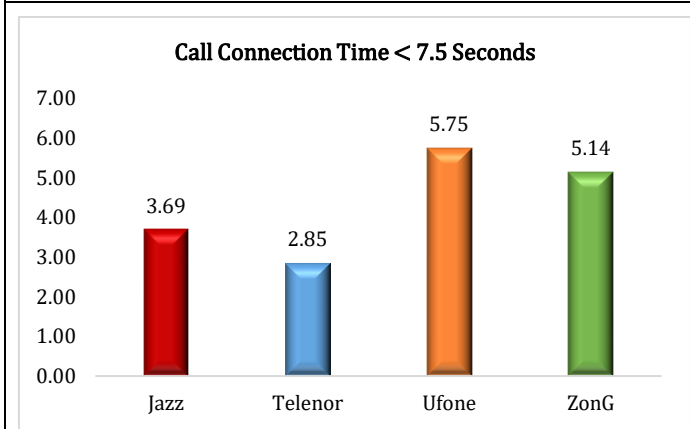
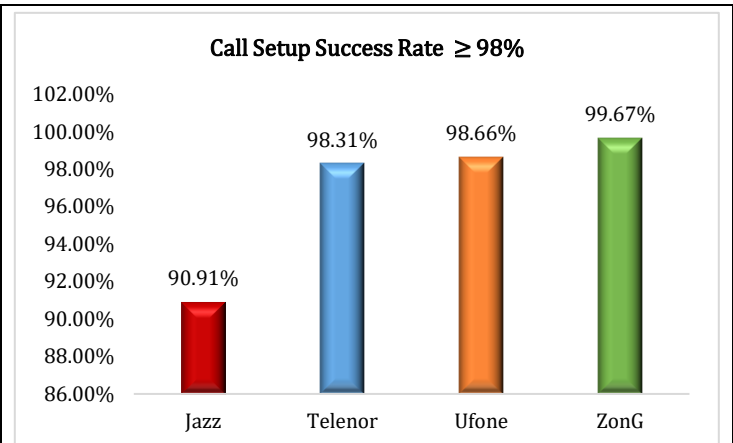
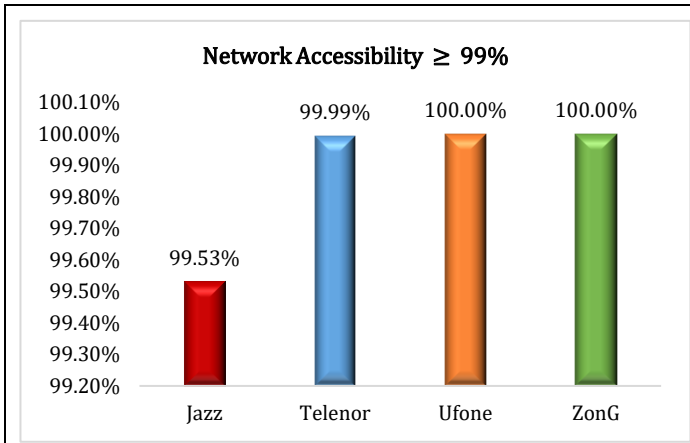
Annex -C(Voice & SMS Results)

VOICE AUTOMODE

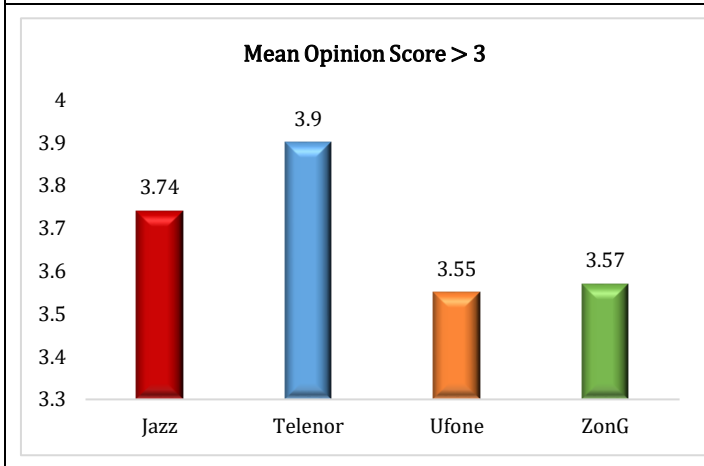
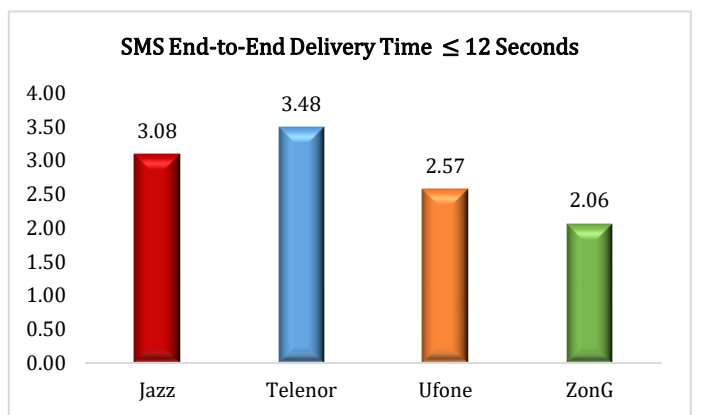
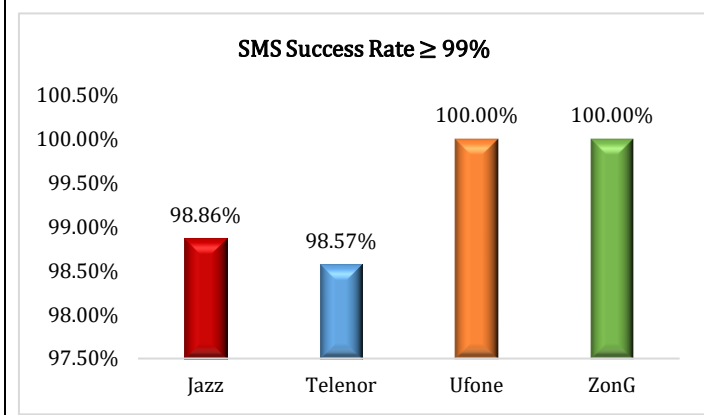
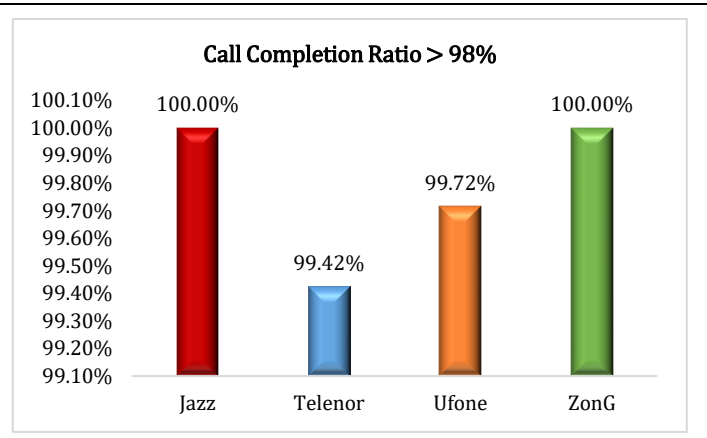
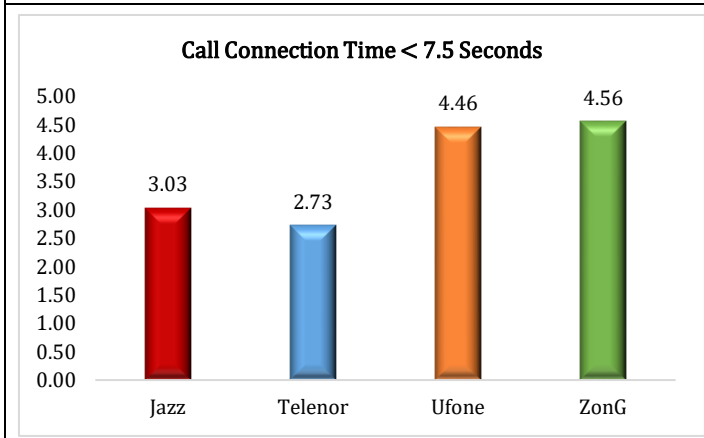
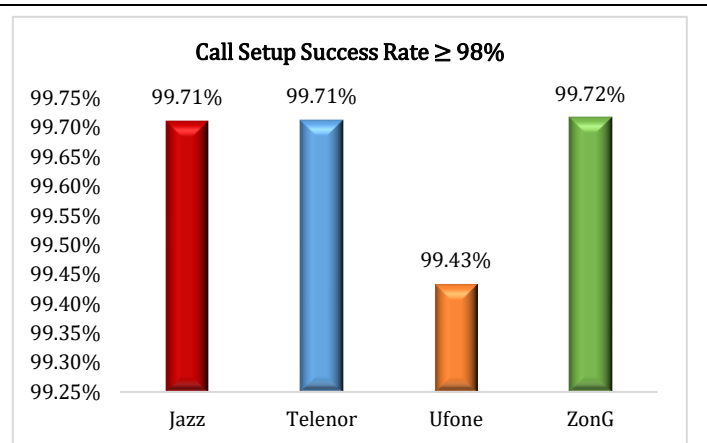
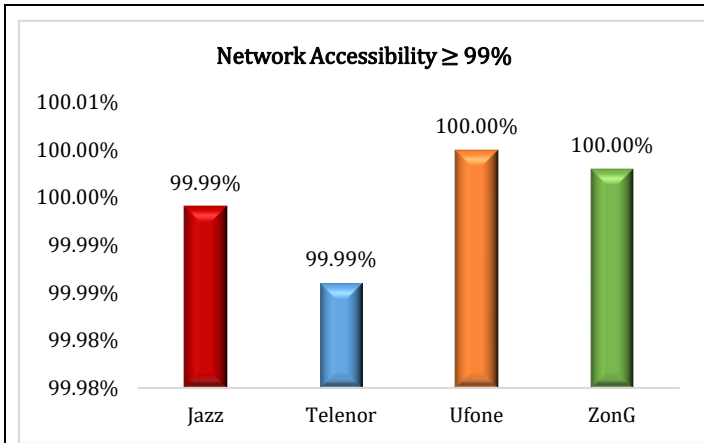
QUALITY OF SERVICE SURVEY RESULTS – ABBOTTABAD



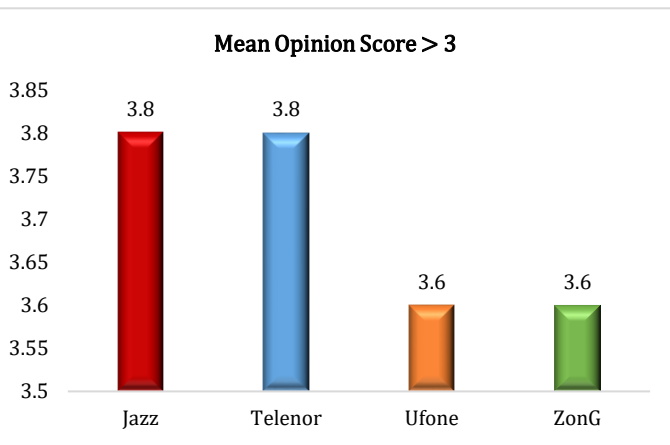
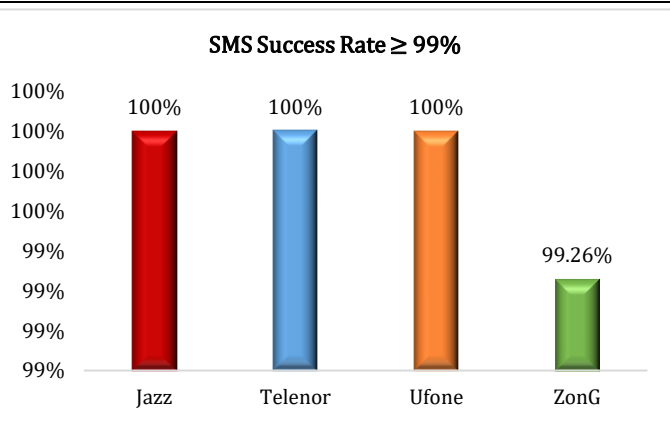
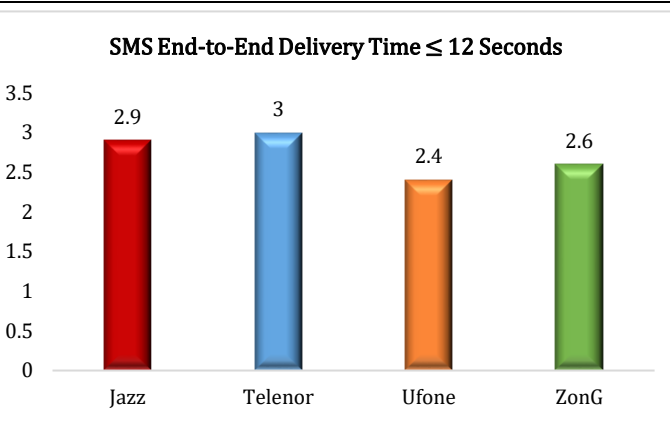
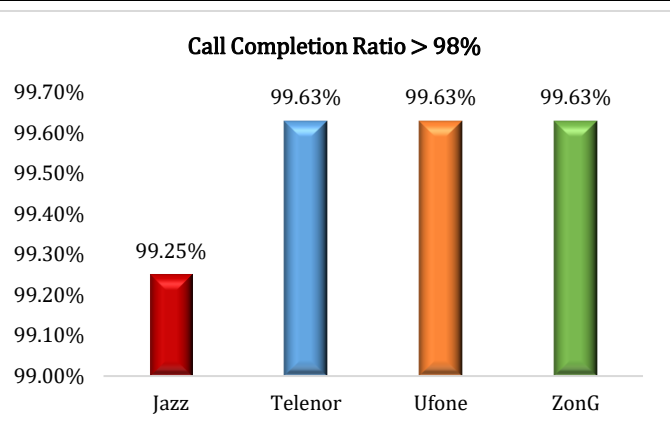
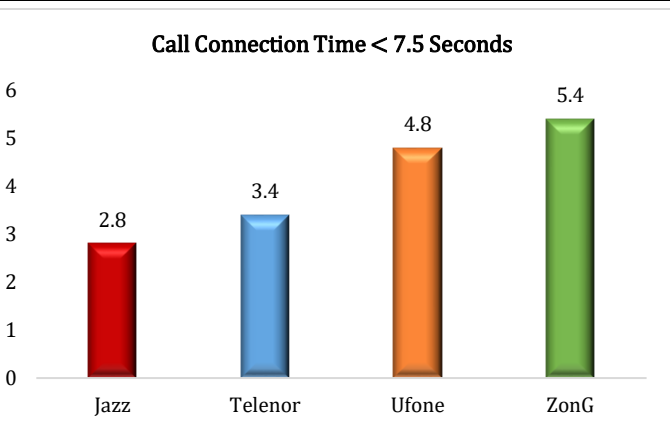
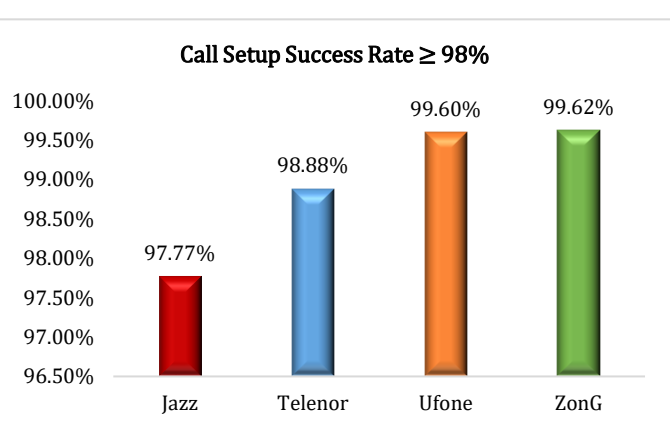
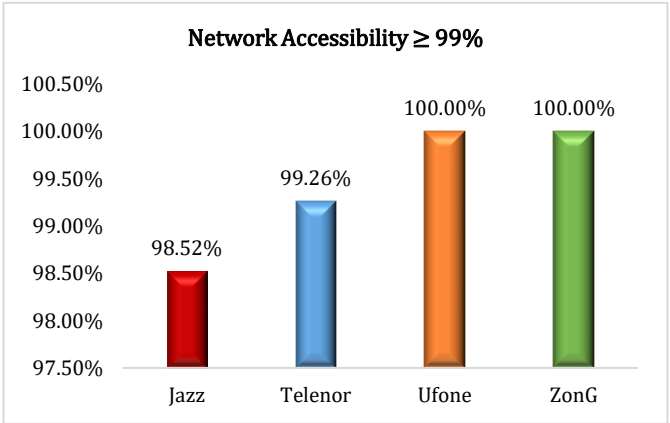
QUALITY OF SERVICE SURVEY RESULTS – BUNER



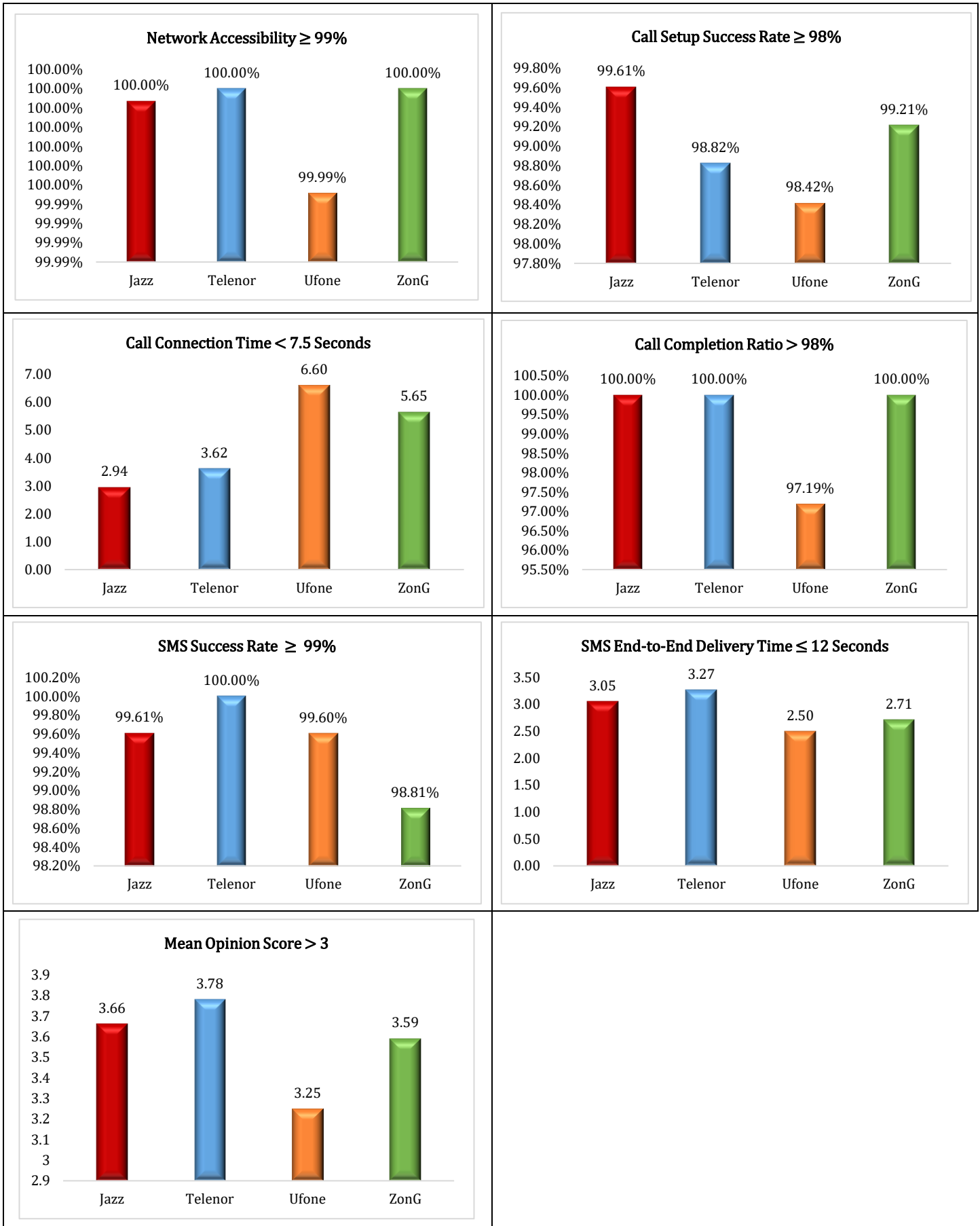
QUALITY OF SERVICE SURVEY RESULTS – GUJAR KHAN



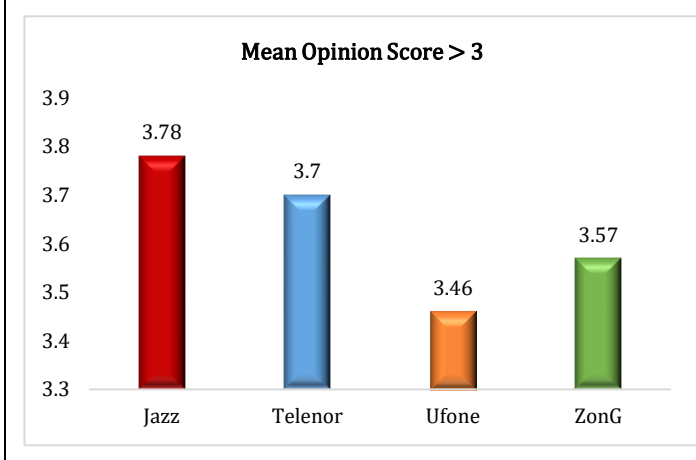
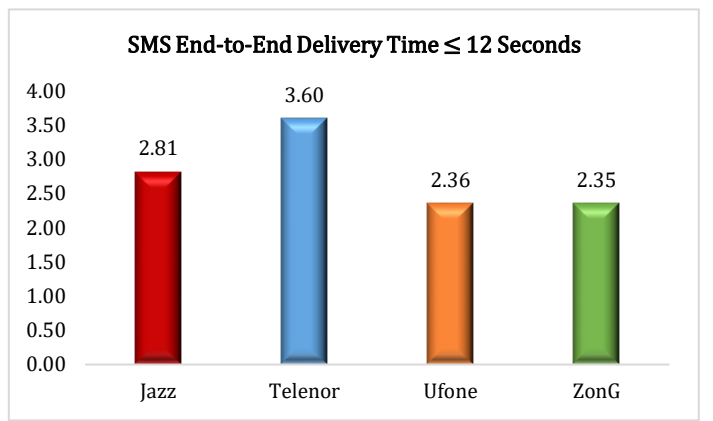
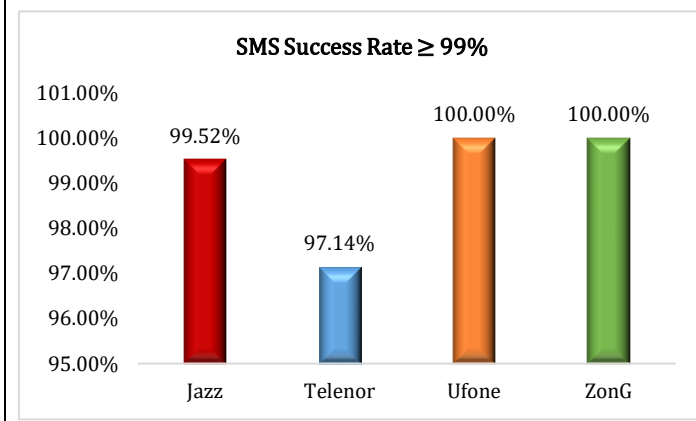
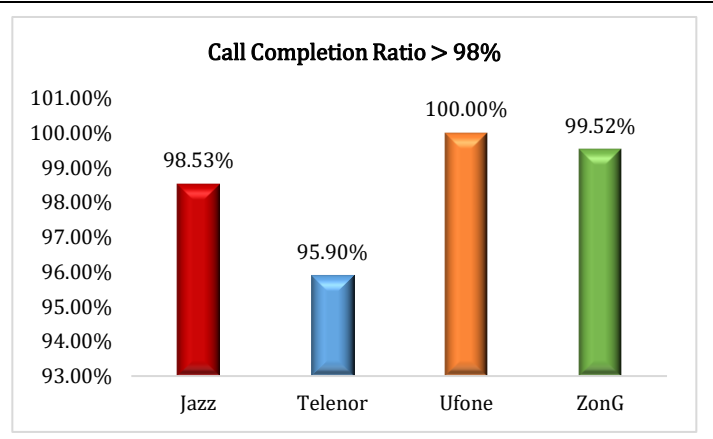
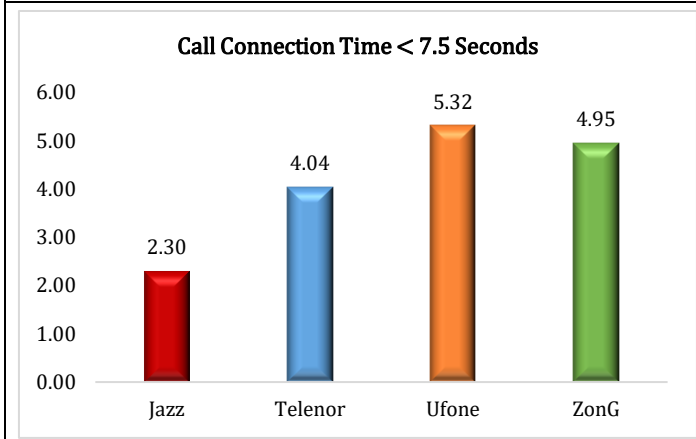
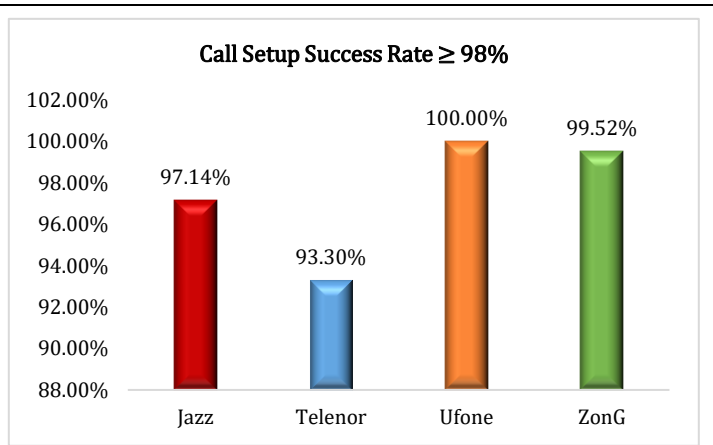
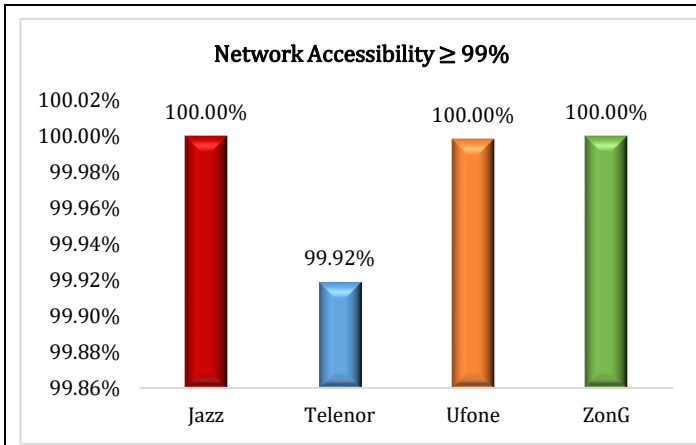
QUALITY OF SERVICE SURVEY RESULTS – JACOBABAD



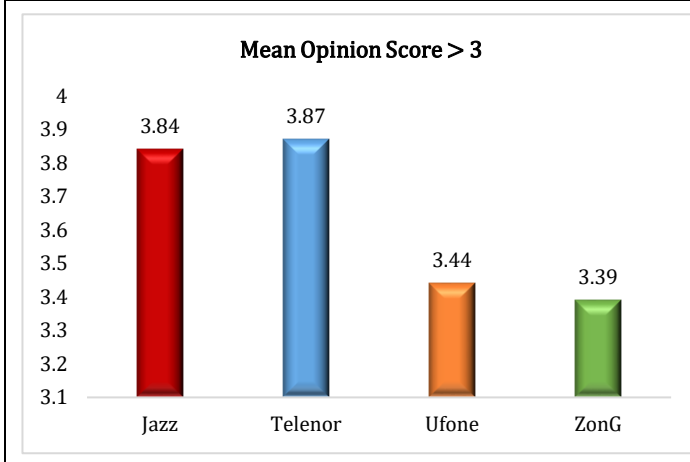
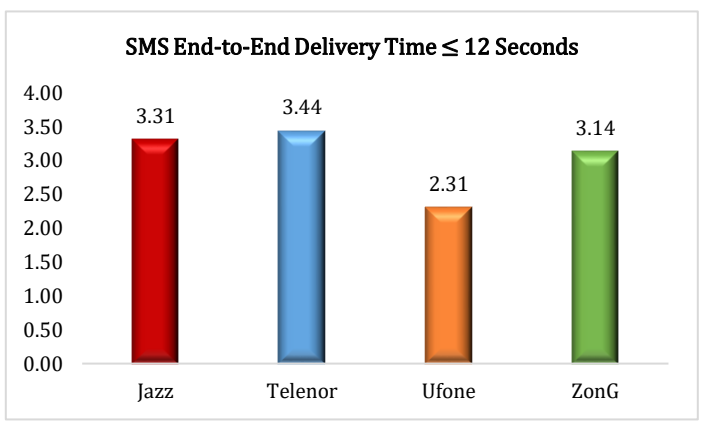
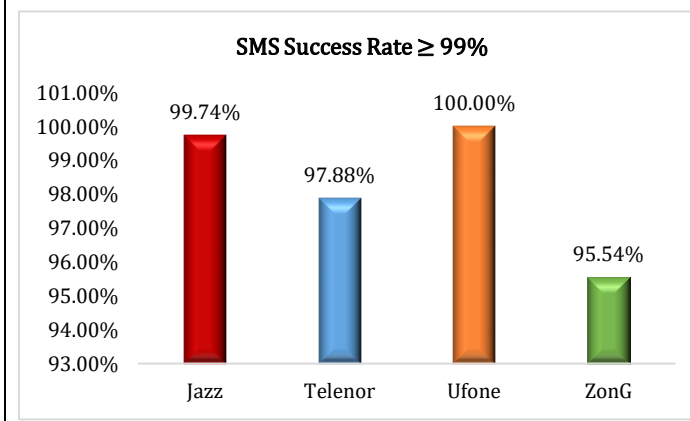
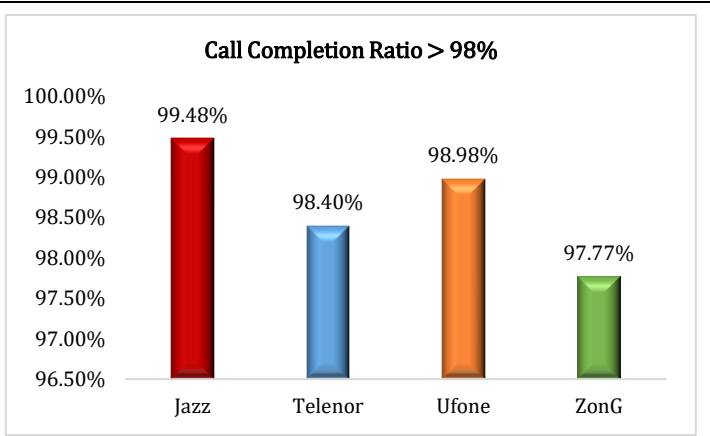
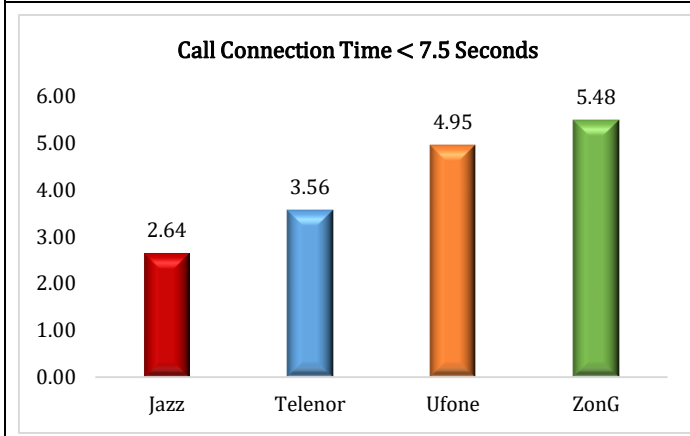
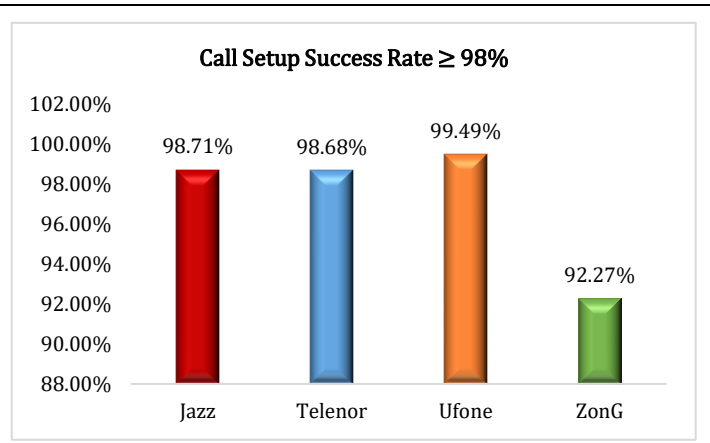
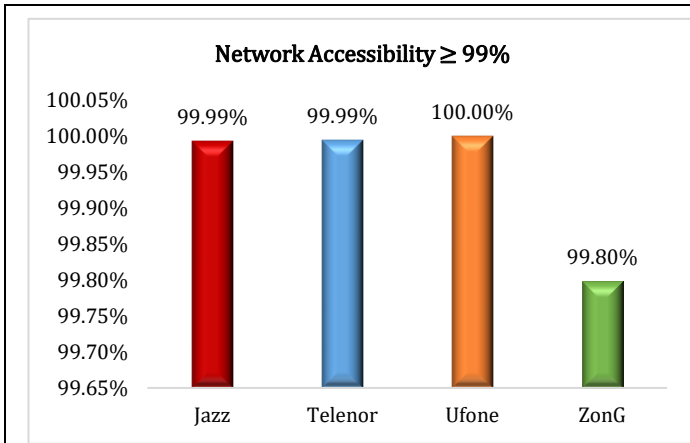
QUALITY OF SERVICE SURVEY RESULTS – KHAIRPUR



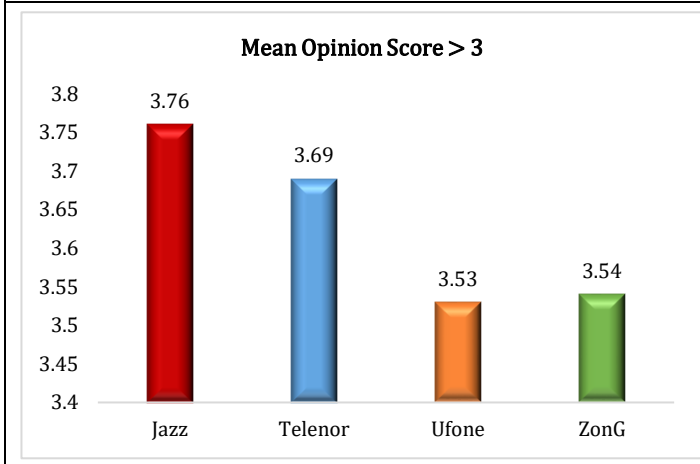
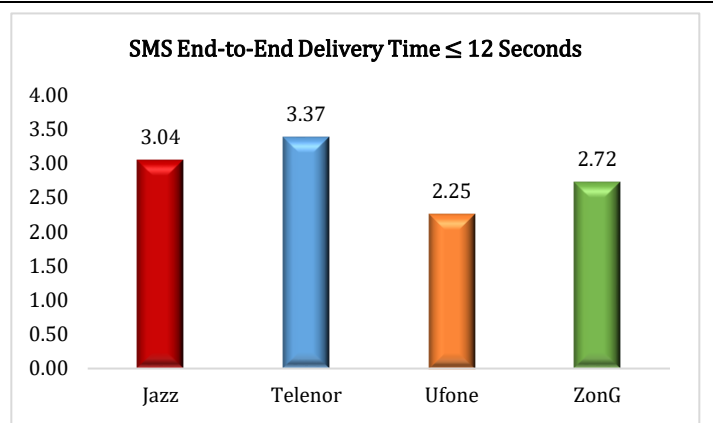
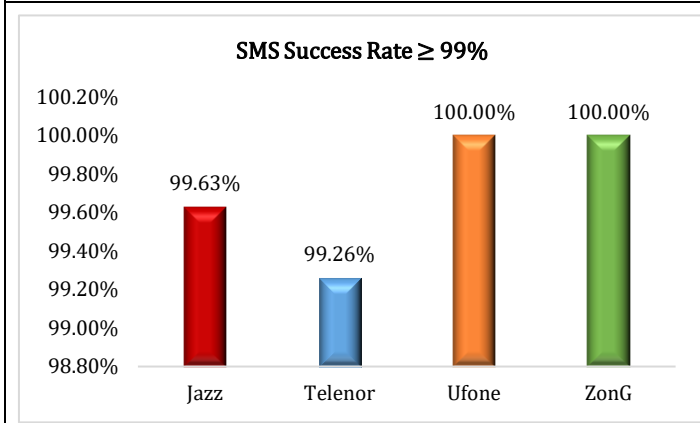
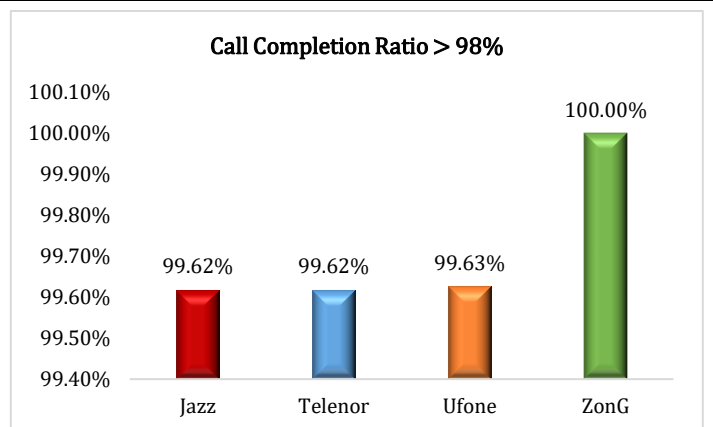
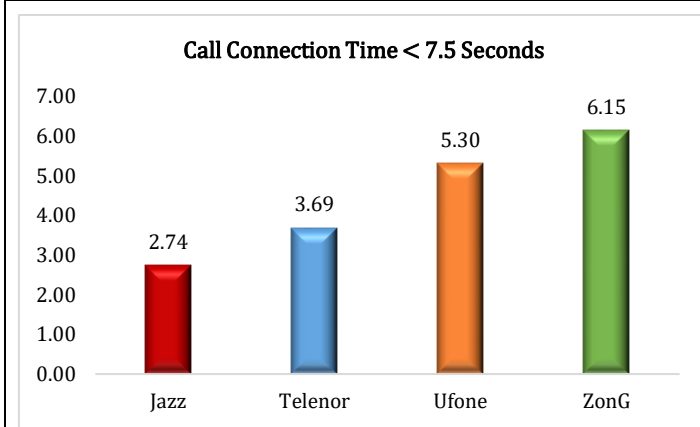
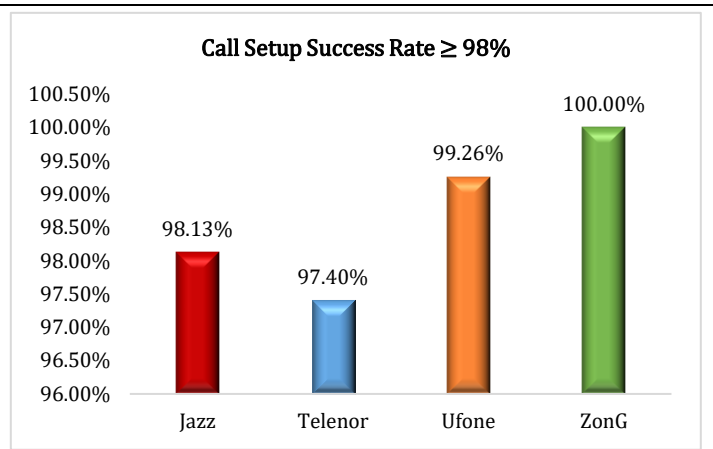
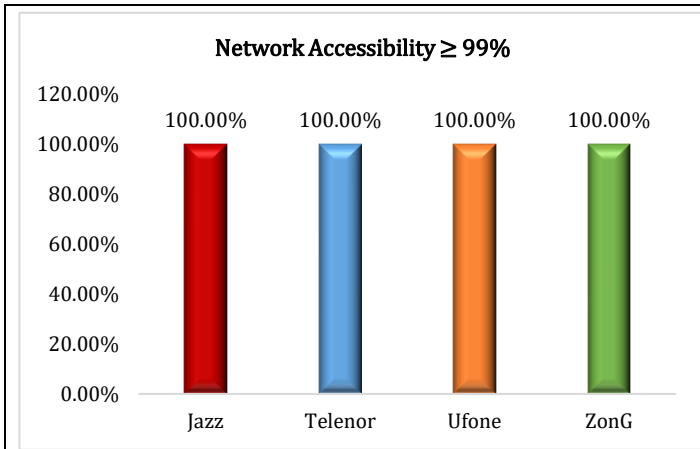
QUALITY OF SERVICE SURVEY RESULTS – KHAROORPACCA



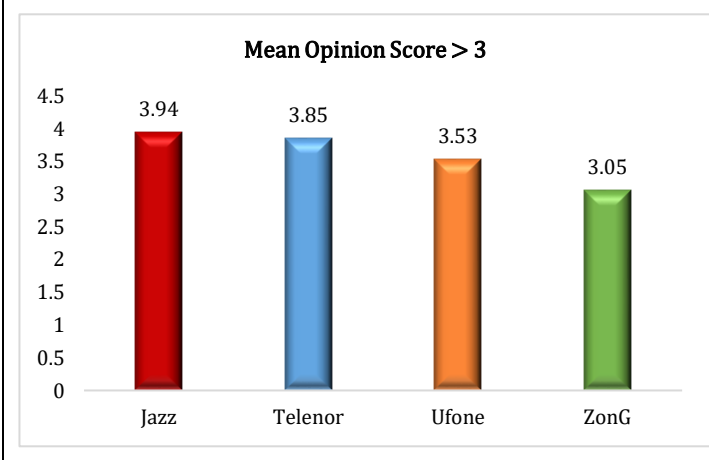
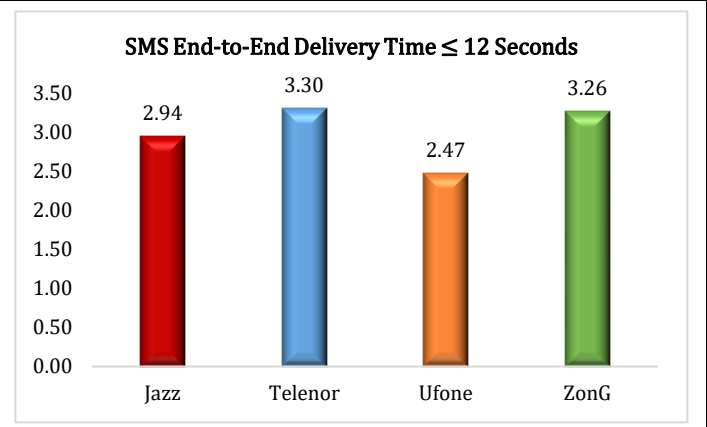
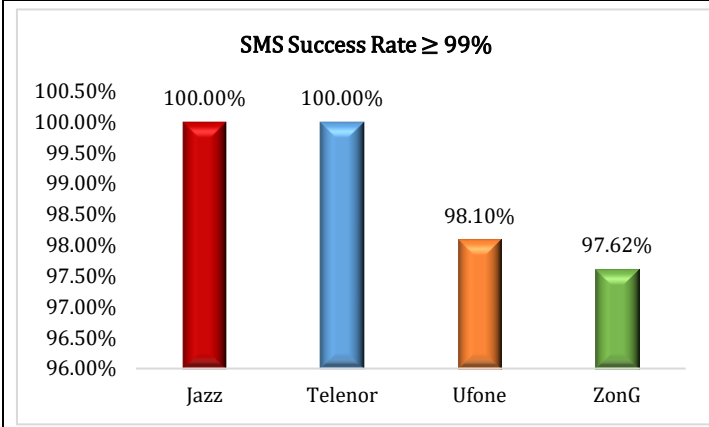
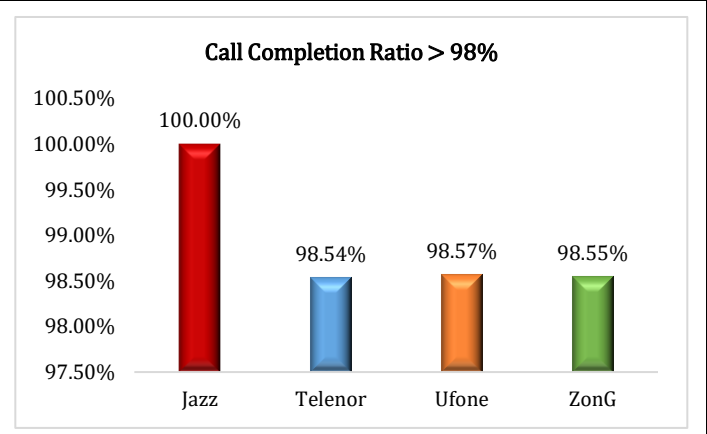
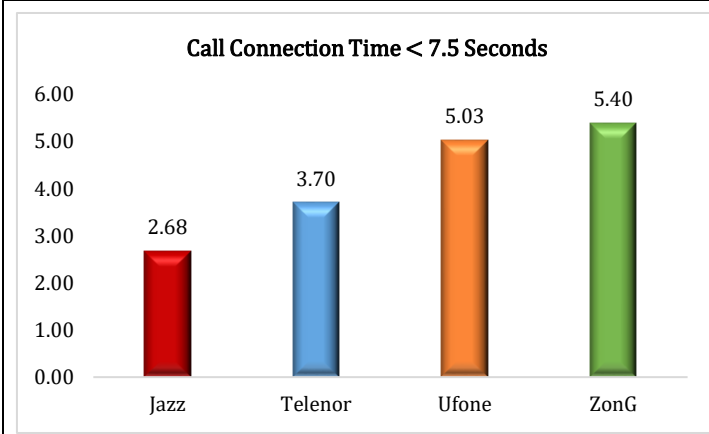
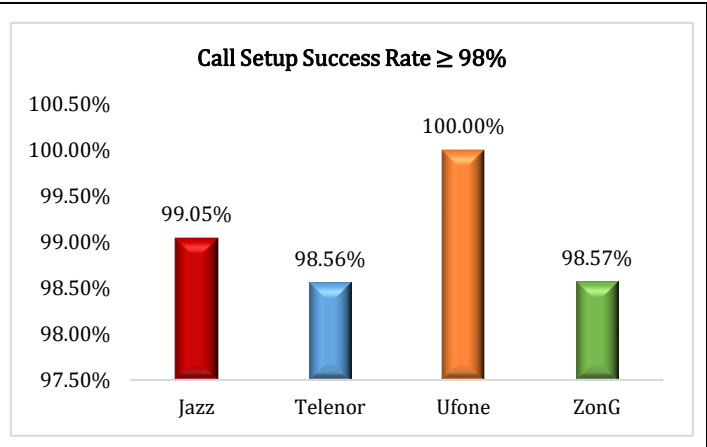
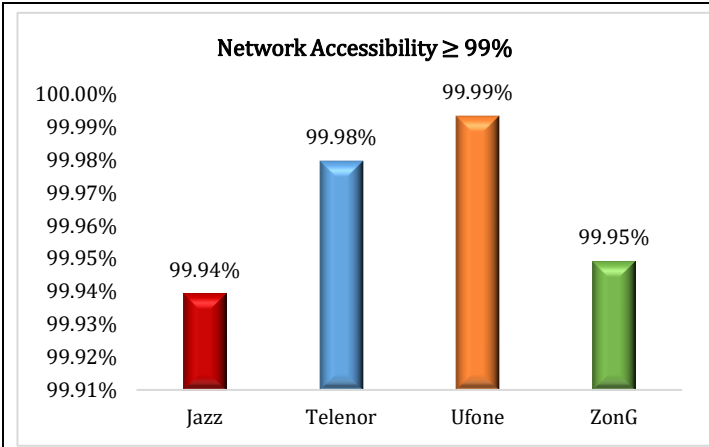
QUALITY OF SERVICE SURVEY RESULTS – LAHORE



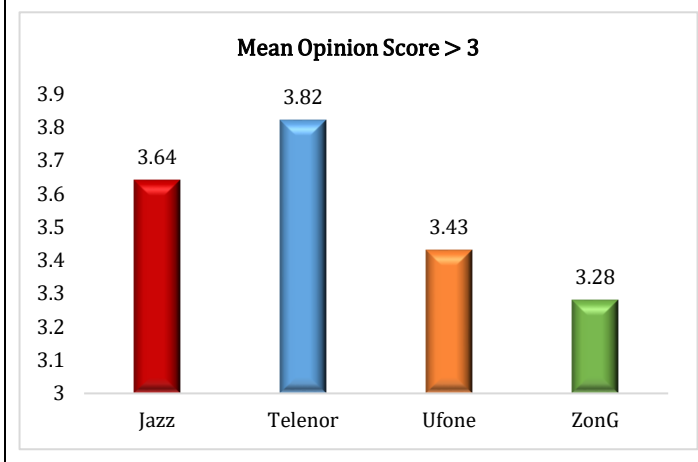
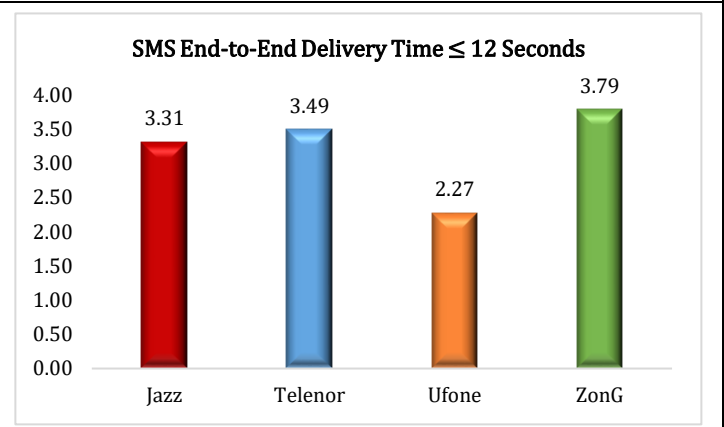
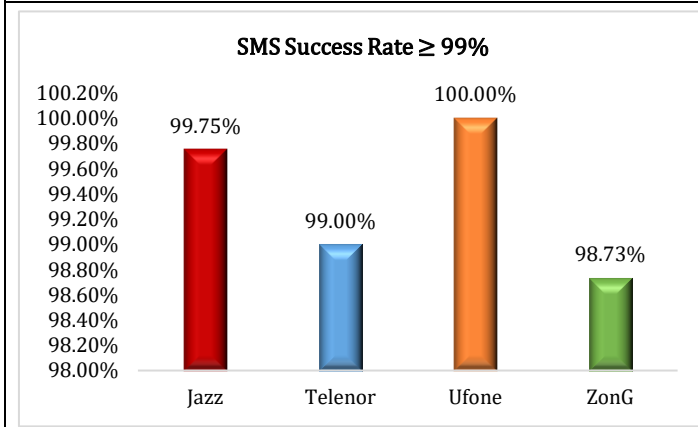
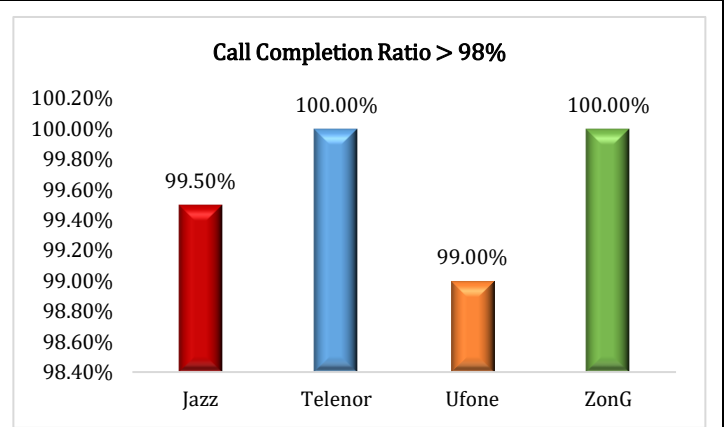
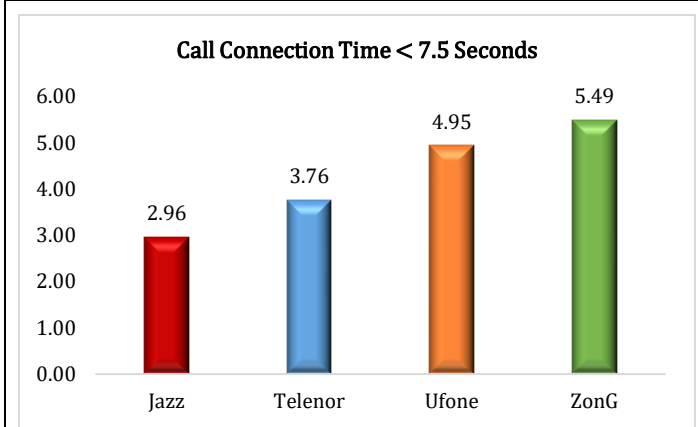
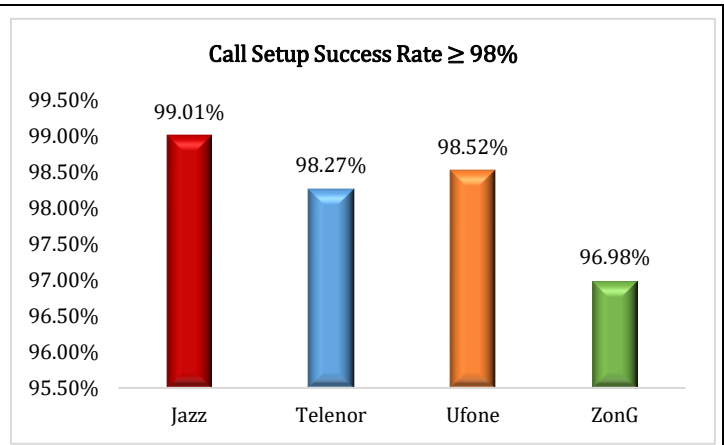
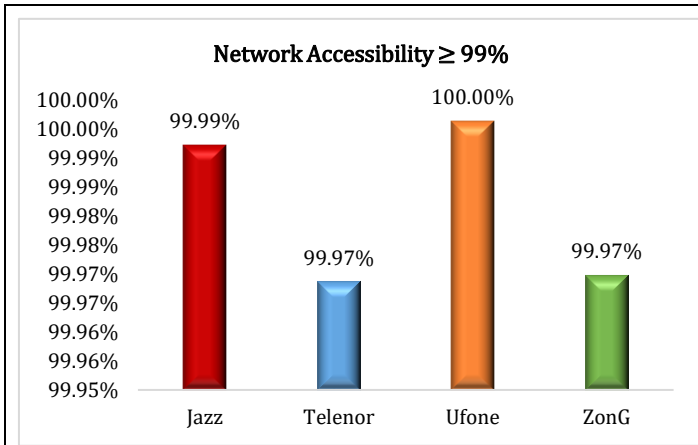
QUALITY OF SERVICE SURVEY RESULTS – LARKANA



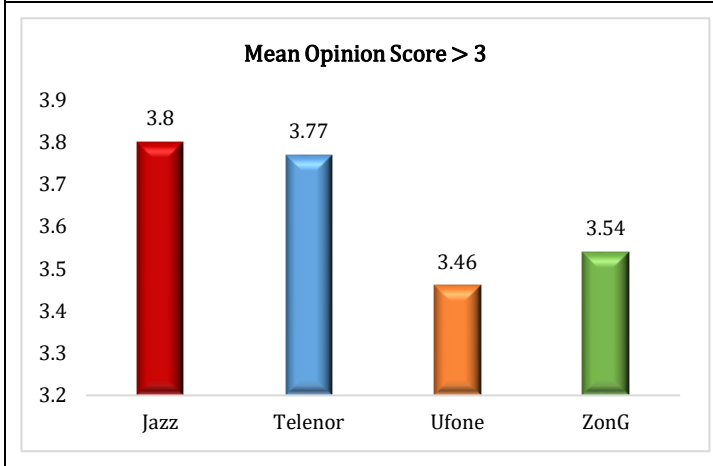
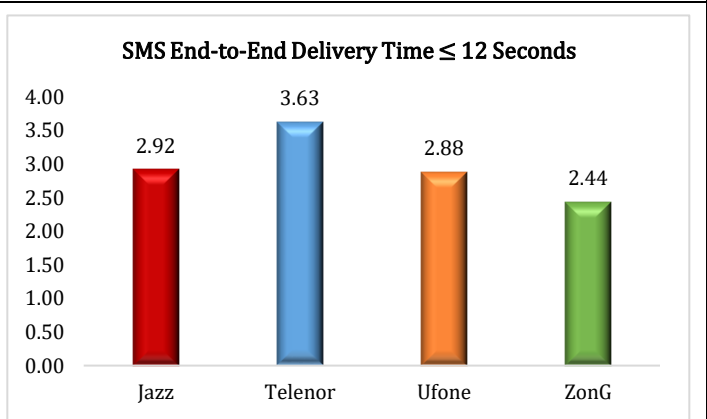
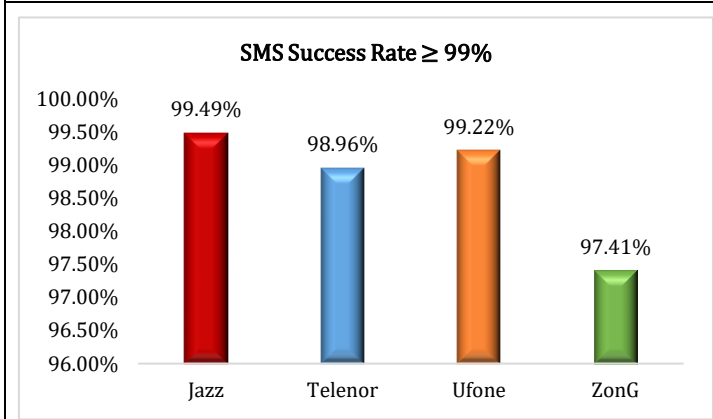
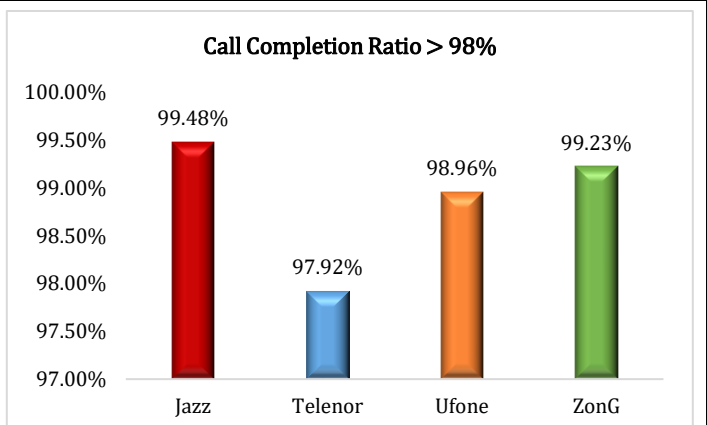
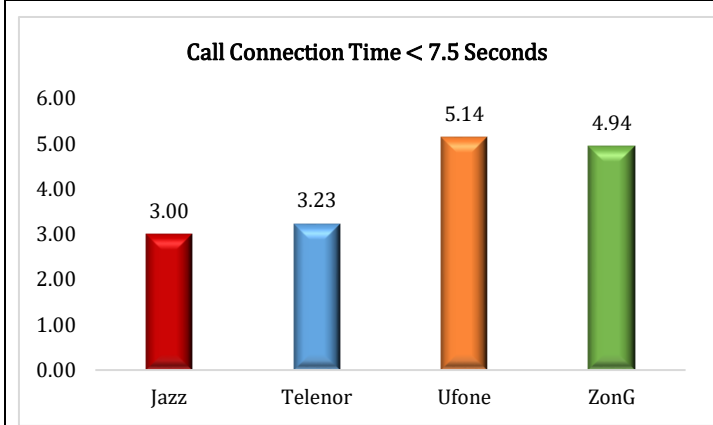
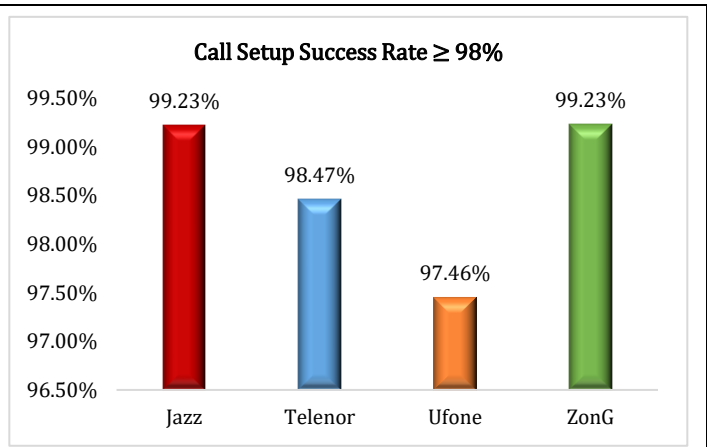
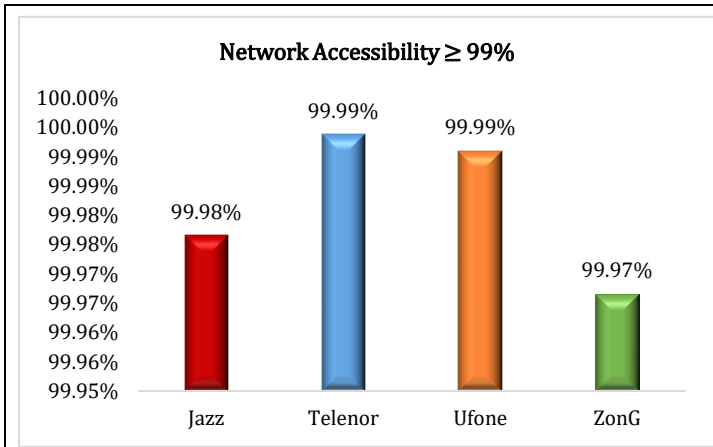
QUALITY OF SERVICE SURVEY RESULTS – MITHI



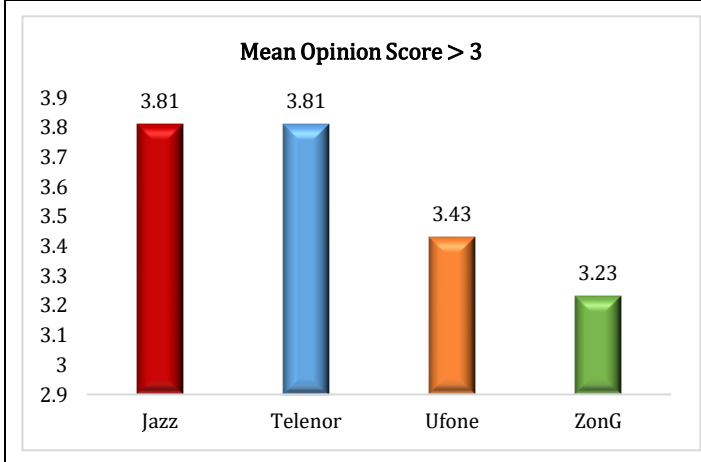
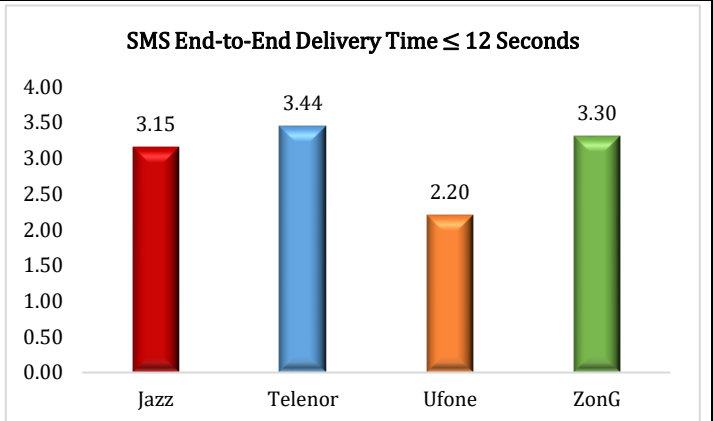
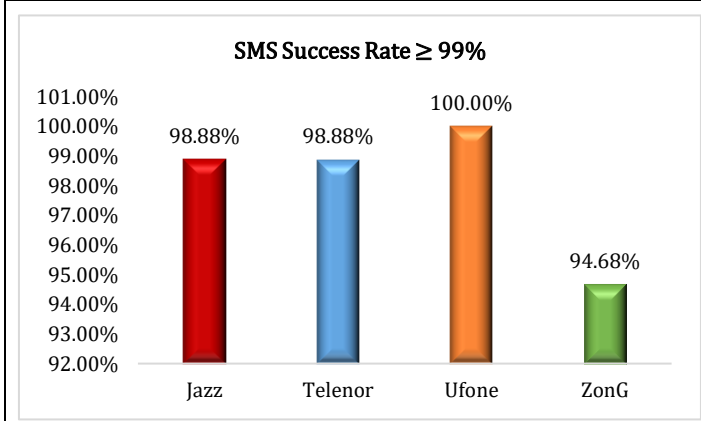
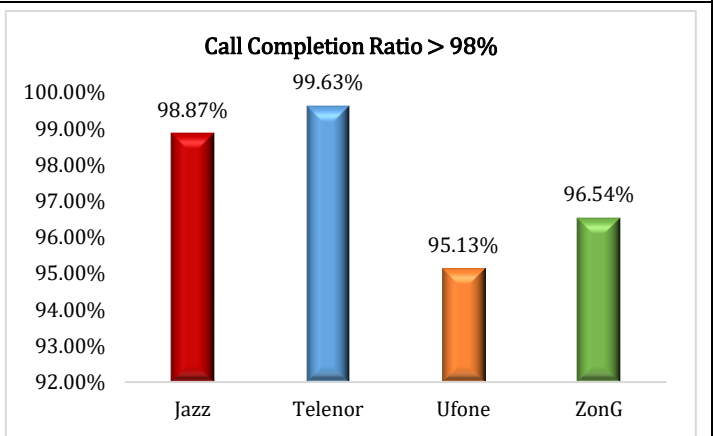
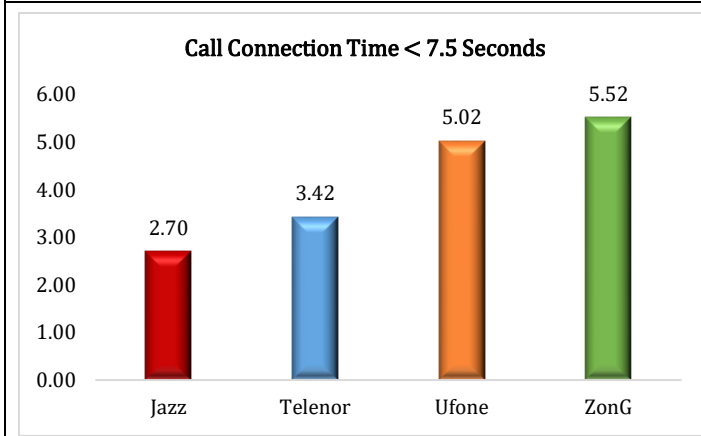
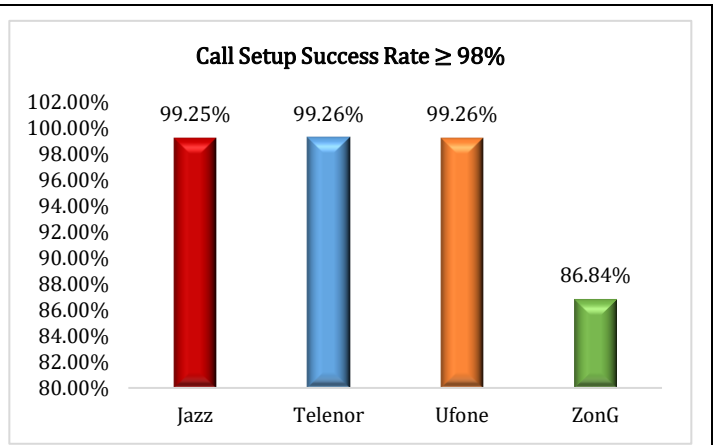
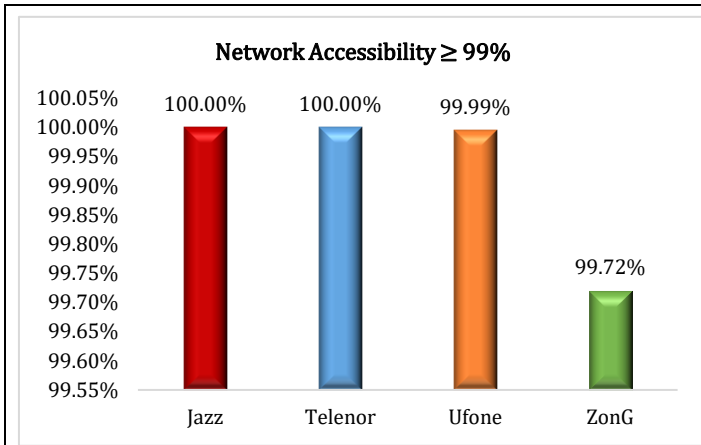
QUALITY OF SERVICE SURVEY RESULTS – MURIDKE



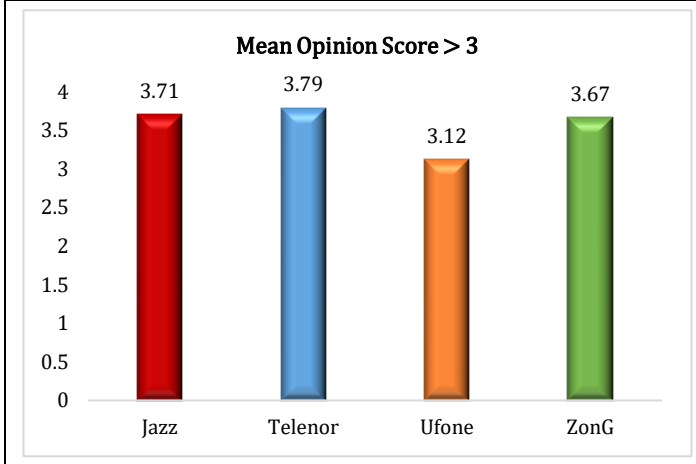
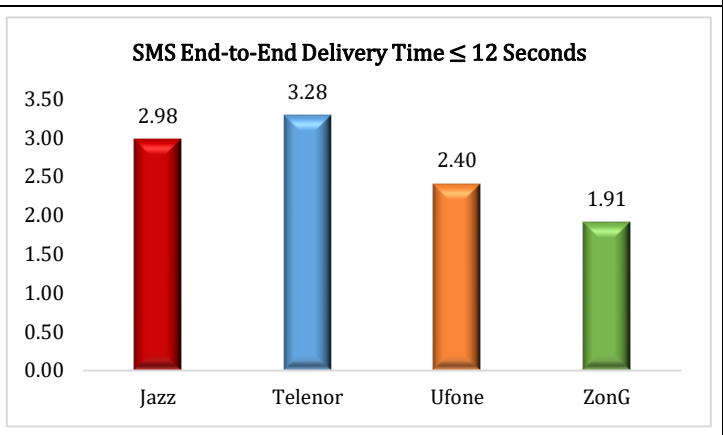
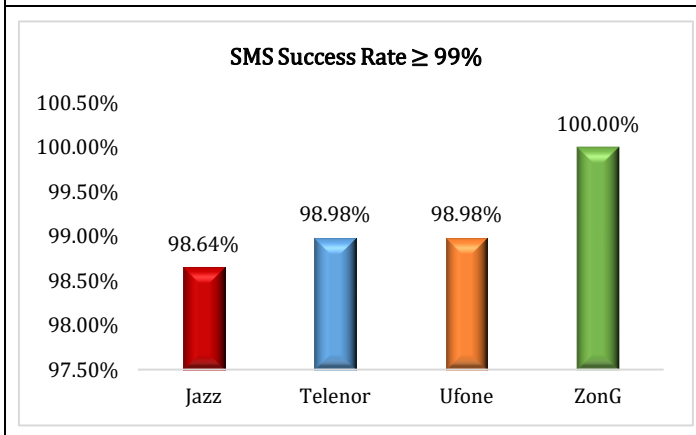
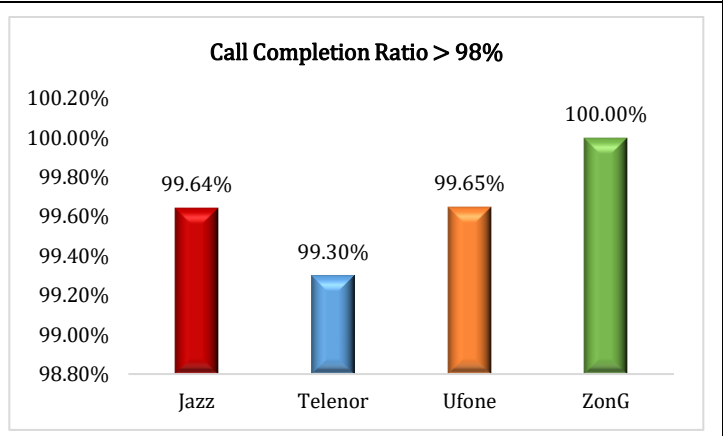
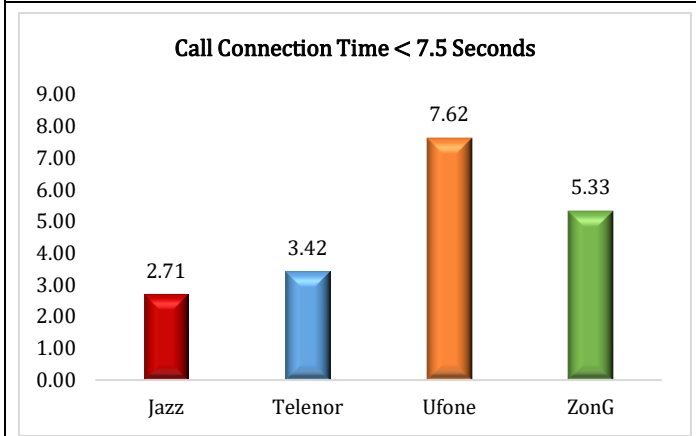
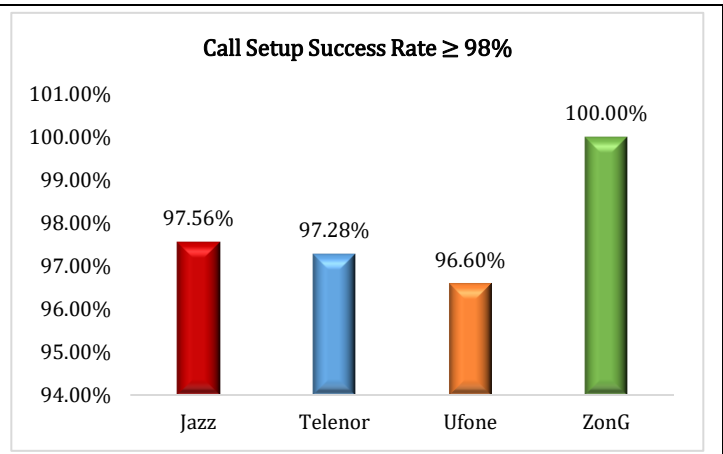
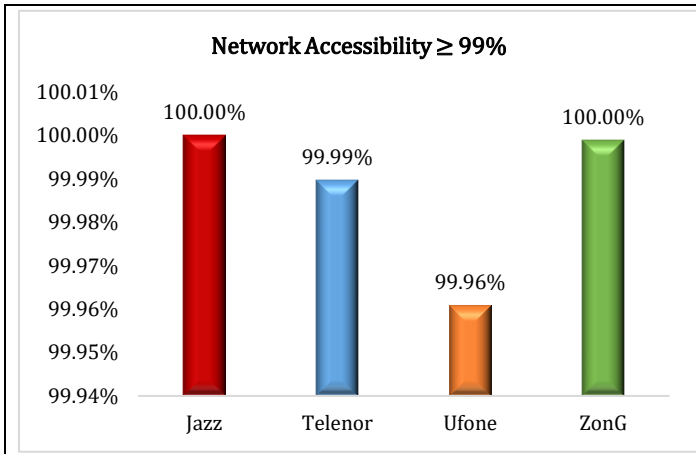
QUALITY OF SERVICE SURVEY RESULTS – RAWALPINDI



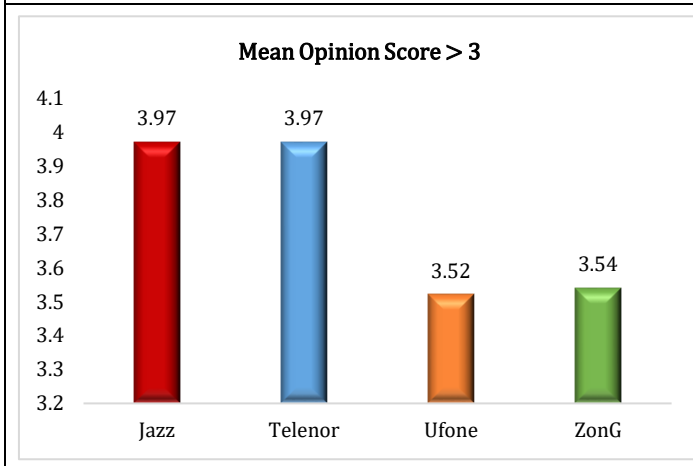
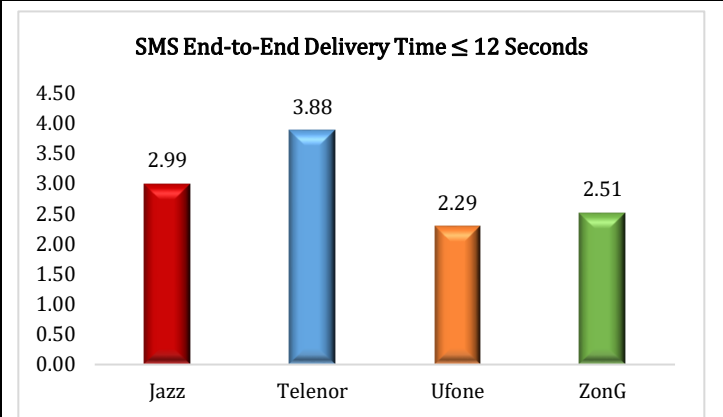
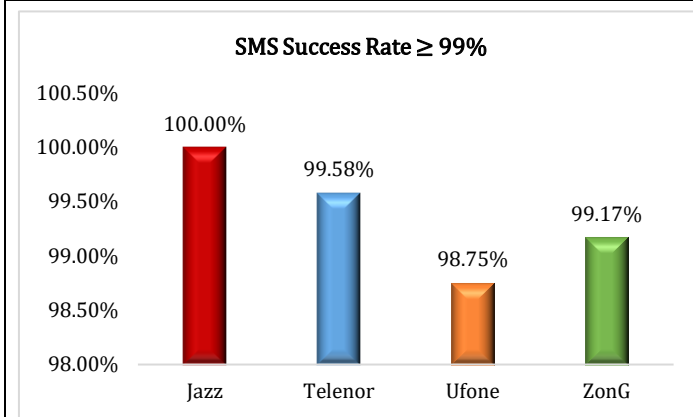
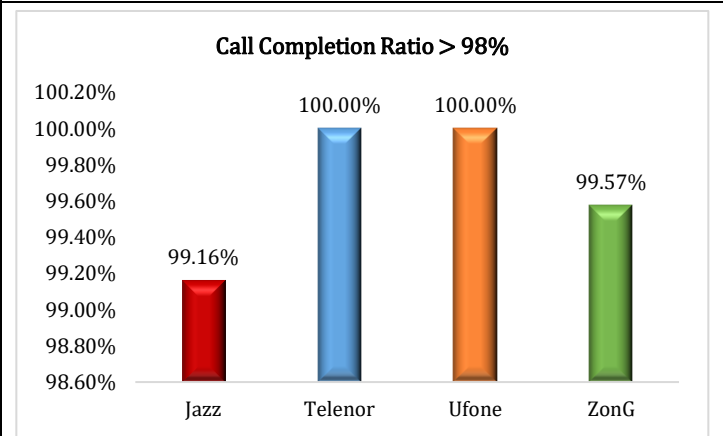
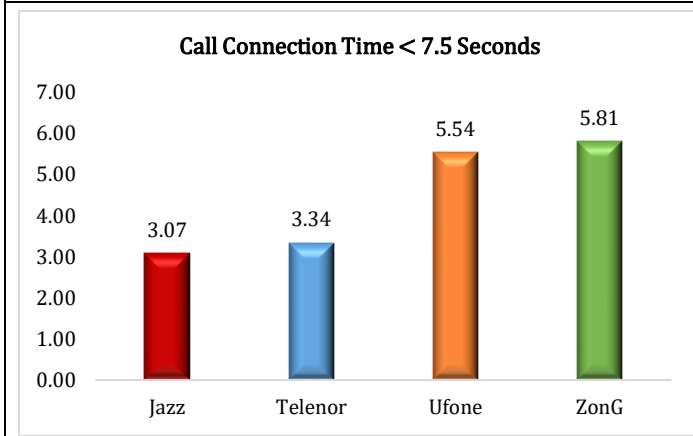
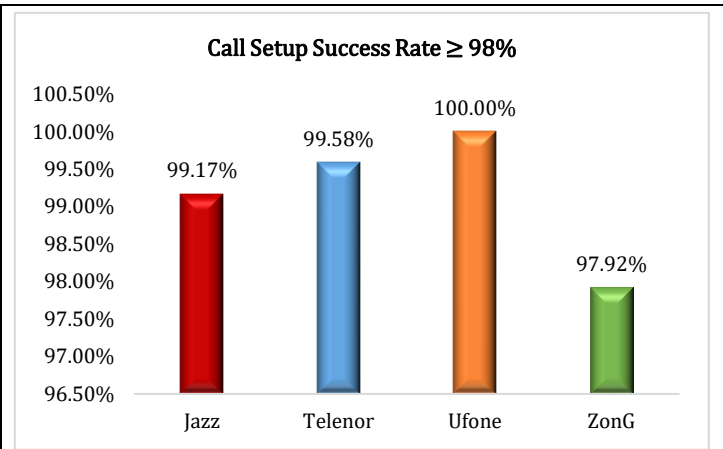
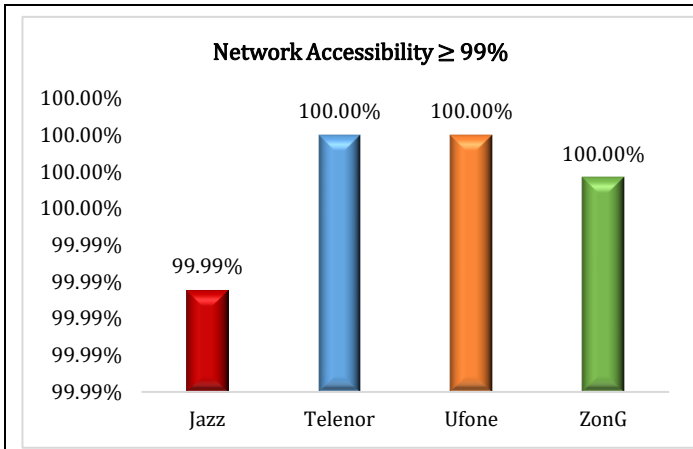
QUALITY OF SERVICE SURVEY RESULTS – SHAHKOT



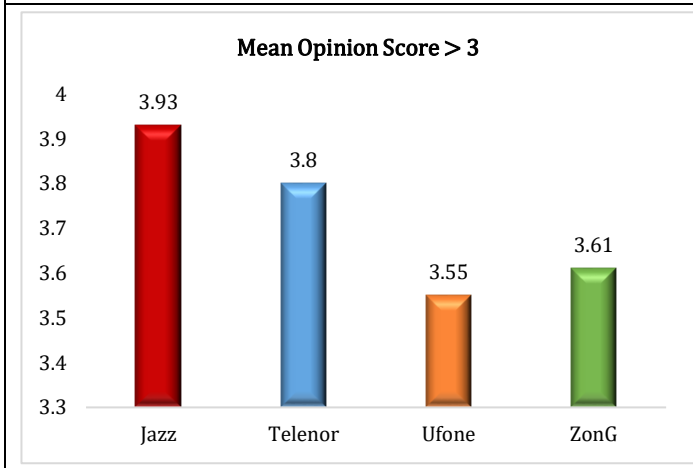
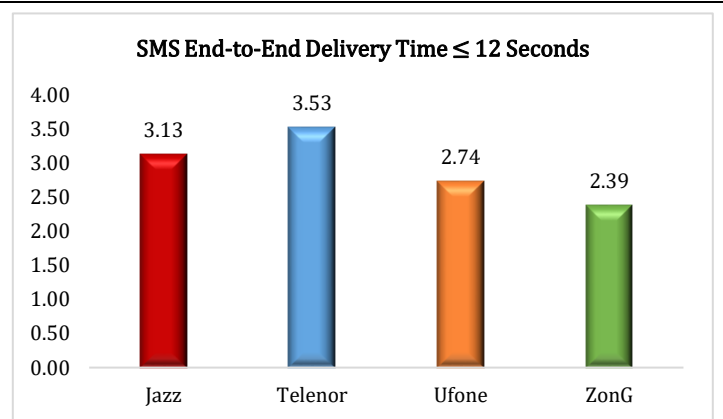
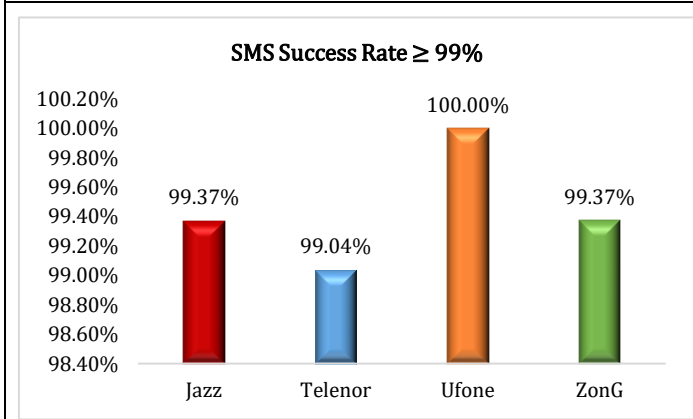
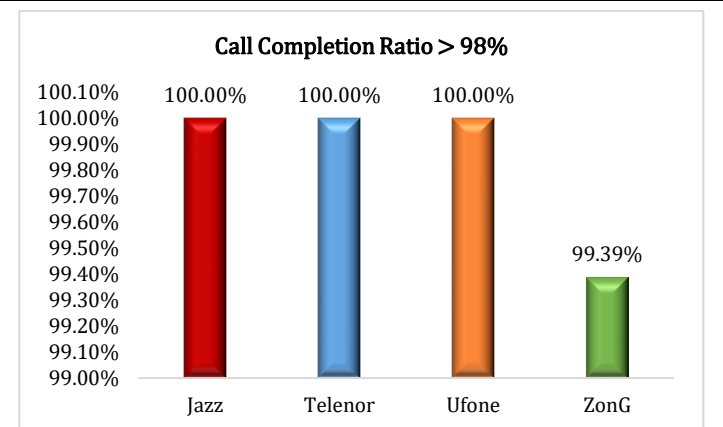
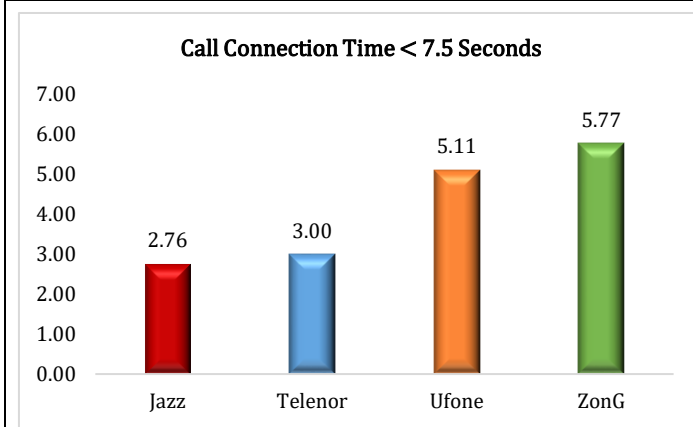
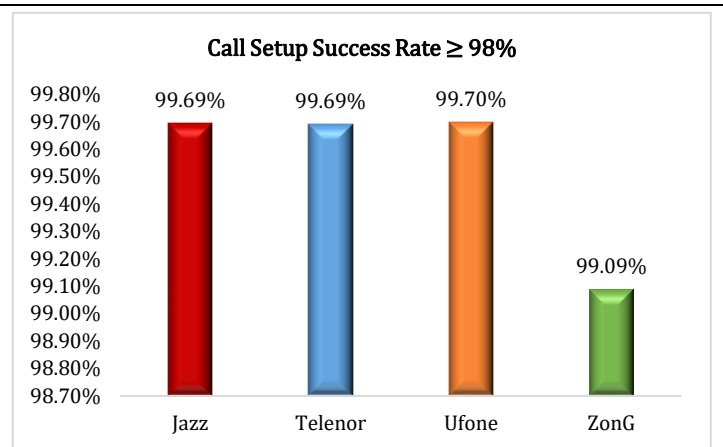
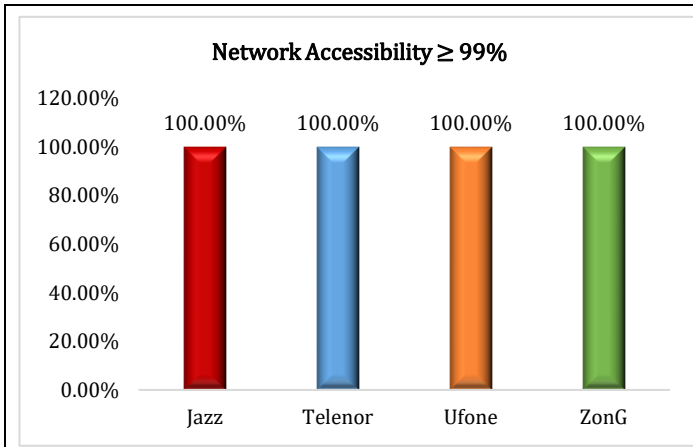
QUALITY OF SERVICE SURVEY RESULTS – SHUJABAD



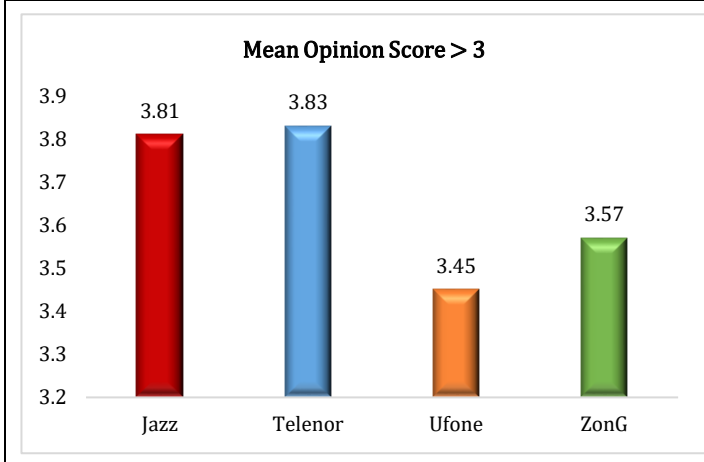
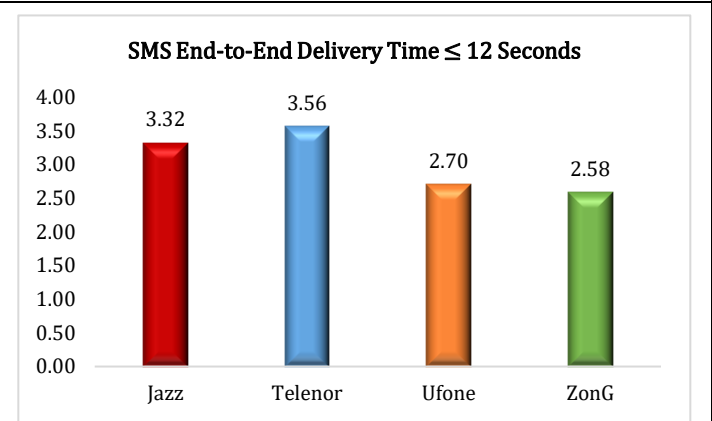
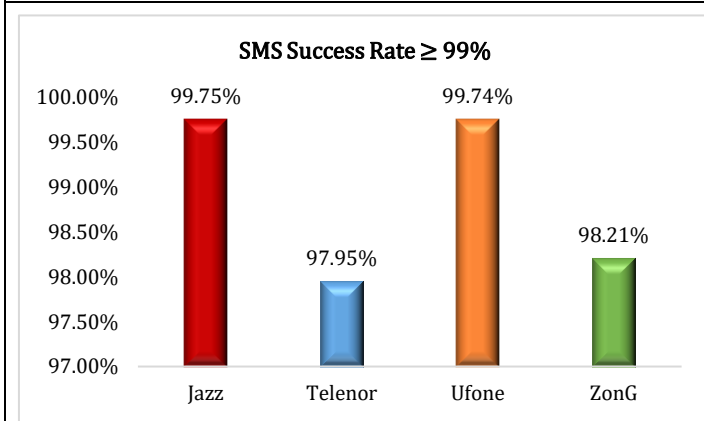
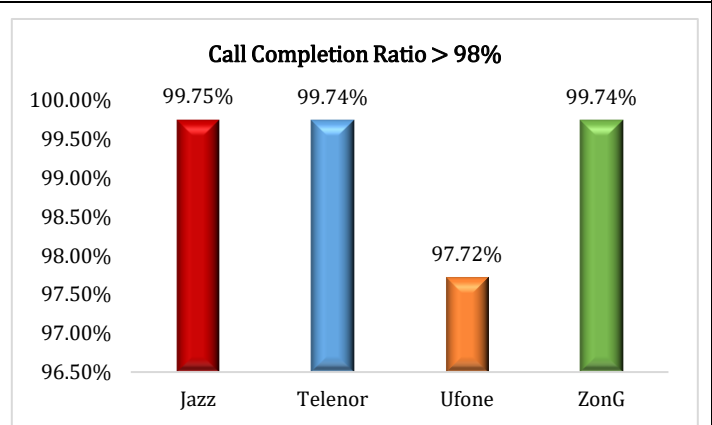
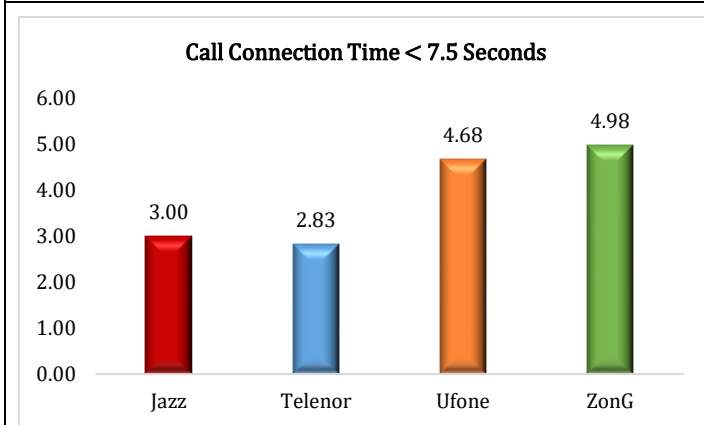
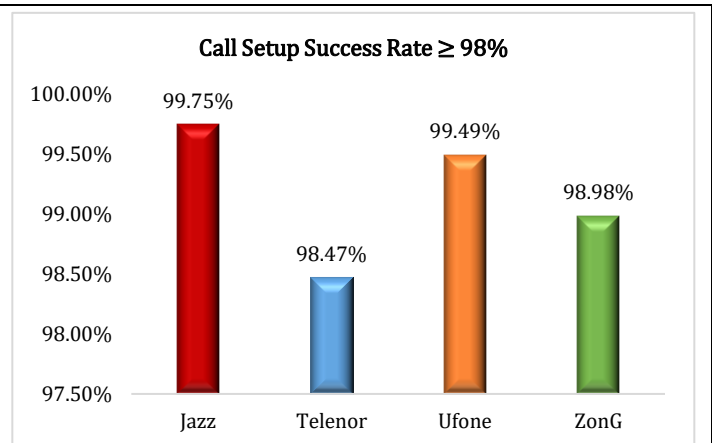
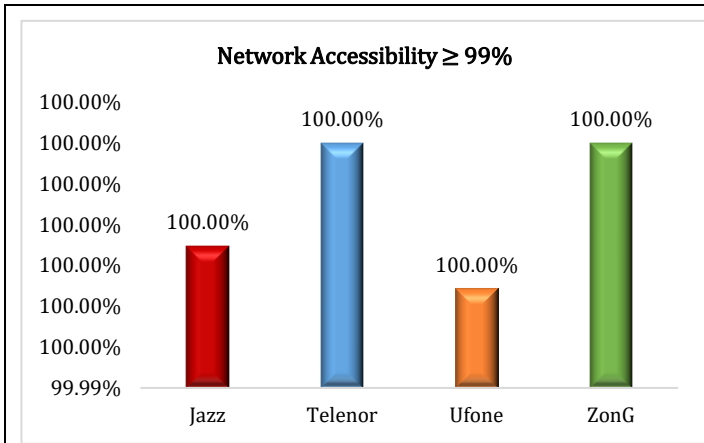
QUALITY OF SERVICE SURVEY RESULTS – SUJAWAL



QUALITY OF SERVICE SURVEY RESULTS – SWABI



QUALITY OF SERVICE SURVEY RESULTS – TAXILA & WAH CANTT



QUALITY OF SERVICE SURVEY RESULTS – UPPER DIR

